



SiWG917 SoC Single Chip Wi-Fi® 6 and Bluetooth® LE 5.4 Wireless Secure MCU Solutions Data Short

Silicon Labs SiWG917 SoC is our lowest power Wi-Fi 6 SoC, ideal for ultra-low power IoT wireless devices using Wi-Fi®, Bluetooth, Matter, and IP networking for secure cloud connectivity. It is optimal for developing battery operated devices that need long battery life. SiWG917 SoC includes an ultra-low power Wi-Fi 6 plus Bluetooth Low Energy (LE) 5.4 wireless CPU subsystem, and an integrated micro-controller (MCU) application subsystem, security, peripherals and power management subsystem all in a single 7x7 mm QFN package. The wireless subsystem consists of a multi-threaded processor (ThreadArch®) running up to 160 MHz, baseband digital signal processing, analog front end, 2.4 GHz RF transceiver and integrated power amplifier. The application subsystem consists of an ARM® Cortex®-M4F running up to 180 MHz, embedded SRAM, FLASH, ultra low power sensor hub, AI/ML accelerator and enhanced PSA-L2 certifiable security engine. The ARM® Cortex®-M4F is dedicated for peripheral and application-related processing, while the ThreadArch® runs the wireless and networking stacks on independent threads, thus providing a fully integrated solution that is ready for a wide range of embedded wireless IoT applications.

SiWG917 applications include:

- Smart Homes
- Health and Fitness
- Medical
- Industrial
- Smart Building and Cities
- Asset Tracking

KEY FEATURES

- Wi-Fi 6 Single Band 2.4 GHz and BLE 5.4 wireless radio
- ARM® Cortex® M4 Processor with FPU Subsystem up to 180 MHz
- WLAN/Bluetooth LE Tx power up to +21 dBm with integrated PA
- WLAN Rx sensitivity as low as -98.5 dBm
- Wi-Fi Standby Associated mode current: 51 µA @ 1-second beacon listen interval
- Low MCU Sub-system active current: 19 µA/MHz in LP mode, and 65 µA/MHz in HP mode
- Integrated FLASH/PSRAM up to 8MB, and support for optional external FLASH/PSRAM
- Ultra low-power sensor hub peripherals
- AI/ML Hardware Accelerator (MVP)
- PSA-L2 certifiable security support
- Embedded Wi-Fi, Bluetooth LE, Matter, and networking stacks supporting wireless coexistence
- Operating temperature: -40 °C to +105 °C
- Wide operating supply range: 1.75 V to 3.63 V

