

TOP 10 GRAPHICS CARDS

Rank	Image	Model	Price	Warranty	Review	Graphics cards		Graphics processor	Graphics architecture	DVI	Ramdac
						Installed RAM	Memory interface	8x AGP	Memory bandwidth		
						Core/memory clock					
1		PNY Verto GeForce FX 5900 Ultra	£340 ex VAT	5-year warranty	First review Aug 03	nVidia GeForce FX 5900 Ultra	256bit	yes	400MHz		
						256MB	256bit	yes	27.2GBps		
						450MHz/425MHz					
2		Gigabyte Maya II R9700 Pro	£210 ex VAT	3-year warranty	First review Dec 02	ATI Radeon 9700 Pro	256bit	yes	400MHz		
						128MB	256bit	yes	19.8GBps		
						325MHz/310MHz					
3		Sapphire Radeon 9700 Atlantis Pro	£216 ex VAT	1-year warranty	First review Dec 02	ATI Radeon 9700 Pro	256bit	yes	400MHz		
						128MB	256bit	yes	19.8GBps		
						325MHz/310MHz					
4		Gainward FX PowerPack Ultra/760 XP Golden Sample	£155 ex VAT	3-year warranty	First review Aug 03	nVidia GeForce FX 5600 Ultra	256bit	yes	400MHz		
						128MB	128bit	yes	14.4GBps		
						450MHz/450MHz					
5		Gigabyte Radeon 9800 Pro GV-R98P128D	£270 ex VAT	3-year warranty	First review Sep 03	ATI Radeon 9800 Pro	256bit	yes	400MHz		
						128MB	256bit	yes	21.8GBps		
						380MHz/340MHz					
6		Sapphire Radeon 9800 Atlantis Pro	£270 ex VAT	1-year warranty	First review Sep 03	ATI Radeon 9800 Pro	256bit	yes	400MHz		
						128MB	256bit	yes	21.8GBps		
						380/340MHz					
7		Sapphire Radeon 9600 Atlantis	£95 ex VAT	1-year warranty	First review Sep 03	ATI Radeon 9600	256bit	yes	400MHz		
						128MB	128bit	yes	6.4GBps		
						325MHz/200MHz					
8		MSI FX5600-VTDR128	£110 ex VAT	2-year warranty	First review Sep 03	nVidia GeForce FX 5600	256bit	yes	400MHz		
						128MB	128bit	yes	8.8GBps		
						325MHz/275MHz					
9		Leadtek WinFast A310-TD256Vivo	£128 ex VAT	2-year warranty	First review Sep 03	nVidia GeForce FX 5600	256bit	yes	400MHz		
						256MB	128bit	yes	8.8GBps		
						325/275MHz					
10		Leadtek WinFast A340-TDH128	£63 ex VAT	2-year warranty	First review Sep 03	nVidia GeForce FX 5200	256bit	yes	350MHz		
						128MB	128bit	yes	6.4GBps		
						250/200MHz					



↑ Thanks to its trail-blazing GeForce FX 5900 Ultra chip, the Best Buy Verto storms our Top 10 chart

1 PNY Verto GeForce FX 5900 Ultra
The poorly received GeForce FX 5800 Ultra chip suggested that graphics colossus nVidia might have lost its way, but last month it made a triumphant return with the trail-blazing GeForce FX 5900 Ultra.

In truth, the 5900 Ultra is a refinement rather than a radical overhaul and some of the changes could be mistaken for a step backwards. Out goes the advanced DDR-II RAM, for instance, while the core clock speed has also been reduced from 500MHz to 450MHz.

The 0.13 micron manufacturing process has been retained, however, while the revamped cooling system is more discreet and the addition of a 256bit memory bus almost doubles the 5900's bandwidth. This means it can cope with greater levels of detail without losing performance.

The heavier the workload, the more impressive the results. While the 5900 Ultra is only around 3-10fps (frames per second) faster than ATI's Radeon 9800 Pro across a range of games (including Unreal Tournament 2003, Quake III and Splinter Cell), ratchet up the detail levels and the



