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

Details

Product Status	Obsolete
Core Processor	Z8
Core Size	8-Bit
Speed	8MHz
Connectivity	-
Peripherals	HLVD, POR, WDT
Number of I/O	24
Program Memory Size	8KB (8K x 8)
Program Memory Type	OTP
EEPROM Size	-
RAM Size	237 x 8
Voltage - Supply (Vcc/Vdd)	2V ~ 5.5V
Data Converters	-
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	28-SSOP (0.209", 5.30mm Width)
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/zilog/zgp323heh2808c



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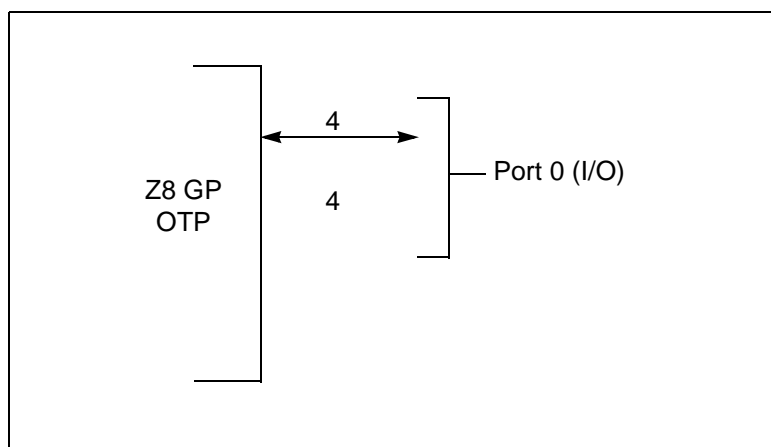
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OTP Programming
— Option

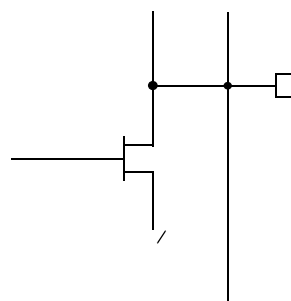


Figure 9. Port 0 Configuration

Port 1 (P17–P10)

Port 1 (see Figure 10) Port 1 can be configured for standard port input or output mode. After POR, Port 1 is configured as an input port. The output drivers are either push-pull or open-drain and are controlled by bit D1 in the PCON register.

The Port 1 direction is reset to its default state following an SMR.

The upper nibble of the register pointer (see Figure 16) selects which working register group, of 16 bytes in the register file, is accessed out of the possible 256. The lower nibble selects the expanded register file bank and, in the case of the Z8 GP family, banks 0, F, and D are implemented. A 0H in the lower nibble allows the normal register file (bank 0) to be addressed. Any other value from 1H to FH exchanges the lower 16 registers to an expanded register bank.

R253 RP

D7	D6	D5	D4	D3	D2	D1	D0
----	----	----	----	----	----	----	----

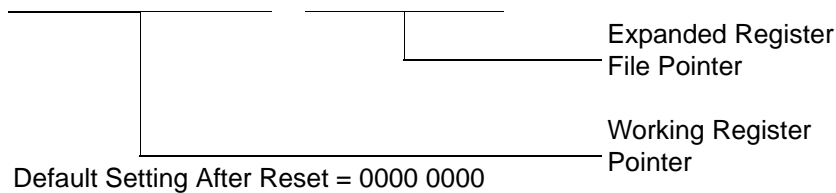


Figure 16. Register Pointer

Example: Z8 GP: (See Figure 15 on page 28)

R253 RP = 00h

R0 = Port 0

R1 = Port 1

R2 = Port 2

R3 = Port 3

But if:

R253 RP = 0Dh

R0 = CTR0

R1 = CTR1

R2 = CTR2

R3 = Reserved

Table 15. CTR0(D)00H Counter/Timer8 Control Register (Continued)

Field	Bit Position		Value	Description
Counter_INT_Mask	-----1-	R/W	0**	Disable Time-Out Interrupt
			1	Enable Time-Out Interrupt
P34_Out	-----0	R/W	0*	P34 as Port Output
			1	T8 Output on P34

Note:

*Indicates the value upon Power-On Reset.

