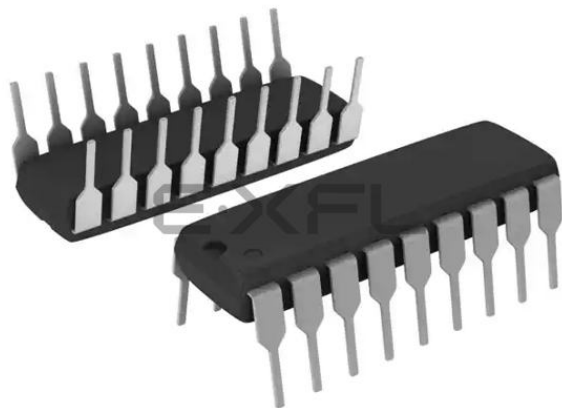




Welcome to [E-XFL.COM](http://E-XFL.COM)

### What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

### Applications of "[Embedded - Microcontrollers](#)"

#### Details

|                            |                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Product Status             | Obsolete                                                                                                                            |
| Core Processor             | Z8                                                                                                                                  |
| Core Size                  | 8-Bit                                                                                                                               |
| Speed                      | 8MHz                                                                                                                                |
| Connectivity               | -                                                                                                                                   |
| Peripherals                | POR, WDT                                                                                                                            |
| Number of I/O              | 14                                                                                                                                  |
| Program Memory Size        | 512B (512 x 8)                                                                                                                      |
| Program Memory Type        | OTP                                                                                                                                 |
| EEPROM Size                | -                                                                                                                                   |
| RAM Size                   | 61 x 8                                                                                                                              |
| Voltage - Supply (Vcc/Vdd) | 4.5V ~ 5.5V                                                                                                                         |
| Data Converters            | -                                                                                                                                   |
| Oscillator Type            | Internal                                                                                                                            |
| Operating Temperature      | -40°C ~ 105°C (TA)                                                                                                                  |
| Mounting Type              | Through Hole                                                                                                                        |
| Package / Case             | 18-DIP (0.300", 7.62mm)                                                                                                             |
| Supplier Device Package    | -                                                                                                                                   |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/zilog/z86e0208pec1925">https://www.e-xfl.com/product-detail/zilog/z86e0208pec1925</a> |



|                                                                                                                                       |    |
|---------------------------------------------------------------------------------------------------------------------------------------|----|
| Software Work Around on the Z86CCP01ZEM Emulator<br>to Enable P27 as Stop-Mode Recovery Source .....                                  | 38 |
| Watch-Dog Timer (WDT) .....                                                                                                           | 38 |
| Software Work Around on the Z86CCP01ZEM Emulator<br>to Emulate the Software WDT Running in HALT Mode .....                            | 39 |
| Software Work Around on the Z86CCP01ZEM Emulator<br>to Emulate the Hardware Enabled Permanent WDT<br>in HALT Mode and Stop Mode ..... | 40 |
| Auto Reset Voltage ( $V_{LV}$ ) .....                                                                                                 | 40 |
| OTP Option Bit Description .....                                                                                                      | 41 |
| Control Registers .....                                                                                                               | 43 |
| Package Information .....                                                                                                             | 51 |
| Ordering Information .....                                                                                                            | 52 |
| Part Number Description .....                                                                                                         | 53 |
| Document Information .....                                                                                                            | 53 |
| Document Number Description .....                                                                                                     | 53 |
| Customer Feedback Form .....                                                                                                          | 54 |
| Z86E02 SL1925 Product Specification .....                                                                                             | 54 |
| Customer Information .....                                                                                                            | 54 |
| Product Information .....                                                                                                             | 54 |
| Return Information .....                                                                                                              | 54 |
| Problem Description or Suggestion .....                                                                                               | 54 |

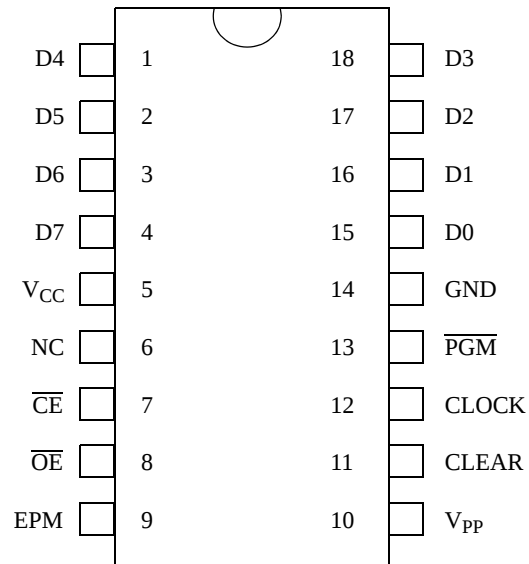
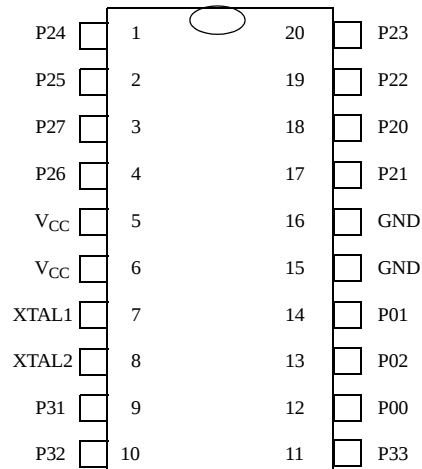


