Rated

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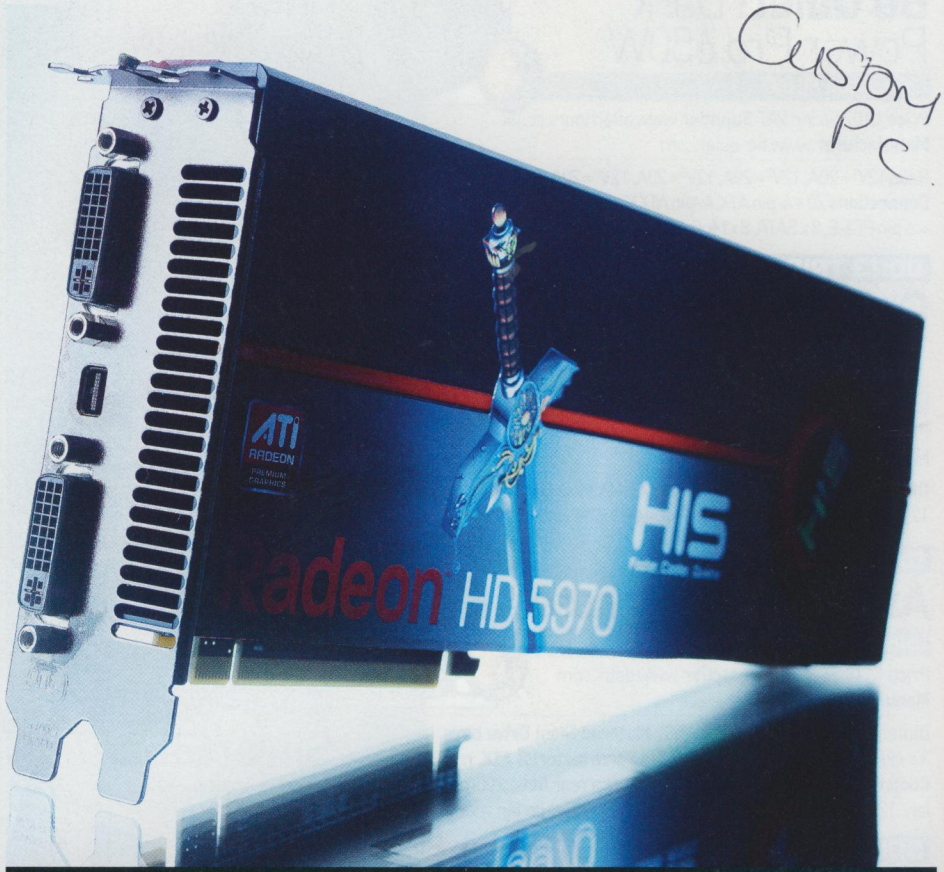
This month's launch of the dual-GPU Radeon HD 5970 (see p42) marks a fairly absurd situation for AMD. The company it bought a couple of years ago (ATI) is clearly on top at the moment, with a range of DX11 cards appearing months before Nvidia's cards. However, AMD's core business of CPUs is way behind its competition.

Manufacturing revisions have made the Phenom II X4 965 Black Edition (see p40) AMD's fastest and most overclockable CPU ever. However, the 965 BE isn't the only CPU on sale for around £150 – there's also Intel's Core i5-750 to consider. Unfortunately for AMD, our tests show that the 965 BE is slower than the i5-750, which means that AMD's fastest CPU is slower than Intel's lowliest 'current' processor (I'm disregarding LGA775, as Intel has no plans to release new CPUs for this socket). The future doesn't look too rosy for AMD either, with Intel set to announce Core i3 early next year (see p11). We expect Core i3 to be cheaper than Core i5 (unless Intel drops the ball again, as it did with LGA1156 Core i7), but the new CPUs will be based on a version of the Nehalem architecture that's proven to be very overclockable in CPUs such as the Core i7-920 (see p98) and the Core i5-750 (see p96).

AMD has two prongs of attack, with the forthcoming 6-core Thuban CPU and Fusion (a CPU with an integrated GPU). However, Intel plans to release an LGA1366 6-core CPU soon, while Core i3 processors will have integrated GPUs from early next year. While ATI's knowledge might help AMD to create a better CPU/GPU hybrid than Intel's woeful graphics department can produce, Fusion is some way from launching. Thank goodness AMD has a successful graphics division to prop it up in the face of Intel's 2010 blitz.



