秘密级别： 公开
生效时间：2025 年 05 月 09
保密期限： 长期

Model WF-M63B-USM3 Datasheet

IEEE 802.11 2x2 WiFi 5 Wireless LAN

and

Bluetooth 5.1

Combo Module

[SoC MT7663BUN]

for 802.11a/b/g/n/ac + Bluetooth 5.1

Version： 1.1

<Specification may be changed without prior notice>

Sichuan AI-Link Technology Co., Ltd

四川爱联科技股份有限公司

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Address: Anzhou Industrial Park, Mianyang, Sichuan, P.R.C
Company: Sichuan AI-Link Technology Co., Ltd.

Module Name	**WF-M63B-USM3**		
	Designed by	Reviewed by	Approved by
Signature	HUANG, Wei	FAN, Xijun	DING, Shuangpeng
Date	04/18/2025	04/18/2025	04/18/2025

Model WF-M63B-USM3

- **Compatible WLAN Standards**

  IEEE Std. 802.11 a/b/g/n/ac
  Bluetooth V2.1/4.2/5.1

- **SoC**

  MT7663BUN

- **Product Size**

  23mm×30mm×2.8mm

- **Product Weight**

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RoHS

Features

WLAN

- IEEE 802.11 a/b/g/n/ac compliant
- Support 20MHz, 40MHz, 80Mhz bandwidth in 2.4GHz,5GHz band
- Dual bands 2T2R mode
- data rate up to 867Mbps with USB2.0
- Support MU-MIMO RX
- Support STBC, LDPC, TX Beamformer, and RX Beamformer
- Greenfield, mixed-mode, legacy modes support
- IEEE 802.11 d/e/h/i/j/k/r/v/w support
- Security support for WFA WPA/WPA2/WPA3 personal, WPS2.0
- QoS support of WFA WMM,WMM PS

Bluetooth

- Bluetooth v5.1 with BLE (BT low energy)
- Supports BT/BLE dual mode
- Supports BT/Wi-Fi coexistence
- Supports 7 BT links and 16 BLE links
- Supports SCO and eSCO link with re-transmission
- Supports wide-band speech
- Supports mSBC and SBC including mono and stereo
- Supports Packet Loss Concealment (PLC) function for better voice quality
- Supports secure connection with AES128 and ECC256
- Channel quality driven data rate adaptation
- Channel assessment and WB RSSI for AFH

Revision Record

Revision	Date	Description	Edited by
V1.0	04/09/2025	Premier Release	HUANG, Wei
V1.2	04/18/2025	Supplement product physical information	HUANG, Wei
** Private Preview Only*			

Contents

1 General Description

1.1 System Overview

Model WF-M63B-USM3 is a highly integrated WiFi module by AI-Link, based on the MediaTek SoC MT7663BUN, featuring a 2x2 a/b/g/n/ac dual-band Wi-Fi, and a Bluetooth v5.1 subsystems.

The finely tuned hardware architecture and baseband algorithms provide superlative RF performance, as well as low power consumption. Intelligent MAC design powers a highly efficient offload engine; the hardware supports standard features of higher level of security, performance, and conforms most international regulations, offering the great performance at any time, in any circumstance.

1.2 System Properties

Dimension	Typically, 23mm x 30mm x 2.8mm
Chipset	MT7663BUN
Operating Frequency	2.4GHz: 2.412~2.484 GHz 5 GHz: 5.180~5.825GHz
Antenna	3 IPEX Connector
Operating Voltage	3.3V±5%
PCB Information	4-layers design (0.8+/-0.15mm)
Peripheral Interface	WIFI&BT@USB
Rate	11b: 1, 2, 5.5 and 11Mbps 11a/g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~15, up to 300Mbps 11ac: MCS0~9, Nss=2, BW=80MHz up to 867Mbps
Operating Temperature	-10℃ to +70℃
Storage Temperature	-40℃ to +85℃

ESD Protection	HBM: IO:2000V RF:6000V

1.3 Diagram

The hardware architecture for the module is shown in Figure 1. The AI-Link's WF-M63B-USM3 module Complies with IEEE standards 802.11a/b/g/n/ac; it also supports 2x2 Multi-User Multiple-Input Multiple-Output (known as MU-MIMO) and could reach up to data rate of 867 Mbps. Meanwhile, it is also a module of Bluetooth v5.1 and Wi-Fi Dual-band.

