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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	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	23
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 8x10b
Oscillator Type	Internal
Operating Temperature	0°C ~ 70°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/z8f042ahj020sc

General-Purpose Input/Output

The Z8 Encore! XP[®] F082A Series products support a maximum of 25 port pins (Ports A–D) for general-purpose input/output (GPIO) operations. Each port contains control and data registers. The GPIO control registers determine data direction, open-drain, output drive current, programmable pull-ups, Stop Mode Recovery functionality, and alternate pin functions. Each port pin is individually programmable. In addition, the Port C pins are capable of direct LED drive at programmable drive strengths.

GPIO Port Availability By Device

[Table 13](#) lists the port pins available with each device and package type.

Table 13. Port Availability by Device and Package Type

Devices	Package	ADC	Port A	Port B	Port C	Port D	Total I/O
Z8F082ASB, Z8F082APB, Z8F082AQB Z8F042ASB, Z8F042APB, Z8F042AQB Z8F022ASB, Z8F022APB, Z8F022AQB Z8F012ASB, Z8F012APB, Z8F012AQB	8-pin	Yes	[5:0]	No	No	No	6
Z8F081ASB, Z8F081APB, Z8F081AQB Z8F041ASB, Z8F041APB, Z8F041AQB Z8F021ASB, Z8F021APB, Z8F021AQB Z8F011ASB, Z8F011APB, Z8F011AQB	8-pin	No	[5:0]	No	No	No	6
Z8F082APH, Z8F082AHH, Z8F082ASH Z8F042APH, Z8F042AHH, Z8F042ASH Z8F022APH, Z8F022AHH, Z8F022ASH Z8F012APH, Z8F012AHH, Z8F012ASH	20-pin	Yes	[7:0]	[3:0]	[3:0]	[0]	17
Z8F081APH, Z8F081AHH, Z8F081ASH Z8F041APH, Z8F041AHH, Z8F041ASH Z8F021APH, Z8F021AHH, Z8F021ASH Z8F011APH, Z8F011AHH, Z8F011ASH	20-pin	No	[7:0]	[3:0]	[3:0]	[0]	17
Z8F082APJ, Z8F082ASJ, Z8F082AHJ Z8F042APJ, Z8F042ASJ, Z8F042AHJ Z8F022APJ, Z8F022ASJ, Z8F022AHJ Z8F012APJ, Z8F012ASJ, Z8F012AHJ	28-pin	Yes	[7:0]	[5:0]	[7:0]	[0]	23
Z8F081APJ, Z8F081ASJ, Z8F081AHJ Z8F041APJ, Z8F041ASJ, Z8F041AHJ Z8F021APJ, Z8F021ASJ, Z8F021AHJ Z8F011APJ, Z8F011ASJ, Z8F011AHJ	28-pin	No	[7:0]	[7:0]	[7:0]	[0]	25

Set 1 Sub-Registers on page 50, GPIO Alternate Functions on page 38, and Port A–D Alternate Function Set 2 Sub-Registers on page 51. See GPIO Alternate Functions on page 38 to determine the alternate function associated with each port pin.

**Caution:**

Do not enable alternate functions for GPIO port pins for which there is no associated alternate function. Failure to follow this guideline can result in unpredictable operation.

Table 20. Port A–D Alternate Function Sub-Registers (PxAF)

BITS	7	6	5	4	3	2	1	0
FIELD	AF7	AF6	AF5	AF4	AF3	AF2	AF1	AF0
RESET	00H (Ports A–C); 01H (Port D); 04H (Port A of 8-pin device)							
R/W	R/W							
ADDR	If 02H in Port A–D Address Register, accessible through the Port A–D Control Register							

AF[7:0]—Port Alternate Function enabled

0 = The port pin is in normal mode and the DDx bit in the Port A–D Data Direction sub-register determines the direction of the pin.

1 = The alternate function selected through Alternate Function Set sub-registers is enabled. Port pin operation is controlled by the alternate function.

Port A–D Output Control Sub-Registers

The Port A–D Output Control sub-register (Table 21) is accessed through the Port A–D Control register by writing 03H to the Port A–D Address register. Setting the bits in the Port A–D Output Control sub-registers to 1 configures the specified port pins for open-drain operation. These sub-registers affect the pins directly and, as a result, alternate functions are also affected.

Table 21. Port A–D Output Control Sub-Registers (PxOC)

BITS	7	6	5	4	3	2	1	0
FIELD	POC7	POC6	POC5	POC4	POC3	POC2	POC1	POC0
RESET	00H (Ports A–C); 01H (Port D)							
R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
ADDR	If 03H in Port A–D Address Register, accessible through the Port A–D Control Register							

POC[7:0]—Port Output Control

These bits function independently of the alternate function bit and always disable the drains if set to 1.

