

8291M-PR

**Wi-Fi Dual-band 2X2 11ax + Bluetooth 5.1
Combo Module Datasheet**



8291M-PR Module Datasheet

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Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2019/11/06	New version	Lgp	Szs
2.0	2019/12/16	Update module number	Lgp	Szs
3.0	2019/12/19	Add M.2 connector information; Add RF connector information; Add key material list; Add package information	Lgp	Szs
4.0	2020/01/04	Update block diagram; Update module pin out figure; Update PCIe powerup timing requirements;	Lgp	Szs
5.0	2020/03/02	Update module number, features, module picture	Lgp	Szs
6.0	2020/06/15	Update operating temperature range; Update ordering partnumber; Correct typo; Update temperature range; Update RF Specification	Lgp	Szs
7.0	2020/08/19	Update temperature range; Update RF Specification; Update Reference design schematic	Lgp	Szs
8.0	2020/12/03	Update power consumption information; Update reference schematic; Correct pin 44 voltage value; Update module picture	Lgp	Szs

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1 Overview

1.1 Introduction

Fn-Link Technology would like to announce a low-cost and low-power consumption module which has all of the Wi-Fi and Bluetooth functionalities. The highly integrated module makes the possibilities of web browsing, VoIP, Bluetooth headsets applications. With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11a/b/g/n/ac/ax 2x2 Access Points in the wireless LAN.

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and it can achieve up to a speed of 1774.5Mbps (2x2 80MHz 11ax + 2x2 40MHz 11ax DBS). The integrated module provides PCIe interface for Wi-Fi, UART/PCM interface for Bluetooth.

This compact module is a total solution for a combination of Wi-Fi and Bluetooth V5.1 technology. The module is specifically developed for all portable devices.

1.2 Features

- Highly integrated wireless local area network (WLAN) system-on-chip (SOC) for 2.4G/5G 802.11ax WLAN applications.
- Compliant with IEEE 802.11a/b/g/n/ac/ax.
- Supports 2x2 Multi-User Multiple-Input Multiple-Output (MU-MIMO).
- Dual Band Simultaneous (DBS) with dual MAC, up to 1774.5 Mbps data rate (2x2+2x2 11ax DBS) Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz.
- Dynamic Frequency Selection (DFS, radar detection).
- Offloading traffic for minimal host utilization at 11ac/ax speeds.
- Supports low power PCIe (w/L1 sub-state) interface for WLAN and UART/PCM interface for Bluetooth.
- Supports Bluetooth V5.1, BLE, ANT+ and be backwards compatible with Bluetooth 1.2, 2.X+ enhance data rate.
- Supports WLAN-Bluetooth coexistence and LTE-5G/ISM coexistence.
- Supports Bluetooth for class1 and class2 power level transmissions without requiring an external PA.
- BT host digital interface:
 - HCI UART (up to 3.2 Mbps)
 - PCM for audio data
- Standard M.2 2230 Key E Golden Finger interface.

