



B-LINK®

BL-M8822CP1

802.11ac 867Mbps WLAN + BT v5.0

M.2 2230 Key A+E Card Specification

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(Top View)



(Bottom View)

Card Name: BL-M8822CP1	
Card Type: 802.11a/b/g/n/ac 867Mbps WLAN + Bluetooth v5.0 Combo M.2 Card	
Revision: V1.1	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
B-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date	Revised By
1.0	Content optimization	2023-04-08	Qx
1.1	Update picture	2023-11-01	Fnz

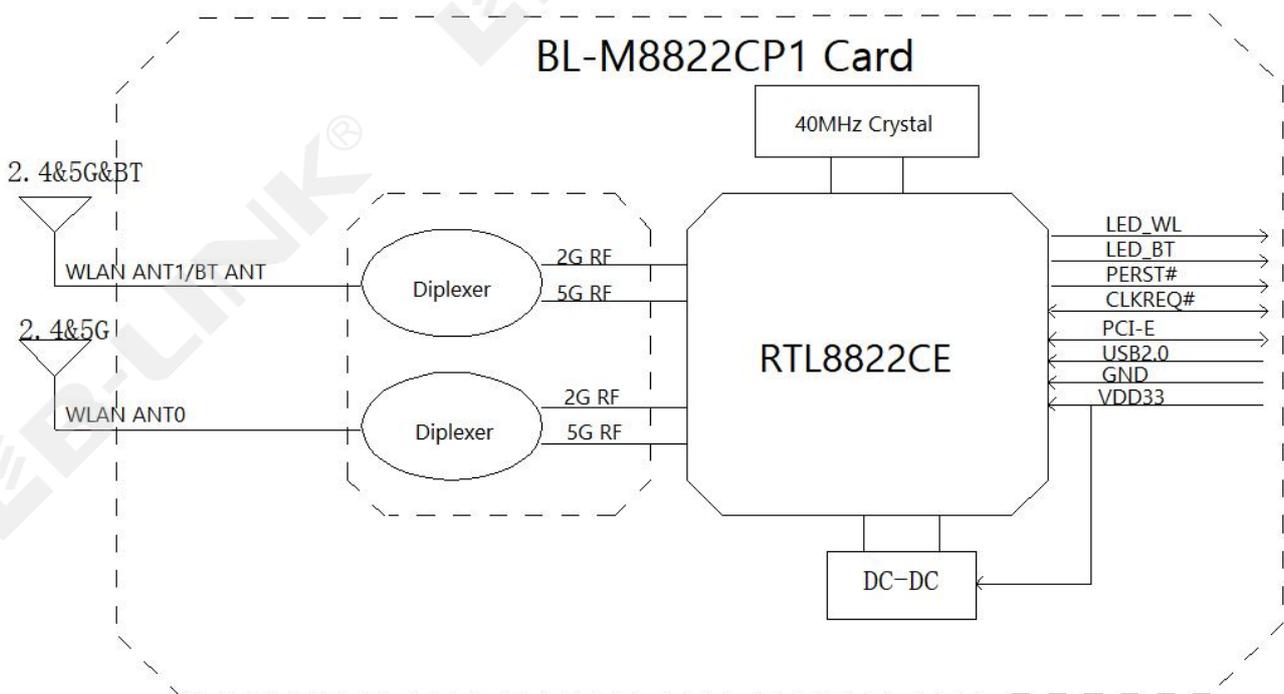
1.Introduction

BL-M8822CP1 is a highly integrated Dual-band WLAN+Bluetooth Combo M.2 Card. It combines a 2T2R Dual-band WLAN subsystem with PCI Express interface controllers and a Bluetooth v5.0 subsystem with USB interface controller. This card compatible IEEE 802.11 a/b/g/n/ac standard and provides the maximum PHY rate up to 867Mbps, it supports Bluetooth dual mode with v5.0/v4.2/v2.1 compliant. The card provides a complete solution for high-performance integrated wireless and Bluetooth devices such as laptops, set-top boxes, smart TVs, etc.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- IEEE Standards: IEEE 802.11a/b/g/n/ac
- Form factor: M.2 2230 generic A key or E key
- Wireless PHY rate can reach up to 867Mbps
- Connect to external antenna through MHF4 connectors
- Power Supply: DC3.3V±0.2V power supply

