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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, WDT
Number of I/O	25
Program Memory Size	2KB (2K x 8)
Program Memory Type	FLASH
EEPROM Size	64 x 8
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	-
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	28-SOIC (0.295", 7.50mm Width)
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/zilog/z8f021asj020ec

- Up to thirteen 5 V-tolerant input pins
- Up to 8 ports capable of direct LED drive with no current limit resistor required
- On-Chip Debugger (OCD)
- Voltage Brownout (VBO) protection
- Programmable low battery detection (LVD) (8-pin devices only)
- Bandgap generated precision voltage references available for the ADC, comparator, VBO, and LVD
- Power-On Reset (POR)
- 2.7 V to 3.6 V operating voltage
- 8-, 20-, and 28-pin packages
- 0 °C to +70 °C and -40 °C to +105 °C for operating temperature ranges

Part Selection Guide

Table 1 on page 3 identifies the basic features and package styles available for each device within the Z8 Encore! XP® F082A Series product line.

addresses outside the available Flash memory addresses returns FFH. Writing to these unimplemented Program Memory addresses produces no effect. Table 5 describes the Program Memory Maps for the Z8 Encore! XP F082A Series products.

Table 5. Z8 Encore! XP F082A Series Program Memory Maps

Program Memory Address (Hex)	Function
Z8F082A and Z8F081A Products	
0000–0001	Flash Option Bits
0002–0003	Reset Vector
0004–0005	WDT Interrupt Vector
0006–0007	Illegal Instruction Trap
0008–0037	Interrupt Vectors*
0038–0039	Reserved
003A–003D	Oscillator Fail Trap Vectors
003E–1FFF	Program Memory
Z8F042A and Z8F041A Products	
0000–0001	Flash Option Bits
0002–0003	Reset Vector
0004–0005	WDT Interrupt Vector
0006–0007	Illegal Instruction Trap
0008–0037	Interrupt Vectors*
0038–0039	Reserved
003A–003D	Oscillator Fail Trap Vectors
003E–0FFF	Program Memory

