

User Manual

Model Name: WSM-A0x
Wi SUN Module

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1 Wi-SUN Introduction

Wi-SUN <Wireless Smart Utility Network> is a wireless communication technology designed for large-scale outdoor industrial and utility applications. It provides a reliable, secure, and low-power solution for connecting devices in smart grid, smart city, and other Internet of Things (IoT) deployments. Wi-SUN is based on the IEEE 802.15.4g standard and operates in the Sub-GHz frequency range, which offers excellent propagation characteristics and long-range connectivity.

2 Wi-SUN Module Scope

The VC7300-series (Vetexcom SoC Solution) is a highly integrated wireless MCU that perfectly fits IoT networking and sensing applications. It integrates Cortex-M3 MCU, 512/1024 KB Flash, 128 KB SRAM, sub-GHz radio, and other functionalities such as UART/SPI/I2C, WDT, and Timer, etc.

The VC7300-series has varieties of power-saving modes which can be leveraged to build ultra-low-power IoT networks with powerful computing capability. The embedded sub-GHz RF transceiver features low power consumption, long-range and robust wireless links, being able to reject large nearby interfering RF signals.

Furthermore, our module is designed to integrate with existing IP-based networks, leveraging IPv6 protocols for seamless connectivity with the broader Internet. This enables the integration of Wi-SUN networks into larger smart grid and smart city deployments, facilitating efficient data collection, management, and control.

3 Application and Scenario

- 3.1 Smart Grid: Wi-SUN enables efficient and secure communication between various components of a smart grid, such as smart meters, distribution automation devices, and grid management systems. It supports advanced metering infrastructure (AMI) and facilitates demand response, grid optimization, and distributed energy resource management.
- 3.2 Smart City: Wi-SUN can be used for various applications in smart cities, including street lighting control, parking management, environmental monitoring, and infrastructure management. It provides a reliable and scalable communication platform to connect a wide range of devices and sensors deployed throughout the city.
- 3.3 Industrial Automation: Wi-SUN offers robust wireless connectivity for industrial automation applications, such as asset tracking, remote monitoring, and control of equipment, and process optimization. It can be deployed in manufacturing plants, oil and gas facilities, and other industrial environments.
- 3.4 Advanced Metering Infrastructure (AMI): Wi-SUN is well-suited for AMI deployments, where it enables two-way communication between utility companies and smart meters. It facilitates automated meter reading, remote disconnect/reconnect, and real-time data collection for billing and load management.

- 3.5 Renewable Energy Integration: Wi-SUN can play a crucial role in integrating renewable energy sources into the grid. It enables communication and control between renewable energy generation systems, energy storage devices, and the utility grid, allowing for efficient utilization and management of renewable resources.
- 3.6 Water Management: Wi-SUN can be applied in water management systems to enable real-time monitoring of water supply, leak detection, and efficient distribution. It allows utilities to collect data from various sensors and devices deployed across the water network, enabling proactive maintenance and conservation measures.
- 3.7 Infrastructure Monitoring: Wi-SUN can be used for monitoring critical infrastructure, such as bridges, dams, and pipelines. It provides wireless connectivity for sensors and monitoring devices, allowing for early detection of structural issues, environmental conditions, and preventive maintenance.