**Indicates the value upon Power-On Reset. Not reset with a Stop Mode recovery.

T8 Enable

This field enables T8 when set (written) to 1.

Single/Modulo-N

When set to 0 (Modulo-N), the counter reloads the initial value when the terminal count is reached. When set to 1 (single-pass), the counter stops when the terminal count is reached.

Timeout

This bit is set when T8 times out (terminal count reached). To reset this bit, write a 1 to its location.



Caution: Writing a 1 is the only way to reset the Terminal Count status condition. Reset this bit before using/enabling the counter/timers.

The first clock of T8 might not have complete clock width and can occur any time when enabled.



Note: Take care when using the OR or AND commands to manipulate CTR0, bit 5 and CTR1, bits 0 and 1 (Demodulation Mode). These instructions use a Read-Modify-Write sequence in which the current status from the CTR0 and CTR1 registers is ORed or ANDed with the designated value and then written back into the registers.

T8 Clock

This bit defines the frequency of the input signal to T8.



Table 17. CTR2(D)02H: Counter/Timer16 Control Register

Field	Bit Position		Value	Description
T16_Enable	7-----	R	0*	Counter Disabled
			1	Counter Enabled
		W	0	Stop Counter
			1	Enable Counter
Single/Modulo-N	-6-----	R/W	0*	Transmit Mode
			1	Modulo-N
			0	Single Pass
			1	Demodulation Mode
Time_Out	--5-----	R	0*	T16 Recognizes Edge
			1	T16 Does Not Recognize Edge
		W	0	No Counter Timeout
			1	Counter Timeout Occurred
T16_Clock	---43---	R/W	00**	No Effect
			01	Reset Flag to 0
			10	SCLK
			11	SCLK/2
Capture_INT_Mask	-----2--	R/W	0**	SCLK/4
			1	SCLK/8
Counter_INT_Mask	-----1-	R/W	0*	Disable Data Capture Int.
			1	Enable Data Capture Int.
P35_Out	-----0	R/W	0*	Disable Timeout Int.
			1	Enable Timeout Int.

Note:

*Indicates the value upon Power-On Reset.

**Indicates the value upon Power-On Reset. Not reset with a Stop Mode recovery.

T16_Enable

This field enables T16 when set to 1.

Single/Modulo-N

In TRANSMIT Mode, when set to 0, the counter reloads the initial value when it reaches the terminal count. When set to 1, the counter stops when the terminal count is reached.



Caution:

Do not load these registers at the time the values are to be loaded into the counter/timer to ensure known operation. An initial count of 1 is not allowed. An initial count of 0 causes T16 to count from 0 to FFFFH to FFFE_H. Transition from 0 to FFFF_H is not a timeout condition.

