

# TEST REPORT

**Product Name** : BT module  
**Brand Mark** : RF-star  
**Model No.** : RF-BM-2652P3  
**FCC ID** : 2ABN2-2652P3  
**Report Number** : BLA-EMC-202106-A9302  
**Date of Sample Receipt** : 2021/6/30  
**Date of Test** : 2021/6/30 to 2021/7/22  
**Date of Issue** : 2021/7/22  
**Test Standard** : 47 CFR Part 15, Subpart C 15.247  
**Test Result** : Pass

Prepared for:

**ShenZhen RF-STAR Technology CO.,LTD**  
**2F, BLDG.8, Zone A,BaoAn Internet Industry Base, BaoYuan Road,**  
**XiXiang, BaoAn DIST, ShenZhen China**

Prepared by:

**BlueAsia of Technical Services(Shenzhen) Co.,Ltd.**  
**Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District,**  
**Shenzhen, Guangdong Province, China**  
**TEL: +86-755-23059481**

Compiled by:

*Sven*

Review by:

*Sueels*

Approved by:

*Blue Zhong*

Date: 2021/7/22



**REPORT REVISE RECORD**

<b>Version No.</b>	<b>Date</b>	<b>Description</b>
00	2021/7/22	Original

BlueAsia

## TABLE OF CONTENTS

<b>1</b>	<b>TEST SUMMARY .....</b>	<b>5</b>
<b>2</b>	<b>GENERAL INFORMATION .....</b>	<b>6</b>
<b>3</b>	<b>GENERAL DESCRIPTION OF E.U.T. ....</b>	<b>6</b>
<b>4</b>	<b>TEST ENVIRONMENT .....</b>	<b>7</b>
<b>5</b>	<b>TEST MODE .....</b>	<b>7</b>
<b>6</b>	<b>MEASUREMENT UNCERTAINTY .....</b>	<b>7</b>
<b>7</b>	<b>DESCRIPTION OF SUPPORT UNIT.....</b>	<b>8</b>
<b>8</b>	<b>LABORATORY LOCATION.....</b>	<b>8</b>
<b>9</b>	<b>TEST INSTRUMENTS LIST .....</b>	<b>9</b>
<b>10</b>	<b>CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ).....</b>	<b>12</b>
10.1	LIMITS .....	12
10.2	BLOCK DIAGRAM OF TEST SETUP .....	12
10.3	PROCEDURE .....	12
10.4	TEST DATA.....	14
<b>11</b>	<b>CONDUCTED BAND EDGES MEASUREMENT.....</b>	<b>16</b>
11.1	LIMITS .....	16
11.2	BLOCK DIAGRAM OF TEST SETUP .....	16
11.3	TEST DATA.....	17
<b>12</b>	<b>RADIATED SPURIOUS EMISSIONS.....</b>	<b>18</b>
12.1	LIMITS .....	18
12.2	BLOCK DIAGRAM OF TEST SETUP .....	19
12.3	PROCEDURE .....	19
12.4	TEST DATA.....	21
<b>13</b>	<b>RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS.....</b>	<b>37</b>
13.1	LIMITS .....	37
13.2	BLOCK DIAGRAM OF TEST SETUP .....	38
13.3	PROCEDURE .....	38
13.4	TEST DATA.....	40
<b>14</b>	<b>CONDUCTED SPURIOUS EMISSIONS .....</b>	<b>48</b>
14.1	LIMITS .....	48

14.2	BLOCK DIAGRAM OF TEST SETUP .....	48
14.3	TEST DATA.....	49
<b>15</b>	<b>POWER SPECTRUM DENSITY.....</b>	<b>50</b>
15.1	LIMITS .....	50
15.2	BLOCK DIAGRAM OF TEST SETUP .....	50
15.3	TEST DATA.....	50
<b>16</b>	<b>CONDUCTED PEAK OUTPUT POWER .....</b>	<b>51</b>
16.1	LIMITS .....	51
16.2	BLOCK DIAGRAM OF TEST SETUP .....	51
16.3	TEST DATA.....	52
<b>17</b>	<b>MINIMUM 6DB BANDWIDTH .....</b>	<b>53</b>
17.1	LIMITS .....	53
17.2	BLOCK DIAGRAM OF TEST SETUP .....	53
17.3	TEST DATA.....	53
<b>18</b>	<b>ANTENNA REQUIREMENT .....</b>	<b>54</b>
18.1	CONCLUSION .....	54
<b>19</b>	<b>APPENDIX.....</b>	<b>55</b>
19.1	MAXIMUM CONDUCTED OUTPUT POWER .....	55
19.2	-6DB BANDWIDTH .....	58
19.3	OCCUPIED CHANNEL BANDWIDTH.....	62
19.4	MAXIMUM POWER SPECTRAL DENSITY LEVEL .....	65
19.5	CONDUCTED RF SPURIOUS EMISSION .....	73
<b>APPENDIX A: PHOTOGRAPHS OF TEST SETUP .....</b>		<b>80</b>
<b>APPENDIX B: PHOTOGRAPHS OF THE EUT.....</b>		<b>82</b>

## 1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass

## 2 GENERAL INFORMATION

<b>Applicant</b>	ShenZhen RF-STAR Technology CO.,LTD
<b>Address</b>	2F, BLDG.8, Zone A,BaoAn Internet Industry Base, BaoYuan Road, XiXiang, BaoAn DIST, ShenZhen China
<b>Manufacturer</b>	ShenZhen RF-STAR Technology CO.,LTD
<b>Address</b>	2F, BLDG.8, Zone A,BaoAn Internet Industry Base, BaoYuan Road, XiXiang, BaoAn DIST, ShenZhen China
<b>Factory</b>	ShenZhen RF-STAR Technology CO.,LTD
<b>Address</b>	2F, BLDG.8, Zone A,BaoAn Internet Industry Base, BaoYuan Road, XiXiang, BaoAn DIST, ShenZhen China
<b>Product Name</b>	BT module
<b>Test Model No.</b>	RF-BM-2652P3

## 3 GENERAL DESCRIPTION OF E.U.T.

<b>Hardware Version</b>	1.0
<b>Software Version</b>	1.0
<b>Operation Frequency:</b>	2402MHz-2480MHz
<b>Modulation Type:</b>	GFSK
<b>Channel Spacing:</b>	2MHz
<b>Number of Channels:</b>	40
<b>Antenna Type:</b>	PCB Antenna
<b>Antenna Gain:</b>	0dBi(Provided by customer)

#### 4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	3.3Vdc

#### 5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
TX	Keep the EUT in transmitting mode with modulation
Remark: Only the data of the worst mode would be recorded in this report.	

#### 6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30Mz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB

## 7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
PC	HASEE	K610D	N/A	N/A

## 8 LABORATORY LOCATION

All tests were performed at:  
BlueAsia of Technical Services(Shenzhen) Co., Ltd.  
Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province,  
China  
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673  
No tests were sub-contracted.



## 9 TEST INSTRUMENTS LIST

Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Shield room	SKET	833	N/A	2020/11/25	2023/11/24
Receiver	R&S	ESPI3	101082	2020/10/12	2021/10/11
LISN	R&S	ENV216	3560.6550.15	2020/10/12	2021/10/11
LISN	AT	AT166-2	AKK1806000003	2020/10/12	2021/10/11
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A

Test Equipment Of Conducted Band Edges Measurement					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

Test Equipment Of Radiated Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Receiver	R&S	ESR7	101199	2020/10/12	2021/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25

Amplifier	SKET	PA-000318G-45	N/A	2020/10/16	2021/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

**Test Equipment Of Radiated Emissions which fall in the restricted bands**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Receiver	R&S	ESR7	101199	2020/10/12	2021/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25
Amplifier	SKET	PA-000318G-45	N/A	2020/10/16	2021/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

**Test Equipment Of Conducted Spurious Emissions**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11

Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

**Test Equipment Of Power Spectrum Density**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

**Test Equipment Of Conducted Peak Output Power**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

**Test Equipment Of Minimum 6dB Bandwidth**

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

## 10 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)

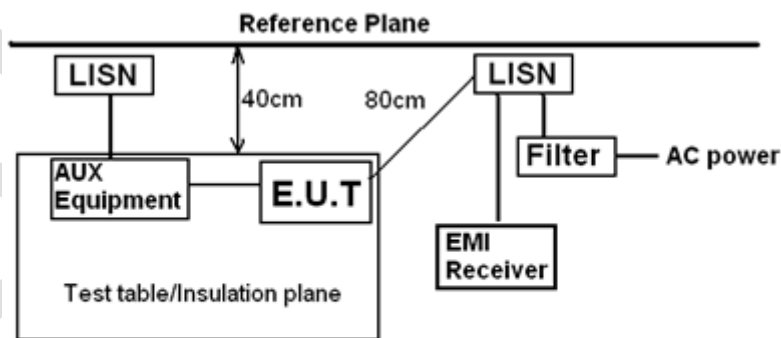
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Sven
Temperature	25°C
Humidity	52%