1. Feature List

- **Microcontroller**
 - ARM Cortex-M4F core with up to 180 MHz, 225 DMIPS performance
 - Integrated Floating Point Unit (FPU), Memory Protection Unit (MPU) and Nested Vectored Interrupt Controller (NVIC)
 - Serial Wire Debug (SWD) and Joint Test Action Group (JTAG) debug options
 - Internal and external oscillators with Phase Locked Loops (PLLs)
 - Flash In-Application Programming (IAP), In-System Programming (ISP) and Over-the-Air Wireless Firmware Upgrade
 - Power-On Reset (POR), Brown-Out and Black-out Detect (BOD) with separate thresholds
 - Integrated Matrix Vector Processor (MVP) Accelerator
 - Has 2 dedicated Quad Serial Peripheral Interface (QSPI) controllers for Pseudo Static Random Access Memory (PSRAM) and Flash respectively
- **Memory**
 - Embedded Static Random Access Memory (SRAM) up to 672 kB total for ARM Cortex-M4F® and ThreadArch®
 - On-chip SRAM of 192 K/256 K/320 Kbytes for M4F based on the memory configuration
 - Up to 8MB embedded PSRAM and support for Optional Ext. PSRAM up to 16 MB
 - Flash up to 8 MB (embedded), up to 16 MB (External Flash)
- **Digital Peripheral**
 - Secure Digital Input Output (SDIO) 2.0 secondary
 - 1x Universal Synchronous/Asynchronous Receiver Transmitter (USART), 2 x Universal Asynchronous Receiver Transmitter (UART), 4x Serial Peripheral Interface(SPI), 3x Inter Integrated Circuit (I2C), 2x Inter- IC Sound Bus (I2S), Serial Input Output (SIO), Pulse Width Modulation (PWM), Quadrature Encoder Interface (QEI)
 - Timers: 4x 16/32-bit, 1x 24-bit, Watchdog Timer (WDT), Real Time Counter (RTC)
 - Up to 44 General Purpose Input Outputs (GPIOs) with GPIO multiplexer
- **Analog Peripherals**
 - 12-bit 16-ch, 5 Mbps Analog to Digital Converter (ADC), 10-bit Digital to Analog Converter (DAC)
 - 3x Op-amps, 2x Comparators, InfraRed (IR) detector and Temperature Sensor
 - 8 capacitive touch sensor inputs
- **Security**
 - HW device identity and key storage with PUF
 - Trusted Execution Environment with Secure Boot loader
 - Hardware Accelerators: Advanced Encryption Standard (AES)128/256/192, Secure Hash Algorithm (SHA)256/384/512, Hash Message Authentication Code (HMAC), Random Number Generator (RNG), Cyclic Redundancy Check (CRC), SHA3, AES-Galois Counter Mode (GCM)/ Cipher based Message Authentication Code (CMAC), ChaCha-poly, True Random Number Generator (TRNG)
- **Security (cont.)**
 - Software Accelerators: RSA, ECC
 - Secure Execution in place (XIP) from flash/ PSRAM
 - Secure Boot
 - Secure firmware upgrade through boot-loader, Secure OTA.
 - Tamper detection with Hardware disable, Secure RTC, Secure Hardware Watchdog and other Secure Peripherals connected to the Trusted Execution Environment.
 - Programmable Secure Hardware Write protect for Flash sectors
 - Secure Isolation
- **Wi-Fi**
 - Compliant to single-spatial stream IEEE 802.11 b/g/n/ax with single band (2.4 GHz) support
 - Support for 20 MHz channel bandwidth for 802.11n
 - Support for 802.11ax in client mode
 - Support for 802.11ax 20 MHz non-AP STA mandatory features and optional features of individual Target wake-up time (iTWT), Broadcast TWT (bTWT)¹, Intra PPDU power save¹, SU extended range (ER).
 - Transmit power up to +21 dBm with integrated PA
 - Receive sensitivity as low as -98.5 dBm
 - Data Rates — 802.11b: up to 11 Mbps; 802.11g: up to 54 Mbps; 802.11n: MCS0 to MCS7; 802.11ax: MCS0 to MCS7
 - Operating Frequency Range: 2412 MHz – 2484 MHz
- **Bluetooth Low Energy (LE) 5.4**
 - Transmit power up to +21 dBm with integrated PA
 - Receive sensitivity — LE: -95 dBm, LR 125 Kbps: -106 dBm
 - Operating Frequency Range — 2.402 GHz - 2.480 GHz
 - Support LE (1Mbps & 2Mbps) and LR (125Kbps & 500Kbps) rates
 - Advertising extensions
 - Data length extensions
 - LL privacy
 - LE Dual Role
 - BLE Whitelisting
- **RF Features**
 - Integrated baseband processor with calibration memory, RF transceiver, high-power amplifier, balun and T/R switch
- **Embedded Wi-Fi and Networking Stack**
 - Support for Embedded Wi-Fi Client mode, Wi-Fi Access point mode and Enterprise Security
 - Supports advanced Wi-Fi security features: WPA Personal, WPA2 Personal, WPA3 Personal, WPA/WPA2 Enterprise
 - Integrated TCP/IP stack, IPV4, IPV6, HTTP, HTTPS Client, SSL/TLS1.3, MQTT
 - Over-the-Air Wireless firmware update and provisioning
- **Matter**
 - Matter over Wi-Fi with Bluetooth LE for provisioning

- **Embedded BlueTooth Stack**
 - Support GAP profile
 - Support GATT profile
 - Support SMP
 - Support LE L2CAP
- **MCU Sub-System Power Consumption**
 - Active current as low as 19 μ A/MHz in low-power mode
 - Active current as low as 65 μ A/MHz in high power mode
 - Deep sleep mode current: \sim 1.5 μ A
 - Dynamic Voltage & Frequency Scaling
 - Deep sleep mode with only timer active – with and without RAM retention
- **Wireless Sub-System Power Consumption**
 - Wi-Fi 4 Standby Associated mode current: 51 μ A @ 1-second beacon listen interval
 - Wi-Fi 1 Mbps Listen current: 14 mA
 - Wi-Fi LP chain Rx current: 19 mA
 - Deep sleep current <1.5 μ A, Standby current (384K RAM retention) < 10 μ A
- **Evaluation Kit**
 - Radio board Prokit for SoC Mode: Si917-PK6030A Pro Kit. This includes "Radio board + Pro Kit Main board"
- **Advance Software Features**¹
 - Amazon FreeRTOS
 - Amazon AWS Cloud Connectivity, Microsoft Azure Cloud Connectivity
 - SensorHub
 - Matter over Wi-Fi with BLE for provisioning
- **Development Environment**
 - Simplicity Studio™ unified development platform
 - VS Code¹
- **Hardware Accelerator**
 - Matrix vector processor for Accelerating AI/ML (Artificial Intelligence / Machine Learning)
- **Operating Conditions**
 - Wide operating supply range: 1.71 V to 3.63 V
 - Operating temperature: -40 °C to +105 °C

