

CDW-208821C-00

DATASHEET

Software:

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

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更改记录:

Reversion History:

版本 Version	日期 Date	更改内容 Modification
1.0	2019.04.25	First release
1.1	2022.02.10	update Physical Dimensions

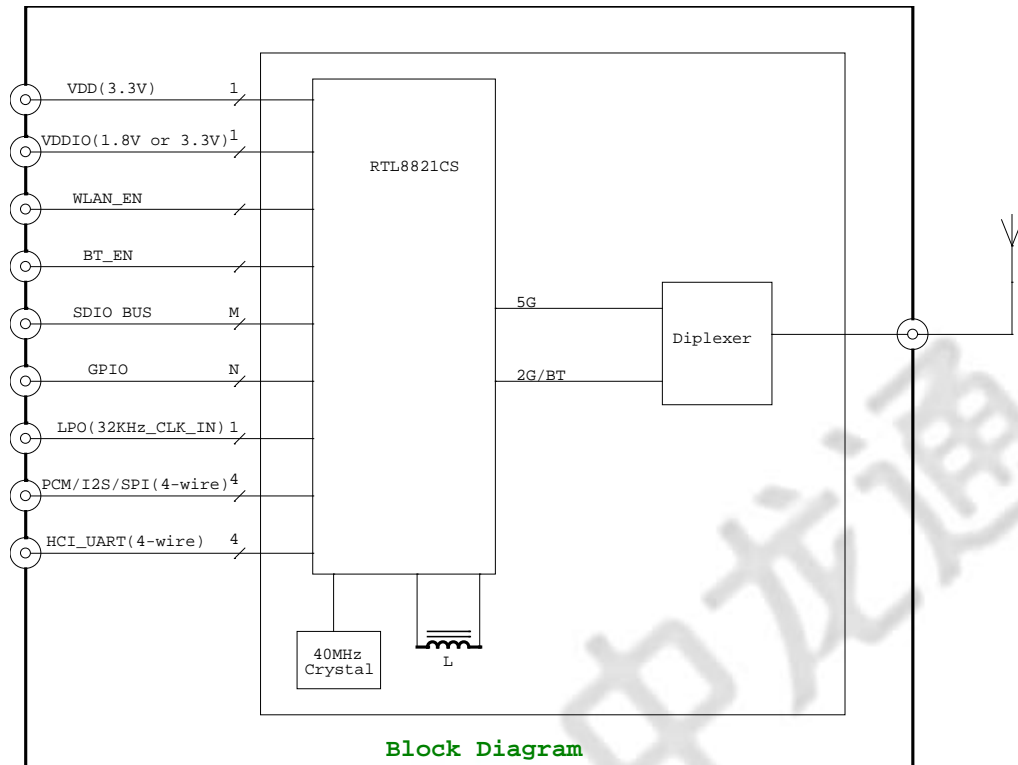
1. Overview

The 208821C-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/ac WLAN standards and BT 4.2 + HS, enabling seamless integration of WLAN/BT and low-energy technology.

2. Features

- Supports a low-power SDIO 3.0 interface for WLAN and a UART/PCM interface for BT
- Provides a highly integrated WLAN system-on-chip (SoC) for 5 GHz 802.11ac, or 2.4 GHz/5 GHz 802.11n WLAN applications
- Support WLAN 2.4GHz and 5GHz band channels
- Supports BT 4.2 + HS, BLE, and ANT+ and backward compatibility with BT 1.x and BT 2.x + Enhanced Data Rate
- Supports a single-ended RF port for cleaner and lower cost design
- Supports 20 MHz/40 MHz at 2.4 GHz and supports 20 MHz, 40 MHz, or 80 MHz at 5 GHz
- Supports multiuser MIMO

3. Block Diagram



4. General Specification

Model	CDW-208821C-00
Product Name	WLAN 11a/b/g/n/ac SDIO3.0 1T1R + Bluetooth 4.2 module
Major Chipset	RTL8821CS
Standard	802.11a/b/g/n/ac
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM/256-QAM
Frequency Band	2.4GHz and 5GHz ISM Band
WiFi Interface	SDIO3.0
BT Interface	UART/PCM
Operating Temperature	-20° C ~ 85° C
Storage Temperature	-40° C ~ 85° C
Humidity	5% to 90% maximum
Dimension	12x12x2.0 (LxWxH) ±0.2mm

