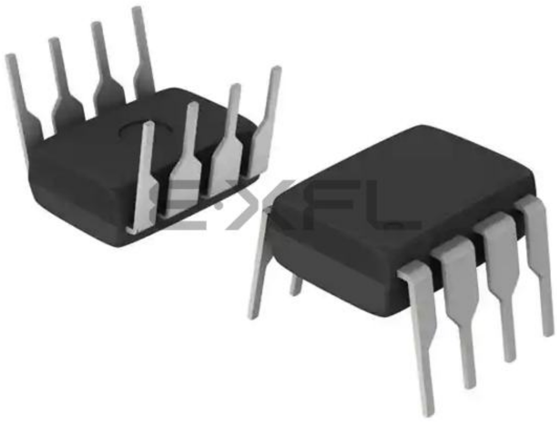

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What is "Embedded - Microcontrollers"?

"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	eZ8
Core Size	8-Bit
Speed	20MHz
Connectivity	IrDA, UART/USART
Peripherals	Brown-out Detect/Reset, LED, LVD, POR, PWM, Temp Sensor, WDT
Number of I/O	6
Program Memory Size	4KB (4K x 8)
Program Memory Type	FLASH
EEPROM Size	128 x 8
RAM Size	1K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 4x10b
Oscillator Type	Internal
Operating Temperature	0°C ~ 70°C (TA)
Mounting Type	Through Hole
Package / Case	8-DIP (0.300", 7.62mm)
Supplier Device Package	8-PDIP
Purchase URL	https://www.e-xfl.com/product-detail/zilog/z8f042apb020sc2106

Table 7. Register File Address Map (Continued)

Address (Hex)	Register Description	Mnemonic	Reset (Hex)	Page No
F0B	Timer 1 Reload Low Byte	T1RL	FF	88
F0C	Timer 1 PWM High Byte	T1PWMH	00	88
F0D	Timer 1 PWM Low Byte	T1PWML	00	89
F0E	Timer 1 Control 0	T1CTL0	00	83
F0F	Timer 1 Control 1	T1CTL1	00	84
F10–F6F	Reserved	—	XX	
UART				
F40	UART Transmit/Receive Data Registers	TXD, RXD	XX	113
F41	UART Status 0 Register	U0STAT0	00	111
F42	UART Control 0 Register	U0CTL0	00	108
F43	UART Control 1 Register	U0CTL1	00	108
F44	UART Status 1 Register	U0STAT1	00	112
F45	UART Address Compare Register	U0ADDR	00	114
F46	UART Baud Rate High Byte Register	U0BRH	FF	114
F47	UART Baud Rate Low Byte Register	U0BRL	FF	114
Analog-to-Digital Converter (ADC)				
F70	ADC Control 0	ADCCTL0	00	130
F71	ADC Control 1	ADCCTL1	80	130
F72	ADC Data High Byte	ADCD_H	XX	133
F73	ADC Data Low Bits	ADCD_L	XX	133
F74–F7F	Reserved	—	XX	
Low Power Control				
F80	Power Control 0	PWRCTL0	80	35
F81	Reserved	—	XX	
LED Controller				
F82	LED Drive Enable	LEDEN	00	52
F83	LED Drive Level High Byte	LEDLVLH	00	53
F84	LED Drive Level Low Byte	LEDLVLL	00	54
F85	Reserved	—	XX	
Oscillator Control				
F86	Oscillator Control	OSCCTL	A0	190
F87–F8F	Reserved	—	XX	
Comparator 0				
F90	Comparator 0 Control	CMP0	14	136
XX=Undefined				

initiate Stop Mode Recovery without being written to the Port Input Data register or without initiating an interrupt (if enabled for that pin).

Stop Mode Recovery Using the External $\overline{\text{RESET}}$ Pin

When the Z8 Encore! XP F082A Series device is in STOP mode and the external $\overline{\text{RESET}}$ pin is driven Low, a system reset occurs. Because of a glitch filter operating on the $\overline{\text{RESET}}$ pin, the Low pulse must be greater than the minimum width specified, or it is ignored. See Electrical Characteristics on page 221 for details.

