



BIOS License Included With Every ZFx86 Chip — Saves Time and Cost!

Every ZFx86 System-on-a-Chip includes a fully paid run time license for the ZF FailSafe BIOS™ based on the Phoenix™ 4.x PC BIOS. Our FailSafe BIOS takes the industry leading Phoenix BIOS and extends it for the ultimate in embedded BIOS features.

There is no requirement for you to negotiate or secure a separate license agreement with Phoenix Technologies, Ltd. Our agreement with Phoenix allows us to distribute the ZF FailSafe BIOS to our customers for use on every ZFx86 chip purchased.

The BIOS included with every ZF chip allows our customers, contract manufacturers, and distributors, to incorporate the ZF FailSafe BIOS within any products that use the ZFx86 System-on-a-Chip. You may resell the CPU itself or any subassembly or end product that includes a ZFx86 CPU and pass on the fully paid Phoenix/ZF BIOS. No further licensing requirement with Phoenix or any third party is required as long as the BIOS used is that supplied by ZF.

A full-featured BIOS, the ZF FailSafe BIOS supports the entire array of system features present in the ZFx86 System-on-a-Chip. The BIOS itself is not a source code distribution, but rather an easily-used executable binary that runs on the ZFx86 within your product. ZF takes care of the cost overhead, paying Phoenix all royalty fees for every ZFx86 sold worldwide.

Lowest BOM Cost

Of prime importance in the design of any OEM product is the overall system cost in production. The ZFx86 architecture was created specifically to be cost-effective, allowing PC functionality and compatibility to be incorporated in high volume OEM products and the included BIOS license further reduces your BOM total.

BIOS Features

Built on the world standard Phoenix BIOS for 32-bit x86 desktop architecture, the ZF FailSafe BIOS supports features designed by ZF expressly for embedded applications. These ZF-unique features include:

- ◆ Default Configuration Settings selectable by OEM product designers. This means that no battery backed CMOS is required to retain your customized settings, resulting in increased reliability at a lower BOM cost.
- ◆ ZEB BIOS Editor. This free development utility provides a way to custom configure the ZF FailSafe BIOS without recompiling or difficult scripting. A simple user interface allows you to change BIOS settings even after your design is finished. Manufacturing engineers find ZEB especially useful.
- ◆ Eight user defined Chip Selects. This enables I/O and Flash Memory devices such as Disk-On-Chips to be connected without additional glue logic, again increasing reliability and reducing BOM cost.
- ◆ Enhanced error checking that not only increases field reliability, but helps pin-point, "bring up" design problems resulting in faster time to market.
- ◆ Built in ZFlash™ Boot-OS-from-Flash capability.
- ◆ Headless (No Video/Keyboard) console support with Redirect terminal (includes POST code outputs).

Video Extension BIOS

The ZF FailSafe BIOS supports a load feature for custom PCI video BIOS binaries. Using our ZEB utility's main menu you may combine the ZFx86 BIOS with your own PCI video BIOS. The BIOS shadows the PCI video BIOS and treats it as if it were a standard PCI Extension ROM and initializes the matching embedded PCI Video chip.

Features

- ◆ License for ZFx86 port of Phoenix™ Rev 4.0 Standard PC BIOS included with every ZFx86
- ◆ ZF FailSafe™ BIOS employs patented H/W and S/W features unique to embedded market for product robustness and longevity
- ◆ BIOS supports industry standard software and hardware architectures
- ◆ ZF FailSafe BIOS is a custom version of Phoenix BIOS, the world's most powerful and popular BIOS in existence on x86 processors. Large installed base ensures future compatibility with hardware and peripherals
- ◆ BIOS supports CPU, support logic, super I/O devices, IRQ routing, boot block, setup, BIOS messages, POST tasks/codes, run-time services, interrupt vectors, BIOS data area, and extended BIOS data areas
- ◆ BIOS updates posted free on ZF website

Extended Features

- ◆ In addition to the standard features documented in the PhoenixBIOS™ User's Manual (available for download on our website <http://www.zfmicro.com/downloadtable.html>), the ZFx86 FailSafe BIOS includes the following extended features important for embedded applications:
- ◆ ZFlash OS Loader Hook enables operating systems such as Linux and VxWorks to boot from the same flash chip that contains the BIOS.
- ◆ ZFlash legacy ISA extension processor allows user extension ROMs to be placed in the same flash device as BIOS.
- ◆ Configuration settings that manage ZFx86 ZF Logic Memory and I/O Chip Selects for Disk-On-Chip, flash based extensions and custom I/O hardware.
- ◆ Advanced Power Management 1.2 Functions
- ◆ Universal Serial BUS 1.1 Host Controller and Legacy Configuration Settings
- ◆ Infrared support
- ◆ Watchdog Timer Function
- ◆ Remote Management from PC Host
- ◆ Resident Flash Disk Function

Making Internet Connected Equipment Crash proof with FailSafe Boot ROM

What happens when you send a software upgrade to an Internet connected system in the field and there is a hardware or software crash while the download is in process? The software is corrupted and the system cannot re-boot. If the download was being sent to hundreds or even thousands of systems at the same time the result can be catastrophic.