5. Electrical Characteristics

5.1 WiFi Section:

2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n 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
Output Power	802.11b / 1Mbps : 17dBm \pm 2 dB @ EVM \leq -10dB 802.11b /11Mbps : 17dBm \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 : 14 dBm \pm 2 dB @ EVM \leq -30dB
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -95 dBm, typical
	- 2Mbps PER @ -93 dBm, typical
	- 5.5Mbps PER @ -90 dBm, typical
	- 11Mbps PER @ -87 dBm, typical
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -90 dBm, typical
	- 9Mbps PER @ -89 dBm, typical
	- 12Mbps PER @ -88 dBm, typical
	- 18Mbps PER @ -85 dBm, typical
	- 24Mbps PER @ -82 dBm, typical
	- 36Mbps PER @ -79 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 @ -85 dBm, typical
	- MCS=3 PER @ -81 dBm, typical
	- MCS=4 PER @ -78 dBm, typical
	- MCS=5 PER @ -73 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 @ -82 dBm, typical
	- MCS=3 PER @ -79 dBm, typical
	- MCS=4 PER @ -75 dBm, typical
	- MCS=5 PER @ -71 dBm, typical
	- MCS=6 PER @ -69 dBm, typical
	- MCS=7 PER @ -68 dBm, typical
Maximum Input Level	802.11b : -10 dBm
	802.11g/n : -20 dBm
Antenna Reference	Small antennas with 0~2 dBi peak gain

5GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac 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
Output Power	802.11a / 6Mbps : 17 dBm ± 2 dB @ EVM ≤ -5dB 802.11a /54Mbps : 14 dBm ± 2 dB @ EVM ≤ -25dB 802.11n HT20 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11n HT20 /MCS7 : 13 dBm ± 2 dB @ EVM ≤ -28dB 802.11n HT40 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11n HT40 /MCS7 : 13dBm ± 2 dB @ EVM ≤ -28dB 802.11ac VHT20 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT20 /MCS8 : 13 dBm ± 2 dB @ EVM ≤ -30dB 802.11ac VHT40 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT40 /MCS9 : 12 dBm ± 2 dB @ EVM ≤ -32dB 802.11ac VHT80 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT80 /MCS9 : 12 dBm ± 2 dB @ EVM ≤ -32dB
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -89 dBm, typical - 9Mbps PER @ -88 dBm, typical - 12Mbps PER @ -87 dBm, typical - 18Mbps PER @ -84 dBm, typical - 24Mbps PER @ -81 dBm, typical - 36Mbps PER @ -78 dBm, typical

	- 48Mbps PER @ -73 dBm, typical
	- 54Mbps PER @ -72 dBm, typical
Receive Sensitivity (11n,20MHz) @ 10% PER	- MCS=0 PER @ -89 dBm, typical
	- MCS=1 PER @ -86 dBm, typical
	- MCS=2 PER @ -84 dBm, typical
	- MCS=3 PER @ -81 dBm, typical
	- MCS=4 PER @ -77 dBm, typical
	- MCS=5 PER @ -72 dBm, typical
	- MCS=6 PER @ -71 dBm, typical
Receive Sensitivity (11n,40MHz) @ 10% PER	- MCS=0 PER @ -86 dBm, typical
	- MCS=1 PER @ -83 dBm, typical
	- MCS=2 PER @ -81 dBm, typical
	- MCS=3 PER @ -78 dBm, typical
	- MCS=4 PER @ -74 dBm, typical
	- MCS=5 PER @ -70 dBm, typical
	- MCS=6 PER @ -68 dBm, typical
Receive Sensitivity (11ac,20MHz) @ 10% PER	- MCS=0, NSS1 PER @ -87 dBm, typical
	- MCS=1, NSS1 PER @ -85 dBm, typical
	- MCS=2, NSS1 PER @ -83 dBm, typical
	- MCS=3, NSS1 PER @ -80 dBm, typical
	- MCS=4, NSS1 PER @ -76 dBm, typical
	- MCS=5, NSS1 PER @ -71 dBm, typical
	- MCS=6, NSS1 PER @ -70 dBm, typical
	- MCS=7, NSS1 PER @ -69 dBm, typical
	- MCS=8, NSS1 PER @ -65 dBm, typical
Receive Sensitivity (11ac,40MHz) @ 10% PER	- MCS=0, NSS1 PER @ -85 dBm, typical
	- MCS=1, NSS1 PER @ -82 dBm, typical
	- MCS=2, NSS1 PER @ -80 dBm, typical
	- MCS=3, NSS1 PER @ -77 dBm, typical
	- MCS=4, NSS1 PER @ -74 dBm, typical
	- MCS=5, NSS1 PER @ -69 dBm, typical
	- MCS=6, NSS1 PER @ -68 dBm, typical
	- MCS=7, NSS1 PER @ -67 dBm, typical
- MCS=8, NSS1 PER @ -62 dBm, typical	