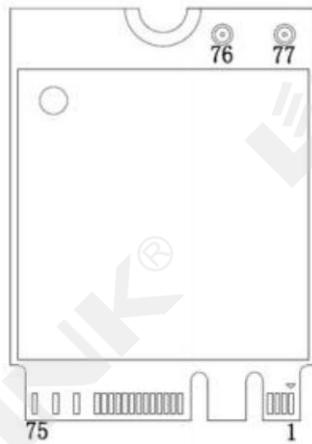
1.2 Block Diagram



1.3 General Specifications

Card Name	BL-M8822CP1
Chipset	RTL8822CE-CG
WLAN Standards	IEEE802.11a/b/g/n/ac
BT Specification	Bluetooth Core Specification v5.0/4.2/2.1
Host Interface	PCI Express 2.1 for WLAN & USB2.0 FS for Bluetooth
Antenna	Connect to the external antennas through MHF4 connector
Dimension	M.2, 30*22*2.15mm (L*W*H)
Power Supply	DC 3.3V±0.2V@ 1000mA (Max)
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



(Top View)



(Bottom View)

2.1 Pin Definition

No	Pin Name	Type	I/O Level	Card Pin Description
1	GND	P		Ground
2	VDD33	P		DC 3.3V power supply

3	USB_D+	A I/O		USB Transmitter/Receiver Differential Pair for BT
4	VDD33	P		DC 3.3V power supply
5	USB_D-	A I/O		USB Transmitter/Receiver Differential Pair for BT
6	WL_LED	O	3.3V	1. General Purpose Input/ Output Pin GPIO8 2. WLAN LED Pin (Active Low)
7	GND	P		Ground
8	NC	--		No connection(floating)
9	NC	--		No connection(floating)
10	NC	--		No connection(floating)
11	NC	--		No connection(floating)
12	NC	--		No connection(floating)
13	NC	--		No connection(floating)
14	NC	--		No connection(floating)
15	NC	--		No connection(floating)
16	BT_LED	O	3.3V	BT LED Pin (Active Low)
17	NC	--		No connection(floating)
18	GND	P		GND
19	NC	--		No connection(floating)
20	UART WAKE	O	3.3V	Shared with GPIO14. Internal pull high by 47K resistor.
21	NC	--		No connection(floating)
22	NC	--		No connection(floating)
23	NC	--		No connection(floating)
24	Connector Key	--		Connector Key
25	Connector Key	--		Connector Key
26	Connector Key	--		Connector Key
27	Connector Key	--		Connector Key
28	Connector Key	--		Connector Key
29	Connector Key	--		Connector Key
30	Connector Key	--		Connector Key
31	Connector Key	--		Connector Key
32	NC	--		No connection(floating)
33	GND	P		Ground
34	NC	--		No connection(floating)
35	PERp0+	AI		PCI Express receive differential pair for WLAN
36	NC	--		No connection(floating)
37	PERn0-	AI		PCI Express receive differential pair for WLAN
38	HOST_WAKE_BT	O	3.3V	Shared with GPIO13. HOST to wake up BT
39	GND	P		GND
40	NC	--		No connection(floating)