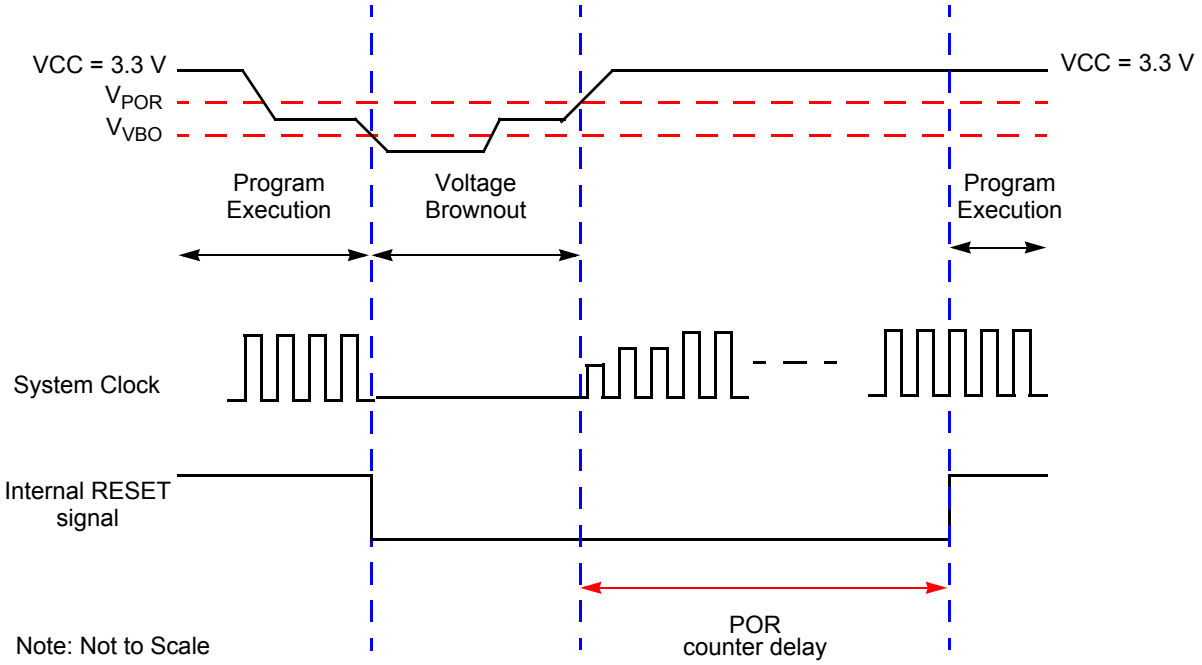

Figure 6. Voltage Brownout Reset Operation

The POR level is greater than the VBO level by the specified hysteresis value. This ensures that the device undergoes a Power-On Reset after recovering from a VBO condition.

Watchdog Timer Reset

If the device is in NORMAL or HALT mode, the Watchdog Timer can initiate a System Reset at time-out if the WDT_RES Flash Option Bit is programmed to 1. This is the unprogrammed state of the WDT_RES Flash Option Bit. If the bit is programmed to 0, it configures the Watchdog Timer to cause an interrupt, not a System Reset, at time-out.

The WDT bit in the Reset Status (RSTSTAT) register is set to signify that the reset was initiated by the Watchdog Timer.

External Reset Input

The $\overline{\text{RESET}}$ pin has a Schmitt-Triggered input and an internal pull-up resistor. Once the $\overline{\text{RESET}}$ pin is asserted for a minimum of four system clock cycles, the device progresses through the System Reset sequence. Because of the possible asynchronicity of the system clock and reset signals, the required reset duration may be as short as three clock periods

Watchdog Timer

The Watchdog Timer (WDT) protects against corrupt or unreliable software, power faults, and other system-level problems which may place the Z8 Encore! XP® F082A Series devices into unsuitable operating states. The features of Watchdog Timer include:

- On-chip RC oscillator.
- A selectable time-out response: reset or interrupt.
- 24-bit programmable time-out value.

Operation

The Watchdog Timer is a one-shot timer that resets or interrupts the Z8 Encore! XP F082A Series devices when the WDT reaches its terminal count. The Watchdog Timer uses a dedicated on-chip RC oscillator as its clock source. The Watchdog Timer operates in only two modes: ON and OFF. Once enabled, it always counts and must be refreshed to prevent a time-out. Perform an enable by executing the WDT instruction or by setting the WDT_AO Flash Option Bit. The WDT_AO bit forces the Watchdog Timer to operate immediately upon reset, even if a WDT instruction has not been executed.

The Watchdog Timer is a 24-bit reloadable downcounter that uses three 8-bit registers in the eZ8 CPU register space to set the reload value. The nominal WDT time-out period is described by the following equation:

$$\text{WDT Time-out Period (ms)} = \frac{\text{WDT Reload Value}}{10}$$

where the WDT reload value is the decimal value of the 24-bit value given by {WDTU[7:0], WDTH[7:0], WDTL[7:0]} and the typical Watchdog Timer RC oscillator frequency is 10 kHz. The Watchdog Timer cannot be refreshed after it reaches 000002H. The WDT Reload Value must not be set to values below 000004H. Table 56 provides information about approximate time-out delays for the minimum and maximum WDT reload values.

Table 56. Watchdog Timer Approximate Time-Out Delays

WDT Reload Value (Hex)	WDT Reload Value (Decimal)	Approximate Time-Out Delay (with 10 kHz typical WDT oscillator frequency)	
		Typical	Description
000004	4	400 µs	Minimum time-out delay
FFFFFF	16,777,215	28 minutes	Maximum time-out delay

