



High-Performance 8-Bit Microcontrollers

# Z8 Encore! XP<sup>®</sup> F0823 Series

## Product Brief

PB016509-0508



## Product Block Diagram

1-8 KB Flash	256 B -1 KB RAM	Up to 8 10-Bit ADC Channels
Watchdog Timer with RC Oscillator	5 MHz eZ8 <sup>™</sup> CPU	Two 16-Bit Timers/PWM
Analog Comparator		POR/VBO & Reset Control
UART with IrDA	On-Chip Debugger	Internal Precision Oscillator
Up to 24 General-Purpose I/O Pins		

## Overview

Zilog's Z8 Encore! XP<sup>®</sup> Z8F0823 Series Flash microcontrollers are based on Zilog's 8-bit eZ8 CPU core. The Z8 Encore! XP F0823 Series set a new standard of performance and on-chip peripherals.

The Z8 Encore! XP F0823 Series support 8 KB of non-volatile Flash memory and 1 KB on-chip register RAM. The Z8 Encore! Z8F0823 Series features up to 8 single-ended channels of 10-bit analog-to-digital conversion.

These devices include two enhanced 16-bit reloadable timers featuring generation of PWM signals, and Capture and Compare capability.

Up to 18 vectored interrupts with 3 levels of programmable priorities, providing increased application flexibility.

The Z8 Encore! XP F0823 Series features an on-chip internal precision oscillator (IPO) as a trimmable clock source that requires no external components. The IPO features the output frequency of either 5 MHz or 32 kHz.

The full-duplex UART provides serial communication and IrDA encoding and decoding capability. The UART baud rate generator (BRG) can be configured and used as a basic 16-bit timer. The new single-pin on chip debugger and programming interface simplifies code development and allows for easy in-circuit programming.

## Features

Key features of Z8 Encore! XP F0823 Series include:

- 5 MHz eZ8 CPU core
- Up to 8 KB Flash memory with in-circuit programming capability
- Up to 1 KB register RAM
- Up to 8 channels 10-bit Analog-to-Digital Converter (ADC)
- On-Chip Analog Comparator
- Full-duplex 9-bit UART with bus transceiver Driver Enable Control
- The UART Baud Rate Generator (BRG) can be configured and used as a basic 16-bit timer
- Infrared Data Association (IrDA)-compliant infrared encoder/decoders
- Two 16-bit timers with capture, compare, and PWM capabilities



- Watchdog Timer (WDT) with dedicated internal RC oscillator
- 6 to 24 I/O pins depending upon package
- Direct LED Drive with programmable drive strengths
- Up to 18 interrupts with configurable priority
- On-Chip Debugger (OCD)
- Voltage Brownout Protection (VBO)
- Power-On Reset (POR)
- Internal Precision Oscillator with output frequency of either 5 MHz or 32 kHz
- 2.7 V to 3.6 V operating voltage with 5 V-tolerant inputs
- 8-pin, 20-pin, and 28-pin packages
- 0 °C to +70 °C standard temperature and –40 °C to +105 °C extended temperature operating ranges

## eZ8<sup>™</sup> CPU Features

The eZ8 CPU, Zilog's latest 8-bit CPU, meets the continuing demand for faster and more code-efficient microcontrollers. The eZ8 CPU features include:

- 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
- Compatible with existing Z8<sup>®</sup> code
- Up to 10 MIPS operation
- C-Compiler friendly
- 2 to 9 clock cycles per instruction

## Development Kit

The Z8 Encore! XP F0823 Series uses the Z8 Encore! XP F08xA Series Development Kit which includes:

### Hardware

- Z8 Encore! XP F08xA Series Development Board
- Smart Cable
- 5 V DC power supply

### Software on CD-ROM

- ZDS II–Z8 Encore!<sup>®</sup> IDE with ANSI C-Compiler
- Sample code
- Document browser
- Acrobat Reader<sup>®</sup>

### Documentation

- Quick Start Guide
- Z8 Encore! XP F0823 Series technical documentation (on CD-ROM):
  - Development Kit User Manual
  - ZDSII IDE User Manual
  - eZ8<sup>™</sup> CPU User Manual
  - Product Specification
  - Product Brief

## Architecture

Figure 1 displays the Z8 Encore! XP F0823 Series block diagram.