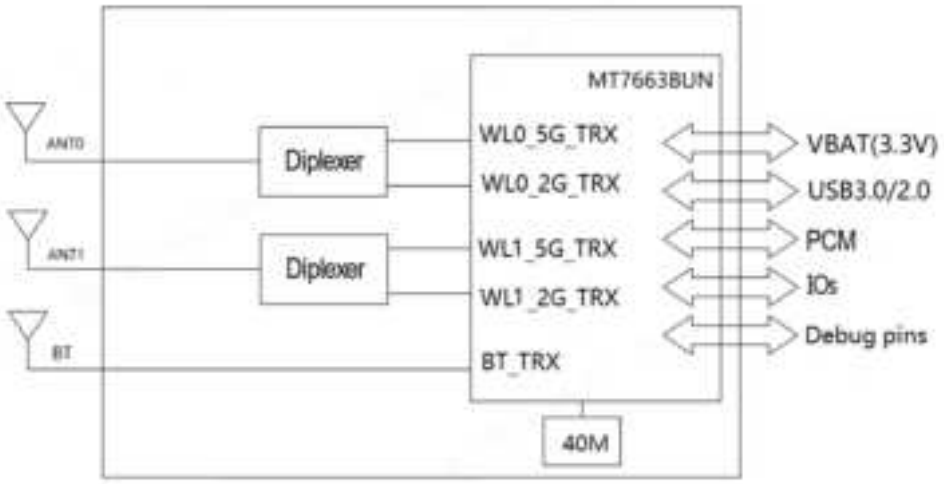
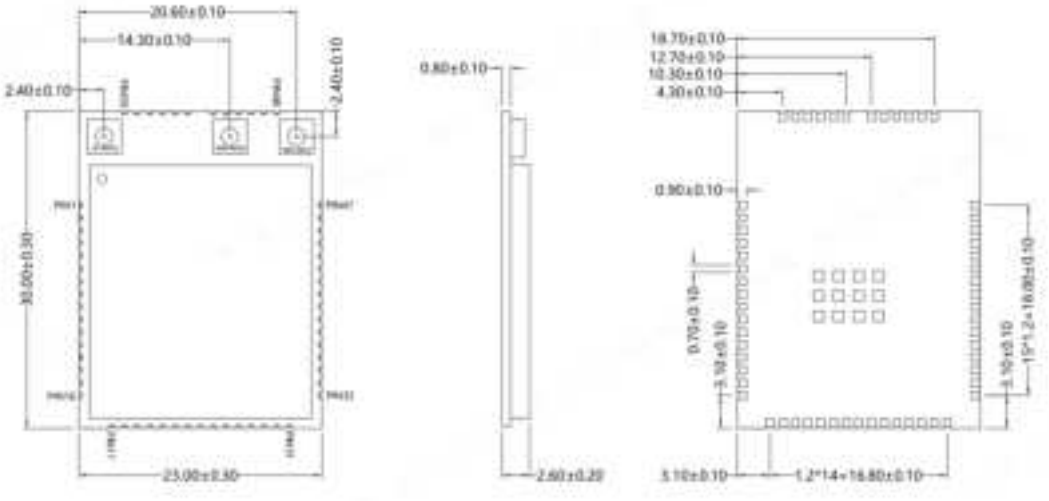


Figure 1: WF-M63B-USM3 Block Diagram

2 Mechanical Dimensions

2.1 Mechanical Outline Drawing

- Typical Dimension (W x L x T): 23.0mmx 30.0mm x 2.8mm
- General tolerance: ±0.3mm
- PCB Thickness: 0.8mm (+/-0.15mm)