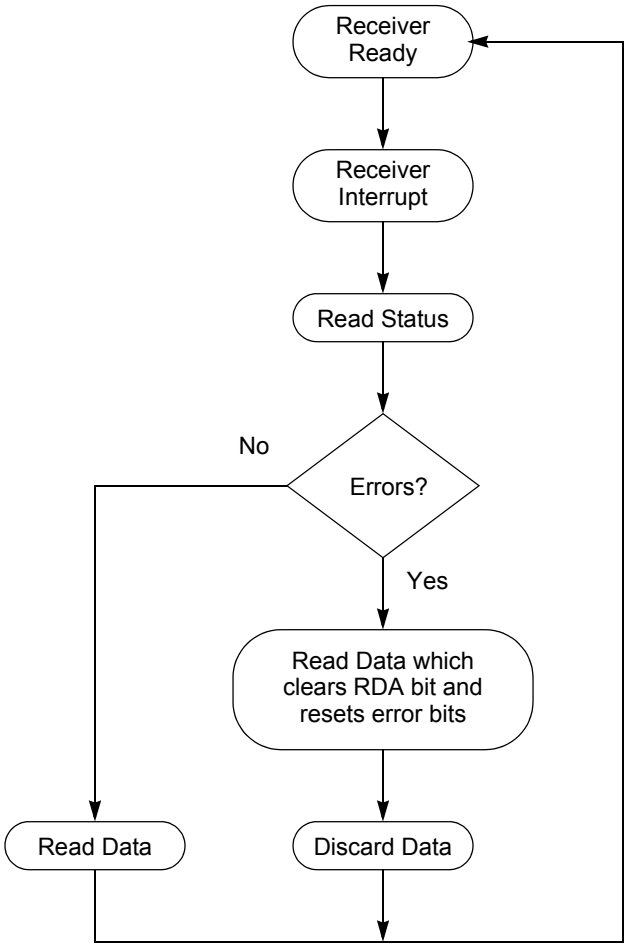

Figure 15. UART Receiver Interrupt Service Routine Flow

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.

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.

Option Bit Types

User Option Bits

The user option bits are contained in the first two bytes of program memory. User access to these bits has been provided because these locations contain application-specific device configurations. The information contained here is lost when page 0 of the program memory is erased.

Trim Option Bits

The trim option bits are contained in the information page of the Flash memory. These bits are factory programmed values required to optimize the operation of onboard analog circuitry and cannot be permanently altered. Program Memory may be erased without endangering these values. It is possible to alter working values of these bits by accessing the Trim Bit Address and Data Registers, but these working values are lost after a power loss or any other reset event.

There are 32 bytes of trim data. To modify one of these values the user code must first write a value between 00H and 1FH into the Trim Bit Address Register. The next write to the Trim Bit Data register changes the working value of the target trim data byte.

Reading the trim data requires the user code to write a value between 00H and 1FH into the Trim Bit Address Register. The next read from the Trim Bit Data register returns the working value of the target trim data byte.

Note: *The trim address range is from information address 20-3F only. The remainder of the information page is not accessible through the trim bit address and data registers.*

Calibration Option Bits

The calibration option bits are also contained in the information page. These bits are factory programmed values intended for use in software correcting the device's analog performance. To read these values, the user code must employ the LDC instruction to access the information area of the address space as defined in See Flash Information Area on page 17.

Serialization Bits

As an optional feature, Zilog® is able to provide factory-programmed serialization. For serialized products, the individual devices are programmed with unique serial numbers. These serial numbers are binary values, four bytes in length. The numbers increase in size with each device, but gaps in the serial sequence may exist.

These serial numbers are stored in the Flash information page (see Reading the Flash Information Page on page 155 and Serialization Data on page 165 for more details) and are unaffected by mass erasure of the device's Flash memory.