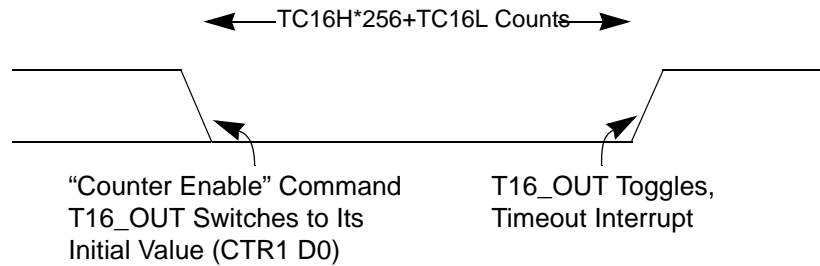


Figure 26. T16_OUT in Single-Pass Mode

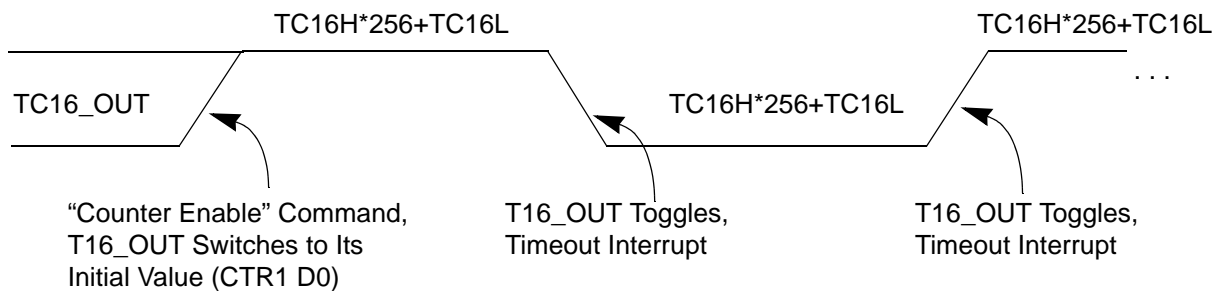


Figure 27. T16_OUT in Modulo-N Mode

T16 DEMODULATION Mode

The user must program TC16L and TC16H to FF_H. After T16 is enabled, and the first edge (rising, falling, or both depending on CTR1 D5; D4) is detected, T16 captures HI16 and LO16, reloads, and begins counting.

If D6 of CTR2 Is 0

When a subsequent edge (rising, falling, or both depending on CTR1, D5; D4) is detected during counting, the current count in T16 is complemented and put into HI16 and LO16. When data is captured, one of the edge detect status bits (CTR1, D1; D0) is set, and an interrupt is generated if enabled (CTR2, D2). T16 is loaded with FFFF_H and starts again.

This T16 mode is generally used to measure space time, the length of time between bursts of carrier signal (marks).

If D6 of CTR2 Is 1

T16 ignores the subsequent edges in the input signal and continues counting down. A timeout of T8 causes T16 to capture its current value and generate an interrupt if enabled (CTR2, D2). In this case, T16 does not reload and continues counting. If the D6 bit of CTR2 is toggled (by writing a 0 then a 1 to it), T16 captures and reloads on the next edge (rising, falling, or both depending on CTR1, D5; D4), continuing to ignore subsequent edges.

This T16 mode generally measures mark time, the length of an active carrier signal burst.

If T16 reaches 0, T16 continues counting from `FFFFh`. Meanwhile, a status bit (CTR2 D5) is set, and an interrupt timeout can be generated if enabled (CTR2 D1).

Ping-Pong Mode

This operation mode is only valid in TRANSMIT Mode. T8 and T16 must be programmed in Single-Pass mode (CTR0, D6; CTR2, D6), and Ping-Pong mode must be programmed in CTR1, D3; D2. The user can begin the operation by enabling either T8 or T16 (CTR0, D7 or CTR2, D7). For example, if T8 is enabled, T8_OUT is set to this initial value (CTR1, D1). According to T8_OUT's level, TC8H or TC8L is loaded into T8. After the terminal count is reached, T8 is disabled, and T16 is enabled. T16_OUT then switches to its initial value (CTR1, D0), data from TC16H and TC16L is loaded, and T16 starts to count. After T16 reaches the terminal count, it stops, T8 is enabled again, repeating the entire cycle. Interrupts can be allowed when T8 or T16 reaches terminal control (CTR0, D1; CTR2, D1). To stop the ping-pong operation, write 00 to bits D3 and D2 of CTR1. See Figure 28.

- **Note:** Enabling ping-pong operation while the counter/timers are running might cause intermittent counter/timer function. Disable the counter/timers and reset the status flags before instituting this operation.

