



*Totally Logical*

# Z8ICE001ZEM

## Z8PLUS EMULATOR

### KIT CONTENTS

#### Circuit Board

Z8M001 Emulation Board (99C0603-001)

#### Cables

18-Pin Emulation Pod Cable

9-Pin M-F Serial Cable (6 ft.)

#### Host Software

ZiLOG Developer Studio (ZDS) CD-ROM

#### Documentation

ZiLOG 1999 Technical Library CD ROM, which contains Z8 device data sheets, user manuals, application notes, and other valuable information.

Z8ICE001ZEM Emulator User's Manual

Z8ICE001ZEM User's Manual Addendum

### OPTIONAL ITEMS NOT SUPPLIED

- Laboratory Power Supply with Supply Current of 0.5A @9VDC or 9 VDC, 500 mA Wall Transformer (ZPS09V00ZAC)
  - ZiLOG recommends a laboratory-type power supply when using circuits sensitive to noise, such as analog-to-digital converters
- SOIC-to-DIP Programming Adapter (Z86E0700ZDP)
  - 18-Pin SOIC-to-DIP Programming Adapter
- SSOP-to-DIP Programming Adapter (Z8E00101ZDH)
  - 20-Pin SSOP-to-DIP Programming Adapter for Z8M001-based emulators
- A Custom Z8Plus-Based Design
  - This design is typically a wire-wrapped or printed circuit prototype that includes a socket for the Z8E00X device into which the designer can insert the emulation cable from the emulator.

## FEATURES

### Supported Products

| Packages    | Emulation                 | OTP Programming                        |
|-------------|---------------------------|--|
| 18-Pin PDIP | Z8E000, Z8E001            | Z8E000, Z8E001                         |
| 18-Pin PDIP | Z8PE001, Z8PE002, Z8PE003 | Z8PE001, Z8PE002, Z8PE003              |
| 18-Pin SOIC | n/a                       | Z8E000, Z8E001 <sup>1</sup>            |
| 18-Pin SOIC | n/a                       | Z8PE001, Z8PE002, Z8PE003 <sup>1</sup> |
| 20-Pin SSOP | n/a                       | Z8E000, Z8E001 <sup>2</sup>            |
| 20-Pin SSOP | n/a                       | Z8PE001, Z8PE002, Z8PE003 <sup>2</sup> |

**Notes:**

1. Requires an SOIC-to-DIP Programming Adapter (Z86E0700ZDP) that is an 18-Pin SOIC-to-DIP adapter for Z8M001-based emulators.
2. Requires an SSOP-to-DIP Programming Adapter (Z8E00101ZDH) that is a 20-Pin SSOP-to-DIP adapter for Z8M001-based emulators.

- In-Circuit Program Debug Emulation
- Real-Time Emulation
- Z8 GUI Emulator Software
- Window-Based User Interface
- On-Line Help
- One-Time Programmable (OTP) Support
- Selectable Baud Rates—9600 to 57.6 Kbps
- Bisync Error-Correcting Communications Protocol

## GENERAL DESCRIPTION

ZiLOG's in-circuit emulators are interactive, Window-oriented development tools, providing a real-time environment for emulation and debugging.

The Z8ICE001ZEM Emulator is a member of ZiLOG's ICEBOX product family of in-circuit emulators providing support for Z8Plus-based microcontrollers. The emulator provides essential timing and I/O circuitry to simplify user emulation of the prototype hardware and software product.

The Z8ICE001ZEM Emulator provides users with a hardware platform to develop and debug software in a real-time environment. In contrast, software simulators provide significantly slower operation, making them less practical for code development.

The Z8ICE001ZEM Emulator can be connected to a serial port (COM1, COM2, COM3, and COM4) of the host computer, and uses ZiLOG's Developer Studio (ZDS) software.