Top View *Bottom View*

2.2 Pin definitions

Pin	Define	Description	Pin	Define	Description
1	DBG_TX	DEBUG, FW LOG, Uart Tx (GPIO3)	31	GND	GND
2	NC	Not connect	32	USB DP	USB2.0 data D+
3	GND	GND	33	USB DM	USB2.0 data D-
4	NC	Not connect	34	GND	GND
5	NC	Not connect	35	NC	Not connect
6	GND	GND	36	BT WAKE	蓝牙唤醒,低电平有效
7	RESET	PMU RESET,内部 10K 上拉，低电平有效	37	NC	NC
8	GND	GND	38	BT IR OUT	连接芯片 Pin38
9	GND	GND	39	GND	GND
10	3.3V	POWER（请预留 1.5A，纹波小于 5%）	40	NC	Not connect
11	3.3V	POWER（请预留 1.5A，纹波小于 5%）	41	NC	Not connect
12	GND	GND	42	NC	Not connect
13	NC	Not connect	43	NC	Not connect
14	NC	Not connect	44	GND	GND

15	PCM_SYNC	PCM SYNC	45	GND	GND
16	PCM_OUT	PCM OUT(strapping 上电需要为低电平，内部 10K 下拉)	46	NC	Not connect
17	GND	GND	47	NC	Not connect
18	WIFI WAKE	WIFI 唤醒,低电平有效.	48	GND	GND
19	PCM CLK	PCM CLK	49	NC	Not connect
20	PCM_IN	PCM IN	50	GND	GND
21	NC	Not connect	51	GND	GND
22	GND	GND	52	NC	Not connect
23	U3-TXN	USB3.0 TXN,连接主平台 RXN	53	GND	GND
24	U3-TXP	USB3.0 TXP,连接主平台 RXP	54	GND	GND
25	GND	GND	55	NC	Not connect
26	NC	Not connect	56	GND	GND
27	NC	Not connect	57	GND	GND
28	GND	GND	58	NC	Not connect
29	U3-RXN	USB3.0 RXN,连接主平台 TXN.	59	GND	GND
30	U3-RXP	USB3.0 RXP,连接主平台 TXP.			

2.4 Product Photos

TOP View

BOT View

2.5 Label Information

- Top Label

WF-M63B-USM3
CMIIT ID:
四川爱联科技股份有限公司

- WIFI MAC information DM code
- Part number：WF-M63B-USM3
- SRRC ID
- Company information

- BT Mac =WIFI Mac + 1

3 RF Characteristics

3.1 Wi-Fi Subsystem

Items	Contents	
WLAN Standard	IEEE 802.11a/b/g/n/ac	
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz)	
	5.1 GHz~5.9 GHz (5 GHz)	
Channels	CH1 to CH13 @ 2.4G	
	CH36 to CH165 @ 5G	
Modulation Mode	802.11b: DBPSK, DQPSK ,CCK	
	802.11 a/g/n: BPSK, QPSK, 16QAM, 64QAM	
	802.11 ac: BPSK, QPSK, 16QAM, 64QAM,256QAM	
Output Power Min& EVM	Power Value	EVM
	802.11b /11Mbps: 17dBm±2	≤ -13dB
	802.11g /54Mbps: 16dBm±2	≤ -28dB
	802.11a /54Mbps: 15dBm±2	≤ -28dB
	802.11n HT20 /MCS7: @2.4G 16dBm±2	≤ -30dB
	802.11n HT20 /MCS7: @5G 15dBm±2	≤ -30dB
	802.11n HT40 /MCS7: @2.4G 16dBm±2	≤ -30dB
	802.11n HT40 /MCS7: @5G 15dBm±2	≤ -30dB
	802.11ac VHT20 /MCS8: @5G 14dBm±2	≤ -33dB
	802.11ac VHT40 /MCS9: @5G 14dBm±2	≤ -33dB
	802.11ac VHT80 /MCS9: @5G 14dBm±2	≤ -33dB
Receiver Sensitivity @2.4G PER≤ 10% @5G PER≤ 10%	Rate Type	Max
	802.11b /11Mbps @2.4G PER≤8%	-85dBm
	802.11g /54Mbps @2.4G	-68dBm
	802.11a /54Mbps @5G	-68dBm
	802.11n HT20 /MCS7 @2.4G	-67dBm
	802.11n HT20 /MCS7 @5G	-67dBm
	802.11n HT40 /MCS7 @2.4G	-64dBm
	802.11n HT40 /MCS7 @5G	-64dBm
	802.11ac VHT20 /MCS8 @5G	-62dBm
	802.11ac VHT40 /MCS9 @5G	-57dBm
	802.11ac VHT80 /MCS9 @5G	-54dBm

