

6188E-UF

**Wi-Fi Single-band 1X1
Module Datasheet**



6188E-UF Module Datasheet

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	_____	Title
	_____	Signature
	_____	Date
	_____	Fn-Link

Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2021/04/22	New version	Lxy	Szs

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1 Overview

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.

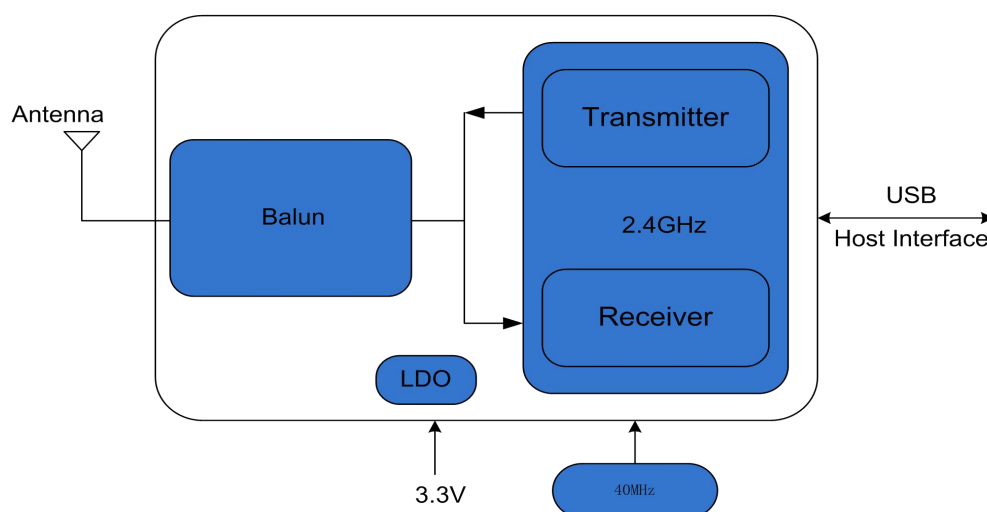
6188E-UF uses highly integrated Wi-Fi single chip based on advanced COMS process. 6188E-UF integrates whole Wi-Fi function blocks into a chip, such as USB/PCM, MAC, BB, AFE, RFE, PA, EEPROM and LDO/SWR, except fewer passive components remained on PCB.

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

1.2 Features

- Operate at ISM frequency bands (2.4GHz)
- USB for Wi-Fi
- 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

Block Diagram:



1.3 General Specification

Model Name	6188E-UF
Main Chipset	RTL8188FTV-VC-CG
Product Description	Support Wi-Fi functionality
Dimension	L x W x H: 12.2 x 13 x2.0 mm (typical)
Wi-Fi Interface	Support USB2.0
Operating temperature	0°C to 70°C ¹
Storage temperature	-40°C to 85°C
RoHS	All hardware components are fully compliant with EU RoHS directive

Note: Module actually passed at -20° C operating temperature.

1.4 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.45	V

※1.5 EEPROM Information

WI-FI

Vendor ID	0BDAh
Product ID	F179h

2 Wi-Fi RF Specification

2.1 2.4GHz RF Specification

Feature	Description			
Operating Frequency	2.400~2.4835GHz			
Spectrum Mask	Min. b/g/n	Typ. b/g/n	Max. b/g/n	Unit b/g/n
1st side lobes(to fc ± 11MHZ)	-	-40/-31/-41	-	dBr
2st side lobes(to fc ± 22MHZ)	-	-50/-61/-61	-	dBr