Maximum resolution @75Hz	TV-out	Manufacturing process	Software and extras
	Video-in	DirectX 9.0 support	
2,048x1,536	yes	0.13 micron	Morrowind
	no	yes	
1,920x1,440	yes	0.15 micron	CyberLink PowerDVD, games bundle
	no	yes	
1,920x1,440	yes	0.15 micron	ATI Catalyst Suite
	no	yes	
2,048x1,536	yes	0.13 micron	InterVideo WinCinema (DVD/DVR), FireWire expansion card
	yes	yes	
2,048x1,536	yes	0.15 micron	CyberLink PowerDVD, games bundle
	no	yes	
2,048x1,536	yes	0.15 micron	Soldier of Fortune II, Return to Castle Wolfenstein
	no	yes	
2,048x1,536	yes	0.13 micron	CyberLink PowerDVD
	no	yes	
2,048x1,536	yes	0.13 micron	MSI Media Center, InterVideo WinDVD, WinProducer, WinCode, games bundle, FarStone VirtualDrive/RestoreIT
	yes	yes	
2,048x1,536	yes	0.13 micron	WinFast PVR/DVD, Ulead VideoStudio 6.0 SE, Cool 3DSE, games bundle
	yes	yes	
2,048x1,536	yes	0.15 micron	WinFast DVD, games bundle
	no	yes	

↑ Hanging on in the chart, last month's Best Buy card slips only one position

2 Gigabyte Maya II R9700 Pro



Over six months on from its launch, the 9700 Pro might seem like yesterday's news but it still packs hardware worthy of tomorrow's games. The FX 5900 Ultra may be the top performer but, for the most part, the cheaper 9700 Pro keeps within sight of its faster rival. At a resolution of 1,024x768 on titles such as Quake III, Unreal Tournament 2003 and Aquanox, the 9700 Pro keeps to within 3-8fps (frames per second) of the 9800 Pro, while even the all-conquering 5900 Ultra can only pull out a 5-20fps lead.

The true performance difference is seen only when detail levels are pushed through the roof. At this point the 9700 Pro's reduced memory bandwidth comes into play. Even so, only the FX 5900 Ultra significantly extends its lead at a resolution of 1,600x1,200 and ATI's own Radeon 9800 Pro is unable to pull decisively away from the 9700 Pro.

The Radeon 9600 and GeForce FX 5600 will suffice for those on a limited budget, but as games developers start to unlock the potential of DirectX 9.0 (including the versatile vertex shaders and the gorgeous 128bit colour), those chips will quickly become inadequate. The 9700 Pro, on the other hand, has powerful onboard hardware and will carry on performing even as the lesser chips fall by the wayside.

ATI Radeon 9700 cards like the Gigabyte Maya won't be available for much longer, but hunt around and you could grab a winning product at a knockdown price.

3 Sapphire Radeon 9700 Atlantis Pro



Like the Gigabyte Maya, this card makes an excellent choice for anyone wanting high-calibre performance without paying top whack. The key to the Radeon 9700 Pro's success is its excellent DirectX 9.0 support. Built by Microsoft, DirectX is the programming interface used by almost all

lead widens. At a resolution of 1,600x 1,200 the gap opens to 10-25fps.

Anti-aliasing is also much improved. The 5900's new IntelliSample HCT (high compression technology) feature boasts enhanced texture compression that, nVidia claims, is up to 50 percent more efficient.

Switch on 4x anti-aliasing and 8x anisotropic filtering at a resolution of 1,600x1,200 and the 5900 Ultra sees performance cut by just 18 percent. In contrast the Radeon 9800 Pro suffered a 36 percent drop.

Realistic graphics are part and parcel of the 5900 Ultra. The UltraShadow feature creates stunning shadow effects at little cost to performance, while the DirectX 9.0 support is more advanced than that of any other chip on the market.

PNY's 256MB GeForce FX 5900 Ultra isn't the cheapest of cards, but its immense firepower and essential feature set will make this a star performer that will retain its lustre even as games titles grow in complexity and sophistication.



of the major games developers.

Every year sees the release of a new DirectX version, each one stuffed with new features and techniques designed to make games more realistic and absorbing. While pixel and vertex shaders (pieces of code that let programmers manipulate graphics without compromising on speed) aren't new, it's only 9.0 that offers the level of control needed to be truly programmable.

Another addition, 128bit floating-point colour, gives games developers a near infinite number of colours to choose from, allowing them to add new textures and shades. We're still waiting for the first major DirectX 9.0 games to be released, but when they are you'll need the power of a chip like the Radeon 9700 Pro to do them full justice.

The 9700 Pro is also the first chip that can truly carry off anti-aliasing (smoothing out jagged lines that mar computer-generated images). And while 4x anti-aliasing is going to see a performance hit of 40-60 percent at higher resolutions, games will not be rendered unplayable.

In terms of performance, software and warranty details, the Gigabyte Maya is marginally superior to this card. However, should the Maya sell out first then this is an excellent substitute.