3.2 Bluetooth Subsystem

Items	Contents			
Host Interface	USB			
TX Characteristics				
Channel	BR、EDR:CH0 toCH78			
	LE:CH0 to CH39			
Modulation	GFSK、π/4-DQPSK 、8PSK			
TX Power	Rate Type	Min(dBm)	Typ(dBm)	Max(dBm)
	1DH5	4	8	12
	2DH5	4	8	12
	3DH5	4	8	12
	1LE	4	8	12
	2LE	4	8	12
RX Characteristics				
RX	Rate Type	Min(dBm)	Typ(dBm)	Max(dBm)
	1DH5 (BER<0.1%)		-92	-70
	2DH5 (BER<0.01%)		-90	-70
	3DH5 (BER<0.01%)		-85	-70
	1LE (PER<30.8%)		-92	-70
	2LE (PER<30.8%)		-89	-70

** Note: [1] Typical RF Output Power are tested at room temp.25℃*

4 Interface

4.2 USB Interface

The module supports the USB (USB v3.0/2.0 specification) device port, Use USB as the host interface for Bluetooth.

5 Electrical Current Consumption

5.1 WLAN Current Consumption

Description	Value	Unit
Power Consumption (5G TX NSS=2 HT20 MCS0)	813	mA
Power Consumption (5G RX NSS=2 VHT80 MCS9)	165	mA

**Note:*

[1] Results are measured provided VDD33 is 3.3V. TX power is measured at the antenna port. The temperature is 25oC.

[2] The duty cycle for TX/RX measurement is 100%.

[3] The chip variation is +/- 25%.

5.2 Bluetooth Current Consumption

Description	Value	Unit
Power Consumption (BT TX)	82	mA
Power Consumption (BT RX)	29	mA

**Note:*

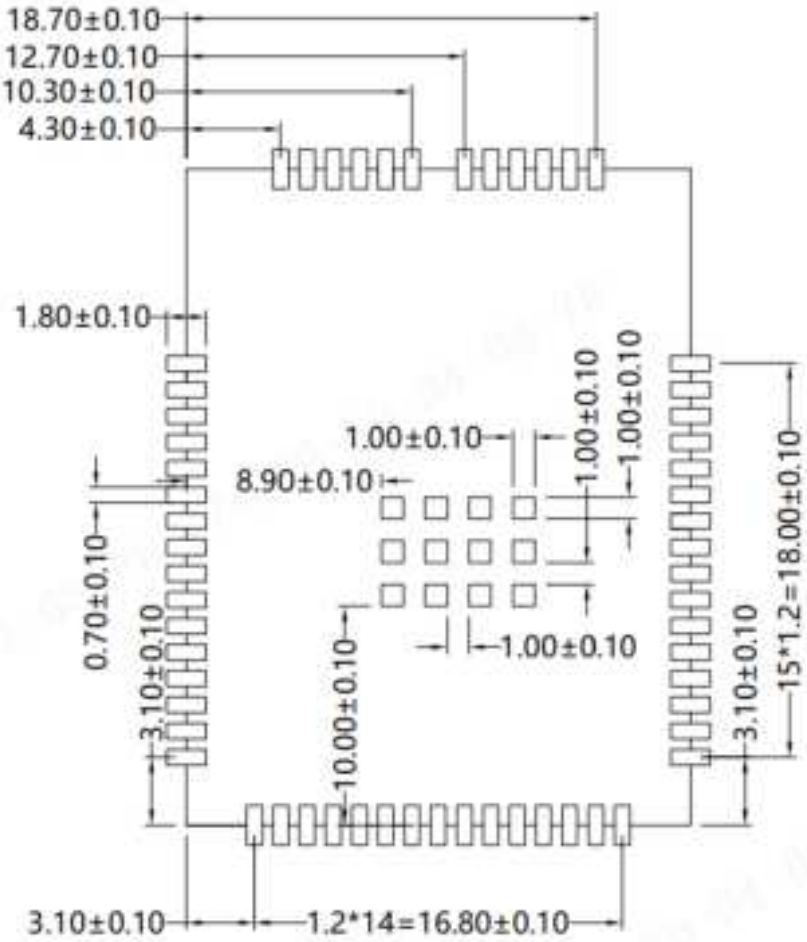
[1] Results are measured provided VDD33 is 3.3V. TX power is measured at the antenna port. The temperature is 25oC.