Freq. Tolerance	-20/-20/-20	-	20/20/20	ppm
Standards	Wi-Fi: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i			
Modulation	Wi-Fi: 802.11b: CCK, DQPSK, DBPSK 802.11 g/n: 64QAM, 16QAM, QPSK, BPSK			
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			
Transmit Output Power	Wi-Fi: 802.11b@11Mbps 17±1.5dBm 802.11g@54Mbps 15±1.5dBm 802.11n@MCS7 14±1.5dBm (HT20) 802.11n@MCS7 14±1.5dBm (HT40)			
EVM	802.11b /11Mbps : EVM ≤ -10dB 802.11g /54Mbps : EVM ≤ -25dB 802.11n /MCS7 : EVM ≤ -28dB			
Receiver Sensitivity (Wi-Fi)	802.11b@8% PER 1Mbps ≤ -91dBm 2Mbps ≤ -89dBm 5.5Mbps ≤ -87dBm 11Mbps ≤ -85dBm Max input level ≤ -8			
	802.11g@10% PER 6Mbps ≤ -87dBm 9Mbps ≤ -86dBm 12Mbps ≤ -84dBm 18Mbps ≤ -82dBm 24Mbps ≤ -79dBm 36Mbps ≤ -75dBm 48Mbps ≤ -71dBm 54Mbps ≤ -70dBm Max input level ≤ -20			
	802.11n@10% PER HT20_MCS 0 ≤ -87dBm HT20_MCS 1 ≤ -84dBm HT20_MCS 2 ≤ -82dBm			

	HT20_MCS 3 $\leq$ -79dBm HT20_MCS 4 $\leq$ -75dBm HT20_MCS 5 $\leq$ -71dBm HT20_MCS 6 $\leq$ -70dBm HT20_MCS 7 $\leq$ -69dBm Max input level $\leq$ -20
Operating Channel	Wi-Fi 2.4GHz: 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan
Media Access Control	Wi-Fi: CSMA/CA with ACK
Antenna	External Antenna
Network Architecture	Ad-hoc mode (Peer-to-Peer) Infrastructure mode Software AP Wi-Fi Direct
Security	WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i
OS Supported	Android /Linux/ Win CE /iOS /XP/WIN7/Win10
Host Interface	USB
Operating Voltage	3.3 $\pm$ 10% Vdc I/O supply voltage

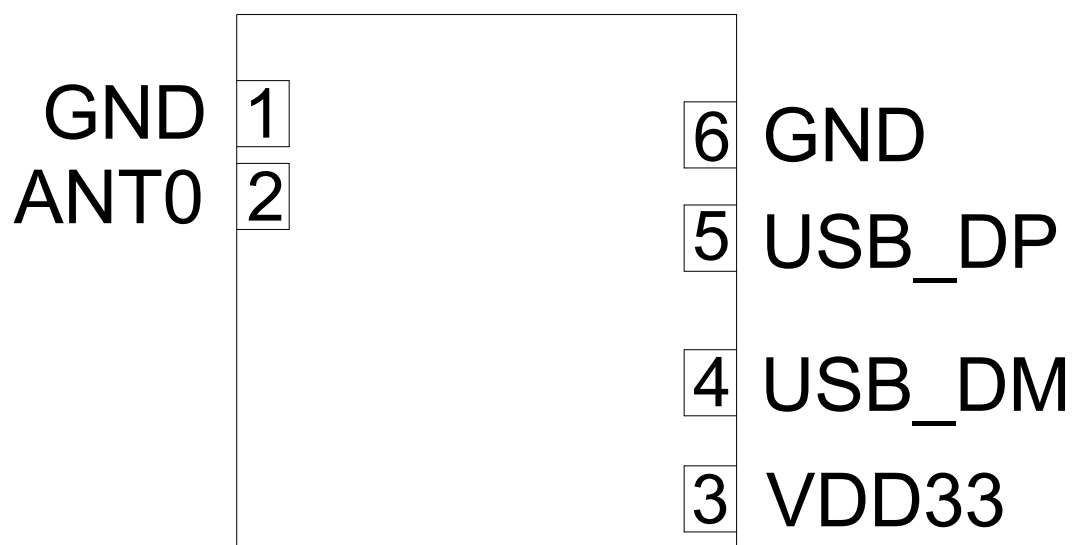
3 Power Consumption

Power Consumption (Typical by using SWR)	TX Mode: (Throughput mode) 230mA (MCS7/BW20) RX Mode: (Throughput mode) 130mA (MCS7/BW20)
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4 Pin Assignments

