

PRODUCT SPECIFICATION

6188E-UF

Wi-Fi Single-band 1x1 Datasheet

Version:v2.1

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

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6188E-UF Module Datasheet

Ordering Information	Part NO.	Description
	FG6188EUFX-08	RTL8188FTV-VC, b/g/n, Wi-Fi, 1T1R, 12.2X13mm, USB ,邮票孔, PCB V1.0, Without IPEX Connector



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Revision History

[illegible]

1. General Description

1.1 Introduction

Fn-Link Technology would like to announce a low-cost and low-power consumption module which has all of the Wi-Fi functionalities. It is a highly-integrated IEEE 802.11 a/b/g/n MAC/Baseband/RF WLAN single chip. For Wireless LAN(WLAN)operation. The integrated module provides USB interface for Wi-Fi . The module provides simple legacy and 20MHz/40MHz co-existence mechanisms to ensure backward and network compatibility.

6188E-UF uses highly integrated Wi-Fi single chip based on advanced COMS process. 6188E-UF integrates whole Wi-Fi function blocks into a chip, such as USB/PCM, MAC, BB, AFE, RFE, PA, EEPROM and LDO/SWR, except fewer passive components remained on PCB.

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

1.2 Description

Model Name	6188E-UF
Product Description	Support Wi-Fi functionalities
Dimension	L x W x H: 12.2 x 13 x1.5mm (typical)
Wi-Fi Interface	Support USB2.0
OS supported	Android /Linux/ Win
Operating temperature	0°C to 70°C ¹
Storage temperature	-40°C to 85°C

Note: sample module extremely passed at -20°C, but recommended operating temperature range is 0~70°C.

2. Features

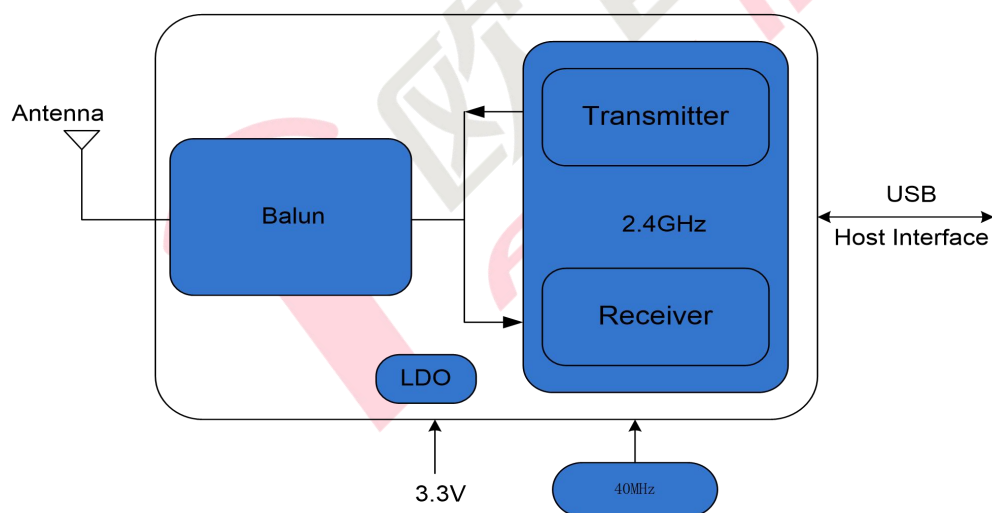
General Features

- Operate at ISM frequency bands (2.4GHz)
- IEEE standards support: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i
- Enterprise level security which can apply WPA/WPA2 certification for Wi-Fi
- Wi-Fi 1 transmitter and 1 receiver allow data rates supporting up to 150 Mbps downstream upstream PHY rates
- 802.11i (WPA, WPA2, WPA3). Open, shared key, and pair-wise key authentication services

