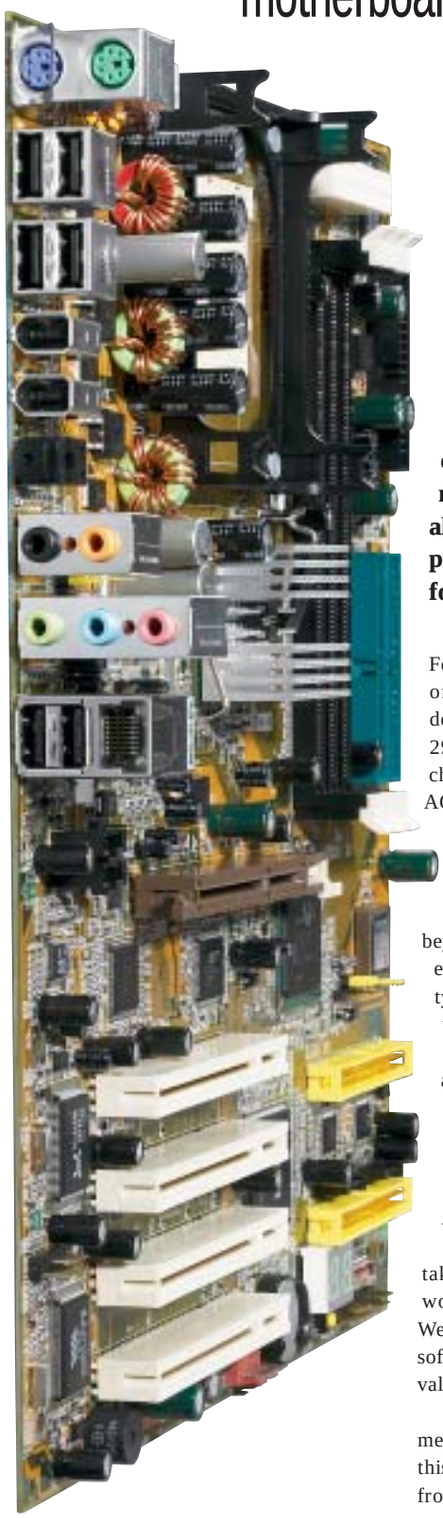
Motherboard megatest

We give our definitive verdict on 34 desktop motherboards, covering every current chipset for Intel and AMD



CONTRIBUTORS Alyn Sparkes, Jim Martin, Tim Danton

Whether you're upgrading your existing PC or building one from scratch, the motherboard you choose is of critical importance. Make the wrong decision and you could be left behind when the next generation of hard disks, graphics cards and memory hits the market. This comprehensive Labs highlights all the most important issues, from which processor to choose to the optimum memory for your system.

For many, the first decision is whether to use an Intel or AMD CPU. That's why we've produced our definitive test of processors on p140, with a stunning 29 chips put through our benchmarks. Then there's the chipset. This determines support for memory types, AGP 8x graphics cards, USB 2 and much more. As well as giving a guide to each chipset's features, we test their speed in both 2D and 3D (*see Performance analysis, opposite*).

But there are plenty more decisions to be made beyond the processor and chipset. Factors such as expansion potential, integrated components, memory type and even overclocking options must be weighed up, as they all differ from board to board.

While purists may still consider integration to be a dirty word, we were surprised at the high quality of integrated components. The majority of motherboards have six-channel audio – adequate for all but the most demanding users – and 10/100 Ethernet. In addition, several feature built-in Ultra ATA RAID, Serial ATA and Gigabit Ethernet.

To find out exactly what features each board has, take a close look at the Feature table on p122 – you won't find a more detailed side-by-side comparison. We've also listed all bundled accessories, cables and software, as these make a big difference to the boards' value for money.

With additional articles on bare-bones systems, memory and our guide to how a modern chipset works, this Labs holds all the answers. Plus, with prices ranging from £56 to £153, we've got every budget covered.

Performance analysis

How the chipsets performed in our tests and the features they offer

The ten chipsets on test this month offer a broadly similar set of core features, but performance differs quite considerably between them. It isn't possible to make an apples-to-apples performance comparison between an Intel board and an AMD board, but this analysis – combined with our processor round-up on p140 – should help you decide the right route for you.

INTEL CHIPSETS

Intel's latest E7205 chipset, also known as Granite Bay, incorporates a dual-channel memory controller. Being able to address 128 bits at a time rather than the traditional 64 bits allows the chipset to take advantage of the 533MHz FSB (front side bus) used by Northwood B Pentium 4 CPUs. No other Pentium 4 chipset (apart from the 850E with PC1066 Rambus memory and the SiS655) supplies the CPU bandwidth of 4.2GB/sec, even by overclocking with high-speed memory like Corsair's XMS3500. This is part of the reason why the E7205 only needs to support PC2100 memory. It's also worth noting that if you use faster memory, you lose the benefits of a synchronous memory bus.

Apart from native support for Hyper-Threading (*see Guide to processors, p140*), which all the Pentium 4 chipsets here support, the E7205's other noteworthy feature is AGP 8x. While this isn't particularly useful for most current software, future apps like high-bandwidth video streaming and games will be able to utilise the extra bandwidth on offer.

SiS isn't far behind Intel with its own dual-channel chipset – the 655. This goes one step further than the E7205 to offer PC2700 support for a bandwidth of 5.4GB/sec, far in excess of the 533MHz FSB Pentium 4's capability, although the extra headroom may help in 'non-ideal' situations. AGP 8x support is also part of the specification. A proprietary interconnect, which SiS calls MuTIOL 1G, provides a bandwidth of 1GB/sec between the north bridge and 963 south bridge. The latter features integrated controllers for six-channel audio, USB 2 and FireWire, bolstering the chipset's appeal.

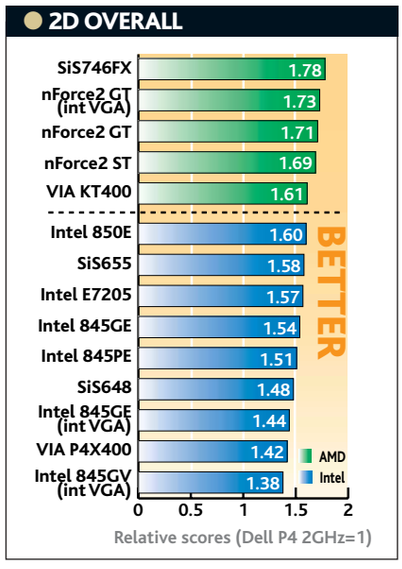
SiS's 648 is one of the oldest chipsets on test here. It still has AGP 8x, 533MHz FSB and PC2700 support, though. In fact, the only major feature lacking compared with the 655 is dual-channel memory architecture.

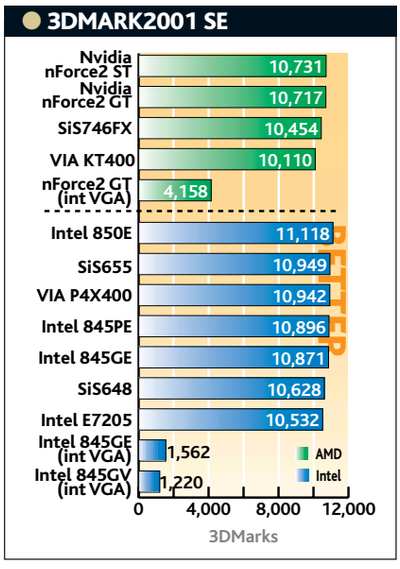
In our 2D tests, the 648 scored 1.48 overall, while the 655 managed 1.58 – a considerable boost from the enhanced memory controller. The E7205 was only marginally slower with a result of 1.57, perhaps due to the lack of PC2700 support. In 3DMark2001 SE, the 655 was second fastest on test with 10,949 3DMarks. Mysteriously, the E7205 was slower than even the SiS648 with scores of 10,532 and 10,628 respectively.

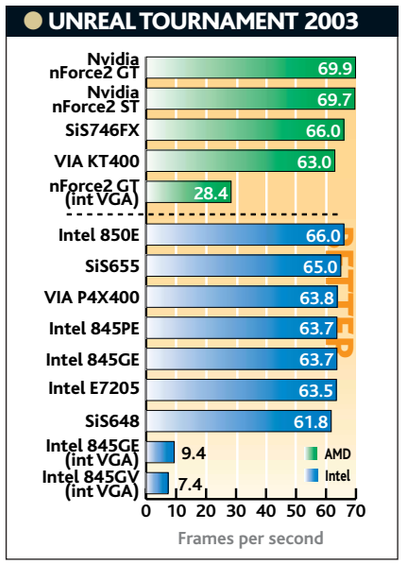
Intel has shied away from using Rambus memory with its latest chipsets, but the 850E is still around for high-end workstations. Both PC800 and PC1066 RIMMs are supported, the latter giving a bandwidth of 4.26GB/sec. There are two types of Rambus: 16- and 32-bit. The former has to be used in pairs, while the latter can be used on its own. Unlike the older 850, the 850E supports CPUs with a 533MHz FSB and also Hyper-Threading.

The standard 850E chipset uses Intel's ICH2 south bridge, which offers basic AC97 audio and support for just four USB 1.1 ports. However, board manufacturers like EPoX and Gigabyte have included the ICH4 south bridge to provide USB 2. The good news is that the 850E is the fastest Intel chipset in 2D, just beating the E7205 and SiS655. It's also the clear leader in 3DMark2001 SE, but middle of the table in Unreal Tournament 2003 (UT2003).

The 845PE chipset was supposed to be Intel's mainstream desktop chipset, although the E7205 stole much of its thunder. However, it remains an appealing platform thanks to Hyper-Threading support, official PC2700 support and the ICH4 south bridge, which includes the USB 2 controller. While there's also an enhanced AC97 controller, most manufacturers choose to use separate six-channel audio.







CHIPSET PERFORMANCE ANALYSIS

	Intel E7205	Intel 845PE	Intel 845GE	Intel 845GV	Intel 850E	SiS648	SiS655	SiS746FX	nVidia nForce2	VIA KT400	VIA P4X400
CPU	Pentium 4, Celeron	Pentium 4, Celeron	Pentium 4, Celeron	Pentium 4, Celeron	Pentium 4, Celeron	Pentium 4, Celeron	Pentium 4, Celeron	Athlon XP, Duron	Athlon XP, Duron	Athlon XP, Duron	Pentium 4, Celeron
Hyper-Threading	✔	✔	✔	✔	✔	✔	✔	N/A	N/A	N/A	✔
Memory controller	Dual-channel 64-bit	32-bit	32-bit	32-bit	32-bit	32-bit	Dual-channel 64-bit	32-bit	Dual-channel 64-bit	32-bit	32-bit
AGP	8x	4x	4x	4x	4x	8x	8x	8x	8x	8x	8x
USB 2	✔	✔	✔	✔	With ICH4	✔	✔	✔	✔	✔	✔
FireWire	X	X	X	X	X	✔	✔	X	✔	X	X
Six-channel audio	✔	✔	✔	✔	X	✔	✔	✔	✔	✔	✔
North/south bridge link speed	266MB/sec	266MB/sec	266MB/sec	266MB/sec	266MB/sec	1,024MB/sec	1,024MB/sec	1,024MB/sec	800MB/sec	533MB/sec	533MB/sec

One of the main limitations of the 845PE is its support for AGP 4x only. This didn't appear to hinder it in our UT2003 benchmark, though, as the 845PE managed almost 64fps – only the nForce2 was noticeably quicker. The 845PE also claimed third place in 3DMark2001 SE, but didn't excel in 2D with a result of 1.51. The other limitation is that the chipset supports a maximum of 2GB of memory and only two double-sided DIMMs can be used because banks two and three are shared between two sockets.

Essentially, the 845GE is identical to the 845PE but with integrated Intel Extreme Graphics. Sadly, this chipset has just a 266MHz core clock and the 3D performance is only extreme in the bad sense. Achieving just 9.4fps in UT2003 proves that gamers should avoid the chipset – the nForce2 at least managed a playable 28.4fps.

Building on the P4X266A, VIA has recently released the P4X400 chipset. This comprises the VT8754 north bridge and VT8235 south bridge and uses VIA's V-Link interconnect to deliver a 533MB/sec bandwidth between the two. The VT8754 offers support for 533MHz FSB and AGP 8x, but importantly is the first chipset to claim – if only limited – support for PC3200 memory. The VT8235 has integrated USB 2, six-channel AC97 audio and support for Ultra ATA/133.

The P4X400 performed relatively well in 3D; it was third fastest overall in 3DMark2001 SE, but proved average in UT2003. Sadly, it was the second slowest overall in 2D with a paltry score of 1.42.

AMD CHIPSETS

There aren't as many chipset choices for AMD processors, but Nvidia, VIA and SiS all have tempting offerings if you want to run an Athlon XP or Duron CPU. Nvidia's nForce2 is perhaps the most tempting, offering the only dual-channel memory controller available for the AMD world. There are two north bridges to choose from: one with integrated GeForce4 MX-class graphics (nForce2 GT) and one without (nForce2 ST). Both offer support for AGP 8x and up to PC3200 memory, although we recommend you use PC2100 or PC2700 memory in synchronous mode (PC2100 for chips with a 266MHz FSB, PC2700 for those with a 333MHz FSB) for best performance.

It's clear from the results on p119 that the nForce2's integrated graphics can't compete with the GeForce4 Ti 4200 used for the rest of the tests, but it can just about handle current 3D games at low resolutions. Oddly, the nForce2 GT was slightly faster in 2D with the integrated graphics enabled. By contrast, enabling the integrated graphics on the 845GE led to a significant drop of 0.10.

Two south bridges are on offer for the

How we test

When choosing which motherboard is right for you, the three main factors to consider are features, performance and layout. We rate features by allocating points to physical features such as ports, fan headers and diagnostic LEDs; to expansion capability, such as USB ports and PCI slots; to the number and quality of integrated components and bundled accessories; and to overclocking and other BIOS options.

The feature points are averaged out as per the usual Labs system, so 100 is the average, and a score of 105 means the board has 5 per cent more feature points. The scores are printed at the bottom of each review.

Depending on your priorities, however, performance can make the difference between choosing one chipset over another. We test each chipset using both our usual 2D suite as well as two 3D tests: 3DMark2001 SE and Unreal Tournament 2003 (UT2003). For more details on all these benchmarks, see p104. We run 3DMark2001 SE using the usual settings at 1,024 x 768 in 32-bit colour at 60Hz.

For UT2003, we use the demo version (1,142) and select a resolution of 1,024 x 768. The result we quote, in frames per second, is the Botmatch score rather than the fly-by score. To carry out this benchmark yourself, run BENCHMARK.EXE which can be found in the System folder where you installed the game.

Due to time constraints, we can't test every motherboard; instead, we use a reference board from the chipset manufacturer. Where this isn't available, we employ the most basic motherboard with that given chipset. Although performance will vary slightly between motherboards based on the same chipset, the difference between chipsets is large enough to give a good indication of what you can expect from a particular motherboard using a particular chipset.

We attach identical components to each motherboard to enable direct comparison between chipsets, with the exception of the Intel 850E motherboard, which uses Rambus memory. For this chipset, we use two 256MB Kingston PC1066 ValueRAM modules, but for every other chipset we use two 256MB sticks of Crucial PC2700 memory. Intel's E7205 is the only chipset not to support PC2700, so we ran the memory at PC2100 settings.

For graphics, we use any integrated chipsets where present, but otherwise choose MSI GeForce4 Ti 4200 AGP 8x cards, as they represent good performance as well as good value. Hard disks are an important factor in overall system performance, and for this reason we use Western Digital's Caviar WD1200JB. Thanks to 8MB of cache, this disk remains one of the fastest EIDE disks available.

We employ the fastest available processors to check for compatibility and to stress the chipsets as much as possible. For Pentium 4 motherboards, we install a 3.06GHz CPU with Hyper-Threading enabled. For Socket A motherboards, we use an Athlon XP 2700+ (AMD was unable to supply us an Athlon XP 3000+ at the time of testing). Last, but not least, Simply (www.simply.co.uk) provides us with 300W power supplies. Our thanks go to all the companies mentioned above for providing components for this Labs.

nForce2: the MCP and the MCP-T. The advantages of the MCP-T are support for FireWire, dual Ethernet and SoundStorm hardware audio support. Audio is identical to the original nForce, providing proper Dolby Digital AC-3 sound. The HyperTransport link between the north and south bridges also remains the same as for the nForce and allows them to exchange data at up to 800MB/sec.

VIA has dominated in the AMD arena for the last few years, and its latest offering is the KT400 chipset. Despite the name, it officially supports up to just PC2700 memory, but many boards offer limited PC3200 support. AGP 8x is supported, as are 200, 266 and 333MHz FSBs. That's all thanks to the new VT8377 north bridge.

