

TEST REPORT

Product Name : Bluetooth module
Brand Mark : ABLUE TECH
Model No. : PTR9611
FCC ID : 2AWMN-PTR9611
Report Number : BLA-EMC-202006-A3501
Date of Sample Receipt : 2020/6/15
Date of Test : 2020/6/15 to 2020/7/6
Date of Issue : 2020/7/6
Test Standard : 47 CFR Part 15, Subpart C 15.247
Test Result : Pass

Prepared for:

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Room703 of Block WanHai Building B, 1031 South Sea Avenue, Nanshan
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Prepared by:

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Date:

2020/7/6



REPORT REVISE RECORD

Version No.	Date	Description
00	2020/7/6	Original

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TABLE OF CONTENTS

1	TEST SUMMARY	6
2	GENERAL INFORMATION	7
3	GENERAL DESCRIPTION OF E.U.T.	7
4	TEST ENVIRONMENT	8
5	TEST MODE	8
6	MEASUREMENT UNCERTAINTY	8
7	DESCRIPTION OF SUPPORT UNIT.....	9
8	LABORATORY LOCATION.....	9
9	TEST INSTRUMENTS LIST	10
1	CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ).....	13
1.1	LIMITS	13
1.2	BLOCK DIAGRAM OF TEST SETUP	13
1.3	PROCEDURE	14
1.4	TEST DATA	15
2	CONDUCTED BAND EDGES MEASUREMENT.....	17
2.1	LIMITS	17
2.2	BLOCK DIAGRAM OF TEST SETUP	17
2.3	TEST DATA	18
3	RADIATED SPURIOUS EMISSIONS.....	19
3.1	LIMITS	19
3.2	BLOCK DIAGRAM OF TEST SETUP	20
3.3	PROCEDURE	20
3.4	TEST DATA	22
4	RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS.....	27
4.1	LIMITS	27
4.2	BLOCK DIAGRAM OF TEST SETUP	28
4.3	PROCEDURE	28
4.4	TEST DATA	30
5	CONDUCTED SPURIOUS EMISSIONS	31
5.1	LIMITS	31

5.2	BLOCK DIAGRAM OF TEST SETUP	31
5.3	TEST DATA	32
6	POWER SPECTRUM DENSITY.....	33
6.1	LIMITS	33
6.2	BLOCK DIAGRAM OF TEST SETUP	33
6.3	TEST DATA	33
7	CONDUCTED PEAK OUTPUT POWER	34
7.1	LIMITS	34
7.2	BLOCK DIAGRAM OF TEST SETUP	34
7.3	TEST DATA	35
8	MINIMUM 6DB BANDWIDTH	36
8.1	LIMITS	36
8.2	BLOCK DIAGRAM OF TEST SETUP	36
8.3	TEST DATA	36
9	ANTENNA REQUIREMENT	37
9.1	CONCLUSION	37
10	APPENDIX.....	38
10.1	APPENDIX: DTS BANDWIDTH.....	38
	Test Result.....	38
	Test Graphs.....	38
10.2	APPENDIX : OCCUPIED CHANNEL BANDWIDTH.....	40
	Test Result.....	40
	Test Graphs.....	40
10.3	APPENDIX : MAXIMUM CONDUCTED OUTPUT POWER	42
	Test Result.....	42
	Test Graphs.....	42
10.4	APPENDIX : MAXIMUM POWER SPECTRAL DENSITY	44
	Test Result.....	44
	Test Graphs.....	44
10.5	APPENDIX : BAND EDGE MEASUREMENTS	46
	Test Result.....	46
	Test Graphs.....	46
10.6	APPENDIX : CONDUCTED SPURIOUS EMISSION.....	47
	Test Result.....	47

Test Graphs	48
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	51
APPENDIX B: PHOTOGRAPHS OF EUT	53

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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	SHENZHEN CHUANGHONGXIN INTELLIGENT TECHNOLOGY CO.,LTD
Address	Room703 of Block WanHai Building B, 1031 South Sea Avenue, Nanshan district, Shenzhen, China
Manufacturer	SHENZHEN CHUANGHONGXIN INTELLIGENT TECHNOLOGY CO.,LTD
Address	Room703 of Block WanHai Building B, 1031 South Sea Avenue, Nanshan district, Shenzhen, China
Factory	N/A
Address	N/A
Product Name	Bluetooth module
Test Model No.	PTR9611

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	N/A
Software Version	N/A
Operation Frequency:	2402~2480MHz
Modulation Type:	GFSK
Channel Spacing:	2MHz
Number of Channels:	40
Antenna Type:	PCB Antenna
Antenna Gain:	0 dBi (Provided by the customer)

4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25℃	DC3.3V

5 TEST MODE

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

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission	±4.34dB
Radiated Emission	±4.24dB
Radiated Emission	±4.68dB
AC Power Line Conducted Emission	±3.45dB

Parameter	Expanded Uncertainty (Confidence of 95%)
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %
Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Radiated Emission (1GHz ~ 18GHz)	±4.44 dB

7 DESCRIPTION OF SUPPORT UNIT

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

8 LABORATORY LOCATION

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, 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	6/10/2018	6/9/2021
Receiver	R&S	ESPI3	101082	4/20/2020	4/19/2021
LISN	R&S	ENV216	3560.6550.15	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
LISN	AT	AT166-2	AKK1806000003	12/17/2019	12/16/2020
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	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of Radiated Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2020
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2020

Amplifier	SKET	LNPA-0118-45	N/A	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2022
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Radiated Emissions which fall in the restricted bands

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2020
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2020
Amplifier	SKET	LNPA-0118-45	N/A	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2022
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Conducted Spurious Emissions

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
				7/4/2020	7/3/2021

Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of Power Spectrum Density

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of Conducted Peak Output Power

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of Minimum 6dB Bandwidth

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
				7/4/2020	7/3/2021
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

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

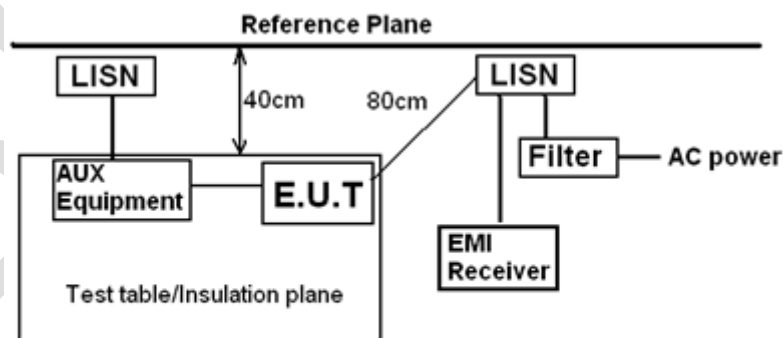
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Ben
Temperature	25℃
Humidity	60%

1.1 LIMITS

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

*Decreases with the logarithm of the frequency.

1.2 BLOCK DIAGRAM OF TEST SETUP



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

1.3 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/50 μ H + 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

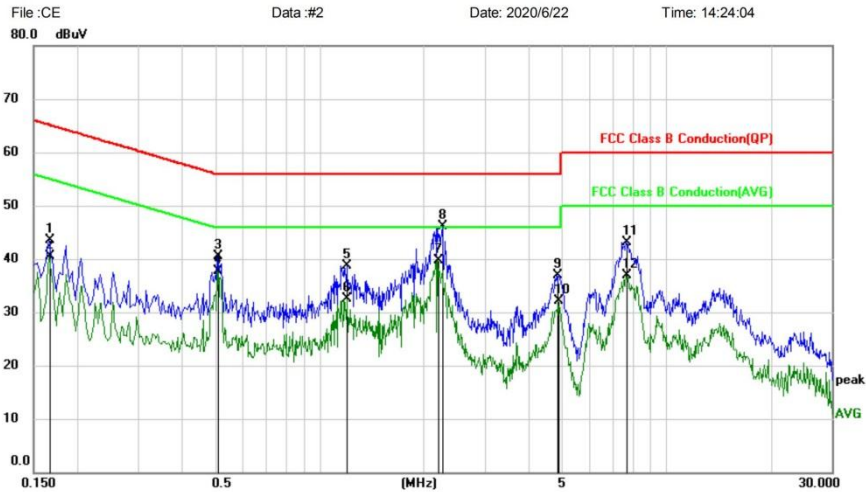
1.4 TEST DATA

[TestMode: TX]; [Line: Line]



Company: Qianhai BlueAsia of Technical Services(Shenzhen) Co., Ltd.
Address: 深圳市龙岗区坂田街道布龙路448号BlueAsia物联网测试中心
Tel: +86-755-28682673 or +86-755-23059481

