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S3 Family 8-Bit Microcontrollers

S3F8S39/S3F8S35

Product Specification

PS031405-0118





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Revision History

Each instance in this document's revision history reflects a change from its previous edition. For more details, refer to the corresponding page(s) or appropriate links furnished in the table below.

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1

Product Overview

1.1 S3F8 Series Microcontrollers

Zilog's S3 Family of 8-bit single-chip CMOS microcontrollers offers a fast and efficient CPU, a wide range of integrated peripherals, and various mask-programmable Read only memory (ROM) sizes. Address/data bus architecture and a large number of bit-configurable Input/Output (I/O) ports provide a flexible programming environment for applications with varied memory and I/O requirements. It includes timer/counters with selectable operating modes to support real-time operations.

1.2 S3F8S39/S3F8S35 Microcontrollers

The S3F8S39/S3F8S35 single-chip CMOS microcontrollers are fabricated using the highly advanced CMOS process technology based on Zilog's latest CPU architecture. The S3F8S39/S3F8S35 is a microcontroller with an embedded 32K/16K byte full-flash ROM.

By using a proven modular design approach, Zilog engineers have successfully developed the S3F8S39/S3F8S35 by integrating these peripheral modules with the powerful SAM8 RC core:

- Four configurable I/O ports (26 pin)
- Twenty six interrupt sources and eight interrupt levels
- Eight bit-programmable pins for external interrupts
- One watchdog timer function (Basic Timer)
- One 8-bit basic timer for oscillation stabilization
- Two 8-bit timer/counters and three 16-bit timer/counters with selectable operating modes
- A Stop Wake-Up Timer to wake up CPU from Stop Mode
- Watch timer for real time
- Two asynchronous UART modules
- One SPI module
- One IIC module
- Analog to digital converter with 16 input channels and 10-bit resolution
- One BUZ for programmable frequency output

The S3F8S39/S3F8S35 microcontrollers are ideal for use in a wide range of home applications that requires simple timer/counter, ADC, and so on. They are currently available in 32-pin SOP/SDIP and 32-pin QFN packages.

Comparison	S3F8S39	S3F8S35
Flash Size (Bytes)	32K	16K

1.3 Features

1.3.1 CPU

- SAM8RC CPU core

1.3.2 Memory

Features of internal multi-time program Full-Flash memory are:

- 32K × 8-bit program memory (S3F8S39)
- 16K × 8-bit program memory (S3F8S35)
 - Sector size: 128 Bytes
 - User programmable by "LDC" instruction
 - Sector erase available
 - Fast programming time
 - External serial programming support
 - Endurance: 10,000 erase/program cycles
 - 10 Years data retention
- Data Memory (RAM)
 - 1,040 × 8 bit data memory

1.3.3 Instruction Set

- Seventy eight instructions
- Idle and Stop instructions

1.3.4 26 I/O Pins

- Twenty six normal I/O pins for 32 pin

1.3.5 Interrupts

- Eight interrupt levels and 26 interrupt sources
- Fast interrupt processing feature

1.3.6 Timers and Timer/Counters

- One programmable 8-bit Basic Timer (BT) for oscillation stabilization control or watchdog timer function.
- One 8-bit timer/counter (Timer A) with three operating modes:
 - Interval Mode
 - Capture Mode
 - PWM Mode

- One 16-bit timer/counter (Timer 0) with Interval Mode and PWM Mode.
- Two 16-bit timer/counter (Timer 1/2) with three operating modes:
 - Interval Mode
 - Capture Mode
 - PWM Mode
- One 16-bit Timer B with one-shot-pulse output mode and repeat output mode. It can be triggered by external input or software.
- One Stop Wake-Up Timer with Ring oscillator as its clock source.