4.1 Pin Outline

< TOP VIEW >



4.2 Pin Definition

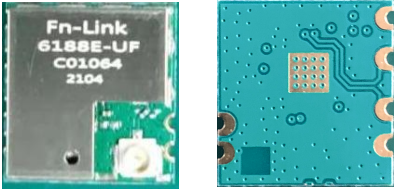
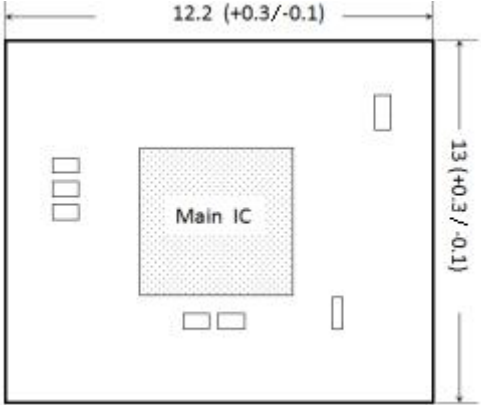
NO	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	ANT 0	I/O	RF I/O port	
3	VDD33	—	Main power voltage source input 3.3V	3.3V
4	USB_DM	I/O	USB2.0 differential pair for WLAN	
5	USB_DP	I/O	USB2.0 differential pair for WLAN	
6	GND	—	Ground connections	

P:POWER I:INPUT O:OUTPUT

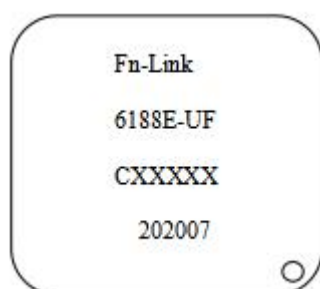
5 Dimensions

5.1 Physical Dimensions

(Unit: mm)

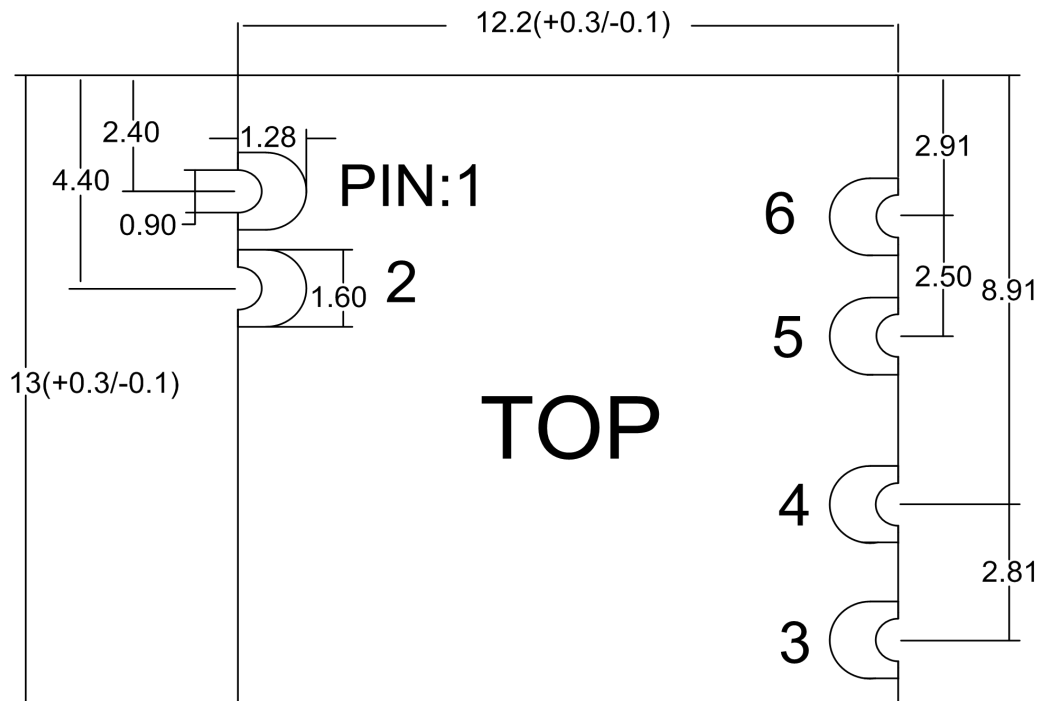
< TOP VIEW > L x W: 12.2 x 13 mm 	
< Side View > H:2.0 mm	
Weight	0.37g

