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What is "Embedded - Microcontrollers"?

"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	128KB (128K 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/sim3c157-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.

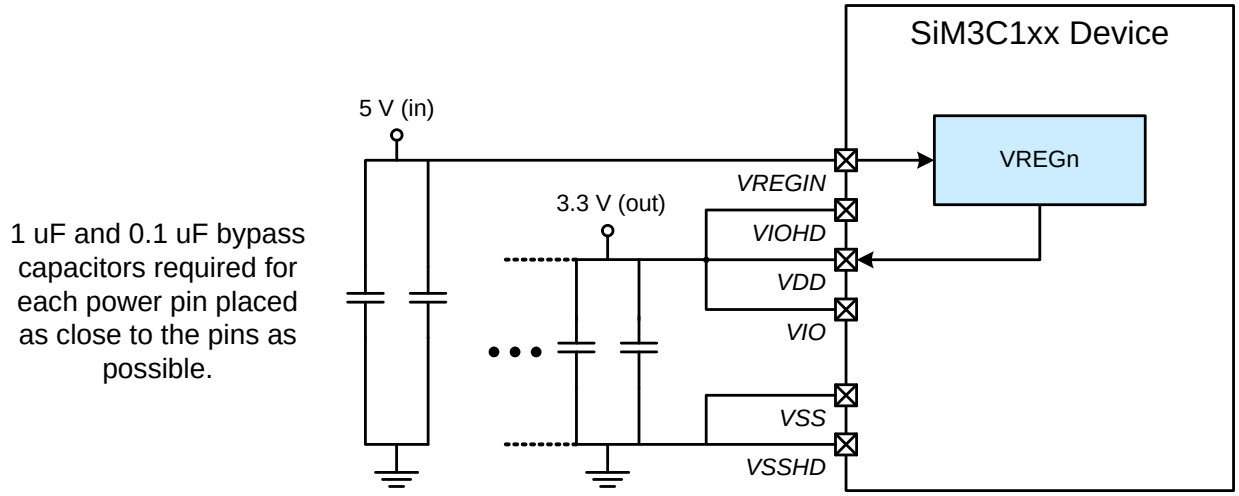


Figure 2.1. Connection Diagram with Voltage Regulator Used

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

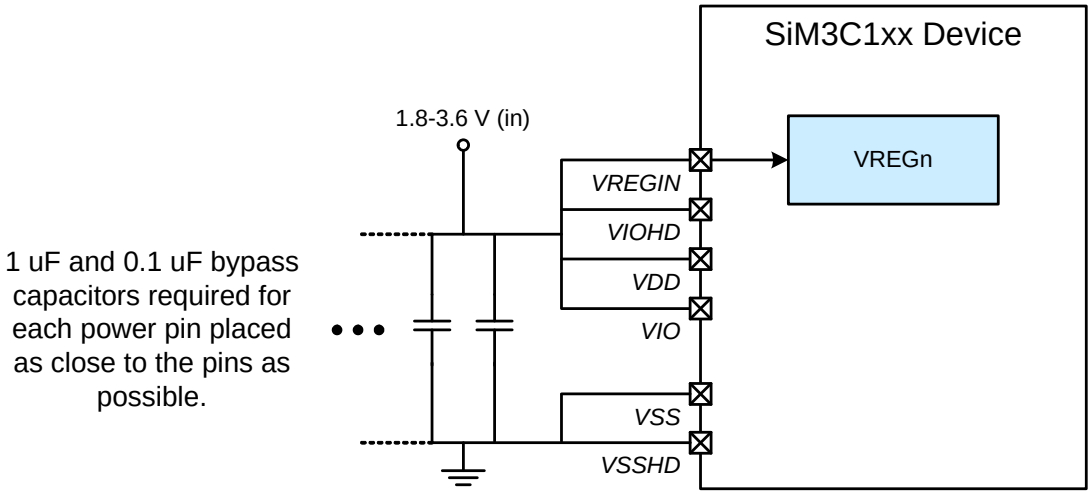


Figure 2.2. Connection Diagram with Voltage Regulator Not Used

Table 3.2. Power Consumption (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Analog Peripheral Supply Currents						
Voltage Regulator (VREG0)	I_{VREGIN}	Normal Mode, T_A = 25 °C BGDIS = 0, SUSEN = 0	—	300	—	µA
		Normal Mode, T_A = 85 °C BGDIS = 0, SUSEN = 0	—	—	650	µA
		Suspend Mode, T_A = 25 °C BGDIS = 0, SUSEN = 1	—	75	—	µA
		Suspend Mode, T_A = 85 °C BGDIS = 0, SUSEN = 1	—	—	115	µA
		Sleep Mode, T_A = 25 °C BGDIS = 1, SUSEN = X	—	90	—	nA
		Sleep Mode, T_A = 85 °C BGDIS = 1, SUSEN = X	—	—	500	nA
Voltage Regulator (VREG0) Sense	$I_{VRSENSE}$	SENSEEN = 1	—	3	—	µA
External Regulator (EXTVREG0)	$I_{EXTVREG}$	Regulator	—	215	250	µA
		Current Sensor	—	7	—	µA
PLL0 Oscillator (PLL0OSC)	I_{PLLOSC}	Operating at 80 MHz	—	1.75	1.86	mA
Low-Power Oscillator (LPOSC0)	I_{LPOSC}	Operating at 20 MHz	—	190	—	µA
		Operating at 2.5 MHz	—	40	—	µA
Low-Frequency Oscillator (LFOSC0)	I_{LFOSC}	Operating at 16.4 kHz, T_A = 25 °C	—	215	—	nA
		Operating at 16.4 kHz, T_A = 85 °C	—	—	500	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 3.2. Power Consumption (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Flash Current on VDD						
Write Operation	$I_{FLASH-W}$		—	—	8	mA
Erase Operation	$I_{FLASH-E}$		—	—	15	mA

