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"[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	HLVD, POR, WDT
Number of I/O	32
Program Memory Size	4KB (4K 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	0°C ~ 70°C (TA)
Mounting Type	Through Hole
Package / Case	40-DIP (0.620", 15.75mm)
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/zilog/zgp323hsp4004g



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- Port 1: 0–3 pull-up transistors
- Port 1: 4–7 pull-up transistors
- Port 2: 0–7 pull-up transistors
- EPROM Protection
- WDT enabled at POR

General Description

The ZGP323H is an OTP-based member of the MCU family of infrared microcontrollers. With 237B of general-purpose RAM and up to 32KB of OTP, ZiLOG[®]'s CMOS microcontrollers offer fast-executing, efficient use of memory, sophisticated interrupts, input/output bit manipulation capabilities, automated pulse generation/reception, and internal key-scan pull-up transistors.

The ZGP323H architecture (Figure 1) is based on ZiLOG's 8-bit microcontroller core with an Expanded Register File allowing access to register-mapped peripherals, input/output (I/O) circuits, and powerful counter/timer circuitry. The Z8[®] offers a flexible I/O scheme, an efficient register and address space structure, and a number of ancillary features that are useful in many consumer, automotive, computer peripheral, and battery-operated hand-held applications.

There are three basic address spaces available to support a wide range of configurations: Program Memory, Register File and Expanded Register File. The register file is composed of 256 Bytes (B) of RAM. It includes 4 I/O port registers, 16 control and status registers, and 236 general-purpose registers. The Expanded Register File consists of two additional register groups (F and D).

To unburden the program from coping with such real-time problems as generating complex waveforms or receiving and demodulating complex waveform/pulses, the Z8 GP OTP offers a new intelligent counter/timer architecture with 8-bit and 16-bit counter/timers (see Figure 2). Also included are a large number of user-selectable modes and two on-board comparators to process analog signals with separate reference voltages.

► **Note:** All signals with an overline, " $\overline{}$ ", are active Low. For example, $\overline{B/W}$, in which WORD is active Low, and $\overline{B/W}$, in which BYTE is active Low.

Power connections use the conventional descriptions listed in Table 3.

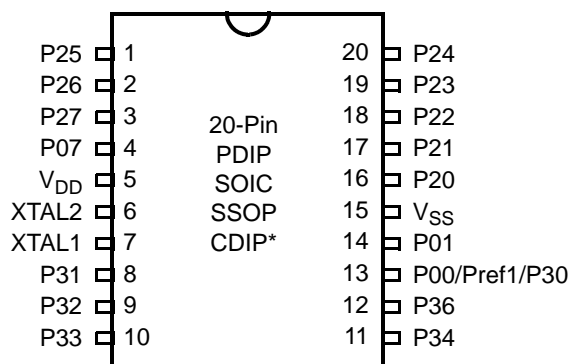


Figure 3. 20-Pin PDIP/SOIC/SSOP/CDIP* Pin Configuration

Table 4. 20-Pin PDIP/SOIC/SSOP/CDIP* Pin Identification

Pin #	Symbol	Function	Direction
1–3	P25–P27	Port 2, Bits 5,6,7	Input/Output
4	P07	Port 0, Bit 7	Input/Output
5	V _{DD}	Power Supply	
6	XTAL2	Crystal Oscillator Clock	Output
7	XTAL1	Crystal Oscillator Clock	Input
8–10	P31–P33	Port 3, Bits 1,2,3	Input
11,12	P34. P36	Port 3, Bits 4,6	Output
13	P00/Pref1/P30	Port 0, Bit 0/Analog reference input Port 3 Bit 0	Input/Output for P00 Input for Pref1/P30
14	P01	Port 0, Bit 1	Input/Output
15	V _{SS}	Ground	
16–20	P20–P24	Port 2, Bits 0,1,2,3,4	Input/Output

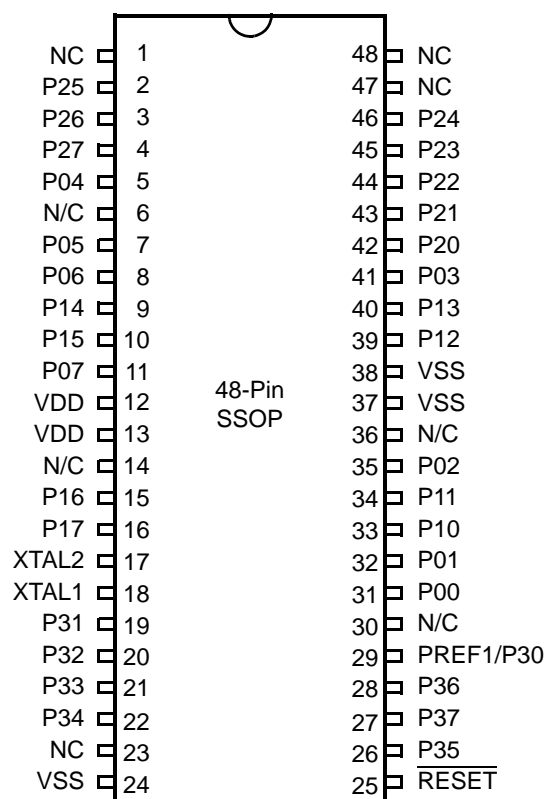


Figure 6. 48-Pin SSOP Pin Configuration

Table 6. 40- and 48-Pin Configuration

40-Pin PDIP #	48-Pin SSOP #	Symbol
26	31	P00
27	32	P01
30	35	P02
34	41	P03
5	5	P04
6	7	P05
7	8	P06
10	11	P07
28	33	P10
29	34	P11
32	39	P12

Capacitance

Table 8 lists the capacitances.