Low Voltage Detection

In addition to the Voltage Brownout (VBO) Reset described above, it is also possible to generate an interrupt when the supply voltage drops below a user-selected value. For details about configuring the Low Voltage Detection (LVD) and the threshold levels available, see Trim Bit Address 0003H on page 159. The LVD function is available on the 8-pin product versions only.

When the supply voltage drops below the LVD threshold, the LVD bit of the Reset Status (RSTSTAT) register is set to one. This bit remains one until the low-voltage condition goes away. Reading or writing this bit does not clear it. The LVD circuit can also generate an interrupt when so enabled, see Interrupt Vectors and Priority on page 58. The LVD bit is NOT latched, so enabling the interrupt is the only way to guarantee detection of a transient low voltage event.

The LVD functionality depends on circuitry shared with the VBO block; therefore, disabling the VBO also disables the LVD.

Reset Register Definitions

The following sections define the Reset registers.

Reset Status Register

The Reset Status (RSTSTAT) register is a read-only register that indicates the source of the most recent Reset event, indicates a Stop Mode Recovery event, and indicates a Watchdog Timer time-out. Reading this register resets the upper four bits to 0.

This register shares its address with the Watchdog Timer control register, which is write-only (see Table 11 on page 31).

tions as a GPIO pin. If it is not present, the debug feature is disabled until/unless another reset event occurs. For more details, see On-Chip Debugger on page 173.

Crystal Oscillator Override

For systems using a crystal oscillator, PA0 and PA1 are used to connect the crystal. When the crystal oscillator is enabled (see Oscillator Control Register Definitions on page 190), the GPIO settings are overridden and PA0 and PA1 are disabled.

5 V Tolerance

All six I/O pins on the 8-pin devices are 5 V-tolerant, unless the programmable pull-ups are enabled. If the pull-ups are enabled and inputs higher than V_{DD} are applied to these parts, excessive current flows through those pull-up devices and can damage the chip.

Note: *In the 20- and 28-pin versions of this device, any pin which shares functionality with an ADC, crystal or comparator port is not 5 V-tolerant, including PA[1:0], PB[5:0] and PC[2:0]. All other signal pins are 5 V-tolerant, and can safely handle inputs higher than V_{DD} except when the programmable pull-ups are enabled.*

External Clock Setup

For systems using an external TTL drive, PB3 is the clock source for 20- and 28-pin devices. In this case, configure PB3 for alternate function CLKIN. Write the Oscillator Control (OSCCTL) register (see Oscillator Control Register Definitions on page 190) such that the external oscillator is selected as the system clock. For 8-pin devices use PA1 instead of PB3.

Table 14. Port Alternate Function Mapping (Non 8-Pin Parts)

Port	Pin	Mnemonic	Alternate Function Description	Alternate Function Set Register AFS1
Port A	PA0	T0IN/$\overline{\text{T0OUT}}$*	Timer 0 Input/Timer 0 Output Complement	N/A
		Reserved		
	PA1	T0OUT	Timer 0 Output	
		Reserved		
	PA2	DE0	UART 0 Driver Enable	
		Reserved		
	PA3	$\overline{\text{CTS0}}$	UART 0 Clear to Send	
		Reserved		
	PA4	RXD0/IRRX0	UART 0/IrDA 0 Receive Data	
		Reserved		
	PA5	TXD0/IRTX0	UART 0/IrDA 0 Transmit Data	
		Reserved		
	PA6	T1IN/$\overline{\text{T1OUT}}$*	Timer 1 Input/Timer 1 Output Complement	
		Reserved		
	PA7	T1OUT	Timer 1 Output	
		Reserved		

Note: Because there is only a single alternate function for each Port A pin, the Alternate Function Set registers are not implemented for Port A. Enabling alternate function selections as described in Port A–D Alternate Function Sub-Registers on page 47 automatically enables the associated alternate function.

* Whether PA0/PA6 take on the timer input or timer output complement function depends on the timer configuration as described in Timer Pin Signal Operation on page 82.

PAFS1[7:0]—Port Alternate Function Set 1
0 = Port Alternate Function selected as defined in Table 14 and Table 15 on page 44.
1 = Port Alternate Function selected as defined in Table 14 and Table 15 on page 44.

Port A–D Alternate Function Set 2 Sub-Registers

The Port A–D Alternate Function Set 2 sub-register (Table 26) is accessed through the Port A–D Control register by writing `08H` to the Port A–D Address register. The Alternate Function Set 2 sub-registers selects the alternate function available at a port pin. Alternate Functions selected by setting or clearing bits of this register is defined in Table 15.