### 10.1 LIMITS

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### 10.2 BLOCK DIAGRAM OF TEST SETUP



Remark  
 E.U.T: Equipment Under Test  
 LISN: Line Impedance Stabilization Network  
 Test table height=0.8m

### 10.3 PROCEDURE

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as

the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

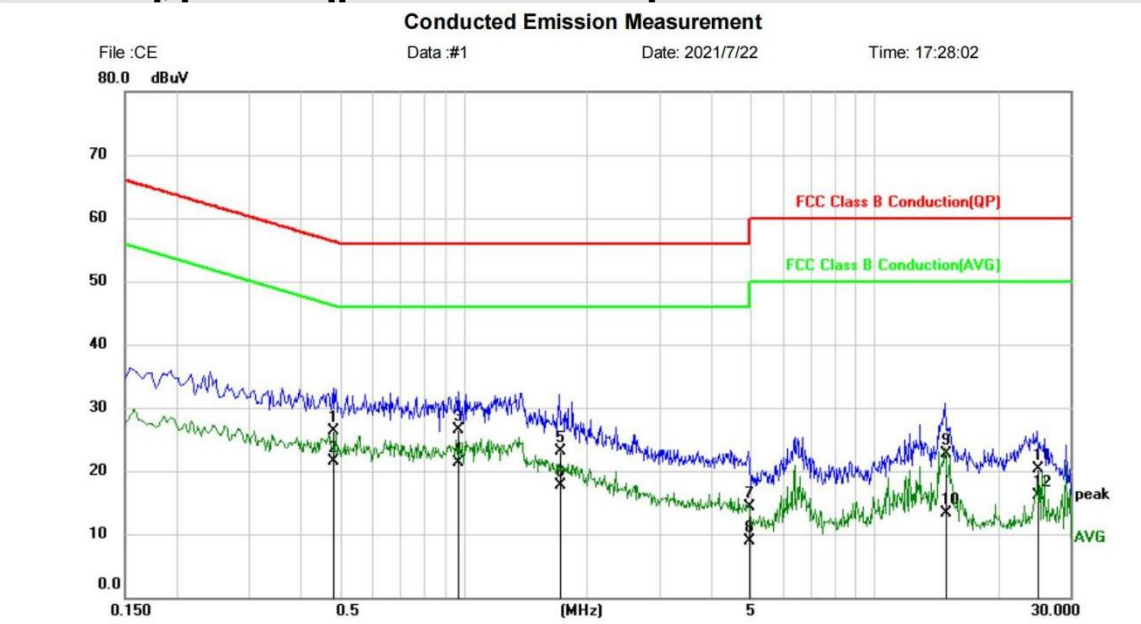
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

BlueAsia

## 10.4 TEST DATA

[TestMode: TX]; [Line: Line][Power:AC120V/60Hz]



Site:      Phase: **L1**      Temperature:      °C  
 Limit: FCC Class B Conduction(QP)      Power:      Humidity:      %  
 EUT: BT module  
 M/N: RF-BM-2652P3  
 Mode: TX mode  
 Note:

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.4820	16.48	9.78	26.26	56.30	-30.04	QP	
2	0.4820	11.72	9.78	21.50	46.30	-24.80	AVG	
3	0.9700	16.95	9.63	26.58	56.00	-29.42	QP	
4 *	0.9700	11.72	9.63	21.35	46.00	-24.65	AVG	
5	1.7140	13.39	9.63	23.02	56.00	-32.98	QP	
6	1.7140	8.13	9.63	17.76	46.00	-28.24	AVG	
7	4.9500	4.65	9.63	14.28	56.00	-41.72	QP	
8	4.9500	-0.82	9.63	8.81	46.00	-37.19	AVG	
9	14.8860	12.90	9.75	22.65	60.00	-37.35	QP	
10	14.8860	3.61	9.75	13.36	50.00	-36.64	AVG	
11	24.9619	10.53	9.87	20.40	60.00	-39.60	QP	
12	24.9619	6.17	9.87	16.04	50.00	-33.96	AVG	

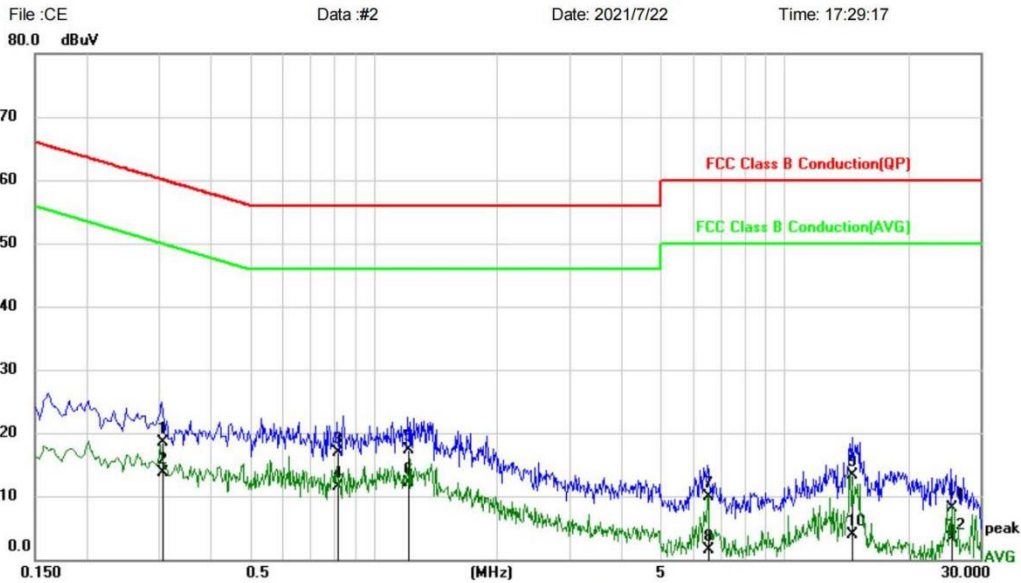
\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX]; [Line: Neutral][Power:AC120V/60Hz]

**Conducted Emission Measurement**



Site:      Phase: **N**      Temperature:      Humidity: %  
 Limit: FCC Class B Conduction(QP)      Power:        
 EUT: BT module  
 M/N: RF-BM-2652P3  
 Mode: TX mode  
 Note:

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.3060	18.43	0.07	18.50	60.08	-41.58	QP	
2	0.3060	13.61	0.07	13.68	50.08	-36.40	AVG	
3	0.8139	16.77	0.09	16.86	56.00	-39.14	QP	
4	0.8139	11.50	0.09	11.59	46.00	-34.41	AVG	
5	1.2100	17.20	0.11	17.31	56.00	-38.69	QP	
6 *	1.2100	11.92	0.11	12.03	46.00	-33.97	AVG	
7	6.5220	9.83	0.13	9.96	60.00	-50.04	QP	
8	6.5220	1.42	0.13	1.55	50.00	-48.45	AVG	
9	14.5980	13.07	0.16	13.23	60.00	-46.77	QP	
10	14.5980	3.71	0.16	3.87	50.00	-46.13	AVG	
11	25.5700	7.85	0.20	8.05	60.00	-51.95	QP	
12	25.5700	3.02	0.20	3.22	50.00	-46.78	AVG	

\*:Maximum data    x:Over limit    !:over margin

(Reference Only)

**Test Result: Pass**

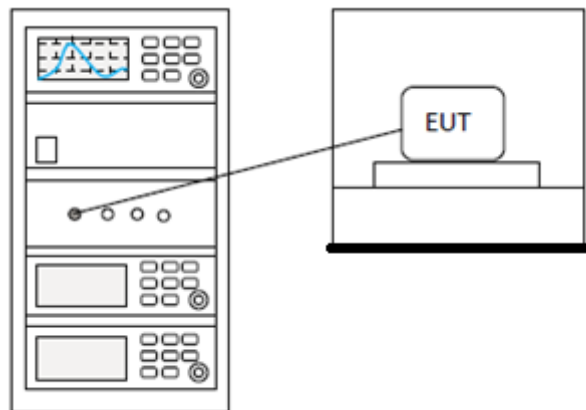
## 11 CONDUCTED BAND EDGES MEASUREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Sven
Temperature	25°C
Humidity	52%

