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High Performance 8-Bit Microcontrollers

Z8 Encore! XP[®] F64xx Series

Product Specification

PS019924-0113



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Revision History

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

Date	Revision Level	Description	Page
Jan 2013	24	Restored 40-pin PDIP package to Signal and Pin Descriptions and Packaging chapters.	7 , 286
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Dec 2006	18	Updated Flash Memory Electrical Characteristics and Timing table and Ordering Information chapter.	213 , 287
Nov 2006	17	Updated Part Number Suffix Designations section.	292

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Introduction

Zilog's Z8 Encore! XP F64xx Series MCU family of products are a line of Zilog micro-controller products based upon the 8-bit eZ8 CPU. The Z8 Encore! XP F64xx Series adds Flash memory to Zilog's extensive line of 8-bit microcontrollers. The Flash in-circuit programming capability allows for faster development time and program changes in the field. The new eZ8 CPU is upward-compatible with existing Z8 instructions. The rich-peripheral set of the Z8 Encore! XP F64xx Series makes it suitable for a variety of applications including motor control, security systems, home appliances, personal electronic devices, and sensors.

Features

The features of Z8 Encore! XP F64xx Series include:

- 20MHz eZ8 CPU
- Up to 64KB Flash with in-circuit programming capability
- Up to 4KB register RAM
- 12-channel, 10-bit Analog-to-Digital Converter (ADC)
- Two full-duplex 9-bit UARTs with bus transceiver Driver Enable control
- Inter-integrated circuit (I²C)
- Serial Peripheral Interface (SPI)
- Two Infrared Data Association (IrDA)-compliant infrared encoder/decoders
- Up to four 16-bit timers with capture, compare and PWM capability
- Watchdog Timer (WDT) with internal RC oscillator
- Three-channel DMA
- Up to 60 input/output (I/O) pins
- 24 interrupts with configurable priority
- On-Chip Debugger
- Voltage Brown-Out (VBO) Protection
- Power-On Reset (POR)
- Operating voltage of 3.0V to 3.6V with 5V-tolerant inputs
- 0°C to +70°C, -40°C to +105°C, and -40°C to +125°C operating temperature ranges

Part Selection Guide

Table 1 identifies the basic features and package styles available for each device within the Z8 Encore! XP product line.

Table 1. Z8 Encore! XP F64xx 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	40-/44-Pin Package	64/68-Pin Package	80-Pin Package
Z8F1621	16	2	31	3	8	2	1	1	X		
Z8F1622	16	2	46	4	12	2	1	1		X	
Z8F2421	24	2	31	3	8	2	1	1	X		
Z8F2422	24	2	46	4	12	2	1	1		X	
Z8F3221	32	2	31	3	8	2	1	1	X		
Z8F3222	32	2	46	4	12	2	1	1		X	
Z8F4821	48	4	31	3	8	2	1	1	X		
Z8F4822	48	4	46	4	12	2	1	1		X	
Z8F4823	48	4	60	4	12	2	1	1			X
Z8F6421	64	4	31	3	8	2	1	1	X		
Z8F6422	64	4	46	4	12	2	1	1		X	
Z8F6423	64	4	60	4	12	2	1	1			X

Note: For die form sales, contact your local [Zilog Sales Office](#).

Block Diagram

Figure 1 displays the architecture of the Z8 Encore! XP F64xx Series.