1.3.7 Watch Timer

- Interval time: 1.995 ms, 0.125s, 0.25s, and 0.5s at 32.768 kHz
- 0.5/1/2/4 kHz buzzer output selectable

1.3.8 Analog to Digital Converter

- 16-channel analog input
- 10-bit conversion resolution

1.3.9 Two Channels UART

- Full-duplex serial I/O interface
- Four programmable operating modes
- Auto generating parity bit

1.3.10 Multi-Master IIC-Bus

- Serial Peripheral Interface
- Serial, 8-bit Data Transfers
- Programmable Clock Prescale

1.3.11 SPI

- Support Master and Slave Mode
- Programmable Clock Prescale

1.3.12 Two Power-Down Modes

- **Idle Mode:** Stops only CPU clock
- **Stop Mode:** Stops system clock and CPU clock

1.3.13 Oscillation Sources

- Main clock frequency: 0.4 MHz-12.0 MHz
- External RC for main clock
- Internal RC: 8 MHz (typ.), 4 MHz (typ.), 1 MHz (typ.), 0.5 MHz (typ.)
- On-chip free running Ring oscillator with 32 kHz frequency for 16-bit Timer 1.

1.3.14 Instruction Execution Time

- 333 ns at $f_x = 12$ MHz (minimum, main clock)

1.3.15 Built-In Reset Circuit (LVR)

- Low-Voltage check to reset system
- $V_{LVR} = 1.9/2.3/3.0/3.9$ V (by the Smart Option)

1.3.16 Low Voltage Detect Circuit (LVD)

- Flag or Interrupt for voltage drop detection
- Programmable detect voltage: 2.1/2.5/3.2/4.1 V
- Enable/Disable software selectable

1.3.17 Operating Voltage Range

- 1.8 V to 5.5 V at 4 MHz (main clock)
- 2.7 V to 5.5 V at 12 MHz (main clock)

1.3.18 Package Type

- 32-pin SDIP
- 32-pin SOP
- 32-pin QFN
- 32-pin LQFP

1.3.19 Operating Temperature Range

- -40°C to $+85^{\circ}\text{C}$

1.3.20 Smart Option

- ISP-related option selectable (ROM address 3EH)
- Oscillator selection, LVR selection (ROM address 3FH)

1.4 Block Diagram

[Figure 1-1](#) illustrates the block diagram of S3F8S39/S3F8S35.