0 = The source current is enabled for any output mode (unless overridden by the alternate

**Caution:**

To avoid re-triggerings of the Watchdog Timer interrupt after exiting the associated interrupt service routine, it is recommended that the service routine continues to read from the RSTSTAT register until the WDT bit is cleared as given in the following coding sample:

```
CLEARWDT:
    LDX r0, RSTSTAT    ; read reset status register to clear wdt bit
    BTJNZ 5, r0, CLEARWDT    ; loop until bit is cleared
```

Interrupt Control Register Definitions

For all interrupts other than the Watchdog Timer interrupt, the Primary Oscillator Fail Trap, and the Watchdog Oscillator Fail Trap, the interrupt control registers enable individual interrupts, set interrupt priorities, and indicate interrupt requests.

Interrupt Request 0 Register

The Interrupt Request 0 (IRQ0) register ([Table 33](#)) stores the interrupt requests for both vectored and polled interrupts. When a request is presented to the interrupt controller, the corresponding bit in the IRQ0 register becomes 1. If interrupts are globally enabled (vectored interrupts), the interrupt controller passes an interrupt request to the eZ8 CPU. If interrupts are globally disabled (polled interrupts), the eZ8 CPU can read the Interrupt Request 0 register to determine if any interrupt requests are pending.

Table 33. Interrupt Request 0 Register (IRQ0)

BITS	7	6	5	4	3	2	1	0
FIELD	Reserved	T1I	T0I	U0RXI	U0TXI	Reserved	Reserved	ADCI
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	FC0H							

Reserved—Must be 0.

T1I—Timer 1 Interrupt Request

0 = No interrupt request is pending for Timer 1.

1 = An interrupt request from Timer 1 is awaiting service.

T0I—Timer 0 Interrupt Request

0 = No interrupt request is pending for Timer 0.

1 = An interrupt request from Timer 0 is awaiting service.

Also, if the Timer Output alternate function is enabled, the Timer Output pin changes state for one system clock cycle (from Low to High or from High to Low) upon timer Reload. If it is appropriate to have the Timer Output make a state change at a One-Shot time-out (rather than a single cycle pulse), first set the TPOL bit in the Timer Control Register to the start value before enabling ONE-SHOT mode. After starting the timer, set TPOL to the opposite bit value.

Follow the steps below for configuring a timer for ONE-SHOT mode and initiating the count:

1. Write to the Timer Control register to:
 - Disable the timer
 - Configure the timer for ONE-SHOT mode.
 - Set the prescale value.
 - Set the initial output level (High or Low) if using the Timer Output alternate function.
2. Write to the Timer High and Low Byte registers to set the starting count value.
3. Write to the Timer Reload High and Low Byte registers to set the Reload value.
4. If appropriate, enable the timer interrupt and set the timer interrupt priority by writing to the relevant interrupt registers.
5. If using the Timer Output function, configure the associated GPIO port pin for the Timer Output alternate function.
6. Write to the Timer Control register to enable the timer and initiate counting.

In ONE-SHOT mode, the system clock always provides the timer input. The timer period is given by the following equation:

$$\text{ONE-SHOT Mode Time-Out Period (s)} = \frac{\text{Reload Value} - \text{Start Value} \times \text{Prescale}}{\text{System Clock Frequency (Hz)}}$$

CONTINUOUS Mode

In CONTINUOUS mode, the timer counts up to the 16-bit Reload value stored in the Timer Reload High and Low Byte registers. The timer input is the system clock. Upon reaching the Reload value, the timer generates an interrupt, the count value in the Timer High and Low Byte registers is reset to 0001H and counting resumes. Also, if the Timer Output alternate function is enabled, the Timer Output pin changes state (from Low to High or from High to Low) at timer Reload.

Follow the steps below for configuring a timer for CONTINUOUS mode and initiating the count:

1. Write to the Timer Control register to:
 - Disable the timer
 - Configure the timer for CONTINUOUS mode.

1000 = PWM DUAL OUTPUT mode
 1001 = CAPTURE RESTART mode
 1010 = COMPARATOR COUNTER mode

Timer 0–1 High and Low Byte Registers

The Timer 0–1 High and Low Byte (TxH and TxL) registers ([Table 50](#) and [Table 51](#)) contain the current 16-bit timer count value. When the timer is enabled, a read from TxH causes the value in TxL to be stored in a temporary holding register. A read from TxL always returns this temporary register when the timers are enabled. When the timer is disabled, reads from TxL read the register directly.

Writing to the Timer High and Low Byte registers while the timer is enabled is not recommended. There are no temporary holding registers available for write operations, so simultaneous 16-bit writes are not possible. If either the Timer High or Low Byte registers are written during counting, the 8-bit written value is placed in the counter (High or Low Byte) at the next clock edge. The counter continues counting from the new value.