Figure 4. 18-Pin DIP/SOIC Configuration, EPROM Mode

Table 3. 18-Pin DIP/SOIC Pin Identification, EPROM Mode

| Pin # | Symbol           | Function           | Direction    |
|-------|------------------|--------------------|--------------|
| 1-4   | D4-D7            | Data 4-7           | Input/Output |
| 5     | $V_{CC}$         | Power Supply       |              |
| 6     | NC               | No Connection      |              |
| 7     | $\overline{CE}$  | Chip Enable        | Input        |
| 8     | $\overline{OE}$  | Output Enable      | Input        |
| 9     | EPM              | EPROM Program Mode | Input        |
| 10    | $V_{PP}$         | Program Voltage    | Input        |
| 11    | CLEAR            | Clear Clock        | Input        |
| 12    | CLOCK            | Address            | Input        |
| 13    | $\overline{PGM}$ | Program Mode       | Input        |
| 14    | GND              | Ground             |              |
| 15-18 | D0-D3            | Data 0-3           | Input/Output |



**Figure 5. 20-Pin SSOP Pin Configuration, STANDARD Mode**

**Table 4. 20-Pin SSOP Pin Identification, STANDARD Mode**

| Pin # | Symbol          | Function                 | Direction    |
|-------|-----------------|--------------------------|--------------|
| 1,2   | P24-P25         | Port 2, Pins 4-5         | Input/Output |
| 3     | P27             | Port 2, Pin 7            | Input/Output |
| 4     | P26             | Port 2, Pin 6            | Input/Output |
| 5     | V <sub>CC</sub> | Power Supply             |              |
| 6     | V <sub>CC</sub> | Power Supply             |              |
| 7     | XTAL1           | Crystal Oscillator Clock | Input        |
| 8     | XTAL2           | Crystal Oscillator Clock | Output       |
| 9     | P31             | Port 3, Pin 1, AN1       | Input        |
| 10    | P32             | Port 3, Pin 2, AN2       | Input        |
| 11    | P33             | Port 3, Pin 3, REF       | Input        |
| 12    | P00             | Port 0, Pin 0            | Input/Output |
| 13    | P02             | Port 0, Pin 1            | Input/Output |
| 14    | P01             | Port 0, Pin 1            | Input/Output |
| 15    | GND             | Ground                   |              |
| 16    | GND             | Ground                   |              |
| 17    | P21             | Port 2, Pin 1            | Input/Output |
| 18    | P20             | Port 2, Pin 0            | Input/Output |
| 19-20 | P22-P23         | Port 2, Pins 2-3         | Input/Output |

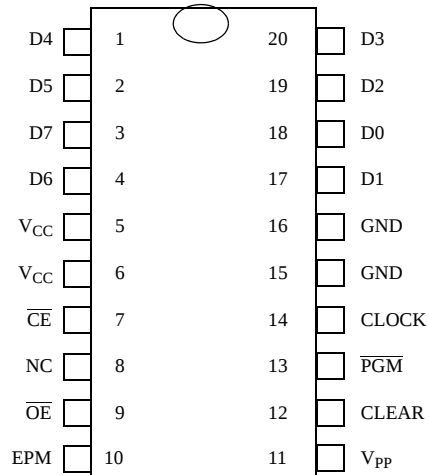


Figure 6. 20-Pin SSOP Pin Configuration, EPROM Mode

Table 5. 20-Pin SSOP Pin Identification, EPROM Mode

| Pin # | Symbol           | Function           | Direction    |
|-------|------------------|--------------------|--------------|
| 1-2   | D4-D5            | Data 4-5           | Input/Output |
| 3     | D7               | Data 7             | Input/Output |
| 4     | D6               | Data 6             | Input/Output |
| 5     | V <sub>CC</sub>  | Power Supply       |              |
| 6     | V <sub>CC</sub>  | Power Supply       |              |
| 7     | $\overline{CE}$  | Chip Enable        | Input        |
| 8     | NC               | No Connection      |              |
| 9     | $\overline{OE}$  | Output Enable      | Input        |
| 10    | EPM              | EPROM Program Mode | Input        |
| 11    | V <sub>PP</sub>  | Program Voltage    | Input        |
| 12    | CLEAR            | Clear Clock        | Input        |
| 13    | $\overline{PGM}$ | Program Mode       | Input        |
| 14    | CLOCK            | Address            | Input        |
| 15    | GND              | Ground             |              |
| 16    | GND              | Ground             |              |
| 17    | D1               | Data 1             | Input/Output |
| 18    | D0               | Data 0             | Input/Output |
| 19-20 | D2-D3            | Data 2-3           | Input/Output |



