

承认书

APPROVAL SHEET

客户名称:
CUSTOMER NAME.

深圳市睿联技术股份有限公司

客户料号:
CUSTOMER Part No.

48.01.001.0088

产品名称:
PRODUCT NAME.

WiFi模块、AIC8800M40B

产品型号
PRODUCT MODEL No.

CD0.RL800M4-00

产品规格:
SPECIFICATION

2.4G+5G+BT5.0

供应商:
VENDOR

深圳市中龙通电子科技有限公司

供应商		
MANUFACTURER		
拟制	审核	批准
DESIGNER	CHECKED BY	APPROVED BY
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更改记录:

Reversion History:

版本 Version	日期 Date	更改内容 Modification
1.0	2024.11.18	First release

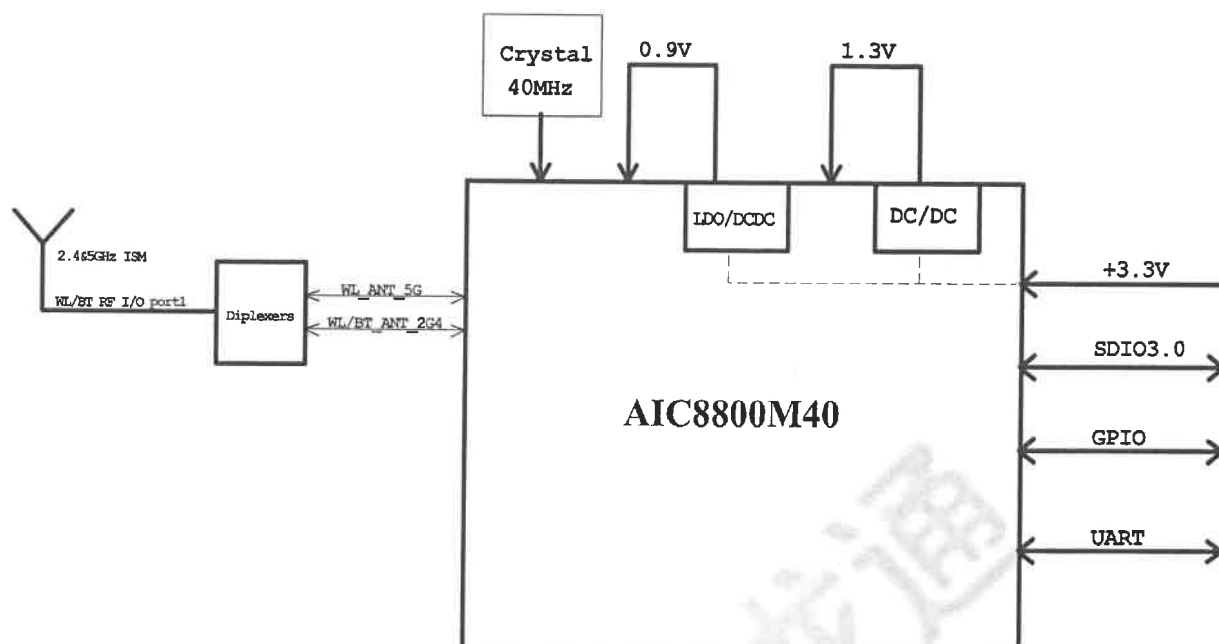
1. Overview

The RL800M4-00 is a single-die wireless local area network (WLAN) and Bluetooth (BT) combination solution to support 1×1 IEEE 802.11a/b/g/n/ax/ac WLAN standards and BT 5.4 enabling seamless integration of WLAN/BT and low-energy technology.

2. Features

- CMOS single - chip fully - integrated RF, Modem and MAC
- Support 2.4GHz/5GHz Wi - Fi 6
- Support 5MHz/10MHz mode
- Supports all the mandatory and optional features of Bluetooth 2.1+EDR/3.0/4.x/5.3/5.4
- Support STA, AP, Wi - Fi Direct modes concurrently
- Support STBC, beamforming
- Support Two NAV, Buffer Report, Spatial reuse, Multi - BSSID, intra - PPDU power save
- Support LDPC
- Support MU - MIMO, OFDMA
- Support DCM, Mid -amble, UORA
- Support WEP/WPA/WPA2/WPA3 - SAE Personal, MFP
- Integrated Cortex - M4F CPU with MPU and FPU
- On - chip memory includes 992KB SRAM and 896KB ROM
- Integrated low power timer and watchdog