4 Specification

4.1 Key Features

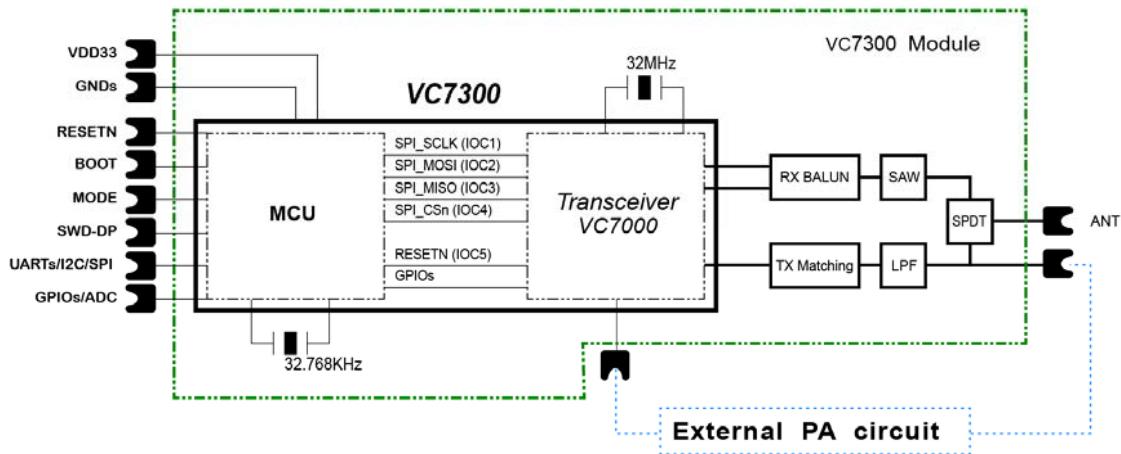
- Vertexcom VC7300 SoC
- Support IEEE802.15.4g/WI-SUN FAN
- Support Wireless M-BUS
- Radio frequency: ISM bands: NCC: 920MHz ~ 925MHz, FCC : 902MHz ~ 928MHz, CE: 868MHz
- Modulation method: OOK, (G)FSK, 4(G)FSK and GMSK
- Configurable maximum transmit output power : +20dBm
- Interface Support: UART/I2C/SPI/ADC/GPIO
- Root & Node (Dual application)