Conducted Emission Measurement



Site: Phase: **L1** Temperature: 26
Limit: FCC Class B Conduction(QP) Power: AC120V/60Hz Humidity: 60 %
EUT: Bluetooth module
M/N: PTR9611
Mode: BLE
Note:

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1660	33.64	9.87	43.51	65.16	-21.65	QP	
2	0.1660	30.64	9.87	40.51	55.16	-14.65	AVG	
3	0.5100	30.70	9.72	40.42	56.00	-15.58	QP	
4	0.5100	27.93	9.72	37.65	46.00	-8.35	AVG	
5	1.1980	28.85	9.83	38.68	56.00	-17.32	QP	
6	1.1980	22.65	9.83	32.48	46.00	-13.52	AVG	
7 *	2.1900	29.90	9.86	39.76	46.00	-6.24	AVG	
8	2.2620	36.23	9.86	46.09	56.00	-9.91	QP	
9	4.8339	27.05	9.90	36.95	56.00	-19.05	QP	
10	4.8819	22.23	9.90	32.13	46.00	-13.87	AVG	
11	7.6700	33.34	9.86	43.20	60.00	-16.80	QP	
12	7.6700	27.04	9.86	36.90	50.00	-13.10	AVG	

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

(Reference Only)

File : CE\Data : #2

Page: 1

Engineer Signature:

Test Result: Pass

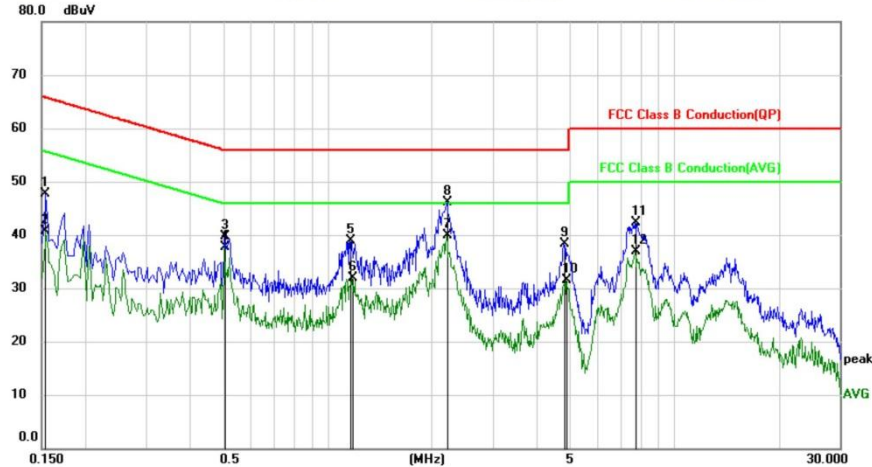
[TestMode: TX]; [Line: Nutral]



Company: Qianhai BlueAsia of Technical Services (Shenzhen) Co., Ltd.
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Tel: +86-755-28682673 or +86-755-23059481

Conducted Emission Measurement

File: CE Data: #1 Date: 2020/6/22 Time: 14:14:35



Site: Phase: **N** Temperature: 26
Limit: FCC Class B Conduction (QP) Power: AC120V/60Hz Humidity: 60 %
EUT: Bluetooth module
M/N: PTR9611
Mode: BLE
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBμV	dB	dBμV	dBμV	dB		
1		0.1539	37.90	9.88	47.78	65.79	-18.01	QP	
2		0.1539	30.77	9.88	40.65	55.79	-15.14	AVG	
3		0.5060	30.01	9.72	39.73	56.00	-16.27	QP	
4		0.5060	27.94	9.72	37.66	46.00	-8.34	AVG	
5		1.1620	29.12	9.82	38.94	56.00	-17.06	QP	
6		1.1820	22.10	9.83	31.93	46.00	-14.07	AVG	
7	*	2.2100	30.00	9.86	39.86	46.00	-6.14	AVG	
8		2.2139	36.23	9.86	46.09	56.00	-9.91	QP	
9		4.7979	28.41	9.90	38.31	56.00	-17.69	QP	
10		4.8778	21.59	9.90	31.49	46.00	-14.51	AVG	
11		7.6900	32.42	9.86	42.28	60.00	-17.72	QP	
12		7.6900	27.01	9.86	36.87	50.00	-13.13	AVG	

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

(Reference Only)

File: CE\Data: #1

Page: 1

Engineer Signature:

Test Result: Pass

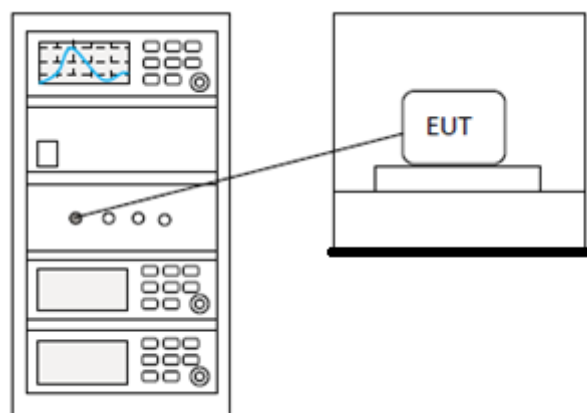
2 CONDUCTED BAND EDGES MEASUREMENT

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	Ben
Temperature	25°C
Humidity	60%

2.1 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)).
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2.2 BLOCK DIAGRAM OF TEST SETUP



2.3 TEST DATA

Pass: Please Refer To Appendix: For Details

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3 RADIATED SPURIOUS EMISSIONS

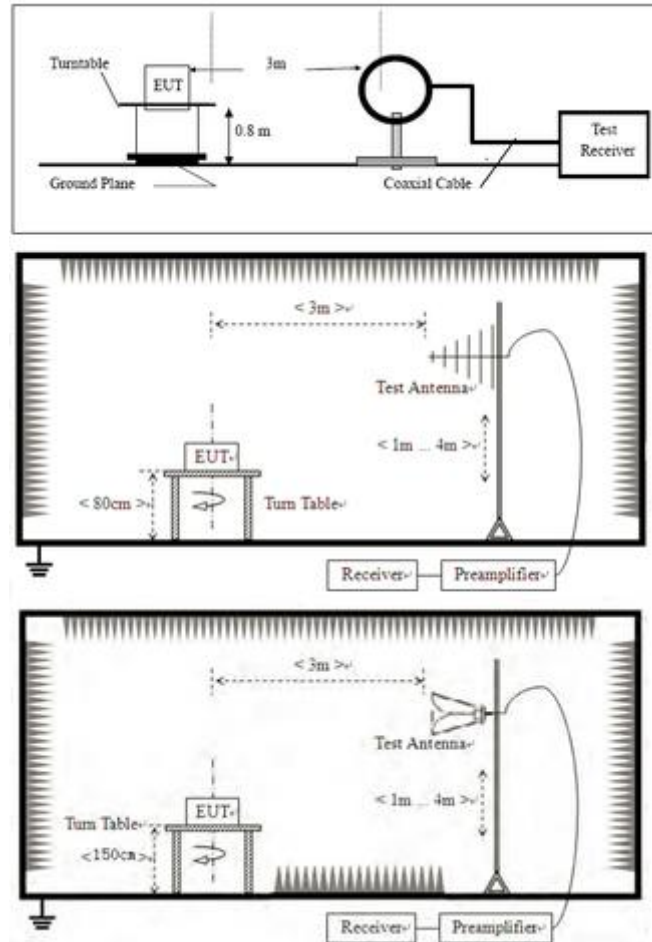
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Ben
Temperature	25℃
Humidity	60%

3.1 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.

