

**119  
EXPERT  
REVIEWS!**

# Digital Camera Special **CAMERA SHOPPER**

THE BIGGEST AND BEST PHOTOGRAPHY BUYERS' GUIDE

**164** PAGES  
UPDATED FOR  
SPRING 2016



**TESTS YOU  
CAN TRUST!**

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Nobody runs tougher,  
more scientific reviews

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# CAMERA SHOPPER

THE BIGGEST AND BEST PHOTOGRAPHY BUYERS' GUIDE



Something about the 'newness' of spring makes it seem an appropriate time to invest in a new camera, whether it's your first 'serious' camera or the latest in a long line of upgrades. All

the vibrant fresh growth, fluffy lambs and busy wildlife are just crying out to be photographed, and the longer and brighter days make the prospect of spending a day outdoors so much more enticing than during the bleakness of winter. It's a time when a new camera, lens or accessory can help you take your photography to a whole new level.

If you pop into your local camera store, you'll find a huge array of cameras vying for your

attention, and it can be difficult to decide which to opt for. That's where this issue of *Camera Shopper* can help: we've included reviews of all the popular SLR and compact system or mirrorless cameras, as well as a selection of great lenses and accessories. All of our reviews are carried out by dedicated photographers who understand the different needs of novice, enthusiast and professional photographers, so you can be sure to find the right model.

*Angela*

Angela Nicholson Head of testing



## Brought to you by Digital Camera

*Camera Shopper* is brought to you by the team behind *Digital Camera*, the UK's best-selling monthly photographic magazine. Where issue numbers are mentioned they relate to *Digital Camera*; back issues can be purchased from [www.myfavouritemagazines.co.uk/digitalcamera](http://www.myfavouritemagazines.co.uk/digitalcamera)

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THE BIGGEST AND BEST PHOTOGRAPHY BUYERS' GUIDE

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The  
UK's most  
in-depth  
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Imaging lab manager Ali Jennings benchmarks cameras and lenses in our controlled testing environment

# Trusted Tests

Rigorous ▶ Accurate ▶ Independent ▶ Fair

**C**amera Shopper is brought to you by the UK's most experienced team of photography journalists, which means you can trust everything you read on these pages and can buy your next piece of photography equipment with total confidence. In case you need any further convincing, here's why our tests are the best:

## Depth

At *Camera Shopper*, we take great pride in the rigorous nature of our testing process. Every product and service is tested in appropriate circumstances, and a combination of real world and objective tests are performed to ensure all products and services are credibly

graded. Take a look at the opposite page for more details.

## Passion

We believe the best way to test a product is to use it as it was intended, so our real world testing involves taking equipment on a proper shoot – whether outdoors or in the studio – and testing it exactly as you would use it in real life to let you know whether it's fit for purpose.

## Objectivity

Although scientific data won't tell you everything about a product, it's a great way to draw direct comparisons and sense-check our real world conclusions, so we've devised a series of controlled tests for cameras and

lenses that supplement our real world testing with benchmarks.

## Independence

*Camera Shopper* is 100% independent and never swayed by the influence of advertisers or PR firms. The tests you read in the magazine are our genuine unbiased opinions and Future Publishing, the company behind *Camera Shopper*, has a strict code of conduct on testing.

## Transparency

The JPEG files of every test image we shoot can be downloaded from our website, TechRadar ([www.techradar.com/cameras](http://www.techradar.com/cameras)). This means you can check the quality for yourself and even run your own tests if you wish.

## OUR SCORES AND AWARDS EXPLAINED

**T**wo philosophies underpin our scoring system: transparency and flexibility. Transparency involves keeping our scoring accurate and explaining why we reach a verdict. Flexibility enables us to change our scoring criteria to ensure that each product and service is scored on appropriate criteria – a tripod, for instance, needs to be judged on different qualities than a digital SLR, and a flashgun needs to be judged on different

## HOW WE TEST

*Camera Shopper's* test policy is the most strict and rigorous of any photography magazine. We believe the only way to bring you a genuine and reliable verdict on a product is to test it in both the field and the lab, so we use two sets of criteria to test SLRs and lenses – real-world testing and objective testing.

## Real-world testing

The first and most important pillar of our process is real-world testing. We firmly believe that the best measure of a product is how it performs in the field (or studio) doing the job for which it was intended. The majority of our testing time is therefore spent using products in this way, so we can report back on how they cope under a number of different lighting scenarios and conditions.

The first part of our real-world testing involves telling you how a product handles and our impressions of its performance; the second is about examining the image quality produced, so we take a number of photographs under different conditions with every camera and lens we test, which means you can see the results achieved for yourself.

## Benchmarking

The second pillar of our testing policy involves testing the output



qualities than a lens. Each of our tests scores out of five in one or more sub-categories and then applies an overall mark out of five, enabling you to tell the wheat from the chaff.

### Five scores, five meanings:

★ ★ ★ ★ ★

Forget it

★ ★ ★ ★ ★

Below average

★ ★ ★ ★ ★

Good for the money

★ ★ ★ ★ ★

Very good in all areas

★ ★ ★ ★ ★

A truly exceptional, best-in-class product



Awarded to any product that comes top in a group test



Awarded to products that offer exceptional value for money



Awarded to any product that receives five stars in a test



Particularly innovative or breakthrough products receive this special award



A discretionary award given to truly exceptional products

of cameras and lenses under controlled conditions. We shoot a series of test charts that are specifically designed to test different performance aspects of a camera or lens. Further details about the tests we perform can be found in the panel to the right.

To minimise the variables when testing SLRs, we use Sigma's 50mm f/1.4 EX DG HSM prime lens, which is available for every SLR camera system.

Next, we perform an analysis of the test images using Imatest's Imatest Master ([www.imatest.com](http://www.imatest.com)) and DxO Analyzer ([www.dxo.com/intl/image\\_quality/dxo\\_analyzer](http://www.dxo.com/intl/image_quality/dxo_analyzer)) to generate benchmark figures for each test. These can then be plotted against the results from rival products to enable us to

make a direct comparison and determine which performs better under different criteria.

Copies of the resolution test chart images are available to download from our website – go to [www.techradar.com/cameras](http://www.techradar.com/cameras), choose the camera you're interested in and browse the review for full details of all tests. Benchmarks shouldn't be seen as a substitute for real-world testing, though – they won't tell you which camera handles best in the field or is easiest to use, but they do enable us to sense-check our real-world image test results and make accurate comparisons of products' capabilities.

No other magazine goes this far to deliver equipment test results you can really trust.

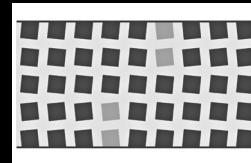


Our head of testing, Angela Nicholson, puts equipment through its paces

## THE APPLIANCE OF SCIENCE

Camera Shopper runs tests under controlled conditions on both camera bodies and lenses. Lenses are assessed using an Imatest analysis of photos of three charts. We use both Imatest Master and DxO Analyzer to measure camera performance in four tests. Here's more about each test...

### Lens tests



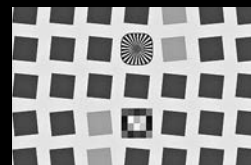
#### DISTORTION: IMATEST

**1** This test measures the distortion caused by the lens. We shoot the simple, lined chart pictured above and then output an accuracy percentage in Imatest. The most accurate result (ie, the best) would be 0%.



#### FRINGING: IMATEST

**2** This test measures the occurrence of chromatic aberration. We shoot the chart pictured above, then analyse the photos using Imatest. The results are expressed in pixels, with lower numbers being better.



#### SHARPNESS: IMATEST

**3** Here we measure sharpness at different apertures from the centre to the outer edge. We shoot the chart pictured and Imatest outputs a figure based on line width divided by picture height – high numbers are better.

### Camera tests



#### DYNAMIC RANGE: DXO ANALYZER

**1** This is a measure of a camera's ability to capture detail in the highlights and shadows. We use DxO's transmissive chart, which enables us to test a dynamic range of 13.3 stops.



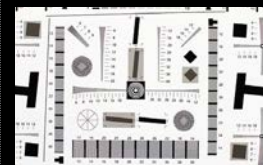
#### COLOUR ERROR: IMATEST

**2** This measures colour reproduction. We shoot the X-Rite ColorChecker chart pictured above and output an accuracy percentage from Imatest, with 100% being the most accurate result possible.



#### NOISE: DXO ANALYZER

**3** We use the dynamic range transmissive chart to analyse the signal-to-noise ratio for raw and JPEG files at every sensitivity setting using DxO Analyzer. A higher value means the signal is cleaner.



#### RESOLUTION

**4** We use a resolution chart based on ISO-12233 from Applied Image Inc to indicate the limit of the camera's vertical resolution at the centre of the frame. The higher the value, the better the detail resolution.

# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

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# CAMERAS & ACCESSORIES

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## CSC OR SLR? WHAT'S THE DIFFERENCE?

Single-lens-reflex or SLR cameras have a mirror that bounces light from the lens up into an optical viewfinder. It's a tried-and-tested design that's much loved by enthusiast and professional photographers alike.

Like SLRs, compact system or mirrorless cameras can accept interchangeable lenses, but they don't have a mirror inside; and if there is a viewfinder, it's an

electronic device that shows the image that's formed on the sensor. The advantage of this is that you can see the impact of camera settings before you take a shot, so you know if you've set the correct exposure or if you're in black-and-white mode. However, autofocus tends to be a little slower, especially in low light – although the situation is improving all the time. Another

advantage of omitting the mirror is that it enables CSCs and their lenses to be smaller, even when the same-sized sensor is used.

Both types of camera are capable of producing high-quality images. Some people prefer the larger size, faster autofocus and optical viewfinder of an SLR, while others like the innovative features, smaller size and full-time Live View of CSCs.

# Cameraphones

We test the latest leading smartphones to see which comes out on top for camera quality



1

[www.apple.com](http://www.apple.com)

## Apple iPhone 6S

From £539/\$649

At first glance, the iPhone 6S appears almost identical to its predecessor the iPhone 6, but under the skin is a brand-new 12MP camera with optical image stabilisation and 4K video capability. The bump in megapixels sounds great, but the camera only resolves slightly more detail compared to the 8MP iPhone 6. The 6S doesn't improve much on its predecessor's already impressive dynamic range, colour accuracy and low noise levels. Apple is also sticking to a traditional 4:3 image aspect ratio. Screen quality is another area where little has changed. You get vibrant yet natural colour and good brightness, but the lowest resolution and pixel density by far of today's flagship phones.

OVERALL ★★★★★



2

[www.htc.com](http://www.htc.com)

## HTC One M9

£580/\$648

The image sensors in previous HTC One models traded megapixels for larger individual photosites, giving increased sensitivity in low light. However, the One M9 uses a 20MP chip design to try and trump more pixel-packed rivals.

Despite the high pixel count, the M9's images are very soft, and plagued with noise and an unsightly amount of image smoothing. JPEG compression artefacts further blur colour boundaries, and there's no optical image stabilisation. HTC's camera app is responsive, though, and gives respectable manual control. Autofocusing is adequate, as is the 5.0-inch Full HD screen. In isolation, this looks great, but it lacks the wow factor of the Galaxy S6 or the LG G4's displays.

OVERALL ★★★★★



3

[www.lg.com](http://www.lg.com)

## LG G4

£420/\$552

Boasting a 5.5-inch display, the G4 is the longest and widest phone here: combined with its super-slim profile, it means it isn't easy to hold in one hand. The payoff is the best screen quality of the bunch, thanks to stunning 1,440 x 2,560 resolution and superb brightness. It makes browsing photos a pleasure, and the images don't let the side down.

The 16MP main camera can record DNG raw files, but even JPEG shots pack respectable detail levels and punchy colour. The G4's low-light abilities are also good, with a large f/1.8 aperture and optical image stabilisation helping to minimise noise. Add in the removable 3000mAh battery and a Micro SD slot, and the G4 is a great all-rounder.

OVERALL ★★★★★







4



www.panasonic.com

### Panasonic Lumix DMC-CM1

£649/\$998

At the heart of the CM1 is the 1-inch, 20MP sensor you get in Panasonic's FZ1000 bridge camera, giving a maximum sensitivity of ISO 25,600, raw image capture and dynamic range far beyond what the competition can offer. A 28mm-equivalent Leica lens ensures top optical quality, while Panasonic's camera app is the most comprehensive here. The CM1 feels more like a real camera than a cameraphone and its autofocus performance is excellent in all conditions, as is image quality. Quad-core processing power and a 4.7-inch Full HD screen ensures the CM1's smartphone side is just as impressive.

OVERALL ★★★★★



5

www.samsung.com

### Samsung Galaxy S6

From £499/\$576

After a couple of mediocre Galaxy S-series phones, the S6 makes its mark with a new metal case style. There's no Micro SD slot, but inside is a 16MP 1/2.6-inch image sensor that's capable of resolving bags of detail while maintaining good colour accuracy. The sharp lens features a fast f/1.9 aperture and optical image stabilisation, reducing the need for high sensor sensitivities when shooting indoors. Just as well: its high-ISO shots can look somewhat soft and blotchy. With the same screen resolution as the LG G4 but squeezed into a smaller 5.1-inch panel, the S6's display is the sharpest here. Its Super AMOLED screen technology is also extremely vibrant, although not particularly bright.

OVERALL ★★★★★



6

www.sonymobile.com

### Sony Xperia Z3

£399/\$520

Sony's camera experience really shows in The Xperia Z3, as it contains a 20MP, 1/2.3-inch Exmor RS sensor and a G lens, just as you'd find in a full-on Sony compact camera. This is also one of the few smartphones to have a proper two-stage shutter release button. The Z3's camera app gives excellent manual control and a plethora of shooting options. You'll need to choose the Manual mode to access the full sensor resolution as the default Superior Auto mode only records 8.3MP images. That said, the shots are very detailed. A 1,080 x 1,920 5.2-inch display isn't quite in the same league as the LG G4's screen, but the Z3 has an even bigger battery and a water-resistant body.

OVERALL ★★★★★

# Compact cameras

Conventional compacts don't get much love these days, but they still have a lot to offer

1

## Canon PowerShot SX610 HS

Price: £139/\$229  
Web: [www.canon.co.uk](http://www.canon.co.uk)

This Canon compact camera slightly trails the Nikon and Panasonic competition with its 18x zoom, but produces the cleanest daytime images here. The tables turn in dimmer conditions, where the SX610's 20.2MP sensor generates slightly more noise than the TZ57, but detail is well preserved. Reliable autofocus and metering systems boost appeal, and Wi-Fi, NFC and Full HD video recording are all present, along with a Hybrid Auto mode that records stills with video clips.

There's a high-quality 922k-dot monitor with great viewing angles, and the camera is slimmer than the Panasonic TZ57. Add a 270-shot battery life and the SX610 makes a pretty good all-rounder.

OVERALL

★★★★★

4

## Panasonic Lumix DMC-TZ57 (ZS45 in US)

Price: £159/\$298  
Web: [www.panasonic.com](http://www.panasonic.com)

Although it's the priciest camera here, the TZ57 comes with an impressive 3-inch, 1040k-dot monitor. It boasts excellent viewing angles and contrast, and flips forward for selfie shooting. Other features include a stabilised 20x zoom lens and Full HD video, manual control and two custom shooting modes. But with extra features comes bulk: at 248g, this is the heaviest camera here, and a 32.1mm thickness is far from svelte. At least there's space for a beefy battery with a 350-shot capacity.

Shots are detailed, vibrant and well-exposed in bright conditions, and low-light photos also retain fine details thanks to restrained noise processing.

OVERALL

★★★★★

2

## Fujifilm FinePix XP80

Price: £127/\$170  
Web: [www.fujifilm.com](http://www.fujifilm.com)

The toughened-up XP80 will keep on snapping at up to 15 metres under water, and it'll survive drops from up to 1.75m. It's also freeze-proof, while that chunky design sits well in the hand. Features include Full HD video, plus built-in Wi-Fi for easy image transfer and an intervalometer for time-lapse.

The sealed lens design limits optical zoom to a 5x, 28-140mm-equivalent focal range and the 2.7-inch screen's viewing angles are nothing special, but it has a reasonable resolution. Image quality from the 16.4MP sensor is close to the other cameras here, with decent low light performance up to ISO 3,200. The XP80 is less adept at resolving very fine detail.

OVERALL

★★★★★

5

## Ricoh WG-30

Price: £152/\$164  
Web: [www.ricoh-imaging.co.uk](http://www.ricoh-imaging.co.uk)

With its 12m waterproof rating and 1.5m shockproofing, the WG-30 seems to be playing catch-up to the Fujifilm XP-80 on toughness. However, the Ricoh adds a 100kg crush-proof rating and six LEDs encircle the lens to assist its 1cm Macro mode. There's 5x optical zoom with a 28mm wide-angle focal length, and battery life is 300 shots. Wi-Fi is extra though.

Daytime image quality is an even match for the others, but low-light shots can look undersaturated. You'll struggle to see this at first, though, as the 2.7-inch screen's viewing angles are limited. The widescreen aspect ratio is annoying, making standard 4:3 images look tiny.

OVERALL

★★★★★

3

## Nikon Coolpix S7000

Price: £130/\$197  
Web: [www.europe-nikon.com](http://www.europe-nikon.com)

The S7000 manages to pack a 20x optically stabilised lens into a body that's smaller and lighter than the 20x Panasonic TZ57. While it doesn't feature a flip-up screen like the TZ57, the S7000 does get Wi-Fi with NFC pairing, Full HD video and plenty of effects like portrait enhancement and automatic panorama capture. You'll have to put up with poor viewing angles from the LCD monitor and a fairly mediocre 210-shot battery life.

A back-illuminated 16MP sensor provides respectable image quality in good light, and fine detail is well-resolved. Once you reach ISO 800, Nikon's noise reduction processing is more aggressive, making low-light images look painterly.

OVERALL

★★★★★

6

## Sony Cyber-shot DSC-QX10

Price: £169/\$248  
Web: [www.sony.co.uk](http://www.sony.co.uk)

No, this isn't just a pancake lens for a Sony Alpha: it's actually a complete compact camera, minus a monitor and any non-essential buttons. That's because the QX10 is designed to piggy-back on your phone, using its screen and touch controls. Two clips attach it to almost any smartphone, with Wi-Fi and NFC technology making pairing painless.

Sony's 18.2MP Exmor R sensor delivers detailed shots with well-managed noise levels in all conditions. However, it's only the 10x optical zoom that really gives the QX10 an appreciable edge over a decent cameraphone, making the additional cost, bulk and inconvenience hard to justify.

OVERALL

★★★★★









# Budget cameras

Matthew Richards picks out eight cameras that pack punch and add fun

**L**et's have some fun! We've rounded up a bunch of cameras that are stylish, easy to use and – most important – reasonably priced.

There's a mix of digital SLRs and CSCs (compact system cameras), each of which weigh in at under £600/\$800, complete with a kit zoom lens. Some of them cost considerably

less – such as the Canon EOS 100D and the Nikon D5500.

Whether you're buying a camera as a present for someone else or are just treating yourself, there are some little treasures to choose from.

Even if you already own an relatively expensive outfit, there's certainly a lot to be said for having one you can take anywhere without feeling too precious about it.

## THE CONTENDERS

- 1 Canon EOS 100D with 18-55mm IS STM lens £330/\$500
- 2 Canon EOS 750D with 18-55mm IS STM lens £550/\$750
- 3 Nikon D3300 with 18-55mm VR II lens £350/\$450
- 4 Nikon D5500 with 18-55mm VR II lens £590/\$795
- 5 Olympus OM-D E-M10 with 14-42mm EZ lens £475/\$500
- 6 Panasonic DMC-GF7 with 12-32mm lens £340/\$460
- 7 Pentax K-S1 with 18-55mm lens £420/\$340
- 8 Sony Alpha 5100 with 16-50mm OSS lens £430/\$530





Whether you're looking for more than a compact camera or want a more everyday model alongside your high-end body, today's budget SLRs and CSCs can deliver stunning results.

From the makers of **Digital Camera** magazine





## • Canon EOS 100D with 18-55mm IS STM lens £330/\$500

The smallest SLR in the group

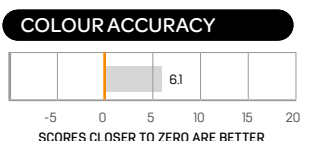
**L**ighter than any other SLR on test and smaller even than the diminutive Pentax K-S1, this is the baby of Canon's current line-up. It's a generation older than the 750D in terms of image sensor, processor and the hybrid sensor-based autofocus system for use in Live View and movie modes.

The regular phase-detection autofocus module is also quite basic. It features just nine AF points, of which only the central point is cross-type, able to resolve detail in both vertical and horizontal planes.

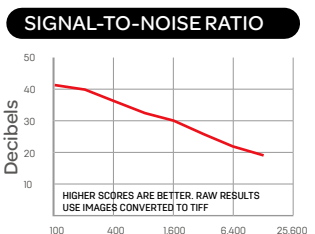
The image sensor's megapixel count of 18MP is lower than in any other SLR here, but it's still higher than in either the Olympus or the Panasonic Micro Four Thirds cameras. Handling feels good rather than great: the 100D is a little cramped for a full-blown SLR.

### PERFORMANCE

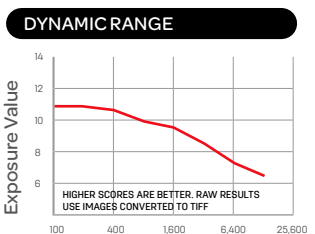
Image quality is very pleasing overall, with good results in a decent range of scene modes, along with enough manual adjustments to please more experienced photographers. The maximum burst rate of 4 frames per second is the slowest in the group.



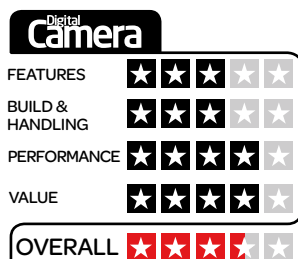
Typical of Canon SLRs, colour rendition errs a bit on the warm side but is very pleasant.



High-ISO images are clean, but slightly noisier than from the newer Canon 750D.



Detail in highlights and lowlights gets a boost from the Auto Lighting Optimizer.



## Canon EOS 750D with 18-55mm IS STM lens £550/\$750

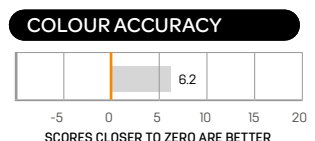
Canon's newest budget camera

**T**he 750D is similar to the concurrently released 760D. Lacking that model's top-panel info screen or rear-mounted quick control dial, the 750D has a more traditional layout for entry-level Canon SLRs. Its cheaper price tag also qualifies it as more of a budget camera. It's a larger and heavier camera than the older Canon 100D, and its handling feels more assured and comfortable as a result.

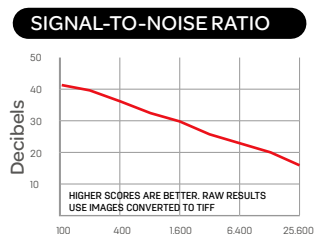
New and improved features include a 24.2MP image sensor, a Digic 6 processor, a 19-point (all cross-type) phase-detection autofocus module, and a new-generation hybrid autofocus system for Live View and movie shooting. Even so, Live View autofocus isn't as fast as in most CSCs. Further attractions include an articulated and touch-sensitive rear screen, Wi-Fi and NFC (Near Field Communication).

### PERFORMANCE

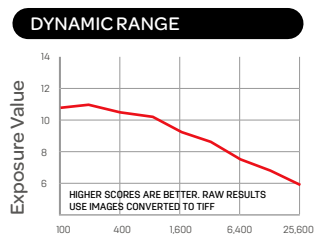
The 5fps burst rate and hybrid autofocus system are both faster than in the 100D. The autofocus system delivers better accuracy for off-centre objects, especially moving targets. Retention of fine detail is also better.



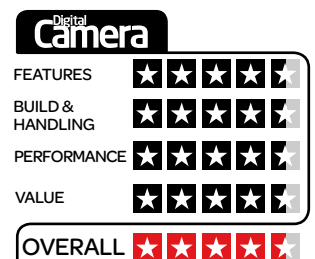
There's nothing to choose between the 750D and the 100D for natural colour rendition.



High-ISO noise is well suppressed, despite the relatively high megapixel count.



Lab test scores aren't great but the 750D copes well, even in high-contrast scenes.







## Nikon D3300 with 18-55mm VR II lens £350/\$450

Roll up for your guided tour

**L**ike the Nikon 3000-series cameras before it, the D3300 offers an interactive Guide mode.

It acts like a built-in photography course and makes this SLR particularly beginner-friendly. It also adds an Effects shooting mode, lacking in the previous D3200, with options like toy camera, colour sketch and night vision for entertainment.

At its core, the D3300's more serious upgrades include a new-generation Expeed 4 processor and the omission of an optical low-pass filter, which gives the potential for greater retention of fine detail, albeit with an increased risk of moiré patterning and false colour. Another bonus over the D3200 is a bigger sensitivity range of ISO 100-12,800 (25,600 expanded), matching the two Canon SLRs.

### PERFORMANCE

The 11-point autofocus system (with one cross-type point) is basic but effective, with similar performance in our tests to that of the Canon 100D. The D3300 has a faster 5fps maximum burst rate than the 100D, equalling the 750D, and the image quality tends to be a little more vibrant.

#### COLOUR ACCURACY



Colour rendition is fairly accurate, but can sometimes look a little over-saturated.

#### SIGNAL-TO-NOISE RATIO

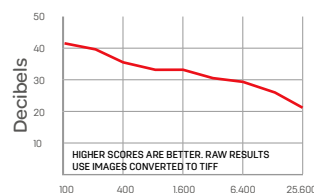
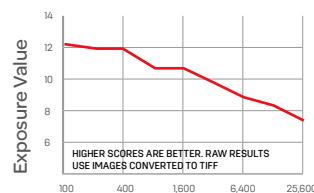


Image noise at high ISO settings is more noticeable than from the D5500.

#### DYNAMIC RANGE



The D3300 scores better than the Canon SLRs but not quite as highly as the Pentax.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



## Nikon D5500 with 18-55mm VR II lens £590/\$795

A pricey option in present company

**N**ikon's mid-range D5500 is the most expensive camera in this group. It has the same

megapixel count and image processor as the D3300, the same omission of an optical low-pass filter, and the same maximum drive rate of 5fps. A notable upgrade in the D5500 is a 39-point autofocus module, of which nine points are cross-type.

Handling is good, helped by a surprisingly slim body with an extra-large finger grip area. Around the back, the D5500 matches the Canon 750D with a fully articulated LCD that includes touchscreen facilities. There's an extended range of scene modes and special effects, but the D3300's Guide shooting mode is absent. The sensitivity range stretches all the way to ISO 25,600 in its standard range, but there's no expanded mode.

### PERFORMANCE

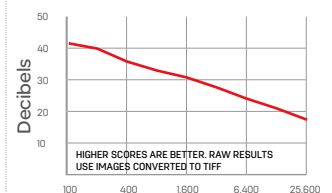
Nikon SLRs over the years (including the D3300) have typically delivered very vibrant image quality. By comparison, images from the D5500 often tend to be a bit on the light side with a less richly saturated look.

#### COLOUR ACCURACY



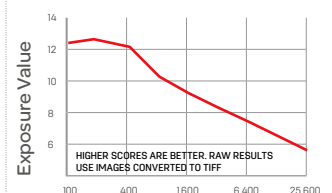
Images can often look a bit on the bright side, with slightly desaturated colours.

#### SIGNAL-TO-NOISE RATIO



It's the best camera here for delivering low-noise images at high ISO settings.

#### DYNAMIC RANGE



We often had to dial in negative exposure compensation for good dynamic range.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



## Olympus OM-D E-M10 with 14-42mm EZ lens

It's a thing of beauty

**C**lassic retro design meets high-tech sophistication in this Micro Four Thirds camera. It's the most full-featured of all the CSCs on test, and the only one here to boast a viewfinder and hotshoe. The others don't even enable the addition of a viewfinder as an extra, or the fitment of a flashgun.

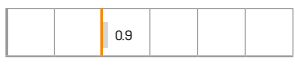
Beautifully built with a tough little magnesium alloy body and automatically retracting kit zoom lens, the EM-10 strikes an excellent balance of size, weight and comfortable handling.

Despite being the most budget-conscious camera in the OM-D line-up, the 16.1MP E-M10 still features sensor-shift (in-camera) stabilisation, a tilting touchscreen, Wi-Fi and trick modes like Live Bulb, where you can see long exposures of up to 30 minutes developing as they happen.

### PERFORMANCE

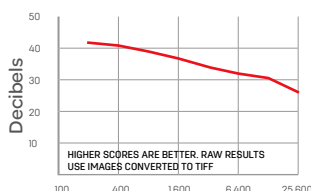
Autofocus is fast and accurate, metering is reliable and the maximum burst rate is an impressive 8fps. The triple-axis stabiliser works well and image quality remains beautiful, even at very high ISO settings. It's the most desirable of the CSCs on test.

#### COLOUR ACCURACY



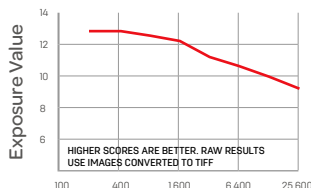
SCORES CLOSER TO ZERO ARE BETTER  
Similar to the Canon cameras, colour rendition is highly accurate overall.

#### SIGNAL-TO-NOISE RATIO

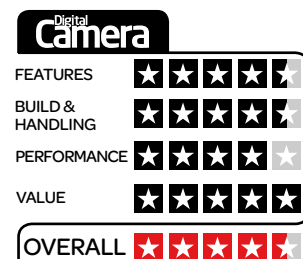


HIGH-ISO IMAGES ARE IMPRESSIVE, AND CLEANER THAN FROM THE PANASONIC CAMERA.

#### DYNAMIC RANGE



The Olympus does well to hang onto highlight and lowlight detail at high ISOs.



## Panasonic DMC-GF7 with 12-32mm lens

£340/\$460

It's not quite plastic and fantastic

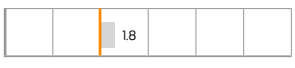
**C**ompared with the Olympus E-M10, this Panasonic Micro Four Thirds camera feels quite plasticky and downmarket. On the plus side, its lack of a viewfinder or sculpted finger and thumb grip areas make the body slim and extremely light at just 266g. Like all kit lenses here apart from the Canon and Pentax, the Panasonic's is retractable. It's almost as small as the Olympus lens, but lacks powered zoom or automatic retraction.

Neat extras include Wi-Fi and a tilting touchscreen that, like the Sony's, can be flipped through 180 degrees for selfie-shooting. The 16MP image sensor resolution is par for the MFT course.

### PERFORMANCE

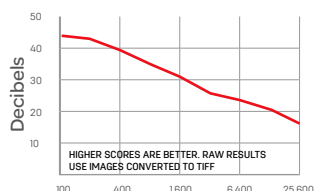
A speed demon for continuous shooting, the GF7 can achieve burst rates of up to 40fps, although this sinks to a more typical 5fps with continuous autofocus. The autofocus system itself is pretty quick, similar to that of the Olympus, but images tend to look a little less vibrant, high-ISO shots aren't quite as clean, and the maximum length for Bulb exposures is only one minute.

#### COLOUR ACCURACY



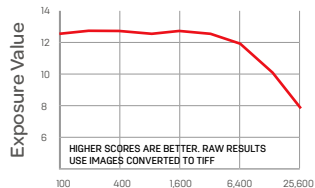
SCORES CLOSER TO ZERO ARE BETTER  
Technically, rendition is pretty accurate, but colours can look a little desaturated.

#### SIGNAL-TO-NOISE RATIO

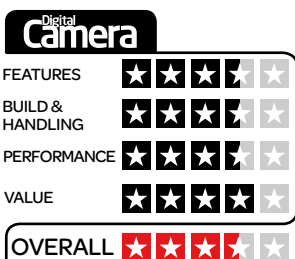


The GF7 struggles to keep noise under control at high sensitivity settings.

#### DYNAMIC RANGE



Lab scores for dynamic range are rather similar to those of the Olympus.







## Pentax K-S1 with 18-55mm lens £420/\$340

Lights, camera, action

**T**his Pentax really takes the fight to Canon and Nikon. It beats all other SLRs on test by featuring a pentaprism viewfinder rather than a low-budget pentamirror design – and with 100-per-cent frame coverage, no less. It's the only SLR to feature sensor-shift stabilisation and, like the Nikon cameras, has no optical low-pass filter to impair the capture of fine detail.

Novelty items include multi-colour indicator lamps on the top, front and rear of the camera, and the body itself is available in a wealth of different colour options. The design looks quite boxy but handles well, although the oversized shooting mode dial cuts into thumb space around the back. There's no tilt or touch-sensitivity for the LCD, and no built-in Wi-Fi.

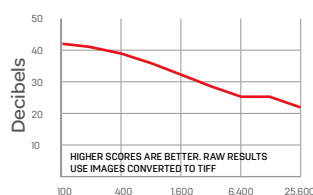
### PERFORMANCE

The K-S1 is the fastest SLR in the group in terms of its 5.4fps burst rate and 1/6,000 sec shutter speed, and offers a maximum sensitivity of ISO 51,200. In contrast, the clunky kit lens has an appallingly loud autofocus system. Image quality is good overall, but colour rendition can be a bit cool.

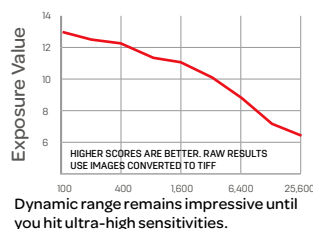
#### COLOUR ACCURACY



#### SIGNAL-TO-NOISE RATIO



#### DYNAMIC RANGE



Digital Camera	
FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



## Sony Alpha 5100 with 16-50mm OSS lens £430/\$530

Small build, relatively large sensor

**T**his Sony is a similar size and weight to the Panasonic GF7 that's also on test. Both cameras lack a viewfinder (either built-in or as an optional extra), and neither has a hotshoe for adding an external flashgun. The Sony has a larger APS-C rather than a Four Thirds format image sensor, and so the kit zoom lens is correspondingly bigger. Like only the Olympus kit lens in this group, the Sony's features automatic extension and retraction.

A tilting touchscreen enables easy selfie shooting, but in other areas, the touch facilities are relatively poorly implemented and aren't available for menu navigation. Overall handling is still an improvement over the Panasonic GF7, thanks to a sculpted and textured finger grip.

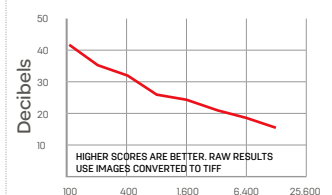
### PERFORMANCE

Despite boasting 179 phase points and 25 contrast areas, the hybrid autofocus system is a little slower than in the contrast-area-only Olympus and Panasonic CSCs. Metering is accurate, the image quality is vibrant, and sharing is easy thanks to the inclusion of both Wi-Fi and NFC.

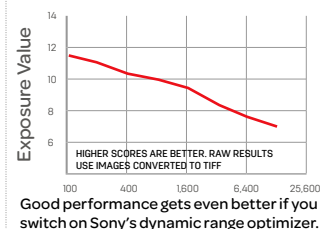
#### COLOUR ACCURACY



#### SIGNAL-TO-NOISE RATIO



#### DYNAMIC RANGE



Digital Camera	
FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★

## THE DIGITAL CAMERA VERDICT

## CANON TAKES TOP SPOT

The Canon EOS 750D is our best budget buy









**F**or handling, performance and pleasing image quality, the Canon 750D is the best budget buy on the market. It's beginner-friendly yet packs in plenty of features to please enthusiast photographers, all wrapped in a small and lightweight body. We prefer the Canon's handling and elegant interface to those of the pricier Nikon D5500, although the latter reigns supreme among this group for minimising image noise at high ISO settings.

The Pentax K-S1 is also worth considering: it combines seriously upmarket specifications

with some genuinely fun elements. It's great value for money in the US (less so in the UK). For a good-performance SLR at a rock-bottom price in the UK, the Nikon D3300 edges out the Canon 100D, and its Guide shooting mode can be a real help for beginners.

Of the three CSCs on test, the Olympus E-M10 is a clear winner. Its built-in viewfinder makes it feel like a 'proper' camera, and the hotshoe is a big advantage. The newer Mk II edition has several upgrades, but the original is currently better value for money and delivers near-identical image quality. 📷



HOW THE CAMERAS COMPARE								
	Canon EOS 100D, 18-55mm IS STM	Canon EOS 750D, 18-55mm IS STM	Nikon D3300, 18-55mm VR II	Nikon D5500, 18-55mm VR II	Olympus E-M10, 14-42mm EZ	Panasonic GF7, 12-32mm	Pentax K-S1, 18-55mm	Sony Alpha 5100, 16-50mm OSS
Website	www.canon.co.uk		www.nikon.co.uk		www.olympus.co.uk	www.panasonic.co.uk	www.pentax.co.uk	www.sony.co.uk
Street price	£330/\$500	£550/\$750	£350/\$450	£590/\$795	£475/\$500	£340/\$460	£420/\$340	£430/\$530
Sensor (size)	18.0MP CMOS (22.3 x 14.9mm)	24.2MP CMOS (22.3 x 14.9mm)	24.2MP CMOS (23.5 x 15.6mm)	24.2MP CMOS (23.5 x 15.6mm)	16.1MP Live MOS (17.3 x 13.0mm)	16.0MP Live MOS (17.3 x 13.0mm)	20.1MP CMOS (23.5 x 15.6mm)	24.3MP CMOS (23.5 x 15.6mm)
Lens mount (crop factor)	Canon EF-S (1.5x)	Canon EF-S (1.5x)	Nikon DX (1.5x)	Nikon DX (1.5x)	Micro Four Thirds (2.0x)	Micro Four Thirds (2.0x)	Pentax KAF2 (1.5x)	Sony E-mount (1.5x)
Viewfinder	Optical (pentamirror)	Optical (pentamirror)	Optical (pentamirror)	Optical (pentamirror)	Electronic (1,440k dots)	None	Optical (pentaprism)	None
ISO range (expanded)	ISO 100-12,800 (25,600)	ISO 100-12,800 (25,600)	ISO 100-12,800 (25,600)	ISO 100-25,600	ISO 200-5,000 (100-25,600)	ISO 200-25,600 (100)	ISO 100-51,200	ISO 100-25,600
Primary autofocus	Phase (9 points, 1 cross-type)	Phase (19 points, all cross-type)	Phase (11 points, 1 cross-type)	Phase (39 points, 9 cross-type)	Contrast (via image sensor)	Contrast (via image sensor)	Phase (11 points, 9 cross-type)	Hybrid (179 phase points)
Shutter speeds	30-1/4,000 sec, Bulb	30-1/4,000 sec, Bulb	30-1/4,000 sec, Bulb	30-1/4,000 sec, Bulb	60-1/400 sec, Bulb 30m	60-1/16,000 sec	30-1/6,000 sec, Bulb	30-1/4,000 sec, Bulb
Max burst rate	4fps	5fps	5fps	5fps	8fps	40fps (5fps with AF cont)	5.4fps	6fps
Flash	Pop-up, hotshoe	Pop-up, hotshoe	Pop-up, hotshoe	Pop-up, hotshoe	Pop-up, hotshoe	Pop-up	Pop-up, hotshoe	Pop-up
Image stabilisation	Via lens	Via lens	Via lens	Via lens	In-camera	Via lens	In-camera	Via lens
Video – max resolution	1080p, 30/25/24fps	1080p, 30/25/24fps	1080p	1080p	1080p, 30fps	1080p, 60/50/30/25fps	1080p, 30/25/24fps	1080p
LCD screen	3.0-inch, 1,040k, fixed, touch	3.0-inch, 1,040k, pivot, touch	3.0-inch, 921k, fixed	3.2-inch, 1,037k, pivot, touch	3.0-inch, 1,037k, tilt, touch	3.0-inch, 1,040k, tilt, touch	3.0-inch, 921k, fixed	3.0-inch, 921k, tilt, touch
Memory	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1)	SD/SDHC/SDXC (UHS-1) or MS
Wireless connectivity	None	Wi-Fi, NFC	None	Wi-Fi	Wi-Fi	Wi-Fi	None	Wi-Fi, NFC
Body (W x H x D), weight	117 x 91 x 69mm, 407g	132 x 101 x 78mm	124 x 98 x 76mm, 460g	124 x 97 x 70mm, 470g	119 x 82 x 46mm, 396g	107 x 65 x 33mm, 266g	120 x 93 x 70mm, 558g	110 x 63 x 36mm, 283g
Battery life (CIPA)	380 shots	440 shots	700 shots	820 shots	320 shots	230 shots	480 shots	400 shots
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD & HANDLING	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
PERFORMANCE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★



# DRONE TEST

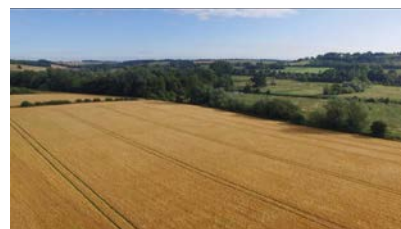
## DJI PHANTOM 3 PROFESSIONAL



### > THE SPECS

<b>Sensor</b>	Sony Exmor 1/2.3in
<b>Effective pixels</b>	12.4 million (total pixels, 12.76 million)
<b>Lens</b>	FOV 94° 20 mm (35 mm format equivalent) f/2.8, focus at infinity
<b>ISO range</b>	100-3,200 (video) 100-1,600 (photo)
<b>Shutter speed</b>	1/8,000-8 sec
<b>Image max size</b>	4,000 x 3,000
<b>Still photography modes</b>	Single Shot
<b>Burst shooting</b>	3/5/7 shots, Auto Exposure, Bracketing (AEB), Bracketed Frames at 0.7EV Bias, Time-Lapse

### KEY FEATURES



Unlike action cameras that feature a similar lens and build, the Phantom's camera manages to keep distortion to a minimum.



These two ground-facing sensors enable stability and positioning of the drone, even when there is no GPS connection.

**CAMERA DRONE** DJI Phantom 3 Professional > £1,052/\$1,259 > [www.dji.com](http://www.dji.com)

# High flyer

## A groundbreaking 4K-enabled drone

**N**ot that long ago, if you wanted to shoot aerial stills or video, you would have needed a helicopter and some specialist kit. Today, a small camera-equipped drone is all that's required.

The Phantom 3 Professional has a 4K camera and is incredibly easy to fly, even without prior experience. Flight control is on the verge of being fully automatic: the intelligent flight controller, GPS, motorised gimbal and built-in sensors all work together to stabilise the craft and create a very solid platform for filming and capturing stills.

### BUILD AND HANDLING

Advanced flight features such as auto-braking are essential for first-time flyers; and, once linked to the iOS or Android app, further options such as return to home, auto-takeoff and auto-landing enable you to concentrate on capturing the scenery rather than keeping the Phantom in the air. A wireless Live View link is created through an iOS or Android

device and DJI's Lightbridge Technology and app. Together they enable you to control the camera and see the world from its point of view.

### PERFORMANCE

Stills from the Phantom are vibrant, with plenty of colour and tonal gradation. Zoom to 100% to check the detail for both stills and video, however, and you'll see that there is some smoothing and loss of fine detail. The camera evaluates exposure well, capturing plenty of shadow and highlight detail to produce images with good overall contrast. Video quality is vibrant. The 4K mode is impressive, with smooth motion despite the lowish frame rate. Rolling shutter is well controlled, with no visible signs even at low altitudes when the craft is panning in flight.

The Phantom 3 has everything you need for hassle-free flying and high-quality video and stills capture. The integration of flight and camera control make this a complete package that is easy to understand and use. 📷

**1** The slight tilt on the rotors within the body of the craft greatly improve the responsiveness of the device in flight.

**2** This motorised gimbal automatically ensures that footage is stable and level when in flight.

**3** The ability to tilt the camera while flying through the jog wheel on the controller enables you to adjust the vertical angle of the camera.

### Digital Camera

#### FEATURES



#### PERFORMANCE



#### BUILD QUALITY



#### VALUE



## Overall ★★★★★

**WE SAY:** If you're looking to capture aerial footage, you won't be disappointed with the stills and video quality. Ease of use both for flight and control of the camera make this the most accessible drone presently on the market, and will open up a huge range of photo opportunities. Before you get started, though, make sure you read the restrictions and cautions on the Civil Aviation Authority website ([www.caa.co.uk](http://www.caa.co.uk)).

A close-up photograph of a Canon EOS 5D MK II camera. The camera is black with a 50mm lens attached. The lens has a red ring and the text "CANON LENS EF 50mm 1:1.4". The camera body has "Canon" and "EOS 5D" printed on it. A hand is visible holding the camera.

# CANON EOS 5D MK II

VS

A close-up photograph of a Sony Alpha 7 II camera. The camera is black with a lens attached. The lens has a red ring and the text "SONY" and "Sonnar FE 2.8/28 ZA". A hand is visible holding the camera.

# SONY ALPHA 7 II



Decisions, decisions... They're tough if you're upgrading to a full-frame camera. Chances are you'll need to buy at least a couple of new lenses as well, so there's the added temptation of switching to a different brand, or even to a completely different type of camera altogether.

**S**hould you 'stick' with tradition and settle on the somewhat antiquated design of an SLR, or 'twist' with a more revolutionary mirrorless compact system camera?

There are highly attractive 'all-rounders' in both camps: cameras that don't go overboard on megapixel count, yet aim to take everything from portraiture to landscape photography in their stride. Two of our current favourites are the Canon 5D Mk III SLR, and the mirrorless Sony A7 II from Sony's 'ILC' (interchangeable-lens camera) stable.

A major factor in choosing any 'system' camera is the depth and breadth of the system itself. You're spoiled for choice when it comes to lenses and other accessories for the long-established line of Canon SLRs. Sony's mirrorless cameras are a much newer proposition, especially when it comes to full-frame models, but the range of compatible E-mount lenses has grown over the last couple of years, and an adaptor is also available for fitting A-mount lenses.

## FEATURES

Billed by Canon as a professional-grade camera, the 5D Mk III has an exotic feature set. Highlights include a 61-point autofocus module with 41 cross-type points and five double-cross points, 63-zone metering, and a working range of -2EV to 18EV. The 22.3 megapixel-count of the image sensor is modest by the latest standards, but it helps to enable an enormous sensitivity range of ISO 100-25,600 (50-102,400 expanded). The viewfinder is a high-quality pentaprism unit that gives a bright and super-sharp display, with 100% frame coverage.

For its part, the Sony has a hybrid phase/contrast autofocus system with 117 active points on the image sensor.

## CANON EOS 5D MK III



Website	www.canon.co.uk
Street price (body)	£2,250/\$2,500
Image sensor	22.3MP CMOS, 36 x 24mm
Max image size	5,760 x 3,840 pixels
Image processor	Digic 5
Stabilisation	Via lens
Lens mount	Canon EF
Viewfinder	Pentaprism, 0.71x, 100%
ISO range (expanded) (50-102,400)	ISO 100-25,600
Autofocus points	61-point (41 cross-type)
Shutter speeds	1/8,000 to 30 sec, Bulb
X-sync	1/200 sec
Max burst rate	6fps
Buffer capacity (raw)	18 shots
Video - max resolution	1080p (24-30fps)
LCD screen	3.2-inch, 1,040k
Memory	1x CF, 1x SD/HC/XC
Wi-Fi built in	No
Interface	USB 2.0
Body materials	Magnesium alloy
Body (W x H x D)	152 x 116 x 76mm
Weight	950g
Battery life (CIPA)	950 shots

Sensor-based autofocus systems can be slow, but Sony claims a 30% increase in autofocus speed over the original A7

Without a reflex mirror, there's no facility for having a separate autofocus module. Sensor-based autofocus systems can be slow, but Sony claims a 30% increase in autofocus speed for its hybrid system over the original A7, and a 50% improvement in AF tracking performance.

The sensitivity range for autofocus is -1EV to 20EV, so it loses out for extremely low-light focusing to the Canon. There's a 1,200-zone metering system, again taken directly from the image sensor rather than the separate module featured in SLR cameras. The sensitivity range is generous

## SONY ALPHA 7 II



Website	www.sony.co.uk
Street price (body)	£2,600/\$1,700
Image sensor	24.3MP CMOS (36 x 24mm)
Max image size	6,000 x 4,000 pixels
Image processor	Bionz X
Stabilisation	Sensor-shift
Lens mount	Sony E
Viewfinder	Electronic, 2,359k, 100%
ISO range (expanded)	ISO 50-25,600
Autofocus points	117-point (hybrid)
Shutter speeds	1/8,000-30 sec, Bulb
X-sync	1/250 sec
Max burst rate	5 frames per second
Buffer capacity (raw)	25 shots
Video - max resolution	1080p (24-60fps)
LCD screen	3.0-inch, 1,229k, tilt
Memory	1x SD/HC/XC or MS
Wi-Fi built in	Yes (+NFC)
Interface	USB 2.0
Body materials	Magnesium alloy
Body (W x H x D)	127 x 96 x 60mm
Weight	599g
Battery life (CIPA)	350 shots

at ISO 50-25,600, but lacks the Canon's expanded range.

With no reflex mirror, the Sony naturally can't have an optical viewfinder but, while some CSCs (compact system cameras) omit a viewfinder altogether, the Sony has a built-in EVF (electronic viewfinder). This boasts a huge image resolution of 2,359,000 dots and, like the Canon's optical unit, gives 100% frame coverage.

One feature that's always welcome for handheld photography is image stabilisation. Canon has never produced a full-frame SLR with built-in, sensor-shift stabilisation, and the 5D Mk III is no exception. If you want stabilisation, you have to fit a lens that includes an optical stabiliser. Canon makes many of these, as do Sigma and Tamron. Taking the opposite path, the A7 II was the world's first full-frame camera to feature sensor-shift stabilisation. It's a highly advanced five-axis design that features correction not only in the X and Y planes, but also for pitch, yaw and roll. The A7 II is well connected with Wi-Fi and NFC (Near Field Communication) built in,

## CANON 5D MK III

1

The info LCD (lacking on the Sony) sits behind a clearly labelled row of buttons for shooting settings.

2

In keeping with its pro-grade status, the shooting mode dial has three custom settings but no scene modes.

3

Unlike in many Canon SLRs, there's no pop-up flash built into the viewfinder dome.

4

Dual CF and SD/SDHC/SDXC card slots give you the option of instant back-up of your images.

5

The left-hand buttons give direct access to a number of playback functions.

6

To avoid accidental exposure compensation, the rotary control dial's action can be locked.



## SONY A7 II

1

The shooting mode dial includes scene modes, a sweep panorama mode and two custom settings.

2

It's too easy to rotate the exposure compensation dial accidentally.

3

Unlike the Canon, the Sony features an AF-assist lamp to aid autofocus in extremely low lighting.

4

Given the camera's slim-line build, handling is enhanced by the deeply sculpted finger grip.

5

Control buttons and dials are tightly packed in, but don't encroach on the thumb grip.

6

The Sony scores a win over the Canon with its tilting LCD display for high- and low-level shooting.



while the 5D Mk III has neither.

Strangely the A7 II lacks a standalone battery charger. Instead, you have to connect to the whole camera to the charger via its USB socket. This makes life awkward if you want to recharge a battery while you carry on shooting with a spare. At least a self-contained battery charger is available as an optional extra. Battery life itself is poor at 350 shots between recharges, though, compared with the Canon's 950 shots.

## BUILD AND HANDLING

Put the A7 II and the 5D Mk III next to each other, and it's like the Little and Large show. The Canon appears to dwarf the Sony, but specifications reveal that it's actually only 16mm deeper. This is mostly due to the Sony's protruding viewfinder and finger grip, either side of its svelte and slim-line body. At 950g compared with 599g, the Canon is also more than 50% heavier. The build of both cameras is largely based on magnesium alloy to keep weight down

and strength up. Weather seals are plentiful and, when it comes to dials, buttons and switches, both cameras show a similarly high standard of quality.

Considering the Sony was only launched in 2015 and that it's three years newer than the Canon, it's surprising that the build doesn't include a touchscreen. However, the screen does have a tilt mechanism, which is lacking on the Canon. Up on top, the Canon features a secondary mono LCD display, but this is omitted on the Sony – no surprise, given that there's no room for one.

Canon has been making SLR cameras since 1959, so it's had plenty of time to sort out handling. The relatively large body enables plenty of room for dials and buttons without it feeling cramped. In fact, the physical size and weight make for comfortable handling and great balance when using chunky full-frame lenses. The provision and placement of the shooting mode dial with its three custom settings, the strips of buttons along the top right and rear left, and the joystick-like

multi-controller and rotary quick control dial, all make for easy control. The 'Quick' menu is similarly intuitive and a delight to use.

It's great having a 'small' camera when you're traipsing around streets, trekking into the hills or jetting off to the other side of the world. However, handling can often feel compromised. Balance can feel front-heavy when using large lenses, while grip areas can feel inadequate, failing to inspire confidence and steadiness. Similarly, with less room to play with, you'll often find that buttons and dials for important shooting settings are fiddly or get nudged accidentally when you're holding the camera.

The Sony strikes a good balance, managing to pack in lots of control buttons and dials, while still leaving room for a comfortable grip. Better still, while we've criticised Sony SLRs of old in the past for having meagre customisation options, the A7 II has a wealth of customisable buttons, menus and settings to suit the way you shoot. One niggle



### IMAGE TEST



Canon



Sony

**Outdoor** \_\_\_\_ The Canon's colour rendition tends to be warmer and more highly saturated for outdoor shots using auto white balance. There's a bit more contrast here, producing a punchier image.

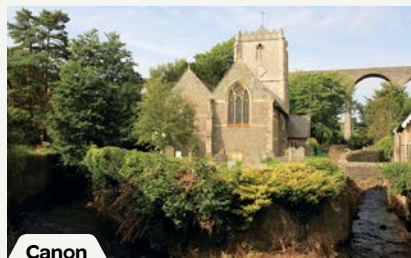


Canon



Sony

**Low-light** \_\_\_\_ The Sony performs pretty well under low lighting conditions but, in these shots taken at ISO 6,400, the Canon delivers cleaner image quality with greater retention of fine detail.



Canon



Sony

**Metering** \_\_\_\_ The Canon's evaluative metering gives an ideal exposure whereas the Sony's 'multi' metering mode seems to have been fooled by dark foreground areas, overexposing most of the scene.



Canon



Sony

**Skin tones** \_\_\_\_ Viewed on their own, portraits from the Sony look very natural with good colour quality, but skin tones in the Canon's images are much richer and more flattering.

The Canon's physical size and weight make for comfortable handling and great balance when using full-frame lenses

with the Sony is that it's easy to turn the exposure compensation dial accidentally with your right thumb, applying bias unintentionally when you don't want to. Then again, some people make the same complaint about the Canon's rotary quick control dial, but at least that has a lock lever to disable action.

### PERFORMANCE

Out and about with the Sony, its SteadyShot stabilisation system pays dividends with a claimed 4.5-stop benefit in beating camera-shake. It actually turned out to be about four stops in our tests, but that equals or beats most in-lens optical stabilisers. Optical stabilisation tends to be better for telephoto shooting but a neat trick from the Sony is that, if you fit a stabilised lens to the camera, the system can automatically choose which to use for better performance.

As claimed, the Sony's autofocus is noticeably quicker than in the original A7, but the Canon still has the edge, at least when fitted with a lens that has a fast, ring-type ultrasonic system. It's the same story for continuous autofocus, where the

Canon reigns supreme in its ability to stay locked on moving objects. This makes the Canon preferable for sports and wildlife photos. Another performance boost is that the Canon has a maximum continuous drive rate of 6fps compared with the Sony's 5fps.

The Canon's evaluative metering mode is quite strongly biased to the active focus point (or points) that achieve autofocus but, even so, results are more predictable than from the Sony. In our tests, the Sony frequently blew highlights while trying to

boost the brightness of shadowy areas in high-contrast scenes.

The actual amount of dynamic range is similar from both cameras but, when switched on, Canon's Auto Lighting Optimizer is a little more effective than Sony's D-Range Optimizer. When it comes to raw headroom for reclaiming highlights that are lost in JPEGs, both cameras have an impressive latitude.

Colour rendition tends to be a little warmer from the Canon, delivering richer and more flattering skin tones, as well as



The Sony's viewfinder is excellent for an electronic module but, compared to the Canon's optical one, it's relatively poor

adding a touch of gold to landscapes. But the flip side is that, when using automatic white balance, the Sony is technically a bit more accurate.

For low-light shooting, both cameras do well to suppress noise at low to medium sensitivity settings. However, the Canon eases ahead at ISO 1,600 and beyond, giving cleaner-looking images that retain greater fine detail and texture.

One key aspect of performance that needs consideration is the viewfinder. The Sony's viewfinder is excellent for an electronic module, but it doesn't compare well with the Canon's optical one. The Canon's viewfinder makes it much easier to see even the smallest details, especially in very bright or dark areas of a high-contrast scene.

The Sony's EVF takes a 'what you see is what you get' approach to exposure settings and the application of exposure compensation. To see this on the Canon, or any other SLR, you need to switch to Live View and use the rear screen. 📷



CANON EOS 5D MK III



SONY ALPHA 7 II

COLOUR ERROR CLOSER TO ZERO IS BETTER; RAW RESULTS USE IMAGES CONVERTED FROM TIFF

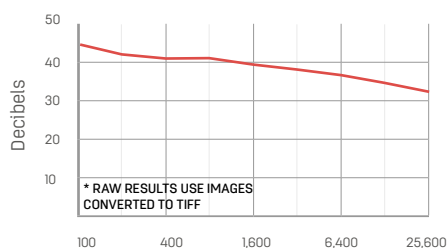


It's not a great score for accuracy, but the slight warmth in colour rendition is very attractive.

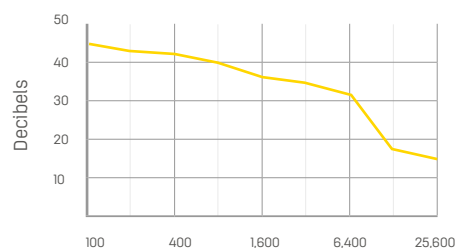


The lab score is good. The auto white balance system gives accurate or slightly cool colour rendition.

RAW\* SIGNAL-TO-NOISE RATIO HIGHER IS BETTER; RAW RESULTS USE IMAGES CONVERTED FROM TIFF

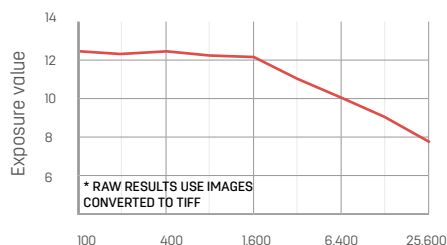


Images are impressively clean and richly detailed, even at a super-high sensitivity of ISO 12,800.

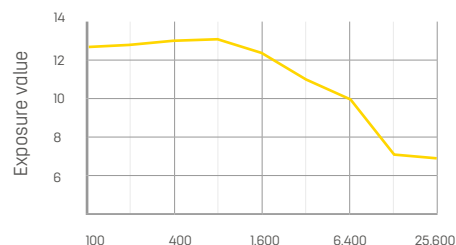


It really drops away from the Canon's noise performance levels at ISO 1,600 and above.

RAW\* DYNAMIC RANGE HIGHER IS BETTER



There's little to choose between the two cameras, but the Canon edges ahead at high ISO settings.



The Sony beats the Canon at ISO 50, but apart from that, there's very little between the two models.

VERDICT

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★

We could easily point to pros and cons for each camera and hedge our bets – but instead, we'll nail our colours to the mast. The Canon 5D Mk III is a better camera than the Sony A7 II. Overall handling and the quality of the viewfinder are sufficiently better to make it worth the increase in size and weight. Metering in evaluative/multi mode is more reliable, and autofocus makes a better job of tracking moving objects. When it comes to image quality, the Canon delivers more

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★

beautiful skin tones and gives an attractive warmth to colour rendition. It also creates cleaner, more richly detailed images at high ISOs under low lighting conditions. Back under the sun, the Canon's dynamic range optimiser is more effective for boosting shadow detail while reining in the highlights.

Don't get us wrong: the Sony A7 II is an extremely capable camera that's very well built and is rich in features. But the Canon 5D Mark III has the edge.





**INKJET PRINTER** Epson SureColor SC-P800 > £975/\$1,195 > [www.epson.co.uk](http://www.epson.co.uk)

# Epson SC-P800

Go XXL with your printing and enjoy the megapixels!

**B**uilding on the success of Epson's Stylus Pro 3880 A2 printer, the SC-P800 uses a new generation of UltraChrome HD inks, giving richer blacks, a wider dynamic range and a reduction in bronzing (apparent colour inaccuracies due to differences in glossiness between ink colours). Other new features include Wi-Fi, mobile and cloud printing services and a full-colour touchscreen.

## BUILD AND HANDLING

The new model is compatible with a roll feeder, but you have to buy it separately for around £195/ \$200. It's great for maintaining your preferred aspect ratios in large-format prints. As featured in the smaller SC-P600 A3+ printer, nine pigment-based inks include cyan, light cyan, vivid magenta, light vivid magenta, yellow, photo black, light black, light light black and matte black. However, the SC-P800 uses larger-capacity cartridges containing 80ml instead

of 25.9ml. Naturally, they're more expensive initially, but the cost per millilitre works out much cheaper at 50p/69c per ml instead of 86p/\$1.23.

The photo black and matte black inks are tailored to output on glossy and matte media, but they share a channel within the print head. This needs to be purged and re-primed every time you switch between glossy and matte media, which wastes ink.

## PERFORMANCE

For a pigment-ink printer, output is very smooth on gloss media and great on lustre-finish paper. Matte output is sumptuous. Colour accuracy is excellent in standard settings, and the Photo Enhance Automatic mode makes for greater vibrancy.

At the maximum quality setting, using the highest possible resolution of 2,880 x 1,440dpi, A2, A3+ and A4 prints take about 13 minutes, nine minutes and four-and-a-half minutes respectively. In High quality mode at a resolution of 1,440 x 720dpi, the output is nearly twice as fast.