1.3 Block Diagram

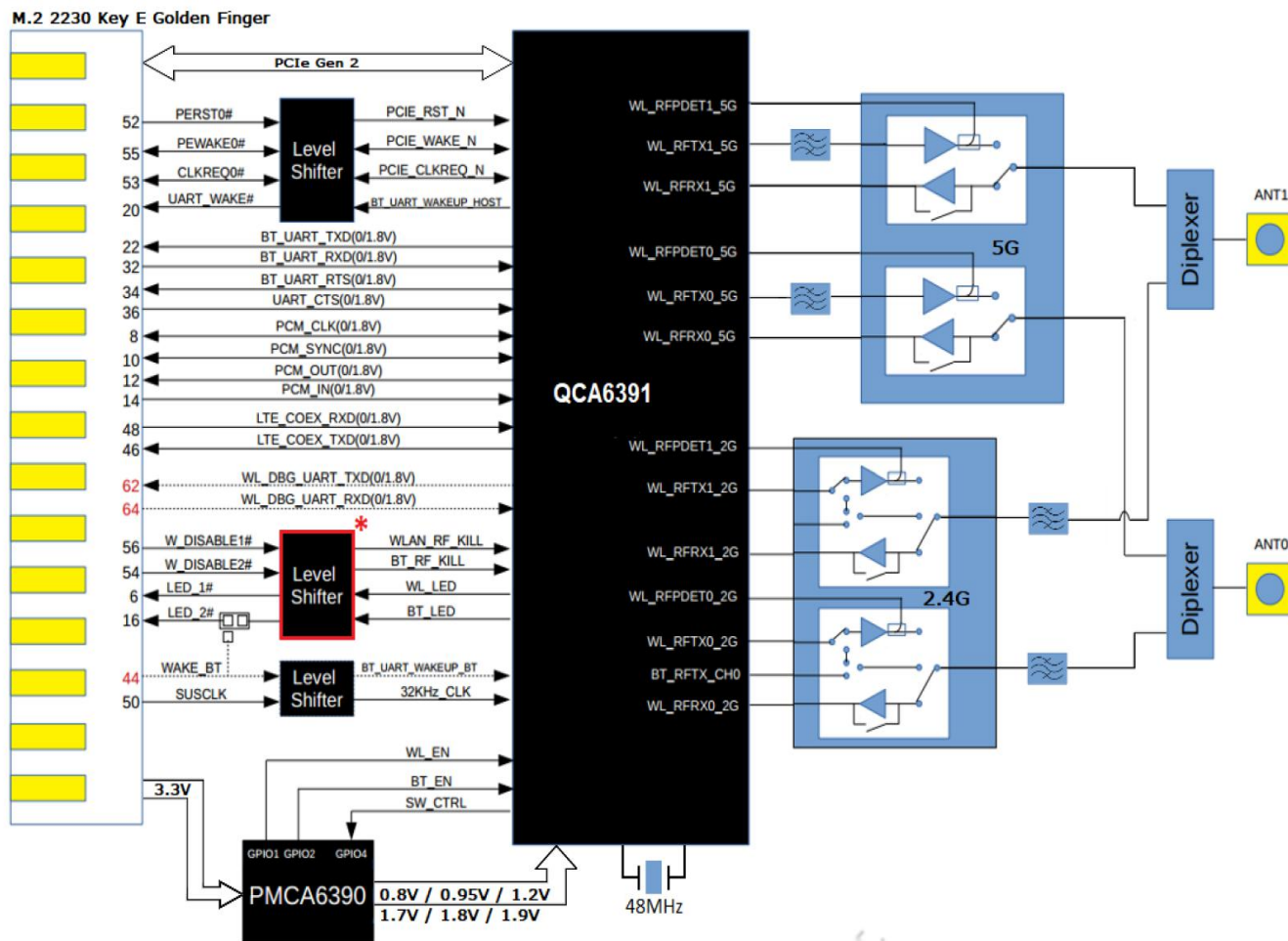


Figure 1-1 Block Diagram

1.4 General Specification

Model Name	8291M-PR
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 22 x 30 x 2.2 (typical) mm
Wi-Fi Interface	Support PCIe
BT Interface	UART / PCM
Operating temperature	-30°C to 70°C
Storage temperature	-40°C to 125°C

1.5 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	-30	25	70	deg.C
VDD	3.15	3.3	3.45	V
VDDIO_3.3V	3.15	3.3	3.45	V
VDDIO_1.8V	1.71	1.8	1.89	V

1.6 Power Consumption Information

Test Mode	Current Value @3.3Vdc
2G TX (Chain Mask 2x2)	11M @20dBm 880mA
	54M @17dBm 840mA
	HT40 MCS7 @17dBm 810mA
	vHT40 MCS9 @15dBm 788mA
	HE40 MCS11 @14dBm 778mA
5G TX (Chain Mask 2x2)	54M @16dBm 750mA
	HT40 MCS7 @16dBm 726mA
	Vht80 MCS9 @14dBm 727mA
	HE80 MCS11 @13dBm 728mA
2G RX (Chain Mask 2x2)	Max 182mA
5G RX (Chain Mask 2x2)	Max 152mA
Power Up	118mA
BT TX	1M @7dBm 147mA
BT RX	Max 136mA

2 Wi-Fi RF Specification

2.1 2.4GHz RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz : Ch1 ~ Ch14	
Item	Value	Standard Value
Output Power	802.11b /1Mbps: 20 dBm ± 2 dB	EVM ≤ -9dB
	802.11b /11Mbps: 20 dBm ± 2 dB	EVM ≤ -9dB
	802.11g /6Mbps: 20 dBm ± 2 dB	EVM ≤ -5dB
	802.11g /54Mbps: 17 dBm ± 2 dB	EVM ≤ -25dB
	802.11n HT20 /MCS0: 19.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11n HT20 /MCS7: 17dBm ± 2 dB	EVM ≤ -28dB
	802.11n HT40 /MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
	802.11n HT40 /MCS7: 17 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac vHT20/MCS0: 19.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT20/MCS8: 15 dBm ± 2 dB	EVM ≤ -30dB
	802.11ac vHT40/MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT40/MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20/MCS0: 19.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE20/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40/MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
802.11ax/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps ≤ -92 dBm	≤ -83 dBm
	- 11Mbps ≤ -85 dBm	≤ -76 dBm
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps ≤ -87 dBm	≤ -85 dBm
	- 54Mbps ≤ -71 dBm	≤ -68 dBm
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 ≤ -86 dBm	≤ -85 dBm
	- MCS=7 ≤ -68 dBm	≤ -67 dBm
SISO Receive Sensitivity	- MCS=0 ≤ -83 dBm	≤ -82 dBm

(11n,40MHz) @10% PER	- MCS=7	≤ -65 dBm	≤ -64 dBm
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0	≤ -83 dBm	≤ -82 dBm
	- MCS=8	≤ -63 dBm	≤ -60 dBm
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0	≤ -82 dBm	≤ -79 dBm
	- MCS=9	≤ -60 dBm	≤ -55 dBm
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0	≤ -81 dBm	≤ -74 dBm
	- MCS=11	≤ -55 dBm	≤ -52 dBm
SISO Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0	≤ -74 dBm	≤ -71 dBm
	- MCS=11	≤ -52 dBm	≤ -49 dBm
Maximum Input Level	802.11b: -10 dBm		
	802.11g/n/ac/ax: -10 dBm		

2.2 5GHz RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description	
WLAN Standard	IEEE 802.11 a/n/ac/ax 2x2, Wi-Fi compliant	
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)	
Number of Channels	5.0GHz : Please see the table ¹	
Item	Value	Standard Value
Output Power	802.11a /6Mbps: 20 dBm \pm 2 dB	EVM \leq -5dB
	802.11a /54Mbps: 16 dBm \pm 2 dB	EVM \leq -25dB
	802.11n HT20 /MCS0: 19 dBm \pm 2 dB	EVM \leq -5dB
	802.11n HT20 /MCS7: 16 dBm \pm 2 dB	EVM \leq -28dB
	802.11n HT40 /MCS0: 18.5 dBm \pm 2 dB	EVM \leq -5dB
	802.11n HT40 /MCS7: 16 dBm \pm 2 dB	EVM \leq -28dB
	802.11ac vHT20/MCS0: 19 dBm \pm 2 dB	EVM \leq -5dB
	802.11ac vHT20/MCS8: 15 dBm \pm 2 dB	EVM \leq -30dB

