



BL-M8189FS6(VC)

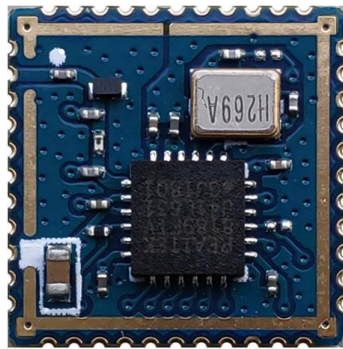
802.11n 150Mbps WiFi

SDIO Module Specification

SHENZHEN BILIAN ELECTRONIC CO., LTD

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Module Name: BL-M8189FS6(VC)

Module Type: 802.11b/g/n 150Mbps 1T1R WiFi SDIO Module

Revision: V1.0

Customer Approval:

Company:

Title:

Signature:

Date:

BL-link Approval:

Title:

Signature:

Date:

Revision History

Revision	Summary	Release Date
1.0	Official release	2020-03-25

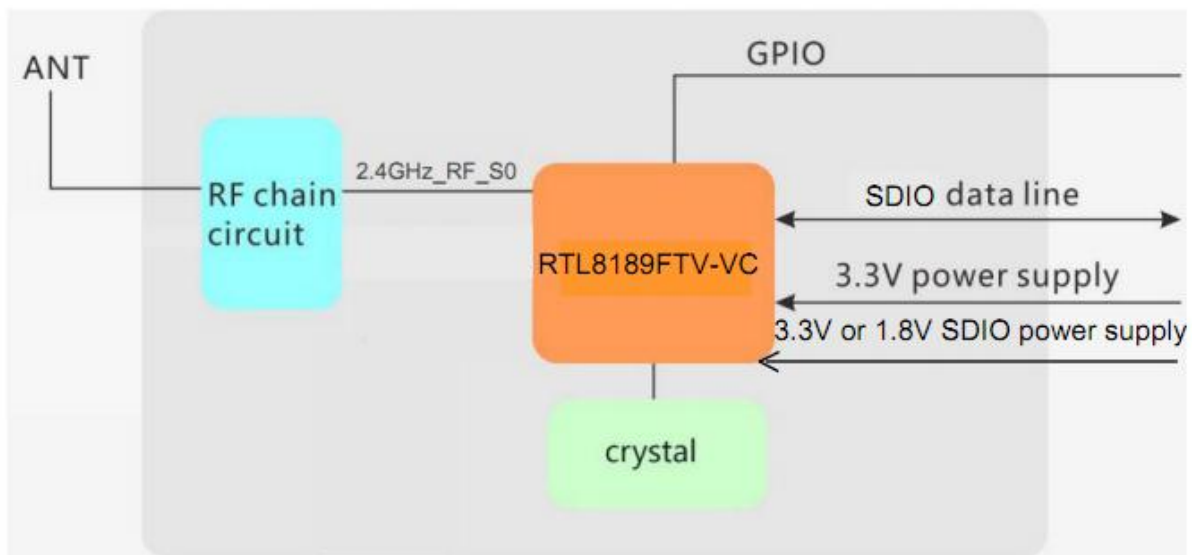
1. Introduction

BL-M8189FS6(VC) is a highly integrated WiFi module, it contains a WLAN MAC, a 1T1R capable WLAN base band. It supports IEEE 802.11b/g/n standard and provides the highest PHY rate up to 150Mbps, offering feature-rich wireless connectivity and reliable throughput from an extended distance.

1.1 Features

- Operating Frequencies: 2.412~2.462GHz
- Host Interface is SDIO 2.0
- IEEE Standards: IEEE 802.11b/g/n
- Wireless data rate can reach up to 150Mbps
- Connect to external antenna through half hole pad
- Power Supply: $3.3\pm0.2\text{V}$ main power supply; $3.3\pm0.2\text{V}$ or $1.8\pm0.1\text{V}$ for VDIO (SDIO and Digital I/O power supply)

