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"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	ARM® Cortex®-M3
Core Size	32-Bit Single-Core
Speed	80MHz
Connectivity	EBI/EMI, I²C, IrDA, SmartCard, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT
Number of I/O	65
Program Memory Size	256KB (256K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	32K x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 3.6V
Data Converters	A/D 32x12b; D/A 2x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	80-TQFP
Supplier Device Package	80-TQFP (12x12)
Purchase URL	https://www.e-xfl.com/product-detail/silicon-labs/sim3c167-b-gq

2. Typical Connection Diagrams

This section provides typical connection diagrams for SiM3C1xx devices.

2.1. Power

Figure 2.1 shows a typical connection diagram for the power pins of the SiM3C1xx devices when the internal regulator is in use.

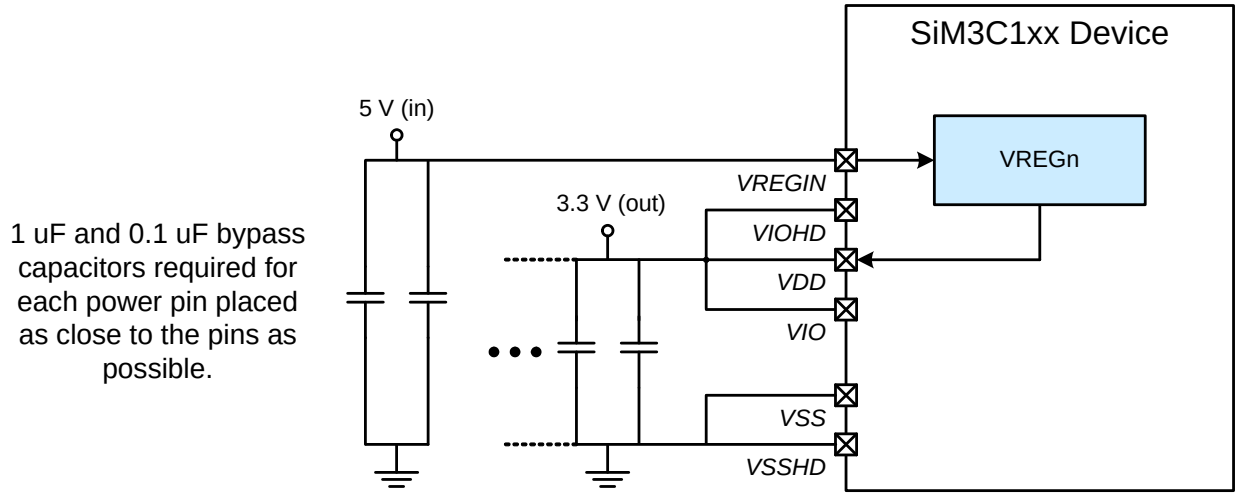


Figure 2.1. Connection Diagram with Voltage Regulator Used

Figure 2.2 shows a typical connection diagram for the power pins of the SiM3C1xx devices when the internal regulator is not used.

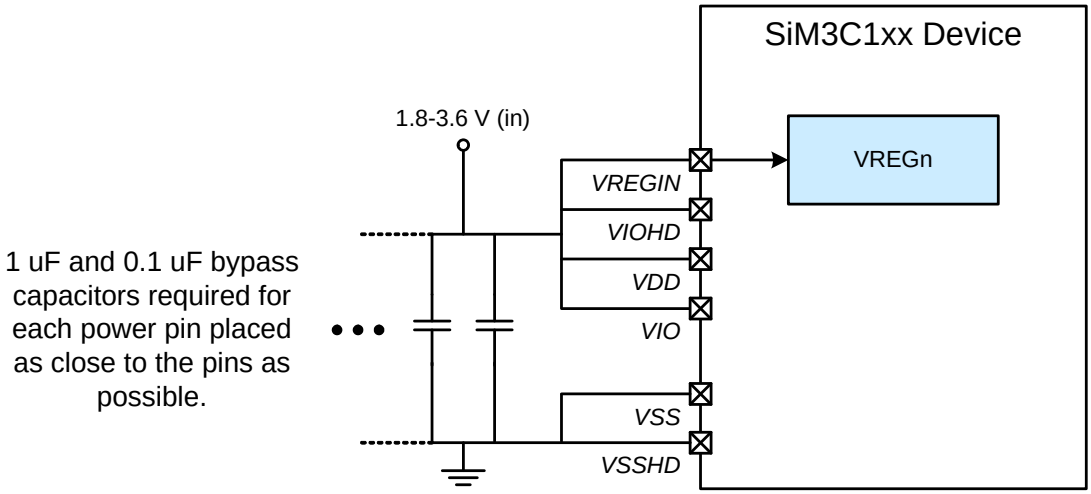


Figure 2.2. Connection Diagram with Voltage Regulator Not Used

Table 3.2. Power Consumption (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Power Mode 9[2,3]—Low Power Shutdown with VREG0 disabled, powered through VDD and VIO	I_{DD}	RTC Disabled, V_{DD} = 1.8 V, T_A = 25 °C	—	85	—	nA
		RTC w/ 16.4 kHz LFO, V_{DD} = 1.8 V, T_A = 25 °C	—	350	—	nA
		RTC w/ 32.768 kHz Crystal, V_{DD} = 1.8 V, T_A = 25 °C	—	620	—	nA
		RTC Disabled, V_{DD} = 3.0 V, T_A = 25 °C	—	145	—	nA
		RTC w/ 16.4 kHz LFO, V_{DD} = 3.0 V, T_A = 25 °C	—	500	—	nA
		RTC w/ 32.768 kHz Crystal, V_{DD} = 3.0 V, T_A = 25 °C	—	800	—	nA
Power Mode 9[2,3]—Low Power Shutdown with VREG0 in low-power mode, VDD and VIO powered through VREG0 (Includes VREG0 current)	I_{VREGIN}	RTC Disabled, VREGIN = 5 V, T_A = 25 °C	—	300	—	nA
		RTC w/ 16.4 kHz LFO, VREGIN = 5 V, T_A = 25 °C	—	650	—	nA
		RTC w/ 32.768 kHz Crystal, VREGIN = 5 V, T_A = 25 °C	—	950	—	nA
VIOHD Current (High-drive I/O disabled)	I_{VIOHD}	HV Mode (default)	—	2.5	5	µA
		LV Mode	—	2	—	nA

Notes:

1. Perhipheral currents drop to zero when peripheral clock and peripheral are disabled, unless otherwise noted.
2. Currents are additive. For example, where I_{DD} is specified and the mode is not mutually exclusive, enabling the functions increases supply current by the specified amount.
3. Includes all peripherals that cannot have clocks gated in the Clock Control module.
4. Includes supply current from internal regulator and PLL0OSC (>20 MHz) or LPOSC0 (<=20 MHz).
5. Flash execution numbers use 2 wait states for 80 MHz and 0 wait states at 20 MHz or less.
6. RAM execution numbers use 0 wait states for all frequencies.
7. IDAC output current and IVC input current not included.
8. Bias current only. Does not include dynamic current from oscillator running at speed.

