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# **TEST REPORT**

Product Name	:	BLE Module
Brand Mark	:	Shinwa
Model No.	:	BT-MP62-SH1
Extension Model	:	BT-MP62-1
Report Number	:	BLA-EMC-202209-A2102
FCC ID	:	ZWYP6222
Date of Sample Receipt	:	2022/9/7
Date of Test	:	2022/9/7 to 2022/9/20
Date of Issue	:	2022/9/20
Test Standard	:	47 CFR Part 15, Subpart C 15.247
Test Result	:	Pass

Prepared for:

Shinwa industries(China)Itd. No.26, HuiFeng West 2 Road, Zhongkai High-Tech Park,Huizhou,Guangdong,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:

Approved by:







#### **REPORT REVISE RECORD**

Version No.	Date	Description
00	2022/9/20	Original



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## 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**

Applicant	Shinwa industries(China)Itd.		
Address	No.26,HuiFeng West 2 Road,Zhongkai High-Tech Park,Huizhou,Guangdong,China		
Manufacturer	Shinwa industries(China)ltd.		
Address	No.26,HuiFeng West 2 Road,Zhongkai High-Tech Park,Huizhou,Guangdong,China		
Factory	Shinwa industries(China)ltd.		
Address	No.26,HuiFeng West 2 Road,Zhongkai High-Tech Park,Huizhou,Guangdong,China		
Product Name	BLE Module		
Test Model No.	BT-MP62-SH1		
Extension Model	BT-MP62-1		
Remark	All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are model name for commercial purpose.		

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

3 GENERAL DESCR	RIPTION OF E.U.T.
Hardware Version	V1.0
Software Version	N/A
Operation Frequency:	2402MHz-2480MHz
Data Rata	1Mbps; 2Mbps
Modulation Type:	GFSK
Channel Spacing:	2MHz
Number of Channels:	40
Antenna Type:	PCB Antenna
Antenna Gain:	-0.62dBi(Provided by the customer)



## **4 TEST ENVIRONMENT**

Environment	Temperature	Voltage
Normal	25°C	DC3.3V

## 5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION		
ТХ	Keep the EUT in transmitting mode with modulation		
Remark:Only the data of the worst mode would be recorded in this report.For Radiated emission,1Mbps and 2Mbps mode all have been tested,only worse case 1Mbps mode 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		



## 7 DESCRIPTION OF SUPPORT UNIT

Dev	vice 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, Shiyan 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	25/11/2020	24/11/2023	
Receiver	R&S	ESPI3	101082	24/9/2021	23/9/2022	
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 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	

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
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 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 Power Spectrum Density					
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					
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 Minimum 6dB Bandwidth					
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 Antenna Requirement					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due



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

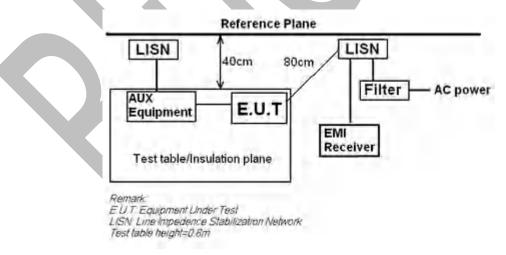
Test Standard	47 CFR Part 15, Subpart C 15.247		
Test Method	ANSI C63.10 (2013) Section 6.2		
Test Mode (Pre-Scan)	ТХ		
Test Mode (Final Test)	ТХ		
Tester	Charlie		
Temperature	25°C		
Humidity	60%		

#### 10.1 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 of the frequency.

## 10.2 BLOCK DIAGRAM OF TEST SETUP



#### 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,

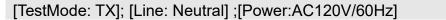
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test 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.

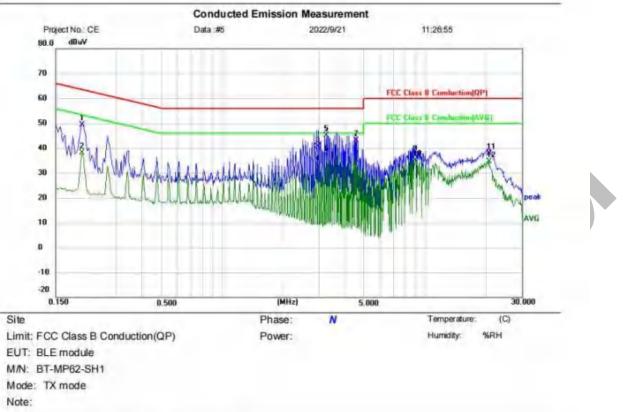
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

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



### 10.4 TEST DATA



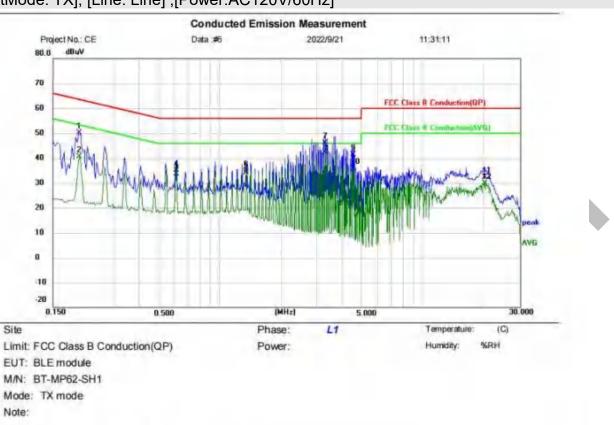


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
-	-	MHz	dBuN	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2020	39.23	10.15	49.38	63.53	-14.15	QP	
2		0.2020	27.90	10.15	38.05	53.53	-15.48	AVG	
3		2.9739	30.69	9.90	40.59	56.00	-15.41	QP	
4		2.9739	23.16	9.90	33.06	46.00	-12.94	AVG	
5		3.2420	35.20	9.91	45.11	56.00	-10.89	QP	
6	*	3.2420	27.26	9.91	37.17	46.00	-8.83	AVG	
7		4.5939	33.10	9.94	43.04	56.00	-12.96	QP	
8		4.5939	25.33	9.94	35.27	46.00	-10.73	AVG	
9	-	8.9180	27.04	10.10	37.14	60.00	-22.86	QP	
10		8,9180	25.09	10.10	35.19	50.00	-14.81	AVG	
11		20.7380	27.50	10.42	37.92	60.00	-22.08	QP	
12		20.7380	24.10	10.42	34.52	50.00	-15.48	AVG	
_									

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

(Reference Only





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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
_		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1		0.2020	39.95	10.23	50.18	63.53	-13.35	QP		
2		0.2020	30.40	10.23	40.63	53.53	-12.90	AVG		
3		0.6100	23.76	9.88	33.64	56.00	-22.36	QP		
4		0.6100	25.36	9.88	35.24	46.00	-10.76	AVG		
5		1.3500	24.30	9.93	34.23	56.00	-21.77	QP		
6		1.3500	24.92	9,93	34.85	46.00	-11.15	AVG		
7		3.3100	36.14	9.97	46.11	56.00	-9.89	QP		_
8		3.3100	32.44	9.97	42.41	46.00	-3.59	AVG		
9		4.5260	31.27	10.01	41.28	56.00	-14.72	QP		
10	-	4.5260	25.90	10.01	35.91	46.00	-10.09	AVG		
11		20.2620	22.06	10.42	32.48	60.00	-27.52	QP		
12		20.2620	19.54	10.42	29.96	50.00	-20.04	AVG		

\*:Maximum data x:Over limit 1:over margin

(Reference Only



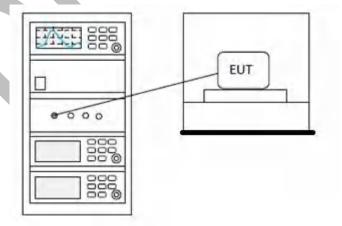
## 11 CONDUCTED BAND EDGES MEASUREMENT

Test Standard	7 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)	ТХ						
Test Mode (Final Test)	ТХ						
Tester	Charlie						
Temperature	25°C						
Humidity	60%						

#### 11.1 LIMITS

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 §15.209(a) (see §15.205(c)).

