

# Tips for choosing RAM for Sandy Bridge chips: Don't swing your hands over your forehead

There are 2 most difficult to select components in a desktop computer. That is the power supply and the RAM kit. If the reviews evaluate processor chips and graphics cards appear abundantly on reliable technology websites, ...

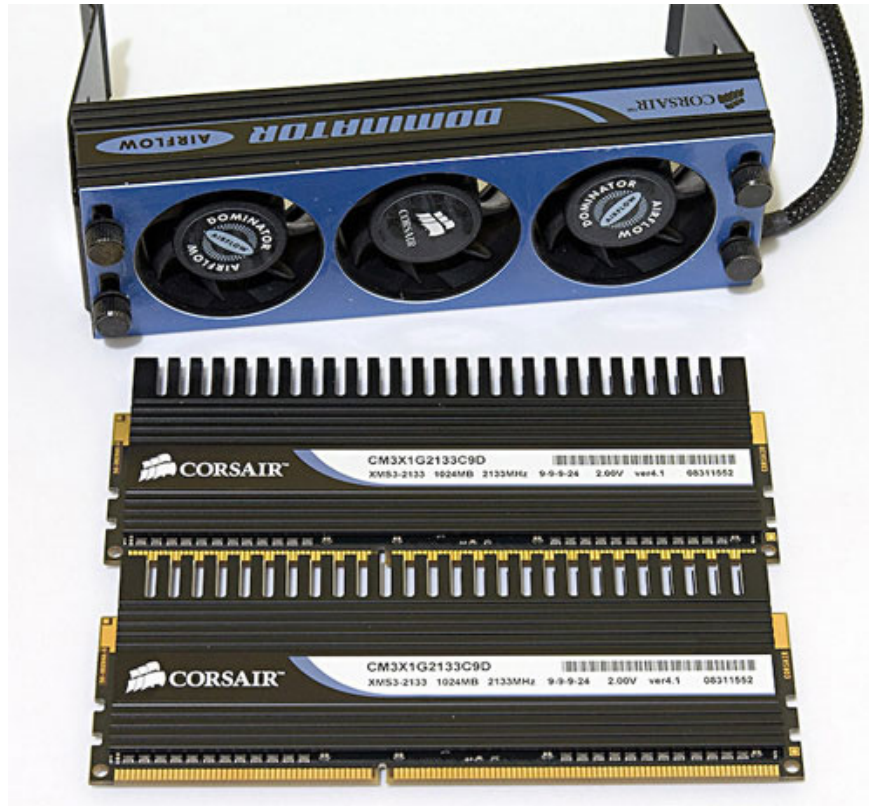
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## **Choose RAM for your computer: is it more expensive to increase performance?**

There are 2 most difficult to select components in a desktop computer. That is **the power supply** and the RAM kit. If the reviewers evaluate the processor chip and graphics card that appear rife on reliable technology websites, or choosing a motherboard is quite simple when only interested in connectivity ports and overclocking capabilities, then consumers seem quite vague for the remaining 2 important components. In addition to the main reason because of the user's inadequate attention (only particularly interested in VGA and CPU), partly due to information and reviews about the power supplies and RAM kit appear quite rare, and their content . read nothing.

This leads to a rather messy situation: users are always on the brink of trying to find the cheapest RAM possible, while gamers are more likely to have expensive products that have 'terrible' specs. I don't know what they mean. In the framework of this article, we will cover the choice of internal RAM for desktop computers - components that appear as rain on the market today from all manufacturers to specifications and prices. both. Is there a difference between a 'battle' kit *and the* 'affordable' *product that* is half the price? And is that difference worth the cost difference?



Huge RAM kit with both heat sink attached.

## The parameters of RAM

In this section we only mention two parameters that are most meaningful to consumers: **clock** and **CAS Latency**

**Clock (MHz):** In addition to capacity, this is probably the parameter that users are most interested in when choosing RAM. The clock determines the signal bandwidth between CPU and RAM is high or low. In theory, the bigger the bandwidth, the better (and the more expensive), but if the CPU doesn't use that bandwidth, it's just a waste of useless money. It's like using a 10-ton truck only to carry 1 ton of cargo.

**CAS Latency:** '1333MHz cas 7', '1600MHz cas 9'. You must have encountered such parameters but you don't understand what it is?! This is a very confusing concept so the writer can summarize it in a simple way. Latency is defined 'the time period from when the command is issued to the response received'. CAS delay is the number of clock cycles the system must wait for RAM to obtain data.

In theory, low latency and high (bandwidth) speeds will make programs much dependent on memory such as heavy games or graphics applications that run faster. In particular, the clock (bandwidth) plays a more important role. In terms of visualization, it's like a truck that runs slower than a motorcycle but carries more cargo.

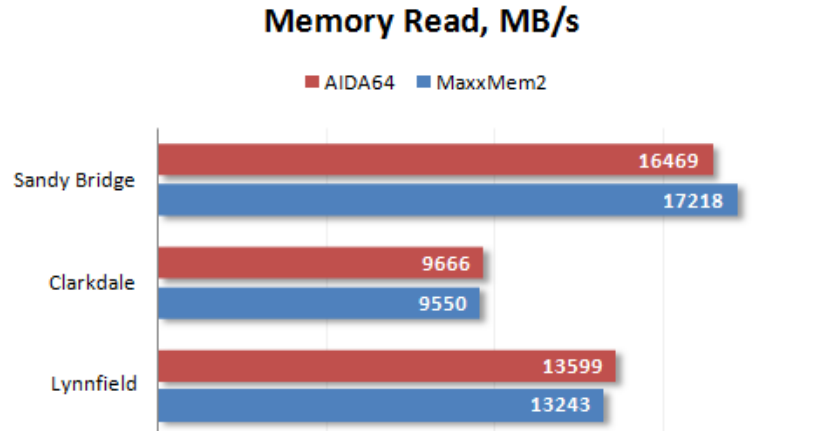
In short, the clock (the higher the better) and the lower (the lower the better) are the two most decisive factors for the performance and cost of a RAM kit. But the extent to which these parameters affect the gaming system, the advisory high-level professionals are . unable to answer.