3.2 BLOCK DIAGRAM OF TEST SETUP



3.3 PROCEDURE

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

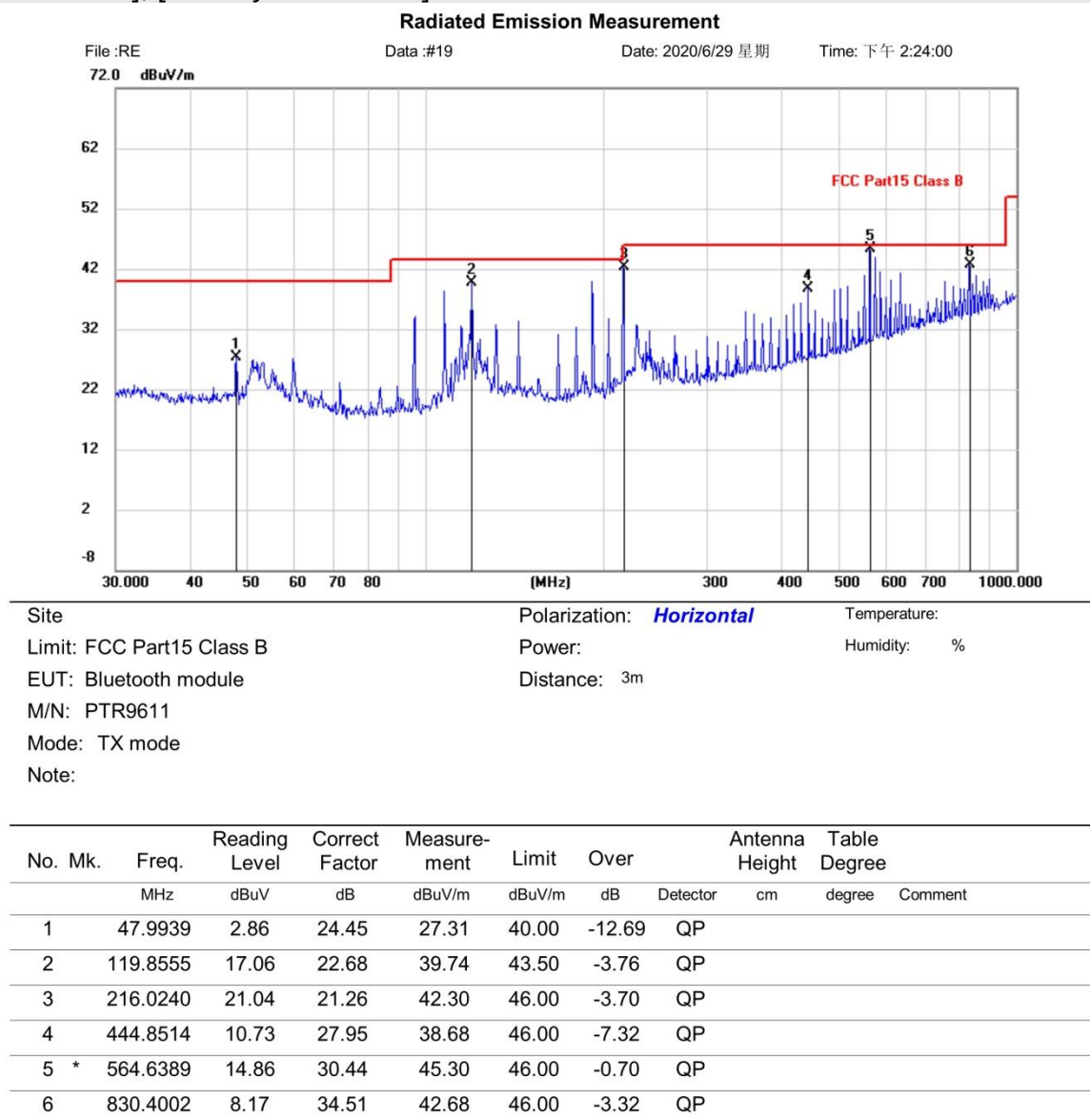
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was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

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz 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.
- 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.

3.4 TEST DATA

[TestMode: TX]; [Polarity: Horizontal]



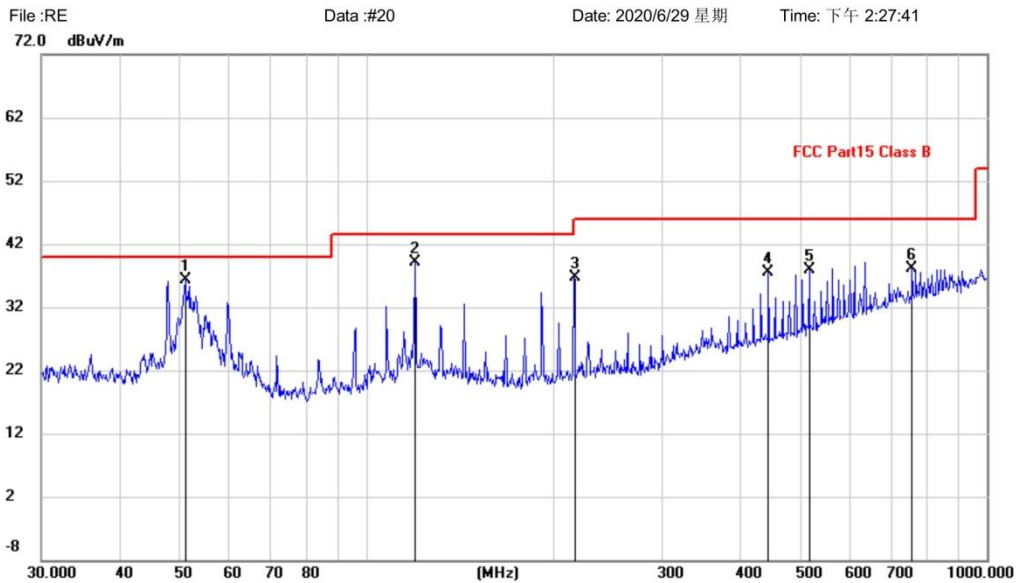
*:Maximum data x:Over limit !:over margin

⟨Reference Only

Test Result: Pass

[TestMode: TX]; [Polarity: Vertical]

Radiated Emission Measurement



Site Polarization: **Vertical** Temperature:
Limit: FCC Part15 Class B Power: Humidity: %
EUT: Bluetooth module Distance: 3m
M/N: PTR9611
Mode: TX mode
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	51.1209	11.84	24.37	36.21	40.00	-3.79	QP		
2		119.8556	16.49	22.68	39.17	43.50	-4.33	QP		
3		216.0240	15.54	21.26	36.80	46.00	-9.20	QP		
4		444.8514	9.58	27.95	37.53	46.00	-8.47	QP		
5		517.2480	8.52	29.40	37.92	46.00	-8.08	QP		
6		758.0408	4.38	33.64	38.02	46.00	-7.98	QP		

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

〈Reference Only

Test Result: Pass

[Test Mode: TX]						
Test channel:lowest						
Peak value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	59.71	2.38	62.09	74	-11.91	Vertical
7206.00	52.94	2.17	55.11	74	-18.89	Vertical
9608.00	53.84	2.06	55.90	74	-18.10	Vertical
12010.00				74		Vertical
14412.00				74		Vertical
4804.00	55.36	2.38	57.74	74	-16.26	Horizontal
7206.00	54.98	2.17	57.15	74	-16.85	Horizontal
9608.00	50.65	2.06	52.71	74	-21.29	Horizontal
12010.00				74		Horizontal
14412.00				74		Horizontal
Average value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	38.82	2.38	41.20	54	-12.80	Vertical
7206.00	33.39	2.17	35.56	54	-18.44	Vertical
9608.00	28.73	2.06	30.79	54	-23.21	Vertical
12010.00	*			54		Vertical
14412.00	*			54		Vertical
4804.00	35.58	2.38	37.96	54	-16.04	Horizontal
7206.00	32.04	2.17	34.21	54	-19.79	Horizontal
9608.00	37.98	2.06	40.04	54	-13.96	Horizontal
12010.00	*			54		Horizontal
14412.00	*			54		Horizontal

Test channel: Middle						
Peak value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	59.69	0.17	59.86	74	-14.14	Vertical
7323.00	54.66	1.43	56.09	74	-17.91	Vertical
9764.00	54.31	1.26	55.57	74	-18.43	Vertical
12205.00	*			74		Vertical
14646.00	*			74		Vertical
4882.00	62.88	0.17	63.05	74	-10.95	Horizontal
7323.00	60.43	1.43	61.86	74	-12.14	Horizontal
9764.00	52.03	1.26	53.29	74	-20.71	Horizontal
12205.00	*			74		Horizontal
14646.00	*			74		Horizontal
Average value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	39.92	0.17	40.09	54	-13.91	Vertical
7323.00	44.47	1.43	45.90	54	-8.10	Vertical
9764.00	28.62	1.26	29.88	54	-24.12	Vertical
12205.00	*			54		Vertical
14646.00	*			54		Vertical
4882.00	46.96	0.17	47.13	54	-6.87	Horizontal
7323.00	34.68	1.43	36.11	54	-17.89	Horizontal
9764.00	28.77	1.26	30.03	54	-23.97	Horizontal
12205.00	*			54		Horizontal
14646.00	*			54		Horizontal

Test channel: Highest						
Peak value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	61.30	1.04	62.34	74	-11.66	Vertical
7440.00	52.12	2.59	54.71	74	-19.29	Vertical
9920.00	50.42	2.74	53.16	74	-20.84	Vertical
12400.00	*			74		Vertical
14880.00	*			74		Vertical
4960.00	66.35	1.04	67.39	74	-6.61	Horizontal
7440.00	61.08	2.59	63.67	74	-10.33	Horizontal
9920.00	59.65	2.74	62.39	74	-11.61	Horizontal
12400.00	*			74		Horizontal
14880.00	*			74		Horizontal
Average value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	41.97	1.04	43.01	54	-10.99	Vertical
7440.00	42.14	2.59	44.73	54	-9.27	Vertical
9920.00	26.58	2.74	29.32	54	-24.68	Vertical
12400.00	*			54		Vertical
14880.00	*			54		Vertical
4960.00	46.08	1.04	47.12	54	-6.88	Horizontal
7440.00	35.19	2.59	37.78	54	-16.22	Horizontal
9920.00	39.31	2.74	42.05	54	-11.95	Horizontal
12400.00	*			54		Horizontal
14880.00	*			54		Horizontal
Test Result: Pass						

