

# Z86CCP00ZEM

## IN-CIRCUIT EMULATOR

### HARDWARE FEATURES

#### ■ Supported Products

Packages	Emulation	Programming	Notes
18-pin DIP	Z86C03/04/06/07 /08/09/16/19 Z86E03/04/06/07/08	Z86E04/07/08 Z86E03/06	1
20-pin DIP	N/A	Z86717	2
18-pin SOIC	N/A	Z86E04/07/08 Z86E03/06	3
20-pin SOIC	N/A	Z86717	4
20-pin SSOP	N/A	Z86717	5
28-pin DIP	Z86C03/31/32/233	Z86E30/31	6,7
28-pin SOIC	N/A	N/A	
40-pin DIP	Z86C40/243	Z86E40	7,8
44-pin PLCC	N/A	N/A	
44-pin QFP	N/A	N/A	

#### 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 or ROM.
7. E30/31/140: With opt., separately purchased acc. kit Z86CCP00ZAC
8. To emulate Z86243, select Z86C40 with 8 KB or ROM.

- ICEBOX Emulator Provides In-Circuit Program Debug Emulation
- Z8 GUI Emulator Software
- Bit-Programmable I/O Ports for Digital Input/Output Functions
- RS-232 Connector
- One-Time Programmable

### GENERAL DESCRIPTION

The Z86CCP00ZEM is a member of Zilog's family of in-circuit emulators providing support for the Consumer Controller Processor (CCP™) microcontrollers.

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 Z86CCP00ZEM 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 +7.5 VDC to +9.0 VDC  
(+8.0 VDC Typical)  
Minimum Emulation Speed: 1 MHz  
Maximum Emulation Speed: 8 MHz

### Power Requirements

+8.0 VDC @ 0.5A Minimum

### Dimensions

Width: 7.0 in. (17.7 cm)  
Length: 9.0 in (22.9 cm)  
Height: 0.9 in. (2.3 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 or RAM (or more)  
SVGA Video Adapter  
Color Monitor  
Printer

---

## KIT CONTENTS

### Z8<sup>®</sup> CCP<sup>™</sup> Emulator

CMOS Z86C9320VSC  
20 MHz CMOS Z86C5020FSE ICE Chip  
8K x 8 Static RAM (For Code Memory)  
18-pin DIP Zero Insertion Force (ZIF)  
Programming Socket  
Sockets Available for 18/28/40-Pin Target Cables  
Holes Available for 28/40-Pin ZIF Sockets  
RS-232C Interface  
Reset Switch

### Cables

18-Pin DIP Target Cable

### Devices

One Z86E0812PSC (18-Pin DIP)

### Software (IBM PC Platform)

Z8 GUI Emulator Software  
ZASM Cross-Assembler/MOBJ Object File Utilities  
Production Languages Corporation COMPASS/Z8  
(Evaluation Version)

### Documentation

Emulator User Manual  
Discrete Z8 Databook  
Z8 Microcontroller Technical Manual  
Registration Card  
Product Information

## Z8 CCP Emulator Accessory Kit (Z86CCP00ZAC)

(Not included with Z86CCP00ZEM)

28-Pin ZIF Socket

28-Pin DIP Target Cable

40-Pin ZIF Socket

40-Pin DIP Target Cable

DB25 RS-232C Cable

Power Cable with Banana Plugs

---

## 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. 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

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 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, 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.”
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 bits of non-implementing features (of devices having a PCON register) must be set to ‘1’ state on the emulator.
11. The jumpers for implementing IRQ3 rising edge interrupt on P32 for Z86C04/C07/C08/E04/E08 must be removed when emulating other devices.
- 12 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.
- 13 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.
14. RC oscillator emulation is not supported.

### Z86C03/06/09/16

1. Devices with the comparator output feature have the P32 comparator output coming out of P335.
2. For Z86C03/04/06/07/08/09/16/19/30/31 and Z86E03/04/07/08/30/31, the register %F8 (P01M 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 can 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. SPI functions are not supported.
6. When using the CCP Emulator to emulate the C06, the comparator outputs are at P34 and P37, which is different than the C06, which is at P34 and P35.

