



DDR2 Frequently Asked Questions

Q. What is DDR2?

A. DDR2 is the second generation of Double Data Rate (DDR) Synchronous Dynamic Random Access Memory (SDRAM). It is an evolution of DDR memory technology that delivers higher speeds (up to 800MHz for ValueRAM® memory, beyond 1066MHz for HyperX® memory), lower power consumption and heat dissipation.



Q. When will DDR2 memory launch?

A. DDR2 memory is already here! Kingston® ValueRAM modules are available in 400, 533, 667, and 800MHz speeds. Kingston HyperX modules are available in speeds from 533MHz up to 1066MHz. In 2006, DDR2 memory was the dominant memory technology and generally cost less than DDR memory (due to market fluctuations, DDR2 prices may sometimes rise above DDR prices due to short-term memory chip supply shortages). In the next few years, DDR2 memory will be less costly than DDR memory until DDR3 memory is expected to replace it as the dominant memory technology in 2009.

Q. What platforms is DDR2 memory supported on?

A. **Desktops/Notebooks:** Intel-based desktops and notebooks have been available with DDR2 memory since 2004. AMD-based desktops and notebooks support DDR2 memory as of May 2006.

Workstations: Intel-based workstations have been available with DDR2 memory since 2004. AMD-based workstations with Opteron Revision F processors have supported DDR2 memory since 3Q 2006.

Servers: Intel "Lindenhurst" or E7520 servers have supported DDR2 memory since January 2005. Intel two-way servers launched in May 2006 with the 5000 series chipset only support DDR2 FB-DIMMs. AMD Opteron Revision F servers support DDR2 Registered DIMMs as of 3Q 2006.

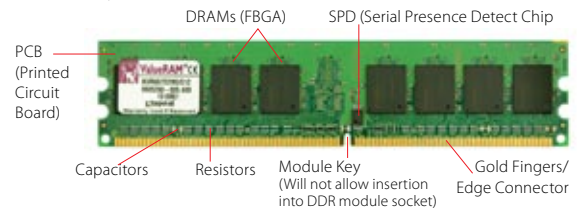
Kingston engineers work closely with both Intel and AMD to ensure best-compatibility ValueRAM server, workstation, desktop, and notebook memory.

Q. Is DDR2 backward compatible with DDR?

A. No. DDR2 memory chips and modules are very different from DDR. For example, DDR2 runs at a lower voltage (1.8V) than DDR (2.5V).

Q. Can DDR2 DIMMs be plugged into DDR sockets or vice versa?

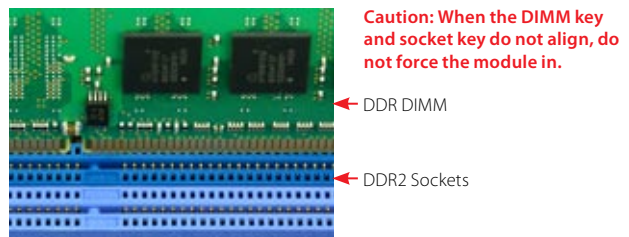
A. No. Memory modules (Unbuffered, Registered, Small Outline DIMMs) have a special "key" or notch in their connector. These keys must align with a key in the memory socket to allow the module to be inserted. All DDR and DDR2 module types are keyed differently.



Q. How can you tell the difference between a DDR2 socket and a DDR socket?

A. It is difficult to differentiate a DDR2 motherboard from a DDR motherboard just by looking at it. Inserting a DDR2 DIMM into a DDR motherboard could damage the module, the motherboard, or both. To prevent such damage, the simplest process is to align the memory module and the socket, and visually check that the module "key" aligns perfectly with the socket key. You may have to turn over the memory module as the memory module direction may misalign even compatible socket and module keys.

The picture below illustrates the incorrect alignment of a DDR memory module key and a DDR2 socket key:



DDR DIMM key (right) is not aligned with DDR2 socket key

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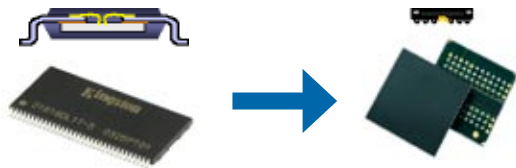
Q. What are DDR2 memory speeds and naming conventions?

Memory Speed	Memory Chip Classification	Module Classification	Module Bandwidth	Dual-Channel DDR2 System Bandwidth
400MHz	DDR2-400	PC2-3200	3.2GB/sec.	6.4GB/sec
533MHz	DDR2-533	PC2-4200	4.2GB/sec.	8.4GB/sec
667MHz	DDR2-667	PC2-5300	5.3GB/sec.	10.6GB/sec
800MHz	DDR2-800	PC2-6400	6.4GB/sec.	12.8GB/sec

Q. Are DDR2 chips different from DDR?

A. DDR2 memory chips were internally redesigned to support higher speeds and lower power consumption, and dissipate less heat than DDR.

In addition, the “package” used to encapsulate the DDR2 die is limited to only one type. All DDR2 chips will come in Finepitch Ball Grid Array (FBGA) packages only (no TSOPs) as shown below:



Most common SDRAM and DDR DDR2 chips in Fine chip package type – TSOP pitch Ball Grid Array (Thin Small Outline Package) (FBGA)

DDR2 chips in Fine-pitch Ball Grid Array (FBGA)

In addition, while DDR memory chips come in up to 1GB chip sizes, DDR2 memory chips are specified by JEDEC to go up to 4GB in capacity.

Q. What are the different DDR and DDR2 module types?

	DDR	DDR2
Unbuffered DIMMs	184-pin 2.5V	240-pin 1.8V
Registered DIMMs	184-pin 2.5V	240-pin 1.8V
SO-DIMMs	200-pin 2.5V	200-pin 1.8V
Mini Registered DIMMs	–	244-pin 1.8V
MicroDIMMs	172-pin 2.5V	214-pin 1.8V

Notes: While DDR and DDR2 SODIMMs have the same pin count, they have a different module key to prevent their insertion into incompatible sockets.

Q. What latencies will standard DDR2 DIMMs support?

A. JEDEC DDR2 specifications define standard DDR2 CAS Latencies of 3, 4, and 5:

- 400MHz DDR2: CAS 3 (3-3-3)
- 533MHz DDR2: CAS 4 (4-4-4)
- 667MHz DDR2: CAS 5 (5-5-5)
- 800MHz DDR2: CAS 5 (5-5-5)

Q. What latencies do Kingston HyperX DDR2 modules support?

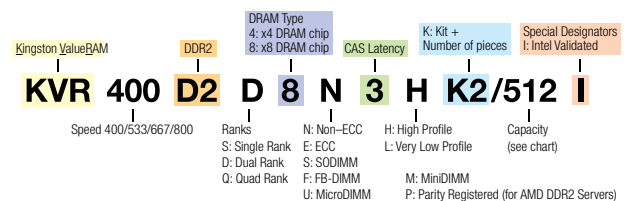
A. HyperX memory modules for gamers and enthusiasts support higher memory speeds and enhanced CAS Latencies (CL):

- 533MHz PC2-4300: CL 3 (3-3-3)
- 675MHz PC2-5400: CL 4 (4-4-4)
- 750MHz PC2-6000: CL 4 (4-4-4)
- 800MHz PC2-6400: CL 5 (5-5-5) or CAS 4 for Low-Latency Modules (4-4-4)
- 900MHz PC2-7200: CL 5 (5-5-5)
- 1000MHz PC2-8000: CL 5 (5-5-5)
- 1066MHz PC2-8500: CL 5 (5-5-5)

For more information, visit kingston.com/hyperx.

Q. What is Kingston ValueRAM's DDR2 module naming convention?

DDR2 for Notebooks, Desktops, and Servers (PC2-3200, PC2-4200, PC2-5300, PC2-6400)



For the latest part number decoder and other information, visit us at valueram.com.