Table 94. ADC Calibration Data Location

Info Page Address	Memory Address	Compensation Usage	ADC Mode	Reference Type
60	FE60	Offset	Single-Ended Unbuffered	Internal 2.0 V
08	FE08	Gain High Byte	Single-Ended Unbuffered	Internal 2.0 V
09	FE09	Gain Low Byte	Single-Ended Unbuffered	Internal 2.0 V
63	FE63	Offset	Single-Ended Unbuffered	Internal 1.0 V
0A	FE0A	Gain High Byte	Single-Ended Unbuffered	Internal 1.0 V
0B	FE0B	Gain Low Byte	Single-Ended Unbuffered	Internal 1.0 V
66	FE66	Offset	Single-Ended Unbuffered	External 2.0 V
0C	FE0C	Gain High Byte	Single-Ended Unbuffered	External 2.0 V
0D	FE0D	Gain Low Byte	Single-Ended Unbuffered	External 2.0 V
69	FE69	Offset	Single-Ended 1x Buffered	Internal 2.0 V
0E	FE0E	Gain High Byte	Single-Ended 1x Buffered	Internal 2.0 V
0F	FE0F	Gain Low Byte	Single-Ended 1x Buffered	Internal 2.0 V
6C	FE6C	Offset	Single-Ended 1x Buffered	External 2.0 V
10	FE10	Gain High Byte	Single-Ended 1x Buffered	External 2.0 V
11	FE11	Gain Low Byte	Single-Ended 1x Buffered	External 2.0 V
6F	FE6F	Offset	Differential Unbuffered	Internal 2.0 V
12	FE12	Positive Gain High Byte	Differential Unbuffered	Internal 2.0 V
13	FE13	Positive Gain Low Byte	Differential Unbuffered	Internal 2.0 V
30	FE30	Negative Gain High Byte	Differential Unbuffered	Internal 2.0 V
31	FE31	Negative Gain Low Byte	Differential Unbuffered	Internal 2.0 V
72	FE72	Offset	Differential Unbuffered	Internal 1.0 V
14	FE14	Positive Gain High Byte	Differential Unbuffered	Internal 1.0 V
15	FE15	Positive Gain Low Byte	Differential Unbuffered	Internal 1.0 V
32	FE32	Negative Gain High Byte	Differential Unbuffered	Internal 1.0 V
33	FE33	Negative Gain Low Byte	Differential Unbuffered	Internal 1.0 V
75	FE75	Offset	Differential Unbuffered	External 2.0 V
16	FE16	Positive Gain High Byte	Differential Unbuffered	External 2.0 V
17	FE17	Positive Gain Low Byte	Differential Unbuffered	External 2.0 V

Table 108. Oscillator Configuration and Selection

Clock Source	Characteristics	Required Setup
Internal Precision RC Oscillator	• 32.8 kHz or 5.53 MHz • High accuracy • No external components required	• Unlock and write Oscillator Control Register (OSCCTL) to enable and select oscillator at either 5.53 MHz or 32.8 kHz
External Crystal/ Resonator	• 32 kHz to 20 MHz • Very high accuracy (dependent on crystal or resonator used) • Requires external components	• Configure Flash option bits for correct external oscillator mode • Unlock and write OSCCTL to enable crystal oscillator, wait for it to stabilize and select as system clock (if the XTLDIS option bit has been de-asserted, no waiting is required)
External RC Oscillator	• 32 kHz to 4 MHz • Accuracy dependent on external components	• Configure Flash option bits for correct external oscillator mode • Unlock and write OSCCTL to enable crystal oscillator and select as system clock
External Clock Drive	• 0 to 20 MHz • Accuracy dependent on external clock source	• Write GPIO registers to configure PB3 pin for external clock function • Unlock and write OSCCTL to select external system clock • Apply external clock signal to GPIO
Internal Watchdog Timer Oscillator	• 10 kHz nominal • Low accuracy; no external components required • Very low power consumption	• Enable WDT if not enabled and wait until WDT Oscillator is operating. • Unlock and write Oscillator Control Register (OSCCTL) to enable and select oscillator

Caution: *Unintentional accesses to the oscillator control register can actually stop the chip by switching to a non-functioning oscillator. To prevent this condition, the oscillator control block employs a register unlocking/locking scheme.*

OSC Control Register Unlocking/Locking

To write the oscillator control register, unlock it by making two writes to the OSCCTL register with the values E7H followed by 18H. A third write to the OSCCTL register changes the value of the actual register and returns the register to a locked state. Any other sequence of oscillator control register writes has no effect. The values written to unlock the register must be ordered correctly, but are not necessarily consecutive. It is possible to write to or read from other registers within the unlocking/locking operation.

