

Group Test

We test and compare the latest products

Upgrade your laptop's SSD

We've tested seven M.2 solid-state drives that could improve your laptop's performance and increase its storage space

There are two types of SSD (solid-state drive): those with a standard SATA connection, which usually come in a 2.5in drive case and look a bit like regular hard drives; and M.2 models, which look more like memory modules, except that they're a bit squarer and the gold teeth that connect them to your PC's motherboard are along the short edge, rather than the long one.

M.2 SSD drives are usually found in laptops rather than desktop PCs, because they're more compact. However, because they have direct contact with the motherboard, they also tend to be faster than regular 2.5in SSDs, which is why they're now cropping up in desktop PCs, too.

HOW WE TESTED

We ran seven M.2 SSDs through a series of benchmark tests. Some were 'artificial' tests that push the drives to their limits so you can monitor their raw performance; others were 'real world' tests, where we look at how well a standard PC performs with the drives inserted, and time how quickly it can be used to transfer data to and from the PC.

The **Samsung 970 Evo** (£75.51 for 256GB | bit.ly/sevo469 | ★★★★★) is a popular M.2 SSD that appears in a lot of PCs nowadays. It's not hard to see why – it offers the same class of memory as the 970 Pro (see opposite) but at a much cheaper price. This discrepancy is down to technicalities (this one has 2-bit architecture compared to the Pro's

3-bit, if you must know) but the key point is that the drive didn't perform like a second-class product in our tests.

We tested the 256GB model but it's worth getting a larger one if you can, because 512GB and above SSDs have a quoted maximum write speed of between 2,300MB/s (the 512GB model) and 3,400MB/s (the 2TB model), while

the 256GB model tops out at 1,500MB/s. Despite this, in our real-world tests, its read speed was very close to the fastest drive we tested. This is precisely where SSD's should excel – they're all about shifting large amounts of data into the computer's memory at top speed, which is why launching operating systems and other software on PCs with SSDs

Buying an M.2 SSD

There are a few things you need to check before you buy an M.2 drive and most important of all is whether your PC accepts them. Have a look in the documentation for your computer or motherboard, or contact the manufacturer. If you're upgrading, make sure you can access the M.2 slot and the existing drive.

The physical size of M.2 drives varies. If you're upgrading, check the size of the unit you're removing. When buying a replacement drive, you'll normally find a four-digit number in the device's name, such as 2280. This indicates the

size in mm: 22 x 80mm. Measure your existing device or check the distance between the M.2 slot and the hole you screw it into. Most are 22mm wide but vary in length, though 80mm is the norm. Some motherboards may have more than one screw-hole, so you can fit different-sized devices.

There's also the complication of interface. M.2 SSDs started off reconfiguring standard SATA interfaces, like you get on standard hard drives. However, newer



An SSD's interface type is usually written on the module – just check what your PC can accept

motherboards may have PCIe M.2 ports, which can transfer data faster. Fastest of all are the NVMe drives, but again, that's a different M.2 format. You should check the spec of your existing drive or research your PC or motherboard specification for information on what you can use.

installed is much faster.

The write speed (transferring files from the PC to the drive) of the 970 Evo sits in the middle of the group but isn't far behind the leaders, and its multi-tasking benchmark score achieved a similar position. We think it offers the best balance between price and performance. However, if you want more power from your SSD, it's worth considering other options.

The **Corsair MP510** (£189.84 for 960GB | bit.ly/corsa469 | ★★★★★) came second in all our speed tests, only just behind the Samsung 970 Pro. If you want a bit more performance than the Samsung 970 Evo but don't want to pay Pro prices, then this is a serious contender. In some of the artificial performance tests we ran, the Corsair model outpaced even the 970 Pro, though we'd put greater weight on the real-world performance results shown in our graphs.

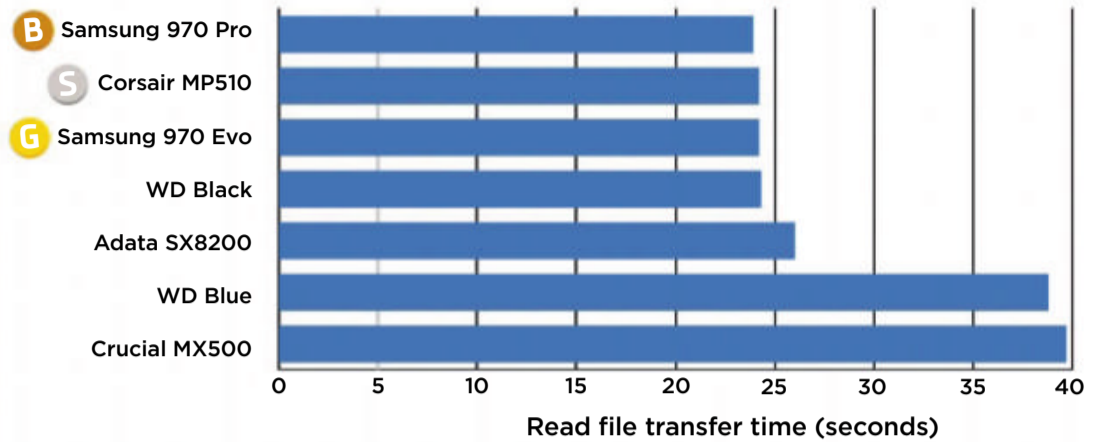
We've already mentioned the **Samsung 970 Pro** (£157.57 for 512GB | bit.ly/spro469 | ★★★★★☆) because it's the best performer in this Group Test. The Corsair may have pipped it in some of our raw-performance tests but the Pro has it where it counts, racing through our realistic everyday performance benchmarks at a blistering pace and scoring at the top of all our charts.