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 3.3. Power Mode Wake Up Times

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Power Mode 2 Wake Time	t_{PM2}		4	—	5	clocks
Power Mode 3 Fast Wake Time	t_{PM3FW}		—	425	—	µs
Power Mode 9 Wake Time	t_{PM9}		—	12	—	µs

Table 3.16. Comparator (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Positive Hysteresis Mode 3 (CPMD = 11)	HYS_{CP+}	CMPHYP = 00	—	1.4	—	mV
		CMPHYP = 01	—	4	—	mV
		CMPHYP = 10	—	8	—	mV
		CMPHYP = 11	—	16	—	mV
Negative Hysteresis Mode 3 (CPMD = 11)	HYS_{CP-}	CMPHYN = 00	—	1.4	—	mV
		CMPHYN = 01	—	–4	—	mV
		CMPHYN = 10	—	–8	—	mV
		CMPHYN = 11	—	–16	—	mV
Input Range (CP+ or CP–)	V_{IN}		–0.25	—	V_{DD}+0.25	V
Input Pin Capacitance	C_{CP}	PB2 Pins	—	7.5	—	pF
		PB3 Pins	—	10.5	—	pF
Common-Mode Rejection Ratio	$CMRR_{CP}$		—	75	—	dB
Power Supply Rejection Ratio	$PSRR_{CP}$		—	72	—	dB
Input Offset Voltage	V_{OFF}		–10	0	10	mV
Input Offset Tempco	TC_{OFF}		—	3.5	—	µV/°C
Reference DAC Resolution	N_{Bits}			6		bits

Table 3.17. Port I/O (Continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Output Fall Time	t_F	Slew Rate Mode 0, V_{IOHD} = 5 V	—	50	—	ns
		Slew Rate Mode 1, V_{IOHD} = 5 V	—	300	—	ns
		Slew Rate Mode 2, V_{IOHD} = 5 V	—	1	—	µs
		Slew Rate Mode 3, V_{IOHD} = 5 V	—	3	—	µs
Input High Voltage	V_{IH}	1.8 V≤ V_{IOHD} ≤ 2.0 V	0.7 x V_{IOHD}	—	—	V
		2.0 V≤ V_{IOHD} ≤ 6 V	V_{IOHD} – 0.6	—	—	V
Input Low Voltage	V_{IL}		—	—	0.6	V
N-Channel Sink Current Limit (2.7 V ≤ V_{IOHD} ≤ 6 V, V_{OL} = 0.8 V) See Figure 3.1	I_{SINKL}	Mode 0	—	1.75	—	mA
		Mode 1	—	2.5	—	
		Mode 2	—	3.5	—	
		Mode 3	—	4.75	—	
		Mode 4	—	7	—	
		Mode 5	—	9.5	—	
		Mode 6	—	14	—	
		Mode 7	—	18.75	—	
		Mode 8	—	28.25	—	
		Mode 9	—	37.5	—	
		Mode 10	—	56.25	—	
		Mode 11	—	75	—	
		Mode 12	—	112.5	—	
		Mode 13	—	150	—	
		Mode 14	—	225	—	
		Mode 15	—	300	—	
Total N-Channel Sink Current on P4.0-P4.5 (DC)	I_{SINKLT}		—	—	400	mA

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

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.

4. Precision32™ SiM3C1xx System Overview

The SiM3C1xx Precision32™ devices are fully integrated, mixed-signal system-on-a-chip MCUs. Highlighted features are listed below. Refer to Table 5.1 for specific product feature selection and part ordering numbers.

- **Core:**
  - 32-bit ARM Cortex-M3 CPU.
  - 80 MHz maximum operating frequency.
  - Branch target cache and prefetch buffers to minimize wait states.
- **Memory:** 32–256 kB Flash; in-system programmable, 8–32 kB SRAM (including 4 kB retention SRAM, which preserves state in PM9 mode).
- **Power:**
  - Low drop-out (LDO) regulator for CPU core voltage.
  - Power-on reset circuit and brownout detectors.
  - 3.3 V output LDO for direct power from 5 V supplies.
  - External transistor regulator.
  - Power Management Unit (PMU).
- **I/O: Up to 65 total multifunction I/O pins:**
  - Up to six programmable high-power capable (5–300 mA with programmable current limiting, 1.8–5 V).
  - Up to twelve 5 V tolerant general purpose pins.
  - Two flexible peripheral crossbars for peripheral routing.
- **Clock Sources:**
  - Internal oscillator with PLL: 23–80 MHz with ± 1.5% accuracy in free-running mode.
  - Low-power internal oscillator: 20 MHz and 2.5 MHz modes.
  - Low-frequency internal oscillator: 16.4 kHz.
  - External RTC crystal oscillator: 32.768 kHz.
  - External oscillator: Crystal, RC, C, CMOS clock modes.
  - Programmable clock divider allows any oscillator source to be divided by binary factor from 1-128.
- **Data Peripherals:**
  - 16-Channel DMA Controller.
  - 128/192/256-bit Hardware AES Encryption.
  - 16/32-bit CRC.
- **Timers/Counters and PWM:**
  - 6-channel Enhanced Programmable Counter Array (EPCAn) supporting advanced PWM and capture/compare.
  - 2 x 2-channel Standard Programmable Counter Array (PCAn) supporting PWM and capture/compare.
  - 2 x 32-bit Timers - can be split into 4 x 16-bit Timers, support PWM and capture/compare.
  - Real Time Clock (RTCn).
  - Low Power Timer.
  - Watchdog Timer.
- **Communications Peripherals:**
  - External Memory Interface.
  - 2 x USARTs and 2 x UARTs with IrDA and ISO7816 SmartCard support.
  - 3 x SPIs.
  - 2 x I2C.
  - I^2S (receive and transmit).
- **Analog:**
  - 2 x 12-Bit Analog-to-Digital Converters (SARADC).
  - 2 x 10-Bit Digital-to-Analog Converter (IDAC).
  - 16-Channel Capacitance-to-Digital Converter (CAPSENSE).
  - 2 x Low-Current Comparators (CMP).
  - 1 x Current-to-Voltage Converter (IVC) module with two channels.
- **On-Chip Debugging**