Table 50. Timer 0–1 High Byte Register (TxH)

BITS	7	6	5	4	3	2	1	0
FIELD	TH							
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	F00H, F08H							

Table 51. Timer 0–1 Low Byte Register (TxL)

BITS	7	6	5	4	3	2	1	0
FIELD	TL							
RESET	0	0	0	0	0	0	0	1
R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
ADDR	F01H, F09H							

TH and TL—Timer High and Low Bytes

These 2 bytes, {TH[7:0], TL[7:0]}, contain the current 16-bit timer count value.

Timer Reload High and Low Byte Registers

The Timer 0–1 Reload High and Low Byte (TxRH and TxRL) registers ([Table 52](#) and [Table 53](#)) store a 16-bit reload value, {TRH[7:0], TRL[7:0]}. Values written to the Timer Reload High Byte register are stored in a temporary holding register. When a write to the

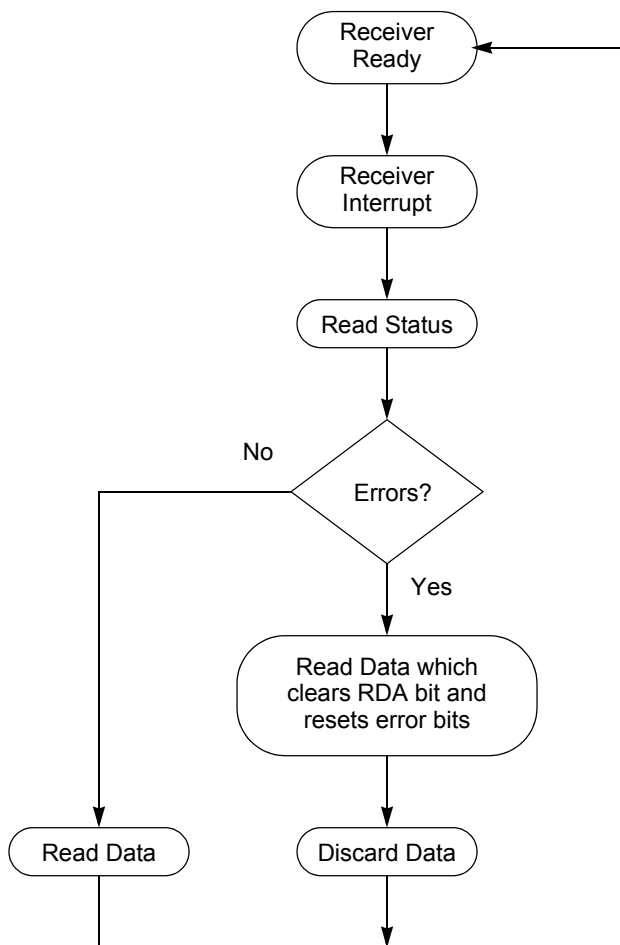


Figure 15. UART Receiver Interrupt Service Routine Flow

Baud Rate Generator Interrupts

If the baud rate generator (BRG) interrupt enable is set, the UART Receiver interrupt asserts when the UART Baud Rate Generator reloads. This condition allows the Baud Rate Generator to function as an additional counter if the UART functionality is not employed.

UART Baud Rate Generator

The UART Baud Rate Generator creates a lower frequency baud rate clock for data transmission. The input to the Baud Rate Generator is the system clock. The UART Baud Rate High and Low Byte registers combine to create a 16-bit baud rate divisor value

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.

UART Address Compare Register

The UART Address Compare (UxADDR) register stores the multi-node network address of the UART (see [Table 67](#)). When the MPMD[1] bit of UART Control Register 0 is set, all incoming address bytes are compared to the value stored in the Address Compare register. Receive interrupts and RDA assertions only occur in the event of a match.

Table 67. UART Address Compare Register (U0ADDR)

BITS	7	6	5	4	3	2	1	0
FIELD	COMP_ADDR							
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	F45H							

COMP_ADDR—Compare Address
This 8-bit value is compared to incoming address bytes.

UART Baud Rate High and Low Byte Registers

The UART Baud Rate High (UxBRH) and Low Byte (UxBRL) registers ([Table 68](#) and [Table 69](#)) combine to create a 16-bit baud rate divisor value (BRG[15:0]) that sets the data transmission rate (baud rate) of the UART.

Table 68. UART Baud Rate High Byte Register (U0BRH)

BITS	7	6	5	4	3	2	1	0
FIELD	BRH							
RESET	1	1	1	1	1	1	1	1
R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
ADDR	F46H							

Table 69. UART Baud Rate Low Byte Register (U0BRL)

BITS	7	6	5	4	3	2	1	0
FIELD	BRL							
RESET	1	1	1	1	1	1	1	1
R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
ADDR	F47H							

Receiving IrDA Data

Data received from the infrared transceiver using the IR_RXD signal through the RXD pin is decoded by the Infrared Endec and passed to the UART. The UART's baud rate clock is used by the Infrared Endec to generate the demodulated signal (RXD) that drives the UART. Each UART/Infrared data bit is 16-clocks wide. Figure 18 displays data reception. When the Infrared Endec is enabled, the UART's RXD signal is internal to the Z8 Encore! XP[®] F082A Series products while the IR_RXD signal is received through the RXD pin.