[2] The duty cycle for TX/RX measurement is 100%.

[3] The chip variation is +/- 25%

6 Reference Design

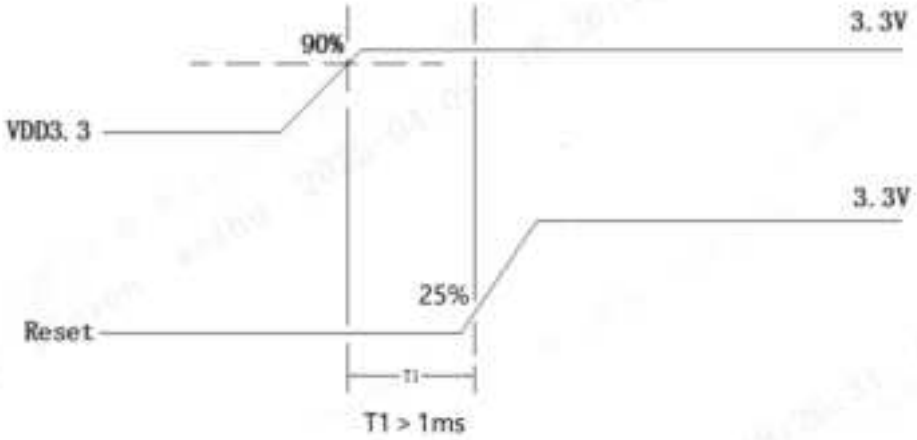
6.1 Recommend PCB Layout Decal



TOP VIEW

