CUSTOMER PROCUREMENT SPECIFICATION

Z89C6700ZEM

ICEBOX™ FAMILY Z8® IN-CIRCUIT EMULATOR–C67

HARDWARE FEATURES

- Supported Devices

Package	Emulation	Programming
84-Pin PLCC	Z89167	N/A
84-Pin PLCC	Z89168	N/A
84-Pin PLCC	Z89169	N/A
84-Pin PLCC	Z89C67	N/A
84-Pin PLCC	Z89C68	N/A
84-Pin PLCC	Z89C69	N/A

- Real-Time Emulation
- ICEBOX Emulator Provides In-Circuit Program Debug Emulation
- Z8 GUI Emulator Software
- Windows-Based User Interface
- RS-232 Connector
- ICE Pod Connector for Emulation

GENERAL DESCRIPTION

The Z89C6700ZEM is a member of Zilog's ICEBOX product family of in-circuit emulators providing support for the above listed Z8 microcontroller devices.

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

The emulator provides essential timing and I/O circuitry to simplify user emulation of the prototype hardware and software product.

Data entering, program debugging are performed by the monitor ROM and the host package, which communicates through RS-232C serial interface. The user program can be downloaded directly from the host computer through the RS-232C connector. User code may be executed through debugging commands in the monitor.

The Z89C6700ZEM emulator can be connected to a serial port (COM1, COM2, COM3, and COM4) of the host computer and uses Graphical User Interface (GUI) software.

SPECIFICATIONS

Operating Conditions

Operating Temperature: 20°C, ±10°C
Supply Voltage: +5.0 VDC, ± 5%
Max. Oscillator Freq.: 20.48 MHz
Max. DSP Internal Clock Oper. Freq.: 10 MHz
Max. Z8 Internal Clock Oper. Freq.: 10 MHz
Min. DSP Internal Clock Oper. Freq.: 1 MHz
Min. Z8 Internal Clock Oper. Freq.: 1 MHz

Power Requirements

+5.0 VDC @ 2.0A

Dimensions

Width: 6.25 in. (15.8 cm)
Length: 9.5 in. (24.1 cm)
Height: 2.5 in. (6.35 cm)

Serial Interface

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

HOST COMPUTER

Minimum Requirements

IBM PC (or 100-percent compatible) 386-based machine
33 MHz
4 MB RAM
VGA Video Adapter
Hard Disk Drive (1 MB free space)
3.5-inch, High-Density (HD) Floppy Disk Drive
RS-232C COM port
Mouse or Pointing Device
Microsoft Windows 3.1

The following changes to the Minimum Requirements are recommended for increased performance:

486- or Pentium-based machine
66 MHz (or faster)
8 MB of RAM (or more)
SVGA Video Adapter
Color Monitor
Printer

KIT CONTENTS

Z89C67 Emulator

•Emulation Base Board includes:
CMOS Z86C9320PSC
8K x 8 EPROM (Programmed with Debug Monitor)
32K x 8 Static RAM
Three 64K x 4 Static RAM
RS-232C Interface
Reset Switch

•Z89C67 Emulation Daughterboard
Z86C5020GSE ICE Chip
Two 3K x 8 Static RAM
Two 100-Pin HP-16500 Logic Analysis System Interface Connectors
Z89C0010GSC
80/80-Pin Target Connectors

Cables/Pods

Power Cable with Banana Plugs
DB25 RS-232C Cable
84-Pin PLCC Emulation Pod Cable

Host Software

Z8® GUI Emulator Software
ZASM Cross-Assembler/ MOBJ Object File Utilities

Miscellaneous

20-Pin DIP Jumper Block

Documentation

Emulator User Manual
Z8 Cross-Assembler User's Guide
Universal Object File Utilities (MOBJ)
Registration Card

LIMITATIONS

1. Changing drives in file download and load symbol dialog boxes is not anticipated by the GUI. Typing in the filename in a directory other than shown in “Path:” will result in “File not found”. Changing the drive using the mouse is the workaround.

2. The initial blue Zilog screen will be distorted by other active windows. This only affects the appearance, not functionality, of the GUI.

3. Switching ICEBOXes without quitting the GUI is not supported.

4. The maximum symbols that can be loaded is 32768, provided that there is enough system resource (memory).

5. The ICEBOX breakpoint hardware does not distinguish between instruction and data fetches. When a breakpoint in the GUI is set, the breakpoint hardware triggers when the addresses match for either code or data fetches.