Tốc độ (MHz)	CAS Latency	Giá tham khảo
1333	9	1.200.000 VND
	8	1.300.000 VND
	7	1.300.000 VND
1600	9	1.300.000 VND
	8	1.500.000 VND
	7	1.700.000 VND
1866	9	1.800.000 VND
	8	?
2133	10	?
	9	2.100.000 VND

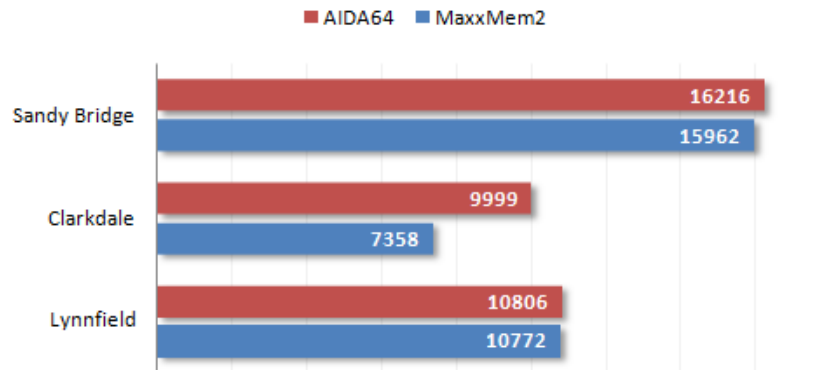
Reference price 1 kit 4 GB RAM.

## Sandy Bridge RAM controller: better RAM exploitation

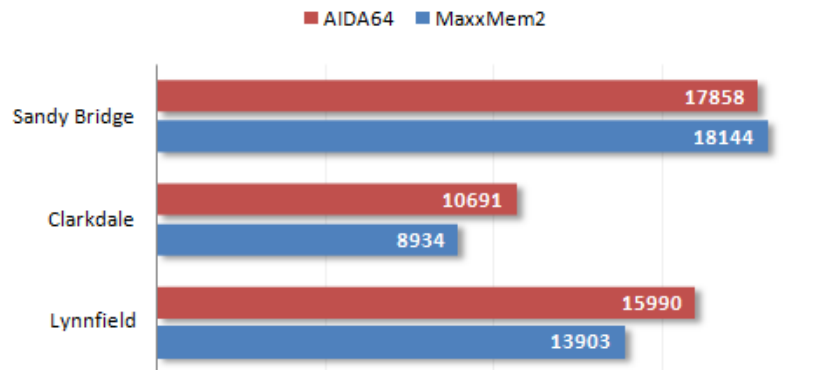
As we all know, parts such as RAM controllers, integrated graphics cores . are now on the same semiconductor with L3 cache cache and processor cores, connected through the device. The ring bus structure along with the link bandwidth between them is significantly increased. Thus, in addition to integrated graphics performance, data read and write speeds on RAM are higher than Clarkdale and Lynnfield (Core i3, i5 and i7 socket 1156 generations).



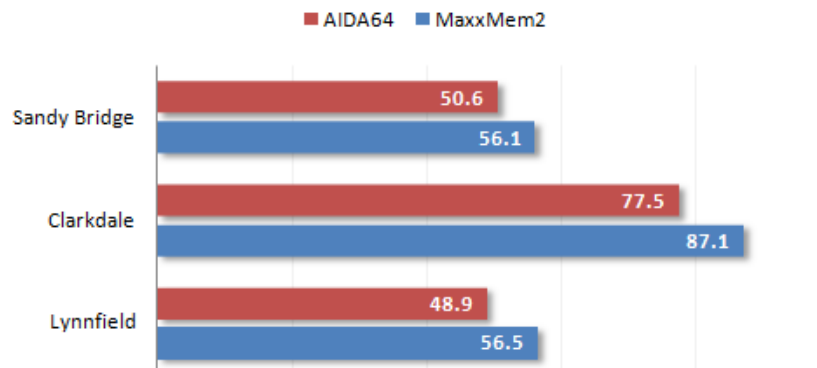
### Memory Write, MB/s



### Memory Copy, MB/s



### Memory Latency, ns



It also means that high bandwidth and low latency will significantly affect the performance of Sandy Bridge platform system compared to the old Core-i generation.