### 11.1 LIMITS

<b>Limit:</b>	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
---------------	--

### 11.2 BLOCK DIAGRAM OF TEST SETUP





### 11.3 TEST DATA

**Pass: Please Refer To Appendix: For Details**

BlueAsia

## 12 RADIATED SPURIOUS EMISSIONS

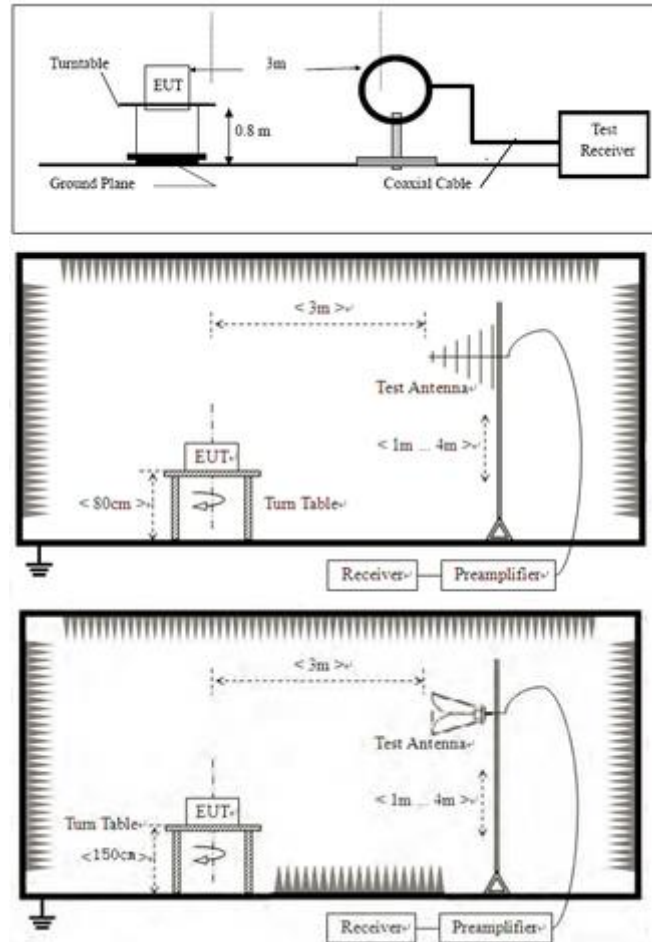
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.4,6.5,6.6
<b>Test Mode (Pre-Scan)</b>	TX Low channel;TX middle channel;TX high channel
<b>Test Mode (Final Test)</b>	TX Low channel;TX middle channel;TX high channel
<b>Tester</b>	Sven
<b>Temperature</b>	25°C
<b>Humidity</b>	52%

### 12.1 LIMITS

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

## 12.2 BLOCK DIAGRAM OF TEST SETUP



## 12.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

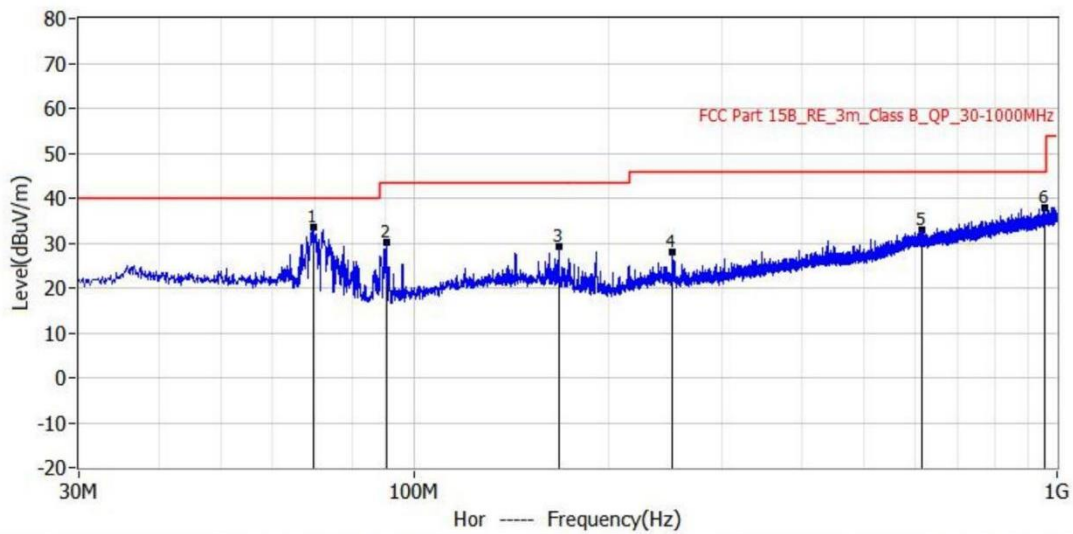
- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. fundamental frequency is blocked by filter, and only spurious emission is shown.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

## 12.4 TEST DATA

BLE 1M

[TestMode: TX]; [Polarity: Horizontal]

Test Lab: BlueAsia EMC Lab (RE #1)	Project: BLA-EMC-202106-A93-1
EUT: BT module	Test Engineer:
M/N: RF-BM-2652P3	Temperature: 25℃
S/N:	Humidity:
Test Mode: TX mode	Test Voltage:
Note:	Test Data: 2021-07-12 16:10:46

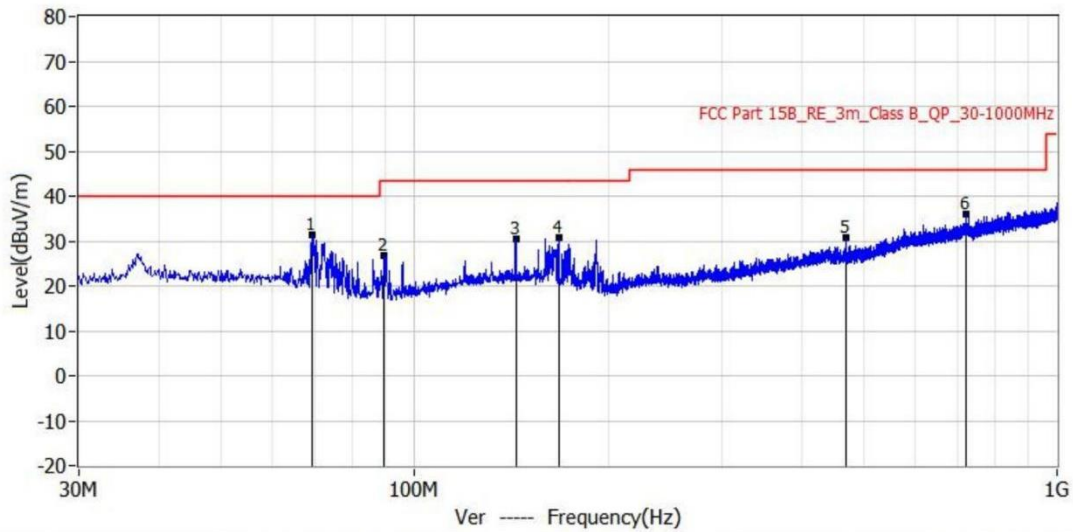


No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	69.406MHz	40.0	33.4	-6.6	11.9	21.5	QP	Hor		
2*	90.261MHz	43.5	30.1	-13.4	10.8	19.3	QP	Hor		
3*	167.498MHz	43.5	29.1	-14.4	6.5	22.6	QP	Hor		
4*	251.888MHz	46.0	27.9	-18.1	5.2	22.7	QP	Hor		
5*	614.546MHz	46.0	32.8	-13.2	1.4	31.4	QP	Hor		
6*	958.411MHz	46.0	37.9	-8.1	2.2	35.7	QP	Hor		

**Test Result: Pass**

[TestMode: TX]; [Polarity: Vertical]