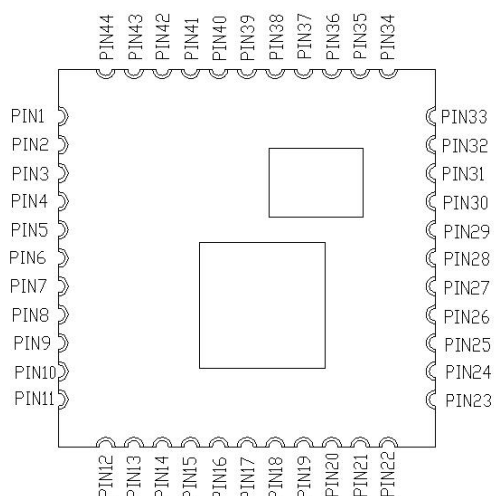
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M8189FS6(VC) WiFi Module
Chipset	RTL8189FTV-VC-CG
WiFi Standards	IEEE802.11b/g/n/, 1T1R, 2.4GHz, 150Mbps (Max)
Host Interface	SDIO 3.0
Antenna	Connect to the external antennas through half hole pad
Dimension	SMD 44Pins, 12*12*1.5mm (L*W*H)
Power Supply	DC 3.3±0.2V(main power) @ 350 mA (Max) DC 3.3±0.2V or 1.8±0.1V(SDIO and Digital I/O power)
Operation Temperature	-10°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



Top view

2.1 Pin Definition

No	Pin Name	Type	Description	Supply
1	GND	RF	Ground connections	
2	ANT	RF	WLAN RF port	
3	GND	RF	Ground connections	
4	NC	/	NC	

5	NC	/	NC	
6	NC	/	NC	
7	NC	/	NC	
8	NC	/	NC	
9	VDD33	P	3.3V Main power supply	
10	NC	/	NC	
11	NC	/	NC	
12	WL_REG_ON	I	Power down select (active low)	VDD33
13	WAKE	O	WLAN to wake-up HOST, pull high for use	VDIO
14	SD_D2	I/O	SDIO data line	
15	SD_D3	I/O	SDIO data line	
16	SD_CMD	I/O	SDIO command line	
17	SD_CLK	I	SDIO clock line	
18	SD_D0	I/O	SDIO data line	
19	SD_D1	I/O	SDIO data line	
20	GND	P	Ground connections	
21	NC	/	NC	
22	VDIO	P	VDIO for SDIO and Digital I/O pin, the power supply is same as the signal level of SDIO bus. Base on platform to choose 3.3V or 1.8V	
23	NC	/	NC	
24	NC	/	NC	
25	NC	/	NC	
26	NC	/	NC	
27	NC	/	NC	
28	NC	/	NC	
29	NC	/	NC	
30	NC	/	NC	
31	GND	P	Ground connections	
32	NC	/	NC	
33	GND	P	Ground connections	
34	NC	/	NC	
35	NC	/	NC	
36	GND	P	Ground connections	
37	NC	/	NC	
38	NC	/	NC	

39	NC	/	NC	
40	NC	/	NC	
41	NC	/	NC	
42	NC	/	NC	
43	NC	/	NC	
44	NC	/	NC	

P: Power, I: Input, O: Output, I/O: In/Output, RF: Analog RF Port

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-10	25	70	°C
External Antenna VSWR		1	1.92	2.5	/
Supply Voltage	VDD33	3.1	3.3	3.5	V
	VDIO(1.8V)	1.7	1.8	2.0	V

