PRODUCT SPECIFICATION

6252C-PUB-EVB

Wi-Fi Dual-band 2T2R 11ax

Mini PCIE Combo Module

Version:v1.0

6252C-PUB-EVB Module Datasheet

	Part NO.	Description
Ordering Information	FG6252CPUB-E0	RTL8852BE-CG,wifi6,2T2R,802.11a/b/g/n/ac/ax,30*26.8,Mini-PCIE,PCB V1.0，2 颗四代天线座

Customer: _____

Customer P/N:_____

Signature:_____

Date:_____

Office: 14th floor, Block B, phoenix zhigu, Xixiang Street, Baoan District, Shenzhen

Factory: NO.8, Litong RD., Liuyang Economic & Technical Development Zone, Changsha, CHINA

TEL:+86-755-2955-8186 Website:www.fn-link.com

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Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2022/11/10	Draft version	LXY	TZQ	QJP

1. General Description

1.1 Introduction

6252C-PUB-EVB is a highly integrated module that support 2-stream 802.11ax solutions with Multi-user MIMO with Wireless LAN MiNi-PCI Express network interface. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.

The baseband implements MU-MIMO OFDM with 2T2R. Features include two spatial stream transmissions, short Guard Interval (GI), spatial spreading, and support for variant channel bandwidth. Moreover, provides one spatial stream space-time block code (STBC), Transmit Beamforming (TxBF) and Low Density Parity Check (LDPC) to extend the range of transmission. At the receiver, extended range and good minimum sensitivity is achieved by having receiver diversity up to 2 antennas. As the recipient, the module also supports explicit sounding packet feedback that helps senders with beamforming capability.

For legacy compatibility, Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK) and OFDM baseband processing are included to support all IEEE 802.11b, 802.11g and 802.11a data rates. Differential phase shift keying modulation schemes, DBPSK and DQPSK with data scrambling capability are available, and CCK provides support for legacy data rates, with long or short preamble. The CCK processor can perform dual-receiver by providing diversity gain to extend range and improve the reception. The high speed FFT/IFFT paths, combined with BPSK, QPSK, 16QAM, 64QAM, 256QAM, and up to 1024QAM modulation of the individual subcarriers, and rate compatible coding rate of 1/2, 2/3, 3/4, and 5/6, provide up to 1201Mbps for IEEE 802.11ax MIMO OFDM.

For advanced 11ax spec, can receive with OFDMA (OFDM Access) technology. The RU size can be supported form small unit, e.g., RU26, and RU52, 106, 242, 484, and finally up to RU996. The high-order modulation scheme, such as 1024-QAM, can also be handled very well. Meanwhile, diff number of total subcarrier in the HE-LTF, such as 1x, 2x and 4x is considered. More networking efficiency can be achieved by 1x, and better channel estimation performance provided by 4x

The module chip MAC supports 802.11e for multimedia applications, 802.11i and WAPI (Wireless Authentication Privacy Infrastructure) for security, and 802.11n/802.11ac/802.11ax for enhanced MAC protocol efficiency. Using packet aggregation techniques such as A-MPDU with BA and A-MSDU, protocol efficiency is significantly improved. Power saving mechanisms such as Legacy Power Save, U-APSD, and MIMO power saving reduce the power wasted during idle time, and compensate for the extra power required to transmit MIMO OFDM. The RTL8852BE provides simple legacy, 20MHz/40MHz/80MHz co-existence mechanisms to ensure backward and network compatibility.

1.2 Description

Model Name	6252C-PUB-EVB
Product Description	Support Wi-Fi functionalities
Dimension	L x W x H: 30x 26.8x 2.7 mm (typical)
Wi-Fi Interface	Support MiNi PCIe
BT Interface	/
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	0°C to 70°C
Storage temperature	-55°C to 85°C

2. Features

General

- CMOS MAC, Baseband PHY and RF in IEEE 802.11a/b/g/n/ac/ax compatible WLAN
- Support 802.11ac 2x2,Wave-2 compliant with RX MU-MIMO
- Support 802.11ax 2x2,with OFDMA and MU-MIMO, by 4 types PPDU format, such as HE-SU-PPDU, HE-ER-SU-PPDU, HE-MU-PPDU, and HE-TB-PPDU
- Complete802.11n MIMO solution for 2.4GHz and 5GHz band, 20MHz/40MHz/80MHz bandwidth ,rate up to 1201Mbps
- IEEE 802.11e/i/h/k,WAPI,WPA3
- Support STBC,LDPC
- Integrated 32K oscillator for power management