Table 116 through Table 123 lists the instructions belonging to each group and the number of operands required for each instruction. Some instructions appear in more than one table as these instruction can be considered as a subset of more than one category. Within these tables, the source operand is identified as ‘src’, the destination operand is ‘dst’ and a condition code is ‘cc’.

Table 116. Arithmetic Instructions

Mnemonic	Operands	Instruction
ADC	dst, src	Add with Carry
ADCX	dst, src	Add with Carry using Extended Addressing
ADD	dst, src	Add
ADDX	dst, src	Add using Extended Addressing
CP	dst, src	Compare
CPC	dst, src	Compare with Carry
CPCX	dst, src	Compare with Carry using Extended Addressing
CPX	dst, src	Compare using Extended Addressing
DA	dst	Decimal Adjust
DEC	dst	Decrement
DECW	dst	Decrement Word
INC	dst	Increment
INCW	dst	Increment Word
MULT	dst	Multiply
SBC	dst, src	Subtract with Carry
SBCX	dst, src	Subtract with Carry using Extended Addressing
SUB	dst, src	Subtract
SUBX	dst, src	Subtract using Extended Addressing

AC Characteristics

The section provides information about the AC characteristics and timing. All AC timing information assumes a standard load of 50 pF on all outputs.

Table 129. AC Characteristics

		V_{DD} = 2.7 V to 3.6 V T_A = -40 °C to +105 °C (unless otherwise stated)			
Symbol	**Parameter**	**Minimum**	**Maximum**	**Units**	**Conditions**
F_{SYSCLK}	System Clock Frequency	–	20.0	MHz	Read-only from Flash memory
		0.032768	20.0	MHz	Program or erasure of the Flash memory
F_{XTAL}	Crystal Oscillator Frequency	–	20.0	MHz	System clock frequencies below the crystal oscillator minimum require an external clock driver
T_{XIN}	System Clock Period	50	–	ns	$T_{CLK} = 1/F_{sysclk}$
T_{XINH}	System Clock High Time	20	30	ns	T_{CLK} = 50 ns
T_{XINL}	System Clock Low Time	20	30	ns	T_{CLK} = 50 ns
T_{XINR}	System Clock Rise Time	–	3	ns	T_{CLK} = 50 ns
T_{XINF}	System Clock Fall Time	–	3	ns	T_{CLK} = 50 ns

On-Chip Peripheral AC and DC Electrical Characteristics

Table 131. Power-On Reset and Voltage Brownout Electrical Characteristics and Timing

		T_A = -40 °C to +105 °C				
Symbol	**Parameter**	**Minimum**	**Typical[1]**	**Maximum**	**Units**	**Conditions**
V_{POR}	Power-On Reset Voltage Threshold	2.20	2.45	2.70	V	$V_{DD} = V_{POR}$
V_{VBO}	Voltage Brownout Reset Voltage Threshold	2.15	2.40	2.65	V	$V_{DD} = V_{VBO}$
	V_{POR} to V_{VBO} hysteresis		50	75	mV	
	Starting V_{DD} voltage to ensure valid Power-On Reset.	–	V_{SS}	–	V	
T_{ANA}	Power-On Reset Analog Delay	–	70	–	µs	$V_{DD} > V_{POR}$; T_{POR} Digital Reset delay follows T_{ANA}
T_{POR}	Power-On Reset Digital Delay		16		µs	66 Internal Precision Oscillator cycles + IPO startup time (T_{IPOST})
T_{POR}	Power-On Reset Digital Delay		1		ms	5000 Internal Precision Oscillator cycles
T_{SMR}	Stop Mode Recovery with crystal oscillator disabled		16		µs	66 Internal Precision Oscillator cycles
T_{SMR}	Stop Mode Recovery with crystal oscillator enabled		1		ms	5000 Internal Precision Oscillator cycles
T_{VBO}	Voltage Brownout Pulse Rejection Period	–	10	–	µs	Period of time in which $V_{DD} < V_{VBO}$ without generating a Reset.
T_{RAMP}	Time for V_{DD} to transition from V_{SS} to V_{POR} to ensure valid Reset	0.10	–	100	ms	
T_{SMP}	Stop Mode Recovery pin pulse rejection period		20		ns	For any SMR pin or for the Reset pin when it is asserted in STOP mode.