## 11.2 BLOCK DIAGRAM OF TEST SETUP



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## 11.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details



## **12 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)	ТХ
Test Mode (Final Test)	ТХ
Tester	Charlie
Temperature	25°C
Humidity	60%

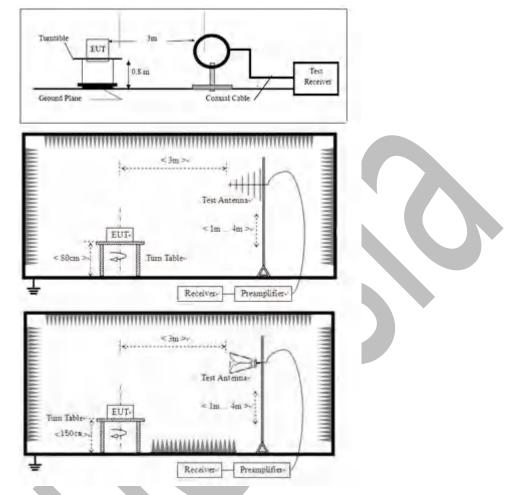
#### 12.1 LIMITS

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.



#### 12.2 BLOCK DIAGRAM OF TEST SETUP



#### 12.3 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.



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.

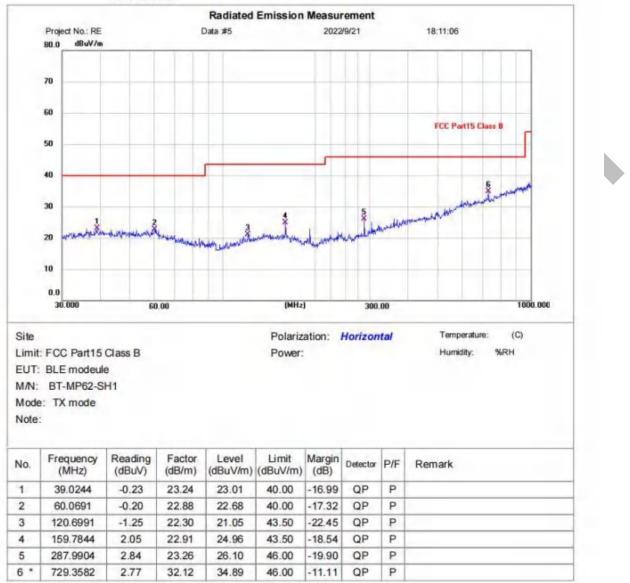
4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower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



## 12.4 TEST DATA

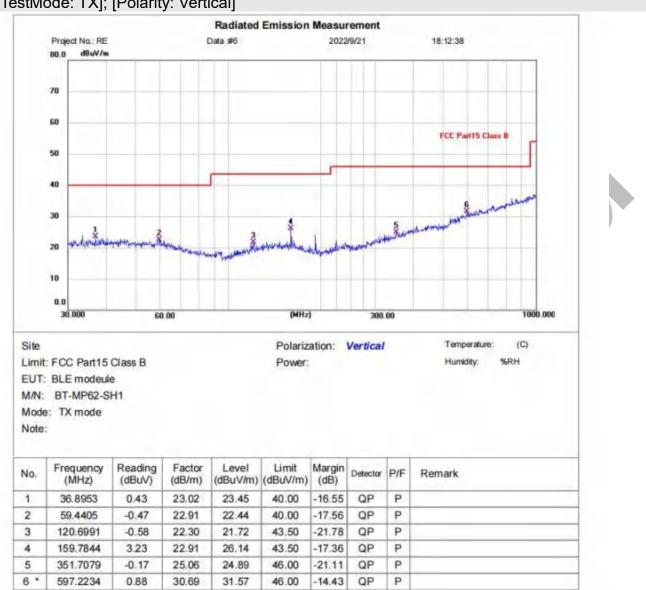
#### Below 1GHz





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



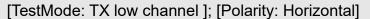


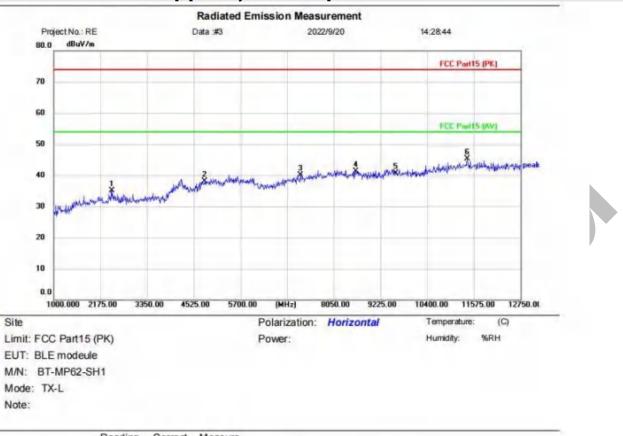
## [TestMode: TX]; [Polarity: Vertical]

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



## Above 1GHz



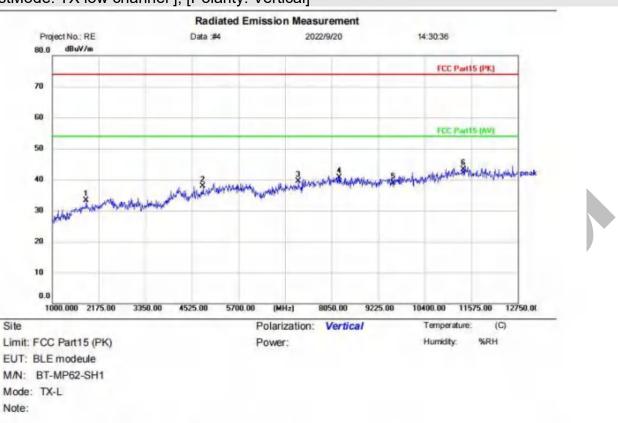


No.	Mk.	Freq.	Level	Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2468.750	46.96	-11.91	35.05	74.00	-38.95	peak		
2		4804.000	44.14	-5.95	38.19	74.00	-35.81	peak		
3		7206.000	42.24	-2.07	40.17	74.00	-33.83	peak		
4		8602.250	42.04	-0.83	41.21	74.00	-32.79	peak		
5		9608.000	39.79	0.90	40.69	74.00	-33.31	peak		
6		11410.500	41.74	3.63	45.37	74.00	-28.63	peak		
_										

\*:Maximum data x:Over limit 1:over margin

(Reference Only





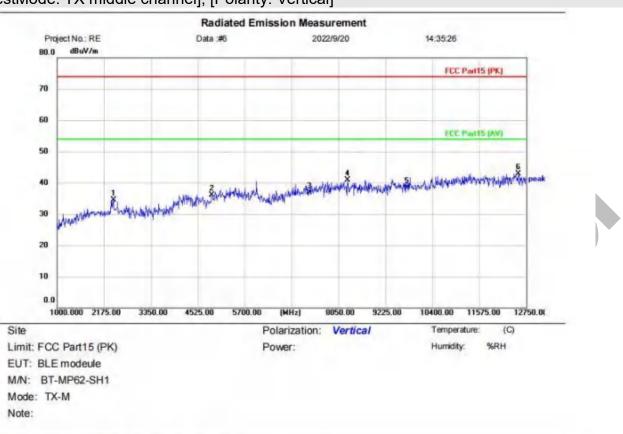
## [TestMode: TX low channel ]; [Polarity: Vertical]