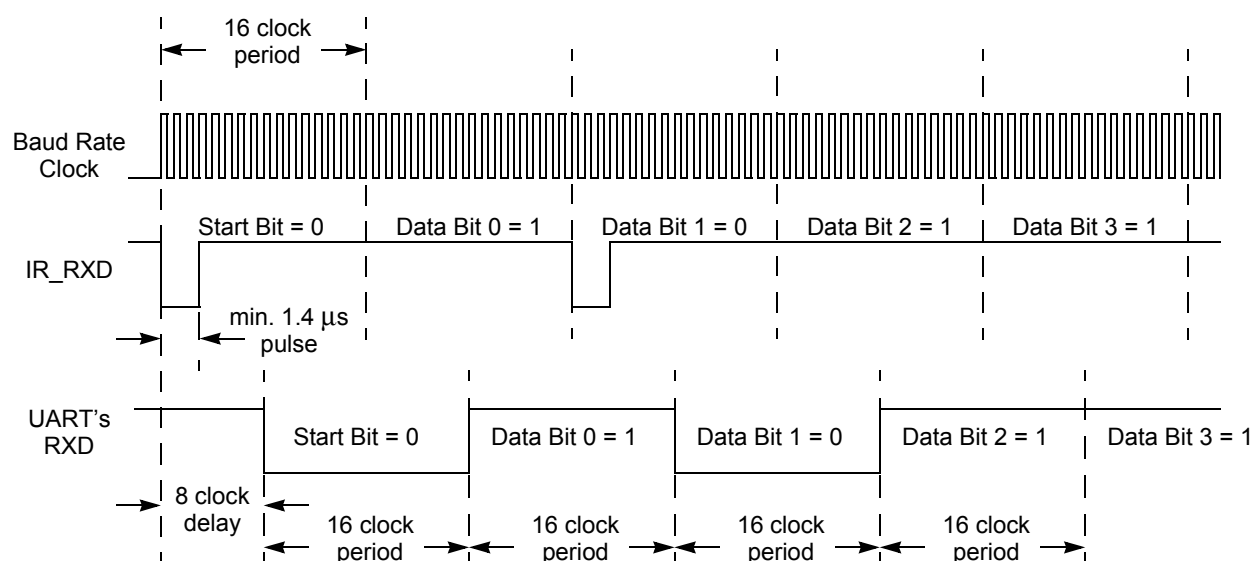


Figure 18. IrDA Data Reception

Infrared Data Reception



Caution: The system clock frequency must be at least 1.0 MHz to ensure proper reception of the 1.4 μs minimum width pulses allowed by the IrDA standard.

Endec Receiver Synchronization

The IrDA receiver uses a local baud rate clock counter (0 to 15 clock periods) to generate an input stream for the UART and to create a sampling window for detection of incoming pulses. The generated UART input (UART RXD) is delayed by 8 baud rate clock periods with respect to the incoming IrDA data stream. When a falling edge in the input data stream is detected, the Endec counter is reset. When the count reaches a value of 8, the UART RXD value is updated to reflect the value of the decoded data. When the count reaches 12 baud clock periods, the sampling window for the next incoming pulse opens. The window remains open until the count again reaches 8 (that is, 24 baud clock periods since the previous pulse was detected), giving the Endec a sampling window of minus four

Operation

The Flash Controller programs and erases Flash memory. The Flash Controller provides the proper Flash controls and timing for Byte Programming, Page Erase, and Mass Erase of Flash memory.

The Flash Controller contains several protection mechanisms to prevent accidental programming or erasure. These mechanisms operate on the page, sector and full-memory levels.

The Flow Chart in [Figure 22](#) displays basic Flash Controller operation. The following subsections provide details about the various operations (Lock, Unlock, Byte Programming, Page Protect, Page Unprotect, Page Select, Page Erase, and Mass Erase) displayed in [Figure 22](#).

DBG ← Size[15:8]
DBG ← Size[7:0]
DBG ← 1-65536 data bytes

- **Read Data Memory (0DH)**—The Read Data Memory command reads from Data Memory. This command is equivalent to the LDE and LDEI instructions. Data can be read 1 to 65536 bytes at a time (65536 bytes can be read by setting size to 0). If the device is not in DEBUG mode, this command returns FFH for the data.

DBG ← 0DH
DBG ← Data Memory Address[15:8]
DBG ← Data Memory Address[7:0]
DBG ← Size[15:8]
DBG ← Size[7:0]
DBG → 1-65536 data bytes

- **Read Program Memory CRC (0EH)**—The Read Program Memory CRC command computes and returns the Cyclic Redundancy Check (CRC) of Program Memory using the 16-bit CRC-CCITT polynomial. If the device is not in DEBUG mode, this command returns FFFFH for the CRC value. Unlike most other OCD Read commands, there is a delay from issuing of the command until the OCD returns the data. The OCD reads the Program Memory, calculates the CRC value, and returns the result. The delay is a function of the Program Memory size and is approximately equal to the system clock period multiplied by the number of bytes in the Program Memory.