[1]Data in the typical column is from characterization at 3.3 V and 30 °C. These values are provided for design guidance only and are not tested in production.

Table 134. Non-Volatile Data Storage

	V_{DD} = 2.7 V to 3.6 V T_A = -40 °C to +105 °C				
Parameter	**Minimum**	**Typical**	**Maximum**	**Units**	**Notes**
NVDS Byte Read Time	34	–	519	µs	With system clock at 20 MHz
NVDS Byte Program Time	0.171	–	39.7	ms	With system clock at 20 MHz
Data Retention	100	–	–	years	25 °C
Endurance	160,000	–	–	cycles	Cumulative write cycles for entire memory

Table 135. Analog-to-Digital Converter Electrical Characteristics and Timing

		V_{DD} = 3.0 V to 3.6 V T_A = 0 °C to +70 °C (unless otherwise stated)				
Symbol	**Parameter**	**Minimum**	**Typical**	**Maximum**	**Units**	**Conditions**
	Resolution	10		–	bits	
	Differential Nonlinearity (DNL)	-1.0	–	1.0	LSB[3]	External V_{REF} = 2.0 V; $R_S \leftarrow$ 3.0 kΩ
	Integral Nonlinearity (INL)	-3.0	–	3.0	LSB[3]	External V_{REF} = 2.0 V; $R_S \leftarrow$ 3.0 kΩ
	Offset Error with Calibration		±1		LSB[3]	
	Absolute Accuracy with Calibration		±3		LSB[3]	
V_{REF}	Internal Reference Voltage	1.0 2.0	1.1 2.2	1.2 2.4	V	REFSEL=01 REFSEL=10
V_{REF}	Internal Reference Variation with Temperature		±1.0		%	Temperature variation with V_{DD} = 3.0
V_{REF}	Internal Reference Voltage Variation with V_{DD}		±0.5		%	Supply voltage variation with T_A = 30 °C
R_{REFOUT}	Reference Buffer Output Impedance		850		Ω	When the internal reference is buffered and driven out to the VREF pin (REFOUT = 1)

UART Timing

Figure 37 and Table 142 provide timing information for UART pins for the case where CTS is used for flow control. The CTS to DE assertion delay (T1) assumes the transmit data register has been loaded with data prior to CTS assertion.

