6252M-PUB

Wi-Fi Dual-band 2T2R 11ax +Bluetooth 5.2

Combo Module Datasheet

6252M-PUB Module Datasheet

Revision History

Version	Date	Revision Content	Draft	Approved

CONTENTS

1 Overview

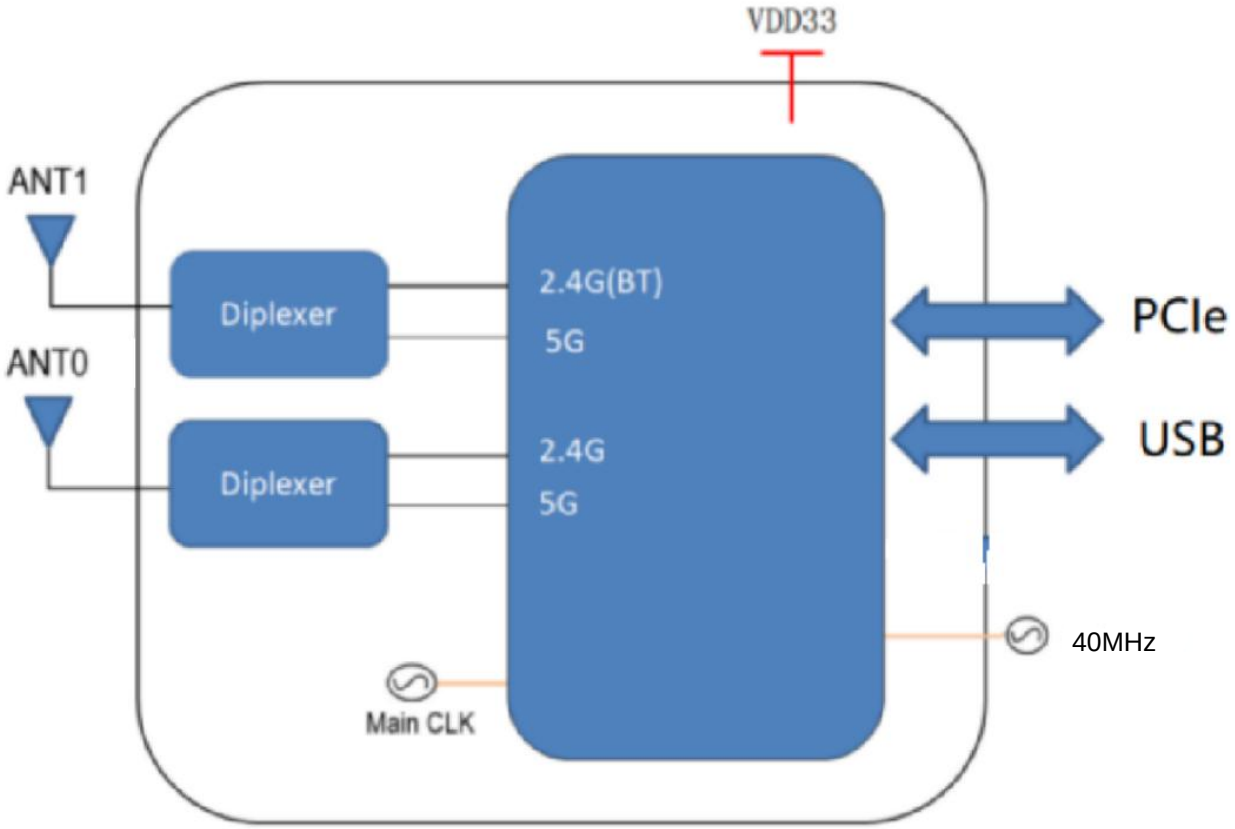
1.1 Introduction

The fn-link6252M-PUB is a highly integrated single-chip that support 2-stream 802. 11ax solutions with Multi-user MIMO (Multiple-Input, Multiple-Output)with Wireless LAN (WLAN) PCI Express network interface controller with integrated Bluetooth 5 USB interface controller.It combines a WLAN MAC, a2T2R capable WLAN baseband, and RF in a single chip. The RTL8852BE provides a complete solution fora high-performance integrated wireless and Bluetooth device.

1.2 Features

- IEEE 802.11a/b/g/n/ac/ax compatible WLAN
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports 802.11ac 2x2, Wave-2 compliant with RX MU-MIMO
- Complete 802.11n MIMO solution for 2.4GHz and 5GHz band
- Supports low power PCIe(Base Specification Revision 1.1) interface for WLAN and USB(2.0 FS-mode)
- Supports Bluetooth 5.0 system
- Compatible with Bluetooth v2.1+EDR
- Dual Mode support: Simultaneous LE and BR/EDR
- Enhanced BT/Wi-Fi Coexistence Control to improve transmission quality in different profiles
- Supports Bluetooth for class1, class2 and class3 power level transmissions without requiring an external PA

1.3 Block Diagram



1.4 General Specification

Model Name	6252M-PUB
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 22x 30x 2.2 (typical) mm
Wi-Fi Interface	Support PCIe
BT Interface	USB
Operating temperature	0°C to70°C
Storage temperature	-55°C to 85°C
RoHS	All hardware components are fully compliant with EU RoHS directive