## FEATURES

**01** The colour touch-screen makes it easy to navigate menus and keep tabs on printer status.

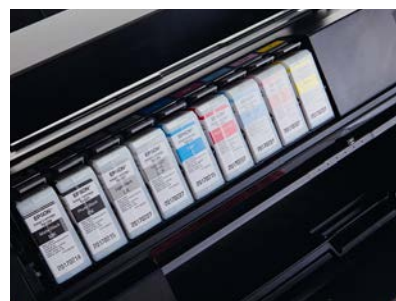
**02** The relatively small footprint for this A2 printer grows considerably once the input and output trays are fully extended.

**03** A front-mounted input tray enables printing on media up to 1.5mm thick or 1,000gsm.

## > THE SPECS

Max Sheet size	A2 (420 x 594mm)
Roll feeder	Optional
Nozzle configuration	180 black nozzles, 180 colour nozzles
Minimum droplet size	3.5 pl (pico-litre)
Max resolution	2,880 x 1,440dpi
Connections	USB, Ethernet, Wi-Fi
Screen	6.8cm colour touchscreen
Max burst rate	4.2fps
Screen	Touch-sensitive 3-inch 1,040,000-dot LCD
Dimensions	3684 x 376 x 250mm (width x depth x height)
Weight	19.5kg

## KEY FEATURES



The nine ink cartridges have very large capacities, which add convenience and also drive down the running costs.



An optional roll feeder can be mounted at the rear of the printer to enable prints of any aspect ratio, and panoramic printing.

## Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** The SC-P800 gives excellent quality results for both colour and monochrome prints, on a very wide and diverse range of media. The roll feeder is straightforward to fit and a worthwhile addition, while running costs are reasonable, thanks to the high-capacity cartridges. If you want to really big up your home photo printing, there's no better desktop machine on the market.



# CANON EOS 6D

VS

# NIKON D750





W

ANT the very best enthusiast-level digital SLR without blowing your budget on a fully professional body? There are two main contenders— the Canon EOS 6D and the Nikon D750. Canon and Nikon's range of 'professional' digital SLRs kick off with the 5D Mk III and D810, both of which cost roughly £1,000/\$1,000 more than their range-topping consumer-class cameras.

The Canon 6D feels like it's been around for yonks, having been announced back in September 2012. The Nikon D750 is two years newer and fresher, and outguns the Canon for features and specifications. It has a newly designed image sensor and the same Expeed 4 image processor as the very latest D810A and D7200. By contrast, the 6D looks a bit of a poor relation, especially compared with Canon's latest APS-C format camera, the 7D Mk II, which boasts a newer generation of processor and a more sophisticated autofocus system.

Even so, the majority of enthusiast photographers will still prefer to go full-frame, for its greater creative control over depth of field and wider choice of top-grade lenses. So let's see how the well-established 6D holds out against Nikon's D750 scene-stealer.

## FEATURES

Rightly or wrongly, many of us check out the megapixel count before anything else when we eye up a prospective new camera. The 6D has a somewhat modest 20.2MP sensor, whereas Nikon takes an early lead with its 24.3MP sensor. Nikon claims that its new design delivers "exceptional" image quality that's cleaner than ever before at high ISO settings. Even so, the 6D stretches a full f/stop further than the D750 in its native and expanded sensitivity ranges, to ISO 25,600 and 102,400 respectively.

A little curiosity is that the D750 bucks Nikon's trend with its other recent digital SLRs and retains an OLPF (Optical Low-Pass Filter) in front of its image sensor. This comes with an anti-alias filter to guard against moiré patterning and false colour. This is the usual Canon stance, and the 6D also has an OLPF.

The D750 looks the sportier camera of the two, with a 6.5fps maximum drive rate. That's two whole frames per second faster than the 6D can muster. And where the 6D has sufficient buffer capacity for 17 shots in raw mode, the D750 can stretch to

## CANON EOS 6D



Website	www.canon.co.uk
Street price (body)	£1,130/\$1,400
Image sensor	20.2MP CMOS
Max image size	5,472 x 3,648
Image processor	Digic 5+
Low-pass filter	Yes
Lens mount	Canon EF
Viewfinder	Pentaprism, 0.71x, 97%
ISO range (expanded) (50-102,400)	ISO 100-25,600
Autofocus points	11-point (1 cross-type)
Shutter speeds	1/4,000 to 30 sec, Bulb
X-sync	1/180 sec
Max burst rate	4.5fps
Buffer capacity (raw)	17 shots
Video – max resolution	1080p, 25/30fps
LCD screen	3.0-inch, 1,040k, fixed
Memory	1 x SD/SDHC/SDXC UHS-I
Wireless connectivity	Wi-Fi & GPS
Interface	USB 2.0, HDMI
Body materials	Alloy & polycarbonate
Body (W x H x D)	145 x 111 x 71mm
Weight	755g
Battery life (CIPA)	1,090 shots

Both the 6D and D750 feature bright and sharp pentaprism viewfinders rather than cheaper pentamirror units

33 shots. However, you can only squeeze that many raw shots into the buffer if you switch to 12-bit compressed mode. In 14-bit uncompressed raw mode, there's only enough space for 15 shots. At least Nikon gives you choices over bit-depth and compression settings, unlike Canon.

Tracking action should be another sporty win to the D750, as it features a new-generation 51-point autofocus module. This includes 15 cross-type points for resolving detail in both horizontal and vertical planes, as well as enabling 11 points to be used where your

## NIKON D750



Website	www.nikon.co.uk
Street price (body)	£1,500/\$1,900
Image sensor	24.3MP CMOS
Max image size	6,016 x 4,016
Image processor	Expeed 4
Low-pass filter	Yes
Lens mount	Nikon F
Viewfinder	Pentaprism, 0.7x, 100%
ISO range (expanded) (50-51,200)	ISO 100-12,800
Autofocus points	51-point (15 cross-type)
Shutter speeds	1/4,000 to 30 sec, Bulb
X-sync	1/200 sec
Max burst rate	6.5fps
Buffer capacity (raw)	15-33 shots
Video – max resolution	1080p, 50/60fps
LCD screen	3.2-inch, 1,229k, tilt
Memory	2 x SD/SDHC/SDXC UHS-I
Wireless connectivity	Wi-Fi
Interface	USB 2.0, HDMI
Body materials	Alloy & polycarbonate
Body (W x H x D)	141 x 113 x 78mm
Weight	840g
Battery life (CIPA)	1,230 shots

widest available aperture is only f/8. It comes into its own if you need to add a 2x tele-converter to an f/4 telephoto lens. By comparison, the 6D is a real under-achiever in the autofocus stakes. It has a mere 11 AF points in total, with just a single cross-type point at the centre, and none of them can function at apertures narrower than f/5.6.

Both the 6D and D750 feature bright and sharp pentaprism viewfinders rather than cheaper pentamirror units. However, the 6D's viewfinder only gives 97% frame coverage, whereas the D750 shows you the whole picture. The 6D lacks the 'intelligent' viewfinder display options that are available in many of Canon's newer SLRs, including the 70D and 7D Mk II APS-C format cameras.

Up above the viewfinder, the D750 adds a pop-up flash which is omitted in the 6D's design. You could argue that photographers at this level are unlikely to use a pop-up flash, but it can be useful for the emergency filling of shadows, as well as for wirelessly triggering off-camera flashguns that are compatible with Nikon's wireless master/slave flash modes.

## CANON EOS 6D

1

AF, Drive, ISO and Metering mode buttons are lined up along the front of the top-panel info LCD.

2

The 6D includes 'Creative Auto' and scene modes as well as a full auto setting.

3

The viewfinder housing doesn't include a pop-up flash module, and there's no built-in AF assist lamp either.

4

There's only one control button on the front, which is for depth of field preview.

5

The pentaprism viewfinder only gives 97 per cent frame coverage and crops the extreme edges.

6

The 6D's screen has a lower pixel count and no tilt facility.



## NIKON D750

1

As well as plentiful scene modes, the D750 adds an Effects setting with options like night vision and colour sketch.

2

The drive mode wheel under the shooting mode dial is simpler than the 6D's arrangement.

3

The pop-up flash, absent on the 6D, is worth having even if only for easy wireless control of external flashguns.

4

Front-mounted controls include a depth of field preview and an autofocus mode selector.

5

An additional row of control buttons down the left-hand side enable quick access to shooting and playback options.

6

The tilting LCD screen comes in handy for Live View and movies.



Around the back, the D750 boasts a slightly larger and higher-resolution LCD screen than the 6D. The Nikon also adds a tilt facility that's missing on the Canon. It's not fully articulated and, unlike in some current cameras, the range of tilt doesn't extend to flipping the screen over completely for selfie mode shooting. Even so, it's a bonus for high-level or low-level Live View and movie shooting. The D750 also includes two SD slots rather than the 6D's one. The extra slot is useful for instantly creating backups of your images while shooting, or for saving raw and JPEG files to separate cards. Both cameras are compatible with SDHC and SDXC cards, and are able to make use of the performance increase offered by the UHS-1 (Ultra High Speed) bus.

The Nikon can record Full HD 1080p movies at maximum frame rates of 50 or 60 frames per second rather than the Canon's 25 or 30fps, but neither camera is capable of 4K video capture. Both have built-in Wi-Fi connectivity, and the only notable feature that's included in the 6D

but lacking in the D750 is built-in GPS for geo-tagging images.

## BUILD AND HANDLING

The build quality of the two cameras feels very similar in most respects. Both use a mix of reinforced polycarbonate and magnesium alloy sections. The Nikon has alloy sections at the top and rear, with a polycarbonate front panel, whereas the Canon has alloy front and rear panels and polycarbonate up on top. Both feature weather-seals.

The 6D and D750 make great everyday walkabout and travel cameras, with compact dimensions for full-frame SLRs. They're noticeably smaller than the Canon 5D Mk III and Nikon D810, and nowhere near as big as the top-flight 1D X and D4S models with their built-in vertical grips. The 6D is marginally smaller than the D750 and somewhat lighter at 755g compared with 840g. The D750 has better stamina, with 1,230 shots from a freshly-charged battery rather than the 6D's 1,090 shots (Cipa-tested).

Both of these SLRs have conventional shooting mode dials that include a Scene position for access to various scene modes, as well as a fully automatic shooting mode that has intelligent real-time scene analysis. The Nikon goes a step further with an Effects position on the shooting mode dial, for applying special imaging effects while shooting, whereas the Canon adds a more serious and enthusiast-friendly Bulb mode. Both cameras add two user-defined positions on the shooting mode dial for quick access to preferred set-ups.

Further similarities in handling include a top-panel info LCD for showing important shooting settings and various other parameters like battery status. In front of this LCD, the Canon has a bank of buttons for accessing AF mode, drive mode, ISO and metering mode. The Nikon only has a metering mode button in front of the top screen, other functions being dispersed to buttons and dials at other positions around the camera. The Nikon also adds an exposure compensation





Both the 6D and D750 make great everyday walkabout and travel cameras, with relatively compact dimensions for full-frame SLRs

button just behind the shutter release-button. We prefer this to the Canon's rear-mounted rotary dial for exposure compensation, which is easy to adjust accidentally unless you engage the adjacent locking switch.

The now ubiquitous Quick or Info menu is available on both cameras, for quick and easy control over shooting settings via a specialist on-screen menu on the rear LCD. Both are pretty slick and well thought out, although Canon wins out for intuitive design. Overall, the layout of controls and general handling of the 6D and D750 are typical of Canon and Nikon designs respectively, and will feel immediately familiar to photographers accustomed to either brand.

## PERFORMANCE

With equivalent high-quality lenses that have fast ring-type ultrasonic autofocus, there's practically no difference in the speed with which the two competing cameras can lock onto stationary objects. At least, that's the case when using the

## IMAGE TEST



Canon



Nikon

**Outdoor** \_\_\_\_ For outdoor and landscape shots using auto white balance, the D750 tends to give a slightly cooler colour balance than the 6D. The Nikon's images are more vibrant with greater contrast.



Canon



Nikon

**Detail** \_\_\_\_ The Nikon performs better in capturing fine detail. It makes the most of its sensor's higher megapixel count and stays slightly ahead of the Canon throughout the sensitivity range.

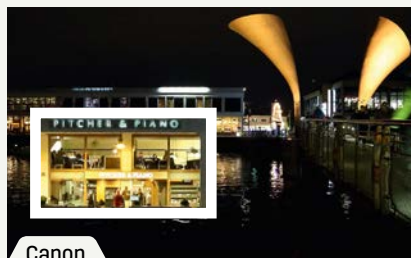


Canon



Nikon

**Dynamic range** \_\_\_\_ This shot with bright highlights and deep shadows shows the D750 gives higher-contrast results. Highlights are well preserved in both, but the Canon retains more lowlights.



Canon



Nikon

**Low light** \_\_\_\_ There's practically nothing to choose in the clean and noise-free quality of these lowlight images, which both retain high levels of detail. They were taken well after sunset at ISO 12,800.

central AF point, which is equally effective in both cameras even in very low lighting conditions. However, the D750 is more competent than the 6D at autofocus with off-centre AF points, and it's notably better at tracking moving objects in continuous autofocus mode, too. Nikon's advanced, 3D-tracking AF mode is particularly good for this.

Both cameras have consistent metering, although the 6D tends to give marginally brighter images in centre-weighted metering mode. In evaluative or matrix

metering mode, the 6D biases results more exclusively to brightness levels at the AF point (or points) that achieve autofocus, whereas the D750's value judgments are based more on the whole scene. The D750 is more safety-conscious in its efforts to avoid blown highlights when using matrix metering.

For colour rendition, the Canon's images are typically a little warmer whereas the Nikon often tends to pump up saturation a little more and adds a little extra punch and vibrancy. This arguably



There's very little to choose between the two cameras for dynamic range at the base sensitivity setting of ISO 100

❶ makes the 6D a little more flattering for portraits, and the D750 a bit more dramatic for landscapes.

There's very little to choose between the two for dynamic range at the base sensitivity setting of ISO 100. However, from ISO 200 and upwards, the 6D gives better detail in lowlights, and more convincing tonal range. This remains the case whether the Canon's Auto Lighting Optimizer and Nikon's Active D-Lighting features are enabled or switched off.

The D750 improves on the older Nikon D610 and easily outclasses the D810 for delivering clean, noise-free images at high ISO settings. Low-light, low-noise imagery has recently been a Canon strong point but the D750 proves every bit as good as the 6D at producing clean images with impressive fine detail. Results are superb even at super-high sensitivity settings of ISO 6,400 and 12,800, although the Canon is slightly better at the top of its native sensitivity range of ISO 25,600, at which point the Nikon is already in its expanded range. 📷



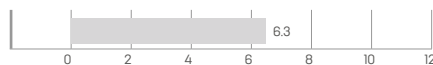
CANON EOS 6D



NIKON D750



COLOUR ERROR CLOSER TO ZERO IS BETTER

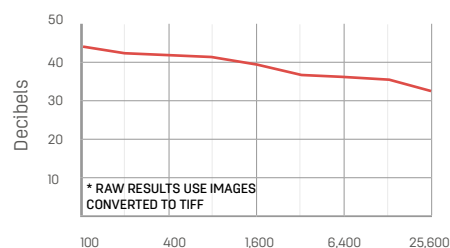


Technically, the score for colour accuracy isn't great, but there's an attractive warmth to the 6D's images.

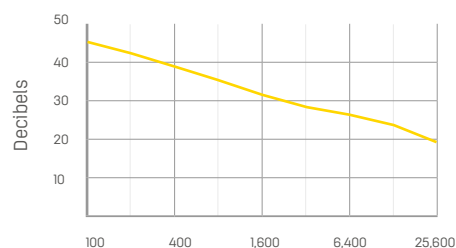


Near-perfect colour rendition in the lab, but the auto white balance system produces cool shots

RAW\* SIGNAL-TO-NOISE RATIO HIGHER IS BETTER; RAW RESULTS USE IMAGES CONVERTED FROM TIFF

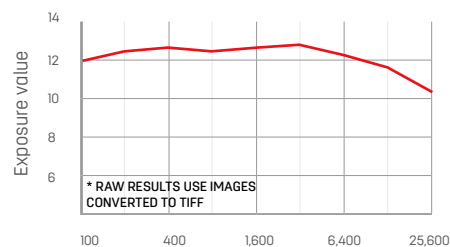


Signal-to-noise ratio scores are better than from the D750, but the Nikon draws closer in JPEG quality.

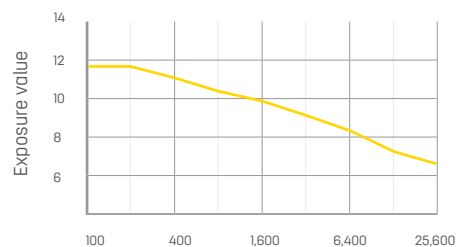


The D750's images look equally detailed and noise-free, before and after conversion.

RAW\* DYNAMIC RANGE HIGHER IS BETTER; RAW RESULTS USE IMAGES CONVERTED FROM TIFF



The 6D maintains astonishingly rich highlight and low-light detail, even at ultra-high ISO settings.



The D750 loses more low-light detail than the 6D and is more likely to blow highlights at high ISO settings.

VERDICT

FEATURES ★★★★★

BUILD & HANDLING ★★★★★

PERFORMANCE ★★★★★

VALUE ★★★★★

OVERALL ★★★★★

FEATURES ★★★★★

BUILD & HANDLING ★★★★★

PERFORMANCE ★★★★★

VALUE ★★★★★

OVERALL ★★★★★

The Canon 6D and Nikon D750 are both excellent cameras, ideally suited to expert and enthusiast photographers. The D750 reaches out a little more to beginners with its additional Effects modes. Both cameras strike a great balance between size and natural handling: the 6D has a more intuitive Quick menu, whereas the D750 adds a tilting rear screen. For overall features and specifications, the D750 is a clear winner over the 6D. As for performance, both cameras have

strengths and weaknesses. The Nikon delivers punchier-looking images and has better autofocus, especially for moving objects. The Canon has better dynamic range and is more able to retain detail in bright highlights and dark lowlights. Both cameras also give stunning low-light performance, delivering amazingly clean images even at super-high sensitivity settings. All things considered, however, the Nikon D750 is the better camera, and well worth its higher asking price.



# Card cases

Compact, convenient cases that'll keep your cards protected and your kit bag tidy



### Delkin SD Memory Tote

Web: [www.delkin.com](http://www.delkin.com) Price: £8/\$10

The Delkin's hard outer shell gives great protection to eight SD cards stored in easily accessible individual slots. These could do with being slightly tighter, though, as cards can work loose.

OVERALL



### Hama Outdoor Memory Card Case

Web: [www.hama.com](http://www.hama.com) Price: £13

It's tough and compact, but Hama's strange internal design means cards are stored on one side behind an awkward panel. There's room for five SD cards, but they don't get individual slots.

OVERALL



### HPRC 1300

Web: [www.plaber.com](http://www.plaber.com) Price: £23/\$26

Your cards will be invincible in this impact, water and dust-resistant case. Inside, you can fit four CF, SD and Memory Stick cards in rubber mouldings, but these are too tight, so access is slow.

OVERALL



### LensCoat Memory Wallet Combo 66

Web: [www.lenscoat.com](http://www.lenscoat.com) Price: £18/\$20

Don't fancy a bulky hard case? This wallet design is easily pocketable, yet you can stash six CF cards and another six SD cards. The only downside is the time needed to roll it closed.

OVERALL

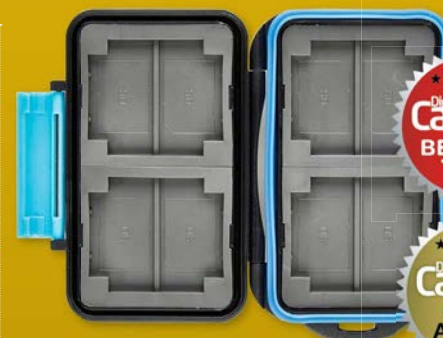


### Lowepro Compact Media Case 20

Web: [www.lowepro.co.uk](http://www.lowepro.co.uk) Price: £14/\$20

This is the largest case here – but it will pack a small portable hard drive. However, there's only space for four SD cards, and they'll be a pain to access, thanks to fiddly soft pouches.

OVERALL



### PNY Memory Card Case

Web: [www.pny.eu](http://www.pny.eu) Price: £14/\$20

Storing cards securely but also maintaining easy access is tricky, but PNY has managed it perfectly here. You get slots for eight SD cards plus another four CF, as well as weather-sealing.

OVERALL



Digital Camera  
BEST ON  
TEST

Digital Camera  
GOLD  
AWARD

Digital Camera  
GREAT  
VALUE

## &gt; THE SPECS

Sensor	18MP APS-C (22.3x14.9mm) CMOS sensor
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder, 95% coverage, 0.8x magnification
Video resolution	Full HD (1,920x1,080 pixels) at 30, 25 or 24fps
ISO range	ISO 200-6,400 (expandable to 12,800)
Autofocus points	9
Max burst rate	3fps
LCD screen size	3-inch; 460,000 dots
Shutter speeds	1/4,000-30 sec
Weight	480g (inc battery and memory card)
Dimensions	129.6x99.7x77.9mm
Power supply	BLS-5 Li-Ion battery

**T**he new Canon EOS 1200D replaces the 12-million-pixel EOS 1100D, which is now three years old, and sits just below the ultra-small 100D as the first camera in Canon's line-up. The 1200D is less a major overhaul of its predecessor than a gentle upgrade. In terms of specifications, it seems like Canon has played it relatively safe. It features an 18-million-pixel sensor, and has a Digic 4 processor, which is two generations old.

## FEATURES

Aimed squarely at the entry-level user, the 1200D comes packed with several automatic modes, including Scene Recognition Auto and some creative modes to give images a different look. Unlike the 100D, these filters can only be applied post-shooting, rather than as the image is being captured.

On the back of the camera is a 460,000-dot, three-inch display, which is neither touch-sensitive nor tilting. It is joined by an optical viewfinder that offers a 95% field of view.

Full HD video recording is possible, which means that the whole Canon digital SLR line-up now has the capacity to record high-resolution movies. You can also take full manual control of video recording, which is nice to see in an entry-level model.

The camera's native sensitivity run starts at ISO 100, rising up to ISO 6,400, but this is expandable up to 12,800. As the camera doesn't use the most recent image processor, it will be interesting to see how well it copes



SLR Canon 1200D &gt; £319 with 18-55mm lens

> [www.canon.co.uk](http://www.canon.co.uk)

# Bag a bargain

Canon's EOS 1200D is certainly excellent value for money – but what are the images like? **Amy Davies** finds out

with noise in high-sensitivity and low-light situations.

There are nine autofocus points, with only the central point being cross-type for extra sensitivity. The camera can shoot at up to three frames per second, which doesn't compare particularly well with the Nikon D3300's 5fps, for example.

Canon hasn't included Wi-Fi or NFC connectivity for the 1200D. Although that's perhaps offputting for those coming from a smartphone background, it's to be expected at this price point. It is compatible with Wi-Fi-equipped SD cards, though, if you want to expand its capability.

Battery life is claimed to be up to 500 shots, which is a reasonable offering. Again, though, it doesn't compete too well with the Nikon D3300, which is rated at over 700 shots per charge. But although the 1200D goes head to head with the D3300, with them both sitting in the same position in each other's

**Above** With a decent kit lens included, the 1200D looks great value

respective line-ups, the 1200D, for now at least, is much cheaper.

## BUILD AND HANDLING

Canon has given the 1200D an improved look and feel compared with the 1100D. It's now more in line with something like the 700D, which sits ahead of it in the line-up.

As there is no touchscreen on the 1200D, every element of camera control is done via the physical buttons, unlike some of the other SLRs in Canon's range (such as the 100D and the 700D). Despite it being an entry-level model, there are still a decent number of those buttons on the back of the camera, including dedicated buttons for white balance and sensitivity (ISO).

As can be found on all Canon digital SLRs, there is a mode dial on top of the camera to enable quick changes between the different shooting modes on offer. There's a lot of choice on this dial, including the





The 1200D's textured coating and chunky grip help you get a firm hold



There's a good range of direct control buttons on the 1200D



Successful composition through the viewfinder can be tricky



The rear screen is neither touch-sensitive nor articulating

## Zooming in on the... Canon EOS 1200D

A quick tour of the camera's key features



Tap this Q button to quickly access up to 12 settings you'll commonly use, such as metering

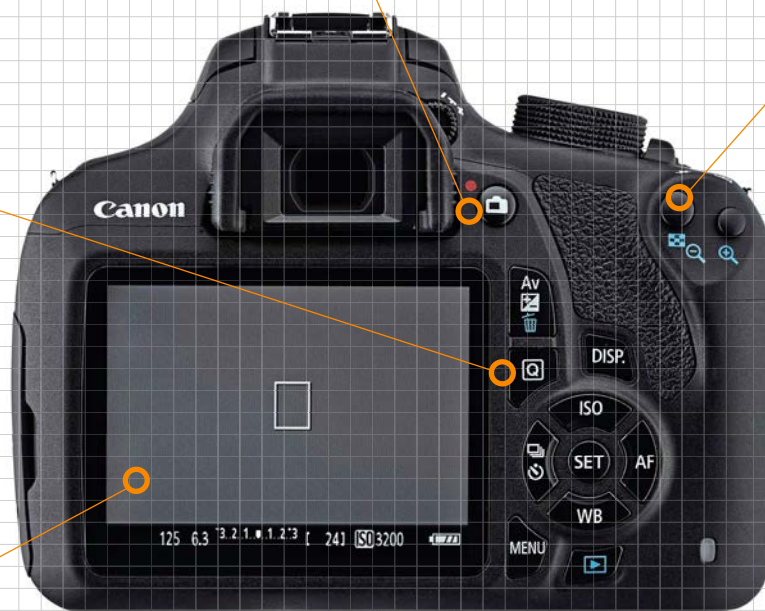


Use this button to start shooting with Live View – but note that focussing speeds will be drastically reduced

The left-hand button here allows you to change the active AF point, of which nine are available



Canon hasn't made any drastic changes to the user interface: it's simple and does the job



standard exposure modes, as well as fully automatic and the various scene modes the camera offers.

Unlike with the 100D, in order to activate video recording, you need to set the mode dial to this setting. The Live View button on the back of the camera can then be used to start the recording off.

By pressing the quick menu button, labelled as Q, you can quickly scroll to 12 different settings displayed on the screen and change them using the scrolling dial. So, for instance, you can navigate to the metering setting, then scroll with the

**“The 1200D is less a major overhaul of its predecessor than a gentle upgrade”**

dial to change from general-purpose to spot metering.

There aren't many in the way of creative options to be found on the 1200D – there's no panoramic mode of the kind you'll find on the D3300 – but you can experiment with Picture Styles before shooting. There are a number of presets, such as Landscape and Monochrome, which

you can modify, for instance by upping the contrast. The benefit here is that you can shoot in raw format to keep an unaltered version of the image should you need it.

Along with that option, you can also edit photos in-camera with certain filter effects. These are fun to experiment with – and you'll have the original version of the file too.

There will be those who prefer optical viewfinders to electronic. Although the 1200D's optical finder is bright and clear, the fact that it only offers a 95-per-cent field of view can be problematic as stray artefacts can creep into compositions.

## Meet the rivals...

See how the EOS 1200D stands up against the competition



**Nikon D3300**  
£499 (body only)  
With its high resolution, the D3300 satisfies those who crave megapixels without skimping on image quality.  
Reviewed: page 14  
★★★★★



**Canon EOS 100D**  
£279 (body only)  
The smallest and lightest SLR on the market and a fantastic choice for the first-time SLR buyer.  
Reviewed: page 14  
★★★★★



**Fujifilm X-A1**  
£349 with 18-50mm lens  
The X-A1 CSC scores well for build, functionality and price, which makes the slight dip in image quality from the X-M1 palatable.  
Not reviewed

## PERFORMANCE

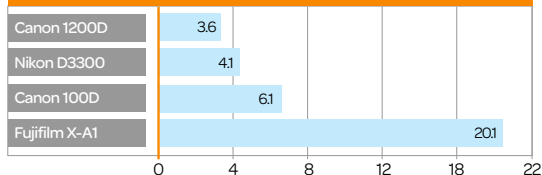
Image quality from the 1200D is very good, as we've come to expect from Canon cameras. Colours are bright and punchy without being overly vibrant. The 1200D maintains Canon's propensity towards pleasingly warm tones that stay just on the right side of accurate.

You can use Picture Styles to experiment with how colours appear, which is useful if you want to increase vibrancy or contrast. Using the

## CAMERA BENCHMARKS

How does the EOS 1200D measure up?

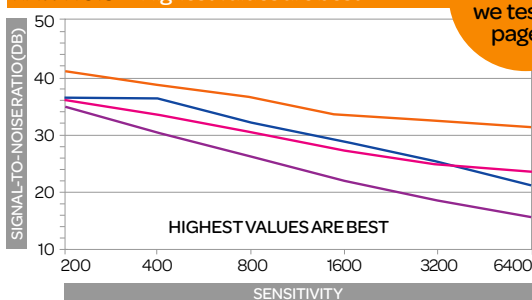
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** This test shows the 1200D is reasonably close to accurate, erring on the side of producing warm tones.

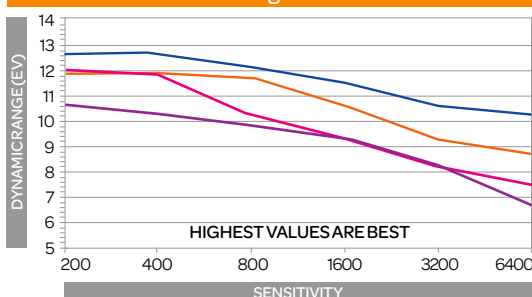
**KEY** Canon 1200D (purple), Nikon D3300 (pink), Canon 100D (orange), Fujifilm X-A1 (blue)

## RAW NOISE\* Highest values are best



**NOISE RESULT:** The graph suggests the 1200D is a poor performer, but this could be due to Canon prioritising detail resolution.

## RAW DYNAMIC RANGE\* Highest values are best



**DYNAMIC RESULT:** The 1200D puts in a consistent performance across the sensitivity range, although the X-A1 does better.

## OVERALL BENCHMARK RESULT

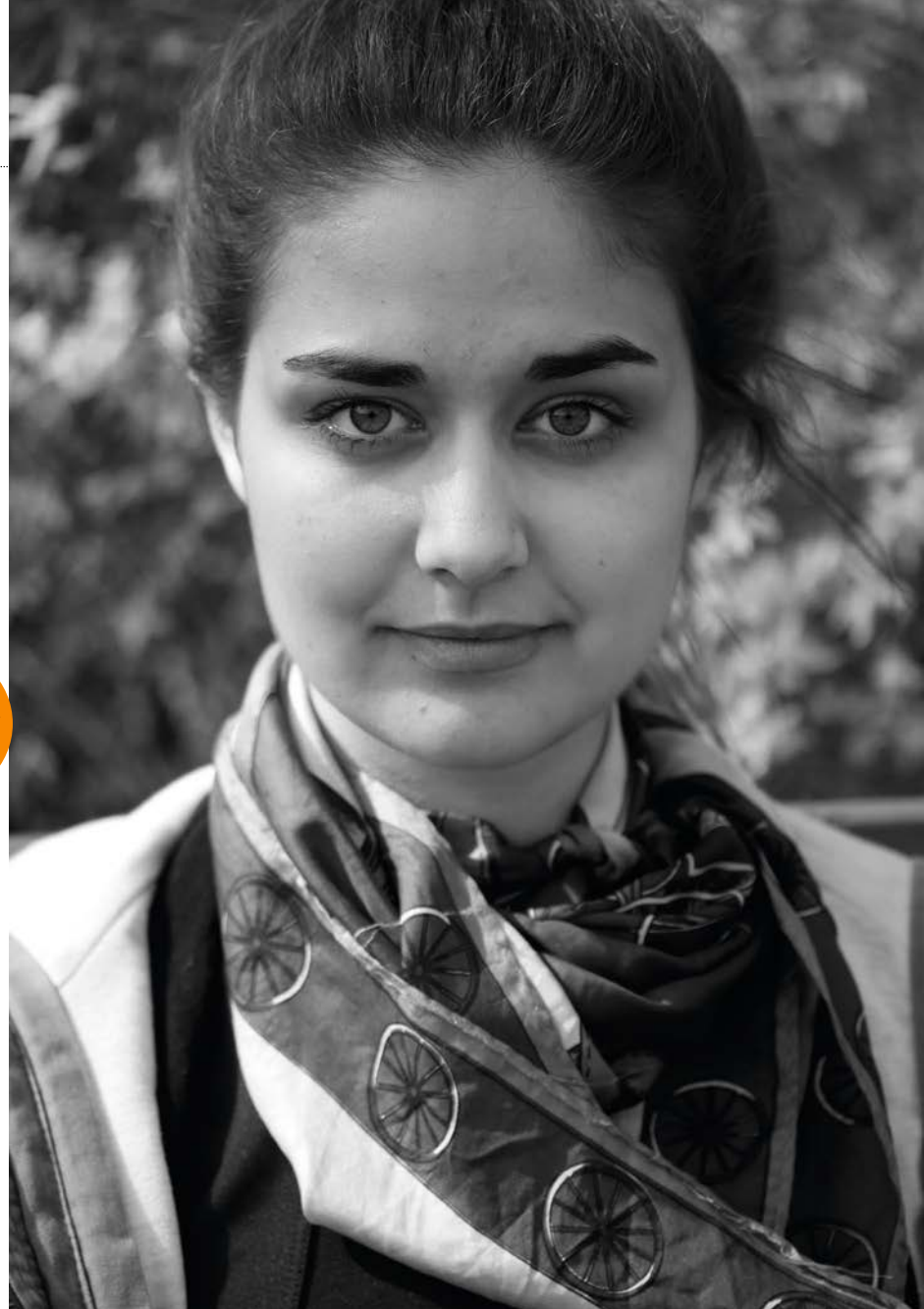
JPEG images have a stronger signal-to-noise ratio result than the raw format images, reflecting the fact Canon is applying its own noise-processing to JPEG images in-camera. For dynamic range in JPEG images, the 1200D beats its predecessor by a good margin, but is closely matched with the Nikon D3300.

\* Raw results use images converted to TIFF

- Automatic setting is good for everyday shooting scenarios, while the Monochrome setting gives pleasing black-and-white images.

Compared to the Nikon D3300's 24.2 million pixels, 18MP may seem fairly modest, but the 1200D is capable of resolving a good amount of detail. Our lab tests indicate that the 1200D does well for detail resolution, favouring it over noise reduction, especially in raw files.

**Above right**  
Experiment with Picture Styles in-camera to shoot in monochrome



If you examine images at their actual size, it's possible to see some image smoothing at mid-range sensitivities, but it's not something that is troubling at printing sizes of A3 or below. At low sensitivities, such as ISO 100 or 200, detail is kept well.

The Nikon D3300 has a higher resolution and no optical low-pass filter, so it is better placed to capture detail. But the difference is probably only something you'll notice if you make huge prints or tend to shoot photographs with lots of fine detail in them.

Noise is generally well controlled throughout the sensitivity range. At reasonably high sensitivities, such as ISO 800, noise is very low, which is great to see. Happily, detail is also kept pretty well at these sensitivities. There is more noise visible at ISO 1,600, although the noise reduction system does a good job of keeping it to a minimum. There is some detail lost if you examine an image at actual

size, but it's not likely to be a problem for the typical user.

More detail is visible in raw files with the noise reduction switched off. This means you can apply your own processing using Canon's Digital Photo Professional software, which comes with the camera, depending on whether you want to prioritise detail resolution or lack of noise.

Like other Canon cameras, the 1200D uses Canon's iFCL metering system. Generally, this does a good job of producing well-balanced exposures, but it can be problematic to use when you're shooting a high-contrast scene.

The camera's automatic white balance system does an excellent job in most situations. While shooting under artificial lighting, the camera errs ever so slightly towards warmer tones, but it's generally not too displeasing. You can always set a more specific white balance setting.

Processing speed can sometimes be a little lacklustre. For instance,





## Tech Briefing

## Canon EOS Companion app



While Nikon includes an in-camera guide to taking photographs in the D3300, Canon has created an app that can guide you through the basics of using your camera, along with giving you hints, tips and inspiration for photography itself.

EOS Companion is available for Android and iOS. It includes a fun game, which asks you to select a random theme ('Clothes', for example) and an approach (like 'Happy'), which can be a good way to challenge yourself. Exercises are also available to show you more conventional techniques, such as making the subject stand out. Lens tutorials are useful when you want to move past the kit lens.

if you take a couple of shots in quick succession, waiting for them to appear on the back display can take a frustrating few seconds. This is probably due to the older processor. In fairness, it's also something that is problematic with the Nikon D3300.

Autofocussing speeds are generally fairly good when shooting in bright light. The kit lens takes a little longer to focus than some other prime lenses, and because it's not

**Above** Colours are bright and punchy straight from the camera, displaying a pleasing warm tone

**Below** The top controls follow the classic Canon layout

hyper- or ultrasonic, it can seem quite loud if you're shooting in a quiet environment. It's also worth noting that switching to Live View significantly reduces the speed at which the camera can focus, so it's only really recommended for shooting still or nearly still subjects. It can be useful for shooting macro subjects, where the larger view is useful for pinpoint-accurate focussing.

Going back to the kit lens for a moment, the 18-55mm f/3.5-5.6 optic supplied with the 1200D is a decent all-round performer for your first lens. By shooting at mid-range apertures, such as f/8, we can assess the sharpness of the lens. Here the kit lens puts in a good performance, producing reasonably sharp images across the frame.

Although battery life isn't quite as good as the quoted Nikon D3300 battery life, it still puts in a very good performance. We shot for a few hours at a time, and the battery indicator was still displaying as full or nearly full by the end of the day. It's unlikely you'll need a second battery unless you plan to shoot with it for several days at a time without charge.

## VERDICT

Three years is a long time to wait for an upgrade of this kind of camera, so

we can't help but be a little disappointed not to see something a little more revolutionary in the 1200D's specifications. That said, image quality is great, if not a massive leap forward from the 1100D.

Detail resolution is good, but not quite as good as the Nikon D3300, which has a higher-resolution sensor and no anti-aliasing filter. Unless you're planning to make huge prints, though, it's not something that should be too much of an issue for the majority of subjects.

There's no touchscreen on the 1200D, but thanks to the number of buttons available on the body, you shouldn't feel it's a feature that is desperately lacking – and its absence helps to keep the price low. 📷



## Digital Camera

## FEATURES



## IMAGE QUALITY



## BUILD/HANDLING



## VALUE



## Overall ★★★★★

**WE SAY:** Canon has produced a reliable camera capable of creating some beautiful images. If you're in the market for your first digital SLR, and you're OK with a no-frills purchase, the 1200D is a great option.



## &gt; THE SPECS

Sensor	24.2MP APS-C (22.3 x 14.9mm) CMOS sensor
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder, 95% coverage, 0.82x magnification
Video resolution	Full HD (1,920x1,080 pixels) at 30, 25 or 24fps
ISO range	ISO 100-12,800 (expandable to 25,600)
Autofocus points	19
Max burst rate	5fps
LCD screen size	3-inch; 1,040,000 dots
Shutter speeds	1/4,000-30 sec, Bulb
Weight	565g (inc battery and memory card)
Dimensions	131.9x100.9x77.8mm
Power supply	LP-E17 Li-ion battery (supplied with camera)



SLR Canon EOS 760D &gt; £649 / \$849

> [www.canon.co.uk](http://www.canon.co.uk)

**W**ith three cameras in its entry-level range Canon already had plenty to interest novices and enthusiast photographers on a budget. Now the company has replaced the 700D with two models, the EOS 760D and 750D, rather than one.

As the 700D continues in the line-up (for now at least), this means that there are five cameras in what Canon calls its beginners' range. The new 760D and 750D, known as the Rebel T6s and T6i in the US, sit at the top of this group above the 700D, 100D and 1200D.

The 760D is designed with more experienced photographers in mind than the 750D, and has a few features from Canon's high-end cameras. In this review we're going to concentrate on the 760D, but you can find out more about the 750D on page 14.

## FEATURES

Although they are aimed at slightly different people, the Canon 760D shares many components with the 750D. For a start they both have Canon's new APS-C format CMOS sensor with an effective pixel count of 24.2 million, a Digic 6 processing engine and a phase detection

autofocus system, with 19 cross-type points for use when focusing images in the viewfinder. The cameras can select the appropriate AF point to use automatically in 19-point AF mode, or it can be set manually in groups in Zone AF mode (there are five groups of points for selection) or individually in Single-point AF mode.

There's also Canon's new Hybrid CMOS AF III system (with Face Detection, Tracking AF, FlexiZone-Multi and FlexiZone-Single modes), for use when images or video are composed on the screen in Live View mode. This system has a greater

**Above** That hand grip is deep and comfortable.

*The EOS 760D is sold as the Rebel T6s in the US.*

number of focusing pixels, set in a more regular array than before. Canon says it's about four times faster than version II (used in the EOS 100D).

Despite the increase in pixel count in comparison with the 700D, which has 18 million pixels, the 760D has a native sensitivity range of ISO 100-12,800, with an expansion setting of ISO 25,600 for when it's vital to get an image in low light. For movie shooting, the maximum native setting is ISO 6,400, and there's an expansion value of ISO 12,800.

When shooting through the viewfinder, the metering system uses a 7,560-pixel RGB and Infra Red (IR) metering sensor. These pixels are grouped into 63 segments (9x7) and the usual options of Evaluative, Partial (6.0% of viewfinder), Spot (3.5% of viewfinder) and Centre-weighted average metering are available. In Evaluative mode the metering is linked to the AF points, so the brightness of the subject could have



## Stick or twist? Upgrade advice

Although the 760D and 750D replace the 700D (pictured), with the addition of the rear control dial and a top-plate LCD, the 760D is closer in handling to the Canon 70D. This may take some adjusting to, but it makes the camera quicker and easier to

use. The addition of an electronic level is also useful for keeping horizons straight. Most importantly, the 760D can resolve a lot more detail than the 700D without detriment to image noise control, making it a great upgrade.



## Zooming in on the... Canon EOS 760D

A quick tour of the camera's key features



### Mode dial

This button needs to be pressed before the mode dial can be rotated, which seems rather fiddly at first.



### Sensor

This detects when the 760D is held to your eye and turns off the main screen display.



### LCD light button

This turns on the top-plate LCD light to allow the settings to be seen in low light.



### Top LCD

The 760D displays when the Wi-Fi system is active in the top-plate LCD.



### Viewfinder

If the 760D detects flicker from lights, an icon tells you to use Anti-Flicker Shoot.

### Q button

Pressing this button gives a quick route to changing some key settings.



an impact upon overall exposure. Unlike the 700D's (iFCL) metering system, the pixels on the sensor each have their own RGB-IR filter and are read independently within the zone, which Canon claims gives more accuracy and better colour detection. In Live View and video mode the same metering options are available, but the camera uses the imaging sensor to supply the information and Evaluative mode uses 315 zones, Partial metering covers 10% of the scene and Spot 2.7%.

Canon has been pretty quick to appreciate the benefits brought by

**“The pixels on the sensor each have their own RGB-IR filter and are read independently”**

touchscreen technology. Like the 700D, the 760D has a 3-inch touch-sensitive Clear View II TFT screen with 1,040,000 dots and an aspect ratio of 3:2 to match the uncropped ratio of the imaging sensor precisely.

In another first for Canon SLRs, both cameras feature Wi-Fi and NFC (Near Field Communication)

technology to enable them to be connected to other devices for remote control and image sharing. The NFC function provides a quick way of connecting them wirelessly to other NFC-enabled devices such as a smartphone, tablet, another camera or Canon's Connect Station CS100, the company's portable storage unit. Once enabled via the menu, two NFC devices are connected just by touching their NFC logos together. You can also control the cameras remotely via Wi-Fi using Canon's free app on a smartphone.

## BUILD AND HANDLING

Although they have a different control layout, the 750D and 760D feel very similar in the hand. There's only 0.2mm difference in one dimension between them – the 760D is the slightly taller of the two. They don't have quite the solidity of the 5D Mark III, but they have a chassis that is constructed from aluminium alloy and polycarbonate resin with glass fibre and they feel pretty durable for entry-level models. There's no alarming creaking when you grip them tightly.

## Meet the rivals...

The models the 760D is taking on



### Canon 750D

£526 / \$749 without lens

An alternative use of the 760D's processing engine, sensor, metering, white balance and AF systems.

Reviewed: page 14



### Nikon D5500

£608 / \$745 without lens

The first Nikon SLR to have a touchscreen, this 24MP has no AA sensor filter for better detail resolution.

Reviewed: page 14



### Pentax K-S2

£499 / \$597 without lens

This 20MP SLR has a vari-angle screen and Wi-Fi connectivity for sharing images.

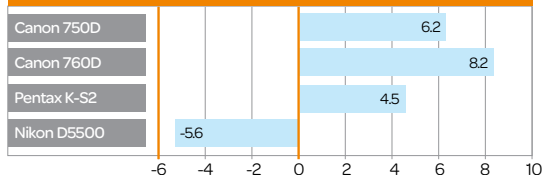
Reviewed: issue 165



## CAMERA BENCHMARKS

How does the Canon 760D fare in our tests?

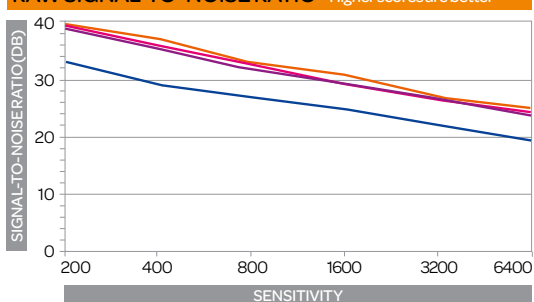
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** This shows that the 760D and 750D produce well saturated images. The Pentax K-S2 is the most accurate.

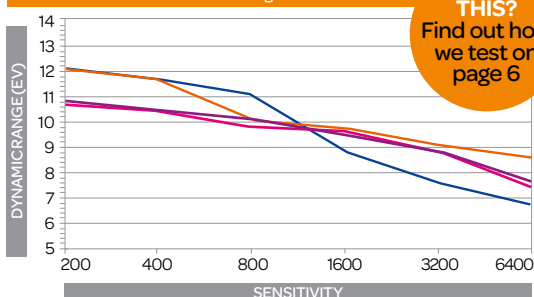


## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The two Canons beat the D5500 for signal-to-noise ratio – which means that they produce cleaner images.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The 760D and 750D capture a wide good dynamic range, but they can't quite match the Pentax K-S2.

**WHAT'S THIS?**  
Find out how we test on page 6

## OVERALL BENCHMARK RESULT

Both the 760D and the 750D (see page 14) performed well in our tests, indicating that they capture lots of detail and control noise well. They also have consistent dynamic range across their sensitivity range, beating the D5500 at high values. But, in the lab at least, the Pentax K-S2 holds its own in this company.

\* Raw results use images converted to TIFF

- One of the biggest differences between the two cameras is that the 760D has a secondary (monochrome) LCD on the top-plate. This shows useful information such as the sensitivity, battery level, exposure level, shutter speed and aperture. It's useful to see the camera settings from above and uses less power than the main screen.

In another departure from the 750D, the 760D has a dial around the

**Above The** metering and AF systems coped well with this tricky shot.

navigation buttons, with a lock to deactivate it. As on the 70D, this allows quick adjustments to exposure in manual exposure mode and exposure compensation in the automatic and semi-automatic modes, as there's no need to press a button while using the main dial.

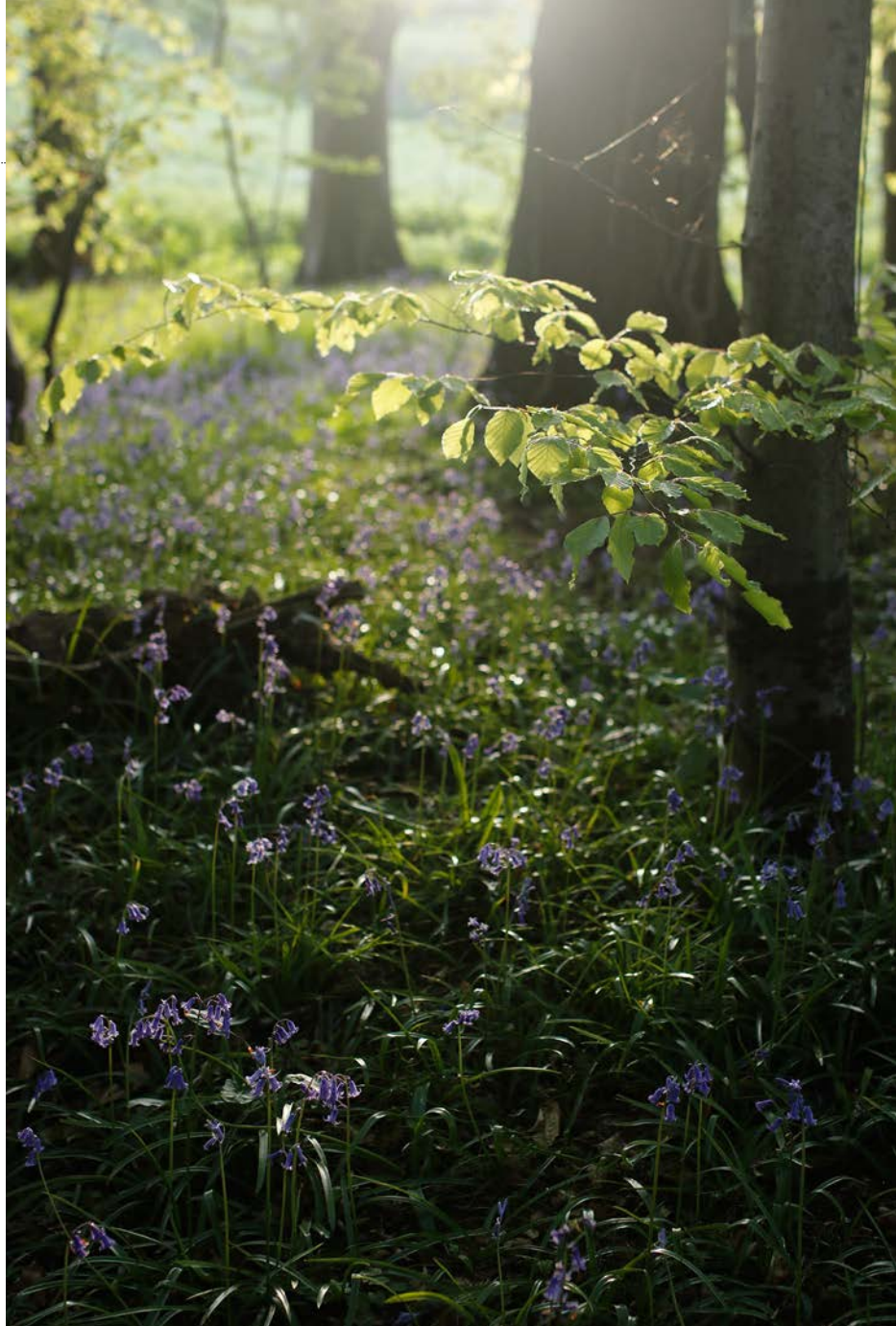
The new dial feels lightweight in comparison with the larger dial found on the back of higher-end cameras like the 5D Mark III. It's also rather low down on the body, so it doesn't fall within the natural reach of your thumb: you have to stretch down to it. Nevertheless, it allows quicker adjustments to be made than is possible with the 700D or 750D.

Like the 7D Mark II but unlike the 750D, the 760D has an electronic level that can be shown in the viewfinder or the main screen. This has a dedicated icon in the viewfinder and it doesn't use the AF points, so it

can be seen when pressing the shutter release to focus the lens. However, it can be hard to see when the scene is dark and (unlike the 7D Mark II's) it only indicates horizontal tilt, not up/down tilt. This means that while it's useful for getting horizons straight, it can't help when you're trying to ensure that the sensor is parallel to a building to avoid converging verticals.

## PERFORMANCE

Probably the first question that everyone wants to be answered when they hear about the 750D and 760D is whether they produce the same image quality. Not surprisingly, the answer is yes. We saw an occasional exposure variation, but that can easily be explained by slight differences in framing (resulting from the different lens position) and the location of the active AF point. In other respects – colour noise control and detail – our







## “The new metering system in the cameras produces good results even in very tricky conditions”

tests reveal that the two cameras produce the same results.

The follow-up questions are usually “How much detail can they resolve?” and “What’s the noise control like?” It’s good news on both counts. The level of detail in images is a huge leap up from that from the 700D. Further good news is that the level of noise is about the same, or slightly better than in images from the 700D throughout the sensitivity range. That’s despite the six-million hike in pixel count.

At 100% on-screen, high-sensitivity JPEGs from the 760D look softer than simultaneously captured raw files, but even at ISO 12,800 they look good at around A3 size. Raw files have more visible noise at 100%, but it’s fine grained and there’s no banding, so it’s possible to produce images that have a bit more bite than the JPEGs.

While the Live View autofocus system is relatively speedy and can be used when hand-holding the camera to shoot stationary subjects, it’s not quick enough to keep up with fast-moving subjects. This means it’s best

**Above** Both the new Canons could resolve the detail of these tomato stalks.

to compose sport and action images in the viewfinder and use the phase detection system, which is fast and accurate. We found this AF system does a pretty good job of selecting the right subject in 19-point mode, but Zone-AF and Single-point mode are a better bet if you can keep the active area over the subject.

The new metering system in the cameras is also very good, and it manages to produce good results, even in very tricky conditions when some cameras’ metering would falter. Exposure is skewed towards that required by the subject under the active AF point, but it’s usually balanced well across the frame. However, that doesn’t mean you won’t need to use the compensation control occasionally. Very bright

sections of sky, for example, can sometimes trick them into underexposing shots.

## VERDICT

The 760D produces superb-quality images that can match Canon’s top-end APS-C format camera, the EOS 7D Mark II, for detail. Noise is controlled well, and colour and exposure are excellent. While the secondary LCD is a useful bonus, it’s the 760D’s electronic level and the rear dial that really make the difference between it and the 750D in use.

The main and Quick menus are well organised and the touch control is very well implemented, so you switch seamlessly between tapping or swiping the screen and using the control buttons and dials. 📷

**Below** Unlike the 750D, the 760D has a top-plate LCD.



## Check your camera Sensor marks advisory



**S**ome Rebel T6s and T6i models have been found with marks on the sensor that can’t be cleaned off. Canon has issued an advisory notice, which says cameras with serial numbers that start with 01 or 02 may be affected. However, cameras with those numbers that also have a mark on the inside of the battery cover are not affected. Canon will inspect potentially affected cameras and repair them for free.

The advisory note is available via [www.bit.ly/T6s\\_T6i](http://www.bit.ly/T6s_T6i). Neither of the samples we used in this test were affected.

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD/HANDLING



### VALUE



## Overall ★★★★★

**WE SAY:** The 760D has the same superb image quality as the 750D, but its better handling, secondary LCD and electronic level make it our choice of the two models. It’s almost like a smaller, lighter 70D.

## &gt; THE SPECS

Sensor	20.2 million pixel APS-C CMOS sensor (22.5mm x 15.00mm)
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical pentaprism, 98% coverage, 0.95x magnification
Video resolution	Full HD (1920 x 1080)
ISO range	ISO 100-12800 (expandable to 25600)
Autofocus points	19
Max burst rate	7fps
LCD	3 inch, 1040k dots, touchscreen
Weight	755g
Dimensions	139.0 x 104.3 x 78.5mm
Power supply	LP-E6 Li-ion battery

**T**he announcement of any Canon SLR usually creates a lot of buzz, but when that camera launches a new sensor with a new pixel count (for the manufacturer) and is aimed at enthusiasts, it ups the ante. Naturally there's been quite a buzz surrounding the Canon EOS 70D, which has a 20.2 million-pixel CMOS sensor coupled with a DIGIC 5 processor.

## FEATURES

The Canon 70D also has a dedicated phase-detection sensor for use when your images are composed in the viewfinder. This has 19 AF points, all of which are cross type, just like the Canon 7D's AF system. However, the two cameras AF systems aren't identical, as the 70D only has three AF point selection modes.

While the 60D has a maximum continuous shooting speed of 5.3fps, the 70D can shoot at up to 7fps at full resolution for up to 65 JPEGs or 16 raw files. This is very useful when shooting sport.

Meanwhile, sensitivity may be set in the native range of ISO 100-12,800 with an expansion setting allowing the equivalent of ISO 25,600. The top native setting, ISO 12,800, is an expansion setting on Canon's other enthusiast SLRs.

Canon was the first manufacturer to give an SLR a touch-sensitive screen and the 70D has a three-inch 1,040,000 dot LCD that can be used to make settings adjustments and scroll through images. Canon hasn't added the touchscreen functionality at the expense of buttons or dial controls as the 70D has all the



SLR Canon EOS 70D &gt; £869 (body only)

> [www.canon.co.uk](http://www.canon.co.uk)

# Bigger and better

The upgrade to the EOS 60D is an enthusiast SLR with an intriguing new sensor, articulating touchscreen and Wi-Fi. **Angela Nicholson** tests the new 70D

physical controls that you'd hope for. Then there is Wi-Fi. Wi-Fi connectivity is fast becoming one of the must have features for cameras, and the 70D does not disappoint.

Canon has also included a few features to enable more creative images to be captured. There's a built-in speed light transmitter, for example, which gives wireless control over multiple Canon EX flashguns, a multi-exposure mode and an HDR mode that combines three images to create one with a greater range of tones. There's also a collection of Creative Filters that can be used to give JPEG's particular look when shooting in live view mode. While it's disappointing that these can't be used when shooting raw simultaneously, or when using the viewfinder, they can be applied post capture in review

**Above** The 70D is a very worthy upgrade, packed with new features

mode, so it's possible to retain a 'clean' image as well as one with the filter effect.

## BUILD AND HANDLING

Some photographers get a bit worked up about Canon's choice to use polycarbonate rather than metal – but this new camera feels nice and solid, and seals ensure that it should survive some exposure to the weather.

Not surprisingly there are no major changes to the overall shape and feel of Canon's replacement to the 60D. The buttons and dials are sensibly arranged and the deep grip has a textured coating that makes it feel secure. Canon has opted to use capacitive technology for the touchscreen and this ensures that it's very responsive. We suspect that even those who don't intend to use the

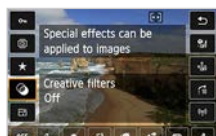




The vari-angle touchscreen makes awkward angles a cinch.



Inbuilt Wi-Fi enables remote control of the 70D – a real bonus.



Note digital filters are only available in Live View or post capture.



Built-in Wi-Fi lets you shoot and adjust settings remotely

## Zooming in on the... Canon 70D

A quick tour of the camera's key features



Use the mode dial to switch between different exposure modes, including aperture priority and shutter priority.



Press this button to activate Live View shooting, or to start video recording when in movie mode.

Press this to switch between AF modes, then use either the dial or touchscreen to select an AF point.



Access the quick menu in Live View by pressing start and then pressing the Q button. It's really very easy!



touchscreen will find that they do gradually, starting with swiping from image to image in review mode, perhaps progressing to pinch-zooming to check sharpness and eventually progressing to taking more control over the camera via the screen. One downside to a touchscreen is that the screen inevitably gets covered in fingerprints and this makes the image harder to see, especially in bright light.

The touchscreen is particularly useful for setting the AF point quickly in Live View and movie mode. It can also be used to set the AF point when

**“The touchscreen is particularly useful for setting the AF point quickly in Live View”**

shooting with the camera held to the eye, just press the AF point selection button and then tap the desired point on screen (or use the navigation keys).

Because the 70D has a new, faster AF system in Live View mode, we think that users far more likely to compose images on the LCD screen than they may have been in the past. However, it's quite a bulky camera

compared with a compact system model and it doesn't feel totally natural to hold it away from your face to compose images on-screen. However, it's very useful when shooting with the camera on a tripod or composing images at awkward angles – it's here that Touch-shutter mode comes into its own as it allows you to set the AF point, focus the lens and trigger the shutter with a single touch on the screen.

One advantage that electronic viewfinders offer is the ability to display the image as it will be captured, naturally as an optical finder the 70D's viewfinder can't do this, but it does have an electronic overlay that displays key settings. There are also three new icons at the top of the viewfinder that indicate the AF point selection mode. It's also easy to change the mode because Canon has introduced a new button just to the side of the shutter release. A single press activates the system, and subsequent presses toggle through the selection mode options. Alternatively, a single press of the new button followed by presses of the navigation keys selects the AF point

## Meet the rivals...

The 70D is good, but good enough to see off these rivals?



**Nikon D7100**  
£706 (body only)  
Gives you sharp images with bags of detail, but some fine-grained noise creeps in from ISO 400. Reviewed: issue 138



**Pentax K-30**  
£280 (body only)  
The K-30 can produce high-quality results, is easy to use and has plenty of features. Waterproof too! Reviewed: issue 131



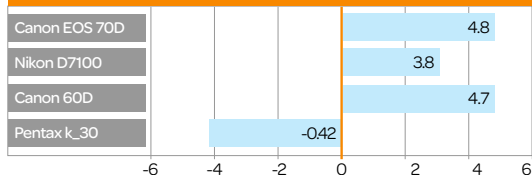
**Canon 700D**  
£390 (body only)  
A more affordable 18Mp alternative that gives plenty of control and has touchscreen. Reviewed: issue 140



## SLR BENCHMARKS

See how Canon's 6D fared in our tests

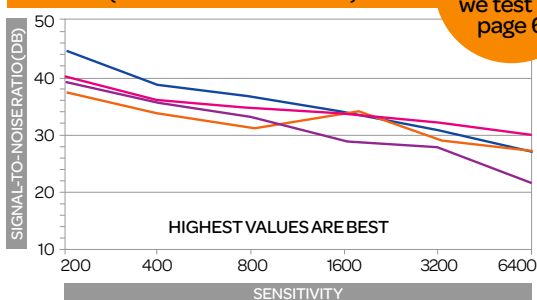
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** The 70D's colours are warmer than other cameras in the test, so very pleasing to the eye.