Table 3.7. Flash Memory

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Write Time[1]	t_{WRITE}	One 16-bit Half Word	20	21	22	µs
Erase Time[1]	t_{ERASE}	One Page	20	21	22	ms
	t_{ERALL}	Full Device	20	21	22	ms
V_{DD} Voltage During Programming	V_{PROG}		1.8	—	3.6	V
Endurance (Write/Erase Cycles)	N_{WE}		20k	100k	—	Cycles
Retention[2]	t_{RET}	T_A = 25 °C, 1k Cycles	10	100	—	Years

Notes:
1. Does not include sequencing time before and after the write/erase operation, which may take up to 35 µs. During a sequential write operation, this extra time is only taken prior to the first write and after the last write.
2. Additional Data Retention Information is published in the Quarterly Quality and Reliability Report.

Table 3.8. Internal Oscillators

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Phase-Locked Loop (PLL0OSC)						
Calibrated Output Frequency*	$f_{PLL0OSC}$	Full Temperature and Supply Range	77	79	80	MHz
Power Supply Sensitivity*	$PSS_{PLL0OSC}$	T_A = 25 °C, Fout = 79 MHz	—	430	—	ppm/V
Temperature Sensitivity*	$TS_{PLL0OSC}$	V_{DD} = 3.3 V, Fout = 79 MHz	—	95	—	ppm/°C
Adjustable Output Frequency Range	$f_{PLL0OSC}$		23	—	80	MHz
Lock Time	$t_{PLL0LOCK}$	f_{REF} = 20 MHz, $f_{PLL0OSC}$ = 80 MHz, M=24, N=99, LOCKTH = 0	—	1.7	—	µs
		f_{REF} = 32 kHz, $f_{PLL0OSC}$ = 80 MHz, M=0, N=2440, LOCKTH = 0	—	91	—	µs

***Note:** PLL0OSC in free-running oscillator mode.

Table 3.10. SAR ADC

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Resolution	N_{bits}	12 Bit Mode		12		Bits
		10 Bit Mode		10		Bits
Supply Voltage Requirements (VDD)	V_{ADC}	High Speed Mode	2.2	—	3.6	V
		Low Power Mode	1.8	—	3.6	V
Throughput Rate (High Speed Mode)	f_S	12 Bit Mode	—	—	250	ksps
		10 Bit Mode	—	—	1	Msps
Throughput Rate (Low Power Mode)	f_S	12 Bit Mode	—	—	62.5	ksps
		10 Bit Mode	—	—	250	ksps
Tracking Time	t_{TRK}	High Speed Mode	230	—	—	ns
		Low Power Mode	450	—	—	ns
SAR Clock Frequency	f_{SAR}	High Speed Mode	—	—	16.24	MHz
		Low Power Mode	—	—	4	MHz
Conversion Time	t_{CNV}	10-Bit Conversion, SAR Clock = 16 MHz, APB Clock = 40 MHz		762.5		ns
Sample/Hold Capacitor	C_{SAR}	Gain = 1	—	5	—	pF
		Gain = 0.5	—	2.5	—	pF
Input Pin Capacitance	C_{IN}	High Quality Inputs	—	18	—	pF
		Normal Inputs	—	20	—	pF
Input Mux Impedance	R_{MUX}	High Quality Inputs	—	300	—	Ω
		Normal Inputs	—	550	—	Ω
Voltage Reference Range	V_{REF}		1	—	V_{DD}	V
Input Voltage Range[1]	V_{IN}	Gain = 1	0	—	V_{REF}	V
		Gain = 0.5	0	—	$2xV_{REF}$	V
Power Supply Rejection Ratio	$PSRR_{ADC}$		—	70	—	dB
DC Performance						
Integral Nonlinearity	INL	12 Bit Mode[2]	—	±1	±1.9	LSB
		10 Bit Mode	—	±0.2	±0.5	LSB

Notes:
1. Absolute input pin voltage is limited by the lower of the supply at VDD and VIO.
2. INL and DNL specifications for 12-bit mode do not include the first or last four ADC codes.
3. The maximum code in 12-bit mode is 0xFFFC. The Slope Error is referenced from the maximum code.

Table 3.10. SAR ADC (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Differential Nonlinearity (Guaranteed Monotonic)	DNL	12 Bit Mode[2]	–1	±0.7	1.8	LSB
		10 Bit Mode	—	±0.2	±0.5	LSB
Offset Error (using VREFGND)	E_{OFF}	12 Bit Mode, VREF =2.4 V	–2	0	2	LSB
		10 Bit Mode, VREF =2.4 V	–1	0	1	LSB
Offset Temperatue Coefficient	TC_{OFF}		—	0.004	—	LSB/°C
Slope Error[3]	E_M	12 Bit Mode	–0.07	–0.02	0.02	%
Dynamic Performance with 10 kHz Sine Wave Input 1 dB below full scale, Max throughput						
Signal-to-Noise	SNR	12 Bit Mode	62	66	—	dB
		10 Bit Mode	58	60	—	dB
Signal-to-Noise Plus Distortion	SNDR	12 Bit Mode	62	66	—	dB
		10 Bit Mode	58	60	—	dB
Total Harmonic Distortion (Up to 5th Harmonic)	THD	12 Bit Mode	—	78	—	dB
		10 Bit Mode	—	77	—	dB
Spurious-Free Dynamic Range	SFDR	12 Bit Mode	—	–79	—	dB
		10 Bit Mode	—	–74	—	dB

Notes:
1. Absolute input pin voltage is limited by the lower of the supply at VDD and VIO.
2. INL and DNL specifications for 12-bit mode do not include the first or last four ADC codes.
3. The maximum code in 12-bit mode is 0xFFFC. The Slope Error is referenced from the maximum code.