Table 8. Capacitance

Parameter	Maximum
Input capacitance	12pF
Output capacitance	12pF
I/O capacitance	12pF
Note: $T_A = 25^\circ\text{C}$, $V_{CC} = \text{GND} = 0\text{V}$, $f = 1.0\text{MHz}$, unmeasured pins returned to GND	

DC Characteristics

Table 9. GP323HS DC Characteristics

Symbol	Parameter	V_{CC}	$T_A = 0^\circ\text{C to } +70^\circ\text{C}$			Units	Conditions	Notes
			Min	Typ(7)	Max			
V_{CC}	Supply Voltage		2.0		5.5	V	See Note 5	5
V_{CH}	Clock Input High Voltage	2.0-5.5	$0.8 V_{CC}$		$V_{CC}+0.3$	V	Driven by External Clock Generator	
V_{CL}	Clock Input Low Voltage	2.0-5.5	$V_{SS}-0.3$		0.4	V	Driven by External Clock Generator	
V_{IH}	Input High Voltage	2.0-5.5	$0.7 V_{CC}$		$V_{CC}+0.3$	V		
V_{IL}	Input Low Voltage	2.0-5.5	$V_{SS}-0.3$		$0.2 V_{CC}$	V		
V_{OH1}	Output High Voltage	2.0-5.5	$V_{CC}-0.4$			V	$I_{OH} = -0.5\text{mA}$	
V_{OH2}	Output High Voltage (P36, P37, P00, P01)	2.0-5.5	$V_{CC}-0.8$			V	$I_{OH} = -7\text{mA}$	
V_{OL1}	Output Low Voltage	2.0-5.5			0.4	V	$I_{OL} = 4.0\text{mA}$	
V_{OL2}	Output Low Voltage (P00, P01, P36, P37)	2.0-5.5			0.8	V	$I_{OL} = 10\text{mA}$	
V_{OFFSET}	Comparator Input Offset Voltage	2.0-5.5			25	mV		
V_{REF}	Comparator Reference Voltage	2.0-5.5	0		V_{CC} 1.75	V		
I_{IL}	Input Leakage	2.0-5.5	-1		1	μA	$V_{IN} = 0\text{V}$, V_{CC} Pull-ups disabled	
R_{PU}	Pull-up Resistance	2.0V	225		675	$\text{K}\Omega$	$V_{IN} = 0\text{V}$; Pullups selected by mask option	
		3.6V	75		275	$\text{K}\Omega$		
		5.0V	40		160	$\text{K}\Omega$		

AC Characteristics

Figure 8 and Table 13 describe the Alternating Current (AC) characteristics.

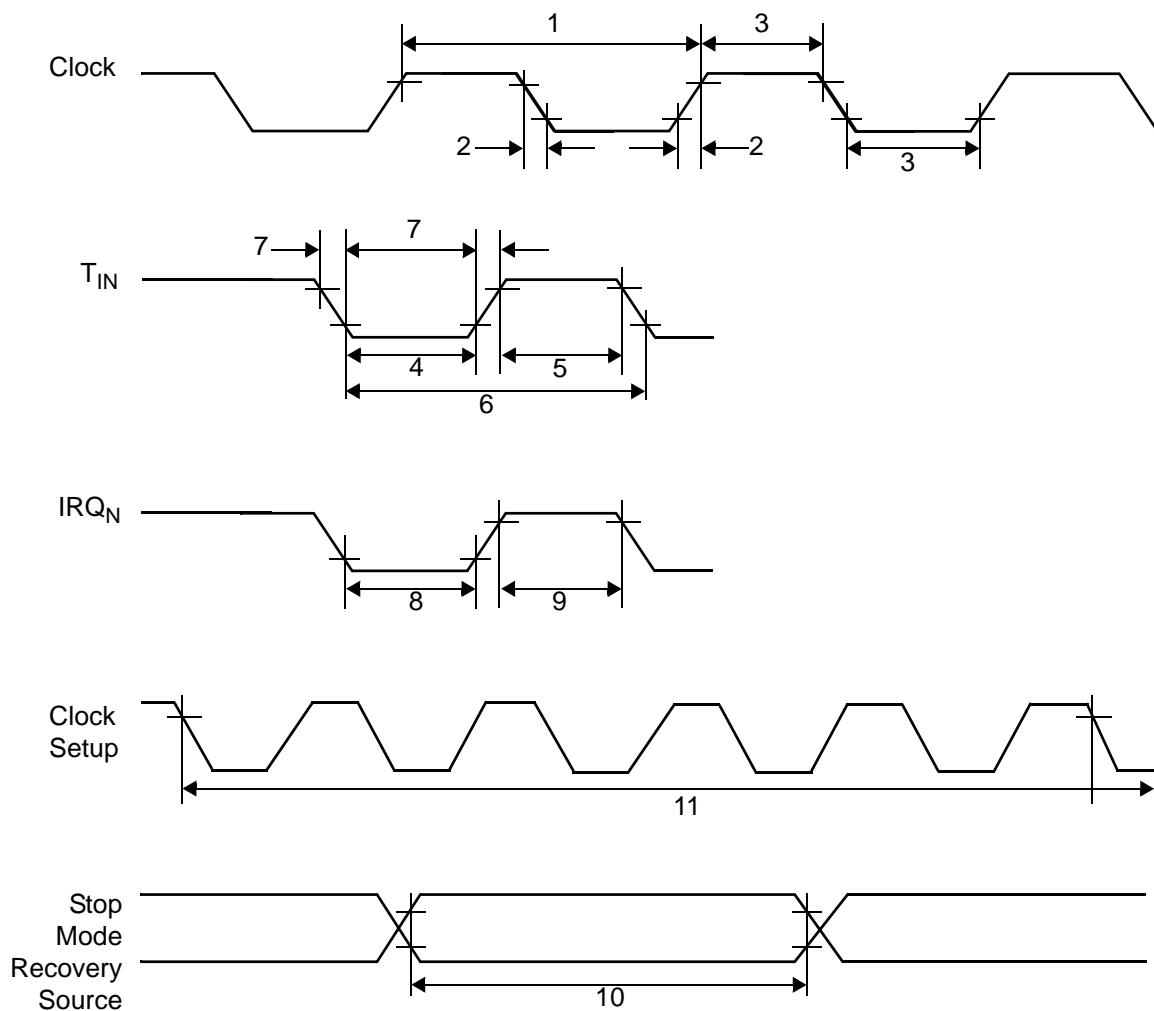


Figure 8. AC Timing Diagram



Pin Functions

XTAL1 Crystal 1 (Time-Based Input)

This pin connects a parallel-resonant crystal or ceramic resonator to the on-chip oscillator input. Additionally, an optional external single-phase clock can be coded to the on-chip oscillator input.