41	PETp0+	AO		PCI Express transmit differential pair for WLAN
42	NC	--		No connection(floating)
43	PETn0-	AO		PCI Express transmit differential pair for WLAN
44	LTE COEX3	I/O	3.3V	Shared with GPIO7.
45	GND	P		GND
46	LTE TXD	I/O	3.3V	Shared with GPIO12.
47	PEFCLK+	AI		Input signal for PCIE differential reference clock (100MHz)
48	LTE RXD	I/O	3.3V	Shared with GPIO12.
49	PEFCLK-	AI		Input signal for PCIE differential reference clock (100MHz)
50	SUSCLK (32KHz)	I	3.3V	32.768KHz clock supply input that is provided to reduce power and cost for the card. SUSCLK will have a duty cycle that can be as low as 30% or as high as 70% with 200ppm tolerance
51	GND	P		GND
52	PERST#	I	3.3V	PCI Express Reset Signal, active low input. When the PERST# is asserted at power-on state , the RTL8822CE returns to a pre-defined reset state and is ready for initialization and configuration after the de-assertion of the PERST#
53	CLKREQ#	O/D	3.3V	Reference Clock Request output Signal. Also used by LI PM substates. This signal is used by the RTL8822CE to request for the PCI Express reference clock
54	BT_DIS_#	I	3.3V	Shared with GPIO11. This pin can externally shut down the RTL8822CE BT function when BT_DIS_# is pulled Low . When this pin is pulled low , USB interface will be also disabled . When this function is not required , external pull high is not required
55	WAKE#	O/D	3.3V	Power Management Event : Open drain active low output. Used to reactivate the PCI Express slots main power rails and reference clocks. This WAKE# can be shared with BT wake up host function via side band signals
56	WL_DIS_#	I	3.3V	Shared with GPIO9 ,This pin can be defined as the WLAN Radio-of function with host interface remaining connected . When this pin is pulled low, WLAN function will be Radio-off. When this function is not required, external pull high is not required
57	GND	P		GND
58	NC	--		No connection(floating)

59	NC	--		No connection(floating)
60	NC	--		No connection(floating)
61	NC	--		No connection(floating)
62	NC	--		No connection(floating)
63	GND	P		GND
64	NC	--		No connection(floating)
65	NC	--		No connection(floating)
66	PCM_IN	I/O	3.3V	Shared with GPI09
67	NC	--		No connection(floating)
68	PCM_OUT	I/O	3.3V	Shared with GPI01
69	GND	P		GND
70	PCM_SYNC	I/O	3.3V	Shared with GPI02
71	NC	--		No connection(floating)
72	3.3Vaux	P		Auxiliary DC3.3V power supply ("3.3Vaux" and "VDD33" are connected together in the card)
73	NC	--		No connection(floating)
74	3.3Vaux	P		Auxiliary DC3.3V power supply ("3.3Vaux" and "VDD33" are connected together in the card)
75	GND	P		GND
77	RF			IPEX connector for 2.4G WLAN/5G WLAN/2.4G BT RF to ANT1
76	RF			IPEX connector for 2.4G WLAN / 5G WLAN / to ANT0

P: Power or Ground; I/O: In/Output; I: Input; A I/O: Analog In/Output; AI: Analog Input;
 AO: Analog Output; RF: Analog RF Port or RF Ground; O/D:Open Drain Output;

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters	Min	Typ	Max	Units	
Ambient Operating Temperature	-20	25	70	°C	
* Limited Ambient Operating temperature	-40	25	85	°C	
External Antenna VSWR		1.7	2	/	
Supply Voltage	VDD33	3.1	3.3	3.5	V

Note: * The card has passed the WLAN communication test in this temperature range, but the RF specifications and WLAN throughput performance cannot be guaranteed.

3.2 Current Consumption

Conditions : VDD33=3.3V ; Ta:25°C			
Use Case	VDD33 Current(average)		
	Typ	Max	Units
WLAN Unassociated (Linux Driver, BT disable)	195	210	mA
2.4G HT40 RX Listen (Linux Driver, BT disable)	180	200	mA
5G VHT80 RX Listen (Linux Driver, BT disable)	202	214	mA
Bluetooth Unassociated (Linux Driver, WLAN disable)	33	35	mA
2.4G 11n@HT20 MCS8 TX@18dBm (2TX RF-Test)	648	655	mA
2.4G 11n@HT40 MCS15 TX@16dBm(2TX RF-Test)	380	390	mA
2.4G 11n@HT40_MCS15 RX (2RX RF-Test)	232	240	mA
5G 11ac@VHT80 MCS0 TX@16dBm(2TX RF-Test)	490	500	mA
5G 11ac@VHT80 MCS9 TX@14dBm(2TX RF-Test)	339	347	mA
5G 11ac@VHT80 MCS9 RX (2RX RF-Test)	237	246	mA
BT			
BT BR_1M DH5 TX@5dBm (RF test)	305	310	mA
BT EDR_3M DH5 TX@5dBm (RF test)	303	309	mA
BT LE_2M TX@5dBm (RF test)	296	312	mA
LE 2M RX (RF-Test)	278	285	mA
BT BR_1M DH5 RX(RF test)	258	265	mA
BT LE_2M RX(RF test)	258	264	mA