Table 3.12. Capacitive Sense

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Single Conversion Time (Default Configuration)	t_{single}	12-bit Mode	—	25	—	µs
		13-bit Mode	—	27	—	µs
		14-bit Mode	—	29	—	µs
		16-bit Mode	—	33	—	µs
Maximum External Capacitive Load	C_L	Highest Gain Setting (default)	—	45	—	pF
		Lowest Gain Setting	—	500	—	pF
Maximum External Series Impedance	C_L	Highest Gain Setting (default)	—	50	—	kΩ

Table 3.13. Current-to-Voltage Converter (IVC)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Supply Voltage (VDD)	V_{DDIVC}		2.2	—	3.6	V
Input Pin Voltage	V_{IN}		2.2	—	VDD	V
Minimum Input Current (source)	I_{IN}		100	—	—	µA
Integral Nonlinearity	INL_{IVC}		–0.6	—	0.6	%
Full Scale Output	V_{IVCOUT}		—	1.65	—	V
Slope	M_{IVC}	Input Range 1 mA (INxRANGE = 101)	1.55	1.65	1.75	V/mA
		Input Range 2 mA (INxRANGE = 100)	795	830	860	mV/mA
		Input Range 3 mA (INxRANGE = 011)	525	550	570	mV/mA
		Input Range 4 mA (INxRANGE = 010)	390	415	430	mV/mA
		Input Range 5 mA (INxRANGE = 001)	315	330	340	mV/mA
		Input Range 6 mA (INxRANGE = 000)	260	275	285	mV/mA
Settling Time to 0.1%	V_{IVCOUT}		—	—	500	ns

Table 3.17. Port I/O (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
P-Channel Source Current Limit (2.7 V ≤ VIOHD ≤ 6 V, V_{OH} = VIOHD – 0.8 V) See Figure 3.2	I_{SRCL}	Mode 0	—	0.8	—	mA
		Mode 1	—	1.25	—	
		Mode 2	—	1.75	—	
		Mode 3	—	2.5	—	
		Mode 4	—	3.5	—	
		Mode 5	—	4.75	—	
		Mode 6	—	7	—	
		Mode 7	—	9.5	—	
		Mode 8	—	14	—	
		Mode 9	—	18.75	—	
		Mode 10	—	28.25	—	
		Mode 11	—	37.5	—	
		Mode 12	—	56.25	—	
		Mode 13	—	75	—	
		Mode 14	—	112.5	—	
		Mode 15	—	150	—	
Total P-Channel Source Current on P4.0-P4.5 (DC)	I_{SRCLT}		—	—	400	mA
Pin Capacitance	C_{IO}		—	30	—	pF
Weak Pull-Up Current in Low Voltage Mode	I_{PU}	V_{IOHD} = 1.8 V	–6	–3.5	–2	µA
		V_{IOHD} = 3.6 V	–30	–20	–10	µA
Weak Pull-Up Current in High Voltage Mode	I_{PU}	V_{IOHD} = 2.7 V	–15	–10	–5	µA
		V_{IOHD} = 6 V	–30	–20	–10	µA
Input Leakage (Pullups off)	I_{LK}		–1	—	1	µA

***Note:** $\overline{\text{RESET}}$ does not drive to logic high. Specifications for $\overline{\text{RESET}}$ V_{OL} adhere to the low drive setting.

- Internal transmit and receive FIFOs with flush capability and support for byte, half-word, and word reads and writes.
- Data bit lengths from 5 to 9 bits.
- Programmable inter-packet transmit delays.
- Auto-baud detection with support for the LIN SYNC byte.
- Automatic parity generation (with enable).
- Automatic start and stop generation.
- Transmit and receive hardware flow-control.
- Independent inversion correction for TX, RX, RTS, and CTS signals.
- IrDA modulation and demodulation with programmable pulse widths.
- Smartcard ACK/NACK support.
- Parity error, frame error, overrun, and underrun detection.
- Multi-master and half-duplex support.
- Multiple loop-back modes supported.

4.6.4. SPI (SPI0, SPI1)

SPI is a 3- or 4-wire communication interface that includes a clock, input data, output data, and an optional select signal.

The SPI module includes the following features:

- Supports 3- or 4-wire master or slave modes.
- Supports up to 10 MHz clock in master mode and 5 MHz clock in slave mode.
- Support for all clock phase and slave select (NSS) polarity modes.
- 16-bit programmable clock rate.
- Programmable MSB-first or LSB-first shifting.
- 8-byte FIFO buffers for both transmit and receive data paths to support high speed transfers.
- Programmable FIFO threshold level to request data service for DMA transfers.
- Support for multiple masters on the same data lines.

4.6.5. I2C (I2C0, I2C1)

The I2C interface is a two-wire, bi-directional serial bus. The two clock and data signals operate in open-drain mode with external pull-ups to support automatic bus arbitration.

Reads and writes to the interface are byte oriented with the I2C interface autonomously controlling the serial transfer of the data. Data can be transferred at up to 1/8th of the APB clock as a master or slave, which can be faster than allowed by the I2C specification, depending on the clock source used. A method of extending the clock-low duration is available to accommodate devices with different speed capabilities on the same bus.

The I2C interface may operate as a master and/or slave, and may function on a bus with multiple masters. The I2C provides control of SDA (serial data), SCL (serial clock) generation and synchronization, arbitration logic, and start/stop control and generation.

The I2C module includes the following features:

- Standard (up to 100 kbps) and Fast (400 kbps) transfer speeds.
- Can operate down to APB clock divided by 32768 or up to APB clock divided by 8.
- Support for master, slave, and multi-master modes.
- Hardware synchronization and arbitration for multi-master mode.
- Clock low extending (clock stretching) to interface with faster masters.
- Hardware support for 7-bit slave and general call address recognition.
- Firmware support for 10-bit slave address decoding.
- Ability to disable all slave states.
- Programmable clock high and low period.
- Programmable data setup/hold times.

- Spike suppression up to 2 times the APB period.

4.6.6. I²S (I2S0)

The I²S module receives digital data from an external source over a data line in the standard I²S, left-justified, right-justified, or time domain multiplexing format, de-serializes the data, and generates requests to transfer the data using the DMA. The module also reads stereo audio samples from the DMA, serializes the data, and sends it out of the chip on a data line in the same standard serial format for digital audio. The I²S receive interface consists of 3 signals: SCK (bit clock), WS (word select or frame sync), and SD (data input). The block's transmit interface consists of 3 signals: SCK (bit clock), WS (word select or frame sync) and SD (data output).