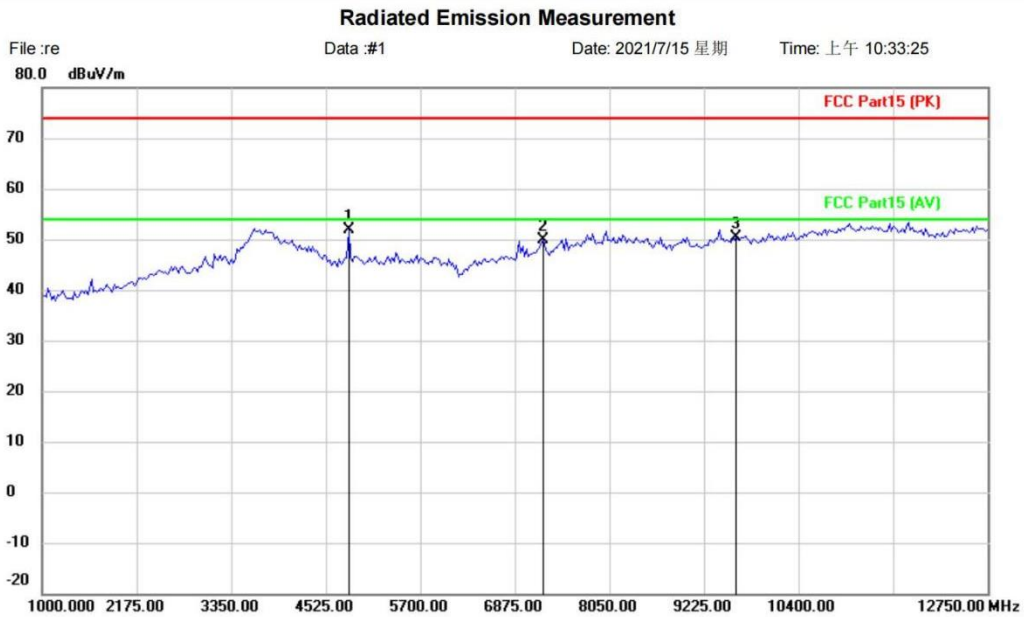
Test Lab: BlueAsia EMC Lab (RE #1)	Project: BLA-EMC-202106-A93-1
EUT: BT module	Test Engineer:
M/N: RF-BM-2652P3	Temperature: 25°C
S/N:	Humidity:
Test Mode: TX mode	Test Voltage:
Note:	Test Data: 2021-07-12 16:12:38



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	69.164MHz	40.0	31.3	-8.7	9.7	21.6	QP	Ver		
2*	89.655MHz	43.5	26.9	-16.6	7.6	19.3	QP	Ver		
3*	143.611MHz	43.5	30.6	-12.9	7.0	23.6	QP	Ver		
4*	167.619MHz	43.5	30.7	-12.8	8.1	22.6	QP	Ver		
5*	468.076MHz	46.0	30.9	-15.1	2.8	28.1	QP	Ver		
6*	722.095MHz	46.0	35.9	-10.1	3.5	32.4	QP	Ver		

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-L		
Note:		

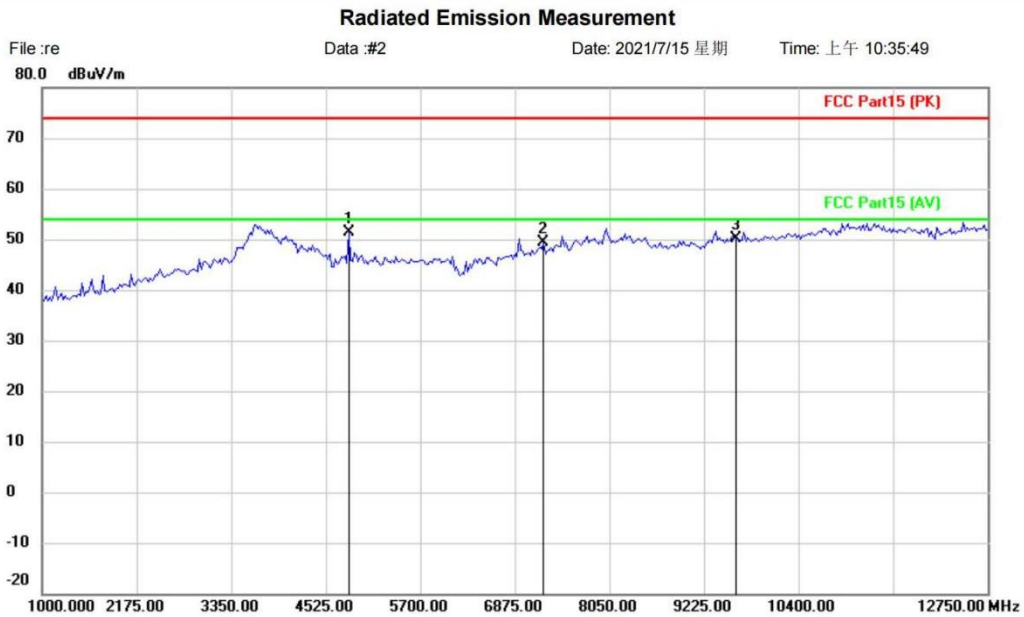
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4807.000	48.20	3.71	51.91	74.00	-22.09	peak		
2		7206.000	43.83	5.96	49.79	74.00	-24.21	peak		
3		9608.000	41.12	9.29	50.41	74.00	-23.59	peak		

\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-L		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4807.000	47.59	3.71	51.30	74.00	-22.70	peak		
2		7206.000	43.49	5.96	49.45	74.00	-24.55	peak		
3		9608.000	40.93	9.29	50.22	74.00	-23.78	peak		

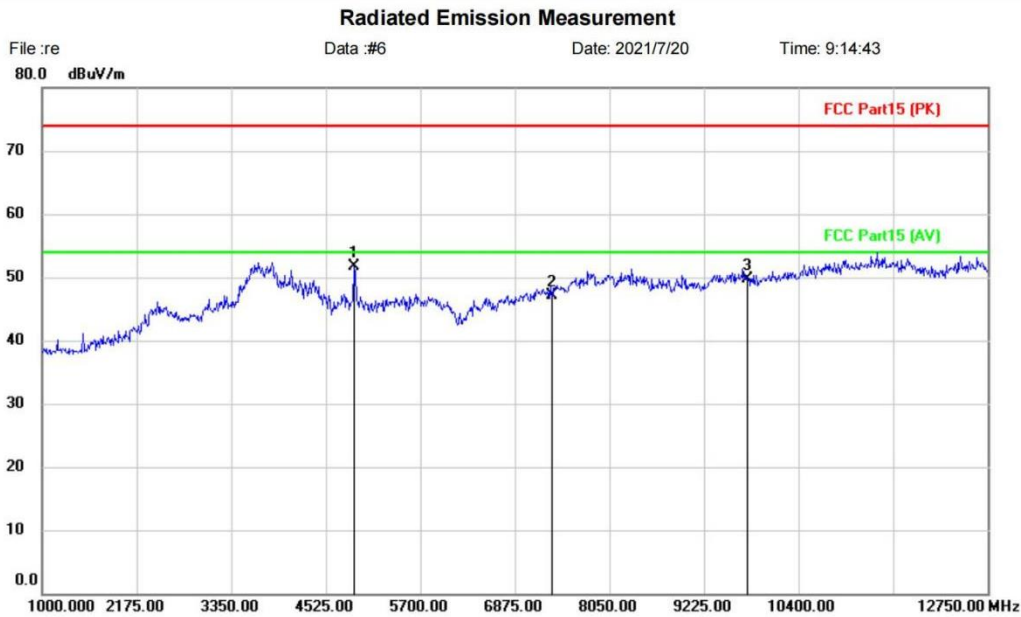
\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**



[TestMode: TX middle channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-M		
Note:		

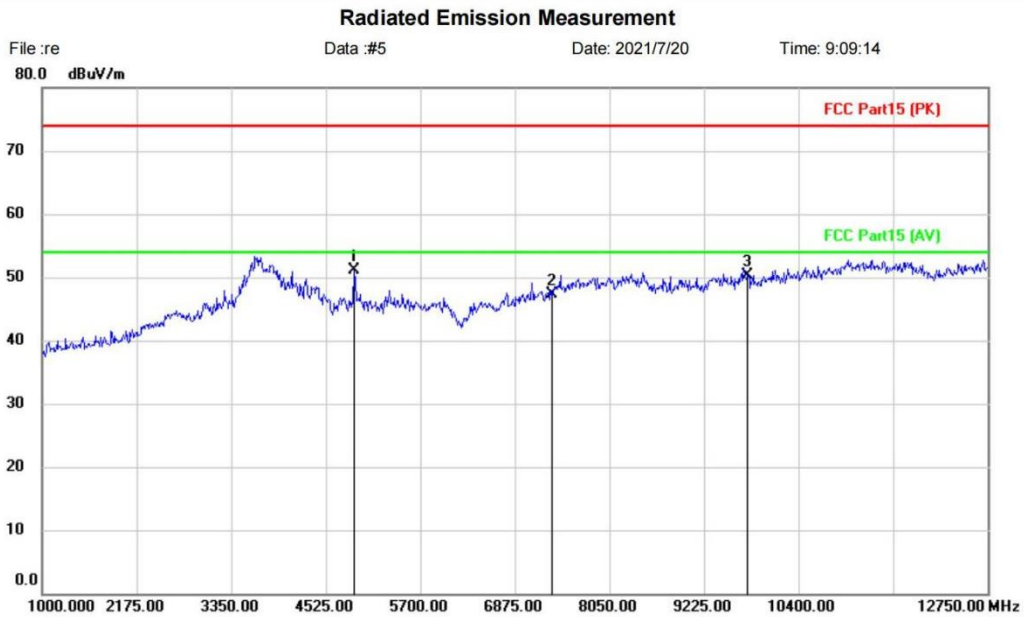
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1	*	4877.500	48.35	3.37	51.72	74.00	-22.28	peak	
2		7323.000	40.66	6.43	47.09	74.00	-26.91	peak	
3		9764.000	40.07	9.63	49.70	74.00	-24.30	peak	