XTAL2 Crystal 2 (Time-Based Output)

This pin connects a parallel-resonant crystal or ceramic resonator to the on-chip oscillator output.

Port 0 (P07–P00)

Port 0 is an 8-bit, bidirectional, CMOS-compatible port. These eight I/O lines are configured under software control as a nibble I/O port. The output drivers are push-pull or open-drain controlled by bit D2 in the PCON register.

If one or both nibbles are needed for I/O operation, they must be configured by writing to the Port 0 mode register. After a hardware reset, Port 0 is configured as an input port.

An optional pull-up transistor is available as a mask option on all Port 0 bits with nibble select.

- **Notes:** Internal pull-ups are disabled on any given pin or group of port pins when programmed into output mode.

The Port 0 direction is reset to its default state following an SMR.

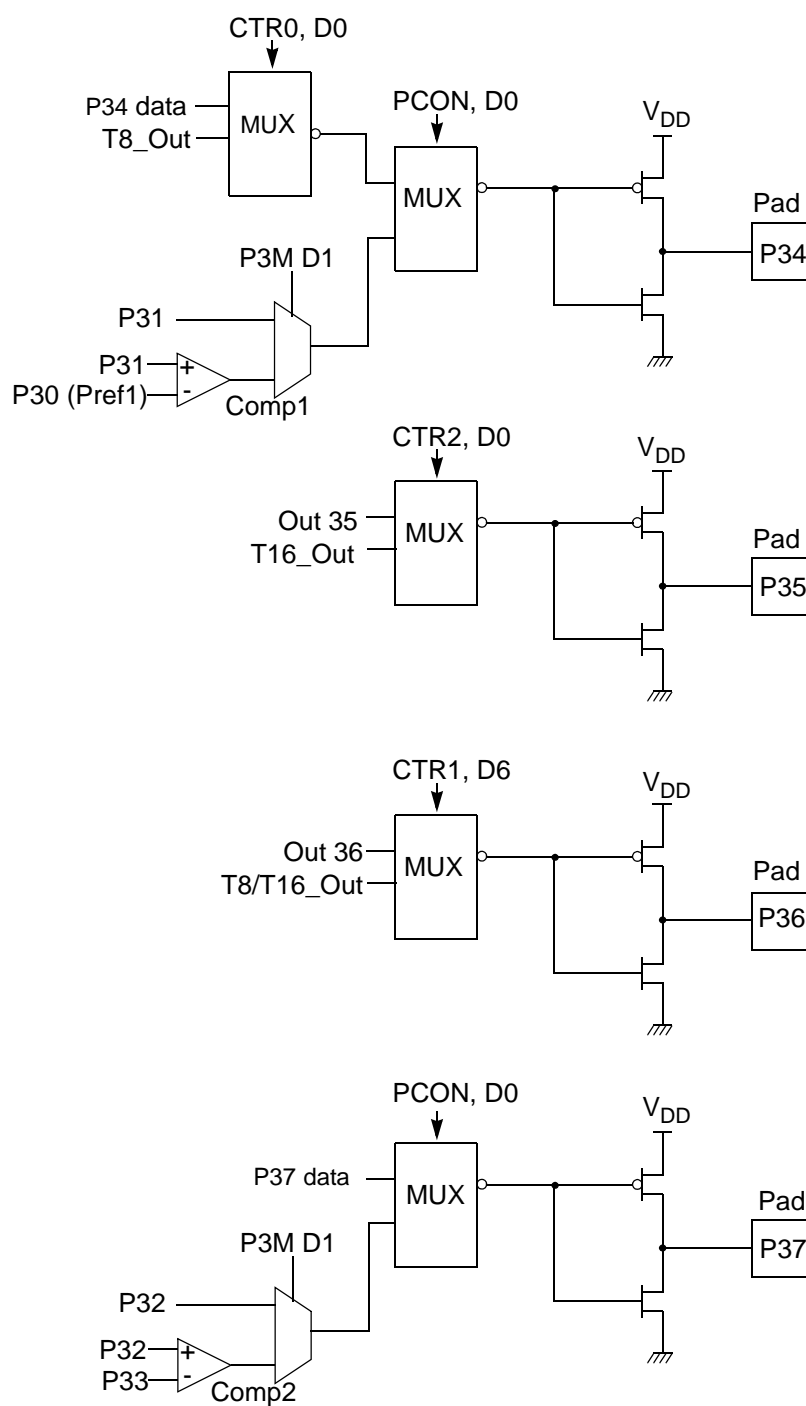


Figure 13. Port 3 Counter/Timer Output Configuration

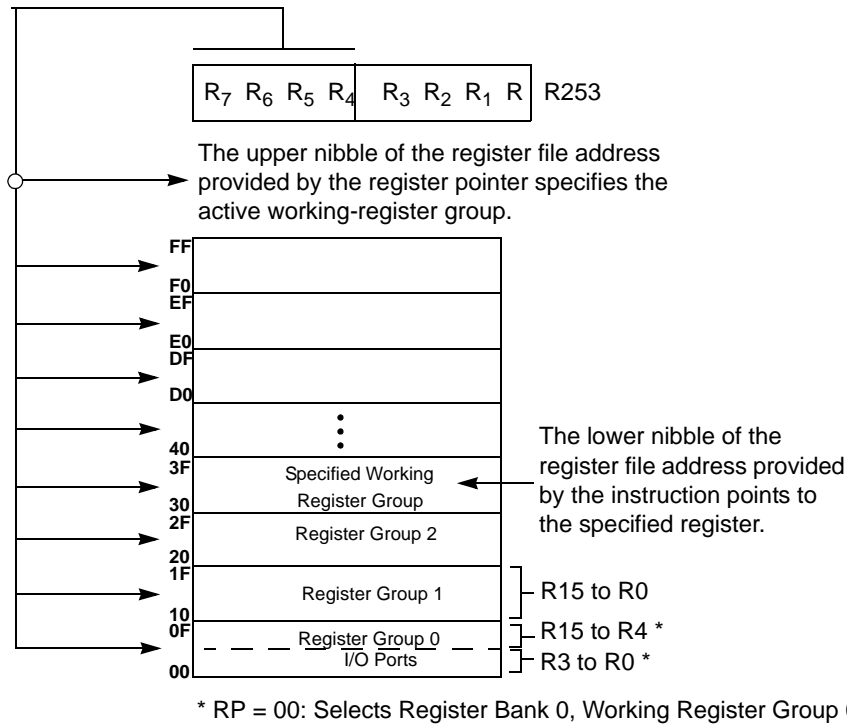


Figure 17. Register Pointer—Detail

Stack

The internal register file is used for the stack. An 8-bit Stack Pointer SPL (R255) is used for the internal stack that resides in the general-purpose registers (R4–R239). SPH (R254) can be used as a general-purpose register.



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.

When T8 is enabled, the output T8_OUT switches to the initial value (CTR1, D1). If the initial value (CTR1, D1) is 0, TC8L is loaded; otherwise, TC8H is loaded into the counter. In SINGLE-PASS Mode (CTR0, D6), T8 counts down to 0 and stops, T8_OUT toggles, the timeout status bit (CTR0, D5) is set, and a timeout interrupt can be generated if it is enabled (CTR0, D1). In Modulo-N Mode, upon reaching terminal count, T8_OUT is toggled, but no interrupt is generated. From that point, T8 loads a new count (if the T8_OUT level now is 0), TC8L is loaded; if it is 1, TC8H is loaded. T8 counts down to 0, toggles T8_OUT, and sets the timeout status bit (CTR0, D5), thereby generating an interrupt if enabled (CTR0, D1). One cycle is thus completed. T8 then loads from TC8H or TC8L according to the T8_OUT level and repeats the cycle. See Figure 20.

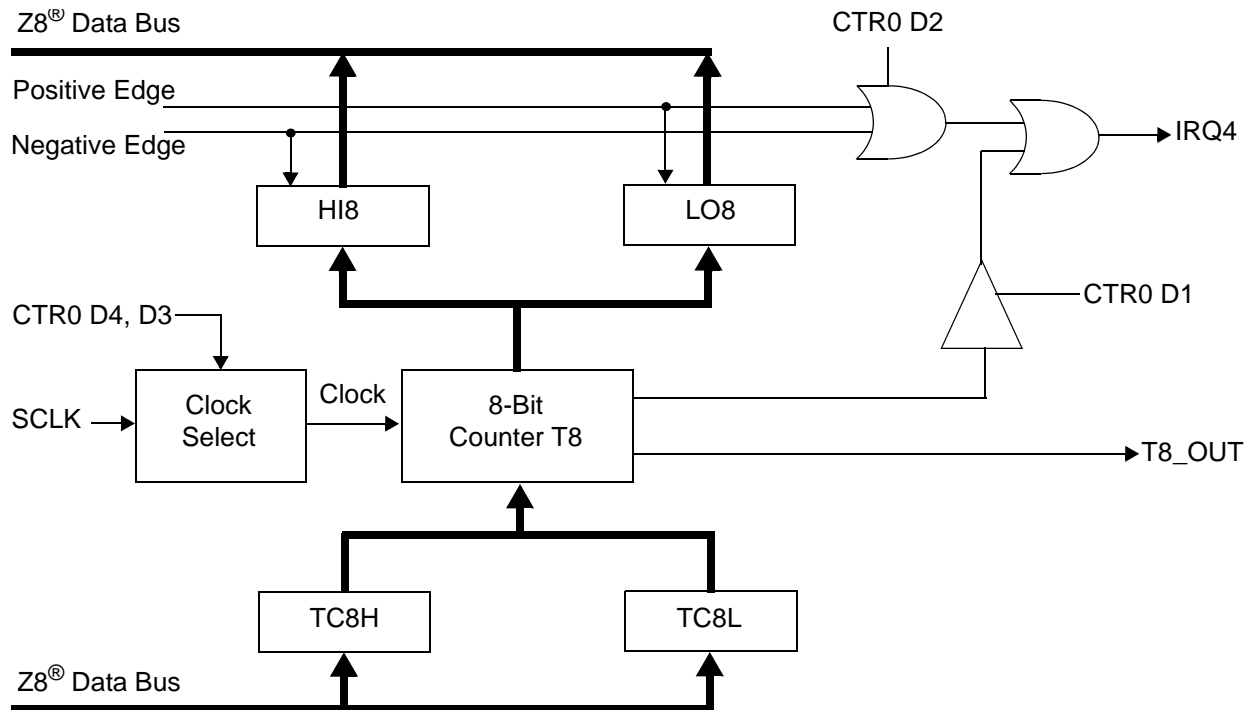


Figure 20. 8-Bit Counter/Timer Circuits

You can modify the values in TC8H or TC8L at any time. The new values take effect when they are loaded.



Caution: To ensure known operation do not write these registers at the time the values are to be loaded into the counter/timer. An initial count of 1 is not allowed (a non-function occurs). An initial count of 0 causes TC8 to count from 0 to FFH to FEH.

into LO8; if it is a negative edge, data is put into HI8. From that point, one of the edge detect status bits (CTR1, D1; D0) is set, and an interrupt can be generated if enabled (CTR0, D2). Meanwhile, T8 is loaded with FFh and starts counting again. If T8 reaches 0, the timeout status bit (CTR0, D5) is set, and an interrupt can be generated if enabled (CTR0, D1). T8 then continues counting from FFh (see Figure 23 and Figure 24).