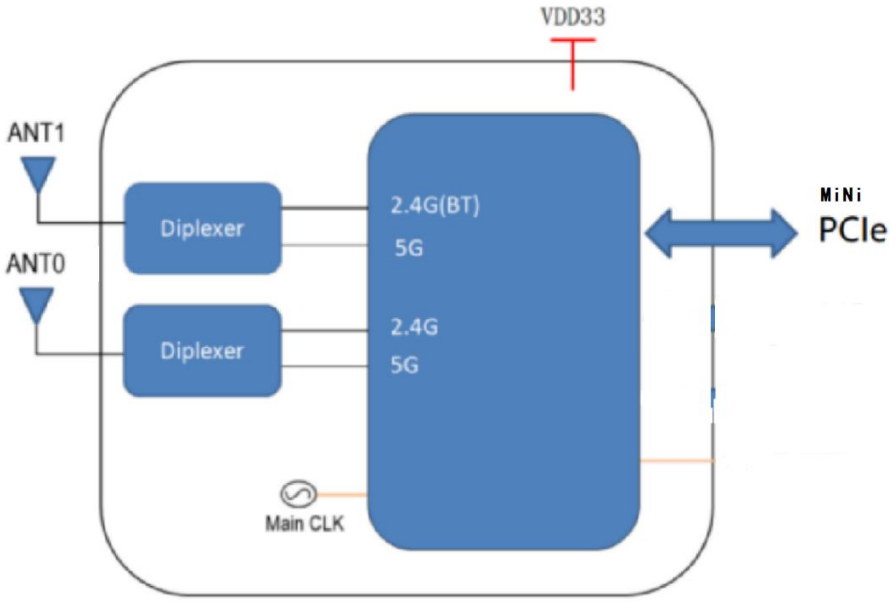
Host Interface

- Complies with PCI Express Base Specification Revision 1.1

Bluetooth Features

- None

3. Block Diagram



4. General Specification

4.1 2.4GHz RF Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11 b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1 ~ Ch14	
Test Items	**Typical Value**	**EVM**
Output Power	802.11b /11Mbps: 19dBm ± 2 dB	EVM ≤ -9dB
	802.11g /54Mbps: 18dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 17dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20 MCS8: 16dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40 MCS9: 15dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps @ -94 dBm	≤-83 dBm
	- 11Mbps @ -85 dBm	≤-76 dBm
Receive Sensitivity	- 6Mbps @ -90 dBm	≤-85 dBm

(11g,20MHz) @10% PER	- 54Mbps @ -71 dBm	≤-68 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-85 dBm
	- MCS=7 @ -69 dBm	≤-67 dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-82 dBm
	- MCS=7 @ -66 dBm	≤-64 dBm
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤ -82 dBm
	- MCS=8 @ -64 dBm	≤ -60 dBm
Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤ -79 dBm
	- MCS=9 @ -59 dBm	≤ -55 dBm
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-74 dBm
	- MCS=11 @ -60 dBm	≤-52 dBm
Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-71 dBm
	- MCS=11 @ -57 dBm	≤-49 dBm
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

4.2 5GHz RF Specification

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

Feature	**Description**	
WLAN Standard	IEEE 802.11a/n/ac/ax 2x2, Wi-Fi compliant	
Frequency Range	5.150 GHz ~ 5.850 GHz (5.0 GHz ISM Band)	
Number of Channels	5.0GHz：Please see the table1	
Test Items	**Typical Value**	**EVM**
Output Power	802.11a /54Mbps: 18 dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 17 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20 MCS8: 16 dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40 MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ac VHT80 MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE80 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
Test Items	**Test Value**	**Standard Value**
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps @ -90 dBm	≤-85
	- 54Mbps @ -71 dBm	≤-68
Receive Sensitivity	- MCS=0 @ -90 dBm	≤-85

(11n,20MHz) @10% PER	- MCS=7 @ -69 dBm	≤-67
Receive Sensitivity	- MCS=0 @ -87 dBm	≤-82
(11n,40MHz) @10% PER	- MCS=7 @ -66 dBm	≤-64
Receive Sensitivity	- MCS=0, NSS1 @ 90 dBm	≤-82
(11ac,20MHz)@10% PER	- MCS=8, NSS1 @ -64 dBm	≤-60
Receive Sensitivity	- MCS=0, NSS1 @ -87 dBm	≤-79
(11ac,40MHz) @10% PER	- MCS=9, NSS1 @ -59 dBm	≤-55
Receive Sensitivity	- MCS=0, NSS1 @ -84 dBm	≤-79
(11ac,80MHz) @10% PER	- MCS=9, NSS1 @ -56 dBm	≤-54
Receive Sensitivity	- MCS=0 @ -90 dBm	≤-74
(11ax,20MHz) @10% PER	- MCS=11 @ -60 dBm	≤-52
Receive Sensitivity	- MCS=0 @ -87 dBm	≤-71
(11ax,40MHz) @10% PER	- MCS=11 @ -57 dBm	≤-49
Receive Sensitivity	- MCS=0 @ -84 dBm	≤-68
(11ax,80MHz) @10% PER	- MCS=11 @ -54 dBm	≤-46
Maximum Input Level	802.11a/n: -30 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

