From Zilog's New S3 Family of Microcontrollers: the S3F8S39 8-Bit MCU

Overview

The S3F8S35 and S3F8S39 are 32 pin members of Zilog's S3 Family of MCUs which offer a fast and efficient Z8 compatible CPU, 16KB or 32KB of Flash memory and a wide range of integrated peripherals. The S3 family CPU features an efficient register-oriented architecture and a sophisticated interrupt controller allowing for fast context switching. The Flash memory is CPU programmable and has a 128 byte sector size. The internal oscillator is switchable between 8MHz, 4MHz, 1MHz and 0.5MHz for low power applications. 4 16-bit timers with PWM and pulse generation make the devices ideal for controlling load power in heating and motor control applications in home appliance applications. The timers can also be configured for carrier generation in IR Remote Control applications.

Features

- SAM88 Z8-Compatible CPU Core
- Flash Memory
  - o 16 KB internal Flash program memory (S3F8S35)
  - o 32 KB internal Flash program memory (S3F8S39)
    - Sector size: 128 bytes
    - CPU-programmable with LDC instruction
    - Fast 25 µs byte programming time
    - Endurance: 10,000 erase/program cycles
    - 10 years data retention
- RAM
  - o 1,040 bytes general-purpose register RAM area
- Instruction Set
  - o 78 CISC instructions
  - o Idle and Stop instructions for power-down modes
  - o LDC for reading and writing Flash memory
- Interrupts
  - o 26 interrupt sources with 8 programmable priorities
- General-Purpose I/O
  - o 26 programmable GPIO pins
  - o Bit-programmable ports
  - o Programmable pull-up on each port pin
- Clock Sources
  - o Internal oscillator: 8 MHz, 4 MHz, 1 MHz, or 0.5 MHz
  - o External RC oscillator: 4 MHz max. (capacitor is integrated on chip)
  - o External crystal oscillator: 12 MHz max.
  - o Low power ring oscillator: 32 kHz

ADVANTAGES

- Multiple 16 PWM timers with pulse and carrier generation
- 2 UART's, SPI and I2C to cover all serial communication needs
- 10 bit ADC for temperature, current or voltage measurement
- Small Flash sector size allows Flash to be used as EEPROM
- Programmable Low Voltage Reset ensure stable system operation
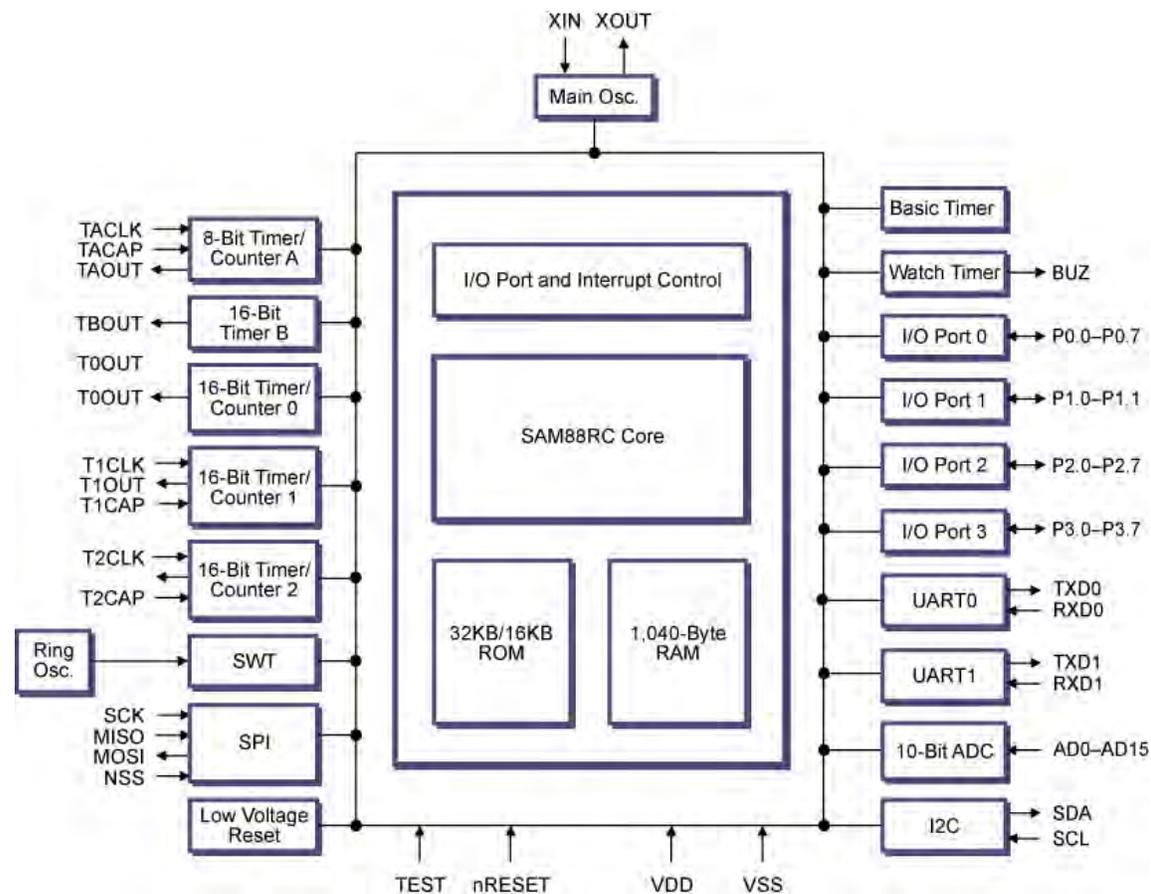
APPLICATIONS

