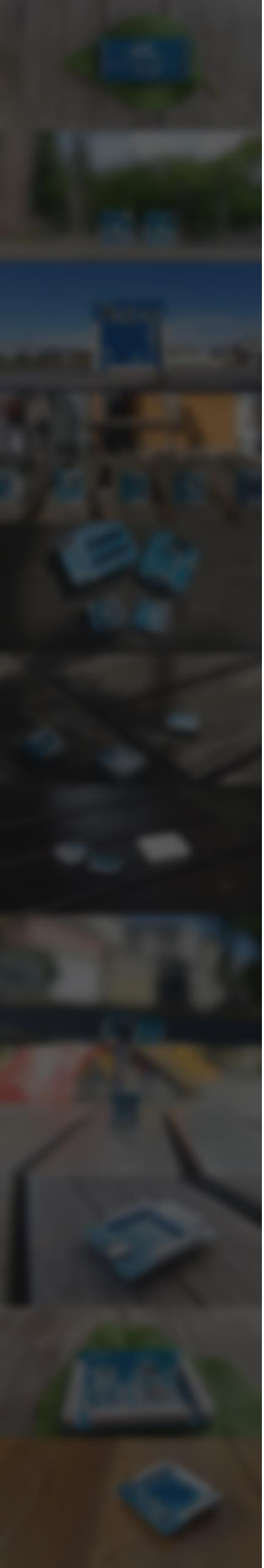


MtM+ Technology

M907

Bluetooth 4.2 Low Energy Energy/Zigbee/RF4CE/Thread SiP Module

with MCU and integrated antenna

Preliminary DATASHEET
16th April, 2018

Table of Contents

1 Product Brief

The SiP module is a small size module with antenna inside. It's compatible with standards and industrial alliance specifications including Bluetooth Smart (BLE 4.0 and BLE 4.2), BLE Mesh, 6LoWPAN, Thread, Zigbee, RF4CE, HomeKit and 2.4GHz proprietary standard. It allows easy connectivity with Bluetooth Smart Ready mobile phones, tablets, laptops, which supports BLE slave and master mode operation, including broadcast, encryption, connection updates, and channel map updates.
It is completely RoHS-compliant and 100% lead (Pb)-free

For the software and driver development, we provide extensive technical document and reference software code for the system integration. Hardware evaluation kit and development utilities are ready to applied.

KEY FEATURES

- Bluetooth 4.2 Low Energy Compliant
- Embedded 32 bits high performance MCU with clock up to 48MHz
- 512 kB programmable flash
- 32 kB SRAM
- Built-in antenna
- Module size: 12 x 12 mm

2 Features and Applications

Feature List

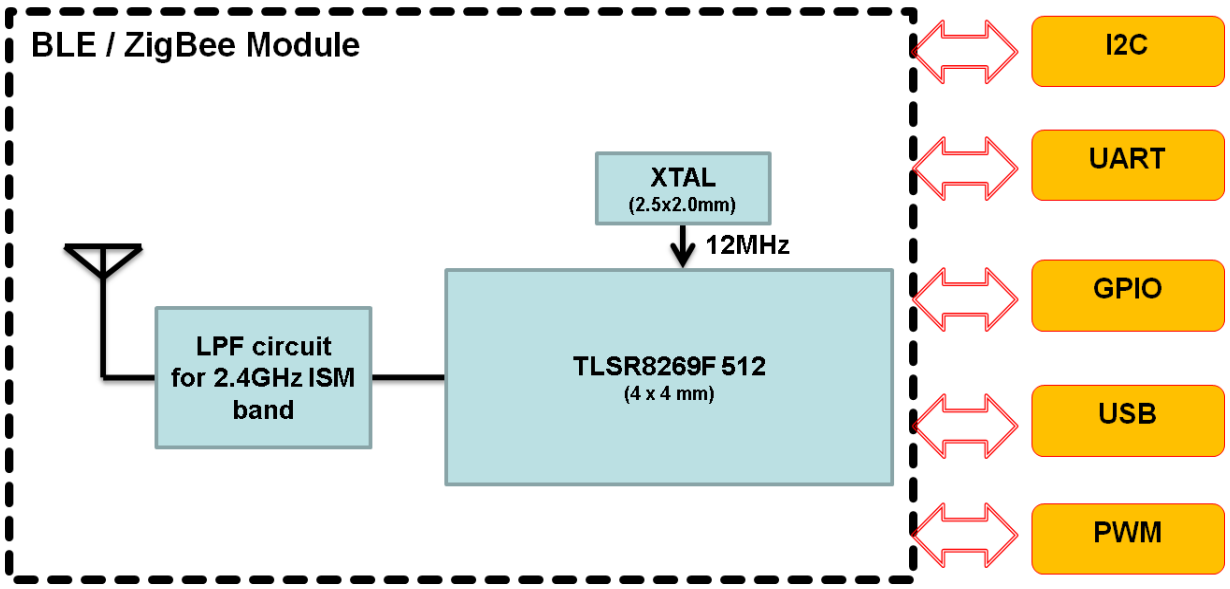
- Multi-protocol with Bluetooth low energy / ANT / 2.4GHz RF
- Support Zigbee, RF4CE, Thread and Homekit standards
- Embedded 32-bit high performance MCU with clock up to 48MHz
- Program memory: Internal 512KB Flash
- Data memory: 32KB on-chip SRAM
- 12MHz and 32KHz/32MHz embedded RC oscillator
- A rich set of I/Os:
  - Up to 14 GPIOs
  - DMIC (Digital Mic)
  - AMIC (Analog Mic)
  - Mono-channel audio output
  - SPI
  - I^2C
  - UART with hardware flow control
  - USB
  - Debug Interface
- Up to 6 channels of PWM, 2-channel IR
- Sensor:
  - 14bit ADC with PGA
  - Temperature sensor
- One quadrature decoder
- Embedded hardware AES
- Operating temperature: -40°C ~ +85°C industrial temperature range
- Antenna on Package (AoP)
- LGA-36 package, 12 x 12 mm