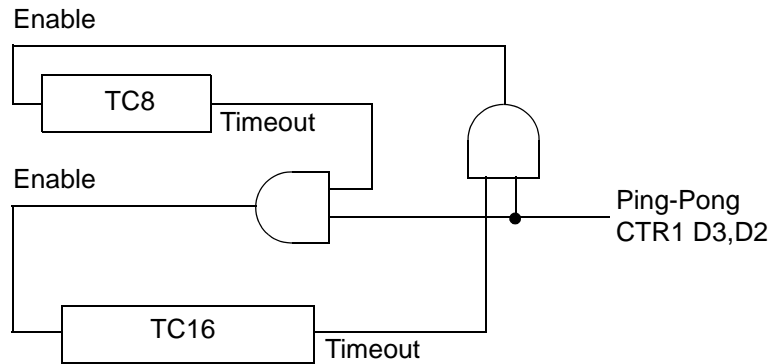


Figure 28. Ping-Pong Mode Diagram

Initiating PING-PONG Mode

First, make sure both counter/timers are not running. Set T8 into Single-Pass mode (CTR0, D6), set T16 into SINGLE-PASS mode (CTR2, D6), and set the Ping-Pong mode (CTR1, D2; D3). These instructions can be in random order. Finally, start PING-PONG mode by enabling either T8 (CTR0, D7) or T16 (CTR2, D7). See Figure 29.

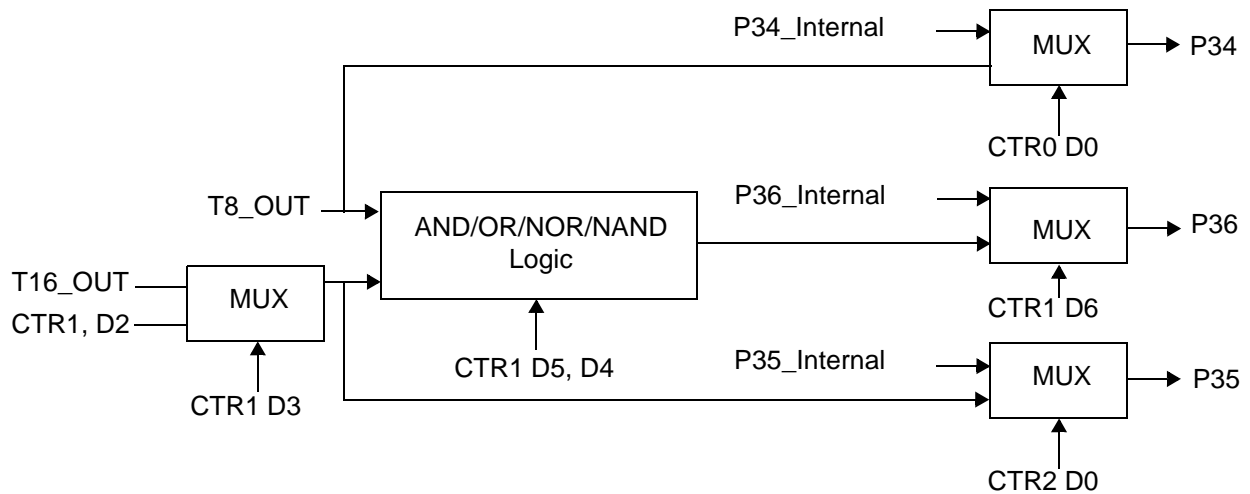


Figure 29. Output Circuit

The initial value of T8 or T16 must not be 1. Stopping the timer and restarting the timer reloads the initial value to avoid an unknown previous value.

```
FF      NOP      ; clear the pipeline
6F      Stop     ; enter Stop Mode
```