4. WLAN & Bluetooth RF Specifications

4.1 2.4G WLAN RF Specification

Conditions : VDD33=3.3V ; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11b/g/n

Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)
Channels	Ch1~Ch13 (For 20MHz Channels)
Modulation	802.11b (DSSS): CCK, DQPSK, DBPSK; 802.11g (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;
Data 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 (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps;
Frequency Tolerance	≤±20ppm

2.4G Transmitter Specifications (ANT0 & ANT1. TX power of some rates is calibrated, customers can define the target TX power of other rates by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)

TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11b@1Mbps	Recommended Target TX Power : 18	±2	≅ -10
802.11b@11Mbps	Calibrated TX Power :18	±2	≤ -10
802.11g@6Mbps	Recommended Target TX Power : 19	±2	≤ -10
802.11g@54Mbps	Calibrated TX Power :17	±2	≤ -25
802.11n@HT20_MCS0	Recommended Target TX Power : 18	±2	≤ -10
802.11n@HT20_MCS7	Calibrated TX Power :16	±2	≤ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 18	±2	≤ -10
802.11n@HT40_MCS7	Calibrated TX Power :16	±2	≤ -28

2.4G Receis (WLAN_Ant0&WLAN_Ant1)

RX Rate	Min Input Level (Typ dBm)	Max Input Level (Typ dBm)	PER
802.11b@1Mbps	-94	-5	< 8%
802.11b@11Mbps	-84	-5	< 8%
802.11g@6Mbps	-92	-5	< 10%
802.11g@54Mbps	-70	-5	< 10%
802.11n@HT20_MCS0	-92	-5	< 10%
802.11n@HT20_MCS7	-68	-5	< 10%
802.11n@HT40_MCS0	-87	-5	< 10%
802.11n@HT40_MCS7	-65	-5	< 10%

4.2 5G WLAN RF Specification

Conditions: VDD33=3.3V; Ta:25°C			
Features	Description		
WLAN Standard	IEEE 802.11a/n/ac		
Frequency Range	5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.73GHz; 5.735~5.835GHz (5GHz ISM Band)		
Channels	Ch36, Ch40, Ch44, Ch48; Ch52~Ch64; Ch100~Ch140; Ch149~Ch165 (For 20MHz Channels)		
Modulation	802.11a (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11ac (OFDM): BPSK, QPSK, QAM16, QAM64, QAM256;		
Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; 802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps; 802.11ac (VHT20): MCS0~MCS8(2T2R) 13~173.3Mbps; 802.11ac (VHT40): MCS0~MCS9(1T1R)13.5~200Mbps; 802.11ac (VHT40): MCS0~MCS9(2T2R)27~400Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps; 802.11ac (VHT80): MCS0~MCS9(2T2R)58.5~866.7Mbps;		
Frequency Tolerance	≤ ±20ppm		
5G Transmitter Specifications(ANT0 & ANT1. TX power of some rates is calibrated, customers can define the target TX power of other rates by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)			
TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11a@6Mbps	Recommended Target TX Power :19	±2	≤-10
802.11a@54Mbps	Calibrated TX Power :17	±2	≤-25
802.11n@HT20_MCS0	Recommended Target TX Power :18	±2	≤-13
802.11n@HT20_MCS7	Calibrated TX Power :16	±2	≤-28