Note: *Alternate function selection on port pins must also be enabled as described in* Port A–D Alternate Function Sub-Registers *on page 47.*

Table 26. Port A–D Alternate Function Set 2 Sub-Registers (PxAFS2)

BITS	7	6	5	4	3	2	1	0
FIELD	PAFS27	PAFS26	PAFS25	PAFS24	PAFS23	PAFS22	PAFS21	PAFS20
RESET	00H (all ports of 20/28 pin devices); 04H (Port A of 8-pin device)							
R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
ADDR	If 08H in Port A–D Address Register, accessible through the Port A–D Control Register							

PAFS2[7:0]—Port Alternate Function Set 2
0 = Port Alternate Function selected as defined in Table 15.
1 = Port Alternate Function selected as defined in Table 15.

Port A–C Input Data Registers

Reading from the Port A–C Input Data registers (Table 27) returns the sampled values from the corresponding port pins. The Port A–C Input Data registers are read-only. The value returned for any unused ports is 0. Unused ports include those missing on the 8- and 28-pin packages, as well as those missing on the ADC-enabled 28-pin packages.

Table 27. Port A–C Input Data Registers (PxIN)

BITS	7	6	5	4	3	2	1	0
FIELD	PIN7	PIN6	PIN5	PIN4	PIN3	PIN2	PIN1	PIN0
RESET	X	X	X	X	X	X	X	X
R/W	R	R	R	R	R	R	R	R
ADDR	FD2H, FD6H, FDAH							
X = Undefined.								

Caution: *The following coding style that clears bits in the Interrupt Request registers is not recommended. All incoming interrupts received between execution of the first* `LDX` *command and the final LDX command are lost.*

Poor coding style that can result in lost interrupt requests:

```
LDX r0, IRQ0
AND r0, MASK
LDX IRQ0, r0
```

Caution: *To avoid missing interrupts, use the following coding style to clear bits in the Interrupt Request 0 register:*

Good coding style that avoids lost interrupt requests:

```
ANDX IRQ0, MASK
```

Software Interrupt Assertion

Program code can generate interrupts directly. Writing a 1 to the correct bit in the Interrupt Request register triggers an interrupt (assuming that interrupt is enabled). When the interrupt request is acknowledged by the eZ8 CPU, the bit in the Interrupt Request register is automatically cleared to 0.

Caution: *The following coding style used to generate software interrupts by setting bits in the Interrupt Request registers is not recommended. All incoming interrupts received between execution of the first LDX command and the final LDX command are lost.*

Poor coding style that can result in lost interrupt requests:

```
LDX r0, IRQ0
OR r0, MASK
LDX IRQ0, r0
```

Caution: *To avoid missing interrupts, use the following coding style to set bits in the Interrupt Request registers:*

Good coding style that avoids lost interrupt requests:

```
ORX IRQ0, MASK
```

Watchdog Timer Interrupt Assertion

The Watchdog Timer interrupt behavior is different from interrupts generated by other sources. The Watchdog Timer continues to assert an interrupt as long as the timeout condition continues. As it operates on a different (and usually slower) clock domain than the rest of the device, the Watchdog Timer continues to assert this interrupt for many system clocks until the counter rolls over.