3. Block Diagram



4. General Specification

Model	CDO-RL800M4-00
Product Name	WLAN 802.11a/b/g/n/ax/ac USB2.0 1T1R + BT5.4 module
Major Chipset	AIC8800M40B
Standard	802.11a/b/g/n/ac/ax
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM/256-QAM/1024-QAM
Frequency Band	Dual band 2.4&5GHz ISM
WiFi Interface	SDIO3.0
BT Interface	UART/PCM
Operating Temperature	-20° C ~ 70° C
Storage Temperature	-20° C ~ 125°C
Humidity	5% to 90% maximum

5. RF Specification

A. 2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n/ax WiFi compliant
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch14
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM, 16-QAM, QPSK, BPSK 802.11 ax : OFDMA /1024-QAM, 256-QAM, 64-QAM, 16-QAM, QPSK, BPSK
Output Power	802.11b / 1Mbps : 18dBm $\pm$ 2 dB @ EVM $\leq$ -10dB 802.11b /11Mbps : 18dBm $\pm$ 2 dB @ EVM $\leq$ -15dB
	802.11g / 6Mbps : 18dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11g /54Mbps : 15 dBm $\pm$ 2 dB @ EVM $\leq$ -28dB
	802.11n /MCS0 : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11n /MCS7 : 15 dBm $\pm$ 2 dB @ EVM $\leq$ -34dB
	802.11ax /HE0(20/40M) : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11ax /HE11(20/40M) : 13 dBm $\pm$ 2 dB @ EVM $\leq$ -36dB
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -93 dBm, typical
	- 2Mbps PER @ -90 dBm, typical
	- 5.5Mbps PER @ -88 dBm, typical
	- 11Mbps PER @ -86 dBm, typical
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -91 dBm, typical
	- 9Mbps PER @ -89 dBm, typical
	- 12Mbps PER @ -86 dBm, typical
	- 18Mbps PER @ -83 dBm, typical
	- 24Mbps PER @ -80 dBm, typical
	- 36Mbps PER @ -77 dBm, typical
	- 48Mbps PER @ -74 dBm, typical
	- 54Mbps PER @ -72 dBm, typical
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm, typical
	- MCS=1 PER @ -87 dBm, typical
	- MCS=2 PER @ -84 dBm, typical
	- MCS=3 PER @ -81 dBm, typical

	- MCS=4	PER @ -78 dBm, typical
	- MCS=5	PER @ -75 dBm, typical
	- MCS=6	PER @ -72 dBm, typical
	- MCS=7	PER @ -70 dBm, typical
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -87 dBm, typical
	- MCS=1	PER @ -84 dBm, typical
	- MCS=2	PER @ -81 dBm, typical
	- MCS=3	PER @ -78 dBm, typical
	- MCS=4	PER @ -75 dBm, typical
	- MCS=5	PER @ -72 dBm, typical
	- MCS=6	PER @ -69 dBm, typical
	- MCS=7	PER @ -67 dBm, typical
Receive Sensitivity (11ax,20MHz) @10% PER	- HE=0	PER @ -90 dBm, typical
	- HE=1	PER @ -88 dBm, typical
	- HE=2	PER @ -86 dBm, typical
	- HE=3	PER @ -84 dBm, typical
	- HE=4	PER @ -81 dBm, typical
	- HE=5	PER @ -79 dBm, typical
	- HE=6	PER @ -76 dBm, typical
	- HE=7	PER @ -73 dBm, typical
	- HE=8	PER @ -70 dBm, typical
	- HE=9	PER @ -66 dBm, typical
Receive Sensitivity (11ax,40MHz) @10% PER	- HE=0	PER @ -88 dBm, typical
	- HE=1	PER @ -86 dBm, typical
	- HE=2	PER @ -83 dBm, typical
	- HE=3	PER @ -80 dBm, typical
	- HE=4	PER @ -77 dBm, typical
	- HE=5	PER @ -74 dBm, typical
	- HE=6	PER @ -72 dBm, typical
	- HE=7	PER @ -69 dBm, typical
	- HE=8	PER @ -66 dBm, typical
	- HE=9	PER @ -60 dBm, typical
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n/ax : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