4.2 Characteristic specifications

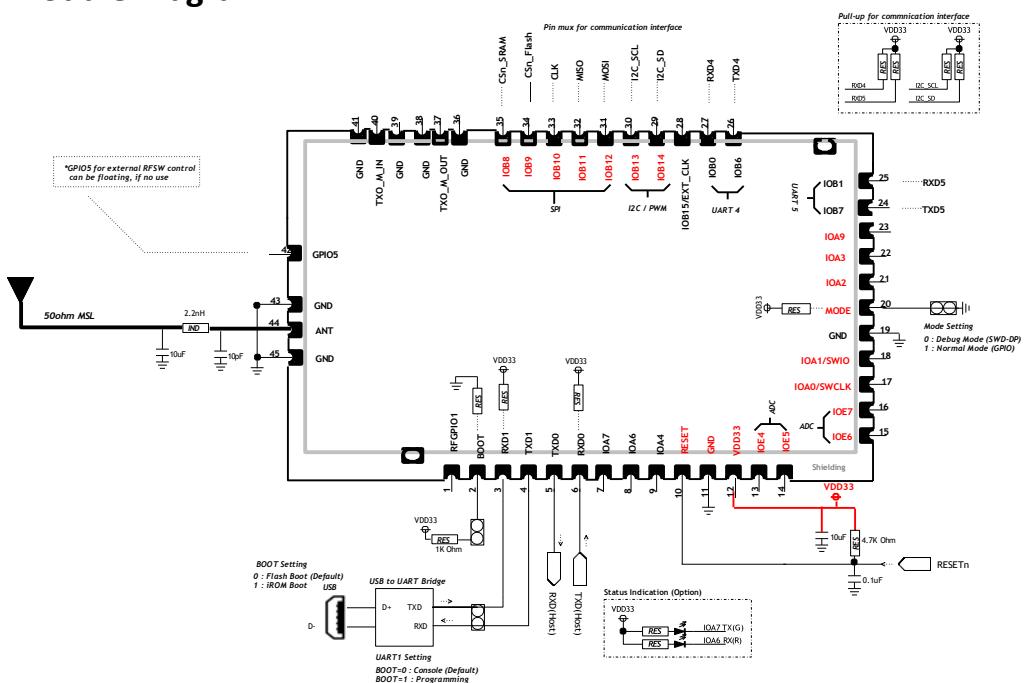
Typical values at T=25°C

Parameter	Description
Radio standards	Compliant with IEEE802.15.4g/WI-SUN
Radio frequency	NCC: 920MHz ~ 925MHz, FCC : 902MHz ~ 928MHz, CE: 868MHz
Modulation method	(G)FSK
Data rate	50kbps
Receiving sensitivity	-109 dBm at 50 kbps GFSK (Typ.)(100 kbps, BER<0.1%)
Frequency deviation	±20ppm or less
Power Supply	VDD=2.7~3.6V