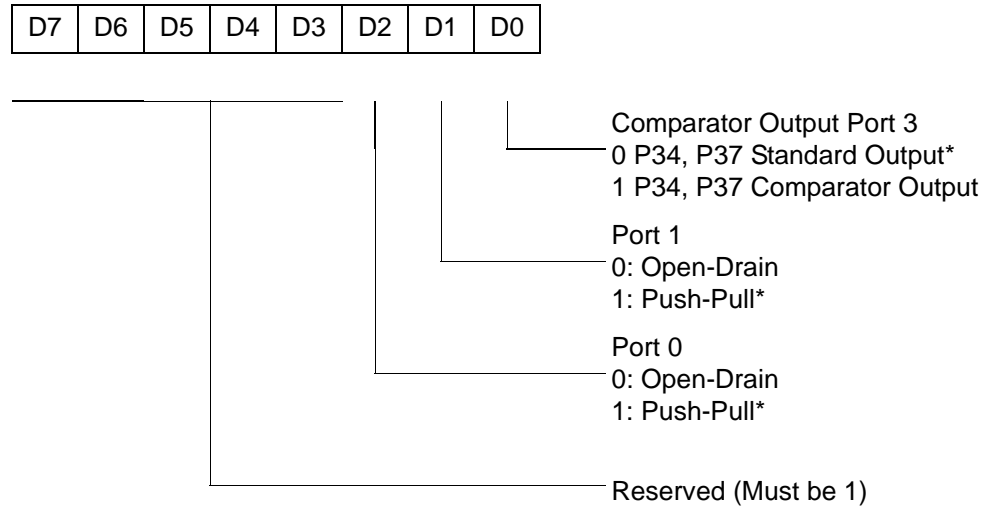
or

```
FF      NOP      ; clear the pipeline
7F      HALT     ; enter HALT Mode
```

Port Configuration Register

The Port Configuration (PCON) register (Figure 32) configures the comparator output on Port 3. It is located in the expanded register 2 at Bank F, location 00.

PCON(FH)00H



* Default setting after reset

Figure 32. Port Configuration Register (PCON) (Write Only)

Comparator Output Port 3 (D0)

Bit 0 controls the comparator used in Port 3. A 1 in this location brings the comparator outputs to P34 and P37, and a 0 releases the Port to its standard I/O configuration.

Port 1 Output Mode (D1)

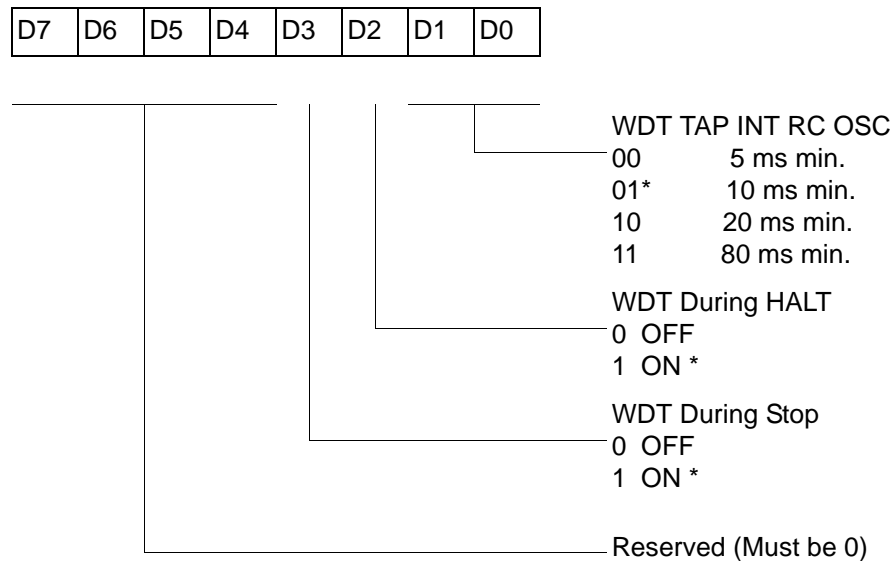
Bit 1 controls the output mode of port 1. A 1 in this location sets the output to push-pull, and a 0 sets the output to open-drain.

Watch-Dog Timer Mode Register (WDTMR)

The Watch-Dog Timer (WDT) is a retriggerable one-shot timer that resets the Z8[®] CPU if it reaches its terminal count. The WDT must initially be enabled by executing the WDT instruction. On subsequent executions of the WDT instruction, the WDT is refreshed. The WDT circuit is driven by an on-board RC-oscillator. The WDT instruction affects the Zero (Z), Sign (S), and Overflow (V) flags.

