

White Paper

Application Benchmarks vs. Megahertz (MHz) As a Measure of Performance for the IDT WinChip Family



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Overview

Megahertz (MHz) has become the de facto standard for measuring CPU performance. However, with the advent of other important CPU enhancements that significantly improve performance such as the Super7** 100 MHz bus and larger integrated caches, MHz is only one measure of actual CPU performance. Add to this fact that as CPU MHz alone increases, the actual performance benefit to the user diminishes for a given system architecture. For example, in the same system environment, a 350 MHz CPU (AMD K6-2, Intel Pentium II) performs only 6-7% better than a 300 MHz CPU of the same architecture (based on Winstone 99) while the actual MHz improvement is almost 17%.

In order to provide clarity to the user regarding real performance, vendors use industry standard benchmarks, such as Winstone 99 and 3D WinMark 99, to compare against the competition as well as within their own family of products. These benchmarks provide a measure of performance based on the use of actual applications, rather than raw CPU MHz, which does not take into account other elements of CPU performance such as bus speed and cache size.

IDT is using these benchmark results to communicate its speed grades based on a comparison with all of its competitors' benchmark results at their respective speed grades. Intel and AMD use MHz-based speed grades while Cyrix uses speed grades that reflect benchmark performance. (In the past, Cyrix has utilized the term performance rating or "PR-rating" to rate how their parts perform against comparable Intel CPUs. Today, Cyrix uses a generic model number system as their device with a 3X bus multiplier and a 66 MHz system bus clock frequency, i.e. a 200 MHz internal clock frequency, is called an MII-266.)

IDT WinChip Performance Enhancements

The IDT WinChip 2 and WinChip 3 are the first low-end CPUs that have support for the 100 MHz Super7 bus, while the WinChip 3 has a large 128KB L1 cache (the largest of any low-cost desktop CPU), both of which add significant performance that cannot be easily communicated in a MHz rating. The 100 MHz Super7 bus provides about a 5% performance improvement versus the 66 MHz system bus and the 128KB L1 cache in the IDT WinChip 3 improves performance by 8-10% over the IDT WinChip 2 for a given bus multiplier and system bus clock frequency. In order to communicate the value of these added features in a single number, IDT is utilizing speed grades that reflect those increases in benchmark performance.

IDT is using the Ziff-Davis Winstone 99 and 3D WinMark 99 benchmarks, as these are considered industry standards, against IDT's key competitors' products with the same speed grade. The Ziff-Davis Testing and Analysis Group (ZDTAG) has independently verified the WinChip 2 results. The WinChip 3 comparison, which has been benchmarked by IDT, will have been verified by ZDTAG by April 30, 1999.

The speed grade and actual MHz match up for the IDT WinChip 2 per the following:

WinChip 2-200 = 3X 66 MHz clock

WinChip 2-233 = 3.5X 66 MHz clock

WinChip 2-266 = 2.33X 100 MHz clock

WinChip 2-300 = 2.5X 100 MHz clock

The speed grade and actual MHz match up for the IDT WinChip 3 per the following:

* Super7 is a trademark of AMD

WinChip 3-233 = 3X 66 MHz clock
WinChip 3-266 = 3.5X 66 MHz clock
WinChip 3-300 = 4X 66 MHz clock
WinChip 3-333 = 2.66X 100 MHz clock

Thus, IDT will continue to offer 66 MHz bus speed parts for the older Socket 7 and upgrade markets while adding higher speed grades based on the performance increase for the newer Super7 100 MHz system bus motherboards.

In looking at the charts below, comparisons are made within the IDT WinChip family of processors as well as with competitive products at various performance levels.

For competitive products:

- The IDT WinChip 2-266 performs on par with its competitors.
- The IDT WinChip 2-300 performs on par with the Cyrix MII-300 and the AMD K6-2 300 MHz with a 66 MHz bus, performs 9% below the AMD K6-2 300 MHz with 100 MHz bus and 7% below the Intel Celeron (A) 300 MHz.
- The IDT WinChip 3-333 performs on par with the Cyrix MII-333 and the AMD K6-2 333 MHz with a 95 MHz bus and performs 4% below the Intel Celeron 333 MHz.

With these comparisons, though, there is no measure of *value* for performance. In the market, the IDT WinChip family represents a tremendous value for the system builder and the user. Pricing for comparable IDT WinChip products are typically lower than the competitor's products – as much as 50% below in some cases. IDT targets system builders and users who are looking for the best price-performance in a processor and system in the low-cost computing category.