Applications

- IoT:
  - Smart home
  - Sensor networks
  - Building automation
  - Industrial
  - Retail
  - Smart Lighting
- Beacons

3 Block Diagram

There is fully integration module with TLSR8269F512, 12MHz low power crystal. Especially, there is a high-performance PCB antenna.



4 Technical Specifications

Operation and storage condition

4.1 Absolute Maximum Ratings

Item	Description		Value	Unit
Ratings Over Operating Free-Air Temperature Range				
1	Supply voltage	All supply pins must have the same voltage	-0.3 ~ 3.9	V
2	Voltage on any pin		-0.3 ~ 3.9	V
3	Storage temperature range		-40 ~ 125	˚C
4	Bluetooth RF output (Typ.)		4	dBm

4.2 Operation Condition

Operating Condition	Min	Typical	Max	Unit
VCC	1.7	3.3	3.6	V
Operation ambient temperature range	-40	--	85	˚C

4.3 Wireless Specifications

The M907 module is compliant with the following features and standards:

Features	Description
Bluetooth Standards	Bluetooth core v4.2 Low Energy
Antenna Port	Built-in Antenna
Frequency Band	2.402 – 2.480 GHz

4.4 Radio Specifications – Bluetooth 4.2 Low Energy

Features	Description
Features	Bluetooth core v4.2 Low Energy
Frequency Band	2.402 – 2.480GHz
Number of Selectable Sub Channels	40 Channels
Modulation	GFSK
Support Rates	< 2Mbps
Maximum Receive Level	-10dBm (with PER <30.8%)

4.5 Built-In Antenna Performance

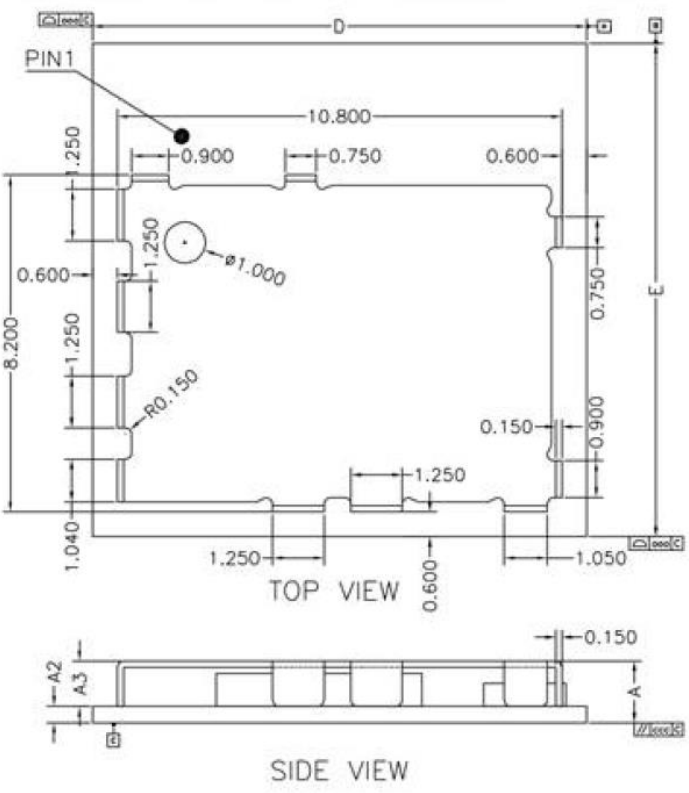
Item	Freq. Band	Gain	Return Loss	VSWR
Spec	2.4 to 2.5GHz	>5dBi	<6dB	3 max
Item	**Impedance**	**Polarization**	**Directivity**	**Efficiency**
Spec	50 ohm	Linear	Omni-directional	>30%

