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Z86C5000ZEM

ICEBOX™ Z8® FAMILY IN-CIRCUIT EMULATOR –C50

HARDWARE FEATURES

■ Supported Products

Packages	Emulation	Programming	Notes
18-Pin DIP	Z86C03/06/09/ 16/19, Z86E03/06	Z86E04/07/08 Z86E03/06	[1]
20-Pin DIP	N/A	Z86717	[3]
18-Pin SOIC	N/A	Z86E04/07/08 Z86E03/06	[2] [1]
20-Pin SOIC	N/A	Z86717	[4]
20-Pin SSOP	N/A	Z86717	[5]
28-Pin DIP	Z86C30/31/233	Z86E30/31	[6]
40-Pin DIP	Z86C40/90/243	Z86E40	[7]
44-Pin PLCC	N/A	Z86E40	[8]
44-Pin QFP	N/A	Z86E40	[9]

Notes:

- [1] E03/06: With optional, separately purchased adapter, Z86E0601ZDP.
- [2] With optional, separately purchased adapter, Z86E0700ZDP.
- [3] With optional, separately purchased adapter, Z8671701ZDP.
- [4] With optional, separately purchased adapter, Z8671701ZDS.
- [5] With optional, separately purchased adapter, Z8671701ZDH.
- [6] To emulate Z86233, select Z86C30 with 8 KB of ROM.
- [7] To emulate Z86243, select Z86C40 with 8 KB of ROM.
- [8] With optional, separately purchased adapter, Z86E4001ZDV.
- [9] With optional, separately purchased adapter, Z86E4001ZDF.

- Real-Time Emulation
- ICEBOX Emulator Provides In-Circuit Program Debug Emulation
- Windows-Based User Interface
- Z8 GUI Emulator Software
- Bit-Programmable I/O Ports for Digital Input/Output Functions
- RS-232 Connector
- One-Time Programmable (OTP) Option
- HP-16500 Logic Analysis System Interface Connector

GENERAL DESCRIPTION

The Z86C5000ZEM is a member of Zilog's family of ICEBOX in-circuit emulators providing support for the Consumer Controller Processor (CCP™) microcontrollers.

Zilog's in-circuit emulators are interactive, Windows-based 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, and OTP programming 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 Z86C5000ZEM 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 VDC, ± 5%
 Minimum Emulation Speed: 1 MHz
 Maximum Emulation Speed: 20 MHz

Power Requirements

+5 VDC @ 1.0 A Minimum

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

Z86C50 Emulator

Emulation Base Board:
 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

Z86C50 Emulation Daughterboard:
 20 MHz CMOS Z86C5020GSE ICE Chip
 2K x 8 Static RAM
 18/28/40-Pin ZIF OTP Sockets
 Six HP-16500A Logic Analysis
 System Interface Connectors
 40/60/80-Pin Target Connectors

Cables

Power Cable with Banana Plugs
 DB25 RS-232C Cable
 40-Pin DIP Emulation Cable
 28-Pin DIP Emulation Cable
 18-Pin DIP Emulation Cable
 Power Cable with 1A Slow-Blow Fuse

Devices

One Z86E3012PSC (28-Pin DIP OTP)
 One Z86E4012PSC (40-Pin DIP OTP)

Host Software (IBM PC Platform)

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

Miscellaneous

20-Pin Jumper Block
 Two, Two Position Shunt Jumpers

Documentation

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

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.

LIMITATIONS (Continued)

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

- 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.

- Do not put breakpoint at address after Stop instruction. This will cause program counter to continue at that location after a Stop-Mode Recovery.
- Since the emulator uses the C50 ICE Chip, port 1 cannot be configured to Low EMI mode. (Bit 4 in PCON registers must be set to logic "1").
Note: This is not a problem with the actual emulated device.

PRECAUTIONS

All Devices

- 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.
- When device serialization is enabled in the OTP dialog, the GUI copies the current serial number to code memory immediately before performing a VERIFY operation. If this behavior is undesirable, then device serialization must be disabled prior to invoking the VERIFY operation.
- The status color bar in OTP dialog box will be cleared in the area where a new window opens on top of it.
- 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.

- Do not press hardware reset when the ICEBOX is in OTP programming. If reset is pressed while the GUI is doing OTP programming, close the OTP dialog window and reopen it to reload the information back to the hardware.

Note: Although the Command Status shows "Processing" after the GUI reestablishes the communication link when Retry was selected, the ICEBOX is actually sitting idle.)

- All Z8 control registers are write-only unless stated otherwise.
- Programming the ROM protect bit on all Z8s and Z8 OTPs will disable all use of the LDC, LDCI, LDE, and LDEI instructions. Thus, ROM protect does not support the use of a ROM look-up table. The value must be loaded as "immediate values."
- The special OTP programming options such as ROM protect, RAM protect, Low Noise, and RC will be programmed if the option has been selected and the VERIFY command was then executed.

PRECAUTIONS (Continued)

9. 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.
10. The bits of non-implemented features (of devices having a PCON register) must be set to "1" state on the emulator.
11. 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.
12. 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.

Z86C03/06/09/16

1. Devices with the comparator output feature have the P32 comparator output coming out of P35.
2. For Z86C03/04/06/07/08/09/16/19/30/31 and Z86E03/04/07/08/30/31, the register %F8 (PO1M register) bits D4 and D3 must be set to state "0" and bit D2 must be set to state "1."
3. WDT Register (F) %0F should only be written in the first 64 internal system clocks from the start of program execution.
4. The PCON register on Z86C16 is not reset after Stop-Mode Recovery.
5. When using the C50 ICEBOX to emulate the C06, the comparator outputs are at P34 and P37, which is different than the C06, which is at P34 and P35.

Z86E04/E08/E07

1. Z86E04 and Z86E08 have special features such that programming the ROM protect mode will also put the device in Low EMI mode, where XTAL frequency = internal SCLK and all output drive capabilities are reduced by 75 percent.

Z86E04/E08/E07

1. The Z86C30/31/40/50/89/90 and Z86E30/31/40 have the P32 comparator output coming out of P37.
2. Reg (F) %00 PCON has D2 controlling the open-drain for Port 0 and D1 controlling the open-drain for Port 1. This is for the following:
 Z86C30/31/40/50/89/90
 Z86E30/31/40
3. For Z86C03/04/06/07/08/09/16/19/30/31 and Z86E03/04/07/08/30/31, the register %F8 (PO1M register) bits D4 and D3 must be set to state "0" and bit D2 must be set to state "1."
4. WDT Register (F) %0F should only be written in the first 64 internal system clocks from the start of program execution.
5. For Z86C30/31, the "No Auto Latch" feature is not implemented.

Z86C40/50/89/90 and Z86E40

1. WDT Register (F) %0F should only be written in the first 64 internal system clocks from the start of program execution.
2. The Z86C30/31/40/50/9/90 and Z86E30/31/40 have the P32 comparator output coming out of P37.
3. Reg (F) %00 PCON has D2 controlling the open-drain for Port 0 and D1 controlling the open-drain for Port 1. This is for the following:
 Z86C30/31/40/50/89/90
 Z86E30/31/40
4. For Z86C40, the "No Auto Latch" feature is not implemented.