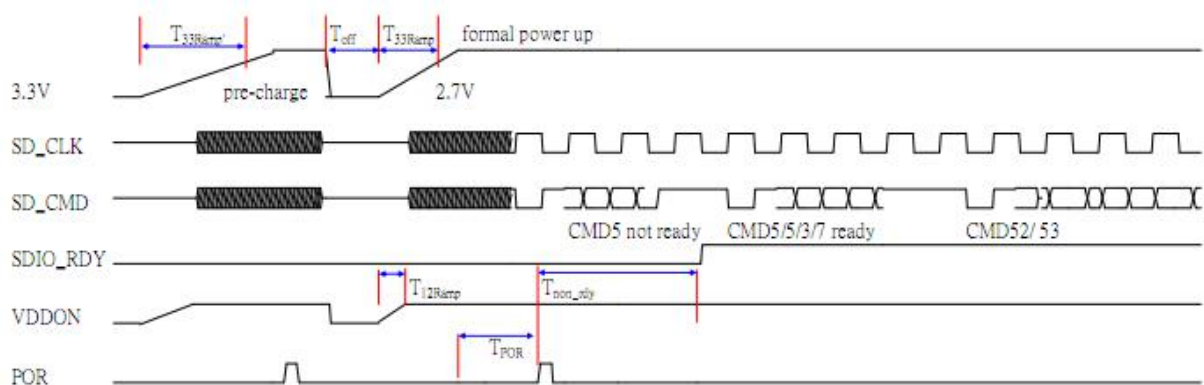
3.2 Current Consumption

Conditions : VDD33=3.3V ; Ta:25°C			
Use Case	VDD33 Current (average)		
	Typ	Max	Units
WiFi Radio Off (Linux Driver)	40	50	mA
WiFi Unassociated (Linux Driver)	40	60	mA
2.4G 1Mbps TX (RF-Test)	273	320	mA
2.4G 1Mbps RX (RF-Test)	60	70	mA
2.4G 11Mbps TX (RF-Test)	280	320	mA
2.4G 11Mbps RX (RF-Test)	55	70	mA
2.4G 6Mbps TX (RF-Test)	265	285	mA
2.4G 6Mbps RX (RF-Test)	60	70	mA

2.4G 54Mbps TX (RF-Test)	260	270	mA
2.4G 54Mbps RX (RF-Test)	60	65	mA
2.4G MCS0(HT20) TX (RF-Test)	275	287	mA
2.4G MCS0(HT20) RX (RF-Test)	60	70	mA
2.4G MCS7(HT20) TX (RF-Test)	265	282	mA
2.4G MCS7(HT20) RX (RF-Test)	59	70	mA
2.4G MCS7(HT40) TX (RF-Test)	275	291	mA
2.4G MCS7(HT40) RX (RF-Test)	60	80	mA

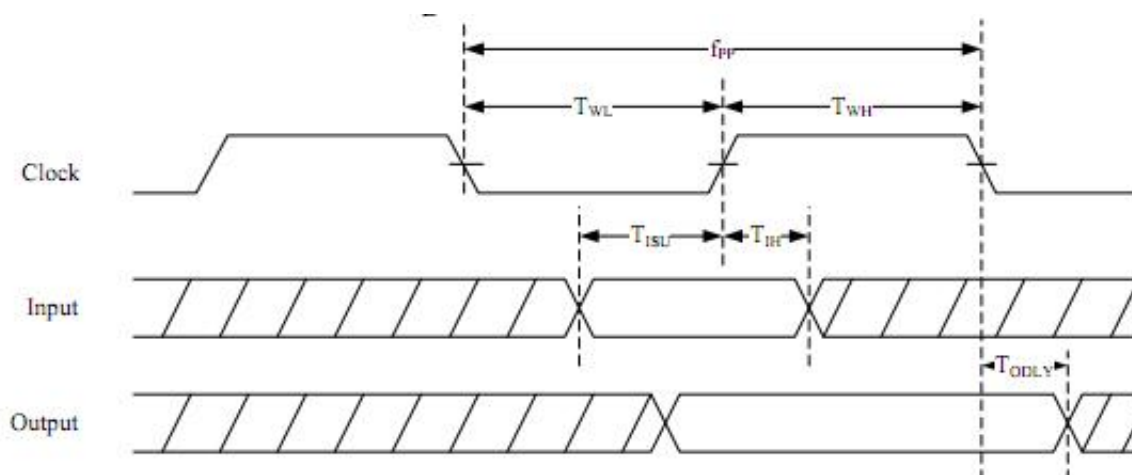
4. Interface Functional and Timing Specifications