DBG ← 0EH
DBG → CRC[15:8]
DBG → CRC[7:0]

- **Step Instruction (10H)**—The Step Instruction command steps one assembly instruction at the current Program Counter (PC) location. If the device is not in DEBUG mode or the Flash Read Protect Option bit is enabled, the OCD ignores this command.

DBG ← 10H

- **Stuff Instruction (11H)**—The Stuff Instruction command steps one assembly instruction and allows specification of the first byte of the instruction. The remaining 0-4 bytes of the instruction are read from Program Memory. This command is useful for stepping over instructions where the first byte of the instruction has been overwritten by a Breakpoint. If the device is not in DEBUG mode or the Flash Read Protect Option bit is enabled, the OCD ignores this command.

DBG ← 11H
DBG ← opcode[7:0]

- **Execute Instruction (12H)**—The Execute Instruction command allows sending an entire instruction to be executed to the eZ8 CPU. This command can also step over Breakpoints. The number of bytes to send for the instruction depends on the opcode.

WDFEN—Watchdog Timer Oscillator Failure Detection Enable

1 = Failure detection of Watchdog Timer oscillator is enabled

0 = Failure detection of Watchdog Timer oscillator is disabled

SCKSEL—System Clock Oscillator Select

000 = Internal precision oscillator functions as system clock at 5.53 MHz

001 = Internal precision oscillator functions as system clock at 32 kHz

010 = Crystal oscillator or external RC oscillator functions as system clock

011 = Watchdog Timer oscillator functions as system

100 = External clock signal on PB3 functions as system clock

101 = Reserved

110 = Reserved

111 = Reserved

Figure 29 displays the typical (3.3 V and 25 °C) oscillator frequency as a function of the capacitor (C in pF) employed in the RC network assuming a 45 K Ω external resistor. For very small values of C , the parasitic capacitance of the oscillator XIN pin and the printed circuit board must be included in the estimation of the oscillator frequency.

It is possible to operate the RC oscillator using only the parasitic capacitance of the package and printed circuit board. To minimize sensitivity to external parasitics, external capacitance values in excess of 20 pF are recommended.