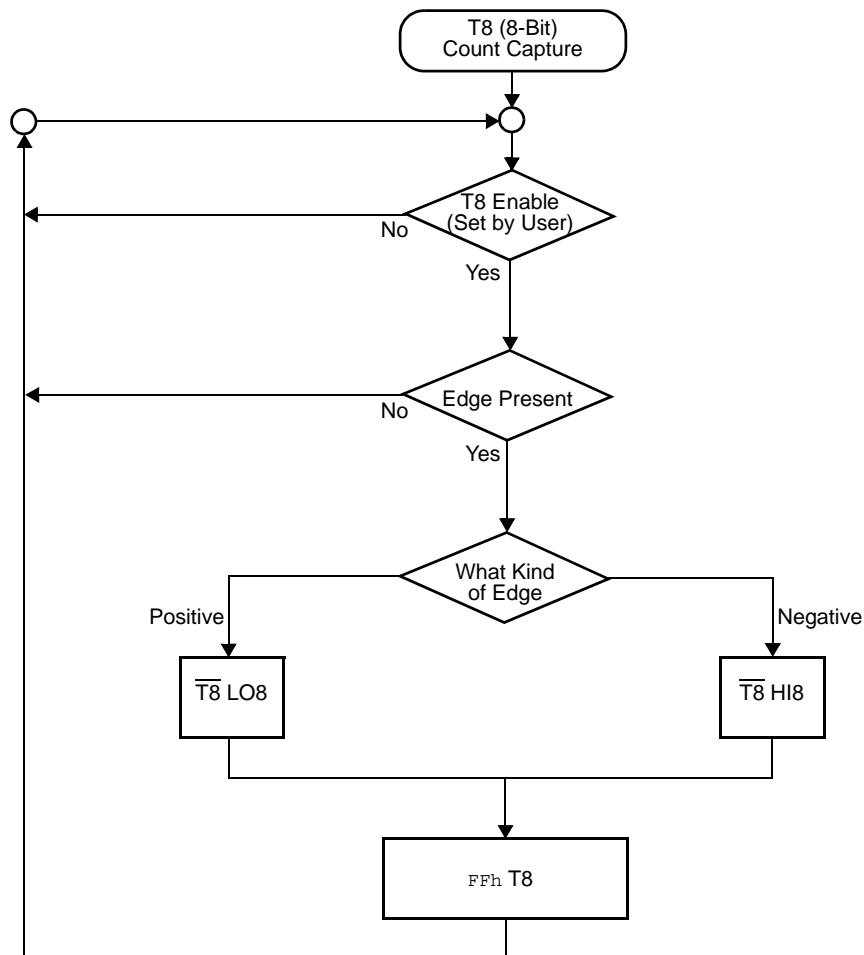


Figure 23. Demodulation Mode Count Capture Flowchart

Clock

The device's on-chip oscillator has a high-gain, parallel-resonant amplifier, for connection to a crystal or ceramic resonator, or any suitable external clock source (XTAL1 = Input, XTAL2 = Output). The crystal must be AT cut, 1 MHz to 8 MHz maximum, with a series resistance (RS) less than or equal to 100 Ω . The on-chip oscillator can be driven with a suitable external clock source.

The crystal must be connected across XTAL1 and XTAL2 using the recommended capacitors (capacitance greater than or equal to 22 pF) from each pin to ground.

