

Uascent Technology Co., Ltd

UAW6158B

Wi-Fi and Bluetooth Combo SoC

Module Datasheet

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	_____	Date
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Revision History.

Version	Date	Revision Content	Draft	Approved
1.0	2021/07/12	New version	Nick	Jeremywu

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1 Overview.

1.1 Introduction.

UAW6158B is a wireless SDIO 1T1R 11b/g/n Wi-Fi and Bluetooth Low Energy 5.0 module designed with the latest low-power simple-chip, which adopts advanced design technology to achieve Low Power consumption and high throughput Up to 150Mbps, and communicates with peripherals through the SDIO interface. The module works in the 2.4GHz band and supports 802.11b /g/n wireless standard. The UAW6158B series supports BLE Master, Slave, Advertiser, Scanner roles. It supports standard HCI in BLE side. The module adopts 3.3V single power supply and SMT installation mode, which can be flexibly applied to all kinds of consumer products to meet customer needs to the greatest extent.

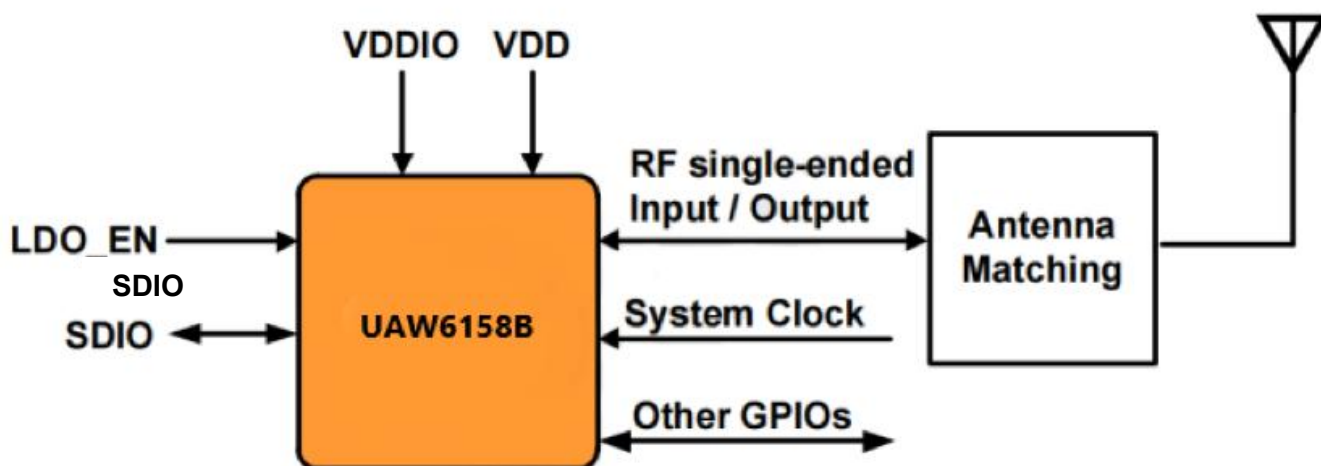
The UAW6158B integrated the Balun, T/R switch, LNA, PA with advanced architecture enhancement to achieve great receive sensitivity for noisy home scenarios.

This compact module is a total solution for Wi-Fi technology. The module is specifically developed for Smart phones and Portable devices.

1.2 Features.

- IEEE 802.11 b/g/n compliant.
- Bluetooth Low Energy version 5.0.
- Internal co-existence scheme between Wi-Fi and Bluetooth.
- Concurrent slave/advertiser/scanner operations supported.
- Support 20/40MHz up to MCS7 150Mbps.
- Andes D10F 32-bit RISC core which runs at up to 320MHz.
- 128KB ROM and up to 384KB SRAM for Instruction and data SRAM in total.
- STA, SoftAP and Sniffer modes supported.
- Concurrent AP + STA supported.
- Ad-hoc, peer-to-peer and Wi-Fi Direct modes supported.
- Low power Tx/Rx for short range scenario.
- Low power beacon listen mode.
- Low power dormant mode.
- Low power Shut-Down mode.
- Suspend/Wake-up manager controller.
- Security and encryption.
- AES/SHA/ECC hardware acceleration.
- Master mode supported.
- SIG Mesh v1.01 supported.
- Device Provision Protocol (DPP) with BLE 5.0 Extended Advertising supported.

Block Diagram:



1.3 Model General Specification.

Model Name	UAW6158B
Product Description	Support Wi-Fi + Bluetooth
Dimension	L x W x T: 12 x 12 x 1.8 (typical) mm
Wi-Fi Interface	Support SDIO
Operating temperature	-10°C to 70°C
Storage temperature	-40°C to +125°C

1.4 Recommended Operating Rating.

Description		Min.	Typ.	Max.	Unit
Ambient Temperature (TA)		-10	25	70	deg.C
VBAT		3.13	3.3	3.46	V
VDDIO		1.75	1.8 or 3.3	3.46	V
(VIL)	Input Low voltage when VDDIO=3.3V	-0.3		0.8	V
(VIH)	Input High voltage when VDDIO=3.3V	2		3.6	V
(VT+)	Schmitt trigger low to high threshold voltage when VDDIO=3.3V	1.6	1.74	1.89	V
(VT-)	Schmitt trigger high to low threshold voltage when VDDIO=3.3V	1.27	1.4	1.56	V
(VOL)	Output low voltage when VDDIO=3.3V			0.4	V
(VOH)	Output high voltage when VDDIO=3.3V	2.4			V

1.5 Reference power consumption for conventional continuous

operation.

Parameter	Condition / Notes	Typ.	Unit
TX model			
I_{RF}	11b 11M	212	mA
I_{RF}	11g 54M	161	mA
I_{RF}	11n HT20 MCS7	163	mA
I_{RF}	11n HT40 MCS7	163	mA
RX model			
I_{RF}	11b 11M	33	mA
I_{RF}	11g 54M	33	mA
I_{RF}	11n HT20 MCS7	33	mA
I_{RF}	11n HT40 MCS7	33	mA

1.6 System Power Consumption.

Note: All results are measured at the condition that VIO and VBAT are 3.3V.
Peak operating reference power consumption.

Power Consumption at DCDC mode (DCDC buck convertor is enable)		
WLAN Operational Modes	Typ.	Unit
OFFa	<1	uA
Rx, CCK, 1 Mbps	33	mA
Rx, OFDM, 54 Mbps	33	mA
Rx, HT20, MCS7	33	mA
Rx, HT40, MCS7	33	mA
Tx, CCK, 1 Mbps	212	mA
Tx, OFDM, 54 Mbps@15dBm	161	mA
Tx, HT20, MCS7@15dBm	163	mA
Tx, HT40, MCS7@15dBm	163	mA
Power-saving(MCU_off)b , DTIM1	0.43	mA
Power-saving(MCU_off)b , DTIM3	0.21	mA

Power Consumption at LDO mode (DCDC buck convertor is disable)		
WLAN Operational Modes	Typ.	Unit
OFFa	<1	uA
Rx, CCK, 1 Mbps	80	mA
Rx, OFDM, 54 Mbps	80	mA
Rx, HT20, MCS7	80	mA
Rx, HT40, MCS7	80	mA
Tx, CCK, 1 Mbps@19dBm	243	mA

Tx, OFDM, 54 Mbps@15dBm	214	mA
Tx, HT20, MCS7@15dBm	215	mA
Tx, HT40, MCS7@15dBm	215	mA
Power-saving(MCU_off)b , DTIM1	1.20	mA
Power-saving(MCU_off)b , DTIM3	0.45	mA

- OFF mode test condition: VBAT=GND, RVDD33=GND, VDD=3.3V, LDO_EN=0V.
- Intra-beacon Sleep when MCU is turn off.
- Conditions: VBAT=GND, RVDD33=GND, VDD=3.3V.
- When the CPU CLK is 160MHz, the Tx current increases 10mA, when the CPU CLK is 320MHz, the Tx current increases 20mA.
- When the CPU CLK is 160MHz, the Rx current increases 6mA, when the CPU CLK is 320MHz, the Rx current increases 12mA.