Current consumption (VDD=3.3V) (Data rate=100 kbps)	50~145 mA(Typ.)(Transmission) 30 mA(Typ.)(Reception) 7mA(Typ.)(Sleep state)
Host interface	UART(115,200 bps)
Certification	FCC/CE/NCC

4.3 Main Chip Diagram



4.4 Module Diagram

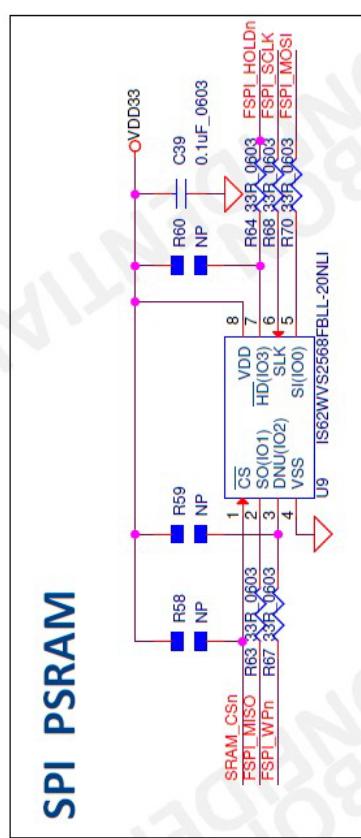
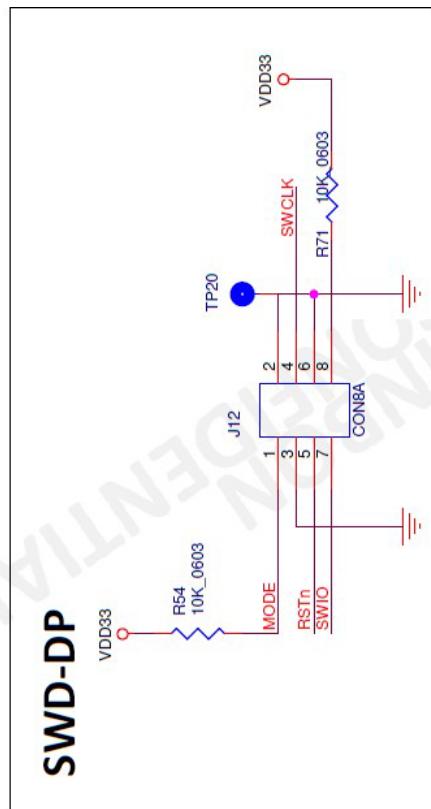
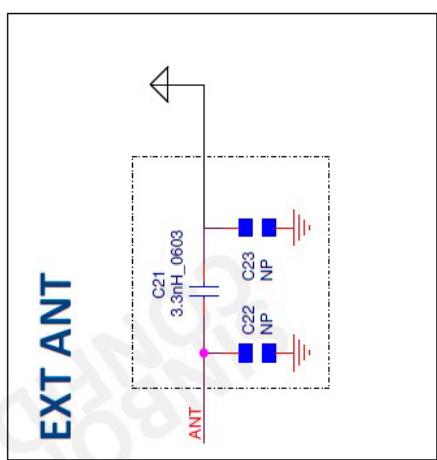
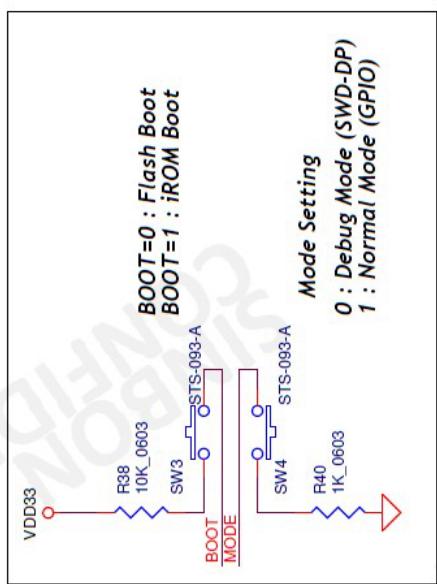
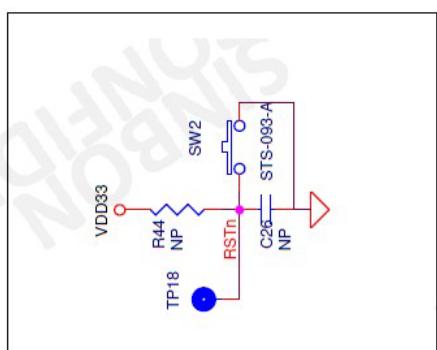