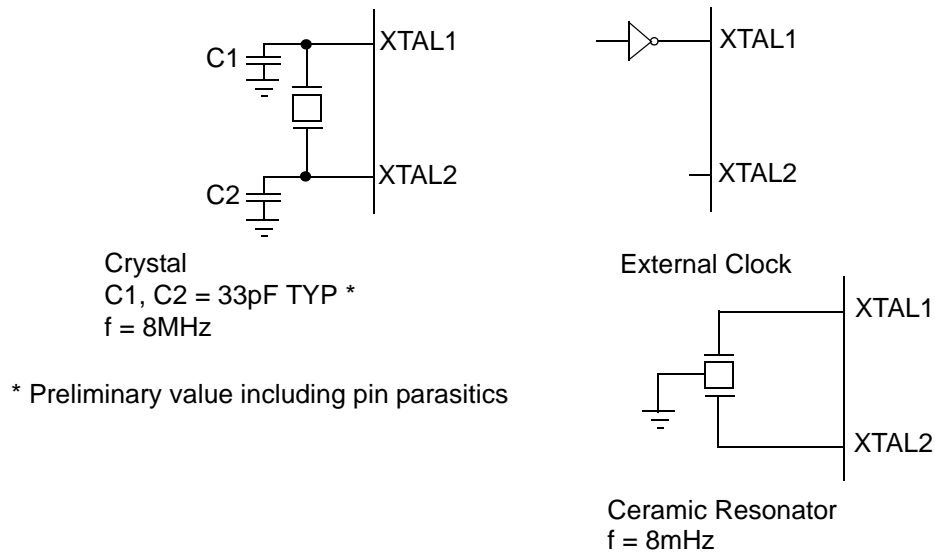


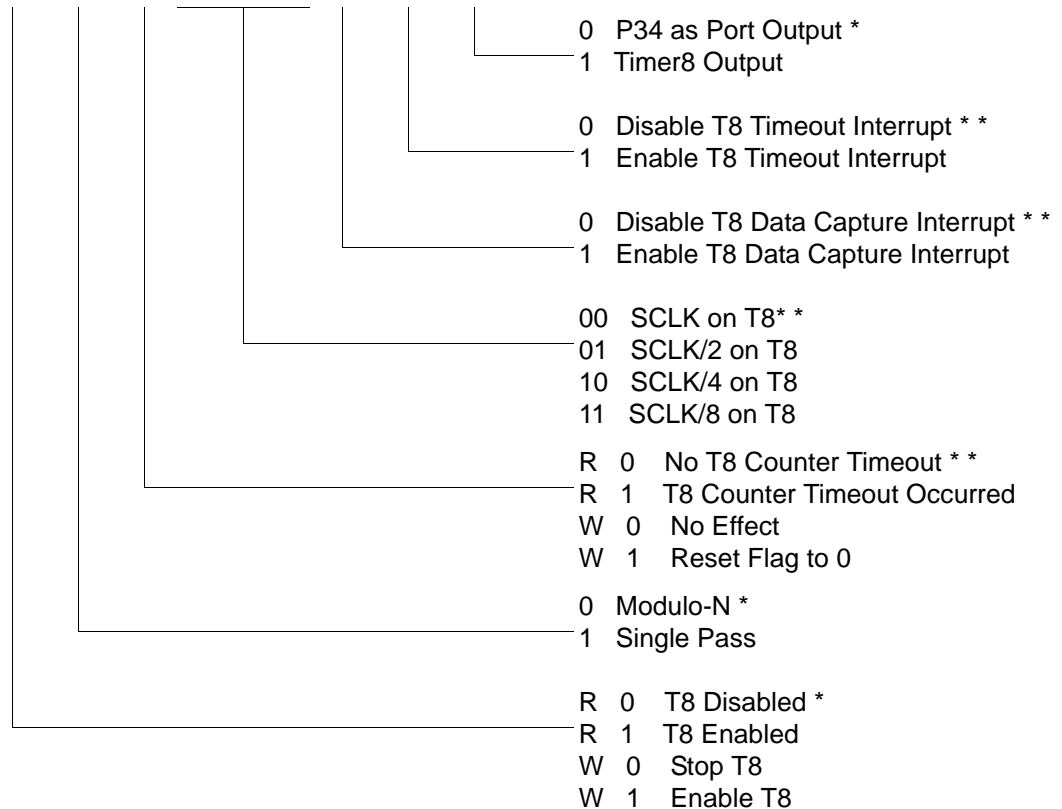
Figure 31. Oscillator Configuration

Expanded Register File Control Registers (0D)

The expanded register file control registers (0D) are depicted in Figure 39 through Figure 43.

CTR0(0D)00H

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



* Default setting after reset.

** Default setting after Reset.. Not reset with a Stop-Mode recovery.

Figure 39. TC8 Control Register ((0D)00H: Read/Write Except Where Noted)