WLAN Interface

- USB for Wi-Fi

3. Block Diagram



4. General Specification

4.1 WI-FI Specification

Feature	Description	
WLAN Standard	IEEE 802.11 b/g/n Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz: Ch1 ~ Ch14	
Test Items	Typical Value	EVM
Output Power	802.11b /11Mbps : 19dBm $\pm$ 2 dB	EVM $\leq$ -10dB
	802.11g /54Mbps : 17dBm $\pm$ 2 dB	EVM $\leq$ -25dB
	802.11n /MCS7 : 16dBm $\pm$ 2 dB	EVM $\leq$ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	$\pm$ 20ppm	
Test Items	TYP Test Value	Standard Value
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -91 dBm	$\leq$ -83
	- 2Mbps PER @ -89 dBm	$\leq$ -80
	- 5.5Mbps PER @ -87 dBm	$\leq$ -79
	- 11Mbps PER @ -85 dBm	$\leq$ -76
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -87 dBm	$\leq$ -85
	- 9Mbps PER @ -86 dBm	$\leq$ -84
	- 12Mbps PER @ -84 dBm	$\leq$ -82
	- 18Mbps PER @ -82 dBm	$\leq$ -80
	- 24Mbps PER @ -79 dBm	$\leq$ -77
	- 36Mbps PER @ -75 dBm	$\leq$ -73
	- 48Mbps PER @ -71 dBm	$\leq$ -69
	- 54Mbps PER @ -70 dBm	$\leq$ -68
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -87 dBm	$\leq$ -85
	- MCS=1 PER @ -84 dBm	$\leq$ -82
	- MCS=2 PER @ -82 dBm	$\leq$ -80
	- MCS=3 PER @ -79 dBm	$\leq$ -77
	- MCS=4 PER @ -75 dBm	$\leq$ -73
	- MCS=5 PER @ -71 dBm	$\leq$ -69
	- MCS=6 PER @ -70 dBm	$\leq$ -68
	- MCS=7 PER @ -69 dBm	$\leq$ -67
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0, PER @ -85 dBm	$\leq$ -82
	- MCS=1, PER @ -82 dBm	$\leq$ -79

	- MCS=2, PER @ -80 dBm	≤ -77
	- MCS=3, PER @ -77 dBm	≤ -74
	- MCS=4, PER @ -73 dBm	≤ -70
	- MCS=5, PER @ -69 dBm	≤ -66
	- MCS=6, PER @ -68 dBm	≤ -65
	- MCS=7, PER @ -67 dBm	≤ -64
Maximum Input Level	802.11b : ≤ -8 dBm	
	802.11g/n : ≤ -20 dBm	