1.7 ESD Specifications

Pin Type	Test Conditio	ESD Rating	Unit
Human Body Mode (HBM)	refers to MIL-STD- 883G Method 3015.7	Pass ± 3	KV
CDM	-20	Pass ± 500	V

2 WiFi Specification.

Features	Descriptions
Main Chipset	iComm : SV6158M
Operating Frequency	2.412~2.484GHz, 1T1R compliant
Operating Voltage	3.3Vdc $\pm 10\%$ supply voltage
Host Interface	SDIO
WIFI Standard	Wi-Fi: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n,
Modulation	Wi-Fi: 802.11b: CCK(11, 5.5Mbps), QPSK(2Mbps), BPSK(1Mbps), 802.11 g/n: OFDM
PHY Data rates	Wi-Fi: 802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: up to 150Mbps HT20 MCS0-MCS7, HT40 MCS0-MCS7
Transmit Output Power	Wi-Fi: 802.11b@11Mbps 17 ± 2 dBm 802.11g@54Mbps 14 ± 2 dBm 802.11n@65Mbps 13 ± 2 dBm Other rate power control by power by rate.

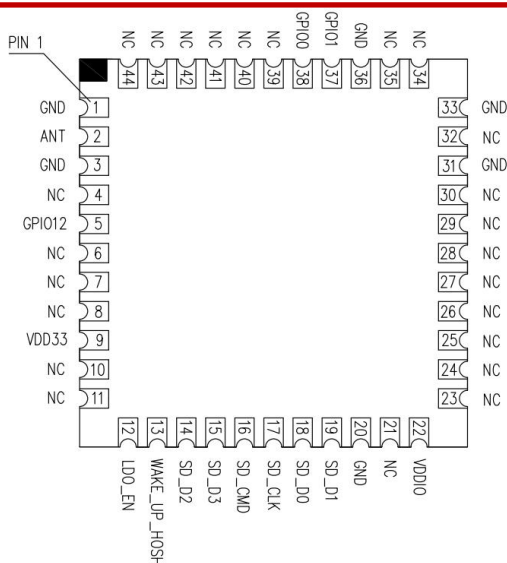
EVM	802.11b /11Mbps: EVM $\leq$ -18dB 802.11g /54Mbps: EVM $\leq$ -28dB 802.11n /65Mbps: EVM $\leq$ -30dB
Receiver Sensitivity (HT20)	802.11b@8% PER 11Mbps < -88dBm
	802.11g@10% PER 54Mbps < -74dBm
	802.11n@10% PER MCS 7 < -72dBm
Receiver Sensitivity (HT40)	802.11n@10% PER MCS 7 < -69dBm
Operating Channel	Wi-Fi 2.4GHz: 11: (Ch. 1-11) – United States(North America) 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan
Network Architecture	Wi-Fi: Ad-hoc, peer-to-peer and Wi-Fi Direct modes supported
WFA features	Wi-Fi: WEP, WPA, WPA2, WPA3 WMM
Antenna	Needs to be added antenna

2.1 Bluetooth Specifications.

Features	Descriptions
Main Chipset	iComm : SV6158M
Operating Frequency	2.402~2.480GHz
Operating Voltage	3.3Vdc $\pm$ 10% supply voltage
Host Interface	SDIO
Bluetooth Standard	IEEE 802.11 d/e/i/k/r/w supported
Transmit Output Power	Typ. 6dBm Max. 10dBm
Receiver Sensitivity	Typ. -91dBm Max. -94dBm
Antenna	Needs to be added antenna

3 Pin Descriptions.

3.1 Pin Outline.



<TOP>

3.2 Pin Definition.

Pin No.	Name	Type	Description	Voltage
1	GND	P	Ground connections	
2	ANT	RF	Antenna connections	
3	GND	P	Ground connections	
4	NC		Floating (Don't connected to ground)	
5	GPIO12	I/O	GPIO, Strap	
6~8	NC		Floating (Don't connected to ground)	
9	VDD33	P	Supply 3.3V	3.3V
10~11	NC		Floating (Don't connected to ground)	
12	LDO_EN	I	Wi-Fi reset pin, default pull high	
13	WAKE_UP_HOSH	O	WLAN to wake-up HOST	
14	SDIO_D2	I/O	SDIO Data line 2	1.8V ~ 3.3V
15	SD_D3	I/O	SDIO Data line 3	1.8V ~ 3.3V
16	SD_CMD	I/O	SDIO Command Input	1.8V ~ 3.3V
17	SD_CLK	I	SDIO Clock Input	1.8V ~ 3.3V
18	SD_D0	I/O	SDIO Data line 0	1.8V ~ 3.3V
19	SD_D1	I/O	SDIO Data line 1	1.8V ~ 3.3V
20	GND	P	Ground connections	
21	NC		Floating (Don't connected to ground)	
22	VDDIO	P	I/O Voltage supply input 1.8V to 3.3V	1.8V ~ 3.3V
23~30	NC		Floating (Don't connected to	

			ground)	
31	GND	P	Ground connections	
32	NC		Floating (Don't connected to ground)	
33	GND	P	Ground connections	
34~35	NC		Floating (Don't connected to ground)	
36	GND	P	Ground connections	
37	GPIO1	I/O	GPIO,UART_LOG_TX	
38	GPIO0	I/O	GPIO,UART_LOG_RX	
40~44	NC		Floating (Don't connected to ground)	