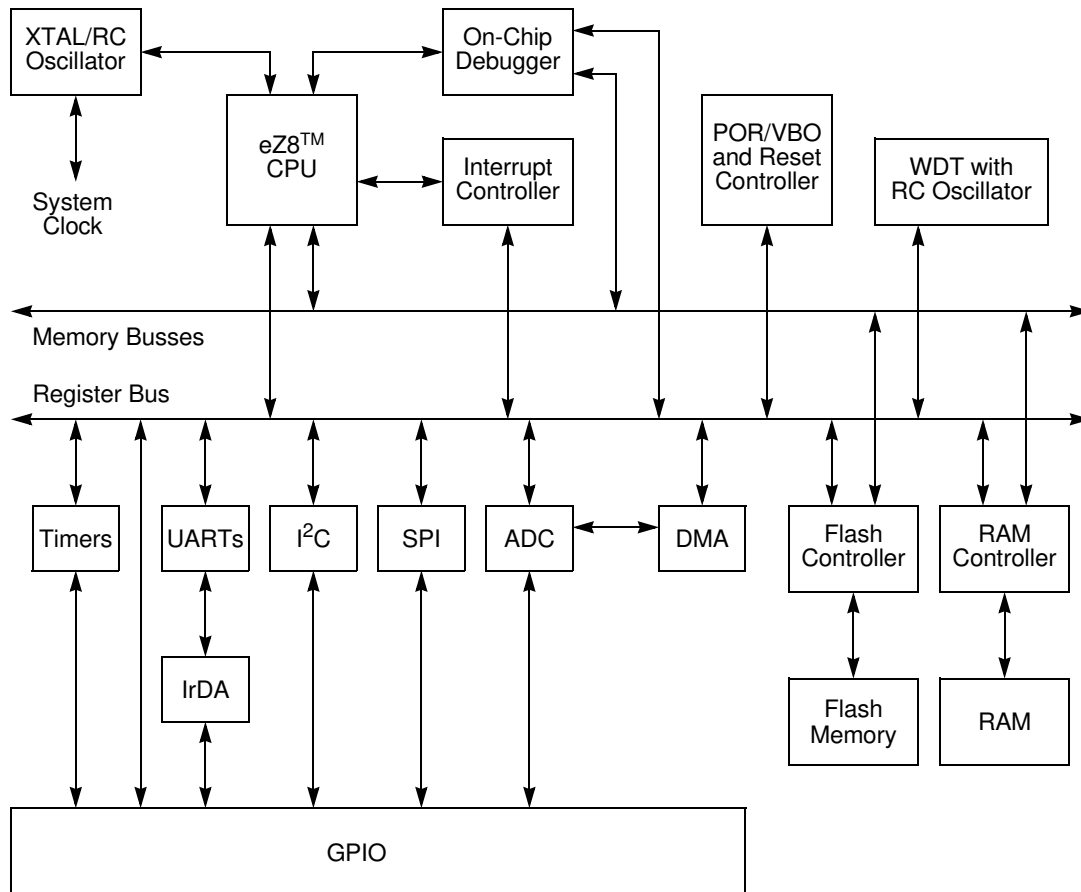


Figure 1. Z8 Encore! XP F64xx Series Block Diagram

CPU and Peripheral Overview

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

eZ8 CPU features include:

- 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 on www.zilog.com.

General-Purpose Input/Output

The Z8 Encore! XP F64xx Series features seven 8-bit ports (ports A–G) and one 4-bit port (Port H) for general-purpose input/output (GPIO). Each pin is individually programmable. All ports (except B and H) support 5V-tolerant inputs.

Flash Controller

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

10-Bit Analog-to-Digital Converter

The Analog-to-Digital Converter converts an analog input signal to a 10-bit binary number. The ADC accepts inputs from up to 12 different analog input sources.

UARTs

Each UART is full-duplex and capable of handling asynchronous data transfers. The UARTs support 8- and 9-bit data modes, selectable parity, and an efficient bus transceiver Driver Enable signal for controlling a multitransceiver bus, such as RS-485.

I²C

The I²C controller makes the Z8 Encore! XP F64xx Series 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 allows the Z8 Encore! XP F64xx Series to exchange data between other peripheral devices such as EEPROMs, A/D converters and ISDN devices. The SPI is a full-duplex, synchronous, character-oriented channel that supports a four-wire interface.

Timers

Up to four 16-bit reloadable timers can be 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. Only 3 timers (Timer 0–2) are available in the 44-pin package.

Interrupt Controller

The Z8 Encore! XP F64xx Series products support up to 24 interrupts. These interrupts consist of 12 internal and 12 GPIO pins. The interrupts have 3 levels of programmable interrupt priority.

Reset Controller

The Z8 Encore! XP F64xx Series can be reset using the $\overline{\text{RESET}}$ pin, Power-On Reset, Watchdog Timer, STOP Mode exit, or Voltage Brown-Out (VBO) warning signal.

On-Chip Debugger

The Z8 Encore! XP F64xx Series features an integrated On-Chip Debugger. The OCD provides a rich set of debugging capabilities, such as reading and writing registers, programming the Flash, setting breakpoints and executing code. A single-pin interface provides communication to the OCD.