丝印标识



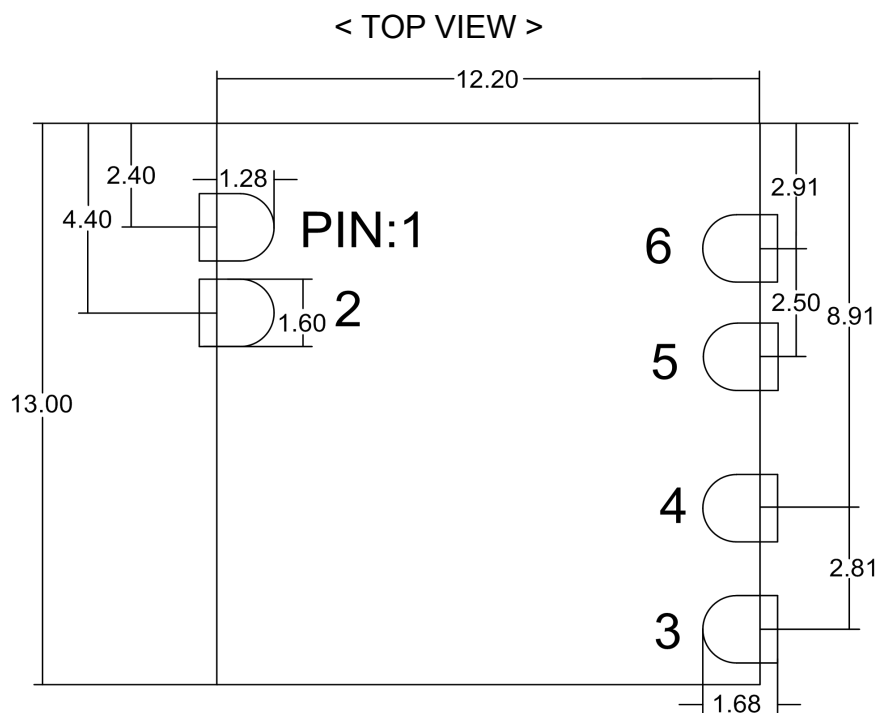
5.2 Module Physical Dimensions

(Unit: mm)