\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX middle channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-M		
Note:		

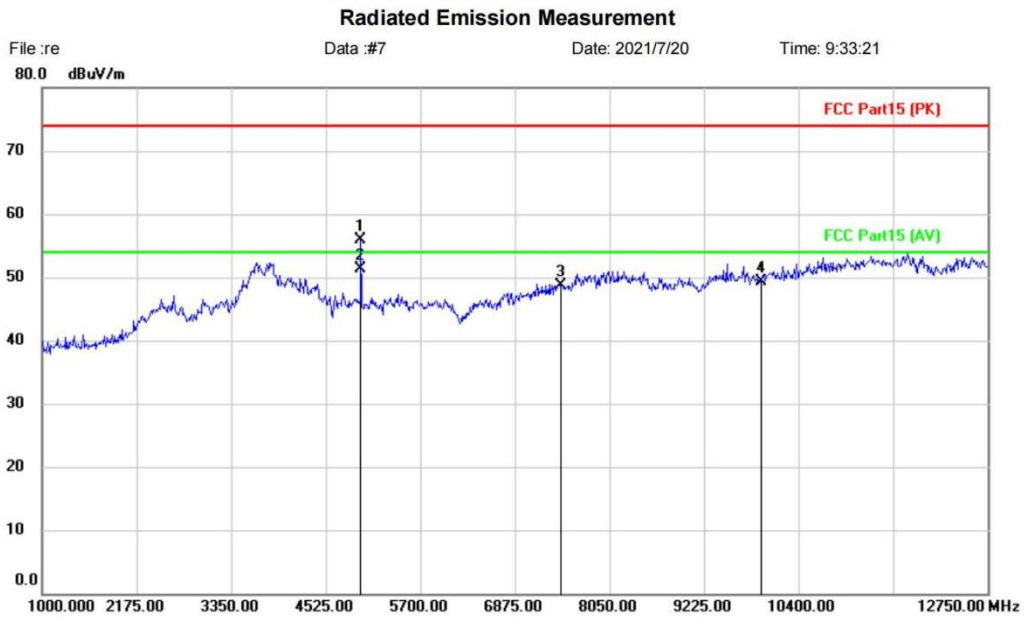
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4877.500	47.75	3.37	51.12	74.00	-22.88	peak		
2		7323.000	40.83	6.43	47.26	74.00	-26.74	peak		
3		9764.000	40.63	9.63	50.26	74.00	-23.74	peak		

\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-H		
Note:		

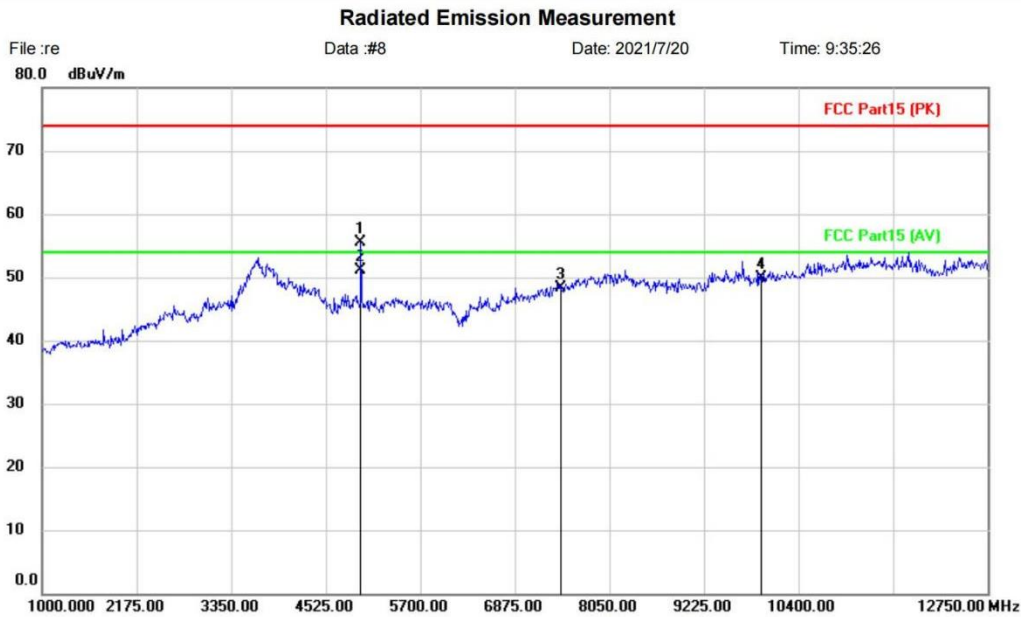
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4959.750	52.07	3.75	55.82	74.00	-18.18	peak		
2	*	4959.750	47.47	3.75	51.22	54.00	-2.78	AVG		
3		7440.000	41.76	6.86	48.62	74.00	-25.38	peak		
4		9920.000	39.18	10.16	49.34	74.00	-24.66	peak		

\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-H		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4959.750	51.66	3.75	55.41	74.00	-18.59	peak		
2	*	4959.750	47.31	3.75	51.06	54.00	-2.94	AVG		
3		7440.000	41.45	6.86	48.31	74.00	-25.69	peak		
4		9920.000	39.69	10.16	49.85	74.00	-24.15	peak		

\*:Maximum data    x:Over limit    !:over margin

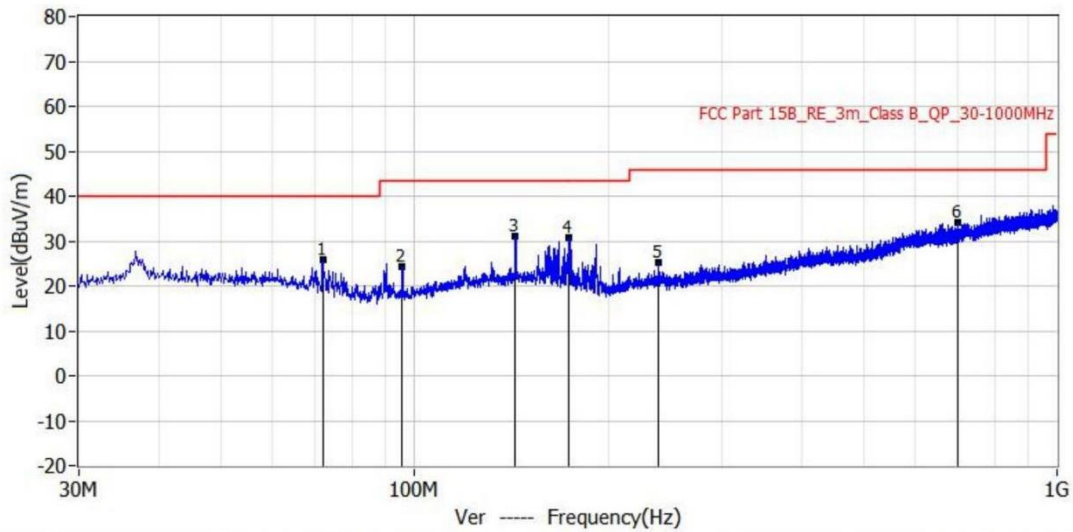
<Reference Only

**Test Result: Pass**

BLE 2M

[TestMode: TX]; [Polarity: Horizontal]

Test Lab: BlueAsia EMC Lab (RE #1)	Project: BLA-EMC-202106-A93
EUT: BT module	Test Engineer:
M/N: RF-BM-2652P3	Temperature: 25°C
S/N:	Humidity:
Test Mode: TX mode	Test Voltage:
Note:	Test Data: 2021-07-12 16:15:04