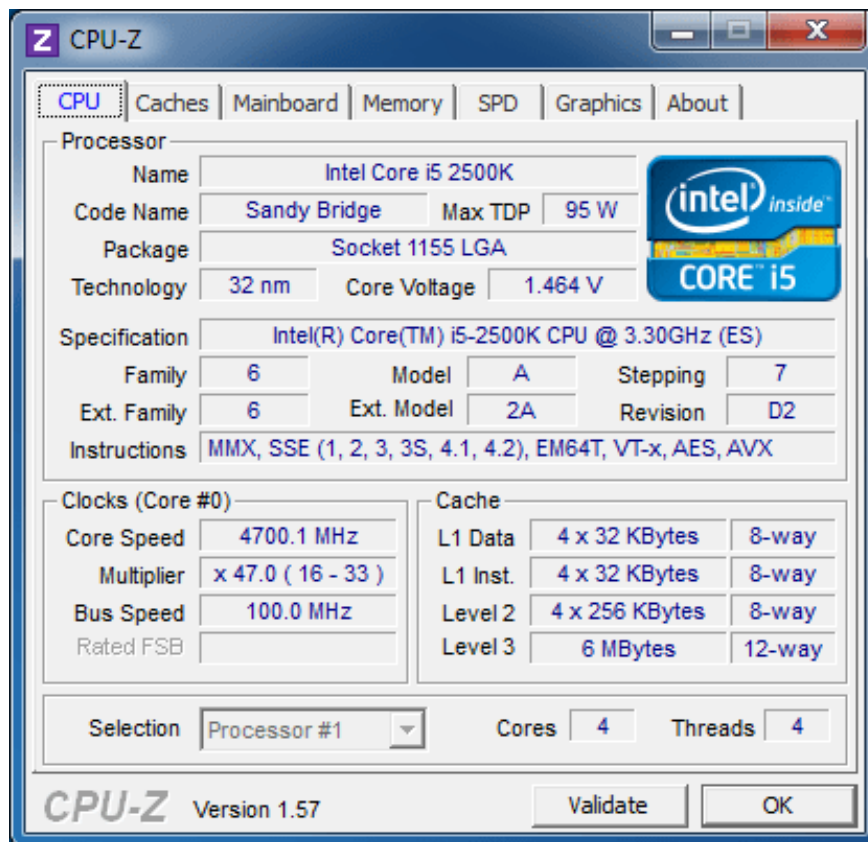
Platform	Processors	DDR3 SDRAM support
LGA1156	Core i7	DDR3-1067/1333/1600
	Core i5	DDR3-1067/1333
	Core i3	DDR3-1067/1333
LGA1155	Core i7	DDR3-1067/1333/1600/1866/2133/2400
	Core i5	DDR3-1067/1333/1600/1866/2133/2400
	Core i3	DDR3-1067/1333/1600/1866/2133/2400

## Table supports RAM clock

The table above provides information on RAM clock speeds that older Sandy Bridge and Core-i processors support. As you can see, the old socket 1156 processor like the i7 870 only supports up to 1600 MHz, i3 and i5 even supports only 1333 MHz. This means if you hastily carry a kit of RAM with 1600 MHz To plug into your i5 760 system, you will be forced to overclock the processor to run the correct RAM bandwidth. Very cumbersome!

## Test configuration & setup

The system uses Core i5-2500K processor. Tests will be carried out at default pulses of 3.3 GHz and 4.7 GHz with 10 kit RAM from affordable to super-powerful.



**CPU:** Intel Core i5-2500K (Sandy Bridge, 4 cores, 3.3 GHz, 6 MB L3);

Mainboard: ASUS P8P67 Deluxe (LGA1155, Intel P67 Express);

Graphics card: ATI Radeon HD 6970.

Hard drive: Kingston SNVP325-S2 / 128GB.

Power supply unit: Tagan TG880-U33II (880 W).

Operating system: Microsoft Windows 7 SP1 Ultimate x64.

### **Memory:**

DDR3-1066 CL7 (7-7-7-21-1T);

DDR3-1333 CL9 (9-9-9-27-1T);

DDR3-1333 CL7 (7-7-7-21-1T);

DDR3-1600 CL9 (9-9-9-27-1T);

DDR3-1600 CL8 (8-8-8-24-1T);

DDR3-1600 CL7 (7-7-7-21-1T);

DDR3-1866 CL9 (9-9-9-27-1T);

DDR3-1866 CL8 (8-8-8-24-1T);

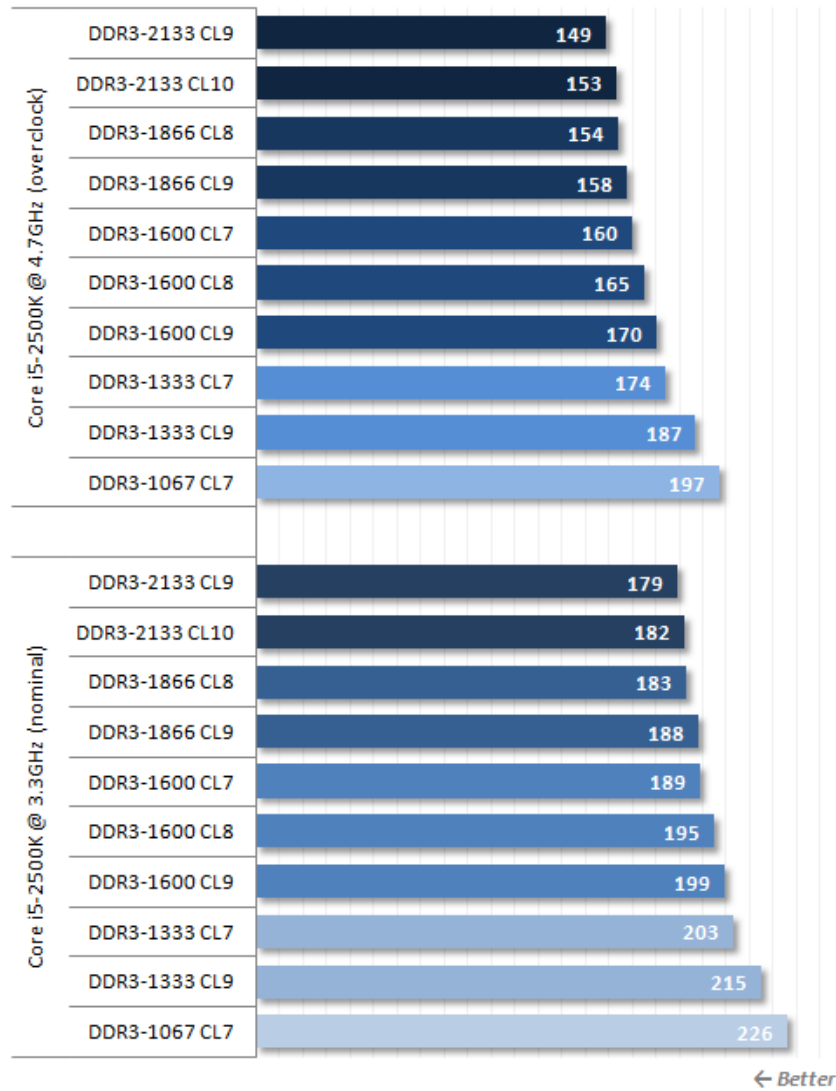
DDR3-2133 CL10 (10-10-10-30-1T);

DDR3-2133 CL9 (9-9-9-27-1T).