## OPERATING INSTRUCTIONS

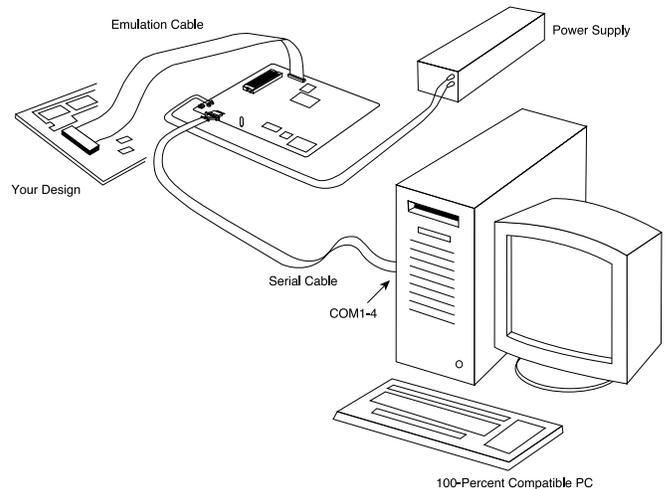
1. Check Supporting Package Contents
2. Load Software
  - a. Insert the ZiLOG Developer Studio CD into your CD-ROM drive.
  - b. Follow all on-screen instructions.
- d. Select the microcontroller and ROM size in the Configuration dialog box.
- e. Use the File menu to download sample files to Z8 Code Memory.
- f. Refer to the Z8ICE000ZEM Emulator User's Manual, "Chapter 3: Emulator Sample Session".

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**Note:** For this example, please load the ZDS software, and not the 1999 Technical Library CD-ROM.

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- c. Remove the CD-ROM and store in a safe place.
3. Connect the appropriate cables
  - a. Power Supply, PC, and Your Design.
4. Read the enclosed technical documentation
  - a. Refer to the Z8ICE000ZEM Emulator User's Manual.
  - b. Observe the Electrical Safeguards in the User's Manual before operating the emulator.
  - c. Select the correct COM port and desired baud rate in the ZiLOG ICEBOX Connect dialog box.



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## SPECIFICATIONS

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### Operating Conditions

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#### Operating Temperature:

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20°C ±10°C

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#### Supply Voltage:

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+7.5 VDC to 10.0 VDC  
(+8.0 VDC typical)

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10-MHz external Crystal  
(shipped with 10-MHz oscillator)

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#### Operating Humidity:

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10%–90% RH (noncondensing)

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### Power Requirements

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+9.0 VDC @ 0.5A Minimum (typical)

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### Dimensions

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#### Width:

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6.75 in. (17.15 cm)

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#### Length:

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7.50 in. (19.05 cm)

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#### Height:

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0.90 in. (2.30 cm)

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### Serial Interface

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RS-232C @ 9600, 19200 (default), 28800, or 57600  
Baud

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## HOST COMPUTER

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### Minimum Requirements

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IBM PC (or 100-percent compatible) 486-Based  
Machine

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75 MHz

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8 MB RAM

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VGA Video Adapter

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Hard Disk Drive (60 MB free space)

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CD-ROM Drive

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RS-232C COM Port

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Mouse or Pointing Device

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Microsoft Windows 95 or later

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The following changes to the Minimum Requirements are recommended:

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Pentium-Based Machine

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100 MHz (or faster)

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16 MB of RAM (or more)

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SVGA Video Adapter

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Color Monitor

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Printer

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## PRECAUTIONS

### All Devices

1. This emulator is only supported by ZDS version 2.12 or later.
2. The emulator cannot be operated while performing ESD/EMI testing on the target board.
3. Ensure that the target cable is correctly aligned (pin 1 to pin 1) before inserting into the target system. Incorrect alignment may damage the emulator and/or the target system.
4. If the Program Counter jumps to an unknown address:
  - a. The Stack may have overflowed into the general-purpose register locations, and/or
  - b. An extra POP, PUSH, IRET, or RET was encountered.
5. If the Program keeps resetting:
  - a. The Program Counter rolled over from value *end address* to value 0000 and proceeded back to the beginning of the program.
  - b. The Watch-Dog Timer (WDT) was not refreshed from devices with the WDT feature.
6. Check the  $T_{POR}$  and  $T_{WDT}$  specifications of the device required for emulation. The actual specification may differ from the ICE chip specifications.
7. Do not start the emulator with an OTP device in the programming socket. The emulator may not start up correctly and the device may become corrupted.
8. A shorted OTP device can crash the emulator when inserted into the OTP programming socket. If a part is inserted in such a way as to cause a temporary short, then functionality is lost. An attempt to perform BLANK CHECK on such a part causes the *hourglass* to appear continuously. The Windows application must be reset and restarted.
9. Do not press the emulator's MASTER RESET when the ICEBOX is in the OTP dialog for programming. If MASTER RESET is pressed while the GUI is performing OTP programming, close the OTP dialog box and reopen it to reload the information back to the hardware.