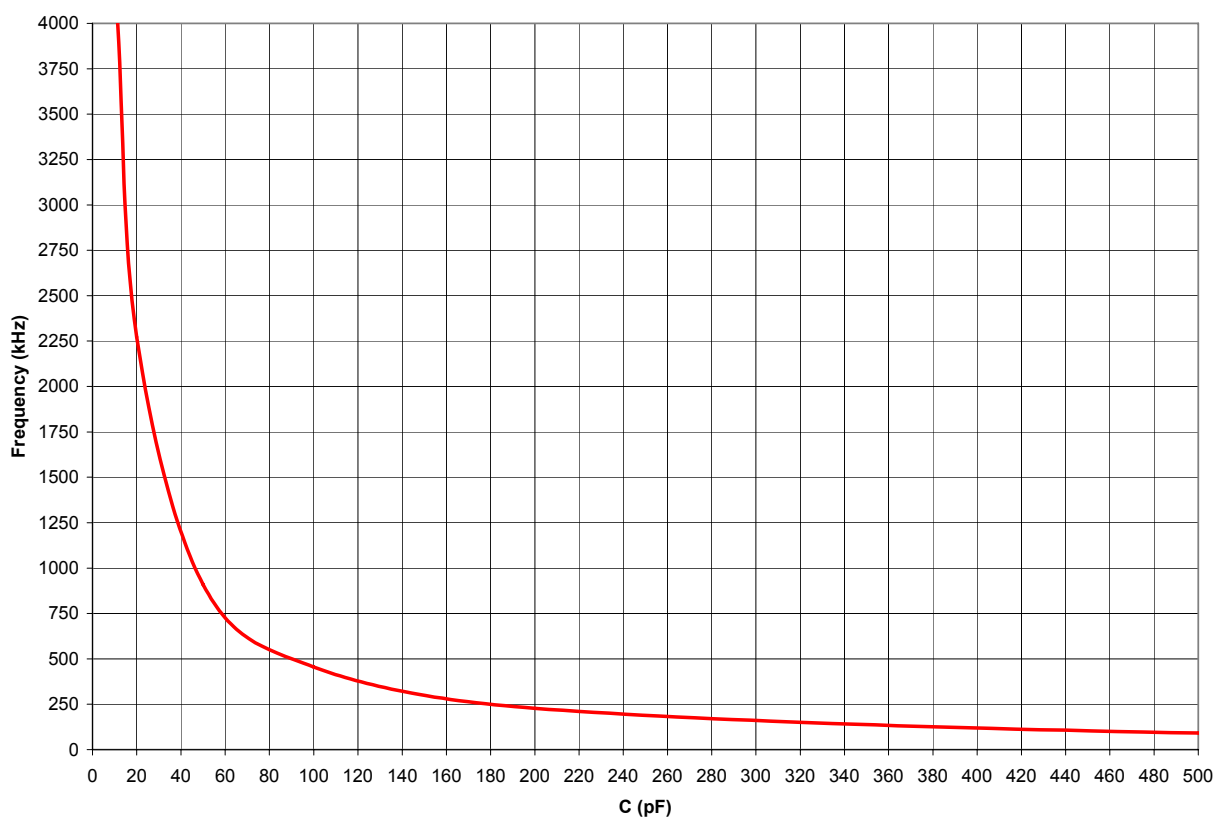


Figure 29. Typical RC Oscillator Frequency as a Function of the External Capacitance with a 45 k Ω Resistor



Caution:

When using the external RC oscillator mode, the oscillator can stop oscillating if the power supply drops below 2.7 V, but before the power supply drops to the Voltage Brownout threshold. The oscillator resumes oscillation when the supply voltage exceeds 2.7 V.

Table 128. Power Consumption (Continued)

$V_{DD} = 2.7 \text{ V to } 3.6 \text{ V}$						
Maximum ² Maximum ³						
Symbol	Parameter	Typical ¹	Std Temp	Ext Temp	Units	Conditions
I_{DD} LPO	Low-Power Operational Amplifier Supply Current	3	5	5	μA	Driving a high-impedance load
I_{DD} TS	Temperature Sensor Supply Current	60			μA	See Notes 4
I_{DD} BG	Band Gap Supply Current	320	480	500	μA	For 20-/28-pin devices
						For 8-pin devices

Notes

1. Typical conditions are defined as $V_{DD} = 3.3 \text{ V}$ and $+30 \text{ }^{\circ}\text{C}$.
2. Standard temperature is defined as $T_A = 0 \text{ }^{\circ}\text{C}$ to $+70 \text{ }^{\circ}\text{C}$; these values not tested in production for worst case behavior, but are derived from product characterization and provided for design guidance only.
3. Extended temperature is defined as $T_A = -40 \text{ }^{\circ}\text{C}$ to $+105 \text{ }^{\circ}\text{C}$; these values not tested in production for worst case behavior, but are derived from product characterization and provided for design guidance only.
4. For this block to operate, the bandgap circuit is automatically turned on and must be added to the total supply current. This bandgap current is only added once, regardless of how many peripherals are using it.

Table 132. Flash Memory Electrical Characteristics and Timing

$V_{DD} = 2.7\text{ V to }3.6\text{ V}$ $T_A = -40\text{ }^{\circ}\text{C to }+105\text{ }^{\circ}\text{C}$ (unless otherwise stated)					
Parameter	Minimum	Typical	Maximum	Units	Notes
Flash Byte Read Time	100	–	–	ns	
Flash Byte Program Time	20	–	40	μs	
Flash Page Erase Time	10	–	–	ms	
Flash Mass Erase Time	200	–	–	ms	
Writes to Single Address Before Next Erase	–	–	2		
Flash Row Program Time	–	–	8	ms	Cumulative program time for single row cannot exceed limit before next erase. This parameter is only an issue when bypassing the Flash Controller.
Data Retention	100	–	–	years	25 $^{\circ}\text{C}$
Endurance	10,000	–	–	cycles	Program/erase cycles

Table 133. Watchdog Timer Electrical Characteristics and Timing

V _{DD} = 2.7 V to 3.6 V T _A = -40 °C to +105 °C (unless otherwise stated)						
Symbol	Parameter	Minimum	Typical	Maximum	Units	Conditions
F _{WDT}	WDT Oscillator Frequency		10		kHz	
F _{WDT}	WDT Oscillator Error			±50	%	
T _{WDT_{CAL}}	WDT Calibrated Timeout	0.98	1	1.02	s	V _{DD} = 3.3 V; T _A = 30 °C
		0.70	1	1.30	s	V _{DD} = 2.7 V to 3.6 V T _A = 0 °C to 70 °C
		0.50	1	1.50	s	V _{DD} = 2.7 V to 3.6 V T _A = -40 °C to +105 °C

Table 136. Low Power Operational Amplifier Electrical Characteristics

$V_{DD} = 2.7 \text{ V to } 3.6 \text{ V}$ $T_A = -40 \text{ }^{\circ}\text{C to } +105 \text{ }^{\circ}\text{C}$						
Symbol	Parameter	Minimum	Typical	Maximum	Units	Conditions
A_v	Open loop voltage gain		80		dB	
GBW	Gain/Bandwidth product		500		kHz	
PM	Phase Margin		50		deg	Assuming 13 pF load capacitance
V_{OSLPO}	Input Offset Voltage		± 1	± 4	mV	
V_{OSLPO}	Input Offset Voltage (Temperature Drift)		1	10	$\mu\text{V}/^{\circ}\text{C}$	
V_{IN}	Input Voltage Range	0.3		$V_{DD} - 1$	V	
V_{OUT}	Output Voltage Range	0.3		$V_{DD} - 1$	V	$I_{OUT} = 45 \mu\text{A}$

