

TEST REPORT

Product Name : BT module

Brand Mark : RF-star

Model No. : RF-BM-2642B1

FCC ID : 2ABN2-BM2642B1

Report Number : BLA-EMC-202203-A3902

Date of Sample Receipt : 2022/3/9

Date of Test : 2022/3/9 to 2022/3/25

Date of Issue : 2022/3/25

Test Standard : 47 CFR Part 15, Subpart C 15.247

Test Result : Pass

Prepared for:

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Review by:

Date:







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REPORT REVISE RECORD

Version No. Date		Description	
00 2022/3/25		Original	





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1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Conducted Spurious Emissions	Ourious 47 CFR Part 15, (2013) S Subpart C 15.247 7.8.6 & 5		47 CFR Part 15, Subpart C 15.247(d)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Carrier Frequencies Separation	ANCI CG2 10		47 CFR Part 15, Subpart C 15.247a(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Conducted Peak Output Power	1 / /// 31 SACTION		47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
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	N/A
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	adiated Emissions nich fall in the 47 CFR Part 15, Subpart C 15 247 (2013) Secti		47 CFR Part 15, Subpart C 15.209 & 15.247(d)	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	



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2 GENERAL INFORMATION

Applicant	ShenZhen RF-STAR Technology CO.,LTD
Address	2F,BLDG.8,Zone A,BaoAn Internet Industry Base, BaoYuan Road,XiXiang, BaoAn DIST, ShenZhen China
Manufacturer	ShenZhen RF-STAR Technology CO.,LTD
Address	2F,BLDG.8,Zone A,BaoAn Internet Industry Base, BaoYuan Road,XiXiang, BaoAn DIST, ShenZhen China
Factory	ShenZhen RF-STAR Technology CO.,LTD
Address	2F,BLDG.8,Zone A,BaoAn Internet Industry Base, BaoYuan Road,XiXiang, BaoAn DIST, ShenZhen China
Product Name	BT module
Test Model No.	RF-BM-2642B1

3 GENERAL DESCRIPTION OF E.U.T.

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



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4 TEST ENVIRONMENT

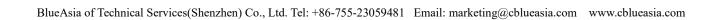
Environment	Temperature	Voltage	
Normal	25°C	3.3Vdc	

5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION			
Transmitting mode	Keep the EUT in continuously transmitting mode with modulation.			
Remark: Full battery is used during all test except ac conducted emission, BLE1M, BLE2M all have been				
tested, were all pre-scanned only BLE1M worse case is reported.				

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		





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7 DESCRIPTION OF SUPPORT UNIT

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

8 LABORATORY LOCATION

All tests were performed at:

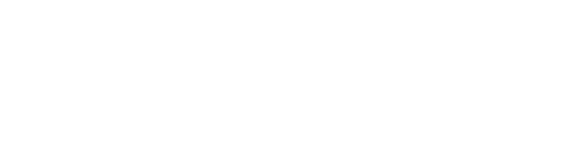
BlueAsia of Technical Services(Shenzhen) Co., Ltd.

Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province,

China

Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673

No tests were sub-contracted.





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9 TEST INSTRUMENTS LIST

Test Equipment Of Conducted Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022

Test Equipment Of D					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022

Test Equipment Of Hopping Channel Number								
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due			
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022			
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022			
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022			
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022			

Test Equipment Of Carrier Frequencies Separation						
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due	



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Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022

Test Equipment Of 2	*				
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022

Test Equipment Of Conducted Peak Output Power								
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due			
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022			
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022			
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022			
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022			

Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)							
Equipment Manufacturer Model S/N Cal.Date Cal.Date							
Shield room	SKET	833	N/A	25/11/2020	24/11/2023		
Receiver	R&S	ESPI3	101082	24/9/2021	23/9/2022		



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LISN	R&S	ENV216	3560.6550.15	24/9/2021	23/9/2022
LISN	AT	AT166-2	AKK1806000003	26/9/2021	25/9/2022
EMI software	EZ	EZ-EMC	N/A	N/A	N/A

Test Equipment Of Radiated Spurious Emissions							
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due		
Chamber	SKET	966	N/A	10/11/2020	9/11/2023		
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022		
Receiver	R&S	ESR7	101199	24/9/2021	23/9/2022		
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	26/9/2020	25/9/2022		
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	26/9/2020	25/9/2022		
Amplifier	SKET	LNPA-0118-45	N/A	24/9/2021	23/9/2022		
EMI software	EZ	EZ-EMC	N/A	N/A	N/A		
Loop antenna	SCHNARZBECK	FMZB1519B	00102	26/9/2020	25/9/2022		

Test Equipment Of	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	10/11/2020	9/11/2023				
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022				
Receiver	R&S	ESR7	101199	24/9/2021	23/9/2022				
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	26/9/2020	25/9/2022				
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	26/9/2020	25/9/2022				



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Amplifier	SKET	LNPA-0118-45	N/A	24/9/2021	23/9/2022
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	26/9/2020	25/9/2022

Test Equipment Of Conducted Band Edges Measurement								
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due			
Spectrum	R&S	FSP40	100817	24/9/2021	23/9/2022			
Spectrum	Agilent	N9020A	MY49100060	24/9/2021	23/9/2022			
Signal Generator	Agilent	N5182A	MY49060650	24/9/2021	23/9/2022			
Signal Generator	Agilent	E8257D	MY44320250	24/9/2021	23/9/2022			



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10 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	N/A	

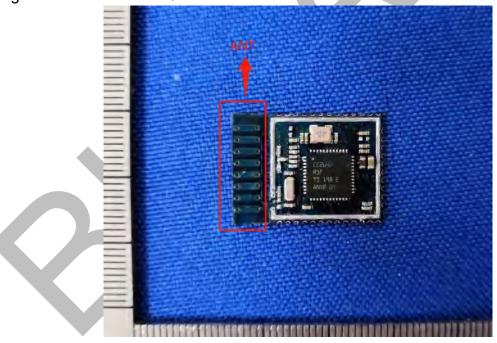
10.1 CONCLUSION

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.