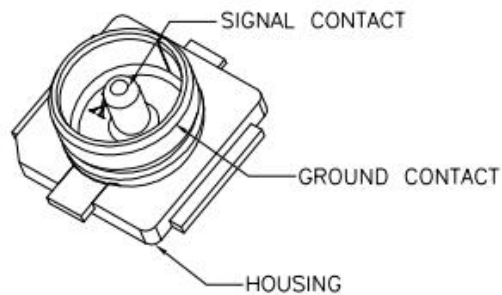
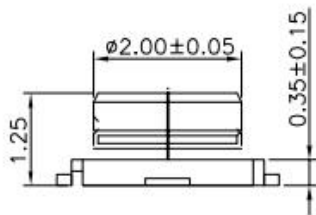
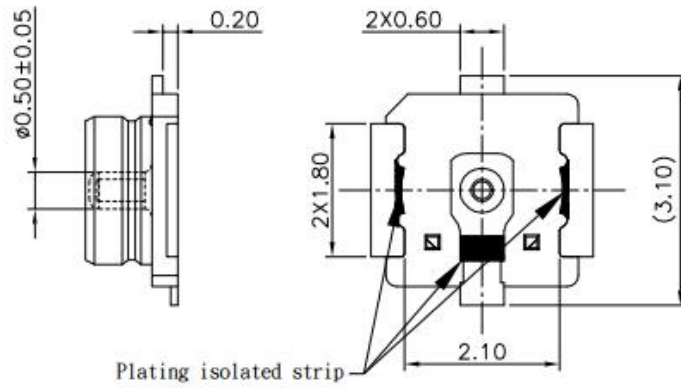
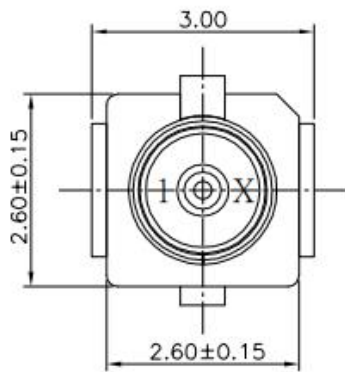
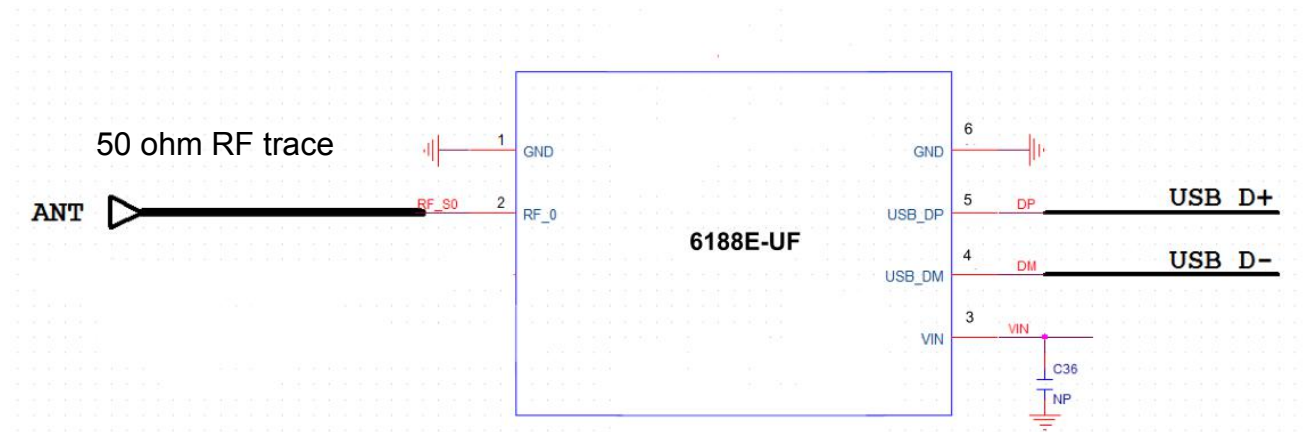


5.3 Layout Recommendation

(Unit: mm)



6 Reference Design



7 Ordering Information

Part No.	Description
FG6188EUFX-07	RTL8188FTV-VC, b/g/n, Wi-Fi, 1T1R, 12.2X13mm, USB ,With IPEX and shielding , PCB Version V1.0