**Table 8. DC Characteristics, Standard Temperature Range (Continued)**

| TA = 0°C to +70°C |                                                  |                 |      |                       |                                |       |                                        |       |
|-------------------|--------------------------------------------------|-----------------|------|-----------------------|--------------------------------|-------|----------------------------------------|-------|
| Sym               | Parameter                                        | V <sub>CC</sub> | Min  | Max                   | Typical @<br>25°C <sup>1</sup> | Units | Conditions                             | Notes |
| V <sub>ICR</sub>  | Comparator Input<br>Common Mode<br>Voltage Range |                 | 0    | V <sub>CC</sub> - 1.0 |                                | V     |                                        |       |
| I <sub>CC</sub>   | Supply Current                                   | 3.5V            | 3.5  |                       | 1.5                            | mA    | @ 2 MHz                                | 3,6   |
|                   |                                                  | 5.5V            | 7.0  |                       | 6.8                            | mA    | @ 2 MHz                                | 3,6   |
|                   |                                                  | 3.5V            | 8.0  |                       | 3.0                            | mA    | @ 8 MH                                 | 3,6   |
|                   |                                                  | 5.5V            | 11.0 |                       | 8.2                            | mA    | @ 8 MHz                                | 3,6   |
| I <sub>CC1</sub>  | Standby Current<br>(HALT Mode)                   | 3.5V            | 2.5  |                       | 0.7                            | mA    | @ 2 MHz                                | 3,6   |
|                   |                                                  | 5.5V            | 4.0  |                       | 2.5                            | mA    | @ 2 MHz                                | 3,6   |
|                   |                                                  | 3.5V            | 4.0  |                       | 1.0                            | mA    | @ 8 MHz                                | 3,6   |
|                   |                                                  | 5.5V            | 5.0  |                       | 3.0                            | mA    | @ 8 MHz                                | 3,6   |
| I <sub>CC</sub>   | Supply Current<br>(HALT and Low EMI<br>Mode)     | 3.5V            | 3.5  |                       | 1.5                            | mA    | @ 1 MHz                                | 6,10  |
|                   |                                                  | 5.5V            | 7.0  |                       | 6.8                            | mA    | @ 1 MHz                                | 6,10  |
|                   |                                                  | 3.5V            | 5.8  |                       | 2.5                            | mA    | @ 2 MHz                                | 6,10  |
|                   |                                                  | 5.5V            | 9.0  |                       | 7.5                            | mA    | @ 2 MHz                                | 6,10  |
|                   |                                                  | 3.5V            | 8.0  |                       | 3.0                            | mA    | @ 4 MHz                                | 6,10  |
|                   |                                                  | 5.5V            | 11.0 |                       | 8.2                            | mA    | @ 4 MHz                                | 6,10  |
| I <sub>CC1</sub>  | Standby Current<br>(Low EMI Mode)                | 3.5V            | 1.2  |                       | 0.4                            | mA    | @ 1 MHz                                | 6,10  |
|                   |                                                  | 5.5V            | 1.6  |                       | 0.9                            | mA    | @ 1 MHz                                | 6,10  |
|                   |                                                  | 3.5V            | 1.5  |                       | 0.5                            | mA    | @ 2 MHz                                | 6,10  |
|                   |                                                  | 5.5V            | 1.9  |                       | 1.0                            | mA    | @ 2 MHz                                | 6,10  |
|                   |                                                  | 3.5V            | 2.0  |                       | 0.8                            | mA    | @ 4 MHz                                | 6,10  |
|                   |                                                  | 5.5V            | 2.4  |                       | 3.0                            | mA    | @ 4 MHz                                | 6,10  |
| I <sub>CC2</sub>  | Standby Current<br>(STOP Mode)                   | 3.5V            | 10.0 |                       | 1.0                            | μA    | WDT is not Running                     | 6,7,8 |
|                   |                                                  | 5.5V            | 10.0 |                       | 1.0                            | μA    | WDT is not Running                     | 6,7,8 |
| I <sub>ALL</sub>  | Auto Latch Low<br>Current                        | 3.5V            | 12.0 |                       | 3                              | μA    | 0V < V <sub>IN</sub> < V <sub>CC</sub> | 9     |
|                   |                                                  | 5.5V            | 32.0 |                       | 16                             | μA    | 0V < V <sub>IN</sub> < V <sub>CC</sub> | 9     |

## AC Electrical Timing Characteristics

Figure 8 illustrates Alternating Current timing for the Z86E02 SL1925 microcontroller.

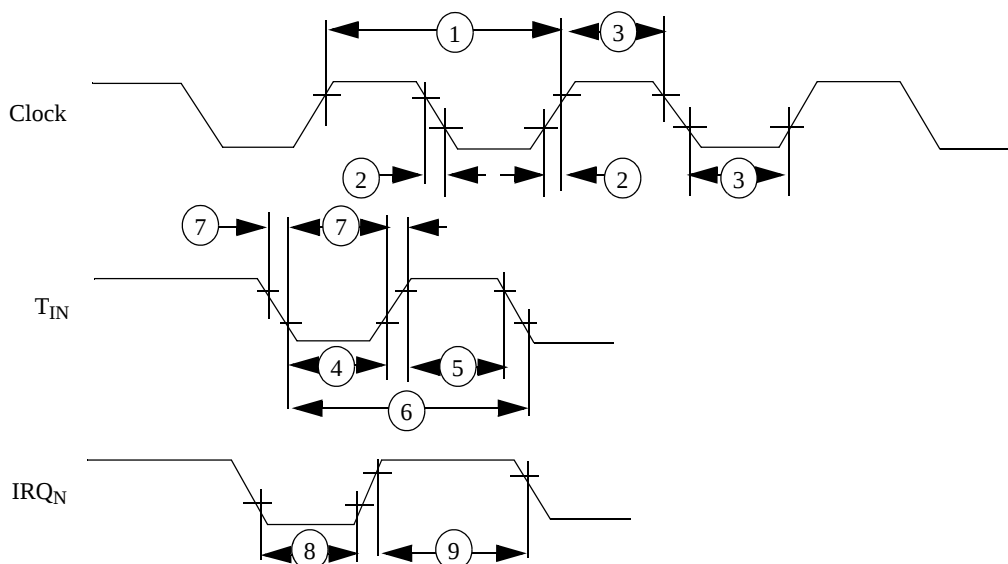


Figure 8. AC Electrical Timing

### STANDARD Mode at Standard Temperature

Table 10 describes timing characteristics in STANDARD mode at standard temperature for the timing diagram noted in Figure 8.