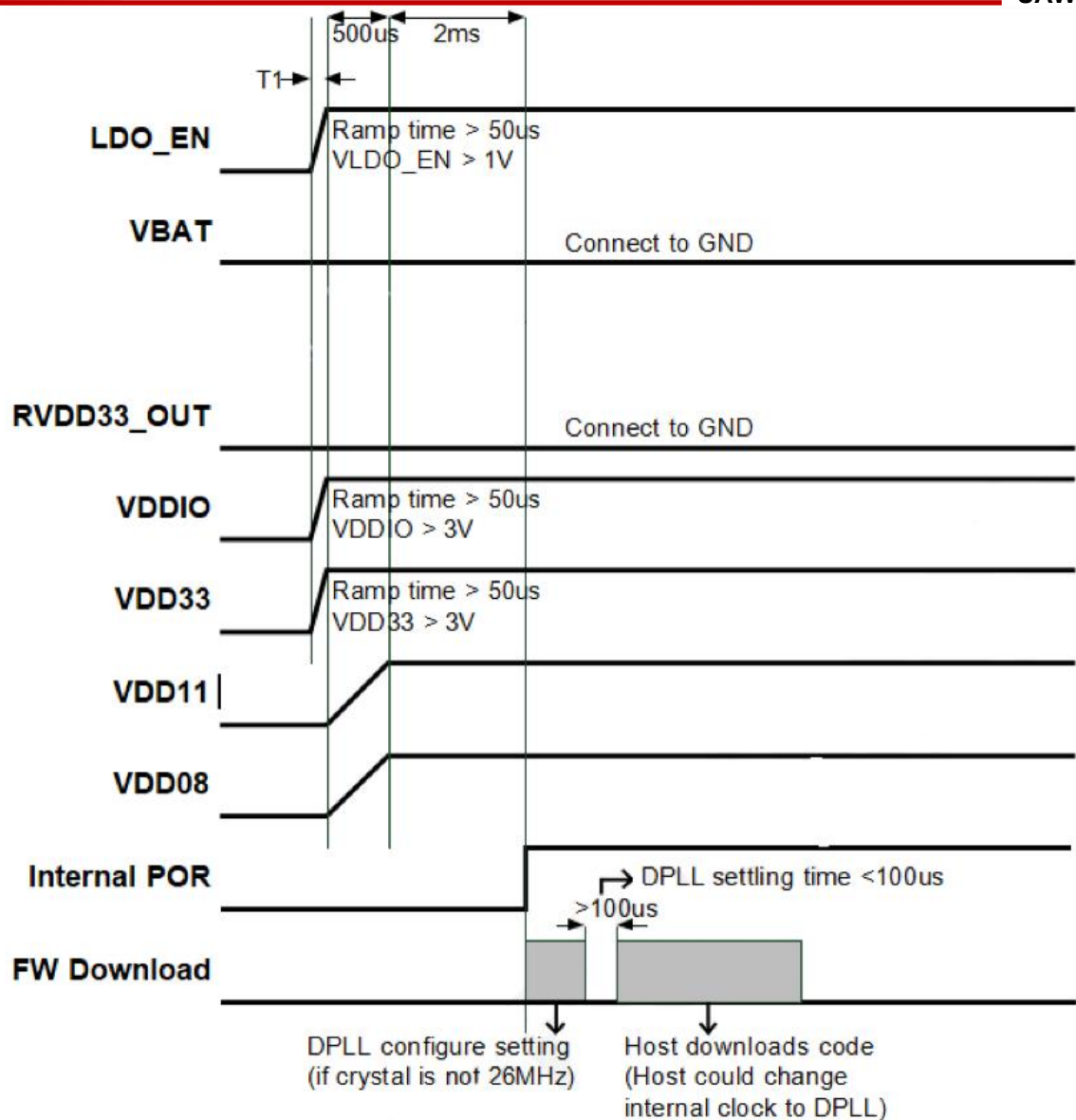
※ P:POWER I:INPUT O:OUTPUT

3.3 Power-ON Sequence.

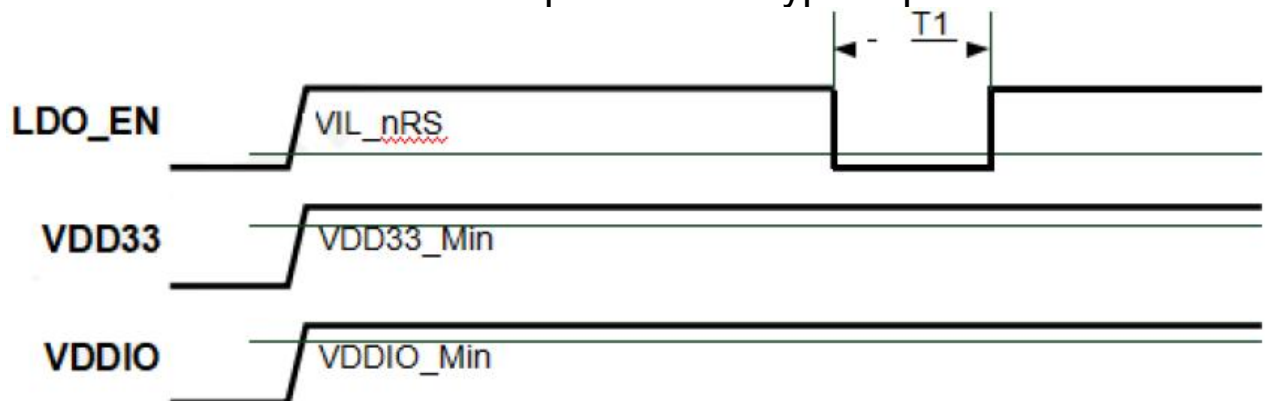
Shows the VDD33=3.3V power-on sequence of the UAW6158B from power-up to firmware download, including the initial device power-on reset evoked by LDO_EN signal. The LDO_EN input level must be kept above the threshold voltage. After initial power-on, the LDO_EN signal can be held low to turn off the SV6158 or pulsed low to induce a subsequent reset.

After LDO_EN is asserted, the host starts the power-on sequence of the UAW6158B. From that point, the typical UAW6158B power-on sequence is shown below:

1. Within T1+2.5ms, the internal power-on reset (POR) will be done. And host could download firmware code of DPLL setting if the crystal is not default setting, 26MHz. The internal running clock is crystal frequency.
2. After 100us of DPLL settling time, host could set internal clock to full speed and finish all the downloading of firmware code.



Power-on sequence with typical power



Reset Timing Parameters

Parameters	Description	Min.	Unit
------------	-------------	------	------

T1	Duration of LDO_EN signal level < VIL_nRST(refer to its value in Table 9: Recommended Operating Conditions and DC Characteristics) to reset the chip	500	us
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3.4 Reset control.

The UAW6158B LDO_EN pin can be used to completely reset the entire chip. After this signal has been de-asserted, the UAW6158B is in off mode waiting for host communication. Until then, the MAC, Baseband modem, and MCU subsystem blocks are powered off and all modules are held in reset. Once the host has initiated communication, the UAW6158B turns on its crystal and later on DPLL. After all clocks are stable and running, the resets to all blocks are automatically de-asserted.