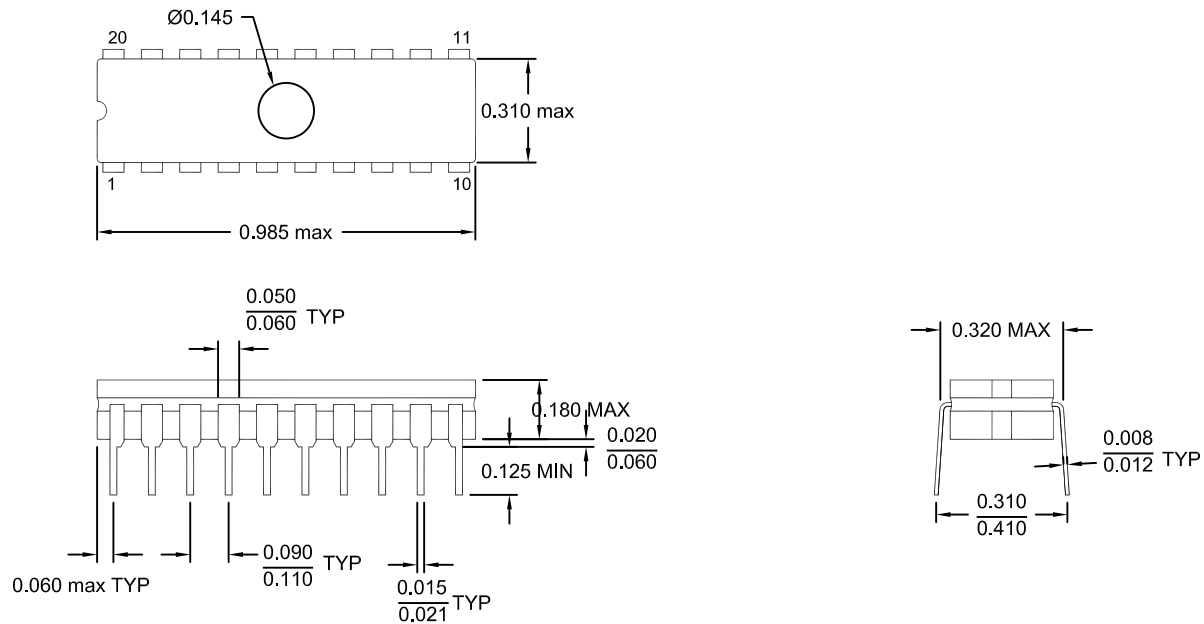


Figure 58. 20-Pin CDIP Package

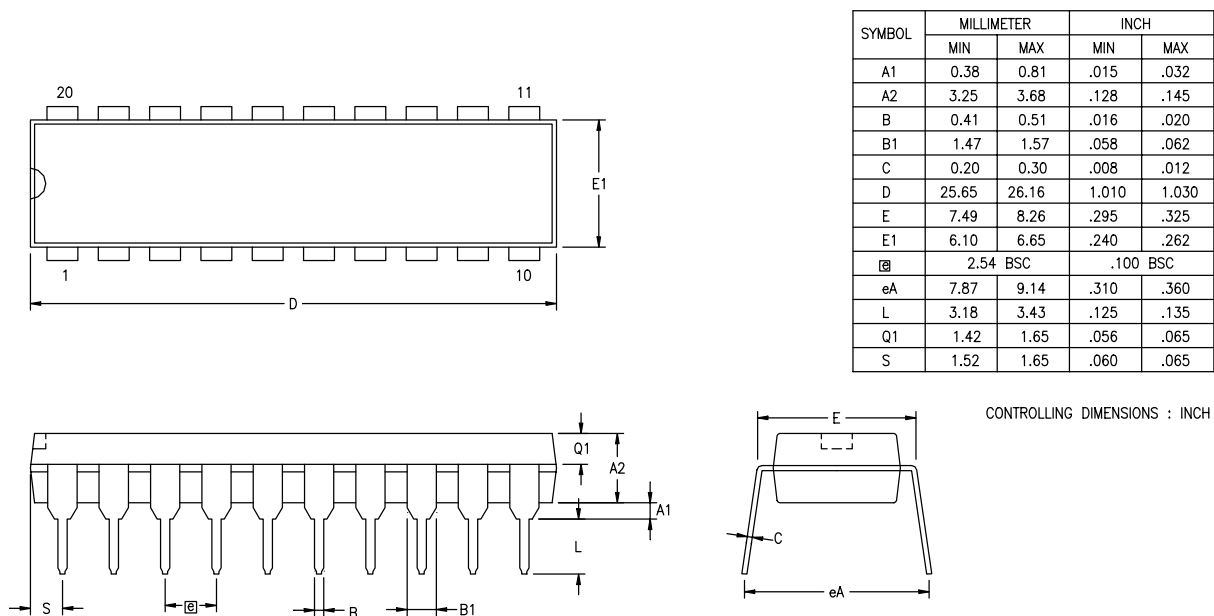


Figure 59. 20-Pin PDIP Package Diagram

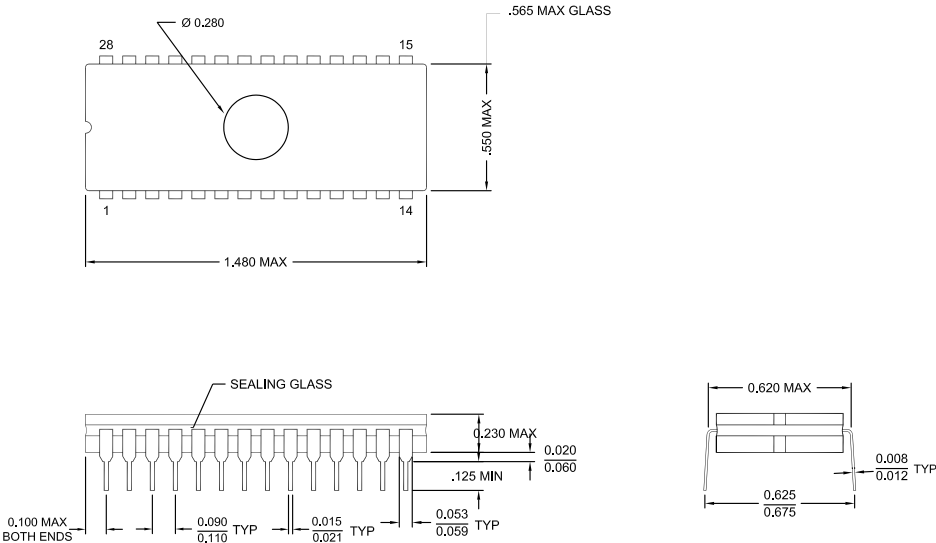