B. 5GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac/ax WiFi compliant
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)
Number of Channels	5.0GHz : Please see the table
Modulation	802.11a : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11n : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11ac : OFDM /256-QAM 802.11ax: OFDMA/1024-QAM
Output Power	802.11a / 6Mbps : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11a /54Mbps : 15 dBm $\pm$ 2 dB @ EVM $\leq$ -25dB
	802.11n HT20 /MCS0 : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11n HT20 /MCS7 : 15 dBm $\pm$ 2 dB @ EVM $\leq$ -28dB
	802.11n HT40 /MCS0 : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11n HT40 /MCS7 : 15dBm $\pm$ 2 dB @ EVM $\leq$ -28dB
	802.11ac VHT20 /MCS0 : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11ac VHT20 /MCS8 : 14 dBm $\pm$ 2 dB @ EVM $\leq$ -30dB
	802.11ac VHT40 /MCS0 : 15 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11ac VHT40 /MCS9 : 14 dBm $\pm$ 2 dB @ EVM $\leq$ -34dB
	802.11ax HE0(20M) : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11ax HE11(20M) : 12 dBm $\pm$ 2 dB @ EVM $\leq$ -34dB
	802.11ax HE0(40M) : 18 dBm $\pm$ 2 dB @ EVM $\leq$ -5dB 802.11ax HE11(40M) : 12 dBm $\pm$ 2 dB @ EVM $\leq$ -34dB
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -93dBm, typical
	- 9Mbps PER @ -90 dBm, typical
	- 12Mbps PER @ -87 dBm, typical
	- 18Mbps PER @ -84 dBm, typical
	- 24Mbps PER @ -81 dBm, typical
	- 36Mbps PER @ -78 dBm, typical
	- 48Mbps PER @ -76 dBm, typical
Receive Sensitivity (11n,20MHz) @10% PER	- 54Mbps PER @ -74 dBm, typical
	- MCS=0 PER @ -92 dBm, typical
	- MCS=1 PER @ -89 dBm, typical
	- MCS=2 PER @ -86 dBm, typical
	- MCS=3 PER @ -83 dBm, typical
	- MCS=4 PER @ -80 dBm, typical
	- MCS=5 PER @ -77 dBm, typical
	- MCS=6 PER @ -74 dBm, typical

	- MCS=7 PER @ -72 dBm, typical
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -90 dBm, typical
	- MCS=1 PER @ -87 dBm, typical
	- MCS=2 PER @ -84 dBm, typical
	- MCS=3 PER @ -81 dBm, typical
	- MCS=4 PER @ -78 dBm, typical
	- MCS=5 PER @ -75 dBm, typical
	- MCS=6 PER @ -72 dBm, typical
	- MCS=7 PER @ -70 dBm, typical
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -91 dBm, typical
	- MCS=1, NSS1 PER @ -88 dBm, typical
	- MCS=2, NSS1 PER @ -85 dBm, typical
	- MCS=3, NSS1 PER @ -82 dBm, typical
	- MCS=4, NSS1 PER @ -79 dBm, typical
	- MCS=5, NSS1 PER @ -76dBm, typical
	- MCS=6, NSS1 PER @ -73 dBm, typical
	- MCS=7, NSS1 PER @ -70 dBm, typical
Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=8, NSS1 PER @ -68 dBm, typical
	- MCS=0, NSS1 PER @ -89 dBm, typical
	- MCS=1, NSS1 PER @ -86 dBm, typical
	- MCS=2, NSS1 PER @ -83 dBm, typical
	- MCS=3, NSS1 PER @ -80 dBm, typical
	- MCS=4, NSS1 PER @ -77 dBm, typical
	- MCS=5, NSS1 PER @ -74 dBm, typical
	- MCS=6, NSS1 PER @ -71 dBm, typical
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=7, NSS1 PER @ -68 dBm, typical
	- MCS=8, NSS1 PER @ -65 dBm, typical
	- MCS=9, NSS1 PER @ -63 dBm, typical
	- HE=0 PER @ -89 dBm, typical
	- HE=1 PER @ -86 dBm, typical
	- HE=2 PER @ -83 dBm, typical
	- HE=3 PER @ -80 dBm, typical
	- HE=4 PER @ -77 dBm, typical
Receive Sensitivity (11ax,20MHz) @10% PER	- HE=5 PER @ -74 dBm, typical
	- HE=6 PER @ -71 dBm, typical
	- HE=7 PER @ -68 dBm, typical

Receive Sensitivity (11ax,40MHz) @10% PER	- HE=8	PER @ -65 dBm, typical
	- HE=9	PER @ -63 dBm, typical
	- HE=0	PER @ -87 dBm, typical
	- HE=1	PER @ -84 dBm, typical
	- HE=2	PER @ -81 dBm, typical
	- HE=3	PER @ -78 dBm, typical
	- HE=4	PER @ -75 dBm, typical
	- HE=5	PER @ -72 dBm, typical
	- HE=6	PER @ -69 dBm, typical
	- HE=7	PER @ -66 dBm, typical
	- HE=8	PER @ -63 dBm, typical
	- HE=9	PER @ -61 dBm, typical
Maximum Input Level	802.11a/n/ac/ax : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