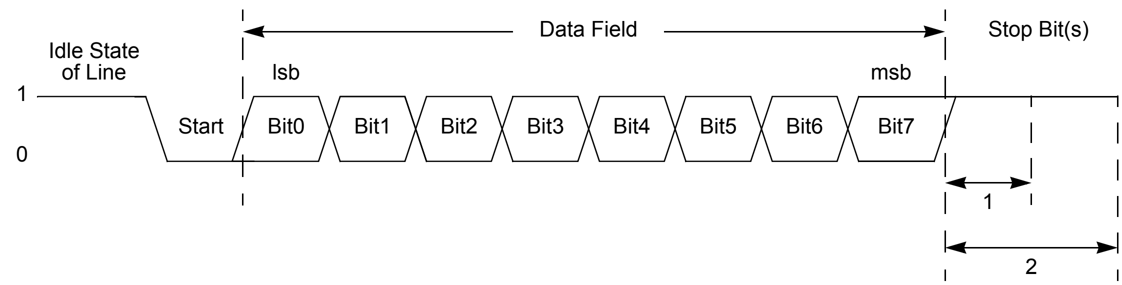


Figure 11. UART Asynchronous Data Format without Parity

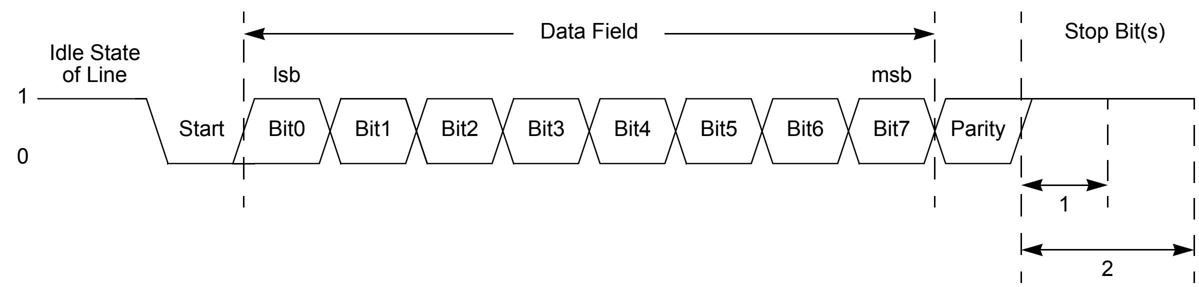


Figure 12. UART Asynchronous Data Format with Parity

Transmitting Data using the Polled Method

Follow the steps below to transmit data using the polled method of operation:

1. Write to the UART Baud Rate High and Low Byte registers to set the required baud rate.
2. Enable the UART pin functions by configuring the associated GPIO Port pins for alternate function operation.
3. Write to the UART Control 1 register, if MULTIPROCESSOR mode is appropriate, to enable MULTIPROCESSOR (9-bit) mode functions.
4. Set the Multiprocessor Mode Select (`MPEN`) bit to enable MULTIPROCESSOR mode.
5. Write to the UART Control 0 register to:
   - Set the transmit enable bit (`TEN`) to enable the UART for data transmission.
   - Set the parity enable bit (`PEN`), if parity is appropriate and MULTIPROCESSOR mode is not enabled, and select either even or odd parity (`PSEL`).
   - Set or clear the CTSE bit to enable or disable control from the remote receiver using the $\overline{\text{CTS}}$ pin.

1 = Received data does not generate an interrupt request to the Interrupt Controller. Only receiver errors generate an interrupt request.

IREN—Infrared Encoder/Decoder Enable
0 = Infrared Encoder/Decoder is disabled. UART operates normally.
1 = Infrared Encoder/Decoder is enabled. The UART transmits and receives data through the Infrared Encoder/Decoder.

UART Status 0 Register

The UART Status 0 (UxSTAT0) and Status 1(UxSTAT1) registers (Table 63 and Table 64) identify the current UART operating configuration and status.

Table 63. UART Status 0 Register (U0STAT0)

BITS	7	6	5	4	3	2	1	0
FIELD	RDA	PE	OE	FE	BRKD	TDRE	TXE	CTS
RESET	0	0	0	0	0	1	1	X
R/W	R	R	R	R	R	R	R	R
ADDR	F41H							

RDA—Receive Data Available
This bit indicates that the UART Receive Data register has received data. Reading the UART Receive Data register clears this bit.
0 = The UART Receive Data register is empty.
1 = There is a byte in the UART Receive Data register.

PE—Parity Error
This bit indicates that a parity error has occurred. Reading the UART Receive Data register clears this bit.

0 = No parity error has occurred.
1 = A parity error has occurred.

OE—Overrun Error
This bit indicates that an overrun error has occurred. An overrun occurs when new data is received and the UART Receive Data register has not been read. If the RDA bit is reset to 0, reading the UART Receive Data register clears this bit.
0 = No overrun error occurred.
1 = An overrun error occurred.

FE—Framing Error
This bit indicates that a framing error (no Stop bit following data reception) was detected. Reading the UART Receive Data register clears this bit.

0 = No framing error occurred.
1 = A framing error occurred.