Table 10. AC Electrical Characteristics, Standard Mode and Temperature

| TA = 0°C to +70°C |                                   |                                 |                 |     |     |       |       |
|-------------------|-----------------------------------|---------------------------------|-----------------|-----|-----|-------|-------|
| 8MHz              |                                   |                                 |                 |     |     |       |       |
| No                | Symbol                            | Parameter                       | V <sub>CC</sub> | Min | Max | Units | Notes |
| 1                 | T <sub>PC</sub>                   | Input Clock Period              | 3.5V            | 125 | DC  | ns    | 1     |
|                   |                                   |                                 | 5.5V            | 125 | DC  | ns    | 1     |
| 2                 | T <sub>RC</sub> , T <sub>FC</sub> | Clock Input Rise and Fall Times | 3.5V            |     | 25  | ns    | 1     |
|                   |                                   |                                 | 5.5V            |     | 25  | ns    | 1     |
| 3                 | T <sub>WC</sub>                   | Input Clock Width               | 3.5V            | 62  |     | ns    | 1     |
|                   |                                   |                                 | 5.5V            | 62  |     | ns    | 1     |



**Table 10. AC Electrical Characteristics, Standard Mode and Temperature (Continued)**

| TA = 0°C to +70°C |                                       |                                            |                 |      |     |       |       |
|-------------------|---------------------------------------|--------------------------------------------|-----------------|------|-----|-------|-------|
| 8MHz              |                                       |                                            |                 |      |     |       |       |
| No                | Symbol                                | Parameter                                  | V <sub>CC</sub> | Min  | Max | Units | Notes |
| 4                 | T <sub>WTINL</sub>                    | Timer Input Low Width                      | 3.5V            | 100  |     | ns    | 1     |
|                   |                                       |                                            | 5.5V            | 70   |     | ns    | 1     |
| 5                 | T <sub>WTINH</sub>                    | Timer Input High Width                     | 3.5V            | 5TpC |     |       | 1     |
|                   |                                       |                                            | 5.5V            | 5TpC |     |       | 1     |
| 6                 | T <sub>PTIN</sub>                     | Timer Input Period                         | 3.5V            | 8TpC |     |       | 1     |
|                   |                                       |                                            | 5.5V            | 8TpC |     |       | 1     |
| 7                 | T <sub>RTIN</sub> , T <sub>TTIN</sub> | Timer Input Rise and Fall Time             | 3.5V            |      | 100 | ns    | 1     |
|                   |                                       |                                            | 5.5V            |      | 100 | ns    | 1     |
| 8                 | T <sub>WIL</sub>                      | Interrupt Request Input Low Time           | 3.5V            | 100  |     | ns    | 1,2   |
|                   |                                       |                                            | 5.5V            | 70   |     | ns    | 1,2   |
| 9                 | T <sub>WIH</sub>                      | Interrupt Request Input High Time          | 3.5V            | 5TpC |     |       | 1,2   |
|                   |                                       |                                            | 5.5V            | 5TpC |     |       | 1,2   |
| 10                | T <sub>WDT</sub>                      | Watch-Dog Timer Delay Time before Time-out | 3.5V            | 10   |     | ms    |       |
|                   |                                       |                                            | 5.5V            | 5    |     | ms    |       |
| 11                | T <sub>POR</sub>                      | Power-On Reset Time                        | 3.5V            | 4    | 36  | ms    |       |
|                   |                                       |                                            | 5.5V            | 2    | 18  | ms    |       |

1. Timing reference is 0.7 V<sub>CC</sub> for a logic 1 and 0.2 V<sub>CC</sub> for a logic 0  
2. Interrupt request through Port 3 (P33-P31)



**Table 12. AC Electrical Timing, Standard Mode at Extended Temperature (Continued)**

| TA = 0°C to +70°C |                  |                     |                 |      |     |      |     |       |       |
|-------------------|------------------|---------------------|-----------------|------|-----|------|-----|-------|-------|
|                   |                  |                     |                 | 1MHz |     | 4MHz |     |       |       |
| No                | Symbol           | Parameter           | V <sub>CC</sub> | Min  | Max | Min  | Max | Units | Notes |
| 11                | T <sub>POR</sub> | Power-On Reset Time | 3.5V            | 2    | 18  | 2    | 18  | ms    |       |
|                   |                  |                     | 5.5V            | 2    | 18  | 2    | 18  | ms    |       |

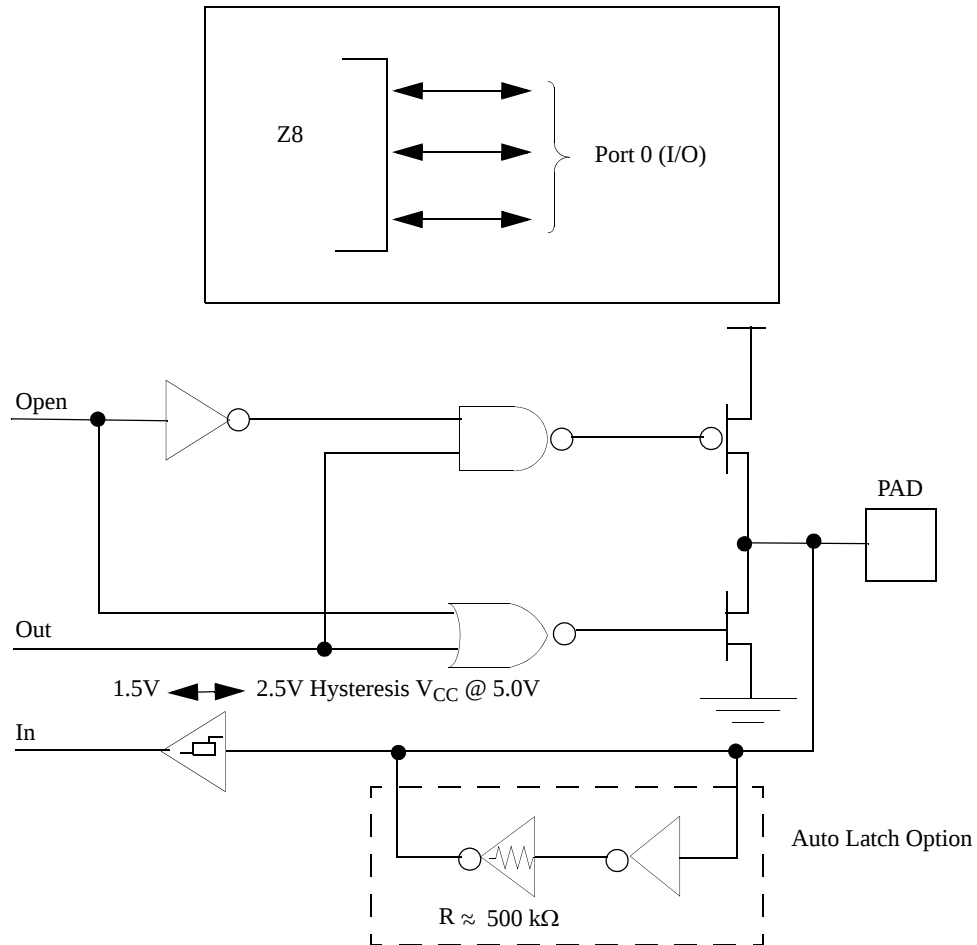
1. Timing reference is 0.7 V<sub>CC</sub> for a logic 1 and 0.2 V<sub>CC</sub> for a logic 0  
2. Interrupt request through Port 3 (P33-P31)