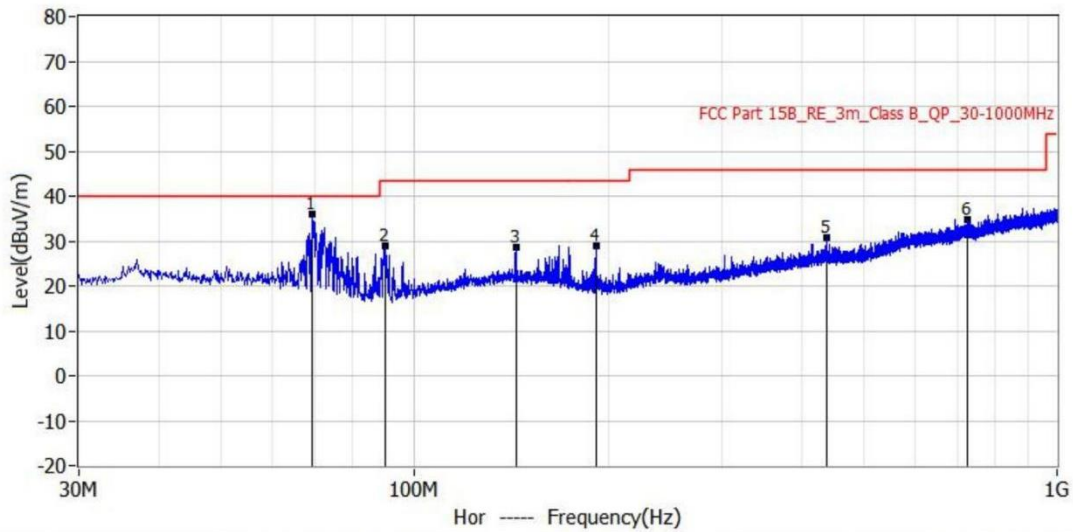


No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	71.831MHz	40.0	26.0	-14.0	4.9	21.1	QP	Ver		
2*	95.596MHz	43.5	24.2	-19.3	4.2	20.0	QP	Ver		
3*	143.490MHz	43.5	31.2	-12.3	7.6	23.6	QP	Ver		
4*	173.681MHz	43.5	30.7	-12.8	8.6	22.1	QP	Ver		
5*	240.005MHz	46.0	25.3	-20.7	2.5	22.8	QP	Ver		
6*	699.421MHz	46.0	34.1	-11.9	2.2	31.9	QP	Ver		

**Test Result: Pass**

[TestMode: TX]; [Polarity: Vertical]

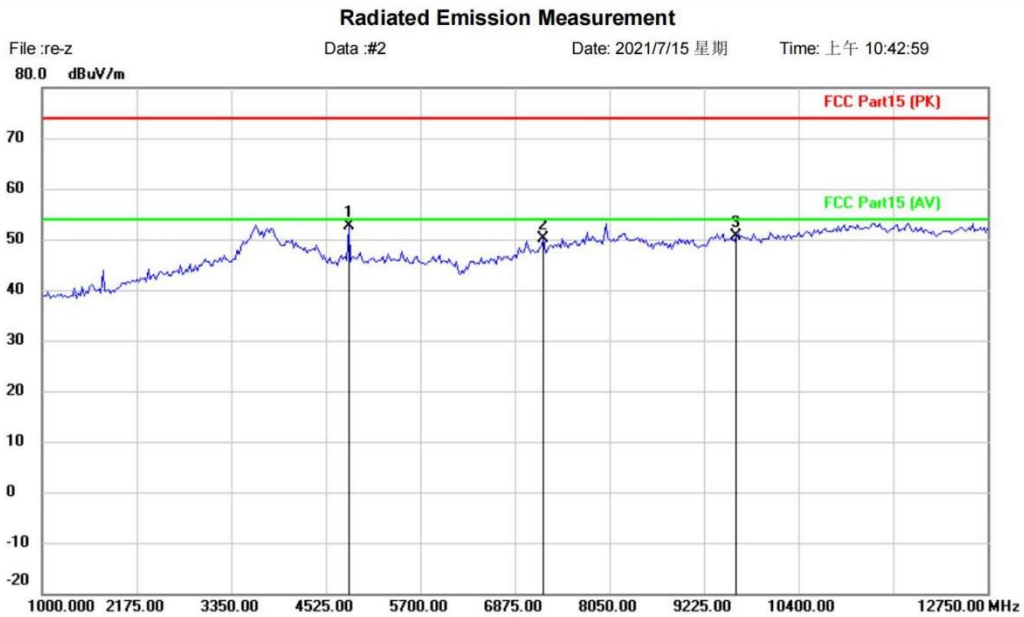
Test Lab: BlueAsia EMC Lab (RE #1)	Project: BLA-EMC-202106-A93
EUT: BT module	Test Engineer:
M/N: RF-BM-2652P3	Temperature: 25°C
S/N:	Humidity:
Test Mode: TX mode	Test Voltage:
Note:	Test Data: 2021-07-12 16:16:49



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	69.164MHz	40.0	36.0	-4.0	14.4	21.6	PK	Hor		
2*	90.140MHz	43.5	28.9	-14.6	9.6	19.3	PK	Hor		
3*	143.611MHz	43.5	28.6	-14.9	5.0	23.6	PK	Hor		
4*	191.384MHz	43.5	28.8	-14.7	7.8	21.0	PK	Hor		
5*	438.006MHz	46.0	30.9	-15.1	3.2	27.7	PK	Hor		
6*	724.399MHz	46.0	34.8	-11.2	2.3	32.5	PK	Hor		

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-L		
Note:		

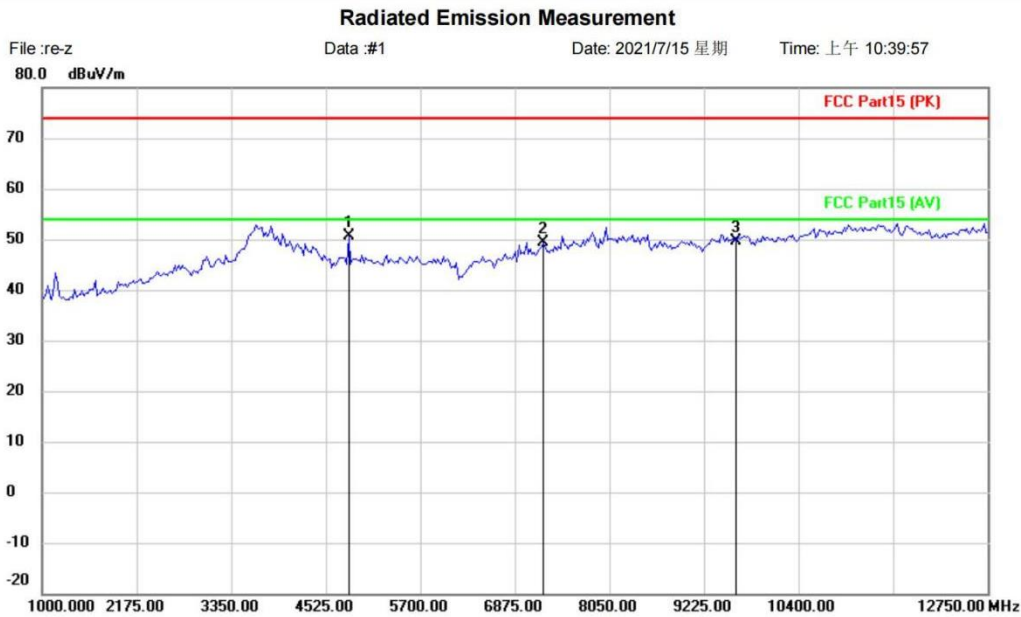
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4807.000	48.89	3.71	52.60	74.00	-21.40	peak		
2		7206.000	44.06	5.96	50.02	74.00	-23.98	peak		
3		9608.000	41.27	9.29	50.56	74.00	-23.44	peak		

\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-L		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4807.000	46.87	3.71	50.58	74.00	-23.42	peak		
2		7206.000	43.39	5.96	49.35	74.00	-24.65	peak		
3		9608.000	40.25	9.29	49.54	74.00	-24.46	peak		