	802.11ac vHT40/MCS0: 18.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT40/MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ac vHT80/MCS0: 18.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT80/MCS9: 14 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20/MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE20/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40/MCS0: 18 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE40/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE80/MCS0: 18 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE80/MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps ≤ -87 dBm	≤-85
	- 54Mbps ≤ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 ≤ -86 dBm	≤-85
	- MCS=7 ≤ -68 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 ≤ -83 dBm	≤-82
	- MCS=7 ≤ -65 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 ≤ -83 dBm	≤-82
	- MCS=8, NSS1 ≤ -63 dBm	≤-60
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 ≤ -82 dBm	≤-79
	- MCS=9, NSS1 ≤ -60 dBm	≤-55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 ≤ -81 dBm	≤-79
	- MCS=9, NSS1 ≤ -57 dBm	≤-54
SISO Receive Sensitivity (11ax, 20MHz) @10% PER	- MCS=0 ≤ -81 dBm	≤-74
	- MCS=11 ≤ -55 dBm	≤-52
SISO Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0 ≤ -74 dBm	≤-71
	- MCS=11 ≤ -52 dBm	≤-49
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0 ≤ -73 dBm	≤-68
	- MCS=11 ≤ -51 dBm	≤-46
Maximum Input Level	802.11a/n/ac/ax : -10 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

15GHz(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
5745MHz~5825MHz	140	5700
	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

RF specification will be updated in a future version of this document.

3 Bluetooth Specification

3.1 Bluetooth Specification

Feature	Description
General Specification	
Bluetooth Standard	Bluetooth V5.1
Host Interface	UART/PCM
Antenna Reference	Small antennas with 0~2 dBi peak gain
Frequency Band	2402 MHz ~ 2480 MHz

Number of Channels	79 channels		
Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK		
RF Specification			
	Min.	Typical.	Max.
Output Power		7 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-92 dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-92 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85 dBm	
Maximum Input Level	GFSK (1Mbps):-10dBm		
	$\pi/4$ -DQPSK (2Mbps) :-10dBm		
	8DPSK (3Mbps) :-10dBm		

4 Pin Assignments

4.1 Pin Outline

M.2 2230 Pinouts(Key E)

Pin	Signal	Signal	Pin
74	3.3 V	GND	75
72	3.3 V	RESERVED/REFCLKn1	73
		RESERVED/REFCLKp1	71
70	UIM_POWER_SRC/GPIO_1/PEWAKE1#	GND	69
68	UIM_POWER_SNK/CLKREQ1#	RESERVED/PETn1	67
66	UIM_SWP/PERST1#	RESERVED/PETp1	65
64	RESERVED	GND	63
62	ALERT# (O)(0/1.8 V)	RESERVED/PERn1	61
60	I2C_CLK (I)(0/1.8 V)	RESERVED/PERp1	59
58	I2C_DATA (I/O)(0/1.8 V)	GND	57
56	W_DISABLE1# (I)(0/3.3V)	PEWAKE# (I/O)(0/3.3V)	55
54	W_DISABLE2# (I)(0/3.3V)	CLKREQ0# (I/O)(0/3.3V)	53
52	PERST0# (I)(0/3.3V)	GND	51
50	SUSCLK(32kHz) (I)(0/3.3V)	REFCLKn0	49
48	COEX_RXD (I)(0/1.8V)	REFCLKp0	47
46	COEX_TXD (O)(0/1.8V)	GND	45
44	COEX3 (I/O)(0/1.8V)	PETn0	43
42	VENDOR DEFINED	PETp0	41
40	VENDOR DEFINED	GND	39
38	VENDOR DEFINED	PERn0	37
36	UART CTS (I)(0/1.8V)	PERp0	35
34	UART RTS (O)(0/1.8V)	GND	33
32	UART RXD (I)(0/1.8V)	ADD-IN CARD KEY E	
	ADD-IN CARD KEY E	ADD-IN CARD KEY E	
	ADD-IN CARD KEY E	ADD-IN CARD KEY E	
	ADD-IN CARD KEY E	ADD-IN CARD KEY E	
	ADD-IN CARD KEY E	ADD-IN CARD KEY E	
22	UART TXD (O)(0/1.8V)	SDIO RESET#Tx_BLANKING (I)(0/1.8V)	23
20	UART WAKE# (O)(0/3.3V)	SDIO WAKE# (O)(0/1.8V)	21
18	GND	SDIO DATA3 (I/O)(0/1.8V)	19
16	LED_2# (O)(OD)	SDIO DATA2 (I/O)(0/1.8V)	17
14	PCM_IN/I2S SD_IN (I)(0/1.8V)	SDIO DATA1 (I/O)(0/1.8V)	15
12	PCM_OUT/I2S SD_OUT (O)(0/1.8V)	SDIO DATA0 (I/O)(0/1.8V)	13
10	PCM_SYNC/I2S WS (I/O)(0/1.8V)	SDIO CMD (I/O)(0/1.8V)	11
8	PCM_CLK/I2S SCK (I/O)(0/1.8V)	SDIO CLK/SYSCLK (I)(0/1.8V)	9
6	LED_1# (O)(OD)	GND	7
4	3.3 V	USB_D-	5
2	3.3 V	USB_D+	3
		GND	1

Figure 4-1 Module pin out

4.2 Pin Definition

Top side

NO	Name	Type	Description	Voltage
1	GND1	-	Ground	
3	NC	-		
5	NC	-		
7	GND2	-	Ground	
9	NC	-		
11	NC	-		
13	NC	-		
15	NC	-		
17	NC	-		
19	NC	-		
21	NC	-		
23	NC	-		
33	GND3	-	Ground	
35	PERP0	I	PCIe RX differential signals	
37	PERN0	I		
39	GND4	-	Ground	
41	PETP0	O	PCIe TX differential signals	
43	PETN0	O		
45	GND5	-	Ground	
47	REFCLKP0	I	PCIe clock differential input signal	
49	REFCLKN0	I		
51	GND6		Ground	
53	CLKREQ0#(I/O)(0/3.3V)	O	PCIe reference clock request signal, open drain, active low	3.3V
55	PEWAKE0#(I/O)(0/3.3V)	O	PCIe wake up host, open drain, active low	3.3V
57	GND7	-	Ground	
59	RESERVED_PERP1	-	NC	
61	RESERVED_PERN1	-	NC	
63	GND8	-	Ground	
65	RESERVED_PETP1	-	NC	