The V8235 south bridge is the same as used in the P4X400 chipset for the Pentium 4. It has six-channel audio and USB 2 but no FireWire. All in all, the KT400 pales against the nForce2 for features, and our benchmarks clearly show that the nForce2 is faster in both 2D and 3D.

SiS's new 746FX has just been launched and, from our initial testing, is the fastest chipset in 2D across both AMD and Intel platforms. It scored 1.78 in our 2D suite – and that's with a single-channel memory controller. The 746FX north bridge has all the support you'd expect, including AGP 8x, up to 3GB of PC3200 memory and communicates with the 963L south bridge over the MuTIOL 1G interconnect. The 963L doesn't have an integrated FireWire controller, but provides up to six USB 2 ports and six-channel audio. In 3D, the 746FX couldn't match the nForce2. Its 3DMark2001 SE score was 300 3DMarks lower, but in UT2003 it managed 66fps – the third fastest on test.

The most surprising trend is that all the AMD chipsets are faster than the Intel offerings in 2D, despite the Athlon XP 2700+ being up against a 3.06GHz Pentium 4 (with Hyper-Threading switched on). While certain chipsets are clear winners in either 2D or 3D, the best compromise if you want good 2D and 3D performance is the nForce2. On the Intel side of things, the 850E is the top performer overall with SiS's 655 just beating the E7205 for second best.

Improve your memory

With the plethora of choice available for those wanting to buy DDR SDRAM, it's tempting to spend extra cash on faster-rated memory. But before you flex your credit card, it's important to note that megahertz isn't the whole story when thinking about memory performance – timings are also crucial in determining how fast you can push a module.

Currently, JEDEC (the organisation in charge of semiconductor engineering standards) only supports speeds up to PC3200 (400MHz), so motherboards don't natively support the PC3500 modules using SPD (serial presence detect) settings. In fact, the only way to run PC3500 RAM at its intended 434MHz speed is to overclock the FSB frequency and set the timings manually.

For Athlon XP CPUs, the bandwidth available (2.7GB/sec) is the same as that offered by PC2700, so installing RAM faster than this shouldn't boost system performance, although in reality the extra headroom often does provide benefits. It's a different story with the 533MHz FSB of the Pentium 4, as it can handle up to 4.3GB/sec, so the 3.5GB/sec theoretical bandwidth of PC3500 will make it popular with anyone wanting ultimate performance.

We tested 256MB modules from various firms as detailed below. We used the same components as for the main chipset tests, the only change being a 2.4GHz Pentium 4 rather than the 3.06GHz. Due to its comprehensive BIOS overclocking options, we chose the Albatron PX845PE Pro II motherboard.

As we had to increase the FSB to run PC3500 at its correct speed, the test results can't be directly compared, but give a good indication of the performance increases you can expect from different modules. We ran Unreal Tournament 2003 and 3DMark2001 SE as real-world gauges, and SiSoft Sandra's unbuffered memory bandwidth benchmark as a low-level synthetic test.

For the PC2100 and PC2700 memory, we set the FSB to 133MHz (533MHz) and set the timings by SPD. With the PC3500 from Corsair and OCZ, we were able to overclock the FSB to 163MHz (652MHz) – upping the CPU to 2.93GHz – and use a CPU:DDR ratio of 2.66x to give the correct 434MHz speed. Timings for both sticks were manually set to a CAS latency of 2 and 7-2-2 for the other latency settings. All tests were run with the AGP:PCI frequency locked at 66/33MHz.

Impressively, the Corsair and OCZ modules were able to run stably at these timings. The results below show that using memory faster than PC2700 enhances 3D performance by a significant amount. It's true that this is with a 163MHz FSB, but if you want to overclock your CPU, fast memory is essential for a stable system.

There's a huge difference between PC2100 and PC3500, as the Pentium 4's quad-pumped FSB can make use of the extra bandwidth. Ultimately, though, PC2700 is half the price of PC3500 so only consider it if you have a Pentium 4 and a motherboard with overclocking controls.

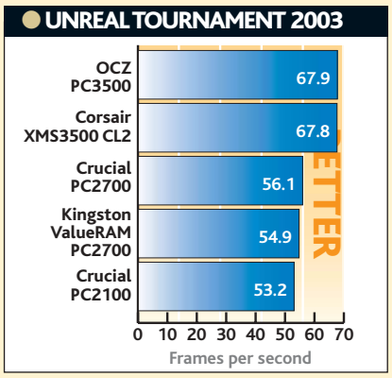
JIM MARTIN

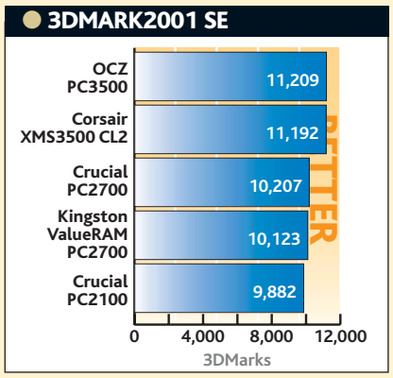
CRUCIAL PC2100/PC2700 (256MB)
PRICE £31 (£36) / £37 (£43)
SUPPLIER www.crucial.com/uk

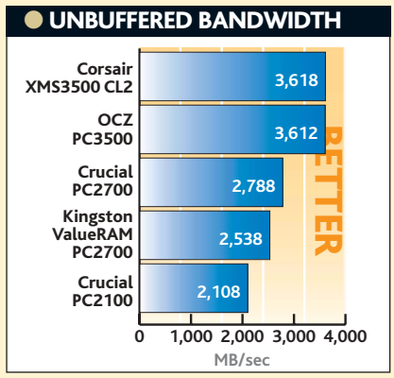
CORSAIR XMS3500 PLATINUM (256MB)
PRICE £66 (£78)
SUPPLIER www.boston.co.uk

KINGSTON VALUERAM PC2700 (256MB)
PRICE £41 (£48 inc VAT)
SUPPLIER www.dabs.com

OCZ PC3500 (256MB)
PRICE £76 (£89)
SUPPLIER www.chillblast.com







FEATURE TABLE








	Abit IT7 Max2 v2	Albatron PX845PE Pro II	AOpen AX45-4D Max	AOpen AX4R Plus	AOpen AX4T II-133	Asus P4G8X Deluxe/GD/LD	Asus P4PE/L/F/SA/GD	Biostar P4TGV
Overall score	106	98	107	102	87	108	113	76
Price[1] (inc VAT)	£117 (£138)	£98 (£115)	£88 (£103)	£102 (£120)	£84 (£99)	£121 (£142)	£87 (£102)	£66 (£78)
Supplier	dabs.com (Web only)	The Overclocking Store 0114 263 4100	PC Nextday (Web only)	dabs.com (Web only)	dabs.com (Web only)	Simply 0870 727 2100	Simply 0870 727 2100	Compubits 0870 458 2222
Supplier's website	www.dabs.com/28j5ws	www.theoverclockingstore.co.uk	www.pcnextday.co.uk	www.dabs.com/2brtws	www.dabs.com/24rdws	www.simply.co.uk (code: 48180)	www.simply.co.uk (code: 48174)	www.compubits.com
Manufacturer's website	www.abit.com.tw	www.albatron.com.tw	www.aopen.nl	www.aopen.nl	www.aopen.nl	www.asus.com.tw	www.asus.com.tw	www.biostar.com.tw
Basic warranty	1yr RTB	3yrs RTB	2yrs RTB	2yrs RTB	2yrs RTB	3yrs RTB	3yrs RTB	2yrs RTB
DETAILS								
Chipset	Intel 845PE	Intel 845PE	SiS655	Intel E7205	Intel 850E	Intel E7205	Intel 845PE	Intel 845GV
Type of memory supported	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100 DDR	PC600, PC800, PC1066 RDRAM	PC1600, PC2100 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR
Form factor	ATX	ATX	ATX	ATX	ATX	ATX	ATX	MicroATX
Dimensions length x width (mm)	305 x 244	305 x 244	305 x 245	305 x 245	305 x 244	305 x 245	305 x 229	244 x 244
INTEGRATED COMPONENTS								
Graphics	X	X	X	X	X	X	X	Intel 845GV
Audio	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC201A (2ch)	Realtek ALC650 (6ch)	Analogue Devices AD1980 (6ch)	C-Media 19739A (6ch)
Network interface adaptor	Realtek RTL8100B (10/100)	Intel 82562 (10/100)	Realtek RTL8100BL (10/100)	Realtek RTL8100BL (10/100)	Intel 82562EC (10/100)	Broadcom BCM5702 (10/100/1000)	Broadcom BCM5702 (10/100/1000)	Realtek RTL8100B (10/100)
Serial ATA controller	Marvel 88i8030 bridge on HighPoint channels	Promise PDC20376	X	Silicon Image Sil3112	X	Silicon Image Sil3112	Promise PDC20376	X
RAID controller	HighPoint HPT374	Promise PDC20376	X	Silicon Image Sil3112	Promise PDC20275	Silicon Image Sil3112	Promise PDC20376	X
Other	VIA VT6202 USB 2, Texas Instruments TSB43AB23 FireWire	X	Agere FW802A FireWire	X	X	Texas Instruments TSB43AB22 FireWire	VIA VT6307 FireWire	X
EXPANSION								
Highest Ultra ATA mode	Ultra ATA/133 (on HighPoint controller)	Ultra ATA/133 (on Promise controller)	Ultra ATA/133	Ultra ATA/100	Ultra ATA/133 (on Promise controller)	Ultra ATA/100	Ultra ATA/133 (on Promise controller)	Ultra ATA/100
Number of Ultra ATA/ Serial ATA channels	4/2	3/2	2/0	2/2	4/0	2/2	3/2	2/0
DIMM/RIMM sockets	3	3	4 (dual-channel)	4 (dual-channel)	4 (16-bit)	4 (dual-channel)	3	2
Maximum memory	2GB	2GB	4GB	4GB	2GB	4GB	2GB	2GB
AGP slot	AGP 4x	AGP 4x	AGP 8x	AGP 8x	AGP 4x	AGP Pro 8x	AGP 4x	X
PCI/CNR/ACR slots	4/0/0	6/0/0	5/1/0	6/1/0	5/1/0	5/0/0	6/0/0	3/1/0
Number of usable fan sockets	5	3	3	3	3	3	3	2
PORTS								
On main back plane[2]	6U2, 2F, 1RJ-45	1S, 1P, 2U2, 1G, 1RJ-45	2S, 1P, 4U2, 1RJ-45	2S, 1P, 4U2, 1RJ-45	2S, 1P, 2U, 1G, RJ-45	2S, 1P, 4U2, 1RJ-45	2S, 1P, 4U2, 1RJ-45	1S, 1P, 2U2, 1G, 1RJ-45, 1VGA
Additional USB supplied	2	4	2	2	X	2	2	X
Other backplates supplied	X	Coaxial S/PDIF in, out, optical S/PDIF out, mic and headphone sockets	S/PDIF, 2-port FireWire	X	X	S/PDIF, 6-pin and 4-pin FireWire gameport (with USB)	S/PDIF, 2-port FireWire	X
Optional IrDA	X	✔	✔	✔	✔	✔	✔	X
Headers	4 USB 2, MediaXP bay	4 USB 2, serial, S/PDIF, front audio	2 USB 2, 2 FireWire, gameport, intrusion, S/PDIF, front audio, Dr. LED	2 USB 2, gameport, intrusion, S/PDIF, front audio, Dr. LED	2 USB, intrusion, front audio	2 USB 2, 2 FireWire, gameport, intrusion, S/PDIF, front audio	4 USB 2, 2 FireWire, gameport, intrusion, front panel audio	4 USB 2, front audio
CPU COMPATIBILITY								
CPU type supported	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron
CPU connector type	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478
CPU multiplier	8x-23x	8x-50x	8x-30x	8x-30x	8x-24x	Not stated	Not stated	8x-50x
OVERCLOCKING SUPPORT								
FSB frequency (MHz)	100-250	100-248	100-248	100-248	100-248	100-400	100-200	100-160
Frequency setting method	BIOS (SoftMenu III)	BIOS	BIOS	BIOS	BIOS	BIOS	BIOS	BIOS, software (WarpSpeeder)
CPU voltage adjust	1.1-1.7V	1.1-1.85V	1.1-1.85V	1.5-1.85V	X	1.5-1.975V	1.5-1.85V	1.5-1.85V
DIMM voltage adjust	2.5-2.8V	2.5-2.8V	2.5-2.7V	2.5-2.65V	X	2.5-2.7V	2.5-2.9V	2.5-2.8V
AGP voltage adjust	X	1.5-1.6V	1.5-1.8V	1.5-1.65V	X	1.5-1.7V	1.5-1.7V	X
FSB/RAM divider	By SPD, 1:1, 3:4	Default, 2x, 2.5x, 2.66x	By SPD, 200, 266, 333, 400MHz	X	X	X	By SPD, 266, 333, 355MHz	X
FSB/AGP/PCI divider	66/33-88/44MHz	66/33MHz	X	66/33-88/44MHz	X	66/33-104/52MHz	66/33-104/52MHz	X
BIOS FEATURES								
BIOS type	Award	Award	Award	Award	Award	Award	Award	Award
Timed wake	✔	✔	✔	✔	✔	✔	✔	X
Fan speed control	X	X	SilentTek	SilentTek	X	Q-Fan	Q-Fan	X
Other BIOS features	IDE delay	BIOS mirror, Voice Genie	Die-Hard BIOS, Dr.Voice II, EzRestore, EzWinFlash	Die-Hard BIOS, Open Jukebox, EzRestore, Dr. Voice II, Watchdog Timer, EzWinFlash	EzRestore, EzWinFlash	C.P.R parameter recall, POST Reporter, EzFlash BIOS	C.P.R parameter recall, POST Reporter, EzFlash BIOS	X
Extra board features	POST display LED	X	X	X	X	X	Molex 12V connector	X
MANUAL								
Error/beep codes guide	✔	X	X	X	X	✔	✔	X
BIOS guide	✔	✔	X	X	X	✔	✔	X
ITEMS SUPPLIED								
34-pin floppy cable	1	1	1	1	1	1	1	1
80-conductor Ultra ATA cable	2	3	1	2	1	1	1	1
Other items	Serial ATA cable, Serial ATA/Ultra ATA converter, cable clips and ties	Serial ATA cable	40-conductor IDE cable	Serial ATA cable	X	40-conductor IDE cable, 2 Serial ATA cables	40-conductor IDE cable, 2 Serial ATA cables	X
Software	Winbond Hardware Doctor	Trend PC-cillin 2002	Norton AntiVirus 2002, E-Color 3Deep	Norton AntiVirus 2002, AOConfig	Norton AntiVirus 2002, ProMagic 6, EzSkin E-Color 3Deep,	InterVideo WinCinema, Winbond Voice Editor, Asus PC Probe 2, Asus Update 3, Trend PC-cillin	InterVideo WinCinema, Winbond Voice Editor, Asus PC Probe 2, Asus Update 3, Trend PC-cillin E-Color 3Deep	Norton AntiVirus 2002, Norton Ghost 2002, Norton Personal FireWall 2002, E-Color 3Deep

1 Prices were correct at time of going to press. 2 Key: S = serial, P = parallel, U = USB, U2 = USB 2, F = FireWire, G = game, RJ-45 = network socket, VGA = monitor