With on-chip power-on reset, voltage supply monitor, watchdog timer, and clock oscillator, the SiM3C1xx devices are truly standalone system-on-a-chip solutions. The Flash memory is reprogrammable in-circuit, providing non-

4.1.5. Device Power Modes

The SiM3C1xx devices feature four low power modes in addition to normal operating mode. Several peripherals provide wake up sources for these low power modes, including the Low-Power Timer (LPT0), RTC0 (alarms and oscillator failure notification), Comparator 0, and PMU Pin Wake.

In addition, all peripherals can have their clocks disabled to reduce power consumption whenever a peripheral is not being used using the clock control (CLKCTRL) registers.

4.1.5.1. Normal Mode (Power Mode 0)

Normal Mode is the default mode of the device. The core and peripherals are fully operational, and instructions are executed from flash memory.

4.1.5.2. Power Mode 1

In Power Mode 1 the core and peripherals are fully operational, with instructions executing from RAM. Compared with Normal Mode, the active power consumption of the device in PM1 is reduced. Additionally, at higher speeds in PM1, the core throughput can also be increased because RAM does not require additional wait states that reduce the instruction fetch speed.

4.1.5.3. Power Mode 2

In Power Mode 2 the core halts and any enabled peripherals continue to run at the selected clock speed. The power consumption in PM2 corresponds to the AHB and APB clocks left enabled, thus the power can be tuned to the optimal level for the needs of the application. To place the device in PM2, the core should execute a wait-for-interrupt (WFI) or wait-for-event (WFE) instruction. If the WFI instruction is called from an interrupt service routine, the interrupt that wakes the device from PM2 must be of a sufficient priority to be recognized by the core. It is recommended to perform both a DSB (Data Synchronization Barrier) and an ISB (Instruction Syncronization Barrier) operation prior to the WFI to ensure all bus accesses complete. When operating from the LFOSC0 with the DMACTRL0 AHB clock disabled, PM2 can achieve similar power consumption to PM3, but with the ability to wake on APB-clocked interrupts. For example, enabling only the APB clock to the Ports will allow the firmware to wake on a PMATCH0, PBEXT0 or PBEXT1 interrupt with minimal impact on the supply current.

4.1.5.4. Power Mode 3

In Power Mode 3, the AHB and APB clocks are halted. The device may only wake from enabled interrupt sources which do not require the APB clock (RTC0ALRM, RTC0FAIL, LPTIMER0, VDDLOW and VREGLOW). A special fast wake option allows the device to operate at a very low level from the RTC0TCLK or LFOSC0 oscillator while in PM3, but quickly switch to the faster LPOSC0 when the wake event occurs. Because the current consumption of these blocks is minimal, it is recommended to use the fast wake option.

The device will enter PM3 on a WFI or WFE instruction. Because all AHB master clocks are disabled, the LPOSC will automatically halt and go into a low-power suspended state. If the WFI instruction is called from an interrupt service routine, the interrupt that wakes the device from PM3 must be of a sufficient priority to be recognized by the core. It is recommended to perform both a DSB (Data Synchronization Barrier) and an ISB (Instruction Synchronization Barrier) operation prior to the WFI to ensure all bus access is complete.

4.1.5.5. Power Mode 9

In Power Mode 9, the core and all peripherals are halted, all clocks are stopped, and the pins and peripherals are set to a lower power mode. In addition, standard RAM contents are not preserved, though retention RAM contents are still available after exiting the power mode. This mode provides the lowest power consumption for the device, but requires an appropriate reset to exit. The available reset sources to wake from PM9 are controlled by the Power Management Unit (PMU).

Before entering PM9, the desired reset source(s) should be configured in the PMU. The SLEEPDEEP bit in the ARM System Control Register should be set, and the PMSEL bit in the RSTSRC0_CONFIG register must be set to indicate that PM9 is the desired power mode.

The device will enter PM9 on a WFI or WFE instruction, and remain in PM9 until a reset configured by the PMU occurs. It is recommended to perform both a DSB (Data Synchronization Barrier) and an ISB (Instruction Synchronization Barrier) operation prior to the WFI to ensure all bus access is complete.

6. Pin Definitions and Packaging Information

6.1. SiM3C1x7 Pin Definitions

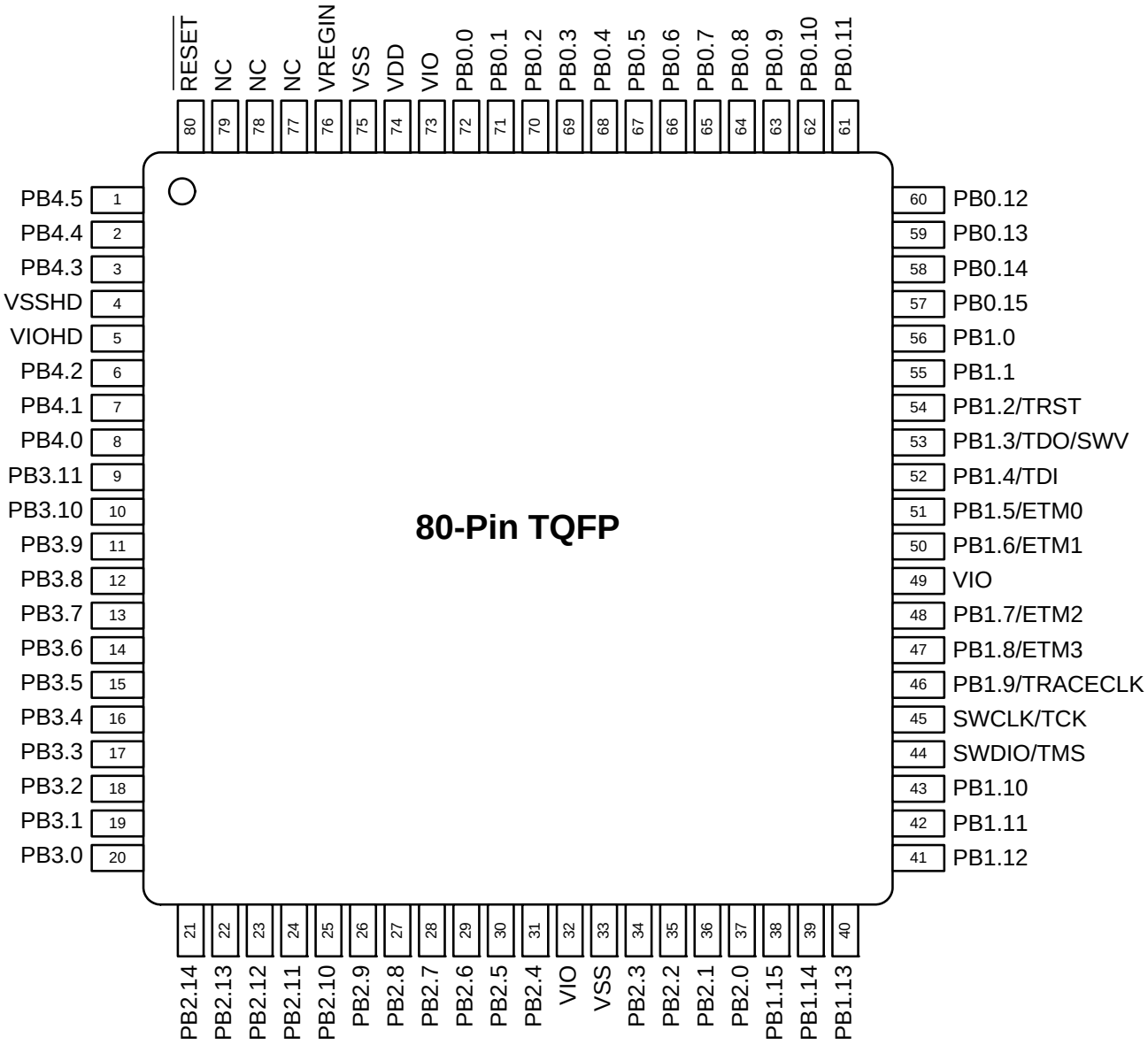
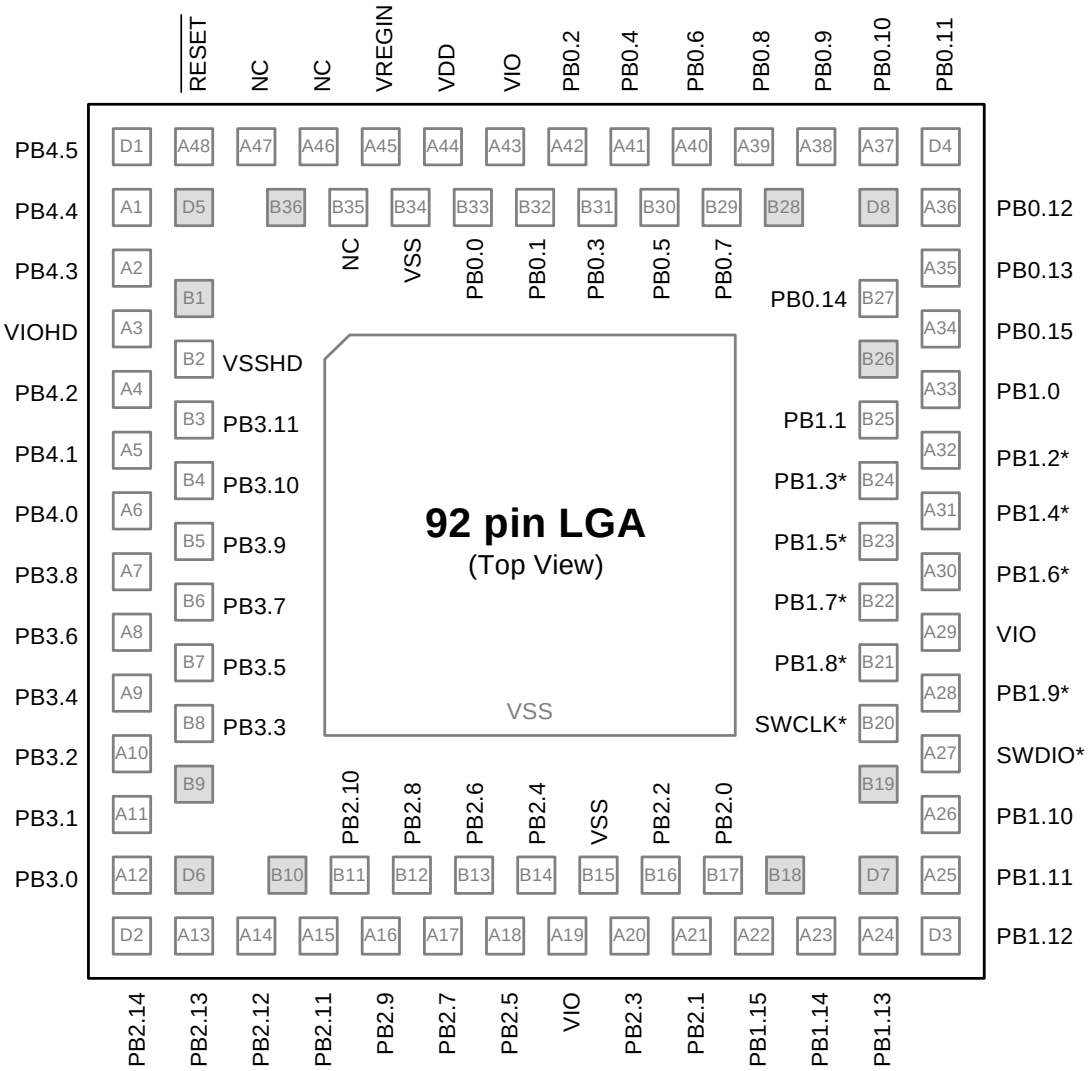


Figure 6.1. SiM3C1x7-GQ Pinout



*Noted pins are listed in the pinout table and 80-pin TQFP package figure with additional names. These alternate functions are also present on the 92-pin LGA package and are identical to those on the 80-pin TQFP package.

Figure 6.2. SiM3C1x7-GM 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
PB0.8	Standard I/O	64	A39	XBR0	✓					ADC0.7 CS0.7 IVC0.1
PB0.9	Standard I/O	63	A38	XBR0	✓					ADC0.8 RTC1
PB0.10	Standard I/O	62	A37	XBR0	✓					RTC2
PB0.11	Standard I/O	61	D4	XBR0	✓					ADC0.9 VREFGND
PB0.12	Standard I/O	60	A36	XBR0	✓					ADC0.10 VREF
PB0.13	Standard I/O	59	A35	XBR0	✓					IDAC0
PB0.14	Standard I/O	58	B27	XBR0	✓					IDAC1
PB0.15	Standard I/O	57	A34	XBR0	✓					XTAL1
PB1.0	Standard I/O	56	A33	XBR0	✓					XTAL2
PB1.1	Standard I/O	55	B25	XBR0	✓					ADC0.11
PB1.2/TRST	Standard I/O /JTAG	54	A32	XBR0	✓					
PB1.3/TDO/ SWV	Standard I/O /JTAG/ Serial Wire Viewer	53	B24	XBR0	✓					ADC0.12 ADC1.12
PB1.4/TDI	Standard I/O /JTAG	52	A31	XBR0	✓					ADC0.13 ADC1.13
PB1.5/ETM0	Standard I/O /ETM	51	B23	XBR0	✓					ADC0.14 ADC1.14
PB1.6/ETM1	Standard I/O /ETM	50	A30	XBR0	✓					ADC0.15 ADC1.15
PB1.7/ETM2	Standard I/O /ETM	48	B22	XBR0	✓					ADC1.11 CS0.8
PB1.8/ETM3	Standard I/O /ETM	47	B21	XBR0	✓					ADC1.10 CS0.9

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
PB1.9/ TRACECLK	Standard I/O /ETM	46	A28	XBR0	✓					ADC1.9
PB1.10	Standard I/O	43	A26	XBR0	✓	A23m/ A15			DMA0T1	ADC1.8
PB1.11	Standard I/O	42	A25	XBR0	✓	A22m/ A14			DMA0T0	ADC1.7
PB1.12	Standard I/O	41	D3	XBR0	✓	A21m/ A13				ADC1.6
PB1.13	Standard I/O	40	A24	XBR0	✓	A20m/ A12			ADC0T15 WAKE.0	ADC1.5 CS0.10
PB1.14	Standard I/O	39	A23	XBR0	✓	A19m/ A11			ADC1T15 WAKE.1	ADC1.4 CS0.11
PB1.15	Standard I/O	38	A22	XBR0	✓	A18m/ A10			WAKE.2	ADC1.3 CS0.12
PB2.0	Standard I/O	37	B17	XBR1	✓	A17m/ A9	LSI0	Yes	INT0.0 INT1.0 WAKE.3	ADC1.2 CS0.13
PB2.1	Standard I/O	36	A21	XBR1	✓	A16m/ A8	LSI1	Yes	INT0.1 INT1.1 WAKE.4	ADC1.1 CS0.14
PB2.2	Standard I/O	35	B16	XBR1	✓	AD15m/ A7	LSI2	Yes	INT0.2 INT1.2 WAKE.5	ADC1.0 CS0.15 PMU_Asleep
PB2.3	Standard I/O	34	A20	XBR1	✓	AD14m/ A6	LSI3	Yes	INT0.3 INT1.3 WAKE.6	
PB2.4	Standard I/O	31	B14	XBR1	✓	AD13m/ A5	LSI4	Yes	INT0.4 INT1.4 WAKE.7	
PB2.5	Standard I/O	30	A18	XBR1	✓	AD12m / A4	LSI5	Yes	INT0.5 INT1.5	

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
PB3.9	5 V Tolerant I/O	7	XBR1	✓	$\overline{BE0}$			DAC0T6 DAC1T6 LPT0T2 INT0.10 INT1.10 WAKE.15	CMP0N.5 CMP1N.5 EXREGBD
PB4.0	High Drive I/O	6				LSO0			
PB4.1	High Drive I/O	5				LSO1			
PB4.2	High Drive I/O	4				LSO2			
PB4.3	High Drive I/O	1				LSO3			

6.3. SiM3C1x4 Pin Definitions

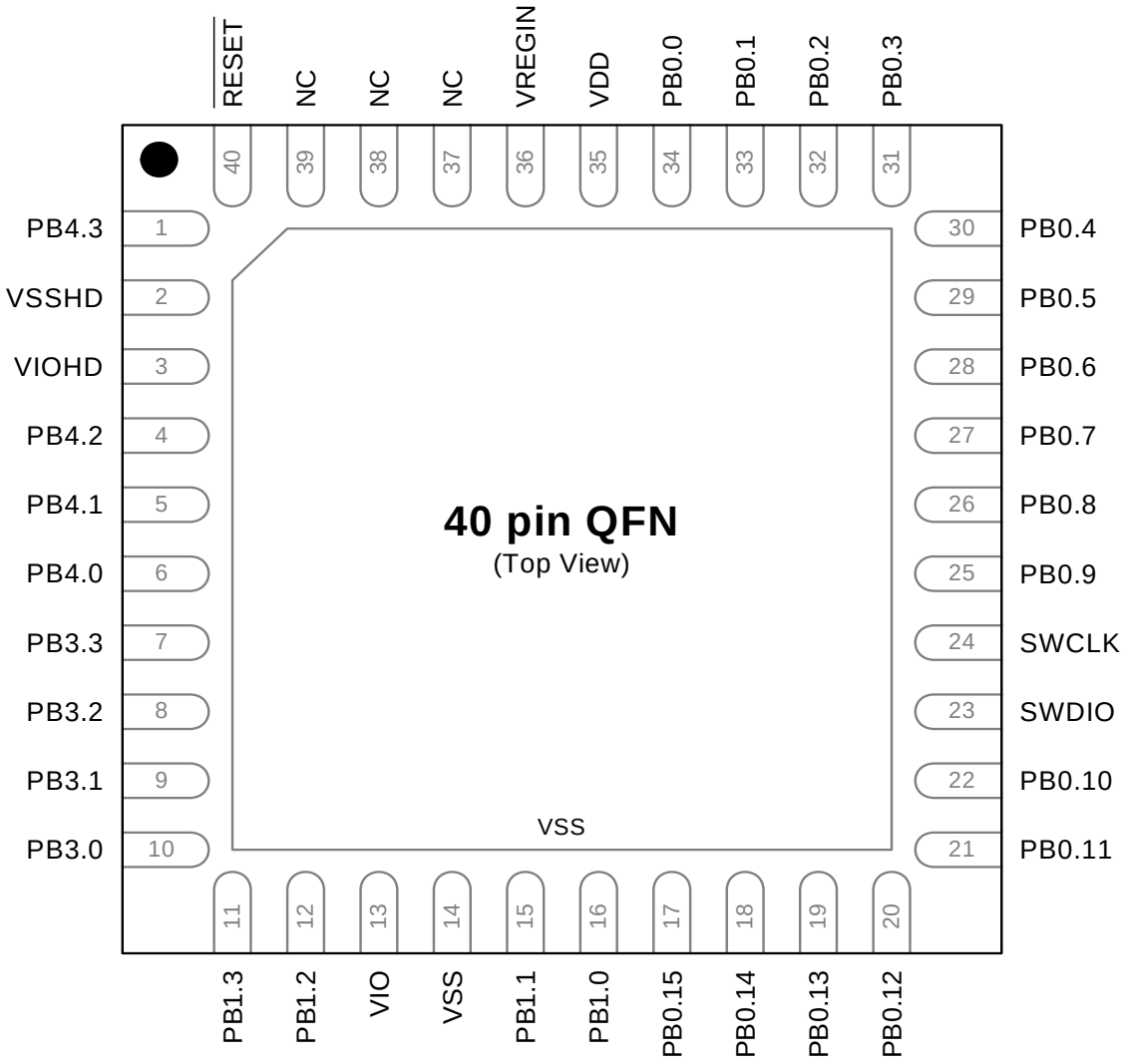


Figure 6.5. SiM3C1x4-GM Pinout

6.4.1. LGA-92 Solder Mask Design

All metal pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 60 µm minimum, all the way around the pad.

6.4.2. LGA-92 Stencil Design

1. A stainless steel, laser-cut and electro-polished stencil with trapezoidal walls should be used to assure good solder paste release.
2. The stencil thickness should be 0.125 mm (5 mils).
3. The ratio of stencil aperture to land pad size should be 1:1 for all perimeter pins.
4. A 2 x 2 array of 1.25 mm square openings on 1.60 mm pitch should be used for the center ground pad.

6.4.3. LGA-92 Card Assembly

1. A No-Clean, Type-3 solder paste is recommended.
2. The recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

6.5.1. TQFP-80 Solder Mask Design

All metal pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 60 µm minimum, all the way around the pad.

6.5.2. TQFP-80 Stencil Design

1. A stainless steel, laser-cut and electro-polished stencil with trapezoidal walls should be used to assure good solder paste release.
2. The stencil thickness should be 0.125 mm (5 mils).
3. The ratio of stencil aperture to land pad size should be 1:1 for all pads.

6.5.3. TQFP-80 Card Assembly

1. A No-Clean, Type-3 solder paste is recommended.
2. The recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

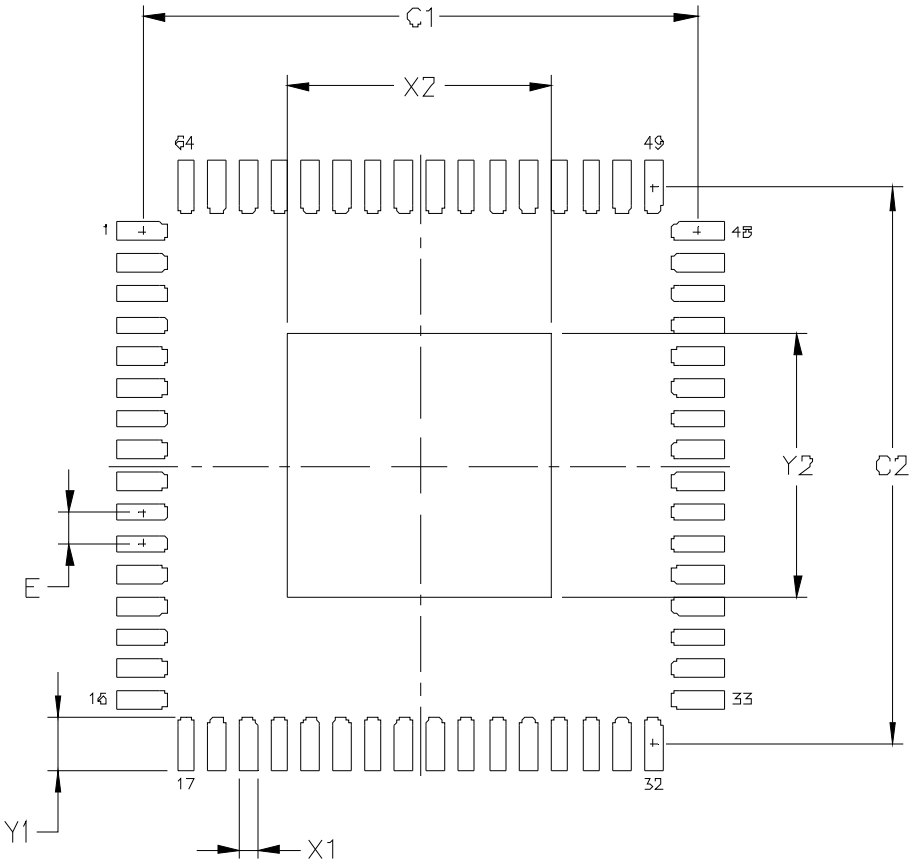


Figure 6.11. QFN-64 Landing Diagram

Table 6.9. QFN-64 Landing Diagram Dimensions

Dimension	mm
C1	8.90
C2	8.90
E	0.50
X1	0.30
Y1	0.85
X2	4.25
Y2	4.25

Notes:
1. All dimensions shown are in millimeters (mm).
2. This Land Pattern Design is based on the IPC-7351 guidelines.
3. All dimensions shown are at Maximum Material Condition (MMC). Least Material Condition (LMC) is calculated based on a Fabrication Allowance of 0.05 mm.