The I²S module includes the following features:

- Master or slave capability.
- Flexible 10-bit clock divider with 8-bit fractional clock divider provides support for various common sampling frequencies (16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, and 48 kHz) for up to two 32-bit channels.
- Support for DMA data transfers.
- Support for various data formats.
- Time Division Multiplexing

4.8. Reset Sources

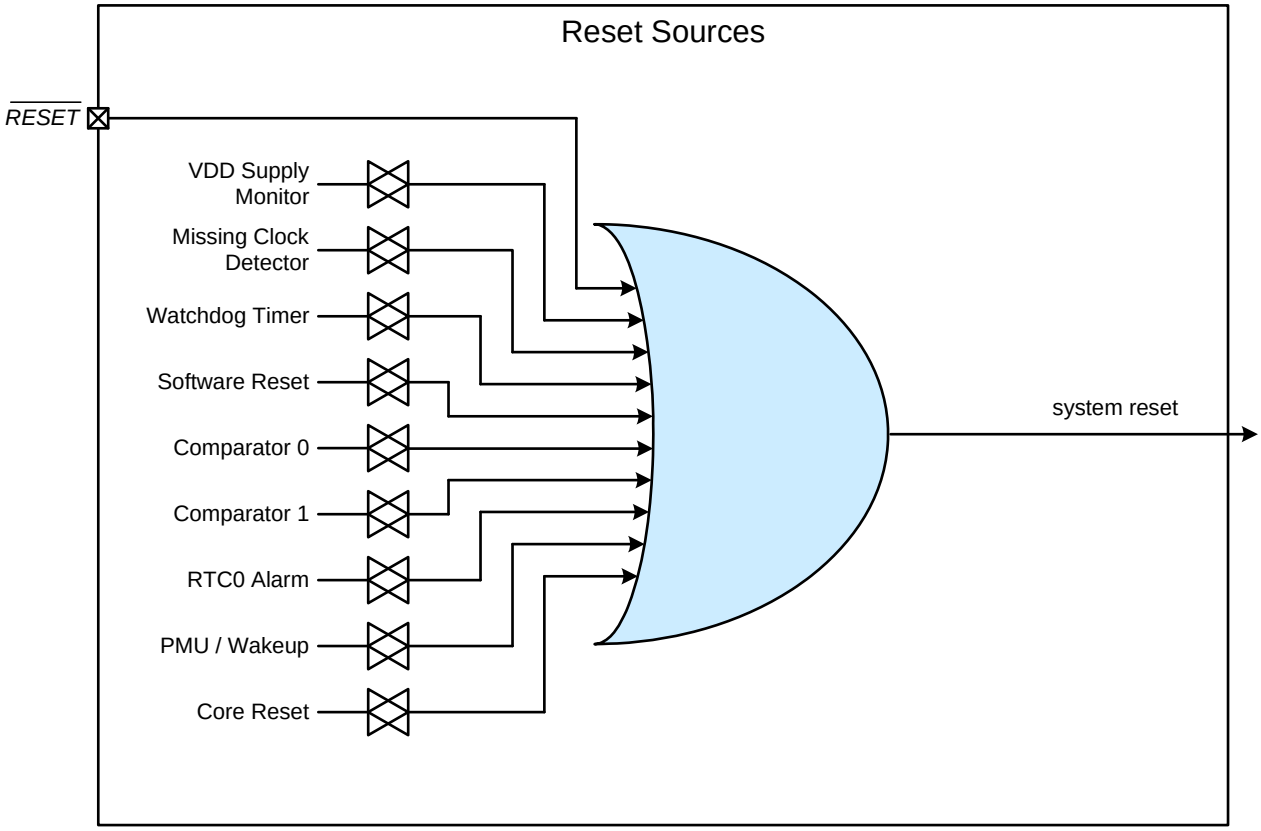
Reset circuitry allows the controller to be easily placed in a predefined default condition. On entry to this reset state, the following occur:

- The core halts program execution.
- Module registers are initialized to their defined reset values unless the bits reset only with a power-on reset.
- External port pins are forced to a known state.
- Interrupts and timers are disabled.
- Clocks to all AHB peripherals are enabled.
- Clocks to all APB peripherals other than Watchdog Timer, EMIF0, and DMAXBAR are disabled.

All registers are reset to the predefined values noted in the register descriptions unless the bits only reset with a power-on reset. The contents of RAM are unaffected during a reset; any previously stored data is preserved as long as power is not lost.

The Port I/O latches are reset to 1 in open-drain mode. Weak pullups are enabled during and after the reset. For VDD Supply Monitor and power-on resets, the $\overline{\text{RESET}}$ pin is driven low until the device exits the reset state.

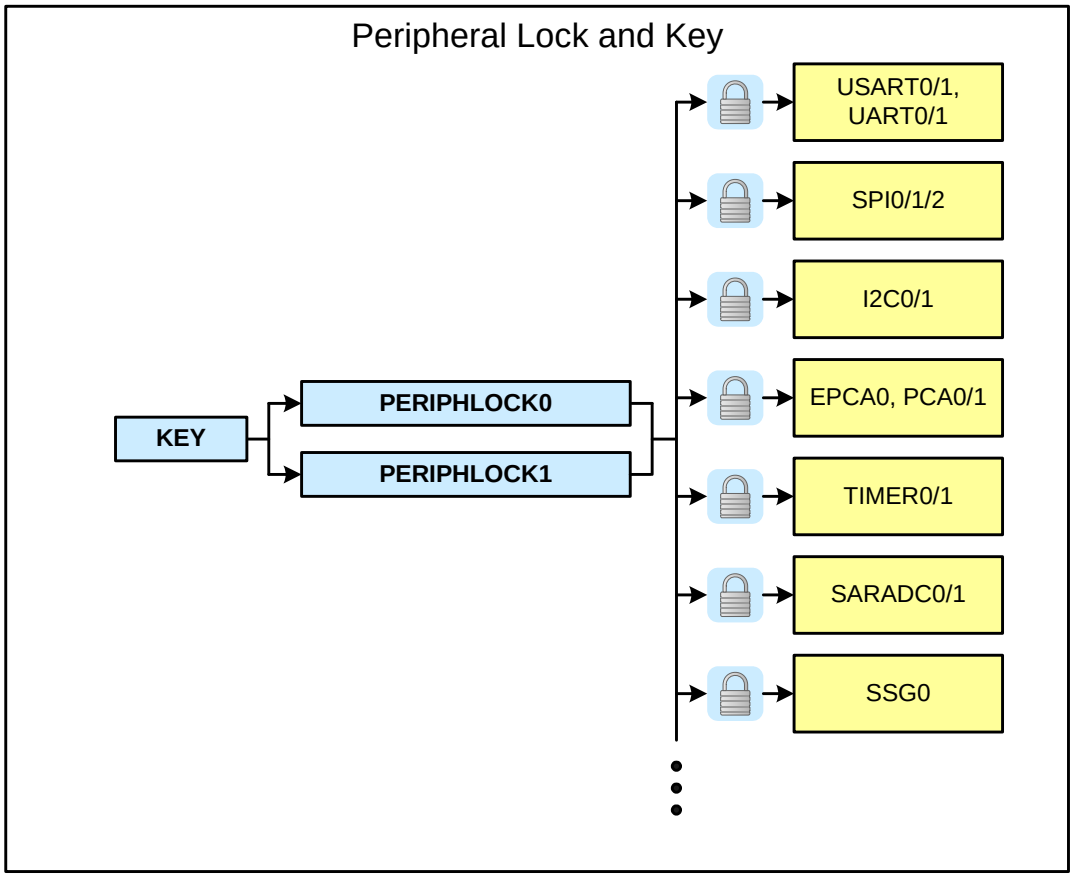
On exit from the reset state, the program counter (PC) is reset, and the system clock defaults to an internal oscillator. The Watchdog Timer is enabled with the Low Frequency Oscillator (LFO0) as its clock source. Program execution begins at location 0x00000000.



