



# Z86C1200ZEM

ICEBOX™ FAMILY Z8®  
IN-CIRCUIT EMULATOR—C12

## HARDWARE FEATURES

### ■ Supported Devices

Package	Emulation	Programming	Notes
18-Pin DIP	Z86C04/07/08/ Z86E04/07/08	Z86E03/06* Z86E04/07/08	[1]*
18-Pin SOIC	N/A	Z86E03/06* Z86E04/07/08*	[1]* [2]*
20-Pin DIP	Z86117/717*	Z86717*	[9, 6]*
20-Pin SOIC	N/A	Z86717*	[8]*
20-Pin SSOP	N/A	Z86717*	[7]*
28-Pin DIP	Z86C20	N/A	
40-Pin DIP	Z86C21/61/63/91 Z86E21/23/61/63	Z86E21/61/63 Z86E23*	[3]*
44-Pin PLCC	N/A	Z86E21*	[4]*
44-Pin QFP	N/A	Z86E21*	[5]*

### ■ Real-Time Emulation

### ■ ICEBOX Emulator Provides In-Circuit Program Debug Emulation

### ■ Z8 GUI Emulator Software

### ■ Windows-Based User Interface

### ■ One-Time Programmable (OTP) Option

### ■ RS-232 Connector

### ■ ICE Pod Connector for Emulation

#### \*Notes:

- [1] With optional, separately purchased adapter, Z86E0601ZDP.
- [2] With optional, separately purchased adapter, Z86E0700ZDP.
- [3] With optional, separately purchased adapter, Z86E2301ZDP.
- [4] With optional, separately purchased adapter, Z86E2101ZDV.
- [5] With optional, separately purchased adapter, Z86E2101ZDF.
- [6] With optional, separately purchased adapter, Z8671701ZDP.
- [7] With optional, separately purchased adapter, Z8671701ZDH.
- [8] With optional, separately purchased adapter, Z8671701ZDS.
- [9] With optional, separately purchased adapter, Z8671700ZDP.

## GENERAL DESCRIPTION

The Z86C1200ZEM 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, 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 Z86C1200ZEM 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%
- Minimum Emulation Speed: 1 MHz
- Maximum Emulation Speed: 16 MHz\*
- \* Shipped with 12 MHz Crystal

### Power Requirements

- +5.0 VDC @ 0.5A

### 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

### Z86C12 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
- Z86C12 Emulation Daughterboard
  - 16 MHz CMOS Z86C1216GSE ICE Chip
  - 2K x 8 Static RAM
  - 18/40-Pin DIP Zero Insertion Force (ZIF) Programming Sockets
  - 40/60/80-Pin Target Connectors

### Cables/Pods

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

### Devices

One Z86E0812PSC (18-Pin DIP OTP)  
 One Z86E2112PSC (40-Pin DIP OTP)

### Host Software

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

### Miscellaneous

20-Pin DIP Jumper Block  
 Two, Two-Position Shunt Jumpers

### Documentation

Emulator User Manual  
 Z8 Cross-Assembler User's Guide  
 Universal Object File Utilities (MOBJ)  
 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.
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. The ICEBOX cannot stop timers during single-step operation, or upon reaching of breakpoint.

## PRECAUTION LIST

### All Devices

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. 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.
3. The status color bar in OTP dialog box will be cleared in the area where a new window opens on top of it.
4. 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.
5. 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.)
6. All Z8 control registers are write only unless stated otherwise.
7. Programming the ROM protect bit on all Z8s and Z8 OTPs will disable all use of the LDC, LDCl, 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."
8. 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.
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 ICEBOX cannot stop Timers and Interrupts at a breakpoint or during ICEBOX Halt operation or a single-step operation. The stack will overflow if an interrupt is enabled and the ICEBOX is in HALT, single-step, or breakpoint. (This is a limitation of the ICE chip.)

## PRECAUTION LIST (Continued)

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.
13. RC oscillator emulation is not supported.

### Z86C04/C08/C07

1. To emulate these devices correctly, the user must select either Digital P3 or Analog P3 Emulation Mode in the Configuration Window of the ICEBOX GUI.
2. 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. Watch-Dog Timer (WDT) running in Stop Mode is not supported.
4. For Z86C07 emulation, the permanent WDT is not emulated. We recommend that you make the first instruction an enable WDT (5F hex).
5. For Z86C07 emulation, the "No Auto Latch" feature is not implemented.
6. The Z86E07 does not have permanently enabled WDT.

### Z86C06

1. When using the C12 Emulator to emulate the C06, the comparator outputs are at P34 and P37, unlike the C06, which are at P34 and P35.

### Z86E03/E06

1. The ICEBOX does not support the programming of RC option bits.

### Z86E04/E08/E07

1. To emulate these devices correctly, the user must select either Digital P3 or Analog P3 Emulation Mode in the Configuration Window of the ICEBOX GUI.

2. 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%.
3. 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. Watch-Dog Timer (WDT) running in Stop Mode is not supported.
5. For Z86C07 emulation, the "No Auto Latch" feature is not implemented.

### Z86E21

1. The ICEBOX does not support the programming of 8K/4K option bits.

### Z86E61/E63

1. The ICEBOX does not support the programming of 32K/16K or 8K/4K option bits.

### Z86E08DB 1840

1. The C12 emulator does not support the programming of WDT enable or "kill" EPM option bits.

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