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High Performance 8-Bit Microcontrollers

**Z8 Encore! XP[®] F0822
Series**

Product Specification

PS022518-1011



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Revision History

Each instance in Revision History reflects a change to this document from its previous revision. For more details, refer to the corresponding pages and appropriate links in the table below.

Date	Revision Level	Description	Page
Oct 2011	18	Added LDWX information to Load Instructions table, eZ8 CPU Instruction Summary table and to Second Op Code Map after 1FH figure; revised Flash Sector Protect Register description; revised Packaging chapter.	206 , 212 , 220 , 152 , 221
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Introduction

Zilog's Z8 Encore! XP[®] MCU product family is a line of Zilog microcontrollers based on the 8-bit eZ8 CPU. Z8 Encore! XP[®] F0822 Series of MCUs adds Flash memory to Zilog's extensive line of 8-bit microcontrollers. The Flash in-circuit programming allows faster development time and program changes in the field. The new eZ8 CPU is upward-compatible with the existing Z8[®] CPU instructions. The rich peripheral set of the Z8 Encore! XP[®] F0822 Series makes it suitable for a variety of applications including motor control, security systems, home appliances, personal electronic devices and sensors.

Features

The Z8 Encore! XP[®] F0822 Series features:

- 20MHz eZ8 CPU core
- Up to 8KB Flash with in-circuit programming capability
- 1KB Register RAM
- Optional 2- to 5-channel, 10-bit Analog-to-Digital Converter (ADC)
- Full-duplex 9-bit Universal Asynchronous Receiver/Transmitter (UART) with bus transceiver Driver Enable Control
- Inter-Integrated Circuit (I²C)
- Serial Peripheral Interface (SPI)
- Infrared Data Association (IrDA)-compliant infrared encoder/decoders
- Two 16-bit timers with Capture, Compare, and PWM capability
- Watchdog Timer (WDT) with internal RC oscillator
- 11 to 19 Input/Output pins depending upon package
- Up to 19 interrupts with configurable priority
- On-Chip Debugger (OCD)
- Voltage Brown-Out (VBO) protection
- Power-On Reset (POR)
- Crystal oscillator with three power settings and RC oscillator option
- 2.7V to 3.6V operating voltage with 5V-tolerant inputs
- 20-pin and 28-pin packages

- 0°C to +70°C standard temperature and –40°C to +105°C extended temperature operating ranges

Part Selection Guide

Table 1 identifies the basic features and package styles available for each device within the Z8 Encore! XP® F0822 Series.

Table 1. Z8 Encore! XP® F0822 Series Part Selection Guide

Part Number	Flash (KB)	RAM (KB)	I/O	16-bit Timers with PWM	ADC Inputs	UARTs with IrDA	I ² C	SPI	Package Pin Counts	
									20	28
Z8F0822	8	1	19	2	5	1	1	1		X
Z8F0821	8	1	11	2	2	1	1		X	
Z8F0812	8	1	19	2	0	1	1	1		X
Z8F0811	8	1	11	2	0	1	1		X	
Z8F0422	4	1	19	2	5	1	1	1		X
Z8F0421	4	1	11	2	2	1	1		X	
Z8F0412	4	1	19	2	0	1	1	1		X
Z8F0411	4	1	11	2	0	1	1		X	

Block Diagram

Figure 1 displays the block diagram of the architecture of Z8 Encore! XP[®] F0822 Series devices.