802.11n@HT40_MCS0	Recommended Target TX Power :18	±2	≤-13
802.11n@HT40_MCS7	Calibrated TX Power :16	±2	≤-28
802.11ac@VHT80_MCS0	Recommended Target TX Power :16	±2	≤-13
802.11ac@VHT80_MCS9	Calibrated TX Power :14	±2	≤-32
5G Receiver Specifications (WLAN_ANT0&WLAN_ANT1)			
RX Rate	Min Input Level (Typ dBm)	Max Input Level (Typ dBm)	PER
802.11a@6Mbps	-91	-5	< 10%
802.11a@54Mbps	-70	-5	< 10%
802.11n@HT20_MCS0	-91	-5	< 10%
802.11n@HT20_MCS7	-68	-5	< 10%
802.11n@HT40_MCS0	-88	-5	< 10%
802.11n@HT40_MCS7	-65	-5	< 10%
802.11ac@VHT80_MCS0	-85	-5	< 10%
802.11ac@VHT80_MCS9	-56	-5	< 10%

4.3 Bluetooth RF Specification

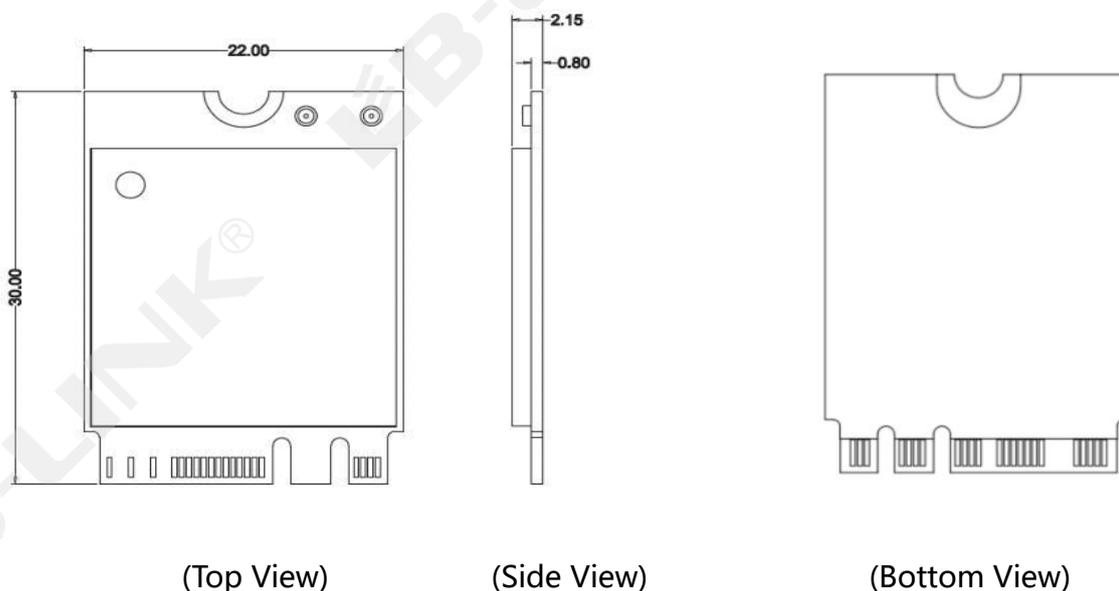
Conditions: VDD33=3.3V; Ta:25°C	
Features	Description
Bluetooth Specification	Bluetooth Core Specification v5.0/4.2/2.1
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)
Channels	Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);
Power Classes	Bluetooth Classic BR/EDR: Class1; Bluetooth Low Energy: Class1.5;
Data Rate & Modulation	BR_1Mbps: GFSK; EDR_2Mbps: $\pi/4$ -DQPSK; EDR_3Mbps: 8DPSK; LE_125Kbps: GFSK (Coded_S=8); LE_500Kbps: GFSK (Coded_S=2); LE_1Mbps: GFSK (Uncoded); LE_2Mbps: GFSK (Uncoded);
Bluetooth Transmitter Specifications (BT_Ant)	

Items	Min (dBm)	Typ (dBm)	Max (dBm)
TX Power			
BR_1M	2	5	8
EDR_2/3M	2	5	8
LE_125K/500K/1M/2M	2	5	8
Items	Min	Typ	Max
BR_1M (DH1) Modulation Characteristics			
Δf_{1avg}	140KHz	164.126KHz	175KHz
Δf_{2avg}	115KHz	151.396KHz	/
Δf_{2max}	115KHz	143.269KHz	/
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.92	/
Items	Min	Typ	Max
EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy			
ω_i	-75KHz	8.34KHz	+75KHz
$\omega_i + \omega_o$	-75KHz	8.86KHz	+75KHz
ω_o	-10KHz	0.52KHz	+10KHz
8DPSK RMS DEVM	/	0.037	0.13
8DPSK Peak DEVM	/	0.082	0.25
Items	Min	Typ	Max
LE_1M Modulation Characteristics			
Δf_{1avg}	225KHz	226.35KHz	275KHz
Δf_{2avg}	185KHz	218.69KHz	/
Δf_{2max}	185KHz	224.60KHz	/
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.918	/
Items	Min	Typ	Max
LE_2M Modulation Characteristics			
Δf_{1avg}	450KHz	499.73KHz	550KHz
Δf_{2avg}	370KHz	495.79KHz	/
Δf_{2max}	370KHz	477.9KHz	/

$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.992	/	
Bluetooth Receiver Specifications(BT_Ant)				
Items	Sensitivity		Maximum Input Level	
	Input Level(Typ)	BER	Input Level(Typ)	BER
BR_1M (DH1)	-90 dBm	$\leq 0.1\%$	-5 dBm	$\leq 0.1\%$
EDR_2M(DH1)	-90dBm	$\leq 0.01\%$	-10dBm	$\leq 0.1\%$
EDR_3M (3DH5)	-80 dBm	$\leq 0.01\%$	-5 dBm	$\leq 0.1\%$
	Input Level (Typ)	PER	Input Level (Typ)	PER
LE_125/500K	-92 dBm	$\leq 5\%$	-5 dBm	$\leq 5\%$
LE_1M	-88 dBm	$\leq 5\%$	-5 dBm	$\leq 5\%$
LE_2M	-84 dBm	$\leq 5\%$	-5 dBm	$\leq 5\%$

5. Mechanical Specifications

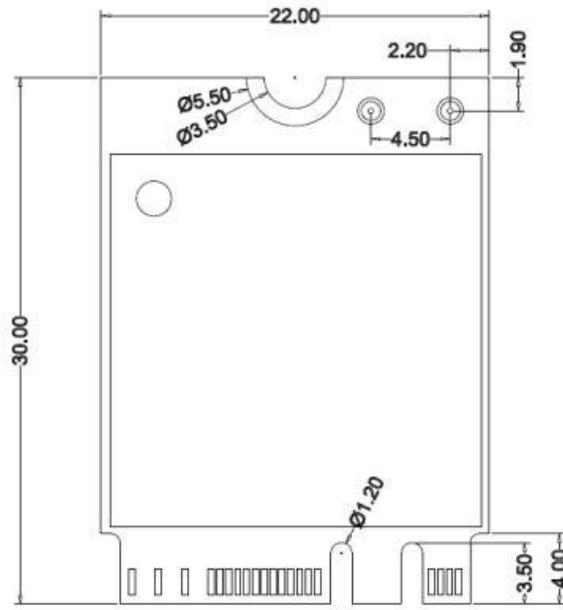
5.1 Card Outline Drawing



Card dimension: 30.0*22.0*2.15mm(L*W*H; Tolerance: ± 0.15 mm)

IPEX / MHF-4 connector dimension: 2.0*2.0*0.6mm (L*W*H, $\varnothing 1.5$ mm)

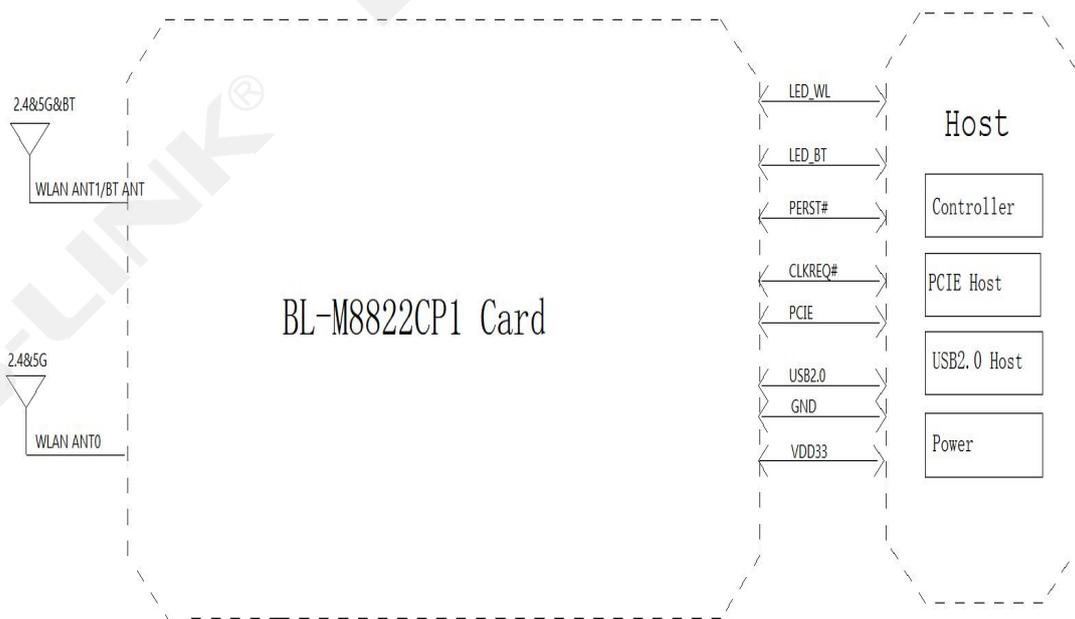
5.2 Mechanical Dimensions



(Top View)

6. Application Information

6.1 Typical Application Circuit



6.2 Recommend PCB Layout Footprint

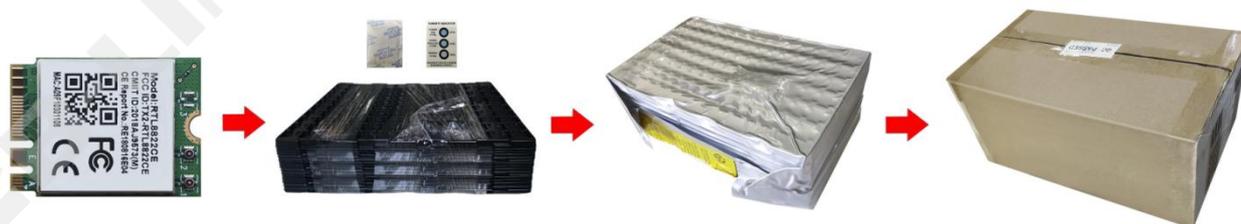
Please use NGFF socket (M.2 connector) A key or E key.

7. Key Components Of Card

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8822CE-CG	Realtek Semiconductor Corp.	
2	PCB	BL-M8822CP1	Huizhou Dayawan Kexiang Technology Circuit Board Co., Ltd	
			SHEN ZHEN QILI ELECTRON CO.,LTD	
			ShenZhen Tie Fa Technology Limited	
			Quzhou Sunlord Electronics Co.,Ltd	
3	Crystal	40MHz-2520	HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD	
			LUCKI CM ELECTRONICS CO.,LTD	
			Chengde oscillator Electronic Technology CO.,LTD	
4	Diplexer	DIP1608	Advanced Ceramic X Corp.	
			Shenzhen Sunlord Electronics Co.,Ltd	
			Dongguan Hekang Electronics Co.,LTD	

8. Package and Storage Information

8.1 Package Dimensions



Package specification:

1. 35 cards per blister plate and 700 cards per box.
2. The blister is bound with wire membrane and put into anti-static vacuum bag.
3. Put 1 bag of dry beads (20g) in each anti-static vacuum bag. 1 pcs 3 point humidity card.
4. The outer box size is 35.2*21.5*15.5cm.

8.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -40°C to +85°C,

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

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C,

Storage humidity: 20% to 90% RH

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

The card shall be stored without opening the packing.

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

When the color of the humidity indicator in the packing changed,

The card shall be baked before use.

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

ESD Sensitivity:

ESD Protection: 2KV (HBM, Maximum rating)

The card is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!



ESD CAUTION