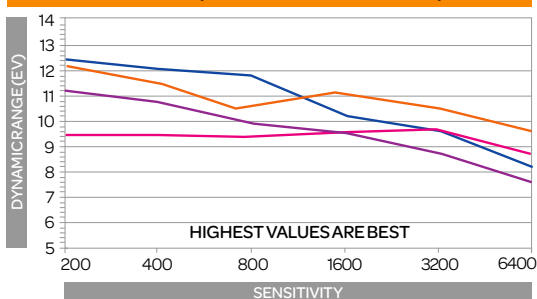
**KEY** Canon EOS 70D (purple), Nikon D7100 (orange), Canon EOS 60D (pink), Pentax K-30 (blue)

## RAW NOISE (AFTER CONVERSION TO TIFF)



**NOISE RESULT:** The 70D shows a consistent signal to noise ratio, performing better than the rival Nikon at lower sensitivities.

## RAW DYNAMIC RANGE (AFTER CONVERSION TO TIFF)



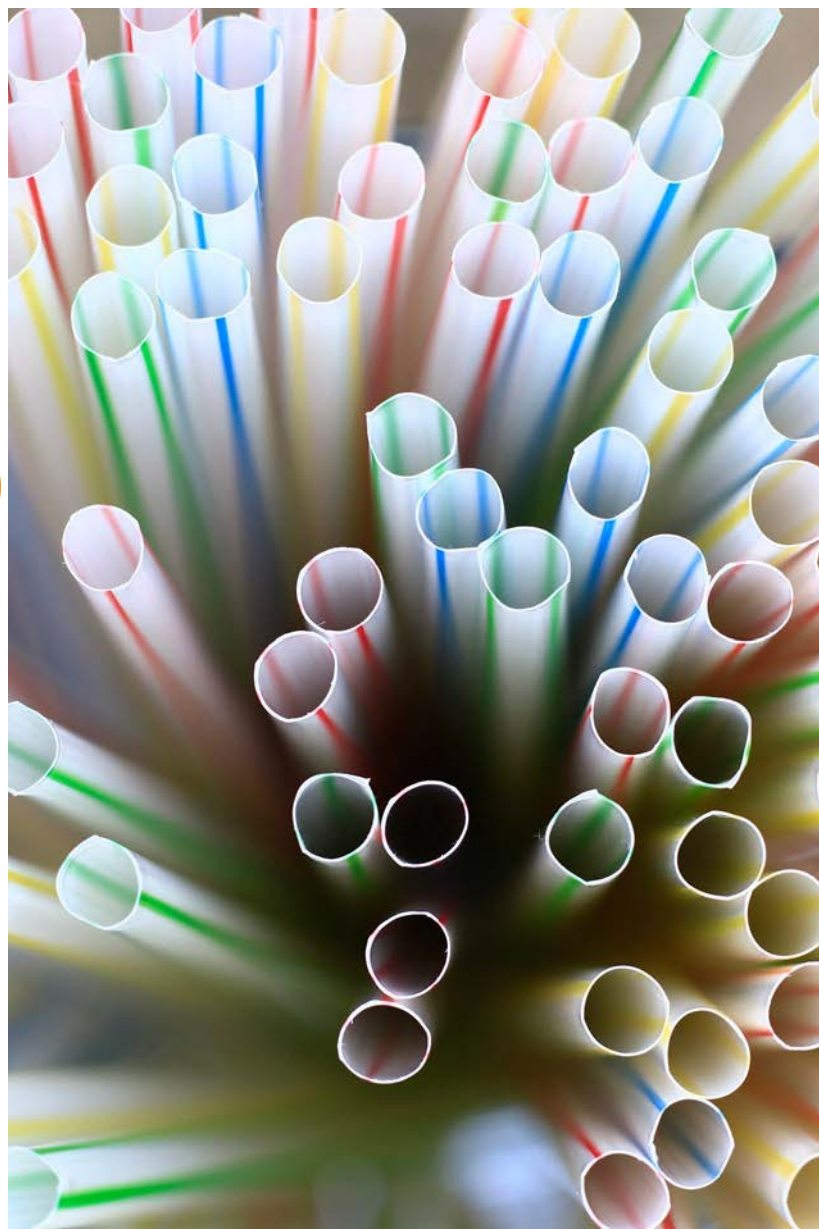
**DYNAMIC RESULT:** When it comes to dynamic range, the 70D is only slightly less capable than the Nikon D7100 and Pentax K-30

## OVERALL BENCHMARK RESULT

JPEG images from the 70D perform very similarly to the 60D in terms of signal to noise ratio. It's also a pretty close match to the Nikon D7100. For raw files, the 70D is a more consistent performer than the 60D, but it is beaten at higher ISOs by the Nikon. For dynamic range, the 70D's JPEGs perform very well, only being beaten at the very lowest sensitivities by the D7100. TIFF images are beaten by Nikon's D7100 at every sensitivity.

to use. It's a great system. Meanwhile, the viewfinder can also display an electronic level. In the past Canon has used the AF point display for its electronic level, but this has the disadvantage of switching off the minute the shutter release button is pressed. While this level is still available, Canon has also given the 70D the option to display a new icon at the bottom of the viewfinder, and this remains visible even when the

**Above right** Detail straight from the camera is excellent, while noise is kept to a minimum throughout the sensitivity range.



shutter release is pressed. It's a much better system, but it takes a little while to get used to how sensitive the level is. As the level icon isn't illuminated it's also quite hard to see when shooting dark subjects.

## PERFORMANCE

Although Canon's new Dual Pixel AF system is faster than its previous Live View AF systems, it isn't quite as fast as the contrast detection systems in Panasonic's recent G series compact system camera is like the G6 and GX7, or Olympus's Pen range including the E-PL5 and E-P5. However, it's not that far off and it's sufficiently fast for the camera to be used hand-held when composing images on screen – at least in normal daylight conditions – and it means that the

articulating joint on the screen is much more useful. When light levels fall however, the focusing slows and a backwards and forwards adjustment becomes noticeable.

While the Dual Pixel AF system may have grabbed many of the headlines, it is only used in Live View and movie mode. When images are composed in the viewfinder the 19-point AF system is on hand along with manual focusing. This AF system uses all cross-type points for greater sensitivity and it's excellent, very fast and accurate. In comparison with Nikon's 51-AF point system, however, 19-points doesn't seem that impressive, but the centre of the frame is well covered. In comparison with the coverage that you get with the average compact system camera it







seems rather poor as the points are clustered around the centre. This means that off centre subjects require the focus-and-recompose technique.

Canon has one of the best automatic white balance systems around and on the whole it does a good job of capturing pleasant looking colours. The images sometimes err on the side of warmth, but the results are generally very pleasant.

**Above** Colours are pleasing directly from the camera, but shooting in raw format gives you more control over the final result.

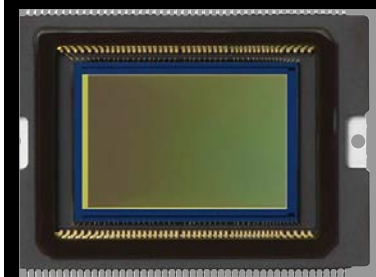
**Below** The 70D feels very good in the hand

There are no surprises with the 70D's 63-zone iFCL metering system. It generally performs well, but because of the weighting that it gives to the brightness of the subject and that the active AF point, it is prone to over or under exposing in high contrast conditions. This can be a pain when shooting sun-lit landscapes as you need to be careful where you set the AF point. If it's positioned over a patch of pale grass in full sun the chances are that rest of the image will be underexposed, whereas positioning the active AF point over a shadow area will mean most of the image is overexposed.

One way around the problem is to shoot in manual exposure mode, taking a spotmeter reading (Partial, Spot and Centreweighted metering are available in addition to Evaluative) from a midtone.

Our tests show that the 70D is capable of capturing plenty of detail. However, even at the lowest sensitivity settings there's a clear benefit to shooting raw files as out of focus areas in JPEGs sometimes have a slightly watercolour appearance at 100% on screen. Even images taken at ISO 100 have a slight texture visible at 100%, but chroma noise (coloured speckling) isn't a major issue throughout the native sensitivity

## Tech Briefing Dual Pixel CMOS



As well as having a higher pixel count than Canon's earlier APS-C format sensors, the EOS 70D sensor is a Dual Pixel CMOS device, which enables faster focusing during Live View and video mode. There are two photo diodes for every pixel site (strictly speaking pixels don't exist until an image is created) on the sensor, and each of them can read light independently to enable a form of phase detection autofocus to be used to focus the lens.

While the diodes are read separately for autofocus, they are read together to form the image, and this means the Canon 70D creates 20.2 million-pixel images. Our test images show it performs very well.

range (ISO 100-12,800). As usual, however, in-camera noise reduction takes its toll on detail as sensitivity rises. We'd recommend keeping below ISO 6400 where possible.

## VERDICT

This is a very well-rounded camera for the photography enthusiast. The Dual Pixel AF system for live view and movie shooting is particularly impressive. In bright light it's fast and decisive, being quickest in still mode and smoothest in movie mode. In lowlight, however, there's often some of the backwards and forwards adjustment that is typical of contrast detection systems rather than phase detection. This a relatively minor niggle, however.

## Digital Camera

FEATURES	★★★★★	BUILD QUALITY	★★★★★
IMAGE QUALITY	★★★★★	VALUE	★★★★★

## Overall ★★★★★

**WE SAY:** This upgrade to the 60D is very desirable. If Canon follows its usual pattern, we can expect to see the EOS 70D's sensor appearing throughout the range, so that is great news for the consumer.





## &gt; THE SPECS

Sensor	APS-C format 20.2MP CMOS
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC and CF
Viewfinder	Pentaprism with 100% coverage
Max video resolution	1,920 x 1,080 pixels
ISO range	100-16,000 (expandable to ISO 51,200)
Autofocus points	65
Screen	3-inch 1,040k-dot LCD
Shutter speeds	30-1/8,000 sec plus Bulb
Weight	820g (body only)
Dimensions	148.8 x 112.4 x 78.2mm
Power supply	Rechargeable Li-ion LP-E6N battery (supplied)



SLR Canon EOS 7D Mark II > Body only: £1,299 / \$1,499 > [www.canon.co.uk](http://www.canon.co.uk)

# A good sport

Is the 7D Mark II worth the five-year wait for the upgrade to Canon's most enthusiast-friendly SLR? **Angela Nicholson** finds out

**A**s you might guess from its name, the new Canon EOS 7D Mark II replaces the Canon 7D. It therefore assumes its place above the APS-C format Canon 70D and below the full-frame Canon 5D Mark III in the Canon SLR line-up. Inside is a new 20.2-million-effective-pixel sensor with redesigned micro-lenses that allow more light to pass through onto the photo diodes.

To boost performance and enable a maximum continuous shooting rate of 10 frames per second, Canon has given the new camera two Digic 6 processing engines. When a UDMA 7 CF card (such as the Lexar Professional 1066x card) is installed, up to 31 raw files or 1,030 JPEGs can be shot in a single burst. If you need to shoot for more than 3.1 seconds, the High continuous shooting rate can be set between 2-10fps, while the Low rate can be set to 1-9fps and Silent mode to 1-4fps.

The sensor and processing engine combination also allows a native sensitivity range of ISO 100-16,000, the widest of any Canon camera. If it's not enough, there are expansion settings going up to ISO 51,200.

While the 7D has 19 autofocus points, all of which are cross-type, its replacement has a class-leading

65 points; again, all are cross-type. With f/2.8 lenses, the central point is dual-cross type for extra sensitivity and is capable of operating when lens and teleconverter combinations take the effective aperture down to f/8. It's also possible to adjust tracking sensitivity, acceleration/deceleration tracking and AF point auto switching options. There are also seven AF point selection modes.

In Live View and video mode, the Dual Pixel AF system comes into play. Videographers will love the ability to



**Above** This new switch helps speed up setting changes.

slow the focusing down to produce a more cinematic transition.

Other notable features include dual card slots (one SD/SDHC/SDXC, the other CompactFlash); an intervalometer for shooting time-lapse sequences; HDR mode (with raw file recording); multiple exposure mode; a built-in compass; and GPS to enable image geotagging. Sadly, there's no Wi-Fi connectivity built in. A Canon Europe representative told us the Mark II's metal body may compromise Wi-Fi performance.

## BUILD AND HANDLING

Canon has retained the 7D's magnesium alloy construction for the Mark II, but it has uprated its weather-proofing so that it is the second most weather-resistant Canon SLR after the 1Dx. This may in part explain the 90g increase in weight and slightly larger size. In any case, the camera feels nice and solid, and



## Stick or twist? Upgrade advice

Canon may only have increased the pixel count of the 7D Mark II by two million in comparison with the original 7D (left), but the new camera resolves noticeably more detail at most sensitivity settings. The autofocus system is also significantly upgraded,

with 65 points instead of 19, and has the same pro-level customisation options as the Canon 1Dx and 5D Mark III. The exposure metering system is the best that Canon has to offer. Travel photographers may also appreciate the addition of GPS.

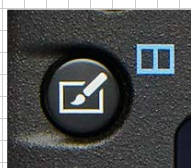


## Zooming in on the... Canon 7D Mark II

A smart layout that gives you access to integrated tech



This button needs to be pressed before the dial can be rotated. We'd prefer a design that can be left locked or unlocked as you like.



This gives access to the Picture Style, multiple exposure and HDR options. In Review mode, it enables you to compare two images side by side and scroll through shots.



The GPS unit is located here. Perhaps a Wi-Fi unit could've gone in its place?



The optical viewfinder shows 100% of the scene and can display an electronic level, as well as important information such as exposure mode, white balance mode, drive mode and the metering mode.

Pressing this when reviewing an image rates it out of five, and the rating is stored with the EXIF data.



We shot over 1,000 images and used the GPS system throughout a day's shooting: the battery still had plenty of power left.



the shutter has a claimed durability of 200,000 cycles.

The grip on the front of the camera and the thumb-ridge on the back have an excellent textured coating, so they feel really secure in your hand. We found the thumb-ridge, which is thinner and more angular than the 7D's, particularly good.

Owners of the original 7D will find the Mark II familiar, but there are a

**"The images and video the 7D Mark II produces look great straight from the camera"**

few changes to the control layout. There are Rate and Creative Photo buttons, for example, as well as a new sprung selection lever around the mini-joystick control. This can

be used to change the function of the main control dial in front of the shutter release on the top of the camera. We found it useful for accessing the sensitivity options.

### PERFORMANCE

On the whole, the images and video the 7D Mark II produces look great straight from the camera. It's also capable of resolving an impressive level of detail: it matches the 24MP Sony Alpha 77II and beats the 24MP Nikon D7100 in this respect until you choose an upper sensitivity setting.

Noise is also controlled well throughout the native sensitivity range, but as usual the expansion settings (which Canon considers not of sufficient quality for normal use) are best reserved for emergency situations or when images only need to be viewed at small sizes. JPEGs captured at the maximum expansion (ISO 51,200) have luminance noise

### Meet the rivals...

The cameras taking on the 7D Mk II



**Canon EOS 6D**

Price: £1,139 / \$1,399 (body)

Full-frame yet more affordable, the 6D is a great camera, if a little less serious than the 7D Mk II.

Reviewed: page 28

★★★★★



**Nikon D7100**

Price: £748 / \$797 (body)

Superb detail and excellent AF performance but a little hampered by a restricted buffer capacity. Great price.

Reviewed: issue 138

★★★★★



**Sony Alpha 77 II**

Price: £764 / \$998 (body)

Sony's best SLT so far has an impressive feature set and a very capable autofocus system.

Reviewed: page 106

★★★★★



## CAMERA SHOPPER

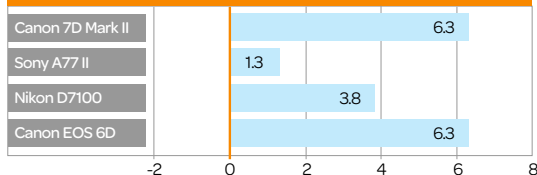
A DIGITAL CAMERA SPECIAL

WHAT'S THIS?  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the 7D Mark II measure up?

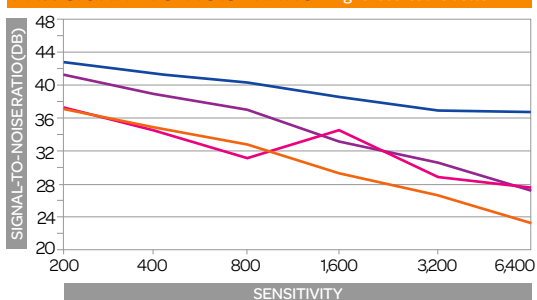
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Like other Canon cameras, the 7D Mark II isn't the most accurate, but images have very pleasant saturation.

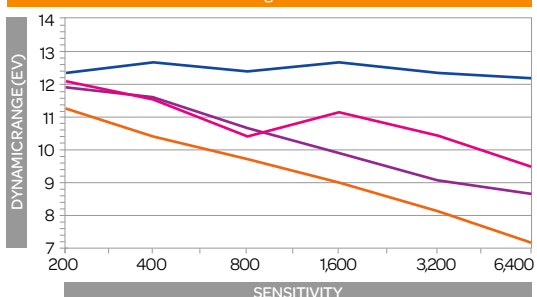
**KEY** Canon 7D Mark II Sony A77 II  
Nikon D7100 Canon EOS 6D

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The 7D Mark II beats the APS-C cameras at low-to-middle sensitivity settings, so its image noise is not excessive.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The 7D Mark II falls behind the Nikon D7100 from about ISO 800 upwards. The full-frame Canon 6D stands out.

## OVERALL BENCHMARK RESULT

The 7D Mark II makes a significant improvement upon the original 7D at the vast majority of its sensitivity settings. It also manages to out-resolve the Canon 6D at in the ISO 100-3200 range, but the larger sensor still brings advantages to noise control and dynamic range.

\* Raw results use images converted to TIFF

visible at most normal viewing sizes, and some areas appear bruised with green and magenta. Stepping down to the uppermost native setting (ISO 16,000) results in a significant improvement in image quality. When all noise reduction is turned off, ISO 16,000 raw files have a hint of coloured speckling visible when sized to A3. Zoom in to 100% and this chroma noise becomes very noticeable, but there's still a respectable level of detail, so

Above This ISO 200 JPEG image has an impressive amount of detail.

“We’ve been looking forward to testing the Mark II’s autofocus system, and it didn’t disappoint”



it's possible to find a good balance between the two in post-processing.

At the other end of the sensitivity scale, there's just a hint of luminance noise in some areas at 100% (even at ISO 100), but images have lots of detail visible.

One of things that impressed us most about the 7D Mark II during our testing is its new 252-zone metering system, which gathers data from a 150,000-pixel RGB and infrared sensor. In the past, we have found Canon's iFCL metering system a little frustrating in Evaluative mode: it can put too much weighting on the brightness of the subject under the active AF point, so you can end up with badly over- or under-exposed shots in high-contrast conditions. It acts more like centre-weighted metering than some other systems. The new system in the Mark II

does a better job of taking the brightness of the whole scene into account. Naturally, there is still some weighting applied, but we found there are fewer occasions when exposure compensation is required.

That said, there seems to be a slight tendency towards bright images. Some of our landscapes shot in bright conditions look better when the exposure is reduced by about 1/3EV, either in-camera or post-capture.

As we have found in the past with Canon SLRs, the 7D Mark II's automatic white balance system does a great job of capturing the atmosphere of the scene. In bright sun, it produces pleasingly warm tones; in overcast conditions, it captures the coolness without going overboard and giving a blue tint. Overall, the results look natural. The Standard Picture Style also provides a good general-purpose setting that generates JPEGs with pleasant colours and decent saturation.

We've been looking forward to testing the 7D Mark II's 65-point





autofocusing system, and it didn't disappoint. It's both fast and accurate, and capable of working in very low light. It's also complex and takes some

**Above** The auto white balance system captures the warm light well in this shot.

getting to know. Provided that you choose the correct AF point selection mode and AF AI servo characteristics (which can be set via a selection of shooting scenario Case Studies), it does a great job. We found Case 1 in the selection list a good starting point that worked well when shooting BMX riders in action.

In addition, the hybrid AF system, which is available when composing video or still images on the LCD screen in Live View mode is capable and able to find its target, even when you're shooting in quite low light. With an STM lens mounted, there's little back-and-forwards adjustment, even in fairly dull conditions. Although it's quite a large camera to use held away from your body, it's possible to use Live View when hand-holding the camera.

Switching from Standard to the slowest AF setting in the Movie Servo AF speed options has a significant impact upon the time the camera takes to focus the lens. Either way, it moves the subject smoothly into focus. If you need to speed things up when using the slowest setting, however, pressing the AF-on button gets the subject sharp quickly.

## VERDICT

Enthusiast photographers shoot a bit of everything, so they need a versatile camera. The EOS 7D Mark II's weatherproofing means that it can be used in harsh conditions, and its autofocus system gets moving subjects sharp quickly. The metering system delivers correctly exposed images in a wide range of conditions. Noise is also controlled well, colours are pleasantly rendered and images have an impressive amount of detail.

It's not often we recommend upgrading a model to its immediate successor, but the Mark II is an exception. It's a great update. 📷



**Left** The 18-135mm kit lens isn't the sharpest optic, but it's a good start.

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** Canon's best APS-C format SLR to date, the 7D Mark II has bags of appeal to the enthusiast wedded to the idea of an SLR rather than a compact system camera. It's even worth it if you already own a 7D.



## &gt; THE SPECS

Sensor	50.6 million effective pixel full-frame (36 x 24mm) CMOS
Focal length conversion	1.0x
Memory	CompactFlash and SD/SDHC/SDXC
Viewfinder	Optical with pentaprism covering 100%
Video	Full-HD (1,920 x 1,080) at 30 / 25 / 24fps
ISO range	100-6,400 expandable to 10-12,800
Autofocus points	61, all cross-type; phase detection in reflex mode
Max burst rate	5fps
Screen	3-inch 1,040k-dot LCD
Shutter speeds	1/8,000-30 sec plus Bulb
Weight	845g without lens
Dimensions	152 x 116 x 76mm
Power supply	Rechargeable LP-E6N lithium-ion battery



SLR Canon 5DS, £2,999 / \$3,699; 5DS R, £3,199 / \$3,899

&gt; www.canon.com

**C**anon's 5D line of SLRs was the first to bridge the gap between professional and amateur photography, giving enthusiasts an affordable route to full-frame shooting and pros a smaller, lighter back-up camera.

Now we have the 5DS and the 5DS R, both of which have 50.6 million effective pixels on their full-frame sensor – that's a count that matches that of medium-format models like the Pentax 645Z.

Neither model is set to replace the 5D Mark III: they give a higher-resolution alternative. The 5DS and 5DS R are identical apart from a small but significant difference with the sensor (see 'What's the difference?' below), so unless otherwise stated, we'll use 5DS in this review to mean both it and the 5DS R.

## FEATURES

The 5DS has two Digic 6 processing engines instead of the single Digic 5+ processor of the 5D Mark III. This enables a native sensitivity range

# High rollers

**Angela Nicholson** tests the Canon 5DS and 5DS R to see if they live up to their promise of setting new standards...

of ISO 100-6,400, with expansion settings taking this to ISO 50-12,800. For comparison, the native range of the 5D Mark III is ISO 100-12,800, and the expansion settings take the range to ISO 50-102,400.

Despite all the processing power, the 5DS can 'only' manage a maximum continuous shooting speed of 5fps (for 510 Large Fine JPEGs or 14 raw files with a UDMA CompactFlash



Above the 'R' in the logo is the only visible difference between the 5DS and the 5DS R.

card installed), rather than 6fps for 16,270 Large Fine JPEGs or 18 raw files of the 5D Mark III with the same card.

Other significant changes from the 5D Mark III include a 150,000-pixel RGB+IR metering sensor with 252 zones, and Intelligent Scene Analysis in place of the iFCL device with 63 zones; a new M-Raw images size that records 28MP images; and a USB 3.0 port. There's also an Intelligent Viewfinder II with AF point illumination in AI Servo mode.

Other introductions include a new Fine Detail Picture Style to tailor the look of JPEGs, and a collection of mirror lock-up options, a built-in intervalometer and the ability to shoot timelapse movies.

## BUILD AND HANDLING

Outwardly the 5DS looks the same as the 5D Mark III. However, there have been some changes to the build of the camera to reduce vibrations, which

## WHAT'S THE DIFFERENCE?

A technical tweak enables the 5DS R to resolve more detail than the 5DS

Both the cameras have a low-pass filter over the sensor. However, the 5DS R has a secondary 'cancellation' filter that enables it to resolve a little more detail, but runs the risk of images suffering from moiré interference. Some other manufacturers have removed the low-pass filter to achieve the same thing. Canon claims that removing the filter would alter the camera's focal plane and require an internal redesign. As yet Canon hasn't been able (or willing) to explain why removing the filter would cause this, but adding a second filter does not.





## Zooming in on the... Canon 5DS

Lots of control options on offer here



### Mode dial

When the Scene Intelligent Auto mode is selected, the camera analyses the scene and selects appropriate settings automatically.



### Menu button

You can create up to five My Menu tabs with customisable names in the menu – and each one can have up to six features assigned to it.

### Rate button

This is useful to give images a star rating and find them quickly after downloading. It can also be customised.



### Video button

Although it can record video, the 5DS has no headphone socket for audio monitoring.

### Viewfinder

The viewfinder can show the cropping when shooting 1:1 (square) format, as well as the 1.3x and 1.6x crop images. 16:9 or 4:3 images can only be shot in Live View mode.

### Creative Photo button

HDR mode is accessed here. It records raw and JPEG files, so can be used like an advanced bracketing option.



could have significant implications for such a high-resolution model. The mirror movement, for example, is controlled by a mechanism to avoid the slap that is typical of SLRs and can lead to blur-inducing mirror-shake. It makes a noticeable difference to the sound and feel of the camera in use.

Externally, the 5DS has exactly the same shape and control layout as the 5D Mark III. This means you can slip seamlessly between the two, perhaps using the 5D Mark III to shoot sport or video, and the 5DS for detail-rich subjects like landscape and macro.

The 5DS has the same AF system as the 5D Mark III, which means there

**“You can customise the screen to remove options you don’t use and change the size of icons you do”**

are quite complex options to control how the camera responds to moving subjects in continuous AF mode, plus six AF point selection modes. By default, an autofocus point (or zone) is set with the AF Point Selection button near the thumb rest on the back of the camera, then using the mini-joystick-like Multi-controller.

Being a full-frame SLR, the 5DS has a large optical viewfinder. This

is bright and shows 100% of the scene, so there are no nasty surprises around the edges of images. Like the 5D Mark III, it’s possible to display an electronic level in the viewfinder as well as on the main screen; but unlike the 5D Mark III, the 5DS uses a dedicated icon instead of the AF points. This means the level stays visible even when the shutter release is depressed to focus the lens.

When using manual focus in Live View mode, the on-screen image can be magnified by 6x or 16x. This makes details clear, but you become acutely aware of how much wobble is introduced by touching the camera. It’s a good reminder to engage Mirror Lock-up mode. The ability to set the shutter to fire following a set delay after the shutter release is pressed means that a remote release is unnecessary in many situations.

The options in the 5DS’s Quick menu are logical, but it’s possible to customise the screen to remove any options you don’t use and change the size of icons representing those that you do. It’s a nice touch.

Although the 5DS isn’t a natural choice for videographers, it’s worth

## Meet the rivals...

Here are the models the Canon 5DS is up against...



### Canon 5D Mark III

£2,250 / \$2,499, body only  
The same weatherproof build and control layout as the 5DS, but with just 22.3MP on the sensor.  
Reviewed: page 22  
★★★★★



### Nikon D810

£2,349 / \$2,997, body only  
A superb 36MP full-frame SLR that ruled the roost for resolution until the 5DS came along.  
Reviewed: page 72  
★★★★★



### Pentax 645Z

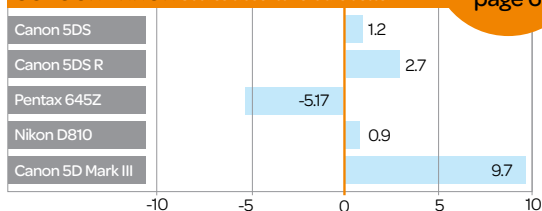
£6,799 / \$8,095, body only  
Affordable in medium-format terms, this 50MP model is at home on location or in the studio.  
Reviewed: issue 164  
★★★★★

## CAMERA BENCHMARKS

How does the Canon 5DS compare?

**WHAT'S THIS?**  
Find out how we test on page 6

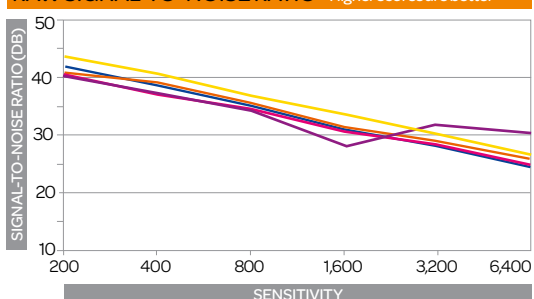
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** With good colour accuracy, the 5DS produces natural-looking JPEG files with appealing saturation.

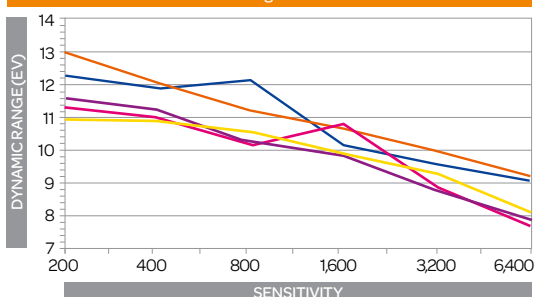
**KEY** Canon 5DS Canon 5DS R Pentax 645Z Nikon D810 Canon 5D Mark III

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** These results indicate that the 5DS produces noisier images. This isn't surprising given the likely pixel density of its sensor.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** While the 5DS's dynamic range is good at the lower sensitivity values, it doesn't quite match the competition.

## OVERALL BENCHMARK RESULT

The higher pixel density of the 5DS's sensor means it struggles to match the signal-to-noise ratio and dynamic range of the others, indicating that images will be noisier and have fewer tones. Our real-world images show the 5DS controls noise well, and detail levels are high, even at ISO 12,800.

\* Raw results use images converted to TIFF

noting that like the 5D Mark III, the large Quick Control dial on the back of the camera can be used as a touch-control, so near-silent adjustments can be made to aspects such as exposure and audio recording level.

## PERFORMANCE

The great news is that the 5DS can resolve a fantastic amount of detail. If you want the ultimate in detail resolution, the 5DS R resolves a tiny

**Above** They're not really designed for sport photography, but the 5DS and 5DS R have an excellent AF system that can track moving subjects



little bit more than the 5DS, but you have to look at 100 or 200% to spot the difference – and even then it's only in the very finest detail areas. Both cameras out-resolve our resolution chart for most of their sensitivity range, and noise levels are the same from each camera.

Both cameras manage to maintain the high level of detail throughout their sensitivity range; even the ISO 12,800 expansion setting produces images with a high level of detail. At lower sensitivity settings, very fine details and subtle tonal gradations are visible at 100% in JPEG files. Much of this is also visible in images taken at ISO 6,400, but there's a fine texture of luminance noise. Chroma noise is visible at 100% in simultaneously captured raw files when all noise reduction is turned off.

There's a suggestion of luminance noise in darker even-toned areas of JPEG and raw files captured at ISO 400, but you really have to look for it at 100% on-screen. This noise becomes a little more noticeable in ISO 800 images, with chroma noise becoming just visible in raw files when all noise reduction is turned off. Our tests indicate that Canon could have given the 5DS higher sensitivity settings and image quality would have been acceptable, but it seems the company has decided to make it deliver the best stills images possible.

Like Canon's earlier iFCL metering system, the 252-zone RGB+IR metering system with Intelligent Scene Analysis of the 5DS applies a weighting to the exposure required by the subject under the active AF point, but it does a better job of





assessing the rest of the scene and recommending exposure values that work for the scene as a whole.

As the 5DS has the same autofocus system as the 5D Mark III, it was no surprise to find that it's highly capable and can lock on to fast-moving subjects, even in low light. When shooting a cycling event continuously at the 5fps maximum, I noticed the camera started to warm up around the card port. This seems to affect burst depth, and the number of images you can shoot drops dramatically.

At the other end of the shooting rate scale, there's a benefit to using mirror lock-up when the camera is on a tripod, even with shutter speeds of around 1/60 sec and a focal length

**Above** Thanks to the level of detail they capture, the 5DS and 5DS R are ideal for shooting landscapes.

of 100mm. I set the camera to take the shot one second after the shutter release was pressed: this produced sharper images than those taken without mirror lock-up.

When hand-holding the camera with the Canon EF 24-70mm f2.8L II USM lens mounted, I recommend keeping shutter speed at 1/125 sec or higher to be sure of getting pin-sharp results. It is possible to get sharp results at slower shutter speeds, but 1/125 sec or faster delivers the goods more consistently.

If you're shooting a moving subject, you may find you need to use a faster shutter speed than you're used to, because although the images look sharp as thumbnails or even at normal viewing sizes, they aren't completely sharp at 100%. The small pixels mean that even tiny movements can cause some blur. You may scoff at this pixel-peeping, but why would you buy a 50MP camera if you can only use the images at a size achievable by a 20MP model?

Canon cameras generally produce images with pleasing colours and the 5DS is no exception. However, probably as a result of the extra pixels delivering the huge level of detail and smooth tonal gradations, some of the files have a bit more pep about them. Using the new Fine Detail Picture Style boosts micro contrast a little,

bringing out small details and giving edges a naturally sharp look.

## VERDICT

While it has an autofocus system that can keep up with fast-moving subjects and can record high quality video, the 5DS/5DS R is designed to take high-quality stills images. The images from the 5DS/5DS R have an incredible amount of detail, with great colour and exposure in most situations. Its handling is also excellent, using the control layout of the 5D Mark III.

Whichever model you opt for, you need to focus carefully, follow the guidelines to avoid camera shake and ensure your lenses can match the resolving power. There's a list of recommended lenses on Canon's website at [www.bit.ly/dc167canon](http://www.bit.ly/dc167canon).



**Below** The control layout and shape is just the same as the 5D Mark III.

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** The Canon 5DS and 5DS R are superb cameras that capture a huge amount of detail. Before you commit to the investment, however, make sure your lenses can match the resolving power.



## &gt; THE SPECS

Sensor	16.3MP APS-C format CMOS
Focal length conversion	1.5x
Memory	SD / SDHC / SDXC
Viewfinder	N/A
Video	1,920 x 1,080 at 30p up to 14min
ISO range	ISO 200–6,400, expandable to ISO 100–25,600 for JPEGs
Autofocus points	49
Max burst rate	5.6fps
Screen	Tilting three-inch, 920,000-dot TFT LCD
Shutter speeds	1/4,000–30 sec plus Bulb to 60 min
Weight	300g (body only)
Dimensions	117 x 67 x 40mm
Power supply	NP-W126 rechargeable lithium ion battery (supplied)



**CSC** Fujifilm X-A2 > With 16–50mm lens: £349 / \$550 > [www.fujifilm.com](http://www.fujifilm.com)

# Flipping good

Fujifilm's most affordable CSC gets an upgrade with the selfie generation in mind. **Angela Nicholson** tries it out

**T**he X-A2 replaces the X-A1 as Fujifilm's most affordable compact system camera. It differs from other X-series CSCs in that it has a standard (and therefore lower-priced) APS-C format CMOS sensor (with a Bayer pattern filter array and anti-aliasing filter), rather than an X-Trans CMOS sensor.

## FEATURES

Many of the features of the X-A2 are the same as the X-A1's. For example, Fujifilm has plumped for the same 16.3MP APS-C format (23.6mm x 15.6mm) sensor and the EXR Processor II image processing engine. Also as before, there's no viewfinder built-in, so images must be composed on the screen on the back of the camera. This is still a 3-inch 921k-dot device, but the range of its upward tilting movement has been increased to 175 degrees to make it easier to compose selfies. What's more,

when the screen is tilted right up for viewing from in-front of the camera, the X-A2 switches to using Face Detection and the new Eye Detection AF mode.

Other new additions to the focusing system include Auto Macro AF and Multi-Target modes, aiming



Above There's a pop-up flash and a hotshoe.

to make it easier for inexperienced photographers to get subjects sharp.

## BUILD AND HANDLING

The X-A2 has a solid-feeling metal body, unlike many entry-level cameras, plus the understated design of other X-series cameras. All controls are within easy reach with the fingers or thumb of the right hand. The X-A2's menu is also sensibly arranged, although there's no customisable screen to get quick access to the features you use most often.

The 3-inch 921,000-dot screen is capable of showing lots of detail, but its Sunlight Mode needs to be activated in bright conditions. It's essential to keep an eye on the histogram in this mode, as images look very bright and it's tempting to reduce the exposure.

Although it's easy to link the X-A2 to a smartphone via its Wi-Fi

## Meet the rivals...

The cameras taking on the Fujifilm X-A2



**Nikon D3300**  
With 18–15mm lens:  
£349 / \$497

A compact but powerful 24MP APS-C format SLR that's perfect for novices wanting to learn about photography.

Reviewed: page 14



**Panasonic GM1**  
With 12–32mm lens:  
£429 / \$698

An incredibly small 16MP Micro Four Thirds CSC. There's no viewfinder or hotshoe, but you get touch-screen control.

Reviewed: issue 149



**Sony Alpha 5100**  
With 16–50mm lens:  
£449 / \$598

An impressive 24MP APS-C format CSC with a tilting touchscreen, although there's no viewfinder or hot-shoe.

Reviewed: issue 157







Reducing the exposure to 1EV below what the multi-zone metering system suggested produced a nicely saturated image here.

connectivity to transfer images, I had no success when attempting to connect it to a computer to transfer images wirelessly via the PC AutoSave software.

## PERFORMANCE

It's not possible to shoot raw files at ISO 100 with the X-A2, but the JPEGs look very good and have a decent level of detail. Stepping up to ISO 200 brings a slight boost in the level of detail, as well as the ability to record raw files. The raw files have a bit more detail than simultaneously captured JPEGs, but there's also a slight texture of luminance noise visible at 100%. Chroma noise (colored speckling) makes an appearance in some areas of ISO 400 raw files viewed at 100% when all noise reduction is turned off, but JPEGs captured simultaneously in the default settings look clean.

By ISO 3,200, speckling is visible in some areas of raw files sized to A4

(when all noise reduction is turned off). Meanwhile, the JPEGs look clean at A3, but at 100% some areas look rather painterly. The JPEG version of images captured at ISO 6,400 look good at A3, although some areas lack a bit of detail. Careful processing of the raw files enables images with a bit more detail and acceptable noise levels to be produced.

The X-A2's JPEGs don't have especially impressive dynamic range, but this is something that we have noticed with other Fujifilm cameras, and it's a consequence of the fairly high mid-tone contrast that they have. The raw files look quite flat by comparison, but they have much higher dynamic range.

"The X-A2 has a solid-feeling metal body, plus the understated design of other X-series cameras"

Right The screen flips up to help you take selfies.



From the makers of Digital Camera magazine

# CSC TEST

FUJIFILM X-A2

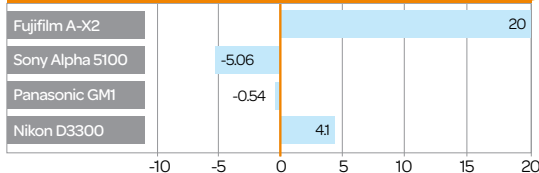
55

## SLR BENCHMARKS

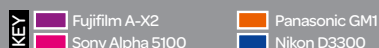
How does the X-A2 measure up?

WHAT'S THIS? Find out how we test on page 6

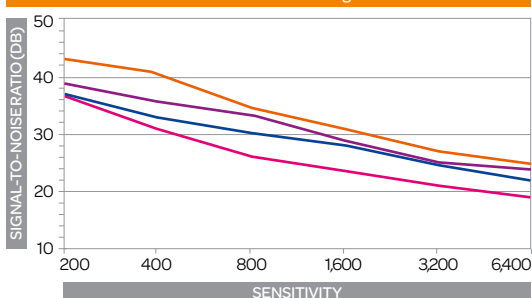
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** This indicates that the X-A2's images are highly saturated in the default (Provia) Film Simulation mode.

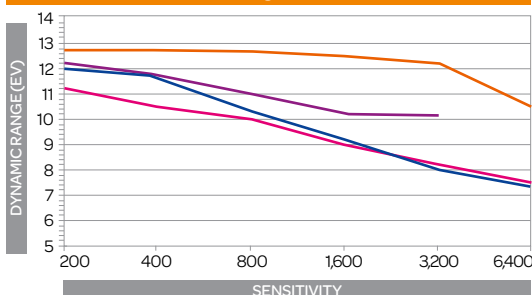


### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** A solid showing from the X-A2, which confirm our real-world findings that its raw files don't suffer much from noise.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The X-A2's raw files have a much wider dynamic range than its JPEGs, indicating they contain many more tones.

### OVERALL BENCHMARK RESULT

While the 16MP X-A2 can't compete with the 24MP Sony A5100 and Nikon D3300 for resolution, it captures a good level of detail, the impression of which is boosted by the mid-tone contrast of JPEGs. Noise is generally controlled well, but we'd avoid the top (JPEG-only) sensitivity values because of the loss of detail.

\* Raw results use images converted to TIFF

## Zooming in on the... Fujifilm X-A2

There's no viewfinder, but plenty of smart features



### Mode dial

This metal mode dial has the usual PSAM options, as well as a Custom mode, a clutch of automatic modes and a route to the Advanced Filters.



### Self-timer button

This is the Macro button on the X-A1. The X-A2 auto-switches to Macro mode so it's now the self-timer control.



### Back buttons

These buttons lack tactile definition, but it's rare that you'll hold the X-A2 so close that you can't see them.



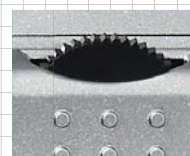
### Q button

Press this to access up to 16 features for adjustment.



### Exposure compensation dial

This is a little easier to knock out of position than the mode dial, so it's a good idea to check it hasn't changed between shots.



### Sub-command dial

This plastic control can be depressed in review mode to zoom into the AF point – a handy way to check focus.

- ❖ The X-A2's automatic white balance system does a good job, on the whole. It generally captures the feel of a scene without a strong colour cast. However, a few of my shots taken in a mixture of bright sun and shadow look a bit cooler than I would like.

While the X-A2's multi-zone metering system is capable of delivering perfect exposures in quite tricky conditions, there were also a few situations in which I had to dial in a little more exposure compensation than I might have expected.

Although the X-A2's autofocus system isn't great with moving subjects, it gets most still subjects sharp quickly. It even copes quite well with quite low light levels, only

## "Fujifilm's selfie-friendly AF options are useful for those who like taking pictures of themselves"

becoming indecisive in very low light. The Face Detection system also usually spots any faces in the scene, and the Eye Detection AF latches onto an eye pretty well, provided you're not wearing spectacles. However, it sometimes focuses on a face towards the back of a group, which can mean that those further forward are soft. Similarly, in Multi-Target mode the camera does a reasonable job of identifying suitable areas for focus, but they are not always all in the same

plane. You don't know the point of focus until you review the image.

### VERDICT

It may be Fujifilm's entry-level CSC, but the X-A2 has a high-quality feel. It's also compatible with Fujifilm's growing range of lenses, and the sensor and processing engine put in a good performance.

Fujifilm's selfie-friendly AF options are useful for those who like taking pictures of themselves. (Doesn't everyone?) The new kit lens can focus as close as 15cm, so you don't even need a selfie stick. 📷

**Below** The X-A2 has a solid-feeling metal body.



### Digital Camera

#### FEATURES



#### IMAGE QUALITY



#### BUILD QUALITY



#### VALUE



## Overall ★★★★★

**WE SAY:** A solid feeling entry-level interchangeable-lens camera which lacks a viewfinder, but has enough features to satisfy novices and enthusiasts on a budget. Image quality is also usually high.



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# Retro charmer

Fujifilm's latest SLR-style camera has the feel of the X-T1 with a smaller body and price, **Angela Nicholson** checks it out



## > THE SPECS

<b>Sensor</b>	16.3 million effective pixels APS-C format X-Trans CMOS II
<b>Focal length conversion</b>	1.5x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	0.39-inch 2,360k-dot OLED
<b>Video</b>	Full HD (1,920x1,080)
<b>ISO range</b>	200-6,400, expandable to ISO 100-51,200 for JPEGs
<b>Autofocus points</b>	15-77 depending upon mode
<b>Max burst rate</b>	8fps
<b>Screen</b>	Tilting three-inch LCD with 920,000 dots.
<b>Shutter speeds</b>	30-1/4,000 sec with mechanical shutter, plus Bulb; or 1-1/32,000 sec with electronic shutter
<b>Weight</b>	331g (body only)
<b>Dimensions</b>	118x83x41mm
<b>Power supply</b>	NP-W126 lithium-ion battery (supplied)

"Fujifilm hasn't compromised with the X-T10's hybrid autofocus system."

**B**ecause of its solid build, retro styling, traditional controls and excellent image quality, the Fujifilm X-T1 is one

of my favourite cameras. It's also proved very popular among enthusiast and professional photographers looking for a smaller alternative to a bulky advanced SLR.

Now we have the Fujifilm X-T10, a slightly more compact Mini-Me of the X-T1 that uses the same APS-C format 16-megapixel X-Trans CMOS II sensor and EXR processor.

Being a little smaller and more affordable than the X-T1 means that the X-T10 makes a few compromises. One of these is with the electronic viewfinder (EVF): although it has the same 2.36-million dot resolution as the X-T1's, it's the smaller (0.39-inch) device that's found in the Fujifilm X-E2, with 0.62x magnification rather than 0.77x. This means that it isn't possible to see a dual image, with a magnified view alongside the full image. However, like the X-T1's EVF, there's a lag time of just 0.005 seconds, rather than 0.05.

**1** The tilting screen is good, but the EVF is a better option for composing images in very bright sunlight.

**2** If this dial and the lens aperture ring are set to A, the camera is in Program mode.

**3** This button is used to enter AF point selection mode.

**4** This dial enables you to set exposure compensation between -3 and +3EV.

One area where Fujifilm hasn't compromised is with the X-T10's hybrid autofocus system – it's the updated version of the X-T1's. In single autofocus (AF-S) mode there are three options for setting the focus point: Single, Zone and Wide; and in continuous autofocus (C-AF) mode, there are Single, Zone and Wide/Tracking options. When you shoot in Single shot or Continuous Low shooting mode and Zone AF mode, the X-T10 has 77 user-selectable autofocus points (rather than the 49 available in Single AF mode). These can be selected individually or in groups of 3x3, 3x5 or 5x5. When Continuous High shooting mode is selected, the number of AF points drops to 15 around the centre of the frame, and the zone can be set to the whole area or a 3x3 square.

Other specification highlights of the X-T10 include a pop-up flash in addition to a hotshoe; a native sensitivity range of ISO 200-6400 with JPEG-only expansion settings taking this to ISO 100-51,200; a UHS-I SD/SDHC/SDXC card slot; a maximum continuous shooting





Post-capture raw file conversions give the best results, but the X-T10's black-and-white Film Simulation mode is pretty good straight from the camera.

rate of 8fps for eight images; Wi-Fi connectivity; and the same electronic shutter found in the X100T and X-T1, giving shutter speeds up to 1/32,000 sec. To help less experienced photographers, there's also a fully automatic mode.

## BUILD AND HANDLING

The X-T10 doesn't have the weather-resistant build of the X-T1, like other X-series CSCs, but it's pleasantly solid with a die-cast magnesium alloy construction. From the front and rear, it doesn't look much smaller than the X-T1; but from above, it's clear that the new camera is slimmer. The front and rear grips are also less pronounced, but thanks in part to their super-grippy covering, the camera feels safe and comfortable in your hands, even with a large lens on.

Like the X-T1, the X-T10 has traditional exposure controls, but there's no sensitivity dial. However, sensitivity can be set via the main menu or the Quick menu, or alternatively, one of the physical controls can be customised to access the ISO values.

The electronic viewfinder is noticeably smaller than the X-T1's, but it's still very good, and shows the image as it will be captured. Details are clear, and the high refresh rate makes it possible to follow fast-moving subjects.



1

### FAST AF

In Continuous AF and Zone AF mode, the X-T10 was able to latch on to fast-moving skateboarders and keep them sharp as they moved, even in low light.

2

### IN A BURST

In Continuous High-Speed (CH) mode, the X-T10 can shoot up to eight images at 8fps, but you can shoot at 3fps until the card is full in Continuous Low-Speed mode.

3

### NOISE CONTROL

This shot was taken at ISO 1,600, and there's good balance between detail and noise control. An aperture of f/2.8 has restricted the depth of field to give separation.

## Meet the rivals...

The cameras that compete with the Fujifilm X-T10

For test images and resolution charts, visit

[www.techradar.com/cameras](http://www.techradar.com/cameras)



### Sony Alpha 6000

£495/\$698 with 16-50mm kit lens

This 24MP APS-C format compact system camera has an excellent autofocus system and a built-in viewfinder, but like the X-T10, the screen isn't touch-sensitive.

Reviewed: page 102



### Panasonic Lumix G7

£679/\$978 with 14-42mm kit lens

Part of the Micro Four Thirds family of compact system cameras, the 16Mp G7 has touchscreen control, a vari-angle screen and an excellent viewfinder.

Reviewed: page 88



### Olympus E-M10

£449/\$530 with 14-42mm EZ kit lens

A 16MP Micro Four Thirds compact system camera with a tilting touchscreen and high quality viewfinder. The E-M10 delivers some really great-looking images.

Reviewed: issue 152







There's an impressive level of detail on this artist's canvas, hand and sleeve. Using the default Provia Film Simulation mode has also produced natural, life-like colours across the image.



At 100% on-screen, some out-of-focus areas of this ISO 6,400 JPEG look a bit mushy, but it looks great at print size.

## PERFORMANCE

Like the X-T1, the X-T10 is capable of capturing an impressive level of detail, and images have pleasant colours. Noise is also controlled well throughout the native sensitivity range, and even the maximum setting (ISO 6,400) results in images that have enough detail to make nice A3 (297x420mm) prints. As usual, raw files have some chroma noise, but this can be controlled easily.

A key criticism of previous X-series compact system cameras has been the autofocus performance with moving subjects. The autofocus system improvements brought by the X-T10, and rolled out to the X-T1 with a firmware upgrade, are designed to address the issue. It's a

big improvement. In Continuous Wide/Tracking mode, it does a reasonable job of locking on to a moving subject and tracking it around the frame, but busy surroundings can be a distraction, so Zone AF or Single point mode is often a better option. Provided the active zone or single point is kept over the subject, the camera does a good job, delivering sharp images on most occasions, even in subdued light.

It would be nice if the focusing points could extend a little further out from the centre of the frame when shooting at the X-T10's maximum rate (8fps), but it's not a major issue in many situations.

Like other Fujifilm X-series compact system cameras, the X-T10 tends to produce JPEG images with quite high mid-tone contrast. This heightens the sense of detail and makes the images look sharp, vibrant and film-like, but their dynamic range isn't especially high.

The general purpose Multi-zone metering system is also a little prone to producing bright images, so it's a good idea to keep an eye on the histogram to make sure that brighter areas aren't lost. Some highlight detail is usually recoverable from raw files, but you still need to take care and keep an eye on the histogram view on the back of the camera. 📷



Noise is controlled well throughout the native sensitivity range of ISO 200-6,400

WHAT'S THIS?  
Find out how we test on page 6

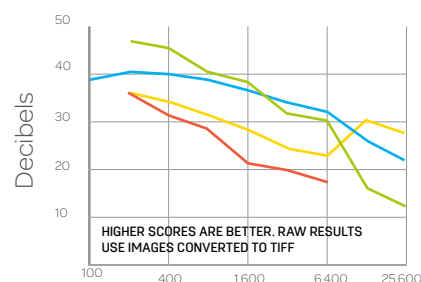
## COLOUR ERROR

Fujifilm X-T10	19.7				
Olympus OM-D E-M10	0.9				
Panasonic G7	2				
Sony Alpha 6000	-1.44				

SCORES CLOSER TO ZERO ARE BETTER

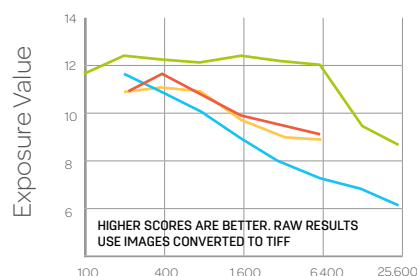
In the default settings, the X-T10 produces the most saturated images of the cameras. This could be enhanced by the relatively high mid-tone contrast of JPEG files..

## RAW SIGNAL-TO-NOISE RATIO\*



This indicates that the X-T10's files are noisier than those from two of the competing cameras, but real-world images generally look great, with a good level of detail.

## RAW DYNAMIC RANGE\*



The X-T10's raw files have a much wider range of tones than the JPEGs, giving greater scope for adjustment of contrast. The JPEGs have attractively high mid-tone contrast.

## Digital Camera

### FEATURES

★★★★★

### PERFORMANCE

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

Overall ★★★★★

**WE SAY:** The X-T10 is a great CSC for those wanting to get serious about their photography, but it's also a good choice for those looking for a backup to their X-T1 or SLR. The X-T10 is a compromise on the X-T1, but it's not much of one – producing the same high-quality images, and with a vastly improved AF.



# Camera Clips

Don't miss shots because your camera's out of reach:  
keep it handy and ready for action



1

**B-Grip Uno**

**Price:** £36/\$55

**Web:** [www.bgrip.com](http://www.bgrip.com)

This little gadget lets you carry your camera on a regular belt or a bag strap, and attaches easily to either. The clip is comfortable on the go. Although predominantly plastic, it's built to last. Only a fiddly release clamp lets it down.



2

**Lowepro S&F Light Utility Belt & Toploader Pro 70 AW II**

**Price:** £54/\$60 & £79/\$90

**Web:** [www.lowepro.co.uk](http://www.lowepro.co.uk)

Combining a camera utility belt and holster bag keeps you comfortable and your camera protected from the elements. The Toploader Pro 70 holster is big enough for a pro SLR, but consequently it's far from sleek, and access can be slow.



3

**Peak Design Capture Pro Camera Clip**

**Price:** £60/\$80

**Web:** [www.peakdesign.com](http://www.peakdesign.com)

Like the Uno, the Capture Clip fastens your camera to your belt or bag strap, however the Capture's quick release system is slicker. It's great with a CSC or a light SLR, but anything heavier will feel like it's pulling your jeans down!



4

**Spider Pro Single Camera System**

**Price:** £110/\$135

**Web:** [www.spiderholster.com](http://www.spiderholster.com)

The Spider Pro is a joy to use, thanks to its instant camera access. Forget bags, clips and clamps: here you get a beautifully designed ball joint that simply slots into a holder on a comfortable belt. The Spider's impeccable build quality seals the deal.



5

**Think Tank Steroid Speed Belt V2.0 & Digital Holster 20 V2.0**

**Price:** £49/\$63 & £55/\$70

**Web:** [www.snapperstuff.com](http://www.snapperstuff.com)

There's another belt and holster bag combination, but both elements are more streamlined and convenient than the Lowepro pairing. Size-wise, it'll pack a small SLR up to a 6D or a D610, but an expandable base enables you to fit a reasonably long lens.



## &gt; THE SPECS

<b>Sensor</b>	16.3 million pixel APS-C X-Trans CMOS II sensor (23.6x15.6 mm)
<b>Focal length conversion</b>	1.5x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	0.5 inch, 2,360k-dot OLED colour viewfinder, 100% coverage, 0.77x magnification
<b>Video resolution</b>	Full HD (1,920x1,080)
<b>ISO range</b>	ISO 200-6,400 (100-51,200 expandable)
<b>Autofocus points</b>	49
<b>Max burst rate</b>	8fps
<b>LCD screen size</b>	3 inch, 1,040k-dot tilting LCD
<b>Shutter speeds</b>	1/4,000-30 seconds
<b>Weight</b>	440g (inc battery and memory card)
<b>Dimensions</b>	129x89.8x46.7mm
<b>Power supply</b>	NP-W126 Li-Ion battery

**F**ujifilm has won many fans with its X-series compact system cameras, which manage to combine good looks

with great performance and have a fantastic retro styling that appeals to today's photographers. However, the firm's latest compact system camera takes a slight departure from the other CSCs in its range. Rather than the flatter design of the X-E2 and the X-Pro1, the X-T1 looks much more like an SLR.

The X-T1 shares a significant portion of its internal design specification with the X-E2. Most importantly, perhaps, the pair share the same excellent APS-C format 16.3-million-pixel X-Trans CMOS II sensor and EXR Processor.

**FEATURES**

Previous Fujifilm cameras have boasted impressive operation speeds. As with the X-E2, the X-T1's start-up time is claimed to be 0.5 seconds, while it has a shutter lag of 0.05 seconds. However, the 2.36-million-dot electronic viewfinder has a refresh rate of 54fps in normal and low-light conditions, and it has a claimed response time of 0.0005 seconds, for a smoother view of moving subjects. This compares favourably with the X-E2 and Olympus E-M1, which Fujifilm claims have response times of 0.05 and 0.029 seconds respectively.

Although the X-T1's viewfinder has the same dot-count as the X-E2's, it is bigger and has a magnification factor of 0.77x – according to Fujifilm, the highest to be found in any current digital camera.



**CSC** Fujifilm X-T1 > £1,049 / \$1,299 (body only)

> [www.fujifilm.eu/uk](http://www.fujifilm.eu/uk)

# Style and speed

Fujifilm is combining SLR-like design with CSC technology for the X-T1. **Amy Davies** finds out how well the combination works

Like the X-E2, the X-T1 has a three-inch 1,040k-dot screen, but is mounted on a tilting bracket for easier viewing when shooting landscape orientation images from high or low angles. This screen can also display the split-image view we discuss in the Tech Briefing panel on page 65.

When the X-E2 was launched, Fujifilm claimed that it had the fastest phase-detection autofocus speed of any digital camera with a 4/3-inch or larger sensor, at 0.08 seconds. At the time of its launch, the X-T1 shared that honour, although both have since been beaten slightly by the newly released Sony A6000.

As with many new cameras, the X-T1 has Wi-Fi connectivity built in. In addition, there's a new Fujifilm Camera Remote app for iOS and Android devices, which allows the camera to be controlled remotely by a smartphone.

Other highlights of the X-T1 include: a native sensitivity range of

**Above** The X-T1 joins the retro design bandwagon, but offers wholly modern imaging

ISO 200-6,400, with JPEG-only expansion settings taking it to ISO 100-25,600; full HD movie recording at 60 and 30fps; and the usual collection of Fujifilm Film Simulation modes and Advanced Filter options.

**BUILD AND HANDLING**

Aimed squarely at the traditionalist, the X-T1 offers more direct control dials on its top plate than you'll find on any other X-series camera. Fujifilm has used cast magnesium alloy for the X-T1's body shell, giving it a solid – and weighty – feel. In addition, 80 seals are in place to keep out dust and moisture. These protections are intended to work in tandem with weatherproof lenses – several of which will be released this year.

Both the finger grip and the thumb rest on the back of the X-T1 have a textured, rubber-like coating, which not only gives a high-quality premium feel, but lends it great purchase. Due to the weight of the camera, it's fairly





Multiple direct control dials make the X-T1 a retro joy to use



The EVF is one of the best on the market, with a clear, bright view



You can't shoot in raw format at the lowest sensitivity setting



The buttons on the back of the camera are a little small and fiddly

## Zooming in on... the Fujifilm X-T1

A quick tour of the camera's key features



A sensor under the EVF automatically detects when the camera has been lifted to your eye, for a seamless transition.



Tap this button to access commonly used settings, such as white balance controls. Use the scrolling dial to make changes.

This slim thumb rest helps the camera sit comfortably in the hand, while the textured coating gives it a premium feel.



The screen tilts downwards and upwards, which is useful when shooting from awkward angles in landscape orientation.



unlikely you'd be using it one-handed for long stretches of time, but if you did, the chunky grip would make it feel secure in the hand.

There will be some who still don't trust the idea of an electronic viewfinder, but the X-T1's 2.36-million-dot EVF is very good. It doesn't suffer from lag in the majority of conditions, and it could easily be argued that the benefits of an electronic viewfinder now outweigh the disadvantages.

Using an EVF allows you to see in real time how changes made to settings will affect the image, while

## "The X-T1 has the traditional exposure controls we would expect from Fujifilm's X-series"

the fact that a preview image pops up (if you have the option enabled) helps you determine whether or not you've nailed the shot without having to constantly remove the camera from your eye. You also have a full field of view, so you can be sure that there won't be any stray objects creeping into the shot that you didn't notice while you were composing it.

The X-T1's tilting screen feels pretty sturdily built. Its usefulness is clear when you're shooting landscape-format images from low or high angles, although it's not quite as handy for portrait-format images.

As we would expect with a camera in Fujifilm's X-series, the X-T1 has traditional exposure controls, and the top plate has dials aplenty. On the left as you hold the camera to use, there's a sensitivity dial that runs from L1 to H2 with numerical ISO settings labelled from 200-6,400, plus an automatic option.

There's a lock button at the centre of the sensitivity dial, which must be pressed before the dial can be rotated to prevent accidental changes to the exposure settings. Directly below this dial, a second dial allows the drive mode to be selected. In addition to single and continuous (high and low) shooting, this gives access to the bracketing, self-timer and Advanced Filter options, plus Motion Panorama mode. It can be fairly easy to knock this dial by accident when changing the ISO speed via the dial above it, but it's something you'll probably get used to with time.

## Meet the rivals...

See how the X-T1 stands up against the competition



**Olympus OM-D E-M1**  
£1,299 / \$1,399 (body only)  
Olympus has created a superb camera. It's quite complex but well worth getting to know.  
Reviewed: issue 84  
★★★★★



**Panasonic Lumix GX7**  
£689 / \$798 (body only)  
Panasonic's GX7 is an ideal choice for photographers looking for a smaller alternative to their SLR.  
Reviewed: issue 158  
★★★★★

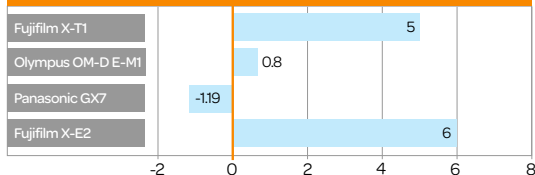


**Fujifilm X-E2**  
£750 / \$999 (body only)  
This great little camera is a good choice for keen landscape, documentary and street photographers.  
Reviewed: issue 150  
★★★★★

## CSC BENCHMARKS

How does the X-T1 fare against its rivals?

