

ZFx86 Clocking

This application note describes some of the alternative ZFx86 clocking opportunities 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.

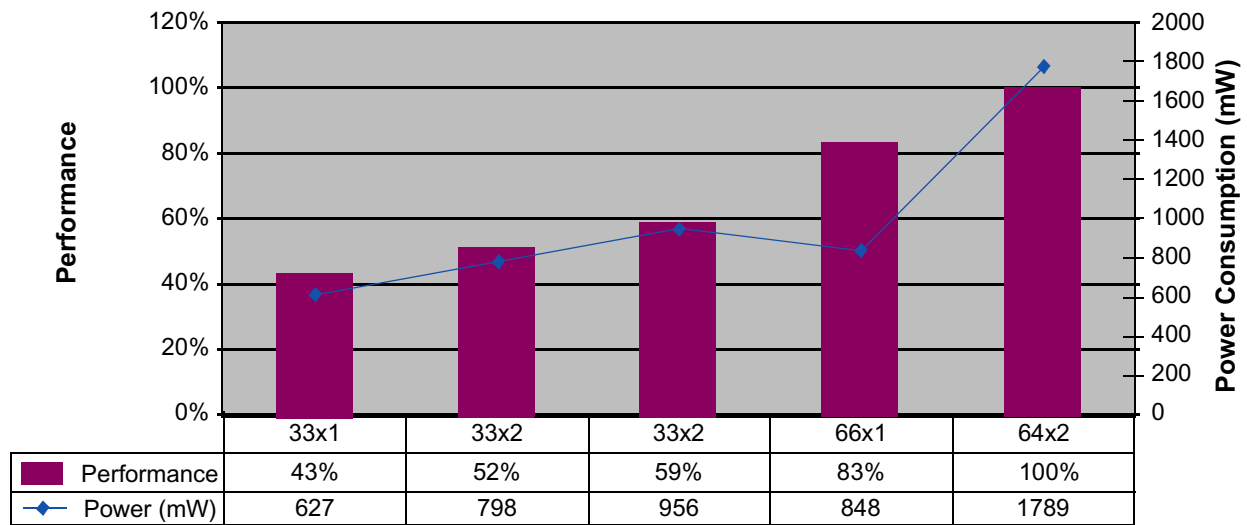


Figure 1. ZFx86 Performance Versus Clock

Clocking Versus Performance



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 | 64x2 | 66x1 | 33x2 |
|---|-------|------|-------|------|
| WinBench 99/Business Disk WinMark 99 (KB/Sec) | 499 | 866 | 707 | 448 |
| WinBench 99/Business Graphics WinMark 99 | 7.6 | 10.8 | 9.54 | N/A |
| WinBench 99/CPUmark 99 | 2.02 | 3.6 | 2.79 | 1.8 |
| WinBench 99/Disk Playback/Bus:Overall (KB/Sec) | 499 | 866 | 707 | 448 |
| WinBench 99/Disk Playback/HE:AVS/Express 3.4 (KB/Sec) | 2940 | 4920 | 4570 | 3790 |
| WinBench 99/Disk Playback/HE:FrontPage 98 (KB/Sec) | 2910 | 5470 | 4430 | 2670 |
| WinBench 99/Disk Playback/HE:MicroStation SE (KB/Sec) | 2190 | 3950 | 3050 | 1910 |
| WinBench 99/Disk Playback/HE:Overall (KB/Sec) | 2660 | 4640 | 3960 | 2610 |
| WinBench 99/Disk Playback/HE:Photoshop 4.0 (KB/Sec) | 4230 | 6620 | 6330 | 5170 |
| WinBench 99/Disk Playback/HE:Premiere 4.2 (KB/Sec) | 1960 | 3450 | 3010 | 1860 |
| WinBench 99/Disk Playback/HE:Sound Forge 4.0 (KB/Sec) | 3380 | 5740 | 5170 | 3350 |
| WinBench 99/Disk Playback/HE:Visual C++ 5.0 (KB/Sec) | 2210 | 3940 | 3210 | 2040 |
| WinBench 99/FPU WinMark | 89.3 | 120 | 63.4 | 60.6 |
| WinBench 99/GDI Playback/HE/AVS/Express 3.4 | 4.22 | 6.21 | 4.9 | N/A |
| WinBench 99/GDI Playback/HE/FrontPage 98 | 4.8 | 7.89 | 6.52 | N/A |
| WinBench 99/GDI Playback/HE/MicroStation SE | 0.322 | 0.57 | 0.455 | N/A |
| WinBench 99/GDI Playback/HE/Photoshop 4.0 | 2.46 | 4.24 | 3.64 | N/A |
| WinBench 99/GDI Playback/HE/Premiere 4.2 | 2.4 | 4.25 | 3.66 | N/A |
| WinBench 99/GDI Playback/HE/Sound Forge 4.0 | 4.54 | 8 | 6.96 | N/A |
| WinBench 99/GDI Playback/HE/Visual C++ 5.0 | 9.16 | 16.3 | 13.9 | N/A |
| WinBench 99/High-End Disk WinMark 99 (KB/Sec) | 2660 | 4640 | 3960 | 2610 |
| WinBench 99/High-End Graphics WinMark 99 | 14.9 | 25.9 | 21.1 | N/A |



System Information and Testing Environment

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

| Basic Info/Project | Test |
|--|--|
| Basic Info/Tester Name | ZFx862 |
| Basic Info/Tester Organization | zflinux |
| 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 Megaton 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 |



| Basic Info/Project | Test |
|--|-------------------------------------|
| 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 Release 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 |