7 Timing Diagram

7.1 Chip power on sequence



注：RESET(PMU_EN)不早于 3.3V

7.2 Reset sequence

8 RF Connector Dimension

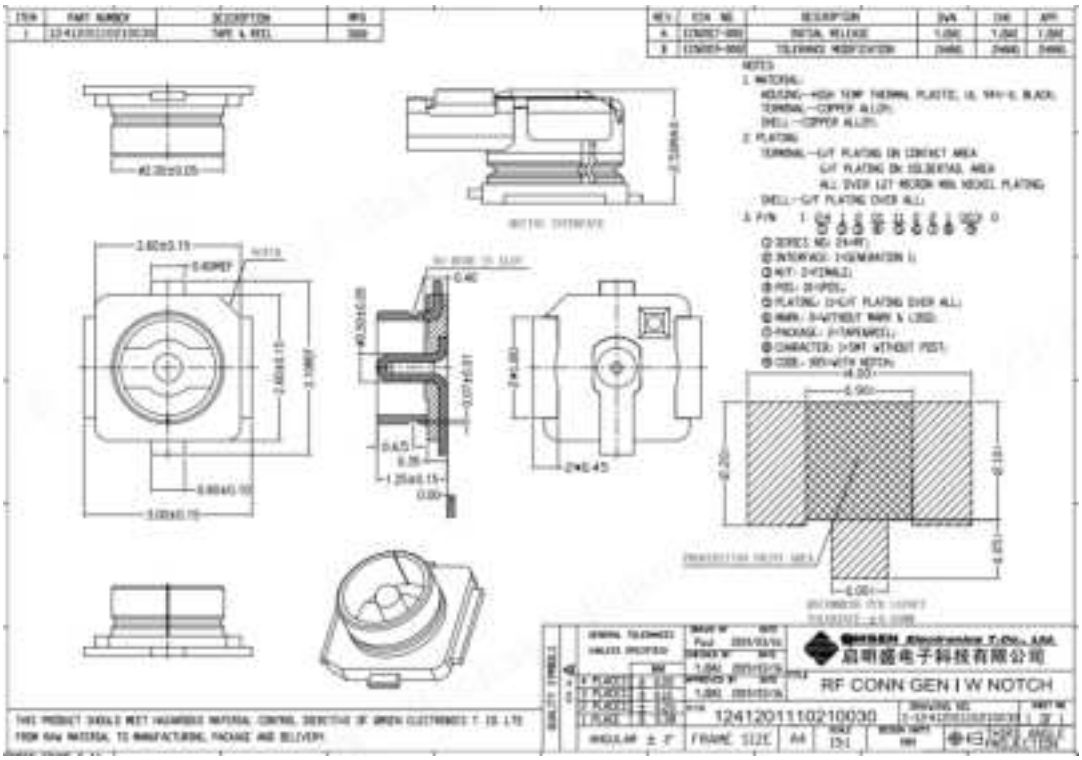
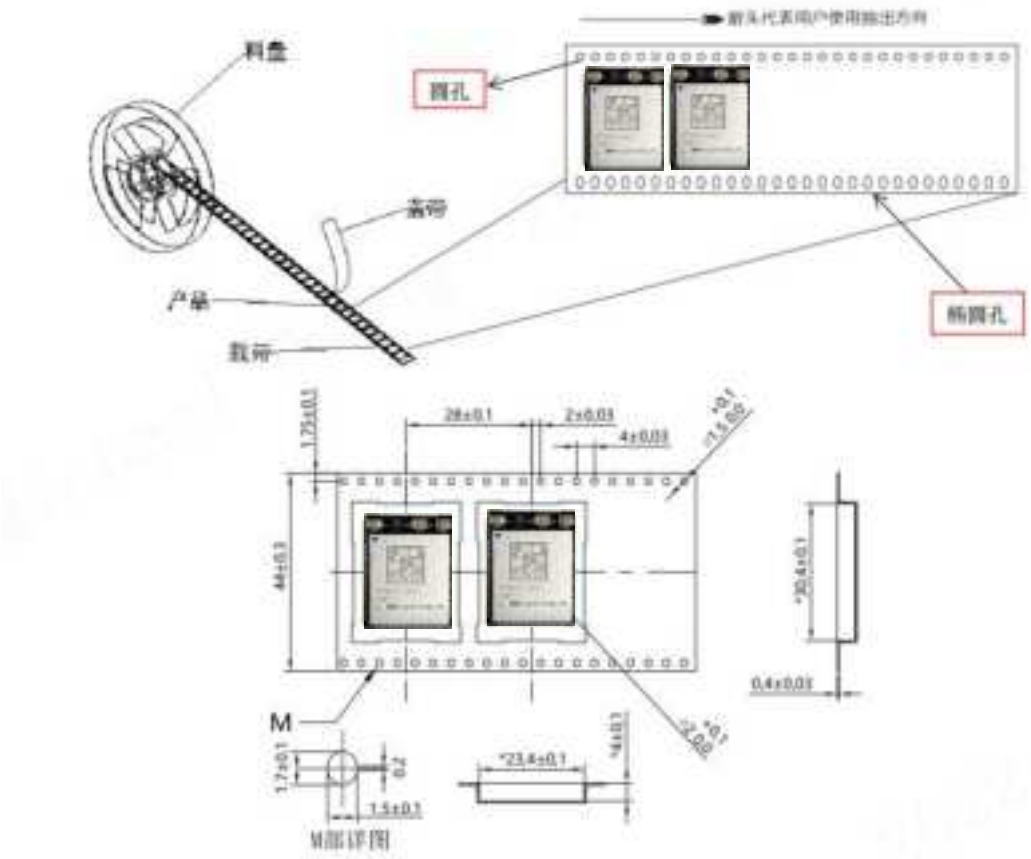