Note:

1. For information about software roadmap, contact Silicon Labs for availability and timeline.
2. Certification will be ready by IP/GA timeframe.
3. For a detailed list of software features and available profiles, refer to the Software Reference Manuals or contact Silicon Labs for availability.

2. Block Diagram

Figure 2.1. SiWG917 Hardware Block Diagram

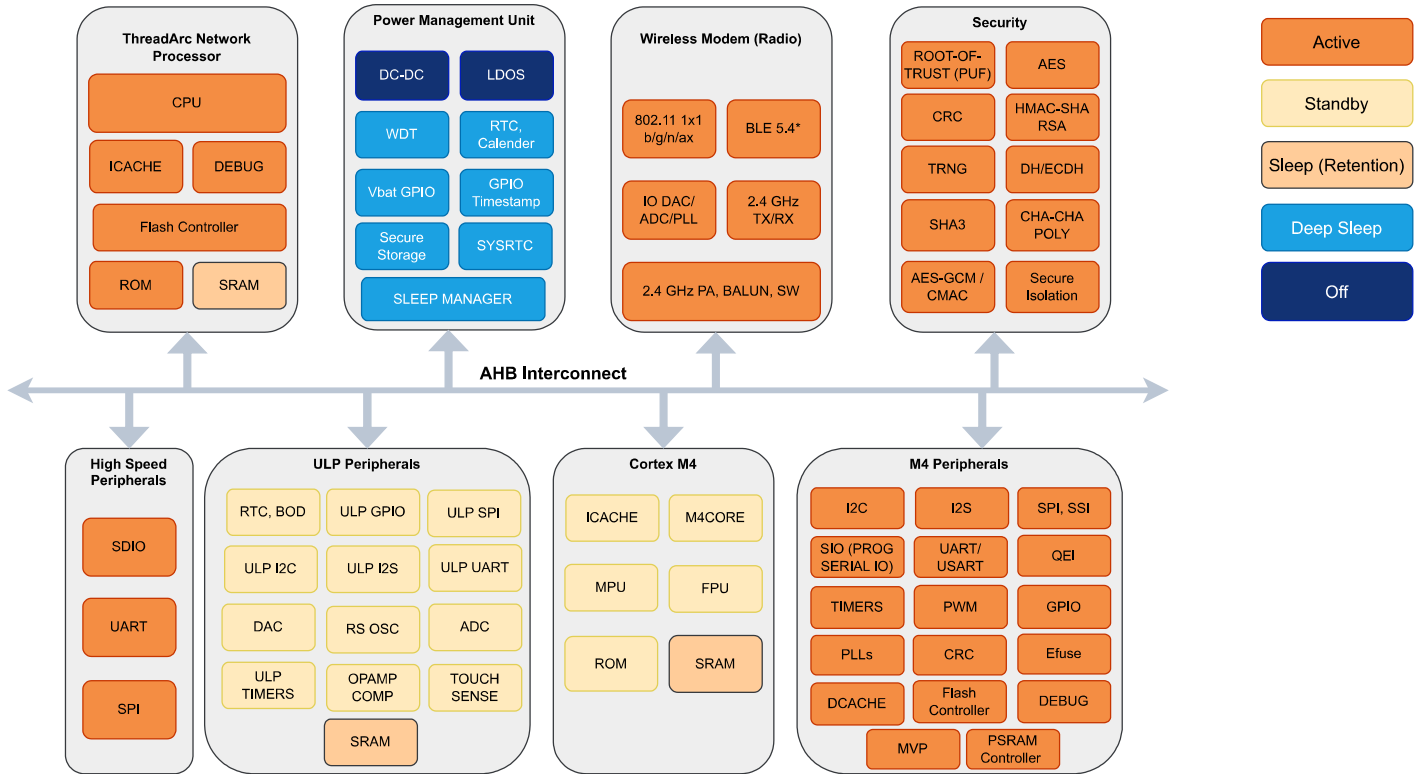


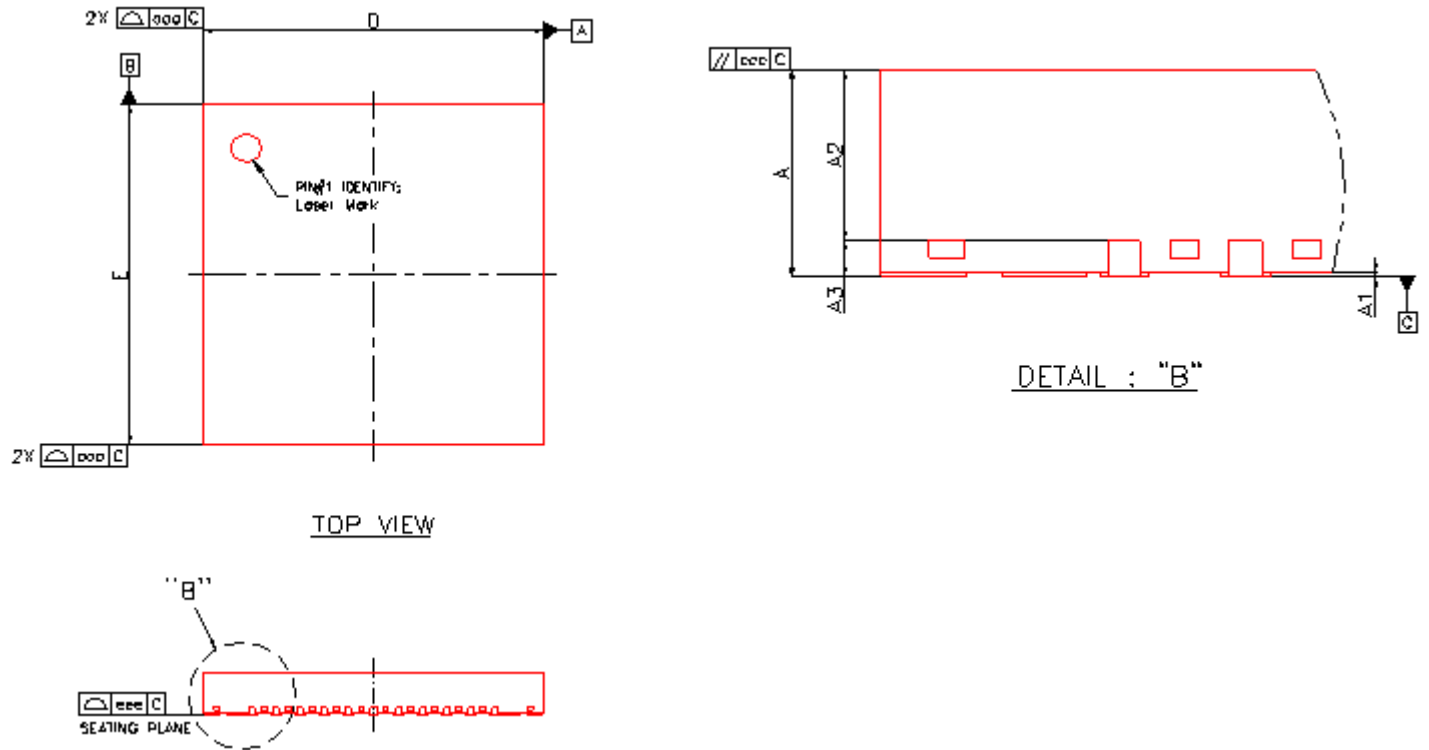
Figure 2.2. System Block Diagram

3. Package Specifications

3.1 Package Outline

Table 3.1. Package Dimensions - QFN

| Parameter | Value (LxWxH) | Units |
|--------------------|---------------|-------|
| Package Dimensions | 7 x 7 x 0.85 | mm |
| Tolerance | ±0.1 | mm |