BRKD—Break Detect
This bit indicates that a break occurred. If the data bits, parity/multiprocessor bit, and Stop bit(s) are all 0s this bit is set to 1. Reading the UART Receive Data register clears this bit.
0 = No break occurred.
1 = A break occurred.

TDRE—Transmitter Data Register Empty
This bit indicates that the UART Transmit Data register is empty and ready for additional data. Writing to the UART Transmit Data register resets this bit.
0 = Do not write to the UART Transmit Data register.
1 = The UART Transmit Data register is ready to receive an additional byte to be transmitted.

TXE—Transmitter Empty
This bit indicates that the transmit shift register is empty and character transmission is finished.
0 = Data is currently transmitting.
1 = Transmission is complete.

CTS—$\overline{\text{CTS}}$ signal
When this bit is read it returns the level of the $\overline{\text{CTS}}$ signal. This signal is active Low.

UART Status 1 Register

This register contains multiprocessor control and status bits.

Table 64. UART Status 1 Register (U0STAT1)

BITS	7	6	5	4	3	2	1	0
FIELD	Reserved						NEWFRM	MPRX
RESET	0	0	0	0	0	0	0	0
R/W	R	R	R	R	R/W	R/W	R	R
ADDR	F44H							

Reserved—Must be 0.

NEWFRM—Status bit denoting the start of a new frame. Reading the UART Receive Data register resets this bit to 0.
0 = The current byte is not the first data byte of a new frame.
1 = The current byte is the first data byte of a new frame.

value `63H` to the Flash Control register initiates the Mass Erase operation. While the Flash Controller executes the Mass Erase operation, the eZ8 CPU idles but the system clock and on-chip peripherals continue to operate. Using the On-Chip Debugger, poll the Flash Status register to determine when the Mass Erase operation is complete. When the Mass Erase is complete, the Flash Controller returns to its locked state.

Flash Controller Bypass

The Flash Controller can be bypassed and the control signals for the Flash memory brought out to the GPIO pins. Bypassing the Flash Controller allows faster Row Programming algorithms by controlling the Flash programming signals directly.

Row programming is recommended for gang programming applications and large volume customers who do not require in-circuit initial programming of the Flash memory. Page Erase operations are also supported when the Flash Controller is bypassed.

For more information on bypassing the Flash Controller, refer to *Third-Party Flash Programming Support for Z8 Encore!® MCU Application Note (AN0117)* available for download at www.zilog.com.

Flash Controller Behavior in DEBUG Mode

The following changes in behavior of the Flash Controller occur when the Flash Controller is accessed using the On-Chip Debugger:

- The Flash Write Protect option bit is ignored.
- The Flash Sector Protect register is ignored for programming and erase operations.
- Programming operations are not limited to the page selected in the Page Select register.
- Bits in the Flash Sector Protect register can be written to one or zero.
- The second write of the Page Select register to unlock the Flash Controller is not necessary.
- The Page Select register can be written when the Flash Controller is unlocked.
- The Mass Erase command is enabled through the Flash Control register.

Caution: *For security reasons, the Flash controller allows only a single page to be opened for write/erase. When writing multiple Flash pages, the flash controller must go through the unlock sequence again to select another page.*

SPROT7-SPROT0—Sector Protection
Each bit corresponds to a 512 byte Flash sector. For the Z8F08xx devices, the upper 3 bits must be zero. For the Z8F04xx devices all bits are used. For the Z8F02xx devices, the upper 4 bits are unused. For the Z8F01xx devices, the upper 6 bits are unused.

Flash Frequency High and Low Byte Registers

The Flash Frequency High (FFREQH) and Low Byte (FFREQL) registers combine to form a 16-bit value, FFREQ, to control timing for Flash program and erase operations. The 16-bit binary Flash Frequency value must contain the system clock frequency (in kHz) and is calculated using the following equation:

$$\text{FFREQ[15:0]} = \{\text{FFREQH[7:0]},\text{FFREQL[7:0]}\} = \frac{\text{System Clock Frequency}}{1000}$$

Caution: *The Flash Frequency High and Low Byte registers must be loaded with the correct value to ensure proper operation of the device. Also, Flash programming and erasure is not supported for system clock frequencies below 20 kHz or above 20 MHz.*

Table 82. Flash Frequency High Byte Register (FFREQH)

BITS	7	6	5	4	3	2	1	0
FIELD	FFREQH							
RESET	0	0	0	0	0	0	0	0
R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
ADDR	FFAH							

FFREQH—Flash Frequency High Byte
High byte of the 16-bit Flash Frequency value.