[1]5GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
5180MHz~5240MHz	36	5180
	40	5200
	44	5220
	48	5240
5260MHz~5320MHz	52	5260
	56	5280
	60	5300
	64	5320
5550MHz~5700MHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
	140	5700
5745MHz~5825MHz	149	5745
	153	5765
	157	5785

	161	5805
	165	5825

4.3 Bluetooth Specification

N/A

5. ID setting information

WI-FI

Vendor ID	TBD
Product ID	TBD

6. Pin Definition

6.1 Pin Outline

< TOP VIEW>

Pin #	Signal Name	Pin #	Signal Name
51	Reserved	52	3.3V
49	Reserved	50	GND
47	Reserved	48	Reserved
45	Reserved	46	Reserved
43	GND	44	LED_WLAN#
41	3.3V	42	Reserved
39	3.3V	40	GND
37	GND	38	Reserved
35	GND	36	Reserved
33	PERp0	34	GND
31	PERn0	32	Reserved
29	GND	30	Reserved
27	GND	28	Reserved
25	PETp0	26	GND
23	PETn0	24	3.3V
21	GND	22	PERST#
19	Reserved	20	W_DISABLE1#
17	Reserved	18	GND
Nase			
15	GND	16	Reserved
13	REFCLK+	14	Reserved
11	REFCLK-	12	Reserved
9	GND	10	Reserved
7	CLKREQ#	8	Reserved
5	Reserved	6	Reserved
3	Reserved	4	GND
1	WAKE#	2	3.3V

6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	WAKE#	O/D	PCIe wake up host,active low	3.3V
2	3.3V	P	Main power voltage source input 3.3V	3.3V
3	Reserved	—	No connect	
4	GND	—	Ground connections	
5	Reserved	—	No connect	
6	Reserved	—	No connect	
7	CLKREQ#	I/O/D	PCIe reference clock request signal	3.3V
8	Reserved	—	No connect	
9	GND	—	Ground connections	
10	Reserved	—	No connect	
11	REFCLK-	I	PCIe CLK Difference -	
12	Reserved	—	No connect	
13	REFCLK+	I	PCIe CLK Difference +	
14	Reserved	—	No connect	
15	GND	—	Ground connections	
16	Reserved	—	No connect	

17	Reserved	—	No connect	
18	GND	—	Ground connections	
19	Reserved	—	No connect	
20	WL_DISABLE1#	—	WLAN enable pin, High: enable,Low:disable	3.3V
21	GND	—	Ground connections	
22	PERST#	I	PCIe reset module,active low	3.3V
23	PETN0	O	PCIe Data Out Difference -	
24	3.3V	P	Main power voltage source input 3.3V	3.3V
25	PETP0	O	PCIe Data Out Difference +	
26	GND	—	Ground connections	
27	GND	—	Ground connections	
28	Reserved	—	No connect	
29	GND	—	Ground connections	
30	Reserved	—	No connect	
31	PERN0	I	PCIe Data IN Difference -	
32	Reserved	—	No connect	
33	PERP0	I	PCIe Data IN Difference +	
34	GND	—	Ground connections	
35	GND	—	Ground connections	
36	Reserved	—	No connect	
37	GND	—	Ground connections	
38	Reserved	—	No connect	
39	3.3V	P	Main power voltage source input 3.3V	3.3V
40	GND	—	Ground connections	
41	3.3V	P	Main power voltage source input 3.3V	3.3V
42	Reserved	—	No connect	
43	GND	—	Ground connections	
44	LED_WLAN#	I	WLAN LED,low active	
45	Reserved	—	No connect	
46	Reserved	—	No connect	
47	Reserved	—	No connect	
48	Reserved	—	No connect	
49	Reserved	—	No connect	
50	GND	—	Ground connections	
51	Reserved	—	No connect	
52	3.3V	P	Main power voltage source input 3.3V	3.3V

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

7.1 Power Supply DC Characteristics

	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	deg.C
VDD33	3.0	3.3	3.6	V

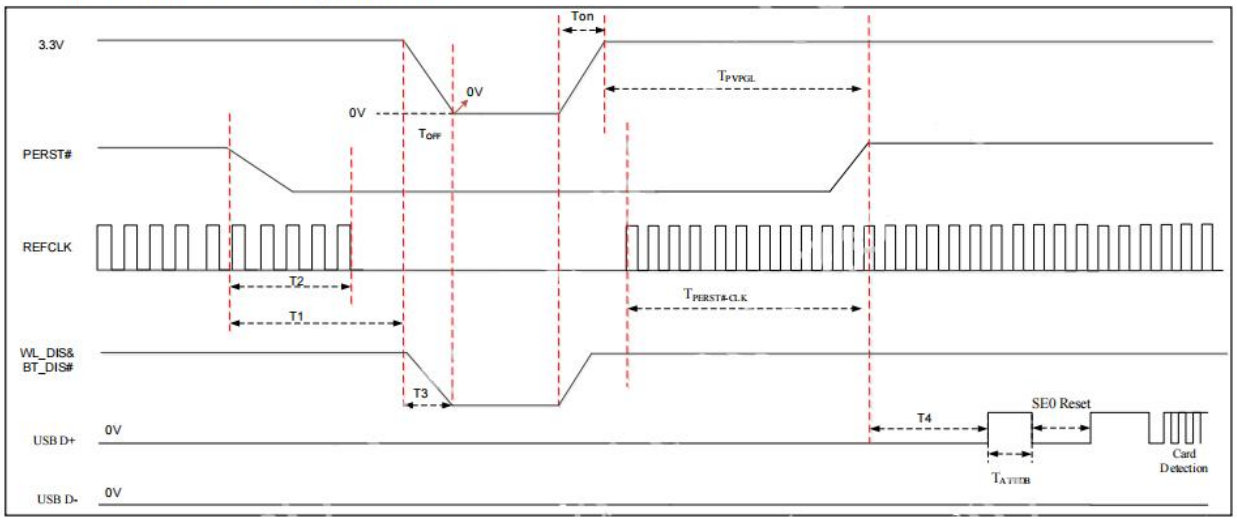
7.2 Power Consumption

		VDD33 = 3.3V(Unit:mA)
Power Consumption	TX (2.4G 54M)	515
	RX (2.4G 54M)	235
	TX (2.4G HE40 11ax)	600
	RX (2.4G HE40 11ax)	235
	TX (5G VHT80 11ac)	765
	RX (5G VHT80 11ac)	285
	TX (5G HE80 11ax)	750
	RX (5G HE80 11ax)	295

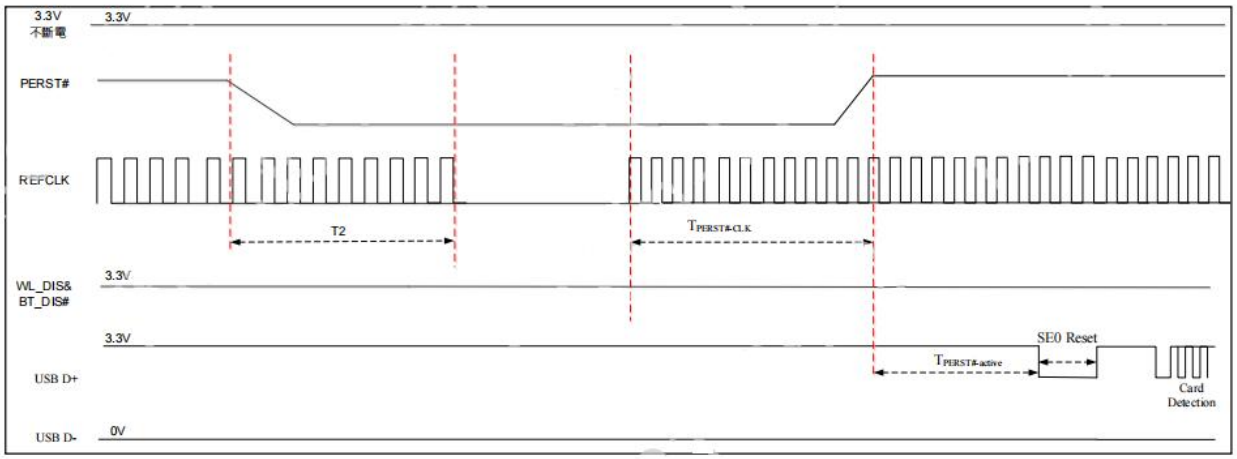
Note: above datum test by normal mode

7.3 PCIe Bus during Power On Sequence

a. When WLAN is power off



b. When WLAN is NOT power off



Ton: The main power ramp up duration

Toff: The main power off duration

TPVPGL: Power valid to PERST# input inactive

TPERST#-CLK: Reference clock stable before PERST# inactive

TATTDB: the debounce interval with a minimal duration of 100ms that provided by the USB system Software

TSE0 Reset: USB host send SE0 Reset duration

TPERST#-active: PCI-e initial duration after PERST# inactive

Note:

T1: PERST# goes active before the power on the connector is removed.

T2: Clock to inactive after PERST# goes active.

T3: WL_DIS# and BT_DIS# goes asserted when the power on the connector is removed.

T4: USB D+ go active after PERST# goes inactive.

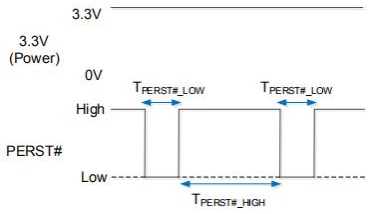
T1/T2/T3/T4 timing value should large than 0.

Symbol	Unit	Min	Typical	Max
T_{on}	ms	0.5	1.5	5
T_{off}	ms	1.5		
T_{PVPGL}	ms	Implementation specific;recommended 50ms	--	--
$T_{PERST\#-CLK}$	us	100	--	--
T_{ATTDB}	ms	100	--	--
$T_{SE0\ Reset}$	ms	10	--	--
$T_{PERST\#-active}$	ms	10	--	--

The typical timing range

7.4 Interface Circuit time series

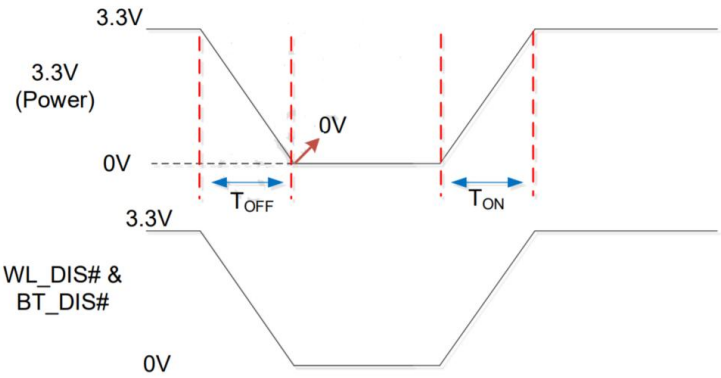
7.4.1 PCIe PERST# Timing Sequence



RTL8821CE-CG PCIE PERST# Timing Parameters

	Min	Typical	Max	Unit	Description
$T_{PERST\#\_LOW}$	6	10	X	ms	PERST# low duration
$T_{PERST\#\_HIGH}$	400	500	X	ms	PERST# high duration

7.4.2 Power Off Sequence



RTL8822CE-CG Power Off Timing Parameters

Symbol	Min	Typical	Max	Unit	Description
T_{OFF}	1.5ms	--	--	ms	Measure point start on 100% Measure point end on 0% (must be 0V)
T_{ON}	0.5	1.5	5	ms	Measure point start on 0% (must be 0V) Measure point end on 100%

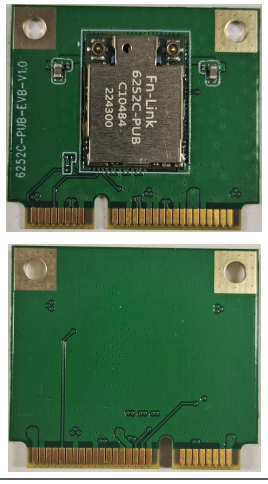
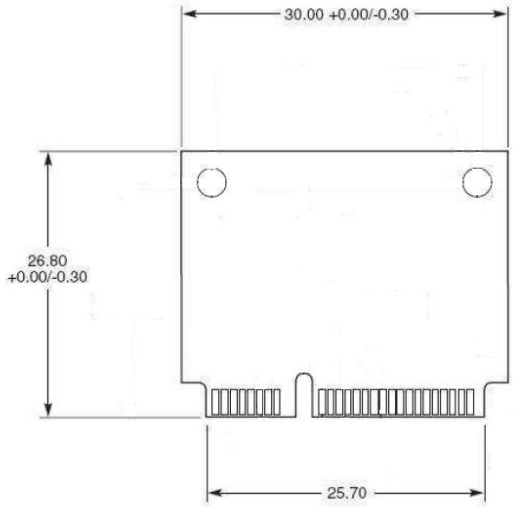
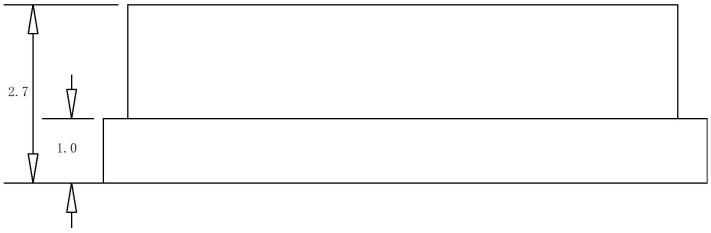
Note: If BT_DIS# can't connect to the same power source with 3.3V, it need to be de-asserted before PERST# with 100ms in power on sequence.

7.4.3 Platform state transitions

3.3V Power range	3.3V Ripple	3.3V Noise	Rise time	
			Min	Max
+/-0.165V	300mVpp @ switching frequency > 100KHz		0.5ms	5ms

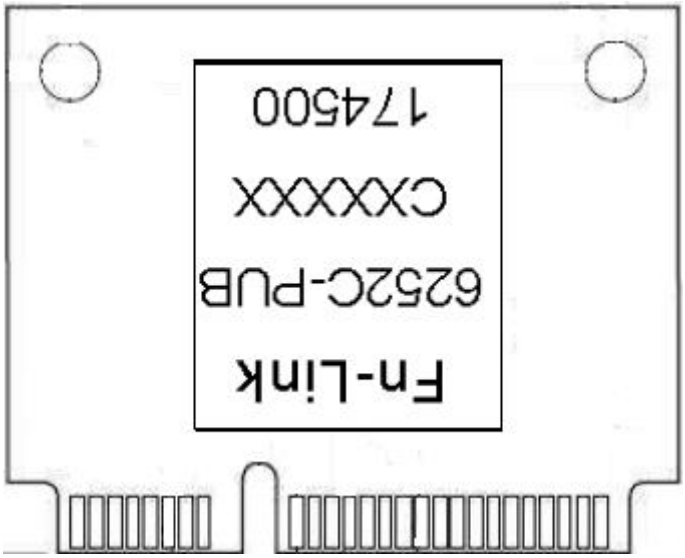
8. Size reference

8.1 Module Picture

L x W : 30 x 26.8 **(-0.3/+0.0) mm** 	
H: 2.7 (±0.2) mm	
Weight	3.1g

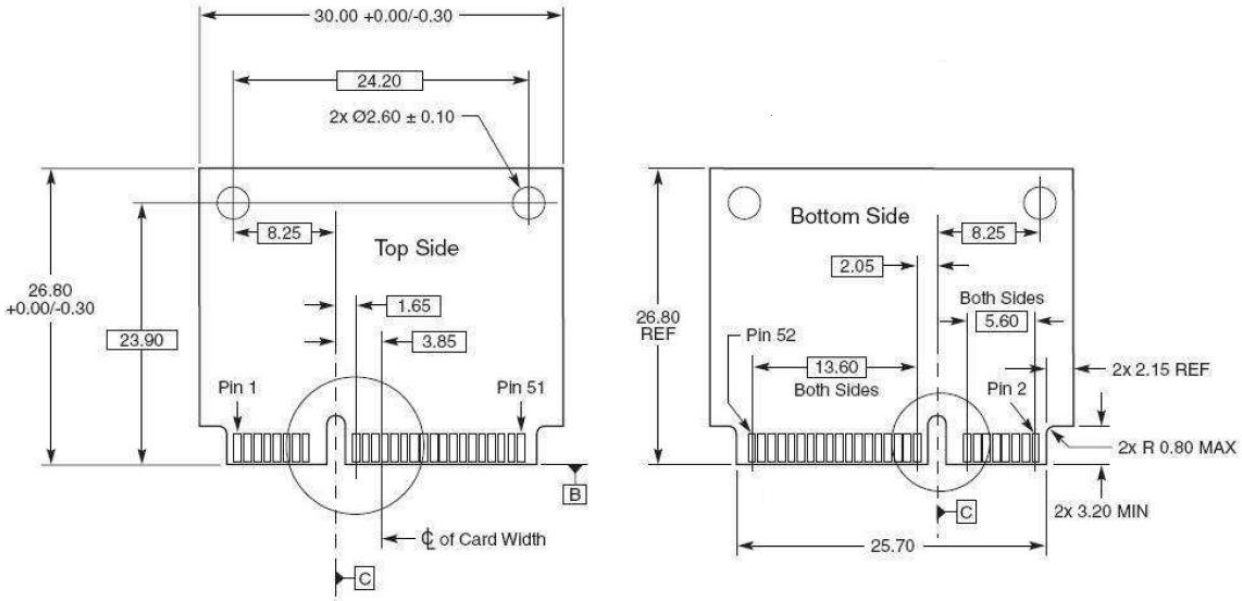
8.2 Marking Description

< TOP VIEW >

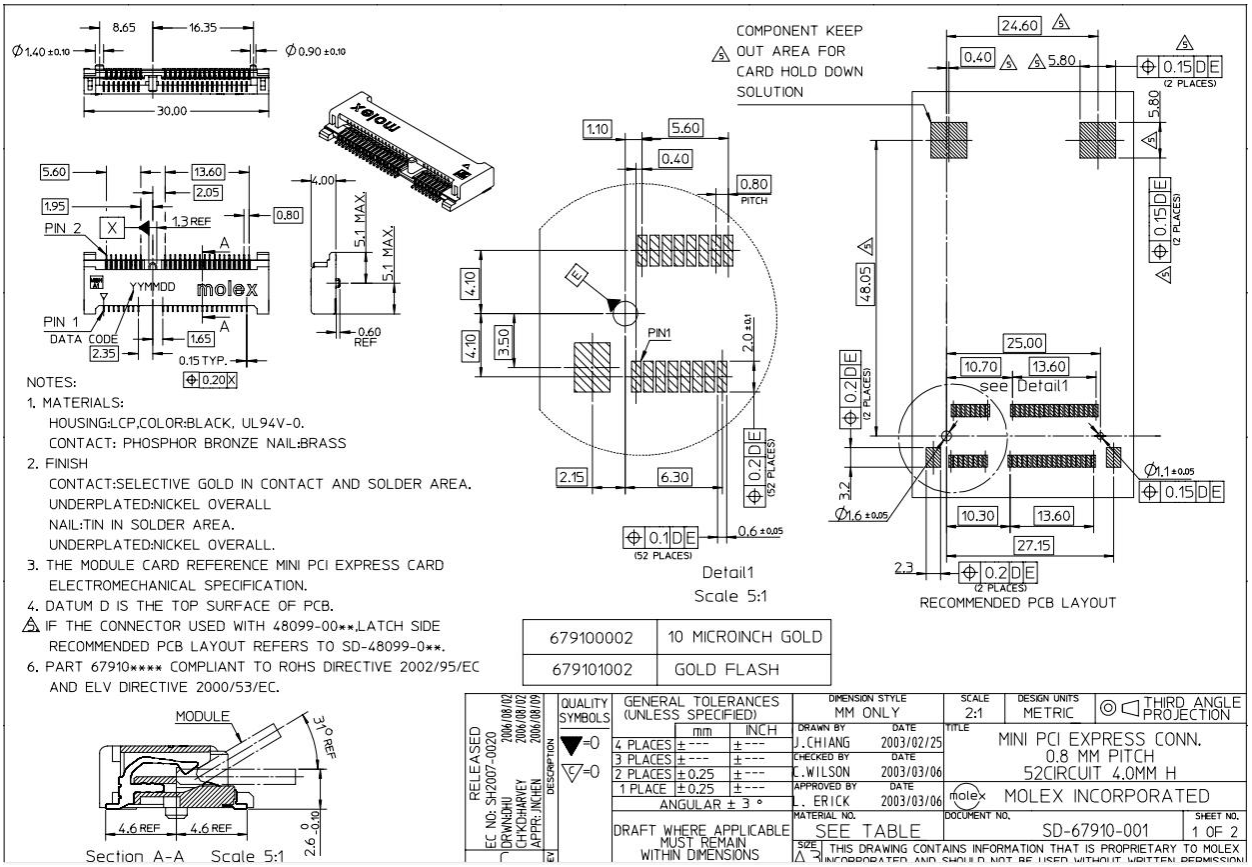


8.3 Physical Dimensions

<TOP View>



8.4 miniPCIE socket Layout Recommendation



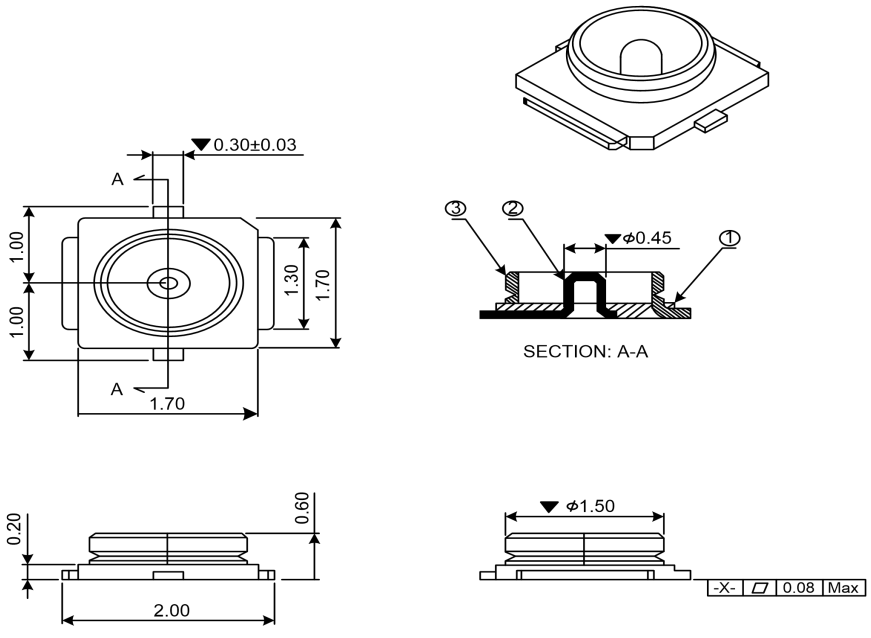
9. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	6252C-PUB-EVB 4L,30X26.8X1.0mm	Brainpower,XY PCB, GDKX, Sunlord,Truly
2	Module	6252C-PUB	Fn-Link

10. Reference Design

Note:

RF Connector Specification



11. Recommended Reflow Profile

It's an assembly part, no need SMT process.

12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

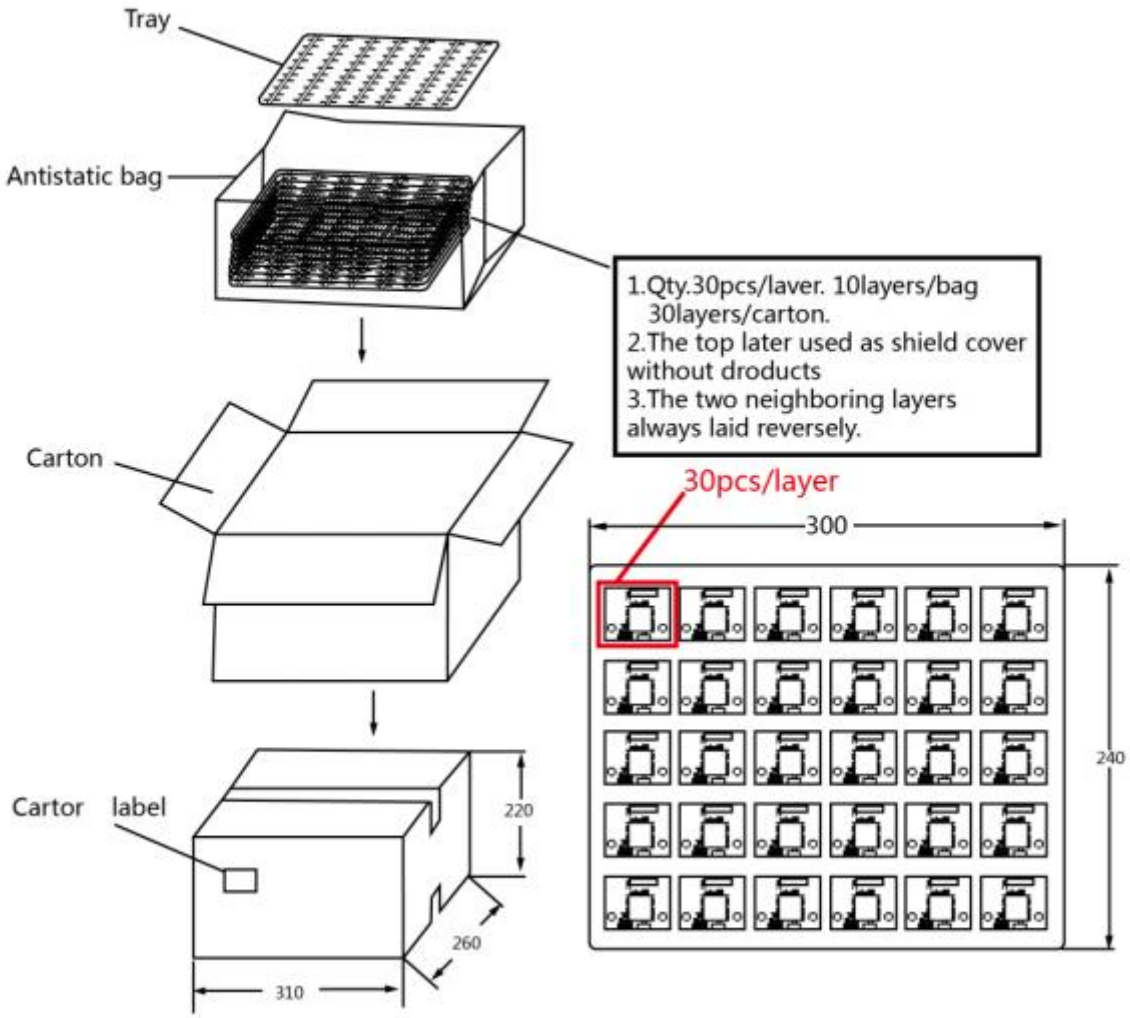
13.1 Reel

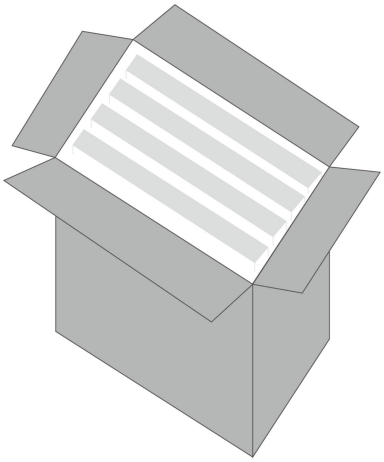
N/A

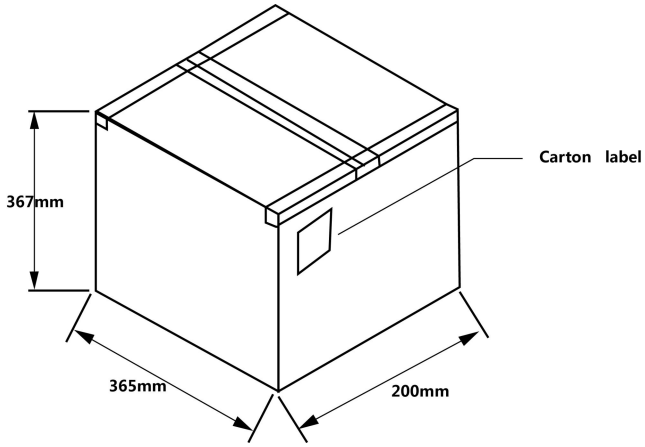
13.2 Carrier Tape Detail

N/A

13.3 Packaging Detail







14. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

b) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected

d) Baking is required if conditions b) or c) are not respected

e) Baking is required if the humidity indicator inside the bag indicates 10% RH or more