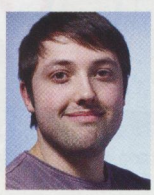
42 ATI RADEON HD 5970

The latest dual-GPU graphics card is a monster

⊕ MULTI-GPU

Clive: While it's true that with multi-GPU setups you're more dependent on a driver than on the raw power of your hardware, when that driver does work, you see amazing speed. Just look at the S.T.A.L.K.E.R. frame rates in the review – the minimums of the HD 5970 are roughly equal to the averages of the already crazily fast cards on test.

⊖ SINGLETON



Harry: For every Fallout 3 and S.T.A.L.K.E.R., there will be the let-down performance we saw in Dawn of War 2 and Call of Duty. There's also the fact that new games you buy probably won't be supported by the driver, leaving you waiting until the next release (or later) to unleash the performance you paid so much for.

HOW WE TEST

Testing is the one true way of measuring product quality and that's why we take testing so seriously at **Custom PC** – so you can rest assured that a review is based on empirical benchmark results. For full details of our standardised test kit, methodology and the software we use, turn to page 63.

Custom PC.

HIS HD 5970 2GB

A twin GPU gaming monster, but only when ATI's driver works

Price £519.98 inc VAT • **Supplier** www.overclockers.co.uk • **Manufacturer** www.hisdigital.com/gb • **SKU number** H597F2GDG

AMD has had no competition since it released its ATI Radeon HD 5870 (see Issue 75, p38); Nvidia has stopped producing GT200-based cards and its forthcoming 'Fermi' card isn't due on sale until January. After the high-end Radeon HD 5870 and 5850, we saw the mid-range Radeon HD 5770 and HD 5750 (see Issue 76, p48 and p52). ATI has returned to the high end for the latest Radeon HD 5000-series card with this, the dual-GPU HD 5970.

While previous dual-GPU Radeon cards were tagged with the 'X2' suffix, ATI has changed its naming scheme to make it more logical and transparent. It's fairly clear that a Radeon HD 5970 is a more high-end model than a Radeon HD 5870, while it isn't instantly obvious that an HD 5870 X2 would have been the better card. Moreover, if ATI were to release a dual-GPU card based around the HD 5850, it could be called an HD 5950. This naming system makes it clear – if the card were called an HD 5850 X2, it wouldn't be obvious where it was positioned in the line-up.

As the name suggests, a Radeon HD 5970 is a single card with two HD 5870 GPUs. Therefore, each of the two GPUs has 20 cores (1,600 stream processors), and both GPUs are each connected to 1GB of GDDR5 memory via a 256-bit memory interface. The two GPUs are connected by a PCI Express 2.0 bridge chip, which accepts data from the PCI-E slot and splits the workload between the two GPUs. This chip also shunts data to and from each GPU as required.

While the GPUs might be of HD 5870 stock, ATI has had to lower the voltage (and consequently, the operating frequency) of the GPUs. Rather than the 750MHz of a standard HD 5870, the GPUs of the HD 5970 run at 725MHz. Similarly, the memory is clocked at 1GHz (4GHz effective) rather than 1.2GHz (4.8GHz effective).