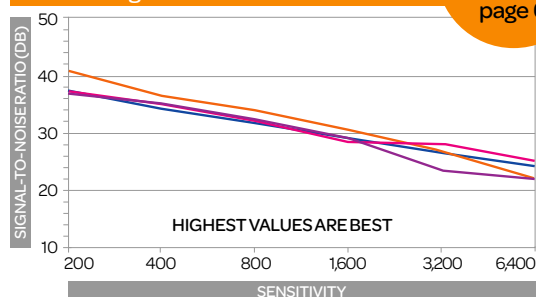
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** The lab tests reflect the X-T1's tendency to warm tones, which give a pleasing if less than accurate look.

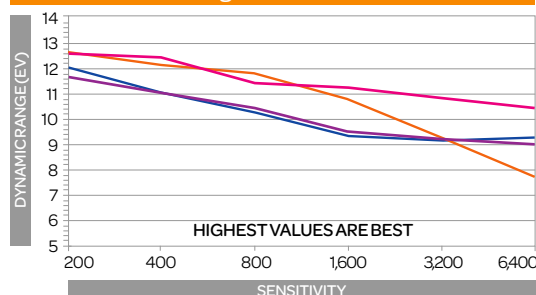
**KEY** Fujifilm X-T1 (purple), Olympus OM-D E-M1 (pink), Panasonic Lumix GX7 (orange), Fujifilm X-E2 (blue)

## TIFF NOISE Highest values are best



**NOISE RESULT:** All of the cameras in this test put in a similar performance, but it's the Panasonic GX7 that – just about – wins.

## RAW DYNAMIC RANGE Highest values are best



**DYNAMIC RESULT:** The X-T1's dynamic range is a little limited, which is again reflective of the warm tones it typically produces.

## OVERALL BENCHMARK RESULT

When we test new cameras, we process their raw files using the supplied software and convert them into TIFFs before analysing them using DxO's Analytics software. With the earlier X-E2, we found that files benefited from being processed in Adobe Camera Raw; we suspect the same will be true of files from the X-T1 once profiles for ACR are released.

- There are two chunky dials on the right of the camera's top plate. Nearest the viewfinder is the shutter speed dial. Like the sensitivity dial, this has a central lock button, but it only comes into play when the dial is rotated to A for automatic. If you have this dial set to automatic, but control the aperture, you're shooting in Shutter Priority mode.

The dial can be rotated between the numeric values (1-1/4,000 sec,

**Above right** The range of Fujifilm X-series lenses is fairly limited, for now. This was taken with the 60mm f/2.4 R Macro Fujinon



with whole-stop markings but 1/3-stop settings), joined by T (Time) and B (Bulb) settings. Another dial under the shutter speed control enables your choice of photometry metering mode (multi, spot and centre-weighted average) to be selected. This seems to be stiffer than the drive mode dial, which combined with its positioning makes it less likely to be accidentally changed.

Towards the far right end of the top plate, within easy reach of your thumb, is the exposure compensation dial. This has settings running from -3 to +3EV. It doesn't have a lock, but it's fairly stiff, so it's reasonably likely to stay in position.

As in Fujifilm's other X-series cameras, pressing the Q button on the back of the X-T1 activates the Quick menu. This provides a speedy route to key features such as the camera's film simulation modes. Simply navigate to the option you want, then use the rear command dial to adjust the setting.

## PERFORMANCE

As the X-T1 uses the same sensor and processor as the X-E2, which was one of our favourites of 2013, we had pretty high hopes for this newcomer. True to expectations, the X-T1 puts in an excellent performance. Images are full of detail, especially at the lower end of the sensitivity run. The lack of an anti-aliasing filter helps to facilitate this level of detail and the sensor design is responsible for ensuring that it is not at the expense of moiré patterning.

Colours are reproduced beautifully. Inspired by Fujichrome camera films, Fujifilm's Film Simulation modes are useful for changing the look of your images. Shooting in Provia mode is generally recommended for everyday shooting, but if you want to boost the saturation and contrast a touch for deeper colours, switching to Velvia is also a good choice. The camera's all-purpose metering mode demonstrates a tendency to





## Tech Briefing

### Dual Display



As the X-T1's viewfinder is so large, there's plenty of room to see Fujifilm's Dual Display, which helps with precise manual focusing. In this mode, the regular view is displayed alongside the Focus Assist view – a magnified view around the active AF point. This is useful as it allows you to keep an eye on the composition while also seeing fine detail for focusing. Focus Peaking can also be displayed to highlight high contrast areas of the subject and aid focusing. Focus Peaking can be set to one of three different colours (white, red or blue), which may be helpful depending on the colour of the subject. Dual Display mode can also be displayed on the rear LCD screen.

underexpose slightly, meaning that you need to dial in some positive exposure compensation to get a more balanced image. Images tend to have quite a limited dynamic range, meaning that highlights can be a little blown out at times.

The X-T1's automatic white balance system is impressive, however. It helps the camera to produce accurate colours, even under artificial lighting.

We found that out-of-focus areas of JPEG

**Above** Colours from the X-T1 are bright and punchy – and the sensor hasn't been confused by the neon lighting

images taken with the X-E2 could be a little painterly – probably as a result of the camera attempting to sharpen areas that shouldn't be sharp. Thankfully, this seems to be less of a problem with the X-T1, suggesting that Fujifilm has tweaked its system's algorithms to prevent this.

Focusing speeds are quick, especially in good light, but they drop off in lower-light conditions. If you're taking pictures of something that is likely to change position while in lower-light conditions, for example, the camera can be quite slow to refocus. And while it may not be as quick to focus as an SLR when shooting through a viewfinder, it's certainly quicker than an SLR shooting in Live View mode, the configuration this camera is essentially always using.

Noise is well-controlled at higher sensitivity settings. At ISO 800, it's virtually non-existent. There's a degree of image smoothing, but detail resolves well. Examining images shot at ISO 1,600 reveals more noise is present, but it's not problematic at normal printing and web sizes.

## VERDICT

We have been big fans of all the cameras in the X-series, but the X-T1 moves into a special place on the

roster, thanks to its beautiful retro styling and classic handling.

Using the X-T1 is simply a joy. It's a return to an old-fashioned way of working, but it's less fiddly than the Nikon Df, which is crafted in the same vein. It's also significantly cheaper than that camera – although the X-T1's sensor is smaller, of course.

There's so much to like about the X-T1 that it's tricky to find something to criticise, which underlines its quality. The lack of a touchscreen is something we usually find fault with, but it's not quite such a wrench here as on other cameras, because the button and dial layout is so good and intuitive. It's a slightly long-winded process to set an autofocus point, but it's not too bad. **A**



**Above** Direct control dials wait invitingly to be used

## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD/HANDLING

★★★★★

### VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** Fujifilm has done it again. The X-T1 is not only beautiful, but is capable of producing some superb images. We can see this on top of many a photographer's lust list, and with good reason.



## &gt; THE SPECS

Sensor	Four Thirds type with 16.84 million pixels (12.8 million effective)
Focal length conversion	N/A
Memory	SD /SDXC /SDHC
Viewfinder	0.38-inch electronic viewfinder with 2,764,000 dots
Video	4K (3,840x2,160)
ISO range	200–25,000; expandable to 100–25,000
Autofocus points	49
Max burst rate	40 frames per second with focus set at start; 6.5fps with continuous AF
Screen	3-inch 921k-dot LCD
Shutter speeds	Mechanical shutter, 1/4000–60 sec; electronic shutter, 1/16,000–1 sec
Weight	365g
Dimensions	117 x 66 x 61mm
Power supply	Rechargeable Li-ion battery



**COMPACT** Leica D-Lux (Typ 109) > £825 / \$1,052 > [www.leica-camera.com](http://www.leica-camera.com)

# Luxury goods

The D-Lux (Typ 109) is Leica's version of the Panasonic LX100. **Angela Nicholson** investigates if it's worth the extra money

**T**he Leica D-Lux (Typ 109) is a rather unusual camera. Thanks to a working agreement between Leica and Panasonic, it's almost identical to the Panasonic LX100, one of our favourite cameras of 2014. There is a price premium to pay for the Leica model, but this also brings a three-year warranty, and Lightroom 5 is included on a disc in the product box.

For those unfamiliar with the LX100, the sensor is a Four Thirds-type; according to Panasonic, it's the same 16MP sensor used in the Panasonic GX7, but it only uses a maximum of 12.5 million pixels (in 4:3 mode). As it's a multi-aspect ratio sensor, 3:2 and 16:9 images use pixels that lie outside the area used by the camera in 4:3 mode.

This sensor is coupled with a new Panasonic Venus engine, which enables a native sensitivity range of ISO 200–25,000 (with expansion settings taking it to ISO 100–25,000) and 4K or Full-HD video recording.

Like the LX100, the D-Lux has a Leica DC Vario-Summilux 24–75mm (equivalent) f/1.7–2.8 lens. As with the rest of the camera, although this lens has Leica's name on it, it is actually built by Panasonic. The company has invested a lot of effort to keep size down while ensuring it's a high quality optic.

## BUILD AND HANDLING

The D-Lux (Typ 109) is aimed at experienced photographers who

**Above** There's no denying that the D-Lux is a fine-looking camera.

want a high-quality compact camera that affords plenty of control. It doesn't disappoint: it has a high-quality feel, along with traditional controls (including a shutter speed dial, aperture ring and exposure compensation dial) to allow quick exposure adjustments. The aspect ratio can also be changed (between 3:2, 16:9, 1:1 and 4:3) using a sliding switch on the lens barrel, just next to the manual focusing/zoom ring, and there's a switch on the lens to select focus mode.

Further good news is that the 2,764k-dot electronic viewfinder (EVF) is very good and provides a nice, clear view. It's especially useful in bright conditions, where the 3-inch 921k-dot screen can suffer from reflections, as do most screens.

However, the front grip that's on the front of the LX100 is completely missing from the D-Lux. This makes it feel rather insecure in your hand, especially in cold weather. There is an optional front grip available that attaches via the tripod bush, although

## Meet the rivals...

The cameras taking on the Leica D-Lux



**Panasonic LX100**  
£598 / \$798

The same spec as the D-Lux, with a shorter warranty. Its front grip is a plus over the D-Lux.  
**Reviewed:** issue 159  
★★★★★

**Fujifilm X30**  
£319 / \$500

The same 12MP 2/3-inch X-Trans CMOS II sensor and 28–114mm f/2–2.8 lens as the X20, in a larger body coupled with an EVF.  
**Not reviewed**

**Fujifilm X100T**  
£846 / \$1,299

Its 16MP APS-C format sensor and Fujinon 23mm f/2 lens give this compact bags of appeal.  
**Reviewed:** issue 161  
★★★★★





this arguably spoils the clean lines of the camera.

## PERFORMANCE

Like the LX100, the D-Lux (Typ 109) produces impressive results. Images taken in daylight have lots of detail, natural colour and good tonal range, and distortion is controlled well. As usual, the highest-quality results are produced at the lower sensitivity settings, and the maximum setting (ISO 25,000) is best avoided.

Dropping down to ISO 6,400 results in much better images and, although we'd still recommend shooting raw files, JPEGs are suitable for making A3 prints. Ideally, it's best to keep the sensitivity to ISO 1,600 or lower, where the image quality is very good, noise is controlled well and there's plenty of detail.

Even in fairly low light, the D-Lux's autofocus system manages

to get subjects sharp quickly; it only starts to struggle in dark conditions. The general-purpose metering system does a good job, but it sometimes produces quite bright images. It can be beneficial to reduce the exposure by 1/3 or 2/3EV to get more saturated colours or to protect the highlights. 📷

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** The D-Lux is a delight to use. It produces high quality images, but the Panasonic LX100, which has the same spec, feels safer in your hand, thanks to the front grip that's missing from the Leica camera.

**WHAT'S THIS?**  
Find out how we test on page 6

# COMPACT TEST

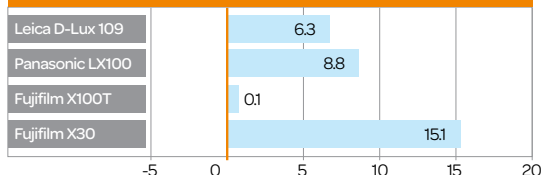
LEICA D-LUX (TYP 109)

67

## CAMERA BENCHMARKS

How does the D-Lux fare against the rest?

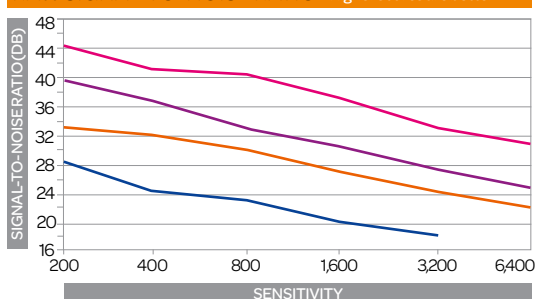
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** It lacks the accuracy of the Fuji X100T, but the D-Lux scores pretty well, producing vibrant images.

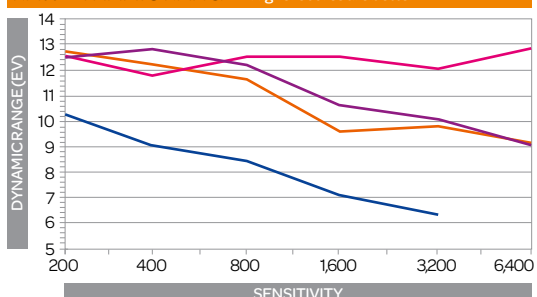
**KEY**  
Leica D-Lux 109 (Purple)  
Panasonic LX100 (Pink)  
Fujifilm X100T (Orange)  
Fujifilm X30 (Blue)

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The LX100 and D-Lux stand up well to the competition from the X100T's larger sensor. Noise is controlled well.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** This indicates that the D-Lux captures a wide range of tones at the lower sensitivity settings.

## OVERALL BENCHMARK RESULT

These figures show the results when the raw files from the LX100 and D-Lux are processed using their own supplied software (Silkypix and Lightroom respectively). When they are both processed using Adobe Camera Raw, the results are a very close match.

\* Raw results use images converted to TIFF

**Above** The D-Lux's images are vibrant and full of detail.



**Right** That's an aperture ring towards the front of the lens.

From the makers of **Digital Camera** magazine



## &gt; THE SPECS

Sensor	24.2-million-pixel DX-format (APS-C) CMOS
Focal length conversion	1.5x
Memory	2x SD / SDHC / SDXC
Viewfinder	Eye-level pentaprism viewfinder; 100% field of view
Video	Full HD (1,920 x 1,080) at 60, 50 (1.3x crop mode), 30, 25 or 24p
ISO range	100-25,600 (expandable to 102,400 equivalent, monochrome only)
Autofocus points	51
Max Burst Rate	6fps (DX), 7fps (1.3x crop)
Screen	3.2 inch, 1,229k-dot fixed TFT LCD
Shutter speeds	1/8,000-30 sec
Weight	765g (body only, with battery and memory card)
Dimensions	136 x 107 x 76mm
Power supply	EN-EL15 rechargeable Li-ion battery

SLR Body: £849 / \$1,197 > [www.nikon.com](http://www.nikon.com)

# Great all round

The Nikon D7200 replaces the D7100 - the body's roughly the same but there are key upgrades. **Amy Davies** checks it out

**R**oughly two years after the introduction of the D7100, the new D7200 which replaces it seems more like an incremental upgrade than a major overhaul. Inside the camera you'll find a sensor with the same 24-million-pixel resolution as its predecessor, while the external body is identical.

As before, the sensor is missing an anti-aliasing filter, which should again make it extremely capable of resolving fine detail. That's not to say that some of the changes that have been made are not significant, though.

## FEATURES

An Expeed 4 processor facilitates an increase in burst depth: Nikon says that the D7200 is capable of shooting up to 27 raw-format files or 100 JPEGs before the buffer fills. There's also an increase in native sensitivity range: it's now ISO 100-25,600, with two special monochrome-only expansion settings which take the sensitivity up to ISO 102,400.

Also included for the first time in a DX format (APS-C) Nikon is the

ability to focus down to -3EV, thanks to the inheritance of the Multi-Cam 3500-II 51-point autofocus system from models that are higher up in Nikon's range.

The D7200 now includes Wi-Fi and, for the first time in a Nikon digital SLR, NFC (Near Field Communication) connectivity. The two wireless technologies should make it easier than ever to establish a remote shooting connection with your phone or tablet, or send pictures across for quick sharing.

**Above** The D7200 looks like the D7100's identical twin - apart from the name badge.

Staying the same as in the D7100 is a 3.2 inch, 1229k-dot LCD screen, which is fixed and not touch-sensitive. It is joined by an eye-level pentaprism optical viewfinder, which offers 100% coverage.

## BUILD AND HANDLING

Nikon has worked hard to make the D7200 look and feel like a high-quality piece of kit. It feels pretty similar to something like the D610 or the D750 when you're holding it. Both the front and rear grip have soft textured coatings, which make it feel nice in the hand, while your fingers sit comfortably thanks to its contoured and shaped grip.

As with the D7100, the D7200 is weatherproof, which gives you the confidence to use it in a range of conditions without concern. It also helps to give it an air of high quality - albeit not feeling quite as rugged as the D810.



## Stick or twist? Upgrade advice

If you already own a D7100 (pictured) or a D7000, there are a couple of additions here that may tempt you to upgrade, especially if you're a sports or wildlife photographer and need a better burst depth, or perhaps if you often shoot in low light and

would like the higher native ISO range. Otherwise, it's a slightly trickier decision, as many of the features have stayed the same. For those looking to move from something lower down in Nikon's line-up, such as D5300, this makes for an excellent upgrade.



## Zooming in on the... Nikon D7200

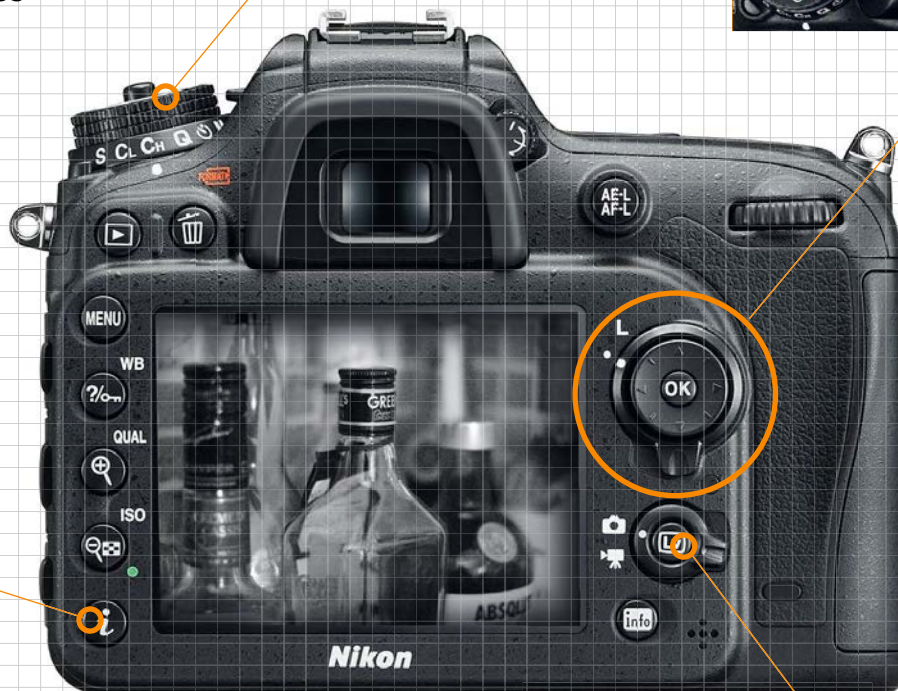
A layout that's full of clever ideas and touches



**AF switch/button**  
Press the button in the centre to choose an autofocus method, while the switch can be flicked to choose between manual and auto focusing.



**i button**  
This button acts as a sort of quick menu, but there should be more options available on the menu that pops up.



### Drive mode dial

Choose a drive mode by holding down this small button and rotating the dial. It's a little fiddly, but you get used to it.



### Lock switch

You can lock the control pad using the outside switch – handy for preventing an accidental change to your focus point.

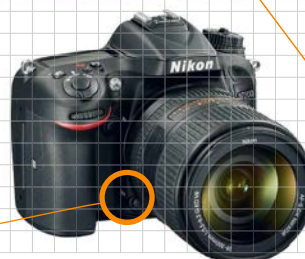


### Live view button

Use this to choose between using the viewfinder and the screen to compose your images. The switch allows you to flick between video and stills shooting.

### Fn button

This button can be assigned to one of 18 different settings, and is easily reachable as it's positioned near the grip.



This is very much a camera that requires both hands to use and, as we'd expect from this level of camera, there's a good range of dials and buttons for making changes to key settings quickly and easily. If you're a D7100 owner, you will feel extremely familiar with both the button and menu layout, but if you're coming from a different Nikon model, you should also feel at home.

**"The optical viewfinder is bright and clear. It's great to see a 100% offering on a camera at this level"**

The optical viewfinder is bright and clear. It's great to see a 100% offering on a camera at this level, as it means you'll never have something unexpected creeping into the edges of

the frame. When shooting macro or still-life scenes, it's advisable to use the rear LCD screen, which offers a magnified view for checking critical focus. It would be nice if the screen was articulated or tilting, though, to help with awkward angles.

Connecting to a smartphone via Wi-Fi is easy, but the control is hidden away a little in the main menu. A dedicated button for quicker access would have been better. NFC is included – but, despite several attempts, I wasn't able to get it to respond to my Android phone. The Nikon Wireless Utility app is also very limited, only offering the ability to set autofocus point and trip the shutter. Nevertheless, it's useful for group shots, or if you want to shoot from a tricky angle.

## PERFORMANCE

The 24.2MP sensor and Expeed 4 processor combination has already

## Meet the rivals...

The cameras taking on the Nikon D7200



### Canon EOS 70D

Body: £734 / \$999

A fantastic all-rounder, with Wi-Fi and great image quality. It's also got an articulating touchscreen.

Reviewed: page 42



### Fujifilm X-T1

Body: £879 / \$1,299

Beautiful retro design makes the X-T1 an ideal camera for enthusiasts who like traditional controls.

Reviewed: page 62



### Olympus OM-D E-M5 Mark II

Body: £869 / \$1,050

An powerful CSC with usability that gives SLRs a run for their money.

Reviewed: page 80

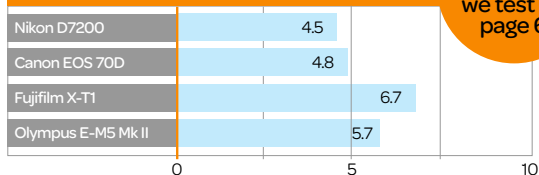




## CAMERA BENCHMARKS

How does the Nikon D7200 fare?

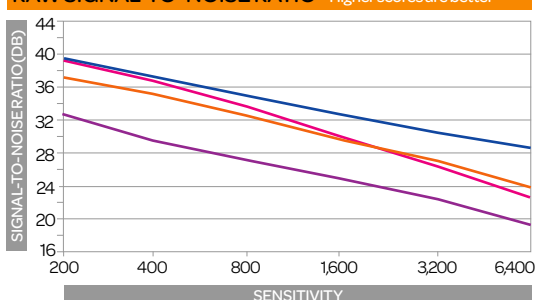
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The D7200 is closely matched with the Canon 70D. Both can produce beautiful tones in real-world shooting.

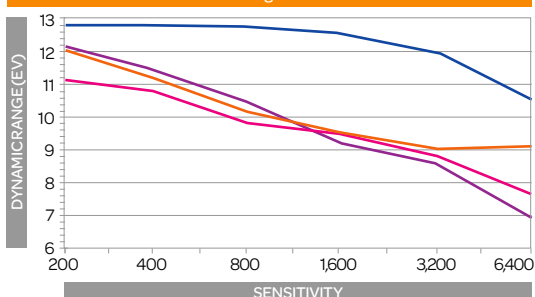
**KEY** Nikon D7200 (purple), Canon EOS 70D (pink), Fujifilm X-T1 (orange), Olympus E-M5 Mk II (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The D7200 comes bottom here. This could be a result of Nikon's processing favouring detail over noise, though.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The D7200 is fairly closely matched here with the Fujifilm X-T1, but it performs slightly better than the 70D.

## OVERALL BENCHMARK RESULT

Unsurprisingly, the D7200 is better at detail resolution than the Canon EOS 70D, while it is very closely matched with the Fujifilm X-T1. Both the 70D and the X-T1 generally perform better than the D7200 for JPEG signal-to-noise ratio, although the Nikon fares better at higher sensitivities. Meanwhile, for JPEG dynamic range, the D7200 and 70D are very closely matched, and are both better than the X-T1.

\* Raw results use images converted to TIFF

proved itself to be great partnership in the Nikon D5500, which sits underneath the D7200 in Nikon's line-up, so we were fully expecting good things from the D7200.

This camera is aimed broadly at enthusiasts, who want to shoot a bit of everything, so it needs to be a fantastic all-rounder, capable of handling lots of different subjects. Looking at JPEG images directly

**Above** As you can see, the D7200 produces lovely natural tones.

**“The automatic white balance system copes very well with different lighting conditions”**



from the camera, colours have a great vibrancy, with a bright but natural appearance. Colours are vivid and bold in good light, but even under different lighting conditions, you still get a nice warmth and saturation.

Detail is also excellently resolved. Examining images at 100% reveals some very fine detail, with pretty much zero evidence of image-smoothing at lower sensitivities. Detail continues to be resolved well throughout the sensitivity range, and even at those incredibly high figures, like ISO 12,800 or 25,600, we can still see a reasonable amount of detail. Even the monochrome-only setting of Hi1 is usable, with the grain arguably adding to the film-like feel

of a black-and-white shot. Looking at raw-format files, it's clear that a fair amount of noise reduction is applied to JPEG images in their default settings, but this gives you scope to apply exactly the kind of noise reduction you want to in post-processing, balancing out detail with the presence of noise.

Using the matrix metering system leaves you with well-exposed images in the majority of conditions, and it even copes well with some high-contrast scenes. On occasion, you may find dialling in some exposure compensation for dull landscapes helps to bring out detail, though.

The automatic white balance system copes very well with different lighting conditions, and is pretty much faultless in daylight or cloudy conditions. It errs ever so slightly on the warm side under artificial lighting, so it's recommended for accuracy that you switch to a more





appropriate white balance setting, or create a custom setting.

Autofocusing is a breeze with the D7200. Thanks to the new AF system, the camera is capable of locking onto

**Above** The Hi1 ISO setting is accessible only in the JPEG Monochrome mode, but its results are atmospheric.

a moving subject, even in lower-light conditions. The 15 cross-type AF points are more sensitive in lower light, while the central point is the most sensitive of all if light levels drop even further.


The camera's burst depth is now much improved when compared with its predecessor. Shooting with Fine JPEG selected allows you to capture around 50 shots before the buffer fills; this equates to around nine seconds of shooting time, giving you plenty of opportunity to catch the action. Raw-format shooting at 14-bit gives you roughly 2–3 seconds, or 4–5 seconds at 12-bit, if you need the higher-quality files.

### VERDICT

Although the D7200 may not be a complete overhaul, Nikon has tweaked an already great camera to produce something that is even better than its predecessor.

The D7200 makes for a great all-rounder. It produces images that are very sharp and detailed, with a pleasing degree of saturation.

While it would be nice to see an articulating, or perhaps even touch-sensitive, screen, as we have on the D5500, it's great to have a 100% viewfinder to use.

The Expeed 4 processor fixes the issue of burst depth, making it more useful than before if you're shooting quick-moving subjects. The handling of the camera also remains great, with a high-quality feel you might otherwise expect from something that sits at the top of Nikon's range, rather than in the middle. 



**Left** You won't find a dedicated Wi-Fi button: its activated via the menu.

### Digital Camera

#### FEATURES



#### IMAGE QUALITY



#### BUILD QUALITY



#### VALUE



### Overall

**WE SAY:** A comprehensive feature set and great quality images make the D7200 the ideal camera for enthusiasts – or maybe even a back-up model for those who already own a full-frame Nikon.

## &gt; THE SPECS

Sensor	36.3MP full-frame format (35.9 x 24mm)
Focal length conversion	1x
Memory	CF and SD / SDHC / SDXC
Viewfinder	Optical pentaprism (approx 100% cover)
Video	Full HD (1080p) at 60p, 50p, 30p, 25p and 24p
ISO range	64 to 12,800, expandable to ISO 32-51,200 equivalent
Autofocus points	51 phase detection points (15 cross-type); contrast detection in Live View and video modes
Max burst rate	5fps at full resolution
Screen	3.2-inch, 1,229,000-dot TFT
Shutter speeds	1/8000 to 30 sec plus Bulb and Time
Weight	880g (body only)
Dimensions	146 x 123 x 81.5mm
Power supply	EN-EL15 rechargeable lithium-ion battery



SLR Nikon D810 > Body only: £2,499 / \$3,297 > [www.nikon.com](http://www.nikon.com)

# Big shoes to fill

The D810 succeeds a much-loved full-frame SLR. **Angela Nicholson** finds out whether it's a worthy successor...

## FEATURES

Given the 36.3-million effective pixel count of the D800, it's no surprise that the D810 has the same number of photosites on its sensor; but we are told that it uses a newly designed chip and Nikon's latest Expeed 4 processing engine. Unlike the D800E, the D810 has a filter with no AA properties at all. This should help it record more sharp detail.

Other changes from the D800 include a higher-resolution rear display, the ability to record small raw

images (useful for animators) and the D4S's AF system with Group-area AF mode. The move to the Expeed 4 processing engine also takes the maximum continuous shooting rate at full resolution up from 4 to 5fps. Alternatively, the D810 can shoot at 7fps in DX format and record 15.3MP images. Helpfully, the buffer capacity has also increased: the D810 can record 47 lossless compressed 12-bit raw files in a single burst rather than 21, or 23 uncompressed 14-bit raw files instead of 16.



Above An optional battery grip for the D810 enables easier upright shooting

You can set sensitivity in the native range ISO 64-12,800, and there are expansion settings of ISO 32-51,200, giving greater scope for shooting at wide apertures or in bright conditions as well as better low-light capability.

The D810's video capability improves on the D800, with the ability to shoot at 50p and 60p, and a Zebra display mode that shows areas close to burning out. There's also a new Flat Picture Control mode, which reduces sharpening and contrast to maximise dynamic range for better post-capture grading. In another change to Picture Controls, it's now possible to adjust image clarity or micro-contrast to give an impression of greater (or reduced) sharpness without over-emphasising edges.

Furthermore, Nikon has given the D810 a new shutter and mirror box mechanism that it claims reduces vibration, giving a steadier viewfinder image with less blackout for better



## Stick or twist? Upgrade advice

The D800 (left) was a huge leap forward from the 12.1MP D700, and the D800E introduced the concept of 'omitting' the anti-aliasing filter over the sensor in a 35mm-format SLR. The D810 doesn't take such a significant step forward, but it's a solid

successor to the D800. However, few D800 owners will find enough new to make it worth upgrading – unless, perhaps, you are keen to get the better autofocussing and improved burst depth for capturing sport and action or wildlife.



## Zooming in on the... Nikon D810

A quick tour of the camera's key features



autofocussing and sharper images. Vibrations can be further reduced by using the new electronic front-curtain shutter in Mirror Lock-Up or Exposure Delay mode.

### BUILD AND HANDLING

Any D800 owner who picks up a D810 will feel at home. There are only a few design changes: the rear grip is a little more pronounced, the front grip is slightly more ergonomically shaped, and the memory card door feels more durable. The changes to the grips make the D810 feel a fraction more comfortable and secure.

**“The changes to the grips make the D810 feel a fraction more comfortable and secure”**

The metering switch on the back of the D800 has also gone, making the AE-Lock/AF-Lock and AF-on buttons easier to operate with the camera held to the eye. Metering options are now accessed via what was the bracketing button, above the drive mode dial on the top. We generally prefer a switch or dial for setting selections because it's usually quicker and easier, but the

change to a button for metering isn't a deal-breaker.

The most noticeable difference is the introduction of an 'i' button on the back. This gives access to some key settings, such as Active D-Lighting, and it works in the same way as it does on Nikon's other recent SLRs. It is particularly useful when shooting in Live View or Video mode, and it provides the means of accessing the Split-screen view. However, as we have said before, it seems strange having options to change some of the customisation settings via this information screen in reflex shooting mode. It would be better to keep the options for changing the functions of the preview and Fn buttons, for example, in the main menu. This would free up space in the information screen for features such as Exposure Delay that may need to be accessed on a shot-by-shot basis.

We'd also like to be able to make adjustments via the Information display that pops up when the Info button is pressed. As it stands, this displays key camera settings, but they can't be changed. It feels like a waste and a bit of an overlap in buttons.

### Meet the rivals...

See how the Nikon D810 stands up against the competition



#### Nikon D800

Body only: £1,880 / \$2,997  
The D800 should be available at a bargain price for a while. It's still an excellent camera.  
Reviewed: issue 125  
★★★★★



#### Sony Alpha 7R

Body only: £1,510 / \$2,298  
It doesn't have the AF speed of the D810, but this full-frame CSC can match the SLR for resolution.  
Reviewed: issue 147  
★★★★★



#### Canon EOS 5D Mark III

Body only: £2,299 / \$3,399  
With 22.3MP, this can't match the D810 for detail resolution, but its handling is superb.  
Reviewed: page 22  
★★★★★

# CAMERA SHOPPER

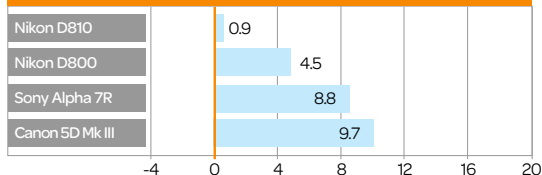
A DIGITAL CAMERA SPECIAL

**WHAT'S THIS?**  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the Nikon D810 measure up?

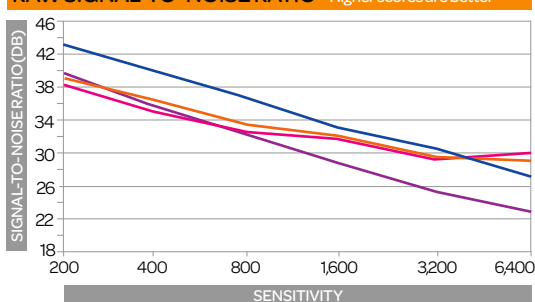
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** These results show that the D810 is comfortably the most accurate camera for colour in this group.

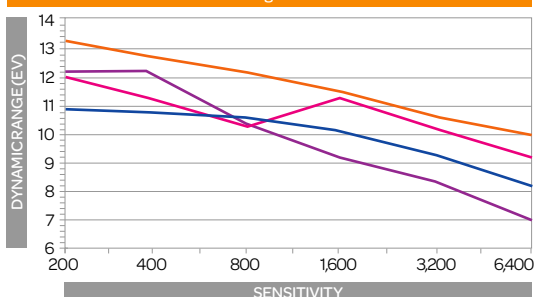
**KEY**  
Nikon D810 (Purple)  
Nikon D800 (Pink)  
Sony Alpha 7R (Orange)  
Canon EOS 5D Mk III (Blue)

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Bringing out more detail appears to make the noise in the D810's images more visible to our lab testing system.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** This indicates that the D810 can record a wide range of tones, although it can't match the Sony A7R.

### OVERALL BENCHMARK RESULT

At 100% the D810's mid- and high-sensitivity images look subtly different from the D800's. Thanks in part to the lack of an AA filter, they look sharper, but the noise also looks finer and less clumped. They also have more detail. Although we think the images look better, this appears to make the noise more visible to our lab test, so its scores are poorer.

\* Raw results use images converted to TIFF



however, operates at a similar speed. It's not a patch on that of a CSC, but it's usable provided the camera is held on a tripod.

### PERFORMANCE

Although they have a little more detail if you really look for it at normal printing sizes, images direct from the D810 don't look dramatically different from those from the D800. As a rule they have pleasant, vibrant colours, natural white balance when the Auto setting is used, and good exposure in most conditions when the Matrix metering system is employed.

Noise is generally controlled well, and shots taken at higher sensitivity settings look very good at normal

viewing and printing sizes. Examining these images at 100% on-screen reveals that noise has a finer texture from the D810 than from the D800; there's less smoothing or clumping. This may make the noise more visible to our lab testing system, but it helps with the impression of detail.

Getting every last scrap of detail from the D810 often demands that the camera is on a tripod, the optimum aperture is set and exposure delay is employed along with the front shutter, and that the subject is motionless. At ISO 100, 1/250 sec and f/8 however, you can expect to be scrutinising the weave of the shirt in a head-and-shoulders portrait and nodding contentedly that the pixel count is worthwhile. Even a shot taken in low light at ISO 3,200 can withstand being viewed at A2 size.

Our lab testing indicates that using the front shutter instead of the standard unit makes a slight

- ➊ D800 users will notice straight away that the mirror and shutter movements are much quieter and feel more dampened in the D810. It makes the camera much more discrete and conveys a sense of better quality.

Another operational difference becomes apparent in Live View mode, where the D810 displays images much more quickly after a shot has been taken than with the D800. The contrast-detection autofocus system,

**Above Right**  
Thanks to the pixel count, there's lots of detail. As there's no anti-aliasing filter, it looks sharp from the camera

**"Even a shot taken in low light at ISO 3,200 can withstand being viewed at A2 size"**





but insignificant difference to detail resolution, but it's possible that the degree of impact varies with the solidity of your tripod. Using Exposure Delay mode, which fires the shutter a little after the mirror has

**Above** Shooting at f/2.8 at 150mm has restricted depth of field nicely, but there's lots of detail in this ISO 100 shot

lifted, however, has a dramatic impact. You won't necessarily see obvious movement, but the image lacks the detail resolution that you get when it is employed.

Given its pixel count and the huge files it produces, it's unlikely that the D810 would be the choice of many professional sports photographers. However, its autofocus system is more than capable of getting moving subjects sharp and tracking them across the frame. It can also operate in very low light levels. All of these factors combine to make the D810 a good all-rounder, which can be used for shooting a variety of subjects in a wide range of conditions.

## VERDICT

Given that the D800 already had a 36MP sensor, it seems unreasonable to expect more in the D810's sensor. Many D800 users already mention (or complain) about the size of the files and the need to upgrade their computer and storage capacity. The tiny photosites are also susceptible to very small movements which means that the camera often needs to be on a decent tripod and used in Exposure Delay mode to get any benefit.

Without these 'rules' being obeyed, there are times when you may as well have a lower-pixel-count camera that delivers manageable file sizes.

However, just about everything else that's important has changed. The sensor and processing engine are new and allow a non-expansion sensitivity setting of ISO 64, which allows you to extend the exposure time that little bit further without needing a neutral-density filter. The updated AF system is both fast and accurate, the main screen has a higher dot count and the maximum continuous full-resolution shooting rate has gone up by 25%. Oh, and the images are superb. 📸



**Left** The grip feels just a little better than the D800's

## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** The Nikon D810 is an excellent camera that's well-suited to landscape, still-life and macro photographers, yet is also capable of delivering superb sport, action and wildlife photos.



**CSC** Olympus OM-D E-M10 Mark II > with 14-42mm EZ lens: £650/\$1,015 > [www.olympus-global.com](http://www.olympus-global.com)

# Double take

A better viewfinder, 5-axis stabilisation and 4K time-lapse video give this camera even greater appeal says **Angela Nicholson**



## > THE SPECS

<b>Sensor</b>	16 million effective pixel Four Thirds type (17.3 x 13mm) CMOS
<b>Focal length conversion</b>	2x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	2,360,000-dot OLED
<b>Max video resolution</b>	Full-HD at 60fps
<b>ISO range</b>	100-25,600
<b>Autofocus points</b>	81
<b>Max burst rate</b>	8.5fps in S-AF at full resolution
<b>Screen</b>	Tilting touch-sensitive 3-inch LCD with 1,037,000 dots
<b>Shutter speeds</b>	60-1/4,000 sec with mechanical shutter; up to 1/16,000 sec with electronic shutter; plus Bulb
<b>Weight</b>	342g (body only)
<b>Dimensions</b>	119.5 x 83.1 x 46.7mm
<b>Power supply</b>	Lithium-ion battery (supplied)

“Short video clips can be shot and then joined together in-camera to create more dynamic movies”

**T**hanks to its small size, durable-feeling body, extensive control and high-quality images, the OM-D E-M10 has been very successful for Olympus, outselling the other OM-D models. Now we have the OM-D E-M10 Mark II, which is more of a refresh than a substantial update.

Like the original E-M10, it has a 16MP Four Thirds type sensor coupled with the TruePic VII processing engine. However, the new model brings a few changes that should help it compete in the current market. The main upgrades include: a 2,360,000-dot OLED viewfinder with an option to simulate an optical finder; image stabilisation that operates over five axes rather than three; focus bracketing; and the ability to use the screen to set the AF point while looking through the viewfinder.

In addition, short video clips can be shot then joined together in-camera to create more dynamic movies, and there's a clean HDMI

**1** These dials are within easy reach for adjusting exposure with the camera to your eye.

**2** If you want a vari-angle screen, you'll have to opt for the OM-D E-M5 II, as this one just tilts.

**3** This isn't as effective as the E-M10's rear grip, so a strap is a good precaution.

**4** There are three customisable Function buttons; the E-M10 has just two.

output for recording or viewing on external devices.

Although it's not possible to record 'normal' 4K movies with the E-M10 II, Olympus has improved upon the original EM10's time-lapse feature with the ability to create 4K time-lapse movies in-camera, although playback is limited to 5fps.

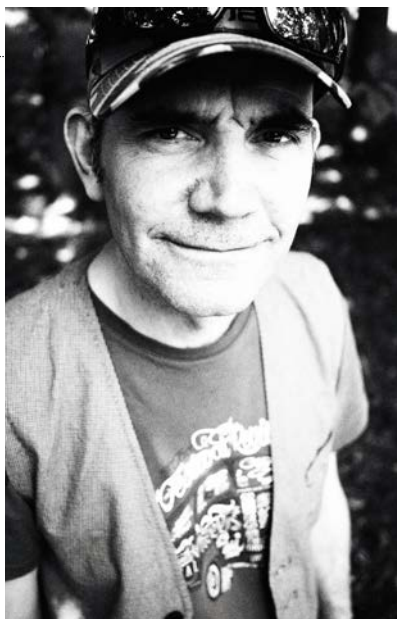
## BUILD AND HANDLING

The E-M10 Mark II is constructed from magnesium alloy and has a solid, durable feel, but it lacks the weatherproof sealing of cameras higher up the range. The most noticeable difference between the new and old cameras is on their top-plates. The control dials on the Mark II are much taller and easier to use, while the exposure mode dial has swapped sides to make room for the retro-styled power-switch.

I found the viewfinder very clear, and it's easy to forget whether you're using an optical or electronic device. It makes the scene look vibrant and attractive to photograph.

However, when shooting from the photographers' pit at Fairport's





Grainy Film mode can be very effective with some subjects, but you can record a raw file as well for processing.

Cropredy Convention, I sometimes found that the viewfinder didn't show the image as it would be captured. I've reported the issue to Olympus, and it's being investigated. On other occasions, the viewfinder correctly previewed the final image – unless I was using the simulated optical finder, as you'd expect.

I had mixed success using the screen to set an AF point while looking in the viewfinder. On some occasions it worked well; on others, I couldn't get it to respond.

On the whole, the E-M10 II's menu is sensibly arranged, but it would be helpful if there was a customisable screen where you could quickly access all your most commonly used features.

It would also be nice if Olympus made more use of the camera's touch control system, so it can be used with more of the Super Control Panel and the main menu.

While the E-M10 II is generally very responsive, I had an occasional problem – as with the E-M5 Mark II – where pressing the info button didn't actually toggle through all the options, skipping the histogram and level views.

## PERFORMANCE

Olympus hasn't divulged whether the sensor inside the OM-D E-M10 Mark II is the same as the one in the E-M10, but it's likely that it is very similar. The processing engine is the same TruePic VII system. Our lab tests indicate that the OM-D E-M10 Mark II produces very similar



### 1 NOISE CONTROL

There's very little sign of noise in this ISO 3,200 image. Although there's just a little smudging visible at 100%, there's a very good level of detail too.

### 2 FAST AUTOFOCUS

This singer was very animated and moved a lot, but with the 40-150mm f/2.8 lens mounted, the AF system was able to latch on to her and deliver sharp results.

### 3 WIDE RANGE

This scene was quite brightly lit but the histogram shows that there's a good range of tones recorded, and none of the highlights have been lost.

## Meet the rivals...

How does the M10 Mark II fare against the competition?

For test images and resolution charts, visit

[www.techradar.com/cameras](http://www.techradar.com/cameras)



**Fujifilm X-T10**  
£799/\$1,099 with 18-55mm lens

The X-T1's little brother, this 16MP beauty has traditional controls and produces superb quality images for a good price.

Reviewed: page 58



**Panasonic G7**  
£629/\$798 with 14-42mm lens

An all-rounder with an excellent viewfinder, a vari-angle touchscreen and clever 4K Photo shooting, but rather lightweight build.

Reviewed: page 88



**Olympus OM-D E-M10**  
£478/\$599 with 14-42mm EZ lens

The original E-M10 remains on sale and offers excellent value for money, producing very similar images.

Reviewed: issue 152







Shooting at 1/3,200 sec enabled an aperture of f/2.8, used here to blur the background and draw attention to the bright and colourful hat – which has bags of detail in its pattern.



Despite being taken at 1/10 sec, this image is sharp at 100%, thanks to the excellent stabilisation system.

Images to those from the Mark I. Although there's a tiny hint of luminance noise visible at 100% in images captured at ISO 400, there's a good level of detail visible in low to mid sensitivity range shots. Noise is controlled well up to around ISO 3,200–6,400, when some areas in JPEGs start to take on a slightly painterly appearance at 100%. The results at ISO 12,800 and 25,600 are reasonably good, provided you are happy to keep printing sizes to A4 (8.3 x 11.7 inches) or smaller.

One area where the E-M10 II really impressed was with its autofocus. I enjoy music photography, and in the past I've found that compact system cameras haven't been able to cope when

stage lights are the main form of illumination. However, when shooting from the photographers' pit, the E-M10 Mark II proved to be more than up to the job with an M Zuiko Digital ED 40-150mm f/2.8 Pro lens mounted.

It was able to get the subject sharp even in very low light conditions. Provided I positioned the starting AF point over the subject, I also found the AF Tracking system was able to get it sharp quickly – and keep it sharp as performers moved.

The five-axis image stabilisation system inside the E-M10 II is very good. When shooting with the 40-150mm lens mentioned earlier, I was able to get images that look sharp at 100% when shooting at the longest point (equivalent to 300mm) and using a shutter speed of 1/8 sec. Rising to 1/15 sec produced more consistently sharp images.

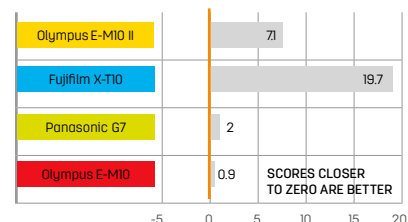
The automatic white balance and metering systems give a good account of themselves, delivering the colours and exposures that you'd expect in any given situation. 📷



The automatic white balance and metering systems give a good account of themselves

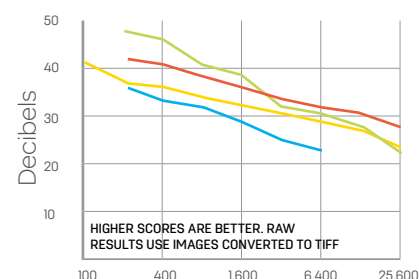
**WHAT'S THIS?**  
Find out how we test on page 6

### COLOUR ERROR



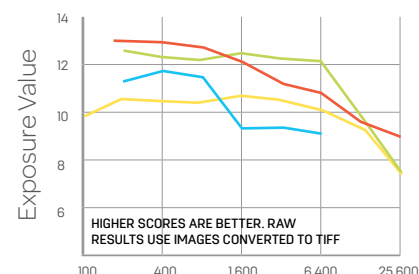
This indicates that the Mark II version of the E-M10 produces more saturated images than the Mark I. There are several ways to tailor colour to suit your preferences in-camera.

### RAW SIGNAL-TO-NOISE RATIO



The E-M10 II's raw files reveal a little more noise than simultaneously captured JPEG files. This enables them to record more detail. It compares well with the competition.

### RAW DYNAMIC RANGE



Unusually, the E-M10's raw files have a lower dynamic range than simultaneously captured JPEGs. Performing a bespoke conversion is likely to draw more information out of the file.

### Digital Camera

#### FEATURES

★★★★★

#### PERFORMANCE

★★★★★

#### BUILD QUALITY

★★★★★

#### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** The OM-D E-M10 II is a high quality camera that feels great, offers an extensive feature set with bags of control and customisation yet it doesn't take up much space in your bag. Its autofocus, white balance and metering systems are excellent, helping it to deliver excellent images, even in challenging conditions.



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## &gt; THE SPECS

Sensor	16.1MP Micro Four Thirds format (17.3 x 13mm)
Focal length conversion	2.0x
Memory	SD /SDHC /SDXC
Viewfinder	Electronic viewfinder (EVF) with 2,360,000 dots (approx 100% cover)
Max Video Resolution	1080
ISO range	100-25,600
Autofocus points	81
Max Burst Rate	10fps (AF, white balance and exposure locked at start)
Screen	Vari-angle three-inch, 1,037,000-dot touchscreen
Shutter speeds	Mechanical shutter, 1/8,000-60 sec plus Bulb; electronic shutter, 1/1,6000-60 sec
Weight	417g (body only)
Dimensions	124 x 85 x 38mm
Power supply	BLN-1 rechargeable lithium ion battery (supplied)



**CSC** Olympus OM-D E-M5 Mark II > Body: £869 / \$1,050 > [www.olympus.com](http://www.olympus.com)

# The big picture

Olympus' 16MP E-M5 Mark II can produce 40MP or even 64MP images automatically. **Angela Nicholson** finds out how

**T**he Olympus OM-D E-M5 was the first camera in Olympus's OM-D line of Micro Four Thirds compact system cameras, and is sometimes referred to as the original OM-D. Its electronic viewfinder and SLR-like design distinguished it from the Olympus Pen series. It was also aimed at more experienced photographers than the Pen or Pen Lite.

As the name suggests, the OM-D E-M5 Mark II is the replacement for the original E-M5. It sits between the top-end E-M1 and the lower-level E-M10 in the OM-D range.

## FEATURES

The E-M5 II uses a modified version of the 16.1MP Four Thirds type (17.3 x 13mm) sensor in the original E-M5, but it's coupled with the TruePic VII processing engine of the E-M1. A more significant upgrade, however, is the Mark II's ability to create 40MP JPEG or 64MP raw files automatically in its High Res Shot mode. Using the

upgraded Image Stabilizer, it shifts the sensor by a tiny amount between shots as it takes a sequence of eight images. The camera then combines these images into a large composite. As the capture process takes around a second, High Res Shot mode is a tripod-only feature that's designed for motionless subjects.

Olympus has also improved the sensor-shifting five-axis image

**Below** The finger grip is slim but effective.



stabilisation system for the E-M5 Mark II. It claims a 5EV extension in the safe hand-holdable shutter speed; that's the difference between 1/500 sec and 1/15 sec. Significantly, it also works in video mode.

Live Bulb and Live Time mode are both present, along with the Live Composite mode introduced with the E-M10. These allow you to see long-exposure images building up on the camera's screen, or on a smartphone or tablet connected via the camera's Wi-Fi system. Live Composite mode is intended for shooting fireworks and star trails or painting with light.

With the possible exception of the lack of a pop-up flash, the E-M5 Mark II has a comprehensive specification that provides the enthusiast photographer with just about everything they could want.



## Stick or twist? Upgrade advice

While it uses essentially the same 16MP sensor as the original OM-D E-M5 (pictured), the Mark II adds the ingenious ability to create much larger files. The screen has also been upgraded from a tilting 610,000-dot unit to a 1,037,000-dot vari-angle device

(although it's an LCD rather than an OLED screen), while the electronic viewfinder has been boosted to 2,360,000 dots. In addition, Olympus has given the new camera an 81-point AF system, although it's not the hybrid AF system of the E-M1.



## Zooming in on the...

### OM-D E-M5 Mark II

There are a couple of telling changes from the original E-M5

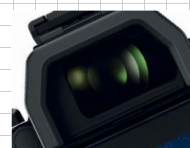
A couple of photographers accidentally pressed this button on the front when holding the camera to their eye.



The mode dial has a lock to prevent you from changing modes by accident.



The Mark II has a couple of extra buttons on the top-plate and a rejig to the adjustment dial arrangement.



The electronic viewfinder (EVF), which shows 100% of the scene, has been improved and has 2,360,000 dots rather than the 1,440,000 dots of the original E-M5's.



In a change from the original E-M5 layout, the power switch is now alongside the mode dial.



The new vari-angle 3-inch 1,037k-dot touch-sensitive screen is useful for composing images at awkward angles in landscape or portrait format.



It also has plenty to entice aspiring videographers, such as frame rates up to 60fps, bit rates up to 77Mbps, Time Code and a 3.5mm mic port.

### BUILD AND HANDLING

It may be small, but the OM-D E-M5 Mark II feels nicely constructed. Its

magnesium body is solid, comfortable and secure in the hand. It's also dust- and water-proof, as well as freeze-proof down to -10 degrees C.

The E-M5 II sits between the E-M1 and E-M10 in the OM-D range, and its control arrangement is halfway between the two. Taking a cue from

the E-M1, there's a switch on the back that changes the options adjusted by the two top-plate dials. This switch is a mixed blessing. On one hand, it doubles the number of options that can be adjusted via the dials, but on the other, you need to remember which setting gives access to the controls you want. You get into the swing of it once you've been using the camera for a while, but you can expect some frustration in the early days.

One of the great features of the OM-D series is that the cameras are extremely customisable. However, it can take quite a while to find and understand all the options as well as the huge range of features. The controls are all within easy reach, but some people may find the small buttons fiddly. I also found that a couple of buttons didn't behave as I would expect on a few occasions. The Info button, for example, which I used to toggle between the

### Meet the rivals...

The cameras taking on the E-M5 Mk II



#### Fujifilm X-T1

Body: £869 / \$1,050

Traditional controls and retro styling, plus superb-quality images make this SLR-like 16MP compact system camera a real winner.

Reviewed: page 62



#### Samsung NX1

Body: £1,249 / \$1,499

With 28MP, this is the highest-resolution APS-C format camera around. Image quality is high and although it's a CSC, the AF system is excellent.

Reviewed: issue 160



#### Sony Alpha 7R

Body: £1,339 / \$1,898

A full-frame 36MP sensor inside a compact body, with bags of control and superb build quality. The image quality doesn't disappoint either.

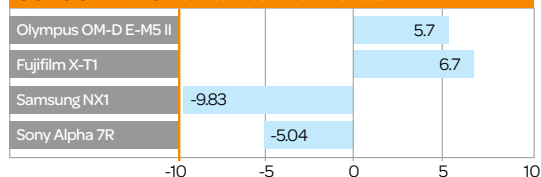
Reviewed: issue 147



## CAMERA BENCHMARKS

How does the E-M5 Mk II fare?

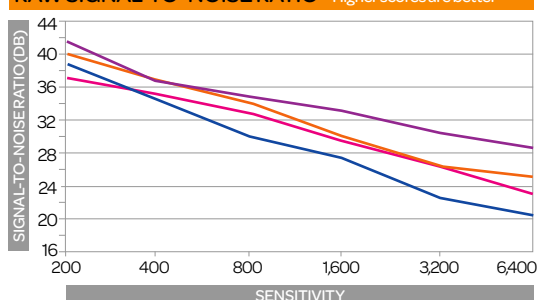
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Some hues are a little over-saturated, but on the whole, the E-M5 Mark II produces very pleasing colours.

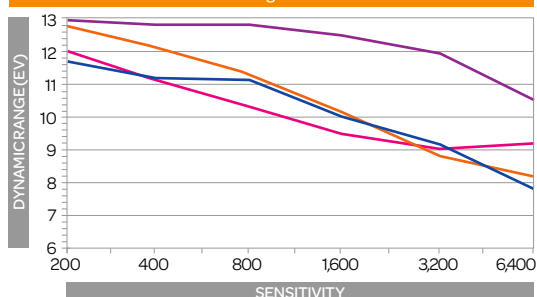
**KEY** Olympus OM-D E-M5 II (Purple)  
Fujifilm X-T1 (Pink)  
Samsung NX1 (Orange)  
Sony Alpha 7R (Blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** In its standard 16MP mode, the E-M5 II beats its rivals at most ISO settings, indicating that images are a little cleaner.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The E-M5 II performs consistently throughout its sensitivity range. This indicates that raw files have a wide tonal range.

## OVERALL BENCHMARK RESULT

Overall the OM-D E-M5 II puts in a good performance in our lab. While it can't match the Samsung and Sony cameras and their larger, higher-pixel-count sensors for detail resolution in its standard 16MP mode, it produces very respectable results for a Micro Four Thirds camera – and can match them in High Res Shot mode.

\* Raw results use images converted to TIFF

on-screen displays, occasionally wouldn't bring up the electronic level display. And there was a short period when I couldn't review images in the viewfinder. I was unable to find any explanation for this within the menu,

**Above** It was very useful to be able to check the focus was spot-on using the magnified view in the rear display.

"It may be small, but the OM-D E-M5 Mark II feels nicely constructed. Its magnesium body is solid and comfortable"

From the makers of **Digital Camera** magazine



and the ability to review recovered without me changing any settings.

The electronic viewfinder provides a good view of the subject. There's no sign of any texture or flickering, and the contrast is a good match for the scene's. With the Natural Picture mode selected, the viewfinder image sometimes looks a little more saturated than the scene, but the hues are a good match. There's some noise visible in very low light, but you can still see the subject clearly.

## PERFORMANCE

One of the main attractions of the OM-D E-M5 Mark II is its High Res Mode, which enables it to record 40MP JPEG images or 64MP raw files. As you might imagine, this isn't without compromise. Sensitivity is limited to ISO 100-1,600, the minimum aperture is f/8 and the

slowest available shutter speed is eight seconds.

It's also essential that the camera is stationary and that the subject doesn't move. Even small movements result in a hatched pattern appearing or ghosting in images. The High Res Shot raw files also have to be processed using a free Photoshop plug-in for Windows or Mac OS X.

Olympus prefers to refer to the camera as a 40MP model, because the engineers believe that the 64MP raw files only resolve a level of detail equivalent to that from a 40MP camera. Of course it depends upon what format that camera is: let's not forget that the Four Thirds-type sensor inside the OM-D series cameras is smaller than



**Below** This is the first Olympus CSC to have a vari-angle screen.





both APS-C and full-frame format. However, our tests show that at the lowest sensitivity settings the E-M5 Mark II can match the full-frame 36MP Nikon D810 for resolving power. It drops away from the D810 a little as sensitivity rises, but as the camera has to be tripod-mounted and the subject motionless, there will be few occasions when sensitivity needs to be raised above ISO 200.

The results are very impressive. Comparing simultaneously captured high-resolution files at 100% reveals that the JPEGs look slightly sharper and more natural, which seems to bear out Olympus's decision to limit their size at 40MP.

Turning to the standard (16MP) files, noise is controlled well from ISO 100–6,400, although some luminance noise is visible at 100% in images taken at the lowest sensitivities. Unusually, JPEG files taken in the standard settings look very similar to raw files processed in the supplied Olympus Viewer software with all noise reduction turned off. Even at the highest sensitivity setting, there's little chroma noise (coloured speckling) visible, but luminance noise is present at every value.

The results at ISO 6,400 are good, but stepping up to ISO 12,800 and ISO 25,600

**Above** Despite being hand-held and taken at 1/6 sec to blur the man's movement, the surrounding walls are perfectly sharp.

**Below** Seals around the controls keep out moisture and dust effectively.

increases the level of smudging in images viewed at 100% and colour saturation drops. These images also look a little softer than ISO 200 shots when sized to make A3 prints, but are still passable.

The E-M5 II's automatic white balance system does a very good job in most natural lighting situations. It also doesn't fare badly in some artificial lighting situations, adding a hint of colour that gives away the light source. Colours are also handled well in the Natural Picture mode, but there's a collection of other options, such as Vivid, Muted, Portrait and Monotone, as well as the Custom and Color Creator options, if you're looking for a different treatment to be applied to the JPEG files.

Although it doesn't have the hybrid AF system of the Olympus OM-D E-M1, the E-M5 Mark II's 81-point AF system is very good. In normal daylight conditions, it gets subjects sharp quickly; and while it struggled more than the Canon 5D Mark III, I was able to get some sharp images in poor light using the M Zuiko Digital ED 40–150mm f/2.8 Pro lens. When shooting

with the M Zuiko Digital 12–50mm f/3.5–6.3 EZ ED MSC kit lens at 14–17mm, which equates to 28–34mm in

full-frame terms, I got consistently sharp results that stand scrutiny at 100% at 1/6 sec. Most shots I took at 1/5 sec are also sharp at 100%.

## VERDICT

Although the occasions in which the system can be used are limited, the E-M5 Mark II's ability to shoot 40MP and 64MP files is very attractive. This and the vari-angle screen could attract new users to the OM-D series, as well as entice existing E-M5 users.

The E-M5 Mark II has a large feature set, and it can take a while to discover important controls and get familiar with the layout. While experience helps, the interface would benefit from a rethink to group more of the connected features or controls together. It is an excellent camera, but these limitations stop the E-M5 Mark II from getting a perfect score. 📷



## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** This is a capable camera that offers extensive control. However, its complexity should not be underestimated. The new High Res Shot mode is especially impressive, despite its limitations.