1.5 Recommended Operating Rating

		Min.	Typ.	Max.	Unit
Operating Temperature		0	25	70	deg.C
VDD33		3.0	3.3	3.6	V
Power Consumption		VDD33 = 3.3V(Unit:mA)			
	Wi-Fi on Mode				
	TX (2.4G 1M)				
	TX (2.4G HT40)				
	RX (2.4G HT40)				
	TX (5G 6M)				
	TX (5G vHT80)				
	RX (5G vHT80)				
	BT on				
	BT Hopping				
	BT TX				
	BT RX				

※1.6 EEPROM Information

Wi-Fi

Vendor ID	
Product ID	

2 Wi-Fi RF Specification

2.1 2.4GHz RF Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11 b/g/n/ax Wi-Fi compliant	
Frequency Range	2.412 GHz ~ 2.462 GHz(2.4GHz ISM Band)	
Number of Channels	2.4GHz：Ch1~Ch11	
Spectrum Mask	Complies with IEEE standard	
Freq. Tolerance	±20 ppm	
Test Items	**Typical Value**	**EVM**
Output Power[1]	802.11b /11Mbps: 16dBm ± 1.5 dB	EVM ≤ -9dB
	802.11g /54Mbps: 18dBm ± 1.5 dB	EVM ≤ -25dB
	802.11n /MCS7: 17dBm ± 1.5 dB	EVM ≤ -28dB
	802.11ax HE20 MCS11:17dBm ± 1.5 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11:17dBm ± 1.5 dB	EVM ≤ -35dB
Test Items	**TYP Test Value**	**Standard Value**
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps @ -94 dBm	≤-83 dBm
	- 11Mbps @ -85 dBm	≤-76 dBm
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps @ -90 dBm	≤-85 dBm
	- 54Mbps @ -71 dBm	≤-68 dBm
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-85 dBm
	- MCS=7 @ -69 dBm	≤-67 dBm
SISO Receive Sensitivity (11n ,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-82 dBm
	- MCS=7 @ -66 dBm	≤-64 dBm
SISO Receive Sensitivity	- MCS=0 @ -90 dBm	≤-74 dBm

(11ax,20MHz) @10% PER	- MCS=11 @ -60 dBm	≤-52 dBm
SISO 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	

2.2 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	5180-5240 MHz, 5745-5825 MHz	
Number of Channels	5.0GHz：Please see the table[1]	
Test Items	**Typical Value**	**EVM**
Output Power[2]	802.11a /54Mbps: 18 dBm ± 1.5 dB	EVM ≤ -25dB
	802.11n /MCS7: 17 dBm ± 1.5 dB	EVM ≤ -28dB
	802.11ac VHT20 MCS8: 17 dBm ± 1.5 dB	EVM ≤ -30dB
	802.11ac VHT40 MCS9: 16 dBm ± 1.5 dB	EVM ≤ -32dB
	802.11ac VHT80 MCS9: 17 dBm ± 1.5 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 16 dBm ± 1.5 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 17 dBm ± 1.5 dB	EVM ≤ -35dB
	802.11ax HE80 MCS11: 17 dBm ± 1.5 dB	EVM ≤ -35dB
Test Items	**Test Value**	**Standard Value**
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps @ -90 dBm	≤-85
	- 54Mbps @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-85
	- MCS=7 @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-82
	- MCS=7 @ -66 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz)@10% PER	- MCS=0, NSS1 @ 90 dBm	≤-82
	- MCS=8, NSS1 @ -64 dBm	≤-60
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 @ -87 dBm	≤-79
	- MCS=9, NSS1 @ -59 dBm	≤-55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 @ -84 dBm	≤-79
	- MCS=9, NSS1 @ -56 dBm	≤-54
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-74
	- MCS=11 @ -60 dBm	≤-52

SISO Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-71
	- MCS=11 @ -57 dBm	≤-49
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0 @ -84 dBm	≤-68
	- MCS=11 @ -54 dBm	≤-46
Maximum Input Level	802.11a/n: -30 dBm	

[1]5GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
5180MHz~5240MHz	36	5180
	40	5200
	44	5220
	48	5240
5745MHz~5825MHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

3 Bluetooth Specification

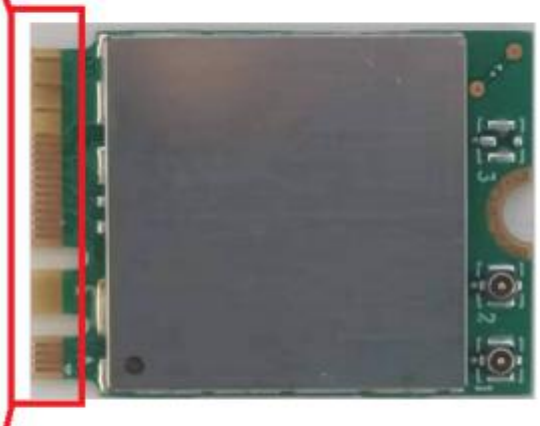
3.1 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.2 of 1, 2 and 3 Mbps.		
Host Interface	USB		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, π/4-DQPSK,8DPSK		
RF Specification			
	Min.	**Typical.**	**Max.**
Output Power		5 dBmÑ1.5dB	
Sensitivity @ BER=0.1% for GFSK (1Mbps)			-70 dBm
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)			-70 dBm
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)			-70 dBm
Maximum Input Level	GFSK (1Mbps):-20dBm		
	π/4-DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