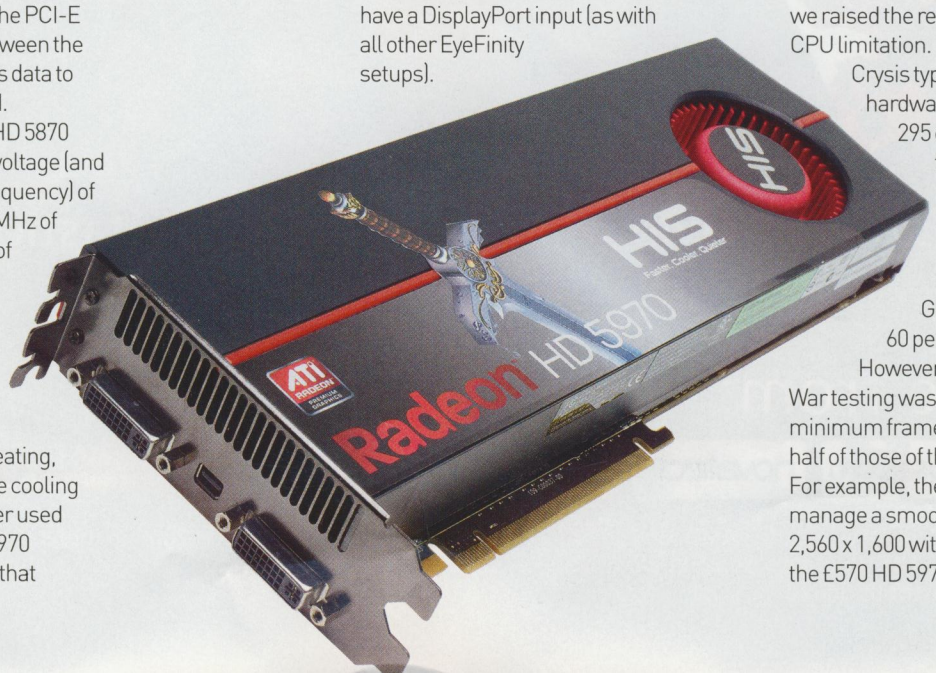
This is very likely due to concerns about the card overheating, despite ATI having upgraded the cooling hardware of the reference cooler used by all the initial cards. The HD 5970 ships as standard with a cooler that incorporates a pair of vapour chambers, much like the Vapor-X cooler of the recent Sapphire Vapor-X, Toxic and Atomic cards we've seen.

+CAR
CrossFire works well in some games; huge potential; DX11 support

−DRIVER
CrossFire is extremely poor in other games; 12.2in long; loud; poor value at the moment

As the single-GPU HD 5870 cards are already 10.5in long, it's slightly surprising that the HD 5970 is 'only' 12.2in long. This measurement is taken from the end of the overhanging cooler to the outputs bracket (which means that it doesn't include the right-angle screw-down kink). As such, you may find that the HD 5970 won't fit in smaller chassis. The 8- and 6-pin PCI-E power inputs are mounted on the side of the card, so at least you don't have to leave extra room for those two connectors. The two power inputs mean that the HD 5970 can be supplied with up to 300W of power, and ATI claims that the card will draw a maximum of 294W. The idle power consumption of the HD 5970 is 51W, which is only 3W lower than that of a pair of HD 5870s. This is despite ATI's new power-saving technology (which can shut down parts of a second GPU when it isn't in use), as well as the lower speeds and voltages of the HD 5970 card, and the reduction of duplicated parts.

As with every other Radeon HD 5000-series card, the HD 5970 supports EyeFinity, which lets you output to three screens. This allows a three-screen setup for both general use and gaming. However, as well as requiring a large wallet, at least one of these screens must have a DisplayPort input (as with all other EyeFinity setups).



PERFORMANCE

To say that the comparative performance of the Radeon HD 5970 was inconsistent is an understatement. Only in S.T.A.L.K.E.R.: Clear Sky did we see the card dominate, with the minimum frame rates of the HD 5970 being roughly equal to the averages of Nvidia's flagship GeForce GTX 295 and the Radeon HD 5870. This is phenomenal performance - if we only tested in this game, the HD 5970 would comfortably be the fastest graphics card in the world.

We suspect that Fallout 3 was CPU-limited even at 2,560 x 1,600 (even with our 3.2GHz Core i7-965 Extreme Edition test rig), as the performance level of the card didn't drop significantly from that of the 1,680 x 1,050 tests. While this means that the HD 5970 might be ideal for triple-screen Fallout 3 via EyeFinity, it also means that an HD 5870 or GTX 295 is fine if you only have one screen (especially if it's smaller than 30in).

A recent update to Dawn of War 2 has caused the minimum frame rates to take a huge hit and, as a result, the HD 5970 could only manage a playable minimum frame rate at 1,920 x 1,200 with 4x AA and 16x AF. Thankfully for ATI, the other cards on test couldn't muster high enough minimums to compete at these settings, with the HD 5870 and GTX 295 only capable of minimums of 11fps and 18fps respectively. Again, the average frame rate of the HD 5970 didn't drop much as we raised the resolution, indicating CPU limitation.

Crysis typically favours Nvidia hardware, and we saw the GTX 295 on near-level terms with the HD 5970 at most resolutions and AA settings. However, the HD 5970 was much faster than the single-GPU HD 5870 (around 60 per cent in most cases).