6.7. TQFP-64 Package Specifications

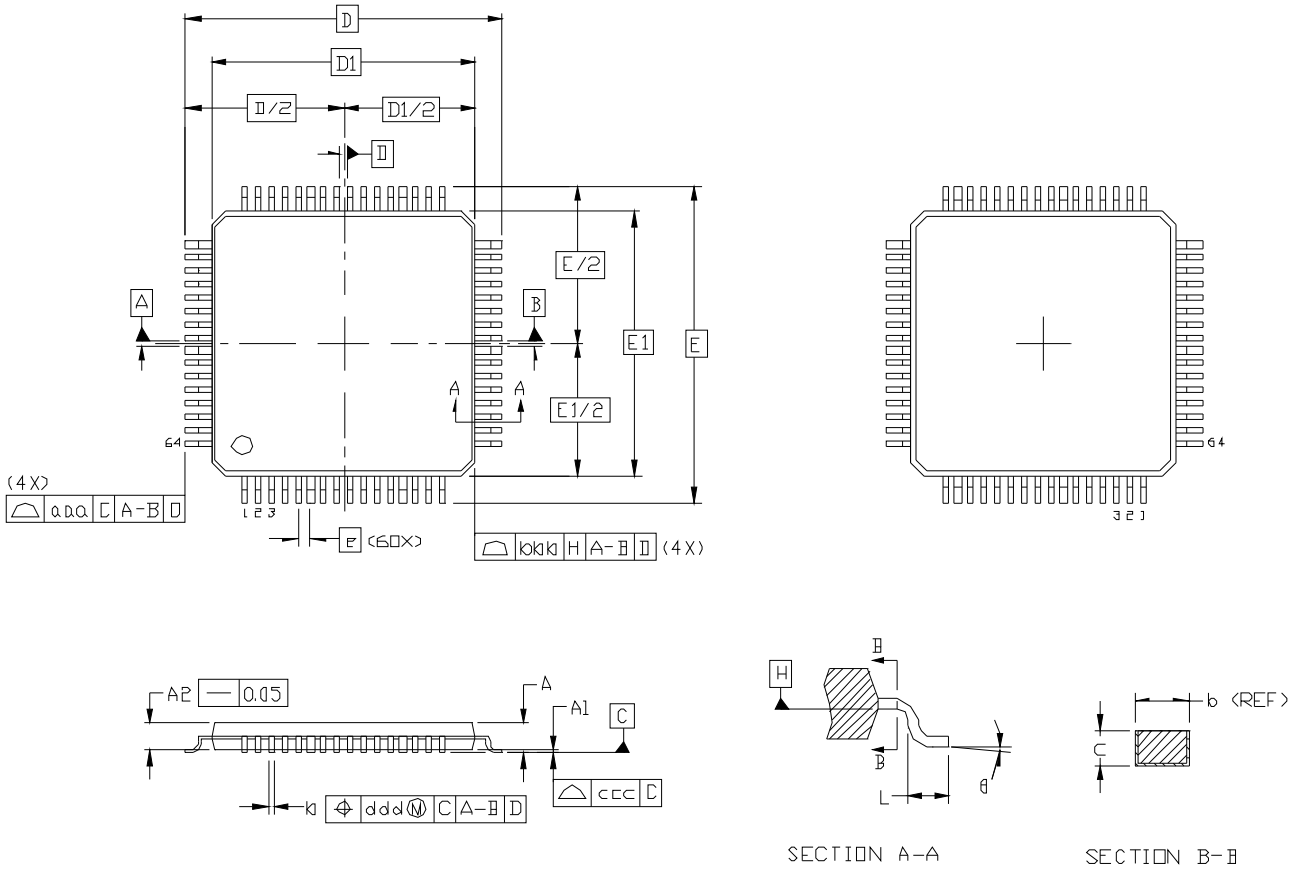


Figure 6.12. TQFP-64 Package Drawing

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°

Table 6.10. TQFP-64 Package Dimensions (Continued)

Dimension	Min	Nominal	Max
aaa	—	—	0.20
bbb	—	—	0.20
ccc	—	—	0.08
ddd	—	—	0.08

Notes:

1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing per ANSI Y14.5M-1994.
3. This package outline conforms to JEDEC MS-026, variant ACD.
4. Recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

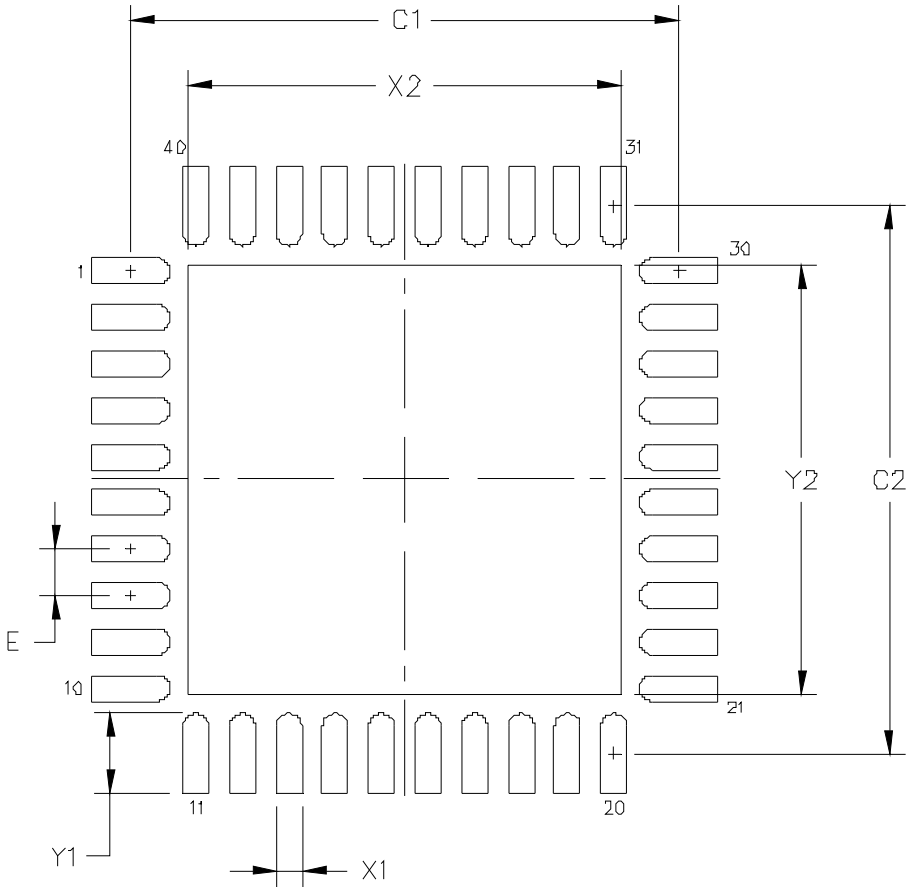


Figure 6.15. QFN-40 Landing Diagram

Table 6.13. QFN-40 Landing Diagram Dimensions

Dimension	mm
C1	5.90
C2	5.90
E	0.50
X1	0.30
Y1	0.85
X2	4.65
Y2	4.65

Notes:
1. All dimensions shown are in millimeters (mm).
2. This Land Pattern Design is based on the IPC-7351 guidelines.
3. All dimensions shown are at Maximum Material Condition (MMC). Least Material Condition (LMC) is calculated based on a Fabrication Allowance of 0.05 mm.