4.5 Module Pin Out

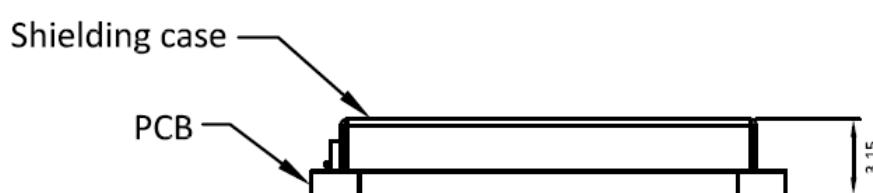
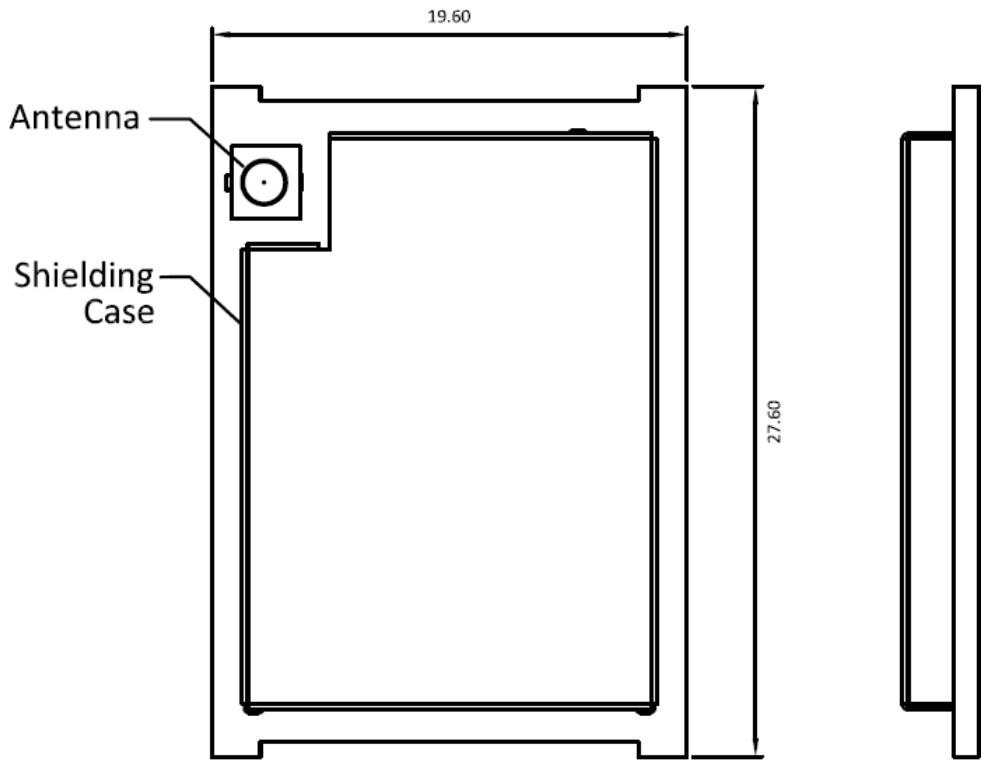
PIN No.	Pin Name	I/O	Function
1	RFGPIO1	0	RF Part general purpose Out (LNA_EN)
2	BOOT	I	Default: General purpose IO, IOD0 Boot strap pin 0: Embedded flash boot. 1: Internal ROM boot.
3	RXD1	I	
4	TXD1	O	Debug/Programming
5	TXD0	O	
6	RXD0	I	Application port
7	IOA7	I/O	Default: General purpose IO, IOA7 Function 2: EINT7 Function 4: Second pulse output (RTC PCLK divider output)
8	IOA6	I/O	Default: General purpose IO, IOA6 Function 2: EINT6 Function 3: Comparator 2 output. Function 4: Key scan input 2
9	IOA4	I/O	Default: General purpose IO, IOA4 Function 1: Comparator 2 P input Function 2: EINT4 Function 4: Key scan input 0
10	RESETN	I	External reset pin, low active.
11	GND	G	GND
12	VDD33	P	DC Power
13	IOE4/ADC	I/O	Default: General purpose IO, IOE4. Function 1: ADC channel 4 input
14	IOE5/ADC	I/O	Default: General purpose IO, IOE5 Function 1: ADC channel 5 input Function 2: VDCIN input
15	IOE6/ADC	I/O	Default: General purpose IO, IOE6. Function 1: ADC channel 6 input
16	IOE7/ADC	I/O	Default: General purpose IO, IOE7. Function 1: ADC channel 7 input
17	IOAO/SWCLK	I/O	Default: General purpose IO, IOAO (MODE=1), SWCK(MODE=0). Function 2: EINT0
18	IOA1/SWIO	I/O	Default: General purpose IO, IOA1 (MODE=1), SWIO(MODE=0). Function 2: EINT1
19	GND	G	GND
20	MODE	I	Debug mode or normal mode selection 0: Debug mode 1: Normal mode The signal level of this pin should be the same as DVDD33, and the state of this IO should not change during normal or debug operation.
21	IOA2	I/O	Default: General purpose IO, IOA2. Function 2: EINT2
22	IOA3	I/O	Default: General purpose IO, IOA3. Function 1: Second pulse output (RTCPPLL divider output) Function 2: EINT3
23	IOA9	I/O	Default: General purpose IO, IOA9. Function 1: ADC channel 1 input Function 2: EINT9