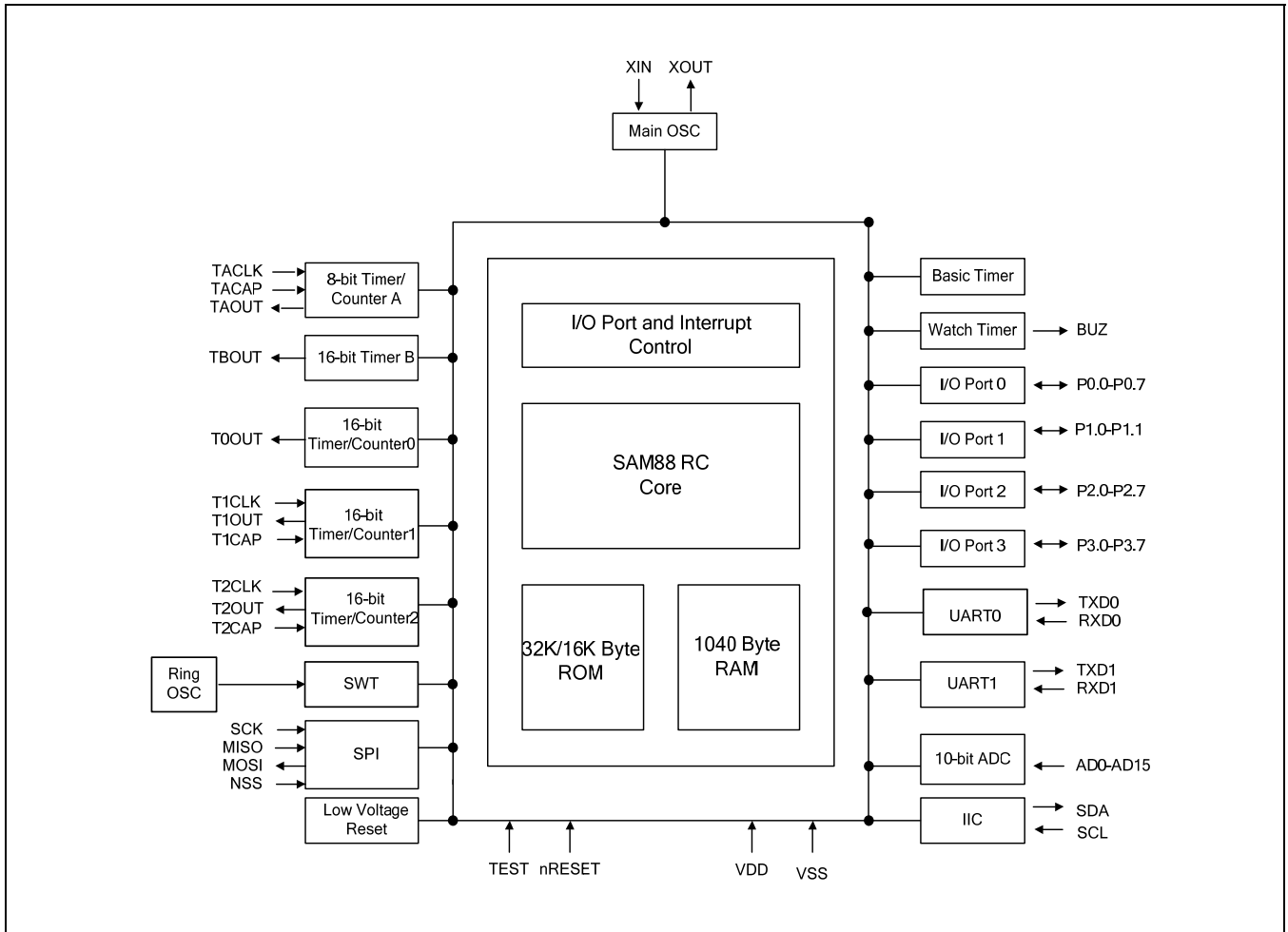


Figure 1-1 S3F8S39/S3F8S35 Block Diagram

1.5 Pin Assignments

[Figure 1-2](#) illustrates the S3F8S39/S3F8S35 pin assignment (32-pin SOP/32-pin SDIP).

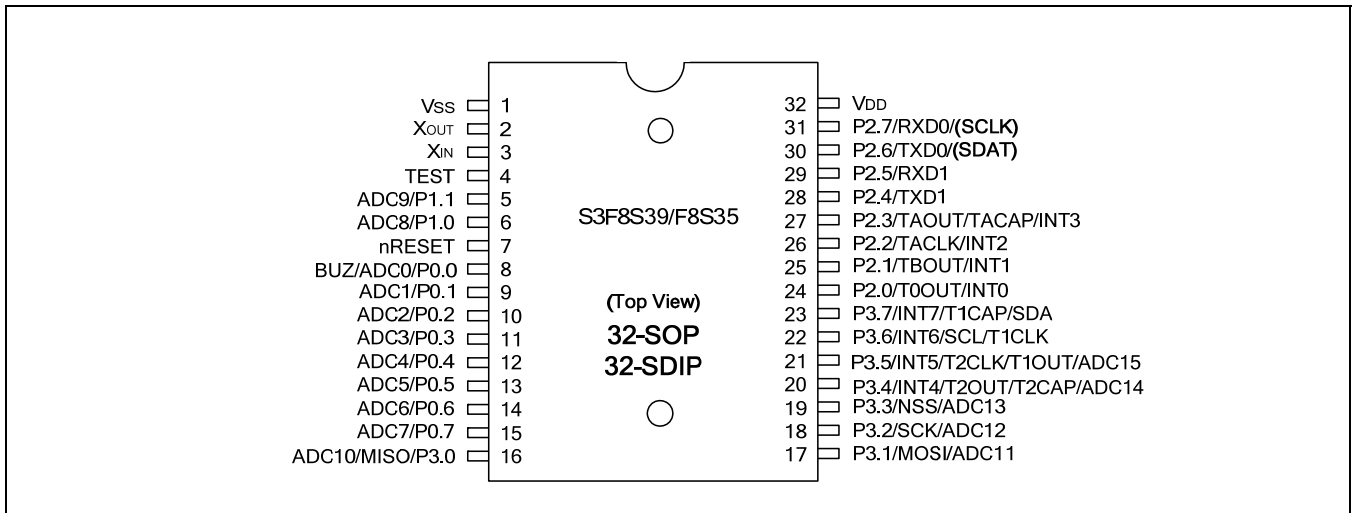


Figure 1-2 S3F8S39/S3F8S35 Pin Assignment (32-SOP/32-SDIP)

[Figure 1-3](#) illustrates the S3F8S39/S3F8S35 pin assignment (32-pin QFN/32-pin LQFP).