	- MCS=9, NSS1 PER @ -58 dBm, typical
Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -82 dBm, typical
	- MCS=1, NSS1 PER @ -79 dBm, typical
	- MCS=2, NSS1 PER @ -77 dBm, typical
	- MCS=3, NSS1 PER @ -73 dBm, typical
	- MCS=4, NSS1 PER @ -70 dBm, typical
	- MCS=5, NSS1 PER @ -67 dBm, typical
	- MCS=6, NSS1 PER @ -65 dBm, typical
	- MCS=7, NSS1 PER @ -63 dBm, typical
	- MCS=8, NSS1 PER @ -59 dBm, typical
	- MCS=9, NSS1 PER @ -55 dBm, typical
Maximum Input Level	802.11a/n/ac : -20 dBm
Antenna Reference	Small antennas with 0~2 dBi peak gain

5.2 5GHz(20MHz) Channel table

Band (GHz)	Operating Channel Numbers	Channel center frequencies(MHz)
5.15GHz~5.25GHz	36	5180
	40	5200
	44	5220
	48	5240
5.25GHz~5.35GHz	52	5260
	56	5280
	60	5300
	64	5320
5.5GHz~5.7GHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660

	136	5680
	140	5700
5.725GHz~5.825GHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

5.3 Bluetooth Section:

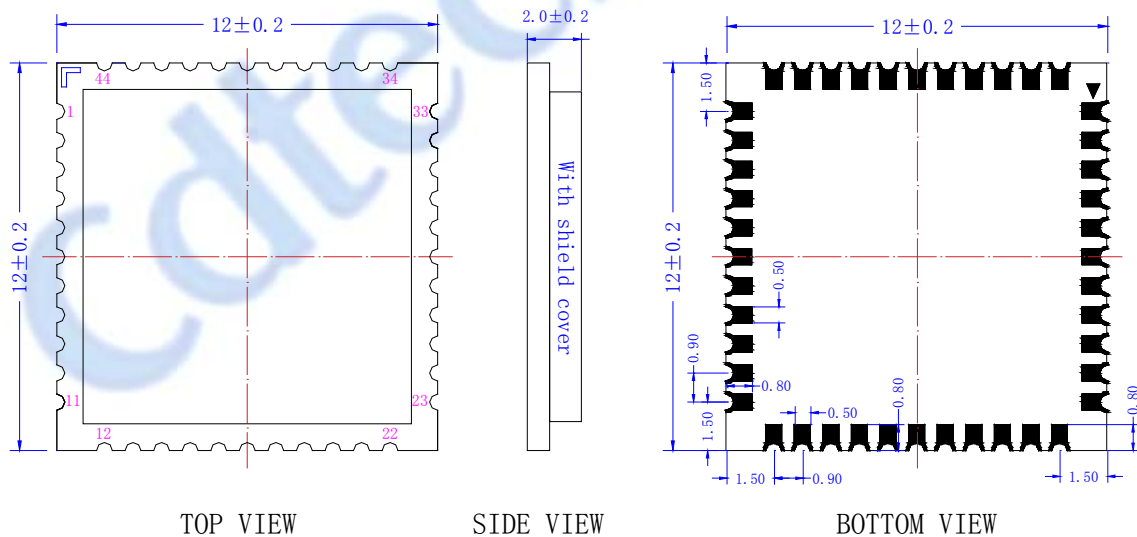
Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V4.2 of 1, 2 and 3 Mbps.		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	FHSS, GFSK, DPSK, DQPSK		
RF Specification			
	Min.	Typical.	Max.
Output Power (Class 1.5)		10 dBm	
Output Power (Class 2)		2 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-86 dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-86 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80 dBm	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