C. Bluetooth Section:

Feature	Description
General Specification	
Bluetooth Standard	Bluetooth V5.4 of 1, 2 and 3 Mbps.
Host Interface	UART/PCM
Antenna Reference	Small antennas with 0~2 dBi peak gain
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	BR/EDR :79 channels;BLE:40 channels
Modulation	FHSS, GFSK, DPSK, DQPSK
RF Specification	
Output Power, tolerance ± 2 dBm	
BDR Output Power	7 dBm
EDR Output Power	6 dBm
BLE Output Power	6 dBm
Sensitivity, tolerance ± 2 dBm	
Sensitivity @ BER=0.1% for GFSK(1Mbps)	-88 dBm

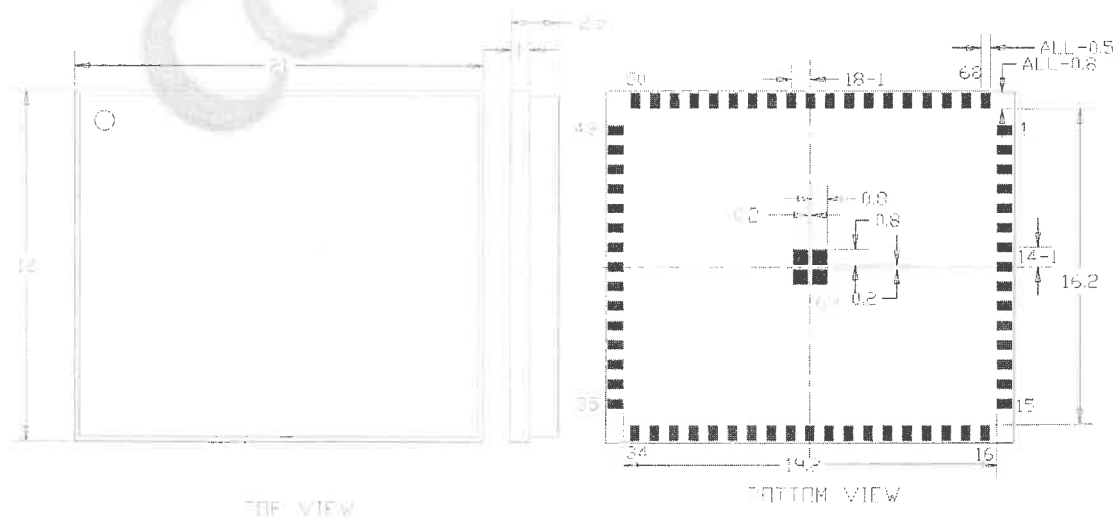
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK(2Mbps)	-91 dBm
Sensitivity @ BER=0.01% for 8DPSK(3Mbps)	-85 dBm
Sensitivity @ BLE=30.8% for LE(1Mbps)	-90 dBm
Sensitivity @ BLE=30.8% for LE(2Mbps)	-91 dBm
Maximum Input Level	GFSK(1Mbps): -20 dBm
	$\pi/4$ -DQPSK(2Mbps): -20 dBm
	8DPSK(3Mbps): -20 dBm

6. Recommended Operating Rating

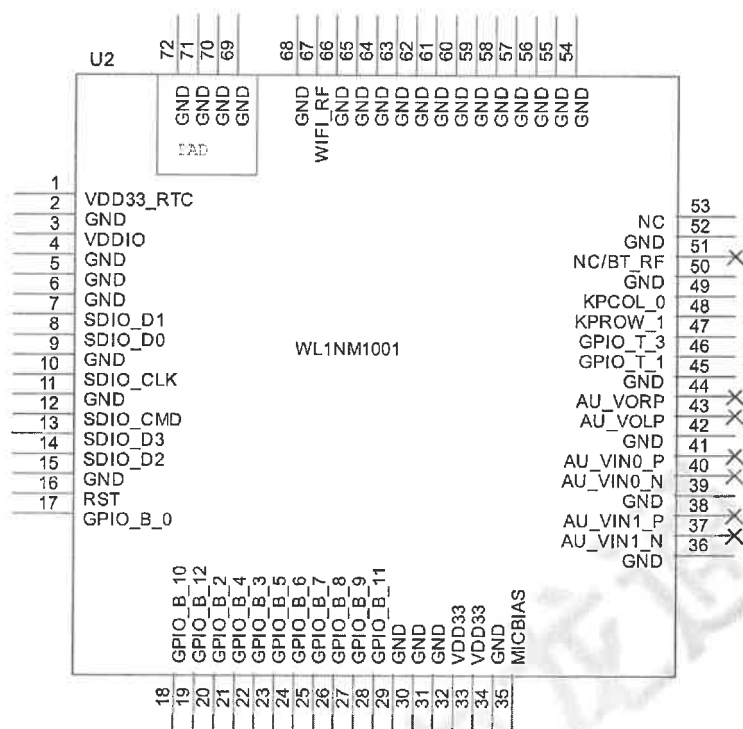
symbol	Parameter	Minimum	Typical	Maximum	Units
VDD	3.3V supply voltage	3.0	3.3	3.6	V
VDDIO	I/O supply voltage	3.0	3.3	3.6	V
Current	3.3V rating current	--	--	1000	mA