4.9. Security

The peripherals on the SiM3C1xx devices have a register lock and key mechanism that prevents any undesired accesses of the peripherals from firmware. Each bit in the PERIPHLOCKx registers controls a set of peripherals. A key sequence must be written in order to the KEY register to modify any of the bits in PERIPHLOCKx. Any subsequent write to KEY will then inhibit any accesses of PERIPHLOCKx until it is unlocked again through KEY. Reading the KEY register indicates the current status of the PERIPHLOCKx lock state.

If a peripheral's registers are locked, all writes will be ignored. The registers can always be read, regardless of the peripheral's lock state.



4.10. On-Chip Debugging

The SiM3C1xx devices include JTAG and Serial Wire programming and debugging interfaces and ETM for instruction trace. The JTAG interface is supported on SiM3C1x7 and SiM3C1x6 devices only, and does not include boundary scan capabiites. The ETM interface is supported on SiM3C1x7 devices. The JTAG and ETM interfaces can be optionally enabled to provide more visibility while debugging at the cost of using several Port I/O pins. Additionally, if the core is configured for Serial Wire (SW) mode and not JTAG, then the Serial Wire Viewer (SWV) is available to provide a single pin to send out TPIU messages on SiM3C1x7 and SiM3C1x6 devices.

Most peripherals have the option to halt or continue functioning when the core halts in debug mode.

5. Ordering Information

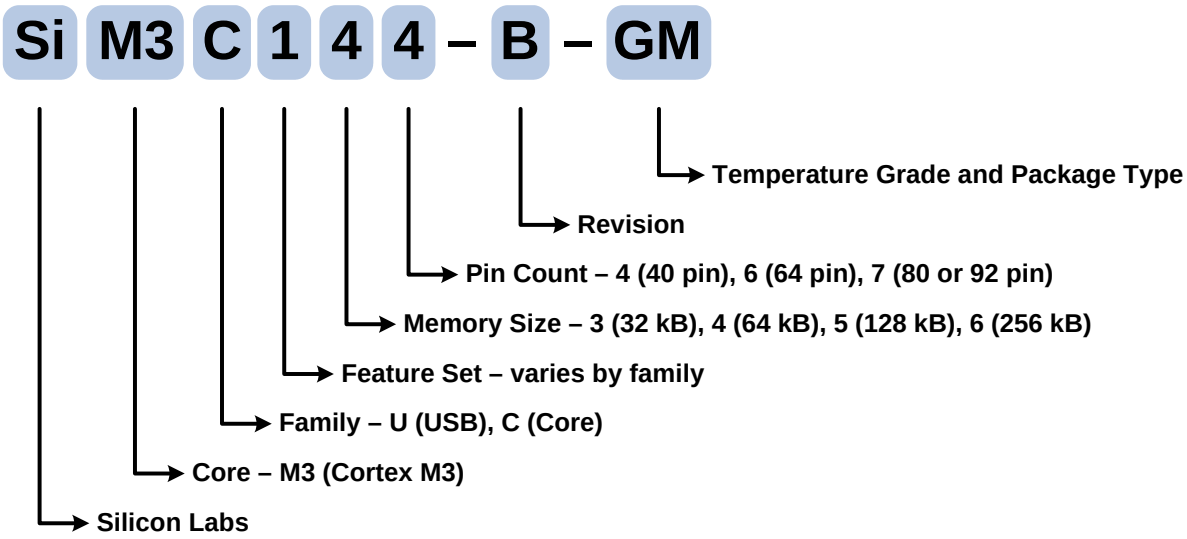


Figure 5.1. SiM3C1xx Part Numbering

All devices in the SiM3C1xx family have the following features:

- **Core:** ARM Cortex-M3 with maximum operating frequency of 80 MHz.
- **Flash Program Memory:** 32-256 kB, in-system programmable.
- **RAM:** 8–32 kB SRAM, with 4 kB retention SRAM
- **I/O:** Up to 65 multifunction I/O pins, including high-drive and 5 V-tolerant pins.
- **Clock Sources:** Internal and external oscillator options.
- **16-Channel DMA Controller.**
- **128/192/256-bit AES.**
- **16/32-bit CRC.**
- **Timers:** 2 x 32-bit (4 x 16-bit).
- **Real-Time Clock.**
- **Low-Power Timer.**
- **PCA:** 1 x 6 channels (Enhanced), 2 x 2 channels (Standard). PWM, capture, and clock generation capabilites.
- **ADC:** 2 x 12-bit 250 ksps (10-bit 1 Msps) SAR.
- **DAC:** 2 x 10-bit IDAC.
- **Temperature Sensor.**
- **Internal VREF.**
- **16-channel Capacitive Sensing (CAPSENSE).**
- **Comparator:** 2 x low current.
- **Current to Voltage Converter (IVC).**
- **Serial Buses:** 2 x USART, 2 x UART, 3 x SPI, 2 x I2C, 1 x I^2S.

The inclusion of some features varies across different members of the device family. The differences are detailed in Table 5.1.