4.1 SDIO Power On Sequence



	Min	Typical	Max	Unit
$T_{33\text{ramp}}$	0.2	0.5	2.5	ms
T_{off}	250	500	1000	ms
$T_{33\text{ramp}}$	0.2	0.5	2.5	ms
$T_{12\text{ramp}}$	0.1	0.5	1.5	ms
T_{por}	2	2	8	ms
$T_{\text{non-rdy}}$	1	2	10	ms

4.2 SDIO Timing



NO	Parameter	Mode	MIN	MAX	Unit
f_{PP}	Clock frequency	Default	0	25	MHz
		HS	0	50	MHz
T_{WL}	Clock low time	DEF	10		ns
		HS	7		ns
T_{WH}	Clock high time	DEF	10		ns

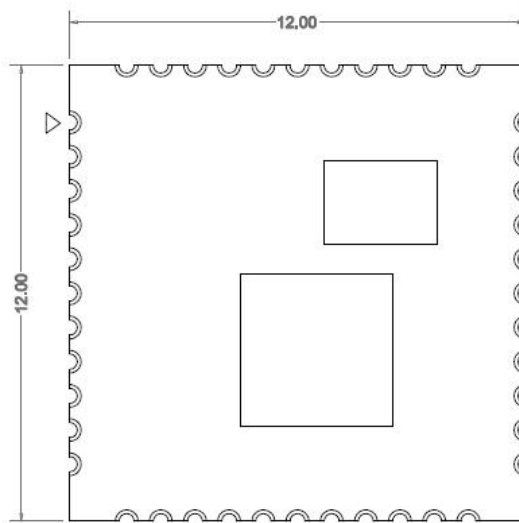
5. WiFi RF Specifications

5.1 2.4G WiFi RF Specification

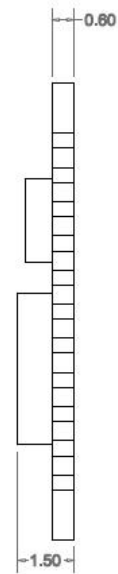
Conditions : VDD33=3.3V ; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11b/g/n CSMA/CA
Frequency Range	2.412~2.462GHz (2.4GHz ISM Band)
Channels	Ch1~Ch11 (For 20MHz Channels)
Modulation	802.11b (DSSS): DBPSK, DQPSK, CCK; 802.11g (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM;
Date Rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7(1T1R_SISO) 13.5~150Mbps;
Frequency Tolerance	$\leq \pm 15\text{ppm}$