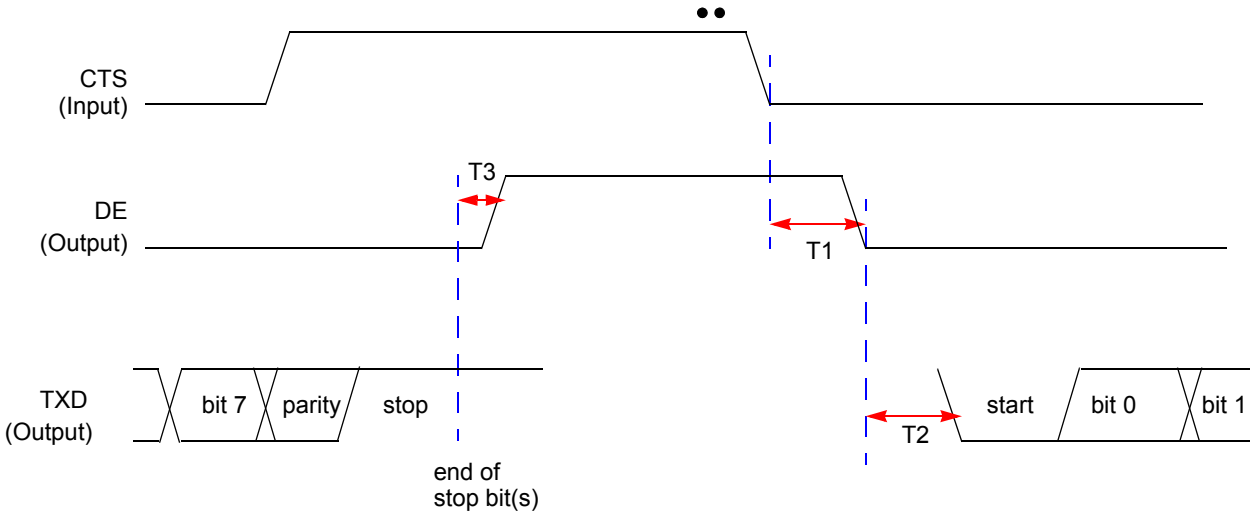

Figure 37. UART Timing With CTS

Table 142. UART Timing With CTS

		Delay (ns)	
Parameter	**Abbreviation**	**Minimum**	**Maximum**
UART			
T_1	CTS Fall to DE output delay	2 * XIN period	2 * XIN period + 1 bit time
T_2	DE assertion to TXD falling edge (start bit) delay	± 5	
T_3	End of Stop Bit(s) to DE deassertion delay	± 5	

Figure 38 and Table 143 provide timing information for UART pins for the case where CTS is not used for flow control. DE asserts after the transmit data register has been written. DE remains asserted for multiple characters as long as the transmit data register is written with the next character before the current character has completed.

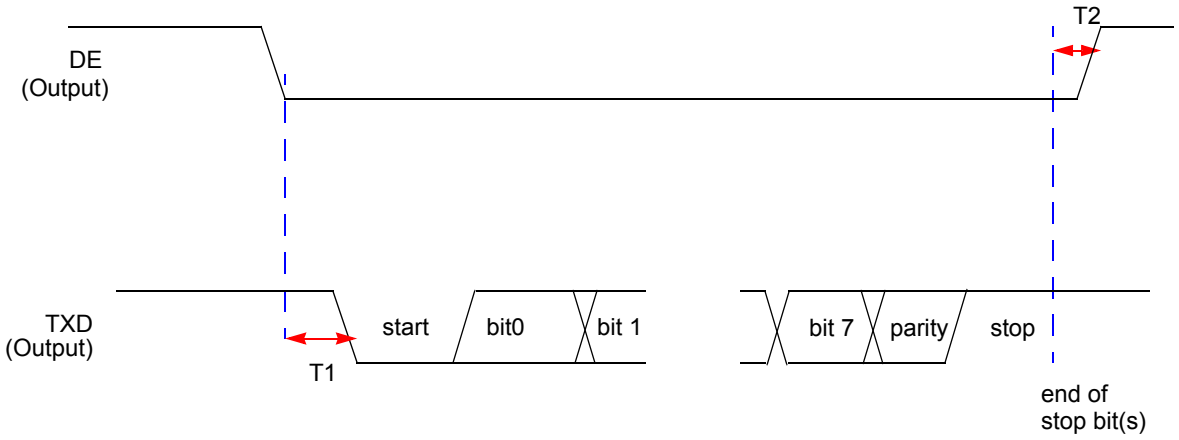

Figure 38. UART Timing Without CTS

Table 143. UART Timing Without CTS

		Delay (ns)	
Parameter	**Abbreviation**	**Minimum**	**Maximum**
UART			
T_1	DE assertion to TXD falling edge (start bit) delay	1 * XIN period	1 bit time
T_2	End of Stop Bit(s) to DE deassertion delay (Tx data register is empty)	± 5	

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											

G

H

I

S