### **Some applications**

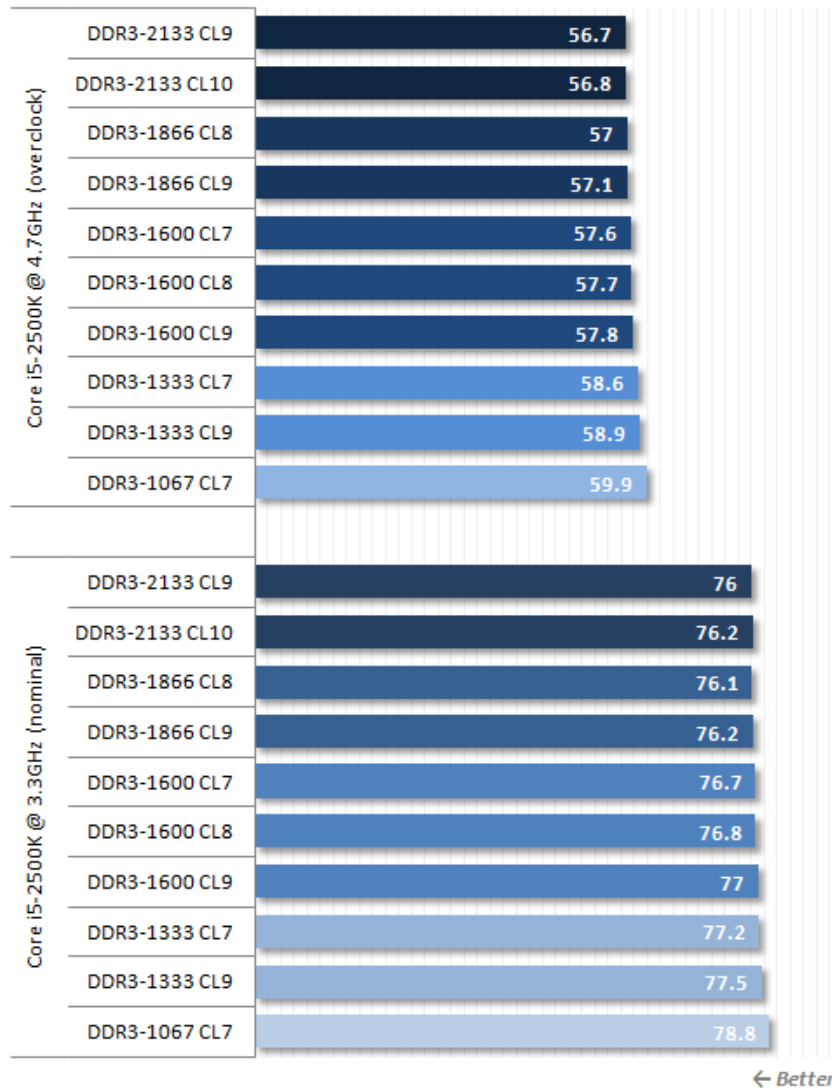
The first is WinRAR - an indispensable extracting application in any computer. We proceed to extract files with 1.1 GB capacity and measure the time:

### WinRAR 4.0, sec

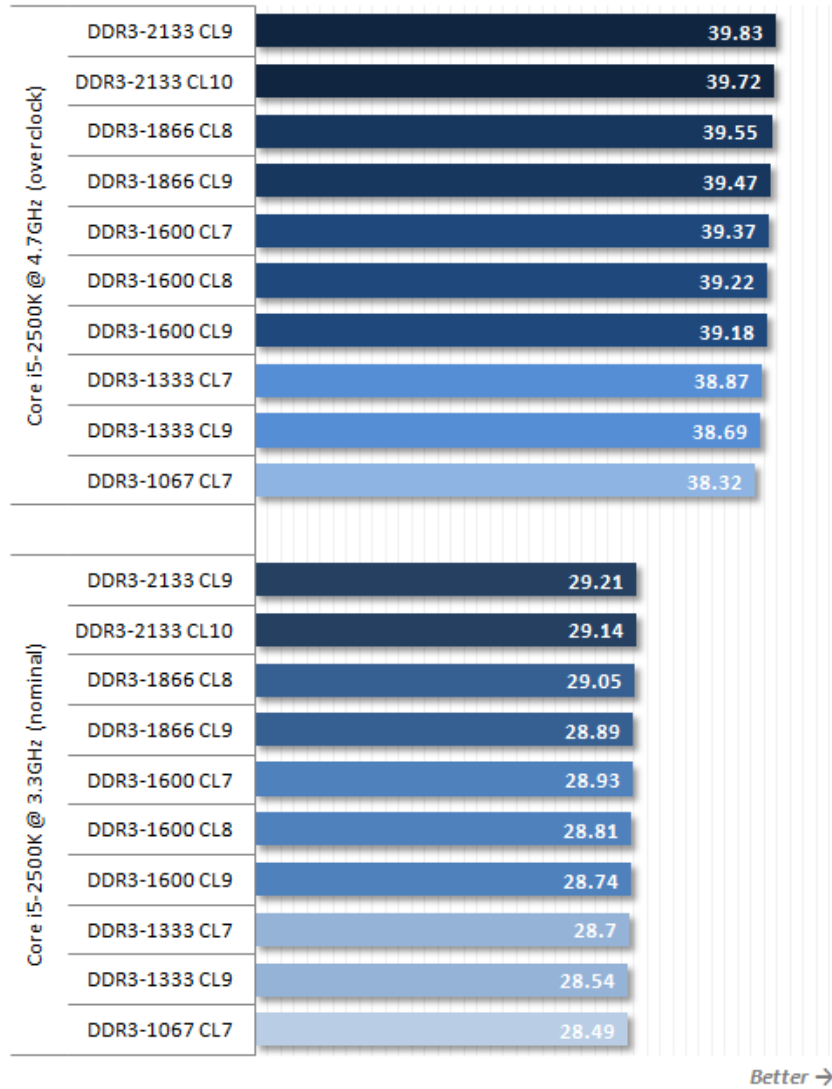


WinRAR is clearly a testament to the impact of clock and latency on system-wide performance. It seems that kit RAM 1600 has the highest investment value when it outperforms the 1067 and 1333 kit, but is not inferior to the 2133 kit 'terrible' price.

