

ZFx86 Clocking

This application note describes two of the alternative ZFx86 clocking options and their performance and power ramifications. The ZFx86 Data Book contains details about how to clock the ZFx86 chip.

Clocking Versus Performance

The most common notion is that higher clock frequencies lead to better processor performance. This is not necessarily always true. The most important issue is to properly balance the system to achieve the maximum performance for a given application.

The chart below shows that as a weighted average the performance of the ZFx86 is considerably higher when the DRAM bus is clocked at its maximum rate. As shown below a SYSCLK of 66MHz multiplied by one (resulting in a 66MHz CPU clock) outperforms a SYSCLK of 33MHz multiplied by three (resulting in a 100MHz CPU clock). It is not efficient to clock the processor extremely fast if the data flow from the DRAM does not keep up.

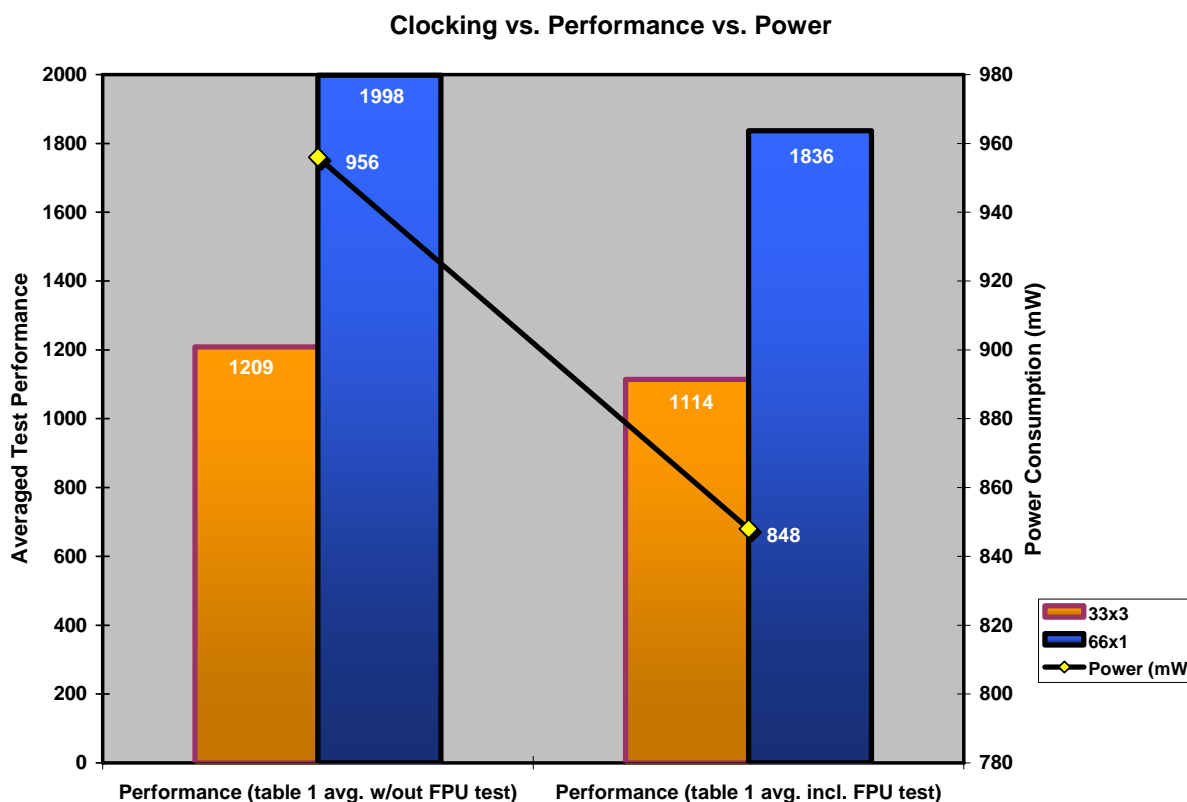


Chart data taken from Table 1 below.

In addition, the core power consumption using a 33x3 processor clock is higher than the better performing 66x1 clocking. However, under certain circumstances such as an FPU or CPU bound operation with totally cached data, a better solution for the application might be 33x3 instead of 66x1. The table below indicates which item is enhanced by the given clocking choices.