Table 137. Comparator Electrical Characteristics

$V_{DD} = 2.7 \text{ V to } 3.6 \text{ V}$ $T_A = -40 \text{ }^{\circ}\text{C to } +105 \text{ }^{\circ}\text{C}$						
Symbol	Parameter	Minimum	Typical	Maximum	Units	Conditions
V_{OS}	Input DC Offset		5		mV	
V_{CREF}	Programmable Internal Reference Voltage		± 5		%	20-/28-pin devices
			± 3		%	8-pin devices
T_{PROP}	Propagation Delay		200		ns	
V_{HYS}	Input Hysteresis		4		mV	
V_{IN}	Input Voltage Range	V_{SS}		$V_{DD} - 1$	V	

On-Chip Debugger Timing

Figure 36 and Table 141 provide timing information for the DBG pin. The DBG pin timing specifications assume a 4 ns maximum rise and fall time.

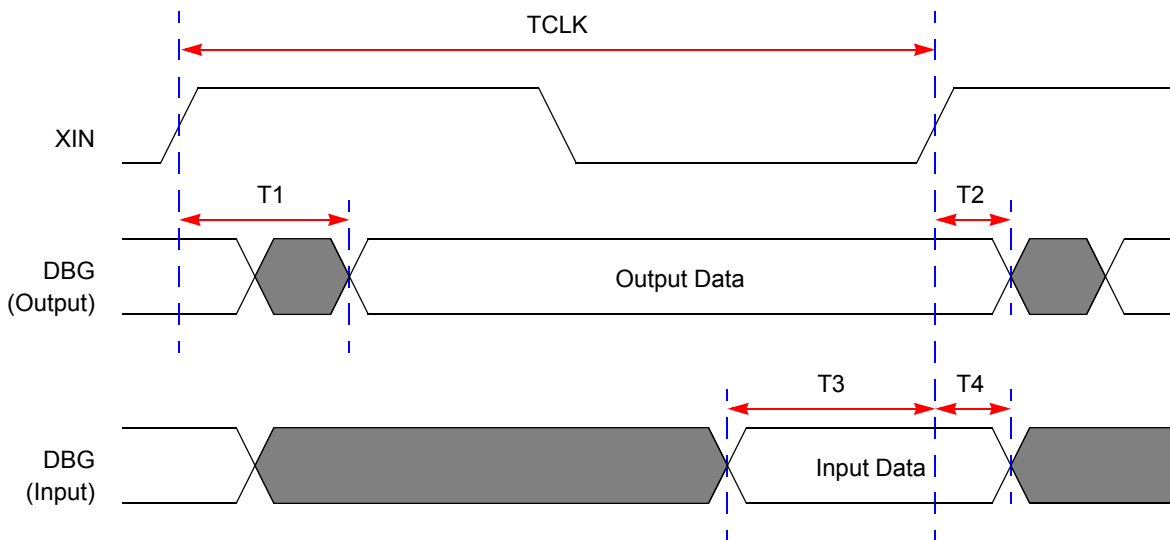


Figure 36. On-Chip Debugger Timing

Table 141. On-Chip Debugger Timing

Parameter	Abbreviation	Delay (ns)	
		Minimum	Maximum
DBG			
T ₁	XIN Rise to DBG Valid Delay	–	15
T ₂	XIN Rise to DBG Output Hold Time	2	–
T ₃	DBG to XIN Rise Input Setup Time	5	–
T ₄	DBG to XIN Rise Input Hold Time	5	–

Figure 40 displays the 8-pin Small Outline Integrated Circuit package (SOIC) available for the Z8 Encore! XP[®] F082A Series devices.