_	MHz 1857.750	dBuV	dB/m	dBuV/m	100.000				
	1857 750	10.00		acourter.	dBuV/m	dB	Detector	Comment	
	1001.100	48.28	-14.91	33.37	74.00	-40.63	peak		
	4804.000	43.83	-5.95	37.88	74.00	-36.12	peak		
	7206.000	41.60	-2.07	39.53	74.00	-34.47	peak		
	8249.750	41.69	-0.99	40.70	74.00	-33.30	peak		
	9608.000	38.04	0.90	38.94	74.00	-35.06	peak		
* 1	11375.250	39.74	3.62	43.36	74.00	-30.64	peak		
	• •	7206.000 8249.750	7206.000     41.60       8249.750     41.69       9608.000     38.04	7206.000     41.60     -2.07       8249.750     41.69     -0.99       9608.000     38.04     0.90	7206.000     41.60     -2.07     39.53       8249.750     41.69     -0.99     40.70       9608.000     38.04     0.90     38.94	7206.000     41.60     -2.07     39.53     74.00       8249.750     41.69     -0.99     40.70     74.00       9608.000     38.04     0.90     38.94     74.00	7206.000     41.60     -2.07     39.53     74.00     -34.47       8249.750     41.69     -0.99     40.70     74.00     -33.30       9608.000     38.04     0.90     38.94     74.00     -35.06	7206.000     41.60     -2.07     39.53     74.00     -34.47     peak       8249.750     41.69     -0.99     40.70     74.00     -33.30     peak       9608.000     38.04     0.90     38.94     74.00     -35.06     peak	7206.000   41.60   -2.07   39.53   74.00   -34.47   peak     8249.750   41.69   -0.99   40.70   74.00   -33.30   peak     9608.000   38.04   0.90   38.94   74.00   -35.06   peak

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

(Reference Only





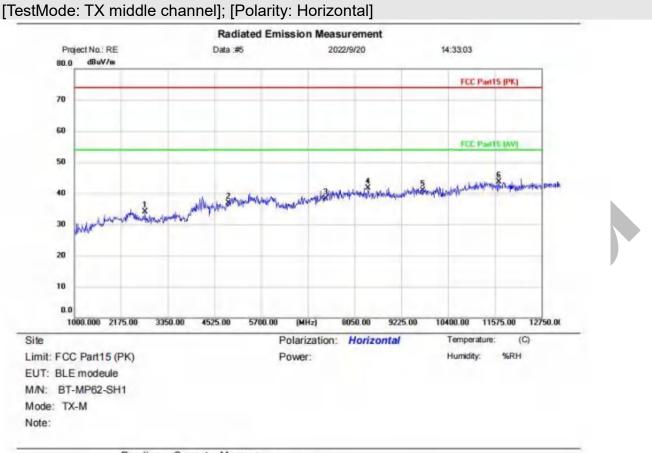
## [TestMode: TX middle channel]; [Polarity: Vertical]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2410.000	45.68	-11.26	34.42	74.00	-39.58	peak		
2		4884.000	41.83	-5.63	36.20	74.00	-37.80	peak		
3		7326.000	38.76	-1.79	36.97	74.00	-37.03	peak		
4		8273.250	41.79	-0.97	40.82	74.00	-33.18	peak		
5		9768.000	37.21	1.31	38.52	74.00	-35.48	peak		
6		12550.250	39.08	3.87	42.95	74.00	-31.05	peak		

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

(Reference Only



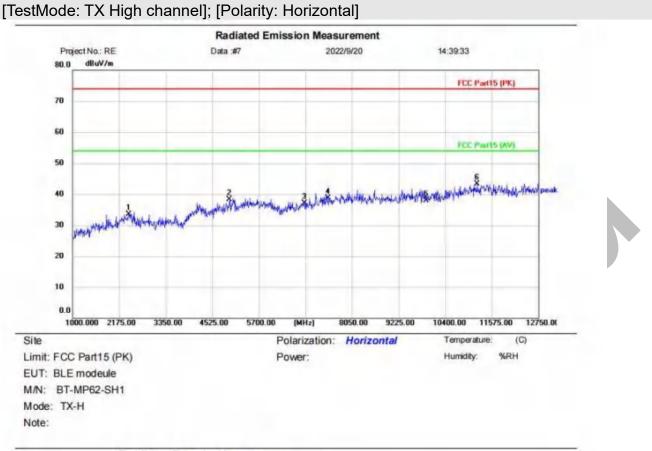


No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2774.250	46.55	-12.54	34.01	74.00	-39.99	peak		
2		4884.000	42.55	-5.63	36.92	74.00	-37.08	peak		
3		7326.000	40.03	-1.79	38.24	74.00	-35.76	peak		
4		8390.750	42.67	-0.92	41.75	74.00	-32.25	peak		
5		9768.000	39.69	1.31	41.00	74.00	-33.00	peak		
6	•	11669.000	39.96	3.75	43.71	74.00	-30.29	peak		
_	_									

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

(Reference Only



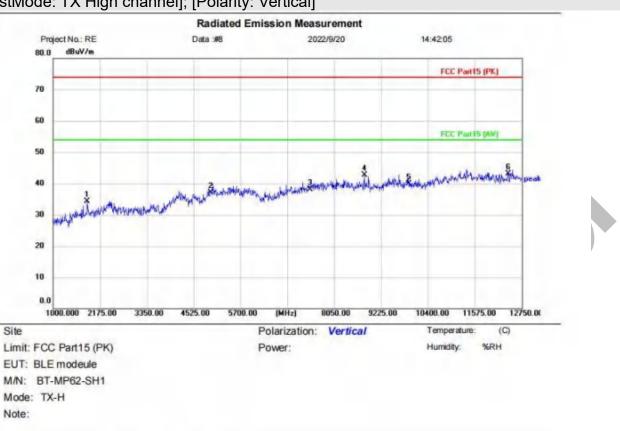


No.	No. Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2410.000	44.70	-11.26	33.44	74.00	-40.56	peak		
2		4960.000	42.90	-4.58	38.32	74.00	-35.68	peak		
3		6851.500	40.12	-2.99	37.13	74.00	-36.87	peak		
4		7440.000	40.25	-1.52	38.73	74.00	-35.27	peak		
5		9920.000	36.15	1.69	37.84	74.00	-36.16	peak		
6	•	11199.000	39.67	3.54	43.21	74.00	-30.79	peak		

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

(Reference Only





	<b>T</b> V/11'1			1 1 11
[TestMode:	I X Hian c	channell:	Polarity:	verticali

Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
	1857.750	49.22	-14.91	34.31	74.00	-39.69	peak	
	4960.000	41.75	-4.58	37.17	74.00	-36.83	peak	
	7440.000	39.60	-1.52	38.08	74.00	-35.92	peak	
	8802.000	43.51	-0.74	42.77	74.00	-31.23	peak	
	9920.000	38.22	1.69	39.91	74.00	-34.09	peak	
•	12409.250	39.30	3.88	43.18	74.00	-30.82	peak	
		MHz 1857.750 4960.000 7440.000 8802.000	Mk.     Freq.     Level       MHz     dBuV       1857.750     49.22       4960.000     41.75       7440.000     39.60       8802.000     43.51       9920.000     38.22	Mk.     Freq.     Level     Factor       MHz     dBuV     dB/m       1857.750     49.22     -14.91       4960.000     41.75     -4.58       7440.000     39.60     -1.52       8802.000     43.51     -0.74       9920.000     38.22     1.69	Mk.     Freq.     Level     Factor     ment       MHz     dBuV     dB/m     dBuV/m       1857.750     49.22     -14.91     34.31       4960.000     41.75     -4.58     37.17       7440.000     39.60     -1.52     38.08       8802.000     43.51     -0.74     42.77       9920.000     38.22     1.69     39.91	Mk.     Freq.     Level     Factor     ment     Limit       MHz     dBuV     dB/m     dBuV/m     dBuV/m       1857.750     49.22     -14.91     34.31     74.00       4960.000     41.75     -4.58     37.17     74.00       7440.000     39.60     -1.52     38.08     74.00       8802.000     43.51     -0.74     42.77     74.00       9920.000     38.22     1.69     39.91     74.00	Mk.     Freq.     Level     Factor     ment     Limit     Over       MHz     dBuV     dB/m     dBuV/m     dBuV/m     dB       1857.750     49.22     -14.91     34.31     74.00     -39.69       4960.000     41.75     -4.58     37.17     74.00     -36.83       7440.000     39.60     -1.52     38.08     74.00     -35.92       8802.000     43.51     -0.74     42.77     74.00     -31.23       9920.000     38.22     1.69     39.91     74.00     -34.09	Mk.     Freq.     Level     Factor     ment     Limit     Over       MHz     dBuV     dB/m     dBuV/m     dB     Detector       1857.750     49.22     -14.91     34.31     74.00     -39.69     peak       4960.000     41.75     -4.58     37.17     74.00     -36.83     peak       7440.000     39.60     -1.52     38.08     74.00     -35.92     peak       8802.000     43.51     -0.74     42.77     74.00     -31.23     peak       9920.000     38.22     1.69     39.91     74.00     -34.09     peak

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

(Reference Only



## **13 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)	ТХ
Test Mode (Final Test)	ТХ
Tester	Charlie
Temperature	25°C
Humidity	60%

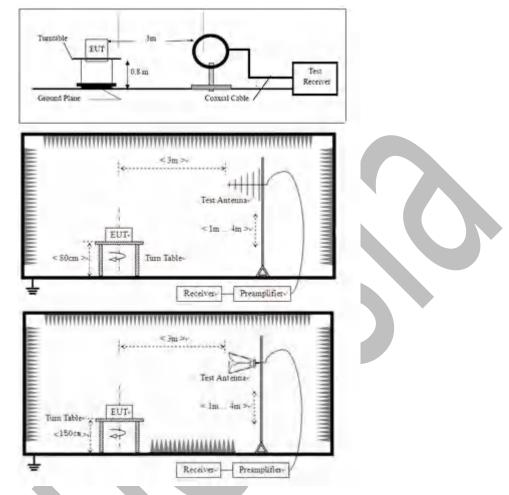
#### 13.1 LIMITS

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.



#### 13.2 BLOCK DIAGRAM OF TEST SETUP



#### **13.3 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.



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.

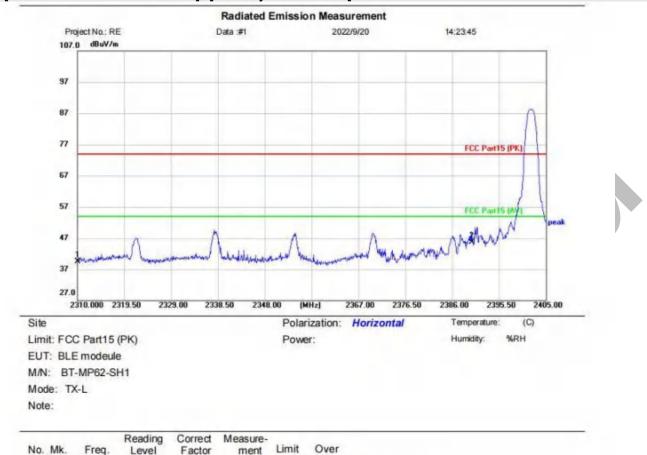
j. Repeat above procedures until all frequencies measured was complete.

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.



#### 13.4 TEST DATA



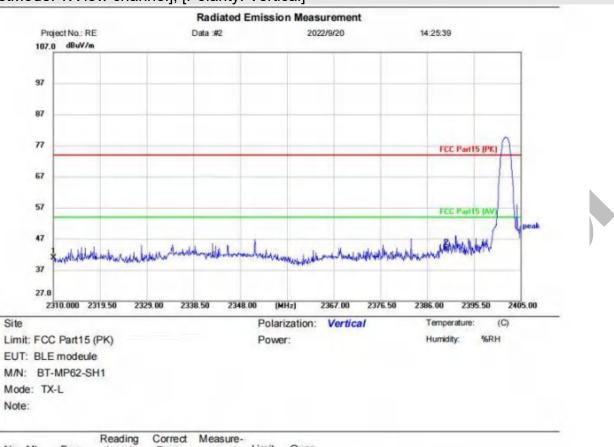
## [TestMode: TX low channel]; [Polarity: Horizontal]

10. min.	riod.	LCACI	1 actor	men					
	MHz	dBuW	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1	2310.000	53.79	-14.27	39.52	74.00	-34.48	peak		
2 *	2390.000	59.47	-13.82	45.65	74.00	-28.35	peak		

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

(Reference Only





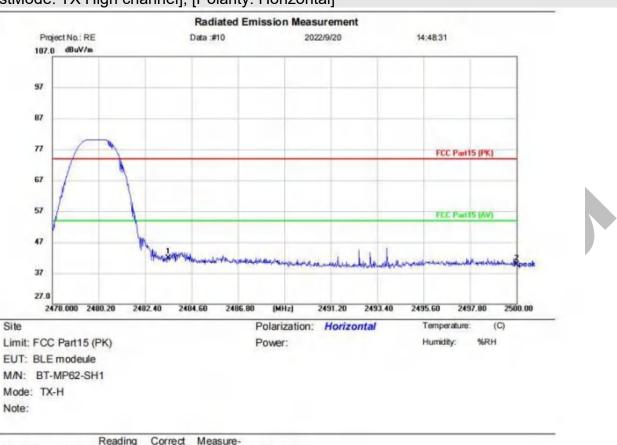
## [TestMode: TX low channel]; [Polarity: Vertical]

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	55.26	-14.27	40.99	74.00	-33.01	peak		
2	*	2390.000	57.59	-13.82	43.77	74.00	-30.23	peak		

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

(Reference Only





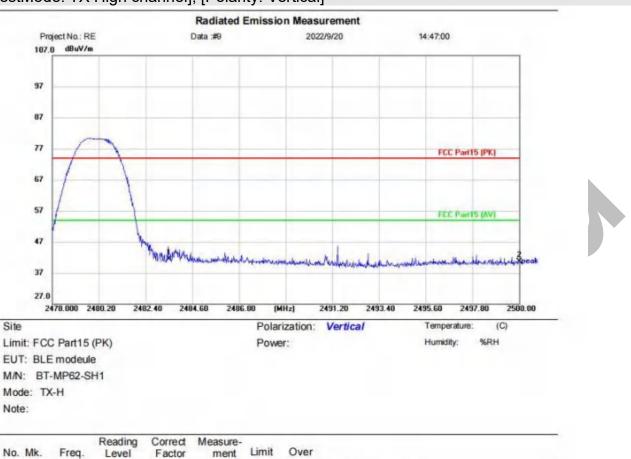
## [TestMode: TX High channel]; [Polarity: Horizontal]

Mk.	Freq.	Level	Factor	Measure- ment	Limit	Over			
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
	2483.500	55.87	-13.96	41.91	74.00	-32.09	peak		
	2500.000	53.71	-14.00	39.71	74.00	-34.29	peak		
	•	MHz * 2483.500	Mk.     Freq.     Level       MHz     dBuV       *     2483.500     55.87	Mk.     Freq.     Level     Factor       MHz     dBul/     dB/m     dB/m       *     2483.500     55.87     -13.96	Mk.     Freq.     Level     Factor     ment       MHz     dBuV     dB/m     dBuV/m       *     2483.500     55.87     -13.96     41.91	Mk.     Freq.     Level     Factor     ment     Limit       MHz     dBuV     dB/m     dBuV/m     dBuV/m     dBuV/m       *     2483.500     55.87     -13.96     41.91     74.00	Mk.     Freq.     Level     Factor     ment     Limit     Over       MHz     dBuV     dB/m     dBuV/m     dBuV/m     dB       *     2483.500     55.87     -13.96     41.91     74.00     -32.09	Mk.     Freq.     Level     Factor     ment     Limit     Over       MHz     dBuV     dB/m     dBuV/m     dBuV/m     dB     Detector       *     2483.500     55.87     -13.96     41.91     74.00     -32.09     peak	Mk. Freq. Level Factor ment Limit Over   MHz dBuV dB/m dBuV/m dBuV/m dB Detector Comment   * 2483.500 55.87 -13.96 41.91 74.00 -32.09 peak

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

(Reference Only





## [TestMode: TX High channel]; [Polarity: Vertical]

No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1	•	2483.500	55.53	-13.96	41.57	74.00	-32.43	peak		
2		2500.000	54.66	-14.00	40.66	74.00	-33.34	peak		

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

(Reference Only



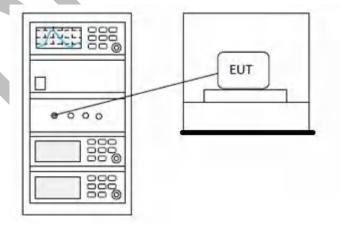
## 14 CONDUCTED SPURIOUS EMISSIONS

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)	ТХ					
Test Mode (Final Test)	ТХ					
Tester	Charlie					
Temperature	25°C					
Humidity	60%					

#### 14.1 LIMITS

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)).

## 14.2 BLOCK DIAGRAM OF TEST SETUP





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#### 14.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details



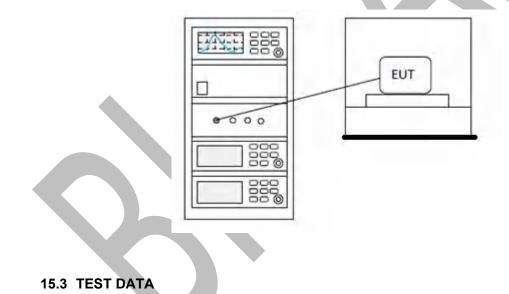
# **15 POWER SPECTRUM DENSITY**

Test Standard	47 CFR Part 15, Subpart C 15.247				
Test Method	ANSI C63.10 (2013) Section 11.10.2				
Test Mode (Pre-Scan)	ТХ				
Test Mode (Final Test)	ТХ				
Tester	Charlie				
Temperature	25°C				
Humidity	60%				

#### 15.1 LIMITS

**Limit:**  $\leq$ 8dBm in any 3 kHz band during any time interval of continuous transmission

#### 15.2 BLOCK DIAGRAM OF TEST SETUP



# Pass: Please Refer To Appendix: Appendix1 For Details



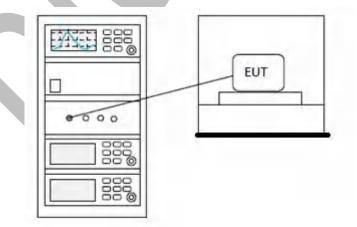
# 16 CONDUCTED PEAK OUTPUT POWER

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.5
Test Mode (Pre-Scan)	ТХ
Test Mode (Final Test)	ТХ
Tester	Charlie
Temperature	25°C
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 $25 \le$ hopping channels $<$ 50				
	1 for digital modulation				
	1 for $\geq$ 75 non-overlapping hopping channels				
2400-2483.5	0.125 for all other frequency hopping systems				
	1 for digital modulation				
5705 5050	1 for frequency hopping systems and digital				
5725-5850	modulation				

# 16.2 BLOCK DIAGRAM OF TEST SETUP





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#### 16.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details



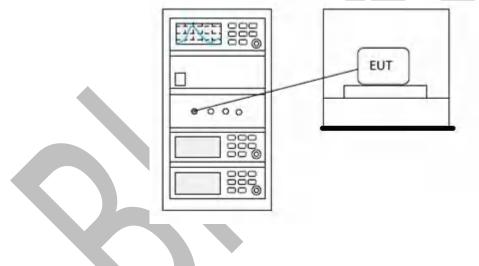
## 17 MINIMUM 6DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247				
Test Method	ANSI C63.10 (2013) Section 11.8.1				
Test Mode (Pre-Scan)	ТХ				
Test Mode (Final Test)	ТХ				
Tester	Charlie				
Temperature	25°C				
Humidity	60%				

#### 17.1 LIMITS

**Limit:**  $\geq$  500 kHz

#### 17.2 BLOCK DIAGRAM OF TEST SETUP



17.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details



### 18 ANTENNA REQUIREMENT

Test Standard47 CFR Part 15, Subpart C 15.247	
Test Method	N/A

#### 18.1 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 -0.62dBi.





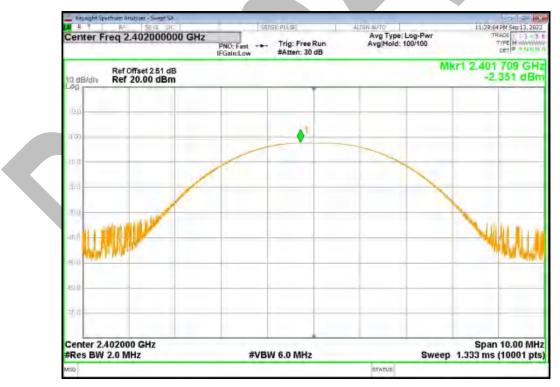
# **19 APPENDIX**

## Appendix1

#### **Maximum Conducted Output Power**

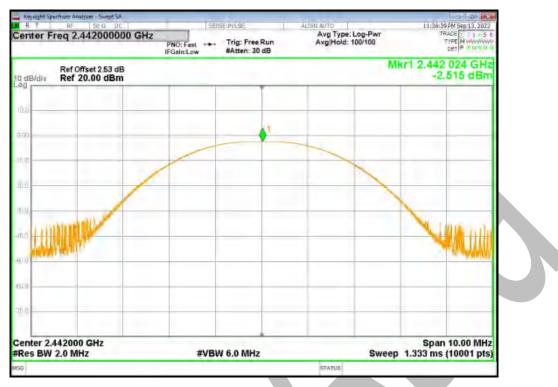
Condition	Mode	Frequency	Antenna	Conducted Power	Limit	Verdict
		(MHz)		(dBm)	(dBm)	
NVNT	BLE	2402	Ant1	-2.351	30	Pass
	1M					
NVNT	BLE	2442	Ant1	-2.515	30	Pass
	1M					
NVNT	BLE	2480	Ant1	-2.797	30	Pass
	1M					
NVNT	BLE	2402	Ant1	-2.53	30	Pass
	2M					
NVNT	BLE	2442	Antl	-2.545	30	Pass
	2M					
NVNT	BLE	2480	Ant1	-3.003	30	Pass
	2M					

# Power NVNT BLE 1M 2402MHz Ant1



### Power NVNT BLE 1M 2442MHz Ant1



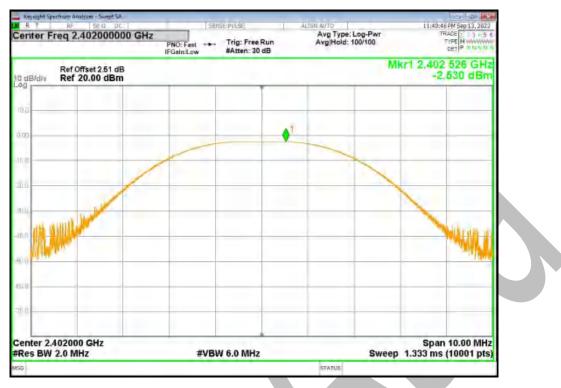


# Power NVNT BLE 1M 2480MHz Ant1

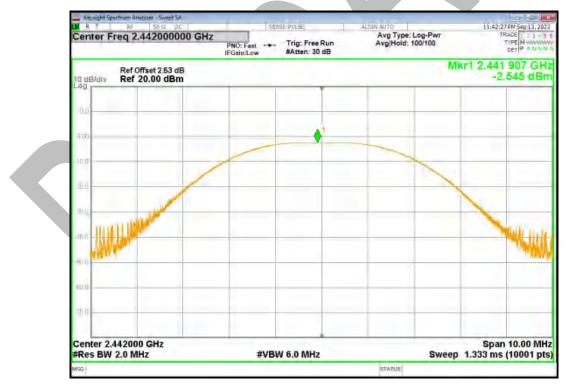


### Power NVNT BLE 2M 2402MHz Ant1



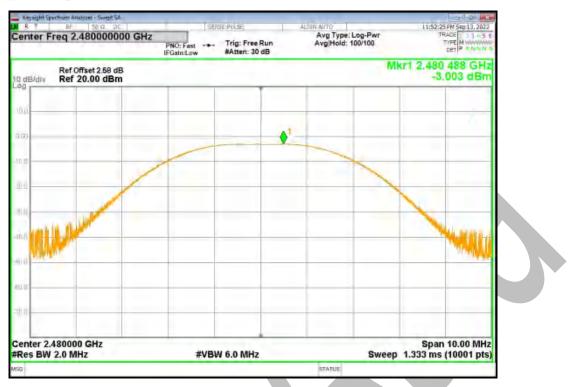


# Power NVNT BLE 2M 2442MHz Ant1



Power NVNT BLE 2M 2480MHz Ant1







#### -6dB Bandwidth

Condition	Mode	Frequency	Antenna	-6 dB Bandwidth	Limit -6 dB	Verdict
		(MHz)		(MHz)	Bandwidth (MHz)	
NVNT	BLE	2402	Ant1	0.657	0.5	Pass
	1M					
NVNT	BLE	2442	Ant1	0.68	0.5	Pass
	1M					
NVNT	BLE	2480	Ant1	0.679	0.5	Pass
	1M					
NVNT	BLE	2402	Ant1	1.136	0.5	Pass
	2M					
NVNT	BLE	2442	Ant1	1.109	0.5	Pass
	2M					
NVNT	BLE	2480	Ant1	1.124	0.5	Pass
	2M					

### -6dB Bandwidth NVNT BLE 1M 2402MHz Ant1

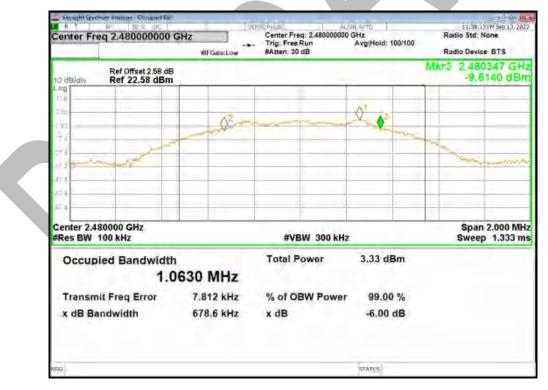


-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1



Keysight Spectrum Analyzes -	Occupied Bar		A REAL PROPERTY.			3.8	
enter Freq 2.442	000000 GI		Center Freq: 2.442000000	N AUTO 3Hz Avg Hold: 100/100		11:38:51 PM Sep 13.2 dio Std: None dio Device: BTS	0.72
	et 2.53 dB				Mkr3	2.442345 GH -9.4729 dB	
9							
	=++	A2		\$ 13	+		-
5		million		- man			
5	-	-			1	hisara	-
5							
1	_						-
5							
enter 2.442000 GH Res BW 100 kHz	łz		#VBW_300 kHz			Span 2.000 M Sweep 1.333 r	
Occupied Bar		39 MHz	Total Power	3.46 dBm			
Transmit Freq E	rror	5.254 kHz	% of OBW Power	99.00 %			
x dB Bandwidth		679.8 kHz	x dB	-6.00 dB			
a				STATUT			

# -6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



#### -6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



	num Attalijan - Obcupred B				<u> </u>
enter Fre	eq 2.40200000		Center Freq: 2.402000000	AVB/Hold: 100/100	Radio Std: None Radio Device: BTS
0 dBJdiv	Ref Offset 2.51 c Ref 22.51 dB	B			Mkr3 2.402561 GHz -10.273 dBm
0					
E)	-	-	0	_	2
15	1 march	tom		10 1-15 - 1	ware ware
2 Martin	1	_			
5	-				
5					
5					
nter 2.4 es BW	02000 GHz 100 kHz	_	#VBW 300 kHz		Span 2.000 MHz Sweep 1.333 ms
Occup	led Bandwid 1.	<sup>th</sup> .8651 MHz	Total Power	3.32 dBm	
Transm	it Freq Error	-7.259 kHz	% of OBW Power	99.00 %	
x dB Ba	ndwidth	1.136 MHz	x dB	-6.00 dB	
91				STATUS	

# -6dB Bandwidth NVNT BLE 2M 2442MHz Ant1



#### -6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



ter Freq 2.4800000		Center Freq: 2.480000000 ( Trig: Free Run #Atten: 30 dB	Hz AvgiHold: 100/100	Radio Std: None Radio Device: BTS
Ref Offset 2.5				Mkr3 2.480555 GHz -8.5975 dBm
		01		
-	A FILMPIN	VI-	month of	Maria
Vintering				and a state of the
	-	1		
ter 2.480000 GHz s BW 100 kHz		#VBW 300 kHz		Span 2.000 MHz Sweep 1.333 ms
ccupied Bandwi	dth	Total Power	2.94 dBm	
	1.8645 MHz			
ansmit Freq Error	-7.047 kHz	% of OBW Power	99.00 %	
dB Bandwidth	1.124 MHz	x dB	-6.00 dB	
			STATUT	



#### **Occupied Channel Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE 1M	2402	Ant1	1.048
NVNT	BLE 1M	2442	Ant1	1.0463
NVNT	BLE 1M	2480	Ant1	1.0506
NVNT	BLE 2M	2402	Ant1	2.0501
NVNT	BLE 2M	2442	Ant1	2.0506
NVNT	BLE 2M	2480	Ant1	2.0365

### OBW NVNT BLE 1M 2402MHz Ant1

R 11:20:00 PM Sep 13.20 Radio Std: None Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hold: 100/100 #Atten: 30 dB Center Freq 2.402000000 GHz Radio Device: BTS #IFGein:Low Ref Offset 2.51 dB Ref 22.51 dBm dBJd VILLER 4/24 Center 2.402000 GHz #Res BW 30 kHz Span 3.000 MHz #VBW 100 kHz Sweep 3.333 ms **Total Power** 4.06 dBm **Occupied Bandwidth** 1.0484 MHz Transmit Freq Error 10.634 kHz % of OBW Power 99.00 % x dB Bandwidth 1.262 MHz x dB -26.00 dB STATUT

### OBW NVNT BLE 1M 2442MHz Ant1





# OBW NVNT BLE 1M 2480MHz Ant1



OBW NVNT BLE 2M 2402MHz Ant1



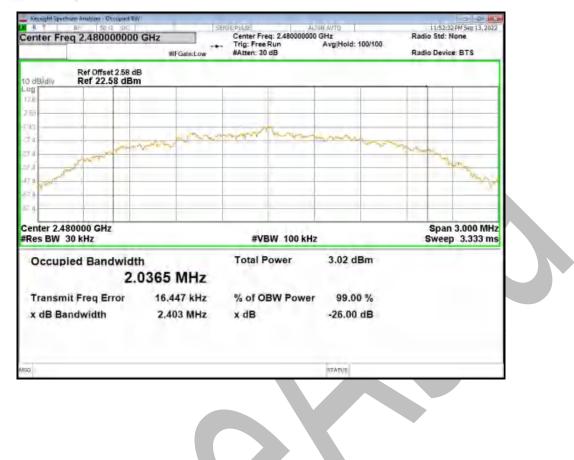


# OBW NVNT BLE 2M 2442MHz Ant1



OBW NVNT BLE 2M 2480MHz Ant1







#### Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-2.636	8	Pass
NVNT	BLE 1M	2442	Ant1	-2.694	8	Pass
NVNT	BLE 1M	2480	Ant1	-3.143	8	Pass
NVNT	BLE 2M	2402	Ant1	-3.064	8	Pass
NVNT	BLE 2M	2442	Ant1	-2.951	8	Pass
NVNT	BLE 2M	2480	Ant1	-3.732	8	Pass

#### PSD NVNT BLE 1M 2402MHz Ant1

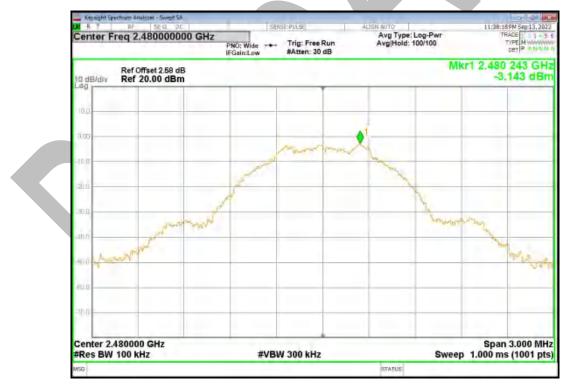


#### PSD NVNT BLE 1M 2442MHz Ant1





# PSD NVNT BLE 1M 2480MHz Ant1



#### PSD NVNT BLE 2M 2402MHz Ant1





# PSD NVNT BLE 2M 2442MHz Ant1



#### PSD NVNT BLE 2M 2480MHz Ant1



eynight Spectrum Analyzm - Swept SA	1 100		Statistics of the second		2
nter Freq 2.480000000 GHz	PNO: Wide	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 100/100	11:52:45 PM 5 TRACE TYPE DET	111156
Ref Offset 2,58 dB Ref 20.00 dBm			M	kr1 2.479 97 -3.73	6 GHz 2 dBm
		Aman			-
marin	- and the	Marrie C. Marriel	man manner to	malitic	
Andrea				Non	
and the second s	_				N. Sta
	-				_
nter 2.480000 GHz es BW 100 kHz	#VBW	/ 300 kHz	Swee	Span 3.0 p 1.000 ms (10	00 MHz 001 pts)
			STATUS		



#### **Band Edge**

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-48.75	-30	Pass
NVNT	BLE 1M	2480	Ant1	-44.09	-30	Pass
NVNT	BLE 2M	2402	Ant1	-49.3	-30	Pass
NVNT	BLE 2M	2480	Ant1	-47.56	-30	Pass



# Band Edge NVNT BLE 1M 2402MHz Ant1 Ref

Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



ent Spectrum Analyzer Swept 54 R T RF Ett 0 Ar	STREE WT	AUGHAUTS	07/49/39 PM Sep 23, 2022
nter Freq 2.356000000 GHz	PNO: Fast Trig: Free Run IFGain: Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 100/100	TYPE M H
Ref Offset 2.51 dB dB/div Ref 20.00 dBm			Mkr1 2.402 3 GHz -2.379 dBm
			A1-
			1
2			
			Q****
		a market and a state	P 03 111 1
	man and which and the second	and the second	and an and the second sec
art 2.30600 GHz es BW 100 kHz	#VBW 300 kHz	Swee	Stop 2.40600 GHz p 9.600 ms (1001 pts)
N     f     2.4023 G       N     f     2.4003 G       N     f     2.400 G       N     f     2.300 G       N     f     2.396 2 G	tz -39.978 dBm tz -55.686 dBm	Function worth	FUNCTION VALUE:
N f 2.380 G N f 2.380 G N f 2.386 2 G			
		STATUS	

# Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



### Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



illere Spectrum Analyzer Swept SA R T RF ED:0 at	THE REPORT	AUGHINTO Avg Type: Log-Pwr	09:56:01 PM Sep 23, 2022 18ACE
enter Freq 2.526000000 GH	PNG: Fast Trig: Free Run IFGain:Low #Atten: 30 dB		TYPE M MANUAL
Ref Offset 2.58 dB o dBidiv Ref 20.00 dBm			Mkr1 2.480 3 GHz -3.115 dBm
202			
			ा ज छह
00 1 12 1			
	and the state of the	Contraction of the last of the	and man presented
tart 2.47600 GHz Res BW 100 kHz	#VBW 300 kHz	Swee	Stop 2.57600 GHz 9.600 ms (1001 pts)
2 N f 2.4803 2 N f 2.4803	GHz -56.512 dBm	N FURCTION WOTH	UNCTION VALUE
3 N f 2,500 ( 4 N f 2,484 (			
67			
9			
2 N f 2483 3 N f 2500 6 7 2484 9 9 0			
a		STATUS	

# Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



### Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



10:09 12PM Sep 23, 2007	AUGHUNTS	SPREE INT	ET SWEPT SA	postrum Analy PF	gliene S R T
TRACE - 3 + 5 C TYPE M MANUAL DET	Avg Type: Log-Pwr Avg Hold: 100/100	Fast - Trig: Free Run mLow #Atten: 30 dB	56000000 GHz		
Mkr1 2.402 0 GHz -2.598 dBm			set 2.51 dB 0.00 dBm		0 dBk
<b>•</b>					4
A					
					1
(2nt-					
The second secon			A4		- 213
La Dente Martin	- Marine Marine		Y		- 20
					L
Stop 2.40600 GHz ep 9.600 ms (1001 pts)	Swee	#VBW 300 KHz		2.30600 G BW 100 ki	
FUNCTION WALVE	UNCTION WIDTH		2.402.0 GHz	11 THE 381	
		-2.598 dBm -37.298 dBm -58.595 dBm -52.001 dBm	2.402 0 GHz 2.400 0 GHz 2.390 0 GHz 2.321 8 GHz	11	NNNN 23466
					6 6 7 9 9 0
	STATUT				0

# Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



### Band Edge NVNT BLE 2M 2480MHz Ant1 Emission



gilent Sportnum Analyzer - Swept 5A	TREEDT	ACENIAUTO		10.00.14	PM Sep 23, 2022
Center Freq 2.526000000 GHz	NO: Fast - Trig: Free R Gain:Low #Atten: 30 d	Avg Type: Avg Hold:	Log-Pwr 100/100	18	ACE 3 3 4 5 6 VPE M HANNEL
Ref Offset 2.58 dB				Vikr1 2.41	30 0 GHz 134 dBm
					_
and W Which for my and the	- Howard and	Month	Maryaller	- lesteres	- Frenche
Start 2,47600 GHz Res BW 100 KHz	#VBW 300 kHz		Sweep	Stop 2.	57600 GHz (1001 pts)
XX     XX<	4.134 dBm -56.195 dBm -59.660 dBm -50.965 dBm	Tign   Flingfron width		NCTION WALUE	-
1) r		STATUS			



#### **Conducted RF Spurious Emission**

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-36.59	-30	Pass
NVNT	BLE 1M	2442	Ant1	-36.49	-30	Pass
NVNT	BLE 1M	2480	Ant1	-36.57	-30	Pass
NVNT	BLE 2M	2402	Ant1	-36.64	-30	Pass
NVNT	BLE 2M	2442	Ant1	-40.95	-30	Pass
NVNT	BLE 2M	2480	Ant1	-36.79	-30	Pass

### Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



07:51:34 PM Seg 23, 2022 18405 TYPE M M DET F	Avg Type: Log-Pwr Avg Hold: 12/12	Trig: Free Run #Atten: 30 dB	0: Fast	PN	m Andyzer Swept 5A PF 30.0 ar aq 13.26500000	RT
Mkr1 2.412 GHz -3.046 dBm		T			Ref Offset 2.51 dB Ref 20.00 dBm	Bław
					<b>•</b> <sup>1</sup>	
المسالية من المسالية الم			05	Q4	2ª	
Stop 26.50 GHz ep. 2.530 s (1001 pts)	Sugar	300 kHz	#1/21		Hz	art 30 N
	and the second se	FUNCTION IM IM IM IM	-3.046 -39.050 -39.050 -41.687 -56.071	2,412 GHz 4.795 GHz 4.795 GHz 7,203 GHz 9,480 GHz		
	STATUS					1

# Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Ref



#### Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Emission



Ref Offset 2.53 dB 3948 d 3 948 d 3 948 d 3 948 d	and a lot
	GHz dBm
	-++
nrt 30 MHz Stop 26.50 es BW 100 kHz #VBW 300 kHz Sweep 2.530 s (1001	
Incert file     St.     X     Function     Function within     Function within       N     f     2.439 GHz     -3.948 dBm     N     Function within     Function within       N     f     2.439 GHz     -39.388 dBm     N     Function within     Function within       N     f     4.874 GHz     -39.338 dBm     N     F     7.336 GHz     -44.523 dBm       N     f     7.336 GHz     -44.523 dBm     N     F     9.956 GHz     -56.089 dBm       N     f     9.956 GHz     -56.089 dBm     -56.089 dBm     -56.089 dBm	1
D 1 5 574 TUR	.*

# Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



#### Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



10/00-39PM Sep 23, 2022 18ACE 2 5 5 TYPE M W 55 00T P	AUGHINTO Avg Type: Log-Pwr Avg Hold: 12/12	Trig: Free Run #Atten: 30 dB		alyze: Swept 54   52 0 ar   13.265000000 GH	RF.	RT
Mkr1 2.492 GHz -4.362 dBm				Offset 2.58 dB / 20.00 dBm		de/
	_			•	1	
			<b>∆</b> 4	Q.		010 - 010 -
and the second second	Jan Martin Martine		lQ <sup>e</sup>	en las	enter	
Stop 26.50 GHz ep 2.530 s (1001 pts)	Sw	300 KHz	#VBV	kHz	80 MHz 3W 100 I	
UNCTION VALUE:	FUNCTION-WIDTH	Bm Bm Bm Bm	GHz -39.756 c GHz -39.756 c GHz -44.129 c	2,492 4,953 4,953 7,442 10,115		1234567990
	STATUE					11 50

# Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref

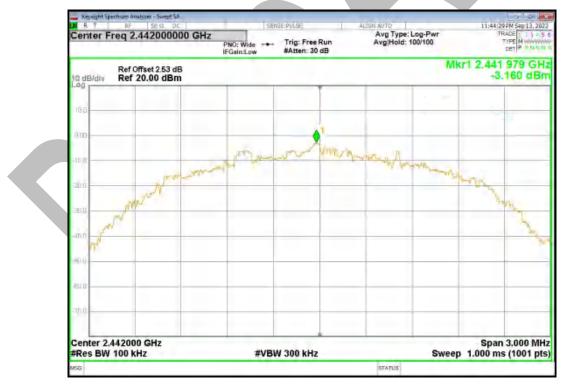


#### Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



	NO: Fast Trig: Free Run Sain: Luw #Atten: 30 dB	AUGHAUTO Avg Type: Log-Pwr Avg Hold: 12/12	10:18:34 PM Sep 23, 2022 TRACE TYPE M + 5 5 PUT F
Ref Offset 2.51 dB Bidev Ref 20.00 dBm			Mkr1 2.412 GHz -3.999 dBm
•			
Q3 Q4			a trap
- have	- land		
30 MHz BW 100 KHz	#VBW 300 kHz	Swee	Stop 26.50 GHz ep 2.530 s (1001 pts)
N f 2.412 GHz N f 7.203 GHz N f 7.203 GHz N f 4.795 GHz N f 7.203 GHz N f 9.718 GHz	-3.999 dBm -39.764 dBm -42.426 dBm -39.764 dBm -39.764 dBm -56.046 dBm	i fusënn wohi fi	NOTON VALUE
		STATUS	

# Tx. Spurious NVNT BLE 2M 2442MHz Ant1 Ref



#### Tx. Spurious NVNT BLE 2M 2442MHz Ant1 Emission



ht Spectrum Analyzer - Sunger SA	Traville 1	ALTER AUTO I	
Prior Freq 13.265000000 GHz	Trig: Free Run #Atten: 30 dB	Avg Type; Log-Pwr Avg Hold: 10/10	11;44:58 PM Sep 13, 2022 TRADE 1 3 + 5 6 TYPE M WARMAN DET P = 14 9/11
Ref Offset 2.53 dB Ref 20.00 dBm			Mkr4 7.336 GHz -46.691 dBm
	_		
× ×			
and and surprised and the second	minter more		
30 MHz BW 100 kHz #VBW	/ 300 kHz	Sw	Stop 26.50 GHz eep 2.530 s (1001 pts)
RE TRP     SGL     X     Y       f     2.439 GHz     -5.833 d     f       f     4.874 GHz     -44.990 d     f       f     4.874 GHz     -44.990 d     f       f     4.874 GHz     -44.990 d     f       f     9.874 GHz     -44.990 d     f       f     9.876 GHz     -54.583 d     f       f     9.692 GHz     -54.559 d     -54.559 d	Bm Bm Bm Bm	Menowind R	FUNCTION WANTE
	- F.	STATUE	

# Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



#### Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission







# **APPENDIX A: PHOTOGRAPHS OF TEST SETUP**



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# APPENDIX B: PHOTOGRAPHS OF EUT

Reference to the test report No. Attachment internal and external photos

## ----END OF REPORT----

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