In summary, IDT's usage of speed grades that reflect benchmark performance is a move to provide the WinChip user with the necessary information to make the best informed buying decision. As most users are not intimate with knowledge about CPU architecture, CPI enhancement techniques and the impact of different cache sizes, IDT's resellers can focus on selling the many *other* benefits of the IDT WinChip including its compatibility, reliability and ability to play the latest 3-D gaming titles.

Benchmark Comparisons

For the benchmark comparisons, the following system configuration was used:

IDT, AMD, Cyrix:

- Gigabyte 5AX motherboard, ALI Aladdin V chipset, 512KB L2 cache, Award Modular BIOS v.4.51G - Revision 2A5KKG09, Plug and Play Bios Extension 1.0A

Intel:

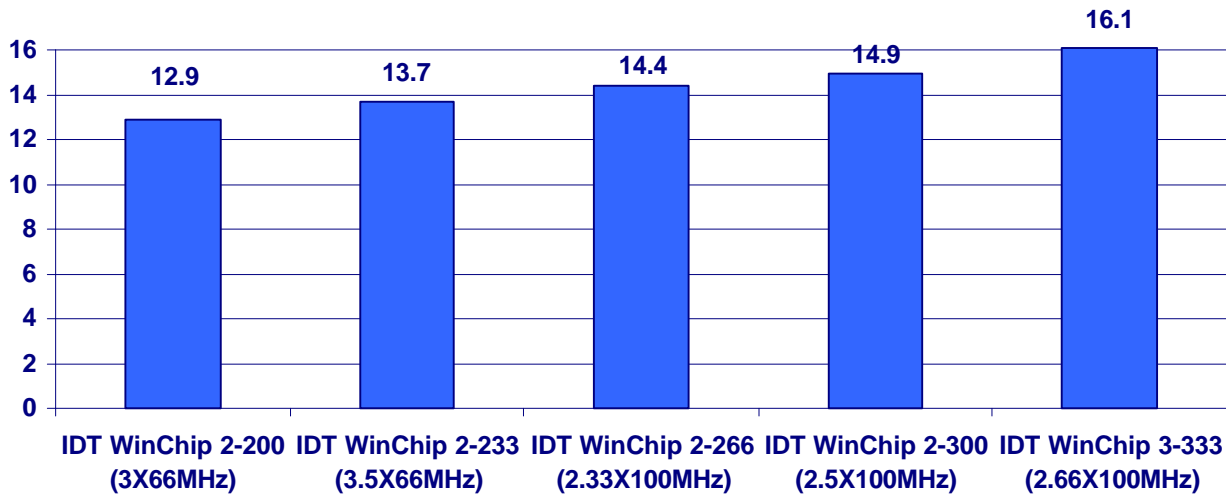
- Asus P2L-B motherboard (rev 1.02), Intel 443LX Chipset, Award Modular BIOS v.4.51G - ASUS PL2-B Revision 1005, Plug and Play Bios Extension 1.0A

Common configuration:

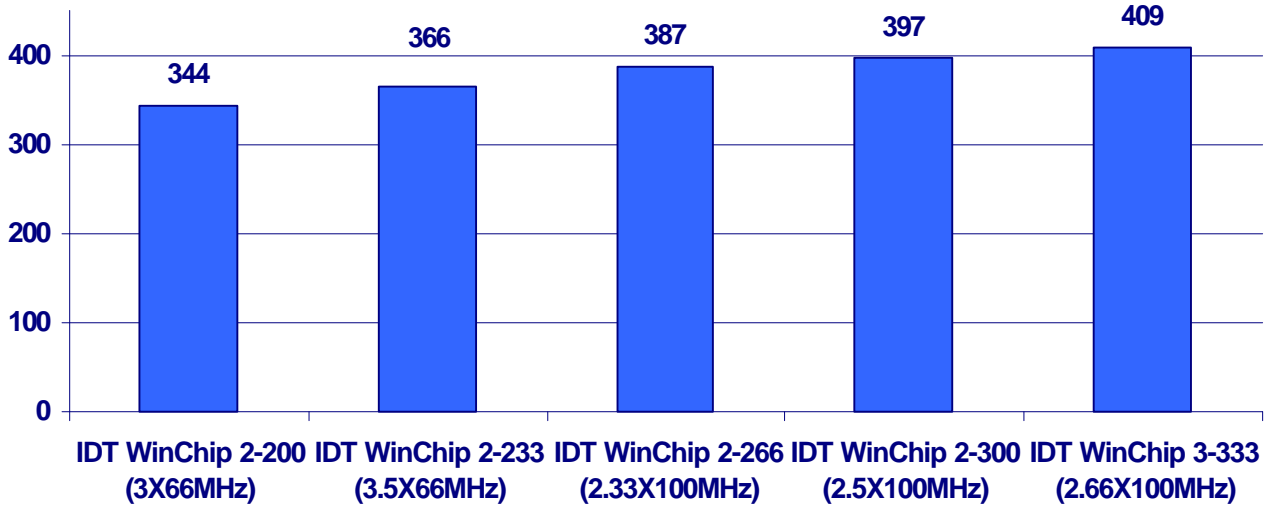
- Diamond V550 AGP 16 MB (Riva TNT) running at 1024 x 768, 16-bit with a 75 Hz monitor, Graphics Driver version 4.10.01.0245 (1/12/99)
- Western Digital 4.3GB EIDE hard drive
- Microsoft Windows 98 operating system, DirectX 6

For comparisons among the IDT WinChip products, the benchmark results are:

Winstone 99



3D WinMark 99

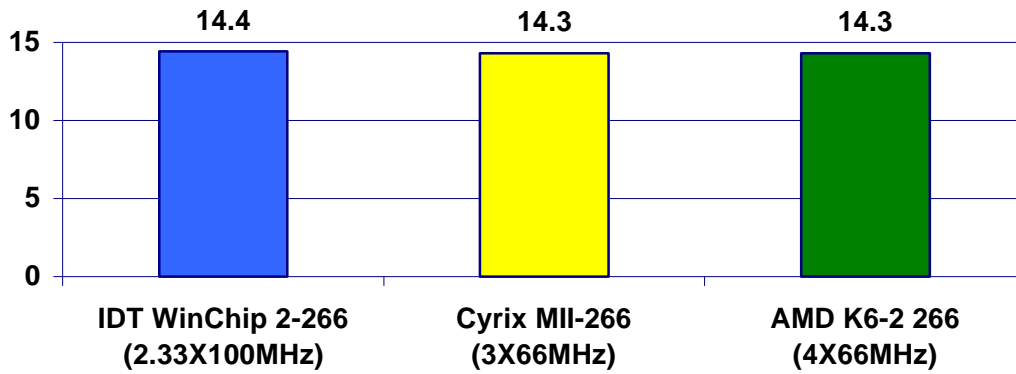


Source: Ziff-Davis Testing and Analysis Group (ZDTAG) (except WinChip 3)

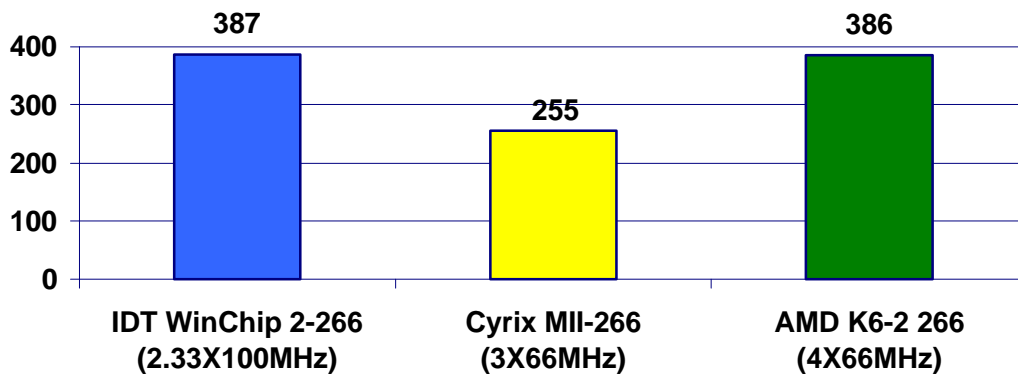


For IDT WinChip 2 - 266 and its competitors, the benchmark results are the following:

Winstone 99



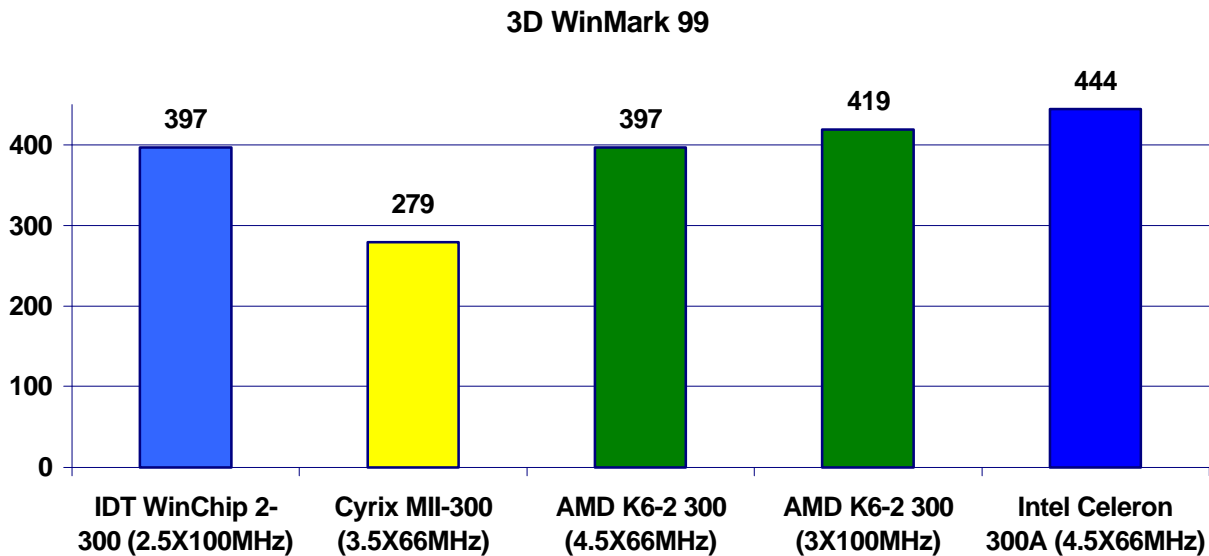
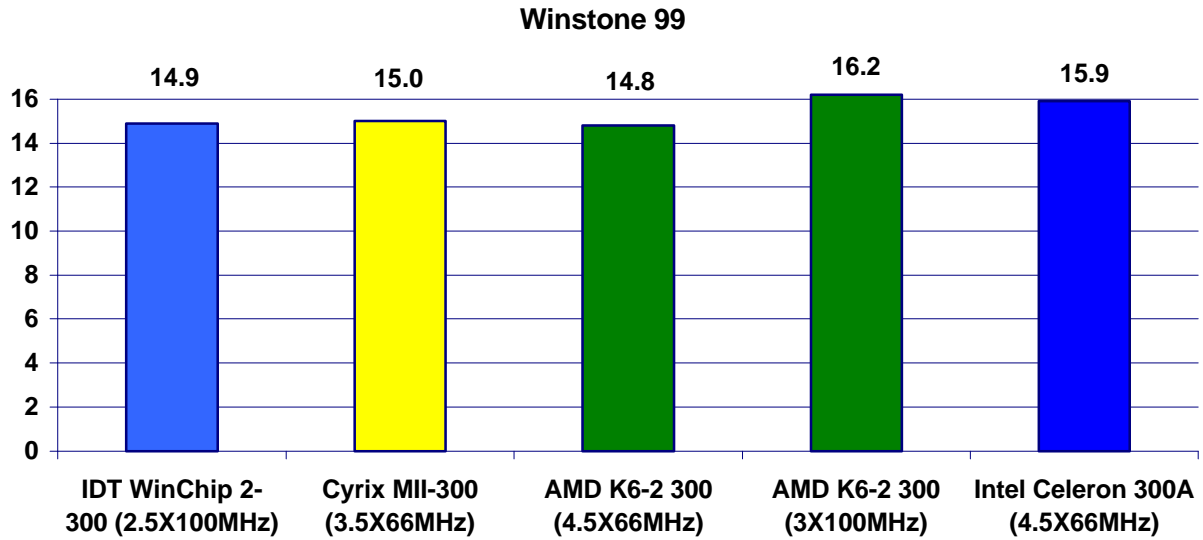
3D WinMark 99



Source: Ziff-Davis Testing and Analysis Group (ZDTAG)



For IDT WinChip 2 – 300 and its competitors, the benchmark results are the following:

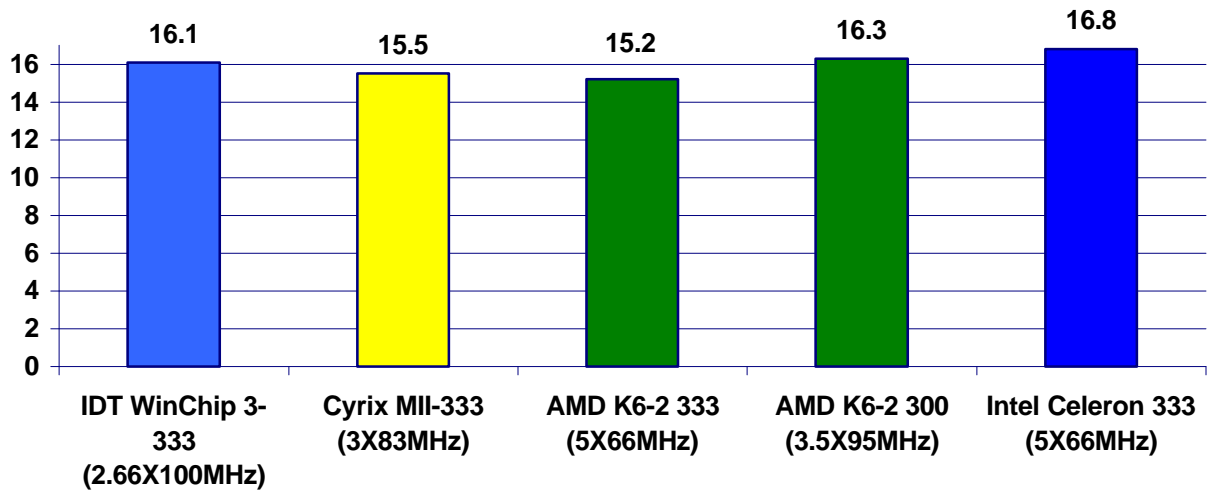


Source: Ziff-Davis Testing and Analysis Group (ZDTAG)

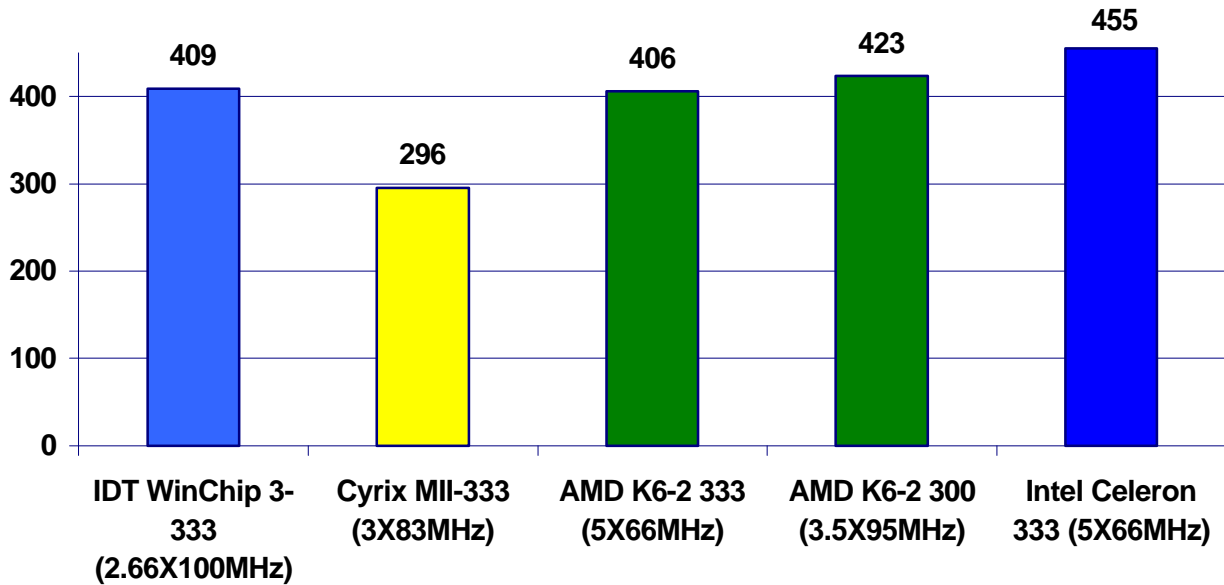


For IDT WinChip 3 - 333 and its competitors, the benchmark results are the following:

Winstone 99



3D WinMark 99



Source: IDT