PIN No.	Pin Name	I/O	Function
24	IOB7/TXD5	I/O	Default: General purpose IO, IOB7. Function 3: UART TXD 5 Function 5: FSPI HOLDN
25	IOB1/RXD5	I/O	Default: General purpose IO, IOB1. Function 2: RTC Second pulse output (Correct in every 30 seconds) Function 3: UART RXD 5 Function 5: FSPI WPN
26	IOB6/TXD4	I/O	Default: General purpose IO, IOB6. Function 2: PWM1 output Function 3: UART TXD 4 Function 4: RTCLK clock output
27	IOB0/RXD4	I/O	Default: General purpose IO, IOB0. Function 2: PWM0 output Function 3: UART RXD 4
28	IOB15/EXT_CLK	I/O	Default: General purpose IO, IOB15. Function 2: Timer external clock input Function 3: UART RXD 6 Function 4: Key-scan output 3 Function 5: FSPI flash CSN
29	IOB14/PWM/SD	I/O	Default: General purpose IO, IOB14. Function 2: PWM3 output Function 3: I2C SDA Function 4: Key scan output 2
30	IOB13/PWM/SCL	I/O	Default: General purpose IO, IOB13. Function 2: PWM2 output Function 3: I2C SCL Function 4: Key scan output 1
31	IOB12/MOSI	I/O	Default: General purpose IO, IOB12. Function 2: SPI1 MOSI Function 5: FSPI MOSI
32	IOB11/MISO	I/O	Default: General purpose IO, IOB11. Function 2: SPI1 MISO Function 5: FSPI MISO
33	IOB10/CLK	I/O	Default: General purpose IO, IOB10. Function 2: SPI1 CLK Function 5: FSPI CLK
34	IOB9/F_CS	I/O	Default: General purpose IO, IOB9. Function 2: SPI1 CSN Function 5: FSPI flash CSN
35	IOB8/S_CS	I/O	Default: General purpose IO, IOB8. Function 4: Key scan output 0 Function 5: FSPI SRAM CSN
36	GND	G	GND
37	TXO_M_OUT	O	EXT PA, RF single out
38	GND	G	GND
39	GND	GND	GND
40	TXO_M_IN	I	EXT PA, RF single in
41	GND	GND	GND
42	GPIO5	I/O	GPIO w ePA Power Control
43	GND	GND	GND
44	ANT	RF	RF in /out
45	GND	GND	GND