4 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

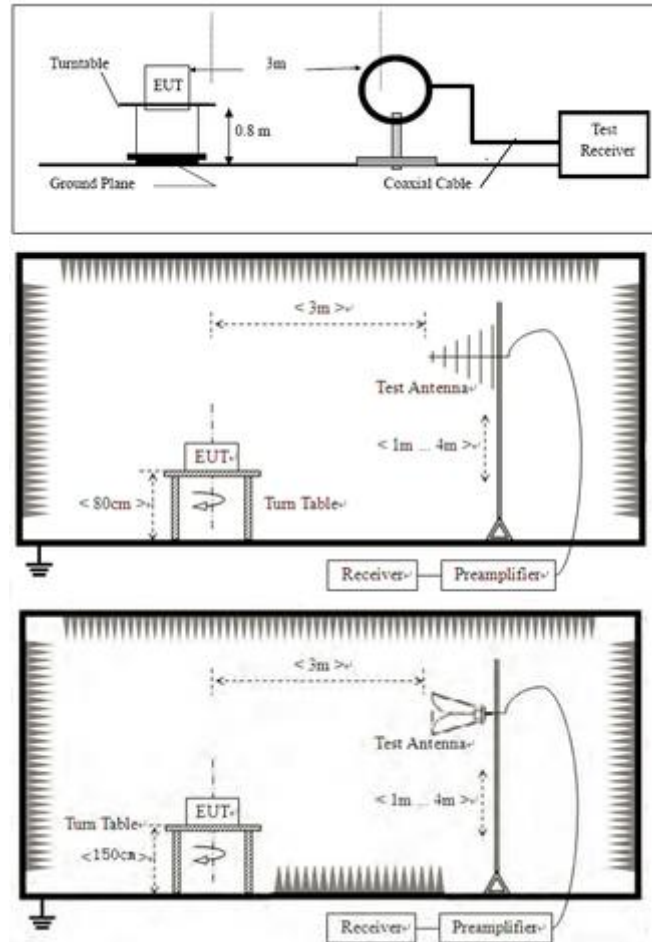
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.10.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Ben
Temperature	25°C
Humidity	60%

4.1 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.

4.2 BLOCK DIAGRAM OF TEST SETUP



4.3 PROCEDURE

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

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

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

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.

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4.4 TEST DATA

[TestMode: TX]						
Test channel:lowest						
Peak value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	44.19	-4.2	39.99	74	-34.01	Horizontal
2390	46.02	-3.88	42.14	74	-31.86	Horizontal
2310	46.17	-4.49	41.68	74	-32.32	Vertical
2390	50.75	-4.21	46.54	74	-27.46	Vertical
Average value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor(dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	31.63	-4.2	27.43	54	-26.57	Horizontal
2390	32.38	-3.88	28.5	54	-25.5	Horizontal
2310	32.35	-4.49	27.86	54	-26.14	Vertical
2390	32.84	-4.21	28.63	54	-25.37	Vertical
Test channel:Highest						
Peak value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	50.77	-3.39	47.38	74	-26.62	Horizontal
2500	46.39	-3.3	43.09	74	-30.91	Horizontal
2483.5	53.78	-3.78	50	74	-24	Vertical
2500	44.77	-3.7	41.07	74	-32.93	Vertical
Average value:						
Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	32.01	-3.39	28.62	54	-25.38	Horizontal
2500	31.32	-3.3	28.02	54	-25.98	Horizontal
2483.5	33.15	-3.78	29.37	54	-24.63	Vertical
2500	31.66	-3.7	27.96	54	-26.04	Vertical
Test Result: Pass						

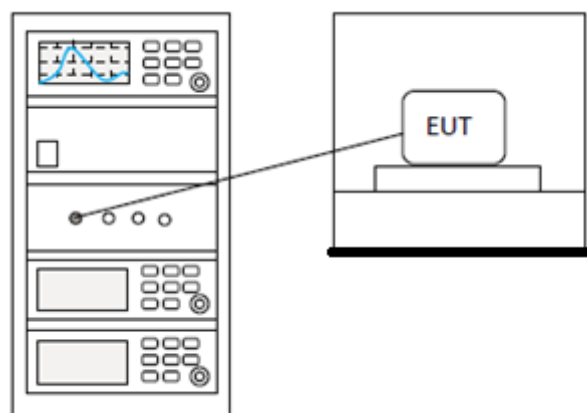
5 CONDUCTED SPURIOUS EMISSIONS

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	Ben
Temperature	25°C
Humidity	60%

5.1 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)).
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5.2 BLOCK DIAGRAM OF TEST SETUP



5.3 TEST DATA

Pass: Please Refer To Appendix: For Details

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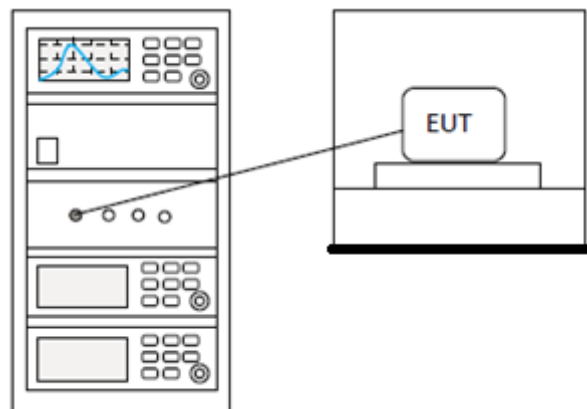
6 POWER SPECTRUM DENSITY

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

6.1 LIMITS

Limit:	$\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission
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6.2 BLOCK DIAGRAM OF TEST SETUP



6.3 TEST DATA

Pass: Please Refer To Appendix: For Details

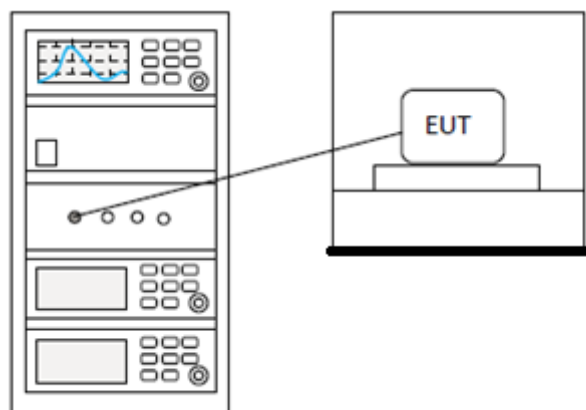
7 CONDUCTED PEAK OUTPUT POWER

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	Ben
Temperature	25°C
Humidity	60%

7.1 LIMITS

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

7.2 BLOCK DIAGRAM OF TEST SETUP



7.3 TEST DATA

Pass: Please Refer To Appendix: For Details

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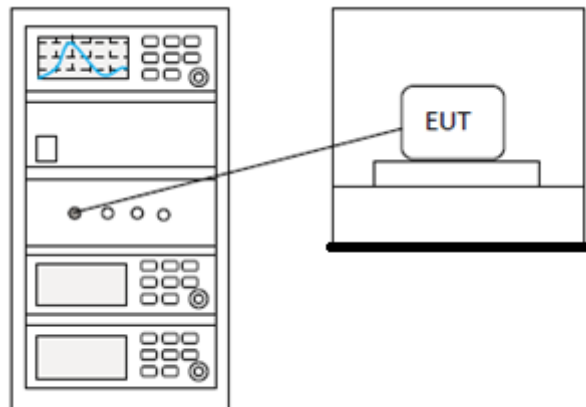
8 MINIMUM 6DB BANDWIDTH