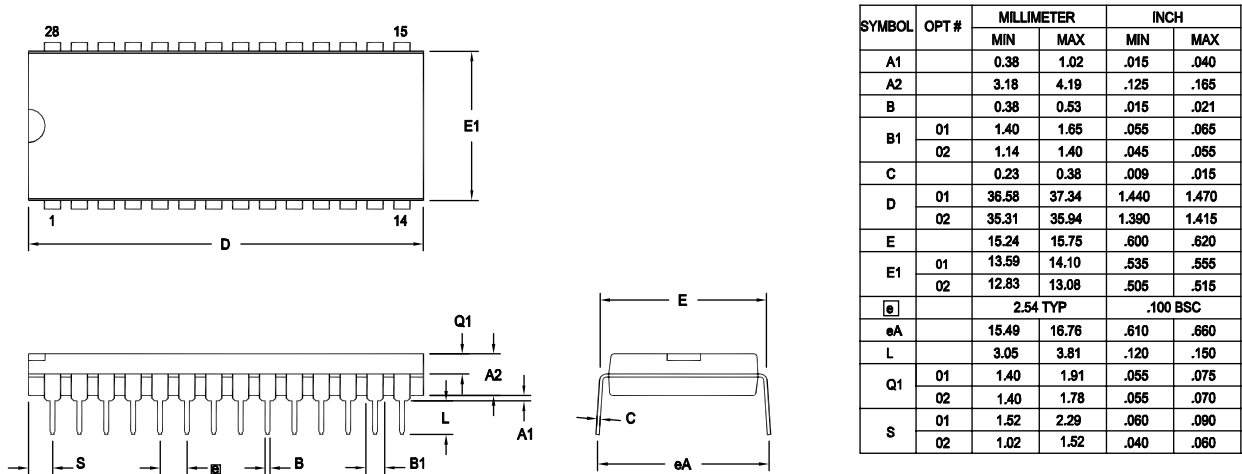


Figure 63. 28-Pin CDIP Package Diagram



CONTROLLING DIMENSIONS : INCH

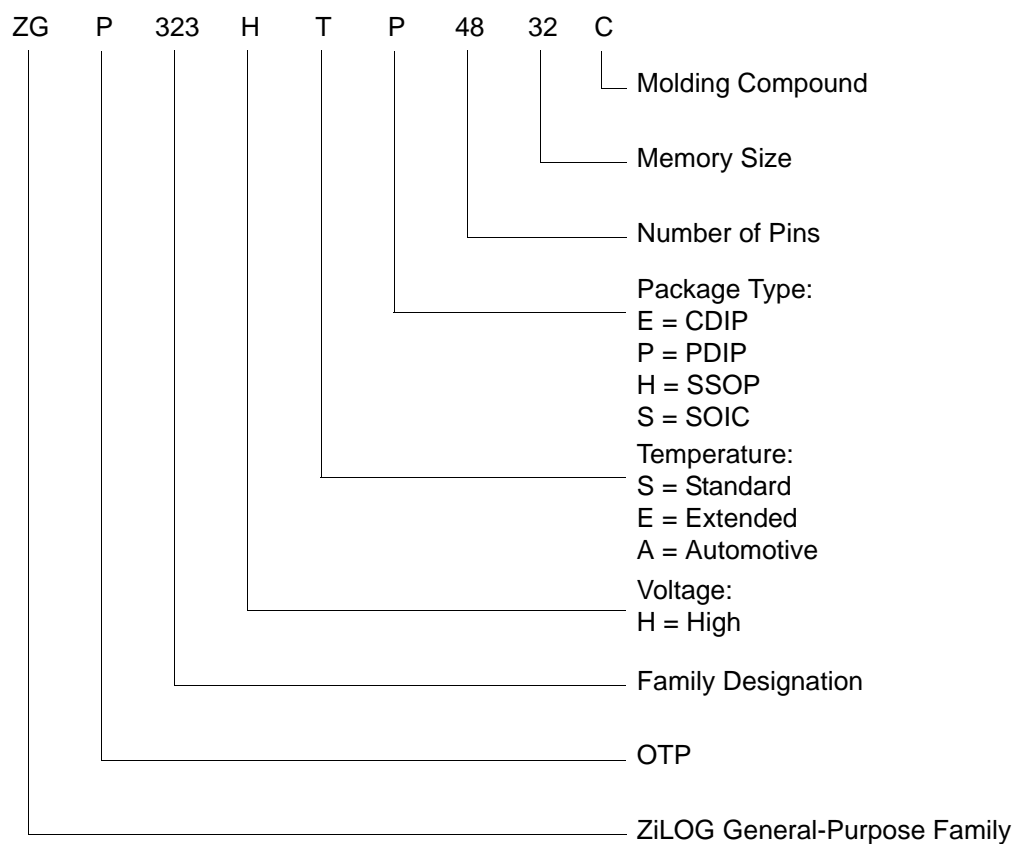
OPTION TABLE	
OPTION #	PACKAGE
01	STANDARD
02	IDF