Despite this superlative achievement, we didn't give it our top award because it's expensive and its results are marginal rather than runaway, particularly when pitched against the Corsair MP510. Pay less and you still get superb value for money for only a modest reduction in performance with the 970 Evo.

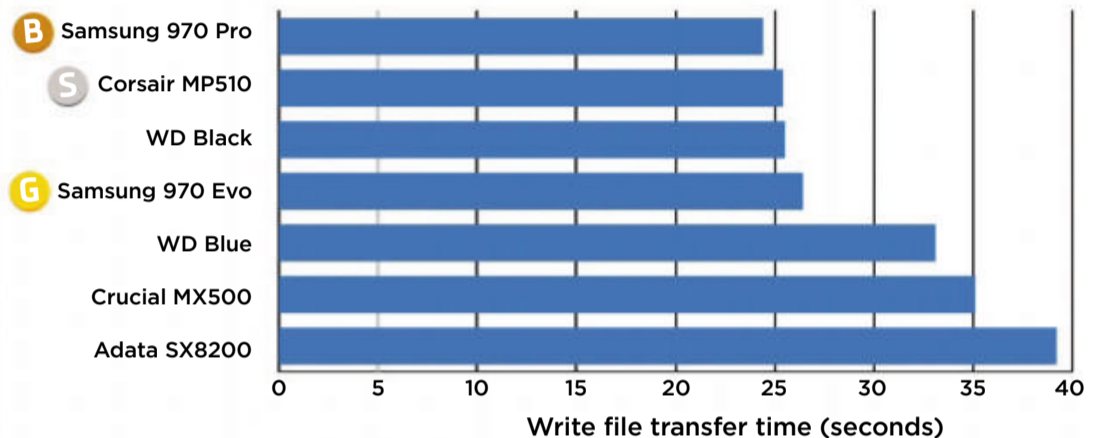
Not quite making our awards but still

TEST-RESULTS CHARTS

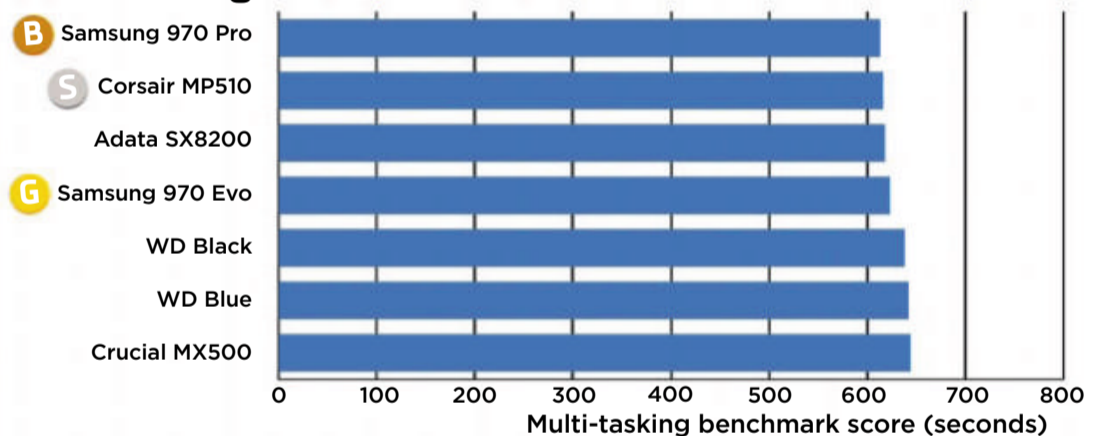
Read file transfer times



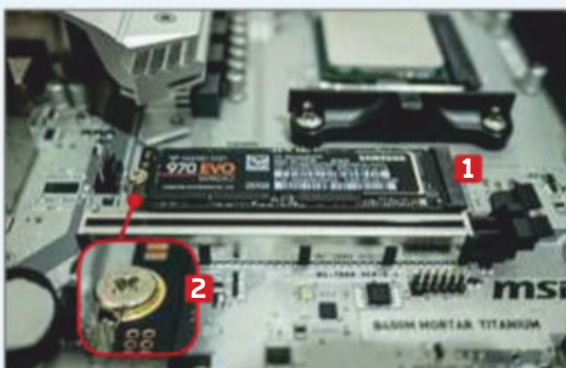
Write file transfer times



Multi-tasking benchmark score



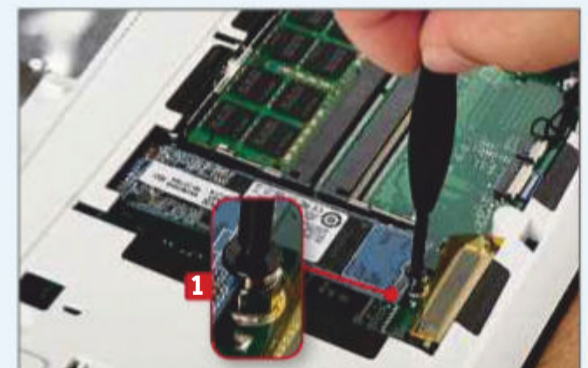
MINI WORKSHOP | How to install an M.2 SSD



1 Open the case and locate the existing M.2 drive or slot, which should be located on the motherboard. The M.2 drive will be connected on one of the short ends **1** with a screw at the other. **2** Don't confuse it with the memory modules, which connect on their long sides.



2 Undo the screw securing any existing device, and lift the end of the SSD that you've unscrewed so it's raised at an angle to the motherboard but still inserted in the connector. **1** Now pull the SSD away from the connector and it should slide out easily.



3 To install the new one, hold it by its long edges, facing upwards, and insert the end with the gold teeth into the slot from which you removed the old SSD. Gently lower it into position before screwing it in place. **1** If it's not fitting, take it out and try again. Don't force it.

Group Test SSDs



	Samsung 970 Evo	Corsair MP510	Samsung 970 Pro	WD Black	Adata SX8200
WEBSITE	bit.ly/sssd469	bit.ly/cors469	bit.ly/sssd469	bit.ly/wd469	bit.ly/adat469
PRICE	£75.51	£189.84	£157.57	£234.99	£71.86
BUY FROM AMAZON	bit.ly/sevo469	bit.ly/corsa469	bit.ly/spro469	bit.ly/wdbk469	bit.ly/adata469
CAPACITY TESTED	256GB	960GB	512GB	1TB	240GB
INTERFACE	M.2 PCIe Gen 3x4	M.2 PCIe Gen 3x4	M.2 PCIe Gen 3x4	M.2 PCIe Gen 3x4	M.2 PCIe Gen 3x4
MAXIMUM BANDWIDTH	3,600MB/s	3,600MB/s	3,600MB/s	3,600MB/s	3,600MB/s
CONTROLLER	Samsung Phoenix 5-core	Phison PS5012-E12	Samsung Phoenix 5-core	SanDisk	SMI SM2262
FLASH-MEMORY TECHNOLOGY	Samsung V-NAND 3-bit MLC	3D BiCS NAND	Samsung V-NAND 2-bit MLC	3D BiCS NAND	64-layer 3D TLC NAND