However, the Call of Duty: World at War testing was a disaster for ATI, with the minimum frame rates often more than half of those of the single-GPU HD 5870. For example, the sub-£300 HD 5870 could manage a smooth minimum of 32fps at 2,560 x 1,600 with 4x AA and 16x AF, while the £570 HD 5970 stuttered to a minimum

of 14fps. Given the popularity of this game – we suspect that millions of people are still playing this game after the backlash against its successor Modern Warfare 2 and its lack of dedicated servers (see p84) – we expected much better.

Stanford still hasn't released its updated Folding@home client, and ATI hasn't implemented support for its current client, so the HD 5970 joins its siblings in being unable to fold. We saw respectable power consumption figures though: our PC sucked only 20W more from the wall than with a single HD 5870 installed, and 72W more when under load. The GPUs didn't become too hot either, with a maximum delta T of 23°C, just 4°C hotter than the single-PCB GTX 295. However, the cooler was noisy when we used the card, emitting a low whooshing sound.

CONCLUSION

The launch of the HD 5970 wasn't smooth, with many resellers only being able to buy from a couple of manufacturers, and possessing very little stock. However, in its current state, the HD 5970 isn't worth a look. In many cases, it's limited by a 3.2GHz Core i7 even at 2,560 x 1,600. You might be able to unlock the full power of the HD 5970 with EyeFinity, but that limits its appeal even more.

The driver support isn't what it should be for such a premium product – only S.T.A.L.K.E.R. gave us the performance justified by the high price, while other games ran roughly as fast with an HD 5870 or a GTX 295. As such, we'd wait for a few driver updates (and hopefully a price drop) before considering buying this card. By that time, we'll also have Nvidia's Fermi card, allowing for a more informed choice.

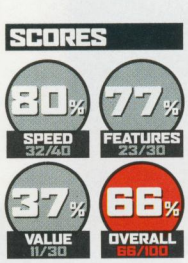
custom pc and bit-tech staff

IN DETAIL

Graphics processor 2 x ATI Radeon HD 5870, 725MHz
Pipeline 2 x 1,600 stream processors (725MHz), 2 x 32 ROPs
Memory 2 x 1GB GDDR5, 4GHz effective
Bandwidth 2 x 128GB/sec, 2 x 256-bit interface
PCI-E 16x (PCI-E 2.1)
Compatibility DirectX 11, OpenGL 3.1
Anti-aliasing 2x, 4x, 8x, 16x HQ
Anisotropic filtering 2x, 4x, 8x, 16x
Connections 2 x DVI, mini-DisplayPort, 2 x CrossFire, 6-pin and 8-pin PCI-E power

Test kit: 3.2GHz Intel Core i7-965 Extreme Edition CPU, Asus P6T V2 Deluxe motherboard, 6GB Corsair 1,333MHz DDR3 memory, Corsair X128 SSD, Windows 7 64-bit, Nvidia ForceWare 190.38 WHQL, ATI Catalyst 9.9 WHQL

SCORES



RESULTS

3D

FALLOUT 3

1,680 x 1,050 0x AA, 16x AF
HD 5970 53fps 85fps
GTX 295 54fps 86fps
HD 5870 54fps 84fps

1,680 x 1,050 4x AA, 16x AF
HD 5970 53fps 85fps
GTX 295 48fps 83fps
HD 5870 49fps 81fps

1,920 x 1,200 0x AA, 16x AF
HD 5970 54fps 85fps
GTX 295 47fps 85fps
HD 5870 51fps 84fps

1,920 x 1,200 4x AA, 16x AF
HD 5970 48fps 85fps
GTX 295 45fps 84fps
HD 5870 46fps 83fps

2,560 x 1,600 0x AA, 16x AF
HD 5970 51fps 85fps
GTX 295 49fps 83fps
HD 5870 48fps 83fps

2,560 x 1,600 4x AA, 16x AF
HD 5970 48fps BEST PLAYABLE 85fps
GTX 295 39fps BEST PLAYABLE 80fps
HD 5870 32fps BEST PLAYABLE 78fps

0 25 50 75 100+

DAWN OF WAR II

1,680 x 1,050 AA off, 16x AF
HD 5970 39fps 82fps
GTX 295 35fps 78fps
HD 5870 33fps 82fps

1,680 x 1,050 AA on, 16x AF
HD 5970 34fps 81fps
GTX 295 15fps 72fps
HD 5870 23fps 74fps