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**Notes:** *The MASTER RESET is physically located on the inside of the ICEBOX, and is not to be confused with the RESET button on the outside of the unit.*

*In this instance, the ICEBOX is really idle, although the Command Status indicates PROCESSING after the GUI reestablishes the communication link when Retry is selected in the Out of Synchronization with the Emulator dialog box.*

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10. When device serialization is enabled in the OTP dialog, ZDS copies the current serial number to code memory immediately before performing a VERIFY operation. If this software action is undesirable, then device serialization should be disabled prior to invoking the VERIFY operation.
11. When interrupts are enabled, breakpointing after a HALT instruction, the emulator breaks at the first instruction in the interrupt service routine that is serviced when an interrupt occurs.
12. The RESET default state of the emulator differs from the parts. Particularly, the TCTLHI register is reset differently than the device. Set this register to the desired value as the first instruction in the program.
13. The emulator does not execute the first instruction to load the TCTLHI register if the user presses RESET and then GO from ZDS or the GUI. For the first instruction to execute correctly, the user should press the RESET+GO button.

## LIMITATIONS

1. Although GUI 3.00 and later support baud rates up to 57.6 K baud, the actual maximum usable rate may be less due to limitations of the user's hardware or systems software setup. The maximum usable rate is determined by the user's tolerance of the frequency of communication errors.
2. Clicking on the HALT button does not always halt the ICEBOX execution. If the application goes into STOP or HALT mode, the only way to halt the emulator execution is by executing a Stop-Mode Recovery (as defined by the user program). The user may also reset the application using the emulator MASTER RESET button; however, doing so resets the entire ICEBOX.
3. RC oscillator emulation is not supported.

### Z8E000/Z8E001

1. Analog Comparator Power-Up Glitch—The Z8E00X family of devices powers the analog comparators off while not in use. When the comparator is enabled, it tends to exhibit glitches on the output until it stabilizes. This condition can cause spurious interrupts if the interrupts are enabled during this interval. If a single command is used to enable the comparator and the PB4 interrupts, the interrupt logic registers the glitches. The IREQ bits for both the rising and falling edges are set. If the IMASK register is configured to allow these interrupts, the device immediately jumps to the interrupt code. To avoid problems and undesirable results, it is recommended that the user observe the following precautions when enabling the comparator.
  - a. The global interrupts should be disabled with the DI command, or the PB4 interrupts should be masked whenever switching from digital-to-analog or analog-to-digital mode.
  - b. The IREQ bits for PB4 (bits 1 and 4) should be cleared after the mode change is complete.
  - c. Finally, the interrupts may be reenabled. This issue is due to an inherent design limitation which affects both the Z8E00X and the emulator.
2. WDT in HALT mode—The Z8M001 ICEchip has a bug that causes the watchdog timer to continue to run in HALT mode, even if the WDT in HALT bit (TCTLHI.7) is cleared. Work around this bug by emulating the code with the WDT stopped and then enabling the watchdog just before programming an OTP device. The Z8E00X devices are not affected by this problem. It is an *emulation-only* limitation.
3. The RC OSCILLATOR option bit is not available for the Z8E000 and Z8E001 devices.
4. Select the EPROM PROTECT/TEST MODE KILL option bit, only after programming the device and verifying the code. From that point, select the EPROM PROTECT option and program again. Finally, run VERIFY one last time (this run should FAIL) to ensure that the code is truly protected.
5. The ZDS command VECTOR RESET adds a jump at address 20h. This command prevents the user from writing to the TCTLHI register to configure the WDT. This command should not be used for Z8Plus parts.
6. The WDT and SMR functions of the emulator are tailored to match Z8PE00X devices. These functions do not perform exactly the same as for Z8E00X devices. Specifically, the SMR is edge-triggered, not level-triggered. On Z8E00X devices, operation does not resume until the pin is released. The WDT of the emulator, like the Z8PE00X devices themselves, counts up, not down, as on Z8E00X devices.

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