## &gt; THE SPECS

Sensor	16.3MP Micro Four Thirds format (17.3x13mm)
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	Electronic viewfinder (EVF) with 2,360,000 dots (approx 100% cover)
Video resolution	Full HD (1,920x1,080) at 30fps
ISO range	200-5,000; expandable to 100-25,600
Autofocus points	81
Max burst rate	10fps (AF, exposure & white balance fixed at start) 6.5fps with continuous AF and exposure
LCD screen size	Tilting three-inch, 1,037,000-dot touchscreen
Shutter speeds	1/8,000-60 sec, plus Bulb to 30 mins
Weight	443g (body only)
Dimensions	113.4x93.5x63.1mm (without protrusions)
Power supply	BLN-1 lithium-ion battery (supplied) battery

CSC OLYMPUS OM-D E-M1 > £1,299 (body only) > [www.olympus.co.uk](http://www.olympus.co.uk)

# Is OM-D OMG?

Olympus hopes its new top-end CSC will keep both SLR users and Micro Four Thirds fans happy. **Angela Nicholson** investigates

Until now, the OM-D E-M5 has largely been referred to as the Olympus OM-D, but it seems we will have to get used to calling it the E-M5: it's been joined by the OM-D E-M1 in the Olympus compact system camera line-up. This new camera doesn't replace the E-M5, but sits above it in the company's CSC range, and is aimed at enthusiasts and professionals.

Olympus hopes that the new OM-D E-M1 will address the needs of Four Thirds users as well as enthusiast Micro Four Thirds users, because it has a dual autofocus system that is designed to work well with both types of lens.

As with other Micro Four Thirds (MFT) cameras, MFT lenses may be mounted directly, while Four Third lenses are compatible via an adaptor. The E-M1's new AF system is claimed to deliver much faster AF speeds than was previously possible with Four Thirds lenses on MFT cameras.

## FEATURES

In a first for Olympus, the 16MP Live MOS sensor in the OM-D E-M1 has no low-pass filter over it. This should enable it to record more detail than the E-M5. In addition, the new TruPic VII image processor is calibrated to put the emphasis on detail visibility at the expense of a little noise.

Thanks to the new processing engine, lateral chromatic aberrations are corrected and sharpness

optimised according to the lens mounted and aperture selected (for Olympus lenses). In fact, Olympus claims that the E-M1 produces the best image quality of any Olympus digital camera, with less colour saturation loss at high sensitivities.

Part of the Dual Fast AF system uses contrast detection and draws information from the imaging sensor. This is used to drive the focus of Micro Four Thirds lenses on the E-M1. The phase detection part is used when Four Thirds lenses are mounted. The camera automatically detects what type of lens is mounted and uses the appropriate AF system.

When Micro Four Thirds lenses are used in continuous autofocus mode, both contrast- and phase-detection focusing are used, increasing the focusing speed.

As it's a compact system camera, the Olympus E-M1 doesn't have an optical viewfinder, but there's an electronic one with 2,360,000 dots

**Above** The E-M1 will coexist with the E-M5, with the E-M1 sitting at the top of Olympus's lineup

and 1.48x magnification. This magnification and dot-count should make it easier to see more detail than usual. In HDR preview mode this viewfinder is capable of showing the effect (there are two HDR modes, Natural and Artistic) as well as the image building up in Live Bulb mode.

Although the E-M1 uses the same five-axis all-mechanical Image Stabilisation system as the E-P5, it makes a small improvement in performance. However, new changes to the Cipa standard mean that this is now billed as a four-stop correction rather than five. Consequently, the camera can be handheld at shutter speeds up to four stops slower than without IS. That's the equivalent of dropping from 1/125 sec to 1/8 sec.

Those more interested in freezing movement will appreciate the E-M1's top shutter speed of 1/8,000 sec, just like the E-P5. It's also possible to shoot continuously with continuous AF at 6.5fps for 50 raw files, or at



## Zooming in on the... OLYMPUS OM-D E-M1

A quick tour of the camera's key features



The electronic viewfinder is superb and details are clearly visible.



It's easy to connect to a tablet or smartphone for remote control.



A tilting LCD is better than a fixed one, but a variangle would be better.



There's no pop-up flash, but a small external flashgun is supplied.

◀ FEELING TREATED



Pressing these buttons accesses the HDR and focusing options, they are selected by rotating the front or rear control dials.

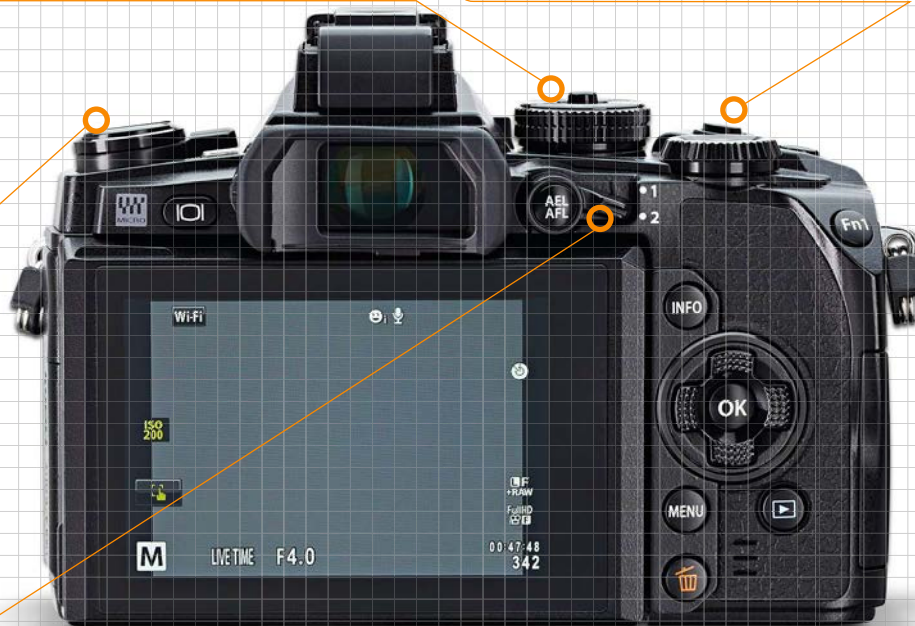


This switch changes the purpose of the front and rear control dials so they can be used to alter four features rather than just two.



The mode dial has a lock which can be left open (in the up position) if you prefer to be able to change mode quickly.

Select Shadow and Highlight, Colour Creator, Magnify or Image Aspect modes by holding this button while rotating the front dial.



10fps with single-AF mode selected for 41 raw files.

Olympus has had a lot of success with its Art Modes. The E-M1 introduces Diorama II, which can be used with vertical format images as well as allowing you to have the sharp area around the focus point.

It would be strange for a new camera not to have built-in Wi-Fi. The E-M1 doesn't disappoint: it has the same system as the E-P5. However, in an upgrade, this enables remote shooting via the Olympus Image Share iOS or Android app in all exposure modes, with control over

**"The diminutive E-M1 feels nicely built and has seals to ensure it stays dust-free and splashproof"**

exposure and white balance. The image can even be seen forming on the screen of the smartphone during long exposures captured using Live Bulb and Live Time modes.

### BUILD AND HANDLING

According to Olympus, the E-M1 is not intended to be the smallest camera available, but to be a good size

for serious use. The thumb grip on the back of the E-M1 is less pronounced than it is on the E-M5, but the front grip is bigger, giving a better, more comfortable hold. It feels secure in your hand.

The diminutive E-M1 is also pretty durable. It feels nicely built and has seals to ensure that it stays dust-free and splashproof. It's guaranteed to work at temperatures down to -10°C. Helpfully, all current Olympus lenses are freeze-proof.

Like the E-M5, the E-M1 has a three-inch tilting touchscreen, but the dot-count has been boosted from 610,000 to 1,037,000 dots. It provides a clear view with plenty of detail. The electronic viewfinder is also impressive, with natural colours, good contrast and lots of detail visible. It's about as close as you can currently get to an optical viewfinder for clarity and is a superb advocate for the technology.

Disappointingly, Olympus has resisted the temptation to make the main menu navigable by touch, so you have to use the physical controls. It would be nice to have the choice of touch or button-and-dial controls.

### Meet the rivals...

See how the Olympus E-M1 stands up against the competition



#### Fuji X-Pro1

£899 (body only)  
A superb 16MP CSC with a hybrid viewfinder that uses a shutter speed dial and lens aperture rings.  
Reviewed: issue 125



#### Sony NEX-7

£649 (body only)  
A high-quality 24.3MP CSC with an OLED viewfinder and tilting LCD that produces excellent images.  
Reviewed: issue 120



#### Olympus OM-D E-M5

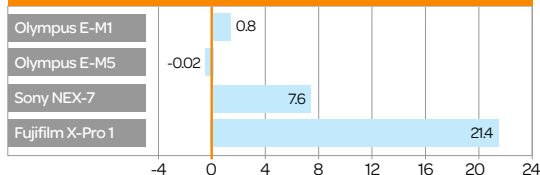
£649 (body only)  
A great 16MP camera loved by pros and enthusiasts, and a more affordable alternative to the E-M1.  
Reviewed: issue 126



## CSC BENCHMARKS

How does the Olympus E-M1 fare?

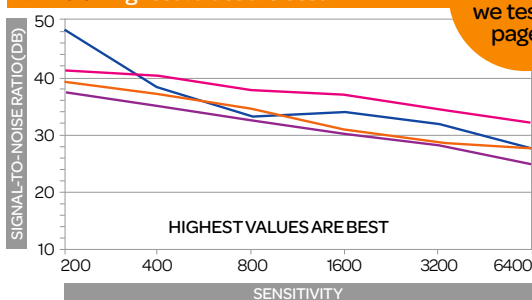
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** Colours are accurate, and images look great straight from the camera with the default Natural Picture mode.

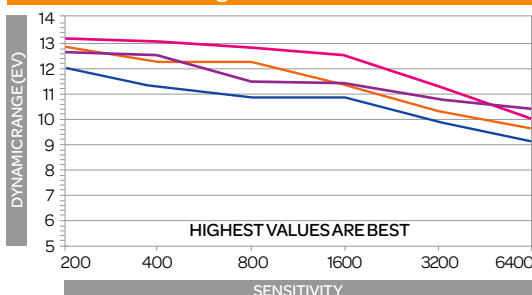
**KEY** Olympus E-M1 (purple), Olympus E-M5 (pink), Sony NEX-7 (orange), Fujifilm X-Pro 1 (blue)

## TIFF NOISE Highest values are best



**NOISE RESULT:** It has a lower signal-to-noise ratio than the original OM-D, but images aren't noticeably different and noise is controlled.

## RAW DYNAMIC RANGE Highest values are best



**DYNAMIC RESULT:** While it doesn't quite match the E-M5, a dynamic range in excess of 12EV at ISO 400 is impressive.

## OVERALL BENCHMARK RESULT

The E-M1 is calibrated to allow a little noise to be visible to retain detail and improve sharpness. It can also record a wide range of tones in a single image at lower sensitivity settings; at higher values it beats the Sony NEX-7 and Fujifilm X-Pro1 for dynamic range. While a good colour accuracy score can sometimes mean flat images, the E-M1's have nice punch.

- However, like the original OM-D and the PEN E-P5, the Super Control Panel can be used with the touchscreen to make changes to key settings, such as white balance and metering.

The control layout of the E-M1 has some significant differences from that of the E-M5. As you hold the camera for use, the mode dial is on the right of the top-plate instead of the left. Meanwhile, the left side has two semi-circular buttons on a shallow column, which looks a bit like the film

**Above right** The autofocus system happily keeps pace with moving subjects in most light conditions



rewind unit on an old film camera, without the flip-up handle. The frontmost button gives access to the drive mode and HDR options, while the rear one is used to access the metering and focusing options.

## PERFORMANCE

While a 16MP sensor isn't really anything to write home about (unless it's in a full-frame retro-style Nikon SLR – see issue 148), the E-M1 gets the best from its device. Images have rich, natural colours and smooth gradations, along with impressive detail. However, our resolution tests reveal that, apart from at the highest sensitivity settings, the E-M1 can't resolve more detail than the E-M5.

Noise is controlled well throughout the sensitivity range, and colour saturation remains good at the higher sensitivity settings. The results at the top sensitivity setting of ISO 25,600

are especially striking, with little noise visible, even when images are viewed at 100%, and fairly restrained levels of softening.

Olympus's general-purpose ESP metering does an excellent job in a range of situations; although the exposure compensation control is required occasionally, it's not often. Even in situations when you might expect it to be needed, the camera delivers correct results by itself.

In addition to the usual alternative metering options (centre-weighted and spot), Olympus continues to offer Highlight Spot and Shadow Spot. Of these two options, Highlight Spot, which is calibrated to allow exposure readings to be made from a highlight, is likely to be the more useful, although we found little reason to use it during this test.

In good light, for example outdoors in daylight, the autofocus system is





fast and accurate with both Micro Four Thirds and Four Thirds lenses. It's capable of keeping up with a galloping horse provided that you keep the active AF point over the subject. It becomes more hesitant as light levels fall, but it remains usable even in fairly dark conditions.

**Above** Colours are accurate, with good noise levels

**Below** The E-M1 takes a buttons-for-everything approach

There are 12 Art Filter modes available on the E-M1. These can be applied in any of the exposure modes, so full control is still available over aperture and shutter speed. Unlike many other manufacturers, Olympus allows them to be used when shooting raw and JPEG files simultaneously, so the camera produces a JPEG with the effect and a raw-format image without. This is especially useful when you fancy experimenting with different looks. It's also a useful way of showing a portrait-sitter the type of look you're aiming for, even if you plan to do all the processing post-capture on a computer.

Another clever move from Olympus is to provide a bracketing option that captures all the filter effects with one press of the shutter release. The end result is 13 images: 12 with a filter effect applied and a raw file to treat as you like.

## VERDICT

The Olympus OM-D E-M1 is weather-sealed, has plenty of direct controls within easy reach and has just about all the features that an enthusiast photographer could want from a good walk-around camera. It has

## Tech Briefing PHASE DETECTION



Olympus introduced a new hybrid AF system with the E-M1. While we have seen this combining of contrast and phase detection used elsewhere on other cameras, Olympus claims that it actually uses a different design to all other camera manufacturers.

Some of the pixels on the E-M1's 16MP sensor are actually half-photosites (strictly speaking pixels don't exist on a sensor, just in an image) with no colour filter. One row has left-half sites while another has right-half receptors.

These two halves match up to create a phase detection focusing system, which is used when Four Thirds lenses are mounted on the camera.

such a wealth of features that many users are likely to find new modes and settings for some time after purchase.

Many photographers will find the EVF a more than adequate stand-in for an optical viewfinder and it has the benefit of being able to show the scene as it will be captured. The LCD screen is also good; it's just a shame that Olympus has opted for a tilting unit rather than a fully articulating one.

While the E-M1's autofocus system isn't a match for a high-end SLR in low light, it's one of the best (if not the best) available in a compact system camera. Happily, the E-M1 isn't all style and no substance: it also delivers high-quality, correctly exposed images with plenty of detail, good colour and well-controlled noise.

## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD/HANDLING

★★★★★

### VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** Olympus has created a superb camera, but it is quite complex and takes some getting to know. However, it's worth investing the time: there are some great features, and the image quality is high.

## &gt; THE SPECS

Sensor	16MP Four Thirds Live MOS sensor (17x13mm)
Focal length conversion	2x
Memory	SD / SDHC / SDXC
Viewfinder	None
Video	Full HD (1,920x1,080)
ISO range	200–25,600 (expandable to ISO 100)
Autofocus points	23
Max burst rate	5.8fps
Screen	Tilting 1,040k-dot TFT LCD.
Shutter speeds	1/16,000–60 sec
Weight	266g (including battery and memory card)
Dimensions	107x65x33mm
Power supply	Li-ion battery pack (rechargeable, included)



**CSC** Panasonic GF7 > With 12–32mm f/3.5–5.6 kit lens: £389 / \$460 > [www.panasonic.com](http://www.panasonic.com)

# Selfie snapper

The GF7, Panasonic's latest starter CSC, offers a host of enticing features in a smaller, more retro body, says **Amy Davies**

**P**anasonic's GF series was traditionally its range aimed at novice photographers – but since the introduction of the GM series, it has taken a little bit of a back seat. The most recent addition to the GF line, the GF7, puts some life back in the older dog.

## FEATURES

At 16 million, the pixel count of the GF7 remains the same as the GF6, but the sensor and processor are upgraded to those from the Panasonic GX7.

There's also a screen that can be flipped upwards through 180 degrees to help when taking selfies. The camera can automatically switch to selfie mode when the screen is flipped up. New options such as Face Shutter, Buddy Shutter and Jump Snap mode have also been included to help when taking shots of yourself.

## BUILD AND HANDLING

Despite the fact that it's smaller than the GF6, the GF7's redesigned body feels a little more solid. For example, there's a more substantial thumb-pad on the back of the camera. Although

the ridge texture on the front of the GF6 is now missing, the coating on the GF7 still gives some purchase.

Semi-automatic modes (such as Aperture Priority) are included on the mode dial, along with Panoramic mode, Scene mode, digital filters and a couple of specific scene modes. The Automatic mode, however, is available via a separate dedicated button.



Above A good range of lenses is available from Panasonic, Olympus and other manufacturers.

While there is now only one customisable physical button – which accesses Wi-Fi settings by default – there are a further six 'virtual' spaces on the touchscreen, which can also be customised; they're useful if you find yourself wanting quick access to a given function.

## PERFORMANCE

Colours are bright and punchy direct from the camera, but without so much vibrance that images appear unnatural.

Changing the Photo Style enables you to alter the look of your image. You can choose from options such as Vivid, for instance, which is useful for boosting the hues in landscape shots. The good news is that you can use these when shooting raw as well as JPEG images, so you also have an unprocessed version of the image should you need it. The same can be said of the more dramatic digital

## Meet the rivals...

The cameras taking on the Panasonic GF7



**Sony A5100**  
With 16–50mm lens:  
£449 / \$598

A decent camera with good features. The Sony E Mount is also well-established.  
**Reviewed:** issue 157  
★★★★★



**Panasonic GM5**  
With 12–32mm lens:  
£449 / \$797

A capable CSC with a Four Thirds sensor, Wi-Fi and a bright viewfinder.  
**Reviewed:** issue 160  
★★★★★



**Nikon 1 J4**  
With 10–30mm lens:  
£359 / \$379

Not the most exciting camera in the world, but image quality is good.  
**Reviewed:** issue 157  
★★★★★





Skin tones in particular are rendered nicely.

filters, which you can apply in semi-automatic or Manual modes to keep control of other camera settings.

The camera reproduces detail very well. As you move up the sensitivity scale towards higher values such as ISO 3,200, you can see some smoothing and loss of detail at 100%. The overall impression at normal printing sizes is very good, though.

Generally speaking, both the all-purpose metering system and the automatic white balance system do a good job of getting exposure and colour just right.

The supplied kit lens is a decent performer, but you may find it useful to purchase a longer focal length optic for holidays and travelling.

I found the GF7's autofocus speeds very quick, especially in bright light, and it's only really when you reach almost pitch-black conditions that the camera starts to struggle to lock on at all.

## VERDICT

Some may question the point of the GF series now that the GM series exists, but it still offers a great range of features at a more affordable price.

Great for travelling, the GF7's flipping screen is ideal for selfies and documenting your holiday visits, but the image sensor and processor can cope with varied conditions. **D**

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** It's easy to recommend this camera to photographers in many fields. Travelling photographers looking for something light and hassle-free will particularly enjoy it, though.

**WHAT'S THIS?**  
Find out how we test on page 6

## CSC TEST

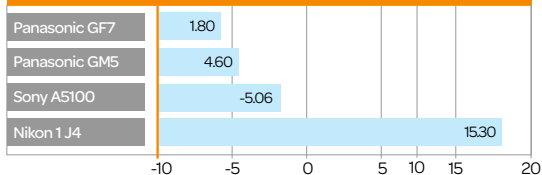
### PANASONIC GF7

89

## SLR BENCHMARKS

How does the GF7 measure up?

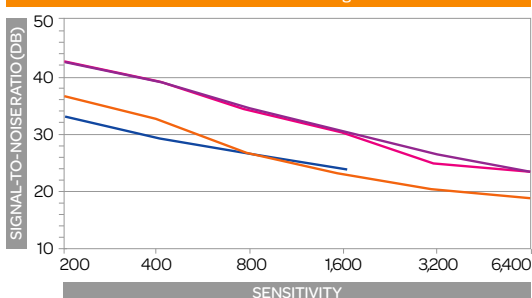
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The GF7 is the most accurate camera in this test. Its real-world shots show vibrance that is not over the top.

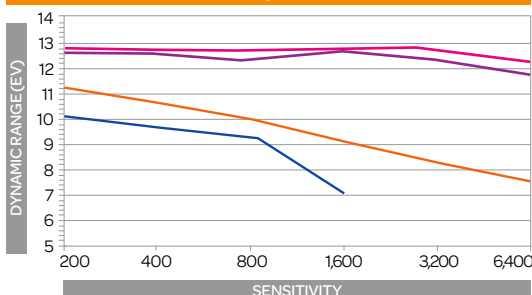
**KEY** Panasonic GF7 (Purple), Panasonic GM5 (Pink), Sony A5100 (Orange), Nikon 1 J4 (Blue)

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The GF7 and the GM5 are very close – not surprising given they share the same sensor and processor.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Again, the GF7 and GM5 are almost identical, while both cameras easily beat the Sony A5100 and the Nikon J4.

### OVERALL BENCHMARK RESULT

As we expected it to, the GF7 performs very well. The Sony A5100 has a APS-C sized sensor, compared with the GF7's Four Thirds, so it's interesting to note the better performance of the smaller sensor. The GF7 also performs well when looking at the JPEG images, and not just the raw files.

\* Raw results use images converted to TIFF



**Below** The iA button is useful if you want the GF7 to take control.



**CSC** Panasonic Lumix DMC-GX8 > £999/\$1,198 > [www.panasonic.com](http://www.panasonic.com)

# Small but mighty

A top-quality EVF, a vari-angle touchscreen and a 20MP sensor could make the GX8 Panasonic's most desirable camera to date

## > THE SPECS

<b>Sensor</b>	20.3-million-effective-pixel Four Thirds type (17.3 x 13mm) CMOS
<b>Focal length conversion</b>	2x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	2,360,000-dot OLED
<b>Max video resolution</b>	4K (3,840 x 2,160)
<b>ISO range</b>	200-25,600; expandable to 200-25,600
<b>Autofocus points</b>	49 areas
<b>Max burst rate</b>	8fps in S-AF at full resolution
<b>Screen</b>	Vari-angle touch-sensitive 3-inch LCD with 1,040,000 dots
<b>Shutter speeds</b>	60-1/8,000 sec with mechanical shutter; 1-1/16,000 with electronic shutter, plus Bulb
<b>Weight</b>	435g (body only)
<b>Dimensions</b>	133 x 78 x 62mm
<b>Power supply</b>	Lithium-ion battery (supplied)

"The new EVF is excellent, offering a clear view with no texture or noise"

**P**anasonic hopes the new Lumix GX8 will be as popular as its GX7 was – and it makes a good start by featuring the company's first Four Thirds type sensor with a pixel count over 16 million. In fact, it has an effective pixel count of 20.3 million; Panasonic claims this enables the GX8 to produce the highest image quality of any G-series camera, beating both the flagship GH4 and the recently released G7.

The GX8 brings in a solid collection of upgrades, including the same processing engine as in the GH4; a top continuous shooting rate of 8fps at full resolution in single autofocus (AF) mode or 6fps with continuous AF; a 2,360,000-dot OLED electronic viewfinder (EVF); and a vari-angle touch-sensitive OLED screen with 1,040,000 dots. There's also a new Dual Image Stabilisation System, which combines lens and sensor-based stabilisation to reduce image blur when hand-holding the camera.

**1** The front and rear dials are easier to use than the GX7's, and the shutter button has moved to the top of the grip.

**2** Those with large hands may press the Quick Menu or Display buttons accidentally from time to time.

**4** Some buttons are flush with the body, which makes them hard to locate while you're looking through the viewfinder.

**4** The exposure compensation dial is within easy reach of your thumb when the GX8 is up to your eye.



The GX8 can also record 4K videos (as well as Full HD), and has Panasonic's 4K Photo mode with three shooting options: 4K Burst Shooting, 4K Burst (Start/Stop) and 4K Pre-burst. These are designed to record footage from which 8MP still images can be extracted.

## BUILD AND HANDLING

The GX8 has a flatter, more rectangular shape than the G7 and GH4. Nevertheless, it has a deep, effective front grip and a shallow thumb-ridge that gives just enough purchase – though it wouldn't hurt if it was a little more pronounced and





A Four Thirds type sensor is smaller than APS-C format, which can make it hard to restrict depth of field. This was shot at f/2.8, with a focal length of 100mm (200mm equivalent).

more ergonomically shaped. That said, its magnesium alloy body gives the GX8 a noticeably higher-quality feel than the G7. It's also splash- and dust-proof, so it can be used in more inclement conditions.

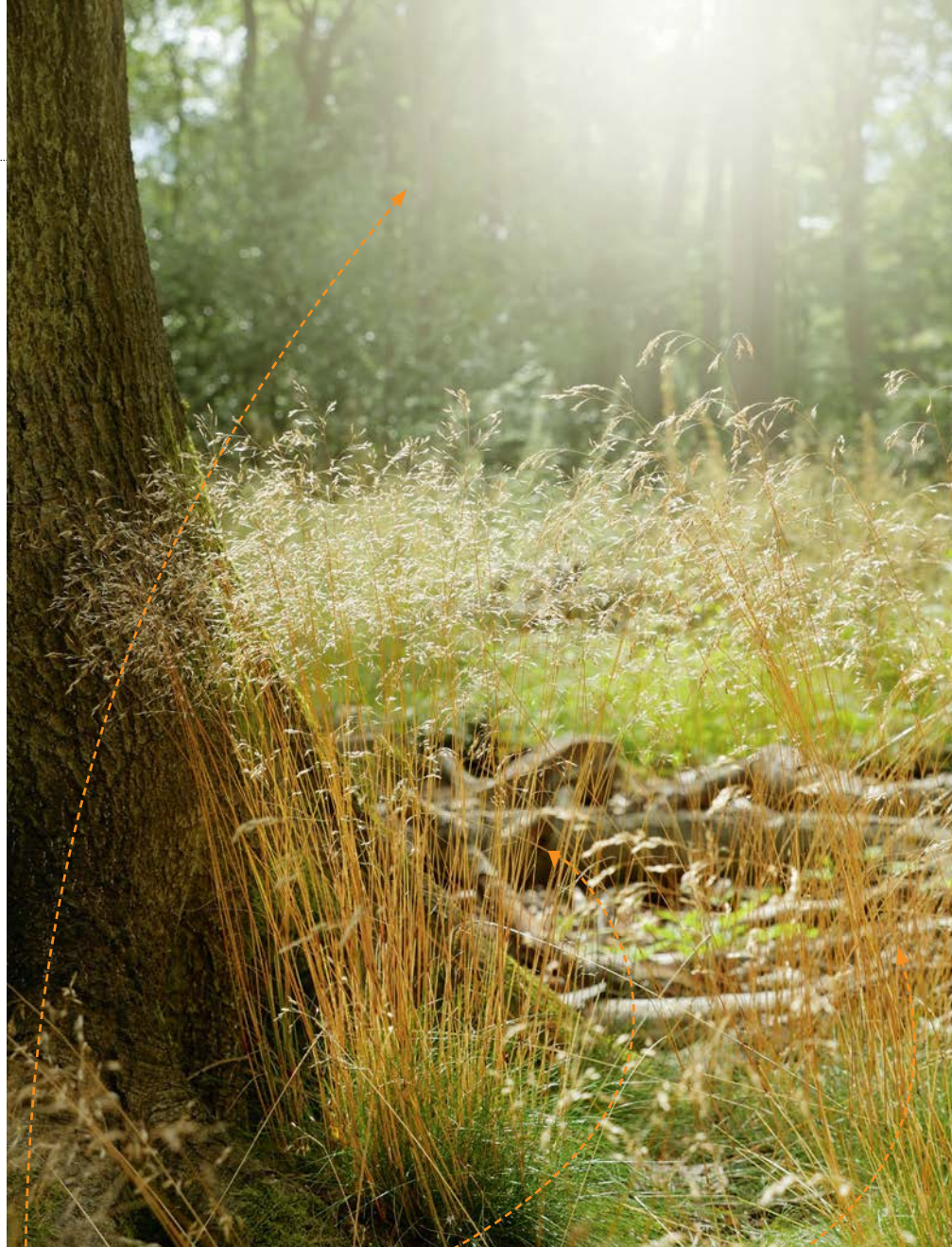
While it's aimed at experienced and enthusiast photographers, the GX8's controls and menus are arranged well, and it's relatively easy to get to grips with using it. It's helpful that the Quick Menu is customisable, but it would be nice if there was a customisable screen in the main menu as well. I also missed the G7's drive mode dial on the GX8.

Among other things, on the G7 this offers a quick way of switching to 4K Photo mode, which is useful for shooting ongoing action, but only generates 8MP JPEGs that must be extracted from the video footage.

I'm a fan of Panasonic's Touch Pad AF system, which allows you to set an AF point using the touchscreen while looking into the viewfinder. However, when using it with the GX8 there were a frustrating number of occasions when the AF point started to resize rather than move to where I wanted it to be. It would be nice to be able to lock off the resizing.

The new EVF is excellent, offering a clear view with no texture or noise, and the image in it is a good match for the captured shot. The viewfinder's refresh rate is high, and I was able to follow moving subjects easily.

Although an electronic level can be useful, the GX8's has quite a wide margin of error, which means it's possible to produce images that look significantly tilted even though the level indicates that it's straight.



1

#### SUN FUN

The light was illuminating the grass heads quite nicely, but using the Sun filter has added a flare effect to accentuate the breezy outdoors feeling of the sunlight.

2

#### RELIABLE AUTOFOCUS

Although these grass heads are very small and were waving in the wind, the GX8's autofocus system was able to get them nice and sharp for this shot.

3

#### ACCURATE EXPOSURES

Despite the brightness of this scene, the GX8's general-purpose Multi-metering system has delivered a perfect exposure of the sunlit grass heads.

### Meet the rivals...

The cameras taking on the Panasonic GX8

For test images and resolution charts, visit

[www.techradar.com/cameras](http://www.techradar.com/cameras)



**Fujifilm X-T1**  
£999/\$1,200,  
body only

This 16MP beauty has traditional exposure controls, a first-rate electronic viewfinder and build quality to match its superb images.

Reviewed: page 62



**Olympus OM-D E-M5 II**  
£869/\$999,  
body only

A strong all-rounder with a stabilisation system that enables a 'tripod-only' mode to produce 64MP raw files.

Reviewed: page 80



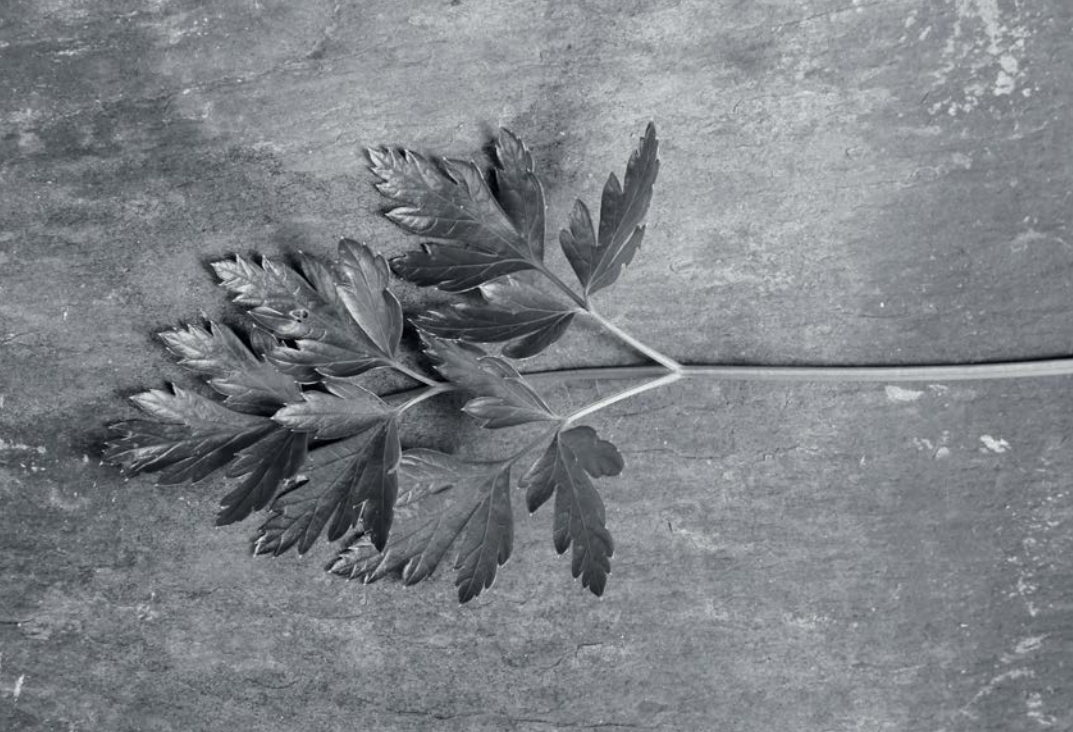
**Sony Alpha 6000**  
£439/\$448,  
body only

This 24MP CSC is getting on a bit, but it still competes very well, has a snappy AF system and offers superb value for its specifications.

Reviewed: page 102







This shot was taken using the GX8's Monochrome Photo Style, with the contrast boosted to its maximum setting and a red filter effect applied to darken the green foliage.



The Impressive Art Filter produces rather unnatural-looking results, but it can produce some fun effects, too.

## PERFORMANCE

Because it has an EVF that's capable of previewing images with settings such as exposure and white balance applied, browsing through shots from the GX8 doesn't bring any major surprises. The camera produces pleasant colours and good exposures on the whole.

As the GX8 is the first Micro Four Thirds camera to offer a pixel count greater than 16 million, there's a lot of interest in how much detail it can capture and how well noise is controlled. It's good news on both counts. With the right lens, the GX8 is capable of capturing an impressive level of detail. In our lab tests, it matched the 24MP Sony Alpha 6000 at the lowest sensitivity setting, and

its JPEGs beat it for much of the range. It also compares very well with the 16MP Olympus OM-D E-M5 II, although it doesn't have that camera's neat trick for increasing resolution.

The GX8's noise control also impresses. Chroma noise makes only a faint appearance in raw files shot at ISO 1,600 when all noise reduction is turned off – you really have to look for it in images that are sized to 100%. Push up to ISO 3,200 or 6,400 and there's naturally an increase in the level of noise in raw files, but it's still subtle. JPEGs taken with the default settings look very good, with lots of detail and a slight smoothing of some details.

Noise is more pronounced in raw files recorded at ISO 12,800, but there's also a good level of detail visible. At ISO 25,600 there's a noticeable drop in saturation and raw files are very noisy, while JPEGs are soft, making them only suitable for use at relatively small sizes.

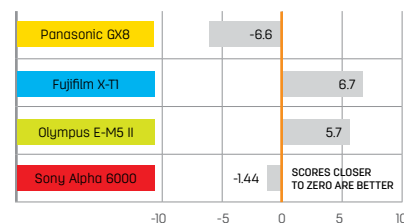
The image stabilisation system is also effective. Shooting at the long end of the Panasonic G X Vario 35-100mm f/2.8 lens, which has an effective focal length range of 70-200mm, I was usually able to get images that look sharp at 100% using a 1/10 sec shutter speed. 📷

**“With the right lens, the GX8 is capable of capturing an impressive level of detail”**

## WHAT'S THIS?

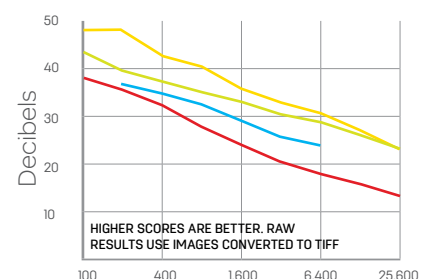
Find out how we test on page 6

## COLOUR ERROR



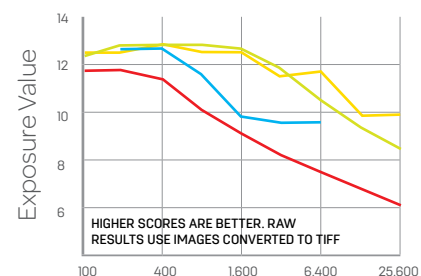
In its default settings, the GX8 produces JPEGs with lower saturation than the competition, but you can boost saturation in-camera using the Vivid Photo Style.

## RAW SIGNAL-TO-NOISE RATIO



This is an especially strong set of results from the GX8, which indicates that its raw files don't have a huge level of noise. In addition, detail is retained well.

## RAW DYNAMIC RANGE



The GX8's high dynamic-range score continues into the upper sensitivity values. It confirms our findings that its raw files have a good range of tones. JPEGs put in a solid performance, too.

## Digital Camera

### FEATURES

★★★★★

### PERFORMANCE

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** The 20MP GX8 has a tasty specification and a solid construction, with a vari-angle touchscreen and a tilting viewfinder for easier image composition. It also has dependable autofocus, metering and white balance systems. Despite the increase in image size, noise is controlled well.



# Photography Week

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<http://tiny.cc/613xkx>



<http://tiny.cc/6x3xkx>



<http://tiny.cc/bz3xkx>

## &gt; THE SPECS

Sensor	16.05MP Micro Four Thirds format (17.3x13mm)
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	OLED Electronic viewfinder (EVF) with 2,359,000 dots (approx 100% cover)
Video resolution	4K (4,096x2,160) and Full HD (1,920x1,080p)
ISO range	200-25,600; expandable to 100-25,600
Autofocus points	49
Max burst rate	12fps Single AF, 7.5fps Continuous AF
LCD screen size	3-inch; 1,036,000 dots
Shutter speeds	1/8,000-60 sec plus Bulb to 60 mins
Weight	480g (body only)
Dimensions	132.9x93.4x83.9mm
Power supply	Li-ion battery (included)



CSC Panasonic Lumix DMC-GH4 > £1,199 / \$1,698 (body only) > [www.panasonic.co.uk](http://www.panasonic.co.uk)

# 4K lightning

It may look like the GH3, but the GH4 is a serious upgrade with 4K video and better images. **Angela Nicholson** investigates

While the Panasonic GH3 is widely regarded as a great compact system camera for shooting video, its stills capability has been rather overlooked. Panasonic is hoping that the GH4 will gain more respect as a stills camera – but its headline specification is its ability to shoot Ultra High Definition 4K (4,096x2,160-pixel) video.

Panasonic has clearly invested a lot of time and effort in improving on the GH3 for the GH4, and the new camera has an extensive list of new or enhanced features. However, some may be surprised to learn that the sensor's pixel count has stayed the same at 16.05 million, even though the sensor is completely new. Outwardly, the GH4 also looks almost identical to the GH3 and has a very similar arrangement of controls.

## FEATURES

Panasonic is keen to point out that any improvements made to allow 4K video recording also have a beneficial impact on still image quality. For example, because 4K recording is so demanding in processor power, the new 16.05-million-pixel Digital Live MOS sensor is coupled with the

Venus Engine IX processor (the Panasonic GX7 has the Venus Engine VIII; the GH3 has the VII version), which is a quad-core processor. In addition, the sensor has twice the read-out speed of the GH3, reaching 200Mbps. This should mean improved autofocussing (AF) speeds and better noise control.

Clearly the company is confident of the GH4's noise control: sensitivity may be set in the native range of ISO 200-25,600, with ISO 100 as an expansion setting. In comparison, the GH3 has a range of ISO 200-12,800,

**Above** The GH4's weatherproof seals mean you can use it in all conditions

with expansion settings of ISO 125 and ISO 12,800-25,600.

Thanks to the new processor, the GH4 can shoot continuously at up to 12fps (frames per second) in Single-AF mode with a UHS-III SD Card installed. This rate drops to 7.5fps in continuous autofocus mode.

Further refinements on the GH3 include an increase in the number of selectable AF points from 23 to 49, focus peaking to help manual focussing, and zebra display to indicate highlights that are close to burning out.

## BUILD AND HANDLING

There are only a few noticeable differences in the appearance of the GH4 in comparison with the GH3. They are closely matched in size and weight, and have an almost identical control layout. However, the eye-cup around the electronic viewfinder is slightly larger on the GH4 to offer a little more shade from strong



## Stick or twist? Upgrade advice

The GH3 (left) was a big hit with keen videographers who wanted a small, high-quality camera. The addition of 4K capability makes the GH4 a desirable upgrade for videographers. Zebra display and focus peaking were widely requested for the upgrade, and

the GH4 delivers both. It also brings an improved processing engine, faster autofocussing and a wider sensitivity range. However, GH3 owners who primarily shoot stills may be disappointed that the sensor's pixel count remains the same.



## Zooming in on the... Panasonic Lumix GH4

A quick tour of the camera's key features



This central button can lock the mode dial to prevent it from being knocked off the selected camera mode



You can change quickly between Single-AF, Continuous-AF and Manual Focus with a simple flick of this switch



These buttons give a direct route to three of the most common image parameters



This port links the GH4 to the optional Interface Unit, which adds lots of connection options

The GH4 has built-in Wi-Fi and NFC for wireless control and image transfer facilities



Customise the Quick Menu for a quick route to your most-used settings

sunlight. There's also a lock button at the centre of the mode dial to prevent it from being knocked out of position. This lock is our preferred type, which clicks to lock or unlock so that the button doesn't need to be held down when rotating the dial.

As before, the GH4 has a magnesium alloy body that is dust- and splash-proof, and it has the same solid feel as the camera it replaces. But Panasonic has bolstered the GH4's durability by giving its shutter a life-span of 200,000 cycles, double that of the GH3.

**"The GH4 produces great-looking images with pleasing contrast, natural colours and lots of detail"**

Like the electronic viewfinder, the 3-inch LCD rear display offers a very clear view, thanks to its 1,036k-dot resolution. Images look great on it, as there's a very pleasing level of contrast. It's also very responsive to the touch, making it a convenient way of selecting AF point and other setting options.

## PERFORMANCE

As a general rule, the GH4 produces great looking images with good exposure, pleasing contrast, natural colours and lots of detail. Zooming in to 100% on-screen reveals that some JPEG images don't have quite the fine detail or micro-contrast that we see from other cameras, but they look great at sensible viewing sizes.

As is often the case, the GH4's simultaneously captured raw files have more detail. At higher sensitivity settings they also have more noise, but this can be dealt with on an image-by-image basis to produce a good result.

Noise is controlled well throughout the sensitivity range, but detail isn't maintained quite as well as in the Fujifilm X-T1, for example, at higher sensitivity settings.

At 100% on-screen, JPEGs look good up to around ISO 3,200. Above this figure, softening becomes more apparent. Raw files have chroma noise visible at 100% from around ISO 800, but it's within acceptable limits, and as we've mentioned before, can be subjected to reduction as required.

## Meet the rivals...

See how the Lumix GH4 stands up against the competition



**Fujifilm X-T1**  
£949 / \$1,200  
An SLR-styled CSC with retro controls and a 16.3-megapixel APS-C size X-Trans CMOS II sensor.  
Reviewed: page 62  
★★★★★



**Olympus OM-D E-M1**  
£949 / \$1,299  
Olympus's top-end Micro Four Thirds CSC, with bags of customisation options and a tilting touch-screen.  
Reviewed: page 84  
★★★★★

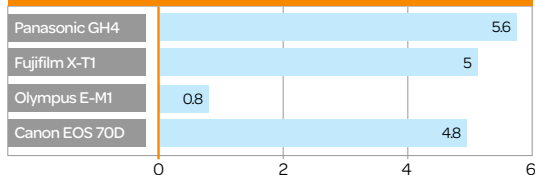


**Canon EOS 70D**  
£815 / \$1,000  
A 20.2MP SLR with a vari-angle touchscreen and built-in Wi-Fi connectivity.  
Reviewed: page 42  
★★★★★

## CAMERA BENCHMARKS

How does the Panasonic GH4 measure up?

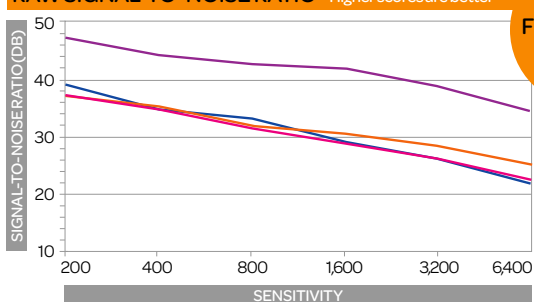
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** It's not the most accurate for colour, but images look very good and have pleasant saturation and contrast.

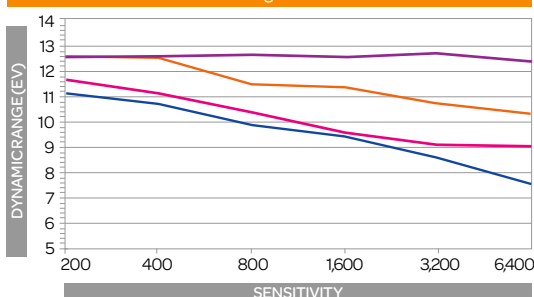
**KEY** Panasonic GH4 (purple), Fujifilm X-T1 (pink), Olympus OM-D E-M1 (orange), Canon EOS 70D (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The GH4 leads, indicating that its images are the cleanest from noise, but its detail resolution can't match the X-T1.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Another very impressive performance from the GH4, showing that its raw files have a wide tonal range.

## OVERALL BENCHMARK RESULT

It's clear that the GH4 makes a significant step forward in image quality on the GH3: the raw file\* signal-to-noise ratios and dynamic range are much improved. Although its signal-to-noise ratio is high at upper sensitivity settings, its ability to resolve detail isn't as good as in some competing cameras.

\* Raw results use images converted to TIFF

- By ISO 12,800, however, raw files need careful editing to conceal noise and preserve detail. ISO 25,600 gives respectable results but, as is often the case, is best kept for emergencies.

Panasonic claims that the GH4's autofocus system can operate down to an incredible -4EV. Our testing indicates that with the right lens, it is quite a bit better in low light than previous G-series cameras. We were impressed by how quickly it was able

**Above right** The 2x focal-length magnification factor is useful with nervous subjects



to focus with the new Leica DG Noctronic 42.5mm f/1.2 ASPH OIS in dim conditions, but this is a super-fast lens with a price to match.

Panasonic's 12-35mm f/2.8 lens, which gives a focal length range equivalent to the popular 24-70mm on a full-frame camera, also delivers sharp subjects quickly, but we found the new 14-140mm f/3.5-5.6 kit lens a little more variable – especially at the telephoto end.

In good light, the AF system is generally very fast and it can keep pace with moving subjects when the AF point is in the correct location. Tracking AF mode has also improved, but it can't be relied upon to follow a fast moving subject around the frame.

The autofocus system changes pace when movies are being recorded. A touch of the screen to change focus point sees the focus shift smoothly and comparatively slowly, creating a professional-looking result. Panasonic's metering and white

balance systems have been found to be good performers in the past, and the GH4 doesn't disappoint in either respect. The camera's automatic white balance system produces convincing results in a wide range of lighting conditions. In natural light, the results you get when shooting using the Automatic setting are often indistinguishable from those taken using the Daylight setting.

Although the GH4 has the usual trio of metering modes (Multiple, Centre-weighted and Spot), we found that the general-purpose 1,728-zone multi-pattern metering delivers great results in most situations. There were relatively few occasions when we had to use the exposure compensation facility to adjust exposure.

As usual, the GH4 is supplied with ISL's Silkypix software for editing images and converting raw files. In reality, few GH4 owners are likely to use Silkypix in preference to Adobe's more refined and better-specified





options: Photoshop CC, Lightroom 5 or Elements 14. Silkipix has most of the controls you need, but it isn't especially intuitive or pleasant to use. Adobe's recent update to its Camera Raw plug-in (version 8.5) makes GH4

**Above** The GH4's AF system found this scene, taken with the 14-140mm lens, challenging

raw file processing possible with the Photoshop family.

We haven't been able to test the GH4's video capability extensively, but it's clear that it produces high-quality footage. As with the camera's still images, exposure, white balance and colour all look good, and there's plenty of detail visible.

## VERDICT

As Panasonic has stuck with the same pixel count as the GH3 for the GH4, it doesn't make really significant strides with detail resolution, but the images do look a little nicer straight from the camera, and noise is better controlled. The GH4 also takes a step forward in autofocussing; it's fast and accurate in most situations and can focus on subjects in pretty low light.

Somehow, holding the GH4 doesn't instil the same level of excitement as picking up the Olympus E-M10 or one of Fujifilm's X-series CSCs, but it combines all the modern technologies that we like:

a high-resolution electronic viewfinder; a vari-angle screen that's touch-sensitive; the ability to shoot raw and JPEG images when using Creative Control filter effects; and Wi-Fi connectivity that allows the camera to be controlled remotely.

Perhaps the lack of excitement is largely because the GH4 has a modern SLR-like design rather than the retro-styling of the Olympus and Fujifilm cameras. Nevertheless, the GH4 is an excellent camera that encourages creativity and is weather- and dust-proof, so it can be used in a wide range of conditions. 📷

**Below** There's a good, deep grip on the GH4 body



## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD/HANDLING

★★★★★

### VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** The GH4 has some of our most sought-after features: a high-resolution EVF, a vari-angle screen that's touch-sensitive and Wi-Fi connectivity. It's also weather- and dust-proof and takes great-looking images.



CSC Pentax K-3 II > £749/\$847 > [www.ricoh-imaging.com](http://www.ricoh-imaging.com)

# All-round success?

Tough, fast and powerful: Pentax includes some compelling technologies in a new SLR aimed at adventurers

## > THE SPECS

<b>Sensor</b>	24.3 million pixel, APS-C (23.5x15.6mm) CMOS
<b>Focal length conversion</b>	1.5x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	Pentaprism 100% optical viewfinder, 0.95x magnification
<b>Max video resolution</b>	Full-HD at 60fps
<b>ISO range</b>	100-51,200
<b>Autofocus points</b>	27 points (25 cross type in sensor)
<b>Max burst rate</b>	8.3fps
<b>Screen</b>	3.2 inch TFT colour LCD with AR coating
<b>Shutter speeds</b>	1/8000 to 30 seconds, Bulb
<b>Weight</b>	785g (including battery)
<b>Dimensions</b>	103x132x78mm
<b>Power supply</b>	D-L190 rechargeable lithium-ion battery (supplied)

“Pixel Shift Resolution mode is designed to overcome the limitations of normal sensor technology”

**D**esigned to steal the thunder of market leaders Canon and Nikon, the K-3 II is Pentax's latest

top-of-the-line digital SLR. It competes most closely with mid-range or enthusiast cameras such as the Nikon D7200 and Canon EOS 70D — at least as far as price and sensor is concerned.

The highlight feature of the K-3 II is what Pentax calls its Pixel Shift Resolution mode. With this enabled, the camera captures a series of images in close succession, with just a one-pixel shift between them.

This is designed to overcome the limitations of normal sensor technology. Each photosite (pixel) in a sensor is sensitive to only red, green or blue light.

This means the camera has to interpolate the full colour data for each pixel using neighbouring pixels. If you shift the sensor, however, you can potentially overcome this limitation by having red, green and blue data captured for each pixel.

The downside to such technology is the huge file sizes

**1** Press this useful button to instantly return exposure compensation to 0, or ISO to Auto.

**2** Press the AF select button, then use the directional keys to move to the point you want to select.

**3** This button brings up a range of options, as a sort of quick menu.

**4** Each of these buttons controls a specific function, such as white balance via the left key.



that are produced, so you can disable Pixel Shift Resolution and shoot in a conventional way, saving the high-resolution mode for when you really need it. It's also not possible to shoot moving subjects with the PSR mode enabled.

Otherwise, the K-3 II shares much of the same specifications as its predecessor. It has a stainless steel and magnesium weatherproof body, with 92 seals to keep both dust and moisture out.

As in the K-3, the 24MP APS-C sensor has no anti-aliasing filter, which should bode well for sharpness





As these flowers were waving in the breeze, it wasn't possible to use the K-3 II's Pixel Shift mode, but the autofocus system managed to get them sharp and there's a very good level of detail.

and detail. If you're photographing fine patterns and textures, you can enable an AA filter simulator to counter any moiré patterning.

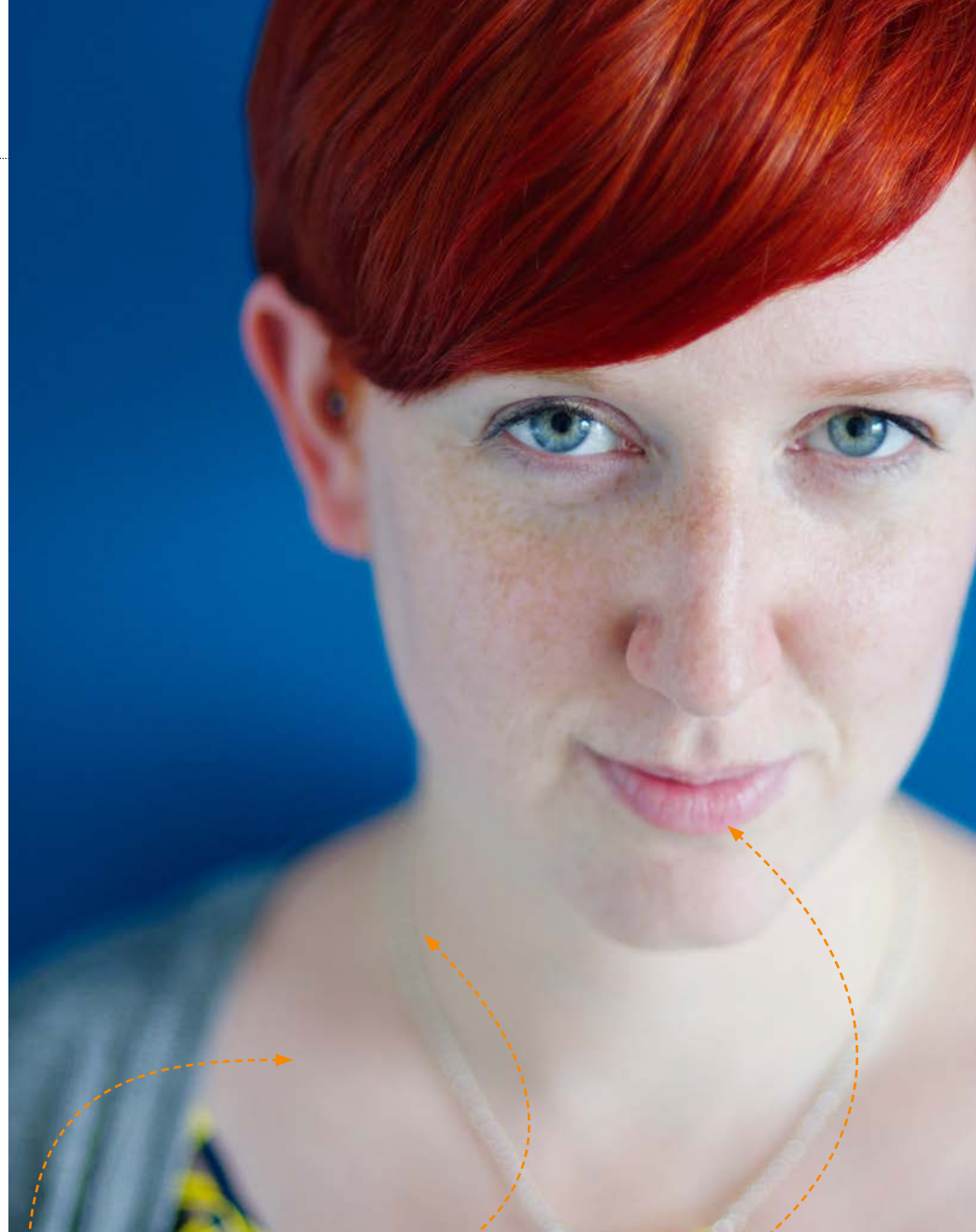
Again, as in the K-3, the continuous shooting speed is 8.3 frames per second, with a buffer capacity of 23 raw-format files or 60 JPEGs. Further similarities between the cameras are twin SD card slots, a body-only weight of 700g, a promised 720-shot battery life and the 27-point Safox II autofocus system.

## BUILD AND HANDLING

A solidly built piece of kit, the K-3 has a textured grip which adds to the camera's high quality feel. The array of dials and buttons on the K-3 II confirm that this is a camera aimed at enthusiast photographers rather than pros. A scroll wheel on the back of the camera sits nicely under your thumb, while another, in front of the shutter release sits under your forefinger.

As well as the usual options, the exposure mode dial features two Pentax-specific modes: Sensitivity Priority, where you dial in an ISO value and the camera selects the aperture and shutter speed; and Shutter-and-Aperture Priority, where you set the aperture and shutter speed and the K-3 II selects the ISO.

Most of the K-3 II's buttons are grouped to the right, either on the top or on the back, making it useful to operate with your right hand while you use your left to steady the device. On the side of the camera is a group of buttons that are within reach of your left thumb when you're supporting the lens with your left hand. There's



1

### ACCURATE TONES

Skin tones are reproduced faithfully yet look flattering. You can use a different Picture Control, such as Portrait or Neutral, if you're looking for greater accuracy.

2

### LENS CHOICE

There's a wide variety of lenses available for the Pentax K-mount, as it's been around for so long. This was shot with a 55mm f/1.4 lens, which is ideal for portraits.

3

### GREAT DETAIL

There's plenty of fine detail present in the K-3 II's images – even those, such as this, which are shot without the Pixel Shift Resolution mode switched on.

## Meet the rivals...

The cameras taking on the Pentax K-3 II

For test images and resolution charts, visit

[www.techradar.com/cameras](http://www.techradar.com/cameras)



**Canon EOS 760D/Rebel 6Ts**  
£649/\$849, body only  
Canon's latest 24MP APS-C format SLR includes a useful vari-angle touchscreen along with an efficient 19-point autofocus system and delivers superb image quality.  
Reviewed: page 38



**Nikon D7200**  
£849/\$1,097, body only  
This 24MP SLR has no anti-aliasing filter over its sensor which enables it to capture more detail than any of the other cameras tested here. It presents enthusiasts with a rich set of features, too.  
Reviewed: page 68



**Pentax K-3**  
£659/\$847, body only  
This camera has a lot in common with the new Mark II model, including the 24MP sensor and lack of AA filter, but there's no Pixel Shift technology. That being said, it'll be available at a much more attractive price point.  
Not reviewed

Pentax gives you interesting Picture Control options, so you can get creative in-camera if you want. As you can shoot raw and JPEG files together, you'll have a clean file to process later.



JPEGs show a good level of vibrance. You can apply different Picture Controls depending on your preference.

- an AF mode button, which enables you to quickly choose modes such as Spot, Auto and Selection. There is also a switch for rapidly moving between autofocus and manual focusing modes.

## PERFORMANCE

Images taken straight from the K-3 II are very pleasing, with vibrant but true-to-life colours. Looking at the raw-format (DNG) images, colours are a little more muted, which gives you good scope for applying colour enhancements while editing in post-production.

Even without the Pixel Shift Resolution mode, images display

a good level of detail. If you're using the special mode, you'll need a tripod to keep the camera perfectly still.

In real-world images, it's difficult to see too much of a difference between images shot with and without Pixel Shift activated. Unless you're likely to be shooting incredibly detailed subjects, you may not even notice the difference for most shots. As raw files can go over 100MB per shot with PSR mode switched on, even though their pixel count is unchanged, it can be a good idea to reserve it for certain occasions.

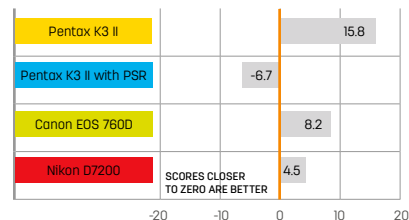
Noise is well-controlled across the K-3 II's sensitivity range. Although it starts to become apparent at around ISO 800 if you examine a JPEG image at 100%, the overall impression of detail remains very good up to around ISO 1,600; ISO 3,200 also produces good results if you need to use it in low light.

Autofocus performance is fast and generally accurate, only struggling in lower light. It's rare for a false positive to be presented. When you're photographing a moving subject, you can switch to Continuous AF which, coupled with 8.2fps shooting, makes the K-3 II a decent choice for shooting sports and other action. The camera is able to keep up with fast-moving subjects quite well if you keep the active AF point on them. 📷

**"Images taken straight from the K-3 II are very pleasing, with vibrant but true-to-life colours"**

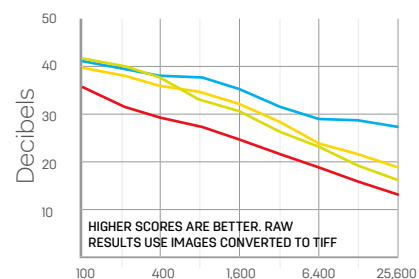
**WHAT'S THIS?**  
Find out how we test on page 6

## COLOUR ERROR



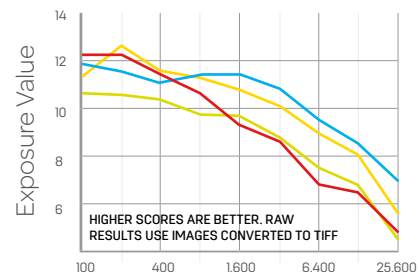
In the lab, using Pixel Shift Resolution mode reduces the saturation of the K-3 II's images significantly. Without it, images appear to be rather over-saturated.

## RAW SIGNAL-TO-NOISE RATIO



As sensitivity rises, the K-3 II overtakes the Canon 760D, indicating that images have less noise. This slight gap is widened when Pentax's PSR mode is employed.

## RAW DYNAMIC RANGE



The K-3 II's raw files offer a similar dynamic range to the Canon and Nikon at low ISOs, but it starts to show a clear advantage as the ISO setting increases.