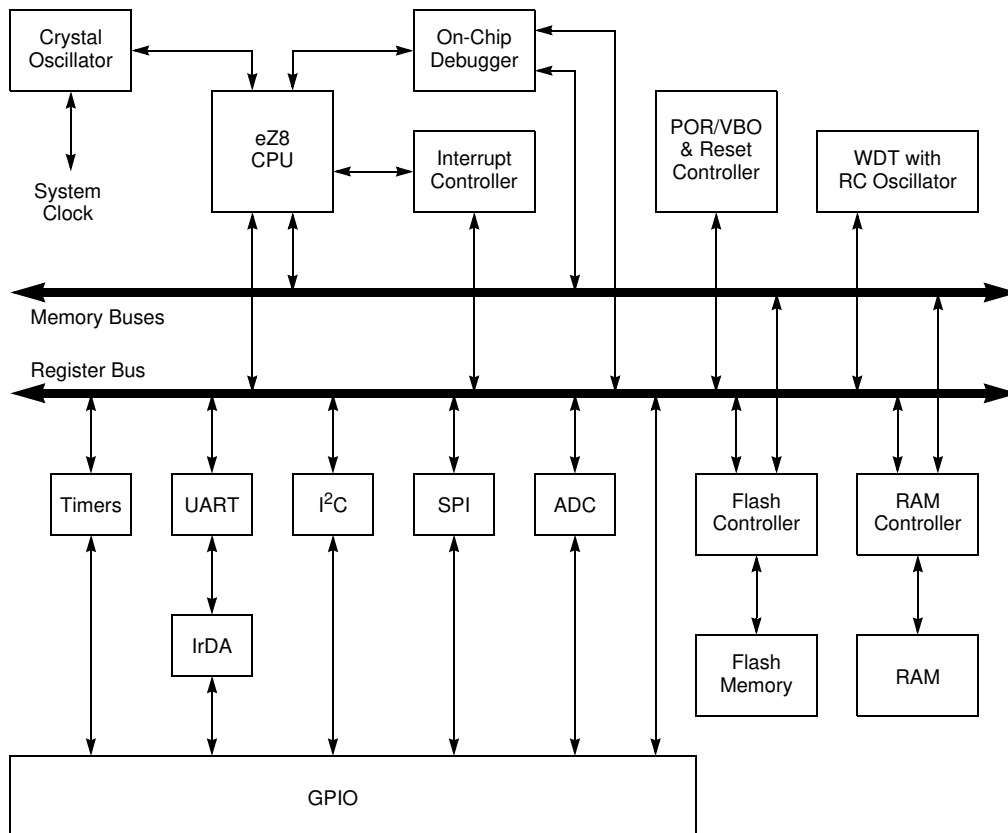


Figure 1. Z8 Encore! XP[®] F0822 Series Block Diagram

CPU and Peripheral Overview

Zilog's latest eZ8 8-bit CPU meets the continuing demand for faster and more code-efficient microcontrollers. The eZ8 CPU executes a superset of the original Z8® instruction set.

The eZ8 CPU features:

- Direct register-to-register architecture allows each register to function as an accumulator, improving execution time and decreasing the required Program memory
- Software stack allows much greater depth in subroutine calls and interrupts than hardware stacks
- Compatible with existing Z8® code
- Expanded internal Register File allows access of up to 4KB
- New instructions improve execution efficiency for code developed using higher-level programming languages, including C
- Pipelined instruction fetch and execution
- New instructions for improved performance including BIT, BSWAP, BTJ, CPC, LDC, LDCI, LEA, MULT and SRL
- New instructions support 12-bit linear addressing of the Register File
- Up to 10 MIPS operation
- C-Compiler friendly
- 2 to 9 clock cycles per instruction

For more information about the eZ8 CPU, refer to the [eZ8 CPU Core User Manual \(UM0128\)](#), which is available for download at www.zilog.com.

General Purpose Input/Output

Z8 Encore! XP® F0822 Series features 11 to 19 port pins (Ports A–C) for General-Purpose Input/Output (GPIO). The number of available GPIO pins is a function of package type. Each pin is individually programmable. Ports A and C support 5V-tolerant inputs.

Flash Controller

The Flash Controller programs and erases the contents of Flash memory.

10-Bit Analog-to-Digital Converter

The optional Analog-to-Digital Converter (ADC) converts an analog input signal to a 10-bit binary number. The ADC accepts inputs from 2 to 5 different analog input sources.

UART

The Universal Asynchronous Receiver/Transmitter (UART) is full-duplex and capable of handling asynchronous data transfers. The UART supports 8-bit and 9-bit data modes and selectable parity.

I²C

The Inter-Integrated Circuit (I²C) controller makes the Z8 Encore! XP compatible with the I²C protocol. The I²C Controller consists of two bidirectional bus lines, a serial data (SDA) line, and a serial clock (SCL) line.

Serial Peripheral Interface

The Serial Peripheral Interface (SPI) allows the Z8 Encore! XP to exchange data between other peripheral devices such as EEPROMs, A/D converters, and ISDN devices. The SPI is a full-duplex, synchronous, and character-oriented channel that supports a four-wire interface.

Timers

Two 16-bit reloadable timers are used for timing/counting events or for motor control operations. These timers provide a 16-bit programmable reload counter and operate in One-Shot, Continuous, Gated, Capture, Compare, Capture and Compare, and PWM modes.

Interrupt Controller

Z8 Encore! XP® F0822 Series products support up to 18 interrupts. These interrupts consist of 7 internal peripheral interrupts and 11 GPIO pin interrupt sources. The interrupts have 3 levels of programmable interrupt priority.

Reset Controller

Z8 Encore! XP® F0822 Series products are reset using the $\overline{\text{RESET}}$ pin, POR, WDT, STOP Mode exit, or VBO warning signal.

On-Chip Debugger

Z8 Encore! XP® F0822 Series products feature an integrated On-Chip Debugger (OCD). The OCD provides a rich-set of debugging capabilities, such as, reading and writing registers, programming Flash memory, setting breakpoints, and executing code. A single-pin interface provides communication to the OCD.

Signal and Pin Descriptions

Z8 Encore! XP[®] F0822 Series products are available in a variety of packages, styles, and pin configurations. This chapter describes the signals and available pin configurations for each of the package styles. For information regarding the physical package specifications, see the [Packaging](#) chapter on page 221.

Available Packages

Table 2 identifies the package styles available for each device within the Z8 Encore! XP[®] F0822 Series.

Table 2. Z8 Encore! XP[®] F0822 Series Package Options

Part Number	10-Bit ADC	20-Pin SSOP and PDIP	28-Pin SOIC and PDIP
Z8F0822	Yes		X
Z8F0821	Yes	X	
Z8F0812	No		X
Z8F0811	No	X	
Z8F0422	Yes		X
Z8F0421	Yes	X	
Z8F0412	No		X
Z8F0411	No	X	

Pin Configurations

Figures 2 through 5 display the pin configurations for all of the packages available in the Z8 Encore! XP[®] F0822 Series. See [Table 4](#) on page 13 for a description of the signals.

► **Note:** The analog input alternate functions (ANAx) are not available on Z8 Encore! XP[®] F0822 Series devices.