67	RESERVED_PETN1	-	NC	
69	GND9	-	Ground	
71	RESERVED_REFCLKP1	-	NC	
73	RESERVED_REFCLKN1	-	NC	
75	GND10	-	Ground	

Bottom side

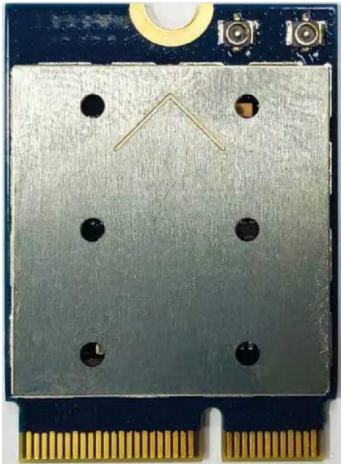
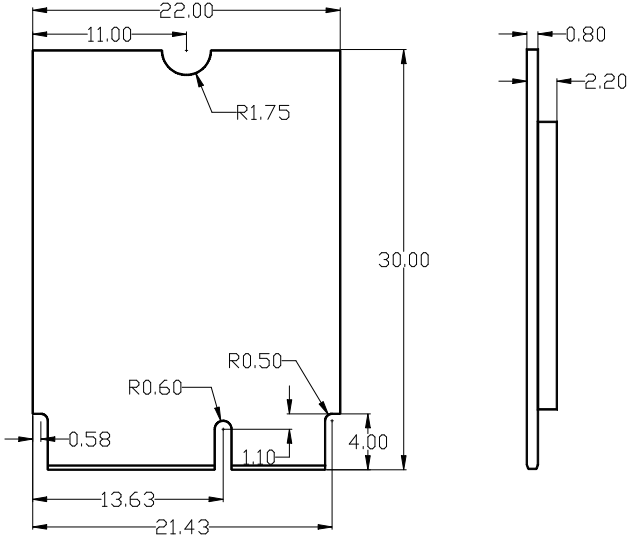
NO	Name	Type	Description	Voltage
2	3_3V_1	P	Power supply	3.3V
4	3_3V_2	P	Power supply	3.3V
6	LED_1#(O)(OD)	O	WLAN LED signal	3.3V
8	PCM_CLK	-	BT PCM clock	1.8V
10	PCM_SYNC	-	BT PCM sync	1.8V
12	PCM_OUT	O	BT PCM data out	1.8V
14	PCM_IN	I	BT PCM data in	1.8V
16	LED_2#(O)(OD)	O	BT LED signal	3.3V
18	GND11	-		
20	UART_WAKE_N	O	BT wake up host signal	3.3V
22	UART_TXD(O)(0/1.8V)	O	BT UART interface	1.8V
32	UART_RXD(I)(0/1.8V)	I		1.8V
34	UART_RTS(O)(0/1.8V)	O	BT UART request to send	1.8V
36	UART_CTS(I)(0/1.8V)	I	BT UART clear to send	1.8V
38	NC	-		
40	NC	-		
42	NC	-		
44	WAKE_BT	I	Host wake up BT signal	3.3V
46	LTE_COEX_TXD	O	LTE coexistence UART TXD	1.8V
48	LTE_COEX_RXD	I	LTE coexistence UART RXD	1.8V
50	SUSCLK_32KHZ	I	Sleep clock input	3.3V
52	PERST0#(I)(0/3.3V)	I	PCIe reset module, internal weak pull down	3.3V
54	W_DISABLE2#(I)(0/3.3V)	I	Turn off BT RF analog. Active low	3.3V
56	W_DISABLE1#(I)(0/3.3V)	I	Turn-off WLAN RF analog	3.3V

			and front-end. Active low	
58	I2C_DATA(I/O)(0/1.8V)	O	WLAN UART TXD for debug	1.8V
60	I2C_CLK(I/O)(0/1.8V)	I	WLAN UART RXD for debug	1.8V
62	NC	-		
64	NC	-		
66	NC	-		
68	NC	-		
70	NC	-		
72	3_3V_3	P	Power supply	3.3V
74	3_3V_4	P	Power supply	3.3V

P:POWER I:INPUT O:OUTPUT PD: PULL-DOWN

5 Dimensions

5.1 Module Picture

<p>L x W : 22 x 30 (+0.3-0.1) mm</p> 	
<p>H: 2.20 (±0.10) mm</p>	
<p>Weight</p>	<p>2.6±0.1g</p>

5.2 Marking Description

TBD

5.3 Module Physical Dimensions

(Unit: mm)

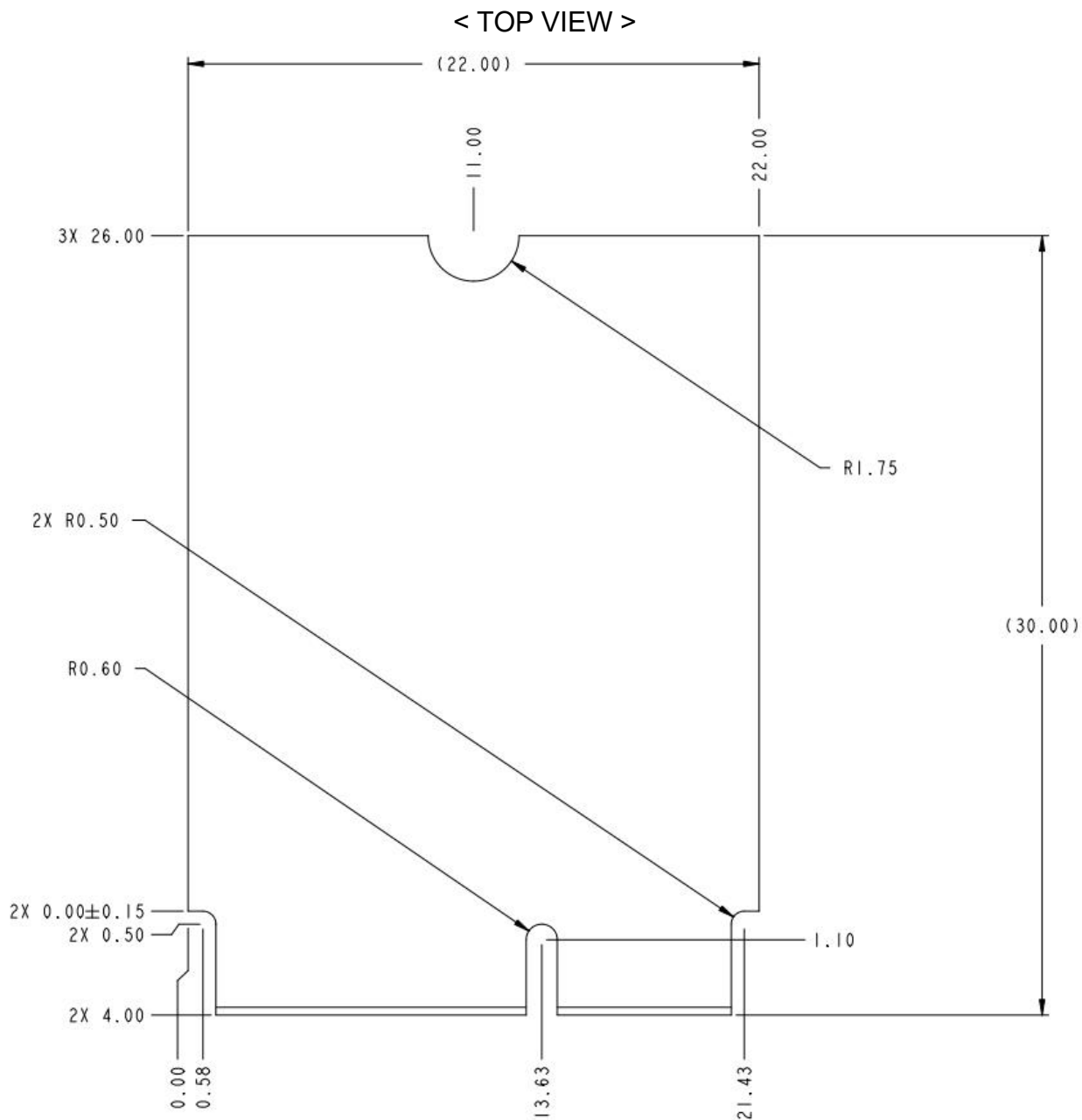


Figure 5-1 Module physical dimensions

6 Host Interface Timing Diagram

6.1 PCIe powerup sequence timing

Supports PCIe Gen 2 interface for WLAN.

Compliant to PCIe Gen 2 powerup sequence timing.

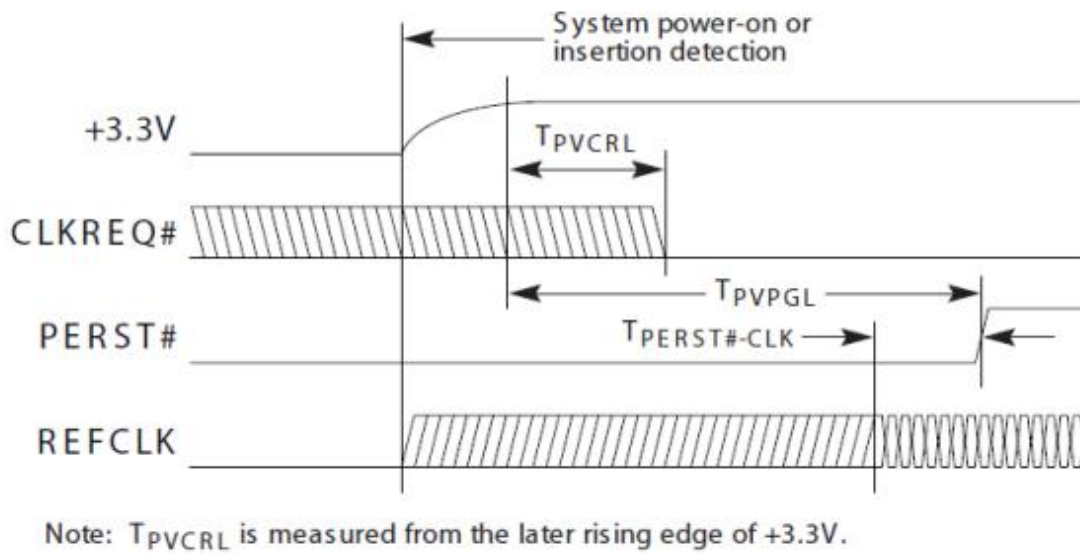


Figure 6-1 Powerup timing requirements

Symbol	Parameter	Min	Max	Units
T_{PVCRL}	Power Valid to CLKREQ# Output active		100	μ S
T_{PVPGL}	Power Valid to PERST# Input inactive	1		mS
$T_{PERST\#-CLK}$	REFCLK stable before PERST# inactive	100		μ S

7 Reference Design

7.1 Reference design schematic

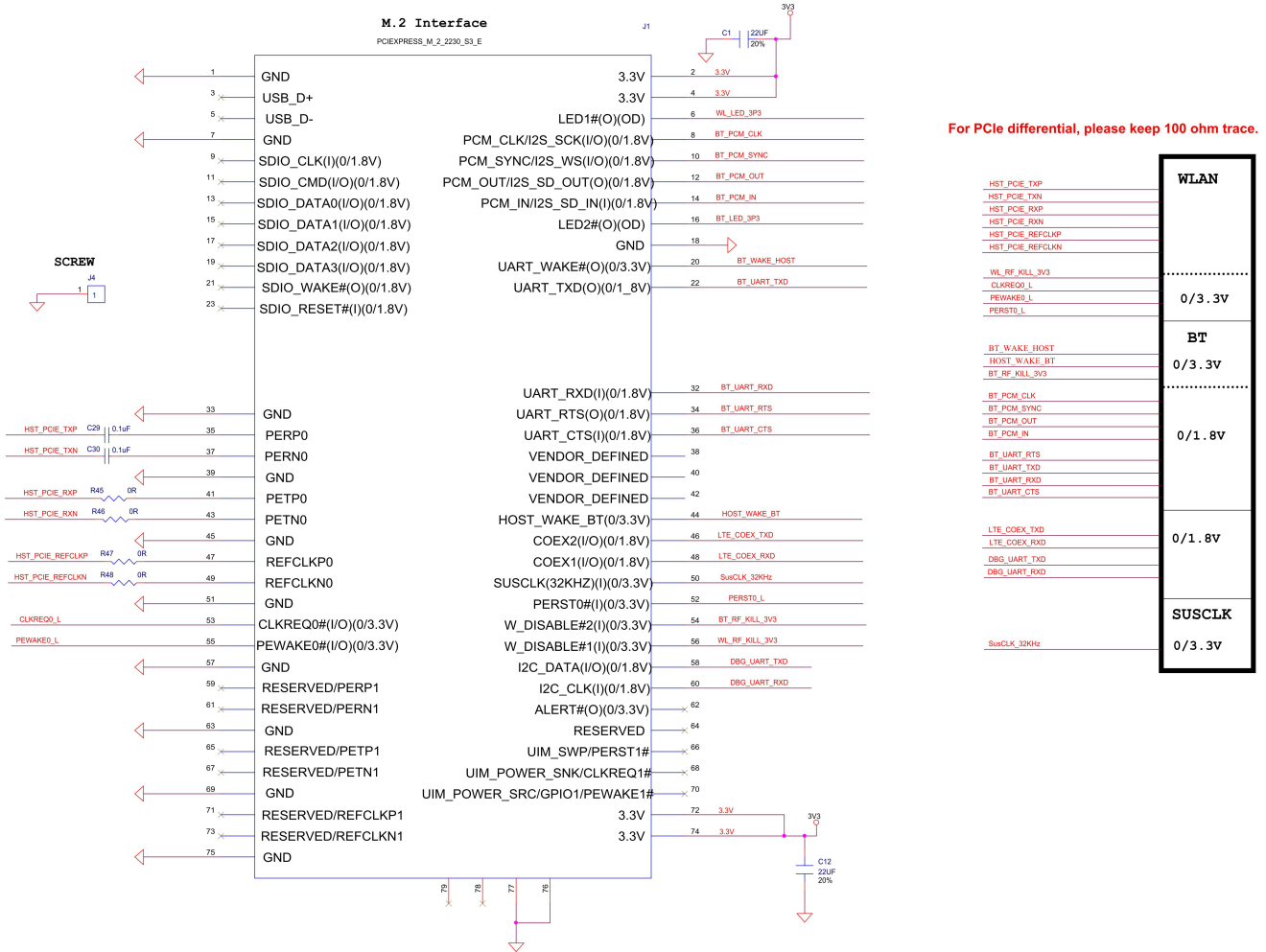


Figure 7-1 Reference schematic

C29, C30 should be closed to host.

PCIe differential signals should be followed 100 Ohm impedance.

For the I/O interface voltage, please refer to chapter 4.2 pin definition.

For the 1.8V interface, such as PCM, UART and some I/O, if the host voltage level is 3.3V or 5V, need to add level shift circuit.

7.2 M.2 connector

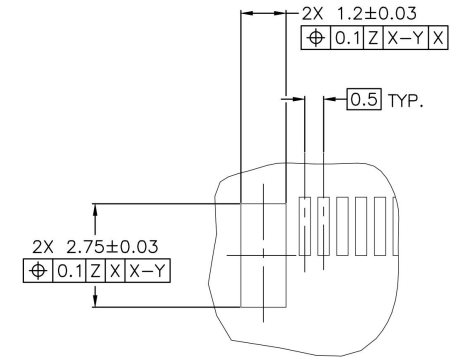
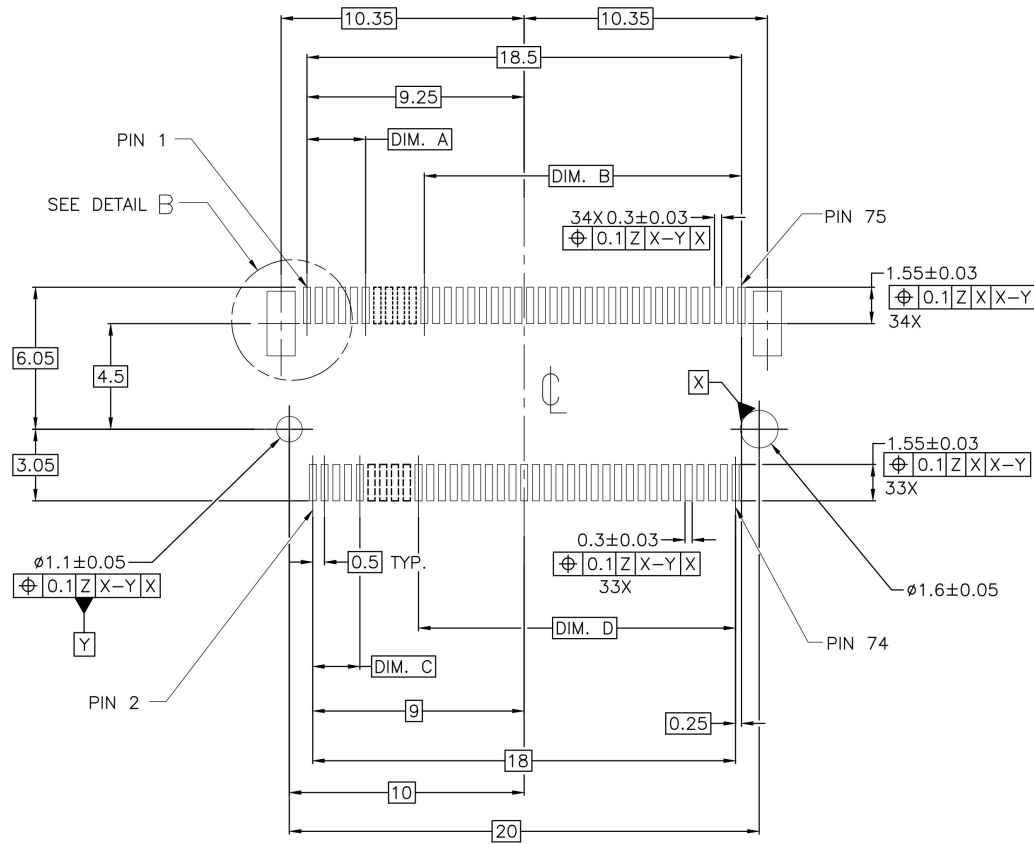
The module is standard M.2 2230 Key E double sided module.
It complies with the standard M.2 2230 Key E slot.

Recommended M.2 connector part number:

2199230-4 (TE connectivity).

AS0BC21-S67BE-LH (Foxconn).

For the mainboard PCB, it should reserve screw hole for fixing the module.



DETAIL B
SCALE 8:1

RECOMMENDED NGFF MINI CARD MOUNTING TYPE_SMT_PCB OUTLINE
DATUM Z: PCB SOLDER SURFACE

M	1.5	14.0	2.0	14.0
E	10.5	5.0	10.5	5.5
B	13.5	2.0	13.5	2.5
A	14.5	1.0	14.5	1.5
KEY ID.	DIM. D	DIM. C	DIM. B	DIM. A

Dimensions unit: mm

Note: Refer Key ID is E

Figure 7-2 Recommended M.2 connector PCB outline

7.3 RF connector of module

There are 2 gen 4 RF receptacle connectors on the module, for external dual band antenna. The RF receptacle connectors are complied with IPEX 4 standard.

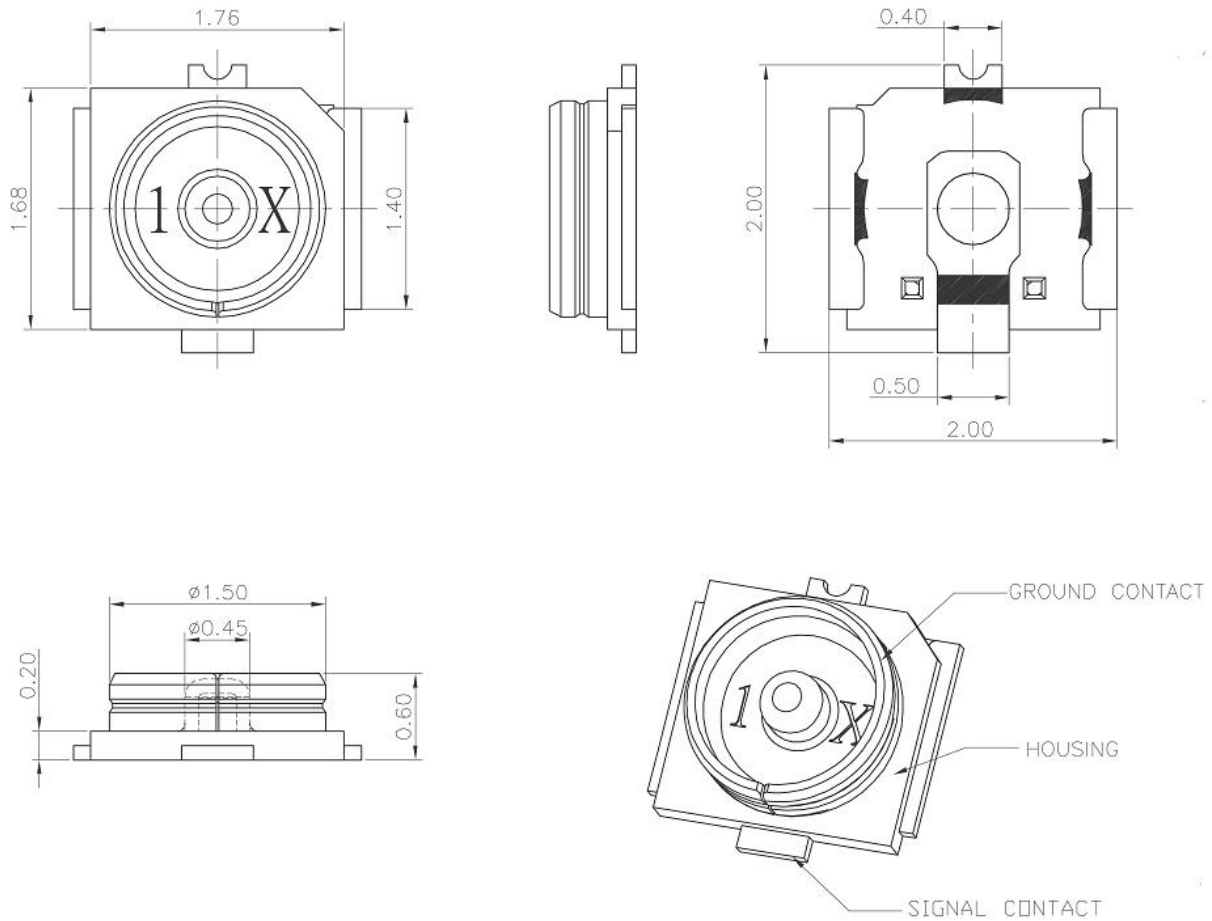


Figure 7-3 RF connector

8 Ordering Information

Part No.	Description
FG8291MPRX-00	QCA6391(QCA1064), M.2 2230 E key, 2x2, 802.11a/b/g/n/ac/ax BT5.1DBS 2G&5G

9 The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2012 0.47uH, ±20%	Sunlord, Ceaiya, Cener
2	Diplexer	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	Glead, Walsin, ACX, Murata, MAG.LAYERS
3	Crystal	2016 48MHz	ECEC, TKD, Hosonic, JWT, TXC
4	Chipset	QCA6391, QCA106X	Qualcomm
5	2.4G FEM	Dual FEM, 2.4G	Qorvo, NXP
6	5G FEM	Dual FEM, 5G	Qorvo, NXP
7	PCB	FR4, 6 LAYER	Brain-power, GDKX, Piotech, Sunlord

10 Package Information

10.1 Tray

Note: The package information will be updated in next revision of this document.

Layer size: L300.0*W240.0 mm

Layer material: PVC

Carton size: L310.0*W260.0*H220.0 mm

Carton material: A=A

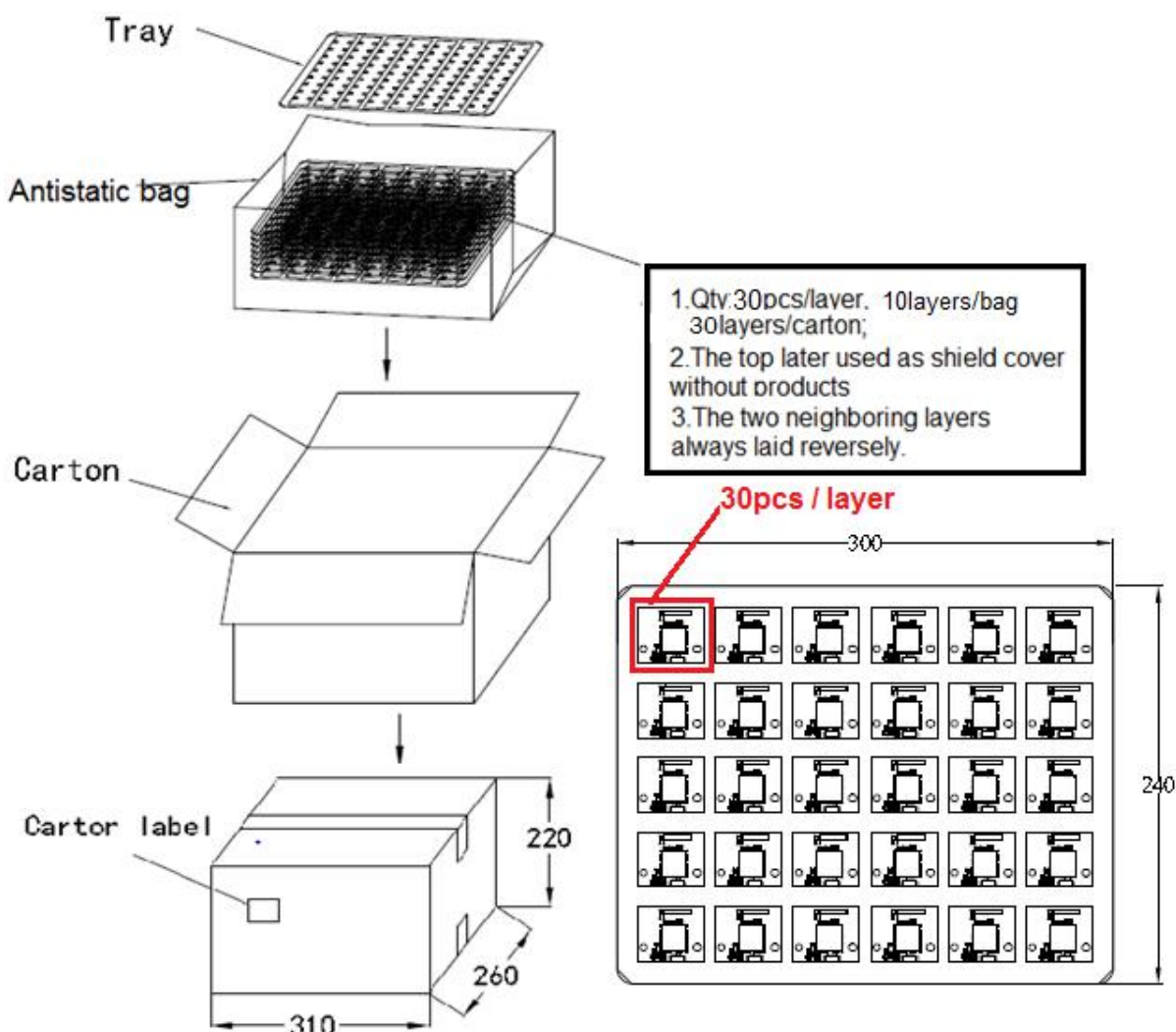


Figure 10-1 Reference Package

10.2 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 <math><40^{\circ}\text{C}</math> and <math><90\%</math> relative humidity (RH)
- b) Environmental condition during the production: - c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition
- d) "IPC/JEDEC J-STD-033A paragraph 5.2" is respected
- e) Baking is required if conditions b) or c) are not respected
- f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more