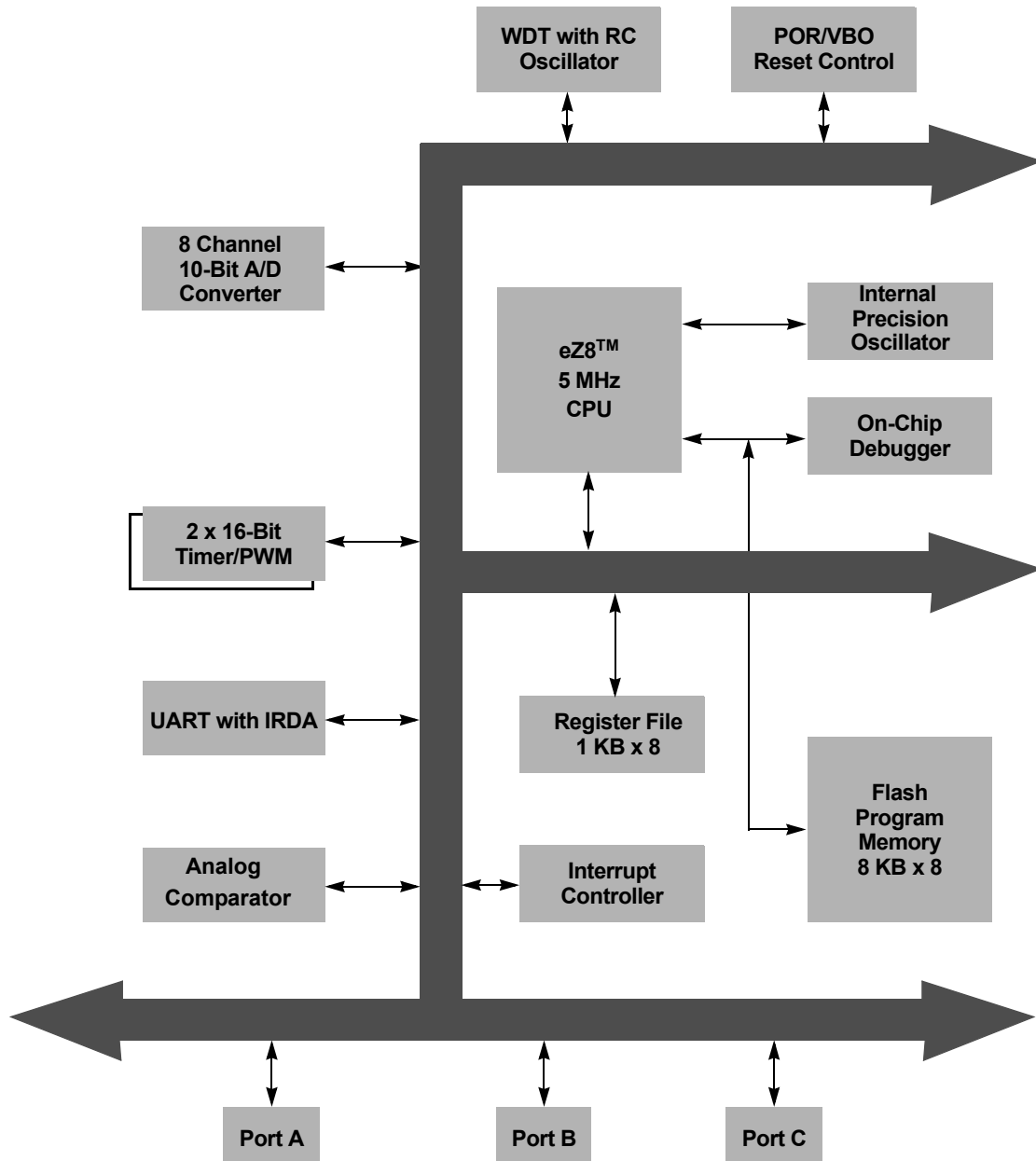


Figure 1. Z8 Encore! XP F0823 Series Block Diagram



## Ordering Information

Order the Z8 Encore! XP F0823 Series from Zilog®, using the following part numbers. For more information regarding ordering, contact your local Zilog sales office. The Zilog website ([www.zilog.com](http://www.zilog.com)) lists all regional offices and provides additional Z8 Encore! XP product information.