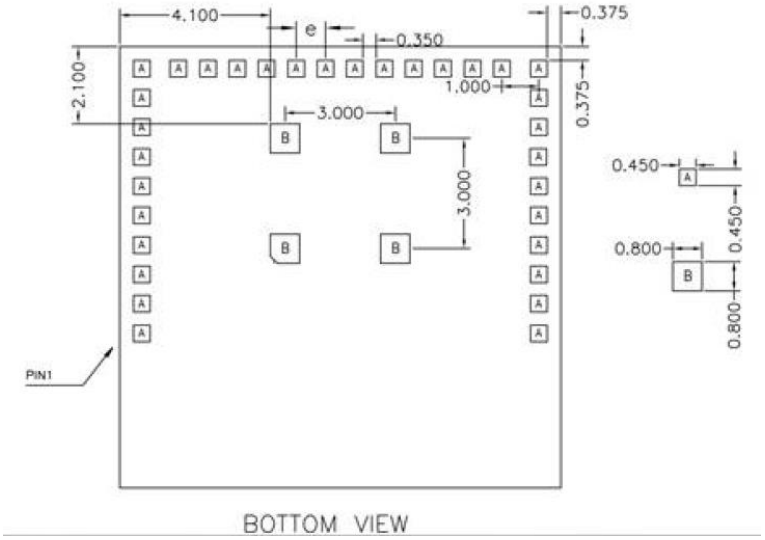
4.6 Power Consumption

Item	Typical	Units
Tx Mode 3.3V	40	mA
Rx Mode 3.3V	29	mA
Deep Sleep Mode (MCU ON)	1.9	uA
Suspend Mode (MCU ON, SRAM ON to keep data)	10.3	uA

5 Dimensions

The size and thickness of the M907 module are 12mm (W) x 12mm (L) x 1.5mm (H):





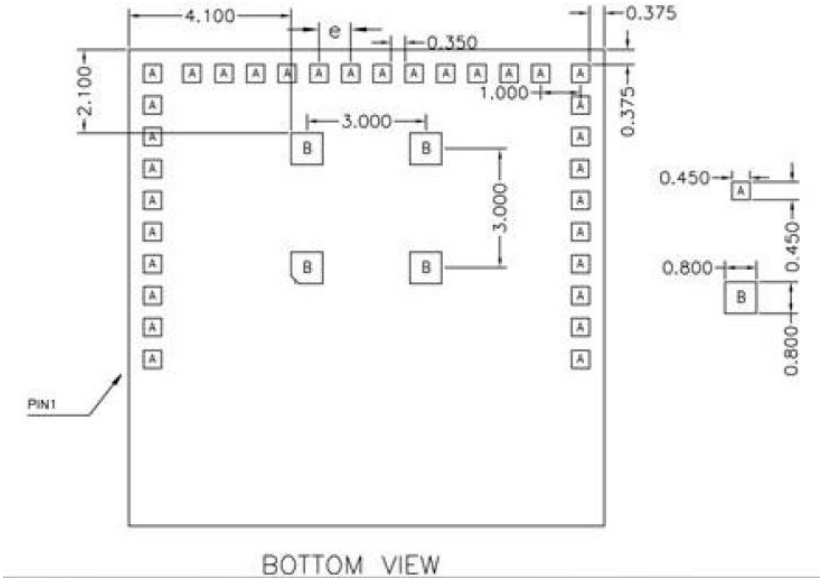
MILLIMETER			
SYMBOL	MIN	NOR	MAX
A	1.40	1.50	1.60
A2	0.35	0.40	0.45
A3	1.05	1.10	1.15
D	11.9	12.0	12.1
E	11.9	12.0	12.1
e	BSC 0.80		
aaa	0.10		
ccc	0.05		