	Chaintech Zenith 9EJS1	DFI NB77-HL	DFI NB78-BL	EPoX 4GEA+	EPoX 4SDA5+	EPoX 4T4AU	Gigabyte 8IHXP	Gigabyte SINXP1394	MSI 655 Max-FISR
	109	90	86	101	108	91	104	115	102
	£132 (£155)	£83 (£98)	£80 (£94)	£124 (£146)	£84 (£99)	£101 (£119)	£108 (£127)	£109 (£128)	£119 (£140)
	Ideal Computing 0870 745 5061	Rapid Distribution 0870 757 4009	Rapid Distribution 0870 757 4009	Overclockers.co.uk 0870 443 0880	CCL Computers 01274 471278	CCL Computers 01274 471278	Insight 0870 700 7350	dabs.com (Web only)	MicroDirect 0870 444 4456
	www.ideal-computing.co.uk	www.rapid-ltd.co.uk	www.rapid-ltd.co.uk	www.overclockers.co.uk	www.cclcomputers.co.uk	www.cclcomputers.co.uk	www.insight.com/uk (code: GBYFA034UB)	www.dabs.com/2bsxws	www.microdirect.co.uk
	www.chaintech.com.tw	www.dfi.com	www.dfi.com	www.epox.org	www.epox.org	www.epox.org	uk.giga-byte.com	uk.giga-byte.com	www.msi.com.tw
	1yr RTB	1yr RTB	1yr RTB	2yrs RTB	2yrs RTB	2yrs RTB	3yrs RTB	3yrs RTB	1yr RTB
	Intel 845PE	Intel 845GE	Intel 845PE	Intel 845GE	SiS648	Intel 850E	Intel 850E	SiS655	SiS655
	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700 DDR	PC800, PC1066 RDRAM	PC800, PC1066 RDRAM	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700 DDR
	ATX	ATX	ATX	ATX	ATX	ATX	ATX	ATX	ATX
	305 x 244	305 x 210	305 x 210	305 x 245	305 x 245	305 x 245	305 x 244	305 x 245	305 x 244
	✗	Intel 845GE	✗	Intel 845GE	✗	✗	✗	✗	✗
	C-Media CMI8738 (6ch)	Realtek ALC202A (2ch)	Realtek ALC202A (2ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	C-Media CMI9739A (6ch)
	Realtek RTL8100B (10/100/HomePNA)	Realtek RTL8100BL (10/100)	Realtek RTL8100BL (10/100)	Realtek RTL8100B (10/100)	Realtek RTL8201BL (10/100)	Realtek RTL8100B (10/100)	Realtek RTL8100BL (10/100)	Intel 82540EM (10/100/1000)	Broadcom BCM5702 (10/100/1000)
	✗	✗	✗	Silicon Image Sil3112	✗	✗	✗	Silicon Image Sil3112	Promise PDC20376
	Promise PDC20276	✗	✗	HighPoint HPT372N	HighPoint HPT372	HighPoint HPT372	Promise PDC20276	Silicon Image Sil3112, ITE GigaRAID 8212F	Promise PDC20376
	VIA VT6306 FireWire	✗	✗	Texas Instruments TSB43AB22 FireWire	Texas Instruments TSB41AB2 FireWire	✗	NEC USB2, Winbond Smart@IO Memory Stick, SD card, smart card controller	Realtek 8801 FireWire on riser	Agere FW803 FireWire
	Ultra ATA/133 (on Promise controller)	Ultra ATA/100	Ultra ATA/100	Ultra ATA/133 (on HighPoint controller)	Ultra ATA/133	Ultra ATA/133 (on HighPoint controller)	Ultra ATA/133 (on Promise controller)	Ultra ATA/133	Ultra ATA/133
	4/0	2/0	2/0	4/2	4/0	4/0	4/0	4/2	3/2
	2	2	2	3	3	2 (32-bit)	4 (16-bit)	4 (dual-channel)	4 (dual-channel)
	2GB	2GB	2GB	2GB	3GB	2GB	2GB	4GB	4GB
	AGP 4x	AGP 4x	AGP 4x	AGP 4x	AGP 8x	AGP 4x	AGP 4x	AGP 8x	AGP 8x
	6/1/0	6/0/0	6/0/0	5/0/0	6/0/0	5/0/0	6/1/0	5/0/0	6/0/0
	2	3	3	3	3	3	3	3	2
A	2S, 1P, 2U2, 1G, 1RJ-45	1S, 1P, 2U2, 1RJ-45, 1VGA	2S, 1P, 2U2, 1G, 1RJ-45	1S, 1P, 4U2, 1RJ-45, 1VGA	2S, 1P, 4U2, 1RJ-45	2S, 1P, 4U2, 1RJ45	2S, 1P, 2U2, 1G, 1RJ-45	2S, 1P, 2U2, 1RJ-45	2S, 1P, 4U2, 1RJ-45
	2 on Cbox2	✗	✗	✗	✗	✗	8	4	2
	S/PDIF, 2-port FireWire, surround line-out	Serial	✗	Gameport, serial, 2-port FireWire	Gameport, 2-port FireWire	Gameport	S/PDIF	S/PDIF, external Serial ATA kit, FireWire card	Optional S/PDIF and surround line-out,optional diagnostic LEDs (with USB)
	✔	✔	✔	✔	✔	✔	✔	✔	✔
	4 USB 2, 3 FireWire, six-channel kit, S/PDIF, Cbox2 front audio, smart card reader, Cbox2 DigiDoc	4 USB 2, serial, S/PDIF, front audio, intrusion	4 USB 2, S/PDIF, front audio	2 USB 2, 2 FireWire, serial, gameport, S/PDIF, front audio	2 USB 2, 2 FireWire, gameport, S/PDIF, front audio	2 USB 2, gameport, S/PDIF	8 USB 2, intrusion, front audio, SD card, Memory Stick, smart card readers	4 USB 2, S/PDIF, front audio	2 USB 2, 3 FireWire, S-Bracket, intrusion, front audio, D-Bracket
	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron
	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478
	10x-24x	Not stated	Not stated	8x-23x	8x-23x	Not stated	8x-24x	8x-24x	Not stated
	100-200	100-165	100-165	90-200	100-200	100-166	100-255	100-355	100-200
	BIOS, jumper, software (Apogee)	BIOS, software	BIOS, software	BIOS	BIOS	BIOS	BIOS, software (EasyTune 4)	BIOS, software (EasyTune3)	Software (Fuzzy Logic 3)
	1.5-1.85V	1.4-1.65V	✗	1.4-1.85V	1.4-2.025V	1.4-1.85V	1.5-1.7V	1.5-1.75V	1.475-1.85V
	2.5-3.1V	2.7-2.9V	✗	2.5-3.2V	2.5-3.2V	2.5-2.92V	2.5-2.6V	2.5-2.6V	2.5-2.8V
	1.5-2.1V	1.5-1.8V	✗	1.5-2.2V	1.5-2.2V	1.5-1.9V	1.5-1.8V	1.5-1.6V	1.5-1.8V
	By SPD, 266, 333MHz	✗	✗	By SPD, 1:1, 3:4	By SPD, 1:1, 1:2, 2:3, 10:9, 3:4, 3:5, 4:5, 5:6, 8:9, 2:1, 3:2, 4:3, 5:3, 5:4, 6:5	✗	✗	By SPD, 200, 266, 333, 400MHz	By SPD, 1:1, 1:2, 2:3, 10:9, 3:4, 3:5, 4:5, 5:6, 8:9, 2:1, 3:2, 5:2, 4:3, 5:3, 5:4, 6:5
	Synchronised, 66/33-88/44MHz	66/33-88/44MHz	66/33-88/44MHz	50/25-80/40MHz	✗	66/33MHz	✗	66/33MHz	66/33-80/40MHz
	Award	Award	Award	Award	Award	Award	Award	Award	Award
	✔	✔	✔	✔	✔	✔	✔	✔	✔
	✗	✗	✗	✗	✗	✗	✗	✔	✗
	Preset timings	✗	✗	Watchdog, POST display LED	✗	✗	DualBIOS, Q-Flash	DualBIOS, Q-Flash	✗
	✗	✗	✗	Blue LED north bridge fan	POST display LED	POST display LED	✗	Dual power system	✗
	✔	✔	✔	✔	✔	✔	✗	✗	✗
	✔	✔	✔	✔	✔	✔	Manual on CD	✔	✔
	1 rounded	1	1	1 rounded	1	1	1	1	1
	2 rounded	1	1	1 rounded	1	1	2	3	1
	Optical S/PDIF cable, Cbox2 front panel, thermal paste, case badge, keyring	✗	✗	✗	✗	C-RIMM	2 C-RIMMs	✗	Serial ATA cable
	Norton AntiVirus 2002, Thiz Linux	Overclock Cruise, Winbond Hardware Monitor	Overclock Cruise	A-1 Avance Media Player, Norton Ghost 7, EPoX Magic Flash	A-1 Avance Media Player, Norton Ghost 7, EPoX Magic Flash	A-1 Avance Media Player, Norton Ghost 7	EasyTune 4, Face Wizard, Norton Internet Security	EasyTune 4, Norton Internet Security	Fuzzy Logic 3, Live Update, PC Alert, Trend PC-cillin 2002, MSI DVD player

FEATURE TABLE








	MSI GNB Max-FISR	Soltek 85DR3-L	SuperMicro P4SAA	VIA P4PB Ultra	Abit NF7-S	Albatron KX400-8X	AOpen AK77-8x Max	Asus A7N8X Deluxe
Overall score	98	99	88	112	99	92	102	109
Price[1] (inc VAT)	£126 (£148)	£61 (£72)	£153 (£180)	£110 (£129)	£85 (£100)	£63 (£74)	£79 (£93)	£92 (£108)
Supplier	Simply 0870 727 2100	CCL Computers 01274 471278	Boston 0870 751 5950	Kustom PCs (Web only)	dabs.com (Web only)	The Overclocking Store 0114 263 4100	PC Nextday (Web only)	Simply 0870 727 2100
Supplier's website	www.simply.co.uk (code: 48253)	www.cclcomputers.co.uk	www.boston.co.uk	www.kustompcs.co.uk	www.dabs.com/293rws	www.theoverclockingstore.co.uk	www.pcnextday.co.uk	www.simply.co.uk (code: 48179)
Manufacturer's website	www.msi.com.tw	www.soltek.de	www.supermicro.com	www.via.com.tw	www.abit.com.tw	www.albatron.com.tw	www.aopen.nl	www.asus.com.tw
Basic warranty	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	3yrs RTB	2yr RTB	3yrs RTB
DETAILS								
Chipset	Intel E7205	Intel 845PE	Intel E7205	VIA P4X400	Nvidia nForce2 ST	VIA KT400	VIA KT400	Nvidia nForce2 ST
Type of memory supported	PC1600, PC2100 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700 DDR	PC1600, PC2100, PC2700, PC3200 DDR
Form factor	ATX	ATX	ATX	ATX	ATX	ATX	ATX	ATX
Dimensions length x width (mm)	305 x 245	305 x 230	305 x 244	305 x 245	305 x 245	305 x 244	305 x 244	305 x 245
INTEGRATED COMPONENTS								
Graphics	X	X	X	X	X	X	X	X
Audio	C-Media CMI8738MX (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	C-Media CMI8738 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)
Network interface adaptor	Intel 8254 (10/100/1000)	Realtek RTL8100B (10/100)	Intel 82540EM (10/100/1000)	VIA VT6103 (10/100)	Realtek RTL8201BL (10/100)	X	Realtek RTL8100BL (10/100)	Realtek RTL8201BL, Altima ALC101 (10/100)
Serial ATA controller	Promise PDC20376	X	X	X	Silicon Image Sil3112A	X	Promise PDC20375	Silicon Image Sil3112A
RAID controller	Promise PDC20376	X	X	Promise PDC20276	Silicon Image Sil3112A	X	Promise PDC20375	Silicon Image Sil3112A
Other	VIA VT6306 FireWire	X	X	VIA VT6202 USB 2	Realtek 8801B FireWire	X	Texas Instruments TSB43AB22 FireWire	Realtek 8801B FireWire
EXPANSION								
Highest Ultra ATA mode	Ultra ATA/100	Ultra ATA/100	Ultra ATA/100	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133
Number of Ultra ATA/ Serial ATA channels	2/2	2/0	2/0	4/0	2/2	2/0	3/2	2/2
DIMM/RIMM sockets	4 (dual-channel)	2	4 (dual-channel)	3	3 (dual-channel)	3	3	3 (dual-channel)
Maximum memory	4GB	2GB	4GB	3GB	3GB	3GB	3GB	3GB
AGP slot	AGP Pro 8x	AGP 4x	AGP Pro 8x	AGP 8x	AGP 8x	AGP 8x	AGP 8x	AGP Pro 8x
PCI/CNR/ACR	5/0/0	6/0/0	6/0/0	6/1/0	5/0/0	6/1/0	6/1/0	5/0/0
Number of usable fan sockets	2	3	4	2	4	3	3	3
PORTS								
On main back plane[2]	2S, 1P, 4U2, 1RJ-45	2S, 1P, 2U2, 1G, 1RJ-45	2S, 1P, 2U2, 1RJ-45	2S, 1P, 2U2, 1RJ-45	2S, 1P, 2U2, 1RJ-45	2S, 1P, 2U2, 1G	2S, 1P, 4U2, 1RJ-45	1S, 1P, 4U2, 2RJ-45
Additional USB supplied	2	X	4	4	2	4	2	2
Other backplates supplied	Optional S/PDIF and surround line-out, optional diagnostic LEDs (with USB)	X	X	S/PDIF out	2-port FireWire	X	2-port FireWire, S/PDIF	Serial, 6-pin and 4-pin FireWire, gameport (with USB)
Optional IrDA	✔	X	✔	✔	✔	✔	✔	✔
Headers	2 USB 2, 3 FireWire, S-Bracket, intrusion, front audio, D-Bracket	4 USB 2, front audio	4 USB 2	8 USB 2, S/PDIF, front audio, SD card, Memory Stick, smart card readers	4 USB 2, 2 FireWire, MediaXP bay	4 USB 2, intrusion, S/PDIF, front audio	2 USB 2, 2 FireWire, gameport, intrusion, S/PDIF, front audio, Dr. LED	2 USB 2, 2 FireWire, serial, gameport, S/PDIF, front audio, intrusion
CPU COMPATIBILITY								
CPU type supported	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz), Celeron	Pentium 4 (400/533MHz Celeron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron
CPU connector type	Socket 478	Socket 478	Socket 478	Socket 478	Socket A	Socket A	Socket A	Socket A
CPU multiplier	Not stated	Not stated	8x-50x	8x-23x	5x-22x	5x-24x	5.5x-18x	5x-13.5x
OVERCLOCKING SUPPORT								
FSB frequency (MHz)	100-133	100-200	100-165	100-200	100- 237	100-233	100 - 248	100-211
Frequency setting method	Software (Fuzzy Logic 3)	BIOS	BIOS	BIOS, software (FlightDeck)	BIOS (SoftMenu III)	BIOS	BIOS	BIOS
CPU voltage adjust	X	1.1-1.85V	1.45-1.7V	1.4-1.6V	1.1-1.85V	1.2-2.1V	1.1-1.85V	1.1-1.85V
DIMM voltage adjust	X	2.5-2.8V	X	2.5-2.6V	2.4-2.7V	2.5-2.8V	2.5-2.65V	2.6-2.8V
AGP voltage adjust	X	1.5-1.8V	X	1.5-1.8V	1.5-1.8V	1.5-1.8V	1.5-1.6V	1.5-1.7V
FSB/RAM divider	X	X	X	By SPD, 200, 266, 333, 400MHz	By SPD, 3:3, 3:4, 3:5, 3:6, 4:3, 4:4, 4:5, 4:6, 5:3, 5:4, 5:5, 5:6, 6:3, 6:4, 6:5, 6:6	By SPD, 2x, 2.66x, 3.33x, 4x	By SPD, 2x, 2.66x, 3.33x, 4x	By SPD, 50%, 60%, 66%, 75%, 80%, 83%, 100%, 120%, 125%, 133%, 150%, 166%, 200%
FSB/AGP/PCI divider	X	X	X	X	66/33-99/49MHz	X	X	50/25-100/50MHz
BIOS FEATURES								
BIOS type	Award	AMI	Award	Award	Award	Award	Award	Award
Timed wake	✔	✔	✔	✔	✔	✔	✔	✔
Fan speed control	X	X	X	X	X	X	SilentTek	Q-Fan
Other BIOS features	X	RedStorm overclocking	Watch Dog	Overclock auto recovery	Delay EIDE	BIOS mirror, Voice Genie, Watchdog Timer, O.T.P	Die-Hard BIOS, Watchdog Timer, Dr. Voice	Asus C.O.P
Extra board features	X	Molex 12V connector	X	X	X	X	X	X
MANUAL								
Error/beep codes guide	X	X	✔	✔	X	X	✔	X
BIOS guide	✔	✔	✔	✔	✔	✔	X	✔
ITEMS SUPPLIED								
34-pin floppy cable	1	1	1	1 rounded	1	1	1	1
80-conductor Ultra ATA cable	1	1	1	1 rounded	1	1	1	1
Other items	2 Serial ATA cables	X	X	Front panel bay (Memory Stick, SD card and smart card reader)	Serial ATA cable, Serial ATA converter	X	40-conductor IDE cable, Serial ATA cable	40-conductor IDE cable, 2 Serial ATA cables
Software	Fuzzy Logic, Live Update, PC Alert, Trend PC-cillin 2002	PowerQuest Drive Image 4 and PartitionMagic 6 SE, Trend PC-cillin 2002, FarStone Virtual Drive 7 FarStone RestoreIT! 3 Lite	SuperO Doctor 2	VIA FlightDeck	Hardware monitor	Trend PC-cillin 2002	Norton AntiVirus 2002, Pro Magic 6, E-Color 3Deep	InterVideo WinCinema, Asus PC Probe 2, Trend PC-cillin 2002, E-Color 3Deep, Winbond Voice Editor, Asus MyLogo2

1 Prices were correct at time of going to press. 2 Key: S = serial, P = parallel, U = USB, U2 = USB 2, F = FireWire, G = game, RJ-45 = network socket, VGA = monitor