4 Pin Assignments

4.1 Pin Outline

PIN	Signal	Signal	PIN
74	NC	GND10	75
72	NC	NC	73
70	NC	NC	71
68	NC	GND9	69
66	NC	NC	67
64	NC	NC	65
62	NC	GND	63
60	NC	NC	61
58	NC	NC	59
56	WL_DIS_N	GND	57
54	BT_DIS_N	PEWAKE0	55
52	PERST0	CLKREQ0	53
50	SUSCLK	GND	51
48	COEX_RXD	REFCLKN0	49
46	COEX_TXD	REFCLKP0	47
44	COEX3	GND	45
42	NC	PETN0	43
40	NC	PETP0	41
38	VENDOR DEFINED	GND	39
36	NC	PERN0	37
34	NC	PERP0	35
32	NC	GND	33
30	NC	NC	31
28	NC	NC	29
26	NC	NC	27
24	NC	NC	25
22	NC	NC	23
20	NC	NC	21
18	GND	NC	19
16	LED_2#	NC	17
14	NC	NC	15
12	NC	NC	13
10	NC	NC	11
8	NC	NC	9
6	LED_1#	GND	7
4	3_3V	USB_D-	5
2	3_3V	USB_D+	3
		GND	1



4.2 Pin Definition

NO	Name	Type	Description	Voltage	
1	GND	-	Ground		
3	USB_D+	I/O	USB differential line for BT		
5	USB_D-	I/O			
7	GND	-	Ground		

9	NC	-			
11	NC				
13	NC				
15	NC				
17	NC	-			
19	NC	-			
21	NC	-			
23	NC	-			
25	NC				
27	NC				
29	NC				
31	NC				
33	GND	-	Ground		
35	PERP0	I	PCIe RX differential signals		
37	PERN0	I			
39	GND	-	Ground		
41	PETP0	O	PCIe TX differential signals		
43	PETN0	O			
45	GND	-	Ground		
47	REFCLKP0	I	PCIe clock differential input signal		
49	REFCLKN0	I			
51	GND		Ground		
53	CLKREQ0	O	PCIe reference clock request signal, open drain, active low	3.3V	
55	PEWAKE0	O	PCIe wake up host, open drain, active low	3.3V	
57	GND	-	Ground		
59	NC	-	NC		
61	NC	-	NC		
63	GND	-	Ground		
65	NC	-	NC		
67	NC	-	NC		
69	GND9	-	Ground		
71	NC	-	NC		

73	NC	-	NC		
75	GND10	-	Ground		

Bottom side

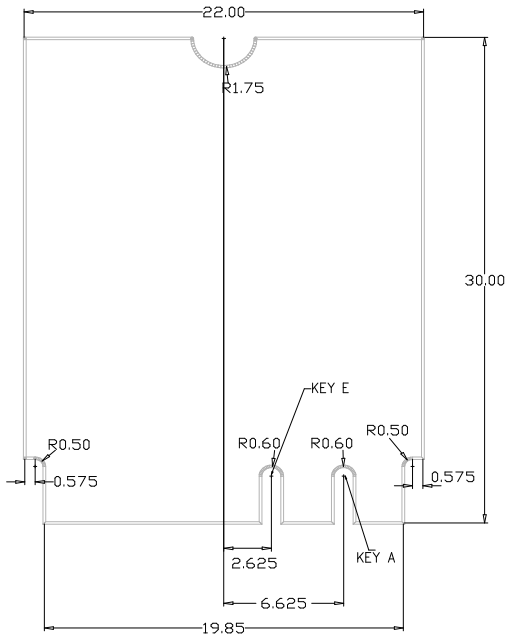
NO	Name	Type	Description	Voltage	
2	3_3V	P	Power supply	3.3V	
4	3_3V	P	Power supply	3.3V	
6	LED_1#	O	WLAN LED signal	3.3V	
8	PCM_CLK	I/O	general perpose input		
10	PCM_SYNC	I/O	general perpose input		
12	PCM_OUT	I/O	general perpose input		
14	PCM_IN	I/O	general perpose input		
16	LED_2#	O	BT LED signal	3.3V	
18	GND	-	Ground		
20	BT_WAKE_ HOST_Ant	O	Bluetooth device to wake-up HOST	3.3V	
22	NC	-	NC		
24	NC		NC		
26	NC		NC		
28	NC		NC		
30	NC		NC		
32	NC		NC		
34	NC	-	NC		
36	NC	-	NC		
38	VENDOR DEFINED	-	Host wake BT. No function, please don't connect to this pin.		
40	NC	-	NC		
42	NC	-	NC		
44	COEX3	I/O	LTE coexistence signal	3.3V	
46	COEX_TXD	O	LTE coexistence signal	3.3V	
48	COEX_RXD	I	LTE coexistence signal	3.3V	
50	SUSCLK	I	Sleep clock input	3.3V	
52	PERST0	I	PCIe reset signal, active low	3.3V	

54	BT_DIS_N	I	Bluetooth enable signal, pull low to disable BT function, default high.	3.3V	
56	WL_DIS_N	I	WLAN enable signal, pull low to disable BT function, default high.	3.3V	
58	NC	-	NC		
60	NC	-	NC		
62	NC	-	NC		
64	NC	-	NC		
66	NC	-	NC		
68	NC	-	NC		
70	NC	-	NC		
72	NC	-	NC		
74	NC	-	NC		