Table 83. Flash Frequency Low Byte Register (FFREQL)

BITS	7	6	5	4	3	2	1	0
FIELD	FFREQL							
RESET	0							
R/W	R/W							
ADDR	FFBH							

FFREQL—Flash Frequency Low Byte
Low byte of the 16-bit Flash Frequency value.

Reserved—Must be 1.

LVD_TRIM—Low Voltage Detect Trim
This trimming affects the low voltage detection threshold. Each LSB represents a 50 mV change in the threshold level. Alternatively, the low voltage threshold may be computed from the options bit value by the following equation:

$$LVD\_LVL = 3.6\ V - LVD\_TRIM \times 0.05\ V$$

	LVD Threshold (V)	
LVD_TRIM	**Typical**	**Description**
00000	3.60	Maximum LVD threshold
00001	3.55	
00010	3.50	
00011	3.45	
00100	3.40	
00101	3.35	
00110	3.30	
00111	3.25	
01000	3.20	
01001	3.15	
01010	3.10	Default on Reset
01011	3.05	
01100	3.00	
01101	2.95	
01110	2.90	
01111	2.85	
10000	2.80	
10001	2.75	
10010	2.70	
10011 to 11111	2.70 to 1.65	Minimum LVD threshold

Table 104. NVDS Read Time (Continued)

Operation	Minimum Latency	Maximum Latency
Read (128 byte array)	883	7609
Write (16 byte array)	4973	5009
Write (64 byte array)	4971	5013
Write (128 byte array)	4984	5023
Illegal Read	43	43
Illegal Write	31	31

If NVDS read performance is critical to your software architecture, there are some things you can do to optimize your code for speed, listed in order from most helpful to least helpful:

- Periodically refresh all addresses that are used. The optimal use of NVDS in terms of speed is to rotate the writes evenly among all addresses planned to use, bringing all reads closer to the minimum read time. Because the minimum read time is much less than the write time, however, actual speed benefits are not always realized.
- Use as few unique addresses as possible: this helps to optimize the impact of refreshing as well as minimize the requirement for it.

Crystal Oscillator

The products in the Z8 Encore! XP® F082A Series contain an on-chip crystal oscillator for use with external crystals with 32 kHz to 20 MHz frequencies. In addition, the oscillator supports external RC networks with oscillation frequencies up to 4 MHz or ceramic resonators with frequencies up to 8 MHz. The on-chip crystal oscillator can be used to generate the primary system clock for the internal eZ8 CPU and the majority of the on-chip peripherals. Alternatively, the X_{IN} input pin can also accept a CMOS-level clock input signal (32 kHz–20 MHz). If an external clock generator is used, the X_{OUT} pin must be left unconnected. The Z8 Encore! XP F082A Series products do not contain an internal clock divider. The frequency of the signal on the X_{IN} input pin determines the frequency of the system clock.

Note: *Although the XIN pin can be used as an input for an external clock generator, the CLKIN pin is better suited for such use (see* System Clock Selection *on page 187).*

Operating Modes

The Z8 Encore! XP F082A Series products support four oscillator modes:

- Minimum power for use with very low frequency crystals (32 kHz–1 MHz).
- Medium power for use with medium frequency crystals or ceramic resonators (0.5 MHz to 8 MHz).
- Maximum power for use with high frequency crystals (8 MHz to 20 MHz).
- On-chip oscillator configured for use with external RC networks (<4 MHz).

The oscillator mode is selected using user-programmable Flash Option Bits. See Flash Option Bits on page 153 for information.

Crystal Oscillator Operation

The Flash Option bit XTLDIS controls whether the crystal oscillator is enabled during reset. The crystal may later be disabled after reset if a new oscillator has been selected as the system clock. If the crystal is manually enabled after reset through the OSCCTL register, the user code must wait at least 1000 crystal oscillator cycles for the crystal to stabilize. After this, the crystal oscillator may be selected as the system clock.