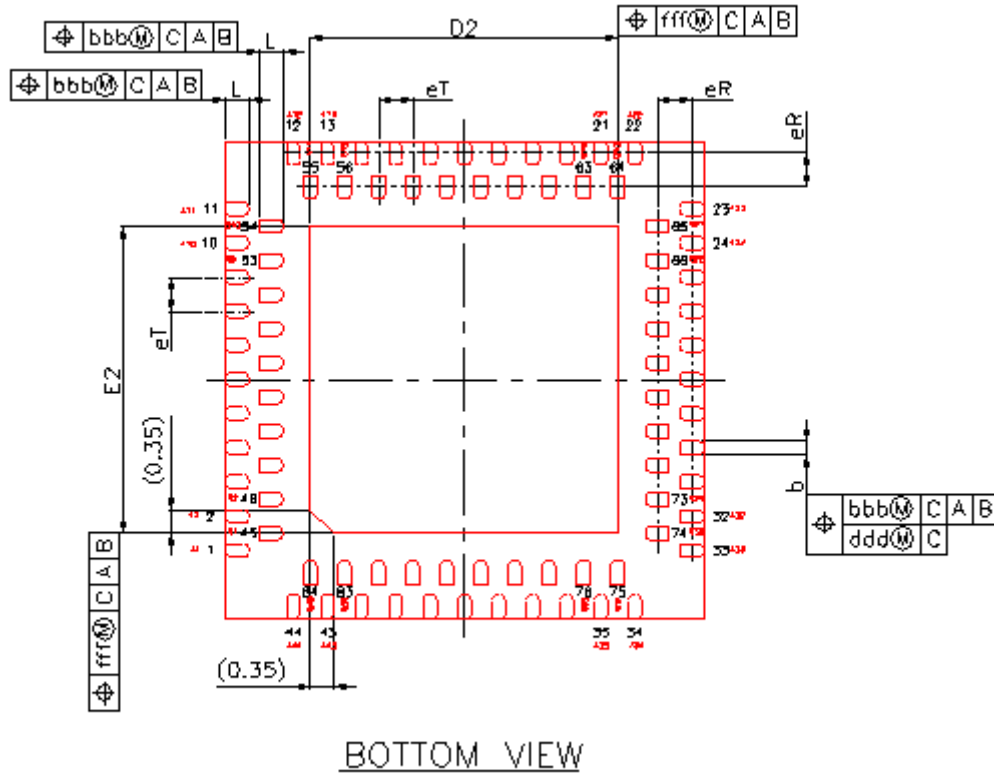


Figure 3.2. Package Outline - QFN

Table 3.2. PCB Landing Pattern - QFN

| Dimension | MIN | NOM | MAX |
|-----------|----------|------|------|
| A | 0.75 | 0.85 | 0.95 |
| A1 | 0.00 | 0.02 | 0.05 |
| A2 | 0.65 | 0.70 | 0.75 |
| b | 0.15 | 0.20 | 0.25 |
| D | 6.90 | 7.00 | 7.10 |
| E | 6.90 | 7.00 | 7.10 |
| D2 | 4.40 | 4.50 | 4.60 |
| E2 | 4.40 | 4.50 | 4.60 |
| eT | 0.50 BSC | | |
| eR | 0.50 BSC | | |
| L | 0.30 | 0.35 | 0.40 |
| aaa | 0.10 | | |
| bbb | 0.10 | | |
| ccc | 0.20 | | |
| ddd | 0.05 | | |

| Dimension | MIN | NOM | MAX |
|-----------|-----|------|-----|
| eee | | 0.08 | |
| fff | | 0.10 | |

Note:

1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing per ANSI Y14.5M-1994.
3. This drawing conforms to the JEDEC Solid State Outline MO-220.
4. Recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