P: POWER I: INPUT O: OUTPUT

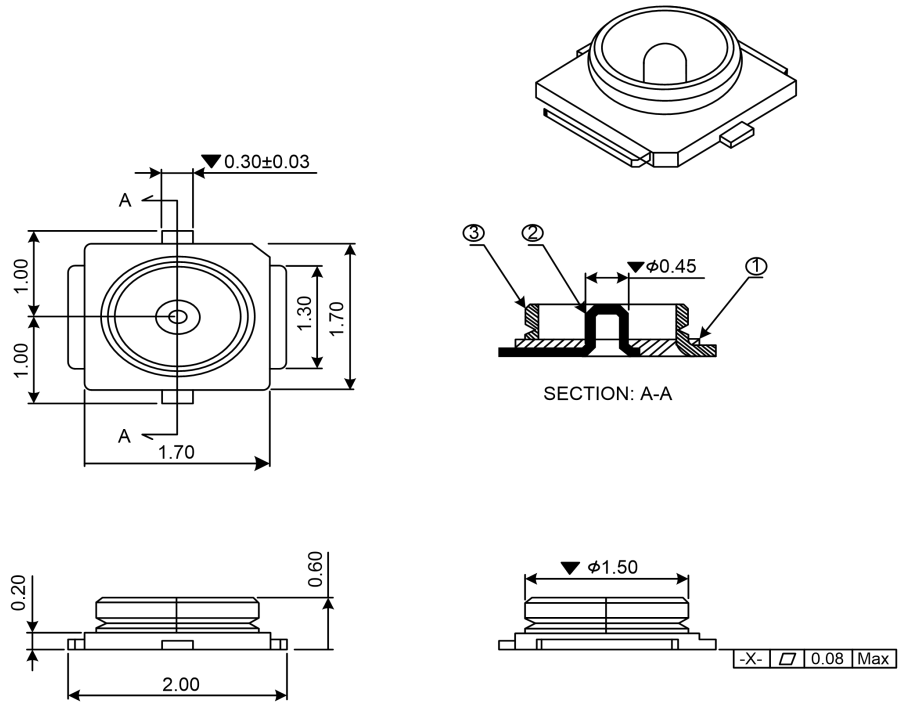
5 Dimensions

5.1 Module Picture

L x W : 22 x 30 (+0.3-0.1) mm	
H: 2.2 (±0.2) mm	

Weight	2.6g

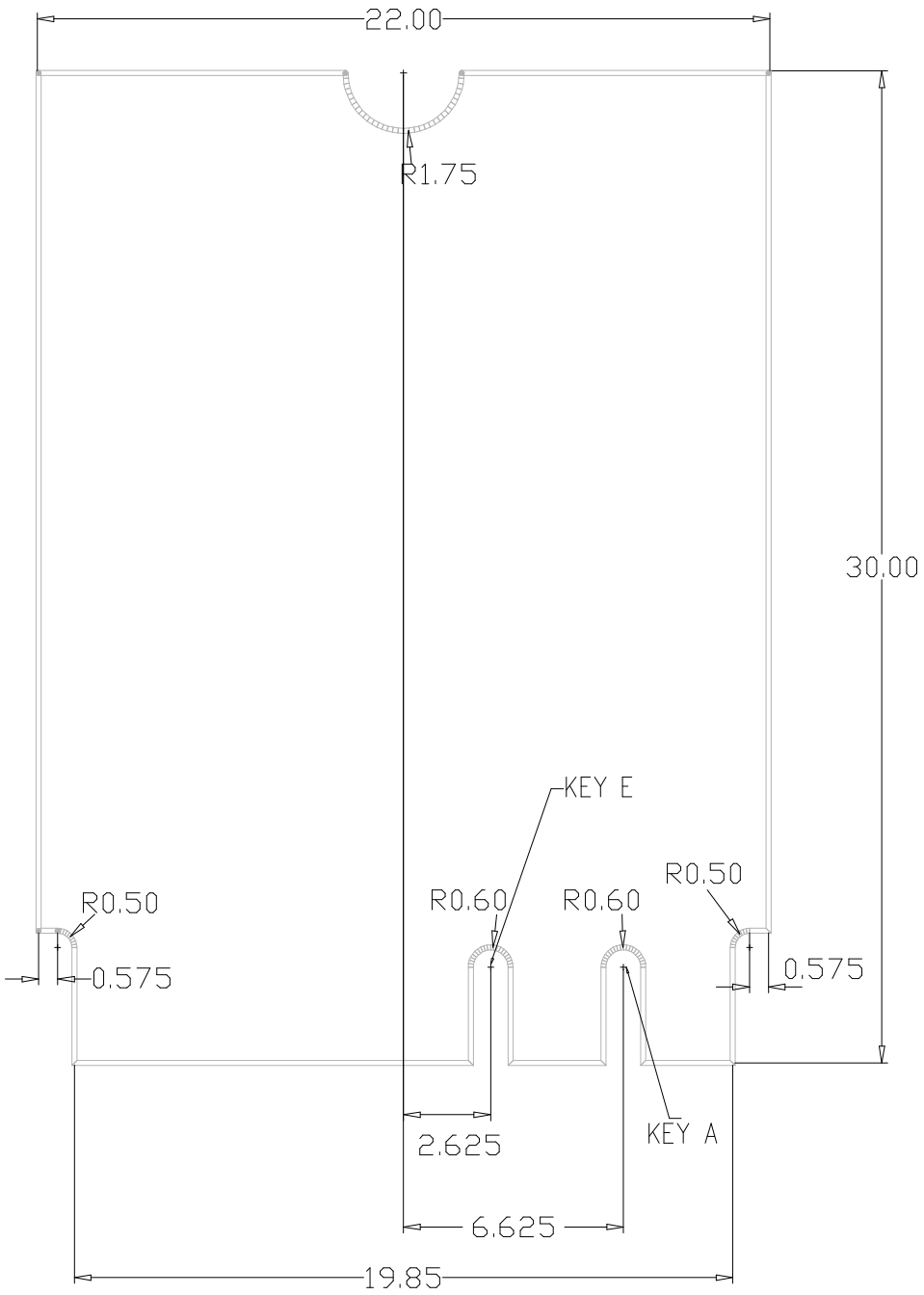
5.2ConnectorSpecification



5.3ModulePhysicalDimensions

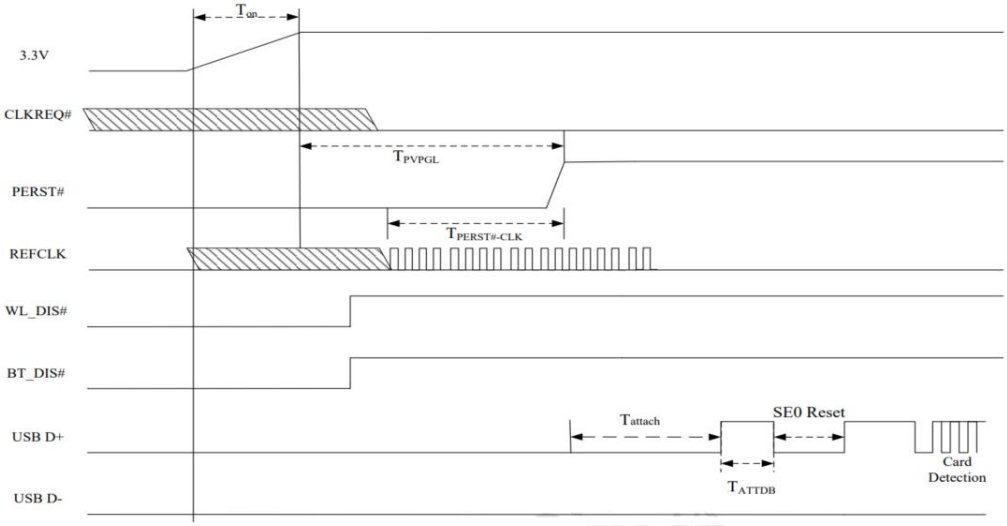
(Unit: mm)

< TOP VIEW >


22.00
R1.75
30.00
KEY E
R0.50
R0.60
R0.60
R0.50
0.575
0.575
2.625
KEY A
6.625
19.85

6 Host Interface Timing Diagram

6.1 PCIe Bus during Power On Sequence



T_{on}: The main power ramp up duration

T_{PVPGL}: Power valid to PERST# input inactive

$T_{PERST\#-CLK}$: Reference clock stable before PERST# inactive

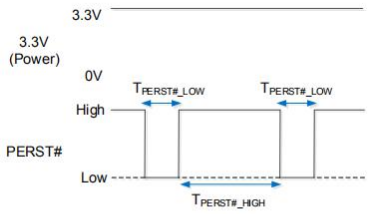