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

8.1 LIMITS

Limit:	≥ 500 kHz
--------	----------------

8.2 BLOCK DIAGRAM OF TEST SETUP



8.3 TEST DATA

Pass: Please Refer To Appendix: For Details

9 ANTENNA REQUIREMENT

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

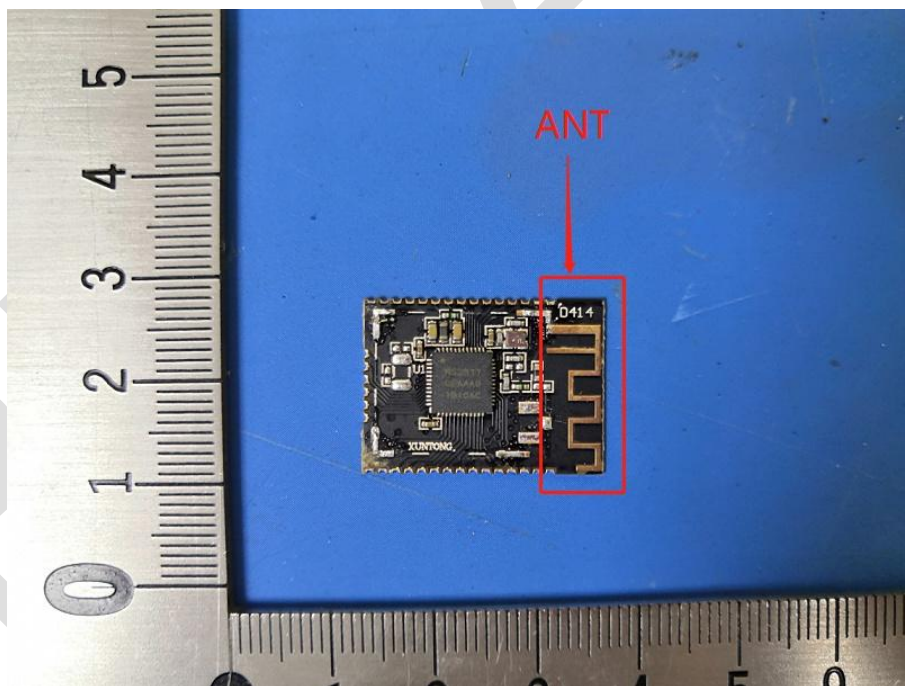
9.1 CONCLUSION

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 an 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.



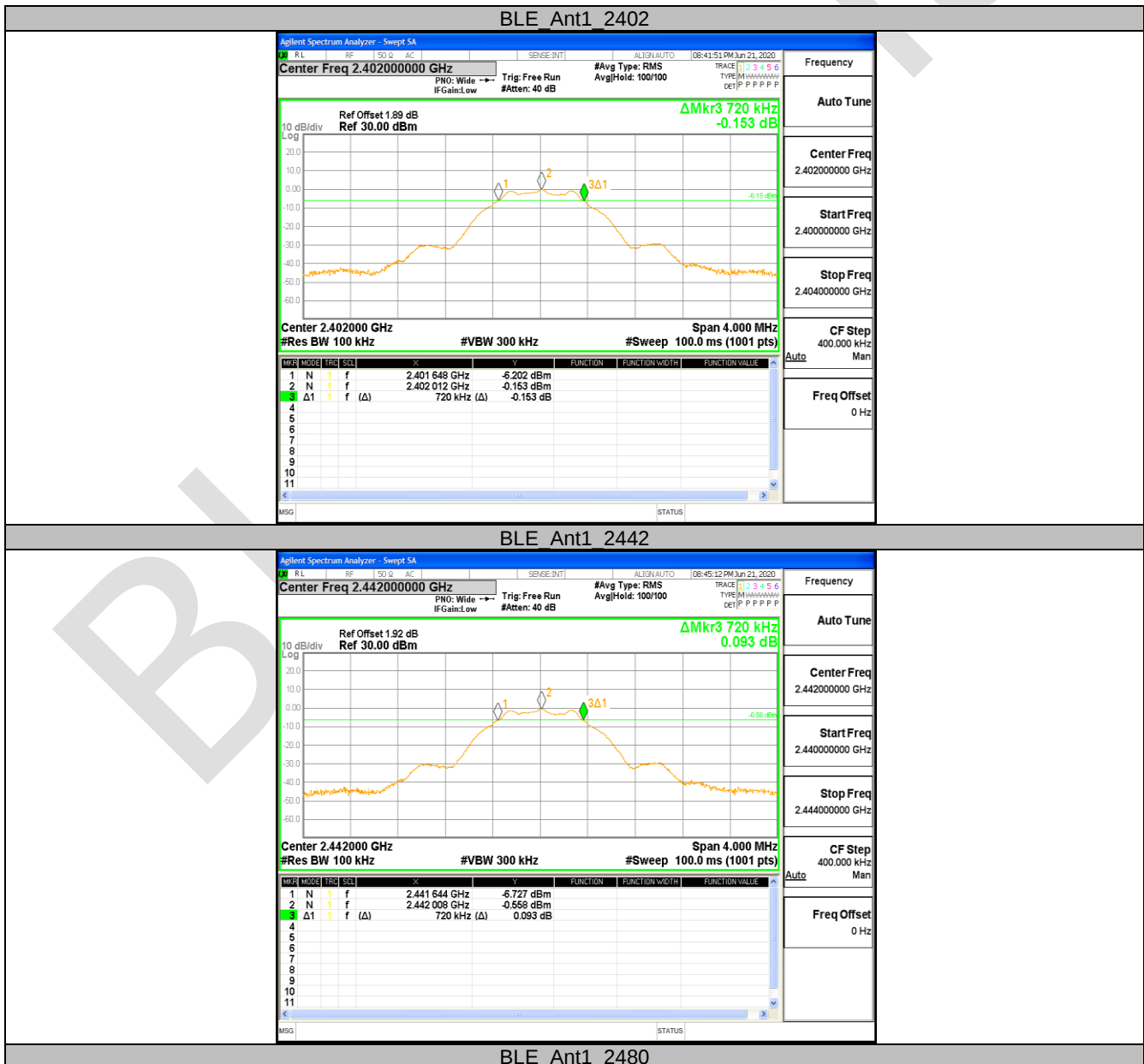
10 APPENDIX

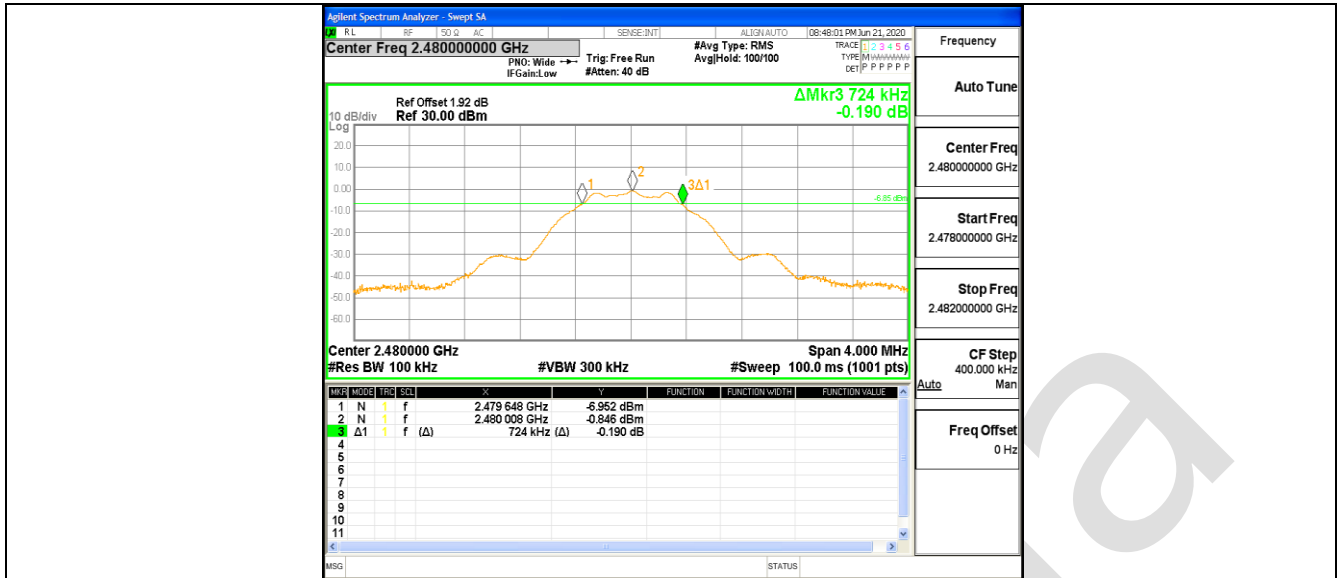
10.1 APPENDIX: DTS BANDWIDTH

Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	0.720	2401.648	2402.368	≥ 0.5	PASS
		2442	0.720	2441.644	2442.364	≥ 0.5	PASS
		2480	0.724	2479.648	2480.372	≥ 0.5	PASS

Test Graphs





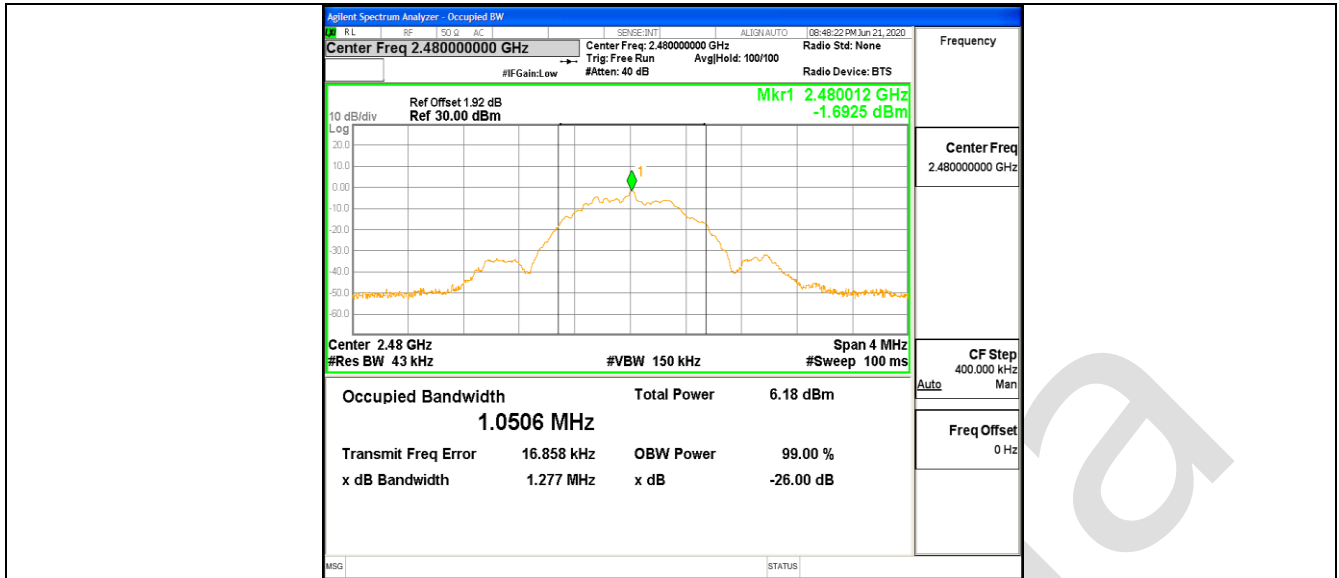
10.2 APPENDIX: OCCUPIED CHANNEL BANDWIDTH

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	1.0473	2401.494	2402.541	---	PASS
		2442	1.0490	2441.492	2442.541	---	PASS
		2480	1.0506	2479.492	2480.542	---	PASS

Test Graphs





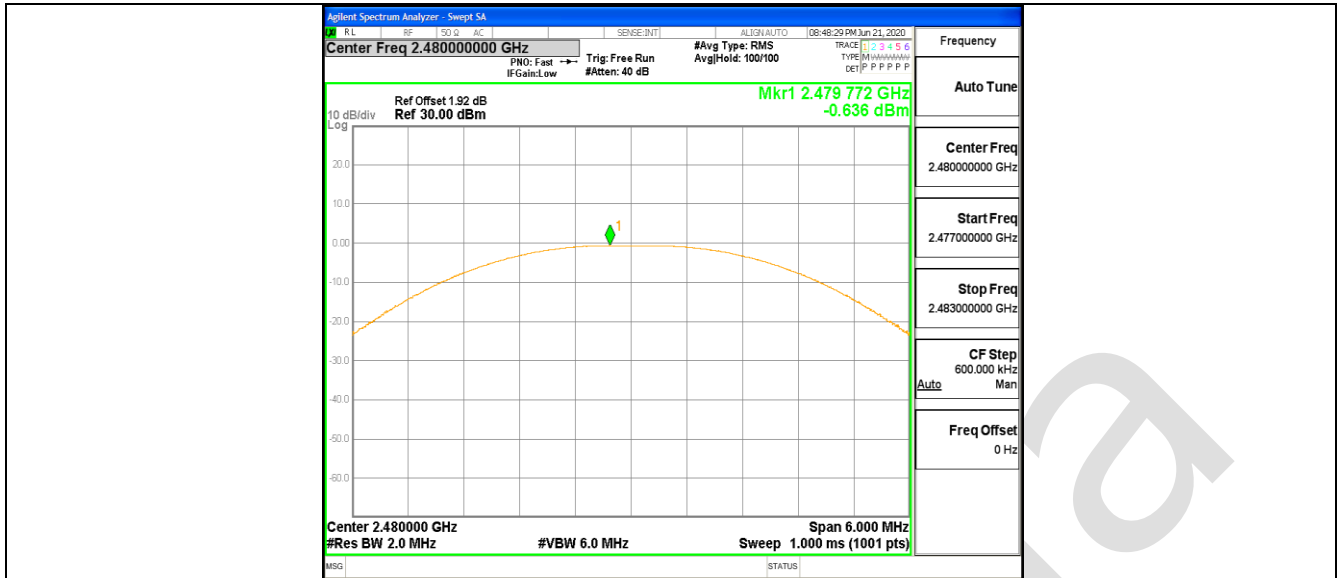
10.3 APPENDIX: MAXIMUM CONDUCTED OUTPUT POWER

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	0.015	<=30	PASS
		2442	-0.343	<=30	PASS
		2480	-0.636	<=30	PASS

Test Graphs



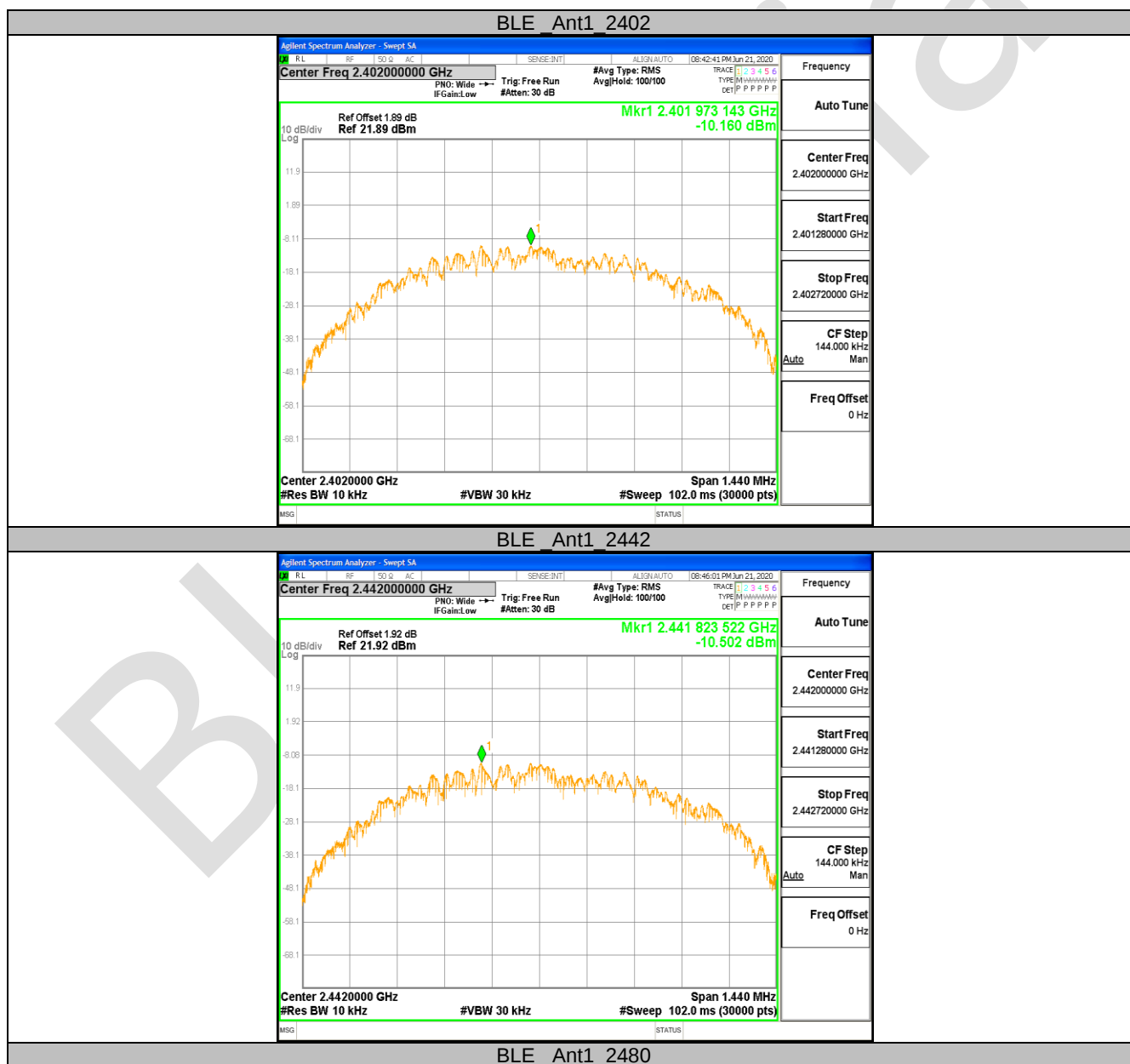


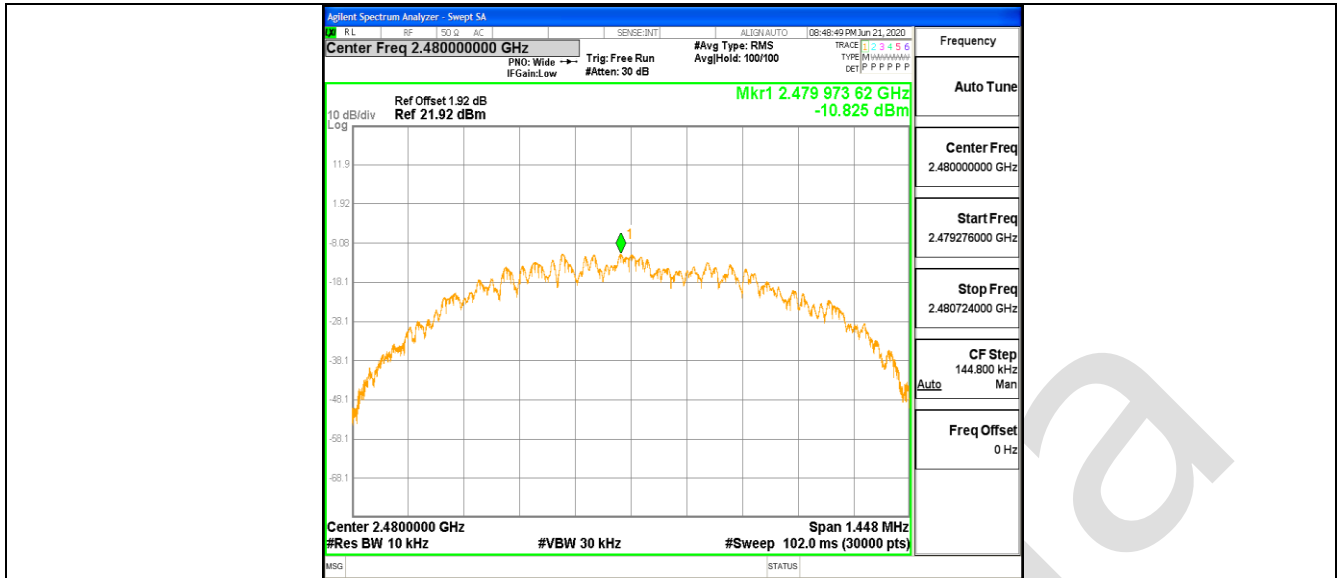
10.4 APPENDIX: MAXIMUM POWER SPECTRAL DENSITY

Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE	Ant1	2402	-10.16	<=8	PASS
		2442	-10.50	<=8	PASS
		2480	-10.83	<=8	PASS

Test Graphs





10.5 APPENDIX: BAND EDGE MEASUREMENTS

Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	Low	2402	-0.19	-54.12	<=-20.19	PASS
		High	2480	-0.81	-55.03	<=-20.81	PASS

Test Graphs



10.6 APPENDIX: CONDUCTED SPURIOUS EMISSION

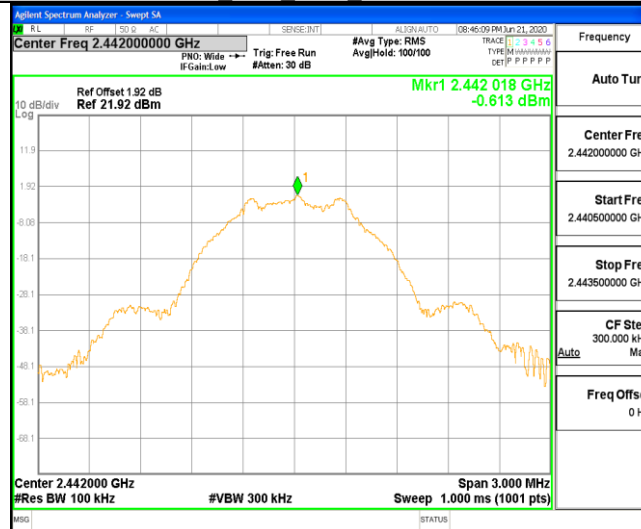
Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	Reference	-0.17	-0.17	---	PASS
			30~1000	30~1000	-64.747	<=-20.173	PASS
			1000~26500	1000~26500	-50.366	<=-20.173	PASS
		2442	Reference	-0.61	-0.61	---	PASS
			30~1000	30~1000	-64.311	<=-20.613	PASS
			1000~26500	1000~26500	-49.593	<=-20.613	PASS
		2480	Reference	-1.66	-1.66	---	PASS
			30~1000	30~1000	-63.882	<=-21.659	PASS
			1000~26500	1000~26500	-50.069	<=-21.659	PASS

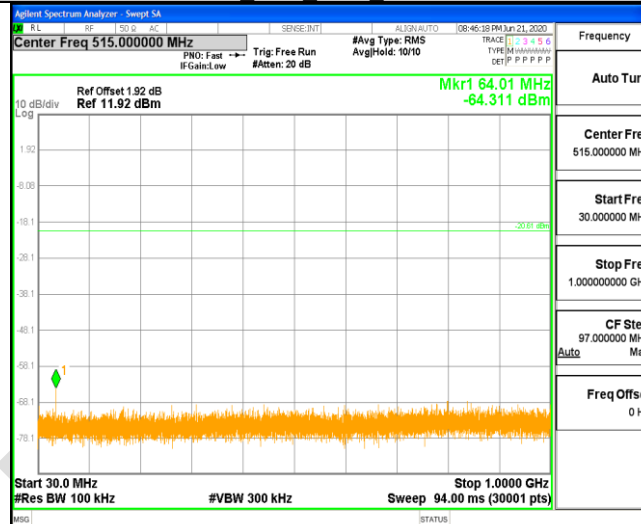
Test Graphs



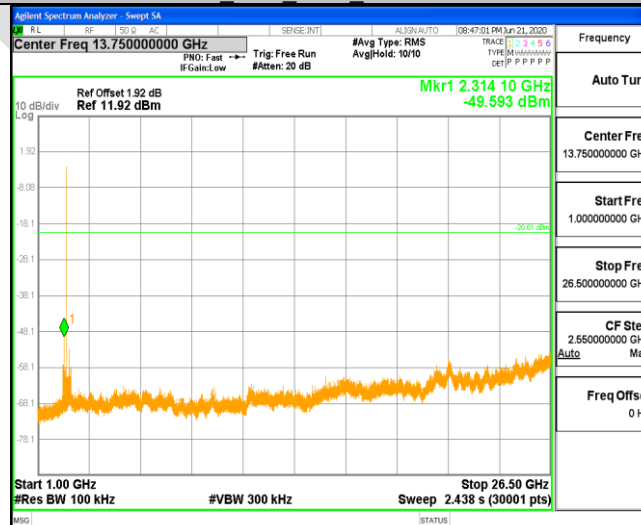
BLE Ant1 2442 0~Reference



BLE Ant1 2442 30~1000



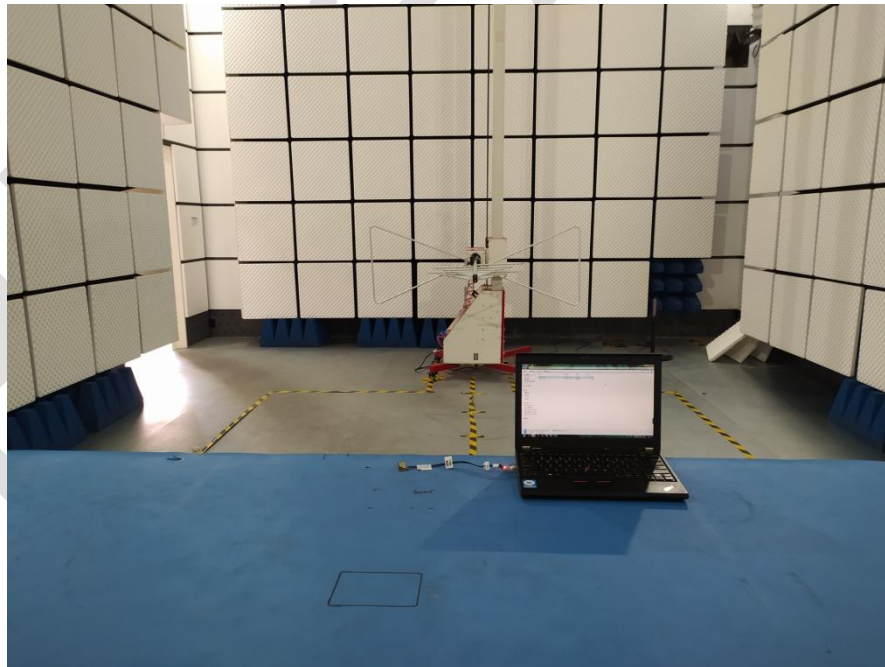
BLE Ant1 2442 1000~26500





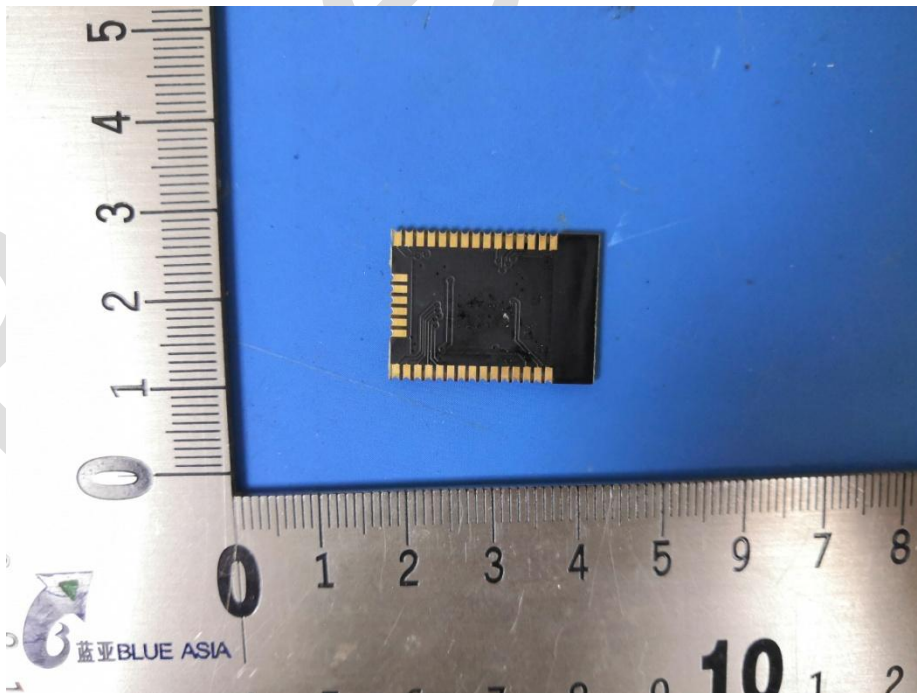
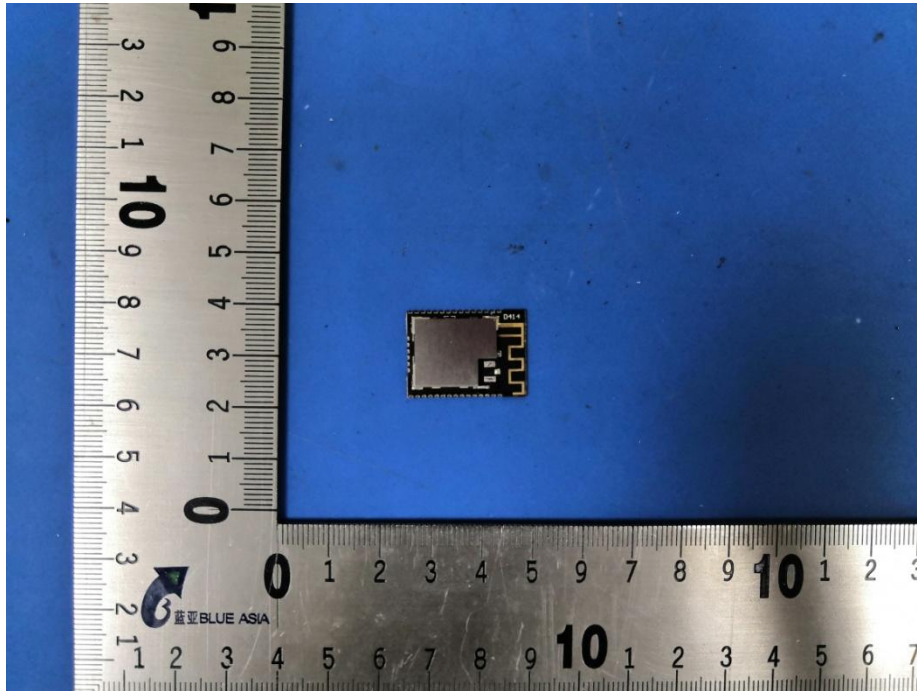
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

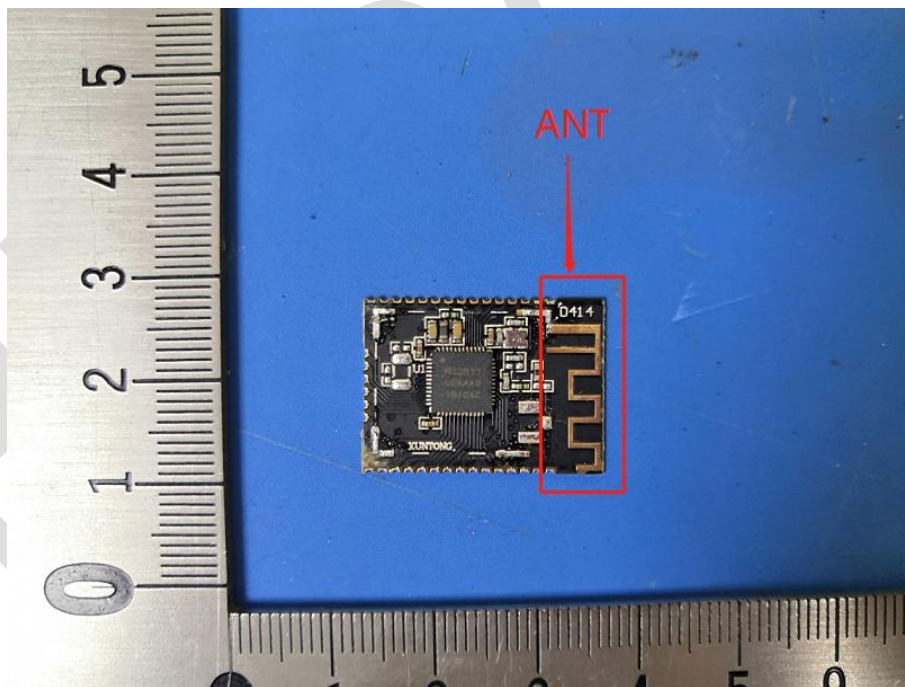
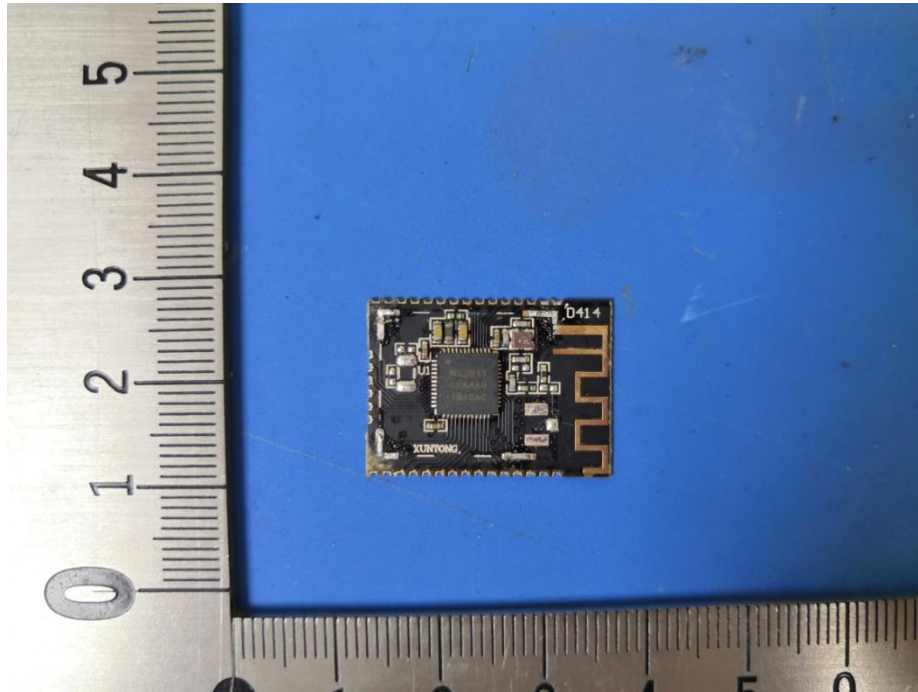
Radiated Spurious Emissions



Conducted Emissions at AC Power Line (150kHz-30MHz)



APPENDIX B: PHOTOGRAPHS OF EUT



----END OF REPORT----

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of BlueAsia, this report can't be reproduced except in full.

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