6. Electrical Characteristics

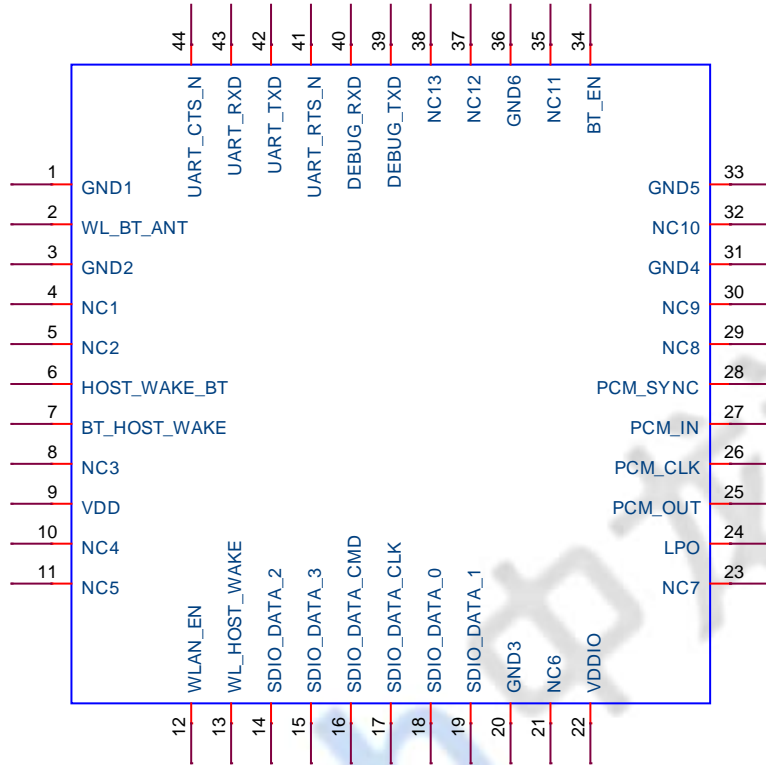
symbol	Parameter	Minimum	Typical	Maximum	Units
VDD	3.3V supply voltage	3.0	3.3	3.6	V
VDDIO	I/O supply voltage	1.62	1.8 or 3.3	3.46	V
VDD	3.3V rating current	--	--	1000	mA

7. Physical Dimensions

(Unit: mm)



8. Pin Description



NO.	Name	Type	Description
1	GND	—	Ground connections
2	RF	I/O	RF I/O port (2.4G and 5G)
3	GND	—	Ground connections
4	NC	—	No connect
5	NC	—	No connect
6	HOST_WAKE_BT	I	HOST wake up Bluetooth device(GPIO13)
7	BT_WAKE_HOST	O	Bluetooth device to wake Host(GPIO14)
8	NC	—	No connect (SDIO_INT_OOB/TEST_MD_SEL) (GPIO4)
9	VDD	P	3.3V INPUT
10	NC	—	No connect
11	NC	—	No connect
12	WLAN_EN	I	Enable pin for WLAN device(GPIO9)
13	WL_HOST_WAKE	O	WL_WAKE_HOST(GPIO10)
14	SD_DAT2	I/O	SDIO DATA2

15	SD_DAT3	I/O	SDIO DATA3
16	SD_CMD	I/O	SDIO command line
17	SD_CLK	I/O	SDIO CLK
18	SD_DAT0	I/O	SDIO DATA0
19	SD_DAT1	I/O	SDIO DATA1
20	GND	—	Ground connections
21	NC	—	No connect
22	VDDIO	P	I/O Voltage supply input 1.8V or 3.3V
23	NC	—	No connect
24	LPO	I	32.768KHz input(EECS)
25	PCM_OUT	O	PCM data output
26	PCM_CLK	I/O	PCM CLK
27	PCM_IN	I	PCM data input
28	PCM_SYNC	I	PCM sync signal
29	NC	—	No connect
30	NC	—	No connect(Share 26MHz_IN)
31	GND	—	Ground connections
32	NC	—	No connect
33	GND	—	Ground connections
34	BT_EN	I	Enable pin for Bluetooth device(GPIO11)
35	NC	—	No connect(Share VBAT_EN)
36	GND	—	Ground connections
37	NC	—	No connect
38	NC	—	No connect
39	DEBUG_TXD	—	No connect
40	DEBUG_RXD	—	No connect
41	UART_RTS_N	I	Bluetooth UART interface
42	UART_TXD	O	Bluetooth UART interface
43	UART_RXD	I	Bluetooth UART interface
44	UART_CTS_N	I	Bluetooth UART interface