4 Host Interface Timing Diagram.

4.1 SDIO Pin Description.

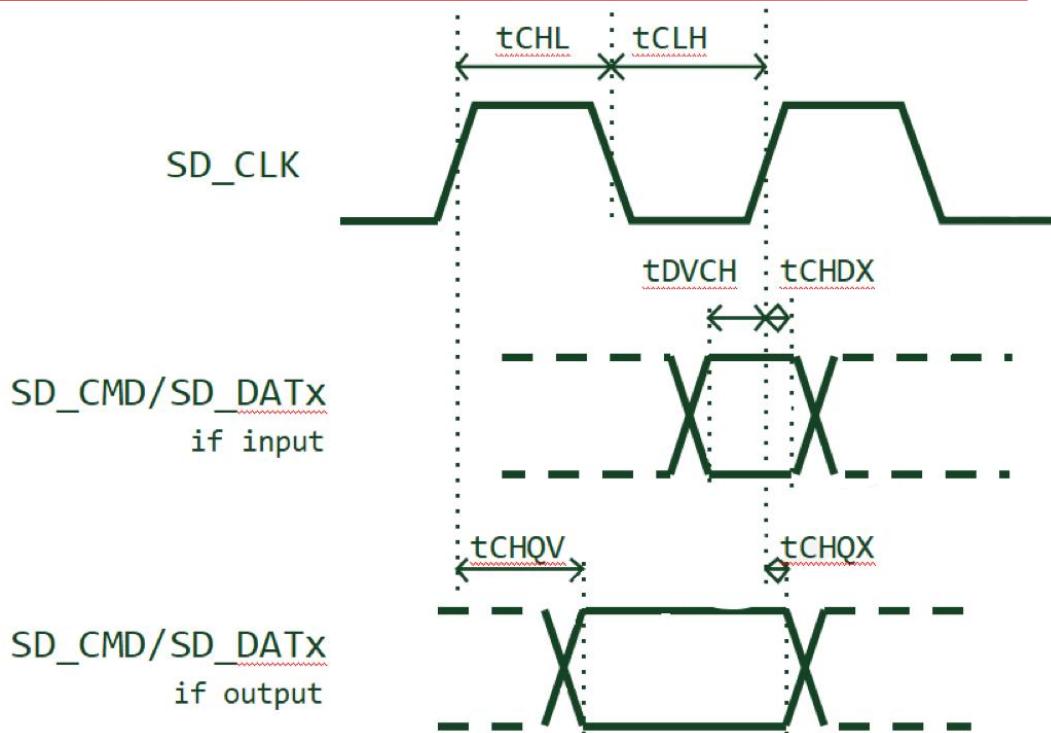
The module supports SDIO version 2.0 for all 1.8V 4-bit UHSI speeds: SDR12(25 Mbps), and SDR25(50Mbps) in addition to the 3.3V default speed(25MHz) and high speed (50 MHz). It has the ability to stop the SDIO clock and map the interrupt signal into a GPIO pin. This 'out-of-band' interrupt signal notifies the host when the WLAN device wants to turn on the SDIO interface. The ability to force the control of the gated clocks from within the WLAN chip is also provided.

SDIO Pin Description

SD 4-Bit Mode	
DATA0	Data Line 0
DATA1	Data Line 1 or Interrupt
DATA2	Data Line 2 or Read Wait
DATA3	Data Line 3
CLK	Clock
CMD	Command Line

4.2 SDIO Characteristics.

SDIO is compliant to SDIO specification version 2.0, supporting 1-bit and 4-bit data transfer mode, and compliant to high speed SD Bus

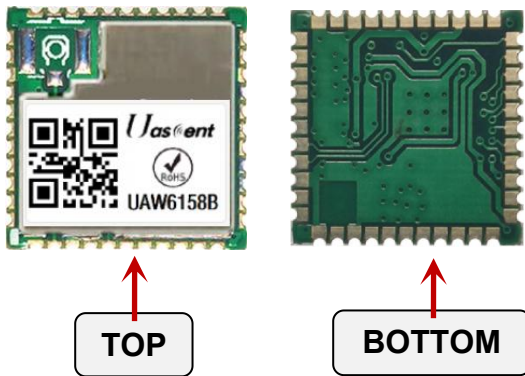
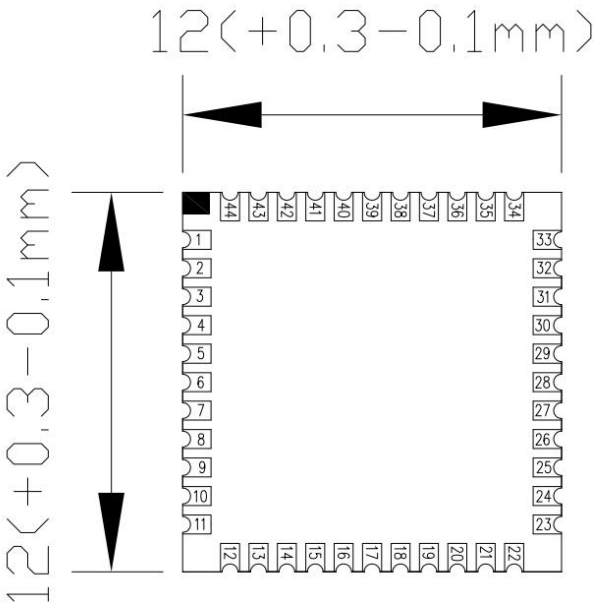
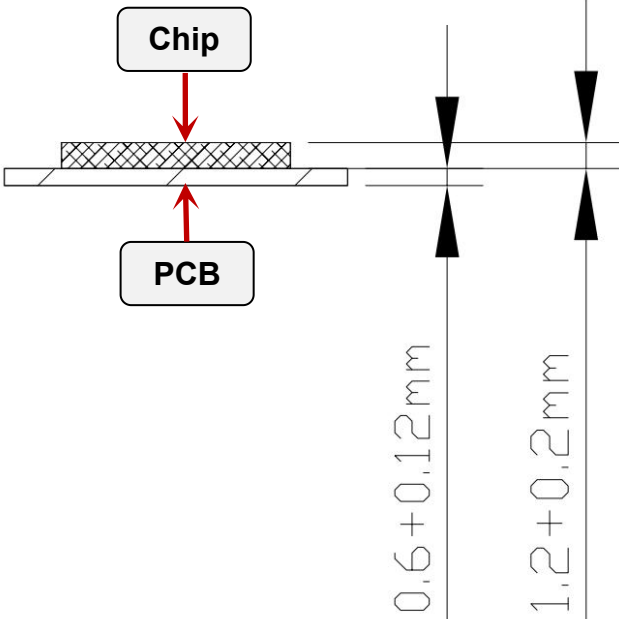


4.3 SDIO version 2.0 Timing Specifications.

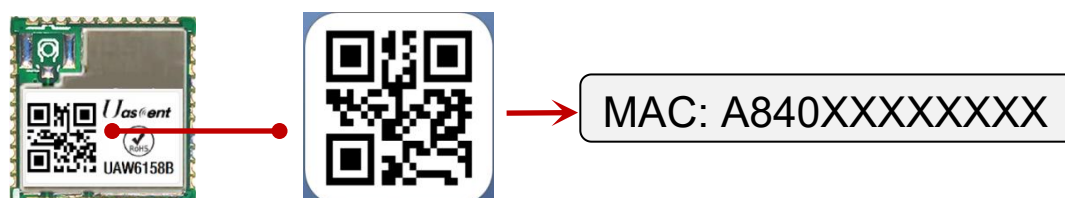
Symbol	Parameter	Min.	Typ.	Max	Unit
Clock CLK (All values are referred to min(V_{IH}) and max (V_{IL}).					
f_{pp}	Clock frequency Data Transfer Mode	0		50	MHz
t_{TLH}	Clock rise time	7	-	-	ns
t_{THL}	Clock fall time	7	-	-	ns
Inputs CMD, DAT (reference to CLK)					
t_{ISU}	Input set-up time	6	-	-	ns
t_{IH}	Input hold time	2	-	-	ns
Outputs CMD, DAT (reference to CLK)					
t_{ODLY}	Output Delay time during Data Transfer Mode	-	-	14	ns
t_{OH}	Output Hold time	2.5	-	14	ns