- Vending Machines
- IR Remote Controls
- Home Appliances:
  - o Induction Heaters
  - o Air Conditioners
  - o Washing Machines
  - o Dryer Controllers
  - o Oven Controllers

Features (continued)

- Peripherals
  o One 8-bit timer for watchdog or periodic interrupt generation
  o One 8-bit timer with input capture
  o Three 16-bit timers with PWM capability
  o One 16-bit timer with PWM, Pulse, and Carrier generation capability
  o Low-power wake-up timer
  o 10-bit SAR A/D Converter
    ▪ 16 analog inputs
  o Full-Duplex SPI
  o Master/Slave I^{2}C
  o 2 Full-Duplex UARTs with independent BRGs
  o Programmable Low Voltage Reset controller (LVR)
    ▪ 1.9, 2.3, 3.0 and 3.9V
  o Programmable Low Voltage Detector (LVD)
    ▪ 2.1, 2.5, 3.2 and 4.1V

Block Diagram

S3F8S39 Block Diagram


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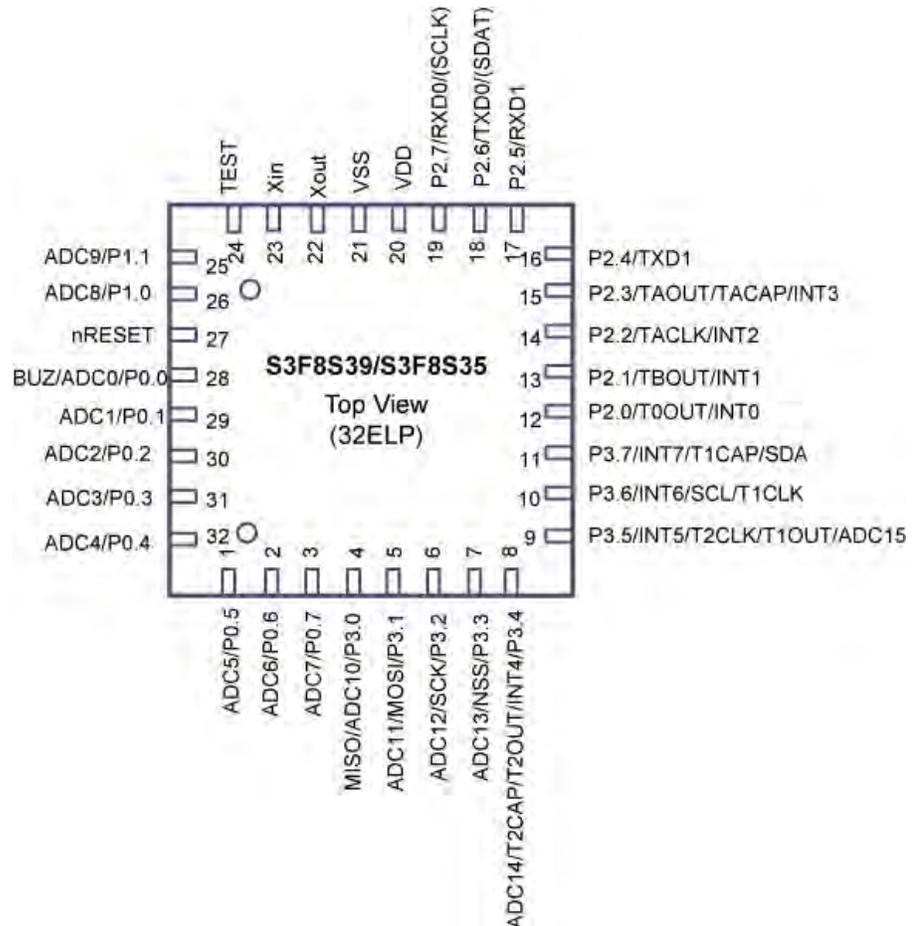- Programmable Low Voltage Reset ensure stable system operation