The POR clock source the internal RC-oscillator. Bits 0 and 1 of the WDT register control a tap circuit that determines the minimum timeout period. Bit 2 determines whether the WDT is active during HALT, and Bit 3 determines WDT activity during Stop. Bits 4 through 7 are reserved (Figure 37). This register is accessible only during the first 60 processor cycles (120 XTAL clocks) from the execution of the first instruction after Power-On-Reset, Watch-Dog Reset, or a Stop-Mode Recovery (Figure 36). After this point, the register cannot be modified by any means (intentional or otherwise). The WDTMR cannot be read. The register is located in Bank F of the Expanded Register Group at address location 0Fh. It is organized as shown in Figure 37.

WDTMR(0F)0Fh



* Default setting after reset

Figure 37. Watch-Dog Timer Mode Register (Write Only)

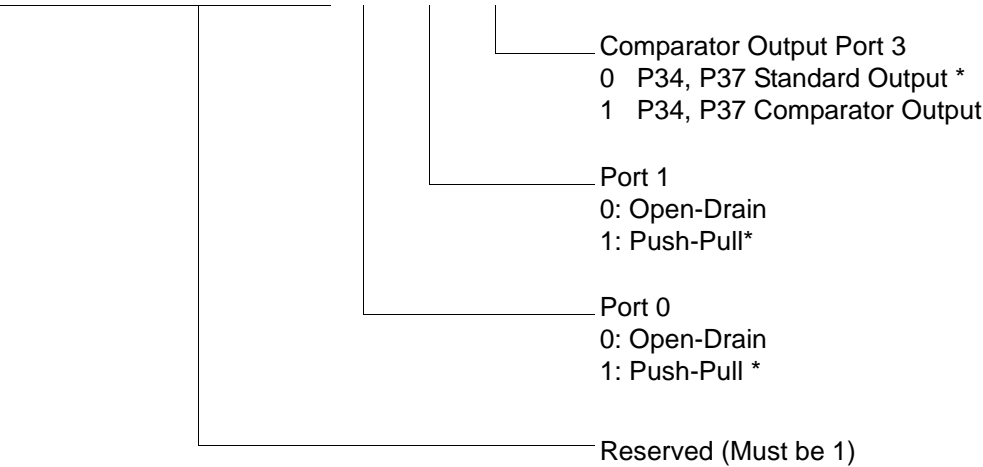
WDT Time Select (D0, D1)

This bit selects the WDT time period. It is configured as indicated in Table 23.