7. Physical Dimensions

(Unit: mm)



8. Pin Description



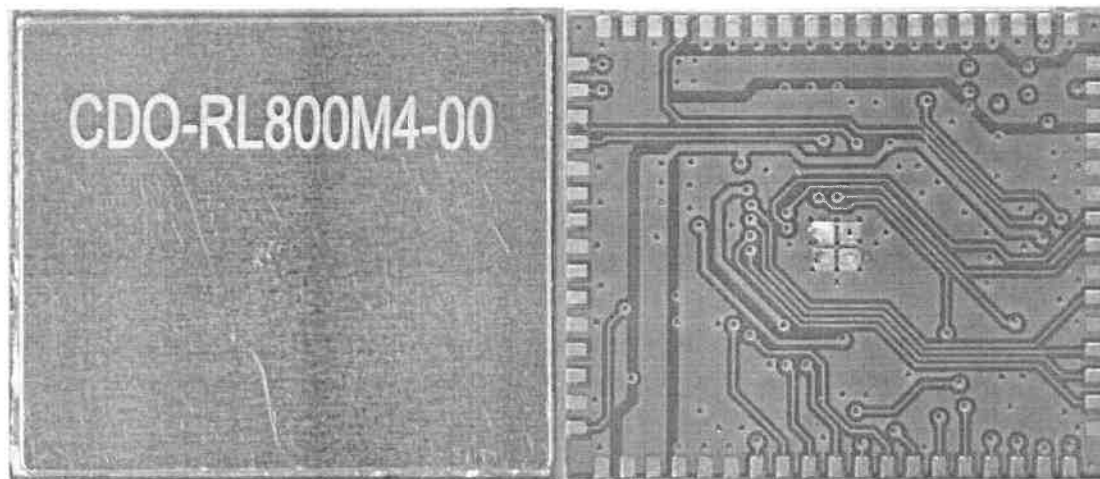
NO.	Name	Type	Description
1	VDD33_RTC	P	3.3V POWER INPUT
2	GND	—	Ground connections
3	VDDIO	P	3.3V POWER INPUT
4-6	GND	—	Ground connections
7	SDIO_D1	I/O	SDIO DATA1
8	SDIO_D0	I/O	SDIO DATA0
9	GND	—	Ground connections
10	SDIO_CLK	I/O	SDIO CLK
11	GND	—	Ground connections
12	SDIO_CMD	I/O	SDIO command line
13	SDIO_D3	I/O	SDIO DATA3
14	SDIO_D2	I/O	SDIO DATA2
15	GND	—	Ground connections
16	RST	—	keep floating
17	GPIO_B_0	I/O	GPIOA2
18	GPIO_B_10	I/O	GPIOB3
19	GPIO_B_12	I/O	GPIOB1
20	GPIO_B_2	I/O	GPIOA3
21	GPIO_B_4	I/O	GPIOB2
22	GPIO_B_3	I/O	GPIOA4
23	GPIO_B_5	I/O	GPIOA5
24	GPIO_B_6	I/O	GPIOB4