Pin Signals

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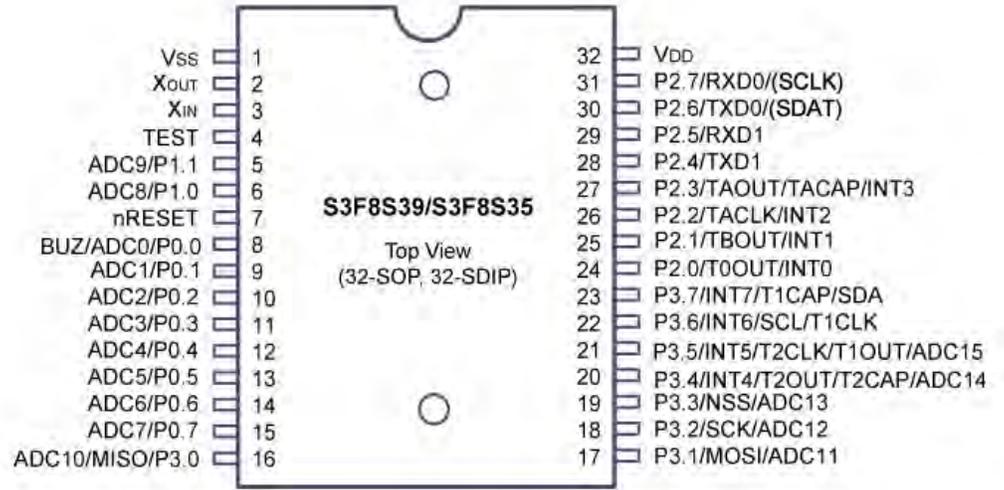
S3F8S39/S3F8S35 32-Pin SOP/SDIP Package

S3F8S39/S3F8S35 32-Pin ELP Package

Operating Characteristics

- **Main Clock Frequency**
  - o 0.4 MHz to 12 MHz
  - o External RC for main clock
  - o Internal RC: 0.5 MHz , 1 MHz, 4 MHz and 8 MHz, all typical
  - o On-chip free-running ring oscillator with 32 kHz frequency for 16-bit Timer 1
- **Operating Voltage Range**
  - o 1.8V to 5.5V up to 4 MHz (LVR disabled)
  - o 2.7V to 5.5V up to 12 MHz
- **Operating Temperature Range: –40°C to 85°C**

Development Tools

A complete line of development tools are available for Zilog's S3 Microcontroller Family. The development environment is composed of your application board, a target board, an emulator, and a host PC running the IDE. Production programmers are also available from third party sources. Zilog's in-circuit emulator solution provides a wide range of capabilities and prices to suite most budgets and system complexities.

In-Circuit Emulators that support the S3 Family

- **OpenICE-i500**
- **OpenICE-i2000**
- **SmartKit SK-1200**

Target Boards for the S3F8S39 and S3F8S35 MCUs

- **TB8S19, TB8S28 and TB8S39**

Programmers

- **SPW-uni: single-device programmer**
- **GW-uni: 8-device gang programmer**
- **AS-pro**

Development Tools Suppliers

Please contact your local Zilog Sales Office, or contact your Third Party Tools supplier directly.

Ordering Information

Order your S3 Family parts from your local Zilog distributor using the part numbers listed below. For more information, or to download product collateral and software, please visit us at www.zilog.com.

Part Number	Package Type	Flash Program Memory	ROM	GPIO	Internal Oscillator
S3F8S35XZZ-AO95	32-Pin SDIP	16 KB	16 KB	26	3.2/0.5 MHz ± 3%
S3F8S35XZZ-SO95	32-Pin SOP	16 KB	16 KB	26	3.2/0.5 MHz ± 3%
S3F8S39XZZ-AO99	32-Pin SDIP	32 KB	32 KB	26	3.2/0.5 MHz ± 1%
S3F8S39XZZ-LO89	32-Pin ELP	32 KB	32 KB	26	3.2/0.5 MHz ± 1%
S3F8S39XZZ-SO98	32-Pin SOP	32 KB	8 KB	26	3.2/0.5 MHz ± 1%
S3F8S39XZZ-SO99	32-Pin SOP	32 KB	32 KB	26	3.2/0.5 MHz ± 1%

Warning: **DO NOT USE THIS PRODUCT IN LIFE SUPPORT SYSTEMS.**

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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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