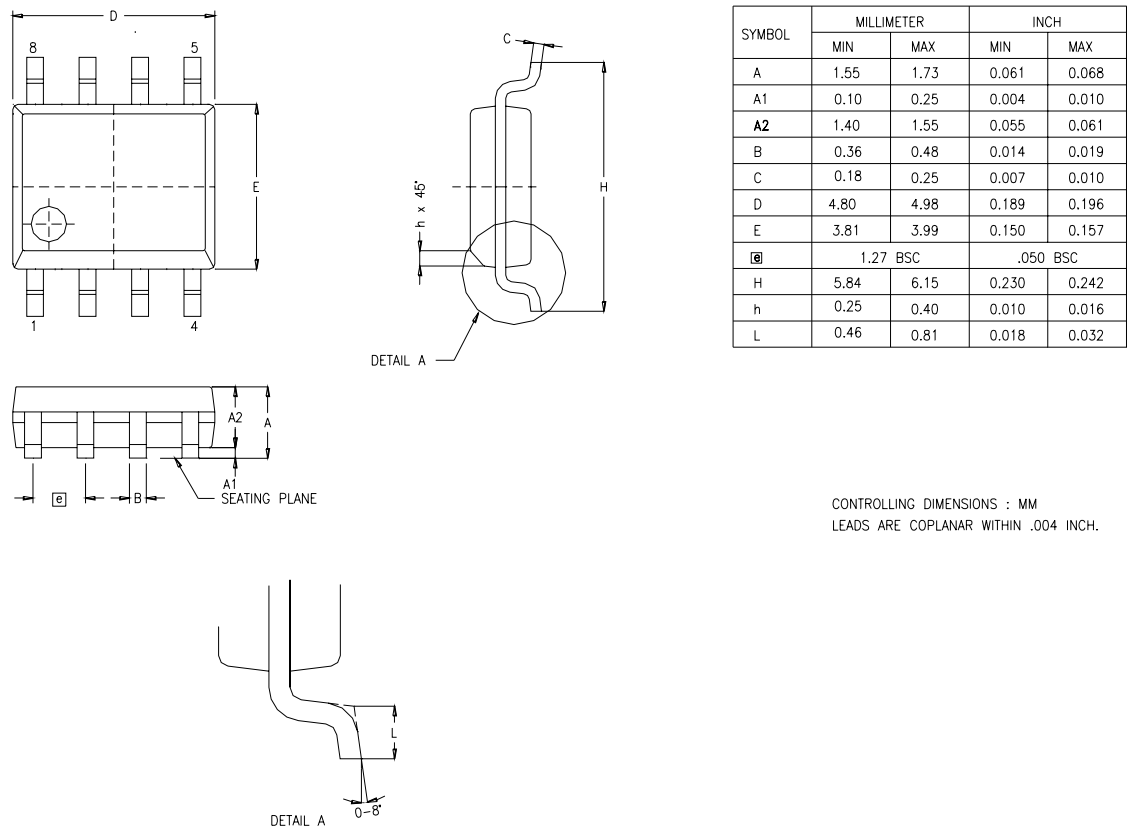


Figure 40. 8-Pin Small Outline Integrated Circuit Package (SOIC)

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 4 KB Flash, 10-Bit Analog-to-Digital Converter											
Standard Temperature: 0 °C to 70 °C											
Z8F042APB020SC	4 KB	1 KB	128 B	6	14	2	4	1	1	1	PDIP 8-pin package
Z8F042AQB020SC	4 KB	1 KB	128 B	6	14	2	4	1	1	1	QFN 8-pin package
Z8F042ASB020SC	4 KB	1 KB	128 B	6	14	2	4	1	1	1	SOIC 8-pin package
Z8F042ASH020SC	4 KB	1 KB	128 B	17	20	2	7	1	1	1	SOIC 20-pin package
Z8F042AHH020SC	4 KB	1 KB	128 B	17	20	2	7	1	1	1	SSOP 20-pin package
Z8F042APH020SC	4 KB	1 KB	128 B	17	20	2	7	1	1	1	PDIP 20-pin package
Z8F042ASJ020SC	4 KB	1 KB	128 B	23	20	2	8	1	1	1	SOIC 28-pin package
Z8F042AHJ020SC	4 KB	1 KB	128 B	23	20	2	8	1	1	1	SSOP 28-pin package
Z8F042APJ020SC	4 KB	1 KB	128 B	23	20	2	8	1	1	1	PDIP 28-pin package
Extended Temperature: -40 °C to 105 °C											
Z8F042APB020EC	4 KB	1 KB	128 B	6	14	2	4	1	1	1	PDIP 8-pin package
Z8F042AQB020EC	4 KB	1 KB	128 B	6	14	2	4	1	1	1	QFN 8-pin package
Z8F042ASB020EC	4 KB	1 KB	128 B	6	14	2	4	1	1	1	SOIC 8-pin package
Z8F042ASH020EC	4 KB	1 KB	128 B	17	20	2	7	1	1	1	SOIC 20-pin package
Z8F042AHH020EC	4 KB	1 KB	128 B	17	20	2	7	1	1	1	SSOP 20-pin package
Z8F042APH020EC	4 KB	1 KB	128 B	17	20	2	7	1	1	1	PDIP 20-pin package
Z8F042ASJ020EC	4 KB	1 KB	128 B	23	20	2	8	1	1	1	SOIC 28-pin package
Z8F042AHJ020EC	4 KB	1 KB	128 B	23	20	2	8	1	1	1	SSOP 28-pin package
Z8F042APJ020EC	4 KB	1 KB	128 B	23	20	2	8	1	1	1	PDIP 28-pin package
Replace C with G for Lead-Free Packaging											