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11 CONDUCTED SPURIOUS EMISSIONS

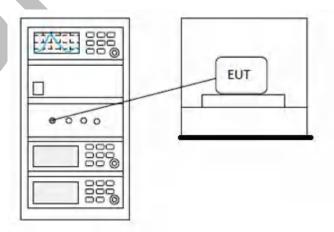
Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25℃	
Humidity	60%	

11.1 LIMITS

Limit:

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)).

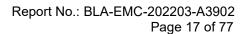
11.2 BLOCK DIAGRAM OF TEST SETUP





11.3 TEST DATA







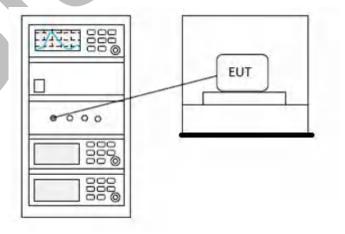
12 DWELL TIME

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 7.8.4	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25℃	
Humidity	60%	

12.1 LIMITS

Frequency(MHz)	Limit	
	0.4S within a 20S period(20dB	
002 028	bandwidth<250kHz)	
902-928	0.4S within a 10S period(20dB	
	bandwidth≥250kHz)	
	0.4S within a period of 0.4S multiplied by the	
2400-2483.5	number	
	of hopping channels	
5725-5850	0.4S within a 30S period	

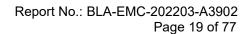
12.2 BLOCK DIAGRAM OF TEST SETUP





12.3 TEST DATA







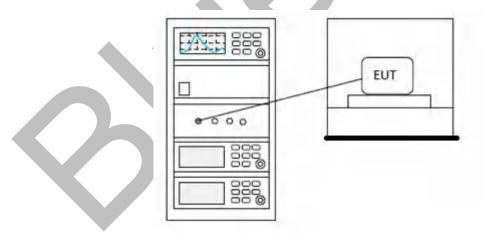
13 HOPPING CHANNEL NUMBER

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 7.8.3	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25℃	
Humidity	60%	

13.1 LIMITS

Frequency range(MHz)	Number of hopping channels (minimum)	
002.020	50 for 20dB bandwidth <250kHz	
902-928	25 for 20dB bandwidth ≥250kHz	
2400-2483.5	15	
5725-5850	75	

13.2 BLOCK DIAGRAM OF TEST SETUP



13.3 TEST DATA



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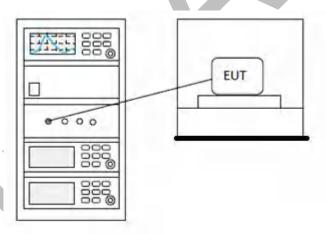
14 CARRIER FREQUENCIES SEPARATION

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 7.8.2	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25℃	
Humidity	60%	

14.1 LIMITS

Limit: 2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

14.2 BLOCK DIAGRAM OF TEST SETUP



14.3 TEST DATA

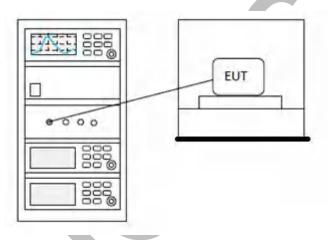


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15 20DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 7.8.7	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25℃	
Humidity	60%	

15.1 BLOCK DIAGRAM OF TEST SETUP



15.2 TEST DATA



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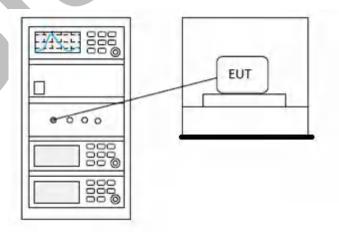
16 CONDUCTED PEAK OUTPUT POWER

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 7.8.5	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25℃	
Humidity	60%	

16.1 LIMITS

Frequency range(MHz)	Output power of the intentional radiator(watt)	
	1 for ≥50 hopping channels	
902-928	0.25 for 25≤ hopping channels <50	
	1 for digital modulation	
	1 for ≥75 non-overlapping hopping channels	
2400-2483.5	0.125 for all other frequency hopping systems	
	1 for digital modulation	
	1 for frequency hopping systems and digital	
5725-5850	modulation	

16.2 BLOCK DIAGRAM OF TEST SETUP





16.3 TEST DATA





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17 RADIATED SPURIOUS EMISSIONS

Test Standard	47 CFR Part 15, Subpart C 15.247	
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6	
Test Mode (Pre-Scan)	TX	
Test Mode (Final Test)	TX	
Tester	Jozu	
Temperature	25 ℃	
Humidity	60%	

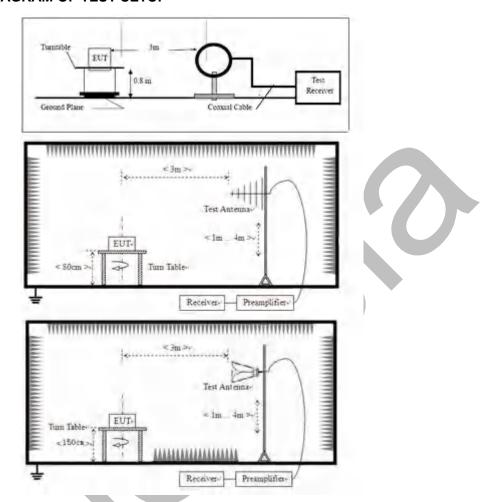
17.1 LIMITS

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
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.



17.2 BLOCK DIAGRAM OF TEST SETUP



17.3 PROCEDURE

- a. 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.
- b. 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.
- c. 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.
- d. 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.
- e. 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.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. 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.



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- 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.