Note: *The stabilization time varies depending on the crystal or resonator used, as well as on the feedback network. See* Table 111 *for transconductance values to compute oscillator stabilization times.*

Table 119. CPU Control Instructions (Continued)

Mnemonic	Operands	Instruction
SCF	—	Set Carry Flag
SRP	src	Set Register Pointer
STOP	—	STOP Mode
WDT	—	Watchdog Timer Refresh

Table 120. Load Instructions

Mnemonic	Operands	Instruction
CLR	dst	Clear
LD	dst, src	Load
LDC	dst, src	Load Constant to/from Program Memory
LDCI	dst, src	Load Constant to/from Program Memory and Auto-Increment Addresses
LDE	dst, src	Load External Data to/from Data Memory
LDEI	dst, src	Load External Data to/from Data Memory and Auto-Increment Addresses
LDWX	dst, src	Load Word using Extended Addressing
LDX	dst, src	Load using Extended Addressing
LEA	dst, X(src)	Load Effective Address
POP	dst	Pop
POPX	dst	Pop using Extended Addressing
PUSH	src	Push
PUSHX	src	Push using Extended Addressing

Table 121. Logical Instructions

Mnemonic	Operands	Instruction
AND	dst, src	Logical AND
ANDX	dst, src	Logical AND using Extended Addressing
COM	dst	Complement
OR	dst, src	Logical OR

General Purpose I/O Port Output Timing

Figure 35 and Table 140 provide timing information for GPIO Port pins.

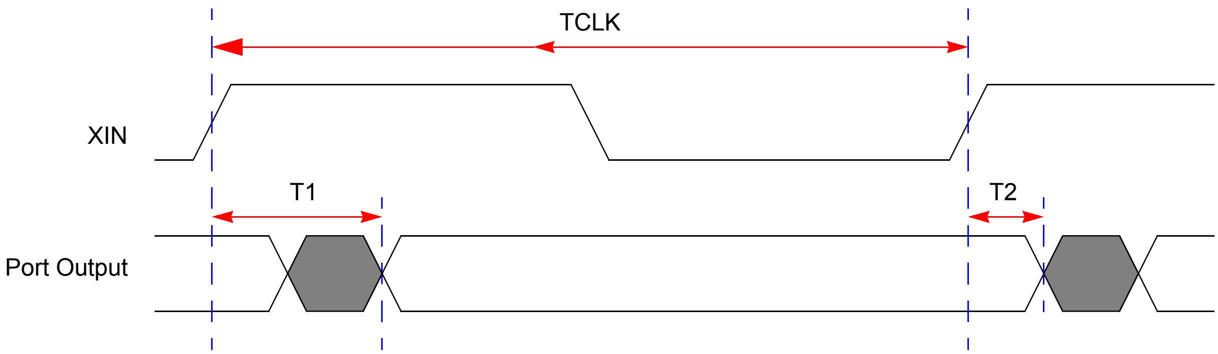
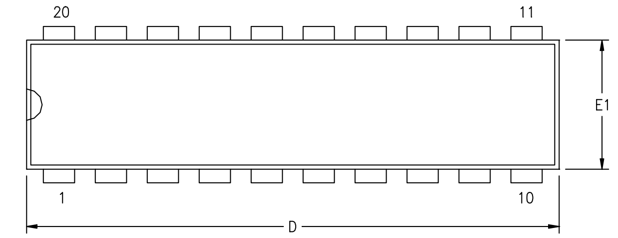


Figure 35. GPIO Port Output Timing

Table 140. GPIO Port Output Timing

		Delay (ns)	
Parameter	**Abbreviation**	**Minimum**	**Maximum**
GPIO Port pins			
T_1	XIN Rise to Port Output Valid Delay	–	15
T_2	XIN Rise to Port Output Hold Time	2	–

Figure 42 displays the 20-pin Plastic Dual Inline Package (PDIP) available for the Z8 Encore! XP F082A Series devices.