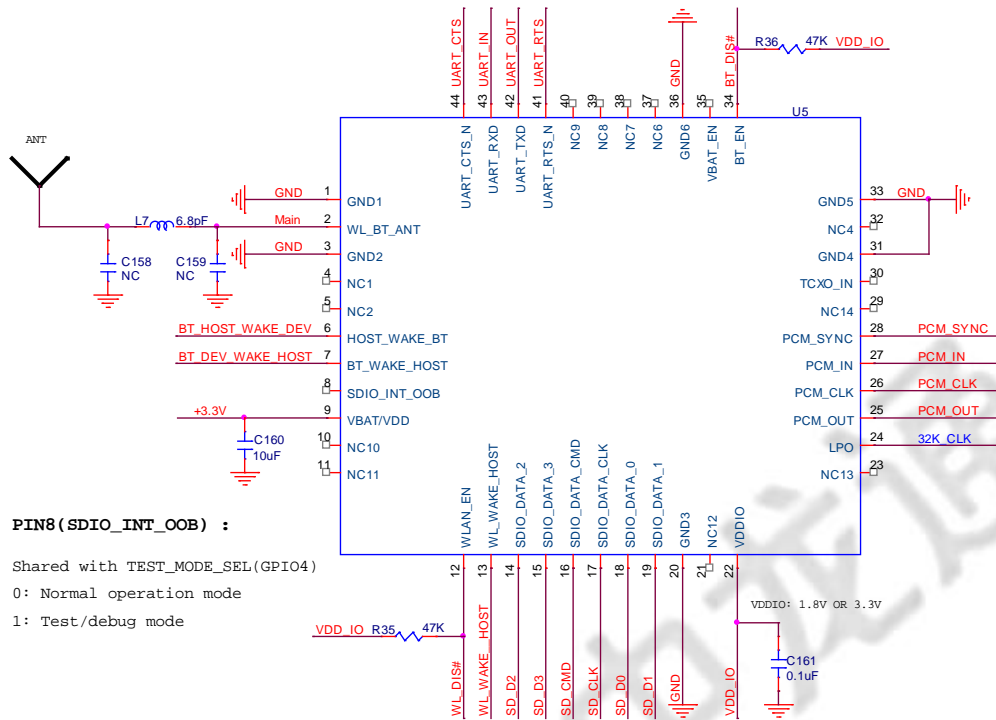
9. Suplier

二级供应商清单	
物料名称	供应商品牌
晶振	JWT/FK/TKD/Murata/TXC
双工器	TDK/ACX/GLEAD
电感	Sunlord/ CHILISIN/ SAMWHA/Murata
wifi 芯片	Realtek
电容	SAMSUNG /EYANG
电阻	UniOhm /YAGEO
PCB(12x12x0.6mm)	A,O