5. ID setting information

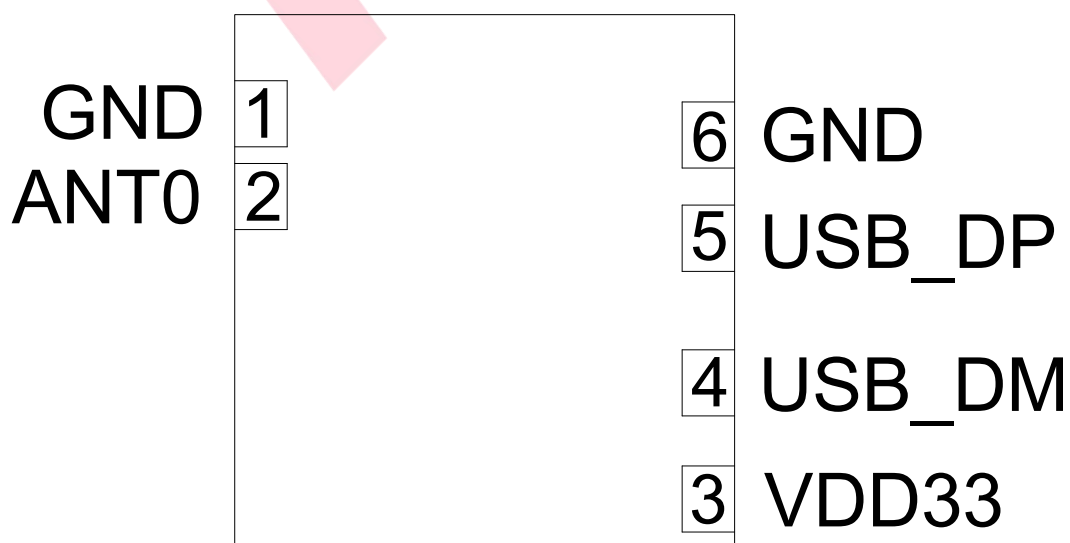
WI-FI

Vendor ID	0BDAh
Product ID	F179h

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	ANT 0	I/O	RF I/O port	
3	VDD33	—	Main power voltage source input 3.3V	3.3V
4	USB_DM	I/O	USB2.0 differential pair for WLAN	
5	USB_DP	I/O	USB2.0 differential pair for WLAN	
6	GND	—	Ground connections	

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

7.1 Power Supply DC Characteristics

	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.45	V

7.2 Power Consumption

Power Consumption (Typical by using SWR)	TX Mode: (Throughput mode) 230mA (MCS7/BW20) RX Mode: (Throughput mode) 130mA (MCS7/BW20)
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7.3 USB Bus during Power-on sequence

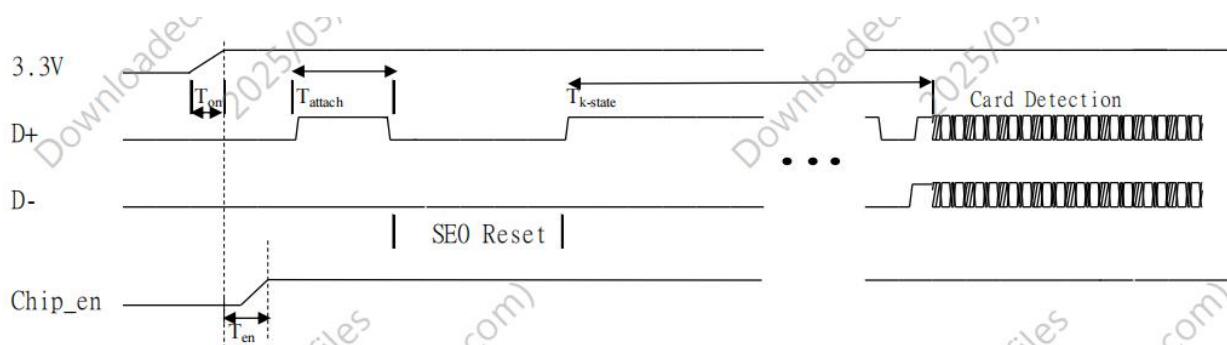


Figure 3 USB Bus Power On Sequence

T_{on}: The main power ramp up duration

T_{attach}: USB attach state

T_{k-state}: the duration from resistor attached to USB host starting card detection procedure

T_{en}: Interval between the rising point of 3.3V and chip_en

The power on flow description:

After main 3.3V ramp up, the internal power on reset is released by power ready detection circuit and the power management unit will be enabled. The power management unit enables the internal regulator and clock circuits.

The power management unit also enables the USB circuits.

USB analog circuits attach resistors to indicate the insertion of the USB device

Table 10. The typical timing range

	Unit	Min	Typical	Max
T_{on}	ms	0.25	1.5	5
T_{attach}	ms	2	7	--
T_{k-state}	ms	50	250	--
T_{en}	ms	0	5	--