4.6 Suggested circuit



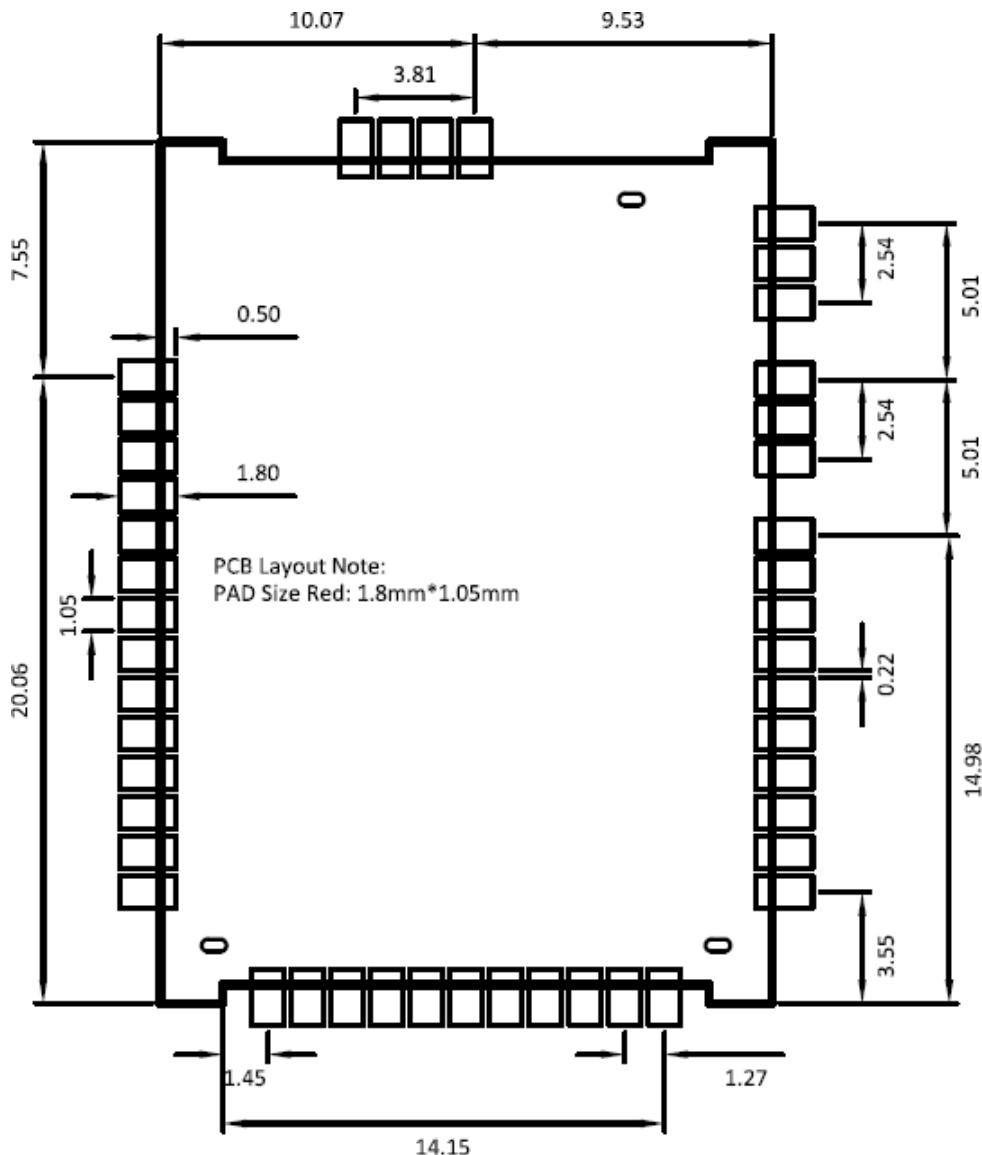
4.7 Module PCB Dimension



4.8 Environmental

Item	Specifications
Operating Temperature Range	-40~85°C
Operating Humidity Range	20 to 90% RH (without condensation or freezing)
Storage Temperature Range	-40~105°C
Storage Operating Humidity Range	20 to 95% RH (Sharp temperature change, without condensation or freezing not allowed)