PC PRO BEST VALUE









	Asus A7V8X Deluxe	Biostar M7NCG	Chaintech Zenith 7NJS	DFI AD77 Infinity	EPoX 8RDA+	Gigabyte 7VAXP Ultra	Leadtek WinFast K7NCR18G-Pro	MSI 746F Ultra-L	MSI K7N2G-ILSR
	105	89	104	97	98	106	104	103	100
	£77 (£90)	£93 (£109)	£132 (£155)	£74 (£87)	£80 (£94)	£85 (£100)	£85 (£100)	£56 (£66)	£98 (£115)
	CCL Computers 01274 471278	Compubits 0870 458 2222	Ideal Computing 0870 745 5061	Computers and Components 01527 578822	Overclockers.co.uk 0870 443 0880	dabs.com (Web only)	dabs.com (Web only)	Simply 0870 727 2100	Simply 0870 727 2100
	www.cclcomputers.co.uk	www.compubits.com	www.ideal-computing.co.uk	www.candccentral.co.uk	www.overclockers.co.uk	www.dabs.com/285tws	www.dabs.com/2bt6ws	www.simply.co.uk (code: 48285)	www.simply.co.uk (code: 48139)
	www.asus.com.tw	www.biostar.com.tw	www.chaintec.com.tw	www.dfi.com	www.epox.org	http://uk.giga-byte.com	www.leadtek.co.uk	www.msi.com.tw	www.msi.com.tw
	3yrs RTB	2yrs RTB	1yr RTB	1yr RTB	2yrs RTB	3yrs RTB	2yrs RTB	1yr RTB	1yr RTB
	VIA KT400	Nvidia nForce2 GT	Nvidia nForce2 ST	VIA KT400	Nvidia nForce2 ST	VIA KT400	Nvidia nForce2 GT	SiS746FX	Nvidia nForce2 GT
	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR	PC1600, PC2100, PC2700, PC3200 DDR
	ATX	MicroATX	ATX	ATX	ATX	ATX	ATX	ATX	ATX
	305 x 244	244 x 244	305 x 245	305 x 244	305 x 245	305 x 243	305 x 244	295 x 200	305 x 244
	✗	Nvidia nForce2	✗	✗	✗	✗	Nvidia nForce2	✗	Nvidia nForce2
	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	C-Media CMI8738 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)	Realtek ALC650 (6ch)
	Broadcom BCM5702 (10/100/1000)	Nvidia nForce2 MCP-T (10/100)	ICS 1893Y (10/100)	VIA VT6103 (10/100)	Realtek RTL8201BL (10/100)	Realtek RTL8100BL (10/100)	Nvidia nForce2 MCP-T (10/100)	Realtek RTL8201BL (10/100)	Nvidia nForce2 MCP-T (10/100)
	Promise PDC20376	✗	Promise PDC20376	Marvel 88i8030 bridge on HighPoint channel	✗	Silicon Image Sil3112	✗	✗	Promise PDC20376
	Promise PDC20376	✗	Promise PDC20376	HighPoint HPT371	✗	Silicon Image Sil3112, Promise PDC20276	✗	✗	Promise PDC20376
	VIA VT6306 FireWire	Realtek RTL8801B FireWire	Realtek 8801B FireWire on ACR card	VIA VT6306 FireWire	Realtek 8801B FireWire	VIA VT6306 FireWire	Agere FW803 FireWire on ACR card	✗	Agere FW803 FireWire
	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133	Ultra ATA/133
	3/2	2/0	3/2	3/1	2/0	4/2	2/0	2/0	3/2
	3	3 (dual-channel)	3 (dual-channel)	4	3 (dual-channel)	3	3 (dual-channel)	3	3 (dual-channel)
	3GB	3GB	3GB	4GB	3GB	3GB	3GB	3GB	3GB
	AGP 8x	AGP 8x	AGP 8x	AGP 8x	AGP 8x	AGP 8x	AGP 8x	AGP 8x	AGP 8x
	6/0/0	3/1/0	5/0/1	5/1/0	6/0/0	5/0/0	4/0/1	5/0/0	5/0/1
	3	2	4	3	3	4	2	2	2
	2S, 1P, 4U2, 1RJ-45	1S, 1P, 2U2, 1RJ-45, 1VGA	2S, 1P, 2U2, 1RJ-45	2S, 1P, 4U2, 1RJ-45	2S, 1P, 4U2, 1RJ-45	2S, 1P, 2U2, 1G, 1RJ-45	1S, 1P, 2U2, 1RJ-45, 1VGA	2S, 1P, 4U2, 1RJ-45	1S, 1P, 4U2, 1RJ-45, 1VGA
	2	✗	4 on Cbox2	2	2	4	✗	2	2
	Gameport (with USB), FireWire	Optional 2-port FireWire, optional USB	2-port FireWire ACR card, S/PDIF, surround line-out	3-port FireWire	2-port FireWire, gameport	3-port FireWire, S/PDIF and surround line-out, external Serial ATA	3-port FireWire ACR card, 2nd VGA, TV-out and S/PDIF	✗	FireWire, TV-out, S/PDIF and surround line-out
	✔	✗	✔	✔	✔	✔	✔	✔	✔
	2 USB 2, 2 FireWire, gameport, intrusion, S/PDIF, front audio, smart card reader, PSU thermal sensor, Asus iPanel	4 USB 2, 2 FireWire, S/PDIF, front audio	4 USB 2, 2 FireWire, S/PDIF kit, Cbox2 front audio, six-channel kit, smart card reader, Cbox2 DigiDoc	2 USB 2, 3 FireWire, gameport, S/PDIF, front audio, surround line-out	2 USB 2, 2 FireWire, gameport, S/PDIF	4 USB 2, 3 FireWire, S/PDIF, surround line-out, front audio, smart card reader	4 USB 2, S/PDIF, smart card reader	2 USB 2, S/PDIF, front audio	2 USB 2, FireWire, TV-out, S/PDIF, surround, Bluetooth, D-Bracket
	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron	Athlon, Athlon XP, Duron
	Socket A	Socket A	Socket A	Socket A	Socket A	Socket A	Socket A	Socket A	Socket A
	5x-13.5x	Not stated	6x-16x	5x-12x	5x-24x	8x-24x	8x-24x	7x-13x	7x-13x
	100-200	100-200	100-200	100-250	100-250	100-200	100-200	100-200	100-200
	BIOS	BIOS	BIOS	BIOS	BIOS	BIOS	BIOS, software (Speed Gear)	BIOS	BIOS
	1.75-1.85V	✗	1.4-2.15V	1.1-2V	1.4-2.2V	1.4-1.54V	1.1-2V	✗	1.55-1.8V
	2.55-2.85V	✗	2.5-3.2V	2.5-2.9V	2.5-2.9V	2.5-2.8V	2.5-2.9V	2.5-2.8V	2.5-2.7V
	1.5-1.8V	✗	1.5-2V	1.5-1.8V	1.5-1.8V	1.5-1.8V	1.5-1.7V	✗	1.5-1.7V
	By SPD, 200, 266, 333, 400MHz	✗	By SPD, 50%, 60%, 66%, 75%, 80%, 83%, 100%, 120%, 125%, 133%, 150%,166%, 200%	By SPD, 266, 333, 400MHz	By SPD, 50%, 60%, 66%, 75%, 80%, 85%, 100%, 120%, 125%, 133%, 150%,166%, 200%	By SPD, 266, 333, 400MHz	By SPD, 50%, 60%, 66%, 75%, 80%, 83%, 100%, 120%, 125%, 133%, 150%,166%, 200%	By SPD, 1:1, 1:2, 2:3, 3:4, 3:5, 4:5, 5:6, 4:3, 5:4	By SPD, 2:1, 5:3, 3:2, 4:3, 5:4, 6:5, 1:1, 5:6, 4:5, 3:4, 2:3, 3:5, 1:2
	✗	✗	50/25-100/50MHz	✗	50/25-100/50MHz	✗	50/25-100/50MHz	66/33-80/40MHz	66/33-120/60MHz
	Award	Award	Award	Award	Award	Award	Award	Award	Award
	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Q-Fan	✗	✗	✗	✗	✗	✗	✗	✗
	Asus C.O.P	9th Touch, Biostar Flasher	✗	Chipset voltage (2.5-2.8V)	✗	DualBIOS, Q-Flash	X-BIOS II, CPU O.T.S	✗	✗
	✔	✗	✗	✗	POST display LED	✗	✗	✗	✗
	✔	✗	✔	✗	✔	✗	✗	✔	✔
	✔	✗	✔	✗	✔	✔	✔	✔	✔
	1	1	1 rounded	1	1	1	1	1	1
	2	1	2 rounded	3	1	3	1	1	1
	40-conductor IDE cable, 2 Serial ATA cables	✗	Optical S/PDIF cable, Cbox2 front panel. thermal paste, case badge, keyring	Serial ATA cable	✗	3 Serial ATA cables, Serial ATA power converter	✗	✗	2 Serial ATA cables
	InterVideo WinCinema, Asus PC Probe 2, Trend PC-cillin 2002, E-Color 3Deep, Winbond Voice Editor, Asus MyLogo2	Norton AntiVirus 2002, Norton Ghost 2002, Norton Personal Firewall 2002	Audio Rack, DigiDoc	Winbond Hardware Monitor	Norton Ghost 7, Trend PC-cillin 2002, Magic Flash	Norton Internet Security 2002, EasyTune 4	Ulead VideoStudio 6 SE DVD, Ulead COOL 3D 3, Leadtek SpeedGear	InterVideo WinDVD 4, PC Alert, Trend PC-cillin 2002	InterVideo WinDVD 4, PC Alert, Trend PC-cillin 2002

Abit IT7 Max2 v2

PRICE £117 (£138 inc VAT)
SUPPLIER www.dabs.com/28j5ws
VERDICT **So many features, Abit could only fit four PCI slots – the Max2 is an awesome 845PE board.**

Abit has a reputation at *PC Pro* for building motherboards for enthusiasts, and the IT7 Max2 v2 is no exception.

The I/O panel has no legacy connectors bar PS/2 sockets for keyboard and mouse. The other ports comprise six USB 2, two FireWire, 10/100 Ethernet, five minijacks for audio and an optical S/PDIF output. These are driven by Intel's ICH4 south bridge, a Texas Instruments controller, Realtek's RTL8100B and ALC650 respectively. HighPoint's HPT374 provides Serial ATA and two Ultra ATA channels for RAID. To compensate for the current unavailability of Serial ATA disks, Abit bundles an Ultra ATA to Serial ATA convertor.

With all this integration, you won't need more than the four PCI slots Abit provides. Diagnostic LEDs and on-board power and reset buttons affirm the Max2's target market. Overclocking is supported by an AGP/CPU lock, selectable DDR/CPU ratios and voltage controls for CPU and DIMMs, but no AGP voltage adjustment.

Performance from the 845PE chipset is only average, and the price is a little high, but otherwise the IT7 Max2 v2 is a superb motherboard.

PC PRO RATINGS
OVERALL
106
PERFORMANCE 101 | FEATURES 116 | VALUE 96
100 IS THE AVERAGE

Albatron PX845PE Pro II

PRICE £98 (£115 inc VAT)
SUPPLIER The Overclocking Store 0114 263 4100
VERDICT **A great choice if you're looking to overclock, but otherwise there are better deals available.**

The PX845PE Pro II Silver Shuriken is a striking motherboard. Its silver PCB isn't just for show – Albatron claims that EMI emissions are reduced by up to 50 per cent, and heat dissipation is also improved. This is great news if you want to overclock your CPU. In fact, the BIOS offers an excellent range of voltage and frequency options including an AGP/PCI lock and a 2.66 multiplier for running PC3500 RAM.

Based on the 845PE chipset, the Pro II is Albatron's feature-packed, flagship Intel motherboard, with Serial ATA, Realtek six-channel audio, 10/100 Ethernet and six USB 2 ports. The former also supports an Ultra ATA disk as well as Serial ATA disks. Voice Genie diagnoses boot issues and BIOS mirror provides a similar backup to Gigabyte's DualBIOS.

Layout is fairly sensible, with headers out of the way of the six PCI slots. While other 845PE motherboards have more features, the Silver Shuriken is a good, reasonably priced choice if you're looking to overclock a Pentium 4.

PC PRO RATINGS
OVERALL
98
PERFORMANCE 101 | FEATURES 96 | VALUE 99
100 IS THE AVERAGE

AOpen AX45-4D Max

PRICE £88 (£103 inc VAT)
SUPPLIER PC Nextday (Web only)
VERDICT **A good-value dual-channel motherboard with a decent crop of features.**

AOpen's AX45-4D Max is the cheapest dual-channel Intel motherboard on test and uses the SiS655 chipset. The layout of the board is interesting – the DIMM sockets are in pairs at 90 degrees to each other, keeping the AGP card clear of the sockets. The rest of the board is well laid out, although the 12V power connector is hidden in a nest of capacitors.

FireWire is supported and a two-port backplate is included. There's also a pair of USB ports on another backplate and a third with both optical and coaxial S/PDIF input and outputs. The BIOS is pretty good for overclocking, although the front side bus doesn't go as high as the other two SiS655 boards. The Die-Hard function allows you to boot from a backup BIOS and Dr. Voice II provides vocal POST error message reporting.

Thanks to the SiS655's great performance, the AOpen is a sensible choice if you don't need all the extras provided with Gigabyte's SINXP1394.

PC PRO RATINGS
OVERALL
107
PERFORMANCE 104 | FEATURES 107 | VALUE 121
100 IS THE AVERAGE

AOpen AX4R Plus

PRICE £102 (£120 inc VAT)
SUPPLIER www.dabs.com/2brtws
VERDICT **The cheapest E7205 board with some interesting features, but not quite enough to make it a winner.**

AOpen is well respected at *PC Pro* for its constant innovation, and the AX4R Plus offers some neat touches. One is SilentTek. From the BIOS, and in Windows, you can control fan RPM and even optical drive speeds to keep noise down. There's a Die-Hard BIOS system to protect from viruses, EzRestore allows you to roll back system settings and Open Jukebox lets you play CDs without booting into Windows.

Integrated six-channel sound is welcome, as are Serial ATA, 10/100 Ethernet and six USB 2 ports. Also, four dual-channel DIMM sockets allow up to 4GB of PC2100 RAM. Sadly, there's no RAID or FireWire, but at least AOpen supplies two EIDE and one Serial ATA cable in the box. The layout is busy, since there are six PCI slots, but headers and controllers are sensibly placed for a tidy install. Overclockers should look elsewhere, though – the AX4R Plus doesn't allow voltages to be pushed much higher than default values.

At this price, the AX4R Plus is a middle-of-the-road Granite Bay motherboard, but the AX45-4D Max offers better value.

PC PRO RATINGS
OVERALL
102
PERFORMANCE 102 | FEATURES 104 | VALUE 101
100 IS THE AVERAGE

AOpen AX4T II-133

PRICE £84 (£99 inc VAT)
SUPPLIER www.dabs.com/24rdws
VERDICT **An Intel 850E board for those who want performance but don't need any frills.**

Looking at the price, you'd be forgiven for thinking that the AX4T is the most basic 850E motherboard money can buy. While AOpen has cut costs by not including a manual or any accessories bar two cables, the AX4T is blessed with a Promise PDC20275 RAID controller, Intel 10/100 Ethernet and basic Realtek stereo audio. Due to the ICH2 south bridge, there are only two USB 1.1 ports, and just one header for an optional two-port backplate.

The CPU socket is located further down the board than usual, so there's only room for five PCI slots and the AGP 4x slot. Beware that the CPU heatsink sits within 5mm of the AGP slot, so any AGP cards with heatsinks on the back won't fit. Another annoyance is that the floppy drive connector is right at the bottom of the board – a problem in full-tower cases.

Overclocking options are limited to increasing the FSB frequency, but if you're looking for a basic, yet fast Rambus motherboard and don't need USB 2 the AX4T II-133 is a sensible choice.

PC PRO RATINGS
OVERALL
87
PERFORMANCE 106 | FEATURES 68 | VALUE 94
100 IS THE AVERAGE

Asus P4G8X Deluxe/GD/LD

PRICE £121 (£142 inc VAT)
SUPPLIER Simply 0870 727 2100 (Code: 48180)
VERDICT **More features than other Granite Bay boards, but it's relatively expensive.**

The P4G8X could almost be described as over-featured, adding massively to the core specification of Intel's E7205 (Granite Bay) chipset. On top of the dual-channel memory controller, which supports up to 4GB of DDR RAM, there's Gigabit Ethernet, six-channel audio, FireWire and Serial ATA RAID.

A glance at the feature table makes MSI's GNB Max-FISR seem equal to the P4G8X, but Asus adds value by bundling plenty of accessories. These include backplates for S/PDIF in and out, FireWire and USB 2, as well as a reference sticker and more than enough cables to get started. Other features like the Q-Fan BIOS option and overclocking recovery are welcome, as is the BlueMagic PCI slot for Asus' wireless 802.11a/b and Bluetooth card.

Overclocking potential is reasonable, but CPU/RAM fixed ratios are missing, though the passive north bridge cooler makes this a quiet board. While this is the best of the E7205 boards, those wanting a dual-channel chipset should look at Gigabyte's cheaper SINXP1394.

PC PRO RATINGS
OVERALL
108
PERFORMANCE 102 | FEATURES 120 | VALUE 95
100 IS THE AVERAGE

Asus P4PE/L/F/SA/GD

PRICE £87 (£102 inc VAT)
SUPPLIER Simply 0870 727 2100 (Code: 48174)
VERDICT **A huge selection of features and BIOS options at an unbelievably low price.**

PC PRO RECOMMENDED

Without a special black or silver PCB, the P4PE doesn't have quite the same visual impact as some other motherboards on test. But it still packs a hefty punch where features are concerned. Based on the Intel 845PE chipset, there's Hyper-Threading and PC2700 support, with USB 2 provided by Intel's ICH4 south bridge.

A Broadcom controller provides Gigabit Ethernet, and a Promise PDC20376 chip drives two Serial ATA channels and one Ultra ATA channel for RAID purposes. It's worth noting that only one interface can be used, not both simultaneously. Then there's a VIA FireWire controller for which Asus bundles a backplate with one six-pin and one four-pin connector. Six-channel audio is produced by an Analog Devices SoundMAX AD1980 chip. Asus bundles a separate backplate with both optical and coaxial S/PDIF outputs.

Six PCI slots are included, one of which is called the BlueMagic slot. This has a dual function – as well as being a standard 32-bit slot, it can also be used for the forthcoming Asus SpaceLink B&W wireless card, featuring 802.11a/b and Bluetooth. Other notable features include a standard Molex power connector for use with non-Pentium 4-equipped PSUs and Q-Fan, a fan-speed control in the BIOS. Together with the fanless north bridge, this means the P4PE is well suited to those wanting to build a quiet PC.

Also in the BIOS are dividers for CPU/AGP and CPU/DDR, as well as good voltage ranges for CPU, AGP and DIMM overclocks. In fact, the P4PE has almost the same overclocking potential as Albatron's PX845PE Pro II. Interestingly, there's a 355MHz setting for memory at a standard 133MHz FSB, which could be useful for running overclockable PC2700 RAM.

Another handy feature is the AGP slot LED, which lights – and prevents booting – when an incompatible 3.3V AGP card is accidentally installed. Layout itself is respectable, considering all the integrated controllers and expansion slots.

The P4PE isn't the perfect Pentium 4 motherboard, though – there are a couple of limitations over boards using newer chipsets. The first is the AGP 4x slot, which will hinder performance of future AGP 8x cards. Then there's the 2GB memory limit, and sharing of memory rows two and three by two of the three DIMM sockets. This means you have to be careful about the type of memory you install – only two double-sided DIMMs can be used.

But, with a decent software bundle, including InterVideo WinCinema, the P4PE is hard to beat at £87. No other motherboard offers such a good range of features at this price, especially Serial ATA, earning the P4PE a well-deserved award.

PC PRO RATINGS
OVERALL
113
PERFORMANCE 101 | FEATURES 120 | VALUE 127
100 IS THE AVERAGE

Biostar P4TGV

PRICE £66 (£78 inc VAT)
SUPPLIER Compubits 0870 458 2222
VERDICT **Poor performance from the integrated graphics and no AGP slot make the P4TGV an unappealing microATX solution.**

As a highly integrated, small form-factor Intel motherboard, the P4TGV is reasonable value at £66. But, it's missing an AGP slot, which limits future upgrades. Unfortunately, the 845GV's graphics can't compete with the nForce2, being slower than even the tardy 845GE due to the slower core clock of just 200MHz.

Keeping costs down means there aren't many extras supplied and the board has only two DIMM sockets. The BIOS is also limited, as only CPU and DIMM voltages can be adjusted and there are no dividers for either AGP or memory clock speeds.

A Realtek chip provides 10/100 Ethernet and six-channel audio comes courtesy of C-Media. The manual is rather sparse – there's no BIOS coverage, only pinouts of the headers on the motherboard. The software pack is reasonable, though, with the essentials of Norton's Internet Security pack.

If you can't stretch to a Shuttle bare-bones box, microATX boards offer an alternative solution. However, Biostar's nForce2-based M7NCG is a much better bet and well worth the extra £30.

PC PRO RATINGS
OVERALL
76
PERFORMANCE 54 | FEATURES 61 | VALUE 90
100 IS THE AVERAGE

Chaintech Zenith 9EJS1

PRICE £132 (£155)
SUPPLIER Ideal Computing 0870 745 5061
VERDICT **If you'll use all the extras, no other board offers more. But you pay for the privilege.**

Chaintech's 9EJS1 package comes with everything you'll need when installing a new motherboard, even down to a small sachet of thermal paste. Aside from the rounded Ultra ATA cables and various backplates, the most impressive inclusion is the Cbox2 – a 5.25in front panel unit. This has four USB ports, a FireWire port, audio in and out and a POST display.

Like most boards with six PCI slots, a graphics card interferes with two DIMM sockets. The power connectors are well placed, but after connecting a CPU fan there's only one fan header free. The BIOS has good overclocking potential. Vdimm can be pushed to 3.1V and the Vagp up to 2.1V, while both clocks can be locked to their default values if required.

Although a Promise chip handles EIDE RAID there's no Serial ATA controller – the only significant feature missing. However, with all the accessories, it's no surprise that the Chaintech is expensive. If you'll use them, the 9EJS1 is a great choice, but there are better-value 845PE boards.

PC PRO RATINGS
OVERALL
109
PERFORMANCE 101 | FEATURES 125 | VALUE 90
100 IS THE AVERAGE

DFI NB77-HL

PRICE £83 (£98 inc VAT)
SUPPLIER Rapid Distribution 0870 757 4009
VERDICT **Compared with Leadtek's similarly priced nForce2 board, the NB77-HL seems underfeatured.**

Most of the motherboards on test have a high level of integration, but DFI's NB77-HL keeps it simple. Like the EPoX 4GEA+, it's based on the 845GE chipset. This differs from the 845PE in that it has integrated Intel Extreme Graphics, but 3D performance pales against the nForce2. In Unreal Tournament 2003, the board managed just 9.4fps, so it's a good job there's an AGP slot, albeit only a 4x version, for upgrades. Disappointingly, 2D performance fell dramatically when using the internal graphics rather than our test GeForce4 Ti 4200.

The VGA port takes the place of one of the serial ports on the rear I/O panel, but a replacement is provided on a backplate. 10/100 Ethernet is integrated as is audio, but only via a stereo AC97 Realtek chip.

If you're after a basic motherboard with integrated graphics, Leadtek's K7NCR18G-Pro is far superior – with six-channel audio, a FireWire ACR card and integrated GeForce4 MX-level 3D performance – and costs just £2 more.

PC PRO RATINGS
OVERALL
90
PERFORMANCE 102 | FEATURES 75 | VALUE 100
100 IS THE AVERAGE

DFI NB78-BL

PRICE £80 (£94)
SUPPLIER Rapid Distribution 0870 757 4009
VERDICT **A basic board, but not at a basic price, the NB78-BL is unlikely to win fans.**

Although it costs nearly £20 more than the Soltek 85DR3-L, the NB78-BL lacks many features that make the Soltek a great budget buy. One of these is the six-channel audio – the integrated Realtek ALC202A codec only provides stereo output. At least 10/100 Ethernet is integrated, thanks to another Realtek chip.

A fanless north bridge keeps noise to a minimum and, while the ATX power connector is sensibly located, the 12V socket is hemmed in by capacitors and other components. The two DIMM sockets will also be inaccessible once a graphics card is inserted because of their close proximity to the AGP slot.

Software is another area where the Soltek wins. The DFI only comes with an overclocking utility, but the BIOS itself offers nothing in the way of voltage adjustment. Only the FSB can be upped, and there's a CPU/AGP frequency lock.

The bottom line is that the NB78-BL simply doesn't offer enough for the price. If you're looking for a basic Intel 845PE board, the Soltek 85DR3-L offers more for a lot less cash.

PC PRO RATINGS
OVERALL
86
PERFORMANCE 101 | FEATURES 66 | VALUE 96
100 IS THE AVERAGE

EPoX 4GEA+

PRICE £124 (£146 inc VAT)
SUPPLIER Overclockers.co.uk 0870 443 0880
VERDICT **It's the best of the 845GE boards, but you definitely pay for the integrated components.**

The 4GEA+ is the most heavily featured 845GE board. Serial ATA and Ultra ATA RAID are provided by Silicon Image and HighPoint controllers respectively, while two FireWire headers come courtesy of Texas Instruments. EPoX also kindly includes rounded Ultra ATA cables, while a blue LED fan cools the north bridge.

The perennial problem of AGP card/DIMM socket interface rears its head again on this board, but other than that we've got no complaints regarding the layout. The BIOS has reasonable overclocking potential, with voltage settings and locks for both AGP and memory speeds. It also has a Watchdog function that automatically resets the BIOS after a failed overclocking attempt. LEDs display POST codes too.

Norton's Ghost 7 is included, as well as a Windows BIOS flashing tool and an audio player. All this adds to the EPoX's attractions, and if you want a Pentium 4 motherboard with integrated graphics it's a good choice – just don't expect amazing 3D performance.

PC PRO RATINGS
OVERALL
101

PERFORMANCE	FEATURES	VALUE
102	108	86

100 IS THE AVERAGE

EPoX 4SDA5+

PRICE £84 (£99 inc VAT)
SUPPLIER CCL Computers 01274 471278
VERDICT **Well featured and boasting a competitive price, the 4SDA5+ offers excellent value.**

The 4SDA5+ uses one of the oldest chipsets on test this month. The SiS648 has already been superseded by the 655 with its dual-channel memory controller. However, it still has plenty of features, including AGP 8x and PC2700 support, plus the same south bridge as used by the 655.

A HighPoint RAID controller gives an extra two Ultra ATA channels for striped or mirrored disk configurations and FireWire is provided by Texas Instruments. A Realtek chip gives 10/100 Ethernet and six-channel audio is courtesy of the ALC650 from the same firm.

Four USB 2 ports adorn the I/O shield, while two FireWire ports are supplied on a backplate along with a gameport. POST LEDs are handy for diagnosing problems and the north bridge is fanless.

The BIOS offers reasonable overclocking potential including wide voltage adjustment and a good spread of CPU/DDR ratios. With a great price, it's just the lack of performance that holds the 4SDA5+ back.

PC PRO RATINGS
OVERALL
108

PERFORMANCE	FEATURES	VALUE
99	109	126

100 IS THE AVERAGE

EPoX 4T4AU

PRICE £101 (£119 inc VAT)
SUPPLIER CCL Computers 01274 471278
VERDICT **A reasonable array of features, but memory limitations and an uncompetitive price hold the EPoX back.**

EPox's 4T4AU is a slightly better-featured Intel 850E board than AOpen's AX4T II-133. Thanks to Intel's ICH4 south bridge, the 4T4AU has USB 2 support: there are four ports on the I/O shield. There's also a Realtek 10/100 Ethernet controller and six-channel audio, while a HighPoint HPT372 controller allows RAID-0, -1 and -0+1 configurations.

One notable feature is the use of 32-bit Rambus, so there are only two RIMM sockets on the board. It's still difficult to find PC1066 RIMMs bigger than 256MB, so the realistic maximum is 512MB.

There are a few layout niggles, one being that the PSU connector clip is next to the CPU heatsink, making removal virtually impossible. Again, we don't like the floppy connector being on the bottom edge of the board either.

Overclocking options are much better than AOpen's, with an AGP/PCI lock and good voltage increases. If you don't want to overclock, though, Gigabyte's 8IHXP is the best 850E choice.

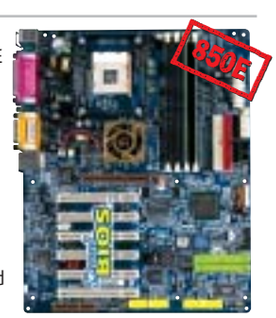
PC PRO RATINGS
OVERALL
91

PERFORMANCE	FEATURES	VALUE
106	82	89

100 IS THE AVERAGE

Gigabyte 8IHXP

PRICE £108 (£127 inc VAT)
SUPPLIER Insight 0870 700 7350 (Code: GBYFA034UB)
VERDICT **Brimming over with features, the 8IHXP is a good-value 850E board.**



Despite being the most expensive 850E motherboard on test, the small premium over EPoX's 4T4AU is worth paying. For a start, the 8IHXP uses 16-bit Rambus rather than 32-bit, so you can easily install 1GB of PC1066 in the four RIMM sockets if you need such a large amount of memory.

Then there's the ICH4 south bridge and NEC chip, which provide USB 2 support. Gigabyte takes full advantage of these with no less than ten USB 2 ports bundled – eight on two backplates. Like the 4T4AU, 10/100 Ethernet and six-channel audio is delivered by two Realtek ASICs and Gigabyte handily bundles an S/PDIF backplate as well. RAID is taken care of by a Promise chip – the only limitation is no support for -0+1 setups.

Other features like DualBIOS and headers for Memory Stick/SD card readers all add appeal, but the 8IHXP's overclocking support is more limited than the EPoX 4T4AU. Other items like the well-written manual, quick install guide and useful reference sticker make this a great Rambus motherboard.

PC PRO RATINGS
OVERALL
104

PERFORMANCE	FEATURES	VALUE
106	109	100

100 IS THE AVERAGE

Gigabyte SINXP1394

PRICE £109 (£128 inc VAT)
SUPPLIER www.dabs.com/2bsxws
VERDICT **An incredible motherboard at an amazingly low price. It would make a great base to any Pentium 4 system.**

PC PRO A LIST

PC PRO LABS WINNER

Buried under the countless accessories in the box is the dubiously colourful SINXP1394. It's based on the new SiS655 dual-channel chipset, but is unique in supporting PC3200 memory by SPD, so you don't have to overclock. Plus, there's a copious amount of other features to make the SINXP1394 our Pentium 4 motherboard of choice.

Its other unique point is the dual power system, which is a daughter card to give a six-phase circuit. Gigabyte claims this ensures smooth power delivery to the CPU, making it ideal for overclockers. The BIOS also offers good overclocking options – including an AGP/PCI frequency lock – but DIMM and AGP voltages can only be increased by 0.1V. The bundled EasyTune 4 allows settings to be made easily from Windows.

Two separate controllers – Silicon Image's Sil3112 and ITE's GigaRAID 8212F for Serial ATA and Ultra ATA RAID respectively – make 0+1 Ultra ATA configurations possible and a total of ten drives can be attached to the SINXP1394. As hinted by the name, FireWire is integrated too. Somewhat oddly, Gigabyte supplies a proprietary riser with three ports, but this still blocks one of the PCI slots.

Also unusual is the external Serial ATA bracket. With the included internal-style cables, you can attach a Serial ATA disk externally, but it's certainly not a particularly elegant solution. A total of six USB 2 ports are present, two on the I/O shield and a further four on a backplate.

Gigabit Ethernet is provided by an Intel 82540EM controller, while AGP 8x is part of the SiS655 north bridge's specification. A Realtek ALC650 delivers six-channel audio and there's a further backplate included with both coaxial and optical S/PDIF outputs.

A sensible layout offers yet more credit to Gigabyte. With five PCI slots rather than six, you can happily install memory without first removing the AGP card. The headers are all located for a tidy install and power connectors are easily accessible at the top of the board.

But, in addition to all the main components, it's all the small touches – like colour-coded front panel connectors, rounded PCB corners and crack-resistant ribbon cable connectors – that put the SINXP1394 head and shoulders above the competition.

Our only slight gripe is that there are two fans on board – one for the north bridge and another (complete with trendy blue LEDs) on the dual power system riser. If you're building a silent PC, this could prove frustrating. However, this is a minor issue and, with a price of only £109, the SINXP1394 is the clear Pentium 4 winner.

PC PRO RATINGS
OVERALL
115

PERFORMANCE	FEATURES	VALUE
104	126	110

100 IS THE AVERAGE

MSI 655 Max-FISR

PRICE £119 (£140 inc VAT)
SUPPLIER MicroDirect 0870 444 4456
VERDICT **MSI's SiS655 offering is too expensive for the features and accessories provided.**

The 655 Max-FISR is the first of MSI's dual-channel Pentium 4 motherboards in this Labs. Unlike the GNB Max-FISR, though, the 655 has plenty of overclocking potential with memory and AGP/PCI dividers. Voltages can be pushed as high as you'd want and there are many DDR/CPU ratios.

The two DIMM sockets at the top of the board mean that six PCI slots can be accommodated without the AGP card fouling the catches. Unfortunately, the EIDE and floppy headers are at the bottom – you'll need longer cables than supplied for full-tower cases.

Like the E7205 version, the 655 has the Promise PDC20376 controller for Serial ATA and Ultra ATA RAID, although you can only use one interface at a time. There are three FireWire headers, but no backplate with physical ports as standard.

Six-channel sound comes courtesy of C-Media, while Gigabit Ethernet is by Broadcom. And, although this makes the MSI undeniably feature rich, the Gigabyte SINXP1394 is a better deal.

PC PRO RATINGS
OVERALL
102

PERFORMANCE	FEATURES	VALUE
104	109	90

100 IS THE AVERAGE

MSI GNB Max-FISR

PRICE £126 (£148 inc VAT)
SUPPLIER Simply 0870 727 2100 (Code: 48253)
VERDICT **Although we like the features on offer, this board is expensive and overclocking is out of the question.**

MSI has crammed so many features onto its Granite Bay motherboard it's almost easier to list what it doesn't have. A Promise PDC20376 controller provides two Serial ATA and one EIDE channels for RAID. The PC99 I/O shield includes an RJ-45 socket for the Intel Gigabit Ethernet controller and sockets for the C-Media six-channel audio codec.

There are omissions – the backplate with coaxial and optical S/PDIF outputs is optional, and there are no FireWire ports supplied on a backplate for the three on-board headers. Also, there are only two usable fan sockets, as the third is used for the north bridge fan. However, with five PCI slots mounted lower down the board, DIMMs can be installed into the four sockets without removing the AGP card.

Our last gripe is the lack of overclocking support in the BIOS. There are no voltage options, and no FSB frequency adjustment, so don't expect anything but standard performance from this board. Unless MSI releases a new BIOS and ships more backplates as standard, the Max-FISR is too expensive to recommend.

PC PRO RATINGS
OVERALL
98

PERFORMANCE	FEATURES	VALUE
102	104	82

100 IS THE AVERAGE

Soltek 85DR3-L

PRICE £61 (£72 inc VAT)
SUPPLIER CCL Computers 01274 471278
VERDICT **For those on a budget, the Soltek offers superb value and doesn't require a power supply upgrade.**

The 85DR3-L has a silver coating – similar to Albatron's Silver Shuriken – to reduce EMI emissions. In addition to the standard 12V CPU power connector, there's a four-pin Molex type on the motherboard. This allows the use of older PSUs, although Soltek doesn't recommend them for use with Pentium 4s faster than 2GHz.

In terms of layout, the inclusion of six PCI slots pushes the AGP slot too close to the DIMM sockets to install memory with a graphics card fitted. The fanless north bridge heatsink is welcome, though.

Not surprisingly at this price, there aren't many features. The only integrated components are 10/100 Ethernet and six-channel audio, both from Realtek. No backplates are provided, but there are headers for an additional four USB 2 ports.

Considering the price, the bundled software pack is respectable. It includes PartitionMagic and Drive Image as well as RestoreIT! 3 Lite and Virtual Drive 7. As the cheapest – and best value – Intel motherboard on test, there's plenty to like about the Soltek.

PC PRO RATINGS
OVERALL
99

PERFORMANCE	FEATURES	VALUE
101	77	139

100 IS THE AVERAGE

SuperMicro P4SAA

PRICE £153 (£180 inc VAT)
SUPPLIER Boston 0870 751 5950
VERDICT **Few additional features on top of the E7205 chipset mean the P4SAA is too expensive to recommend.**

As the most expensive E7205 board on test, you'd expect the P4SAA to have even more features than Asus' P4G8X and MSI's GNB Max-FISR. But the SuperMicro isn't laden with goodies. Aimed at the high-end desktop and workstation market, it has Gigabit Ethernet and an AGP Pro 8x slot, but no RAID controller.

The familiar Realtek ALC650 chip produces six-channel audio, but that's the end of the additional features – unless you count the extra backplate with four USB 2 ports.

Legacy ports – including a gameport – are retained on the non-standard I/O panel; an I/O shield is included in the box to cover the gaps. Six PCI slots allow for plenty of expansion, and component layout is neat. Overclocking options are disappointingly few though – only CPU FSB and voltage can be changed.

The manual is well written and includes a BIOS guide. Unfortunately, besides the basic Windows hardware-monitoring application, the P4SAA has no further significant features.

PC PRO RATINGS
OVERALL
88

PERFORMANCE	FEATURES	VALUE
102	89	61

100 IS THE AVERAGE

VIA P4PB Ultra

PRICE £110 (£129 inc VAT)
SUPPLIER Kustom PCs (Web only)
VERDICT **A strong showing from VIA, with some great features including a bundled memory reader.**

The P4PB Ultra is certainly aimed at the enthusiast. It's based on the P4X400 chipset – VIA's latest Intel offering – although again without an official licence from Intel. This supports Hyper-Threading, AGP 8x, USB 2 and Ultra ATA/133. The only features missing against the SiS655 chipset – as used by the Gigabyte SINXP1394 – are FireWire and the dual-channel memory controller.

VIA adds to the VT8235 south bridge's USB 2 support with the VT6202 for a potential ten ports. Two are integrated, while another four are supplied on a backplate. A Promise PDC20376 chip provides two Ultra ATA channels with RAID support for striping or mirroring, but there's no Serial ATA controller, so the SINXP1394 pulls ahead here too.

A C-Media CMI8738 chip provides six-channel audio – VIA bundles both coaxial and optical S/PDIF outputs on a backplate – while another VIA chip deals with 10/100 Ethernet. Meanwhile, the SINXP1394 scores extra points with dual Ethernet and one controller even provides Gigabit transfers.

But the P4PB has a unique feature of its own. The board has headers for SD, Memory Stick and smart card readers. This is augmented by the fact that VIA bundles a 3.5in box with the actual readers for installing into a front panel bay, making the P4PB Ultra a great choice for digital camera users.

Layout isn't too bad considering the high level of integration and eight expansion slots (six PCI, one AGP and one CNR). As with many other boards on test, long AGP cards will have to be uninstalled to install extra memory. Plus, some headers are located in between the PCI slots, making them hard to get at. Other than that, EIDE and floppy connectors are sensibly placed for a tidy install.

Like the SINXP1394, the P4PB Ultra fully supports PC2700, and also has limited PC3200 support – we tried some Corsair PC3200 memory, which appeared to work with no problems, but VIA doesn't guarantee compatibility with every PC3200 stick.

The BIOS isn't ideal for overclocking, with limited voltage and memory speed settings. However, software is included for doing so within Windows and the BIOS automatically resets if the system can't boot due to overclocking.

The P4PB Ultra came pretty close to winning this test. The bottom line, however, is that the SiS655 chipset on the Gigabyte SINXP1394 is a better performer, and the Asus P4PE offers amazing value for money that can't be ignored.

PC PRO RATINGS
OVERALL
112

PERFORMANCE	FEATURES	VALUE
98	128	110

100 IS THE AVERAGE

Guide to processors

The definitive guide to all the Socket 478 Intel and Socket A AMD chips currently available

INTEL'S OFFERINGS

Intel currently has two types of desktop processor on the market: the Pentium 4 and the Celeron. The Pentium 4 started life as the Willamette core and came in 1.4GHz and 1.5GHz flavours – far surpassing the Pentium III, which struggled to reach 1GHz. It featured a brand-new architecture called NetBurst. One of the key factors was the Hyper Pipelined Technology, which doubled the number of pipelines stages to 20.

The processor pipeline is where the x86 instructions are executed and is split into a number of stages, each of which carries out a certain portion of the work. However, the fewer the number of stages, the greater the amount of work each stage has before it completes, resulting in latency. This latency restricts the maximum speed of the pipeline, and hence the CPU speed.

By using 20 stages, Intel spreads the work more thinly, reducing the latency at each stage and allowing for far greater clock speeds. There are disadvantages too, and executing fewer instructions per stage also means the CPU does less work per clock cycle than, for example, the Pentium III. One way round this is to make the pipeline more efficient, and Intel attempts this by allowing for six instructions to be in the pipeline at any one time, which can be executed out of order.

BUYING YOUR PROCESSOR

Simply (**www.simply.co.uk**, 0870 727 2100) has the most comprehensive range of processors around at the moment. It supplied us with these prices for the retail packs, which include the requisite heatsink and fan (all prices exclude VAT):

Celeron: 1.7GHz, £37; 1.8GHz, £48; 2GHz, £57; 2.1GHz, £67; 2.2GHz, £72.

400MHz FSB Pentium 4: 1.8GHz, £97; 2GHz, £109; 2.2GHz, £112; 2.4GHz, £119; 2.5GHz, £129; 2.6GHz, £161.

533MHz FSB Pentium 4: 2.26GHz, £115; 2.4GHz, £119; 2.53GHz, £129; 2.66GHz, £161; 2.8GHz, £249; 3.06GHz, £449.

Athlon XP: 1700+, £36; 1800+, £46; 1900+, £51; 2000+, £56; 2100+, £61; 2200+, £72; 2400+, £96; 2500+, £117; 2600+, £160; 2700+, £176; 2800+, £247; 3000+, £381.

The CPU also attempts to predict what instructions will be required next, but there will still be times when it 'mispredicts'. In this case, the instruction is flushed and another is loaded – depending on where it was in the pipeline, this can severely affect performance. Intel recognised this and, as well as optimising a small Level 1 cache, added a cache to store micro-ops (basically decoded instructions) ready to feed into the pipeline.

To compensate for the loss of performance due to mispredictions, and also to bring the Integer performer to a competitive level, Intel ran the Pentium 4's ALUs (Arithmetic Logic Units) at twice the speed of the CPU. It also introduced a quad-pumped FSB for communications with the memory and north bridge – this means it transfers data four times per clock cycle. Another change was the new SSE2 instructions, adding further performance benefits in certain areas, such as multimedia applications and games.

The 1.4GHz and 1.5GHz Willamette-based Pentium 4 CPUs used a 100MHz front side bus (FSB) – effectively 400MHz – and were built using a 0.18-micron process, but performance was poor. Intel trailed AMD up until the release of its second Pentium 4 core, named Northwood, which included two changes. The first was a move to a 0.13-micron process, enabling higher frequencies at lower voltages and with less heat. The second was an increase to 512Kb of Level 2 cache, compared to 256Kb. A further revision, called Northwood B, added a 133MHz FSB (effectively 533MHz), broadening the bandwidth significantly.

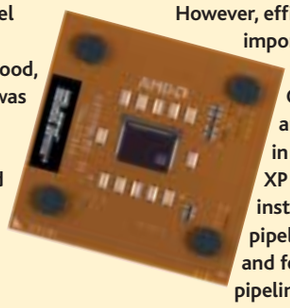
Intel recently introduced a minor revision to the Northwood core to incorporate Hyper-Threading. This is Intel's new technology, introduced with the 3.06GHz Pentium 4, which fools Windows XP into thinking there are two processors inside your PC – it's similar to SMP (symmetrical multiprocessing). However, SMP is only useful if you use your computer for large amounts of number crunching, and even then you'll need to use apps designed to take advantage of more than one processor.

The Celeron is based on the Pentium 4 Willamette core, but features only 128KB of Level 2 cache. The 2GHz and higher Celerons are also built using the latest 0.13-micron process and, although they perform comparatively poorly against the Pentium 4, Celerons can be significantly overclocked (*see p288*).

THE ATHLON XP

When AMD first announced its decision to use an equivalent rating for its XP processors, it met with a cynical reaction from the press. However, the test of time has proved AMD right. Despite being clocked at just 2.17GHz, the latest Athlon XP – named 3000+ – is more than a match for the 3GHz Pentium 4 (although AMD claims the model number refers to how the equivalently clocked Athlon would have performed, not a Pentium 4).

The reason a 2.17GHz chip can perform on a par or faster than Intel's 3GHz chip is their different architectures. As explained earlier, the Pentium 4's deep pipeline allows for higher clock speeds. Conversely, the Athlon XP features a ten-stage pipeline, meaning each stage is more complex and therefore executes more slowly. This has benefits too – the main one being that each stage executes more instructions.



However, efficiency is just as important, and this is where AMD's Quantispeed architecture comes in to play. The Athlon XP can have nine instructions in the pipeline at one time and features powerful pipelined floating-point units – serious number crunching.

There's also technology to keep the CPU fed with data, such as the Hardware Data Prefetch, which looks for regular memory access patterns and loads the data into the Level 2 cache in advance of it being accessed. This reduces latency, as the CPU would otherwise need to fetch data from main memory, which takes longer. There's also a Translation Lookaside Buffer – essentially an index of recently accessed pages of memory – which helps reduce delays in the event that a required instruction isn't stored in the cache memory (a cache miss). It also features AMD's 3DNow! Professional technology, adding 3DNow! and SSE (not SSE2) instructions to accelerate certain

Intel's latest Pentium 4 uses Hyper-Threading to fool Windows into thinking there are two physical CPUs.

apps, such as games and multimedia.

However, AMD still needs high MHz to compete, and to achieve this it has had to revise the Athlon XP core several times. The first Athlon XP (codenamed Palomino) was built using AMD's 0.18-micron process and included 128KB of Level 1 cache and 256KB of Level 2 cache. Like the Thunderbird core before it, the 'Palomino' used a 266MHz FSB, but could run at much faster speeds – the fastest being 1.73GHz for the XP 2100+.

After the Palomino core hit its limit, AMD transitioned to a 0.13-micron Thoroughbred core, which allowed for faster speeds using less power. It also made some architectural changes to help it cope with the higher clocks. This allowed for some extra headroom and speeds up to 1.8GHz (Athlon XP 2200+).

Taking this higher required a second revision of the Thoroughbred core (Thoroughbred-B), which added support for a 333MHz FSB and boosted speeds up to 2.17GHz (XP 2700+). Most Athlon XP processors are now based on the Thoroughbred-B core.

The latest and probably final revision to the XP core is codenamed Barton. This is essentially the same as the Thoroughbred-B, but with 512KB of Level 2 cache as opposed to 256KB. This means AMD can give its chips higher model numbers, but actually reduce the frequency. In fact, the 1.83GHz Athlon XP 2500+, which is based on the Barton core, is almost as fast as the 2.17GHz XP 2700+, based on the Thoroughbred-B. Apart from the XP 2500+, only the 2800+ and 3000+ are currently based on the Barton core.

INTO THE FUTURE

Unfortunately, there's no such thing as future-proofing your PC anymore (if there ever was). If you buy the top-of-the-range Athlon XP or Pentium 4 today, the next big step will be either the Athlon 64 or the Prescott-based Pentium 4. And neither of these will work with any of the motherboards reviewed here. In the near future, it looks like Intel will release a 3.2GHz Pentium 4 and AMD will release an Athlon 3200+ chip (based on the Barton core). But that's it.

Intel has recently revealed more details about the Prescott – Northwood's successor. Features include a 16KB Level 1 cache (up from 8KB), 1MB Level 2 cache, 0.09-micron die and 13 new instructions. Another key change is the 200MHz FSB, which is quad-pumped to give an effective speed of 800MHz. Naturally, there will be new chipsets to accompany the processor too.

AMD has also already announced the successor to the Athlon XP: the Athlon 64. This will use 64-bit technology instead of the 32-bit system in current mainstream chips, but it will be backwards-compatible with 32-bit software. Microsoft hasn't yet committed to a date for its 64-bit version of Windows on the desktop, but hopefully the companies will release products at the same time: September 2003.

PERFORMANCE

Enough theory. We wanted to see how all these chips performed in our real-world benchmarks, and so we set to testing them – every single chip that you can buy today. We used the same Crucial PC2700 memory (512MB split across two DIMMs) and Western Digital hard disks as we do for motherboard testing. To test the AMD chips, we used Gigabyte's 7VAXP Ultra, which is based on VIA's KT400 chipset. To test the Intel chips, we used Gigabyte's SINXP1394, which uses the SiS655 chipset.

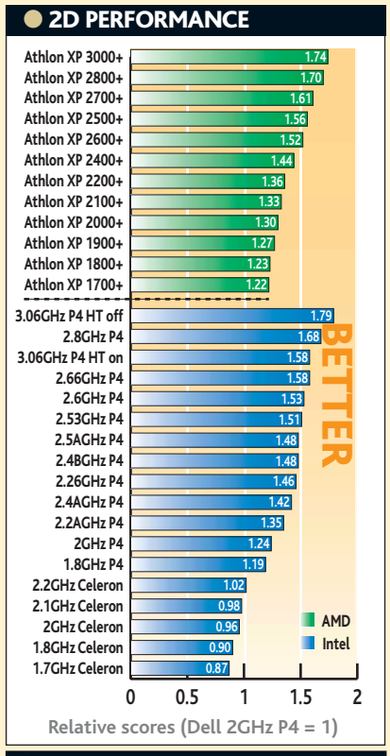
As you can see from the graphs on the right, the 3.06GHz Pentium 4 (with Hyper-Threading turned off) was the fastest CPU in both 2D and 3D. However, we also calculated the processors' scores for value for money (using a weighting of their 2D and 3D performance results combined with the cost of the chip). Here, AMD won most kudos, with all of its range up to the Athlon XP 2500+ offering excellent value for money. See www.pcpro.co.uk for a full breakdown of the results.

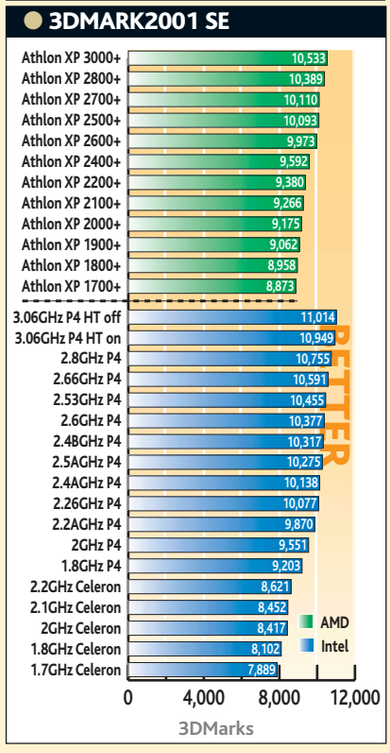
THE VIA ALTERNATIVE

To conclude this round-up of processors, we shouldn't ignore the VIA C3 chip. VIA has just released a 1GHz version and allowed us a first-look at it in action. In terms of performance, it's certainly no match for the latest Athlon XP or Pentium 4 chips – the 1GHz chip only scored 0.46 in our tests – but it can still handle everyday tasks. Most importantly, it can handle DVD video (especially in tandem with the Apollo CLE266 chipset, which includes a hardware MPEG-2 decoder).

It has other advantages over the big two as well. First, VIA has introduced a hardware random number generator in the CPU to protect your data. Second, it doesn't need much power to run, which means less heat and less noise. Take a look at Small is beautiful (*p144*) for details on the VIA EPIA M 9000.

TIM DANTON, GARETH OGDEN





Abit NF7-S

PRICE £85 (£100 inc VAT)
SUPPLIER www.dabs.com/293rws
VERDICT **What the NF7-S lacks in features, it makes up for in price. A good-value nForce2 board.**

Abit's NF7-S uses the graphics-less nForce2 north bridge in combination with the fully featured MCP2-T south bridge to gain the SoundStorm logo on the box for true 5.1 AC3 audio. On the rear I/O panel are the six-channel outputs as well as line-in and mic sockets. There's also an optical S/PDIF output, serial and parallel ports. Best of all, the MCP2-T delivers FireWire, and Abit includes a backplate with two ports.

Serial ATA is provided by a Silicon Image chip, which supplies two channels and RAID support to complement the two Ultra ATA/133 channels. Abit includes an Ultra ATA-to-Serial ATA adaptor in the box for use until the new serial disks are available. The board also integrates a Realtek 10/100 Ethernet controller.

The board is generally well laid out, but a long AGP card will foul at least one DIMM socket. Like other nForce2 boards, the BIOS offers an impressive spread of overclocking options.

At £85, the NF7-S offers good value and is a fine choice if you don't need the extra features of the Asus A7N8X Deluxe or Chaintech's Zenith 7NJS.

PC PRO RATINGS
OVERALL
99
PERFORMANCE 102 | FEATURES 98 | VALUE 96
100 IS THE AVERAGE

Albatron KX400-8X

PRICE £63 (£74 inc VAT)
SUPPLIER The Overclocking Store 0114 263 4100
VERDICT **A no-frills KT400 board that offers superb value, but its layout is disappointing.**

It's clear Albatron is aiming the KX400-8X at those on a budget. Aside from the Ultra ATA and floppy cables, the only hardware included with the motherboard is a four-port USB backplate. There are no Ethernet, RAID or Serial ATA controllers either, so it's good to see six PCI slots.

The only notable integrated component is the Realtek ALC650 six-channel audio chip. The KX400-8X also features Voice Genie – a vocal POST reporter – and BIOS mirroring. Both make experimenting with the BIOS less dangerous. Unfortunately, there's no AGP/CPU clock divider, but overclocking options are otherwise respectable.

The layout of the Albatron is poor. The CPU socket is crowded on one side by capacitors, while the AGP slot and DIMM sockets are practically touching, even without a graphics card fitted. That said, the power connector is out of the way behind the audio I/O ports.

Its incredible price of £63 makes the Albatron's faults forgivable. Take a look at the Gigabyte 7VAXP Ultra before you buy, though.

PC PRO RATINGS
OVERALL
92
PERFORMANCE 96 | FEATURES 78 | VALUE 109
100 IS THE AVERAGE

AOpen AK77-8x Max

PRICE £79 (£93 inc VAT)
SUPPLIER PC Nextday (Web only)
VERDICT **Although well featured and well priced, the AOpen is beaten by even better deals from Gigabyte and Asus.**

The AOpen is much better specified than the Albatron KX400-8X. There's integrated FireWire, Serial ATA RAID and 10/100 Ethernet, making it a competitor to the nForce2 boards. Only the performance deficit of the KT400 chipset holds it back. There are also enough backplates to blank three of the PCI slots, one of which has coaxial and optical S/PDIF inputs and outputs.

The only design flaw is that the DIMM sockets and AGP slot are so close that installing a graphics card means you can't get memory in or out cleanly. Otherwise, the CPU socket has fairly good clearance for oversized coolers and the power socket is well out of the way.

Other innovative features like the SilentTek fan control, Die-Hard BIOS, Watchdog Timer and EzRestore push the AK77-8x Max above the KX400-8X. It's just a shame that the manual doesn't include a BIOS guide.

The AOpen is a good board, but it's eclipsed by the Gigabyte 7VAXP Ultra and several of the nForce2-based boards.

PC PRO RATINGS
OVERALL
102
PERFORMANCE 96 | FEATURES 105 | VALUE 107
100 IS THE AVERAGE

Asus A7V8X Deluxe

PRICE £77 (£90 inc VAT)
SUPPLIER CCL Computers 01274 471278
VERDICT **An excellent advert for the KT400 chipset, with lots of features despite the aggressive price.**

The A7V8X Deluxe differs in a couple of important ways from the other Socket A boards. First, it supports Gigabit Ethernet, thanks to the Broadcom controller. Second, the sixth PCI slot can be used with Asus' own multiformat wireless card, which supports Bluetooth, 802.11b and 802.11a.

With Serial ATA and FireWire controllers on board, there's a good degree of future-proofing too. In order to protect the AGP slot, a red LED lights up if a 3.3V card is inserted. In terms of layout, like other boards the DIMM socket clips clash with the AGP slot. Also, several of the jumper options on the board have been hard-wired, preventing you from disabling FireWire and LAN controllers.

Overclocking options in the BIOS aren't great. You can't lock the AGP/PCI clock, for example. However, you can upgrade the BIOS from Windows and change the startup screen using Asus Live Update.

With headers for other functions like front-panel audio and the inclusion of InterVideo WinCinema, the A7V8X edges ahead of other boards on test. It's a great KT400 choice.

PC PRO RATINGS
OVERALL
105
PERFORMANCE 96 | FEATURES 115 | VALUE 113
100 IS THE AVERAGE

Asus A7N8X Deluxe

PRICE £92 (£108 inc VAT)
SUPPLIER Simply 0870 727 2100 (Code: 48179)
VERDICT **Bursting with features at a low price, the A7N8X Deluxe should be top of your shortlist.**

PC PRO LABS WINNER

The nForce2 has already gained respect from performance enthusiasts, and Asus has exploited all the chipset's features with the A7N8X Deluxe. It uses a combination of the SPP north bridge – sans graphics – and the fully featured MCP-T south bridge.

Like the Abit NF7-S, there are five mini-jack sockets on the I/O panel for six-channel outputs and line-ins without using up a PCI slot backplate. Two of these sockets, along with a coaxial S/PDIF, take up space usually occupied by a serial port, but Asus bundles a second one on a backplate if you need two serial ports.

The A7N8X is the only board we've seen to take advantage of the nForce2's dual-LAN capability. As such, there are also two RJ-45 sockets for broadband-sharing purposes. Another feature unique among the AMD motherboards is an 8x AGP Pro slot. There's also an LED beside the slot to indicate the insertion of an older incompatible 3.3V AGP card. To prevent damage, the system won't boot in this situation until a compatible 1.5V card is installed.

In addition to the four USB 2 ports on the back panel, there are two more on a backplate shared with a gameport. Making use of the MCP-T's FireWire support is a Realtek controller, and Asus supplies a backplate with two ports: one six-pin and one four-pin. Last, but not least, is a Silicon Image controller for the two Serial ATA connectors at the bottom of the board. This allows RAID-0 and -1 configurations, but RAID-0+1 is impossible as each Serial ATA channel, being serial, only supports a single disk.

Layout has been well thought out. There's plenty of room between the AGP Pro slot and the DIMM sockets, so memory can be installed or removed with an AGP card installed. Also, the dual-channel memory sockets are separated and colour coded like the MSI K7N2G-ILSR. Usefully, there are four holes around the CPU socket for installing a hefty heatsink such as an Alpha PAL 8045.

Overclocking tools in the BIOS are as comprehensive as we'd expect. Another useful tool is the Q-Fan control, which slows the fans down below a set temperature. As there's no fan on the north bridge heatsink, acoustic output is kept to zero. The BIOS also has CPU overheating protection, which automatically shuts down the system should temperatures become high enough to damage the CPU.

With all these features, the A7N8X is well future-proofed, and it only costs £7 more than the Abit NF7-S. The Deluxe's extra features and functions, plus the InterVideo software and bundled accessories, are well worth the small premium.

PC PRO RATINGS
OVERALL
109
PERFORMANCE 102 | FEATURES 119 | VALUE 102
100 IS THE AVERAGE

Biostar M7NCG

PRICE £93 (£109 inc VAT)
SUPPLIER Compubits 0870 458 2222
VERDICT **A competent microATX board and a better bet than Biostar's Intel version, thanks to an AGP slot and faster graphics.**

For those wanting a cheaper alternative to Shuttle's nForce2 bare-bones solution, Biostar's microATX nForce2 GT may fit the bill. Three PCI slots would normally be too few, but with graphics, sound and networking integrated there's little else to add. Of course, there's an AGP 8x slot for upgrading 3D performance.

Essentially, it's only the expansion potential that differentiates the M7NCG from other nForce2 GT boards. But the lack of bundled backplates and other accessories makes the price premium over the £85, full-ATX Leadtek seem unjustified.

Software comprises Norton's Internet Security 2002 pack. BIOS options are limited, with no voltage controls for overclocking, and layout is compromised by the size of the board, but is no worse than other nForce2 boards.

As the basis of a small(ish) form-factor PC, the Biostar is a reasonable choice, thanks to the features and performance of the nForce2.

PC PRO RATINGS
OVERALL
89
PERFORMANCE 103 | FEATURES 83 | VALUE 79
100 IS THE AVERAGE

Chaintech Zenith 7NJS

PRICE £132 (£155 inc VAT)
SUPPLIER Ideal Computing 0870 745 5061
VERDICT **A fantastic package – if you'll use all the features, it's well worth the extra outlay.**

Chaintech bundles so many accessories with the 7NJS that its box is twice as big as others. The most impressive item is the Cbox2, a 3.5in unit containing four USB, one FireWire, microphone and line-out jacks, POST and temperature monitors. It's also great to see rounded Ultra ATA and floppy drive cables bundled to help system builders keep their PC tidy and airflow running smoothly.

On top of the nForce2's features, there's integrated Ultra ATA and Serial ATA RAID via the Promise controller. Although we found the usual AGP/DIMM socket clash, the rest of the 7NJS's layout is well thought out. However, those wanting to install an oversized cooler should beware of a couple of capacitors close to the CPU socket.

The BIOS offers great potential for overclocking, with the CPU voltage going to 2.15V and the DIMM voltage to 3.2V, but, of course, your components will have to be able to stand the strain.

The Chaintech is a great board, with extras like the rounded cables and Cbox2 helping to justify the huge outlay.

PC PRO RATINGS
OVERALL
104
PERFORMANCE 102 | FEATURES 119 | VALUE 90
100 IS THE AVERAGE

Small is beautiful

Small form-factor PCs are all the rage, but are they any good?

Micro motherboards are one of the most interesting recent developments in the PC market. There are currently two broad choices – a Shuttle bare-bones system or a VIA EPIA mini-ITX board, but see p70 for EPoX's new e-Cube S968. Shuttle's boards measure 250 x 190mm, while VIA's are even smaller at 170 x 170mm.

The main advantage of Shuttle's latest AMD and Intel offerings is an AGP slot for the newest 3D graphics cards. Plus, they're bare-bones systems that come almost fully built, ready to accept your choice of CPU, RAM, hard disk and optical drives. Front-panel audio, USB 2 and FireWire make life even easier, and there are plenty of accessories to personalise your box. Wireless LAN kits, carry bags, front-panel card readers and glowing fascias are also available – more than enough to make you the centre of attention at LAN parties.

SHUTTLE RANGE

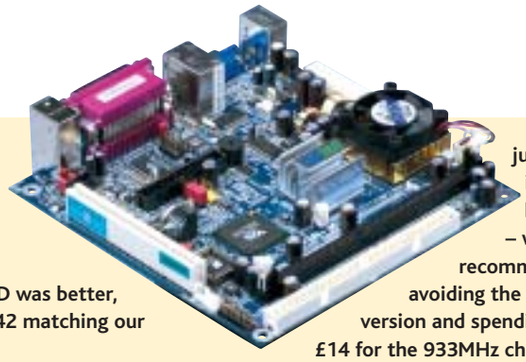
The highlight of Shuttle's range is the SN41G2, based on the nForce2 chipset. It features dual VGA outputs to independently drive two monitors, S-Video out, six-channel audio and 10/100 Ethernet. Inside are the single PCI and AGP slots, which will accommodate all but the longest cards, and there's room for two 3.5in drives as well as a 5.25in optical drive. Two DIMM sockets allow the nForce2's dual-channel memory controller to be fully utilised, and the ingenious heatpipe CPU heatsink keeps temperatures down.

The chipset supports the latest 333MHz FSB Athlon XPs so performance isn't compromised in any way. Overclockers should steer clear, though, because of obvious thermal issues, but overclocking isn't the point of these systems. In our tests, we had no heat issues when using an Athlon XP 2700+ at standard speeds for extended periods.

Shuttle's nForce2 XPC is a desirable mini-PC.

We installed the same components that we used to test the rest of the motherboards, and the SN41G2 managed an overall 2D score of 1.73 – precisely the performance of the standard ATX nForce2 motherboards. In 3DMark2001 SE, with the MSI Ti 4200 installed, the Shuttle scored only 39 3DMarks less than the ATX version, well within 3DMark's accuracy. The integrated graphics managed 4,132 3DMarks and a respectable 33fps in Unreal Tournament 2003.

Shuttle's Intel box, the SB51G, uses the 845GE chipset. The integrated graphics perform poorly compared with the nForce2 – managing 1,331 3DMarks



The EPIA M has an integrated 933MHz CPU and measures just 170 x 170mm.

and 8.3fps in Unreal Tournament 2003. 2D was better, with the result of 1.42 matching our expectations.

Aside from the lack of dual-monitor or TV-out support, the rest of the specifications match the SN41G2. FireWire, six-channel audio, USB 2 and 10/100 Ethernet are integrated, as is the all-important AGP slot, albeit a 4x version as opposed to the SN41G2's 8x support. DDR memory up to PC2700 is supported, a limitation of the 845GE. The internal layout of both boxes is much the same, and both use the same 200W PSU – plenty of power for the minimal expansion potential.

VIA RANGE

If you don't need 3D graphics, VIA's EPIA M mini-ITX motherboard is a smaller solution. Two models are available – the 6000 and 9000 – with integrated VIA C3 633MHz and 933MHz CPUs respectively. As performance isn't brilliant from the 933MHz processor – it managed just 0.41 in our 2D benchmarks – we recommend avoiding the 633MHz version and spending an extra £14 for the 933MHz chip.

The integrated CastleRock AGP 8x graphics are only suitable for 2D tasks, but with an integrated hardware MPEG-2 decoder and six-channel audio, the main purpose of this board is to be the base of a tiny DVD/DivX/MP3 jukebox PC. However, there are also two Ultra ATA/133 channels and 10/100 Ethernet, FireWire and USB 2 controllers. The I/O back panel has S-Video and composite video outputs, bolstering the case for a lounge-based PC, but there are just two USB ports. Two further ports and two FireWire connectors are bundled in the box to attach to headers.

One other limitation over the Shuttle boxes is the single PC2100 DIMM socket. While this supports 1GB modules, you'll have to buy big in the first place – you can't add more memory in the future. A solitary PCI slot allows expansion, but don't even think about an AGP slot. The PCI slot could be useful for installing a TV card, allowing hard disk recordings. However, one of the EPIA M's advantages is that it's virtually silent. The only fan is on the CPU heatsink, and this could potentially be replaced with a larger passive cooler.

Cases for mini-ITX boards are a bit thin on the ground, but Kustom PCs has a couple on offer. The Cubid 2699 (£69) is just 64mm tall and has enough room for a hard disk and notebook optical drive. Adding this cost to the EPIA M 9000 brings the price to £200, but this includes the CPU. You could always save money by building your own custom case. See **www.mini-itx.com** for ideas.

JIM MARTIN

SHUTTLE SN41G2
PRICE £220 (£258 inc VAT)
SUPPLIER The Overclocking Store 0114 263 4100

SHUTTLE SB51G
PRICE £200 (£235 inc VAT)
SUPPLIER The Overclocking Store 0114 263 4100

VIA EPIA M 9000
PRICE £129 (£152)
SUPPLIER www.kustompcs.co.uk (Web only)

How chipsets work

A guide to the complex world of motherboard chipsets

We've looked at over 30 motherboards in this Labs, with ten chipsets. Each offers slightly different features and support for the latest standards, but they all work in essentially the same way. Two main chips are involved, traditionally called the north bridge and the south bridge.

NORTH BRIDGE

The north bridge is responsible for the high-speed data transfers between the CPU, memory and AGP graphics card. It can also have AGP graphics integrated – Nvidia's nForce2 and Intel's Extreme Graphics in this Labs – and deals with data transfer to the south bridge.

The current Pentium 4 and Athlon XP CPUs have a bus width of 64 bits for data going in and out of the CPU to the north bridge. But both employ 32-bit registers for handling 32-bit instructions. Intel's Itanium enterprise processors use 64-bit instructions, while AMD's forthcoming Athlon 64 will bring 64-bit to the desktop and mobile, and the 64-bit Opteron will go head-to-head with the Itanium 2.

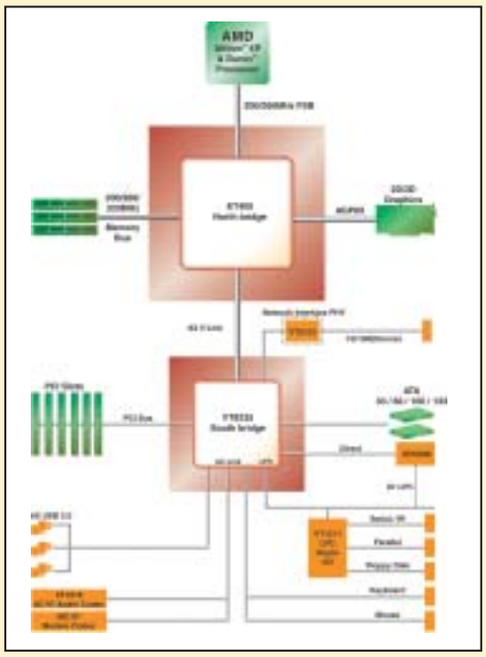
Most current chipsets also have a 64-bit interface between the north bridge and memory. Only Intel's E7205, SiS's 655 and Nvidia's nForce2 differ. These three have a dual-channel memory controller built into the north bridge, which can access two banks of memory at once for 128-bit transfers. Theoretically, this could significantly speed up overall system performance, as modern CPUs operate at a much higher speed than the memory.

The CPU front side bus (FSB) speed is the speed at which the processor communicates with the north bridge and the memory. Athlon XPs have a 133MHz or 166MHz FSB, but as this uses a DDR (double data rate) transfer method, the effective speeds are 266MHz and 333MHz. Pentium 4s have a 100MHz or 133MHz FSB, and this employs a quad-transfer technique for effective speeds of 400MHz or 533MHz. In a bid to keep ahead of AMD, Intel has ditched plans for a Pentium 4 with a 166MHz (666MHz) FSB and will move straight to a 200MHz (800MHz) FSB for the next generation.

Interestingly, the Athlon 64 won't have an FSB as such, as the memory controller is integrated into the CPU itself. It will be able to transfer data at speeds up to its internal clock frequency.

MEMORY

DDR memory speeds vary from PC1600, which runs at 100MHz (200MHz DDR), to PC3500, rated at 217MHz (433MHz). This means that in many configurations, the memory and CPU will be running at different speeds and can't communicate synchronously. For example, an Athlon XP with a 266MHz FSB will have to transfer data asynchronously with PC2700 DDR RAM, which is running at 333MHz.



How the KT400 chipset works in theory.

This means there will be unused clock cycles where data from memory is ready but can't be transferred to the CPU. Conversely it makes no sense to purchase an Athlon XP with a 333MHz FSB and then use PC2100 (266MHz) DDR memory with it.

RDRAM (Rambus) adds another complexity to the equation. There are currently two types: 16-bit and newer 32-bit RDRAM. 16-bit modules have to be used in pairs, while the 32-bit modules are basically a fusion of two 16-bit modules in one, so you can use a single stick with a terminating module in the second slot. PC1066 or RIMM4200 is currently the fastest available and runs at 1,066MHz.

AGP

The AGP slot is an enhancement of the PCI bus, but as it's a point-to-point connection between the graphics card, CPU and memory it's not strictly a bus. One of AGP's original main benefits is that it allows the graphics card direct access to main memory. Most current cards have 64MB or 128MB of fast DDR RAM on board for textures and frame buffers – enough for today's complex games without having to store huge textures in main memory.

Since AGP was first introduced in 1996, its clock speed has been revised upwards from 66MHz through 133MHz (2x), 266MHz (4x) and now 533MHz (8x). This allows a theoretical boost from 267MB/sec to around 2GB/sec. It's likely to be the last boost for AGP, as PCI Express could potentially replace the current AGP and PCI parallel buses (*see issue 98, p77*).

AGP 8x, also called AGP 3, has several enhancements over AGP 4x. The main one is isochronous transfers, which allows predictable and uninterrupted data flow. Essentially, this means that video capture and high-quality streaming video is now possible – AGP 2 simply can't deliver the bandwidth required for such applications.

SOUTH BRIDGE

The other half of a chipset is the south bridge. This chip is responsible for transfers to and from the 'slower' devices such as PCI cards, hard disks, USB and FireWire devices. It can also feature integrated components like audio codecs and modems.

The link between the north and south bridge is another crucial component. Higher bandwidth is always better, since devices such as PCI video-editing cards need to transfer scores of megabytes per second to other components like the hard disk, CPU and memory. For specific details of chipsets on test, see Performance analysis on p119.

JIM MARTIN AND ALYN SPARKES

DFI AD77 Infinity

PRICE £74 (£87 inc VAT)
SUPPLIER Computers and Components 01527 578822
VERDICT **A generally well-specified KT400 board, but the price isn't low enough to be competitive.**

The DFI is unique among these Socket A boards, thanks to its four DIMM sockets. Unlike other KT400 boards, you can add 4GB of memory, although not running at 400MHz. An integrated HighPoint RAID controller has a Serial ATA bridge on one of its channels for compatibility with the latest hard disk technology.

Front side bus speeds are set using jumpers on the board, but can be fine-tuned in the BIOS. Although voltages for the AGP slot and memory may be set, only the DDR clock can be altered separately from the FSB.

Despite having four DIMM sockets and five PCI slots, there's no conflict with the AGP slot and there's plenty of room around the CPU socket. Bundled accessories include backplates for FireWire and USB, plus a Serial ATA cable. Software only includes a hardware monitor utility.

Even though the AD77 Infinity is relatively cheap at £74, there are much better deals available. If you're on a budget, look at MSI's 74GF Ultra-L, which costs just £56.

PC PRO RATINGS
OVERALL
97
PERFORMANCE 96 | FEATURES 93 | VALUE 104
100 IS THE AVERAGE

EPoX 8RDA+

PRICE £80 (£94 inc VAT)
SUPPLIER Overclockers.co.uk 0870 443 0880
VERDICT **A competent, well laid-out board with decent overclocking potential.**

The 8RDA+ is a fairly basic implementation of the nForce2 ST. Despite the low price, it features the MCP-T south bridge and full SoundStorm AC3 audio, but there's no Serial ATA or RAID – you have to pay more for these. Two FireWire ports are included on a backplate, though, as are two USB ports and a game port. Aside from the Ultra ATA and floppy cables, that's all the hardware in the box.

Layout is clean considering the six PCI slots – only the longest AGP cards will interfere with the DIMM sockets, which EPoX warns in the manual. There's lots of room around the CPU socket for large heatsinks, and the SPP north bridge is passively cooled for quieter running.

As usual with EPoX, CPU, DIMM and AGP voltages can be boosted in the BIOS and there are ratios for CPU/DIMM and CPU/AGP, making the 8RDA+ a good choice for overclockers. With extras like diagnostic boot LEDs, the EPoX offers good value if you want nForce2 on a budget.

PC PRO RATINGS
OVERALL
98
PERFORMANCE 102 | FEATURES 93 | VALUE 99
100 IS THE AVERAGE

Gigabyte 7VAXP Ultra

PRICE £85 (£100 inc VAT)
SUPPLIER www.dabs.com/285tws
VERDICT **A well-designed KT400 board with plenty of integration and accessories at a low price.**

As with most motherboard manufacturers, Gigabyte offers several flavours of boards based on a particular chipset. The 7VAXP Ultra, as the name suggests, is a top-of-the-line motherboard, this time based on VIA's KT400 chipset.

The list of integrated components is enough to compete with the most feature-packed on test. The 5.1-channel audio comes from the almost ubiquitous Realtek ALC650 chip, 10/100 Ethernet from a contoller by the same firm, and FireWire from VIA's VT6306 controller. But Gigabyte doesn't stop there, as there's also a Promise PDC20276 chip for Ultra ATA RAID (the 7VAXP boasts four Ultra ATA channels in total) and a Silicon Image Sil3112 Serial ATA controller with two channels. Naturally, the KT400 chipset supports AGP 8x and there are three DIMM sockets which will accept up to 3GB of DDR RAM. PC3200 is also supported.

To accompany all this hardware are several backplates. The audio expansion bracket has both coaxial and optical S/PDIF outputs, along with two mini-jacks for centre/subwoofer and left/right rear channels. This is much more useful than boards that don't come with the extra mini-jacks, since the microphone and line-in sockets have to be switched, in software, to outputs. Two more brackets have four USB 2 ports and three FireWire connections. Gigabyte also goes the extra mile by including three Ultra ATA and three Serial ATA cables. Amazingly, there's also a fourth backplate that allows you to connect external Serial ATA disks. This is the same kit as supplied with the SINXP1394 – of dubious value, but interesting nonetheless.

Gigabyte has also done a good job on the layout. With five PCI slots, there's enough clearance between the AGP and DIMM sockets. Plus, all four Ultra ATA connectors are located on the upper half of the board, ideal for full-tower cases with drive racks at the top.

The BIOS isn't the best we saw for overclocking, but there's still great potential. You have to hit <Ctrl-F1> to access the DRAM timings, though, as Gigabyte hides them away. EasyTune 4 is bundled, which allows real-time overclocking from within Windows, and the DualBIOS feature is handy for protecting against viruses.

If we're looking to pick holes, the Promise RAID controller doesn't support striping and mirroring at the same time, but ultimately the Gigabyte is a good choice. Asus' A7N8X Deluxe just pips the 7VAXP Ultra to the finishing post, but if you can find it cheaper, this KT400 motherboard won't disappoint.

PC PRO RATINGS
OVERALL
106
PERFORMANCE 96 | FEATURES 114 | VALUE 105
100 IS THE AVERAGE

Leadtek WinFast K7NCR18G-Pro

PRICE £85 (£100 inc VAT)
SUPPLIER www.dabs.com/2bt6ws
VERDICT **A more basic board than the MSI, but at a significantly lower price. The Leadtek is a better choice if you don't need Serial ATA.**

This is the only board to include extra video outputs. Fitted to a backplate are a second VGA connector and S-Video out, plus a coaxial S/PDIF output, although you can't use S-Video and VGA together. Also in the box is a three-port FireWire card.

The board is well laid out, with good clearance around the CPU socket, a sensibly placed power connector and enough space between the memory sockets and AGP slot to get DIMMs out without moving the graphics card.

The software pack acknowledges the potential of the FireWire card. There's video-editing and 3D titling software from Ulead, plus SpeedGear, an overclocking utility. The BIOS options for overclocking are fairly extensive and there's a wide spread of memory ratios and AGP speeds.

If you don't need Serial ATA, the Leadtek is a better bet than the MSI K7N2G-ILSR, thanks to dual-monitor support and the lower price.

PC PRO RATINGS
OVERALL
104
PERFORMANCE 103 | FEATURES 107 | VALUE 102
100 IS THE AVERAGE

MSI K7N2G-ILSR

PRICE £98 (£115 inc VAT)
SUPPLIER Simply 0870 727 2100 (Code: 48139)
VERDICT **The plentiful features, including FireWire and RAID, make this a good choice if you want a graphics-enabled motherboard.**

Compared with the Biostar M7NCG, MSI's board is bristling with features. FireWire, Serial ATA and Ultra ATA RAID are all integrated onto the board, while a plethora of cables and backplates are supplied to use with the headers.

We were also impressed by MSI's layout. The power supply blocks are between the I/O ports, and the processor socket is a lot easier to get to than on the 655 Max-FISR. The memory sockets are out of the way of the AGP slot and are helpfully colour coded so that the second of the dual-channel sockets is a different colour and separated.

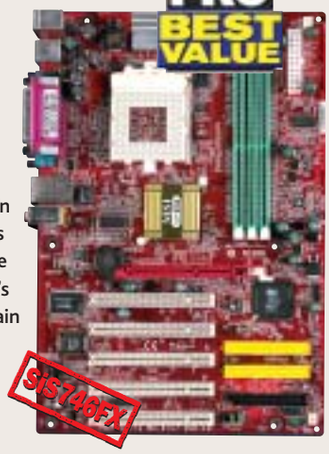
The BIOS supports live updates from MSI's website, avoiding the need for a boot disk. It also has a full spread of overclocking functions.

If you want a motherboard with integrated graphics, the MSI and Leadtek K7NCR18G-Pro boards are the best choices. If you'll use the extras supplied, the MSI is a good choice, but the Leadtek offers a decent saving if you just need a basic board.

PC PRO RATINGS
OVERALL
100
PERFORMANCE 103 | FEATURES 105 | VALUE 88
100 IS THE AVERAGE

MSI 746F Ultra-L

PRICE £56 (£66 inc VAT)
SUPPLIER Simply 0870 727 2100 (Code: 48285)
VERDICT **A superb-value motherboard that boasts excellent performance. Just don't expect a huge number of frills.**



Since the 746F Ultra-L is the cheapest board on test, we weren't surprised to find that the specifications are rather more basic than with other boards. Aside from the Ultra ATA and floppy cables, the only other accessory is a two-port USB 2 backplate to bring the total to six.

Although there's no on-board RAID, FireWire or Serial ATA, the 746F Ultra-L isn't completely barren. In common with most of the boards on test, it supports six-channel analog audio. Decoding is provided by the almost ubiquitous Realtek ALC650 chip. Oddly, there's no gameport provided, or a header for one on the main board. Fast Ethernet is also courtesy of Realtek, this time in the form of the RTL8201BL chip. As you'd expect from a brand-new chipset, the AGP slot supports 8x cards – the extra bandwidth should be lapped up by future cards.

Performance from the SiS746FX was astonishing. Considering it doesn't support 128-bit dual-channel memory architecture, the fact that it outperformed the nForce2 chipset in 2D is seriously impressive. It didn't do quite so well in the 3D tests, however, where the nForce2's extra memory bandwidth allowed it to pull ahead.

As there are fewer components, the 746F Ultra-L is one of the smallest boards on test, being just 200mm wide. This makes it better suited to shallower cases while still giving good access to expansion slots and sockets. In terms of layout, the power socket is ideally located on the top-right corner of the board. As there are just five PCI slots, MSI has managed to position the AGP slot and DIMM sockets so that there's enough room to install memory with a graphics card in place. Our only minor criticism is that a couple of capacitors are close to the edge of the CPU socket, which may prevent larger heatsinks being fitted.

If there's one downside to the 746F Ultra-L, it's limited overclocking potential. There's no voltage control for either Vcore or Vdimm – increasing voltage is the primary method of ensuring stability at higher speeds. At least the AGP clock can be locked to 66MHz and there are memory speed ratio settings to provide support for PC3200 DDR.

If you're looking for excellent 2D performance but don't want to pay for unnecessary extras like RAID or FireWire, the 746F Ultra-L makes for a compelling choice. And, with the future-proofing of AGP 8x together with plenty of expansion potential via the PCI slots, the 746F Ultra-L is an absolute bargain and consequently walks away with our Best Value award this month.

PC PRO RATINGS
OVERALL
103
PERFORMANCE 103 | FEATURES 75 | VALUE 122
100 IS THE AVERAGE