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 8 KB Flash, 10-Bit Analog-to-Digital Converter</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0823PB005SC	8 KB	1 KB	6	12	2	4	1	1	PDIP 8-pin package
Z8F0823QB005SC	8 KB	1 KB	6	12	2	4	1	1	QFN 8-pin package
Z8F0823SB005SC	8 KB	1 KB	6	12	2	4	1	1	SOIC 8-pin package
Z8F0823SH005SC	8 KB	1 KB	16	18	2	7	1	1	SOIC 20-pin package
Z8F0823HH005SC	8 KB	1 KB	16	18	2	7	1	1	SSOP 20-pin package
Z8F0823PH005SC	8 KB	1 KB	16	18	2	7	1	1	PDIP 20-pin package
Z8F0823SJ005SC	8 KB	1 KB	22	18	2	8	1	1	SOIC 28-pin package
Z8F0823HJ005SC	8 KB	1 KB	22	18	2	8	1	1	SSOP 28-pin package
Z8F0823PJ005SC	8 KB	1 KB	22	18	2	8	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0823PB005EC	8 KB	1 KB	6	12	2	4	1	1	PDIP 8-pin package
Z8F0823QB005EC	8 KB	1 KB	6	12	2	4	1	1	QFN 8-pin package
Z8F0823SB005EC	8 KB	1 KB	6	12	2	4	1	1	SOIC 8-pin package
Z8F0823SH005EC	8 KB	1 KB	16	18	2	7	1	1	SOIC 20-pin package
Z8F0823HH005EC	8 KB	1 KB	16	18	2	7	1	1	SSOP 20-pin package
Z8F0823PH005EC	8 KB	1 KB	16	18	2	7	1	1	PDIP 20-pin package
Z8F0823SJ005EC	8 KB	1 KB	22	18	2	8	1	1	SOIC 28-pin package
Z8F0823HJ005EC	8 KB	1 KB	22	18	2	8	1	1	SSOP 28-pin package
Z8F0823PJ005EC	8 KB	1 KB	22	18	2	8	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 8 KB Flash</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0813PB005SC	8 KB	1 KB	6	12	2	0	1	1	PDIP 8-pin package
Z8F0813QB005SC	8 KB	1 KB	6	12	2	0	1	1	QFN 8-pin package
Z8F0813SB005SC	8 KB	1 KB	6	12	2	0	1	1	SOIC 8-pin package
Z8F0813SH005SC	8 KB	1 KB	16	18	2	0	1	1	SOIC 20-pin package
Z8F0813HH005SC	8 KB	1 KB	16	18	2	0	1	1	SSOP 20-pin package
Z8F0813PH005SC	8 KB	1 KB	16	18	2	0	1	1	PDIP 20-pin package
Z8F0813SJ005SC	8 KB	1 KB	24	18	2	0	1	1	SOIC 28-pin package
Z8F0813HJ005SC	8 KB	1 KB	24	18	2	0	1	1	SSOP 28-pin package
Z8F0813PJ005SC	8 KB	1 KB	24	18	2	0	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0813PB005EC	8 KB	1 KB	6	12	2	0	1	1	PDIP 8-pin package
Z8F0813QB005EC	8 KB	1 KB	6	12	2	0	1	1	QFN 8-pin package
Z8F0813SB005EC	8 KB	1 KB	6	12	2	0	1	1	SOIC 8-pin package
Z8F0813SH005EC	8 KB	1 KB	16	18	2	0	1	1	SOIC 20-pin package
Z8F0813HH005EC	8 KB	1 KB	16	18	2	0	1	1	SSOP 20-pin package
Z8F0813PH005EC	8 KB	1 KB	16	18	2	0	1	1	PDIP 20-pin package
Z8F0813SJ005EC	8 KB	1 KB	24	18	2	0	1	1	SOIC 28-pin package
Z8F0813HJ005EC	8 KB	1 KB	24	18	2	0	1	1	SSOP 28-pin package
Z8F0813PJ005EC	8 KB	1 KB	24	18	2	0	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 4 KB Flash, 10-Bit Analog-to-Digital Converter</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0423PB005SC	4 KB	1 KB	6	12	2	4	1	1	PDIP 8-pin package
Z8F0423QB005SC	4 KB	1 KB	6	12	2	4	1	1	QFN 8-pin package
Z8F0423SB005SC	4 KB	1 KB	6	12	2	4	1	1	SOIC 8-pin package
Z8F0423SH005SC	4 KB	1 KB	16	18	2	7	1	1	SOIC 20-pin package
Z8F0423HH005SC	4 KB	1 KB	16	18	2	7	1	1	SSOP 20-pin package
Z8F0423PH005SC	4 KB	1 KB	16	18	2	7	1	1	PDIP 20-pin package
Z8F0423SJ005SC	4 KB	1 KB	22	18	2	8	1	1	SOIC 28-pin package
Z8F0423HJ005SC	4 KB	1 KB	22	18	2	8	1	1	SSOP 28-pin package