## Adobe Photoshop CS5, sec

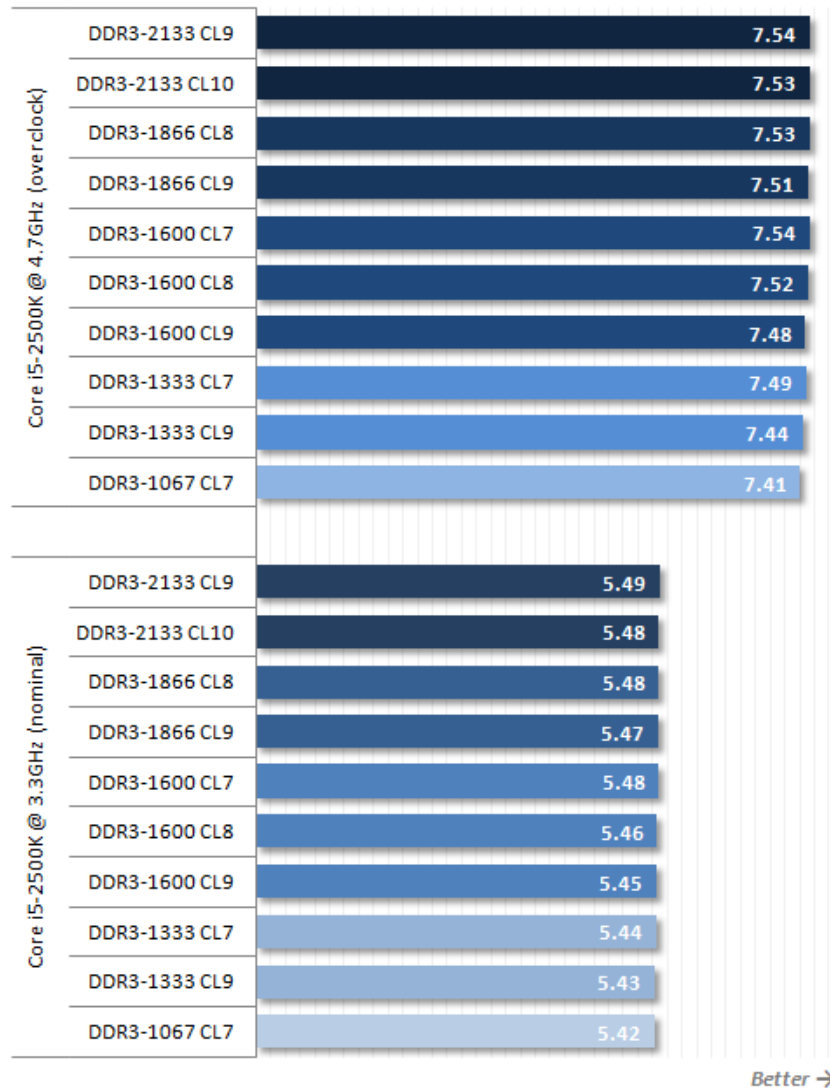


## x264, Encoding, fps



Better →

## CINEBENCH R11.5, Rendering

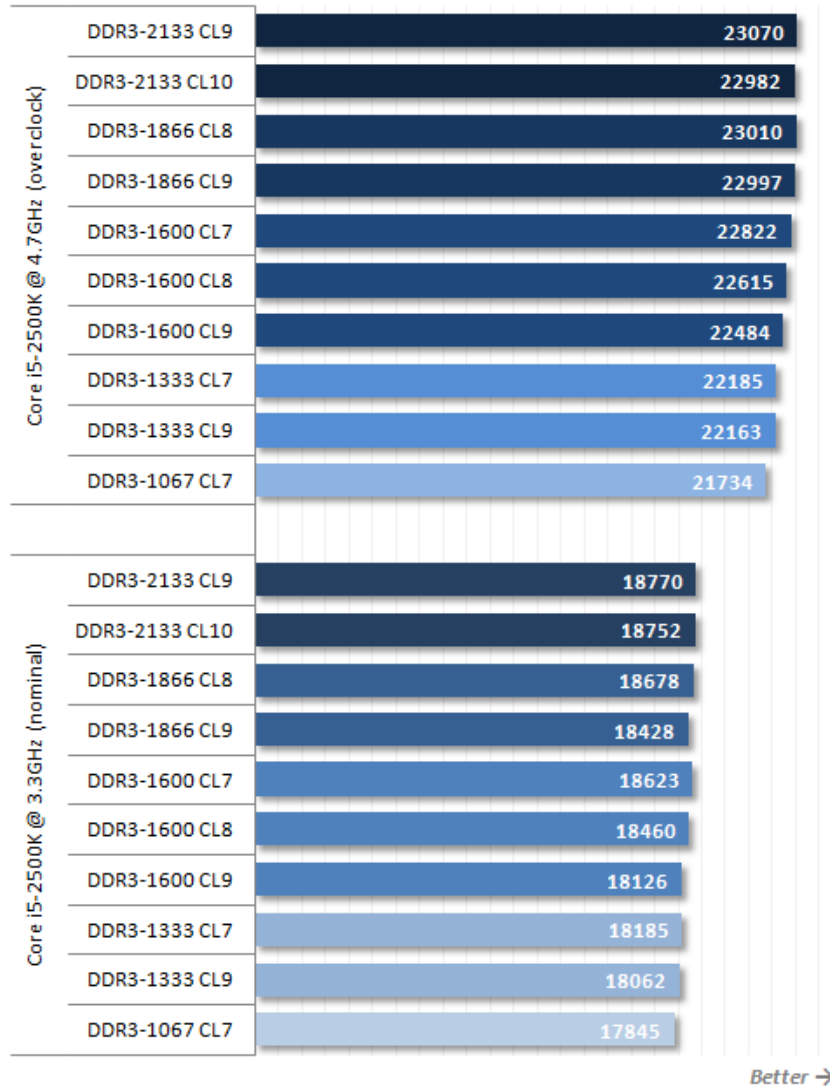


Other popular applications such as Photoshop, video encode and render videos hardly take advantage of the high bandwidth and low latency advantages, just like the '10-ton payload vehicle carrying 1 ton of goods' we mentioned. out. Conversely, clock speeds increase dramatically.