6 Pin Assignments

Pin Number	Pin Name	Pin Function	Description
1	DM/ANA_E<2>	Digital I/O	USB dataMinus/GPIO/ANA_E<2>
2	DP/ANA_E<3>	Digital I/O	USB data Positive/GPIO/ANA_E<3>
3	DMIC_DI/PWM0/ANA_A<0>	Digital I/O	DMIC data input/PWM0/GPIO/ANA_A<0>
4	DMIC_CLK/ANA_A<1>	Digital I/O	DMIC clock/GPIO/ANA_A<1>
5	DI/PWM1/ANA_A<3>	Digital I/O	SPI data input/PWM1 output/GPIO/ ANA_A<3>/I2C_SDA (I2C serial data)
6	CK/PWM1_N/ANA_A<4>	Digital I/O	SPI clock/PWM1 inverting output/GPIO/ ANA_A<4>/I2C_SCK (I2C serial clock)
7	PWM1/SDM_P/ANA_E<1>	Digital I/O	PWM1 output/GPIO /SDM Negative output /ANA_E<1>
8	PWM0/SDM_N/ANA_E<0>	Digital I/O	PWM0 output/GPIO /SDM Positive output/ANA_E<0>
9	GP5/ANA_D<3>	Digital I/O	GPIO5/ANA_D<3>
10	VBAT	Power	3V3
11	GND	Power	Ground (0V)
12	GND	Power	Ground (0V)
13	UART_RX/SWM/ANA_A<7>	Digital I/O	UART_RX/Single Wire Master/ GPIO/ANA_A<7>
14	PWM2/SWS/ANA_B<0>	Digital I/O	PWM2 output/Single wire slave/GPIO/ ANA_B<0>
15	PWM2_N/ANA_B<1>	Digital I/O	PWM2 inverting output /GPIO/ANA_B<1>
16	CN/PWM4/ANA_B<4>	Digital I/O	SPI chip select (Active low)/PWM4 output/GPIO/ ANA_B<4>
17	DO/PWM4_N/ANA_B<5>	Digital I/O	SPI data output/PWM4 inverting output/GPIO/ ANA_B<5>
18	DI/PWM5/ANA_B<6>	Digital I/O	SPI data input/PWM5 output/ GPIO/ ANA_B<6>/I2C_SDA (I2C serial data)
19	CK/PWM5_N/ANA_B<7>	Digital I/O	SPI clock/ PWM5 inverting output/ GPIO/ ANA_B<7>/I2C_SCK (I2C serial clock)
20	UART_TX/PWM2/ANA_C<2>	Digital I/O	UART_TX/PWM2 output/ GPIO/ANA_C<2>/ (optional) 32KHz crystal output
21	UART_RX/PWM3/ANA_C<3>	Digital I/O	UART_RX/PWM3 output/ GPIO/ANA_C<3>/ (optional) 32KHz crystal input
22	UART_RTS/PWM4/ANA_C<4>	Digital I/O	UAR_RTS/PWM4 output/ GPIO /ANA_C<4>
23	UART_CTS/PWM5/ANA_C<5>	Digital I/O	RT_CTS/PWM5 output/ GPIO /ANA_C<5>
24~30	GND	Power	Ground (0V)
31	RF OUT		
32	ANT IN		
33~36	GND	Power	Ground (0V)