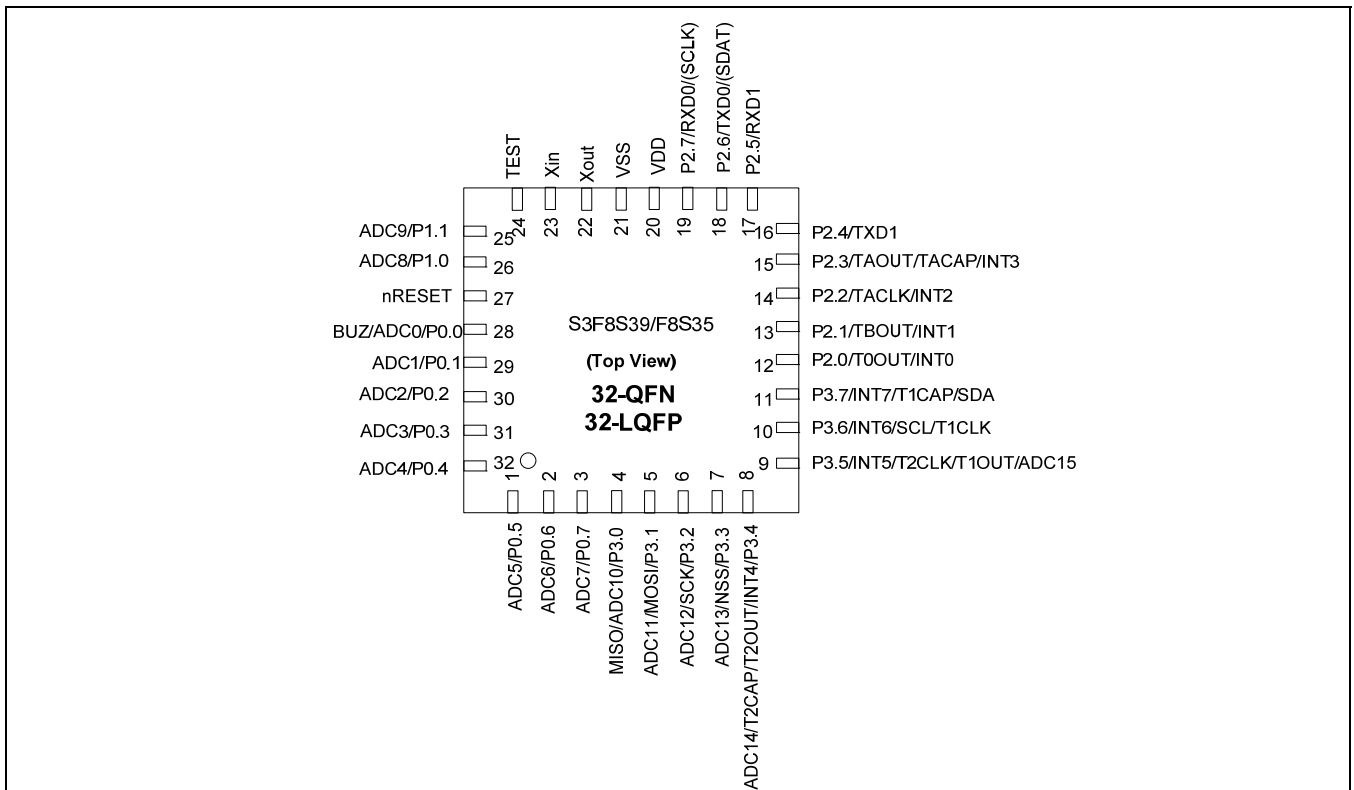


Figure 1-3 S3F8S39/S3F8S35 Pin Assignment (32-QFN/32-LQFP)