5 Dimensions.

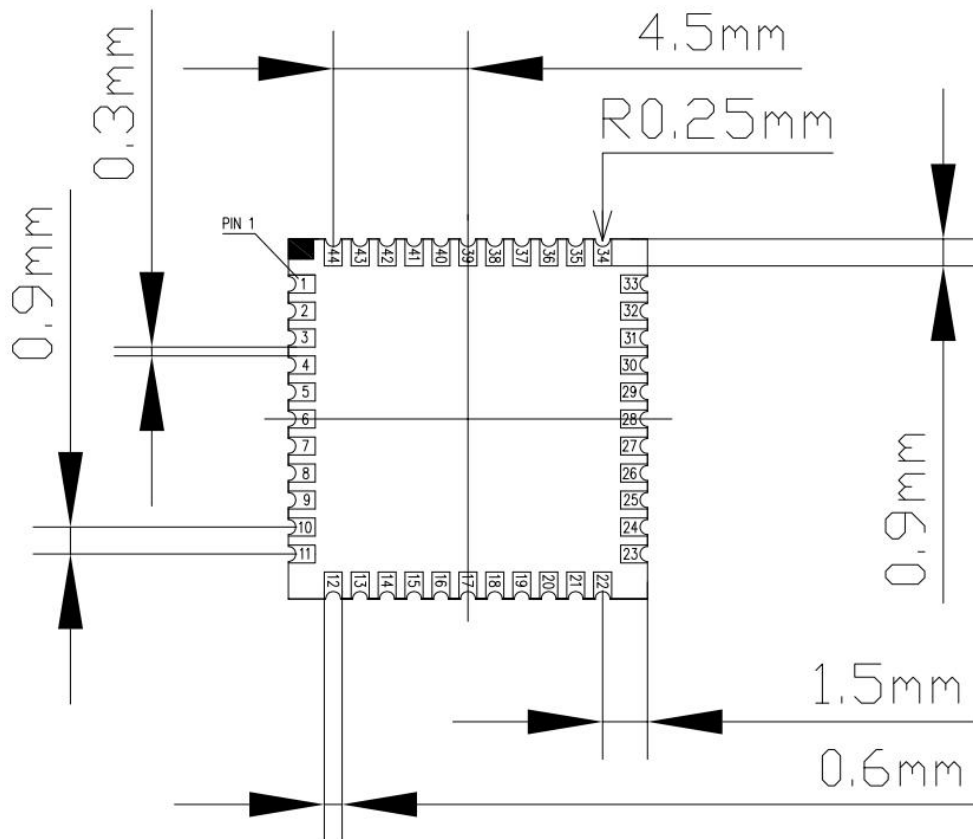
5.1 Module Picture.

L x W : 12 x 12 (+0.3/-0.1) mm 	
H: 1.8 (±0.2) mm	
Weight	0.35g

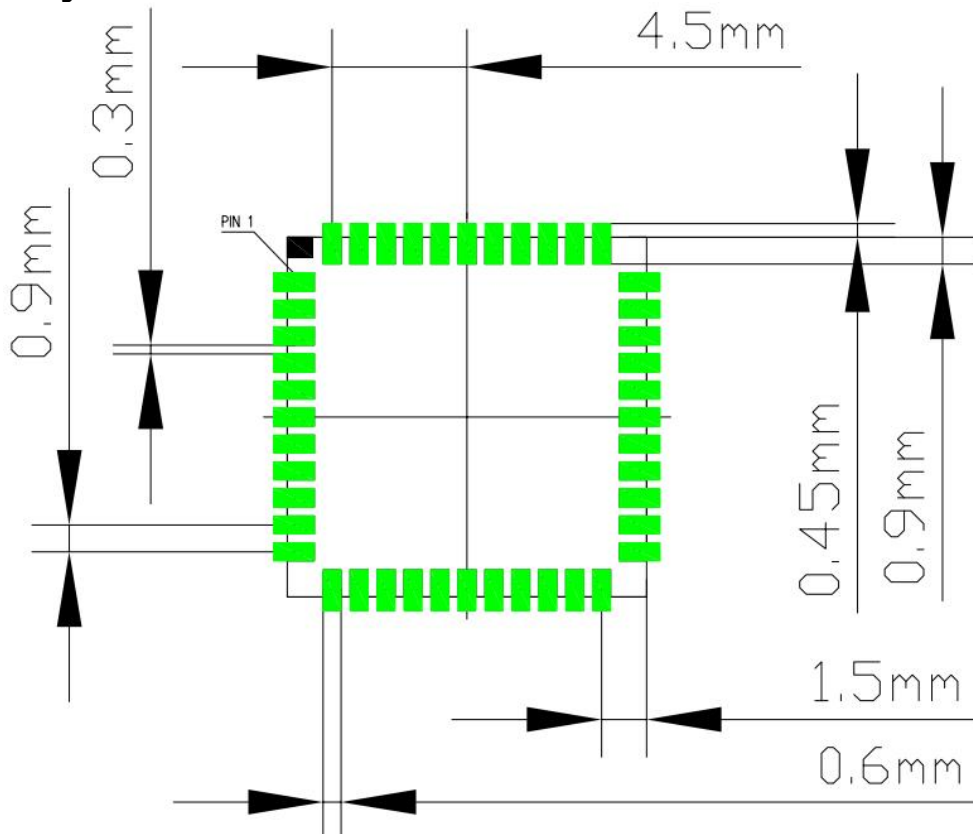
5.2 Marking Description.



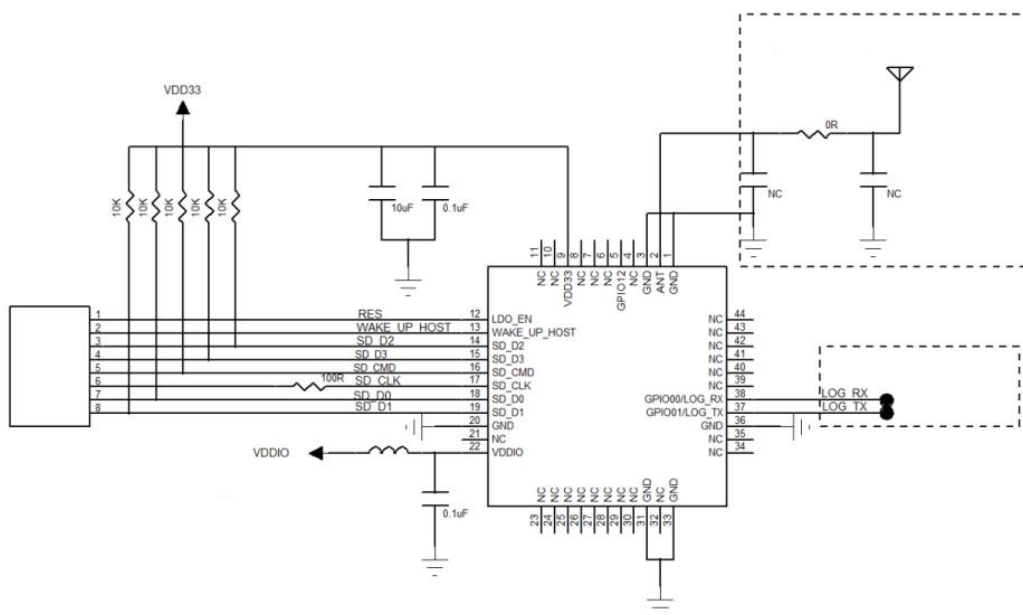
5.3 Module Physical Dimensions.