T_{attach}: The interval to turn on BT after PERST# de-asserted

T_{ATTDB}: the debounce interval with a minimal duration of 100ms that provided by the USB system Software

$T_{SE0\ Reset}$: USB host send SE0 Reset duration

Symbol	Unit	Min	Typical	Max
T_{on}	ms	0.5	1.5	5
T_{PVPGL}	ms	Implementation specific;recommended 50ms	--	--
$T_{PERST\#-CLK}$	us	100	--	--
T_{attach}	ms	0.5	2	5
T_{ATTDB}	ms	100	--	--
$T_{SE0\ Reset}$	ms	10	--	--

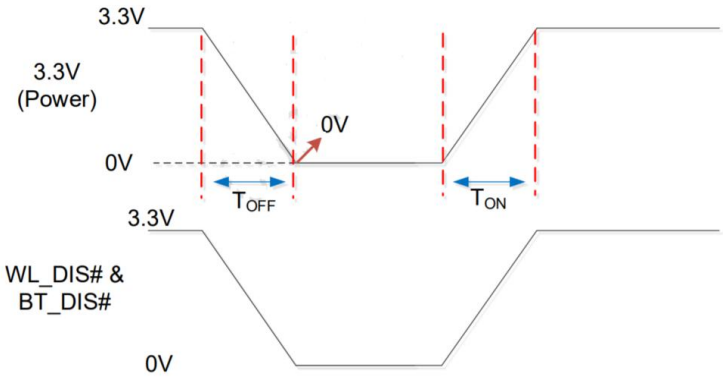
6.2 PCIe PERST# Timing Sequence



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

6.3 Power Off Sequence

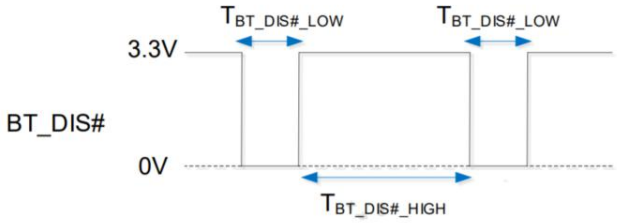


RTL8822CE-CG Power Off Timing Parameters

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.