Figure 2: The dimensions of the connector

9 Package, Storage & Disposal

9.1 Package



1、产品放置方向、标签粘贴位置、包装按示意图进行;
2、每卷放500只产品，每小盒放1卷，大箱共5装个小盒，产品数量共2500只/箱;
3、外箱尺寸：370mm*300mm*370mm，小盒尺寸：355mm*355mm*55mm;
4、真空包内放置2g干燥剂2袋，6色湿度卡1张;
5、其它未尽事宜按客户的包装要求执行。

9.2 Storage

All electronic components must be stored in a clean, well-ventilated place free of corrosive gas. Unless otherwise specified, the temperature and humidity of the storage place must meet below requirements:

- Temperature：-40~85℃;
- Humidity：20%~75%;
- Humidity sensitivity grade： MSL 3
- Container Requirement: products shall be placed in a container well-functioning as an electrostatic shielding.

9.3 Disposal

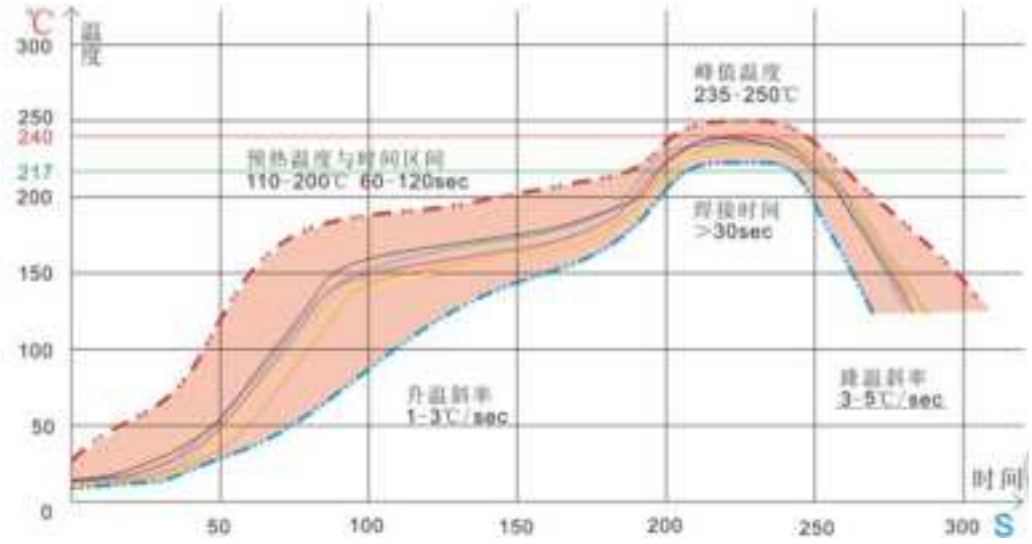
The waste disposal of this product and the package should comply with the applicable local/regional /state/ international regulations.

10 Appendix

Key Components List

NO.	Name	Model	Specification	Manufacturer
1	IC	MT7663BUN		MediaTek
2	PCB	JUI7.820.1709 series	4L 0.8mm	Sunking RJX MZBC IQE
3	Crystal	2016 40M	2016 40M	TKD JWT FAITH LONG ECEC
4	DPX	1608	2G/5G diplexer	GLEAD FTR ACX Walsin
5	Power inductor	252010	IND/SMD	Sunlord MICROGATE INPAQ FENGHUA

11 Refelow Standard Condition



Heating zone: temperature: < 150 °C, time: between 60 and 90 seconds, the slope is controlled between 1 ~ 3 °C / S.
Preheating constant temperature zone: temperature: 150 °C ~ 200 °C, time: between 60-120 seconds, slope between 0.3-0.8.
Reflow soldering area: peak temperature 235 °C ~ 250 °C (recommended peak temperature < 245 °C), time 30-70 seconds.
Cold area: temperature: 217 °C ~ 170 °C, slope between 3 ~ 5 °C / S.
The solder is lead-free solder in tin-silver copper alloys/Sn&Ag&Cu Lead-free solder (SAC305).