## LOW EMI Mode at Extended Temperature

Table 13 describes timing characteristics in LOW EMI mode at extended temperature for the timing diagram noted in Figure 8.

**Table 13. AC Electrical Timing, Low EMI Mode at Extended Temperature**

| TA = 0°C to +70°C |                                       |                                 |                 |      |     |      |     |       |       |
|-------------------|---------------------------------------|---------------------------------|-----------------|------|-----|------|-----|-------|-------|
|                   |                                       |                                 |                 | 1MHz |     | 4MHz |     |       |       |
| No                | Symbol                                | Parameter                       | V <sub>CC</sub> | Min  | Max | Min  | Max | Units | Notes |
| 1                 | T <sub>PC</sub>                       | Input Clock Period              | 4.5V            | 1000 | DC  | 250  | DC  | ns    | 1     |
|                   |                                       |                                 | 5.5V            | 1000 | DC  | 250  | DC  | ns    | 1     |
| 2                 | T <sub>RC</sub> , T <sub>FC</sub>     | Clock Input Rise and Fall Times | 4.5V            |      | 25  |      | 25  | ns    | 1     |
|                   |                                       |                                 | 5.5V            |      | 25  |      | 25  | ns    | 1     |
| 3                 | T <sub>WC</sub>                       | Input Clock Width               | 4.5V            | 500  |     | 125  |     | ns    | 1     |
|                   |                                       |                                 | 5.5V            | 500  |     | 125  |     | ns    | 1     |
| 4                 | T <sub>WTINL</sub>                    | Timer Input Low Width           | 4.5V            | 70   |     | 70   |     | ns    | 1     |
|                   |                                       |                                 | 5.5V            | 70   |     | 70   |     | ns    | 1     |
| 5                 | T <sub>WTINH</sub>                    | Timer Input High Width          | 4.5V            | 3TpC |     | 3TpC |     |       | 1     |
|                   |                                       |                                 | 5.5V            | 3TpC |     | 3TpC |     |       | 1     |
| 6                 | T <sub>PTIN</sub>                     | Timer Input Period              | 4.5V            | 4TpC |     | 4TpC |     |       | 1     |
|                   |                                       |                                 | 5.5V            | 4TpC |     | 4TpC |     |       | 1     |
| 7                 | T <sub>RTIN</sub> , T <sub>TTIN</sub> | Timer Input Rise and Fall Time  | 4.5V            |      | 100 |      | 100 | ns    | 1     |
|                   |                                       |                                 | 5.5V            |      | 100 |      | 100 | ns    | 1     |



**Figure 9. Port 0 Configuration**

**Port 2, P27–P20.** Port 2 is an 8-bit, bit programmable, bidirectional, Schmitt-triggered CMOS-compatible I/O port. These eight I/O lines can be configured under software control to be inputs or outputs, independently. Bits programmed as outputs can be globally programmed as either push-pull or open-drain (Figure 10).

| Location |                             | Identifiers |
|----------|-----------------------------|-------------|
| 255(FFh) | Stack Pointer (Bits 7-0)    | SPL         |
| 254(FEh) | General-Purpose Register    | GPR         |
| 253(FDh) | Register Pointer            | RP          |
| 252(FCh) | Program Control Flags       | Flags       |
| 251(FBh) | Interrupt Mask Register     | IMR         |
| 250(FBh) | Interrupt Request Register  | IRQ         |
| 249(FAh) | Interrupt Priority Register | IRP         |
| 248(F8h) | Ports 0-1 Mode              | P01M        |
| 247(F7h) | Port 3 Mode                 | P3M         |
| 246(F6h) | Port 2 Mode                 | P2M         |
| 245(F5h) | Reserved                    | Reserved    |
| 244(F4h) | Reserved                    | Reserved    |
| 243(F3h) | T1 Prescaler                | PRE1        |
| 242(F2h) | TimerCounter1               | T1          |
| 241(F1h) | Timer Mode                  | TMR         |
| 240(F0h) | Not Implemented             |             |
| 64(40h)  |                             |             |
| 63(30h)  |                             |             |
| 4(04h)   | General-Purpose Registers   |             |
| 3(03h)   | Port 3                      | P3          |
| 2(02h)   | Port 2                      | P2          |
| 1(01h)   | Reserved                    | Reserved    |
| 0(00h)   | Port 0                      | P0          |

**Figure 14. Register File**

The Z8<sup>®</sup> instructions can access registers directly or indirectly through an 8-bit address field, thereby allowing short 4-bit register addressing mode using the Register Pointer.

In the 4-bit address mode, the register file is divided into eight working register groups, each occupying 16 continuous locations. The Register Pointer (Figure 15) addresses the starting location of the active working-register group.



When more than one interrupt is pending, priorities are resolved by a programmable priority encoder that is controlled by the Interrupt Priority register. All Z8<sup>®</sup> interrupts are vectored through locations in program memory. When an interrupt machine cycle is activated, an Interrupt Request is granted, thus disabling all subsequent interrupts, saving the Program Counter and Status Flags, and then branching to the program memory vector location reserved for that interrupt. This memory location and the next byte contain the 16-bit starting address of the interrupt service routine for that particular interrupt request.

To accommodate polled interrupt systems, interrupt inputs are masked and the interrupt request register is polled to determine which of the interrupt requests requires service.

- **Note:** The rising edge interrupt is not supported. on the CCP emulator (a hardware/software work around must be employed).

### **Hardware Work Around on the on the Z86CCP01ZEM Emulator to P32 Rising Edge Digital Interrupt**

To emulate the P32 rising edge digital interrupt the emulator must be modified in the following way:

1. Connect P32 by soldering a wire jumper from either emulation socket (P3, pin 17) or (P2, pin 12) to 74HCT04 U27 pin 1.
2. Connect 74HCT04 U27 pin 2 by soldering a wire jumper from U27 pin 2 to P30 on either emulator socket (P3, pin 25) or (P2, pin 18).

### **Hardware Work Around on the on the Z86CCP01ZEM Emulator to P32 Rising Edge Analog Interrupt**

To emulate the P32 rising edge analog interrupt the emulator must be modified in the following way:

1. Connect P32 by soldering a wire jumper from either emulation socket (P2, pin 16) or (P1, pin 23) to 74HCT04 U27 pin 1.
2. Connect 74HCT04 U27 pin 2 by soldering a wire jumper from U27 pin 2 to P30 on either emulator socket (P3, pin 25) or (P2, pin 18).

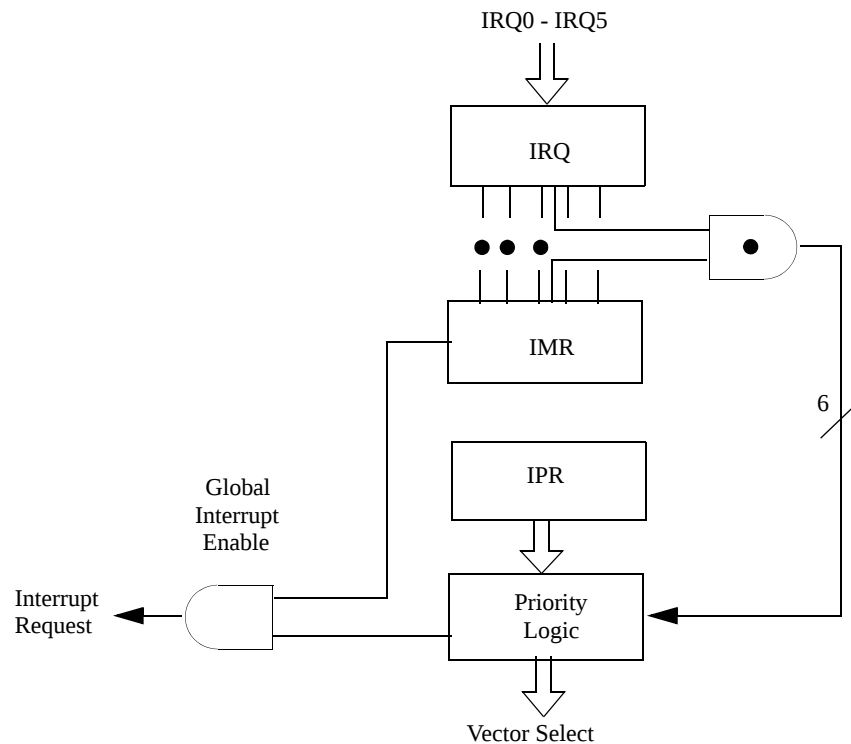
The following routine must be added to the initialization of the device:

|            |              |
|------------|--------------|
| HSWP32AFIX | Push RP      |
|            | LD RP, #0Fh  |
|            | LD R0, #0FFh |
|            | POP RP       |

**Table 15. Interrupt Types, Sources, and Vectors**

| Name | Source    | Vector Location | Comments          |
|------|-----------|-----------------|-------------------|
| IRQ0 | AN2(P32)  | 0,1             | External (F) Edge |
| IRQ1 | REF(P33)  | 2,3             | External (F) Edge |
| IRQ2 | AN1 (P31) | 4,5             | External (F) Edge |
| IRQ3 | AN2 (P32) | 6,7             | External (R) Edge |
| IRQ4 | Software  | 8,9             | Internal          |
| IRQ5 | T1        | 10,11           | Internal          |

Note: Note: F = Falling edge triggered: R = Rising edge triggered



**Figure 17. Interrupt Block Diagram**

## Control Registers

**Table 17. Timer Mode Register, R241 TMR F1h Bank 0h: READ/WRITE**

| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |

Note: R = Read, W = Write

| Bit Position | Bit Field            | R/W | Reset Value | Description                                                                                                                                          |
|--------------|----------------------|-----|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7-6          | Reserved             | R/W | 00          | Reserved-must be 0                                                                                                                                   |
| 5-4          | T <sub>IN</sub> Mode | R/W | 0           | <b>T<sub>IN</sub> Mode</b><br>00: External Clock Input<br>01: Gate Input<br>10: Trigger Input (non retriggeable)<br>11: Trigger Input (retriggeable) |
| 3            | T1 Count             | R/W | 0           | <b>T1 Count</b><br>0: Disable<br>1: Enable                                                                                                           |
| 2            | T1                   | R/W | 0           | <b>T1</b><br>0: No Function<br>1: Load T1                                                                                                            |
| 1-0          | Reserved             | R/W | 0           | Reserved - must be 0                                                                                                                                 |