PCON(0F)00H

D7	D6	D5	D4	D3	D2	D1	D0
----	----	----	----	----	----	----	----

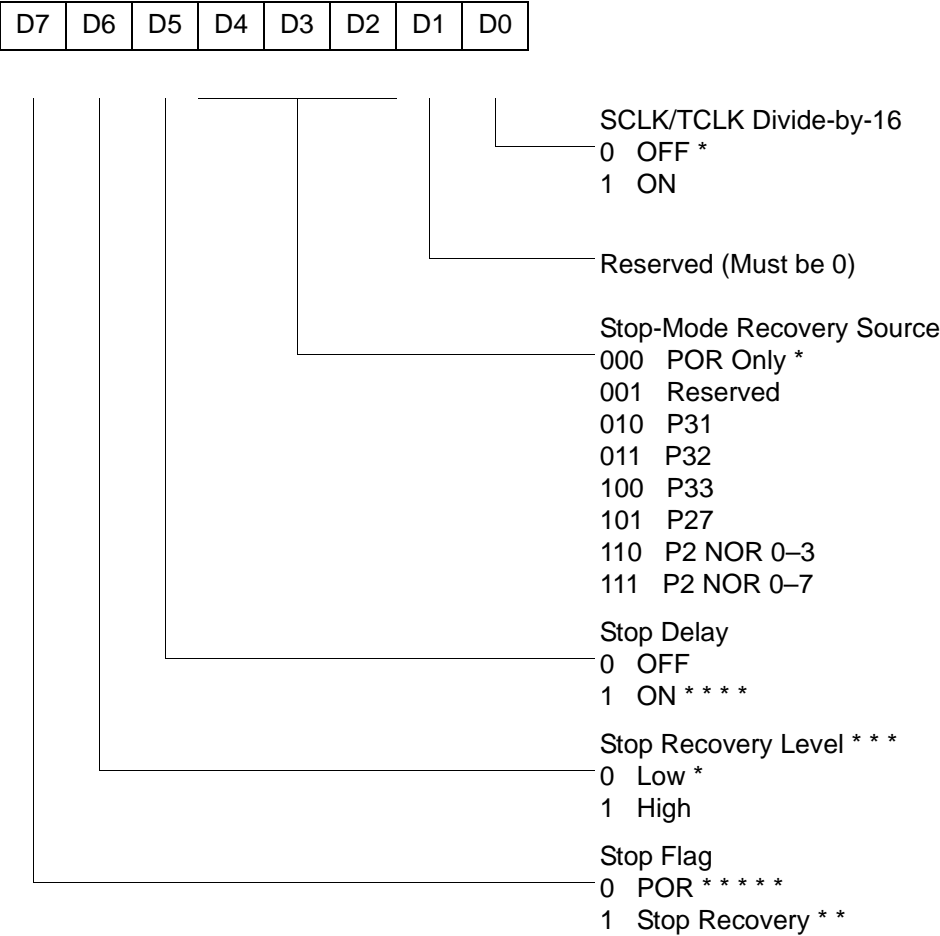


* Default setting after reset

Figure 44. Port Configuration Register (PCON)(0F)00H: Write Only)



SMR(0F)0BH



- * Default setting after reset
- * * Set after Stop Mode Recovery
- * * * At the XOR gate input
- * * * * Default setting after reset. Must be 1 if using a crystal or resonator clock source.
- * * * * * Default setting after Power On Reset. Not reset with a Stop Mode recovery.

Figure 45. Stop Mode Recovery Register ((0F)0BH: D6–D0=Write Only, D7=Read Only)

- pin 4
- E
- EPROM
 - selectable options 64
- expanded register file 26
- expanded register file architecture 28
- expanded register file control registers 71
 - flag 80
 - interrupt mask register 79
 - interrupt priority register 78
 - interrupt request register 79
 - port 0 and 1 mode register 77
 - port 2 configuration register 75
 - port 3 mode register 76
 - port configuration register 75
 - register pointer 80
 - stack pointer high register 81
 - stack pointer low register 81
 - stop-mode recovery register 73
 - stop-mode recovery register 2 74
 - T16 control register 69
 - T8 and T16 common control functions register 67
 - T8/T16 control register 70
 - TC8 control register 66
 - watch-dog timer register 75
- F
- features
 - standby modes 1
- functional description
 - counter/timer functional blocks 40
 - CTR(D)01h register 35
 - CTR0(D)00h register 33
 - CTR2(D)02h register 37
 - CTR3(D)03h register 39
 - expanded register file 26
 - expanded register file architecture 28
 - HI16(D)09h register 32
 - HI8(D)0Bh register 32
 - L08(D)0Ah register 32
 - L0I6(D)08h register 32
 - program memory map 26
 - RAM 25
 - register description 65
 - register file 30
 - register pointer 29
 - register pointer detail 31
 - SMR2(F)0D1h register 40
 - stack 31
 - TC16H(D)07h register 32
 - TC16L(D)06h register 33
 - TC8H(D)05h register 33
 - TC8L(D)04h register 33
- G
- glitch filter circuitry 40
- H
- halt instruction, counter/timer 54
- I
- input circuit 40
- interrupt block diagram, counter/timer 51
- interrupt types, sources and vectors 52
- L
- low-voltage detection register 65
- M
- memory, program 25
- modulo-N mode
 - T16_OUT 47
 - T8_OUT 43
- O
- oscillator configuration 53
- output circuit, counter/timer 49
- P
- package information
 - 20-pin DIP package diagram 82
 - 20-pin SSOP package diagram 84
 - 28-pin DIP package diagram 86
 - 28-pin SOIC package diagram 85
 - 28-pin SSOP package diagram 87
 - 40-pin DIP package diagram 87
 - 48-pin SSOP package diagram 89
- pin configuration
 - 20-pin DIP/SOIC/SSOP 5