5.4 PCB Layout Reference.



6 Reference Design.



Note:

1. VDDIO can connect 3.3V when GPIO level is 3.3V.
2. The design of the antenna should be far away from the metal parts, and the antenna connecting wire should choose the braided mesh shielding copper wire with low loss.
3. RF line as short as possible, and need to do 50 ohm impedance.
4. Please use curved or straight lines for RF layout.
5. The π -type network is reserved between the RF port of the module and the antenna, and of the π -type network is close to the antenna.
6. SDIO PCB Layout needs the same length, and then the ground wire is used to wrap it.
7. If PCB board antenna is used, no other metal is allowed within 8mm around the antenna, nor can copper beryllium be laid.

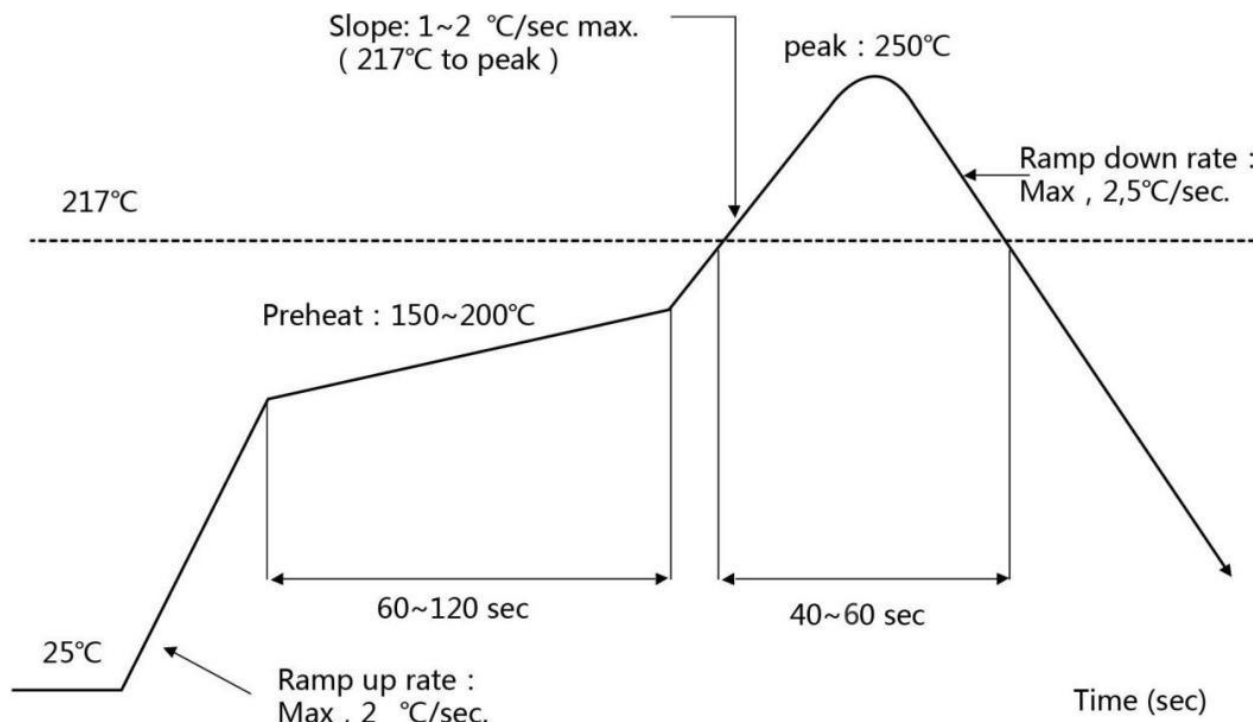
7 Environmental Requirements.

7.1 Recommended Reflow Profile.

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤ 2 times



7.2 Patch Wi-Fi modules installed before the notice.

Module installed note:

1. Take and use the module, please insure the electrostatic protective measures.
 2. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at $250 + 5$ °C for the MID motherboard.
- About the module packaging, storage and use of matters needing attention are as follows:
3. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: < 40 °C, relative humidity: $< 90\%$ r.h.
 4. The module vacuum packing once opened, time limit of the assembly:
Card: 1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.
2.) factory environmental temperature humidity control: ≤ -30 °C, $\leq 60\%$ r.h..
3). Once opened, the workshop the preservation of life for 168 hours.
 5. Once opened, such as when not used up within 168 hours:
 - 1). The module must be again to remove the module moisture absorption.
 - 2). The baking temperature: 125 °C, 8 hours.
 - 3). After baking, put the right amount of desiccant to seal packages.

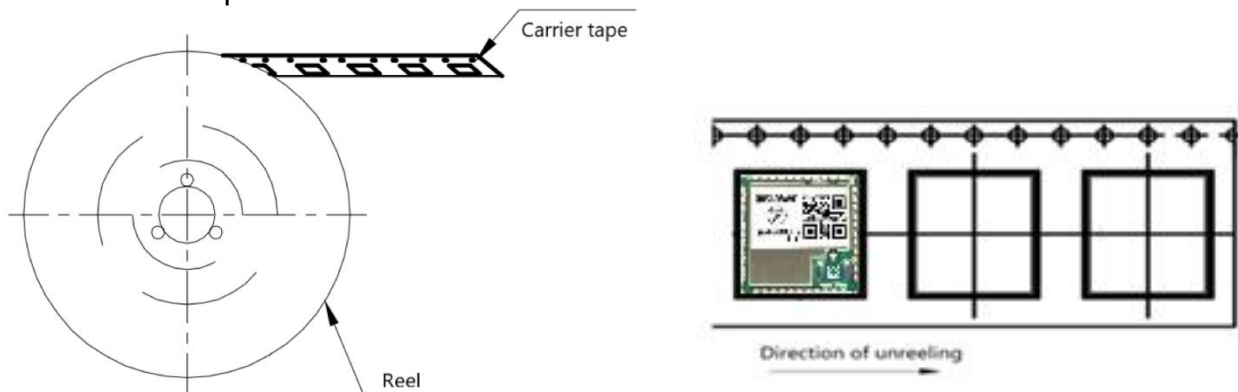
7.3 Humidity sensitive control.

	CAUTION This bag contains MOISTUR-SENSITIVE DEICES	LEVEL 3 If blank, see adjacent bar code label
1. Calculatied shelf life an sealed bag: 12 months at < 40℃ and <90% relative humidity(RH) 2. Peak package body temperature : _____ 260 _____℃ 3. After bag is opened ,devices that will be subjected to reflow solder of other high temperature process must a) Mounted within: _____ 168 _____ hrs. of factory confitions ≤30℃/60%RH, OR b) Stored at<10% RH 4. Devices require bake,before mounting, if: a) Humidity Indicator Care is > 10% when read at 23 ± 5℃ b) 3a or 3b not met. 5. If baking is required , devices may be baked for 48 hrs. at 125 ± 5℃ Note : If device containers cannot be subjected to high temperature of shorted bake times are desired, reference IPC/JDEC J-STD-033 for bake procedure bag Seal Date : _____ Note : level and body temperature defined by IPC/JEDEC J-STD-020		