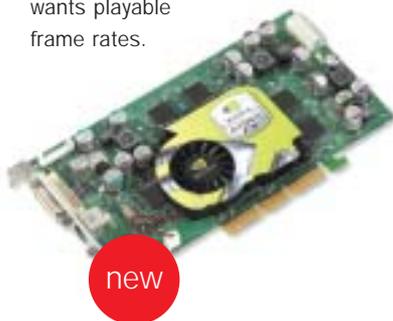
4 Gainward FX PowerPack Ultra/760 XP Golden Sample

The Ultra/760 represents a halfway house between the expensive firepower of the £200-plus cards and the uninspiring performance of the bargain-basement models. It's built around the Ultra version of nVidia's GeForce FX 5600 chip and Gainward has chosen components of the highest quality.

The core and memory clock speeds have been increased to 450MHz apiece, as opposed to the 350MHz of the original 5600 Ultra. This ensures that the Ultra/760 outperforms any 5600 Ultra card on the market, while the inclusion of a FireWire expansion card and video-in/out facilities makes this a superior implementation.

Performance easily eclipses the Radeon 9600 and the standard 5600

chips, although gamers using a GeForce4 Ti 4600/4800 card will see little speed improvement in existing titles. Where the Ultra/760 does beat those cards, however, is with its DirectX 9.0 support. We'll have to wait a while longer to see game programmers exploiting the graphics quality possible with DirectX 9.0, but when these titles are released this card will be the cheapest option for anyone who wants playable frame rates.



new

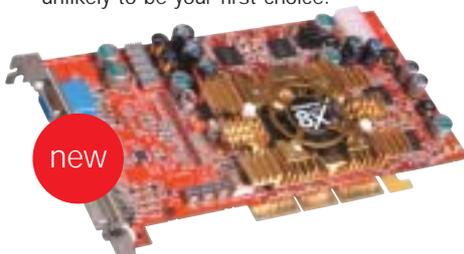
5 Gigabyte Radeon 9800 Pro GV-R98P128D

While the Radeon 9700 Pro temporarily lifted ATI to the top of the graphics chip market, the 9800 Pro shows few true innovations suggesting that the initiative may be back with nVidia.

The most obvious advance that the Radeon 9800 Pro makes over its predecessor is to increase the core and memory clock speeds. The higher these figures, the faster the chip should run. This also generates more memory bandwidth – an important factor when you start increasing detail levels.

But whereas the 9700 Pro's vital statistics were superior to those of nVidia's GeForce FX 5800 Ultra, this time the tables are turned with the FX 5900 Ultra comfortably outclassing the 9800 Pro. The Radeon trails the 5900 Ultra by 3-10fps (frames per second) at lower resolutions, but as you increase the detail levels the Ultra's lead more than doubles.

This card retains plenty of gaming power but, as it lacks either the top-line speed of the FX 5900 Ultra or the enticing price tag of the Radeon 9700 Pro, it's unlikely to be your first choice.



new

6 Sapphire Radeon 9800 Atlantis Pro

In the Radeon 9800 Pro ATI has taken the chance to tidy up a few features – for example, it's improved the memory optimisation. The Smoothvision anti-aliasing technology has been upped to version 2.1. Even so, it isn't as impressive as the FX 5900 Ultra – this chip decisively beat its opponent by running visually pleasing anti-aliasing without a drop in frame rates.

The 9700 Pro was a very good chip and the 9800 Pro is a similarly impressive performer. However, against the might of the 5900 Ultra it struggles to stay on top. A 256MB version is imminent, but in practice doubling the memory tends to make little difference to game speed.

Both Gigabyte and Sapphire have made a good job of packaging the Radeon 9800 Pro chip, although the Sapphire is a frame or two slower across most games. Nonetheless, there's little to choose between them – if you must have a Radeon 9800 Pro, either of these cards will suffice.



new

7 Sapphire Radeon 9600 Atlantis

The battle for the middle ground continues with nVidia's GeForce FX 5600 taking on ATI's Radeon 9600 chip. The Sapphire card is powered by the Radeon 9600 and grabs the initiative by undercutting its rivals, dipping just below the £100 mark.

The Radeon 9600 is an odd hybrid of new and old. It's built on the 0.13 micron manufacturing process – a feat that even the Radeon 9800 Pro can't match. But the low 200MHz memory clock speed restricts bandwidth to a meagre 6.4GBps (gigabytes per second). This was undoubtedly the cause of the 9600 finishing behind the FX 5600 in our games tests. In reality, though, there's little to choose from between these cards – in the resource-intensive Splinter Cell the 9600 finished ahead of the 9800.