## Digital Camera

### FEATURES

★★★★★

### PERFORMANCE

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** The K-3 II offers excellent build quality and some interesting features at a reasonable price. It's a good all-round SLR that's capable of delivering high-quality images. The Pixel Shifting Technology shows a clear advantage in our lab, but we're not convinced it makes much of a difference to real-world images.



# LED lights

Flash is useless for video capture. So grab a mini LED lamp, and let your little light shine...



**Hama 40 LED Slim Panel**

[www.hama.co.uk](http://www.hama.co.uk) £69/\$150

This device consists of two parts, joined by a flexible 30cm gooseneck. In practice, though, the gooseneck feels awkward and flimsy. In our tests, maximum output power at 1/60 sec, ISO 100, was just above average at 8.1EV, corresponding to f/2.

**OVERALL**



**Limelite Mosaic Solo On-Camera LED Light**

[www.limelite.uk.com](http://www.limelite.uk.com) £69/\$130

A chunky, heavy lamp which has the joint-highest number (with the Metz) of LEDs here, at 72, but they're placed on a larger grid here, giving a 145 x 75mm illumination area. It's top of the group for tested maximum output, at 8.5EV, f/2.2.

**OVERALL**



**Metz Mecalight LED-480**

[www.metzflash.co.uk](http://www.metzflash.co.uk) £75/\$125

This Metz lamp is similar in design to the Mosaic Solo, but smaller and lighter. While it's well-built, with a magnetic diffuser and tungsten filter, its maximum power output of 7.2EV, f/1.6, means that it's not the most powerful option on test.

**OVERALL**



**Manfrotto Lumie Muse**

[www.manfrotto.co.uk](http://www.manfrotto.co.uk) £100/\$120

The pocket-sized Lumie Muse measures just 86 x 59 x 28mm. The lamp is based on eight LEDs, and the circular light aperture has a diameter of only 45mm. Despite this, the maximum output is actually pretty respectable at 7.7EV, f/1.8.

**OVERALL**



**Rift Labs Kick**

[www.riftlabs.com](http://www.riftlabs.com) £130/\$150

The Kick uses 48 LEDs in a rectangular array that has a similar surface area to the 72-LED Metz. It has a fixed internal battery like the Manfrotto, recharged via a USB socket. Maximum power output is joint-lowest in this group, at 6.8EV, f/1.2.

**OVERALL**



**Rotolight RL-48 LED Creative Colour Kit V2**

[www.rotolight.com](http://www.rotolight.com) £100/\$100

A 48-LED lamp that looks like a ring flash and can produce halo catch-lights in the eyes. But with an internal diameter of 37mm, it won't fit over any of your lenses. It's powered by three AA cells, but gives a meagre maximum output of 6.8EV, f/1.2.

**OVERALL**



# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

> THE SPECS	
Sensor	24.3 million APS-C (23.5 x 15.6mm) CMOS sensor
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Electronic viewfinder, 0.39 inches, 1,440,000 dots
Video	1080p
ISO range	100 to 25,600
Autofocus points	Hybrid autofocussing, 179 phase detection points, 25 contrast detect points
Max burst rate	11fps
Screen	Three-inch, 921k-dot tilting LCD
Shutter speeds	1/4000 – 30 seconds plus Bulb
Weight	344g (with battery and memory card)
Dimensions	120 x 66.9 x 45.1mm
Power supply	NP-FW50 rechargeable lithium-ion battery



With a new image sensor and the Bionz X processor, the A6000 is a formidable CSC

CSC Body only: £519 / \$649 > [www.sony.com](http://www.sony.com)

With the launch of the Alpha 6000, Sony has introduced what amounts to an APS-C version of the full-frame Alpha 7. At the same time, two old NEX lines, the NEX-7 and the NEX-6, have been discontinued. Sony expects the NEX-7 owner to upgrade to the A7 range, while the A6000 is designed to meet the needs of the NEX-6 owner, sitting at the top of the company's APS-C enthusiast line.

Small and sleek, the A6000 has a similar look and feel to the A7. It features a newly designed 24.3-million-pixel APS-C CMOS sensor. It competes pretty closely with the likes of the Fujifilm X-E2, the Olympus OM-D E-M1 and the Panasonic Lumix G6.

### FEATURES

Along with the new sensor, the A6000 is equipped with the Bionz X, Sony's latest processor, which is also found in the newest full-frames like the A7, the A7R and the A7S. Sony

claims that the Bionz X is three times faster than the previous generation. The image sensor has 179 phase-detection autofocus points. There are also 25 contrast-detection AF points for the hybrid autofocussing system. At the time of launch, Sony claimed that the camera had the fastest AF in the world among cameras with an APS-C sized sensor.



Sony's 16-70mm f/4 lens is a powerful partner for the Alpha 6000

## Two into one

What do you get if you cross the A7R with the NEX-6? **Amy Davies** sees if the Sony Alpha 6000 has the best of both worlds

On the back of the A6000 is a tiltable LCD screen, which is joined by an electronic viewfinder: the same 0.39-inch, 1.4-million dot device found on the RX10 premium bridge camera.

Reflecting the broader trend, the A6000 comes complete with built-in Wi-Fi and NFC. Like several other Sony cameras, it is customisable with apps downloadable from Sony's cloud-based photo storage service PlayMemories ([www.sony.net/Products/playmemories](http://www.sony.net/Products/playmemories)).

As its standard kit lens choice, the A6000 comes with a 16-50mm f/3.5-5.6 power zoom – the same lens that is packaged with the A5000. You can also buy it body only, giving yourself the freedom to choose from the large range of different E-mount lenses now available. Perhaps the perfect all-round lens for this camera is the Zeiss 16-70mm f/4 optic, but that comes with a £799 price tag – quite a bit more than the camera itself.

### Meet the rivals...

See how the Sony A6000 stacks up against the competition



**Fujifilm X-T1**  
Body only: £949 / \$1,200  
The X-T1 is not only beautiful, but it's capable of producing some truly superb images.  
Reviewed: page 62  
★★★★★



**Panasonic GX7**  
Body only: £499 / \$698  
An ideal choice for experienced photographers looking for a smaller alternative to their SLR.  
Reviewed: issue 144  
★★★★★



**Olympus OM-D E-M1**  
Body only: £949 / \$1,299  
A superb camera, but it is quite complex and it takes some time getting to know.  
Reviewed: page 84  
★★★★★





## BUILD AND HANDLING

Those who appreciate lots of dials and buttons will enjoy the A6000. It has plenty of controls available, and, like other Sony cameras, pretty much all of them are customisable to help you adjust the camera to suit the way you take photos.

The grip of the A6000 is ever so slightly more pronounced than on the NEX-6, making it easier to hold. There's also a nice texture covering the camera. On top of the camera are two dials: one for controlling the shooting mode (such as automatic, semi-automatic or manual), and another for altering the shutter speed or aperture, depending on the mode you're shooting in.

Setting the autofocus point on this camera is a task that would be speedier with a touchscreen, but it's not too bad if you set the right custom buttons. To make things quicker, set Focus Area to Flexible

Spot. From here, you simply need to press the button in the centre of the scrolling dial on the back of the camera to bring up the focus point selection option. You can then use the directional keys to move around the screen. It's worth noting that this is the default option for the central button when Flexible Spot is selected: if you've got it set to anything else, it won't work in the same way.

Although it's not a touchscreen, the screen tilts, which is useful for shooting from some awkward angles, or for shielding the screen from glare. The viewfinder is bright and clear, and doesn't seem to suffer from any noticeable lag. Setting up Wi-Fi is quick and easy, and makes the A6000

**"Those who appreciate dials and buttons will enjoy the A6000. It has plenty of controls available"**

**WHAT'S THIS?**  
Find out how we test on page 6

## CSC TEST

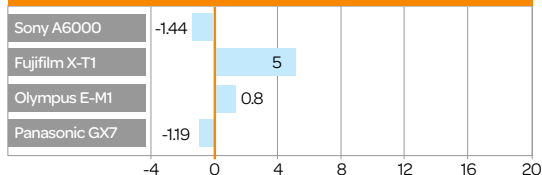
SONY ALPHA 6000

103

### CAMERA BENCHMARKS

How does the Sony A6000 measure up?

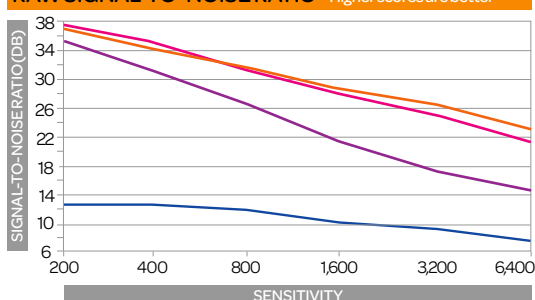
#### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The A6000 strikes a good balance between accurate colours and pleasing warm tones.

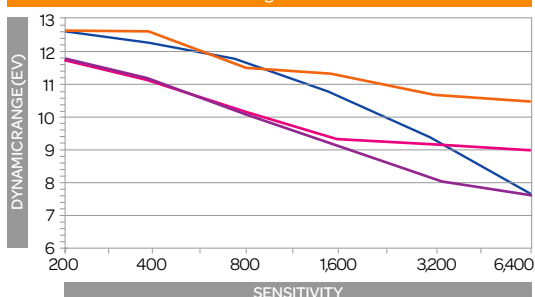


#### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Technically, the A6000 is the worst performer, but Sony is prioritising detail reproduction instead of noise reduction.

#### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Both the A6000 and the X-T1 put in a similar performance, which is a reflection of their warm tones.

#### OVERALL BENCHMARK RESULT

A good consistent performance is put in by the A6000, and while it's not technically the best performer in the group, both signal-to-noise ratio and dynamic range results are pleasing, especially for JPEG images.

\* Raw results use images converted to TIFF

**Above** The 24.3-million-pixel sensor of the A6000 is capable of resolving a great amount of fine detail


convenient for quickly sharing photos to your smartphone or tablet.

## PERFORMANCE


Sony is producing some of the most interesting compact system cameras currently on the market and, pleasingly, the A6000 is another great performer to add to the line-up. Its images are great, with beautifully saturated colours. You can experiment with how JPEGs look straight from the camera by adjusting

## Zooming in on the... Sony A6000


A quick tour of the camera's key features




A sensor in the A6000's eyepiece detects when the camera is lifted to the eye




Press this button to raise the flash. You can also add an external flash via the hotshoe




Tilting downwards and upwards, the screen is useful for shooting from awkward angles



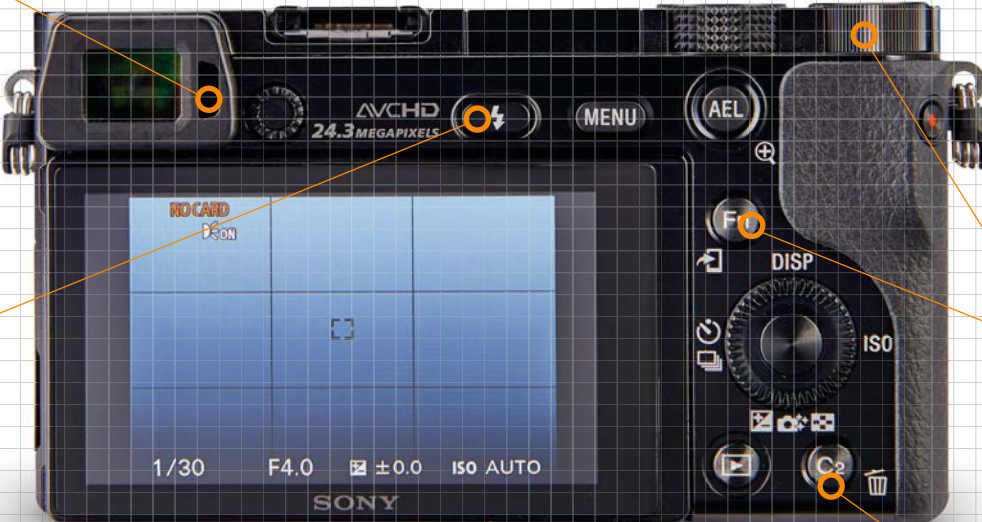
This customisable button can be set to a specific function of your choosing – such as sensitivity



Press the function button to access commonly used settings, such as white balance



This dial controls different functions depending on the shooting mode, like altering the aperture



❶ Creative Styles – a number of which are available as pre-stored settings. Detail is rendered very well by the A6000. Generally, image smoothing only starts to become problematic

“Sony has come within touching distance of creating the perfect compact system camera”

for normal printing sizes in shots taken at around ISO 3,200 upwards. Examining images at 100% from around ISO 1,600 upwards, you will find areas of the image that have a painterly effect, but the overall effect is good.

The camera's metering system does a good job with exposure, although it sometimes struggles in high-contrast situations, when you'll need to dial in some exposure compensation. Similarly, the automatic white balance system is a good performer, although it can

be slightly confused by some artificial light sources.

In good light, autofocus speeds are very quick, dropping as the light levels drop, but only struggling to lock on at all in very dark conditions.

The 16-50mm f/3.5-5.6 kit lens is a good all-rounder to get started with, but this is the kind of camera you'll want to buy additional lenses for. Luckily there are some great ones for the E-mount.

Battery life is better than in the A7, probably due to the smaller sensor, but it's still worth buying a spare battery if you travel. 📷



Digital Camera

FEATURES	★★★★☆	BUILD QUALITY	★★★★★
IMAGE QUALITY	★★★★★	VALUE	★★★★★

Overall ★★★★★

**WE SAY:** Sony has come within touching distance of creating the perfect CSC. Fantastic image quality and customisable buttons are great to have, but a couple of niggles keep it from greatness.





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# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

> THE SPECS	
Sensor	24.3MP APS-C format (23.5 x 15.6mm) Exmor CMOS
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC and Sony Memory Stick
Viewfinder	Electronic viewfinder with 2,359,296 dots (100% cover)
Video	Full HD (1,920 x 1,080) at 60p
ISO range	100 to 25,600; expandable to ISO 50-25,600 for stills, ISO 100-12,800 for movies
Autofocus points	Phase-detection with 79 points (15 cross-type)
Max burst rate	12fps (aperture locked at start)
Screen	3.2-inch, 1,229k-dot TFT
Weight	647g (body only)
Dimensions	142.6 x 104.2 x 80.9mm

After the announcement of the full-frame E-mount Sony A7, A7R and A7S compact system cameras and the demise of the NEX brand, you could be forgiven for thinking that Sony might not continue with its A-mount SLT (single lens translucent) cameras. However, the arrival of the Sony Alpha 77 II indicates that this isn't the case.

As you might guess, the Alpha 77 II replaces the Alpha 77, which is now discontinued, and it has an almost identical shape and design. As before, the new camera is aimed at enthusiast photographers who want a step up from an entry-level model. It sits under the full-frame Alpha 99 in Sony's SLT line-up.

### FEATURES

Like the Alpha 77, the A77 II has a 24-million-pixel sensor, but this is a new device that benefits from the progress that has been made with sensor design in the two-and-half years since the A77 first arrived. Also, for the first time in an A-mount camera, the sensor signal is processed by a Bionz X engine. This has given Sony the confidence



SLT Sony Alpha 77 II > Body only: £764 / \$998 > [www.sony.com](http://www.sony.com)

## Round two

Sony's enthusiast-level Alpha 77 II gets a speed boost as well as better image quality. **Angela Nicholson** checks it out

to allow sensitivity to be set in the native range ISO 100-25,600 for still images, with a low expansion setting of ISO 50 also available.

One of the benefits of the SLT design is that there can be full-time phase-detection autofocus during movie shooting and when composing images on the rear screen. Sony has used a newly developed phase-detection sensor with 79 AF points (15 of which are the more sensitive cross-type) in the Alpha 77 II. Sensor development means that the A77



Above This tilting 3.2-inch screen displays a superb level of detail.

II's CCD AF sensor produces less electronic noise than previous devices and this helps with autofocusing speed and accuracy, as well as boosting low-light performance.

Spot AF performance is also claimed to have been improved, with weighting given to the centre of the spot. There's a collection of AF-point selection options including Wide, Zone, Flexible Spot, Local, Expanded Flexible Spot and Lock-on AF. In Expanded Flexible Spot mode, you select one AF point and the camera supports this with the surrounding eight points, which is useful when shooting a moving subject.

It's also possible to adjust the AF tracking duration across five levels via the menu. The low settings are useful when the subject distance isn't expected to change quickly, while high levels suit shooting subjects at different distances. In addition, a new AF Range Control option allows you



### Stick or twist? Upgrade advice

Sony is proud of the progress it has made with the autofocusing system for the A77 II. We're told that five engineers conducted field tests for six months with rival high-end cameras like the Canon EOS 1DX, the Canon 70D, the Nikon D4, the Nikon D7100 and the Panasonic GH3, in order to find the best parameters for AF while shooting a variety of sports and action. The new system has 79 AF points, whereas the original A77 (pictured) has just 19 AF points, of which 11 are cross-type.



## Zooming in on the... Sony Alpha 77 II

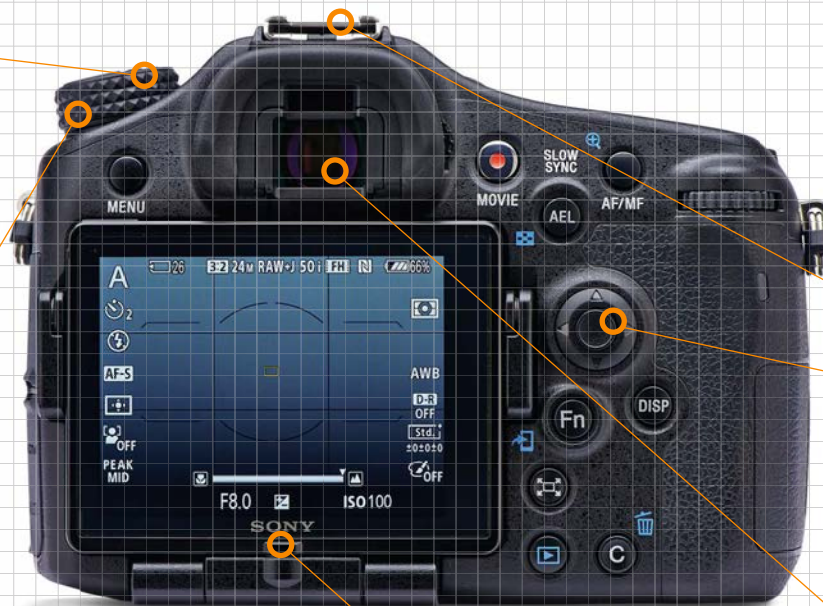
Sony's made important changes from the A77



The mode dial has been updated with a lock button to prevent it from being knocked out of position.



Strangely, Sony has continued with having the 12fps shooting option located on the mode dial.



The vari-angle mechanism on the rear LCD screen seems a little over-complicated.



As SLTs have a fixed translucent mirror, the A77 II has an electronic rather than optical viewfinder.



The hotshoe has changed from the Sony (Minolta) proprietary shape to the more common universal style. It also has contacts for a wide range of accessories.



This controller makes it quick and easy to select the desired autofocus point in your scene.

to restrict the AF to working within a specific distance range – useful when there are objects between the camera and the subject.

According to Sony, almost all of its A-mount lenses are compatible with the 79 AF points, although only 61 are available when you're shooting at 12fps. Sony's 500mm f/8 lens is a notable, but not surprising, exception: it will allow only the centre AF point to be used.

As suggested above, the A77 II can shoot a maximum rate of 12 frames per second with AF tracking, and the buffer has capacity to allow up to 25

## “Almost all of Sony's A-mount lenses are compatible with the A77 II's 79 AF points”

raw and JPEG images to be captured in a single burst, but aperture is locked at the start of the sequence.

Other pleasing additions to the A77 II's featureset include an HDMI port, which can supply clean video output to external storage devices, and Wi-Fi connectivity. As the A77 II has an NFC chip, owners of NFC-enabled smartphones and

tablets can connect to the camera by touching the two devices together. Interestingly, despite the presence of Wi-Fi connectivity, the A77 II cannot make use of Sony's PlayMemories Camera apps.

## BUILD AND HANDLING

Sony has given the Alpha 77 II the same tough feel, overall shape and control layout as the A77, and the vertical grip that was produced for the original model can be used with the new camera. There are a few differences, however: there are 27 features that can be assigned to one of the 12 slots in the Function menu, for example. It's also possible to customise the function of many of the buttons, but the default settings work well.

If you like using Picture Effects (Toy Camera, Pop Color, Posterization, Retro Photo, Soft High-key, Partial Color, High Contrast Mono, Soft Focus, HDR Painting, Rich-tone Monochrome, Miniature, Watercolor and Illustration are provided), it's worth assigning this and image quality to the Function menu so that you can quickly turn off raw recording

## Meet the rivals...

There's a choice of SLRs and CSCs at this price point



**Canon EOS 70D**  
Price £734 / \$999  
This 20.2MP SLR has a responsive vari-angle touchscreen, and captures great images.  
Reviewed: page 42  
★★★★★



**Nikon D7100**  
Price £731 / \$897  
A 24.1MP SLR with superb resolving power and an excellent AF system, but limiting buffer capacity.  
Reviewed: issue 138  
★★★★★



**Fujifilm X-T1**  
Price £879 / \$1,299  
This SLR-style CSC has an excellent electronic viewfinder and traditional exposure controls.  
Reviewed: page 62  
★★★★★



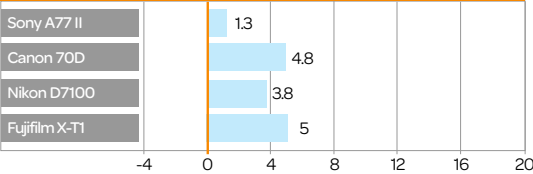
# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

## CAMERA BENCHMARKS

How does the Sony Alpha 77 II measure up?

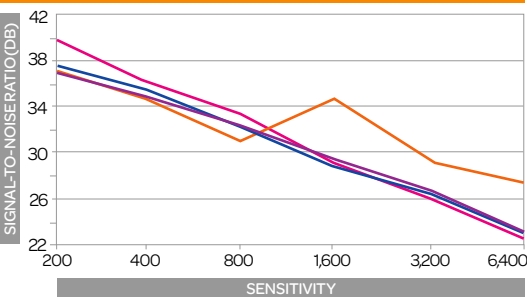
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Our tests show that the Alpha 77 II is comfortably the most accurate camera in this group.

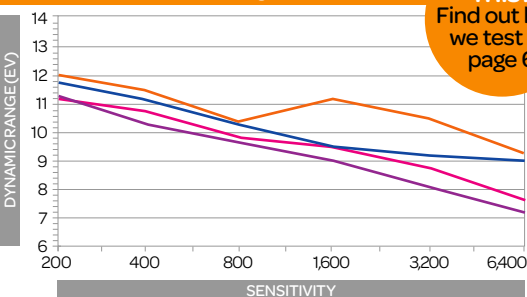


### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The A77 II is one of the lower performing cameras here, but as with the JPEG images, this may be to reveal more detail.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The Sony Alpha 77 II's raw file dynamic range lags behind competing cameras through most of its sensitivity range.

### OVERALL BENCHMARK RESULT

It may not have the best performance in the lab tests, but the A77 II produces high-quality images. We suspect that the signal-to-noise ratio has been limited a little to allow more detail to be visible. However, the lower dynamic range indicates that highlights may burn out slightly earlier than with the competing cameras.

\* Raw results use images converted to TIFF

and access the effects. As with other Sony cameras, the Creative Style options (Standard, Vivid, Neutral, Clear, Deep, Light, Portrait, Landscape, Sunset, Night, Autumn, Black & White and Sepia), which give JPEG images a particular appearance, can be used when shooting raw images simultaneously.

While the three-inch 1,229k-dot vari-angle screen is useful for composing images from awkward

**Above** Noise is controlled well in this ISO 25,600 raw image.

“The articulating hinge seems unnecessarily complicated, and it takes a while to get used to it”



angles, the articulating hinge seems unnecessarily complicated, and it takes a while to get used to its quirks and limitations. The hinges on cameras such as the Canon 70D and Nikon D5300 are much more straightforward.

As on the Sony A7 and 7R, the 2.3-million-dot electronic viewfinder (EVF) is bright and clear, with plenty of detail visible. As usual with an EVF, this brings the benefit of seeing the image as it will be captured. However, when the brightness is set to Automatic rather than manual, the extra gain applied in dark conditions can mean that the viewfinder image looks significantly brighter than the

final image, so it's best to set the brightness to Manual.

### PERFORMANCE

Even at the highest selectable sensitivity setting of ISO 25,600, noise is controlled well in raw files, having a fine texture with no banding or clumping visible at 100% on-screen. With careful processing, it's possible to conceal most of the coloured speckling in raw files and produce an image with just luminance noise giving some grain. Simultaneously captured JPEG files look softer than their raw counterparts, and close examination reveals a painterly texture with slightly sharpened edges. They generally look acceptable viewed at A3 size, but we prefer the slightly sharper, grainier look of the raw files.

As you'd hope with a 24MP sensor, the A77 II is capable of





recording a high level of detail at the lower sensitivity settings. While the A77 II's AF system struggled a little more than the Canon 5D Mark III in the low, flat light of an unlit music gig, there were no such problems with a fast-moving subject in good light. It was positive, fast and accurate. In continuous AF mode with AF selection set to Expanded Flexible Spot, it got rowers sharp in a flash and was able to keep them sharp by using the surrounding points when panning.

**Above** Using the Landscape Creative Style boosts blues and greens.

When AF selection was set to Lock-on AF: Flexible Spot or Lock-on AF: Expanded Flexible Spot, it also tracked them around the frame if the original AF point wasn't kept in the correct location.

As usual, AF performance varies according to the lens that's mounted, and a good optic is required to get the best from the Alpha 77 II. It performs very well with the 70–200mm f/2.8, for example, but is a little more hesitant in low light with the 85mm f/2.8 – which also has a much noisier focus mechanism.


We used the Multi-segment metering system almost exclusively during this test. Although we shot in a wide range of conditions, there were only a few when a little exposure compensation was required.

Colours are also good straight from the camera, and the white balance system general does a good job when set to the Automatic setting.

## VERDICT

While the changes made to the Alpha 77 II may not seem dramatic, Sony has worked on the most important aspects – the sensor and processor – to boost speed and image quality, as

well as the autofocus performance. Many will recognise that it's sensible to stick with the same pixel count as with the Alpha 77: 24 million pixels capture enough detail for most purposes and allow big prints to be made. The files are large without being unmanageable by the average modern computer.

The AF system improvements and the A77 II's ability to control noise at high sensitivity levels, combined with the general high quality of the images, makes it a versatile camera that will be attractive to enthusiast photographers who want to shoot a wide range of subjects in a variety of conditions. 



**Left** The Alpha 77 II has the same shape as the A77 camera it replaces.

## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** The A77 II's image quality is excellent, even at high sensitivity settings, and the autofocus system is fast and accurate. It's a great choice for enthusiasts who want versatility from their camera.





CSC Sony Alpha 7R II &gt; Body only: £2,599/\$3,198

> [www.sony.com](http://www.sony.com)

# Sony Alpha 7R II

Sony's highest-resolution compact system camera proves you don't need a big camera to create large, high-quality images



## > THE SPECS

<b>Sensor</b>	42.4 million effective pixel full-frame (35.9 x 24mm) Exmor R CMOS
<b>Focal length conversion</b>	1x
<b>Memory</b>	2,359,296-dot OLED
<b>Viewfinder</b>	2,359,296-dot OLED
<b>Video</b>	4K (3,840 x 2,160) at 30p
<b>ISO range</b>	100-25,600; expandable to ISO 50-102,400 for stills
<b>Autofocus points</b>	399
<b>Max burst rate</b>	5fps at full resolution
<b>Screen</b>	3-inch LCD with 1,228,800 dots
<b>Shutter speeds</b>	30-1/8,000 sec for stills
<b>Weight</b>	582g (body only)
<b>Dimensions</b>	126.9 x 95.7 x 60.3mm
<b>Power supply</b>	NP-FW50 lithium-ion battery (supplied)

"The front grip is more pronounced, making it more comfortable and secure in use"

**S**ony has had ambitious plans for the camera market ever since it bought Konica Minolta's camera business in 2006, but after the initial excitement there were only sporadic periods of activity, and our attention waned somewhat. Then in September 2013 the company launched the RX1, a small compact camera with a full-frame sensor, and it seemed that there would be more of interest to follow. A little over a year later, the Alpha 7 and 7R were unveiled, and we all sat up and took notice. These were the world's first compact system cameras to feature full-frame sensors. Since then, we've had the Alpha 7S and the Alpha 7 II.

The latest addition to the range is the Alpha 7R II, the highest-resolution model which trumps the A7R's 36 million pixels with an effective pixel count of 42.4 million. To push detail resolution even further, the sensor has no optical low pass filter (OLPF). As well as having the first ever full-frame backside

## FEATURES

**01** It's easy to connect an NFC or Wi-Fi enabled phone to control the camera or share images.

**02** The electronic viewfinder makes the scene look a little more vibrant than it is in reality, but the images match the scene.

**03** We found this dial a bit awkward to reach while holding the camera one-handed.

**04** This lock prevents the mode dial from being accidentally knocked out of position.

illuminated (BSI) sensor, the A7R II is the first full-frame camera to feature in-body five-axis image stabilisation and the ability to record 4K movies internally.

Other specification highlights include Sony's Bionz X processor, which enables a maximum sensitivity setting of ISO 102,400; a 399-point hybrid autofocus system; a new 500,000-cycle life shutter unit that creates less vibration than before; and a 2,359,296-dot OLED electronic viewfinder (EVF).

## BUILD AND HANDLING

Like the other cameras in the Alpha 7 line, the A7R II has retro SLR-like design. However, Sony has taken on-board some of the criticisms made of the original A7 and A7R and make the same handling tweaks to the A7R II as it did to the A7 II. Consequently, the front grip is more pronounced, making it more comfortable and secure in use. The shutter release button is also moved forward onto the top of the grip, and beneath it there's a conveniently placed recessed dial for



01

**DETAIL**

The Sony A7R II is able to resolve a very impressive level of detail. The fabric of the umbrella is clearly visible in the droplets of water.

02

**DEPTH OF FIELD**

Having a full-frame sensor means there's lots of control over depth of field. The softness of out-of-focus areas seems to be emphasised by the sharpness of areas in focus.

03

**GET IT RIGHT**

You can rely on the auto white balance and 1200-zone evaluative metering systems to deliver accurate colours and exposures, even in tricky lighting conditions.





“Three of the navigation buttons and the centre button can also be used as shortcuts to features”

adjusting settings. This has created space for a second customisable button on the camera's top-plate.

The A7R II has a magnesium alloy construction and is weather-sealed. Most of the camera feels very solid, with a pleasant density, but the front grip creaks when it's held tightly.

One of the great things about the A7R II is that it's highly customisable. The control wheel on the back of the camera, for example, can be set to adjust one of six features – I found

**Above** Using an electronic viewfinder makes it easier to produce creative images in-camera; this scene looked far better overexposed by +1.7EV.

it useful for adjusting sensitivity quickly – and any of 62 functions can be assigned for access via four Custom buttons. Three of the navigation buttons and the centre button can also be used as shortcuts to features, and 12 of 34 functions can be assigned for access via the Function menu.

The default set-up makes a good starting point, but it's worth experimenting with other options until you have the optimum control arrangement for your needs.

## Meet the rivals...

The cameras taking on the Sony A7R II...

For test images and resolution charts, visit

[www.techradar.com/cameras](http://www.techradar.com/cameras)



**Canon EOS 5DS**  
£2,999/\$3,699

Along with the 5DS R, this 50-million-pixel SLR is the highest resolution full-frame camera currently available – and it certainly packs in the detail.

**Reviewed:** page 50



**Nikon D810**  
£2,349/\$2,997

With 36 million pixels on its full-frame sensor, this SLR can't quite match the Canon 5DS for detail, but it's still a top choice for Nikon lovers.

**Reviewed:** page 72



**Sony Alpha 7R**  
£1,399/\$1,898

This 36MP CSC turned lots of heads when it was first unveiled. It produces superb images, making it a great and more affordable alternative to buy.

**Reviewed:** issue 147



## PERFORMANCE

One thing that's clear from our real-world and lab tests is that the Alpha 7R II can resolve a lot of detail. As you'd expect, the highest level of detail is captured at the lowest sensitivity settings.

I found it impossible to match the JPEGs' in-camera processing when processing raw files using the supplied software, and the JPEGs resolve very slightly more detail.

It doesn't quite out-resolve our resolution chart, so it can't match the 50MP Canon 5DS for detail.

As sensitivity increases to mid-range values, the JPEGs take on a





slightly painterly appearance at 100% on-screen. This becomes even more evident at high values and the edges of elements become a little harsh while the areas in-between are a softer wash of colour.

Noise levels are perfectly acceptable throughout the native sensitivity range (ISO 100-25,600), but I'd avoid the high expansion settings unless getting a shot is more important than its quality.

The A7R II's autofocus (AF) system is pretty good. It's capable of getting moving subjects sharp quickly, and can even follow them around the frame in fairly low light provided there's a reasonable level of contrast. When this drops, it can become rather ponderous. It's also hard to predict exactly where the focus will be

**Above** These particular lighting conditions pushed the Sony A7R II's autofocus system, but it still managed to deliver a sharp result with the FE 70-200mm f/4 G OSS lens mounted.

when using Lock-on AF. Although it does a good job of tracking a subject, in practice the precise point of focus may turn out to be slightly off where you want it to be. 📷



**“Noise levels are perfectly acceptable across the native sensitivities (ISO 100-25,600)”**

# CSC REVIEW

SONY ALPHA 7R II

113

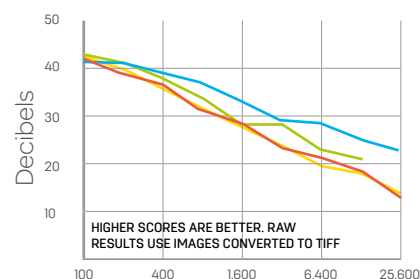
## COLOUR ERROR

Sony Alpha 7R II	3.6				
Sony Alpha 7R		8.8			
Canon 5DS	1.2				
Nikon D810	0.9				

SCORES CLOSER TO ZERO ARE BETTER

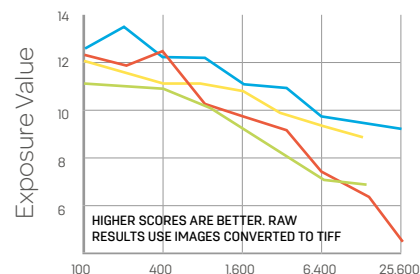
This indicates that the Alpha 7R II produces slightly less saturated images than the original version, but they are still a little more saturated than the images from the Canon and Nikon competition.

## RAW SIGNAL-TO-NOISE RATIO



The A7R II competes well with the Canon and Nikon cameras, and noise is kept well hidden for much of the sensitivity range. Its JPEGs have impressively high scores.

## RAW DYNAMIC RANGE



Dynamic range is down on the original A7R, but it still compares favourably with that of the Canon 5DS, indicating that it captures a wider range of tones in a single image.

## Digital Camera

### FEATURES



### BUILD QUALITY



### PERFORMANCE



### VALUE



**Overall** ★★★★★

**WE SAY:** Although it has a high pixel count and can record lots of detail, the Alpha 7R II needn't be limited to use on a tripod, and its autofocus system is capable of getting moving subjects sharp. It's also highly portable and customisable. Although Sony is working on it, the lens range is a little limited.



# Dedicated flashguns

Matthew Richards reveals the best powerful pieces of electronic wizardry

**T**he key to effective flash photography is striking the right balance between ambient and flash lighting. The flashguns we've tested in this group are all 'dedicated' to suit various makes of camera body, enabling TTL (Through The Lens) metering, which is a great starting point. Off-camera flash typically yields even better

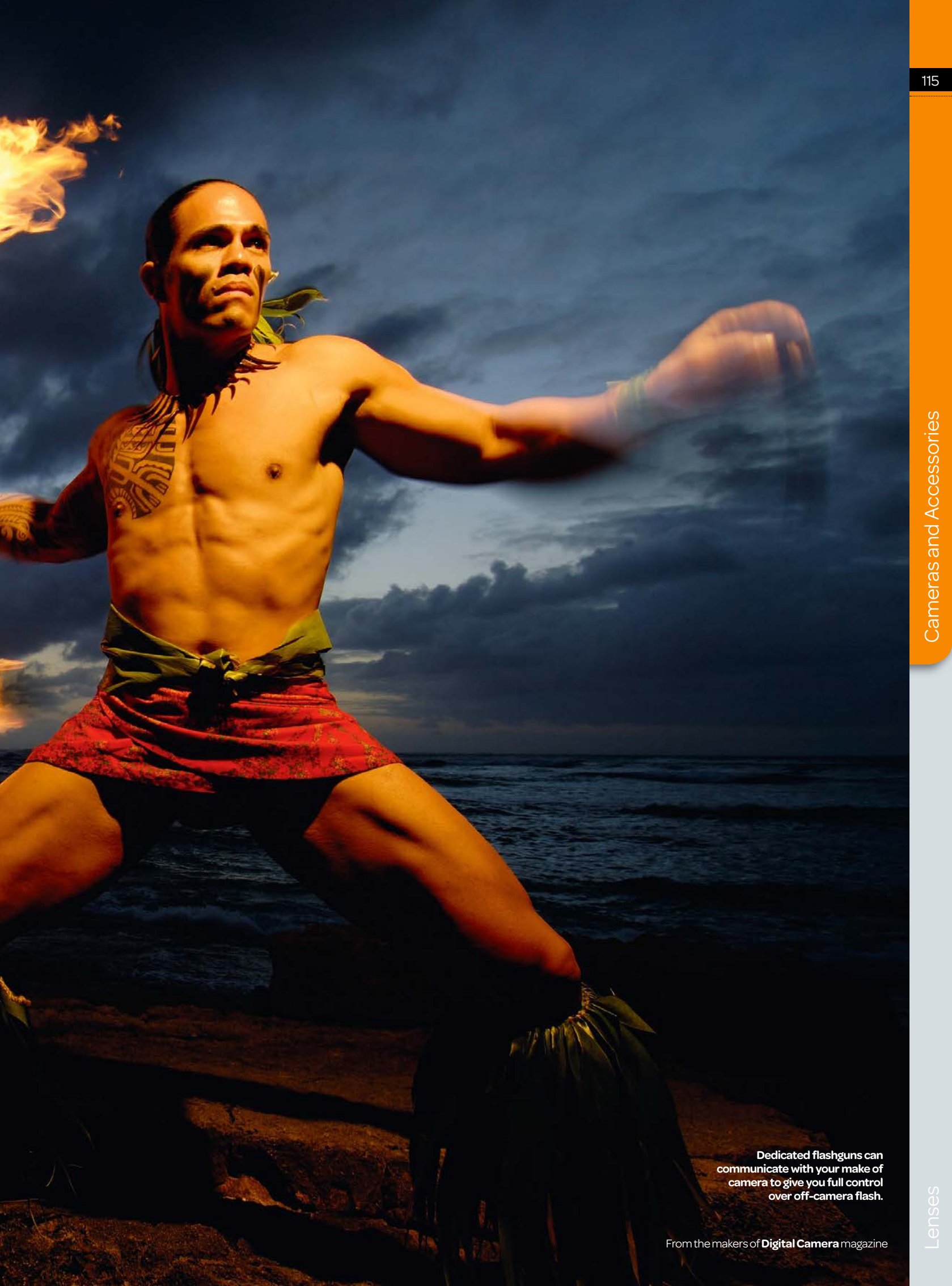
results, with images taking on a more 3D look. Wireless remote functions can be a big bonus, not just for multi-flash set-ups but also for ditching the more traditional curly off-camera cable. Modern flashguns also tend to include functions like high-speed sync, rear-curtain sync and maybe even programmable stroboscopic flash modes. Let's see what these flashes have to offer...

## THE CONTENDERS

- 1 Canon Speedlite 600EX-RT £450/\$500
- 2 Gloxy GX-F990 TTL £130/\$200
- 3 Metz 52 AF-1 Digital £180/\$300
- 4 Metz 64 AF-1 Digital £300/\$480
- 5 Nikon SB-700 Speedlight £230/\$325
- 6 Nikon SB-910 Speedlight £340/\$545
- 7 Nissin Di866 MKII Professional £200/\$350
- 8 Phottix Mitros+ TTL Transceiver £300/\$400







Dedicated flashguns can communicate with your make of camera to give you full control over off-camera flash.

From the makers of **Digital Camera** magazine



## ° Canon Speedlite 600EX-RT

### £450/\$500

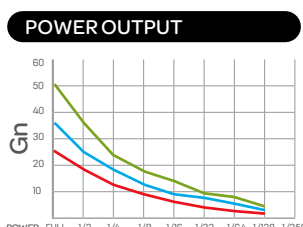
Canon's big, pro-grade gun

**C**anon's fully pro-grade flashgun is bursting with advanced features. The motorised zoom head stretches all the way from 20-200mm focal lengths, an extended bounce range reaches from -7 to 90°, and there's full 180° swivel to both left and right. There are full wireless master and slave modes, HSS, RC and programmable strobe modes and an input socket for powering from an external power pack.

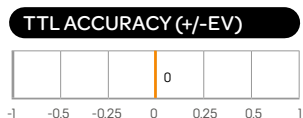
Context-sensitive buttons make for easy navigation of menus on the LCD panel, and RF (Radio Frequency) communication is available in addition to the more usual optical wireless link. This enables an extended range of up to 30m, and can work through obstacles or around corners. The new and less expensive 430EX III-RT also has this facility, but Canon couldn't get one to us in time for this test. We'll bring you a full review as soon as possible.

### PERFORMANCE

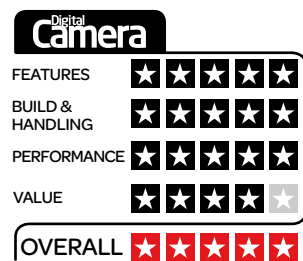
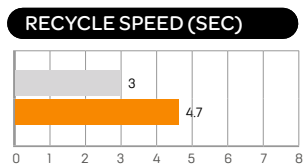
The TTL metering is highly accurate, there's plenty of power on tap and recycling speeds are fast, even when taking advantage of the full Gn 60 rated output.



TTL flash metering proved absolutely accurate and entirely consistent throughout all of our tests.



TTL flash metering proved absolutely accurate and entirely consistent throughout all of our tests.



## Gloxy GX-F990 TTL

### £130/\$200

Clever tricks at a knock-down price

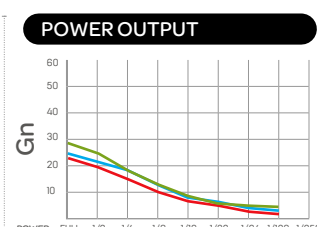
**T**he Gloxy is available in either Canon or Nikon editions, with a disarmingly inexpensive price tag. Despite this, it has a huge range of advanced features, including an 18-180mm motorised zoom head, HSS, RC and even a programmable stroboscopic mode, which is practically unheard of in such a 'budget' flashgun.

The usual remote mounting stand and pouch are included here, but in addition, the Gloxy adds a diffusion dome and a bonus set of colour filters.

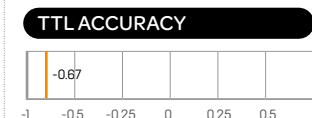
The maximum power rating of Gn 54 is pretty beefy, and the control panel is logical and easy to use. Build quality feels pretty good too. The only real disappointment is that there's no wireless master or slave mode. Instead, you get a rather basic optical slave mode, which only works with manual power settings rather than TTL flash metering.

### PERFORMANCE

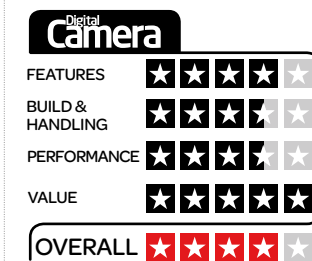
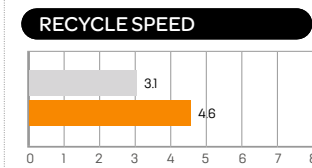
Recycle speeds are pretty brisk, even after a full-power flash but the maximum output is a little disappointing when you compare it with the claimed values, and its TTL accuracy could be better.



TTL flash consistently underexposed by about two thirds of a stop, calling for positive flash compensation.



TTL flash consistently underexposed by about two thirds of a stop, calling for positive flash compensation.







Canon Nikon Micro Four Thirds Pentax Sony

## Metz 52 AF-1 Digital

### £180/\$300

It feels good to the touch

**C**atering to a wide audience, this Metz flashgun is available in a variety of dedicated options to suit Canon, Nikon, Micro Four Thirds, Pentax and Sony cameras. It looks a very basic flashgun from the rear, but don't let that fool you. Instead of sprouting lots of buttons that could be hard to see or use in the dark, the Metz has a touchscreen. You can therefore simply poke your way around the flashgun's extensive menu.

Upmarket attractions include the usual bounce and swivel head with 24-105mm motorised zoom, a built-in wide-angle diffuser and reflector card, and HSS and RC flash functions. As a reasonably low-budget option, it lacks the Gloxy's programmable stroboscopic mode but adds full wireless master and slave functions, at least for most camera types. (Check the Metz website.)

### PERFORMANCE

As with the Gloxy, this Metz flashgun's maximum power doesn't quite live up to expectations, but this time TTL metering is generally a bit on the bright side. Recycling speeds are a little pedestrian.



Canon Nikon Micro Four Thirds Pentax Sony

## Metz 64 AF-1 Digital

### £300/\$480

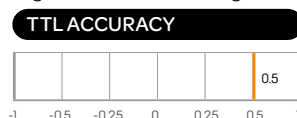
Premium build, pro-grade power

**A**vailable in the same range of dedication options as the Metz 52, the 64 AF-1 is Metz's new flagship flashgun. It has professional-level enticements including a mighty Gn 60 power rating, a 24-200mm motorised zoom range, -9 to 90° bounce and all the flash modes you could possibly want, including a programmable stroboscopic mode, readily available via an oversized colour touchscreen.

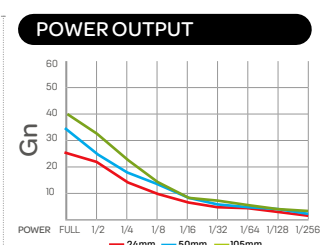
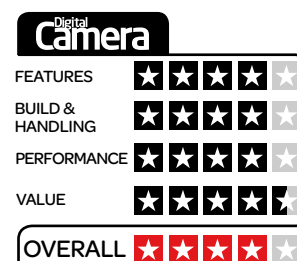
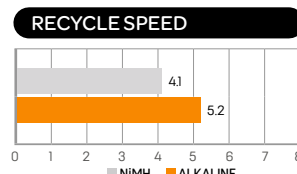
Other pro-level features include PC sync and power input sockets, the latter for attaching an optional power pack. Unlike others here, output can be adjusted down to 1/256 instead of 1/128, which can be helpful when using wide lens apertures at close range. An extra, matched only by the Nissin, is a secondary flash tube, which is great for adding a little direct flash when using the main flash head in bounce or swivel mode.

### PERFORMANCE

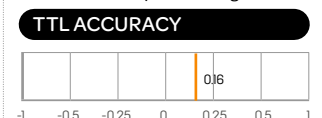
Recycling speeds are better than with the lower-powered Metz 52 (at least when using NiMH batteries) and TTL flash metering is more accurate, just very marginally on the bright side.



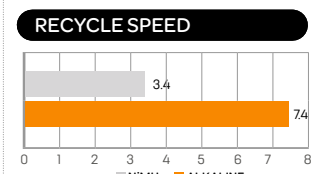
A little over-exuberant when it comes to TTL flash metering, the Metz tends to give overly bright results.



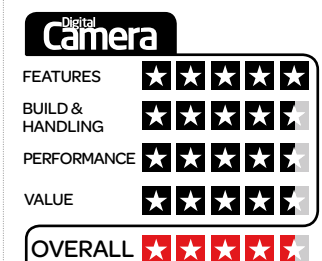
It's not quite as powerful as the Canon, but otherwise there's more power available here than from any other flashgun on test.



TTL metering is impressively consistent and reliable, although it tends to be marginally on the bright side.



It's quick with NiMH batteries, but you're in for a wait after a full-power flash if you use alkaline cells.





Nikon

## Nikon SB-700 Speedlight

### £230/\$325

Plentiful features and keen pricing

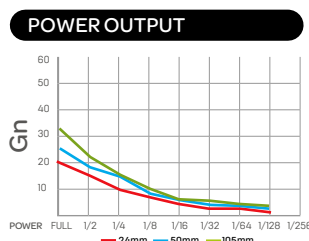
**O**wn-brand flashguns from some camera manufacturers often seem to cost over the odds, but this Nikon Speedlight looks pretty good value. It boasts -7 to 90° bounce, full 180° swivel in both directions, a 24-120mm motorised zoom and full wireless master and slave modes.

The usual wide-angle diffuser and reflector card are built into the head, and the flashgun is supplied with a diffusion dome and colour filters. Cleverly, the SB-700 automatically detects when the dome or filters are fitted.

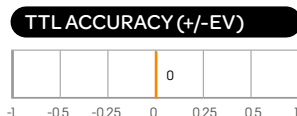
To activate Nikon's excellent TTL-BL (Balanced Light) mode, which aims for the best balance between flash and ambient lighting, you have to switch the host camera to spot metering mode. It seems crazy that you can't just select TTL-BL on the flashgun. There's also no programmable stroboscopic mode.

### PERFORMANCE

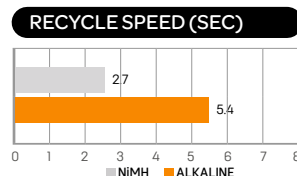
The TTL metering is unerringly accurate and the SB-700 punches well above its weight for maximum power output, matching the Metz 52 and beating the Nissin. Recycling speed is super-swift.



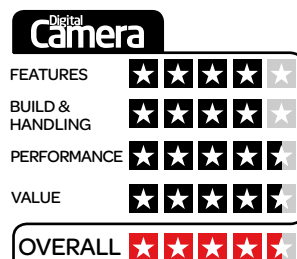
Nikon is modest in its claims for maximum flash power, but the SB-700 competes well against other flashguns on test.



SCORES CLOSER TO ZERO ARE BETTER  
Excellent accuracy and consistency are delivered by TTL flash metering, enabling reliable flash exposures.



When using NiMH batteries, the SB-700 turned in the fastest recycle speed of any flashgun on test.



Nikon

## Nikon SB-910 Speedlight

### £340/\$545

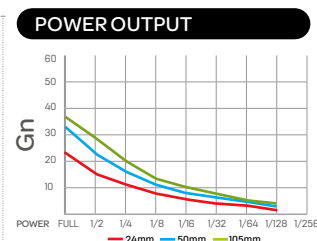
Nikon's range-topping flashgun

**N**ikon's top-flight flashgun includes all of the SB-700's wide-ranging features, like its three different illumination patterns (standard, even and centre-weighted), and a visual indicator on the LCD screen for flash tube temperature. It also comes with the same extras, including a diffusion dome and colour filters, plus auto-sensing for when they're attached to the gun.

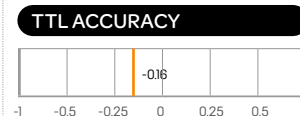
Pro-grade additions include a PC sync socket and a power input socket for an optional external battery pack, greater output power, and a programmable stroboscopic mode. The motorised zoom has a greater range of 24-200mm. The SB-910 is larger and heavier than the SB-700, but the standard of build quality feels very similar. The control panel uses a similar set of context-sensitive buttons to those in the Canon pro-grade flashgun.

### PERFORMANCE

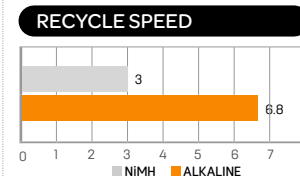
The tested maximum output power of the SB-910 proved only slightly higher than from the SB-700, and TTL accuracy is marginally worse. Recycling speed is also fractionally slower, but the extra features are nice to have.



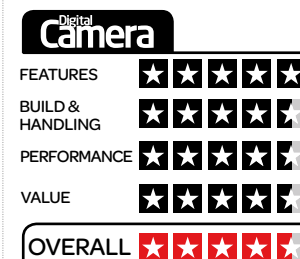
It's slightly more powerful than the SB-700, but falls far short of the competing Canon pro-level flashgun.



SCORES CLOSER TO ZERO ARE BETTER  
There's just a hint of under-exposure in TTL flash metering, with the SB-910 seeming to err on the side of caution.



The recycling speed after a full-power flash is quick, but it's not quite as fast as in the slightly lower-powered SB-700.







Canon Nikon Sony

## Nissin Di866 MKII Professional

### £200/\$350

Inexpensive for a 'pro' flashgun

**P**rofessional by name, the Nissin is mostly professional by nature as well. It has a full set of advanced flash modes including programmable stroboscopic output, sockets for PC sync and an external battery pack, good build quality, and some smart extras. For example, it's the only flashgun to equal the Metz 64 AF-1 by adding a secondary flash tube for direct fill flash when using bounce or swivel.

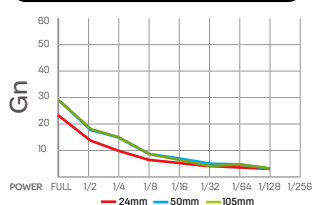
Another neat addition is a colour LCD screen around the back, complete with auto rotation of the display depending on whether you're shooting landscape or portrait orientation. Available in Canon, Nikon and Sony dedicated options, the Nissin also supports full wireless master/slave functions. The motorised zoom has a relatively limited 24-105mm range, but the Gn 60 maximum power rating looks impressive.

### PERFORMANCE

In our tests, the maximum power output and TTL flash accuracy were both disappointing, and the recycling speed is sluggish. The upmarket feature set looks great at the price, but performance is rather more average.

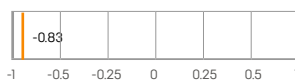


#### POWER OUTPUT



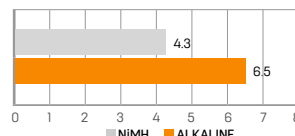
Despite a dazzling Gn 60 rating, the Nissin proved to be the joint-least powerful flashgun in the group, along with the Gloxy.

#### TTL ACCURACY



SCORES CLOSER TO ZERO ARE BETTER  
Significant underexposure is the norm for TTL metering in the Nissin, usually by nearly a full f/stop.

#### RECYCLE SPEED



When loaded with NiMH batteries, recycling speed after a full-power flash is the slowest in the group.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★

OVERALL ★★★★★



Canon Nikon Sony

## Phottix Mitros+ TTL Transceiver

### £300/\$400

Good on- and off-camera

**T**here's plenty to get excited about in this flashgun. Its high-end feature set offers a range of modes, including programmable stroboscopic. Build quality's excellent, pro-grade additions include PC sync and external power sockets, and the flashgun comes complete with a diffusion dome. The 24-105mm zoom range isn't generous, but bounce and swivel adjustments run from -7 to 90° and 180° to left and right.

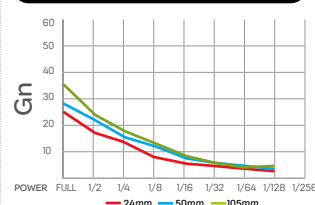
Wireless connectivity gets a real boost with the inclusion of a built-in RF (Radio Frequency) transceiver. The flashgun boasts advanced wireless functions, both as an on-camera controller and for off-camera flash, triggered by Phottix Odin or Strato triggers. The control panel is easy to use, and the four-way pad is intuitive.

### PERFORMANCE

The Phottix may be one of the most powerful flashguns here, but its TTL accuracy was poor in our tests, with a tendency to overexposure. We found it best to permanently apply negative flash exposure compensation. Apart from that caveat, though, overall performance is very good.

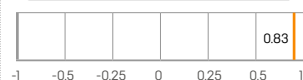


#### POWER OUTPUT



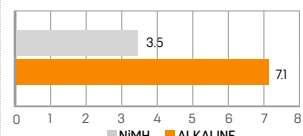
It's beaten by the Canon and the Metz 64 AF-1 for maximum power output, but manages to equal the Nikon SB-910.

#### TTL ACCURACY



SCORES CLOSER TO ZERO ARE BETTER  
Nearly a full f/stop of overexposure is the norm for the TTL flash metering, so it pays to dial in some negative compensation.

#### RECYCLE SPEED



Recycling speeds are about average when using NiMH batteries, but it's slower than most if you switch to alkaline.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★

OVERALL ★★★★★

THE DIGITAL CAMERA VERDICT

CANON COMES OUT ON TOP

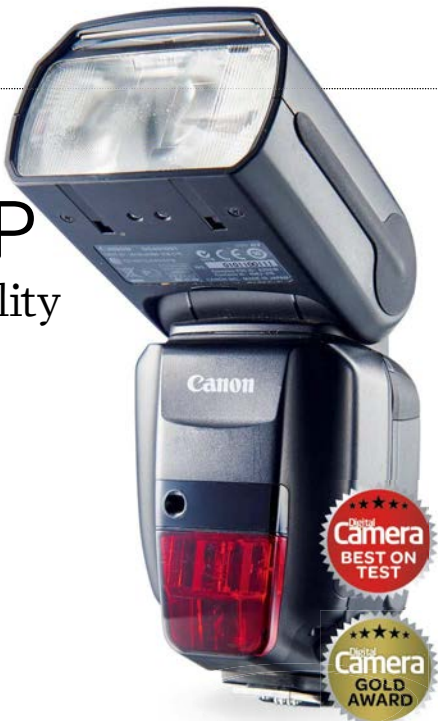
The Canon 600EX-RT wins out for power and versatility

The pro-grade Canon 600EX-RT is the most powerful flashgun in the group, with faultless TTL accuracy and super-fast recycling speeds. In comparison, Nikon's pro-oriented SB-910 proved lacking in power, although the SB-700 and it are both good value for money.

Combining generous power and top-end features with touch-sensitive ease of use, the Metz 64 AF-1 is a fabulous flashgun that, in the UK at least, is competitively priced. The addition of a sub-flash tube is great for direct fill-flash in bounce or swivel mode. The Nissin

also sports this feature but is less powerful, and lacks the Metz's TTL accuracy and recycling speed. Metz's more basic and less expensive 52 AF-1 is also good value.

The Phottix flashgun is powerful, well-built and worth considering if you want to make use of RF triggering for multi-flashgun set-ups. Meanwhile, the Gloxy is the cheapest flashgun here, and also the best value. It includes an impressive array of features and advanced flash modes, but only has a basic optical slave mode rather than 'proper' wireless master/slave connectivity.



HOW THE FLASHGUNS COMPARE								
	Canon Speedlite 600EX-RT	Gloxy GX-F990 TTL	Metz Mecablitz 52 AF-1	Metz Mecablitz 64 AF-1	Nikon Speedlight SB-700	Nikon Speedlight SB-910	Nissin Di866 Mk II Professional	Phottix Mitros+ TTL Transceiver
Website	www.canon.co.uk	www.photo24.co.uk	www.metzflash.co.uk		www.nikon.co.uk		www.nissindigital.com	www.phottix.co.uk
Target price	£450/\$500	£130/\$200	£180/\$300	£300/\$480	£230/\$325	£340/\$545	£200/\$350	£300/\$400
Dedication	C	C N	C N MFT P S	C N MFT P S	N	N	C N S	C N S
Max claimed Gn (ISO 100, metres)	Gn 60	Gn 54	Gn 52	Gn 64	Gn 38	Gn 54	Gn 60	Gn 58
Bounce (degrees)	-7 to 90 degrees	-7 to 90 degrees	0 to 90 degrees	-9 to 90 degrees	-7 to 90 degrees	-7 to 90 degrees	0 to 90 degrees	-7 to 90 degrees
Swivel (left/right)	180/180	180/180	180/120	180/120	180/180	180/180	90/180	180/180
Zoom range (auto)	20-200mm	18-180mm	24-105mm	24-200mm	24-120mm	17-200mm	24-105mm	24-105mm
Wide-angle diffuser	14mm	14mm	12mm	12mm	12mm	14mm	18mm	14mm
Reflector card	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flash exposure compensation	+/-3EV	+/-3EV	+/-3EV	+/-3EV	+/-3EV	+/-3EV	+/-3EV	+/-3EV
Manual power settings	1/1 to 1/128	1/1 to 1/128	1/1 to 1/128	1/1 to 1/256	1/1 to 1/128	1/1 to 1/128	1/1 to 1/128	1/1 to 1/128
AF-assist beam	Red lamp	Red lamp	Red lamp	Red lamp	Red lamp	Red lamp	Red lamp	Red lamp
Secondary lamp	No	No	No	Sub-flash	No	No	Sub-flash	No
Wireless master/slave	Master/Slave RF	Optical slave only	Master/Slave*	Master/Slave	Master/Slave	Master/Slave	Master/Slave	Master/Slave RF
Extra flash modes	HSS, RC, Strobe	HSS, RC, Strobe	HSS, RC	HSS, RC, Strobe	HSS, RC	HSS, RC, Strobe	HSS, RC, Strobe	HSS, RC, Strobe
TTL flash exp error	0EV	-0.67EV	+0.5EV	+0.16EV	0EV	-0.16EV	-0.83EV	+0.83EV
Full-power recycle (NiMH/alkaline)	3.0/4.7 sec	3.1/4.6 sec	4.1/5.2 sec	3.4/7.4 sec	2.7/5.4 sec	3.0/6.8 sec	4.3/6.5 sec	3.5/7.1 sec
Flash info LCD	Yes	Yes	Yes (touchscreen)	Yes (colour/touch)	Yes	Yes	Yes (colour)	Yes
Supplied accessories	Pouch, foot, filters	Pouch, foot, dome, filters	Pouch, foot	Pouch, foot	Pouch, foot, dome, filters	Pouch, foot, dome, filters	Pouch, foot	Pouch, foot, dome
Dimensions (W x H x D)	80 x 143 x 125mm	75 x 148 x 105mm	73 x 134 x 90mm	78 x 148 x 112mm	71 x 126 x 105mm	79 x 145 x 113mm	74 x 139 x 113mm	78 x 147 x 103mm
*varies with fit option								
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD & HANDLING	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
PERFORMANCE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★



# Flashgun modifiers

Give your strobe a little help and make it really shine



## BounceLite

Web: [www.bouncelite.com](http://www.bouncelite.com)

Price: £100

One of the easiest ways to get softer illumination from your flashgun is to bounce light off a white ceiling or wall. You can't always do that, though – so the BounceLite aims to recreate the same effect, wherever you're shooting.