## Game performance

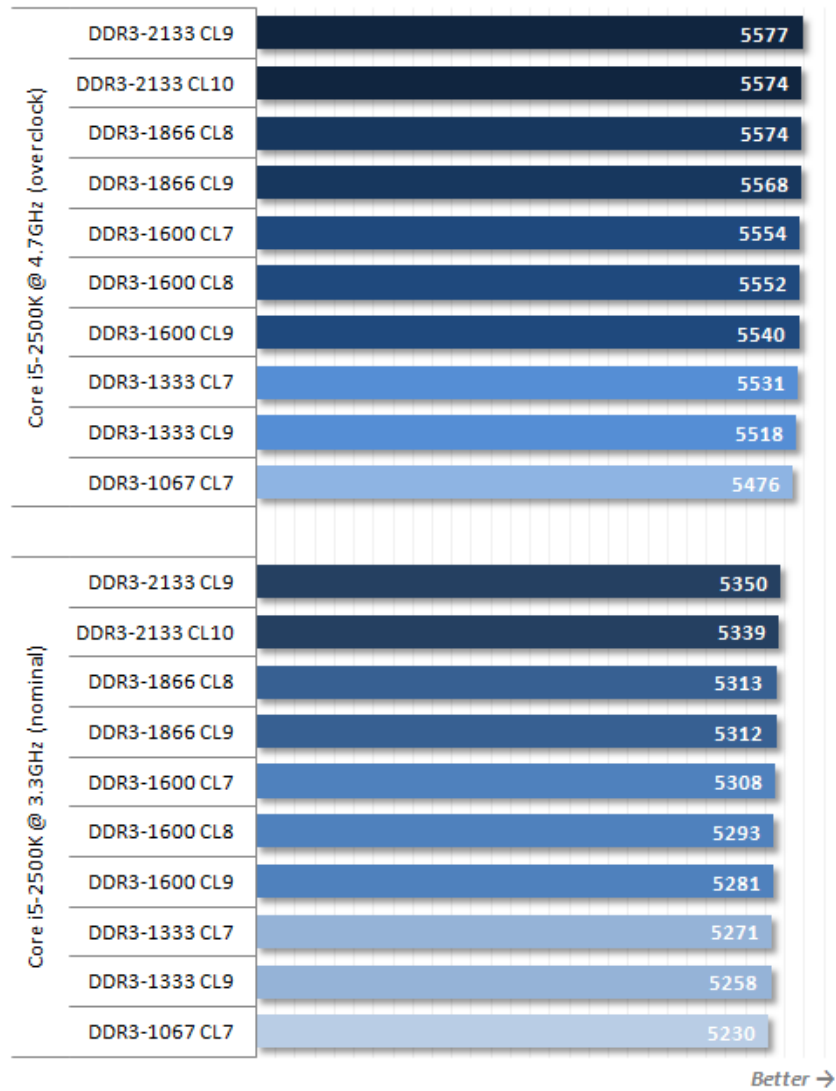
Game performance is not only a matter of most user interest today, but also a group of applications that closely monitor hardware. To clarify the issue we are concerned about is the effect of RAM on system performance, we choose tests that require heavy CPU activity, and do not set the highest graphics setting to avoid VGA situations. Depletion affects results.