6. Pin Definitions and Packaging Information

6.1. SiM3C1x7 Pin Definitions

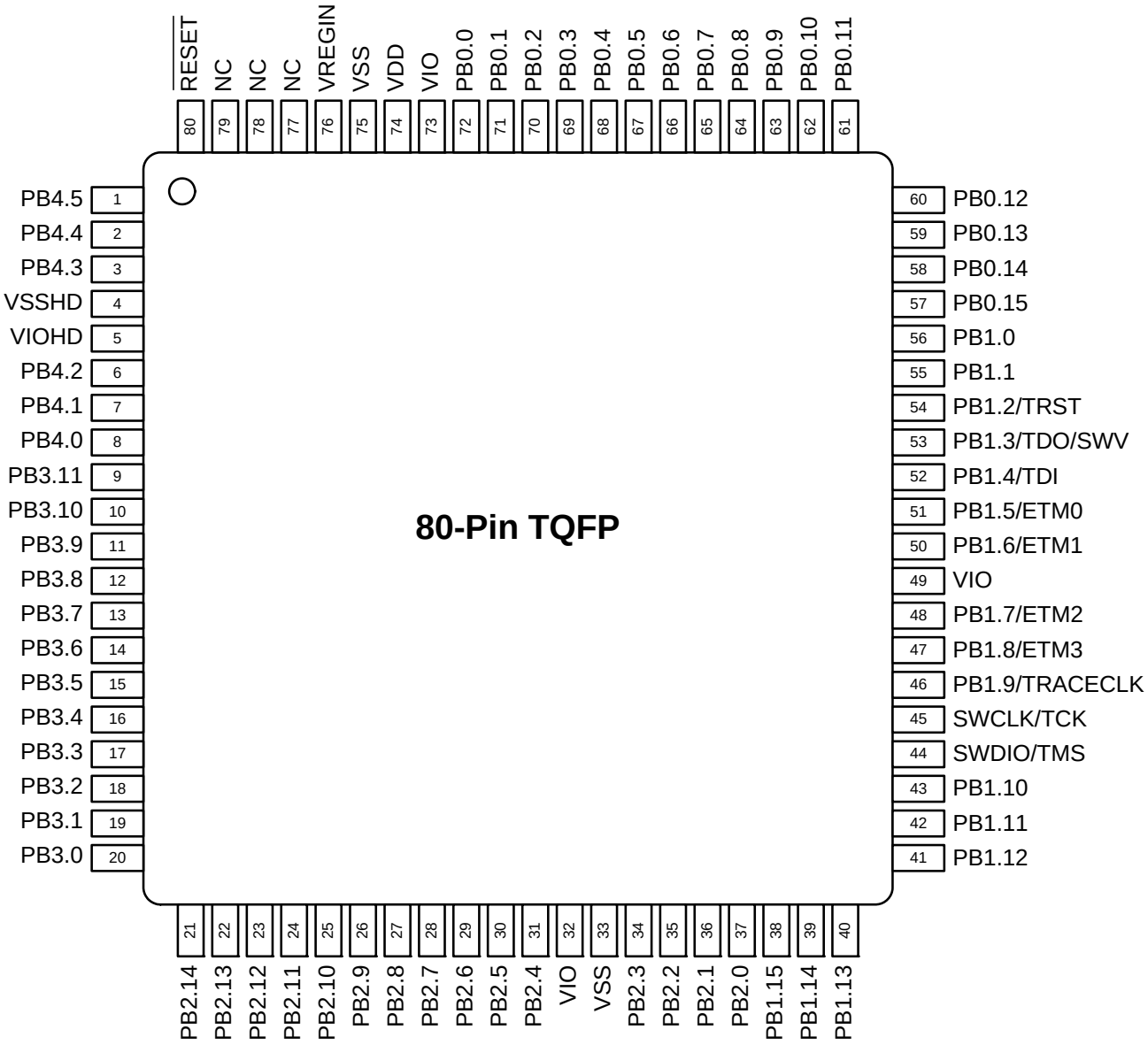


Figure 6.1. SiM3C1x7-GQ Pinout

Table 6.1. Pin Definitions and alternate functions for SiM3C1x7 (Continued)

Pin Name	Type	Pin Numbers TQFP-80	Pin Numbers LGA-92	Crossbar Capability (see Port Config Section)	Port Match	External Memory Interface (m = muxed mode)	Port-Mapped Level Shifter	Output Toggle Logic	External Trigger Inputs	Analog or Additional Functions
PB3.4	5 V Tolerant I/O	16	A9	XBR1	✓	$\overline{OE}$			INT0.9 INT1.9 WAKE.8	CMP0P.4 CMP1P.4
PB3.5	5 V Tolerant I/O	15	B7	XBR1	✓	ALEm			DAC0T2 DAC1T2 INT0.10 INT1.10 WAKE.9	CMP0N.4 CMP1N.4
PB3.6	5 V Tolerant I/O	14	A8	XBR1	✓	CS0			DAC0T3 DAC1T3 INT0.11 INT1.11 WAKE.10	CMP0P.5 CMP1P.5
PB3.7	5 V Tolerant I/O	13	B6	XBR1	✓	$\overline{BE1}$			DAC0T4 DAC1T4 LPT0T1 INT0.12 INT1.12 WAKE.11	CMP0N.5 CMP1N.5
PB3.8	5 V Tolerant I/O	12	A7	XBR1	✓	CS1			DAC0T5 DAC1T5 LPT0T2 INT0.13 INT1.13 WAKE.12	CMP0P.6 CMP1P.6 EXREGSP
PB3.9	5 V Tolerant I/O	11	B5	XBR1	✓	$\overline{BE0}$			DAC0T6 DAC1T6 INT0.14 INT1.14 WAKE.13	CMP0N.6 CMP1N.6 EXREGSN
PB3.10	5 V Tolerant I/O	10	B4	XBR1	✓				INT0.15 INT1.15 WAKE.14	CMP0P.7 CMP1P.7 EXREGOUT
PB3.11	5 V Tolerant I/O	9	B3	XBR1	✓				WAKE.15	CMP0N.7 CMP1N.7 EXREGBD

Table 6.2. Pin Definitions and alternate functions for SiM3C1x6 (Continued)

Pin Name	Type	Pin Numbers	Crossbar Capability (see Port Config Section)	Port Match	External Memory Interface (m = muxed mode)	Port-Mapped Level Shifter	Output Toggle Logic	External Trigger Inputs	Analog or Additional Functions
PB0.7	Standard I/O	50	XBR0	✓					RTC2
PB0.8	Standard I/O	49	XBR0	✓					ADC0.9 VREFGND
PB0.9	Standard I/O	48	XBR0	✓					ADC0.10 VREF
PB0.10	Standard I/O	47	XBR0	✓					ADC1.6 IDAC0
PB0.11	Standard I/O	46	XBR0	✓					IDAC1
PB0.12	Standard I/O	45	XBR0	✓					XTAL1
PB0.13	Standard I/O	44	XBR0	✓					XTAL2
PB0.14/TDO/ SWV	Standard I/O / JTAG / Serial Wire Viewer	43	XBR0	✓					ADC0.12 ADC1.12
PB0.15/TDI	Standard I/O / JTAG	42	XBR0	✓					ADC0.13 ADC1.13
PB1.0	Standard I/O	41	XBR0	✓					ADC0.14 ADC1.14
PB1.1	Standard I/O	40	XBR0	✓					ADC0.15 ADC1.15
PB1.2	Standard I/O	38	XBR0	✓					ADC1.11 CS0.8
PB1.3	Standard I/O	37	XBR0	✓					ADC1.10 CS0.9
PB1.4	Standard I/O	34	XBR0	✓					ADC1.8
PB1.5	Standard I/O	33	XBR0	✓					ADC1.7
PB1.6	Standard I/O	32	XBR0	✓				ADC0T15 WAKE.0	ADC1.5 CS0.10
PB1.7	Standard I/O	31	XBR0	✓	AD15m/ A7			ADC1T15 WAKE.1	ADC1.4 CS0.11