6. Mechanical Specifications

6.1 Module Outline Drawing

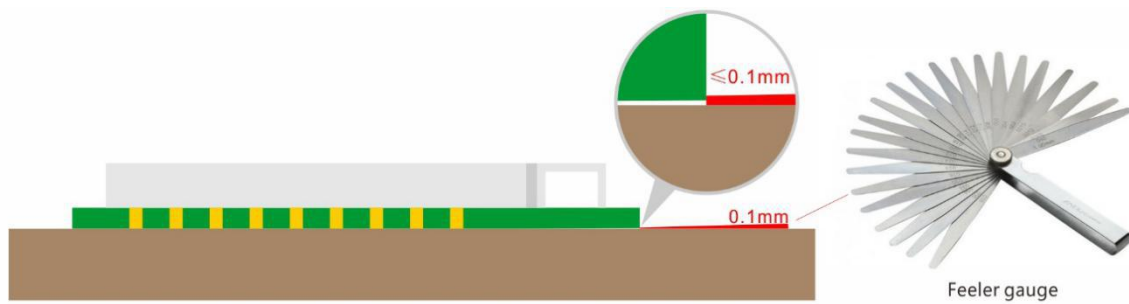


top view



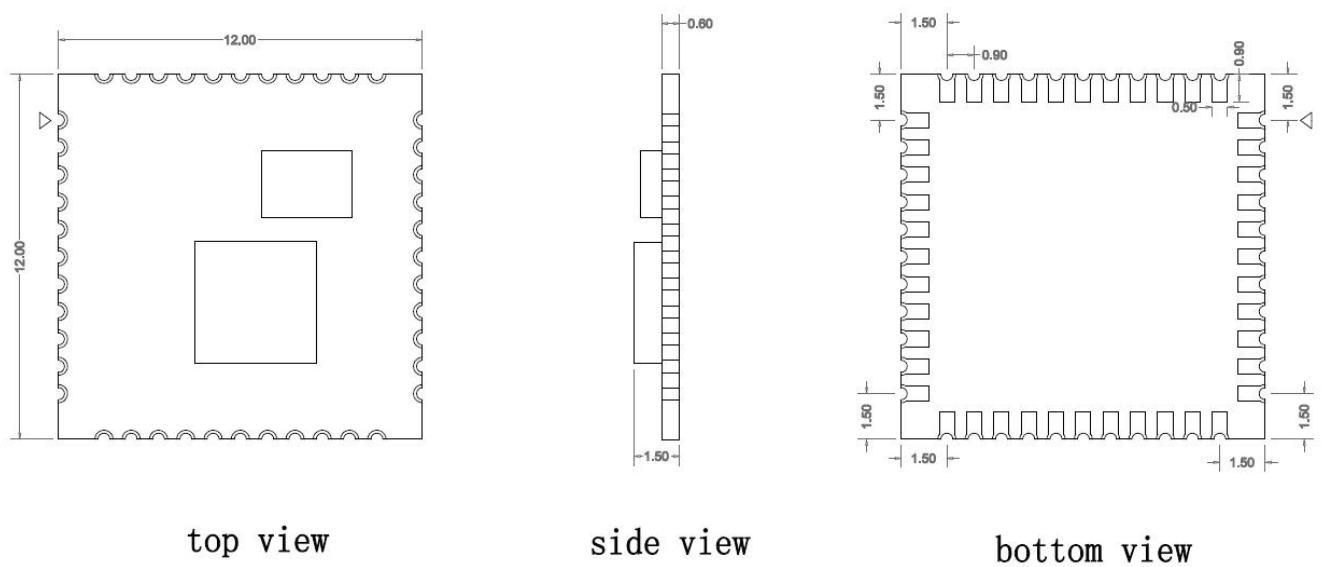
side view

Module dimension: 12.0*12.0*1.5mm (L*W*H; Tolerance: $\pm 0.15\text{mm}$)



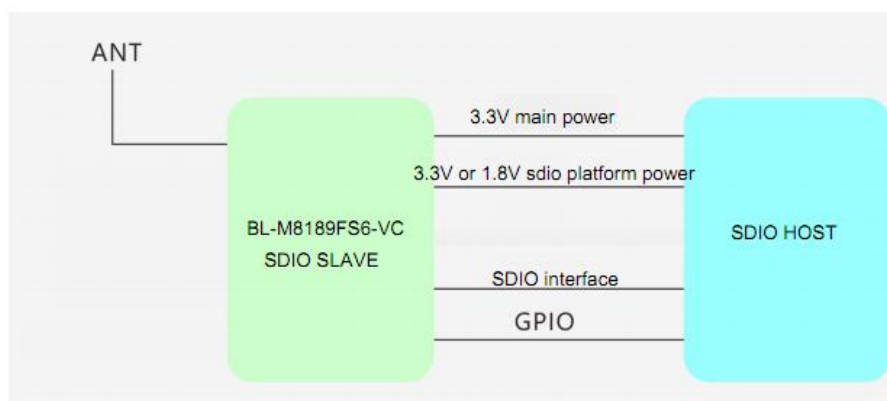
Module Bow and Twist : $\leq 0.1\text{mm}$