7.4 Chip_en reset Power Sequence

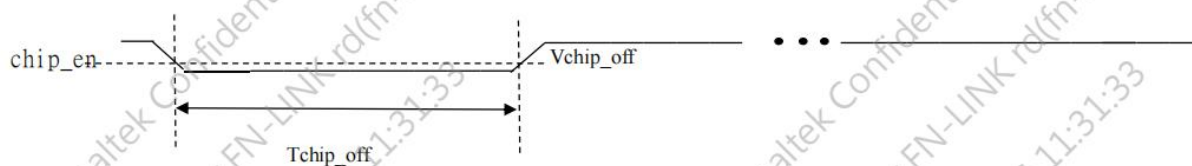


Figure 4. chip_en reset Sequence

Table 11. The typical timing and voltage range

	Min	Typical	Max	Unit	Description
T_{chip_off}	10	100	--	ms	Chip_en reset time
V_{chip_off}	--	--	0.4	V	Chip_en reset voltage

When chip_en reset and on afterward, the voltage of chip_en must keep lower than V_{chip_off}, and the chip_en keeping off duration must be more than T_{chip_off}.

7.5 Power off by 3.3V

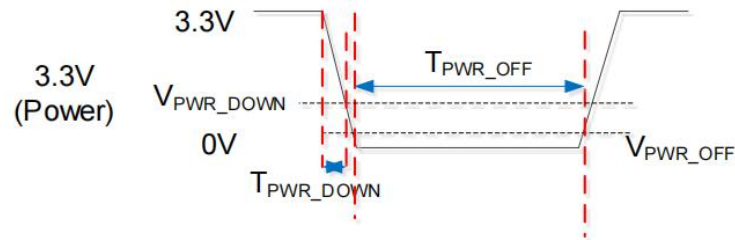


Figure 5. Power off by 3.3V

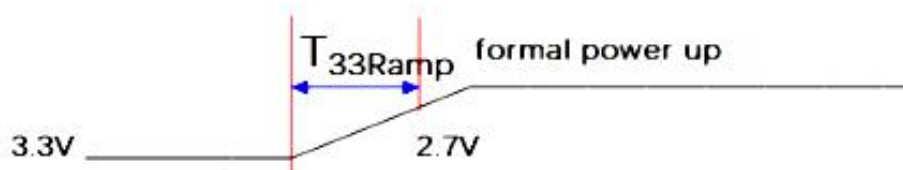
Table 12. Power off by 3.3V timing sequence

	Min	Typical	Max	Unit	Description
T_{PWR_OFF}	10	100	--	ms	3.3V power off time
V_{PWR_OFF}	--	--	0.4	V	3.3V power off voltage
V_{PWR_DOWN}	--	--	0.7	V	3.3V power down voltage
T_{PWR_DOWN}	--	--	10	ms	3.3V power down time

When 3.3V power off and on afterward, the voltage of 3.3V power must keep lower than V_{PWR_OFF} , and the 3.3V power keeping off duration must be more than T_{PWR_OFF}

7.6 Time series

	Min	Typical	Max	Unit
T33 power on ramp	0.2	0.5	2.5	ms
T33 power off ramp	0.2	5	10	ms



1. 上下电时序请满足表格要求；

The power up ramp and power down ramp must meet the following table.

2. 上下电过程如有较长时间中间电压停留都会有几率导致 efuse 被窜写；

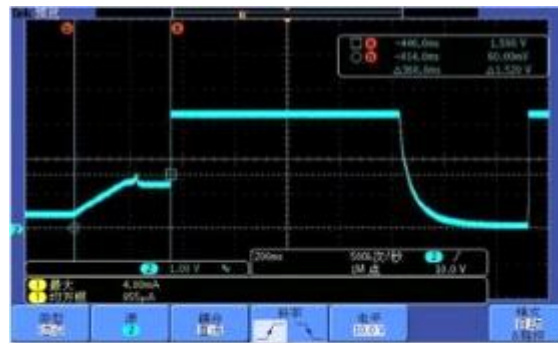
If climbing process for a long time during power-on and power-off, It may cause efuse to be overwritten.