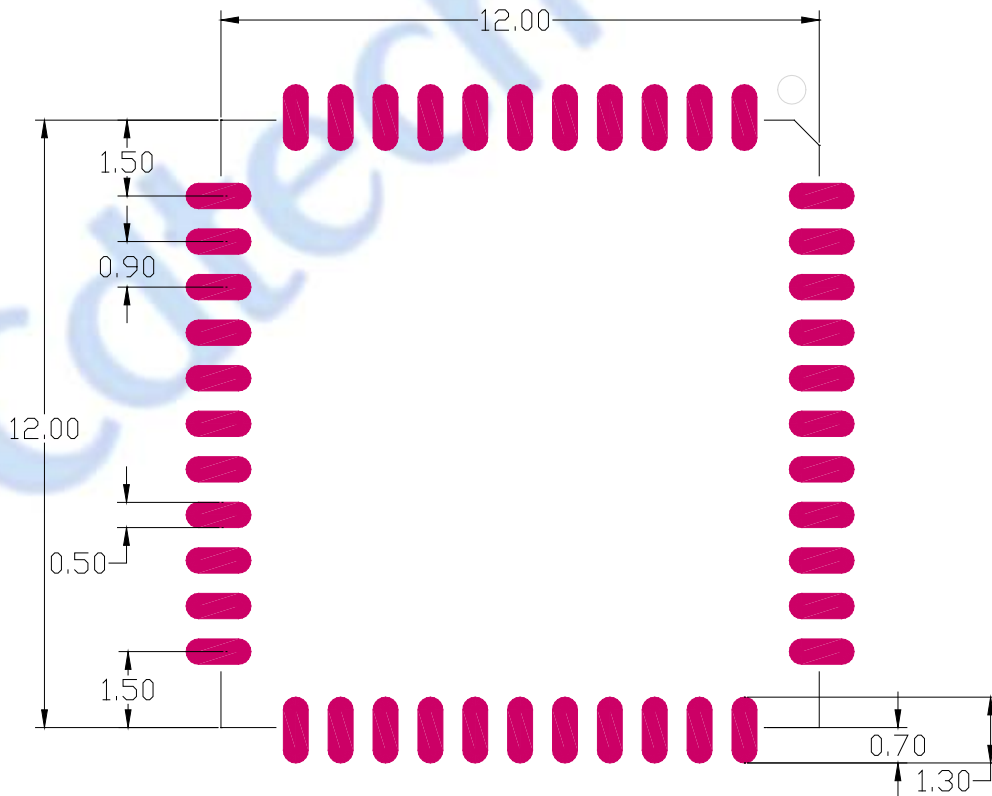
10. Physical photo



11. Application schematic



12. Layout Recommendation



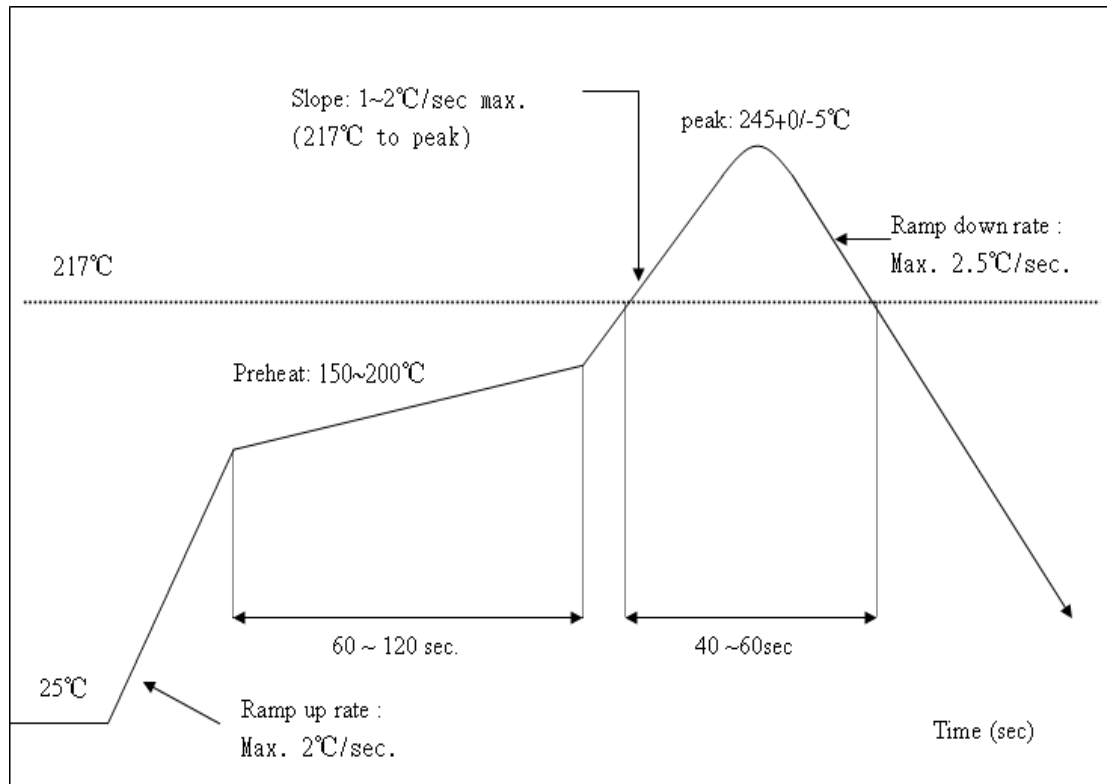
(Top view)

13. Recommended Reflow Profile

Referred IPC/JEDEC standard.