### Z86C04/C08/C07

1. WDT Register (F) %0F can only be written in the first 64 internal system clocks from the start of program execution (need for emulation of device only).
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. For Z86C03/04/06/07/08/09/16/19/30/31 and Z86E03/04/07/08 emulation, the IRQ3 rising edge interrupt of P32 is not supported. To implement the rising edge of P32, a jumper from P32 must be connected to Pin 1 of U27 74HCT04. Another jumper must connect the output of the 74HCT04 Pin 2 to P30 on emulation socket P3, Pin 25 or emulation socket P2, Pin 18.
4. Stop Mode. For Z86C04/08 or Z86E04/08, P27 is used to release Stop Mode. However, since the CCP™ emulator (C50 Ice Chip) is used, you must write to SMR(F)0B 101 in D2, D3, and D4. Use the following code:

```
LD RP, #%0F           ;select Bank F
LD %0B, #00010100B   ;selects P27 as the Stop-Mode
                      Recovery pin.
```

This code must be removed before final ROM code submission or OTP programming. Note that P27 must be in Input Mode, which is accomplished with the following code:

```
LD P2M, #1xxxxxxB
NOP                   ;clears pipeline
Stop                  ;halts processor
```

5. Z86C04/07/08 and Z86E04/07/08 do not support the Watch-Dog Timer (WDT) running in Stop Mode.
6. Z86C04/07/08 and Z86E04/07/08 do not support WDT register. Use the command “4F” to run WDT in HALT Mode.
7. For Z86C07 emulation, the permanent WDT is not emulated. We recommend that you make the first instruction an enable WDT (5F hex).
8. For Z86C07 emulation, the “No Auto Latch” feature is not implemented.
9. The Z86E07 does not have permanently enabled WDT.

10. For Z86C04/07/08 and Z86E04/07/08, the register %FA (IRQ register) bits D7 and D6 must be set to state "0."

### Z86E04/E08/E07

1. WDT Register (F1 %0F can only be written in the first 64 internal system clocks from the start of program execution (need for emulation of device only).
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. 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. Z86C04/07/08 Emulation Rising Edge of P32. For Z86C04/07/08 emulation, the IRQ3 rising edge interrupt on P32 is not supported. To implement the rising edge of P32, a jumper from P32 must be connected to Pin 1 of U27 74HCT04. Another jumper must connect the output of the 74HCT04 Pin 2 to P30 on emulation socket P3, Pin 25 or emulation socket P2, Pin 18.
5. Stop Mode. For Z86C04/08 or Z86E04/08, P27 is used to release Stop Mode. However, since the CCP™ emulator (C50 Ice Chip) is used, you must write to SMR(F) 0B 101 in D2, D3, and D4. Use the following code:

```
LD RP, #%0F           ;selects Bank F
LD %0B, #00010100B   ;selects P27 as the Stop-Mode
                       Recovery pin.
```

This code must be removed before final ROM code submission or OTP programming. Note that P27 must be in Input Mode, which is accomplished with the following code:

```
LD P2M, #1xxxxxB
NOP                ;clears pipeline
Stop               ;halts processor
```

6. Z86C04/07/08 and Z86E04/07/08 do not support the Watch-Dog Timer (WDT) running in Stop Mode.
7. Z86C04/07/08 and Z86E04/07/08 do not support WDT register. Use the command "4F" to run WDT in HALT Mode.

8. For Z86E07, the "No Auto Latch" feature is not implemented.

9. For Z86C04/07/08 and Z86E04/07/08, the register %FA (IRQ register) bits D7 and D6 must be set to state "0."

### Z86C30/31 and Z86E30/31

1. The Z86C30/31/40/50 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  
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 can only 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.
6. To emulate the Z86C89/90, select the "Z86C40/E40" option from the "Microcontroller" pull-down window of the Configuration dialog box, which appears when the Z8® CCP™ GUI starts up and when the Configuration Menu item is selected from the ICEBOX™ Menu.

### Z86C40/50 and Z86E40

1. WDT Register (F) %0F can only be written in the first 64 internal system clocks from the start of program execution.
2. The Z86C30/31/40/50 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  
Z86E30/31/40
4. For Z86C40, the "No Auto Latch" feature is not implemented.

## Z86CCP00ZAC

### Z8<sup>®</sup> CCP<sup>™</sup> EMULATOR ACCESSORY KIT

---

#### DESCRIPTION

The Z86CCP00ZAC is the accessory kit for the Z86CCP00ZEM. The kit contains all accessories to fully populate and operate all functions of the Z86CCP00ZEM.

#### KIT CONTENTS

##### **Z8 CCP Emulator Accessory Kit**

- 28-Pin ZIF Socket
- 28-Pin Target Connector Cable
- 40-Pin ZIF Socket
- 40-Pin Target Connector Cable
- RS-232 Cable
- Power Cable