Z8F0423PJ005SC	4 KB	1 KB	22	18	2	8	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0423PB005EC	4 KB	1 KB	6	12	2	4	1	1	PDIP 8-pin package
Z8F0423QB005EC	4 KB	1 KB	6	12	2	4	1	1	QFN 8-pin package
Z8F0423SB005EC	4 KB	1 KB	6	12	2	4	1	1	SOIC 8-pin package
Z8F0423SH005EC	4 KB	1 KB	16	18	2	7	1	1	SOIC 20-pin package
Z8F0423HH005EC	4 KB	1 KB	16	18	2	7	1	1	SSOP 20-pin package
Z8F0423PH005EC	4 KB	1 KB	16	18	2	7	1	1	PDIP 20-pin package
Z8F0423SJ005EC	4 KB	1 KB	22	18	2	8	1	1	SOIC 28-pin package
Z8F0423HJ005EC	4 KB	1 KB	22	18	2	8	1	1	SSOP 28-pin package
Z8F0423PJ005EC	4 KB	1 KB	22	18	2	8	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 4 KB Flash</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0413PB005SC	4 KB	1 KB	6	12	2	0	1	1	PDIP 8-pin package
Z8F0413QB005SC	4 KB	1 KB	6	12	2	0	1	1	QFN 8-pin package
Z8F0413SB005SC	4 KB	1 KB	6	12	2	0	1	1	SOIC 8-pin package
Z8F0413SH005SC	4 KB	1 KB	16	18	2	0	1	1	SOIC 20-pin package
Z8F0413HH005SC	4 KB	1 KB	16	18	2	0	1	1	SSOP 20-pin package
Z8F0413PH005SC	4 KB	1 KB	16	18	2	0	1	1	PDIP 20-pin package
Z8F0413SJ005SC	4 KB	1 KB	24	18	2	0	1	1	SOIC 28-pin package
Z8F0413HJ005SC	4 KB	1 KB	24	18	2	0	1	1	SSOP 28-pin package
Z8F0413PJ005SC	4 KB	1 KB	24	18	2	0	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0413PB005EC	4 KB	1 KB	6	12	2	0	1	1	PDIP 8-pin package
Z8F0413QB005EC	4 KB	1 KB	6	12	2	0	1	1	QFN 8-pin package
Z8F0413SB005EC	4 KB	1 KB	6	12	2	0	1	1	SOIC 8-pin package
Z8F0413SH005EC	4 KB	1 KB	16	18	2	0	1	1	SOIC 20-pin package
Z8F0413HH005EC	4 KB	1 KB	16	18	2	0	1	1	SSOP 20-pin package
Z8F0413PH005EC	4 KB	1 KB	16	18	2	0	1	1	PDIP 20-pin package
Z8F0413SJ005EC	4 KB	1 KB	24	18	2	0	1	1	SOIC 28-pin package
Z8F0413HJ005EC	4 KB	1 KB	24	18	2	0	1	1	SSOP 28-pin package
Z8F0413PJ005EC	4 KB	1 KB	24	18	2	0	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 2 KB Flash, 10-Bit Analog-to-Digital Converter</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0223PB005SC	2 KB	512 B	6	12	2	4	1	1	PDIP 8-pin package
Z8F0223QB005SC	2 KB	512 B	6	12	2	4	1	1	QFN 8-pin package
Z8F0223SB005SC	2 KB	512 B	6	12	2	4	1	1	SOIC 8-pin package
Z8F0223SH005SC	2 KB	512 B	16	18	2	7	1	1	SOIC 20-pin package
Z8F0223HH005SC	2 KB	512 B	16	18	2	7	1	1	SSOP 20-pin package
Z8F0223PH005SC	2 KB	512 B	16	18	2	7	1	1	PDIP 20-pin package
Z8F0223SJ005SC	2 KB	512 B	22	18	2	8	1	1	SOIC 28-pin package
Z8F0223HJ005SC	2 KB	512 B	22	18	2	8	1	1	SSOP 28-pin package
Z8F0223PJ005SC	2 KB	512 B	22	18	2	8	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0223PB005EC	2 KB	512 B	6	12	2	4	1	1	PDIP 8-pin package
Z8F0223QB005EC	2 KB	512 B	6	12	2	4	1	1	QFN 8-pin package
Z8F0223SB005EC	2 KB	512 B	6	12	2	4	1	1	SOIC 8-pin package
Z8F0223SH005EC	2 KB	512 B	16	18	2	7	1	1	SOIC 20-pin package
Z8F0223HH005EC	2 KB	512 B	16	18	2	7	1	1	SSOP 20-pin package
Z8F0223PH005EC	2 KB	512 B	16	18	2	7	1	1	PDIP 20-pin package
Z8F0223SJ005EC	2 KB	512 B	22	18	2	8	1	1	SOIC 28-pin package
Z8F0223HJ005EC	2 KB	512 B	22	18	2	8	1	1	SSOP 28-pin package
Z8F0223PJ005EC	2 KB	512 B	22	18	2	8	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									