SYMBOL	MILLIMETER		INCH	
	MIN	MAX	MIN	MAX
A1	0.38	0.81	.015	.032
A2	3.25	3.68	.128	.145
B	0.41	0.51	.016	.020
B1	1.47	1.57	.058	.062
C	0.20	0.30	.008	.012
D	25.65	26.16	1.010	1.030
E	7.49	8.26	.295	.325
E1	6.10	6.65	.240	.262
e	2.54 BSC		.100 BSC	
eA	7.87	9.14	.310	.360
L	3.18	3.43	.125	.135
Q1	1.42	1.65	.056	.065
S	1.52	1.65	.060	.065

CONTROLLING DIMENSIONS : INCH

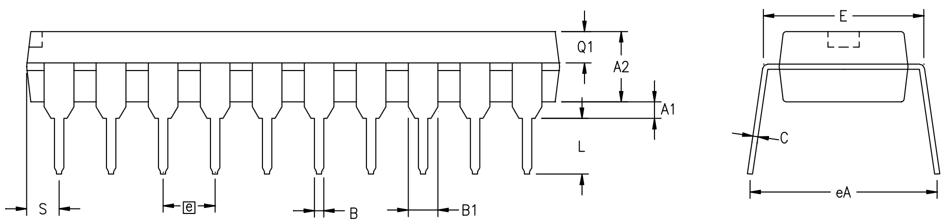


Figure 42. 20-Pin Plastic Dual Inline Package (PDIP)

Part Number	Flash	RAM	NVDS	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Temperature Sensor	Description
Z8 Encore! XP® F082A Series with 1 KB Flash, 10-Bit Analog-to-Digital Converter											
Standard Temperature: 0 °C to 70 °C											
Z8F012APB020SC	1 KB	256 B	16 B	6	14	2	4	1	1	1	PDIP 8-pin package
Z8F012AQB020SC	1 KB	256 B	16 B	6	14	2	4	1	1	1	QFN 8-pin package
Z8F012ASB020SC	1 KB	256 B	16 B	6	14	2	4	1	1	1	SOIC 8-pin package
Z8F012ASH020SC	1 KB	256 B	16 B	17	20	2	7	1	1	1	SOIC 20-pin package
Z8F012AHH020SC	1 KB	256 B	16 B	17	20	2	7	1	1	1	SSOP 20-pin package
Z8F012APH020SC	1 KB	256 B	16 B	17	20	2	7	1	1	1	PDIP 20-pin package
Z8F012ASJ020SC	1 KB	256 B	16 B	23	20	2	8	1	1	1	SOIC 28-pin package
Z8F012AHJ020SC	1 KB	256 B	16 B	23	20	2	8	1	1	1	SSOP 28-pin package
Z8F012APJ020SC	1 KB	256 B	16 B	23	20	2	8	1	1	1	PDIP 28-pin package
Extended Temperature: -40 °C to 105 °C											
Z8F012APB020EC	1 KB	256 B	16 B	6	14	2	4	1	1	1	PDIP 8-pin package
Z8F012AQB020EC	1 KB	256 B	16 B	6	14	2	4	1	1	1	QFN 8-pin package
Z8F012ASB020EC	1 KB	256 B	16 B	6	14	2	4	1	1	1	SOIC 8-pin package
Z8F012ASH020EC	1 KB	256 B	16 B	17	20	2	7	1	1	1	SOIC 20-pin package
Z8F012AHH020EC	1 KB	256 B	16 B	17	20	2	7	1	1	1	SSOP 20-pin package
Z8F012APH020EC	1 KB	256 B	16 B	17	20	2	7	1	1	1	PDIP 20-pin package
Z8F012ASJ020EC	1 KB	256 B	16 B	23	20	2	8	1	1	1	SOIC 28-pin package
Z8F012AHJ020EC	1 KB	256 B	16 B	23	20	2	8	1	1	1	SSOP 28-pin package
Z8F012APJ020EC	1 KB	256 B	16 B	23	20	2	8	1	1	1	PDIP 28-pin package
Replace C with G for Lead-Free Packaging											

Part Number	Flash	RAM	NVDS	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Temperature Sensor	Description
Z8 Encore! XP® F082A Series Development Kit											
Z8F08A28100KITG											Z8 Encore! XP F082A Series 28-Pin Development Kit
Z8F04A28100KITG											Z8 Encore! XP F042A Series 28-Pin Development Kit
Z8F04A08100KITG											Z8 Encore! XP F042A Series 8-Pin Development Kit
ZUSBSC00100ZACG											USB Smart Cable Accessory Kit
ZUSBOPTSC01ZACG											USB Opto-Isolated Smart Cable Accessory Kit
ZENETSC0100ZACG											Ethernet Smart Cable Accessory Kit

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