   Example:

   ```
   000C    SRP   #%0
   000E    LD    R4, #%0016
   0010    LD    R5, @R4
   0012    NOP
   0013    JP    %000C
   0016    NOP
   ```

   Setting the breakpoint at %0016 and click GO.

   Result: The code will break and stop at %0012.

   Note: This will not happen when Animate Mode is on because the GUI is not using the hardware breakpoints when in Animate Mode.

6. If the emulator is running a user code at full speed and the port window is opened: Switching to another application or minimizing the GUI (then restoring) will result in the following ICEBOX Communications Error message: “Emulator rejected command: target program is executing.” This message may need to be cleared several times (as many as seven) before the GUI returns to normal operation.

Workaround: Always close the port window before leaving the GUI.

7. Do not put breakpoint at address after Stop instruction. This will cause program counter to continue at that location after a Stop-Mode Recovery.

8. Breakpointing in interrupt service routine and single-stepping pass the IRET statement will cause global interrupts to be disabled.

9. Clicking on the HALT Button does not always Halt ICEBOX execution.

10. Single-stepping into the HALT instruction will cause an ICEBOX "Fatal Error".

11. Halting the program execution or breakpointing when interrupts are enabled will globally disable interrupts. If halting occurs, the program must be reset and started from address %000c hex.

12. The C67 ICEBOX uses the Z86C50 ICE Chip; therefore, emulation at more than 12 MHz requires that the Expanded Register File (ERF) timing of the ICE Chip be slowed down to SCLK x 2. This is accomplished by loading value %01 to ICECON Register (Bank F, Register A) of the ICE Chip.

Example:
PUSH RP
LD RP, #%0F
LD %A, #%01
POP RP

13. Due to the limitation in the Z86C50 ICE Chip, a software workabound for the interrupt vector fetching must be in place when configuring the emulator for ROMless emulation.

ROM Emulation

The ROM emulation has the **correct sequence** for vectored interrupts, shown as follows:

Push Program Counter (PC) lower byte on stack
Push PC upper byte on stack
Push FLAG on stack
Fetch the upper byte of vector
Fetch the lower byte of vector
Branch to service routine specified by vector