## PCMark Vantage



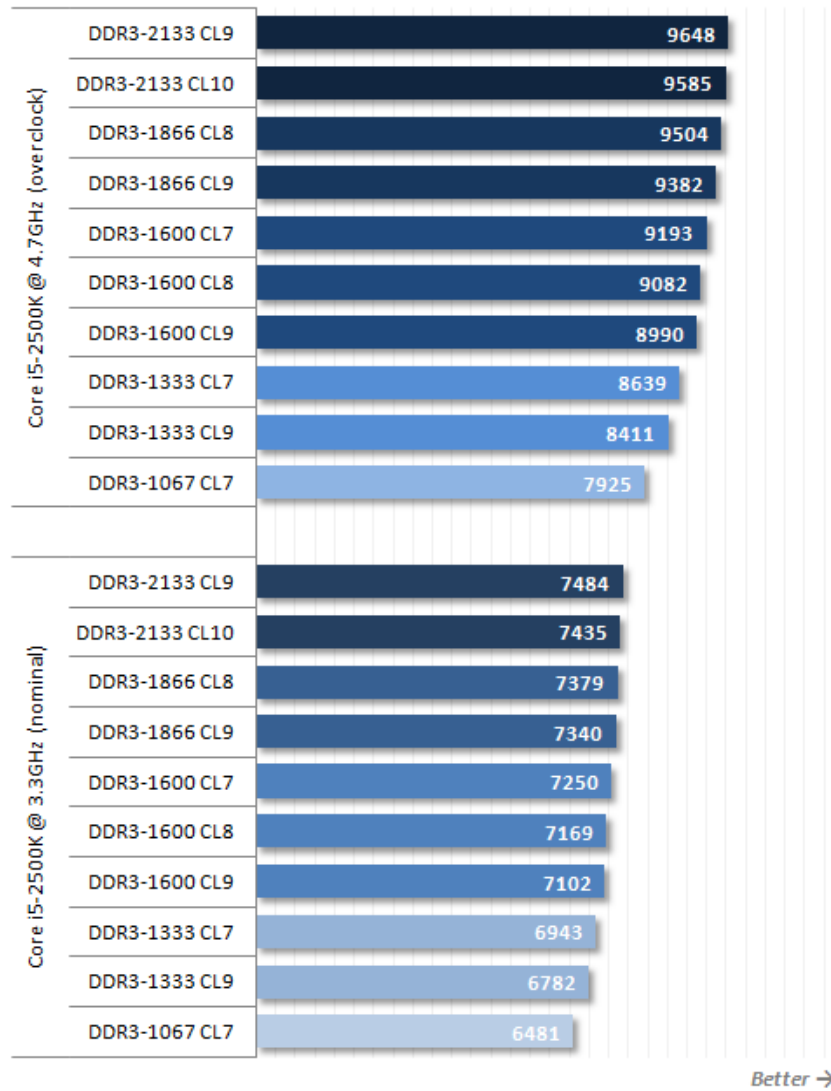
Better →

### 3DMark 11, Performance



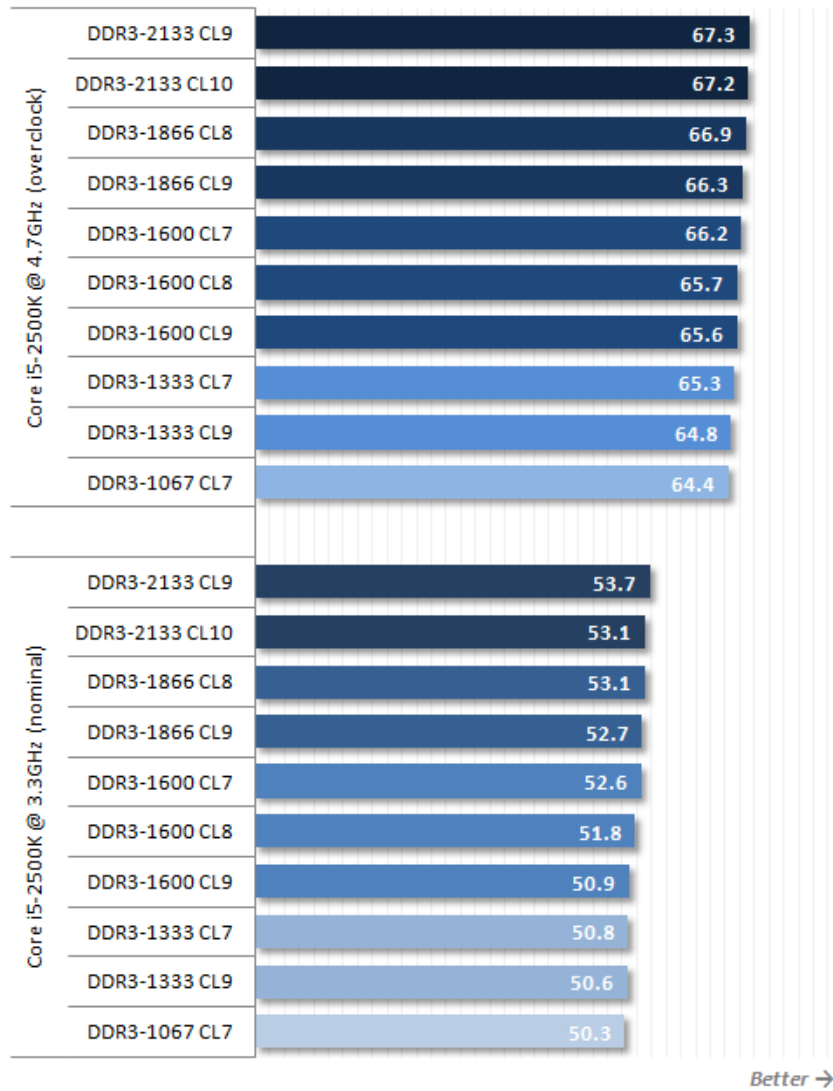
5% is the biggest difference we get from 2133 RAM kit compared to 1067 juniors (only half the price) in 2 performance tests for CPU calculation and graphics processing performance.