6.4 BT_DIS Timing Sequence

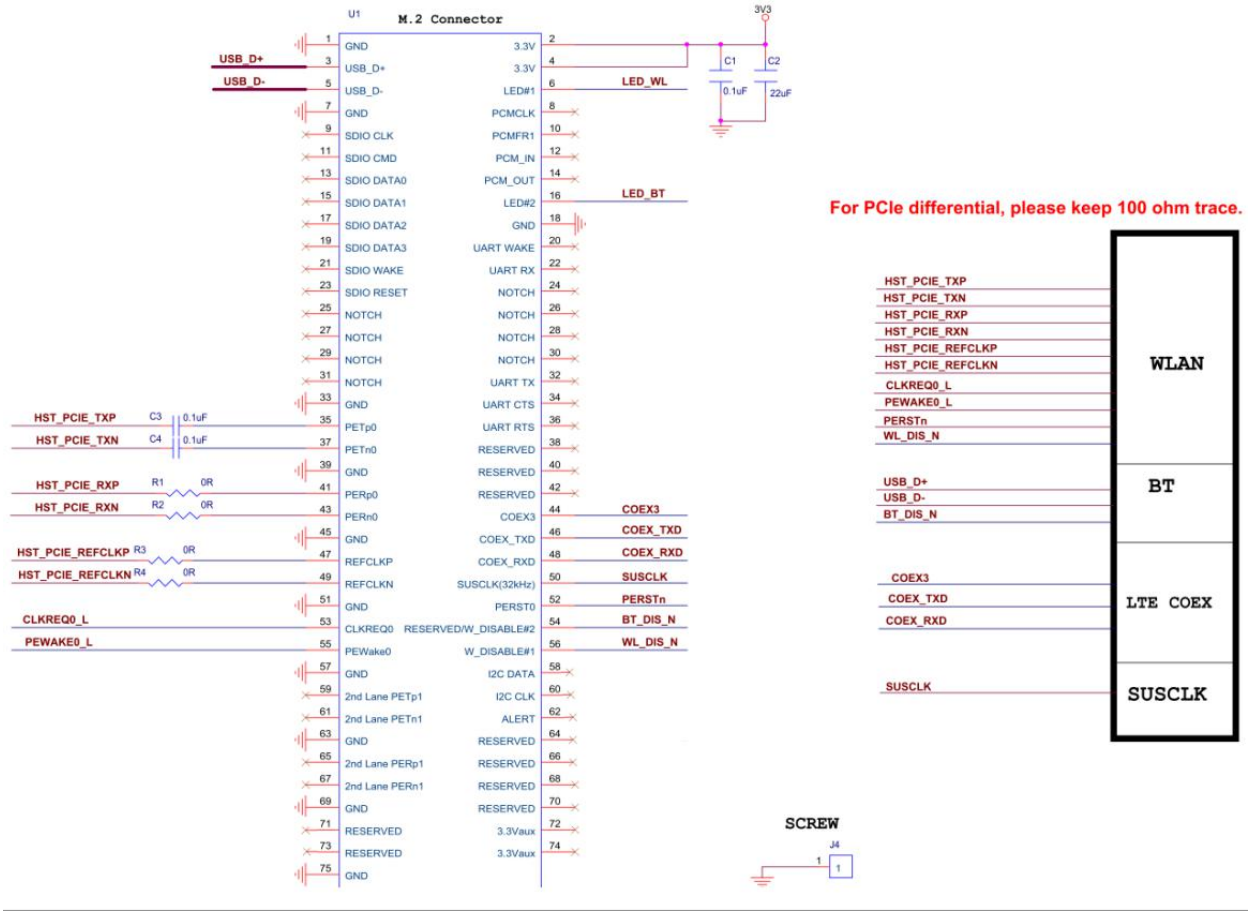


	Min	Typical	Max	Unit	Description
BT_DIS#_LOW	200	--	--	ms	BT_DIS# low duration
BT_DIS#_HIGH	500	--	--	ms	BT_DIS# high duration

6.5 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

7 Reference Design



Note:

1. Both of the 2 ANTs are all support 2.4G/5G/BT function.
2. 6252M-PUB antenna port is control by driver if diversity function is enabled.
3. C1, C2 placed close to module side.
4. PCIe differential keep 100 ohm trace.
5. USB differential keep 90 ohm trace.

8 Ordering Information

Part No.	Description
FG6252MPUB-00	RTL8852BE-CG, a/b/g/n/ac/ax, Wi-Fi+BT5.2, 2T2R, 22X30mm, PCIE+USB, PCB Version V1.0