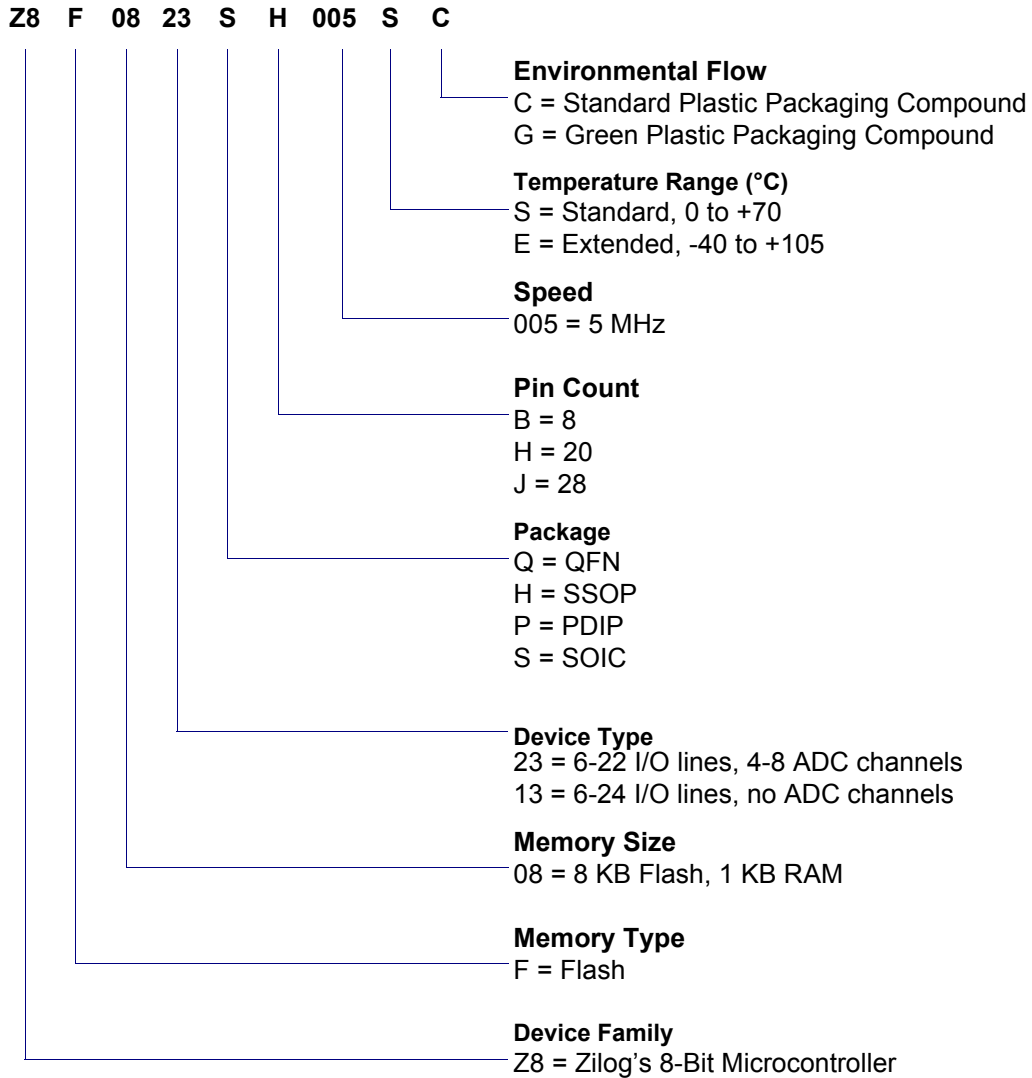
Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 2 KB Flash, 10-Bit Analog-to-Digital Converter</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0223PB005SC	2 KB	512 B	6	12	2	4	1	1	PDIP 8-pin package
Z8F0223QB005SC	2 KB	512 B	6	12	2	4	1	1	QFN 8-pin package
Z8F0223SB005SC	2 KB	512 B	6	12	2	4	1	1	SOIC 8-pin package
Z8F0223SH005SC	2 KB	512 B	16	18	2	7	1	1	SOIC 20-pin package
Z8F0223HH005SC	2 KB	512 B	16	18	2	7	1	1	SSOP 20-pin package
Z8F0223PH005SC	2 KB	512 B	16	18	2	7	1	1	PDIP 20-pin package
Z8F0223SJ005SC	2 KB	512 B	22	18	2	8	1	1	SOIC 28-pin package
Z8F0223HJ005SC	2 KB	512 B	22	18	2	8	1	1	SSOP 28-pin package
Z8F0223PJ005SC	2 KB	512 B	22	18	2	8	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0223PB005EC	2 KB	512 B	6	12	2	4	1	1	PDIP 8-pin package
Z8F0223QB005EC	2 KB	512 B	6	12	2	4	1	1	QFN 8-pin package
Z8F0223SB005EC	2 KB	512 B	6	12	2	4	1	1	SOIC 8-pin package
Z8F0223SH005EC	2 KB	512 B	16	18	2	7	1	1	SOIC 20-pin package
Z8F0223HH005EC	2 KB	512 B	16	18	2	7	1	1	SSOP 20-pin package
Z8F0223PH005EC	2 KB	512 B	16	18	2	7	1	1	PDIP 20-pin package
Z8F0223SJ005EC	2 KB	512 B	22	18	2	8	1	1	SOIC 28-pin package
Z8F0223HJ005EC	2 KB	512 B	22	18	2	8	1	1	SSOP 28-pin package
Z8F0223PJ005EC	2 KB	512 B	22	18	2	8	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 2 KB Flash, 10-Bit Analog-to-Digital Converter</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0223PB005SC	2 KB	512 B	6	12	2	4	1	1	PDIP 8-pin package
Z8F0223QB005SC	2 KB	512 B	6	12	2	4	1	1	QFN 8-pin package
Z8F0223SB005SC	2 KB	512 B	6	12	2	4	1	1	SOIC 8-pin package