Table 6.2. Pin Definitions and alternate functions for SiM3C1x6 (Continued)

Pin Name	Type	Pin Numbers	Crossbar Capability (see Port Config Section)	Port Match	External Memory Interface (m = muxed mode)	Port-Mapped Level Shifter	Output Toggle Logic	External Trigger Inputs	Analog or Additional Functions
PB1.8	Standard I/O	30	XBR0	✓	AD14m/ A6			WAKE.2	ADC1.3 CS0.12
PB1.9	Standard I/O	29	XBR0	✓	AD13m/ A5			WAKE.3	ADC1.2 CS0.13
PB1.10	Standard I/O	28	XBR0	✓	AD12m/ A4			DMA0T1 WAKE.4	ADC1.1 CS0.14
PB1.11	Standard I/O	27	XBR0	✓	AD11m/ A3			DMA0T0 WAKE.5	ADC1.0 CS0.15 PMU_Asleep
PB1.12	Standard I/O	26	XBR0	✓	AD10m/ A2			WAKE.6	
PB1.13	Standard I/O	23	XBR0	✓	AD9m/ A1				
PB1.14	Standard I/O	22	XBR0	✓	AD8m/ A0				
PB1.15	Standard I/O	21	XBR0	✓	AD7m/ D7				
PB2.0	Standard I/O	20	XBR1	✓	AD6m/ D6	LSI0	Yes	INT0.0 INT1.0	
PB2.1	Standard I/O	19	XBR1	✓	AD5m/ D5	LSI1	Yes	INT0.1 INT1.1	
PB2.2	Standard I/O	18	XBR1	✓	AD4m/ D4	LSI2	Yes	INT0.2 INT1.2	CMP0N.0 CMP1N.0 RTC0TCLK_OUT
PB2.3	Standard I/O	17	XBR1	✓	AD3m/ D3	LSI3	Yes	INT0.3 INT1.3	CMP0P.0 CMP1P.0
PB3.0	5 V Tolerant I/O	16	XBR1	✓	AD2m/ D2				CMP0P.1 CMP1P.1
PB3.1	5 V Tolerant I/O	15	XBR1	✓	AD1m/ D1				CMP0N.1 CMP1N.1