DIMENSIONS	22 x 80 x 2.38mm	22 x 80 x 3mm	22 x 80 x 2.38mm	22 x 80 x 2.38mm	22 x 80 x 3.5mm
WARRANTY	5 years	5 years	5 years	5 years	5 years

impressive were the **ADATA XPG-SX2800** (£71.86 for 240GB | bit.ly/adata469 | ★★★★★) and the **WD Black M.2** (£234.99 for 1TB | bit.ly/wdbk469 | ★★★★★). The ADATA drive did well in the general performance benchmark, coming third overall, but its write speed let it down, where it sits at the bottom of the test. The WD Black is much better at writing files, where it came third overall, but its performance in the

Windows benchmark placed it in the bottom half of the group.

If you have a SATA M.2 connection, you'll need to opt for one of the slower-performing models. The **Crucial MX500** (£116.27 for 1TB | bit.ly/cruc469 | ★★★★★) was a full 30 seconds slower than the Samsung 970 Pro when completing our Windows benchmark test, which placed it at the bottom of the group. It was also the slowest of the

lot at transferring files to our PC (the read test).

The **WD Blue M.2** (£128.69 for 1TB | bit.ly/wdbu469 | ★★★★★) also failed to shine. Although it was marginally faster in our tests, it still kept the Crucial SSD company at the bottom of the speed charts. If you only have the option of an SATA M.2 connection, however, this is the better of the two that we tested.

OUR VERDICT

All three award-winners are superb, it's just a question of where your budget lies. You want the largest capacity SSD you can afford, so if you can get a larger Gold Award-winning Samsung 970 Evo within your budget, and don't mind compromising a little on absolute top speeds for a good deal, we'd thoroughly recommend it.

If you need the fastest performance, the Samsung 970 Pro, which won our Bronze Award, is worth the extra cost. It was the speediest drive in the vast majority of our tests, so is well worth the expense if you're looking for the best.

It missed out on the Silver Award to the Corsair MP510.



This is a best-of-both-worlds alternative to the two Samsung models, with performance that approaches the Pro at prices that are closer to the Evo.