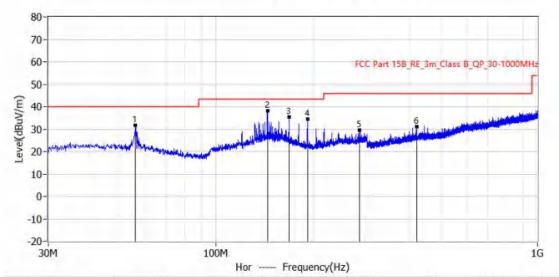




17.4 TEST DATA

[TestMode: TX below 1G]; [Polarity: Horizontal]

Test Lab: BlueAsia EMC Lab (RE #1)	Project: BLA-EMC-202203-A39	
EUT: BT module	Test Engineer: Charlie	
M/N: RF-BM-2642B1	Temperature:	
S/N:	Humidity:	
Test Mode: TX mode	Test Voltage:	
Note:	Test Data: 2022-03-23 14:53:49	

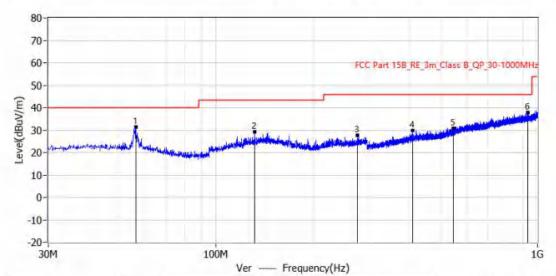


No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	56.069MHz	40.0	31.7	-8.3	8.1	23.6	QP	Hor	100.0	302.0
2*	144.339MHz	43.5	38.1	-5.4	14.5	23.6	QP	Hor	100.0	0.0
3*	168.589MHz	43.5	35.4	-8.1	12.9	22.5	QP	Hor	100.0	324.0
4*	192.596MHz	43.5	34.6	-8.9	13.7	20.9	QP	Hor	100.0	343.0
5*	279.411MHz	46.0	29.4	-16.6	5.8	23.6	QP	Hor	100.0	274.0
6*	419.819MHz	46.0	31.0	-15.0	3.5	27.5	QP	Hor	100.0	306.0



[TestMode: TX below 1G]; [Polarity: Vertical]

Test Lab: BlueAsia EMC Lab (RE #1)	Project: BLA-EMC-202203-A39	
EUT: BT module	Test Engineer: Charlie	
M/N: RF-BM-2642B1	Temperature:	- 4
S/N:	Humidity:	
Test Mode: TX mode	Test Voltage:	
Note:	Test Data: 2022-03-23 14:56:06	



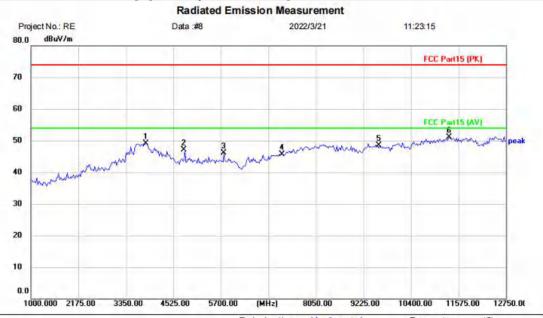
No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	56.311MHz	40.0	31.3	-8.7	7.7	23.6	QP	Ver	100.0	0.0
2*	131.850MHz	43.5	29.1	-14.4	5.8	23.3	QP	Ver	100.0	115.0
3*	275.046MHz	46.0	27.6	-18.4	4.2	23.4	QP	Ver	100.0	121.0
4*	408.058MHz	46.0	30.0	-16.0	2.6	27.4	QP	Ver	100.0	312.0
5*	546.404MHz	46.0	30.9	-15.1	1.2	29.7	QP	Ver	100.0	5.0
6*	932.706MHz	46.0	37.9	-8.1	2.5	35.4	QP	Ver	100.0	78.0



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Above 1GHz:

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



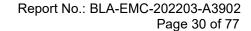
Site Limit: FCC Part15 (PK)

EUT: BT module M/N: RF-BM-2642B1

Mode: TX-L Note: Polarization: Horizontal Temperature: (C)
Power: Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		3843.500	42.07	7.12	49.19	74.00	-24.81	peak		
2		4804.000	43.45	3.71	47.16	74.00	-26.84	peak		
3		5770.500	42.14	3.91	46.05	74.00	-27.95	peak		
4		7206.000	39.69	5.96	45.65	74.00	-28.35	peak		
5		9608.000	39.15	9.29	48.44	74.00	-25.56	peak		
6	* 1	1340.000	39.30	11.85	51.15	74.00	-22.85	peak		

*:Maximum data x:Over limit !:over margin (Reference Only





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

Radiated Emission Measurement Project No.: RE Data:#7 2022/3/21 11:20:38 dBuV/m 80.0 FCC Part15 [PK] 70 60 50 30 20 10 0.0 1000.000 2175.00 3350.00 4525.00

Site Limit: FCC Part15 (PK)

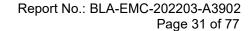
EUT: BT module M/N: RF-BM-2642B1

Mode: TX-L Note:

.00	(MHz)	8050.00	9225.00	10400.00	11575.00	12750.00
P	olarizatio	n: Vertic	al	Temper	ature: (C)
P	ower:			Humidit	y: %RH	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		3820.000	42.42	7.41	49.83	74.00	-24.17	peak		
2		4804.000	43.56	3.71	47.27	74.00	-26.73	peak		
3		7206.000	39.50	5.96	45.46	74.00	-28.54	peak		
4		7791.500	41.94	7.68	49.62	74.00	-24.38	peak		
5		9608.000	38.63	9.29	47.92	74.00	-26.08	peak		
6	*	11199.000	39.16	12.04	51.20	74.00	-22.80	peak		

*:Maximum data x:Over limit !:over margin (Reference Only

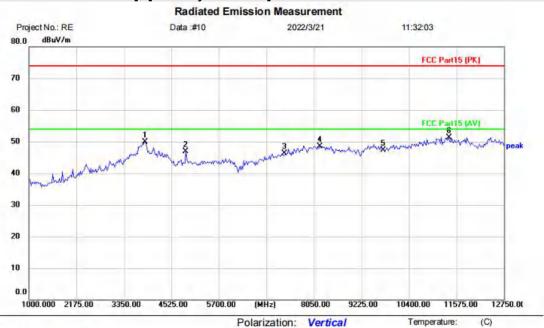


Humidity:

%RH



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



Site Limit: FCC Part15 (PK)

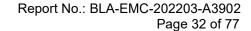
Mode: TX-M Note:

EUT: BT module
M/N: RF-BM-2642B1

No.	Mk.	Freq.	Reading Level	Correct	Measure- ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		3867.000	42.99	6.82	49.81	74.00	-24.19	peak	
2		4877.500	43.47	3.37	46.84	74.00	-27.16	peak	
3		7326.000	39.88	6.44	46.32	74.00	-27.68	peak	
4		8191.000	40.38	8.20	48.58	74.00	-25.42	peak	
5		9768.000	37.73	9.63	47.36	74.00	-26.64	peak	
6	*	11387.000	39.58	11.78	51.36	74.00	-22.64	peak	

Power:

*:Maximum data x:Over limit !:over margin (Reference Only



Temperature:

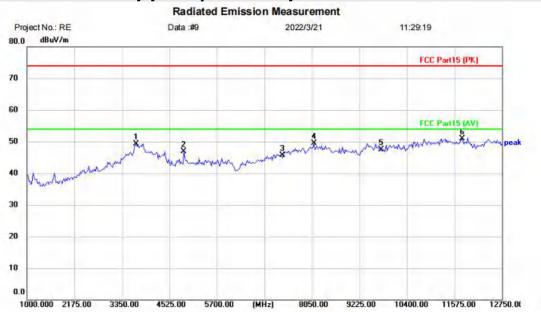
Humidity:

(C)

%RH



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



Polarization: Horizontal

Limit: FCC Part15 (PK)

EUT: BT module M/N: RF-BM-2642B1

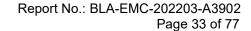
Mode: TX-M Note:

Site

No.	Mk.	Freq.	Reading Level	Correct	Measure- ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		3702.500	41.62	7.72	49.34	74.00	-24.66	peak	
2		4877.500	43.49	3.37	46.86	74.00	-27.14	peak	
3		7326.000	39.21	6.44	45.65	74.00	-28.35	peak	
4		8097.000	41.41	8.07	49.48	74.00	-24.52	peak	
5		9768.000	37.92	9.63	47.55	74.00	-26.45	peak	
6	*	11763.000	39.36	11.63	50.99	74.00	-23.01	peak	

Power:

*:Maximum data x:Over limit !:over margin (Reference Only

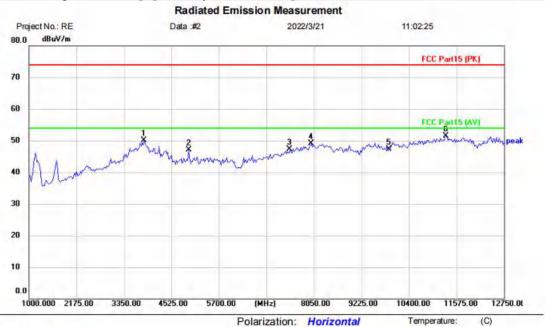


Humidity:

%RH



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



Site Limit: FCC Part15 (PK)

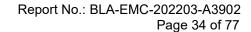
EUT: BT module M/N: RF-BM-2642B1

Mode: TX-H Note:

No.	Mk.	Freq.	Reading Level	Correct	Measure- ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		3843.500	43.05	7.12	50.17	74.00	-23.83	peak	
2		4948.000	43.44	3.65	47.09	74.00	-26.91	peak	
3		7440.000	40.38	6.86	47.24	74.00	-26.76	peak	
4		7979.500	41.28	7.92	49.20	74.00	-24.80	peak	
5		9920.000	37.24	10.16	47.40	74.00	-26.60	peak	
6	*	11316.500	39.57	11.88	51.45	74.00	-22.55	peak	

Power:

*:Maximum data x:Over limit !:over margin (Reference Only

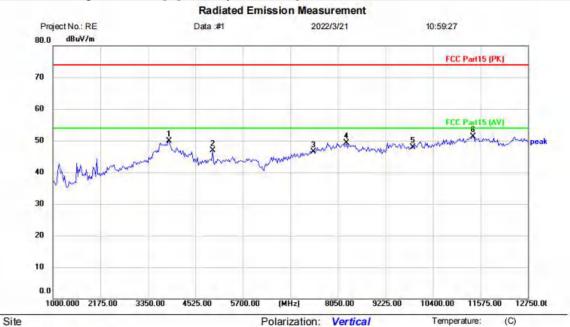


Humidity:

%RH



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



Limit: FCC Part15 (PK)

EUT: BT module M/N: RF-BM-2642B1

Mode: TX-H Note:

No.	Mk.	Freq.	Reading Level	Correct	Measure- ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		3867.000	43.10	6.82	49.92	74.00	-24.08	peak	
2		4948.000	43.19	3.65	46.84	74.00	-27.16	peak	
3		7440.000	39.63	6.86	46.49	74.00	-27.51	peak	
4		8261.500	41.12	8.23	49.35	74.00	-24.65	peak	
5		9920.000	37.69	10.16	47.85	74.00	-26.15	peak	
6	*	11387.000	39.60	11.78	51.38	74.00	-22.62	peak	

Power:

*:Maximum data x:Over limit !:over margin (Reference Only



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18 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.10.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25℃
Humidity	60%

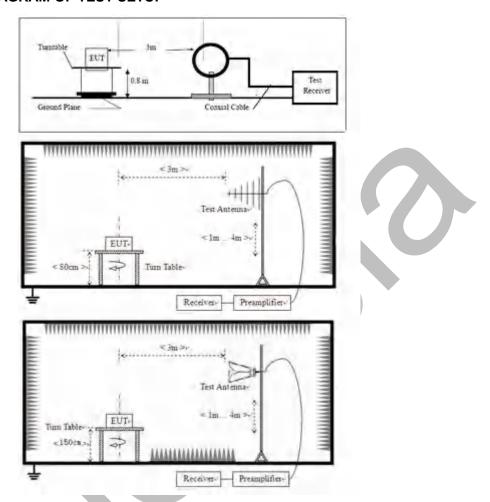
18.1 LIMITS

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
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.