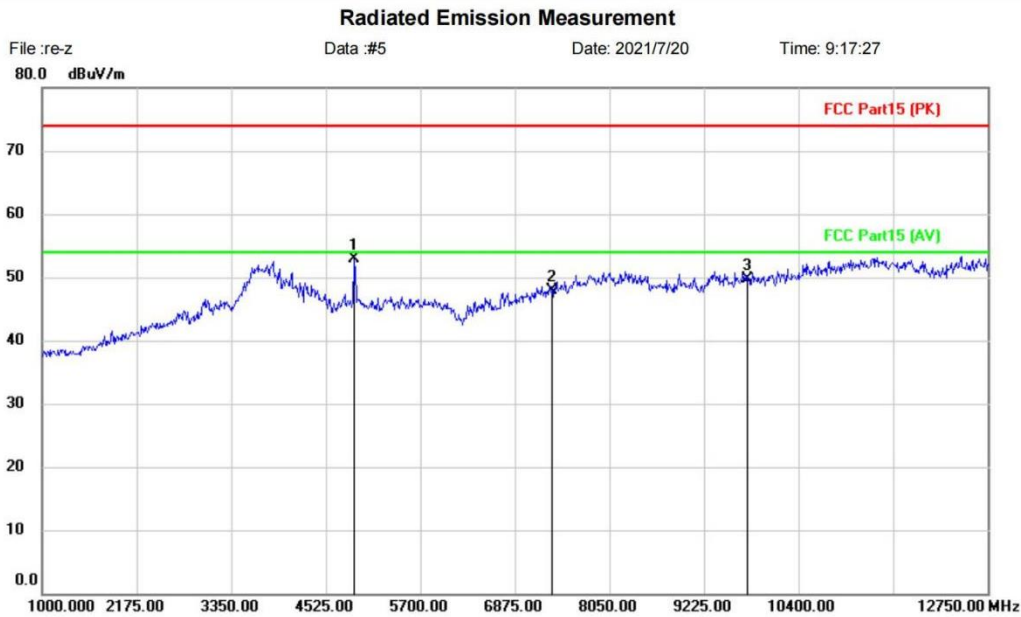
\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**



[TestMode: TX middle channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-M		
Note:		

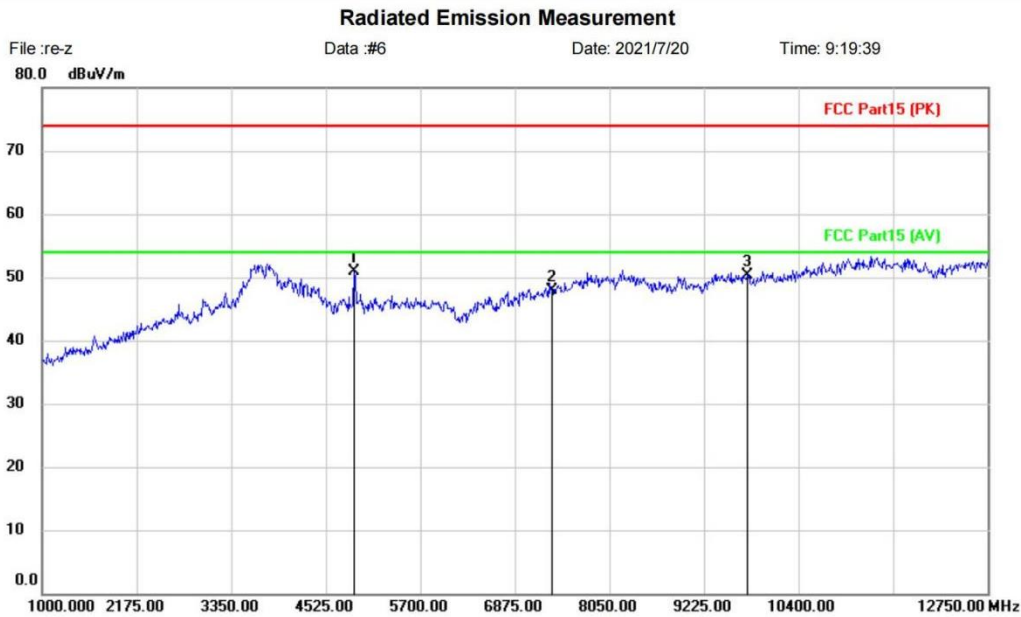
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4877.500	49.49	3.37	52.86	74.00	-21.14	peak		
2		7323.000	41.55	6.43	47.98	74.00	-26.02	peak		
3		9764.000	40.03	9.63	49.66	74.00	-24.34	peak		

\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**

[TestMode: TX middle channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-M		
Note:		

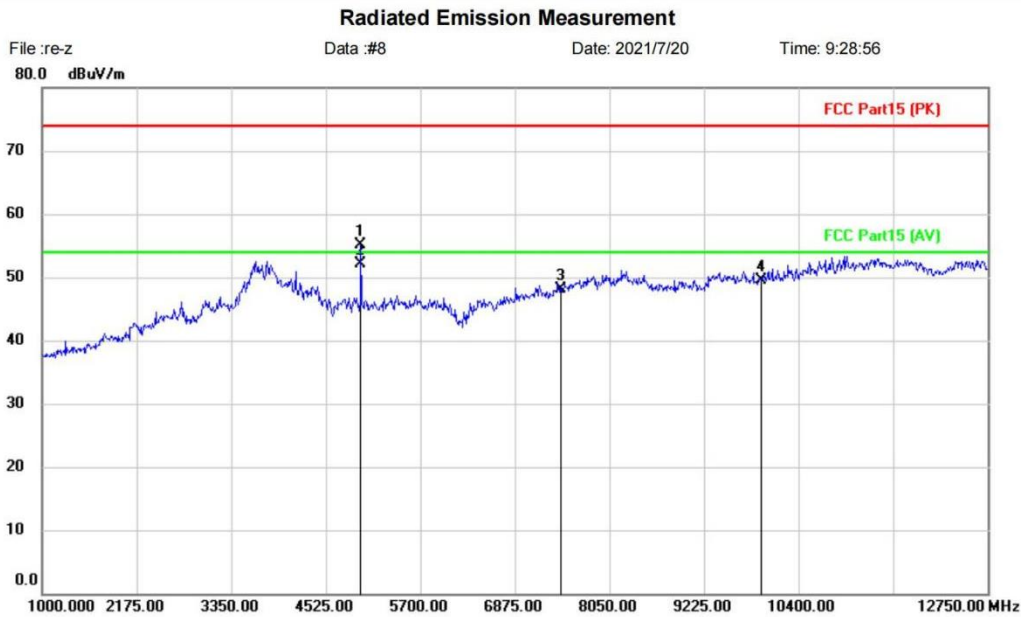
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4877.500	47.60	3.37	50.97	74.00	-23.03	peak		
2		7323.000	41.52	6.43	47.95	74.00	-26.05	peak		
3		9764.000	40.58	9.63	50.21	74.00	-23.79	peak		

\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-H		
Note:		

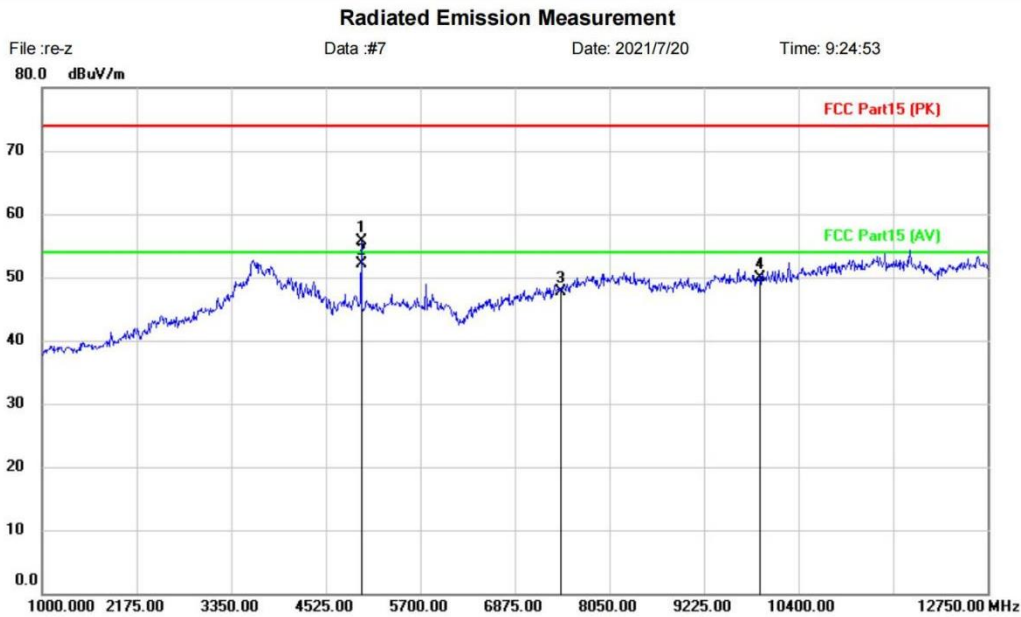
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4959.750	51.43	3.75	55.18	74.00	-18.82	peak		
2	*	4959.750	48.35	3.75	52.10	54.00	-1.90	AVG		
3		7440.000	41.16	6.86	48.02	74.00	-25.98	peak		
4		9920.000	39.40	10.16	49.56	74.00	-24.44	peak		