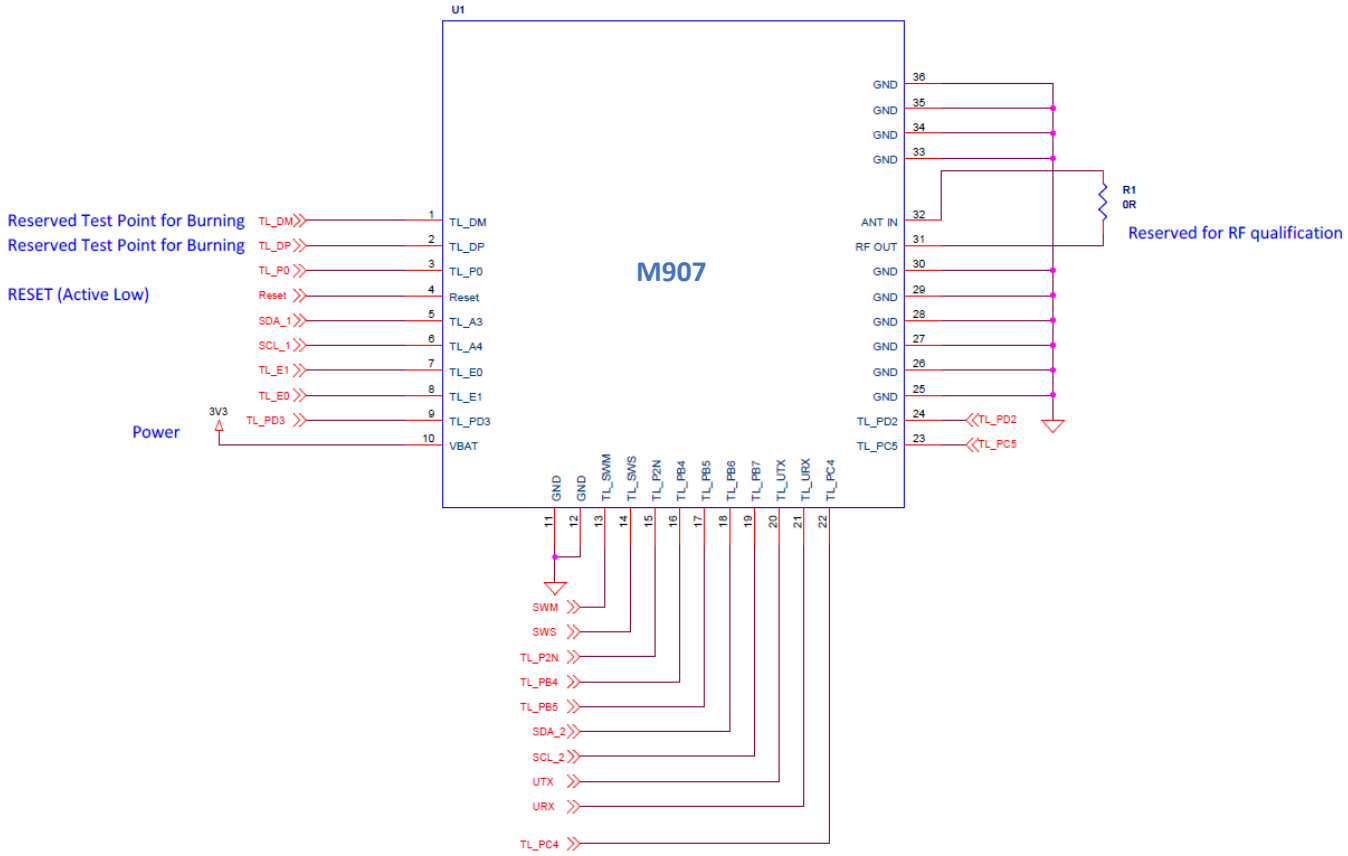
7 Recommended Footprint

Suggest on PCB: SMD (1:1)