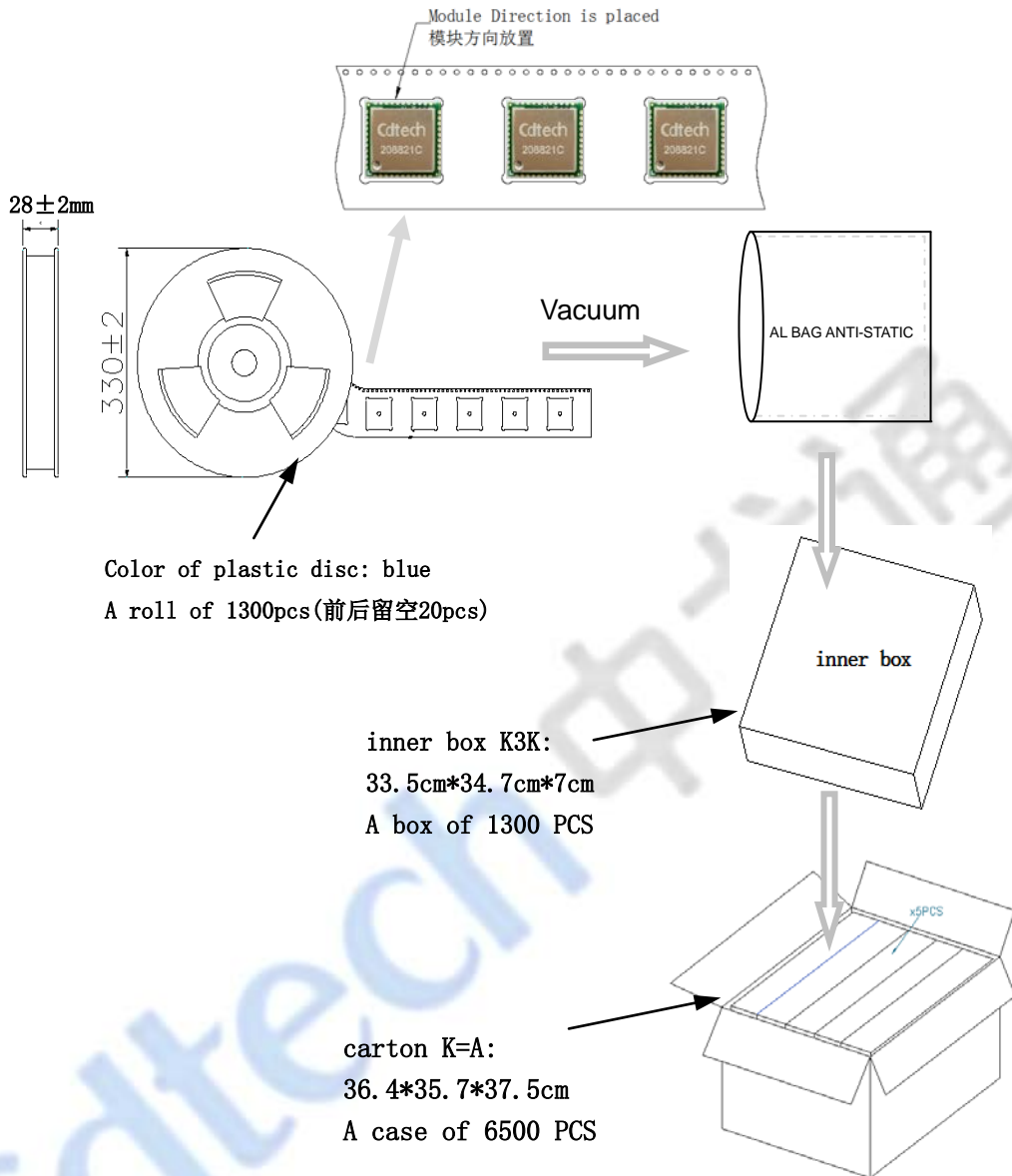
Peak Temperature : <math><250^{\circ}\text{C}</math>

Number of Times : 3 tim



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14. Packing information



ESD CAUTION

The 208821C-00 is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although 208821C-00 is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.