18.2 BLOCK DIAGRAM OF TEST SETUP



18.3 PROCEDURE

- a. 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.
- b. 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.
- c. 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.
- d. 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.
- e. 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.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. 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.



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h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

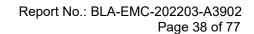
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

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.





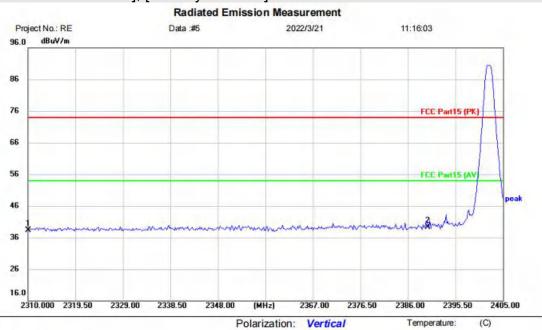
Humidity:

%RH



18.4 TEST DATA

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



Limit: FCC Part15 (PK)

EUT: BT module M/N: RF-BM-2642B1

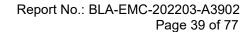
Mode: TX-L Note:

Site

No. M	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2310.000	42.31	-3.93	38.38	74.00	-35.62	peak		
2	*	2390.000	42.97	-3.58	39.39	74.00	-34.61	peak		

Power:

*:Maximum data x:Over limit !:over margin (Reference Only



Temperature:

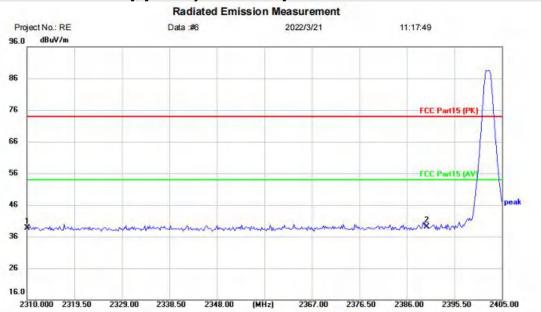
Humidity:

(C)

%RH



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



Polarization: Horizontal

Limit: FCC Part15 (PK)

Mode: TX-L Note:

Site

EUT: BT module
M/N: RF-BM-2642B1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2310.000	42.60	-3.93	38.67	74.00	-35.33	peak		
2	*	2390.000	42.67	-3.58	39.09	74.00	-34.91	peak		

Power:

*:Maximum data x:Over limit !:over margin (Reference Only

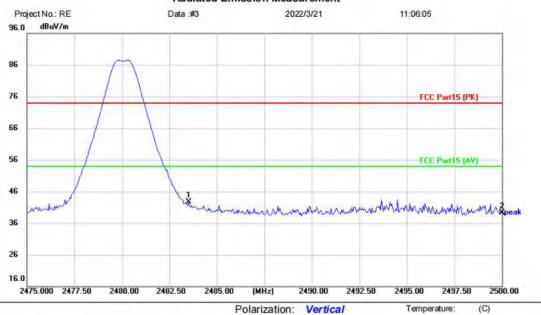
Humidity:

%RH



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

Radiated Emission Measurement



Limit: FCC Part15 (PK)

EUT: BT module M/N: RF-BM-2642B1

Mode: TX-H Note:

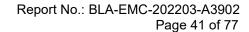
Site

)

No. M	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	2483.500	45.76	-3.14	42.62	74.00	-31.38	peak		
2		2500.000	42.28	-3.08	39.20	74.00	-34.80	peak		

Power:

*:Maximum data x:Over limit !:over margin (Reference Only



Temperature:

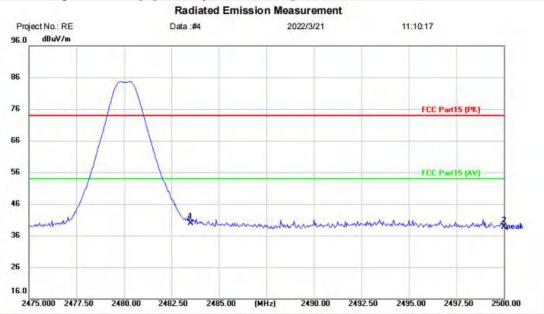
Humidity:

(C)

%RH



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



Polarization: Horizontal

Limit: FCC Part15 (PK)

EUT: BT module M/N: RF-BM-2642B1

Mode: TX-H Note:

Site

No. N	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment		Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	2483.500	43.08	-3.14	39.94	74.00	-34.06	peak		
2		2500.000	41.74	-3.08	38.66	74.00	-35.34	peak		

Power:

*:Maximum data x:Over limit !:over margin (Reference Only



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19 CONDUCTED BAND EDGES MEASUREMENT

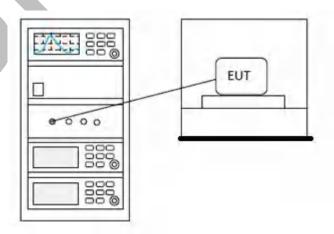
Test Standard	47 CFR Part 15, Subpart C 15.247						
Test Method	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2						
Test Mode (Pre-Scan)	TX						
Test Mode (Final Test)	TX						
Tester	Jozu						
Temperature	25℃						
Humidity	60%						

19.1 LIMITS

Limit:

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)).

19.2 BLOCK DIAGRAM OF TEST SETUP





19.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details





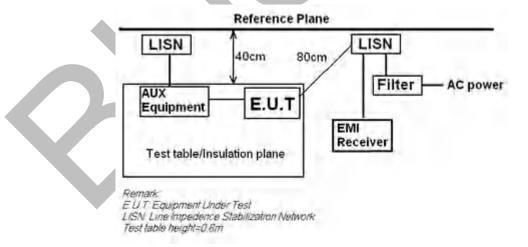
20 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)

Test Standard	47 CFR Part 15, Subpart C 15.247						
Test Method	ANSI C63.10 (2013) Section 6.2						
Test Mode (Pre-Scan)	Transmitting mode						
Test Mode (Final Test)	Transmitting mode						
Tester	Jozu						
Temperature	25℃						
Humidity	60%						

20.1 LIMITS

Frequency of	Conducted limit(dBµV)									
emission(MHz)	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	*Decreases with the logarithm of the frequency.									