9 The Key Material List

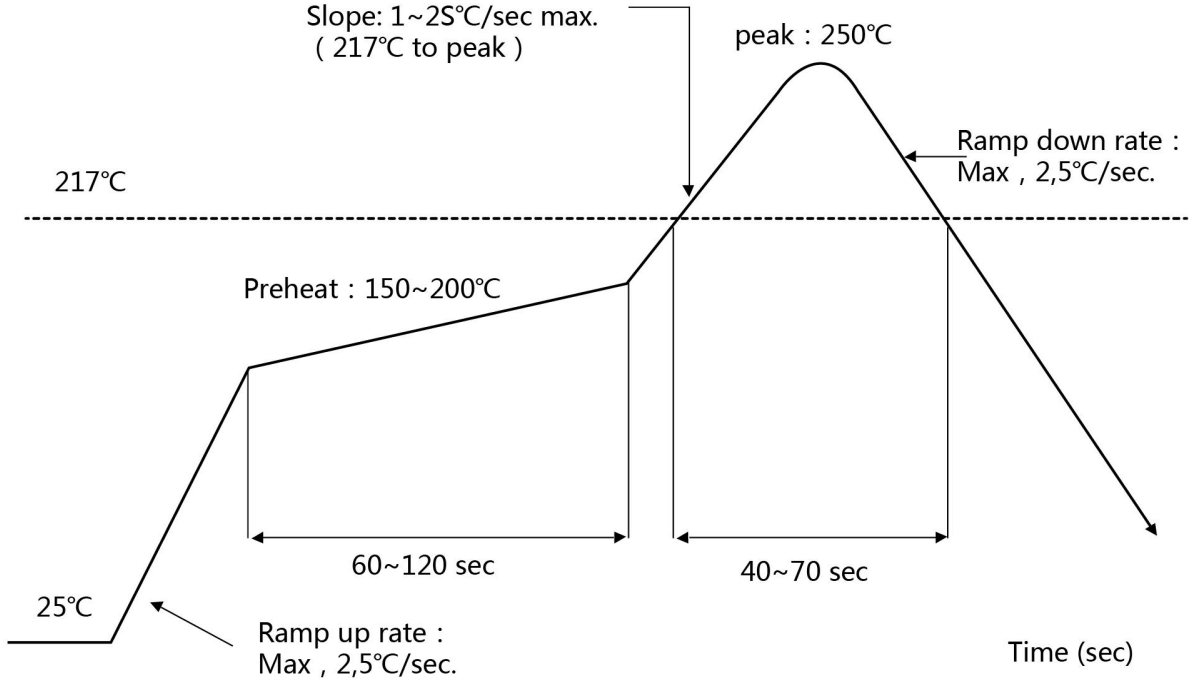
Item	Part Name	Description	Manufacturer
1	Inductor	2520 2.2UH ±20%,	Sunlord, Ceaiya, Cenker
2	Diplexer	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	Glead, Walsin, ACX, Murata, MAG.LAYERS
3	Crystal	3225 40MHz 12pF ±10ppm	ECEC, TKD, Hosonic, JWT, TXC
4	Chipset	RTL8852BE-CG	Realtek
5	PCB	6252M-PUB 22X30X0.8mm TG180	Brain-power, KX-pc，Sunlord, Piotek
6	Shielding Cover	6252M-PUB V1.0 Shielding cover	Suntech, JLitong