**Table 18. Counter/Timer 1 Register, R242 T1 F2h Bank 0h: READ/WRITE**

| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | X   | X   | X   | X   | X   | X   | X   | X   |

Note: R = Read, W = Write, X = Indeterminate

| Bit Position | Bit Field | R/W | Reset Value | Description                                               |
|--------------|-----------|-----|-------------|-----------------------------------------------------------|
| 7-0          | T1        | R   | X           | <b>T1 Current Value</b>                                   |
|              |           | W   | X           | <b>T1 Initial Value</b><br>Range = 1-256 decimal; 01h-00h |

**Table 19. Prescaler 1 Register, R243 PRE1 F3h Bank 0h: WRITE ONLY**

| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | X   | X   | X   | X   | X   | X   | X   | X   |

Note: R = Read, W = Write, X = Indeterminate

| Bit Position | Bit Field | R/W | Reset Value | Description                                                                               |
|--------------|-----------|-----|-------------|-------------------------------------------------------------------------------------------|
| 7-2          | Prescaler | W   | X           | <b>Prescaler Modulo</b><br>Range = 1-64 decimal; 01h-00h                                  |
| 1            | Clock     | W   | 0           | <b>Clock Source</b><br>0: T1 External Timing Input (T <sub>IN</sub> ) Mode<br>1: Internal |
| 0            | Count     | W   | 0           | <b>TI Count Mode</b><br>0: Single Pass<br>1: Modulo N                                     |

**Table 20. Port 2 Mode Register, R246 P2M F6h Bank 0h: WRITE ONLY**

| Bit   | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-------|---|---|---|---|---|---|---|---|
| R/W   | W | W | W | W | W | W | W | W |
| Reset | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: W = Write,

| Bit Position | Bit Field | R/W | Reset Value | Description                                                                          |
|--------------|-----------|-----|-------------|--------------------------------------------------------------------------------------|
| 7-0          | P20-P27   | W   | 1           | <b>P20-P27 I/O Definition</b><br>0: Defines bit as Output<br>1: Defines bit as Input |

**Table 24. Interrupt Request Register, R250 IPR FAh Bank 0h: READ/WRITE**

| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |

Note: R = Read, W = Write

| Bit Position | Bit Field | R/W | Reset Value | Description                                                                                          |
|--------------|-----------|-----|-------------|------------------------------------------------------------------------------------------------------|
| 7-6          | Reserved  | R/W | 00          | Reserved-must be 0                                                                                   |
| 5            | IRQ5      | R/W | 0           | <b>Interrupt</b><br>IRQ5 = T1<br>0: No interrupt pending<br>1: Interrupt pending                     |
| 4            | IRQ4      | R/W | 0           | <b>Interrupt</b><br>RQ4 = Software generated<br>0: No interrupt pending<br>1: Interrupt pending      |
| 3            | IRQ3      | R/W | 0           | <b>Interrupt</b><br>RQ3 = P32 Input (rising edge)<br>0: No interrupt pending<br>1: Interrupt pending |
| 2            | IRQ2      | R/W | 0           | <b>Interrupt</b><br>RQ2 = P31 Input<br>0: No interrupt pending<br>1: Interrupt pending               |
| 1            | IRQ1,     | R/W | 0           | <b>Interrupt</b><br>RQ1 = P33 Input<br>0: No interrupt pending<br>1: Interrupt pending               |
| 0            | IRQ0      | R/W | 0           | <b>Interrupt</b><br>RQ0 = P32 Input<br>0: No interrupt pending<br>1: Interrupt pending               |

Note: \*Selecting a Reserved mode causes an undefined operation.



**Table 27. Register Pointer, R253 RP FDh Bank 0h: READ/WRITE**

| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |

Note: R = Read, W= Write

| Bit Position | Bit Field                | R/W | Reset Value | Description              |
|--------------|--------------------------|-----|-------------|--------------------------|
| 7-4          | Working Register Pointer | R/W | 0           | Working Register Pointer |
| 3-0          | Reserved                 | R/W | X           | Reserved-must be 0       |

**Table 28. General-Purpose Register, R254 GPR FEh Bank 0h: READ/WRITE**

| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |

Note: R = Read, W= Write

| Bit Position | Bit Field | R/W | Reset Value | Description              |
|--------------|-----------|-----|-------------|--------------------------|
| 7-0          | Stack     | R/W | 0           | General-Purpose Register |



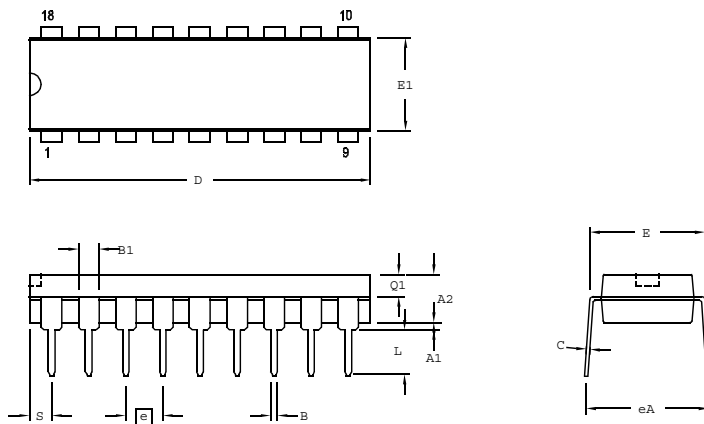
**Table 29. Stack Pointer Low, R255 SPL FFh Bank 0h: READ/WRITE**

|       |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| Bit   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| R/W   | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Reset | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |

Note: R = Read, W= Write

| Bit Position | Bit Field | R/W | Reset Value | Description                        |
|--------------|-----------|-----|-------------|------------------------------------|
| 7-0          | Stack     | R/W | 0           | Stack Pointer Lower Byte (SP0-SP7) |