Test Run	33x3	66x1	% Diff
Business Disk WinMark 99 (KB/Sec)	354	549	155%
CPUmar 99	1.51	2.38	158%
Disk Playback/Bus Overall (KB/Sec)	354	549	155%
Disk Playback/HE:AVS/Express 3.4 (KB/Sec)	1590	2330	147%
Disk Playback/HE:FrontPage 98 (KB/Sec)	2160	3750	174%
Disk Playback/HE:MicroStation SE (KB/Sec)	1290	2150	167%
Disk Playback/Overall (KB./Sec)	1510	2070	137%
Disk Playback/HE: Photoshop 4.0 (KB/Sec)	1500	2550	170%
Disk Playback/HE: Premiere 4.2 (KB/Sec)	1130	2090	185%
Disk Playback/HE Sound Forge 4.0 KB/Sec)	2000	3570	179%
Disk PlayBack/HE Visual C++ 5.0 (KB/Sec)	1410	2370	168%
WinBench 99/FPU WinMark	71.4	56.1	79%

Table 1: WinBench 99 Test Data Comparison@ 33x3 & 66x1

Boot time to System Commander - In Seconds	25	20	125%
Boot windows to Log in prompt - In Seconds	45	40	113%
Loads WinBench to License Notice - In Seconds	39	30	130%

Table 2: WinBench 99 BOOT & load comparison@ 33x3 & 66x1

As shown in Table 2 above, BOOT and load time is shortened by clocking the ZFx86 at 66x1.

System Information and Testing Environment

All testing performed on a ZF Micro Solutions Integrated Development System running Phoenix BIOS. The benchmarking data collected while running Windows 98 and WinBench 99 version 1.1 from Ziff Davis. A system information summary required by Ziff Davis is shown below:

Basic Info/Project	Test
Basic Info/Tester Name	ZFx862
Basic Info/Tester Organization	ZF Micro Devices, Inc.
System Info/APM AC Power	Yes
System Info/APM Enabled	Yes
System Info/CD-ROM Name (Make/Model)	PIONEER DVD-ROM DVD-115
System Info/CD-ROM Windows Cache RAM (KB)	1238 KB
System Info/CD-ROM Windows Cache Type	CDFS Cache
System Info/CPU Active Processors	1
System Info/CPU Family	4
System Info/CPU Features	0x00000001
System Info/CPU Floating Point	Yes
System Info/CPU L1 Cache (KB)	8
System Info/CPU Name	Cyrix Cx486DX4(TM)
System Info/CPU Supports 3DNow!	No
System Info/CPU Supports MMX	No
System Info/CPU Supports Streaming SIMD	No
System Info/Disk Controller (Make/Model)	National ZFx86 Bus Master PCI to Dual IDE Controller
System Info/Disk Name (Make/Model)	FUJITSU MPF3102AH
System Info/Disk Settings 32 bit protect-mode disk drivers disabled	No
System Info/Disk Settings CDFS Prefetch	228
System Info/Disk Settings CDFS Prefetch Tail	128
System Info/Disk Settings Long name preservation for old programs disabled	No
System Info/Disk Settings Name Cache	2729
System Info/Disk Settings New file sharing and locking semantics disabled	No
System Info/Disk Settings Path Cache	64
System Info/Disk Settings Protect-mode hard disk interrupt handling disabled	No
System Info/Disk Settings Read Ahead Threshold	65536
System Info/Disk Settings Synchronous buffer commits disabled	No
System Info/Disk Settings Write-behind caching for all drives dis.	No
System Info/Disk Windows Cache RAM (KB)	All Available RAM
System Info/Disk Windows Cache Type	System Cache: write caching enabled
System Info/Display Adapter Chip	Mach64: RagePro
System Info/Display Adapter DAC	Internal
System Info/Display Adapter Driver Acceleration	0x 0
System Info/Display Adapter Memory (KB)	8192 KB
System Info/Display Adapter Name (Make/Model)	ATI 3D Rage Pro (atir3)
System Info/Display Mode	1024 x 768 16 bits/pixel
System Info/Display Orientation	Landscape
System Info/QueryPerformanceFrequency	1E+06
System Info/System BIOS Version	PhoenixBIOS 4.0 Rel 6.0 (A11)
System Info/System RAM (MB)	64
System Info/Version	2000 Build 20
System Info/Windows Computer Name	ZFx862
System Info/Windows Version	Windows 4 A , Build 2222