10 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

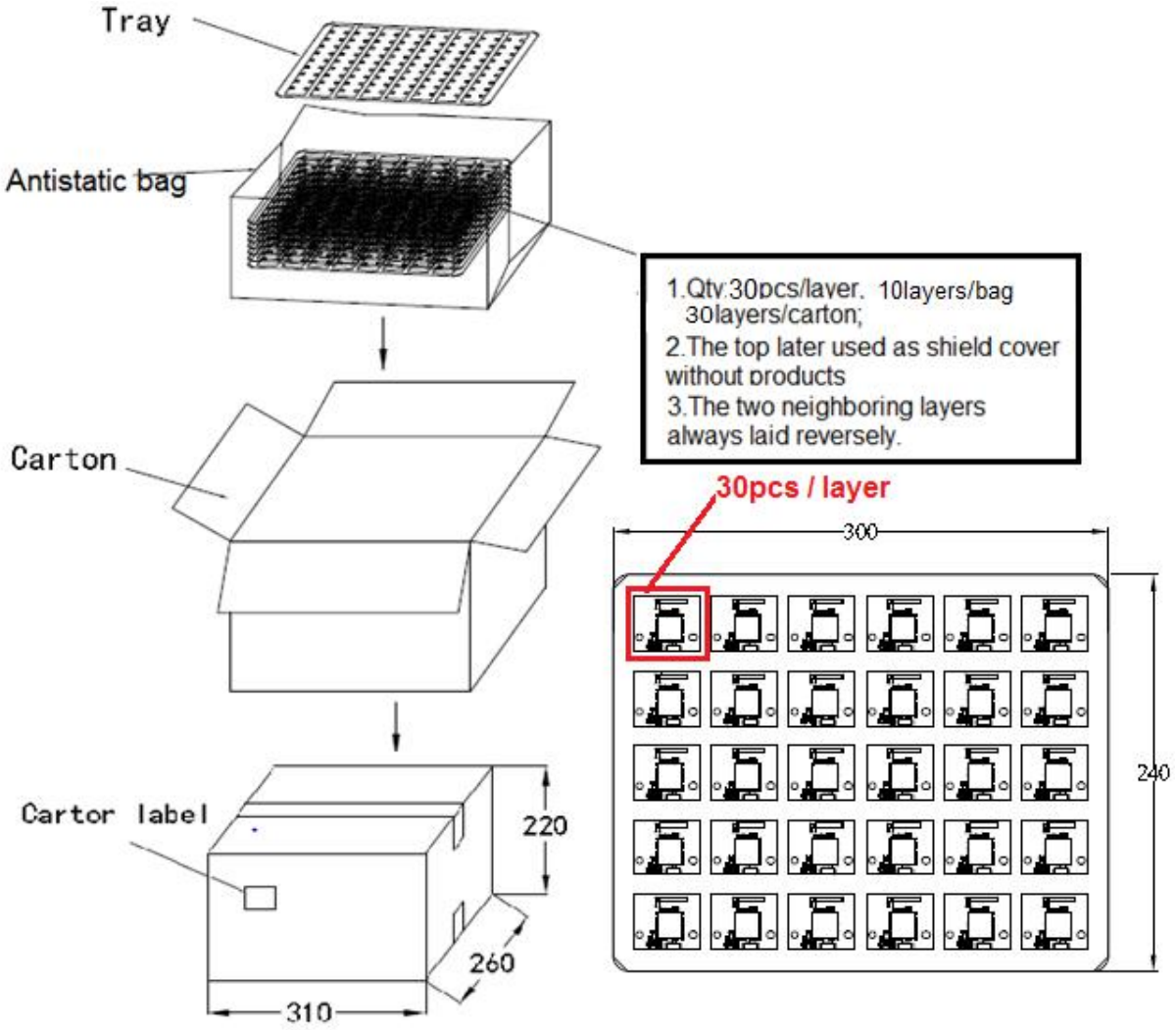
Number of Times : ≤2 times



11 Package Information

11.1 Tray

Layer size: L300.0*W240.0 mm
Layer material: PVC
Carton size: L310.0*W260.0*H220.0 mm
Carton material: A=A



11.2 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 <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

FCC STATEMENT

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 Radiation Exposure Statement:

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

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

1. List of applicable FCC rules

FCC Part 15 Subpart C 15.247 & 15.209 & 15.407

2. Specific operational use conditions

The module with BT/WIFI function.

Operation Frequency: BT/BLE 2402-2480MHz;

Wi-Fi 2412-2462MHz; 5180-5240MHz; 5745-5825MHz

Number of Channel:

BT : 79 Channel, BLE: 40 Channel, 2.4G Wi-Fi :11 Channel,

5G Wi-Fi 5180-5240MHz: 7 Channel, 5G Wi-Fi 5745-5825MHz: 8 Channel

Modulation: GFSK, π/4-DQPSK, 8-DPSK, DSSS, OFDM, OFDMA

Type: External Antenna

Gain: BT/BLE/2.4G Wi-Fi: 1.86dBi,

5G Wi-FI: 5180-5240MHz：1.67dBi，5745-5825MHz：2.55dBi.

The module can be used for mobile or portable applications with a maximum 2.55dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operaition. The host manufacturer has to be aware not to provide information

3. Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

4. Trace antenna designs

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

5. RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

6. Antennas

Antenna Specification are as follows:

Type: External Antenna

Gain: BT/BLE/2.4G Wi-Fi: 1.86dBi,

5G Wi-FI: 5180-5240MHz：1.67dBi，5745-5825MHz：2.55dBi.

This device is intended only for host manufacturers under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna;

The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employa ‘unique’ antenna coupler.

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

7. Label and compliance information

Host product manufacturers need to provide a physical or e-label stating “Contains FCC ID: **2APQQ-6252M-PUB**” with their finished product.

8. Information on test modes and additional testing requirements

Operation Frequency: 2402-2480MHz, 2412-2462MHz; 5180-5240MHz; 5745-5825MHz

Number of Channel:

BT: 79 Channel, BLE: 40 Channel, 2.4G Wi-Fi :11 Channel,

5G Wi-Fi 5180-5240MHz: 7 Channel, 5G Wi-Fi 5745-5825MHz: 8 Channel

Modulation: GFSK, π/4-DQPSK, 8-DPSK, DSSS, OFDM, OFDMA

Host manufacturer must perfom test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

9. Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is **only** FCC authorized for FCC Part 15 Subpart C 15.247 & 15.209 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Federal Communication Commission Statement (FCC, U.S.)

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 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.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTES

Co-location warning:

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

OEM integration instructions:

This device is intended only for OEM integrators under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End product labeling:
The final end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID: 2APQQ-6252M-PUB”.

Information that must be placed in the end user manual:
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

1. List of applicable FCC rules

FCC Part 15 Subpart C 15.247 & 15.209 & 15.407

2. Specific operational use conditions

The module with BT/WIFI function.

Operation Frequency: BT/BLE 2402-2480MHz;

Wi-Fi 2412-2462MHz; 5180-5240MHz; 5745-5825MHz

Number of Channel:

BT : 79 Channel, BLE: 40 Channel, 2.4G Wi-Fi :11 Channel,

5G Wi-Fi 5180-5240MHz: 7 Channel, 5G Wi-Fi 5745-5825MHz: 8 Channel

Modulation: GFSK, π/4-DQPSK, 8-DPSK, DSSS, OFDM

Type: External Antenna

Gain: BT/BLE/2.4G Wi-Fi: 1.86dBi,

5G Wi-FI: 5180-5240MHz：1.67dBi, 5745-5825MHz：2.55dBi.

The module can be used for mobile or portable applications with a maximum 2.55dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operaition. The host manufacturer has to be aware not to provide information

3. Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

4. Trace antenna designs

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

5. RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

6. Antennas

Antenna Specification are as follows:

Type: External Antenna

Gain: BT/BLE/2.4G Wi-Fi: 1.86dBi,

5G Wi-FI: 5180-5240MHz：1.67dBi, 5745-5825MHz：2.55dBi.

This device is intended only for host manufacturers under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna;