

CDI-W30721DM

WiFi and BT Module Spec

(UART, 1 antenna type,with shielding)

Software:

客 户 Customer	客户承认 Approve（请盖印章）	日 期 Date

拟制 Design	审核 Check	批准 Approve	版本 Version	日期 Date
			V1.4	2025.07.11

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更改记录:

Reversion History:

版本 Version	日期 Date	更改内容 Modification
1.0	2025.03.10	First release
1.1	2025.03.20	Revise PIN definition (PIN19)
1.2	2025.04.12	Update power parameter(2.4G 11g/ BLE)
1.3	2025.05.26	Update module photo (Add Laser Marking information)
1.4	2025.07.11	Update Block Diagram Correct 2.4G/5G Frequency Range

1.Overview

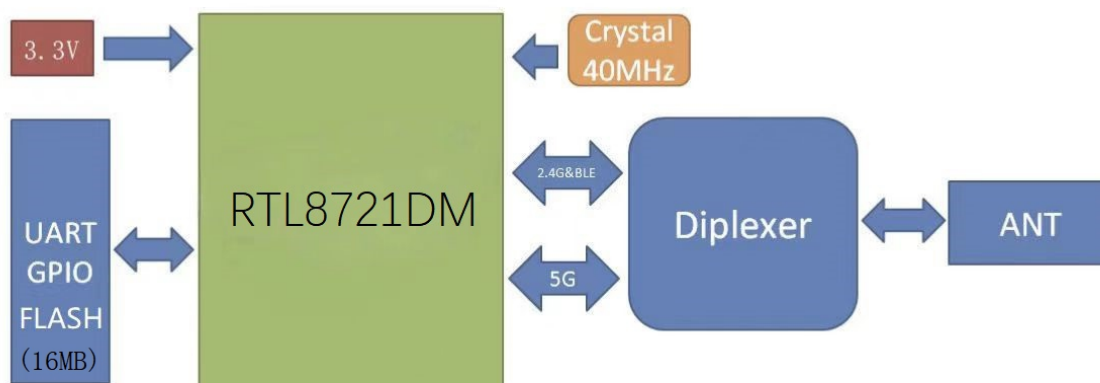
CDI-W30721DM be based on RTL8721DM-VA1 designed module , it is a highly integrated single-chip low power dual bands (2.4GHz and 5GHz) Wireles LAN (WLAN) and Bluetooth Low Energy (BLE 5.0)communication controller. It consists of a high performance MCU (Armv8-M, Cortex-M33 instruction set compatible) called Real-M300 (or KM4thereafter) and alow power MCU (Armv8-M,Cortex-M23 instruction set compatible) called RealM200 or KM0 thereafter) ,WLAN (802.11a/b/g/n) MAC, an 1T1R capable WLAN baseband, RF, Bluetooth and peripherals.

There are also audio codec, Key-Scan and touch kevs integrated into this IC Besides, High speed connectivity interfaces, SD1 and USB are provided. flexible design configures GPIO to different functions according to applications.

2.Features

- Wi-Fi 802.11 a/b/g/n 1x1, 2.4GHz &5GHz
- Supports 20MHz/40MHz up to MCS7
- Internal PTA interface for arbitrating data transmission between Wi-Fi and internal Bluetooth or external 2.4G devices
- Both central and peripheral modes
- BLE 5.0
- Low power beacon listen mode

3.Block Diagram



System block diagram

4.General Specification

Model	CDI-W30721DM
Product Name	WLAN 802.11 a/b/g/n+BLE5.0 Module Spec
Major Chipset	RTL8721DM-VA1-CG
Standard	802.11 a/b/g/n
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM
Frequency Band	Dual band 2.4GHz&5GHz ISM
Interface	UART
Operating Temperature	-10~ 70°C ambient temperature
Storage Temperature	-55 ~ 125°C ambient temperature
Humidity	5% to 90 % maximum (non-condensing)
Dimension	33.0x20.5 x3.0(L*W*H) ±0.2mm

RF Specification

2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n WiFi compliant
Frequency Range	2.412 GHz ~ 2.484 GHz
Number of Channels	2.4GHz: Ch1 ~ Ch14
Modulation	802.11b: CCK 802.11g/n: BPSK,QPSK,16QAM,64QAM/OFDM
Output Power	802.11b / 11Mbps:17.5±2dBm @ EVM ≤ -10dB 802.11g / 54Mbps:16±2dBm @ EVM ≤ -25dB 802.11n / MCS7 HT20/HT40:16±2dBm @ EVM ≤ -28dB
Receive Sensitivity 11b@8%PER	11Mbps PER @ -83dBm
Receive Sensitivity 11g@10%PER	54Mbps PER @ -71dBm
Receive Sensitivity 11n@10%PER	MCS7 PER @ -68dBm

5GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/n WiFi compliant
Frequency Range	5.18 GHz ~ 5.825 GHz
Number of Channels	CH36~CH165(20M) CH38~CH159(40M)
Modulation	802.11a: BPSK,QPSK,16QAM,64QAM/OFDM 802.11n: BPSK,QPSK,16QAM,64QAM/OFDM
Output Power	802.11a / 54Mbps:15±2dBm @ EVM ≤ -25dB 802.11n / MCS7 HT20/HT40:14±2dBm @ EVM ≤ -28dB
Receive Sensitivity 11a@10%PER	54Mbps PER @ -71dBm
Receive Sensitivity 11n@10%PER	MCS7 PER @ -68dBm

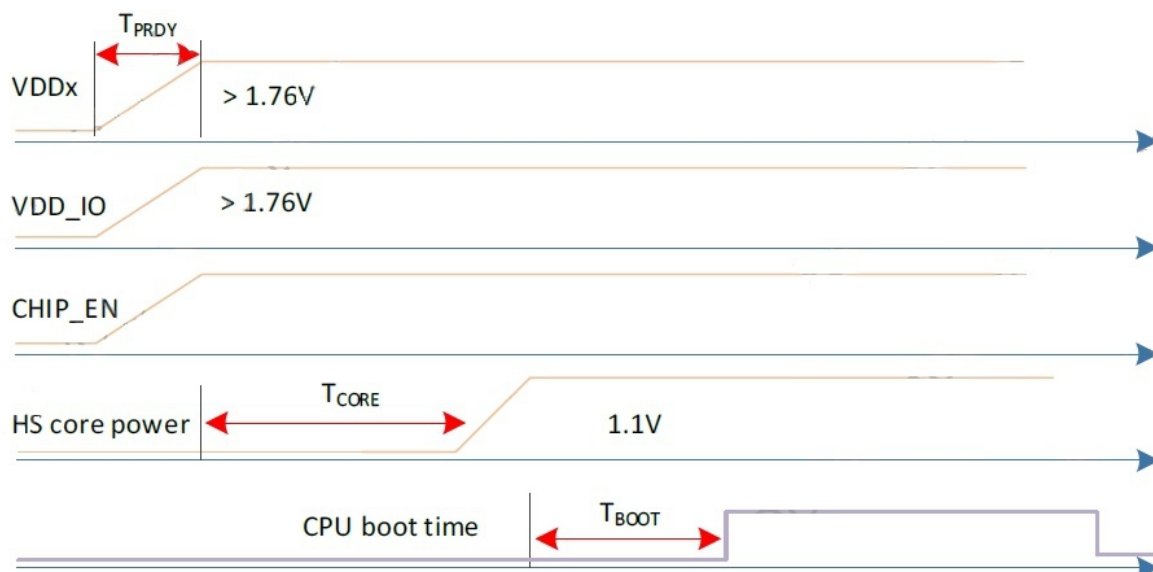
BLE RF Specification

Feature	Description
WLAN Standard	BLE5.0 1M/2Mbps
Frequency Range	2402MHz~2480MHz
Number of Channels	40 chnannels for BLE
Modulation	GFSK
Output Power	normal power 2±2dBm ,BLE low power < -20dbm
Receive Sensitivity @BER=1% FOR GFSK(1Mbps)	PER @ -86dBm
Receive Sensitivity @PER=30.8% FOR BLE	PER @ -90dBm

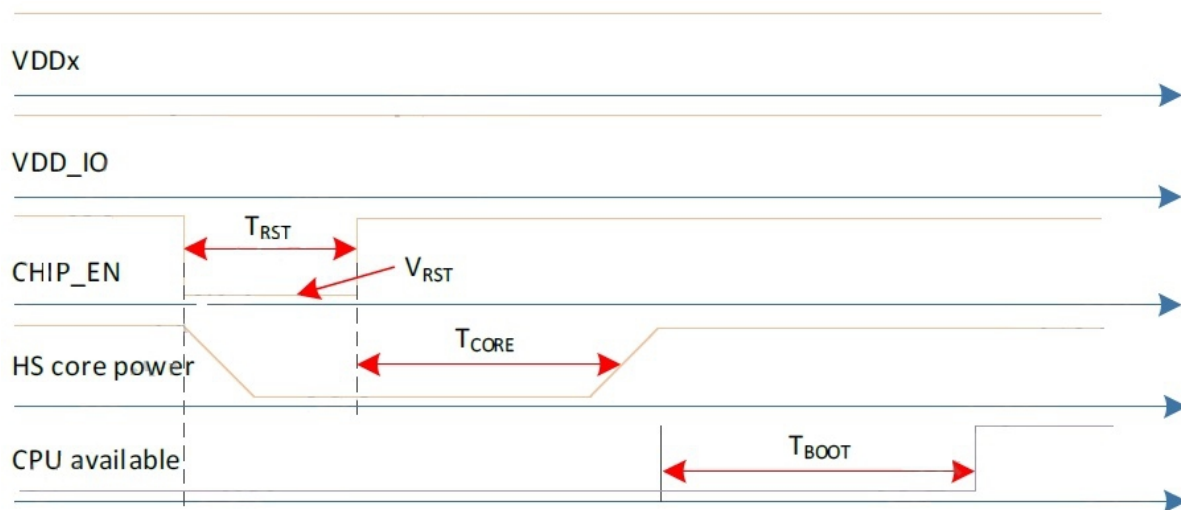
5. Electrical Characteristics

symbol	Parameter	Minimum	Typical	Maximum	Units
VBAT/VDD	3.3V supply voltage	2.97	3.3	3.63	V
VBAT/VDD	current	--	--	500	mA

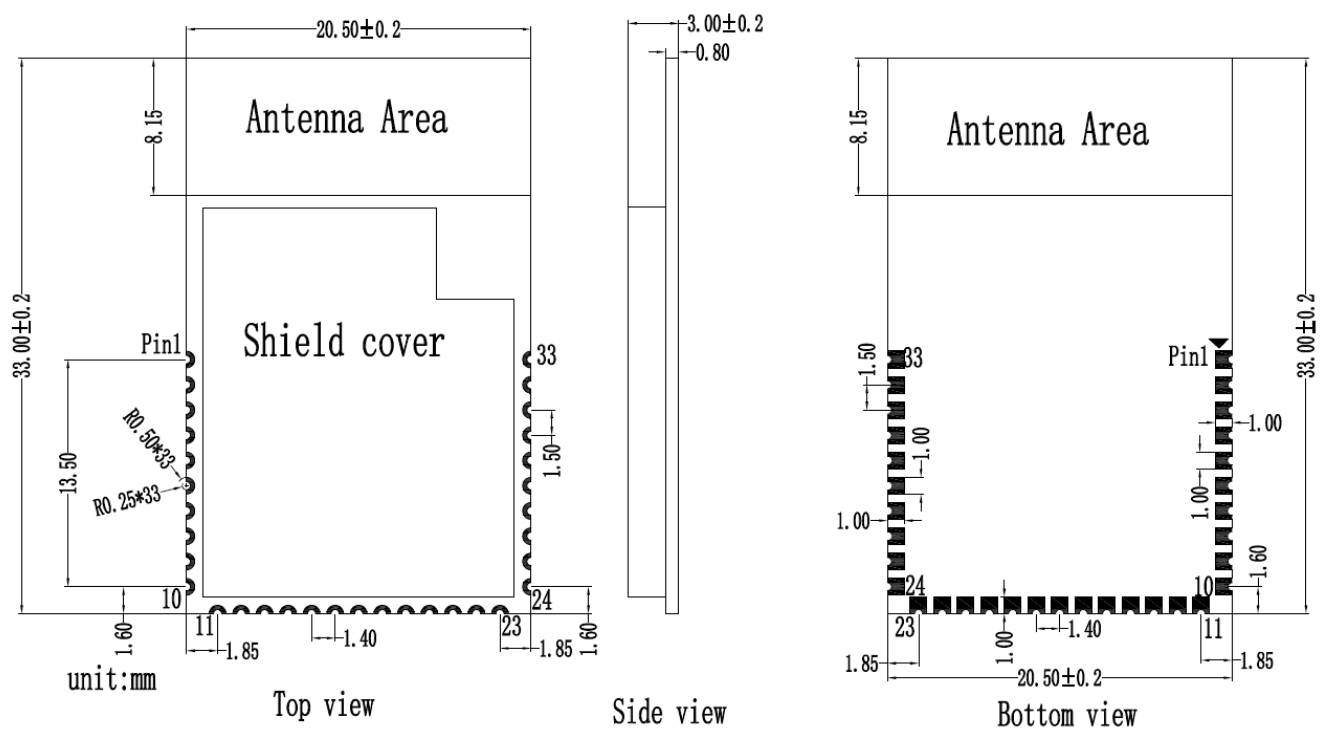
5.1 Power-on or Resuming from Deepsleep Sequence



Shutdown Sequence



6.Pin Description& Dimensions (unit: mm)



NO	Name	Description
1	GND	Ground connections
2	PA12	General purpose input/output,can be use application Tx port
3	PA13	General purpose input/output,can be use application Rx port
4	PA14	General purpose input/output
5	PA15	General purpose input/output
6	PA27	General purpose input/output
7	PA30	General purpose input/output
8	GND	Ground connections
9	VD1833	Main power source input(+3.3V)
10	GND	Ground connections
11	PA28	External reference resistor for USB analog, 1% accuracy
12	GND	Ground connections
13	PA26	USB differential bus
14	PA25	USB differential bus
15	GND	Ground connections
16	PB1	General purpose input/output
17	PB2	General purpose input/output
18	PB3	General purpose input/output
19	PB13	FLASH SPI CLK
20	PB14	FLASH SPI Data Input (Data Input Output 0)
21	PB16	FLASH Chip Select Input
22	PB17	FLASH SPI Data Input (Data Input Output 1)
23	SPI_WP	FLASH Write Protect Input
24	GND	Ground connections
25	PB22	General purpose input/output
26	PB23	General purpose input/output
27	GND	Ground connections
28	CHIP-EN	CHIP-EN(default pull-up,pull-down reset)
29	GND	Ground connections
30	PA8	UART_LOG_RX (UART_DOWNLOAD)
31	PA7	UART_LOG_TX (UART_DOWNLOAD)
32	GND	Ground connections
33	GND	Ground connections

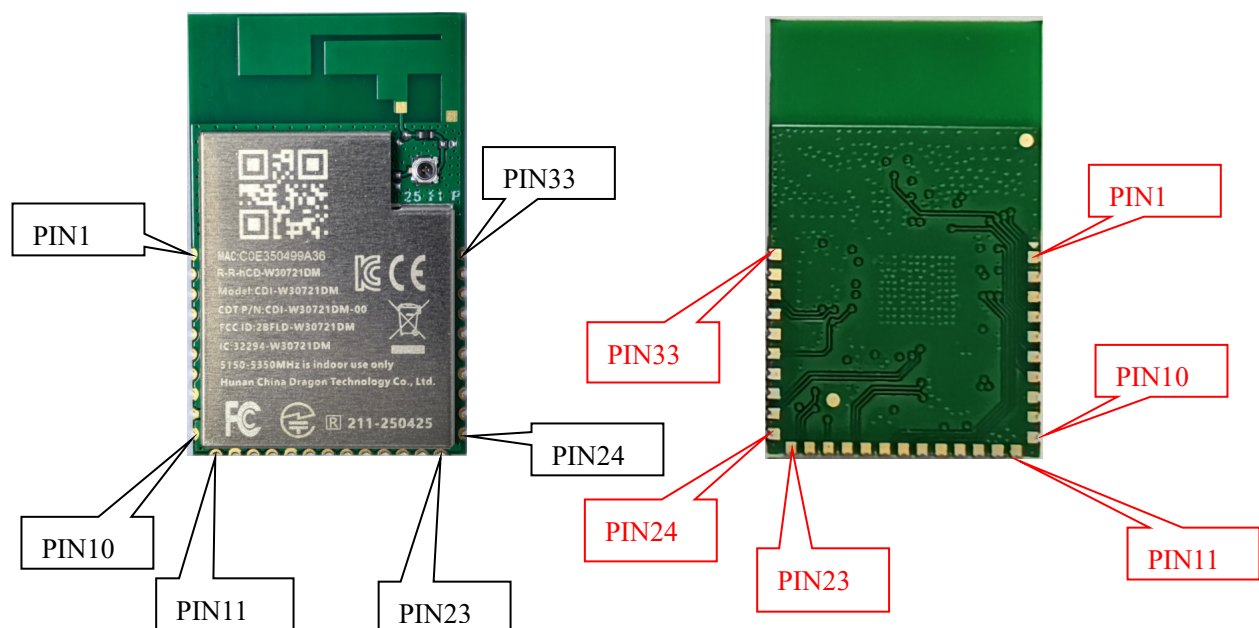
Download : UART_LOG_RX、UART_LOG_TX 、(TX ground before power-on)

When downloading software, run it first and then power on the module

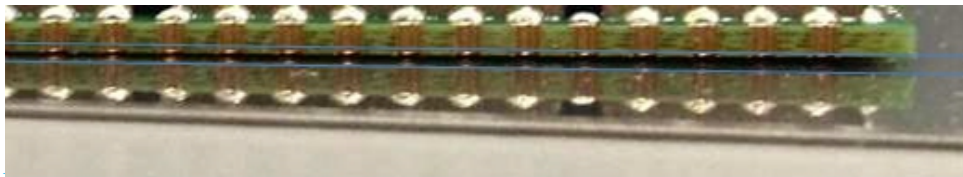
7.Supplier

Supplier list	
Name of material	Material brand
Crystal	FJ /JWT /KYX /TKD
Duplexer	ACX/Walsin/GLEAD/TDK/ Sunlord/FTR
Inductor	Sunlord/CHILISIN/SAMWHA/TDK/MuRata/INPAQ
WiFi chip	Realtek
Capacitance	SAMSUNG /EYANG/ WALSIN/ MuRata/TAIYO/ Darfon
FLASH	MXIC/Winbond/ZBIT/Fudan/GigaDevice
Switch	Maxscend/RichWave/GSR
PCB	Bomin/Kexiang/Sunlord/Taijing

8.Physical photo



9. Warpage



翘曲（间隙）的检测标准：

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 $gap \leq 0.1mm$

10. Baking & storage temperature & Recommended Reflow Profile（烘烤，储存温度和推荐炉温）

10.1 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)

D. Module reel packaging items as follows: (模块卷盘包装事项如下：)

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. Module apart packing after 168 hours, To launch patch need to bake, to move the module hygroscopic, baking temperature conditions: 125°C , 8 hours.

c. (模块拆开包装 168 小时后，如要上线贴片需要重新烘烤，以除去模块吸湿问题，烘烤温度条件： 125°C , 8 小时。)

d. The actual number of module reel packing which is based on the actual number of packages to the customer requirements.

(模块卷盘包装以客户要求的实际包装数量为准。)

E. Module pallet packaging items as follows: (模块托盘包装事项如下:)

- a. Storage life: 3 months. Storage conditions: <40°C. Relative humidity: <90%R.H.
- b. (保存期限: 3 个月, 储存环境条件: 温度在: <40°C, 相对湿度: <90%R.H.)
- c. Module if not used within 48 hours, before launch the need for baking, baking temperature: 125°C , 8 hours.
- d. (模块如在 48 小时内未使用, 在上线之前需要进行烘烤, 烘烤温度条件: 125°C, 8 小时。)
- e. Pallet packaging each plate is 100 PCS. The actual number of module pallet packing which is based on the actual number of packages to the customer requirements.
- f. (托盘包装每盘为 100pcs, 模块托盘包装以客户要求的实际包装数量为准。)

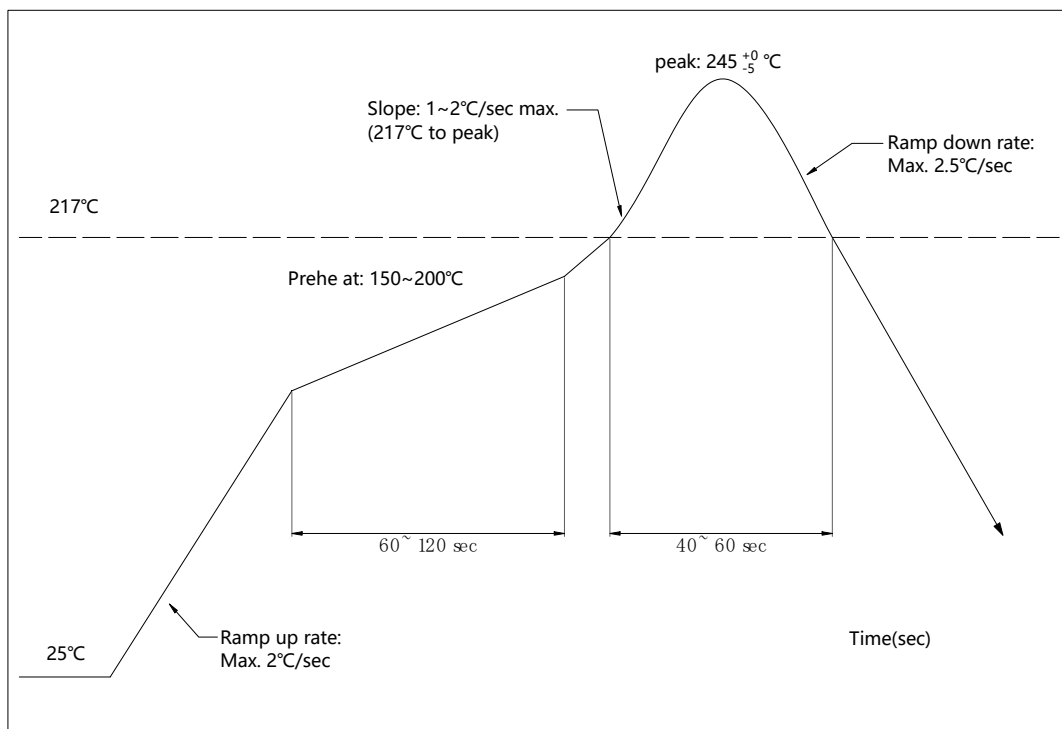
注: 以上包装方式根据客户要求而定, 包装以实际出货为准。

10.2 Recommended Reflow Profile

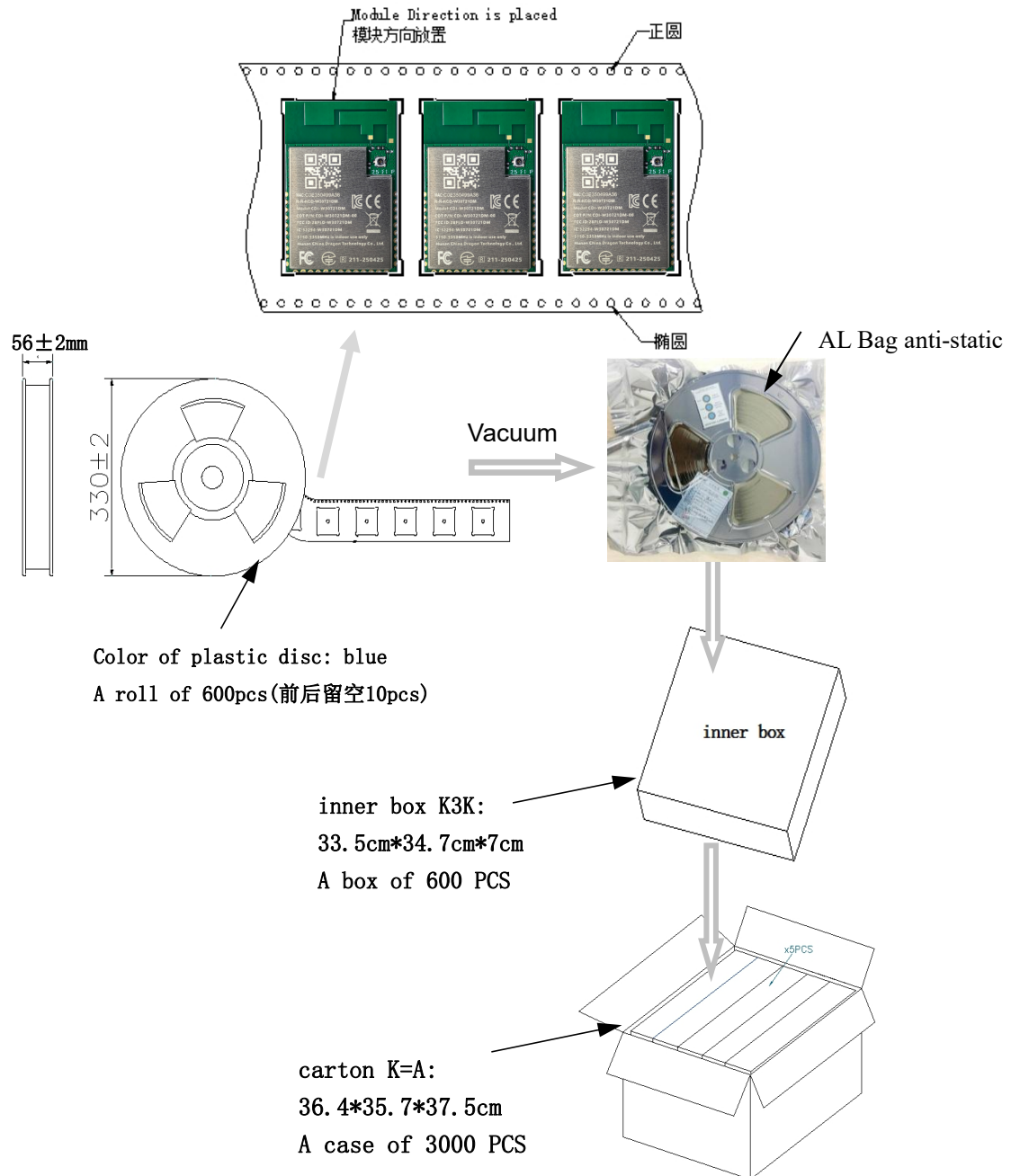
Referred IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