Z8F0223SH005SC	2 KB	512 B	16	18	2	7	1	1	SOIC 20-pin package
Z8F0223HH005SC	2 KB	512 B	16	18	2	7	1	1	SSOP 20-pin package
Z8F0223PH005SC	2 KB	512 B	16	18	2	7	1	1	PDIP 20-pin package
Z8F0223SJ005SC	2 KB	512 B	22	18	2	8	1	1	SOIC 28-pin package
Z8F0223HJ005SC	2 KB	512 B	22	18	2	8	1	1	SSOP 28-pin package
Z8F0223PJ005SC	2 KB	512 B	22	18	2	8	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0223PB005EC	2 KB	512 B	6	12	2	4	1	1	PDIP 8-pin package
Z8F0223QB005EC	2 KB	512 B	6	12	2	4	1	1	QFN 8-pin package
Z8F0223SB005EC	2 KB	512 B	6	12	2	4	1	1	SOIC 8-pin package
Z8F0223SH005EC	2 KB	512 B	16	18	2	7	1	1	SOIC 20-pin package
Z8F0223HH005EC	2 KB	512 B	16	18	2	7	1	1	SSOP 20-pin package
Z8F0223PH005EC	2 KB	512 B	16	18	2	7	1	1	PDIP 20-pin package
Z8F0223SJ005EC	2 KB	512 B	22	18	2	8	1	1	SOIC 28-pin package
Z8F0223HJ005EC	2 KB	512 B	22	18	2	8	1	1	SSOP 28-pin package
Z8F0223PJ005EC	2 KB	512 B	22	18	2	8	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	UART with IrDA	Comparator	Description
<b>Z8 Encore! XP F0823 Series with 1 KB Flash</b>									
<b>Standard Temperature: 0 °C to +70 °C</b>									
Z8F0113PB005SC	1 KB	256 B	6	12	2	0	1	1	PDIP 8-pin package
Z8F0113QB005SC	1 KB	256 B	6	12	2	0	1	1	QFN 8-pin package
Z8F0113SB005SC	1 KB	256 B	6	12	2	0	1	1	SOIC 8-pin package
Z8F0113SH005SC	1 KB	256 B	16	18	2	0	1	1	SOIC 20-pin package
Z8F0113HH005SC	1 KB	256 B	16	18	2	0	1	1	SSOP 20-pin package
Z8F0113PH005SC	1 KB	256 B	16	18	2	0	1	1	PDIP 20-pin package
Z8F0113SJ005SC	1 KB	256 B	24	18	2	0	1	1	SOIC 28-pin package
Z8F0113HJ005SC	1 KB	256 B	24	18	2	0	1	1	SSOP 28-pin package