8 The Key Material List

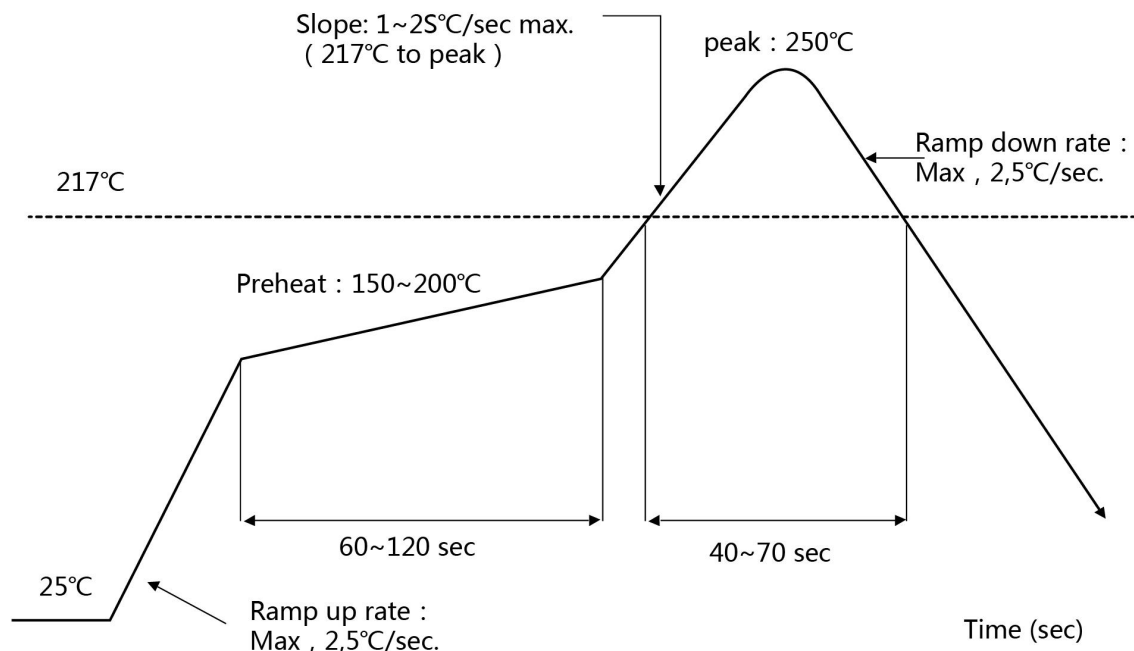
Crystal	3225, 40MHz, CL=15pF, 10ppm	TKD, Honsonic, TST, SIWARD, ECEC,JWT
ESD	0402, 5.5V, 0.1pF	Sunlord, Murata,Way-on
Chipset	RTL8188FTV-VC-CG QFN24	Realtek
PCB	6188G-U-V1.0 green,4L,FR4,Au,12.2x13x0.6mm	Xy-pcb, sl-pcb, kx-pcb, Sunlord
IPEX	1代 UFLR-MINIPCL	佳沃, 创迪尔
Shielding	6188G-U-V2.0 Shielding	信太, 精力通