8 Package style.

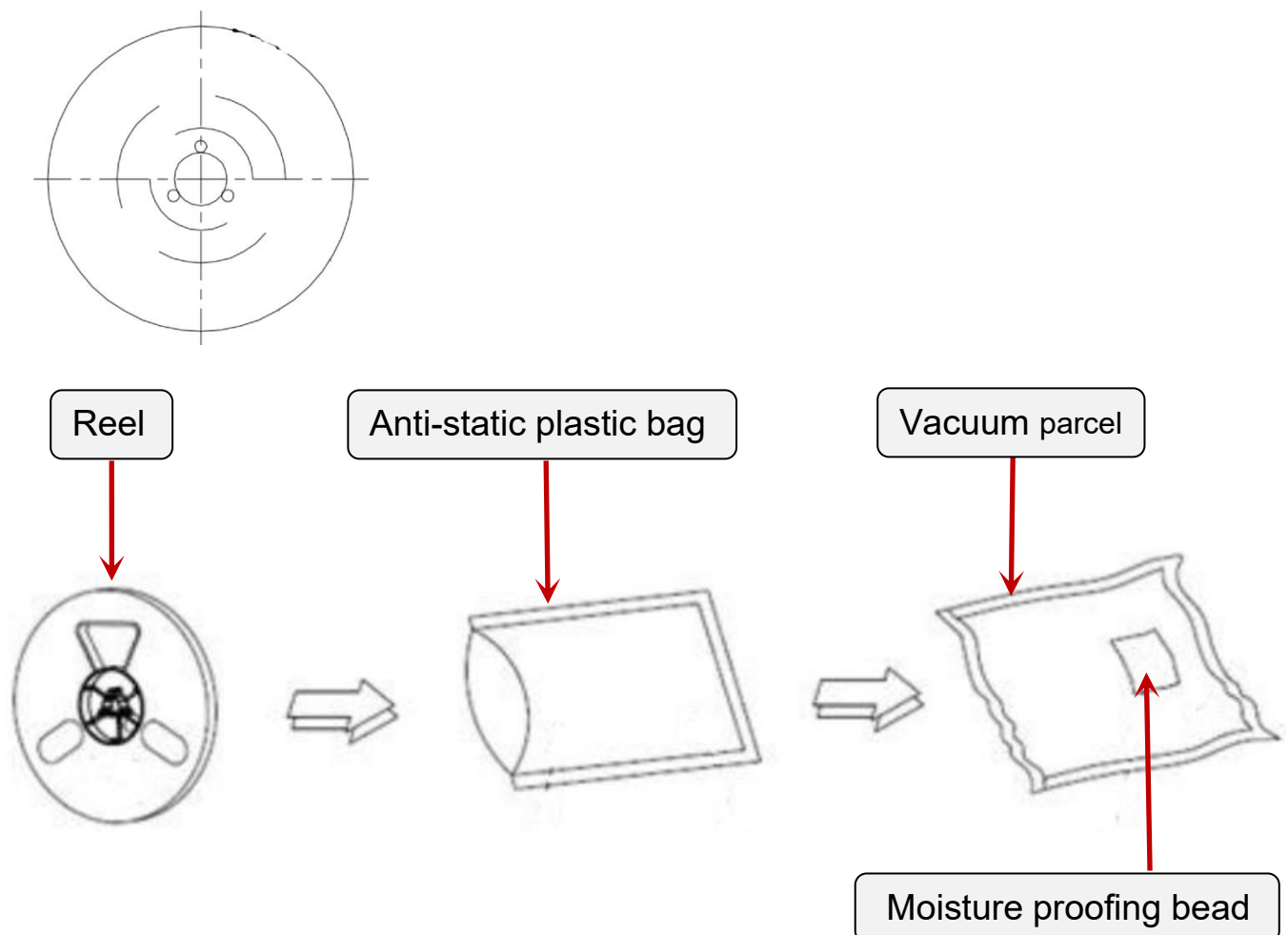
8.1 Reel.

A roll of 2000pcs.



8.1.1 Packaging Detail.

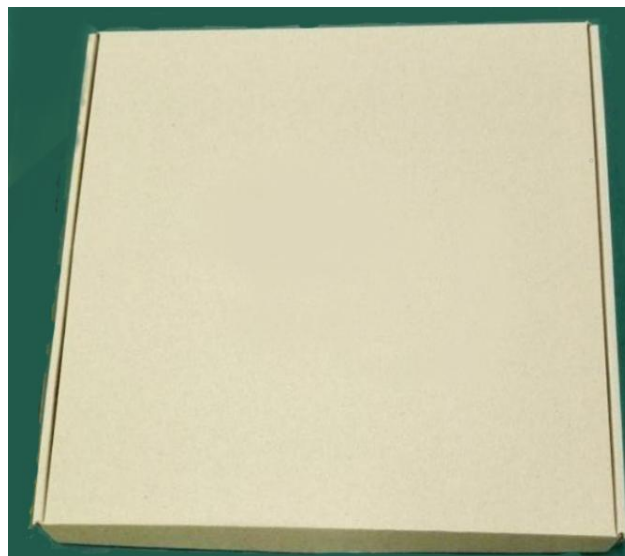
Reel Size: 330mm*28mm



A roll of 2000pcs.



Vacuum parcel effect diagram.



Size : 395mm X 370mm X 50mm

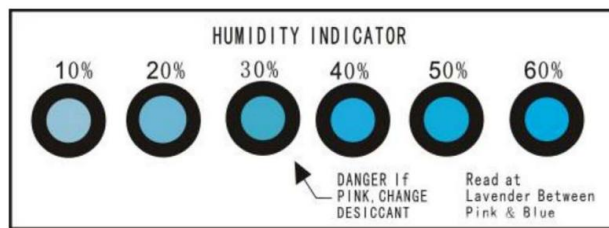
A box of 10000pcs



Outer box size: 410mm X 395mm X 280mm

Note:

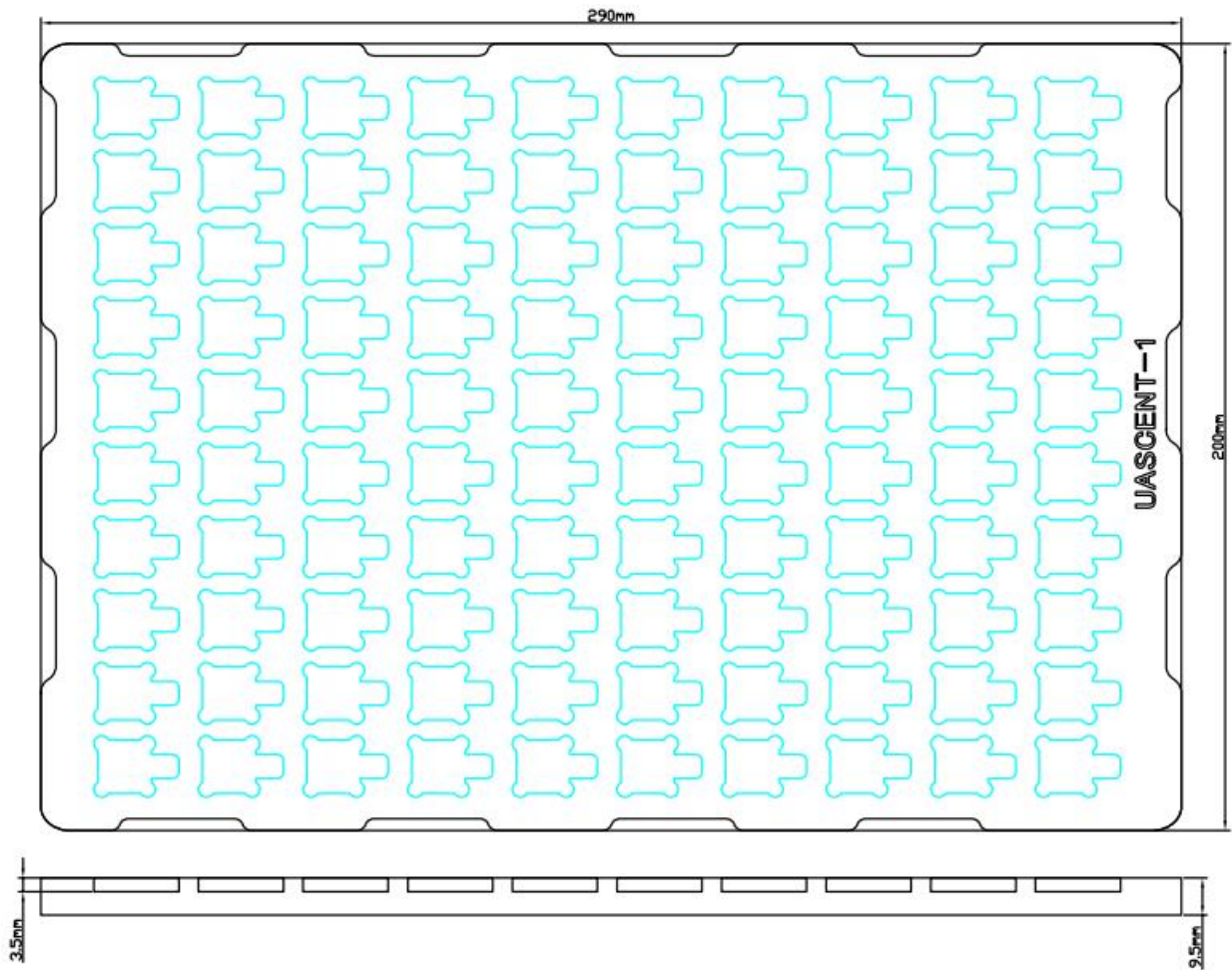
There is a "triangular arrow" on the humidity indicator card indicating at 30%RH (as shown in the picture below). If the chemical changes to pink in the circle it points to, the element is damp and needs baking.



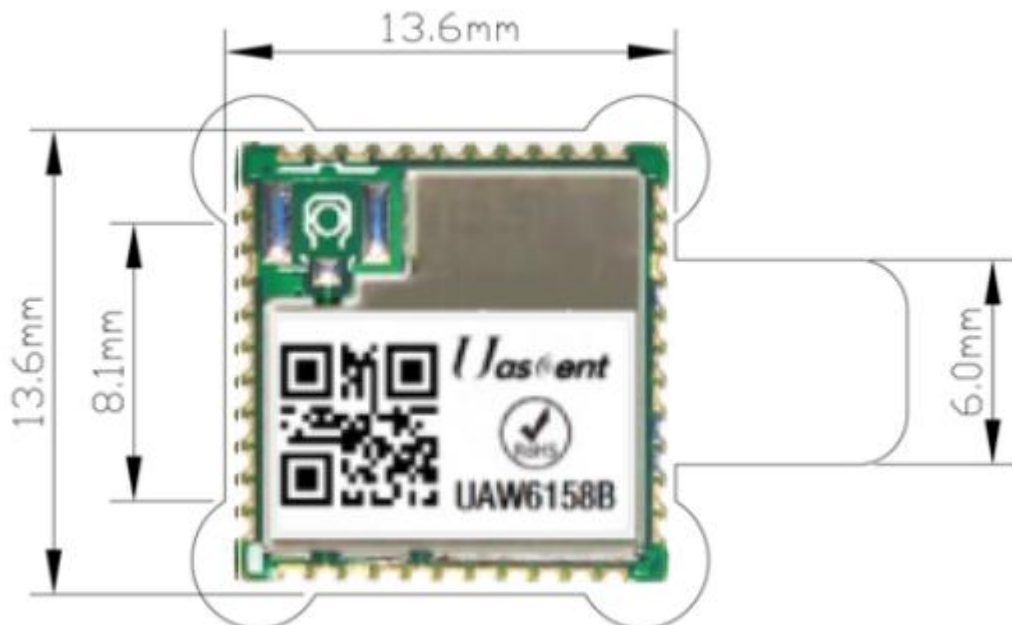
8.2 Antistatic tray.

The modules are placed on an anti-static tray, and each tray is equipped with 100PCS of modules with real air anti-static packaging, moisture-proof beads and humidity labels inside the packaging. 20 anti-static trays are placed in each small carton and 5 small cartons are placed in each large carton.

8.2.1 Packaging Detail.



SIZE: L290mm X W200mm X H9.5mm



SIZE: 13.6mm X 13.6mm X 6mm

A box of 2000pcs.



Vacuum parcel effect diagram.

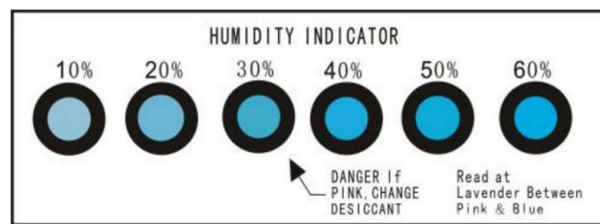
Size : 325mm X 230mm X 80mm

A box of 10000pcs.



Note:

There is a "triangular arrow" on the humidity indicator card indicating at 30%RH (as shown in the picture below). If the chemical changes to pink in the circle it points to, the element is damp and needs baking.



Outer box size: 430mm X 340mm X 250mm

9 Purchase Packaging Information.

Part No.	Description	Small package	Big box
UAW6158B	Reel style	2000PCS	10000PCS
	Antistatic tray style	2000PCS	10000PCS

Note: Please confirm the packaging style with our sales staff before purchasing this product. If no packing style is specified before purchase, we will ship the goods by our own choice of packing method.

10 Disclaimer and copyright notice.

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None of the statements, information and recommendations contained in this manual constitute any warranty, express or implied.

FCC statements:

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.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment. The device has been evaluated to meet general RF exposure requirement, The device can be used in portable exposure condition without restriction. Federal Communication Commission (FCC) Radiation Exposure Statement Power is so low that no RF exposure calculation is needed.

This device is intended only for OEM integrators under the following conditions: 1. The antenna

must be installed such that 20 cm is maintained between the antenna and users. 2. The transmitter module may not be co-located with any other transmitter or antenna. As long as the two conditions above are met, additional transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required for the installed module.

Important Note: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Federal Communications Commission of the U.S. Government (FCC) and the Canadian Government authorizations are no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator shall be responsible for re-evaluating the end-product (including the transmitter) and obtaining a separate FCC authorization in the U.S. and Canada.

OEM Integrators – End Product Labeling Considerations: This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm 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: 2A68EJX-UAW6158B0". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

OEM Integrators – End Product Manual Provided to the End User: The OEM integrator shall not provide information to the end user regarding how to install or remove this RF module in end product user manual. The end user manual must include all required regulatory information and warnings as outlined in this document.