SiM3L1xx

High-Performance, Low-Power, 32-Bit Precision32™ MCU Family with up to 256 kB of Flash

32-bit ARM Cortex-M3 CPU

- 50 MHz maximum frequency
- Single-cycle multiplication, hardware division support
- Nested vectored interrupt control (NVIC) with 8 levels of interrupt priority

Memory

- 32–256 kB flash, in-system programmable
- 8–32 kB SRAM with configurable retention during low power modes in 4 kB blocks

Power Management

- Three (one scaleable) low drop-out (LDO) regulators
- Power-on reset circuit and brownout detectors
- DC-DC buck converter allows dynamic voltage scaling for maximum efficiency (250 mW output)
- Multiple power modes supported for low power optimization

Clock Sources

- Internal oscillator with PLL: 23–50 MHz
- Low power internal oscillator: 20 MHz
- Low frequency internal oscillator: 16.4 kHz
- External real-time clock (RTC) crystal oscillator
- External oscillator: Crystal, RC, C, CMOS clock

128/192/256-bit Hardware AES Encryption

- Hardware-supported Electronic Codebook (ECB), Cipher-Block Chaining (CBC) and Counter (CTR) algorithms
- All cipher operations can be performed without any firmware intervention for multiple 4-word blocks (up to 32 kB)

16/32-bit CRC

- Hardware support for a programmable 16-bit polynomial and one fixed 32-bit polynomial
- Supports byte-order reorientation and byte, word, or half-word bit-reversal
- Supports automatic APB snooping

Encoder / Decoder

- Hardware support for Manchester and Three-out-of-Six encoding or decoding

Integrated LCD Controller

- Supports up to 160 segments (40x4)
- Battery monitor, integrated charge pump, and four auto-contrast modes
- Segment and common signals can be placed in an intermediate state to reduce power consumption

5 V Tolerant Flexible I/O

- Up to 62 contiguous 5 V tolerant GPIO with one priority crossbar providing flexibility in pin assignments

Communication Interfaces

- 1 x USART with IrDA and ISO7816 Smartcard support
- 1 x UART that operates in low power mode
- 2 x SPIs, 1 x I2C

Low Power Features

- 50 nA current mode with voltage supply monitor enabled
- 200 nA current mode with RTC (internal LF oscillator)
- 340 nA current mode with RTC (external crystal oscillator)
- 4 µs wakeup, no reset required (lowest power mode)
- 175 µA/MHz with VBAT at 3.6 V executing from flash
- 140 µA/MHz with VBAT at 3.6 V executing from SRAM
- Clocks can be gated off from unused peripherals to save power
- Specialized on-chip charge pump reduces power consumption
- Process/Voltage/Temperature (PVT) Monitor
- All registers retain their contents in the lowest power mode

1 x 12-Bit Analog-to-Digital Converter

- Up to 24 external input channels and 7 internal input channels
- Up to 250 ksps 12-bit mode or 1 Msps 10-bit mode
- Channel sequencer enables automatic multiplexing of multiple channels without firmware intervention
- Internal VREF or external VREF supported

1 x 10-Bit Digital-to-Analog Converter

- DMA support for waveform generation
- Four-word circular buffer to enable 12-bit mode

Two Low-Current Comparators

- Integrated 6-bit programmable reference voltage
- 400 nA current consumption in low power mode

10-Channel DMA Controller

- Supports various modules, external pin triggers, and timers

3-Channel Data Transfer Manager

- Manages complex DMA transfers without core intervention

Timers/Counters

- 3 x 32-bit or 6 x 16-bit timers with capture/compare
- 16-bit, 6-channel counter with capture/compare/PWM and dead-time controller with differential outputs
- 16-bit low power timer/pulse counter operational in the lowest power mode
- 32-bit real time clock (RTC) with multiple alarms
- Watchdog timer
- Low power mode pulse counter with hardware support for digital inputs, switch topology circuits, or LC resonant circuits

On-Chip Debugging

- JTAG and serial wire debug (SWD) with serial wire viewer (SWV) allow for full-speed, non-intrusive debug
- Cortex-M3 embedded trace macrocell (ETM)