25	GPIO_B_7	I/O	USB_DP
26	GPIO_B_8	I/O	USB_DM
27	GPIO_B_9	I/O	GPIOA6
28	GPIO_B_11	I/O	GPIOB0
29-31	GND	—	Ground connections
32	VDD_33	P	3.3V POWER INPUT
33	VDD_33	P	3.3V POWER INPUT
34	GND	—	Ground connections
35	MICBIAS	I/O	GPIOA7
36	GND	—	Ground connections
37	NC	—	No connect, keep floating
38	NC	—	No connect, keep floating
39	GND	—	Ground connections
40	NC	—	No connect, keep floating
41	NC	—	No connect, keep floating
42	GND	—	Ground connections
43	NC	—	No connect, keep floating
44	NC	—	No connect, keep floating
45	GND	—	Ground connections
46	GPIO_T_1	I/O	GPIOA1
47	GPIO_T_3	I/O	GPIOA0
48	KPROW_1	I/O	GPIOA8
49	KPCOL_0	I/O	GPIOA9
50	GND	—	Ground connections
51	NC	—	No connect, keep floating
52	GND	—	Ground connections
53	NC		BOOT
54-66	GND	—	Ground connections
67	WIFI_RF	I/O	WL_BT RF I/O port (2.4/5GHz)
68-72	GND	—	Ground connections

9. Suplier

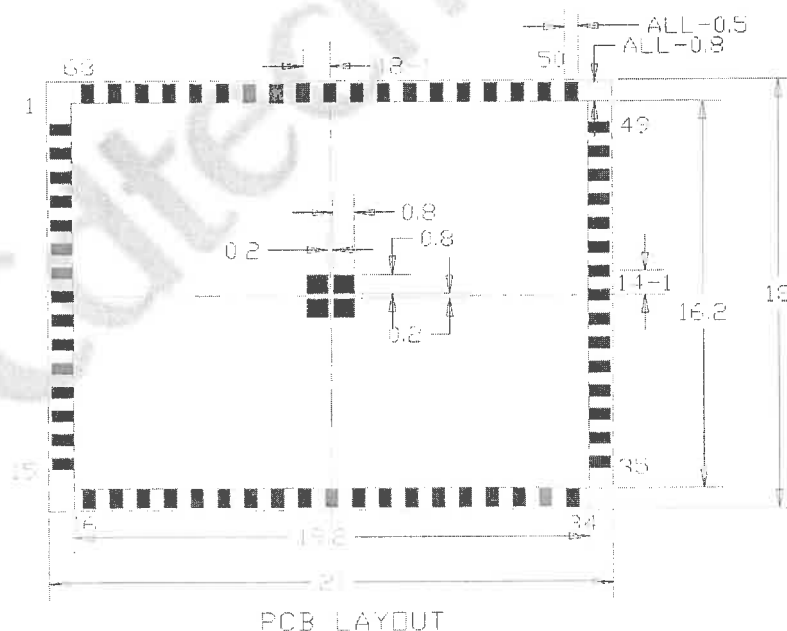
Supplier list	
Name of material	Material brand
Crystal	JWT/FK/TKD/Murata/TXC
Duplexer	ACX/GLEAD/Sunlord/Walsin
Inductor	Sunlord/ CHILISIN/ SAMWHA/Murata
Wifi chip	AIC
Capacitance	SAMSUNG /EYANG
Resistance	UniOhm /YAGEO
PCB(客户设计)	A,O,I,F,D,T

10. Physical photo



说明：PCB 不同供应商，底部丝印有微小差异，不带屏蔽盖产品屏蔽盖位置不上锡。

11. Layout Recommendation



(Top view)

12.Warpage



翘曲（间隙）的检验标准：

将模组放在水平大理石上，用 0.1mm 厚度的塞尺测量模组底部与大理石之间的间隙，

要求 $\text{gap} \leq 0.12\text{mm}$

13.Baking & storage temperature & Recommended Reflow Profile

（烘烤，储存温度和推荐炉温）

13.1 Baking & storage temperature

A. Storage life: 12 months. Storage conditions: $<40^{\circ}\text{C}$. Relative humidity: $<90\%\text{R.H.}$

（保存期限：12个月，储存环境条件：温度在： $<40^{\circ}\text{C}$ ，相对湿度： $<90\%\text{R.H.}$ ）

B. After this bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be. (模块包装被拆后，SMT 组装之时限)

a. Check the humidity card :stored at $\leq 20\%\text{RH}$. If :30%~40%(pink) or greater than 40%(red). Labeling module has moisture absorption. (检查湿度卡：显示值应小于30%（蓝色），如：30%~40%(粉红色)或者大于40%（红色）表示模块已吸湿气.)

b. Mounted within 168 hours at factory conditions of: $t \leq 30^{\circ}\text{C}$, $\leq 60\%\text{R.H.}$

（工厂环境温度湿度管制： $\leq 30^{\circ}\text{C}$ ， $\leq 60\%\text{R.H.}$ ，168小时内。）

c. Once opened, the workshop the preservation of life for 168 hours.