FailSafe vs. Non-Failsafe Systems

When a watchdog timer scheme other than ZF's FailSafe system reaches a point where it cannot recover a hard reset is performed. If the system software has been corrupted, the system will continuously try to re-boot without success. The system will not come up until it has been repaired. This usually requires sending out a field service technician or sending the equipment in for repair.

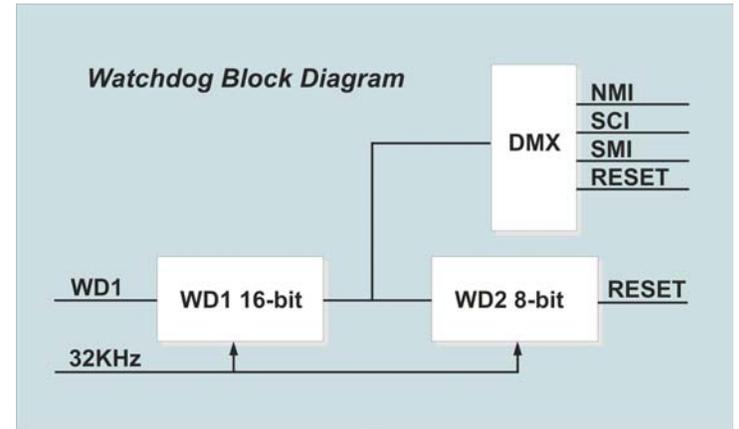
With ZF's FailSafe Boot ROM system in a product, if a failure occurs, the system will reach a hard reset, enable the FailSafe mechanism and allow recovery of the software from any of a number of sources (backup chips, dial-out through a modem, etc.). Once the system software is reloaded the device can re-boot and resume operation.

Protecting your system with the embedded features of the ZFx86™ can be accomplished simply and reliably. The devices you will use include the dual watchdog timer, the FailSafe Boot ROM, the Z-Tag interface, the bootstrap register and a bit of code. The result will be a system that always boots, can diagnose the failure and always recovers.

Watchdog Timer Role

The watchdog timer checks against possible failures and bugs in the application program or operating system that make the system-on-a-chip (SOC) uncontrollable. Both watchdog timers generate events to notify the system of an error condition. These timers are individually initialized to a preset value. After initialization, WD1 begins a countdown that is reset to the initial value by software writing into the watchdog control register (tickle function) or external hardware driving logical "1" to an external control pin.

If WD1 reaches zero, it indicates that the software has been unable to reset the timer in the allotted time and an event is generated to take corrective actions or to reset the device. Once the first watchdog timer expires, the software can attempt to gain control of the system using an interrupt handler routine triggered by any of the events connected to the WD1 output line. If the software is successful, the program can resume as normal. The expired WD1 counter also enables the second watchdog counter (WD2). The second WDT is used to monitor the success of the software recovery mechanism. If the second timer expires it triggers a hardware system reset.



Bootstrap Register Role

A bit on the bootstrap register indicates to the system that a WD timer reset has occurred thereby triggering a FailSafe Boot.

Failsafe Boot Role

The FailSafe Boot ROM is built-in code that initializes the SOC device and uses the Z-Tag™ interface to load the information it needs to recover the system. This code has multiple features that can allow any designer complete flexibility and control over the system.

Z-Tag™ Role

The EEPROM containing the software required to execute the system mandated recovery mechanism (including the contact number for code downloads) is connected to the SOC via the Z-Tag interface. The code in the EEPROM can be as simple as dial-up instructions for an internet appliance that would allow remote surfing of the device, or as complex as a full set of diagnostics and repair programs.

BIOS Resources On Our Website

(<http://www.zfmicro.com/downloadtable.html>)

ZFx86 BIOS Users Supplement

ZFx86 BIOS Routing Interrupts

Phoenix BIOS (4.x Rev 6) User Manual

Notes:

The ZF FailSafe BIOS is unique to ZF and cannot be purchased from Phoenix Technologies Ltd. The ZF FailSafe system and ZF-Logic support are proprietary to ZF Micro Devices Inc. and are not available in any other embedded BIOS.