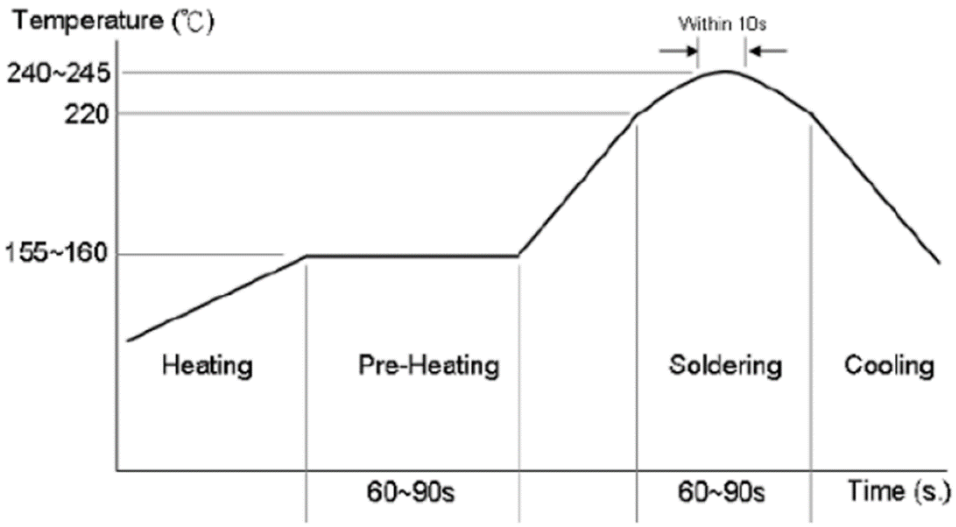


e = BSC 0.80

8 Reference Design Circuit



9 Recommended Reflow Profile



Profile Condition

a. Suitable for lead-free solder
b. Between 155 ~ 160°C: 60 ~ 90 sec.
c. Above 220°C: 60 ~ 90 sec.
d. Peak Temperature: 240 ~ 245°C (<10 sec.)

10 SiP Module Preparation

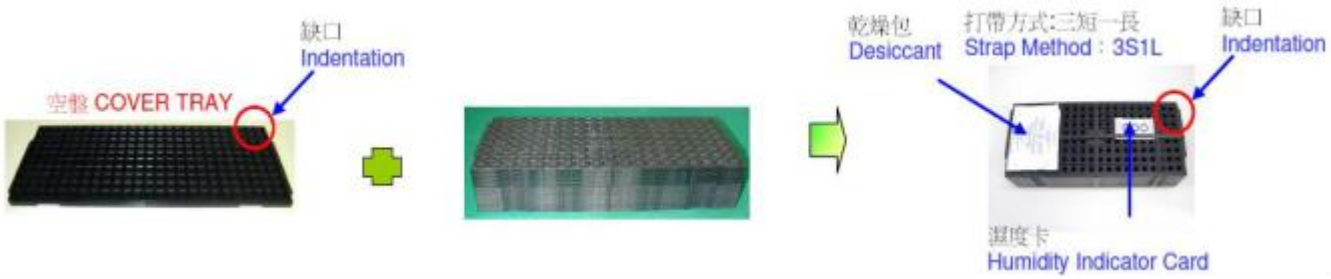
10.1 Handling

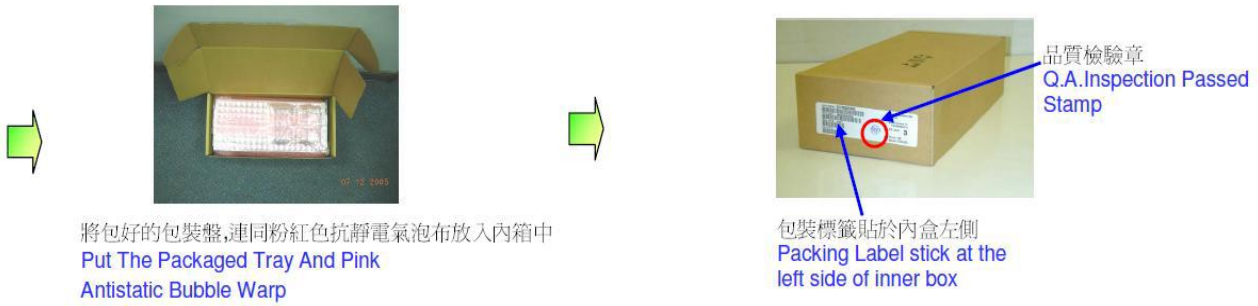
Handling the module must wear the anti-static wrist strap to avoid ESD damage. After each module is aligned and tested, it should be transport and storage with anti-static tray and packing. This protective package must be remained in suitable environment until the module is assembled and soldered onto the main board.

10.2 SMT Preparation

1. Calculated shelf life in sealed bag: 6 months at <40°C and <90% relative humidity (RH).
2. Peak package body temperature: 250°C.
3. After bag was opened, devices that will be subjected to reflow solder or other high temperature process must.
   a. Mounted within: 72 hours of factory conditions <30°C /60% RH.
   b. Stored at ≦10% RH with N2 flow box.
4. Devices require baking, before mounting, if:
   a. Package bag does not keep in vacuumed while first time open.
   b. Humidity Indicator Card is >10% when read at 23±5°C.
   c. Expose at 3A condition over 8 hours or Expose at 3B condition over 24 hours.
5. If baking is required, devices may be baked for 12 hours at 125±5°C.