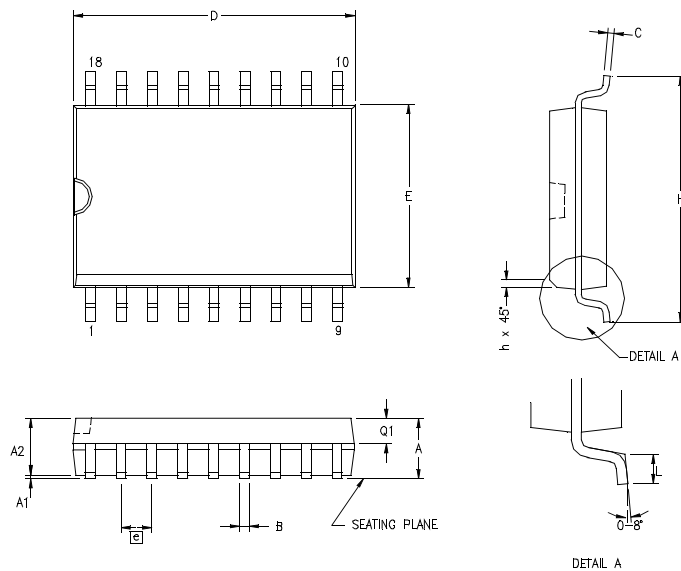
## Package Information



| SYMBOL | MILLIMETER |       | INCH     |       |
|--------|------------|-------|----------|-------|
|        | MIN        | MAX   | MIN      | MAX   |
| A1     | 0.51       | 0.81  | .020     | .032  |
| A2     | 3.25       | 3.43  | .128     | .135  |
| B      | 0.38       | 0.53  | .015     | .021  |
| B1     | 1.14       | 1.65  | .045     | .065  |
| C      | 0.23       | 0.38  | .009     | .015  |
| D      | 22.35      | 23.37 | .880     | .920  |
| E      | 7.62       | 8.13  | .300     | .320  |
| E1     | 6.22       | 6.48  | .245     | .255  |
| e      | 2.54 BSC   |       | .100 BSC |       |
| eA     | 7.87       | 9.40  | .310     | 0.370 |
| L      | 3.18       | 3.81  | .125     | .150  |
| Q1     | 1.47       | 1.65  | .058     | .065  |
| S      | 0.89       | 1.65  | .035     | .065  |

CONTROLLING DIMENSIONS : INCH

Figure 20. 18-Pin DIP Package Diagram



| SYMBOL | MILLIMETER |       | INCH      |       |
|--------|------------|-------|-----------|-------|
|        | MIN        | MAX   | MIN       | MAX   |
| A      | 2.40       | 2.65  | 0.094     | 0.104 |
| A1     | 0.10       | 0.30  | 0.004     | 0.012 |
| A2     | 2.24       | 2.44  | 0.088     | 0.096 |
| B      | 0.36       | 0.46  | 0.014     | 0.018 |
| C      | 0.23       | 0.30  | 0.009     | 0.012 |
| D      | 11.40      | 11.75 | 0.449     | 0.463 |
| E      | 7.40       | 7.60  | 0.291     | 0.299 |
| e      | 1.27 BSC   |       | 0.050 BSC |       |
| H      | 10.00      | 10.65 | 0.394     | 0.419 |
| h      | 0.30       | 0.50  | 0.012     | 0.020 |
| L      | 0.60       | 1.00  | 0.024     | 0.039 |
| Q1     | 0.97       | 1.07  | 0.038     | 0.042 |

CONTROLLING DIMENSIONS : MM  
LEADS ARE COPLANAR WITHIN .004 INCH.

Figure 21. 18-Pin SOIC Package Diagram



For fast results, contact your local ZiLOG Sales offices for assistance in ordering the part(s) required. Contact your local ZiLOG Sales office by navigating to Sales Office on

## Part Number Description

ZiLOG part numbers consist of a number of components. For example, part number Z86E0208PSC1925 is a 8-MHz 18-pin DIP that operates in the -0°C to +70°C temperature range, with Plastic Standard Flow. The Z86E0208PSC1925 part number corresponds to the code segments indicated in the following table.

|    |                        |
|----|------------------------|
| Z  | ZiLOG Prefix           |
| 86 | Z8 Product             |
| E  | OTP Product            |
| 02 | Product Number         |
| 08 | Speed (MHz)            |
| P  | Dual In-line Processor |
| S  | Standard Temperature   |
| C  | Environmental Flow     |

## Document Information

### Document Number Description

The Document Control Number that appears in the footer of each page of this document contains unique identifying attributes, as indicated in the following table:

|      |                          |
|------|--------------------------|
| PS   | Product Specification    |
| 0148 | Unique Document Number   |
| 02   | Revision Number          |
| 0903 | Month and Year Published |



## Customer Feedback Form

### Z86E02 SL1925 Product Specification

If you experience any problems while operating this product, or if you note any inaccuracies while reading this Product Specification, please copy and complete this form, then mail or fax it to ZiLOG (see Return Information, below). We also welcome your suggestions!

### Customer Information

|                |         |
|----------------|---------|
| Name           | Country |
| Company        | Phone   |
| Address        | Fax     |
| City/State/Zip | E-Mail  |

### Product Information

|                                |
|--------------------------------|
| Serial # or Board Fab #/Rev. # |
| Software Version               |
| Document Number                |
| Host Computer Description/Type |

### Return Information

ZiLOG  
532 Race Street  
Campbell, CA 95126-3432  
Fax: (408) 558-8536  
[www.zilog.com](http://www.zilog.com)

### Problem Description or Suggestion

Please provide a complete description of the problem or suggestion. If you are reporting a specific problem, include all steps leading up to the occurrence of the problem. Attach additional pages as necessary.