\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-H		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4963.714	52.00	3.77	55.77	74.00	-18.23	peak		
2	*	4963.714	48.36	3.77	52.13	54.00	-1.87	AVG		
3		7440.000	40.94	6.86	47.80	74.00	-26.20	peak		
4		9920.000	39.69	10.16	49.85	74.00	-24.15	peak		

\*:Maximum data    x:Over limit    !:over margin

<Reference Only

**Test Result: Pass**

### 13 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

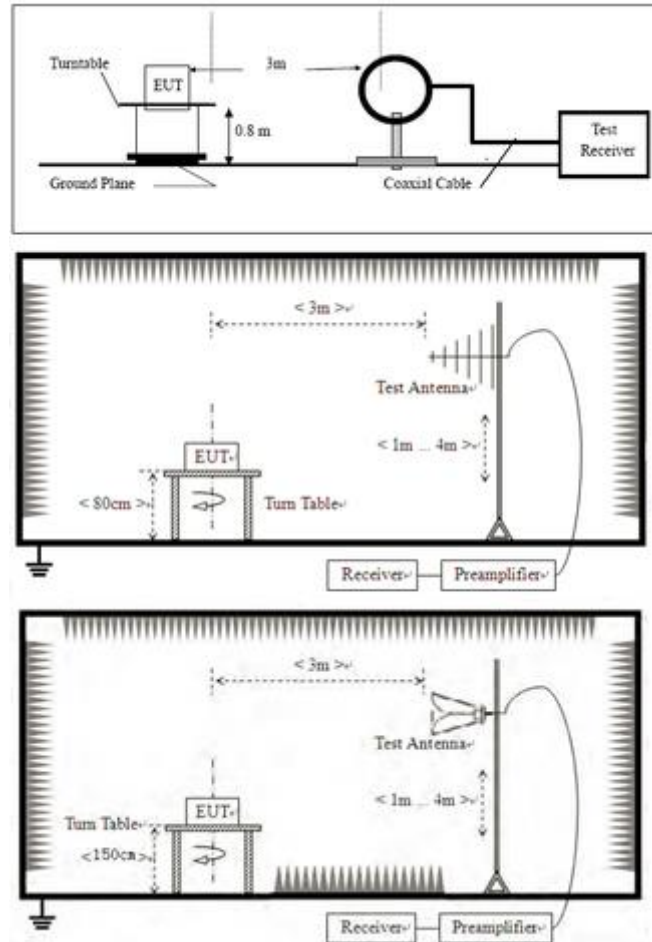
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.10.5
<b>Test Mode (Pre-Scan)</b>	TX Low channel;TX high channel
<b>Test Mode (Final Test)</b>	TX Low channel;TX high channel
<b>Tester</b>	Sven
<b>Temperature</b>	25°C
<b>Humidity</b>	52%

#### 13.1 LIMITS

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

### 13.2 BLOCK DIAGRAM OF TEST SETUP



### 13.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1:  $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$

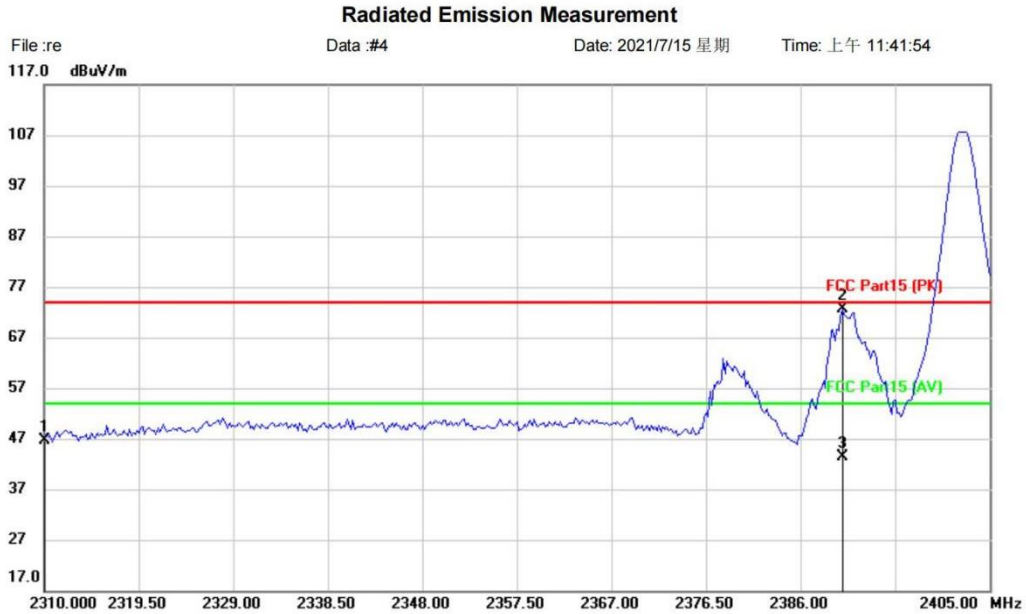
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

BlueAsia

### 13.4 TEST DATA

BLE 1M

[TestMode: TX Low channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-L		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2310.000	51.14	-4.61	46.53	74.00	-27.47	peak		
2	*	2390.000	76.80	-4.27	72.53	74.00	-1.47	peak		
3		2390.000	47.54	-4.27	43.27	54.00	-10.73	AVG		

\*:Maximum data    x:Over limit    !:over margin

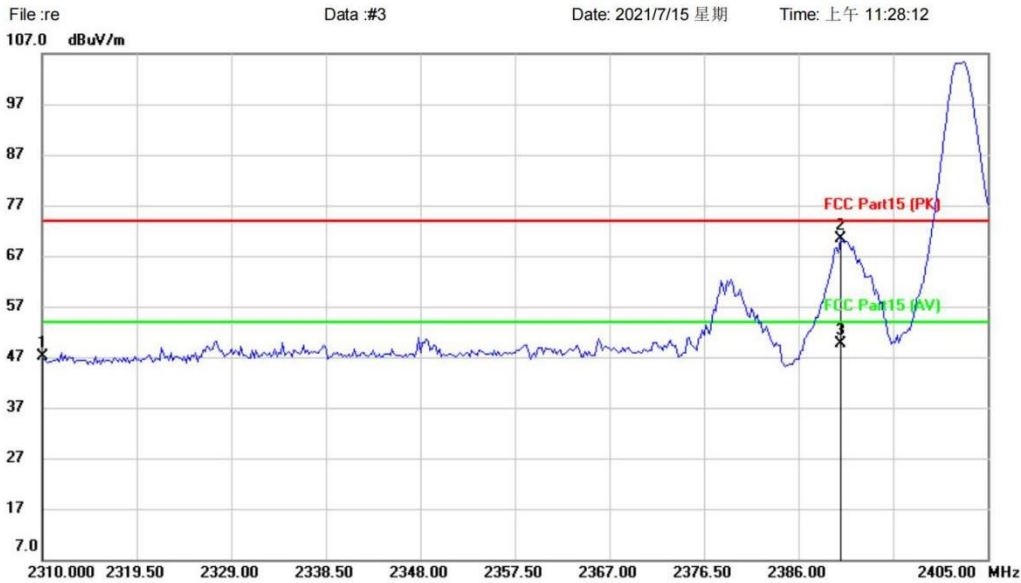
(Reference Only)

**Test Result: Pass**



[TestMode: TX Low channel]; [Polarity: Vertical]

**Radiated Emission Measurement**



Site	Polarization: <b>Vertical</b>	Temperature:
Limit: FCC Part15 (PK)	Power:	Humidity: %
EUT: BT module	Distance:	
M/N: RF-BM-2652P3		
Mode: TX-L		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2310.000	51.64	-4.61	47.03	74.00	-26.97	peak		
2	*	2390.000	74.58	-4.27	70.31	74.00	-3.69	peak		
3		2390.000	53.81	-4.27	49.54	54.00	-4.46	AVG		

\*:Maximum data x:Over limit !:over margin

<Reference Only

**Test Result: Pass**