（拆封后，车间的保存寿命为168小时。）

C. Module apart packing after 168 hours, If baking is required, devices may be baked for.

（如在拆封后的168个小时内未使用完，需要烘烤，烘烤条件如下：）

a. Modules must be to remove module moisture problem. (模块须重新烘烤，以除去模块吸湿问题.)

b. Baking temperature: $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 120 hours. (烘烤温度条件： $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ，120小时.)

c. After baking, put proper amount of desiccant to seal packages.

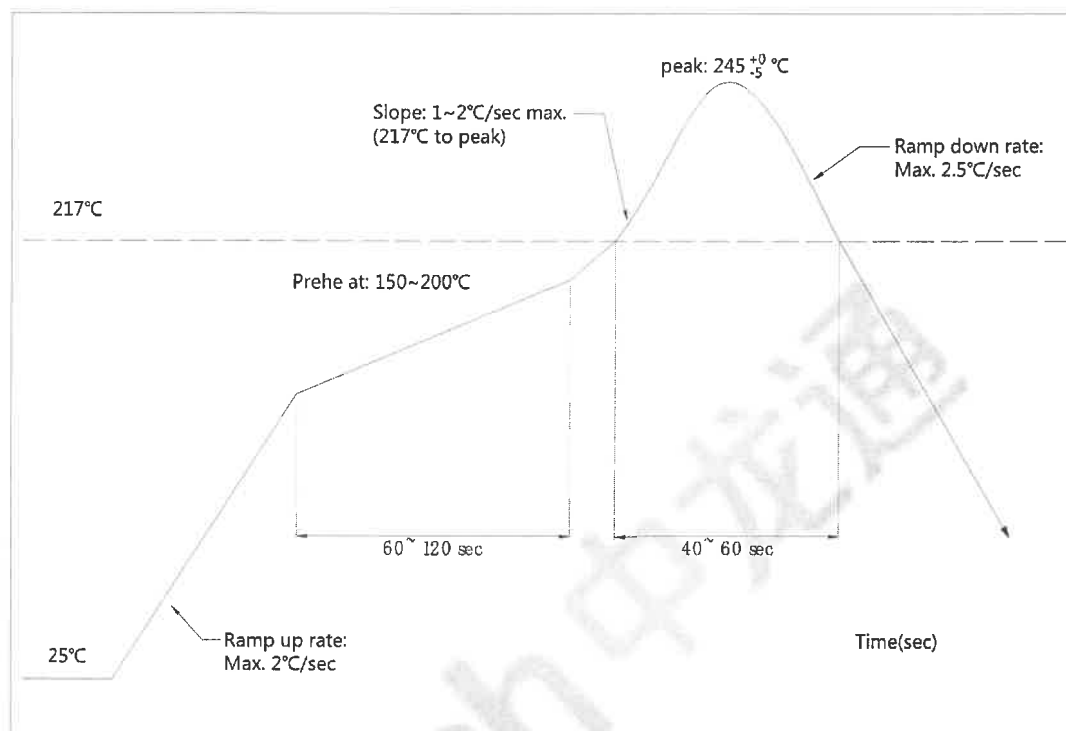
（烘烤后，放入适量的干燥剂再密封包装）

13.2 Recommended Reflow Profile

Referred IPC/JEDEC standard.

Peak Temperature : $<250^{\circ}\text{C}$

Number of Times : ≤ 2 times



ESD CAUTION

The RL800M4-00 module is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although RL800M4-00 module is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.³

Explanation: This module meets the requirements of FCC part 15C(15.247).

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak

gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The EUT has a FPC Antenna and Dipole Antenna, and the antenna use a permanently attached antenna which is not replaceable.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is not a limited module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects:

layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, The module with trace antenna designs, and This manual has been shown the layout of trace design, antenna, connectors, and isolation requirements.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: 2BN5S-2507C

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT has FPC Antenna and Dipole Antenna, and the antenna use a permanently attached antenna which is unique.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: “Contains FCC ID: 2BN5S-2507C, Contains IC: 33667-2507C”

2.9 Information on test modes and additional testing requirements⁵

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

Explanation: Top band can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and 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.

Explanation: The module without unintentional-radiator digital circuitry, so the module does not require an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

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.

Warning: 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.

FCC 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 20cm between the radiator & your body.

ISED Statement

This device complies with Industry Canada licence-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."

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

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."

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

MODIFICATION: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the device.