注意：

1) 推荐钢网厚度: 0.15~0.18mm (优选 0.18mm).

2) 模组 EPAD 接地焊盘钢网开口建议为阻焊层面积的 30%-40%;

12 Certification Information:

This product is a radio transmitter module for restricted non-standalone operation.

The module bearing CMIIT ID: approval does not mean that the final equipment in which the module is embedded or used complies with relevant radio management technical regulations or standards. The final equipment of the specific manufacturer is responsible for the technical compliance with the relative local or nationwide radio management technical regulations or standards.

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FCC Warning

15.19 Labeling requirements.

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.

15.21 Information to user.

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

15.105 Information to the user.

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.

FCC RF Radiation Exposure Statement:

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

2.This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.

IC Warning

This device complies with Industry Canada’s licence-exempt RSSs. Operation is subject to the following two conditions:

(1)This device may not cause interference;

(2)This device must accept any interference, including interference that may cause undesired operation of the device.

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.

The information listed above provides the user with information needed to make him or her aware of a RF exposure, and what to do to assure that this radio operates within the FCC exposure limits of this radio.

The device complies with RF specifications when the device used at **20cm** from the body.Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.

The band 5150-5250MHz indoor use only.

Additional Section: Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01
2.1 Conditions on using Sichuan AI-Link Technology Co.,Ltd. regulatory approvals:

A.Customer must ensure that its product (The ”CUSTOMER Product”) is electrically identical to Sichuan AI-Link Technology Co.,Ltd. reference designs.
Customer acknowledges that any modifications to Sichuan AI-Link Technology 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 Sichuan AI-Link Technology Co.,Ltd.
C.Customer is responsible for regression testing to accommodate changes to Sichuan AI-Link Technology 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 (customers' product must also compliant with these rules)
The module complies with FCC Part 15.247, FCC Part 15.407 and Canada RSS-247

2.3 Specific operational use conditions
The module has been certified for Mobile/portable applications. The host product operating conditions must be such that there is a minimum separation distance of 5mm between the antenna radiating structures and nearby persons. 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 show in this manual. If the end product manufacturer use it to a portable product, please provide the SAR compliance.

2.4 Limited module procedures
Not applicable.

2.5 Trace antenna designs
Not applicable.

2.6 RF exposure considerations
The device can be used in mobile exposure condition without restriction and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

This equipment complies with FCC’s and IC’s RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 5mm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. Installers must ensure that 20cm separation distance will be maintained between the device and users.

Note: the OEM product manuals must include a statement in order to alert the users of FCC RF exposure compliance.

2.7 Antennas
his 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;
The module shall be only used with the following antennas of the same type with equal or lower gain.
The antenna must be installed such that 20cm can be maintained between the antenna and users.

Antenna Type	Antenna Gain	Frequency Range	Connector Type	Min separation
Internal Antenna	3.0	2402-2480MHz	i-pex	5mm
	3.0	2412-2462MHz		
	3.0	5150-5250MHz		
	3.0	5250-5350MHz		
	3.0	5470-5720MHz		
	3.0	5725-5850MHz		

2.8 Label and compliance information

Host product manufacturers must provide a physical or e-label stating
“Contains FCC ID:2AOKI-WFM63BUSM3 ” & "Contains IC: 23460-WFM63BUSM3" with their finished product.

2.9 Information on test modes and additional testing requirements

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. If no other module used and no change to this module, the product can only to compliance with FCC part 15 B to meet the sale requirement. Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

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 circuity), 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.