OVERALL



## Enlight Orbis

Web: [www.enlightphotopro.com](http://www.enlightphotopro.com)

Price: £149/\$199

Dedicated ring flashes are pricey, but the Orbis creates the same effect from your flashgun, funnelling its burst into a ring of light surrounding your camera lens. The end result may be an unwieldy set-up, but the quality of light it produces is worth it.

OVERALL



## Hähnel Universal Flash Accessory Kit

Web: [www.hahnel.ie](http://www.hahnel.ie) Price: £50/\$80

Despite this being the cheapest option here, you get a lot to play with, including a compact softbox, a roll-up snoot and a honeycomb grid. While the kit can indulge your creativity, the softbox isn't all that effective and the honeycomb is basic.

OVERALL



## Light Blaster

Web: [www.inspiredphotogear.com](http://www.inspiredphotogear.com)

Price: £75/\$125

Want to liven up your portraiture with beautiful backdrops? Just slot the Light Blaster onto your flashgun and it'll project any pattern, image or scene from a 35mm slide onto a plain surface. You can mount a Canon lens on the front to control the focus and spread of the projection, too.

OVERALL



## Rogue FlashBender 2 Portable Lighting Kit

Web: [www.rogueflash.com](http://www.rogueflash.com)

Price: £150/\$200

This revised version of the FlashBender kit includes large and small reflector panels that fix to your flashgun with a more secure strap. They're easy to bend into shape and will even roll into a snoot, plus you get diffusion sheets, a grid and 20 gel inserts.

OVERALL



## Roundflash Ring

Web: [www.inspiredphotogear.com](http://www.inspiredphotogear.com)

Price: £66/\$111

At 45cm wide, the Roundflash is twice the diameter of the Orbis, but it's 30% lighter and folds smaller. With a pop-up design, set-up is easy, although there isn't much room to access zoom or focus rings. While the light is reduced by three stops, the pay-off is incredibly soft illumination.

OVERALL



# Camera backpacks

Carry all your camera gear and more in complete comfort and in any weather

Cameras and Accessories



1

## Case Logic Kontrast Pro DSLR Backpack

Price: £129/\$150  
Web: [www.casellogic.com](http://www.casellogic.com)

This may be the cheapest backpack here, but it'll rival bags costing twice the price. There's space inside for a full-frame body with an attached 70-200mm lens, and up to eight lenses or accessories can slot in on either side. At the back is a partition large enough for a 15in laptop, with a subsection that'll house a 10.1in tablet. Tripod-mounting points on either side complete the load-lugging abilities.

Although none of the bags here offer true on-the-go access, the Kontrast's top-loading camera compartment at least lets you get at your camera without revealing the rest of your gear. Thick back padding keeps you comfortable, while semi-rigid internal dividers protect your kit. There's even a tough plastic base for extra stability and waterproofing.

OVERALL

★★★★★



2

## Ikigai Rival with Camera Cell Medium

Price: £230/\$300  
Web: <http://uk.ikigaibags.com>

The Rival gives you two bags in one. Its removable camera compartment cell enables you to instantly transform the main bag into a regular daypack. This self-contained, pull-out module will house a full-frame body and a hefty attached lens, plus six more lenses alongside. The cell itself is well-padded, as is the main backpack and its sculpted back panel. This also doubles as the primary access point, providing better security than a front-facing flap, and it contains individual laptop and tablet compartments.

However, while the bag-in-a-bag design is great for gear protection, it restricts internal space and adds weight. We're not fans of the awkward tripod-mounting system either, but at least you get a separate rain cover.

OVERALL

★★★★★



3

## Lowepro Whistler BP 350 AW

Price: £257/\$350  
Web: [www.lowepro.com](http://www.lowepro.com)

Like the Ikigai Rival, this features a removable camera compartment with a similar amount of space, along with the burden of extra weight. But Lowepro's version compensates with ridged outer panels, which offer good protection when the cell is removed from the main bag. The latter ditches additional padding to save space and weight, but packs a ridged frame like a true hiking backpack.

Entry is via a rear flap, which is hinged halfway down to allow partial access. You'll find a laptop slot round the front, while each side can hold a tripod. But the Whistler's big selling point is its go-anywhere ability. Wide, supple straps provide exceptional prolonged comfort, and top-quality materials will shrug off abuse from Mother Nature.

OVERALL

★★★★★

Lenses



## WHY YOU SHOULD HAVE A BACKPACK

Once you've built up a decent camera kit, carting it all about can fast become a pain in the neck. A camera backpack lightens a heavy load – and you'll get more space to boot. Most of these bags can

accommodate a full-frame camera with a sizable telephoto lens attached, along with a complete complement of extra optics and accessories. Also expect at least one tripod holder.



4

### Manfrotto Pro Light Bumblebee-220 PL

Price: £190/\$260  
Web: [www.manfrotto.co.uk](http://www.manfrotto.co.uk)

Here's an ex-Kata design that used to sport the brand's black-and-yellow look, hence the Bumblebee name. The Pro Light bit is just as confusing, though: at nearly 3kg, this backpack is far from a featherweight.

It's not as if the bulk can be justified by the removable camera compartment in some other design, either. But you get a pair of lift-out lens pods that will house four lenses apiece; between these are two thickly padded dividers to keep your camera and large attached lens cosy. A huge laptop slot is concealed at the back, with smaller front and side pockets taking care of accessories.

The unusual rubberised shoulder straps are supple, if not especially comfortable, although the excellent hip belt will take most of the bag's weight.

OVERALL



5

### Tamrac Anvil 23

Price: £240/\$290  
Web: [www.tamrac.com](http://www.tamrac.com)

If this bag is anything, it's a mixed bag. Externally there are all the trimmings of a quality product, with wide, well-padded straps, an equally supportive hip belt and super-thick back padding. The front access flap is covered in useful pockets on either side, and it also contains sizeable laptop and tablet slots. However, being on the front of the bag, their weight isn't best placed for optimal load carrying comfort.

The main compartment can hold a large SLR and attached lens, along with plenty of extra optics and accessories. But they won't be as well-protected as in the other bags on test, as some of the internal dividers feel thin and weak. Worse still is the base, which hardly feels padded at all. These weaknesses make the price seem disproportionately high.

OVERALL



6

### Tenba Shootout Backpack LE Medium

Price: £159/\$200  
Web: [www.tenba.com/uk](http://www.tenba.com/uk)

There isn't much that'll wow you with the Shootout backpack. It may not have any especially funky features, but Tenba has nailed the essentials. The main compartment is spacious enough to swallow a full-frame body, attached lens and eight surrounding alternatives. Decent padding should keep everything safe from rough and tumble, and the bag's base gets a tough plastic coating for added scuff resistance. Weather protection is good, too, with quality self-sealing zips, a water-resistant nylon outer shell and a rain cover.

It's a comfortable companion thanks to having the softest straps on test, along with an equally comfy back panel. Right behind this you'll find a slot for a 15in laptop, although the front tripod carrier add-on isn't so convenient.

OVERALL





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161



153  
134







146

# LENSES

**126 Group Test:**  
**50mm primes**

Lenses that are ideal for portraits

**133 Nikon 16-80mm**  
A versatile new zoom lens

**134 Group Test:**  
**Superzooms**  
Get closer to the action

**146 Group Test:**  
**Macro primes**  
Lenses made for perfect close-ups

**153 Sigma 24-35mm**  
Like three primes in one

**154 Group Test:**  
**Supertelephoto zooms**  
Get even closer to the action

**161 Sigma 24mm f/1.4**  
This wide-angle prime  
delivers exceptional image quality



153



126



# Standard primes

Matthew Richards picks out the best fixed-focal-length lens buys

**S**tandard prime lenses come in all shapes and sizes nowadays, from teeny pancake optics to huge chunks of fast glass. Prices vary considerably too, ranging from super-cheap 'nifty fifties' to lenses like the Zeiss 55mm f/1.4 Otus at £2,700/\$4,000.

For this group test, we've chosen a selection of standard primes that aim for upmarket

build and performance, without costing silly money.

Despite the convenience of zoom lenses, a standard prime continues to be popular. Image quality is the main attraction, with the promise of minimal distortion or colour fringing, plus excellent sharpness at mid-range apertures. The widest available aperture is usually rather larger than with most zoom lenses, enabling a tight depth of field.

## THE CONTENDERS

- 1 Canon EF 35mm f/2 IS USM £400/\$600
- 2 Canon EF 50mm f/1.4 USM £245/\$350
- 3 Fujifilm Fujinon XF35mm f/1.4 R £380/\$600
- 4 Nikon AF-S DX 35mm f/1.8 £140/\$200
- 5 Nikon AF-S 50mm f/1.4G £275/\$425
- 6 Panasonic 25mm f/1.4 Leica DG £430/\$600
- 7 Sigma 30mm f/1.4 DC HSM | A £370/\$500
- 8 Sigma 50mm f/1.4 DG HSM | A £670/\$950





A DIGITAL



Full-frame Canon EF



Full-frame Canon EF

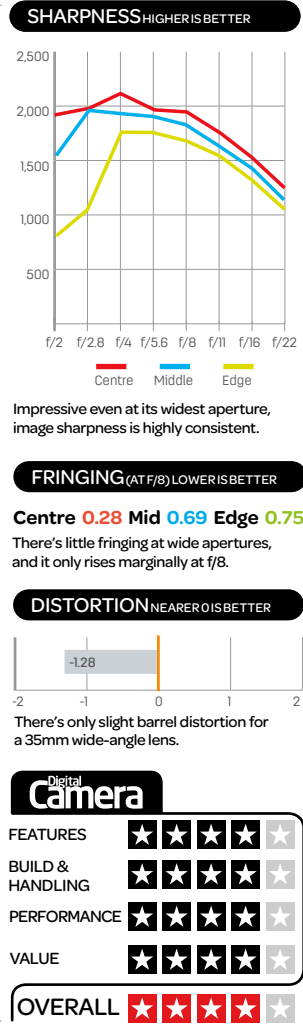
◦ **Canon EF 35mm f/2 IS USM**  
**£400/\$600**  
Ssssh... It's really a wide-angle

**A**mazingly, despite Canon being one of the leading manufacturers of APS-C format digital SLRs since the turn of the century, the company has never made a standard prime EF-S lens. This full-frame compatible optic is arguably the best own-brand alternative, giving an effective focal length of 56mm. It's rather larger and heavier than the Fujinon, Nikon and Sigma APS-C-specific lenses in the group but, at 78 x 63mm and 335g, it's still easily manageable.

A bigger issue is that while most other lenses on test stretch to an aperture of f/1.4, the Canon is a full f/stop slower at f/2. On the plus side, it's the only one that features image stabilisation.

**PERFORMANCE**

One of the pricier lenses in the group, this Canon's upmarket build is matched by impressive performance. Its ring-type ultrasonic autofocus is speedy and very quiet, the image stabiliser lives up to its four-stop claims, and the central region of the excellent full-frame image quality is cherry-picked on APC-S bodies. However, it loses out at enabling a really tight depth of field.



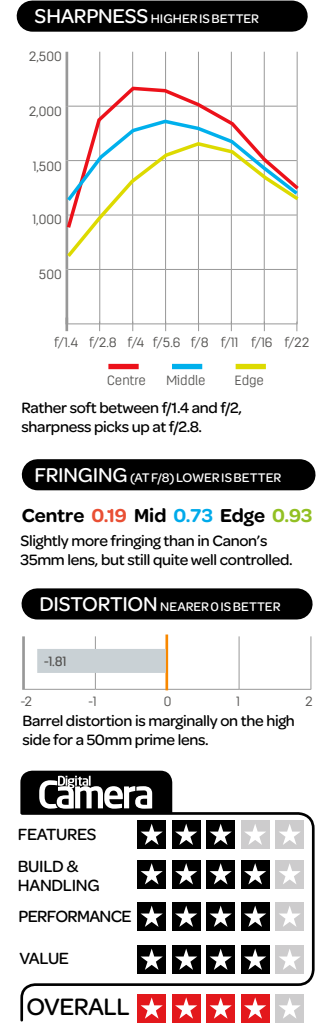
**Canon EF 50mm f/1.4 USM**  
**£245/\$350**  
A popular mainstream option

**M**ore exotic than Canon's inexpensive 50mm f/1.8 lenses but much cheaper than the company's £1,000/\$1,450 f/1.2L lens, this one looks an attractive compromise, at least at first glance. It's quite a simple design, with the fewest optical elements of any lens in the group, numbering seven in total. It's smaller and more lightweight than the Canon 35mm, yet boasts a wider maximum aperture of f/1.4.

It's also little more than half the price of the Canon 35mm lens, although the relatively old design lacks image stabilisation or ring-type ultrasonic autofocus. Instead, there's a more basic ultrasonic motor, but it manages a decent turn of speed and, unusually for this type of system, features full-time manual override.

**PERFORMANCE**

Sharpness at f/1.4 is uninspiring at the centre of the frame, as well as towards the edges and corners, although centre-sharpness improves dramatically between f/2.8 and f/11. Surprisingly, when tested on the same full-frame 5D Mk III body, this lens showed slightly more barrel distortion than Canon's 35mm optic.







APS-C Fujifilm X-Series

## Fujifilm Fujinon XF 35mm f/1.4 R

£380/\$600

High tech meets retro chic

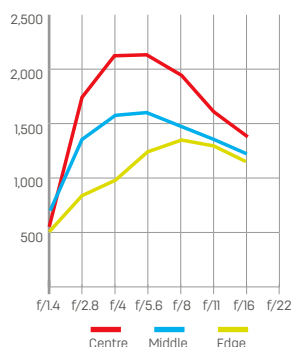
**M**anufactured exclusively for Fujifilm's range of retro-looking X series cameras, this lens has an effective focal length of 52.5mm and an upmarket build that includes a metal rather than plastic barrel. Adding retro charm, there's an aperture ring with one-third f/ stop click stops, behind a high-tech fly-by-wire manual focus ring.

Despite its high-precision, quality build, the Fujinon is the lightest lens in the group at just 187g, and it's very compact too. Indeed, it's only 2mm wider and the same length as the Panasonic 25mm Micro Four Thirds lens, at 65 x 55mm, although the 52mm filter thread is larger than the Panasonic's 46mm. The lens has no focus distance scale and the inner lens barrel extends at shorter focus distances but doesn't rotate, easing the use of filters.

### PERFORMANCE

Autofocus is a little noisier than expected, but fairly quick. The manual focus ring feels a bit stiff and jerky when making fine adjustments. Image quality is pretty good overall, but let down by poor sharpness at apertures wider than f/2.8.

#### SHARPNESS HIGHER IS BETTER



#### FRINGING (AT F/8) LOWER IS BETTER

**Centre 0.12 Mid 0.9 Edge 1.37**  
There's more colour fringing in edges and corners than from most competing lenses.

#### DISTORTION NEARER 0 IS BETTER



#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



APS-C Nikon DX

## Nikon AF-S DX 35mm f/1.8

£140/\$200

Cut-price special for DX bodies

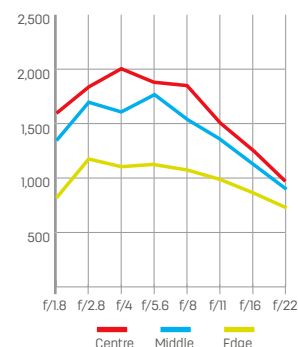
**N**ikon produces a standard prime lens for its DX (APS-C) bodies. Naturally, some DX bodies are priced for beginners, and this lens follows suit as a relatively low-cost item. Unlike the pricier Nikon 50mm and both Canon lenses in the group, it lacks a focus distance scale, and the build quality feels a little downmarket. It's small and lightweight at 70 x 53mm and 200g but, under the plastic skin, there are some appealing features.

Unlike the Canon 50mm lens, this one has ring-type rather than motor-driven ultrasonic autofocus, which moves the rear group of elements. The mounting plate also has a rubber weather-seal ring around it, as featured on the more upmarket Nikon 50mm but none of the other lenses in this group.

### PERFORMANCE

Unlike many ring-type ultrasonic systems, autofocus isn't very fast but at least it's whisper-quiet. Image quality is a bit of a mixed bag, with slightly disappointing corner sharpness and more noticeable colour fringing than from other lenses on test – most of which also have a wider maximum aperture than f/1.8.

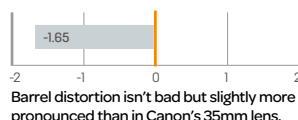
#### SHARPNESS HIGHER IS BETTER



#### FRINGING (AT F/8) LOWER IS BETTER

**Centre 0.37 Mid 1 Edge 2.12**  
Scores for colour fringing are the worst of any lens in the group.

#### DISTORTION NEARER 0 IS BETTER



#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★

A DIGITAL CAMERA SPECIAL



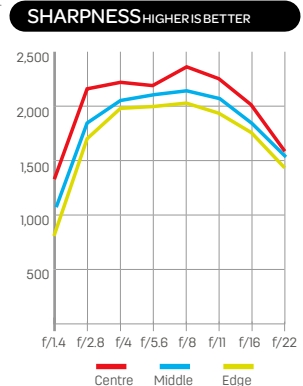
Full-frame Nikon FX

◦ **Nikon AF-S 50mm f/1.4G**  
**£275/\$425**  
Very good quality, stand-out value

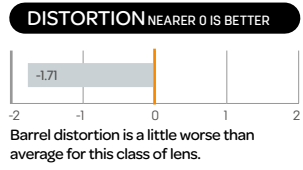
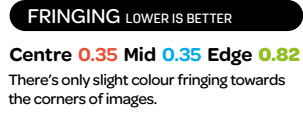
**N**ikon's full-frame compatible 50mm f/1.4 is almost identical to Canon's equivalent lens in size and weight, but feels a little more refined. It has ring-type rather than motor-driven ultrasonic autofocus, as also featured in Nikon's 35mm DX lens. The front group of elements moves during focusing, but the front element doesn't rotate. While the deeply recessed front element draws nearer the front of the lens at shorter focus distances, the overall physical length remains fixed.

There's a rubber weather-seal, rubber on the mounting plate and, unlike the cheaper Nikon 35mm, Fujinon and Panasonic lenses in the test, this has a focus distance scale. The nine-blade diaphragm also gives a well-rounded aperture, whereas the Canon 50mm and Nikon 35mm lenses have eight and seven blades respectively.

**PERFORMANCE**  
Sharpness is excellent through most of the aperture range – and noticeably better than from the Canon 50mm at f/1.4. Its autofocus system isn't fantastically fast, but it's just a little quicker than the system in the Nikon 35mm lens.



It drops off at f/1.4 but image quality is impressively sharp from f/1.8 to f/16.



**Digital Camera**

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



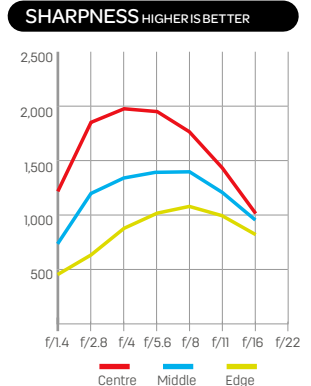
Micro Four Thirds Micro Four Thirds

**Panasonic 25mm f/1.4 Leica DG**  
**£430/\$600**  
As good as it gets for MFT

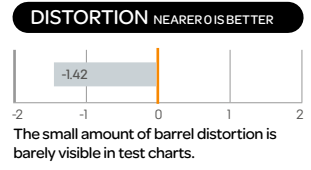
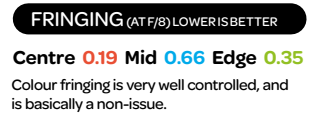
**W**e've rated this lens very highly in the past: it took second place in issue 153's group test of compact system camera lenses, behind Panasonic's own 42.5mm sister lens. There's more of a struggle to match the quality of full-frame and APS-C format SLR lenses, but this Leica-badged optic is nevertheless beautifully put together.

Highlights include a UHR (Ultra High Refractive) element and Nano Surface Coating to boost image quality. The stepping motor autofocus system is virtually silent, as well as enabling precise fly-by-wire manual focusing via a large and blissfully smooth focus ring. In other respects, however, the Panasonic looks quite a bare-bones affair, lacking any buttons, switches or a focus distance scale.

**PERFORMANCE**  
Centre-sharpness through the mid aperture range isn't quite as good as from most lenses in the group, and it drops off a little more at f/1.4. Edge sharpness is also comparatively disappointing until you stop the lens down to f/5.6. However, image quality is very pleasing in all other respects.



It's a little disappointing at wide apertures, especially towards the edges and corners.



**Digital Camera**

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★





APS-C Canon EF Pentax K Nikon DX Sigma SA Sony A

## Sigma 30mm f/1.4 DC HSM | A

### £370/\$500

It's an APS-C art class

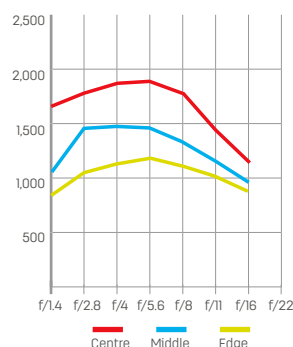
**W**e've been impressed with Sigma's Art lenses, and it's nice to know they're not exclusively made for full-frame cameras. This one is specifically designed for Canon, Nikon and Sigma bodies with APS-C format image sensors. As such, it's much smaller and lighter than Sigma's 50mm Art lens for full-frame cameras, although it's still noticeably larger and more than twice the weight of Nikon's DX format 35mm f/1.8 lens, at 74 x 63mm and 435g.

Features include ring-type ultrasonic autofocus, with a fully internal focusing system driving the rear group of elements, and a focus distance scale mounted beneath a viewing window. It's also compatible with Sigma's optional USB Dock for firmware upgrades, optimisation and customisation.

### PERFORMANCE

Handling is excellent, but autofocus isn't massively fast. Image quality is good, but nowhere near that of Sigma's full-frame 50mm lens. It beats the Canon and Nikon 35mm lenses in the group by having a wider f/1.4 aperture, which enables a tighter depth of field and faster shutter speeds.

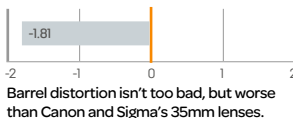
#### SHARPNESS HIGHER IS BETTER



#### FRINGING (AT F/8) LOWER IS BETTER

**Centre 0.19 Mid 1.3 Edge 1.59**  
Colour fringing is more noticeable than with most other lenses in the group.

#### DISTORTION NEARER 0 IS BETTER



#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★

OVERALL ★★★★★



Full-frame Canon EF Nikon FX Sigma SA Sony A

## Sigma 50mm f/1.4 DG HSM | A

### £670/\$950

Let's unleash the beast

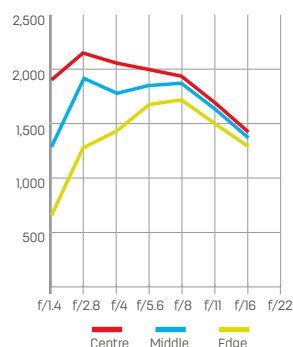
**M**easuring 85 x 100mm, this Sigma 50mm Art lens is simply massive for a standard prime, even taking its full-frame compatibility into account. It dwarfs the Canon and Nikon 50mm f/1.4 lenses and is nearly three times heavier at 815g. A plus side of the wide-diameter front element is that vignetting is remarkably low, even at the widest aperture of f/1.4.

Build quality feels superb and the relatively complex design is based on 13 elements in eight groups, which is much more than usual for a standard prime, especially one without optical stabilisation. Similarities to the Sigma 30mm include compatibility with Sigma's USB Dock and the use of TSC (Thermally Stable Composite) in the construction to retain utmost fidelity during temperature changes.

### PERFORMANCE

What sets this lens apart from all others in the group is that levels of sharpness remain astonishing even at the widest aperture of f/1.4, right across the whole image frame from corner to corner. Image quality and overall performance are equally impressive in all other respects.

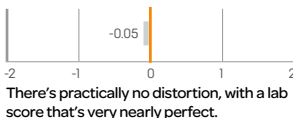
#### SHARPNESS HIGHER IS BETTER



#### FRINGING (AT F/8) LOWER IS BETTER

**Centre 0.28 Mid 0.19 Edge 0.97**  
Colour fringing is so well controlled that it's practically impossible to spot.

#### DISTORTION NEARER 0 IS BETTER



#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★

OVERALL ★★★★★



THE DIGITAL CAMERA VERDICT

SOMETIMES BIGGER REALLY IS BETTER

Sigma's mighty 50mm f/1.4 DG HSM | A is top dog

Not just one of the best Sigma lenses we've seen, but one of *the* best lenses we've tested in recent years, the 50mm f/1.4 DG HSM | A is simply unbeatable on Canon, Nikon and Sony bodies. It works brilliantly as a standard prime on full-frame bodies, and as a portrait lens on APS-C format cameras. Our only criticism is that it's big and heavy for a standard prime. However, the oversized front element enables excellent peripheral illumination in images.

The Nikon AF-S 50mm f/1.4G is the second-best performer here, and it's excellent value for money. The equivalent Canon 50mm isn't as impressive, although the Canon 35mm makes a good standard lens for APS-C format bodies with the bonus of image stabilisation,

albeit with a 'slower' f/2 widest aperture. It's an altogether better lens than the Nikon AF-S DX 35mm and, while the Canon is bigger, it's compatible with full-frame bodies, so will make an excellent wide-angle prime. The Sigma 30mm APS-C specific lens is a little lacklustre compared with the Sigma 50mm, but it's still a good choice for Canon and Nikon APS-C format SLRs.

Image quality from the Fujinon XF 35mm f/1.4R is a little disappointing, mostly in wide-aperture sharpness across the whole frame, while corner-sharpness remains poor until you hit f/5.6. It's still a good choice for Fujifilm X-mount cameras. For Micro Four Thirds bodies, look no further than the Panasonic 25mm f/1.4 Leica DG. 



HOW THE LENSES COMPARE								
	Canon EF 35mm f/2 IS USM	Canon EF 50mm f/1.4 USM	Fujifilm XF 35mm f/1.4 R	Nikon AF-S DX 35mm f/1.8	Nikon AF-S 50mm f/1.4G	Panasonic 25mm f/1.4 Leica DG	Sigma 30mm f/1.4 DC HSM   A	Sigma 50mm f/1.4 DG HSM   A
Contact	www.canon.co.uk		www.fujifilm.co.uk	www.nikon.co.uk		www.panasonic.co.uk	www.sigma-imaging-uk.com	
Street price	£400/\$600	£245/\$350	£380/\$600	£140/\$200	£275/\$425	£430/\$600	£370/\$500	£670/\$950
Mount options	EF	EF	X	DX	FX	MFT	EF DX K SA A	EF FX SA A
Full-frame compatible	Yes	Yes	No	No	Yes	No	Yes	Yes
Elements/Groups	10/8	7/6	8/6	8/6	8/7	9/7	9/8	13/8
Diaphragm blades	8 blades	8 blades	7 blades	7 blades	9 blades	7 blades	9 blades	9 blades
Autofocus type	Ultrasonic (ring)	Ultrasonic (motor)	Stepping motor	Ultrasonic (ring)	Ultrasonic (ring)	Stepping motor	Ultrasonic (ring)	Ultrasonic (ring)
Manual AF override	Full-time	Full-time	Electronic	Full-time	Full-time	Electronic	Full-time	Full-time
Internal focusing	Yes	No	No	Yes	No	Yes	Yes	Yes
Min focus distance	0.24m	0.45m	0.28m	0.3m	0.45m	0.3m	0.3m	0.4m
Max magnification factor	0.24x	0.15x	0.17x	0.16x	0.15x	0.11x	No	0.18x
Image stabiliser	54 degrees (FF)	46 degrees	None	44 degrees (DX)	46 degrees (FX, 31 DX)	47 degrees (MFT)	50 degrees (APS-C)	47 degrees
Filter size	67mm	58mm	52mm	52mm	58mm	46mm	62mm	77mm
Included accessories	None	None	Hood	Hood, pouch	Hood, pouch	Hood	Hood, soft case	Hood, soft case
Dimensions (DxL)	78 x 63mm	74 x 51mm	65 x 55mm	70 x 53mm	74 x 54mm	63 x 55mm	74 x 63mm	85 x 100mm
Weight	335g	290g	187g	200g	280g	200g	435g	815g
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD & HANDLING	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
PERFORMANCE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

KEY: EF Canon X Fujifilm X-Series DX Nikon DX FX Nikon FX MFT Micro Four Thirds K Pentax K SA Sigma SA A Sony A





**ZOOM LENS** Nikon AF-S DX 16-80mm f/2.8-4E ED VR > £870/\$1,070 > [www.nikon.co.uk](http://www.nikon.co.uk)

# Super zoom?

Aiming to set a new standard for Nikon DX

**N**ikon's latest DX-format SLRs are highly sophisticated, as typified by the D5500 and D7200. By contrast, the company's kit zoom lenses can seem a little basic and down-market. For example, none of the current AF-S DX 18-55mm, 18-105mm and 18-140mm kit lenses has ring-type ultrasonic autofocus or even a focus distance scale. The new AF-S DX 16-80mm aims to improve on that.

## BUILD AND HANDLING


Billed by Nikon as "the ultimate walkabout lens for discerning photographers", the 16-80mm is surprisingly compact and light at 80 x 86mm and 480g, despite being pretty much a whole f/stop faster than its kit lens cousins throughout the zoom range. Either way, this lens is a lot smaller and lighter than Nikon's older, constant-aperture AF-S DX 17-55mm f/2.8G, a lens that also lacks Vibration Reduction.

The 5x zoom range is equivalent to 24-120mm on an

APS-C camera, and significantly beats all of Nikon's kit DX-format zooms for wide-angle coverage. The zoom ring operates smoothly and precisely. The whisper-quiet ring-type ultrasonic autofocus system is fairly fast and features full-time manual override.

## PERFORMANCE

High-quality glass includes four Extra-low Dispersion elements, and it's the first DX-format lens to boast nano crystal coatings for reducing ghosting and flare. It's also the first DX lens with an electromagnetically controlled diaphragm, to maintain consistent apertures in rapid bursts of continuous shooting.

Sharpness in the centre of the frame is excellent across the majority of the zoom range, even when using wide apertures, but it does drop off in the 70-80mm sector. Corner sharpness is quite unimpressive at all focal lengths, especially at wide apertures. Vignetting is minimal but chromatic aberrations are a little on the high side, while barrel distortion is noticeable at 16mm. 

**1** This lens has a 72mm thread, so if you're upgrading from a kit lens, you'll need to invest in larger filters.

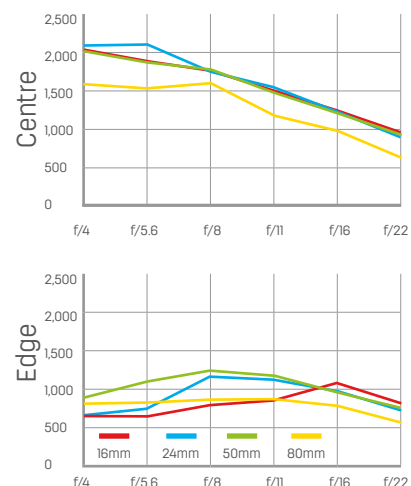
**2** A fluorine coating repels water, dust and dirt, making it easier to clean the front element to maintain image quality.

**3** This focus distance window is useful if you employ hyperfocal distance focusing to get the most from the depth of field.

## > THE SPECS

Full-frame compatible	Yes
Focal length	16-80mm (24-120mm on an APS-C camera)
Image stabiliser	Vibration Reduction
Min focus distance	0.35m
Max magnification factor	0.22x
Manual focus override	Full-time
Focus limit switches	No
Internal zoom/focus	No/Yes
Filter size	72mm
Iris blades	7
Weather seals	No
Dimensions (d x l)	80 x 86mm
Weight	480g

## SHARPNESS



Centre sharpness is best at wider apertures, but edge sharpness is relatively poor.

## FRINGING (AT F/8) LOWER IS BETTER

Wide **1.28** Mid **3.29** Tele **1.78**

Colour fringing is a little high towards the corners of the frame in the 16-24mm range.

## DISTORTION (NEARER 0 IS BETTER)

Wide **2.21** Mid **-4.59** Tele **2.26**

Heavy barrel distortion at 16mm switches to low-ish pincushion distortion beyond 24mm.

## Digital Camera

### FEATURES

★★★★★

### PERFORMANCE

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** Image quality is good but not entirely great, so this Nikkor lens struggles a little to justify its somewhat high asking price.





# Superzoom lenses

Whether you're travelling near or far this summer, it's nice to travel light. Matthew Richards puts space-saving superzoom lenses to the test





## THE CONTENDERS

- 1 Canon EF-S 18-200mm f/3.5-5.6 IS, £390 / \$590
- 2 Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR, £600 / \$895
- 3 Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II, £550 / \$840
- 4 Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS, £480 / \$730
- 5 Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM | C, £270 / \$410
- 6 Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM | C, £400 / \$610
- 7 Tamron 14-150mm f/3.5-5.8 Di III, £340 / \$520
- 8 Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro, £480 / \$730



**P**hotography can literally be a pain. If you're exploring a city, rambling around the countryside, or heading to the other side of the world, a weighty bag of cameras, lenses and accessories will soon have you feeling the strain. Wouldn't it be nice if you could get the advanced handling and image quality of a system camera, without the chore of lugging a big collection of kit around with you? That's where superzoom lenses come in. They aim to deliver standard and telephoto zoom capabilities in a single, space-saving package – but it's not just about keeping the size and weight of your gear to a minimum.

Superzooms have long been popular for their versatility. It's great being able to react quickly as shooting opportunities arise, zooming from wide-angle to telephoto and everything in between at the flick of a wrist. You'll avoid the frustration of missing shots altogether because you were too busy changing lenses. Another bonus for the digital age is that, without needing to swap lenses on the camera so often, you can greatly reduce the risk of dust and muck being dumped on the image sensor. It's especially true for compact system cameras, where the sensor is in plain sight when changing lenses, rather than being hidden away behind a mirror and shutter assembly.

## SLIM AND TRIM

In the downsizing stakes for travel-friendliness, it naturally helps if the host camera is also reasonably compact and lightweight. The biggest competition among superzoom lenses is therefore in APS-C format SLRs, rather than their larger

## Kit anatomy Roll out the barrel

**W**e're all used to zoom lenses extending in length as you sweep through the zoom range. However, while extension is often minimal with wide-angle and standard zoom lenses, or non-existent with many constant-aperture zoom lenses, superzooms are a different story.

While all of the lenses in this group test are reasonably compact and manageable, to varying extents, they all extend greatly as you zoom from the shortest to the longest available focal length.

As a rule of thumb, you can expect a superzoom lens to double in length at its maximum telephoto setting. Add a lens hood as well (sold separately for the Canon and Nikon lenses on test) and the overall length can be more than you bargained for.

Look at a superzoom at its condensed size, and you might be surprised by how big it can get.



**“You’ll avoid the frustration of missing shots altogether because you were too busy changing lenses”**

full-frame siblings, and in compact system cameras. The physically smaller image sensors usually fitted to today's CSCs enable lenses to be even tinier.

One reason for this is that the image circle the lens needs to produce is relatively small. The second is that the greater crop factor

(for example 2.0x for Micro Four Thirds cameras instead of 1.5x or 1.6x for APS-C) means that the actual focal length range tends to be smaller. As a case in point, The Canon 18-200mm APS-C format lens and the Olympus 14-150mm MFT lens both give a similar effective zoom range, equating in 35mm terms to 28.8-320mm for the Canon and 28-300mm for the Olympus. However, while the Canon measures 79 x 102mm and weighs 595g, the Olympus is much smaller at 64 x 83mm and less than half the weight at 285g.

There's been some significant weight loss in APS-C format superzooms over the last few years as well. In our last group test of superzooms (*Digital Camera* 141), we featured the Nikon AF-S DX 18-300mm f/3.5-5.6G ED VR, which we criticised for its podgy proportions of 83 x 20mm and hefty weight of 830g. The newer Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR is a third of a stop slower at the long end of its zoom range, but a much more manageable 79 x 99mm and 550g. A further indication is that

## How we test lenses Advice you can trust

**O**ur lens tests are based on a two-stage procedure. First, lab tests are carried out, shooting two test charts under controlled lighting conditions. The results are then processed using Imatest Master, so that we can quantify optical performance in terms of sharpness, chromatic aberrations and distortion. Overall quality is

assessed at the centre, edge and corners of the images.

For real-world testing, we use each of the lenses under widely varying indoor and outdoor lighting conditions. Overall handling is checked, along with smoothness and precision of zoom and focus rings, and the operation of all switches. We also test the speed and accuracy of

autofocus systems, complete with operation of full-time manual override where available. The effectiveness of optical stabilisation systems, where fitted, is checked by gradually reducing shutter speeds during handheld shooting. Ratings are finally given for features, build quality, image quality and value for money.



the filter thread shrinks from 77mm to 67mm. Even so, the 'slimmer of the year' award goes to Sigma, whose current 18-200mm and 18-250mm lenses (the latter not reviewed this time around) for APS-C format SLRs are much smaller than the original editions, tipping the scales at just 430g and 470g respectively. The 18-200mm featured in this group test measures just 71 x 86mm, so it's barely bigger than most standard zoom lenses for this class of SLR.

## THE LONG AND THE SORT

Some superzoom lenses go all out for zoom range instead of trying to keep size and weight to a minimum. Sigma's latest offering is an 18-300mm lens that gives longer telephoto reach than any of its previous superzooms (not counting the enormous Sigma 50-500mm super-telephoto zoom). Size and weight creep up again to 79 x 102mm and 585g.

Tamron has a habit of eyeing up the biggest zoom range on the market – then trumping it. The company has struck again with its latest 16-300mm lens for Canon, Nikon and Sony APS-C format SLRs. As well as having a class-leading 18.75x zoom range, it gives greater wide-angle coverage than any other superzoom, with an effective shortest focal length of just 24mm (25.6mm in its Canon fit), whereas most superzooms are equivalent to 28mm at their shortest zoom setting.

Getting back to the long end of the zoom range, one perennial problem of telephoto shooting is camera-shake, especially for travel and walkabout shooting, where you may not want to be carrying a tripod around with you.

To combat this, all of the Canon-fit and Nikon-fit lenses featured in this group test have optical image stabilisation. Sigma and Tamron both omit the stabiliser from APS-C format superzooms in their Sony-fit option (also Pentax for Sigma), as the host cameras typically have sensor-shift stabilisation built in.

The same goes for Olympus Micro Four Thirds cameras, whereas Panasonic bodies often don't have built-in stabilisation. The Panasonic 14-140mm MFT lens on test here therefore includes a Power OIS (Optical Image Stabilizer).

## EQUIPMENT KNOW-HOW

# FEATURES TO LOOK FOR

Big up the versatility without going large on size

### Zoom range

For a superzoom lens, it's tempting to go for the maximum possible zoom range, but you can often enjoy a reduction in size and weight if you sacrifice a little telephoto reach.

### Focus distance scale

The Tamron 16-300mm lens has a focus distance scale beneath a viewing window. Both Sigmas have distance scales printed on their focus rings, but none of the others do.

### MFT vs APS-C

Micro Four Thirds lenses in this group are typically smaller and lighter than APS-C format lenses. Check our comparison table (page 144) to see how all the lenses measure up.



### Optical stabilisation

In this test group, optical image stabilisers are built into the Canon, Nikon, Panasonic, Sigma (not Pentax or Sony fitment) and the Tamron 16-300mm (not Sony fitment).

### Aperture width

You won't be able to find a superzoom lens that offers particularly wide apertures. Most shrink from f/3.5 to f/5.6 or f/6.3 as you stretch through the zoom range.

### Zoom lock switch

Apart from the Canon, all lenses on test are impressively resistant to zoom creep. The Canon, Nikon, Sigma and Tamron lenses have the added safety feature of zoom lock switches.

## Explained Autofocus systems

**T**he Canon 18-200mm has a basic electric AF motor, which is audible in operation. The Sigmas and Tamron 16-300mm have ultrasonic motor systems, which are quieter. The Nikon has ring-type ultrasonic autofocus which is quieter still, and the MFT lenses have

virtually silent stepping motors. The focus ring rotates during autofocus in the Canon and both Sigma lenses. Unusually for a lens with an ultrasonic motor, the Tamron 16-300mm also enables full-time manual focus override. This is also available in the Nikon and the MFT lenses.



# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL



APS-C Canon EF



APS-C Nikon F

## ° Canon EF-S 18-200mm f/3.5-5.6 IS £390 / \$590

It's a hefty old beast

**D**espite being outgunned for zoom range by the newer Nikon and Sigma 18-300mm lenses, as well as the Tamron 16-300mm, the Canon is the outright heaviest lens in the group, and the joint biggest along with the Sigma.

Launched in 2008, the Canon looks and feels quite dated. There's no focus distance scale and autofocus is based on a simple and fairly noisy electric motor. Unlike Canon lenses that feature ring-type ultrasonic or stepping motor system (the latter adopted in the newer 18-135mm STM lens), the focus ring rotates during autofocus and there's no full-time manual override.

On the plus side, the lens features a late-generation image stabiliser that has a four-stop rating and comes complete with automatic panning and tripod detection. Two UD (Ultra-low Dispersion) elements are fitted to combat chromatic aberrations and Super-Spectra coatings are applied to reduce ghosting and flare. Overall build quality feels fairly robust, but the mount lacks a weather-seal ring. It also suffers badly from zoom creep.

### PERFORMANCE

Autofocus is reasonably quick for an electric motor-driven system and, in our tests, the stabiliser gave a three-stop benefit. Sharpness is below average throughout the zoom range, but there's no major drop-off at the telephoto end. Barrel distortion at the wide-angle end is worse than all others apart from the Tamron 16-300mm, which gives a wider angle of view.



**Tech focus...**  
16 elements in 12 groups; six diaphragm blades; closest focus distance, 45cm; 72mm filter thread; electric motor autofocus; 79 x 102mm; 595g.

Digital Camera

FEATURES  
★★★★★

BUILD QUALITY  
★★★★★

IMAGE QUALITY  
★★★★★

VALUE  
★★★★★

OVERALL

★★★★★

## Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR £600 / \$895

Newer, smaller and simpler

**T**here are currently two Nikon 18-300mm lenses on the market, this newer one having a narrower f/6.3 rather than f/5.6 aperture at the long end of the zoom range. It's also a lot more travel-friendly than the older lens, being smaller and nearly 300g lighter, at 550g.

Like most Nikon lenses, this one features a rubber weather-seal ring on its metal mounting plate. It beats the competing Canon lens by featuring ring-type ultrasonic autofocus, which is reasonably quick, very quiet and comes complete full-time manual override. As usual for this type of system, the focus ring doesn't rotate during autofocus. Switches are on hand for auto/manual focus, VR (Vibration Reduction) on and off and zoom lock.

We experienced four-stop effectiveness from the VR and, unlike the older Nikon 18-300mm and 18-200mm superzooms, there's no zoom creep. Even so, there's a budget look and feel to the lens, which lacks a focus distance scale and is supplied without a lens hood (sold separately).



**Tech focus...**  
16 elements in 12 groups; 7 diaphragm blades; closest focus distance, 48cm; 67mm filter thread; ultrasonic (ring type) autofocus; 79 x 99mm; 550g.

### PERFORMANCE

Despite featuring three ED (Extra-low Dispersion) elements, colour fringing is the second worst in the group. At least in-camera corrections take care of fringing in current and recent Nikon SLRs, when shooting in JPEG mode or processing raw files in Nikon's own software. Sharpness is good at wide to mid zoom settings but drops off a lot at the long end. Distortion levels are pretty average.

FEATURES  
★★★★★

BUILD QUALITY  
★★★★★

IMAGE QUALITY  
★★★★★

VALUE  
★★★★★

OVERALL

★★★★★





Four Thirds Micro Four Thirds



Four Thirds Micro Four Thirds

## Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II

£550 / \$840

Small, lightweight but powerful

**R**emarkably simple, the Olympus is the only lens in the test group that has no buttons or switches. There's not even one for locking the zoom mechanism, although this isn't a problem as there's no hint of zoom creep. There's no optical image stabiliser either, as it relies on in-camera stabilisation from Olympus Micro Four Thirds bodies. Finally, there's no auto/manual focus switch as this is taken care of by the host camera.

The stepping motor autofocus system is optimised for shooting both stills and movies. It's virtually silent, reasonably quick for stills and gives silky smooth transitions when shooting movies. Multi-coatings are applied to all lens elements to keep ghosting and flare to a minimum and, of the three aspherical elements, one is made from ED (Extra-low Dispersion) glass. Compact and lightweight at 64 x 83mm and 285g, the lens has a high-precision feel to its construction, complete with a weather-sealed mount and dust, splash and freeze-resistance.

### PERFORMANCE

The Olympus beats the competing Panasonic MFT lens for sharpness at wide-angle and mid-zoom settings but drops off at the long end of the zoom range. Sharpness levels are below average, but colour fringing and distortions are complete non-issues on the OM-D E-M1 that we used for testing. For telephoto shooting, we found in-camera stabilisation gave a two-stop advantage, proving less effective than the Panasonic lens's optical stabiliser.



**Tech focus...**  
15 elements in 11 groups; seven diaphragm blades; closest focus distance, 50cm; 58mm filter thread; stepping motor autofocus; 64 x 83mm; 285g.

### Digital Camera

#### FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★

VALUE

★★★★★

### OVERALL

★★★★★

## Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS

£480 / \$730

The shortest and lightest lens here

**W**eighing in at just 265g and measuring 75mm in length, this Panasonic lens is even lighter and smaller than the competing Olympus superzoom. It's also slightly shorter in maximum focal length, equivalent to 280mm instead of 300mm on Micro Four Thirds cameras, but adds optical stabilisation. Panasonic claims a 2x improvement in its Power vs Mega optical image stabilisation system, and it's certainly a big advantage over the Olympus and Tamron MFT lenses in the group, which have no optical stabilisation at all. The addition isn't just good news for owners of Panasonic cameras with no built-in stabilisation, as it gives the choice of whether to use optical or sensor-shift stabilisation on other MFT cameras.

Build quality feels almost as refined as in the Olympus lens but the Panasonic lacks weather seals. However, it features two ED elements where the Olympus only has one. The stepping motor autofocus system is similarly silent and suitable for stills and movie capture. Like the Olympus and Tamron MFT lenses here, manual focusing is an electronic 'fly-by-wire' affair.

### PERFORMANCE

There's a dip in sharpness in the middle of the zoom range but it's pretty good at either end. Sharpness in handheld telephoto shots gets a boost from the optical stabiliser, which gives a benefit of about three and a half stops. Tests from our OM-D E-M1 revealed slightly more noticeable distortions than from the Olympus, but well controlled with minimal colour fringing.



**Tech focus...**  
14 elements in 12 groups; seven diaphragm blades; closest focus distance, 30-50cm; 58mm filter thread; stepping motor autofocus; 67 x 75mm; 265g.

### Digital Camera

#### FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★

VALUE

★★★★★

### OVERALL

★★★★★



APS-C Canon EF Nikon F Pentax K Sigma SA Sony A



APS-C Canon EF Nikon F Pentax K Sigma SA Sony A

# °Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM | C £270 / \$410

A mere slip of a thing

**S**acrificing a little in telephoto reach can pay dividends when you want to travel light. At 430g and 71 x 86mm, this lens is only about two-thirds of the weight of most 18-300mm APS-C format lenses. An exercise in downsizing, it's also 180g lighter and 14mm shorter than the first edition of Sigma's optically stabilised 18-200mm.

Part of this reduction is due to the introduction of double-sided aspherical lens elements and a downsized autofocus motor, while a new TSC (Thermally Stable Composite) material used in the lens barrels also plays a part. However, autofocus lacks full-time manual override, and the focus ring rotates while autofocusing. As the lens is quite compact, you need to be careful to keep your fingers clear of the focus ring when using autofocus.

The maximum telephoto reach is equivalent to a focal length of 300mm on Nikon, Pentax and Sony bodies, and 320mm on Canon cameras. That stacks up well against the MFT lenses in the group, which give an effective reach of between 280mm and 300mm.

## PERFORMANCE

Helped by the inclusion of four SLD (Special Low Dispersion) elements, colour fringing is well controlled, beating most other APS-C format lenses. The optical stabiliser is pretty efficient as well, giving a benefit of about three-stops (Canon and Nikon fit versions). Sharpness is above average at the telephoto end and consistent through the whole zoom range.



**Tech focus...**  
16 elements in 13 groups; seven diaphragm blades; closest focus distance, 39cm; 62mm filter thread; ultrasonic (motor) autofocus; 71 x 86mm; 430g.

**Digital Camera**

FEATURES ★★★★★

BUILD QUALITY ★★★★★

IMAGE QUALITY ★★★★★

VALUE ★★★★★

**OVERALL** ★★★★★

# Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM | C £400 / \$610

A step up in size and quality

**C**ompared with Sigma's 18-200mm lens that's also on test, this one is relatively big and heavy, at 79 x 102mm and 585g. Similar features include motor-driven rather than ring-type ultrasonic autofocus, with the same weaknesses of focus ring rotation during autofocus and the lack of full-time manual override.

Both lenses feature a focus distance scale printed on the focus ring, and a macro scale printed on the inner barrel which extends at longer zoom settings. The maximum macro magnification ratio is 0.33x but you can boost this to 0.5x by buying Sigma's optional close-up filter, developed exclusively for this lens. Neither of the Sigma lenses has a weather-sealed mount.

While the Sigma 18-200mm features four SLD elements, the 18-300mm upgrades to four top-quality FLD (Fluorite-level Low Dispersion) elements as well as one SLD element. A newer optical stabiliser (Canon and Nikon fit only) is also more efficient, with performance that's closer to four stops than three.

## PERFORMANCE

Our tests reveal the new Sigma 18-300mm to be the sharpest lens here at wide-angle to mid-zoom settings, and it remains sharper than the competition at longer focal lengths between 150mm and 300mm (where available in other lenses). Colour fringing is well contained and distortions are less noticeable than in the Canon, Nikon and Tamron APS-C class lenses.



**Tech focus...**  
17 elements in 13 groups; seven diaphragm blades; closest focus distance, 39cm; 72mm filter thread; ultrasonic (motor) autofocus; 79 x 102mm; 585g.

**Digital Camera**

FEATURES ★★★★★

BUILD QUALITY ★★★★★

IMAGE QUALITY ★★★★★

VALUE ★★★★★

**OVERALL** ★★★★★





Four Thirds Micro Four Thirds



APS-C Canon EF Nikon F Sony A

## Tamron 14-150mm f/3.5-5.8 Di III

£340 / \$520

First of the independents

**C**ompared to APS-C and full-frame lenses for various makes of camera, independent lenses for the Micro Four Thirds format are thin on the ground. Indeed, the likes of Sigma, Samyang and Voigtlander only make prime lenses in MFT-fit. This Tamron 14-150mm is the only independently made MFT zoom lens currently available. It equals the Olympus's extended zoom range but lacks the Panasonic's optical image stabiliser. It's compact and lightweight at 64 x 80mm and 285g, although the filter thread is smaller at 52mm.

Build quality feels good with a smooth action to both zoom and focus rings, similar to the other MFT lenses on test. Again, there's no hint of zoom creep but the Tamron includes a zoom lock switch which is absent on both other MFT lenses. The metal mounting plate lacks the Olympus's weather-seal but the finish looks stylish. Inside, the construction includes two LD (Low Dispersion) and one XR (Extra Refractive Index) elements, along with the virtually silent stepping motor autofocus system.

### PERFORMANCE

It's the least impressive lens in the whole group for sharpness at either end of the zoom range, although mid-zoom sharpness is marginally better than from the Panasonic MFT lens. Fringing is more noticeable than from either of the other MFT lenses, but there's less barrel distortion than from the Panasonic lens at the 14mm focal length.



**Tech focus...**  
8 elements in 6 groups; 7 diaphragm blades; closest focus distance, 18cm; 49mm filter thread; autofocus driven from camera; 64 x 40mm; 189g.

### Digital Camera

#### FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★

VALUE

★★★★★

### OVERALL

★★★★★

## Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro

£480 / \$730

Comes top for zoom range

**P**ricier than the Canon and both Sigma lenses for APS-C format SLRs, the Tamron undercuts the Nikon, while beating them all in terms of outright zoom range. The Tamron offers a wider viewing angle at its shortest zoom setting than any other lens in the group. In full-frame terms, it has an effective focal length of 24mm in Nikon and Sony mount options, and 25.6mm in Canon-fit.

The lens feels robust but it's actually lighter than all the other APS-C lenses here, apart from the Sigma 18-200mm. Like the Nikon, it has a weather-seal ring on its mounting plate, and it's the only lens on test to feature a focus distance scale that's positioned beneath a viewing window. Switches are on hand for auto/manual focus and zoom lock, plus VC on/off (Canon and Nikon fit only). The Vibration Compensation stabilisation gave four-stop effectiveness in our tests. The PZD (Piezo Drive) autofocus is an ultrasonic motor-based design, but the focus ring doesn't rotate during autofocus, while also enabling full-time manual focus override.

### PERFORMANCE

A downside of the extra-wide viewing angle is that barrel distortion is worse at the minimum zoom length than in any other lens in the group, although it's only marginally worse than from the Canon and Nikon lenses. It has the highest levels of colour fringing of any lens in the group, while sharpness at any competing focal length is less impressive than from the Sigmas.



**Tech focus...**  
16 elements in 12 groups; seven diaphragm blades; closest focus distance, 39cm; 67mm filter thread; ultrasonic (motor) autofocus; 75 x 100mm; 540g.

### Digital Camera

#### FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★





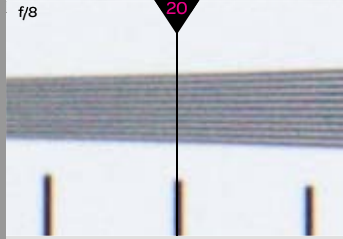
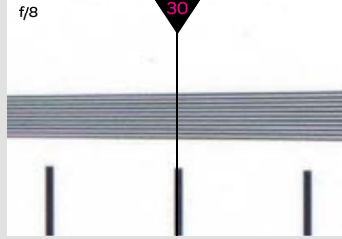
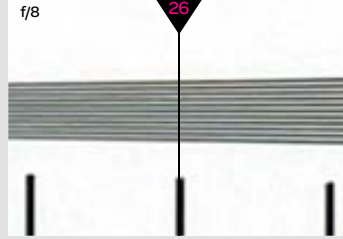
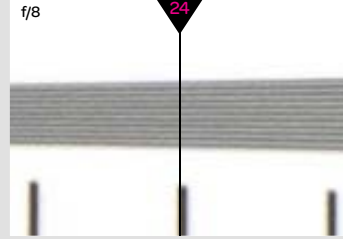








VALUE

★★★★★

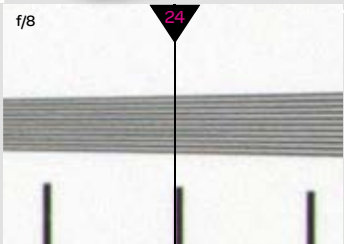
### OVERALL

★★★★★

# IMAGE QUALITY IN FOCUS

	<div>CANON EF-S 18-200MM F/3.5-5.6 IS</div> 	<div>NIKON AF-S DX 18-300MM F/3.5-6.3G ED VR</div> 	<div>OLYMPUS M.ZUIKO DIGITAL ED 14-150MM F/4-5.6 II</div> 	<div>PANASONIC LUMIX G 14-140MM F/3.5-5.6 ASPH POWER</div> 
SHARPNESS TEST	<div>f/8 20</div>  <p>The Canon comes bottom of the group for sharpness at wide to mid-zoom settings, but there's no real drop-off at the long end.</p>	<div>f/8 30</div>  <p>There's plenty of sharpness throughout most of the zoom range but it drops off alarmingly as you approach the longest setting.</p>	<div>f/8 26</div>  <p>The Olympus holds its own pretty well for wide-angle and mid-zoom sharpness, but gradually drops away at long zoom settings.</p>	<div>f/8 24</div>  <p>Slightly less wide-angle sharpness than from the Olympus, and noticeably less at mid-zoom settings, but telephoto sharpness is good.</p>
FRINGING TEST	 <p>Fringing is slightly better controlled at either end of the zoom range than in the Nikon 18-300mm and Tamron 16-300mm.</p>	 <p>At either end of the zoom range, there's more colour fringing than with all other lenses in the group, apart from the Tamron 16-300mm.</p>	 <p>There's practically no colour fringing at wide-angle settings and only very small amounts throughout the rest of the zoom range.</p>	 <p>Colour fringing is very slightly more evident than from the Olympus at the wide-angle end, but there's practically none at the telephoto end.</p>
DISTORTION TEST	 <p>Barrel distortion is worse than all bar the Tamron 16-300mm at the short end of the range. Pincushion is about average at longer settings.</p>	 <p>Slightly less wide-angle barrel distortion than from the Canon 18-200mm, and very slightly more pincushion at longer zoom settings.</p>	 <p>Distortion is basically a non-issue at any zoom setting. The Olympus is a clear winner in the test group in this respect.</p>	 <p>It doesn't score quite as well as the Olympus for distortion, especially at the wide-angle end, but distortions are well controlled overall.</p>
	<div>IMAGE TEST VERDICT</div> <p>Considering this Canon lens's fairly modest zoom range, all the main aspects of image quality in our tests are a little disappointing.</p> <div>★ ★ ★ ★ ★</div>	<div>IMAGE TEST VERDICT</div> <p>The Nikon's image quality isn't particularly impressive, and is let down by a lack of telephoto sharpness and fairly high levels of colour fringing.</p> <div>★ ★ ★ ★ ★</div>	<div>IMAGE TEST VERDICT</div> <p>Impressive in all respects. Image quality only really suffers from a lack of sharpness at the long end of the zoom range.</p> <div>★ ★ ★ ★ ★</div>	<div>IMAGE TEST VERDICT</div> <p>Not quite as good as the Olympus lens for fringing and distortions, but sharpness at the long end of the zoom range is more impressive.</p> <div>★ ★ ★ ★ ★</div>





Good levels of sharpness remain very consistent throughout the entire zoom range, even at the widest available apertures.



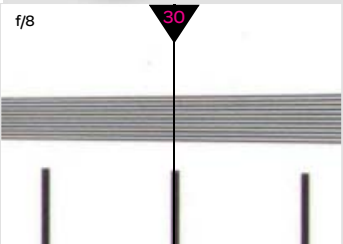
Lab scores for colour fringing on this Sigma lens are better on the whole than for other APS-C format lenses in the group.



There's less wide-angle barrel distortion than from any other APS-C format lens, whereas mid to long range pincushion is average.

IMAGE TEST VERDICT

Image quality is very good overall, with consistent sharpness through the zoom and aperture ranges, along with restrained barrel distortion.



Sharpness levels are better than from any other lens here, at any given focal length, throughout the generous 18-300mm zoom range.



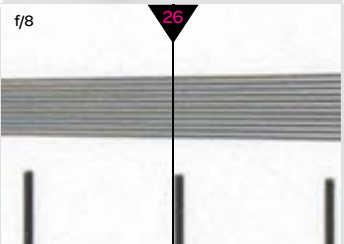
Colour fringing is better controlled than in the Nikon 18-300mm and Tamron 16-300mm lenses, and the Canon at mid-zoom settings.



The new Sigma 18-300mm delivers the most pleasing image quality of any lens in the entire group, despite its mighty zoom range.

IMAGE TEST VERDICT

Overall, the new Sigma 18-300mm delivers the most pleasing image quality of any lens in the entire group, despite its mighty zoom range.



At both ends of the zoom range, the levels of sharpness are less impressive than from any other lens on test.



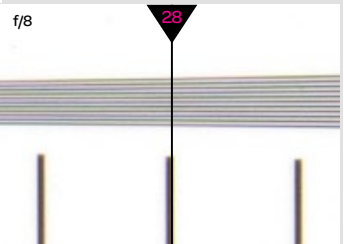
Amounts of colour fringing are fairly well contained but performance in this respect lags behind the Olympus and Panasonic MFT lenses.



The lack of wide-angle and telephoto sharpness is disappointing and the Tamron doesn't score as highly as competing MFT lenses in other areas.

IMAGE TEST VERDICT

Image quality is very good in most respects, but the lack of sharpness towards the edges and corners of images spoils the party somewhat.



Compared with the competing Nikon and Sigma 18-300mm lenses, the Tamron has less wide-to-mid zoom sharpness.



Colour fringing is more pronounced than from any other lens in the group, especially at both ends of the zoom range.



Barrel distortion at the short end of the zoom range is worse than from any other lens, although the Tamron gives a wider angle of view.

IMAGE TEST VERDICT

The enormous zoom range with its extra-wide facility is great to have, but outright image quality drops off as a consequence.



## LENS BENCHMARKS

### How the lenses fare in our lab tests

For our lab tests, we used a Canon 7D Mk II for the Canon and Sigma 18-200mm lenses, and a Nikon D7200 for the Nikon and Sigma 18-300mm lenses, and the Tamron 16-300mm. All three MFT lenses were tested on the same Olympus OM-D E-M1 body. Most lenses dropped in sharpness at the long end of their zoom range, apart from the Panasonic 14-140mm, for which sharpness levels dipped at mid-zoom settings, and the Sigma 18-200mm which maintained fairly even levels of sharpness throughout its zoom range. The Tamron 14-150mm MFT lens was least impressive for sharpness.