20.2 BLOCK DIAGRAM OF TEST SETUP



20.3 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.



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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.

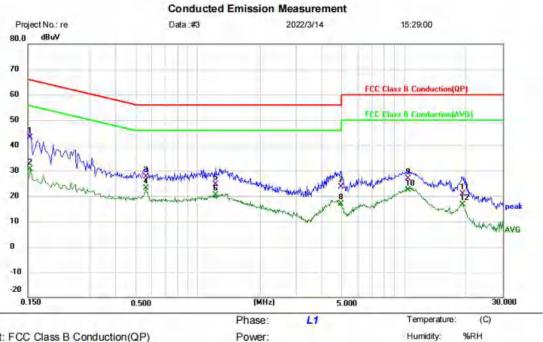
Remark: LISN=Read Level+ Cable Loss+ LISN Factor





20.4 TEST DATA

[TestMode: Transmitting mode]; [Line: Line] ;[Power:AC120V/60Hz]



Limit: FCC Class B Conduction(QP)

EUT: BT module M/N: RF-BM-2642B1 Mode: TX mode

Note:

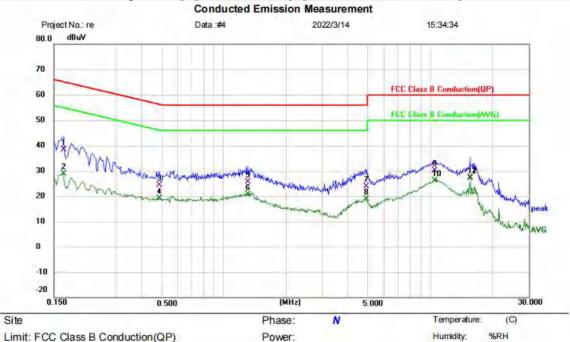
Site

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBu∀	dBuV	dB	Detector	Comment
1		0.1539	33.01	10.11	43.12	65.79	-22.67	QP	
2		0.1539	20.64	10.11	30.75	55.79	-25.04	AVG	
3		0.5580	17.87	9.87	27.74	56.00	-28.26	QP	
4		0.5580	13.29	9.87	23.16	46.00	-22.84	AVG	
5		1.2220	14.80	9.92	24.72	56.00	-31.28	QP	
6		1.2220	10.46	9.92	20.38	46.00	-25.62	AVG	
7		4.9380	13.71	10.01	23.72	56.00	-32.28	QP	
8		4.9380	6.97	10.01	16.98	46.00	-29.02	AVG	
9		10.4060	16.60	10.22	26.82	60.00	-33.18	QP	
10		10.4060	12.07	10.22	22.29	50.00	-27.71	AVG	
11		19.1540	10.58	10.42	21.00	60.00	-39.00	QP	
12		19.1540	6.10	10.42	16.52	50.00	-33.48	AVG	
_									

*:Maximum data x:Over limit (Reference Only !:over margin



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



Limit: FCC Class B Conduction(QP)

EUT: BT module M/N: RF-BM-2642B1 Mode: TX mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	28.30	10.08	38.38	65.16	-26.78	QP	
2		0.1660	18.74	10.08	28.82	55.16	-26.34	AVG	
3		0.4860	14.54	9.79	24.33	56.24	-31.91	QP	
4		0.4860	9.31	9.79	19.10	46.24	-27.14	AVG	
5		1.3099	15.84	9.85	25.69	56.00	-30.31	QP	
6		1.3099	10.78	9.85	20.63	46.00	-25.37	AVG	
7		4.9140	13.89	9.95	23.84	56.00	-32.16	QP	
8		4.9140	8.94	9.95	18.89	46.00	-27.11	AVG	
9		10.5180	19.97	10.17	30.14	60.00	-29.86	QP	
10		10.5180	15.91	10.17	26.08	50.00	-23.92	AVG	
11		15.5980	16.85	10.31	27.16	60.00	-32.84	QP	
12		15.5980	17.02	10.31	27.33	50.00	-22.67	AVG	

*:Maximum data x:Over limit (Reference Only



21 APPENDIX

21.1 MAXIMUM CONDUCTED OUTPUT POWER

Condition	Mode	Frequency	Antenna	Conducted	Limit	Verdict
		(MHz)		Power (dBm)	(dBm)	
NVNT	BLE 1M	2402	Ant1	3.173	30	Pass
NVNT	BLE 1M	2442	Ant1	3.038	30	Pass
NVNT	BLE 1M	2480	Ant1	2.35	30	Pass
NVNT	BLE 2M	2402	Ant1	3.159	30	Pass
NVNT	BLE 2M	2442	Ant1	3.07	30	Pass
NVNT	BLE 2M	2480	Ant1	2.189	30	Pass

Power NVNT BLE 1M 2402MHz Ant1

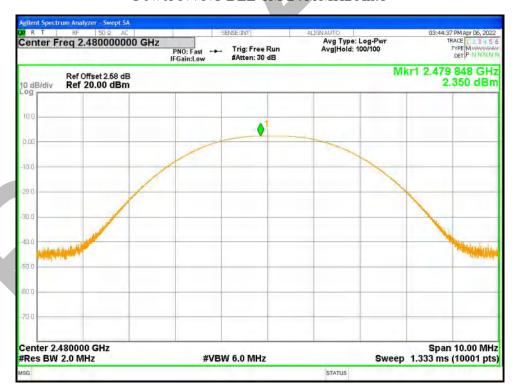


Power NVNT BLE 1M 2442MHz Ant1





Power NVNT BLE 1M 2480MHz Ant1



Power NVNT BLE 2M 2402MHz Ant1





Power NVNT BLE 2M 2442MHz Ant1



Power NVNT BLE 2M 2480MHz Ant1



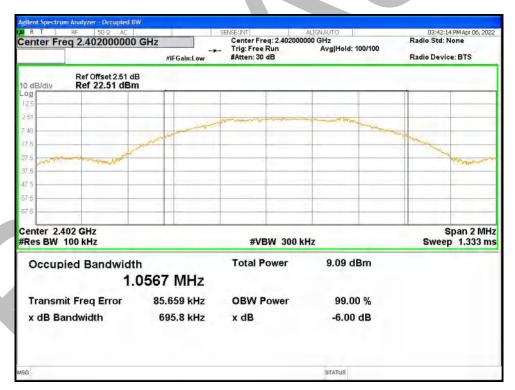




21.2 -6DB BANDWIDTH

Condition	Mode	Frequency	Antenna	-6 dB Bandwidth	Limit -6 dB	Verdict
		(MHz)		(MHz)	Bandwidth (MHz)	
NVNT	BLE	2402	Ant1	0.696	0.5	Pass
	1M					
NVNT	BLE	2442	Ant1	0.75	0.5	Pass
	1M					
NVNT	BLE	2480	Ant1	0.679	0.5	Pass
	1M					
NVNT	BLE	2402	Ant1	1.423	0.5	Pass
	2M					
NVNT	BLE	2442	Ant1	1.465	0.5	Pass
	2M					
NVNT	BLE	2480	Ant1	1.328	0.5	Pass
	2M					

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1





-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1





-6dB Bandwidth NVNT BLE 2M 2442MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1







21.3 OCCUPIED CHANNEL BANDWIDTH

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE 1M	2402	Ant1	1.050373245
NVNT	BLE 1M	2480	Ant1	1.068207947
NVNT	BLE 2M	2402	Ant1	2.053156878
NVNT	BLE 2M	2480	Ant1	2.06982067

OBW NVNT BLE 1M 2402MHz Ant1



OBW NVNT BLE 1M 2480MHz Ant1





OBW NVNT BLE 2M 2402MHz Ant1



OBW NVNT BLE 2M 2480MHz Ant1







21.4 MAXIMUM POWER SPECTRAL DENSITY LEVEL

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	2.802	8	Pass
NVNT	BLE 1M	2442	Ant1	2.264	8	Pass
NVNT	BLE 1M	2480	Ant1	1.774	8	Pass
NVNT	BLE 2M	2402	Ant1	1.087	8	Pass
NVNT	BLE 2M	2442	Ant1	0.409	8	Pass
NVNT	BLE 2M	2480	Ant1	0.088	8	Pass

PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2442MHz Ant1





PSD NVNT BLE 1M 2480MHz Ant1



PSD NVNT BLE 2M 2402MHz Ant1





PSD NVNT BLE 2M 2442MHz Ant1



PSD NVNT BLE 2M 2480MHz Ant1







21.5 BAND EDGE

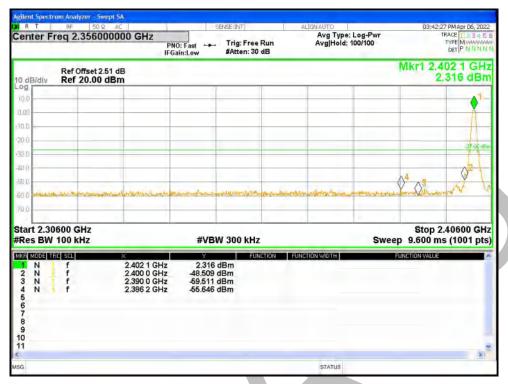
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-58.59	-30	Pass
NVNT	BLE 1M	2480	Ant1	-56.91	-30	Pass
NVNT	BLE 2M	2402	Ant1	-56.05	-30	Pass
NVNT	BLE 2M	2480	Ant1	-53.54	-30	Pass

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



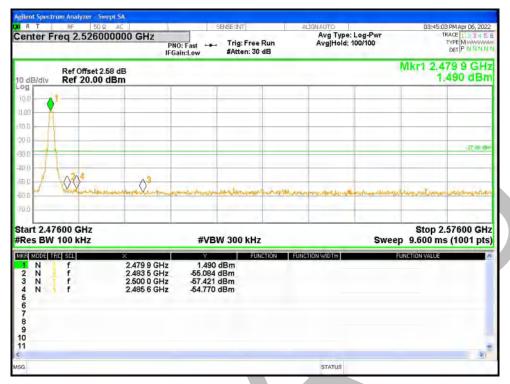


Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



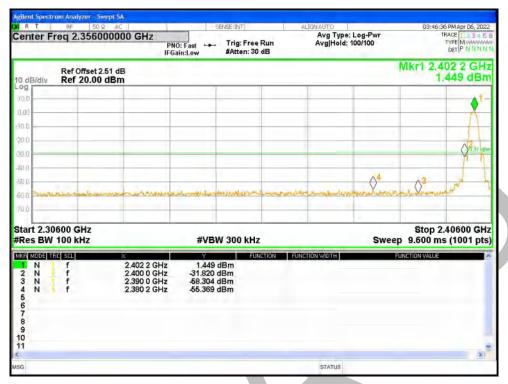


Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



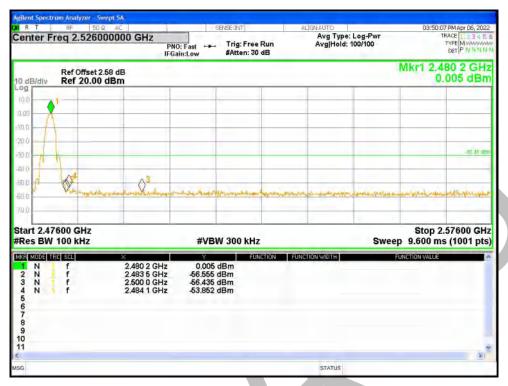


Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



Band Edge NVNT BLE 2M 2480MHz Ant1 Emission







21.6 CONDUCTED RF SPURIOUS EMISSION

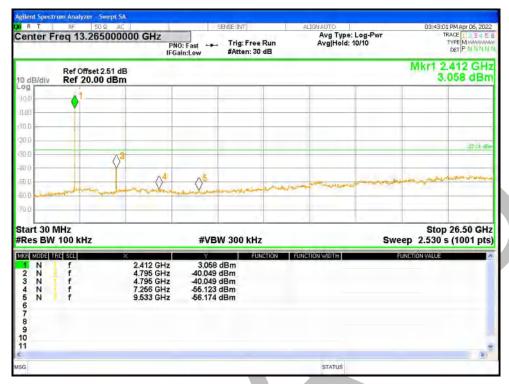
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-43.03	-30	Pass
NVNT	BLE 1M	2442	Ant1	-45.25	-30	Pass
NVNT	BLE 1M	2480	Ant1	-47.33	-30	Pass
NVNT	BLE 2M	2402	Ant1	-41.46	-30	Pass
NVNT	BLE 2M	2442	Ant1	-44.55	-30	Pass
NVNT	BLE 2M	2480	Ant1	-46.37	-30	Pass

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



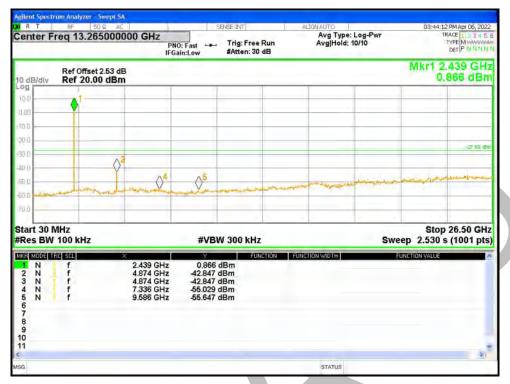


Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Emission



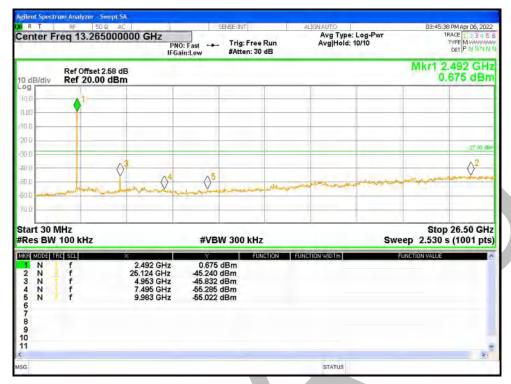


Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



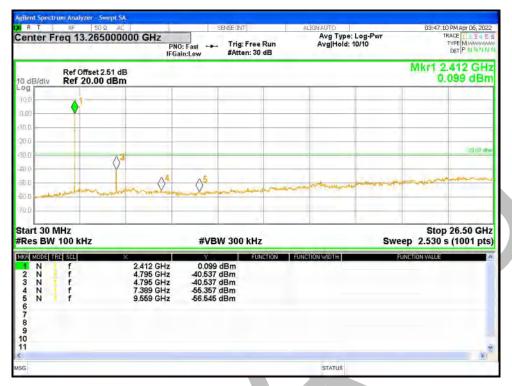


Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



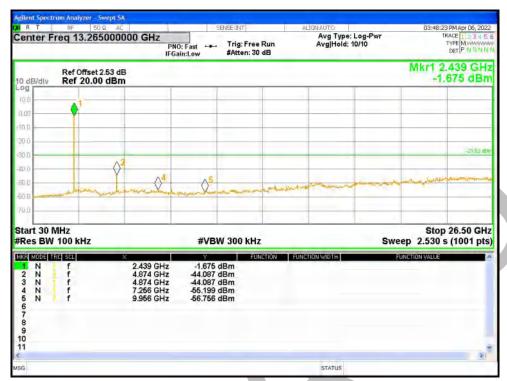


Tx. Spurious NVNT BLE 2M 2442MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2442MHz Ant1 Emission



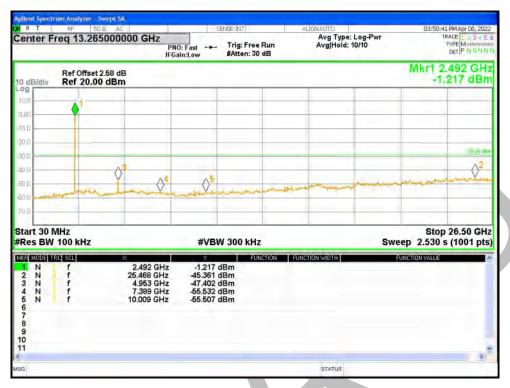


Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



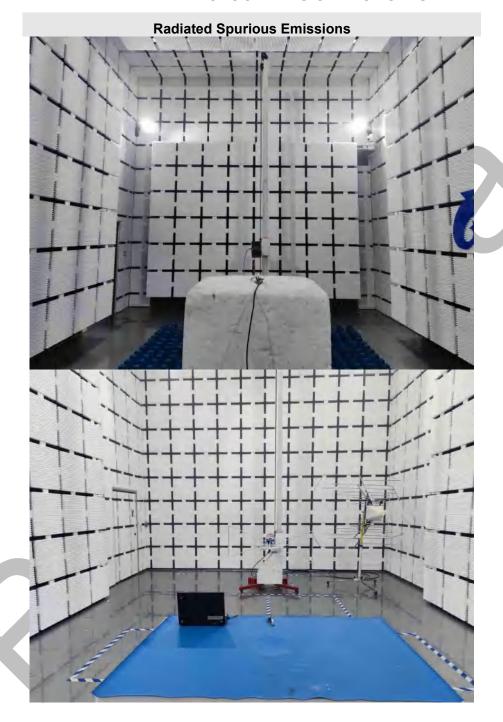
Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission





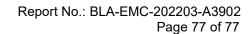


APPENDIX A: PHOTOGRAPHS OF TEST SETUP











APPENDIX B: PHOTOGRAPHS OF EUT

Reference to the test report No. BLA-EMC-202203-A3901

----END OF REPORT----

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