3. 建议主芯片上电完成后，再给模组上电；

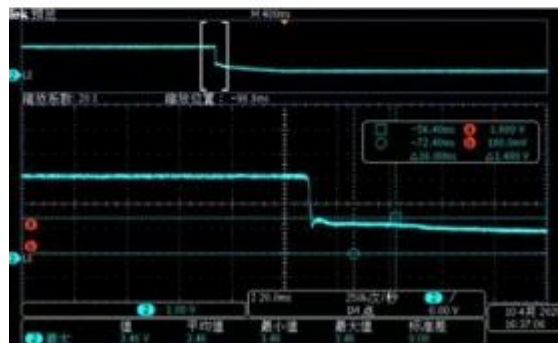
it is recommended to power on the module after platform side.

4. 如有下图所示异常上下电时序，务必做相应调整符合时序规格；

If power on/off timing as below shown, must modify to meet the timing specification.



异常上电时序

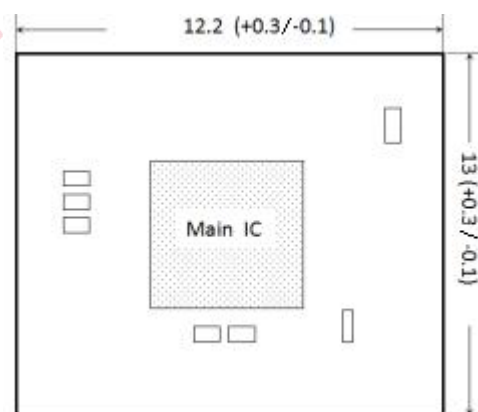
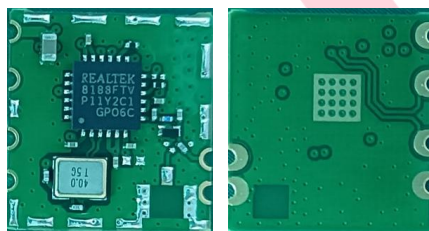