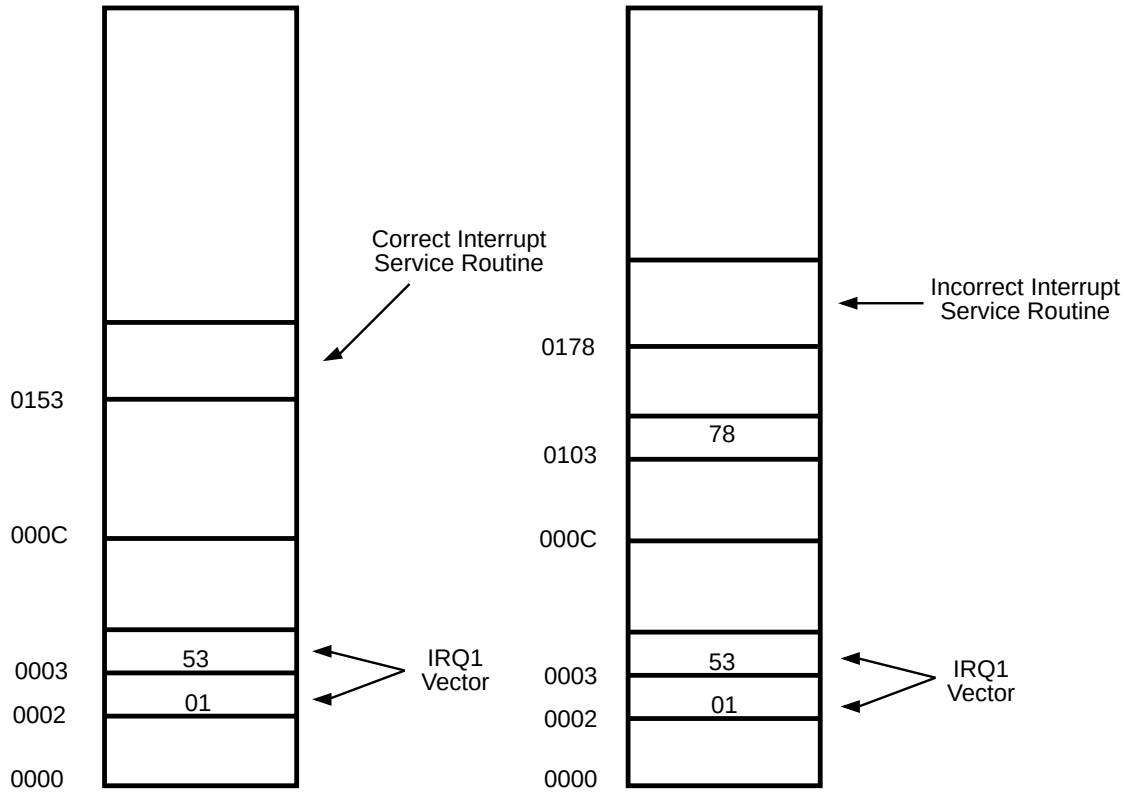
ROMless Emulation

ROMless emulation has the **incorrect sequence** for vectored interrupts. This sequence is shown as follows:

Push PC lower byte on stack
Push PC upper byte on stack
Push FLAG on stack
Fetch the upper byte of vector
Write the upper byte of vector to high byte of PC
Fetch lower byte of vector according to the modified PC
Branch to service routine specified by vector

The following figures illustrate the vectored interrupt operation for ROM and ROMless emulation, respectively:

LIMITATIONS (Continued)



Note: The Incorrect Vectored Interrupt emulation only applies to the emulator. The Z89168/C68 device does not exhibit this problem.

Software Work Around for ROMless Emulation

```
;***Emulator Vector Fixes***
;***Locate in ROM @ %0000***

    .ORG   %0000

    .WORD  IRQ0_JP
    .WORD  IRQ1_JP
    .WORD  IRQ2_JP
    .WORD  IRQ3_JP
    .WORD  IRQ4_JP
    .WORD  IRQ5_JP

;Locate in ROM @ %7F00***

    .EXTERN    IRQ0_ISR
    .EXTERN    IRQ1_ISR
    .EXTERN    IRQ2_ISR
    .EXTERN    IRQ3_ISR
    .EXTERN    IRQ4_ISR
    .EXTERN    IRQ5_ISR
```

```
    .ORG       %7F00

    .WORD  IRQ0_JP
    .WORD  IRQ1_JP
    .WORD  IRQ2_JP
    .WORD  IRQ3_JP
    .WORD  IRQ4_JP
    .WORD  IRQ5_JP
```

```
IRQ0_JP:    JP    IRQ0_ISR    ;P32 Input–IRQ0 Service Routine
IRQ1_JP:    JP    IRQ1_ISR    ;P33 Input–IRQ1 Service Routine
IRQ2_JP:    JP    IRQ2_ISR    ;P31 Input–IRQ2 Service Routine
IRQ3_JP:    JP    IRQ3_ISR    ;Internal–DSP Activated
IRQ4_JP:    JP    IRQ4_ISR    ;T0 Timer–IRQ4 Service Routine
IRQ5_JP:    JP    IRQ5_ISR    ;T1 Timer–IRQ5 Service Routine
```

PRECAUTION LIST

1. GUI software versions prior to 3.00 are incompatible with hardware containing BOOTROM 3.00. The GUI software may still boot, but will fail at some later point of the session.

2. The status color bar in OTP dialog box will be cleared in the area where a new window opens on top of it.

3. For 386 PCs, set the baud rate to 19.2K or less because Windows' communication driver does not guarantee "reliable" operation at more than 9600 baud. Selecting a high baud rate on some slower 386 machines may crash the Windows environment.

4. All Z8 control registers are write only unless stated otherwise.

5. Power Supply ramp-up/rise time must be such that when minimum power-on reset time (T_{POR}) expires, then the V_{CC} must be in the supported specified operating range of the device.

6. Check the T_{POR} and T_{WDT} specifications of the device that you wish to emulate. The actual specification may differ from the ICE chip specifications.

7. The general-purpose registers after Power-On Reset or at initial emulator use will be different than the actual device. The emulator self test will always leave the same values in the general-purpose registers, while the real device will have a random/undefined value in the general-purpose registers.

8. The emulator cannot be operated while performing ESD/EMI testing on the Target Board.

9. The Mother Board (board on the bottom) is specially designed for this emulator and is **not compatible** with any other Zilog ICEBOXES.

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