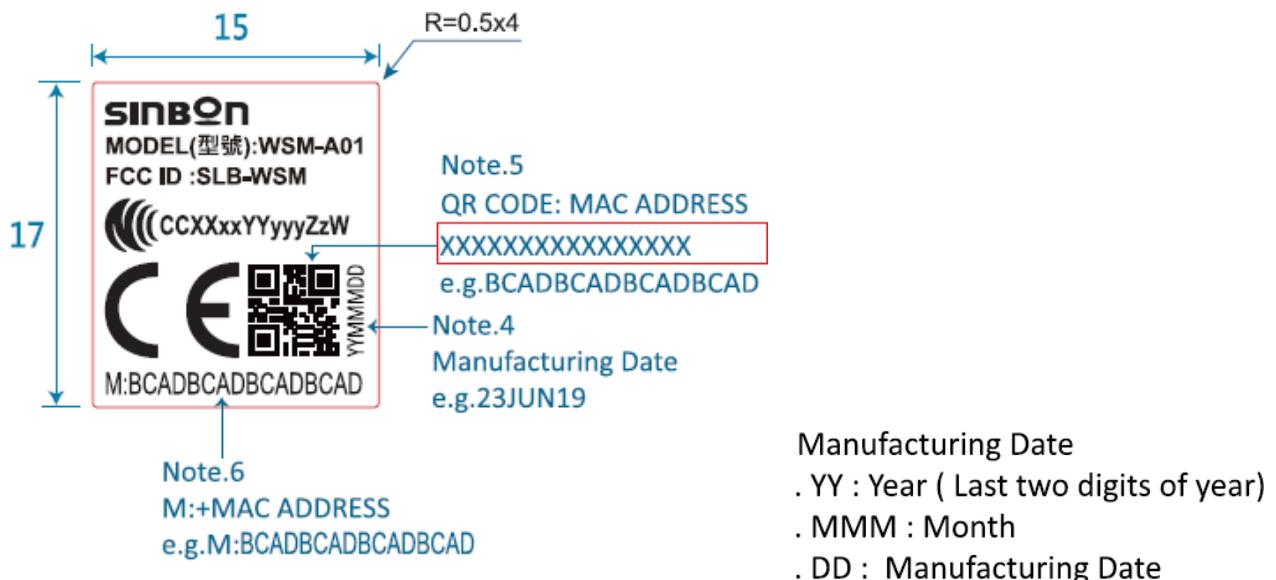
5 Recommended Land Pattern



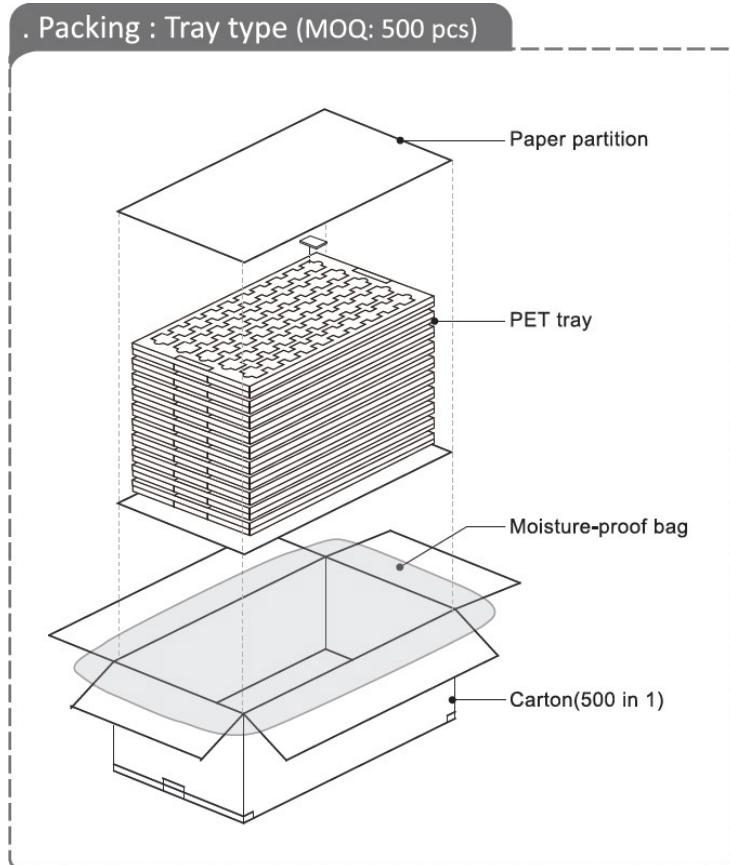
6 Ordering and Marking Information

Part Number	Description	Note
WSM-A01	IEEE 802.15.4g, Wi-SUN Stamp Module , LPWAN, U.FLx1 (915Mhz)	A9314288-001
WSM-A02	IEEE 802.15.4g, Wi-SUN Stamp Module , LPWAN, U.FLx1 (868Mhz)	TBC

7 Product Marking



8 Packing Information



AFEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

(Section 15.19)(a)(3)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This transmitter module is authorized only for use in device where the antenna may be installed such that 20cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains **FCC ID: XXXXX-XXXX**".

***Information for the OEMs and Integrators :**

This device is intended only for OEM integrators under the following conditions :

The module can be used to installation in other host.

the transmitter module may not be collocated with any other transmit or antenna. The module shall be only used with the integral antenna(s) that has been originally tested and certified with this module. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirement with this module installed (for example, digital device emission, PC peripheral requirements, etc.)

The final end product must be labeled in a visible area with the following: " **FCC ID: XXXXX-XXXX**". The equipment complies with FCC RF exposure limits set forth for an uncontrolled environment. The equipment must not be co-located or operating in conjunction with any other antenna or transmitter.

NCC 警語

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求最終產品平台廠商(OEM Integrator)於最終產品平台(End Product)上標示”本產品內含射頻模組，

其 NCC 型式認證號碼為:  CCXXxxYYyyyZzW