It remains to be seen whether either chip will be able to cope with DirectX 9.0

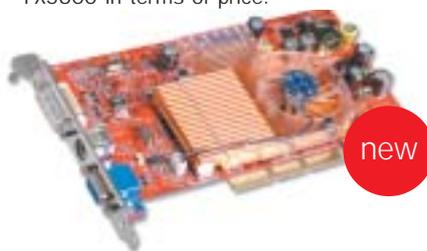


titles, so we'd recommend seasoned gamers to set their sights a little higher. But the Radeon 9600 is still an attractively priced card that will please those on a budget.

8 MSI FX5600-VTDR128

Built around nVidia's modestly priced GeForce FX 5600 chip, the MSI FX5600 will appeal to gamers who want playable frame rates and DirectX 9.0 support but don't want to spend over £150.

Like the Leadtek WinFast A310 below, the FX5600 offers video-in/out facilities and advanced video recording features. The interface, however, is difficult to grasp and lacks the sheer accessibility of Leadtek's MyVivo technology. However, MSI partly compensates with a wealth of games titles and utilities. In our tests the 128MB FX5600 just gets the better of its rivals. However, if you're after top-notch video features then Leadtek is the best choice, while the Sapphire beats the MSI FX5600 in terms of price.



9 Leadtek WinFast A310-TD256Vivo

Not everybody will agree with the A310's lowly placing and this FX 5600-powered card has plenty to offer users that want to do more than play games. Although other cards (notably the MSI) offer video-in/out capabilities for video recording and editing, Leadtek's MyVivo implementation is the smoothest of the lot. The stable and intuitive interface means that the average user can tap into advanced video recording (including timeshifting) and picture-in-picture facilities with ease.

In terms of sheer performance, though, the A310 falls behind the Sapphire Radeon 9600 and MSI FX5600, despite the presence of 256MB of memory. As a pure gaming card there are better choices available for less cash (over £30 less in

Buying advice

- **Graphics chip** Not everybody wants (or needs) to pay hundreds of pounds for a graphics card and the most expensive chips are designed with tomorrow's games in mind. While top performers (such as nVidia's GeForce FX 5900 Ultra and ATI's Radeon 9800/9700 Pro series) can generate high frame rates, even in existing titles you're mostly paying for their ability to show off a host of features which have yet to be introduced.
- **DirectX** Manufacturers are keen to support DirectX 9.0, the latest version of Microsoft's games programming interface. But it will be at least the end of the year before we see major titles exploiting DirectX 9.0's fantastic visual quality and sparkling colour palette. Be warned, though: while older chips such as the GeForce FX 5200 may support DirectX 9.0, in reality they'll lack the brute force necessary to handle the demands of these cutting-edge titles.
- **Memory** Whatever the price, specify no less than 128MB of DDR RAM when buying a card. You'll find 256MB cards available but games are going to have to become much more sophisticated before this extra memory results in a noticeable speed increase. Almost all new cards are equipped with an 8x AGP interface and, for many users with a modern motherboard (manufactured in the last year or so), this will provide a modest boost to frame rates.
- **DVI option** The digital revolution may not have taken over entirely but it's now extremely hard to find a new graphics card that doesn't have a DVI connector. Try not to be one of the exceptions. Most cards have a DVI socket in addition to standard RGB, allowing users to plug in a second monitor and effectively double the workspace in Windows. No mere gimmick, the ability to compare documents and web pages side-by-side is an excellent aid to productivity.
- **Video-in/out facilities** Some graphics cards have special video recording/editing features – most notably, a video-in connection. Some of these cards have advanced facilities, allowing you to record video signals to the hard drive.
- **TV-out option** You're also likely to find TV-out on most cards, so if you fancy hooking your PC up to that big set in lounge then you'll have everything you need. Bear in mind, though, that the resolution support offered by a TV is far less than even the most basic monitor, so don't expect high-quality viewing from a TV.

the case of the Radeon 9600). But for anyone wishing to equip their PC with video facilities, the user-friendly A310 makes it worth the extra money.



10 Leadtek WinFast A340-TDH128

In the past we've been scathing of cards like the A340-TDH128, but as long as you know exactly what this product is and isn't capable of you may find it to your liking.

The £63 price tag is reasonable for a 128MB card with multiple monitor support, DVI connector and 8x AGP interface. Leadtek's high-quality

implementation includes diagnostic LEDs and hardware monitoring software, so it should be easy to keep the card running smoothly.

The graphics chip, on the other hand, is a lowly GeForce FX 5200 and, although this card can support the advanced visual features of DirectX 9.0, it won't have the necessary firepower to play future games titles. Indeed, low frame rates and poor anti-aliasing support will make many of today's games an uncomfortable experience. The A340 may be cheap, but if this is really all you can afford our advice would be to try and get a GeForce4 card at a cut-down price.