Note: ZILOG supplies both options for production. Component layout PCB design should cover bigger option 01.

Figure 64. 28-Pin PDIP Package Diagram



Example



- Numerics
 - 16-bit counter/timer circuits 46
 - 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
 - 8-bit counter/timer circuits 42
- A
 - absolute maximum ratings 10
- AC
 - characteristics 16
 - timing diagram 16
- address spaces, basic 2
- architecture 2
 - expanded register file 28
- B
 - basic address spaces 2
- block diagram, ZLP32300 functional 3
- C
 - capacitance 11
 - characteristics
 - AC 16
 - DC 11
 - clock 53
 - comparator inputs/outputs 25
 - configuration
 - port 0 19
 - port 1 20
 - port 2 21
 - port 3 22
 - port 3 counter/timer 24
 - counter/timer
 - 16-bit circuits 46
 - 8-bit circuits 42
 - brown-out voltage/standby 64
 - clock 53
 - demodulation mode count capture flow-
chart 44
 - demodulation mode flowchart 45
 - EPROM selectable options 64
 - glitch filter circuitry 40
 - halt instruction 54
 - input circuit 40
 - interrupt block diagram 51
 - interrupt types, sources and vectors 52
 - oscillator configuration 53
 - output circuit 49
 - ping-pong mode 48
 - port configuration register 55
 - resets and WDT 63
 - SCLK circuit 58
 - stop instruction 54
 - stop mode recovery register 57
 - stop mode recovery register 2 61
 - stop mode recovery source 59
 - T16 demodulation mode 47
 - T16 transmit mode 46
 - T16_OUT in modulo-N mode 47
 - T16_OUT in single-pass mode 47
 - T8 demodulation mode 43
 - T8 transmit mode 40
 - T8_OUT in modulo-N mode 43
 - T8_OUT in single-pass mode 43
 - transmit mode flowchart 41
 - voltage detection and flags 65
 - watch-dog timer mode register 62
 - watch-dog timer time select 63
 - CTR(D)01h T8 and T16 Common Functions 35
- D
 - DC characteristics 11
- demodulation mode
 - count capture flowchart 44
 - flowchart 45
 - T16 47
 - T8 43
- description
 - functional 25
 - general 2

- 28-pin DIP/SOIC/SSOP 6
- 40- and 48-pin 8
- 40-pin DIP 7
- 48-pin SSOP 8
- pin functions
 - port 0 (P07 - P00) 18
 - port 0 (P17 - P10) 19
 - port 0 configuration 19
 - port 1 configuration 20
 - port 2 (P27 - P20) 20
 - port 2 (P37 - P30) 21
 - port 2 configuration 21
 - port 3 configuration 22
 - port 3 counter/timer configuration 24
 - reset) 25
 - XTAL1 (time-based input 18
 - XTAL2 (time-based output) 18
- ping-pong mode 48
- port 0 configuration 19
- port 0 pin function 18
- port 1 configuration 20
- port 1 pin function 19
- port 2 configuration 21
- port 2 pin function 20
- port 3 configuration 22
- port 3 pin function 21
- port 3 counter/timer configuration 24
- port configuration register 55
- power connections 3
- power supply 5
- program memory 25
 - map 26
- R
- ratings, absolute maximum 10
- register 61
 - CTR(D)01h 35
 - CTR0(D)00h 33
 - CTR2(D)02h 37
 - CTR3(D)03h 39
 - flag 80
 - HI16(D)09h 32
 - HI8(D)0Bh 32
 - interrupt priority 78
 - interrupt request 79
 - interruptmask 79
 - L016(D)08h 32
 - L08(D)0Ah 32
 - LVD(D)0Ch 65
 - pointer 80
 - port 0 and 1 77
 - port 2 configuration 75
 - port 3 mode 76
 - port configuration 55, 75
 - SMR2(F)0Dh 40
 - stack pointer high 81
 - stack pointer low 81
 - stop mode recovery 57
 - stop mode recovery 2 61
 - stop-mode recovery 73
 - stop-mode recovery 2 74
 - T16 control 69
 - T8 and T16 common control functions 67
 - T8/T16 control 70
 - TC16H(D)07h 32
 - TC16L(D)06h 33
 - TC8 control 66
 - TC8H(D)05h 33
 - TC8L(D)04h 33
 - voltage detection 71
 - watch-dog timer 75
- register description
 - Counter/Timer2 LS-Byte Hold 33
 - Counter/Timer2 MS-Byte Hold 32
 - Counter/Timer8 Control 33
 - Counter/Timer8 High Hold 33
 - Counter/Timer8 Low Hold 33
 - CTR2 Counter/Timer 16 Control 37
 - CTR3 T8/T16 Control 39
 - Stop Mode Recovery2 40
 - T16_Capture_LO 32
 - T8 and T16 Common functions 35
 - T8_Capture_HI 32