11. Packing information



The CDI-W30721DM is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although CDI-W30721DM is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s) and Part 15 of the FCC Rules.

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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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& IC Radiation Exposure Statement:

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

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

Déclaration d'IC sur l'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux radiations définies par le Canada pour des environnements non contrôlés. **Cet équipement doit être installé et utilisé à une distance minimum de 20 cm entre l'antenne et votre corps.**

Cet émetteur ne doit pas être installé au même endroit ni utilisé avec une autre antenne ou un autre émetteur.

The functions of Wireless Access Systems including Radio Local Area Networks(WAS/RLANs) within the band 5150-5350 MHz for this device are restricted to indoor use only within all European Union countries.

Company Name: Hunan China Dragon Technology Co., Ltd.

Address: No.13, Ziyuan Road, Xueshi Street, Yuelu, Changsha, Hunan, China

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

The module in this product is labeled with its own FCC ID. The FCC ID is not visible when the module is installed inside another device. Therefore, the outside of the device into which the module is installed must also display a label referring to the module. The final end device must be labeled in a visible area with the following

“Contains FCC ID: **2BFLD-W30721DM**”

The module for the host product shall be labeled with its own IC. The IC is not visible when the module is installed inside another device. Therefore, the outside of the device into which the module is installed must also display a label referring to the module. The final end device must be labeled in a visible area with the following

“Contains IC: **32294-W30721DM**”

The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:

- i. the device for operation in the band 5150 – 5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- ii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
- iii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; and
- iv. where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:

- i. the device for operation in the band 5150 – 5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
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 - iii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; and
 - iv. where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.
- i. le dispositif utilisé dans la bande 5150-5250 MHz est réservé à une utilisation en intérieur afin de réduire le risque de brouillage préjudiciable aux systèmes mobiles par satellite dans le même canal;
- ii. pour les dispositifs à antenne (s) détachable (s), le gain d'antenne maximal autorisé pour les dispositifs dans les bandes 5250-5350 MHz et 5470-5725 MHz doit être tel que l'équipement soit toujours conforme à la norme e.i.r.p. limite;
- iii. pour les dispositifs à antenne (s) détachable (s), le gain d'antenne maximal autorisé pour les dispositifs de la bande 5725-5850 MHz doit être tel que l'équipement soit toujours conforme à la norme e.i.r.p. les limites, le cas échéant; et
- iv. le cas échéant, le (s) type (s) d'antenne, le (s) modèle (s) d'antenne et l'angle (s) d'inclinaison le plus défavorable nécessaire (s) pour rester conforme (e) au p.e. L'exigence relative au masque d'élévation

énoncée à la section 6.2.2.3 doit être clairement indiquée.

当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している

Translation: “This equipment contains specified radio equipment that has been certified to the Technical Regulation Conformity Certification under the Radio Law.”