6.7. TQFP-64 Package Specifications

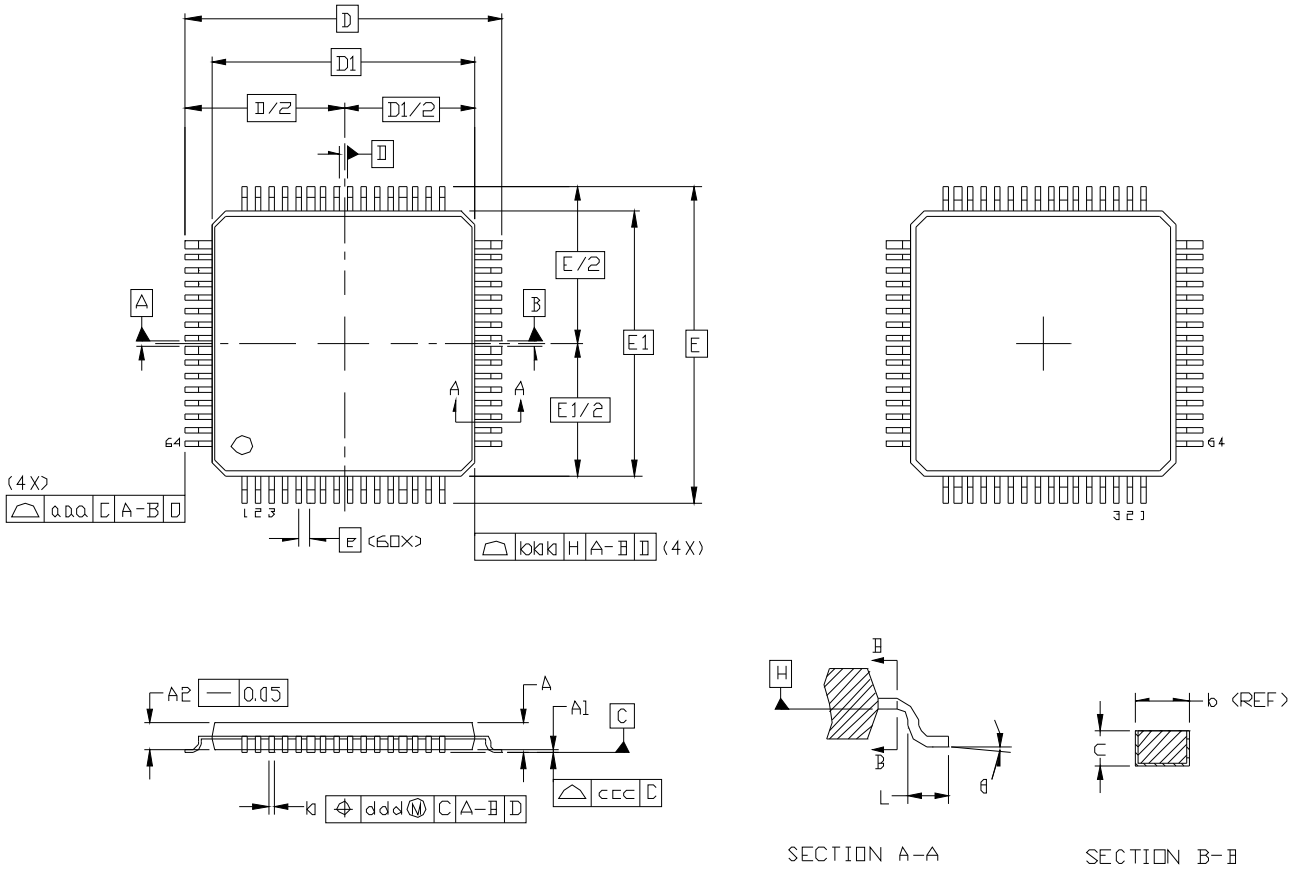


Figure 6.12. TQFP-64 Package Drawing

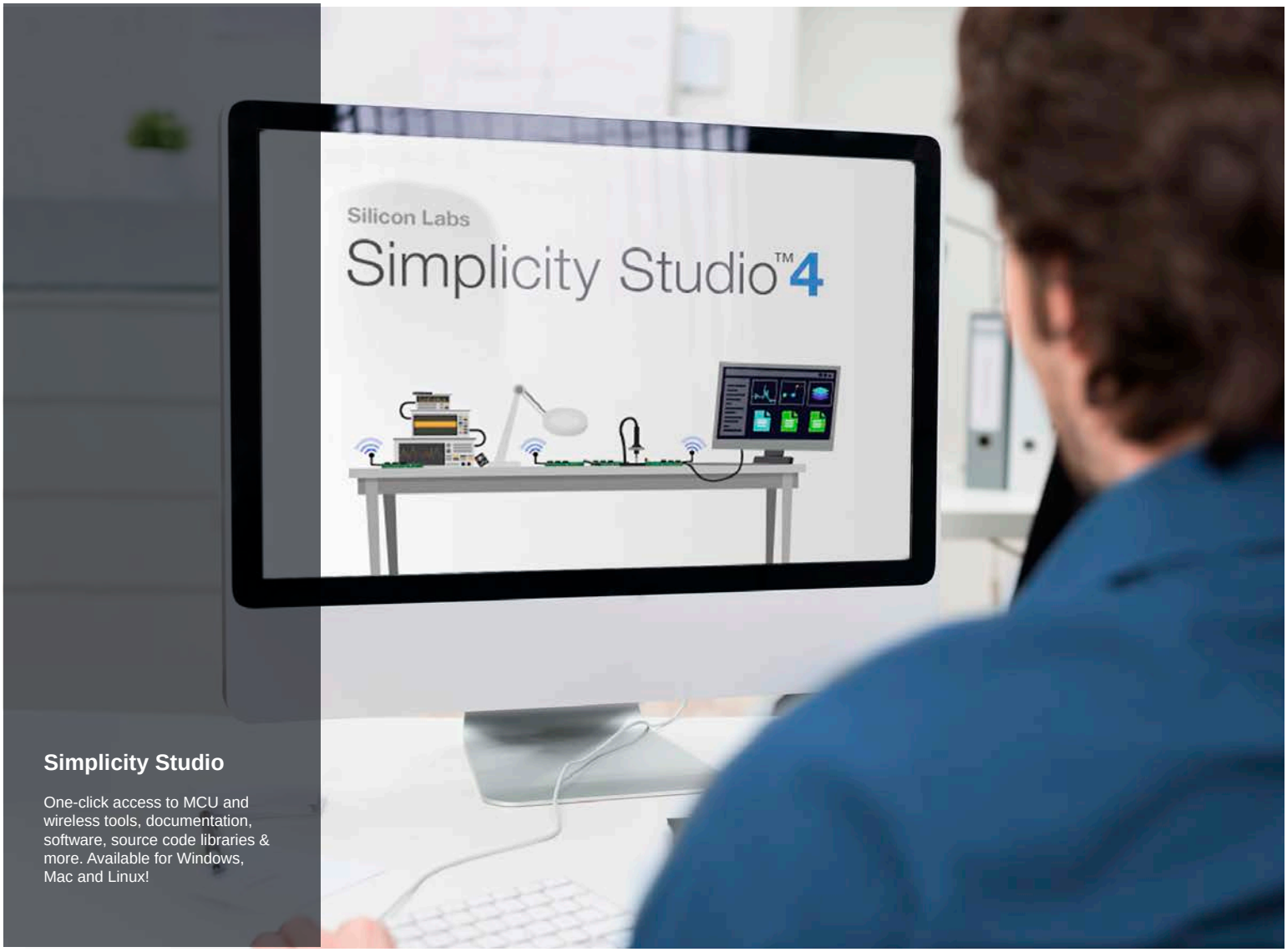
Table 6.10. TQFP-64 Package Dimensions

Dimension	Min	Nominal	Max
A	—	—	1.20
A1	0.05	—	0.15
A2	0.95	1.00	1.05
b	0.17	0.22	0.27
c	0.09	—	0.20
D	12.00 BSC		
D1	10.00 BSC		
e	0.50 BSC		
E	12.00 BSC		
E1	10.00 BSC		
L	0.45	0.60	0.75
Θ	0°	3.5°	7°

Document Change List

Revision 0.8 to Revision 1.0

- Added block diagram to front page; updated feature bullet lists.
- Electrical Specifications Tables Additions:
  - Voltage Regulator Current Sense Supply Current, Typ = 3 µA (Table 3.2)
  - Power Mode 2 Wake Time, Min = 4 clocks, Max = 5 clocks (Table 3.3)
  - External Crystal Clock Frequency, Min = 0.01 MHz, Max = 30 MHz (Table 3.9)
  - Added /RESET pin characteristics (Table 3.17)
- Electrical Specifications Tables Removals:
  - Power Mode 3 Wake Time (Table 3.3)
- Electrical Specifications Tables Corretions/Adjustments:
  - IVC Supply Current, Max = 2.5 µA (Table 3.2)
  - VREG0 Output Voltage Normal Mode, Min = 3.15 V (Table 3.5)
  - VREG0 Output Voltage Suspend Mode, Min = 3.15 V (Table 3.5)
  - External Regulator Internal Pull-Down, Typ = 5 kΩ (Table 3.6)
  - External Regulator Internal Pull-Up, Typ = 10 kΩ (Table 3.6)
  - Flash Memory Endurance, Typ = 100k write/erase cycles (Table 3.7)
  - Flash Memory Retention, Min = 10 Years, Typ = 100 Years (Table 3.7)
  - Low Power Oscillator Frequency, Min = 19.5 MHz, Max = 20.5 MHz (Table 3.8)
  - SAR Dynamic Performance : consolidated all specs. (Table 3.10)
  - IDAC Full Scale Output Current 1 mA Range, Min = 0.99 mA (Table 3.11)
  - IDAC Full Scale Output Current 0.5 mA Range, Min = 493 µA (Table 3.11)
  - IVC Slope @ 1 mA, Min = 1.55 V/mA, Max = 1.75 V/mA (Table 3.13)
  - IVC Slope @ 2 mA, Min = 795 mV/mA, Max = 860 mV/mA (Table 3.13)
  - IVC Slope @ 3 mA, Min = 525 mV/mA, Max = 570 mV/mA (Table 3.13)
  - IVC Slope @ 4 mA, Min = 390 mV/mA, Max = 430 mV/mA (Table 3.13)
  - IVC Slope @ 5 mA, Min = 315 mV/mA (Table 3.13)
  - IVC Slope @ 6 mA, Min = 260 mV/mA (Table 3.13)
  - Temperature Sensor Slope Error, Type = ±120 µV/C (Table 3.15)
  - Comparator Input Offset Voltage, Min = –10 mV, Max = 10 mV (Table 3.16)
- “4. Precision32™ SiM3C1xx System Overview” :
  - Updated Power Modes discussion.
  - Refined and updated feature bullet lists.
- Updated and clarified RTC timer clock output. The RTC output is now referred to as "RTC0TCLK".
- “6. Pin Definitions and Packaging Information” : Renamed RTC0OSC_OUT function to RTC0TCLK_OUT for consistency.
- “7. Revision Specific Behavior” : Updated revision identification drawings to better match physical appearance of packages.



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