异常下电时序

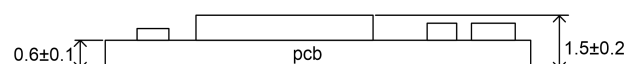
8. Size reference

8.1 Module Picture

L x W : 12.2 x 13 (+0.3/-0.1) mm



H: 1.5 (±0.2) mm



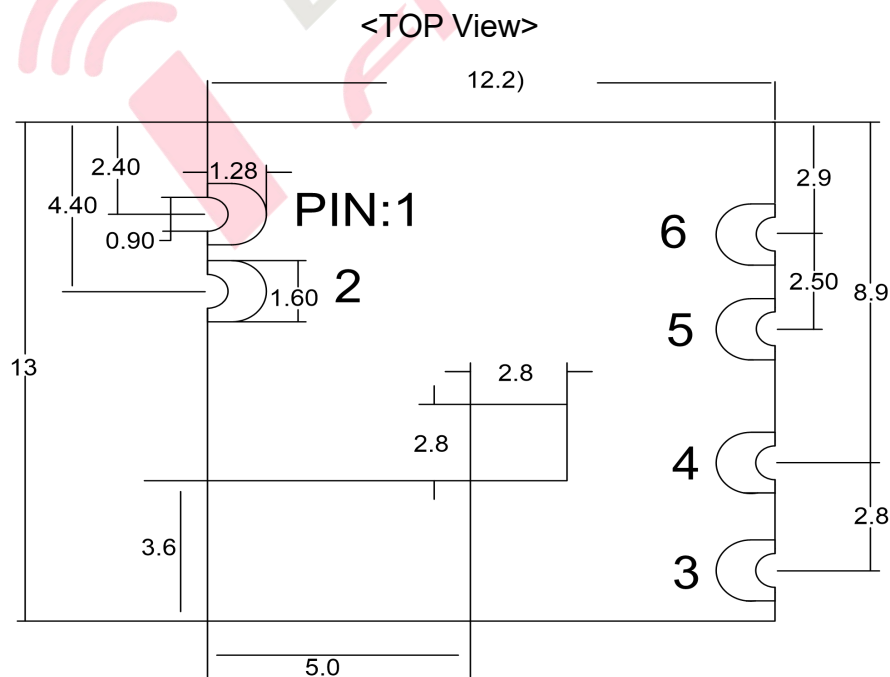
Weight

0.37g

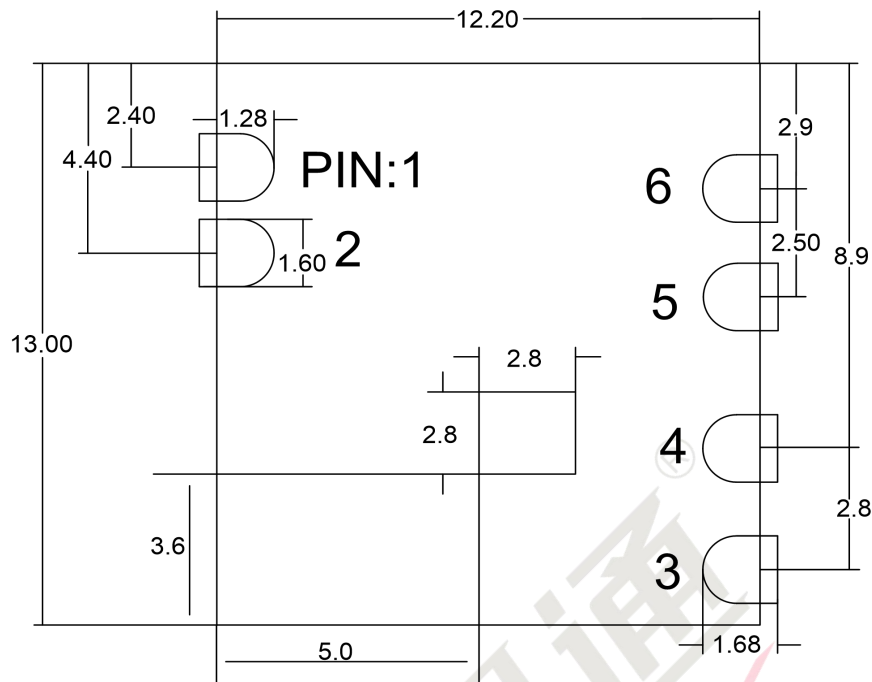
8.2 List of certified information

Certification project	Certificate number
SRRC	CMIIT ID:2020DP5262(M)
FCC	TBD
CE	TBD
IC	TBD
NCC	TBD
KCC	TBD
TELEC	TBD
Brazil	TBD
Argentina	TBD
Japan	TBD