6.2 Mechanical Dimensions

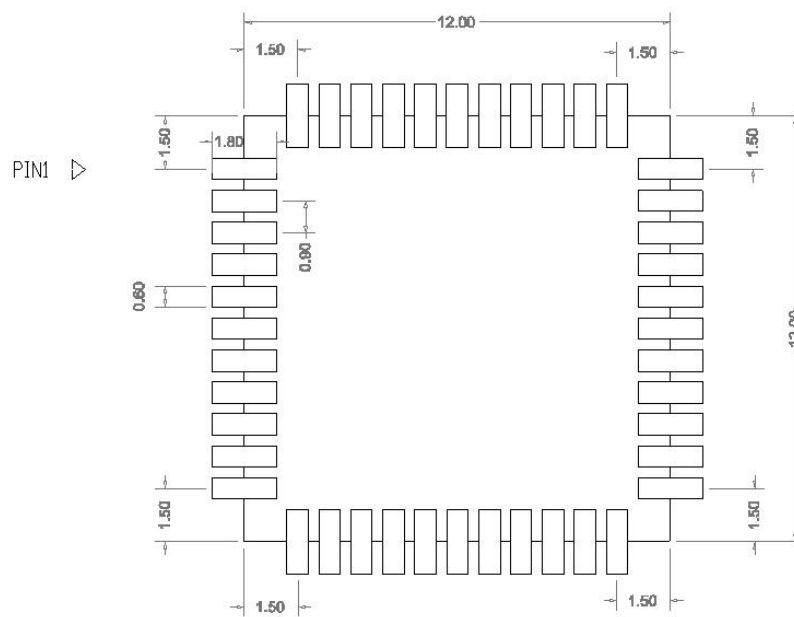


7. Application Information

7.1 Typical Application Circuit



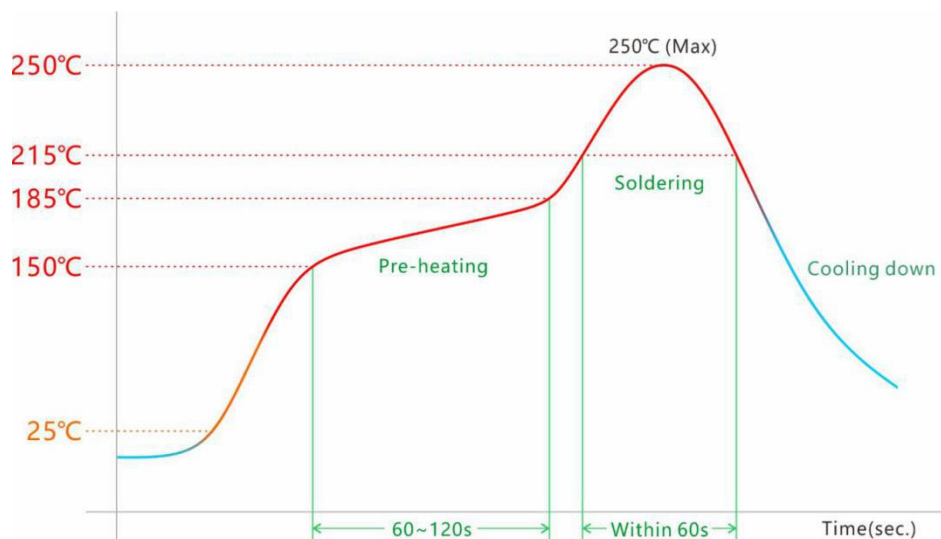
7.2 Recommend PCB Layout Footprint



Design size mm

Top View

7.3 Reflow Soldering Standard Conditions



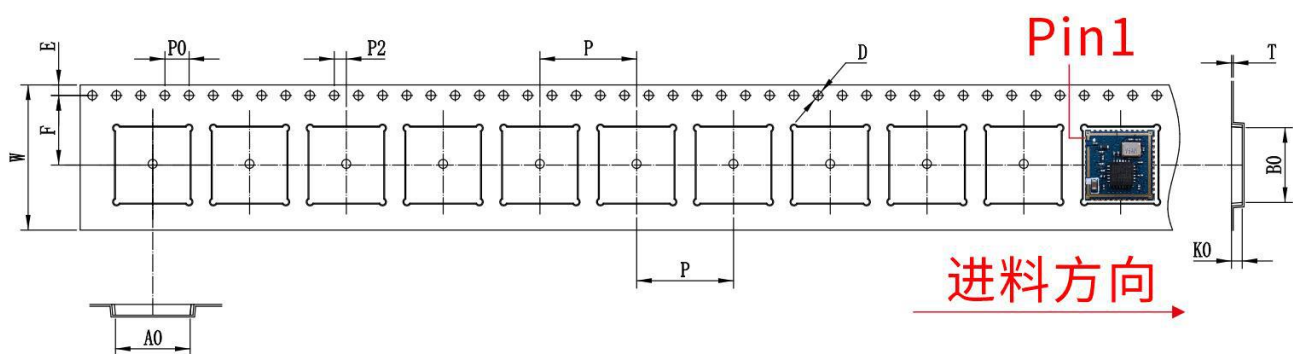
Please use the reflow within 2 times.
Set up the highest temperature within 250°C.

8. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8189FTV-VC-CG	Realtek	
2	PCB	BL-M8189FS6	Shenzhen Tie Fa Technology limited	
			Guangdong KINGSHINE ELECTRONICS CO., LTD	
			Quzhou Sunlord Electronics Co., Ltd	
3	Crystal	26MHz-9pF-10ppm-3225	HUBEI TKD ELECTRONICS TECHNOLOGY CO., LTD.	
			LUCKI CM ELECTRONICS CO., LTD	
			HOSONIC ELECTRONIC CO., LTD.	
			SHENZHEN KAIYUEXIANG ELECTRONICS CO., LTD	
4	TVS diode	TVS diode 0402	WAY ON ELECTRONIC CO., LTD.	
			UN Semiconductor Co., Ltd	

9. Package and Storage Information

9.1 Package Dimensions



ITEM	W	A0	B0	K0	E	F	P	P0	P2	D	T
DIM	24.00±0.3	12.25±0.1	12.5±0.1	1.75±0.1	1.75±0.1	11.5±0.1	16.00±0.1	4.00±0.1	2.00±0.1	Ø1.5±0.1	0.30±0.05



Package specification:

1. 2000 modules per roll and 10,000 modules per box.
2. Outer box size: 37.5*36*29cm.
3. The diameter of the blue environment-friendly rubber plate is 13 inches, with a total thickness of 28mm (with a width of 24mm carrying belt).
4. Put 1 package of dry agent (20g) and humidity card in each anti-static vacuum bag.
5. Each carton is packed with 5 boxes.

9.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -45°C to +85°C

Storage humidity: 10% to 95% RH (Non-Condensing)

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C

Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.

The Module shall be stored without opening the packing.

After the packing opened, the Module shall be used within 72hours.

When the color of the humidity indicator in the packing changed, the Module shall be baked before soldering.

Baking condition: 60°C, 24hours, 1time.

ESD Sensitivity :

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!

ISED Statement

- English: This device complies with Industry Canada license - exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

The digital apparatus complies with Canadian CAN ICES - 3 (B)/NMB - 3(B).

- French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter (ISED certification number: **20944-M8189FS6**) has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (ISED certification number: **20944-M8189FS6**) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Radiation Exposure Statement

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

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

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

As long as the condition above is met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 1 condition ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a

separate Canada authorization.

Note Importante:

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considérée comme valide et l'IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

The final end product must be labeled in a visible area with the following: Contains IC: **20944-M8189FS6**.

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: Contient des IC: **20944-M8189FS6**

Manual Information to the End User

The OEM integrator 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 show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

FCC Statement

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.

NOTE: 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 important announcement

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 0cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

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, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following" Contains FCC ID: **2AL6KBL-M8189FS6**"

Manual Information to the End User

The OEM integrator 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 show in this manual.

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

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

This module is Limited single modular without shielding, host manufacturer have to consult with module manufacturer for the module limiting conditions when integrate the module in the host. module manufacturer should reviews detailed test data or host designs prior to giving the host manufacturer approval.

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

2.7 Antennas

This radio transmitter **2AL6KBL-M8189FS6** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Model	Type	Connector	Peak gain (dBi)				
			2400-2483.5 MHz	5150-5250 MHz	5250-5350 MHz	5470-5725 MHz	5725-5850 MHz
2400-2483.5 MHz	External Antenna	/	2.0dBi	/	/	/	/

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID:2AL6KBL-M8189FS6".

2.9 Information on test modes and additional testing requirements

Host manufacturer which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C:15.247 and 15.209 requirement, only if the test result comply with FCC part 15.247 and 15.209 requirement, then the host can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.