1,920 x 1,200 AA off, 16x AF
HD 5970 37fps 77fps
GTX 295 35fps BEST PLAYABLE 77fps
HD 5870 27fps BEST PLAYABLE 80fps

1,920 x 1,200 AA on, 16x AF
HD 5970 26fps BEST PLAYABLE 77fps
GTX 295 11fps 67fps
HD 5870 18fps 77fps

2,560 x 1,600 AA off, 16x AF
HD 5970 20fps 77fps
GTX 295 19fps 74fps
HD 5870 15fps 70fps

2,560 x 1,600 AA on, 16x AF
HD 5970 15fps 77fps
GTX 295 7fps 53fps
HD 5870 11fps 58fps

0 25 50 75 100+

CRYSIS (DX10, 'HIGH')

1,680 x 1,050 0x AA, 16x AF
HD 5970 45fps 83fps
GTX 295 46fps 72fps
HD 5870 35fps 57fps

1,680 x 1,050 4x AA, 16x AF
HD 5970 40fps 70fps
GTX 295 39fps 62fps
HD 5870 26fps 47fps

1,920 x 1,200 0x AA, 16x AF
HD 5970 40fps 70fps
GTX 295 39fps 60fps
HD 5870 29fps 46fps BEST PLAYABLE

1,920 x 1,200 4x AA, 16x AF
HD 5970 25fps 42fps
GTX 295 22fps 37fps
HD 5870 21fps 39fps

2,560 x 1,600 0x AA, 16x AF
HD 5970 25fps 42fps BEST PLAYABLE
GTX 295 25fps 37fps BEST PLAYABLE
HD 5870 16fps 29fps

2,560 x 1,600 4x AA, 16x AF
HD 5970 9fps 35fps
GTX 295 18fps 30fps
HD 5870 12fps 24fps

0 25 50 75 100+

CALL OF DUTY: WORLD AT WAR

1,680 x 1,050 0x AA, 16x AF
HD 5970 34fps 85fps
GTX 295 88fps 91fps
HD 5870 78fps 89fps

1,680 x 1,050 4x AA, 16x AF
HD 5970 30fps 84fps
GTX 295 82fps 91fps
HD 5870 63fps 81fps

1,920 x 1,200 0x AA, 16x AF
HD 5970 26fps 84fps BEST PLAYABLE
GTX 295 81fps 91fps
HD 5870 65fps 83fps

1,920 x 1,200 4x AA, 16x AF
HD 5970 24fps 83fps
GTX 295 70fps 88fps
HD 5870 52fps 73fps

2,560 x 1,600 0x AA, 16x AF
HD 5970 16fps 81fps
GTX 295 58fps 85fps
HD 5870 44fps 64fps

2,560 x 1,600 4x AA, 16x AF
HD 5970 14fps 74fps
GTX 295 49fps 76fps BEST PLAYABLE
HD 5870 32fps 54fps BEST PLAYABLE

0 25 50 75 100+

Minimum Average

S.T.A.L.K.E.R: CLEAR SKY

1,280 x 1,024, 0x AA, 16x AF
HD 5970 75fps 123fps
GTX 295 57fps 86fps
HD 5870 61fps 82fps

1,680 x 1,050, 0x AA, 16x AF
HD 5970 66fps 100fps
GTX 295 48fps 67fps
HD 5870 48fps 65fps

1,920 x 1,200, 0x AA, 16x AF
HD 5970 57fps 88fps
GTX 295 42fps 55fps
HD 5870 42fps 55fps

2,560 x 1,600, 0x AA, 16x AF
HD 5970 45fps 59fps BEST PLAYABLE
GTX 295 26fps 35fps BEST PLAYABLE
HD 5870 28fps 35fps BEST PLAYABLE

0 25 50 75 100+

FOLDING@HOME

HD 5970 Would not run
GTX 295 15,444ppd
HD 5870 Would not run

0 5,000 10,000 15,000 20,000

PEAK TOTAL SYSTEM POWER CONSUMPTION

HD 5970 340W
GTX 295 315W 375W
HD 5870 268W

0 200 400 600

Folding Gaming Lower is better

PEAK GPU DELTA T TEMPERATURE

HD 5970 23°C 48°C
GTX 295 21°C 44°C
HD 5870 17°C 25°C

0 25 50 75 100

Idle Gaming Lower is better