8.3 Physical Dimensions



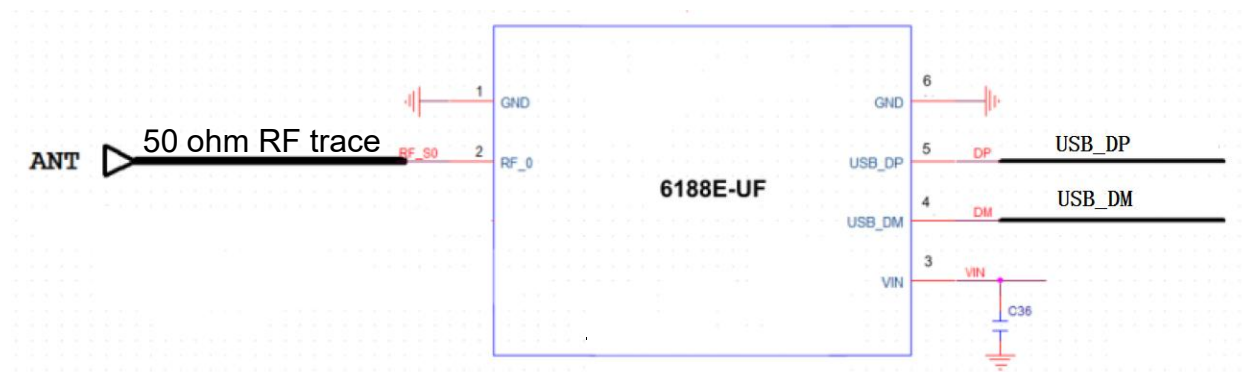
8.4 Layout Recommendation



9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Crystal	3225 40MHz 15pF 10ppm	ECEC, TKD, Hosonic, JWT, TXC, TST, SIWARD
2	Chipset	RTL8188FTV-VC-CG QFN24	Realtek
3	PCB	6188G-U	XY-PCB, GDKX, Sunlord, SLPCB, Truly
4	ESD	0402 ESD	Murata, Sunlord, Wayon, SSGsemi

10. Reference Design



Note:

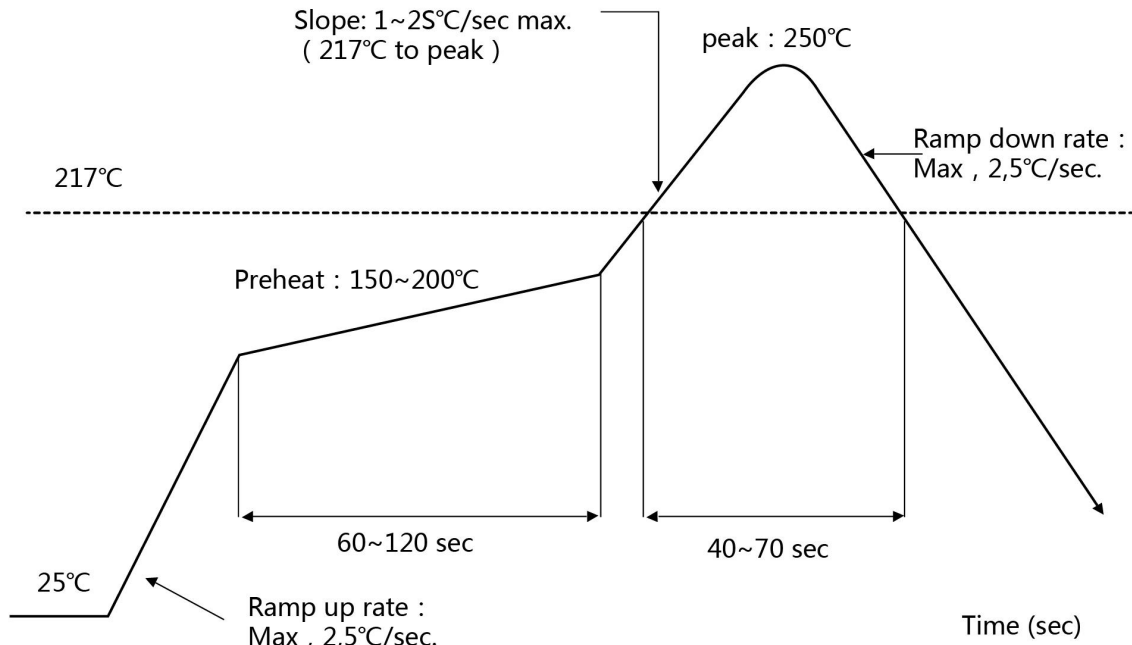
- 1, Please add 22uF cap for VIN.
- 2, For USB 2.0 differential signal, requires 90 ohm impedance.
- 3, For Pin 2 RF IO trace, keep 50 ohm impedance.

11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



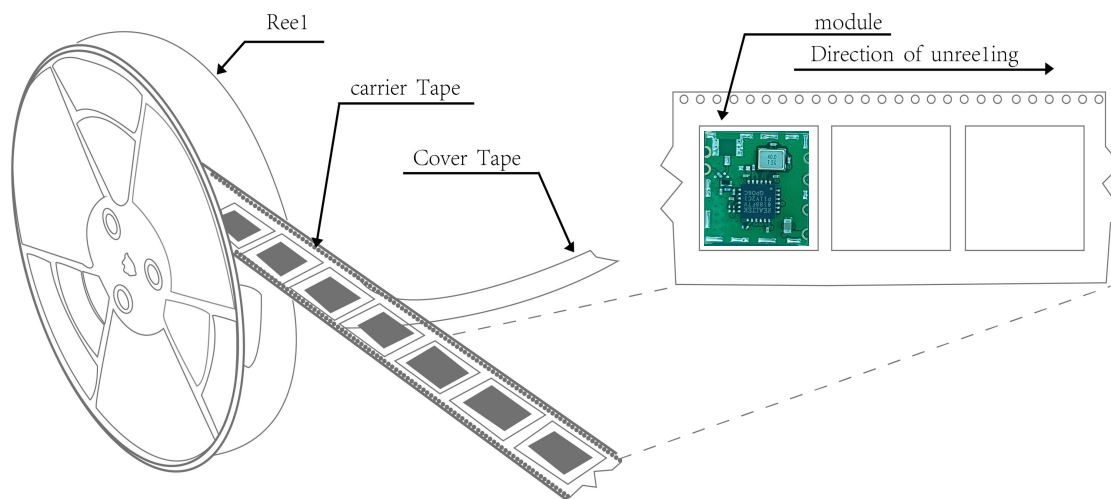
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

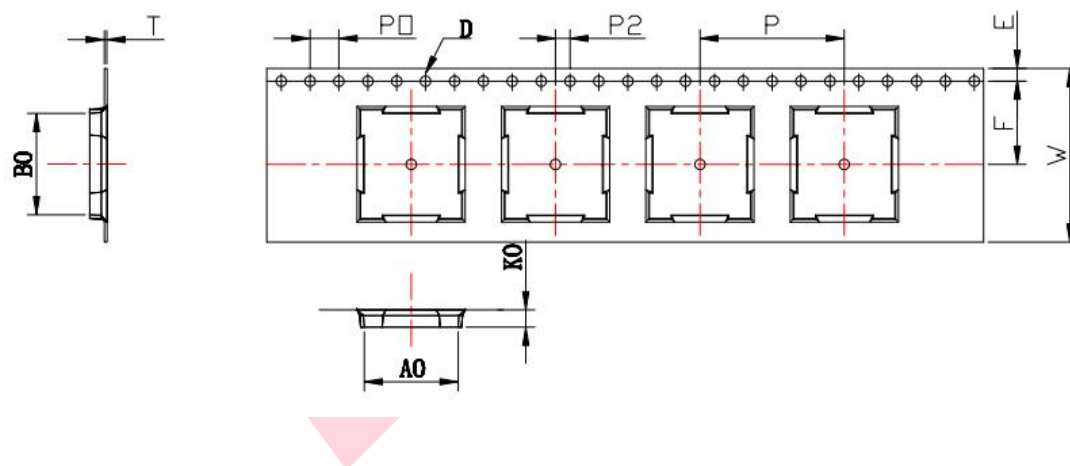
13.1 Reel

A roll of 1500pcs



13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.50	13.50	1.50	11.5	1.75	2.40	4.0	2.0	20.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05



13.3 Packaging Detail

the take-up package



Using self-adhesive tape

Size of black tape: 24mm*32.6m the cover tape :21.3mm*32.6m

Color of plastic disc: blue



NY bag size:460mm*385mm



size : 350*350*35mm



The packing case size:350*210*370mm

14. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care

all the relative requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

- a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
- b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5
- c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition
- b) "IPC/JEDEC J-STD-033A paragraph 5.2" is respected
- d) Baking is required if conditions b) or c) are not respected
- e) Baking is required if the humidity indicator inside the bag indicates 10% RH or more