9 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

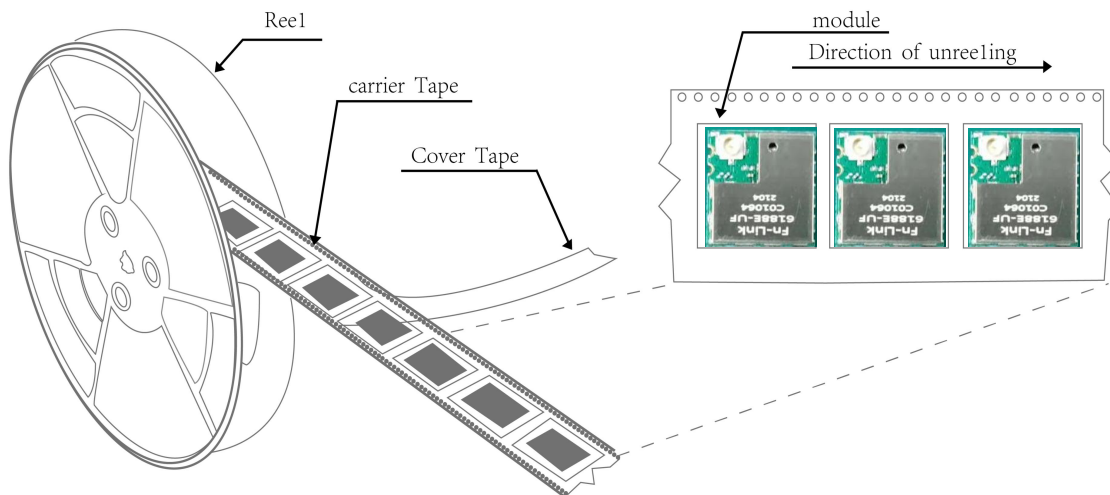
Number of Times : ≤2 times



10 Package Information

10.1 Reel

A roll of 2000pcs



10.2 Packaging Detail

the take-up package



Using self-adhesive tape

Size of black tape: 24mm*32.6m the cover tape : 21.33mm*32.6m

Color of plastic disc: blue

A roll of 2000pcs



NY bag size:460mm*385mm



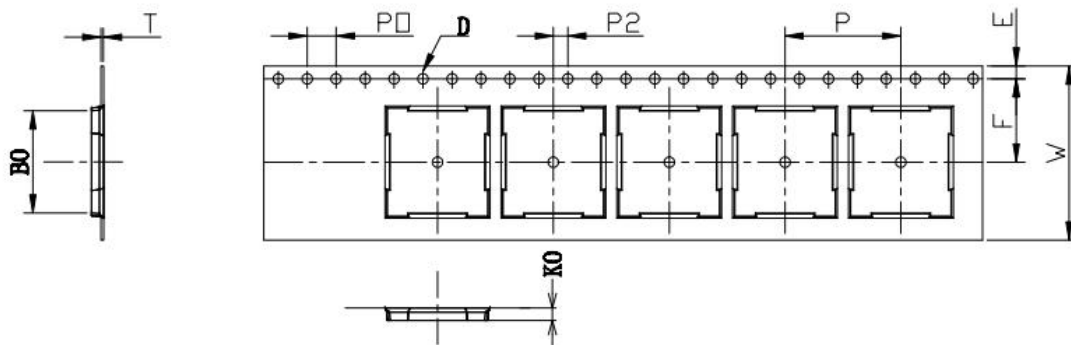
size : 350*350*35mm



The packing case size:350*210*370mm

10.3 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.45	13.45	1.50	11.5	1.75	1.70	4.0	2.0	16.0	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



10.4 Moisture sensitivity

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

all the relatives 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

Integration instructions for host product manufacturers according to KDB 996369 D03 OEMManual v01

Conditions on using Hefei Hualing Co., Ltd. regulatory approvals:

- A. Customer must ensure that its product (The "RF module") is electrically identical to Hefei Hualing Co., Ltd. reference designs. Customer acknowledges that any modifications to Hefei Hualing Co., Ltd. reference designs may invalidate regulatory approvals in relation to the CUSTOMER Product, or may necessitate notifications to the relevant regulatory authorities.
- B. Customer is responsible for ensuring that antennas used with the product are of the same type, with same or lower gains as approved and providing antenna reports to Hefei Hualing Co., Ltd.
- C. Customer is responsible for regression testing to accommodate changes to Hefei Hualing Co., Ltd. reference designs, new antennas, and portable RF exposure safety testing/approvals.
- D. Appropriate labels must be affixed to the CUSTOMER Product that comply with applicable regulations in all respects.
- E. A user's manual or instruction manual must be included with the customer product that contains the text as required by applicable law. Without limitation of the foregoing, an example (for illustration purposes only) of possible text to include is set forth below:

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247

2.3 Specific operational use conditions

Radio Technology: 2.4G WIFI

Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20

2422MHz~2452MHz for IEEE802.11n/HT40

Channel No.: 802.11b/802.11g /802.11n (HT20): 11

802.11(HT40): 7

Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)

IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

Antenna Type: FPC antenna, max gain 3.4dBi

(Antenna information is provided by applicant.)

The module can be used for mobile or portable applications with a maximum 3.4dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

2.4 Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs

The antenna used is the FPC antenna on the module.

2.6 RF exposure considerations

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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

The antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

2.7 Antennas

Antenna Specification are as follows:

Antenna Type: FPC antenna

Antenna Gain (Peak): 2.4GWIFI: 3.4dBi (Provided by applicant)

This device is intended only for host manufacturers under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna;

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2BPVS-6188E-UF" With their finished product.

2.9 Information on test modes and additional testing requirements

Radio Technology: 2.4G WIFI

Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20
2422MHz~2452MHz for IEEE802.11n/HT40

Channel No.: 802.11b/802.11g /802.11n (HT20): 11
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Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

Antenna Type: FPC antenna, max gain 3.4dBi
(Antenna information is provided by applicant.)

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.