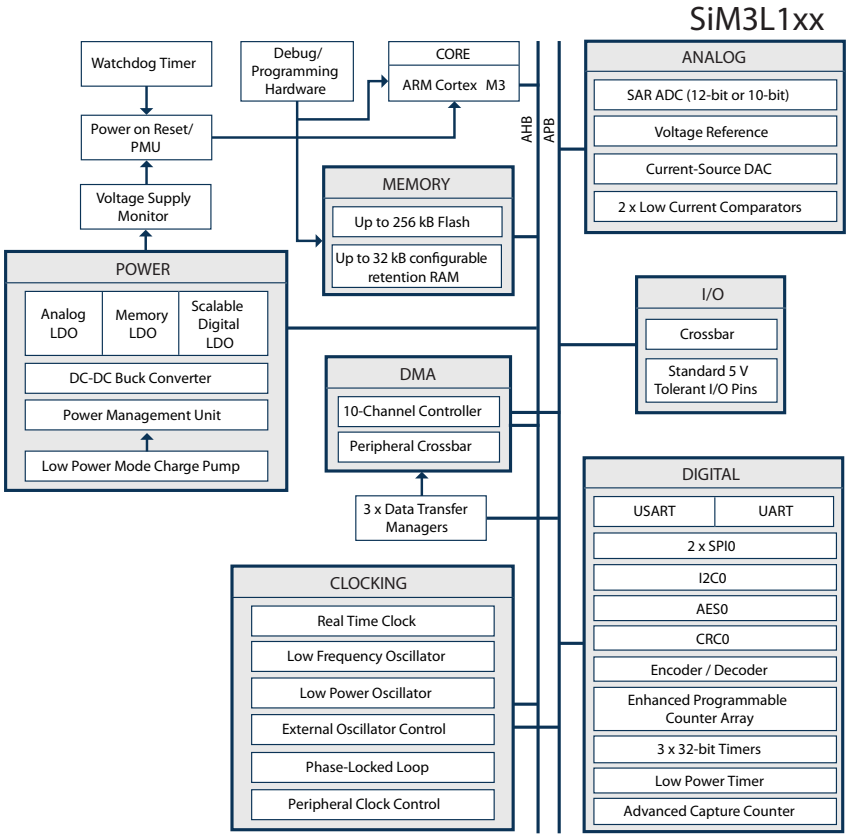
Supply Voltage: 1.8 to 3.8 V

Temperature Range: –40 to +85 °C

Package Options

- QFN options: 40-pin (6 x 6 mm), 64-pin (9 x 9 mm)
- TQFP options: 64-pin (10 x 10 mm), 80-pin (12 x 12 mm)
- BGA option: 80-pin (5.5 x 5.5 mm)

SiM3L1xx Block Diagram



SiM3L1xx Family Selector Guide

Ordering Part #	Flash Memory (kB)	RAM (kB)	LCD Segments	Digital Port I/Os	Digtial Port I/Os on the Crossbar	Number of SARADC0 Channels	Number of Comparator 0/1 Inputs (+/–)	Number of Pulse Counter Inputs and Outputs	JTAG Debugging Interface	ETM Debugging Interface	Serial Wire Debugging Interface	Package (RoHS Compliant)
SiM3L167-C-GL	256	32	160 (4x40)	62	38	24	15/15	12	✓	✓	✓	BGA-80
SiM3L167-C-GQ	256	32	160 (4x40)	62	38	24	15/15	12	✓	✓	✓	TQFP-80
SiM3L166-C-GM	256	32	128 (4x32)	51	34	23	14/12	12		✓	✓	QFN-64
SiM3L166-C-GQ	256	32	128 (4x32)	51	34	23	14/12	12		✓	✓	TQFP-64
SiM3L164-C-GM	256	32		28	26	20	9/10	5			✓	QFN-40
SiM3L157-C-GL	128	32	160 (4x40)	62	38	24	15/15	12	✓	✓	✓	BGA-80
SiM3L157-C-GQ	128	32	160 (4x40)	62	38	24	15/15	12	✓	✓	✓	TQFP-80
SiM3L156-C-GM	128	32	128 (4x32)	51	34	23	14/12	12		✓	✓	QFN-64
SiM3L156-C-GQ	128	32	128 (4x32)	51	34	23	14/12	12		✓	✓	TQFP-64
SiM3L154-C-GM	128	32		28	26	20	9/10	5			✓	QFN-40
SiM3L146-C-GM	64	16	128 (4x32)	51	34	23	14/12	12		✓	✓	QFN-64
SiM3L146-C-GQ	64	16	128 (4x32)	51	34	23	14/12	12		✓	✓	TQFP-64
SiM3L144-C-GM	64	16		28	26	20	9/10	5			✓	QFN-40
SiM3L136-C-GM	32	8	128 (4x32)	51	34	23	14/12	12		✓	✓	QFN-64
SiM3L136-C-GQ	32	8	128 (4x32)	51	34	23	14/12	12		✓	✓	TQFP-64
SiM3L134-C-GM	32	8		28	26	20	9/10	5			✓	QFN-40