Z8F0113PJ005SC	1 KB	256 B	24	18	2	0	1	1	PDIP 28-pin package
<b>Extended Temperature: -40 °C to +105 °C</b>									
Z8F0113PB005EC	1 KB	256 B	6	12	2	0	1	1	PDIP 8-pin package
Z8F0113QB005EC	1 KB	256 B	6	12	2	0	1	1	QFN 8-pin package
Z8F0113SB005EC	1 KB	256 B	6	12	2	0	1	1	SOIC 8-pin package
Z8F0113SH005EC	1 KB	256 B	16	18	2	0	1	1	SOIC 20-pin package
Z8F0113HH005EC	1 KB	256 B	16	18	2	0	1	1	SSOP 20-pin package
Z8F0113PH005EC	1 KB	256 B	16	18	2	0	1	1	PDIP 20-pin package
Z8F0113SJ005EC	1 KB	256 B	24	18	2	0	1	1	SOIC 28-pin package
Z8F0113HJ005EC	1 KB	256 B	24	18	2	0	1	1	SSOP 28-pin package
Z8F0113PJ005EC	1 KB	256 B	24	18	2	0	1	1	PDIP 28-pin package
<b>Note:</b> Replace C with G for Lead-Free Packaging.									
Z8F08A28100KITG	20-pin and 28-pin Development Kit								
Z8F04A08100KITG	8-pin Development Kit								
ZUSBSC00100ZACG	USB Smart Cable Accessory Kit								
ZUSBOPTSC01ZACG	Opto-isolated USB Smart Cable Accessory Kit								
ZENETSC0100ZACG	Ethernet Smart Cable Accessory Kit								



## Part Number Suffix Designations





**Warning:** DO NOT USE IN LIFE SUPPORT

### **LIFE SUPPORT POLICY**

ZILOG'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS PRIOR WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF ZILOG CORPORATION.

### **As used herein**

Life support devices or systems are devices which (a) are intended for surgical implant into the body, or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in a significant injury to the user. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

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