

# Low-Voltage Z8 Microcontroller with ADC

## Designed for battery operation

The Z86L99/D99 is a general purpose Z8 microcontroller designed for use in a wide variety of low-voltage embedded control applications such as home appliances, battery chargers, IR remote controls, wireless keyboards, and security systems.

This controller requires only two batteries to operate, instead of the standard four batteries. The low power consumption (40 mW typical) also allows for extended battery life. It has three standby modes to further reduce consumption:

- Stop (2  $\mu$ A typical)
- Halt (0.8 mA typical)
- Low voltage standby

In addition to a standard watchdog timer, low-voltage protection, and power-on reset circuits, these MCUs also offer a low-battery detection flag that can be programmed to signal when it's time to change batteries.

## Offers a flexible low-voltage AD converter

The Z86L99 incorporates a four-channel 8-bit sigma delta analog-to-digital converter (ADC). The ADC supports up to four analog inputs that are controlled by an analog multiplexer. The ADC also supports both upper and lower external voltage references.

## Combines extended RAM with a special counter/timer architecture

In addition to a standard 233 bytes of register-based RAM, the Z86L99 includes 256 bytes of RAM mapped into the program memory space that can be used as data RAM or executable RAM. The Z86L99/D99 features 3 counter/timers, a general purpose 8-bit timer, and a special counter/timer architecture that automates generating and receiving complex pulses or signals. For example, in IR applications, the 8-bit counter/timer generates a carrier frequency and the 16-bit counter/timer generates the envelope to modulate the signal. This creates either a pulse width modulated signal or a pulse position modulated signal.



Another unique feature of the Z86L99 is a constant current output sink. This pin is designed to deliver a constant current source of 100 mA to direct drive IR LEDs, eliminating the need for external transistors.

## Features

- 8-bit Sigma Delta A/D converter with external voltage references
- Three counter/timers
- Two independent analog comparators
- Constant current source (100 mA)
- Low power consumption

## Benefits

- A/D in a battery-operated product
- Constant current source will deliver more current to IR LED for longer range over the life of the batteries
- Third counter/timer allows more flexible programming, using 8-bit/16-bit counter/timer pair to generate complex waveforms
- Low-voltage OTP



## Z86L99/Z86D99 Product Matrix

PSI	Memory	ADC	OTP	Package	# Pins
Z86L990PSC	16K	X		PDIP	40
Z86L990FSC	16K	X		QFP	44
Z86L991SSC	16K			SOIC	28
Z86D990PSC	32K	X	X	PDIP	40
Z86D990FSC	32K	X	X	QFP	44
Z86D991SSC	32K		X	SOIC	28

### Applications

- Home appliances
- Universal remote controls (IR/RF)
- Wireless keyboards (IR/RF)
- Security applications
- Battery charger applications

### Specifications

- 16 KB ROM (Z86L99)/32 KB OTP (Z86D99)
- 8 MHz system clock
- 489 bytes of RAM
  - 233 bytes of register RAM
  - 256 bytes of executable RAM mapped into program memory space
- Special counter/timer architecture to automate transmitting complex pulses or signals
  - Programmable 8-bit counter/timer with two 8-bit capture registers and two 8-bit load registers
  - Programmable 16-bit counter/timer with one 16-bit capture register and one 16-bit load register pair
- One general purpose 8-bit counter/timer with 6-bit prescaler
- Four channel, 8-bit Analog-to-Digital Converter (ADC) with external voltage references
- 29 Bi-directional I/Os with nibble programmable resistive pull-up transistors
- 16 I/Os that can be selected as stop-mode recovery sources
- Six interrupt vectors with nine interrupt sources

### ZiLOG Development Suite

#### Z86L9900ZEM

The Z86L99 emulator provides full emulation for ZiLOG's Z86D99 and Z86L99 products.

#### ZiLOG Developer Studio

ZDS provides automatic code generation and program management for Z8 microcontroller software.

#### C-compiler

ZiLOG's proprietary C-compiler creates an easy development environment.