3.2 PCB Landpattern

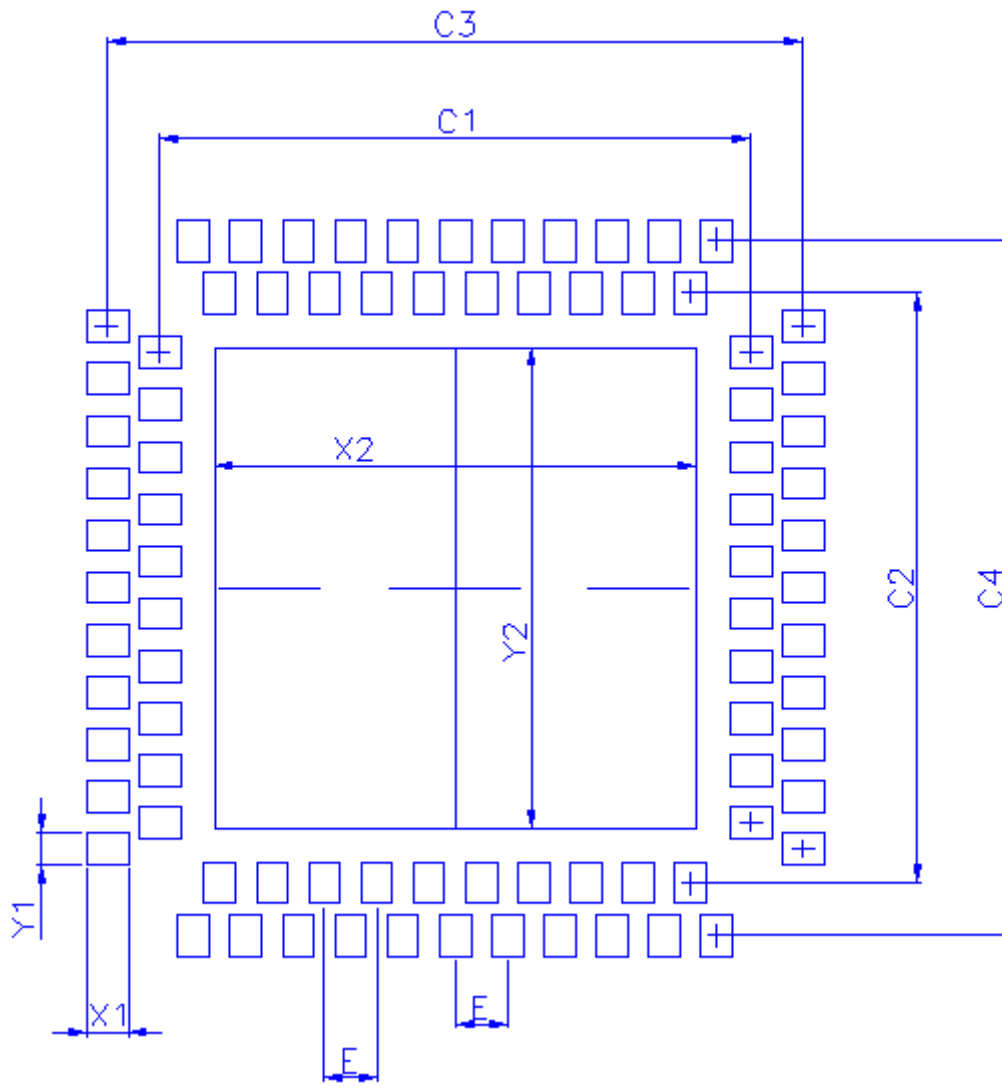


Figure 3.2. PCB Landing Pattern - QFN

Table 3.3. Dimension Table

| Dim | mm |
|-----|---------|
| C1 | 5.55 |
| C2 | 5.55 |
| C3 | 6.55 |
| C4 | 6.55 |
| E | 0.5 BSC |
| X1 | 0.4 |
| X2 | 4.60 |
| Y1 | 0.25 |
| Y2 | 4.60 |

| Dim | mm |
|--|----|
| <p>Note:</p> <p>General</p> <ol style="list-style-type: none">1. All feature sizes shown are at Maximum Material Condition (MMC) and a card fabrication tolerance of 0.05mm is assumed.2. Dimensioning and Tolerancing is per the ANSI Y14.5M-1994 specification. <p>Solder Mask Design</p> <ol style="list-style-type: none">1. All pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 10mm minimum, all the way around the pad. <p>Stencil Design</p> <ol style="list-style-type: none">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 0.100mm (4 mils).3. The stencil aperture to land pad size recommendation is 80% paste coverage. <p>*Above notes and stencil design are shared as recommendations only. A customer or user may find it necessary to use different parameters and fine tune their SMT process as required for their application and tooling.</p> | |

4. Revision History

Revision 0.1

August 2023

Initial draft

Simplicity Studio

One-click access to MCU and wireless tools, documentation, software, source code libraries & more. Available for Windows, Mac and Linux!



IoT Portfolio
www.silabs.com/IoT



SW/HW
www.silabs.com/simplicity



Quality
www.silabs.com/quality



Support & Community
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