Toute modification non approuvée explicitement par le fournisseur de licence de l'appareil peut entraîner l'annulation du droit de l'utilisateur à utiliser l'appareil.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada

The OEM must certify the final end product to comply with unintentional radiators (FCC Sections 15.107 and 15.109) before declaring compliance of the final product to Part 15 of the FCC rules and regulations. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.

The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: 2BN5S-2507C". Additionally, the following statement should be included on the label and in the final product's user manual:

"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 interferences, and
- (2) this device must accept any interference received, including interference that may cause undesired operation."

The module is limited to installation in mobile or fixed applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations.

A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end - use operational conditions, including simultaneous transmission operations.

When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application.

When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers. Integrations using modules where additional testing and/or FCC application filing(s) may be required are: (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together.

This Module is full modular approval, it is limited to OEM installation ONLY.

Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change. (OEM) Integrator has to assure compliance of the entire end product include the integrated Module. Additional measurements (15B) and/or equipment authorizations (e.g. Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable. (OEM) Integrator is reminded to assure that these installation instructions will not be made available to the end user

IC labeling requirement for the final end product:

The final end product must be labeled in a visible area with the following “Contains IC: 33667-2507C”

The Host Marketing Name (HMN) must be indicated at any location on the exterior of the host product or product packaging or product literature, which shall be available with the host product or online.

This radio transmitter [IC:33667-2507C] has been approved by Innovation, Science and Economic Development Canada 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.

Frequency range	Manufacturer	Peak gain	Impedance	Antenna type
2402~2480MHz	SHENZHEN YINGJIACHUANG ELECTRONIC TECHNOLOGY CO.LTD.	2.89 dBi	50 Ω	Dipole Antenna
2412~2462MHz	SHENZHEN YINGJIACHUANG ELECTRONIC TECHNOLOGY CO.LTD.	2.89 dBi	50 Ω	Dipole Antenna
5150-5250 MHz	SHENZHEN YINGJIACHUANG ELECTRONIC TECHNOLOGY CO.LTD.	2.02dBi	50 Ω	Dipole Antenna
5250-5350 MHz	SHENZHEN YINGJIACHUANG ELECTRONIC TECHNOLOGY CO.LTD.	2.32dBi	50 Ω	Dipole Antenna
5470-5725 MHz	SHENZHEN YINGJIACHUANG ELECTRONIC TECHNOLOGY CO.LTD.	2.06dBi	50 Ω	Dipole Antenna
5725-5850 MHz	SHENZHEN YINGJIACHUANG ELECTRONIC TECHNOLOGY CO.LTD.	2.19dBi	50 Ω	Dipole Antenna
2402~2480MHz	SHENZHEN LINRONG TECHNOLOGY CO.LTD	3.37 dBi	50 Ω	FPC Antenna
2412~2462MHz	SHENZHEN LINRONG TECHNOLOGY CO.LTD	3.37 dBi	50 Ω	FPC Antenna
5150-5250 MHz	SHENZHEN LINRONG TECHNOLOGY CO.LTD	4.92dBi	50 Ω	FPC Antenna
5250-5350 MHz	SHENZHEN LINRONG TECHNOLOGY CO.LTD	4.09dBi	50 Ω	FPC Antenna
5470-5725 MHz	SHENZHEN LINRONG TECHNOLOGY CO.LTD	3.82dBi	50 Ω	FPC Antenna
5725-5850 MHz	SHENZHEN LINRONG TECHNOLOGY CO.LTD	4.03dBi	50 Ω	FPC Antenna

Frequency range	Manufacturer	Peak gain	Impedance	Antenna type
2402~2480MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	3.08dBi	50 Ω	FPC Antenna
2412~2462MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	3.08dBi	50 Ω	FPC Antenna
5150~5250MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	3.61dBi	50 Ω	FPC Antenna
5250~5350MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	3.32dBi	50 Ω	FPC Antenna
5470~5725MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	4.20dBi	50 Ω	FPC Antenna
5725~5850MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	4.85dBi	50 Ω	FPC Antenna
2402~2480MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	2.82dBi	50 Ω	FPC Antenna
2412~2462MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	2.82dBi	50 Ω	FPC Antenna
5150~5250MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	5.81dBi	50 Ω	FPC Antenna
5250~5350MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	5.76dBi	50 Ω	FPC Antenna
5470~5725MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	5.62dBi	50 Ω	FPC Antenna
5725~5850MHz	SHENZHENLINRONG TECHNOLOGYCO., LTD	5.44dBi	50 Ω	FPC Antenna