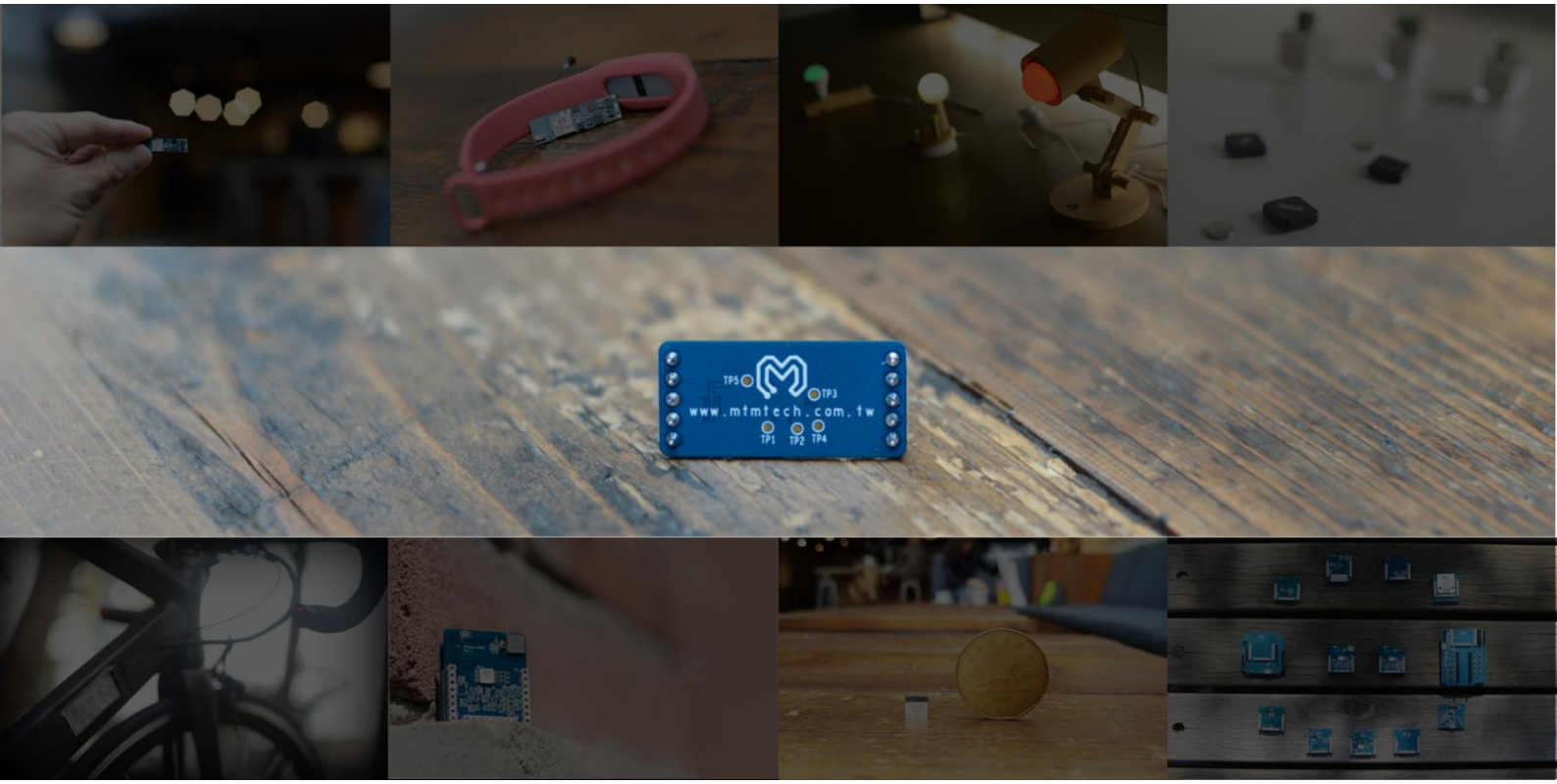
11 Package Information





12 Document History

Date	Modifications	Version
Mar. 08, 2017	Preliminary Version	1.0
Dec. 11, 2017	Fixed description details	1.1
Feb. 26, 2018	Add power consumption	1.2
Apr. 10, 2018	Update the content of “2 Features and Applications”	1.3
Apr. 16, 2018	Update content of “5 Dimension”, “7 Recommended Footprint” and “8 Reference Design Circuit”	1.4



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