### 3DMark 11, Physics



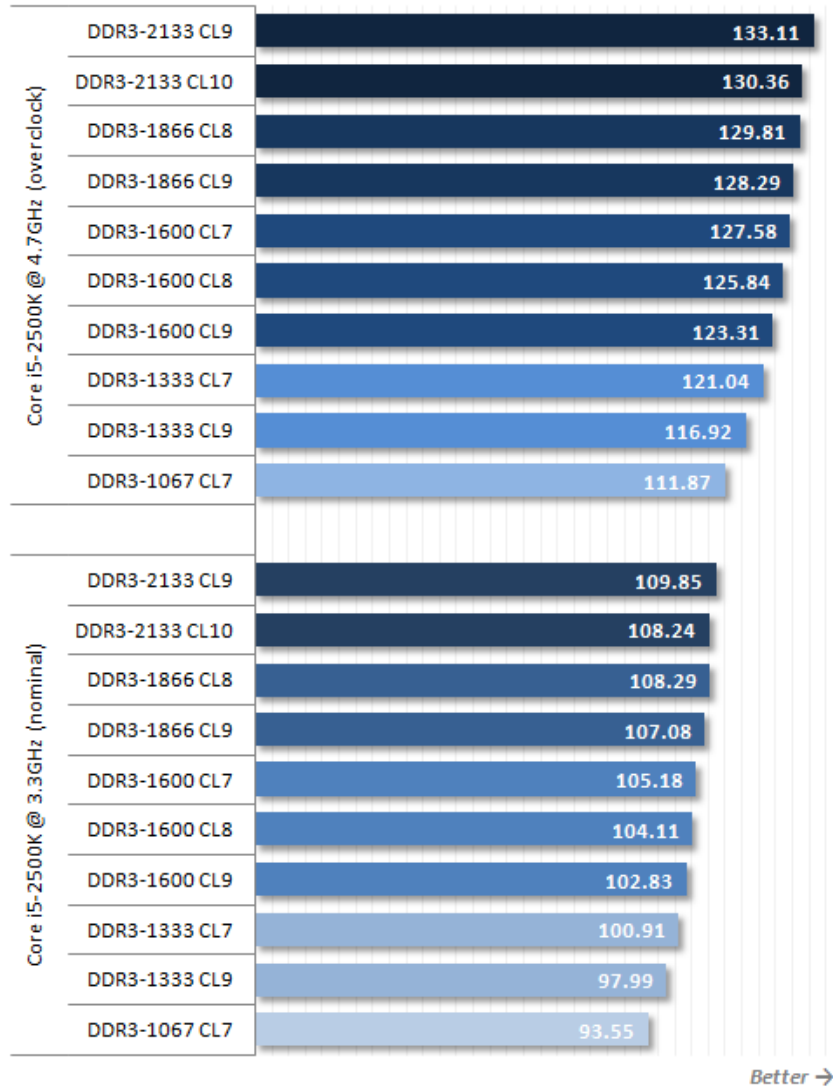
In contrast, physical tasks (requiring multiple parallel processing) seem to be thirsty for more RAM. However, the 4 RAM modules of 1866 and 2133 also show clear advantages compared to the mid-range 1600 kit when overclocking the processor to a very high 4.7 GHz.

### Metro 2033, 1680x1050 HQ+PhysX



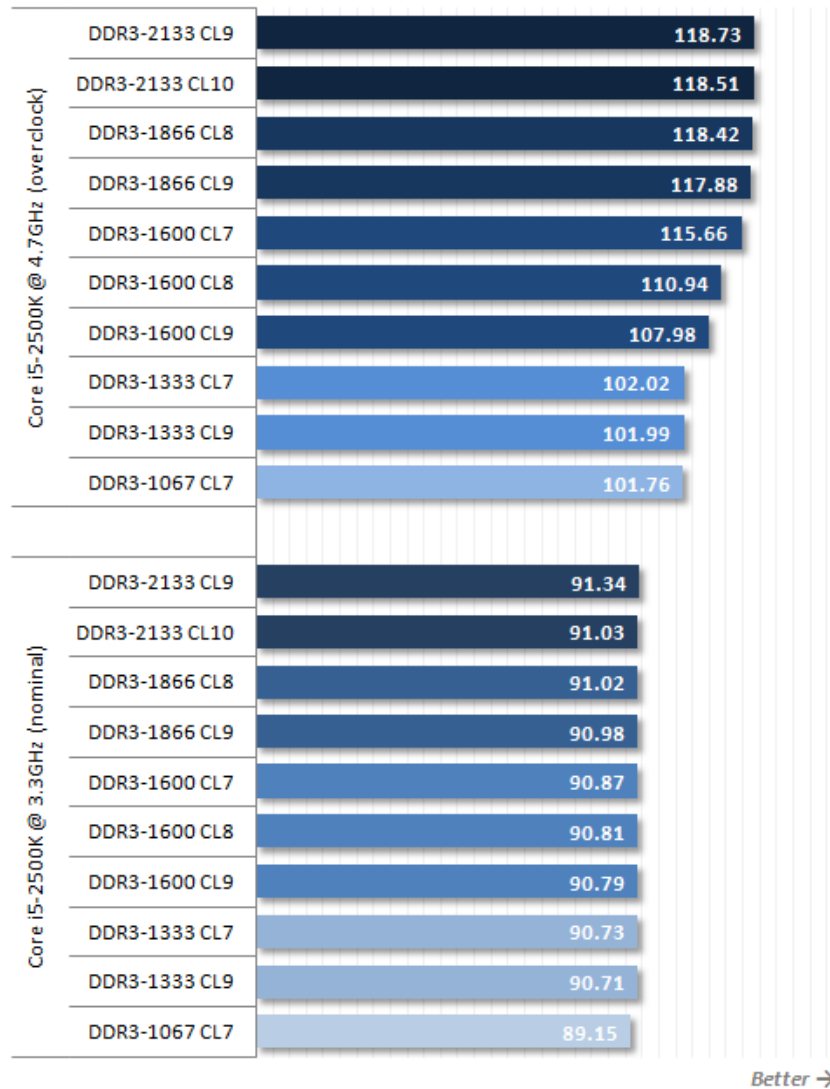
Better →

# F1 2010, 1680x1050 HQ



Better →

## Civilization V, 1680x1050 HQ



Obviously the speed of RAM is something gamers need to keep an eye on when building a gaming system. Of course, the result depends on each case, but in general, a low RAM kit will pull back the system performance by a considerable amount, while too "terrible" does not increase performance.

## Conclude

Summarizing the tests, it seems that a kit RAM 1600 cas 9 is a reasonable choice to balance performance and cost, especially for non-K (non-overclocking) processors. Up to the very high overclocked 2500K or 2600K processors, the higher-end RAM kit will take effect, but at the moment there is a cost problem. On the other side, a 1333 RAM kit proved completely unsuitable for your Sandy Bridge system.

In general, the article only provides test results for reference readers. Depending on your processor, user intentions and wallet, consider choosing the most suitable RAM for your system, avoiding performance bottlenecks, but don't waste too much money. for 1-2 FPS.

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