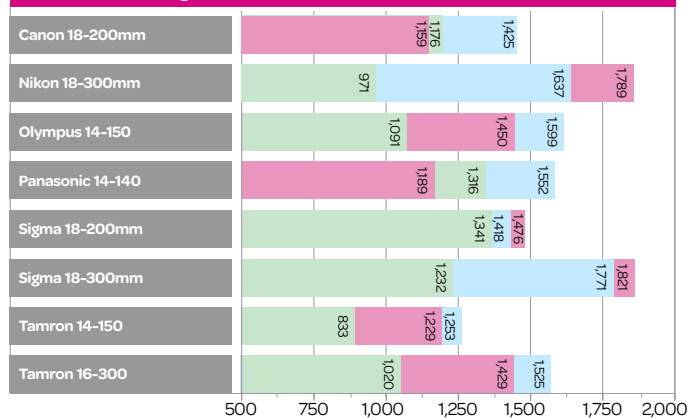
Low levels of colour fringing proved good in the Olympus and Panasonic lenses. The worst performers were the Nikon 18-300mm and Tamron 16-300mm lenses. The Olympus gave negligible amounts of distortion at any zoom setting, whereas other lenses gave varying degrees of barrel distortion at their shortest focal lengths, switching to fairly similar degrees of pincushion at mid to long zoom settings.

#### FRINGING Lower scores are better

	tele	mid	wide
Canon 18-200mm	2.54	1.52	1.94
Nikon 18-300mm	4.42	1.01	3.17
Olympus 14-150	0.88	0.67	0.14
Panasonic 14-140	0.54	0.45	0.94
Sigma 18-200mm	1.83	0.47	2.04
Sigma 18-300mm	1.64	0.58	2.87
Tamron 14-150	2.54	0.83	1.93
Tamron 16-300	5.6	1.56	5.6

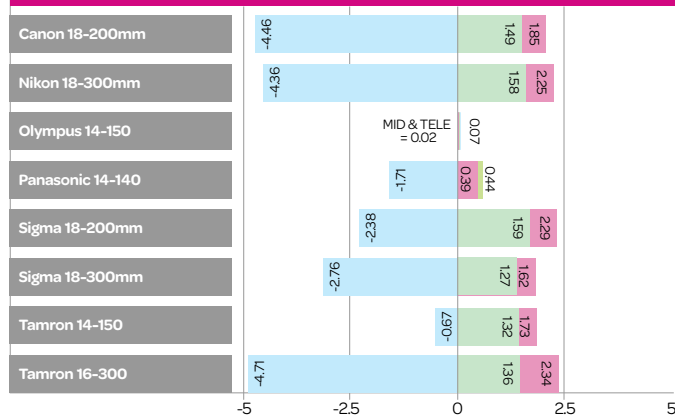
The Olympus and Panasonic lenses boast the best results for colour fringing whereas the Nikon 18-300mm and Tamron 16-300mm fare the worst.

#### SHARPNESS Higher scores are better



The Nikon and Sigma 18-300mm lead for sharpness in the short-to-mid part of the zoom range but the Sigma has better sharpness at the long end.

#### DISTORTION Closer to zero is better



Most lenses follow a similar path of barrel to pincushion distortion as you go through the zoom range, but the Olympus lens delivers negligible distortions.

#### HOW THE LENSES COMPARE



NAME	Canon EF-S 18-200mm f/3.5-5.6 IS	Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR	Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II	Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS	Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM   C	Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM   C	Tamron 14-150mm f/3.5-5.8 Di III	Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro
Contact	<a href="http://www.canon.co.uk">www.canon.co.uk</a>	<a href="http://www.nikon.co.uk">www.nikon.co.uk</a>	<a href="http://www.olympus.co.uk">www.olympus.co.uk</a>	<a href="http://www.panasonic.co.uk">www.panasonic.co.uk</a>	<a href="http://www.sigma-imaging-uk.com">www.sigma-imaging-uk.com</a>		<a href="http://www.tamron.co.uk">www.tamron.co.uk</a>	<a href="http://www.tamron.co.uk">www.tamron.co.uk</a>
Street price	£390 / \$590	£600 / \$895	£550 / \$840	£480 / \$730	£270 / \$410	£400 / \$610	£340 / \$520	£480 / \$730
Sensor fit	APS-C	APS-C	Four Thirds	Four Thirds	APS-C	APS-C	Four Thirds	APS-C
Mount options	EF	F	MFT	MFT	EF F K SA A	EF F K SA A	MFT	EF F A
Autofocus motor	Electric motor	Ultrasonic (ring type)	Stepping motor	Stepping motor	Ultrasonic (motor)	Ultrasonic (motor)	Stepping motor	Ultrasonic (motor)
Dimensions (diameter x length)	79 x 102mm	79 x 99mm	64 x 83mm	67 x 75mm	71 x 86mm	79 x 102mm	63 x 40mm	75 x 100mm
Weight	595g	550g	285g	265g	430g	585g	285g	540g
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
IMAGE QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

KEY: EF Canon EF F Nikon F MFT Micro Four Thirds K Pentax K SA Sigma SA A Sony A

From the makers of Digital Camera magazine





THE DIGITAL CAMERA VERDICT

# SIGMA WINS FOR QUALITY

The best combination of image quality and zoom range

**S**igma's new 18-300mm delivers a mighty 16.7x zoom range with deliver excellent sharpness and reasonably low amounts of distortion and colour fringing. It does rather better than the Tamron 16-300mm in all aspects of image quality. However, the Tamron is more refined in terms of handling, thanks to the way the focus ring doesn't rotate during autofocus and enables full-time manual override. The Tamron also has

a weather-sealed mount that's lacking in the Sigma, as well as giving a wider angle of view at the short end of the zoom range. Overall, it's a close call but the Sigma edges ahead for outright image quality and price.

For outright value, Sigma wins again with the latest incarnation of its 18-200mm lens. The zoom range is less powerful but all-round quality is very impressive at such a low asking price – it's the cheapest lens in the group by quite a margin. We prefer Sigma

lenses to the Canon 18-200mm and Nikon 18-300mm own-brand options. The Canon is dated and needs the same kind of refresh that the company's 18-135mm has benefitted from, while the Nikon lacks telephoto sharpness and is fairly poor value for money.

For Micro Four Thirds, the Panasonic 14-140mm gives best all-round image quality and boasts optical image stabilisation, but it's slightly down on telephoto reach compared to the Olympus and Tamron 14-150mm lenses. **D**



## 1 SIGMA 18-300MM F/3.5-6.3 DC MACRO OS HSM | C

**What's good:** Powerful zoom range; excellent all-round image quality; effective stabiliser.

**What's bad:** Focus ring rotates during autofocus; mounting plate lacks a weather-seal.

**We say:** It edges ahead for image quality.



## 2 TAMRON 16-300MM F/3.5-6.3 DI II VC PZD MACRO

**What's good:** Extra-wide viewing angle at 16mm; good handling; weather-sealed mount.

**What's bad:** Loses out to the Sigma 18-300mm for sharpness, distortions and colour fringing.

**We say:** It adds extra wide-angle potential.



## 3 SIGMA 18-200MM F/3.5-6.3 DC MACRO OS HSM | C

**What's good:** Very compact and lightweight for an APS-C format lens; strong performance.

**What's bad:** Relatively modest telephoto reach; focus ring rotates during autofocus.

**We say:** It's a highly impressive superzoom lens at a bargain price.



## 4 PANASONIC LUMIX G 14-140MM F/3.5-5.6 ASPH POWER OIS

**What's good:** Small and lightweight build but with good performance and stabilisation.

**What's bad:** Less telephoto reach than the Olympus and Tamron 14-150mm lenses.

**We say:** The increase in image quality and added stabiliser makes this the best MFT buy.



## 5 OLYMPUS M.ZUIKO DIGITAL ED 14-150MM F/4-5.6 II

**What's good:** Beautifully built with the inclusion of weather-seals; good image quality.

**What's bad:** No optical stabilisation; sharpness drops off at the telephoto end.

**We say:** It's a pretty good lens but the Panasonic is a better buy at its lower price.





# Macro primes

Ready for your close-up?  
**Matthew Richards** picks the  
'full' macro best buys

**T**he prime lenses we've chosen for this group test are all capable of delivering a full 1.0x or 1:1 reproduction ratio at their closest focus settings. This means that small objects are projected at full life size onto the camera's image sensor, which enables enormous enlargement when images are printed.

Focal lengths of around 90mm to 105mm are historically

popular for 35mm film and full-frame SLRs. Those with crop-sensor cameras also often stick with this focal length, as it enables a comfortable macro working distance of about 30cm.

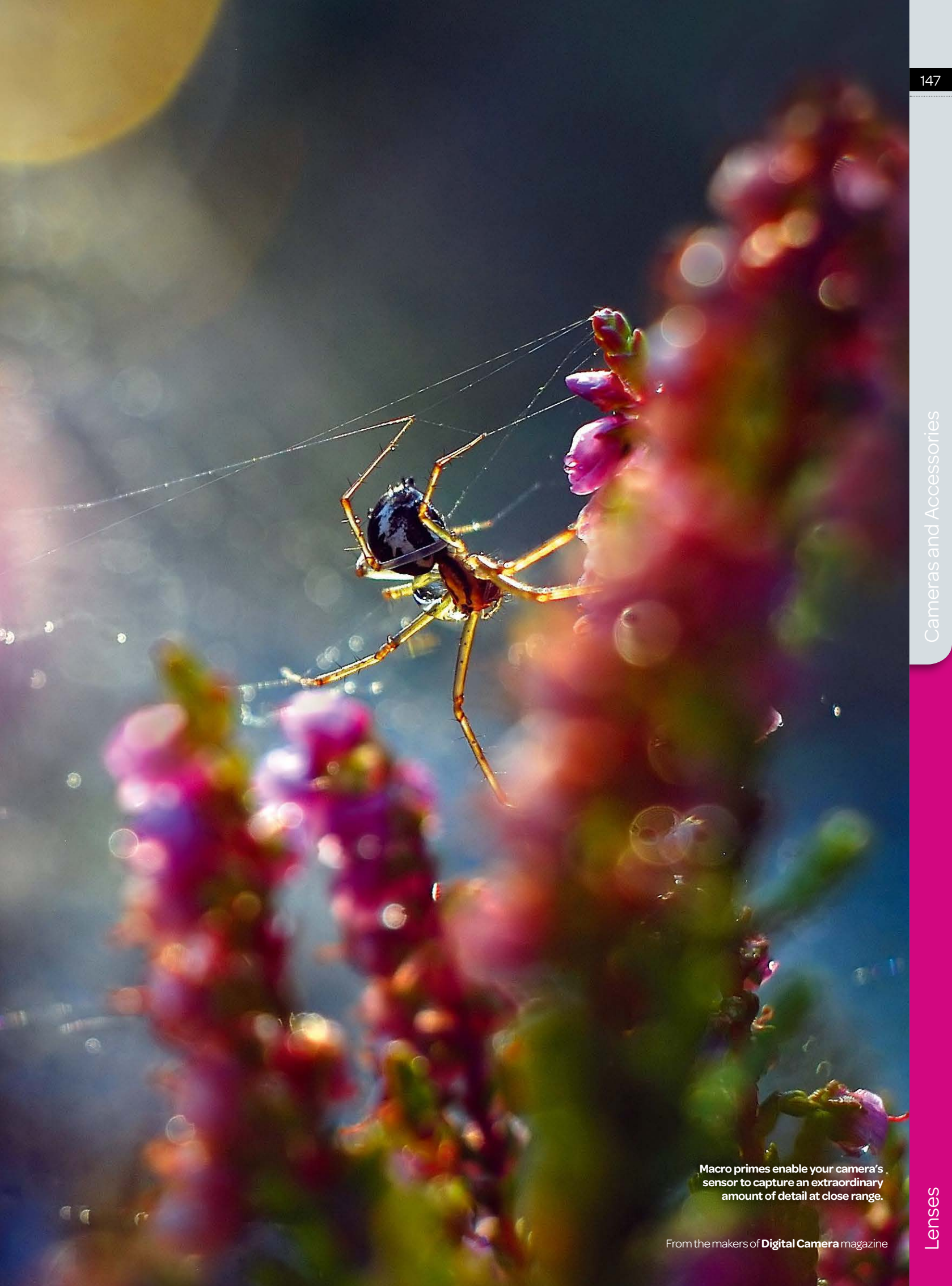
The 60mm macro lenses on test have a shorter minimum focus distance of around 20cm. Either way, it's good that all lenses here have fully internal focusing, so the front element doesn't extend and encroach on the subject.

## THE CONTENDERS

- |   |   |            |
|---|---|------------|
| 1 | Canon EF-S 60mm f/2.8 Macro USM             | £305/\$420 |
| 2 | Canon EF 100mm f/2.8L Macro IS USM          | £635/\$850 |
| 3 | Nikon AF-S Micro 60mm f/2.8G ED             | £370/\$600 |
| 4 | Nikon AF-S VR Micro 105mm f/2.8G IF-ED      | £620/\$980 |
| 5 | Olympus 60mm f/2.8 Macro M.Zuiko Digital ED | £350/\$500 |
| 6 | Samyang 100mm f/2.8 ED UMC Macro            | £350/\$550 |
| 7 | Sigma 105mm f/2.8 Macro EX DG OS HSM        | £380/\$770 |
| 8 | Tamron SP 90mm F/2.8 Di VC USD Macro        | £350/\$750 |







Macro primes enable your camera's sensor to capture an extraordinary amount of detail at close range.

From the makers of **Digital Camera** magazine





APS-C Canon EF

## Canon EF-S 60mm f/2.8 Macro USM

£305/\$420

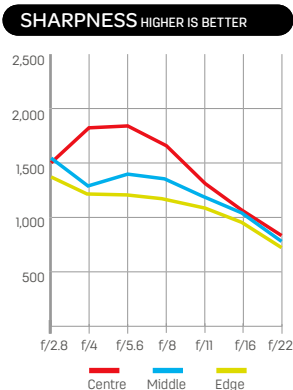
Small in build, big on magnification

**D**esigned exclusively for Canon’s APS-C format D-SLRs, this lens gives an effective focal length of 96mm but is incompatible with full-frame bodies. It’s relatively small and lightweight, but features ring-type ultrasonic autofocus with the usual full-time manual override, and a focus distance scale beneath a viewing window.

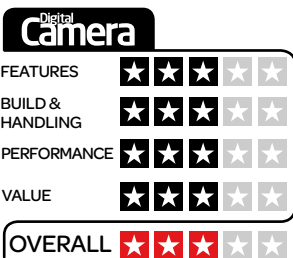
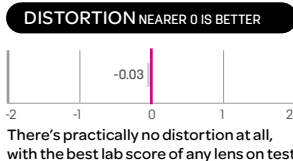
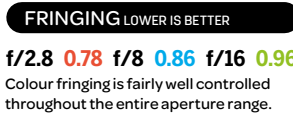
In some ways, the Canon 60mm is a bit of a bare-bones affair. It lacks image stabilisation and has no autofocus limit switch to lock out the short or long ends of the focus range. The full travel of the focus ring is fairly short anyway, which makes manual focusing for macro shooting a bit tricky. With only seven diaphragm blades, the aperture isn’t particularly well rounded and, as with the Olympus lens on page 150, the hood is sold separately as an optional extra.

### PERFORMANCE

Sharpness is pretty mediocre but at least it’s fairly consistent across the whole frame. Worse news is that sharpness drops off more noticeably than usual at narrow apertures, often required for macro photography to maximise the depth of field.



It’s one of the worst performers here for sharpness, especially at narrow apertures.



Full-frame Canon EF

## Canon EF 100mm f/2.8L Macro IS USM

£635/\$850

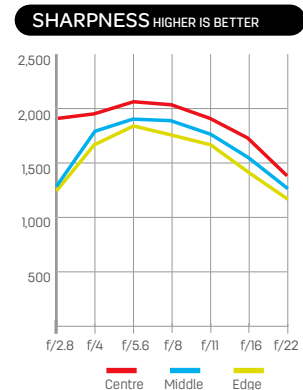
Canon’s luxury-line macro lens

**C**ompatible with both APS-C format and full-frame Canon SLRs, this lens is from the L-series (Luxury) line-up. Like most L-series lenses, it boasts professional-grade build quality, is fitted with weather-seals and comes complete with a lens hood. It also has a ‘hybrid’ image stabiliser specially designed for macro shooting, and counteracts lens shift as well as angular vibration. Even so, the benefit shrinks from four stops to just two stops at the closest focus distance.

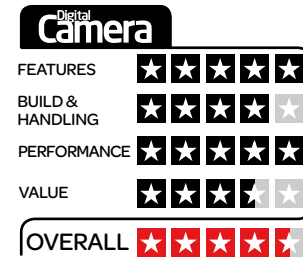
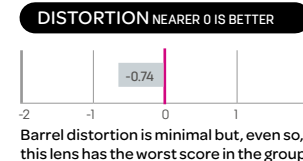
An Ultra-low Dispersion (UD) element is included; there’s a nine-blade diaphragm; and the lens features a three-position autofocus limit switch, which can lock out either the long or short end of the range. Manual focusing is easier and more precise than with the Canon 60mm lens.

### PERFORMANCE

The lens performs well as a macro or short telephoto optic, with fast and accurate autofocus. Sharpness is much more impressive than from the Canon 60mm lens at all apertures, however, it’s relatively poor value compared with the Sigma and Tamron lenses here.



Very good levels of sharpness are available at both extremes of the aperture range.







Full-frame Nikon DX Nikon FX

## Nikon AF-S Micro 60mm f/2.8G ED

### £370/\$600

Small for a full-frame macro

**T**he Nikon 60mm is a little larger and heavier than the Canon 60mm on test, but a crucial difference is that it's fully compatible with full-frame as well as APS-C format D-SLRs.

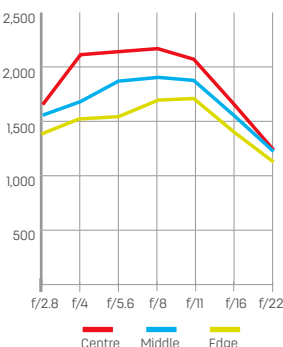
On 'DX' cameras, its effective focal length is 90mm. Similarities with the Canon 60mm include ring-type ultrasonic autofocus, a focus distance scale beneath a viewing window, and the lack of an autofocus limit switch.

Advantages are that the Nikon lens includes a Super ED (Extra-low Dispersion) element, up-market Nano crystal coatings to fend off ghosting and flare, and a well-rounded aperture based on nine diaphragm blades. It also has a rubber sealing ring on its mount, but unfortunately the rest of the lens isn't weather-sealed.

### PERFORMANCE

In the 60mm shoot-out, the Nikon proves to be sharper than the Canon throughout the aperture range, and hangs onto sharpness much better at very narrow apertures. There's less colour fringing as well, but manual focusing is a little bit lacking in smoothness and precision.

#### SHARPNESS HIGHER IS BETTER

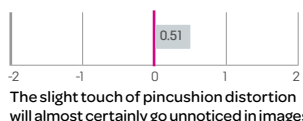


Impressive sharpness characteristics are very similar to those of Nikon's pricier 105mm lens.

#### FRINGING LOWER IS BETTER

**f/2.8 0.37 f/8 0.52 f/16 0.62**  
There's so little colour fringing, it's basically a non-issue at any aperture setting.

#### DISTORTION NEARER 0 IS BETTER



#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



Full-frame Nikon DX Nikon FX

## Nikon AF-S VR Micro 105mm f/2.8G IF-ED

### £620/\$980

It's Nikon's top-dollar stabilised macro

**N**ikon boasts that this was the world's first macro lens to feature stabilisation, or Vibration Reduction, as the company calls it. It's not a 'hybrid' stabiliser, as fitted to the Canon 100mm lens, but is similarly effective.

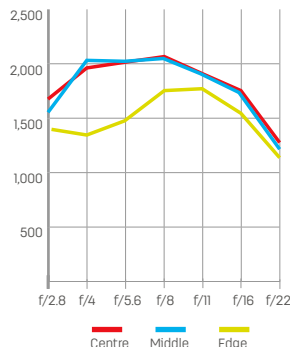
The smooth-action manual focus ring has a long travel, which makes manual focusing for macro shots very precise. There's an autofocus limit switch, but it can only lock out the short end of the range below 0.5m.

An ED (Extra-low Dispersion) element is included in the build, which also features a weather-sealed mounting plate and nine-blade diaphragm. Overall build quality feels of a similarly professional-grade standard to the Canon 100mm lens.

### PERFORMANCE

Autofocus is fast, accurate and very quiet. It's marginally less sharp than the Canon 100mm at both ends of the aperture range but there's very little in it. Again, though, the Nikon struggles to justify its high price when compared with the Sigma and Tamron lenses.

#### SHARPNESS HIGHER IS BETTER



It's no sharper than some lenses on test that are much less expensive to buy.

#### FRINGING LOWER IS BETTER

**f/2.8 1.92 f/8 2.26 f/16 2.31**  
The Nikon 105mm has the worst lab scores for fringing of any lens in the group.

#### DISTORTION NEARER 0 IS BETTER



#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★



Micro Four Thirds Micro Four Thirds

## Olympus 60mm f/2.8 Macro M.Zuiko Digital ED £350/\$500

A slim and stylish MFT macro

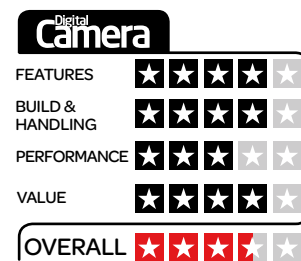
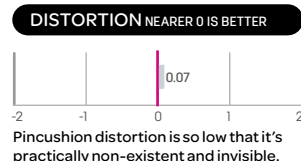
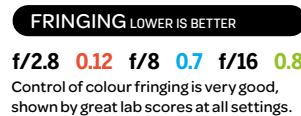
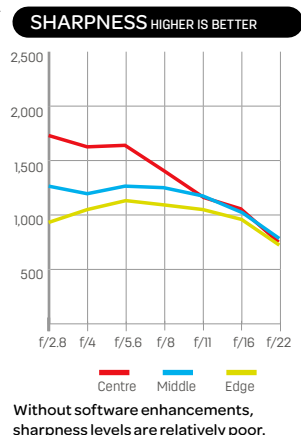
**B**uilt for Micro Four Thirds cameras with a 2.0x crop factor, this lens has an effective focal length of 120mm. It's about the same length as the baby Canon 60mm, but much slimmer and lighter at just 185g.

The lens is beautifully built with a dust- and splash-proof construction, along with a high-precision feel to its fly-by-wire focus ring. A clever four-position AF lock switch includes a setting that forces the lens to its closest focus setting, so you can adjust the position of the camera to achieve maximum macro magnification.

ZERO (Zuiko Extra-low Reflection Optical) coatings are effective against ghosting and flare, although the aperture is only moderately rounded, based on seven diaphragm blades.

### PERFORMANCE

We've been very impressed by this lens in the past, as it works brilliantly well on the OM-D range and other Olympus MFT bodies. However, a lot of artificial sharpening seems to be applied as, when processing raw files with independent software, sharpness figures are relatively lacklustre.



Full-frame Canon EF Fujifilm X Nikon FX Pentax K  
Samsung NX Sony A Sony E Micro Four Thirds

## Samyang 100mm f/2.8 ED UMC Macro £350/\$550

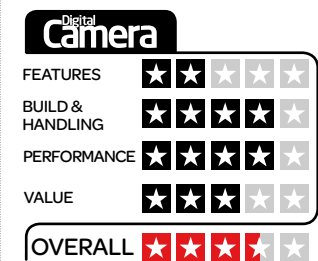
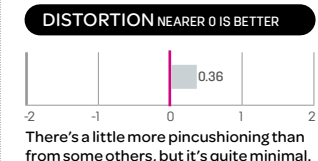
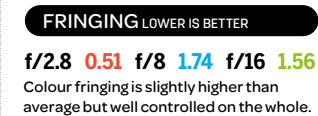
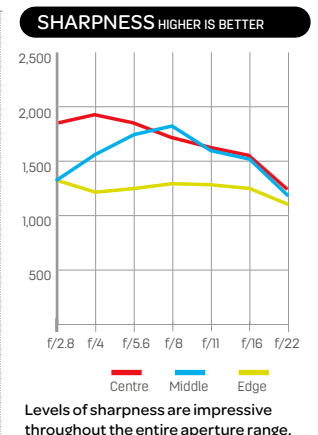
It's a real hands-on approach

**D**igital photographers have grown accustomed to all kinds of bells and whistles, and expect autofocus and camera-controlled aperture settings at the very least. So Samyang's 100mm macro lens can feel like a shock to the system. It has no on-board electronics for communication with the host camera body, and you therefore have to focus manually and adjust the lens's aperture ring by hand.

That's not as bad as it sounds, as manual focusing is usually preferred in macro shooting and the only real downside is that, once stopped down to a narrow aperture, the viewfinder image is quite dark. Even so, Live View can come to the rescue while also enabling a magnified preview for accurate focusing.

### PERFORMANCE

Making the most of its HR (High Refractive) and ED (Extra-low Dispersion) elements, the Samyang delivers very good sharpness and contrast, even at its widest aperture. The focus ring has a long travel and very smooth operation, making for very precise manual adjustments, which is just as well in the absence of autofocus.







Full-frame Canon EF Nikon FX Sigma SA Sony E

## Sigma 105mm f/2.8 Macro EX DG OS HSM

£380/\$770

A great lens at a bargain price

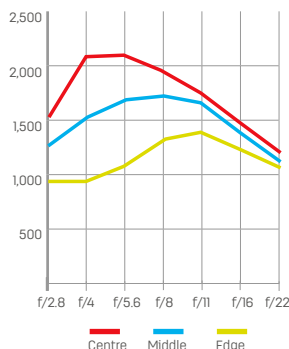
**T**his Sigma lens competes with Canon and Nikon's finest macro offerings on many levels. It's well-built and has an impressive feature list that includes fast, quiet and accurate ring-type ultrasonic autofocus, image stabilisation, and a rounded aperture based on nine diaphragm blades.

It also has a three-position autofocus limit switch for excluding either the short or long ends of the range, and comes complete with a hood, a hood adaptor for shooting with APS-C format cameras, and a well-padded soft case. Optical attractions include two SLD (Special Low Dispersion) elements and SMC (Super Multi-layer Coatings) to reduce ghosting and flare.

### PERFORMANCE

The fast autofocus system and dual-mode stabiliser make the Sigma a great choice for telephoto shooting, along with its excellent sharpness and contrast at wide apertures. This is maintained at all apertures, making the lens excellent for macro shooting. The Sigma easily matches the equivalent Canon and Nikon lenses, making it unbeatable value.

#### SHARPNESS HIGHER IS BETTER



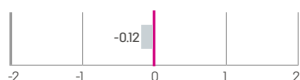
There's a real bite and crispness to the Sigma's images, with excellent sharpness.

#### FRINGING LOWER IS BETTER

Centre **0.56** Mid **0.79** Edge **0.76**

You'd struggle to see any colour fringing, even in the extreme corners of the frame.

#### DISTORTION NEARER 0 IS BETTER



Images are distortion-free although, technically, there's a touch of barrel here.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★

Full-frame Canon EF Nikon FX Sony A

## Tamron SP 90mm f/2.8 Di VC USD Macro

£350/\$750

Super performance and top value

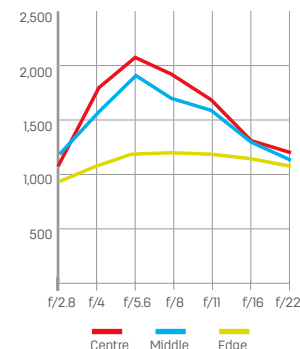
**F**rom Tamron's Super Performance line of lenses, this one takes on the Canon, Nikon and Sigma 100mm and 105mm lenses on test. A similar array of features includes ring-type ultrasonic autofocus, image stabilisation in the shape of Tamron's Vibration Compensation, and a three-position autofocus limit switch.

High-tech glass includes one LD (Low Dispersion) and one XLD (eXtra Low Dispersion) element. Like in the Nikon 105mm lens, there are nano-based coatings, this time based on Tamron's eBand technology. Physically, the Tamron is slightly smaller than the Sigma lens and lighter at 550g instead of 725g. Build quality feels good overall, but the focus ring is slightly lacking in smoothness when making fine adjustments.

### PERFORMANCE

The Tamron matches the Sigma for autofocus speed and the effectiveness of its stabilisation, at least for static rather than panning shots. Sharpness and contrast drop off quite noticeably at the widest aperture setting, but that's not generally a problem when it comes to macro shooting.

#### SHARPNESS HIGHER IS BETTER



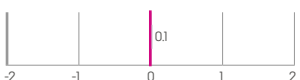
It's not great at f/2.8 to f/4, but matches the Sigma at medium to narrow apertures.

#### FRINGING LOWER IS BETTER

f/2.8 **0.67** f/8 **0.88** f/16 **0.82**

There's hardly any colour fringing, even around high-contrast edges at the corners.

#### DISTORTION NEARER 0 IS BETTER



The tiny amount of pincushion distortion is only seen in lab data, not the image results.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
OVERALL	★★★★★

THE DIGITAL CAMERA VERDICT

SIGMA SCOOPS THE TOP SLOT

For great quality at a great price, the Sigma 105mm wins

The Sigma 105mm OS is a top performer. It's capable of revealing almost microscopic levels of detail in extreme close-ups, and is equally adept as a short telephoto for general shooting. It's quite sporty too, with a dual-mode image stabiliser that has a panning mode.

The Sigma is a much better buy than the comparatively expensive Canon 100mm IS and Nikon 105mm VR lenses. In the UK at least, these 'own brand' lenses are nearly twice the price of the Sigma, although there's less of a price difference in the States. The same applies to the Tamron 90mm VC, which is very nearly as good as the Sigma – and is

also more of a money-saver in the UK.

The Samyang 100mm is another interesting lens which is better value in the US than the UK. The lack of autofocus or aperture control via the camera will put some people off, but it works well as a manual macro lens, and delivers very good image quality.

Results are also excellent from the well-engineered Olympus 60mm, although our tests revealed that it's flattered by sharpening enhancements in-camera or via Olympus's raw conversion software. Image quality from the Nikon 60mm is rather more impressive, whereas sharpness from the APS-C specific Canon 60mm is relatively lacklustre. 📷



HOW THE LENSES COMPARE								
Contact	www.canon.co.uk		www.nikon.co.uk		www.olympus.co.uk	www.syoport.com	www.sigma-imaging-uk.com	www.tamron.co.uk
Street Price	£305/\$420	£635/\$850	£370/\$600	£620/\$980	£350/\$500	£350/\$550	£380/\$770	£350/\$750
Mount options	EF	EF	DX EF	DX EF	MFT	EF X FX K NX A E MFT	EF FX SA E	EF FX A
Full-frame compatible	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Elements/Groups	12/8	15/12	12/9	14/12	13/10	15/12	16/11	14/11
Diaphragm blades	7 blades	9 blades	9 blades	9 blades	7 blades	9 blades	9 blades	9 blades
Autofocus type	Ultrasonic (ring-type)	Ultrasonic (ring-type)	Ultrasonic (ring-type)	Ultrasonic (ring-type)	Stepping motor	Manual focus only	Ultrasonic (ring-type)	Ultrasonic (ring-type)
Manual AF override	Full-time	Full-time	Full-time	Full-time	Via camera menu	N/A	Full-time	Full-time
Min focus distance	0.2m	0.3m	0.19m	0.31m	0.19m	0.31m	0.31m	0.3m
Magnification factor (max)	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x
Minimum aperture	f/32	f/32	f/32	f/32	f/22	f/32	f/22	f/32
Optical stabilizer	No	Yes	No	Yes	No	No	Yes	Yes
Filter size	52mm	67mm	62mm	62mm	46mm	67mm	62mm	58mm
Included accessories	None	Hood, pouch	Hood, pouch	Hood, pouch	None	Hood	Hood, soft case	Hood
Dimensions (D x L)	73 x 70mm	78 x 123mm	73 x 89mm	83 x 116mm	56 x 82mm	73 x 121mm	78 x 126mm	76 x 123mm
Weight	335g	625g	425g	750g	185g	720g	725g	550g
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD & HANDLING	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
PERFORMANCE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

KEY: EF Canon X Fujifilm X-Series DX Nikon DX FX Nikon FX K Pentax K NX Samsung NX SA Sigma SA A Sony A A Sony E MFT Micro Four Thirds





**ZOOM LENS** Sigma 24-35mm f/2 DG HSM | A > £950/\$1,000 > [www.sigma-imaging-uk.com](http://www.sigma-imaging-uk.com)

# Fine Art

Sigma aims for a three-in-one advantage

**S**igma proclaims this 24-35mm Art series lens to be “the world’s first” full-frame wide-angle zoom with a constant f/2 aperture. It seeks to offer the performance of top-flight 24mm, 28mm and 35mm prime lenses in a zoom.

A first for full-frames it may be, but we’ve seen something similar for APS-C cameras: Sigma’s own 18-35mm Art lens, with an even faster f/1.8 aperture.

The new 24-35mm not only has a tough act to follow, it’s got some stiff competition. Canon, for example, makes 24mm f/2.8, 28mm f/2.8 and 35mm f/2 primes. While the first two of these are a full f/stop slower than the Sigma, all three have four-stop image stabilisation: the Sigma has none.

## BUILD AND HANDLING

What you gain with the Sigma is the convenience of not having to keep swapping lenses every time you want a different wide-angle focal length. It’s certainly smaller, lighter and less expensive than all

three Canon lenses. The Sigma is beautifully crafted, and comes with a hood and a soft case.

The lens is pretty chunky, but feels balanced on bodies like the 6D and the 5D Mk III. Internally, the complex optical design of 17 elements in 12 groups is a feast of glass. Along with an FLD (Fluorite Low-Dispersion) element, there are seven SLD (Special Low-Dispersion) elements, aiming to maximise sharpness and contrast while keeping colour fringing to a minimum. Nine diaphragm blades give a rounded aperture.

## PERFORMANCE

Compared with the Canon primes (we rated the 24mm f/2.8 model with four stars in issue 170’s wide-angle prime Group Test), the Sigma is sharper throughout its entire zoom range.

Fringing and distortions are minimal – and highly impressive for this class of lens. While vignetting is noticeable at f/2, peripheral illumination is greatly increased by stopping the aperture down to just f/2.8. 📷

**1** Sigma’s Super Multi-Layer coatings are applied to reduce ghosting and flare.

**2** The focus ring operates smoothly and gives full-time manual override.

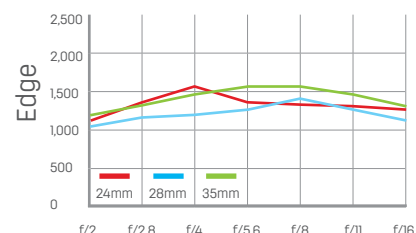
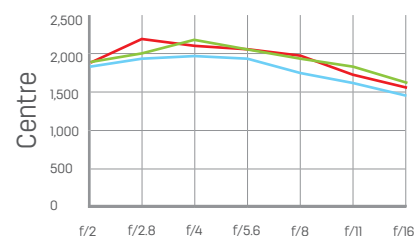
**3** Positioned beneath a viewing window, the focus distance scale is calibrated in both metres and feet.

**4** Build quality is excellent throughout, but the lens doesn’t feature weather seals.

## > THE SPECS

Full-frame compatible	Yes
Focal length	24-35mm (up to 38.4-56mm on an APS-C)
Image stabiliser	No
Min focus distance	0.28m
Max magnification factor	0.23x
Manual focus override	Full-time
Focus limit switches	No
Internal zoom/focus	Yes/Yes
Filter size	82mm
Iris blades	9 blades
Weather seals	No
Diameter and length	88 x 123mm
Weight	940g

## SHARPNESS



Sharpness is superb throughout the zoom and aperture ranges, across the whole frame.

## FRINGING (AT F/8) LOWER IS BETTER

Wide **2.14** Mid **2.02** Tele **1.24**

There’s very little colour fringing at any aperture, even towards the frame’s corners.

## DISTORTION NEARER 0 IS BETTER

Wide **-2.6** Mid **-0.17** Tele **1.13**

Another standout area of performance is that barrel distortion is low for a wide-angle.

## Digital Camera

### FEATURES

★★★★★

### PERFORMANCE

★★★★★

### BUILD QUALITY

★★★★★

### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** Sigma’s new 24-35mm lives up to its claims and really does deliver prime lens image quality with the convenience of zoom.



# Super telephoto zooms

Matthew Richards tests eight long-tom lenses that really go the distance

**B**ack in the days of 35mm film, a 70-300mm lens was enough to satisfy most photographers. But in the digital age of APS-C format cameras, the 'effective' reach stretches to 450mm (480mm for Canon), and that's the new standard. It's easy to feel short-changed in telephoto power when you make the upgrade to a full-frame camera, and shrinking

back to 'just' 300mm. The solution is to go for a bigger lens that gives actual focal lengths of between 400mm and 600mm.

All eight lenses in this test are compatible with full-frame bodies. Naturally, they can also be used on APS-C SLRs to give you an astonishing reach, where a 600mm focal length equates to 900mm (960mm for Canon). Prices start at £900/\$1,100 – so let's see how they compare...

## THE CONTENDERS

- 1 Canon EF 100-400mm f/4.5-5.6L IS II USM, £2,000/\$2,200
- 2 Nikon AF-S 80-400mm f/4.5-5.6G ED VR, £1,900/\$2,700
- 3 HD Pentax D FA 150-450mm f/4.5-5.6 ED DC AW, £2,000/\$2,500
- 4 Sigma APO 50-500mm f/4.5-6.3 DG OS HSM, £1,000/\$1,650
- 5 Sigma 150-600mm f/5-6.3 DG OS HSM | C, £900/\$1,090
- 6 Sigma 150-600mm f/5-6.3 DG OS HSM | S, £1,500/\$2,000
- 7 Sony 70-400mm f/4-5.6 G SSM II, £1,560/\$2,200
- 8 Tamron SP 150-600mm f/5-6.3 Di VC USD, £870/\$1,070





Super-telephoto lenses are great for many sports, such as motor racing – and essential for photographing many birds. But they are also the stock in trade of the avid airshow photographer.

From the makers of **Digital Camera** magazine

# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL



Full-frame Canon EF

## ◦ Canon EF 100-400mm f/4.5-5.6L IS II US

£2,000/\$2,200

A new twist on an old faithful

**T**he original edition of this lens was notorious for its ‘trombone’ zoom mechanism. The new Mark II edition uses a twist-action zoom ring, although it retains the original’s smooth/tight adjustment ring, which is good for avoiding zoom creep or accidental zoom adjustment when panning.

Like most Canon L-series lenses, this one has weather seals and solid build quality. As in the original design, top-quality fluorite and Super UD (Ultra-low Dispersion) elements are incorporated to boost sharpness and contrast. A new nano-technology ASC (Air Sphere Coating) is applied to reduce ghosting and flare.

### PERFORMANCE

Compared with the original lens, it’s hard to spot any real improvement in image quality, but the new image stabiliser boosts effectiveness from three to four stops, while adding an additional third mode, where the stabilisation effect is only applied when the shutter is released. This can be more ideal for action shooting, which also benefits from very fast autofocus.

SHARPNESS HIGHER IS BETTER

Compared to other lenses here, sharpness is average but doesn't drop off too badly.

FRINGING LOWER IS BETTER

Wide 2.44 Mid 0.57 Tele 0.03

It's a little worse than most at the short end but there's little fringing at mid zoom.

DISTORTION NEAR 0 IS BETTER

Wide -1.11 Mid -0.17 Tele 1.33

Unlike most lenses in the group, there's a little barrel distortion at the short end.

Digital Camera	★ ★ ★ ★ ★
FEATURES	★ ★ ★ ★ ★
BUILD & HANDLING	★ ★ ★ ★ ★
PERFORMANCE	★ ★ ★ ★ ★
VALUE	★ ★ ★ ★ ★
OVERALL	★ ★ ★ ★ ★



Full-frame Nikon F

## Nikon AF-S 80-400mm f/4.5-5.6G ED VR

£1,900/\$2,700

The reinvention of a ground-breaker

**N**ikon’s D-mount edition of the 80-400mm (launched in 2000) was the first Nikkor to feature VR (Vibration Reduction). However, the lens was criticised for its slow autofocus, driven by the camera body. The new G-mount edition ditches the aperture ring, adds ring-type ultrasonic autofocus, and includes an additional ED (Extra-low dispersion) element; this takes the total count to four, plus a new Super ED element. The upgraded stabiliser is rated at four stops and adds an Active mode.

Like the Canon lens, the Nikon features a two-position focus limiter switch that can lock out the short range. It also adds a zoom lock switch for use at the shortest zoom length. The lens isn’t weather-sealed, but features a moisture and dust-repellent rubber ring on its mount.

### PERFORMANCE

Not only is the AF-S (AF-Silent wave) system fast and quiet, but it makes autofocus available on any Nikon body. The stabiliser is much more effective than in the original lens, and Nano coatings do a better job of reducing ghosting and flare.

SHARPNESS HIGHER IS BETTER

Mid to long zoom sharpness levels are among the best in the group.

FRINGING LOWER IS BETTER

Wide 1.35 Mid 0.56 Tele 0.77

There's less fringing than from the Canon lens at the shortest zoom setting.

DISTORTION NEAR 0 IS BETTER

Wide 0.32 Mid 1.07 Tele 1.2

Pincushion distortion is minimal at the short end and doesn't rise too steeply.

Digital Camera	★ ★ ★ ★ ★
FEATURES	★ ★ ★ ★ ★
BUILD & HANDLING	★ ★ ★ ★ ★
PERFORMANCE	★ ★ ★ ★ ★
VALUE	★ ★ ★ ★ ★
OVERALL	★ ★ ★ ★ ★





SUPER TELEPHOTO



Full-frame Pentax K

## HD Pentax D FA 150-450mm f/4.5-5.6 ED DC AW

£2,000/\$2,500

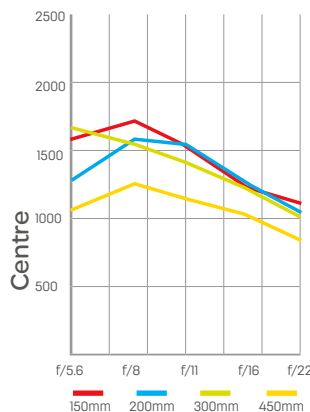
Pentax goes back to the future

**T**his high-tech new Pentax lens boasts ED elements, DC motor-driven 'quick-shift' autofocus, weather-sealed construction and HD coatings to optimise image quality. It's also full-frame compatible – ready for Pentax's first full-frame SLR, set to go on sale later this year. Pro-style design includes four focus buttons positioned around the mid section of the barrel. These can be configured to activate autofocus, to focus on a preset distance, or to cancel autofocus drive. Autofocus modes themselves include QFS/A and QFS/M, enabling full-time manual override either after autofocus has been acquired or while autofocus is operating, respectively.

### PERFORMANCE

Performance is mostly impressive, and benefits from a three-position focus limiter switch that can lock out the long and short end of focus travel. Similarly, the tripod collar's click-stops make for easy switching between landscape and portrait orientation. However, autofocus is sluggish compared with other lenses in the group, and sharpness could be better.

#### SHARPNESS HIGHER IS BETTER



#### FRINGING LOWER IS BETTER

**Wide 0.91 Mid 0.79 Tele 2.08**  
Fairly little colour fringing throughout most of the range, but it rises at 450mm.

#### DISTORTION NEAR 0 IS BETTER

**Wide 0.62 Mid 0.76 Tele 0.44**  
Distortion is consistently well controlled with minor amounts of pincushion throughout.

#### Digital Camera

FEATURES	★ ★ ★ ★ ★
BUILD & HANDLING	★ ★ ★ ★ ★
PERFORMANCE	★ ★ ★ ★ ★
VALUE	★ ★ ★ ★ ★

OVERALL ★ ★ ★ ★ ★

Full-frame Canon EF Nikon F Pentax K Sigma SA Sony A

## Sigma APO 50-500mm f/4.5-6.3 DG OS HSM

£1,000/\$1,650

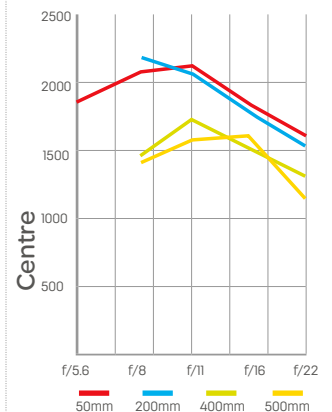
A super-zoom super-telephoto

**T**his lens offers a mighty 10x zoom range that stretches all the way from a 'standard' 50mm focal length to a super-telephoto 500mm. At the long end, it could therefore match the longest super-tele zooms on the market from Sigma and Tamron, while playing into the hands of photographers who hate swapping lenses. However, the lens is ludicrously big and heavy to use at 50mm unless you really have to. Zoom creep is severe and the zoom lock switch can only be used at the shortest focal length. There are no focus limiter switch or weather seals, and no compatibility with Sigma's optional USB Dock. All of this makes the lens look a bit of a poor relation to Sigma's two newer 150-600mm lenses.

### PERFORMANCE

Autofocus is very fast, so the absence of the focus limiter isn't a disaster. The four-stop optical stabiliser works well in both static and panning modes, and is fitted in all of the Canon, Nikon, Pentax and Sony versions. Sharpness is very good throughout most of the zoom range, although distortions and fringing can be noticeable.

#### SHARPNESS HIGHER IS BETTER



#### FRINGING LOWER IS BETTER

**Wide 4.18 Mid 1.56 Tele 3.29**  
This lens gives the worst lab scores for colour fringing of any lens in the group.

#### DISTORTION NEAR 0 IS BETTER

**Wide -1.48 Mid 1.54 Tele 1.8**  
The extra-large zoom range means more barrel and pincushion distortions.

#### Digital Camera

FEATURES	★ ★ ★ ★ ★
BUILD & HANDLING	★ ★ ★ ★ ★
PERFORMANCE	★ ★ ★ ★ ★
VALUE	★ ★ ★ ★ ★

OVERALL ★ ★ ★ ★ ★



Full-frame Canon EF Nikon F Sigma SA

◦ Sigma 150-600mm f/5-6.3 DG OS HSM | C  
£900/\$1,090

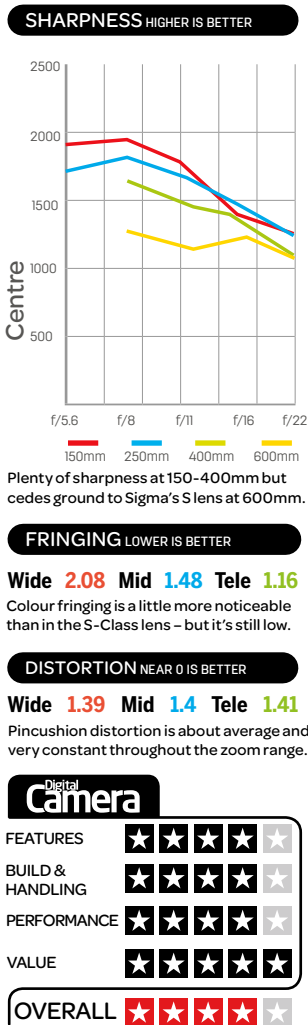
A long yet lightweight zoom

This Contemporary lens has the same zoom range as Sigma's Sport version (see right) in a smaller, lighter package. It's near identical in size and weight to the Tamron 150-600mm.

The C has many of the features of the pricier S-class lens – including a zoom lock that operates at any marked focal length, and a revamped dual-mode optical stabiliser. There's also the same new dual-mode autofocus system where the MO (Manual Override) mode disables autofocus and switches to manual focus if you turn the focus ring. Other similarities include three-position switches for the focus limiter and custom set-up modes, using the optional USB Dock.

PERFORMANCE

The C-class lens isn't as sharp as the pricier S-class optic, and sharpness drops away more through the zoom range. But it's slightly sharper than the Tamron 150-600mm at the longest focal length. Autofocus is fairly fast, but not quite as speedy as in the Canon and Nikon lenses. The zoom and focus rings have a smooth action and a nice level of friction.



Full-frame Canon EF Nikon F Sigma SA Sony A

Sigma 150-600mm f/5-6.3 DG OS HSM | S  
£1,500/\$2,000

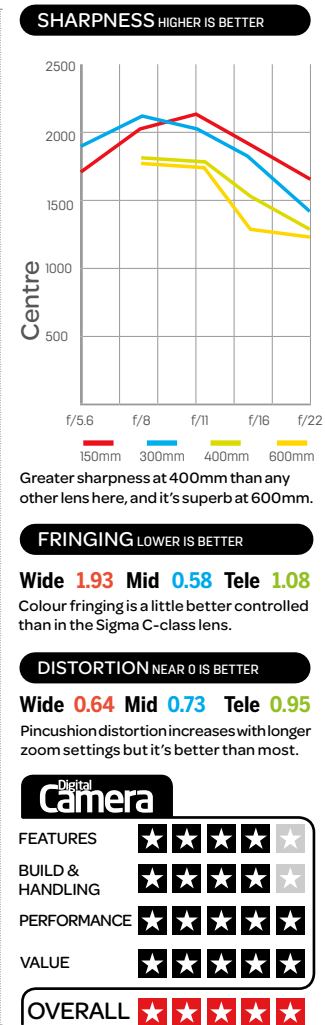
It's a big, weighty beast

This is the biggest and heaviest lens in the group. It has far more telephoto reach than the Canon, Nikon, Pentax and Sony lenses, and the front section is more bulbous than in the Sigma C-class and Tamron 150-600mm competitors, demanding a 105mm filter. Compared with the Sigma C-class's single FLD (Fluorite Low Dispersion) and three SLD (Special Low Dispersion) elements, the S-class adds an extra top-grade FLD element.

The S-class adds a carrying strap and lugs on the body of the lens and on the larger tripod foot. It suffers more from zoom creep – although it does provide a zoom lock switch that can lock the lens at any marked focal length. It's also comprehensively weather-sealed.

PERFORMANCE

Sharpness on the S-class lens is excellent even at the longest 600mm focal length, autofocus is fast and highly accurate, and overall performance is simply superb in all aspects of image quality and handling. It's more expensive than the other two 150-600mm lenses on test, but well worth the extra outlay.







Full-frame Sony A



## Sony 70-400mm f/4-5.6 G SSM II

£1,560/\$2,200

It's Sony's go-faster Mk II edition

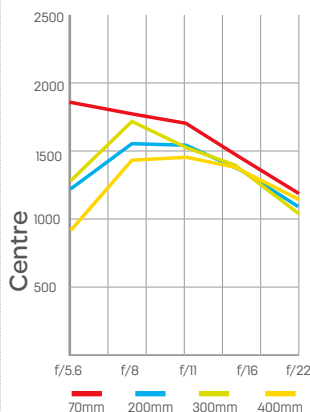
**S**ony's answer to the likes of the Canon 100-400mm and Nikon 80-400mm is very similar in size and weight. The ring-type SSM (Super Sonic wave Motor) gives quiet autofocus, claimed to be four times as fast as its predecessor. The Mk II also adds Nano AR coatings to combat ghosting and flare. It's dust and moisture resistant, but there's no weather-sealed mount.

Our sample didn't suffer from zoom creep, but there's no zoom lock switch. The AF/MF switch also acts as a range limiter, with an extra mid-point lock. Plus you get the usual full-time manual override. Three buttons towards the front of the lens enable 'focus hold' (locking out autofocus), although they can't be configured like on the Pentax lens. Like the Pentax, there's no optical stabiliser.

### PERFORMANCE

Autofocus on this Sony 70-400mm lens isn't any quicker than in the Sigma and Tamron lenses, but faster and quieter than in the Pentax. Image quality is good overall, but levels of sharpness aren't quite a match for the competing Canon and Nikon.

#### SHARPNESS HIGHER IS BETTER



There's greater sharpness at 400mm than with any other lens on test.

#### FRINGING LOWER IS BETTER

**Wide 1.06 Mid 0.72 Tele 0.43**  
Colour fringing is a little better controlled than in the Sigma C-class lens.

#### DISTORTION NEAR 0 IS BETTER

**Wide 0.03 Mid 1.34 Tele 1.38**  
Distortion increases with longer zoom settings but less than from most others.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
<b>OVERALL</b>	★★★★★



Full-frame Canon EF Nikon F Sony A

## Tamron SP 150-600mm f/5-6.3 Di VC

USD £1,000/\$1,650

Affordable long tom with a big reach

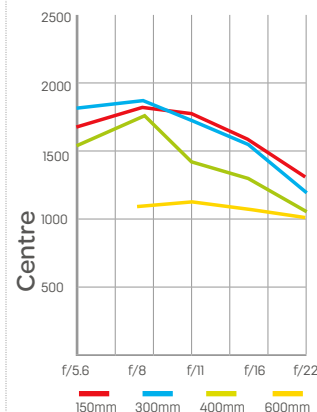
**T**his is the longest lens in the Tamron stable, matching the two new Sigma lenses for zoom range. The design includes LD (Low Dispersion) and XLD (Extra Low Dispersion) elements to boost sharpness and contrast, while reducing chromatic aberration. The XLD element is claimed to give similar performance to fluorite.

It's the same weight as Sigma's C-class lens, but zoom creep is more severe, especially in the 150-350mm section, and the zoom lock can only be engaged at the shortest setting. The two-position focus limiter and autofocus options are more basic than in the Sigma lenses, and there's no separate panning mode for the stabiliser. Overall build feels good; the lens features weather seals and autofocus is remarkably quiet, even for a ring-type ultrasonic system.

### PERFORMANCE

Sharpness is very good throughout most of the zoom range. Overall image quality is impressive for a lens of this price and telephoto reach. However, while the single-mode stabilisation is claimed to be effective when panning, we didn't find it beneficial.

#### SHARPNESS HIGHER IS BETTER



A match for some of the best lenses, but drops off considerably at 500-600mm.

#### FRINGING LOWER IS BETTER

**Wide 1.06 Mid 0.72 Tele 1.59**  
Well controlled overall; there's only a little colour fringing, mostly in image corners.

#### DISTORTION NEAR 0 IS BETTER

**Wide 1.42 Mid 1.52 Tele 1.47**  
Very consistent, and almost exactly the same as the Sigma C-class 150-600mm.

#### Digital Camera

FEATURES	★★★★★
BUILD & HANDLING	★★★★★
PERFORMANCE	★★★★★
VALUE	★★★★★
<b>OVERALL</b>	★★★★★

THE DIGITAL CAMERA VERDICT

SIGMA GRABS THE TOP SPOT

Sigma's new 150-600mm f/5-6.3 DG OS HSM S wins

Sigma's 150-600mm S-class lens is the new champion of reasonably priced super-telephoto zooms. It's packed with high-end features, has excellent handling characteristics and delivers superb image quality. Indeed, image quality is better than from other lenses on test at focal lengths of around 300-400mm, and also beats that of the Sigma C-class and Tamron 150-600mm lenses in the extended 400-600mm range. The only catch is that it's about 50 per cent heavier than some lenses in the group – and nearly twice the weight of others.

The Canon 100-400mm and Nikon 80-400mm lenses are very good performers but lack the extra reach of the 150-600mm lenses, and they're more expensive to buy. The Pentax

is another classy lens with some exotic features but it's a bit lacking in sharpness, and there aren't yet any full-frame Pentax D-SLR bodies to make the most of its full-sized image circle.

The Sony 70-400mm isn't quite as sophisticated as the Pentax, but proved a little sharper at both ends of the zoom range. It's directly supported by the A99 full-frame body and other A-mount APS-C format cameras, and can be used with Sony E-mount bodies via an adaptor.

In the budget stakes, it's a close call between the Sigma C-class and Tamron SP 150-600mm lenses. They're both very similar in size, weight and image quality, but the feature set of the Sigma is a little more advanced, making it better value at the price. 📷



HOW THE LENSES COMPARE								
	Canon EF 100-400mm f/4.5-5.6L IS II USM	Nikon AF-S 80-400mm f/4.5-5.6G ED VR	HD Pentax D FA 150-450mm f/4.5-5.6	Sigma APO 50-500mm f/4.5-6.3 DG OS HSM	Sigma 150-600mm f/5-6.3 DG OS HSM   C	Sigma 150-600mm f/5-6.3 DG OS HSM   S	Sony 70-400mm f/4-5.6 G SSM II	Tamron SP 150-600mm f/5-6.3 Di VC USD
Contact	www.canon.co.uk	www.nikon.co.uk	www.pentax.co.uk	sigma-imaging-uk.com			www.sony.co.uk	www.tamron.co.uk
Street Price	£2,000/\$2,200	£1,900/\$2,700	£2,000/\$2,500	£1,000/\$1,650	£900/\$1,090	£1,500/\$2,000	£1,560/\$2,200	£870/\$1,070
Mount options	EF	F	K	EF F K SA A	EF F SA	EF F SA	A	EF F A
Full-frame compatible	Yes	Yes	Yes (Pentax 35mm bodies)	Yes	Yes	Yes	Yes	Yes
Elements / Groups	21/16	20/12	18/14	22/16	20/14	24/16	18/12	20/13
Diaphragm blades	9 blades	9 blades	9 blades	9 blades	9 blades	9 blades	9 blades	9 blades
Autofocus type	Ultrasonic (ring)	Ultrasonic (ring)	DC motor	Ultrasonic (ring)	Ultrasonic (ring)	Ultrasonic (ring)	Ultrasonic (ring)	Ultrasonic (ring)
Manual AF override	Full-time	Full-time	Full-time	Full-time	Full-time	Full-time	Full-time	Full-time
Minimum focus distance	0.98m	1.5m	2.0m	0.5-1.8m	2.8m	2.6m	1.5m	2.7m
Max magnification factor	0.31x	0.20x	0.22x	0.32x	0.20x	0.20x	0.27x	0.20x
Image Stabiliser	Yes	Yes	No	Yes	Yes	Yes	No	C N fit only
Filter size	77mm	77mm	86mm	95mm	95mm	105mm	77mm	95mm
Included accessories	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch	Hood
Dimensions (DxL)	94x193mm	96x203mm	95x242mm	104x219mm	105x260mm	121x290mm	95x196mm	106x258mm
Weight	1.64kg	1.57kg	2.13kg	1.97kg	1.93kg	2.86kg	1.59kg	1.95kg
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD & HANDLING	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
PERFORMANCE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

KEY: EF Canon EF F Nikon F K Pentax K SA Sigma SA A Sony A



## LENS TEST

SIGMA 24MM F/1.4 DG HSM | A



The high-quality build is matched by optical excellence of the highest order.

**LENS** Sigma 24mm f/1.4 DG HSM | A > £700/\$850 > [www.sigma-imaging-uk.com](http://www.sigma-imaging-uk.com)

# Prime mover

## High-quality, fast, extra-wide glass

**W**e've been impressed by the quality of Sigma's recent Art-line prime lenses, like the 35mm f/1.4 DG HSM | A and the 50mm f/1.4 DG HSM | A. The newest addition to the line-up is this 24mm lens, which maintains the same wide f/1.4 maximum aperture, while extending wide-angle viewing potential.

Compared with the 63.4° viewing angle of the 35mm lens, this one stretches to 84.1° (measured on the diagonal, using a full-frame body). Like the Sigma 35mm and 50mm Art lenses, the 24mm costs around £700/\$850.

### BUILD AND HANDLING

The 24mm lens follows the same design ethic as the 35mm and 50mm Art lenses. As such, it features a high-quality brass mounting plate with compatibility to Sigma's optional USB dock, along with metal and TSC (Thermally Stable Composite) barrel parts. A focus distance scale under a viewing window has depth of field markings for f/8 and f/16

apertures towards the rear, and a super-smooth focus ring towards the front.

Focusing is all internal so the front element neither extends nor rotates. Autofocus is rapid, quiet and precise, based on a ring-type ultrasonic system. A lens hood and soft case are included.

The internals feature three FLD (F Low Dispersion) elements of equal optical performance to top-grade fluorite glass, four SLD (Special Low Dispersion) and two aspherical elements. Super Multi-Layer Coatings reduce flare, and a nine-blade diaphragm enables well-rounded apertures.

### PERFORMANCE

This lens does very well to retain corner-to-corner sharpness even at its widest f/1.4 aperture, where vignetting is also fairly well controlled. Stop down to f/2.8, and corner-sharpness as well as peripheral illumination both become excellent.

Resistance to ghosting and flare is certainly impressive, while chromatic aberrations and distortion are both minimal. 📷

**1** Smooth and precise in operation, the focus ring enables full-time override of the impressively fast autofocus system.

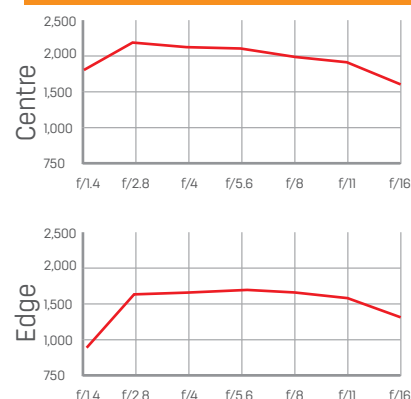
**2** The high-quality brass mount enables compatibility with Sigma's optional USB Dock for firmware upgrades and customisation.

**3** Simple controls boil down to a single switch for AF/MF focusing modes.

### > THE SPECS

Full-frame compatible	Yes
Focal length	24mm (38.4mm on APS-C)
Image stabiliser	No
Min focus distance	0.25m
Max magnification factor	0.19x
Manual focus override	Full-time
Focus limit switches	No
Internal zoom/focus	N/A/Yes
Filter size	77mm
Iris blades	9 (rounded)
Weather seals	No
Dimensions (d x l)	89 x 90mm
Weight	665g

### SHARPNESS



Sharpness across the entire frame is exemplary, especially considering the ultra-wide viewing angle.

### FRINGING (AT F/8) LOWER IS BETTER

**Centre 0.07 Mid 0.72 Edge 0.64**

There's very little colour fringing at any aperture, even towards the frame's corners.

### DISTORTION NEARER 0 IS BETTER



Another standout area of performance is that barrel distortion is extremely minimal for a wide-angle lens.

### Digital Camera

#### FEATURES

★★★★★

#### IMAGE QUALITY

★★★★★

#### BUILD QUALITY

★★★★★

#### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** Continuing the trend set by the other recent Art-line lenses, the new Sigma 24mm is beautifully built and delivers exceptional image quality

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**55**  
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tests

**F**rom the makers of *Digital Camera*, this issue of *Camera Shopper* is packed with reviews of all the latest and most important SLR and compact system (mirrorless) cameras. We've also included reviews of 33 lenses and some great camera accessories. Our tests are the toughest in the business, conducted by photographic experts in our imaging lab as well as in real-world shooting scenarios – so if we say something is the best, believe it.



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