

TEST REPORT

Product Name : Wireless Mouse
Brand Mark : TeckNet or TECKNET
Model No. : EWM01004
FCC ID : 2AK8Q-EWM010041
Report Number : BLA-EMC-202011-A10802
Date of Sample Receipt : 2020/11/30
Date of Test : 2020/11/30 to 2020/12/21
Date of Issue : 2020/12/25
Test Standard : 47 CFR Part 15, Subpart C 15.247
Test Result : Pass

Prepared for:

Shenzhen Unichain Technology Co., Ltd

**201, 2nd Floor, Building C, Shanhai Commercial Plaza, Huangjunshan District,
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Prepared by:

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Date:

2020/12/25



REPORT REVISE RECORD

Version No.	Date	Description
00	2020/12/25	Original

BlueAsia

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1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
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
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
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
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
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

2 GENERAL INFORMATION

Applicant	Shenzhen Unichain Technology Co., Ltd
Address	201, 2nd Floor, Building C, Shanhai Commercial Plaza, Huangjunshan District, Bantian Street, Longgang District, Shenzhen, China
Manufacturer	Dongguan Newmen Electronics Technology Co., Ltd.
Address	No.5, Xifa Road, Lin Village, Tangxia Town, Dongguan City, Guangdong Province, P. R. China
Factory	N/A
Address	N/A
Product Name	Wireless Mouse
Test Model No.	EWM01004

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	V1.0
Software Version	V3.0
Operation Frequency:	2402MHz-2480MHz
Modulation Type:	GFSK
Channel Spacing:	2MHz
Number of Channels:	40
Antenna Type:	Chip Antenna
Antenna Gain:	2dBi(Provided by the customer)

4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	DC3.0V

5 TEST MODE

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

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30MHz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±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
AC Adapter	UGREEN	CD112	N/A	N/A
PC	HASEE	K610D	--	--

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 Band Edges Measurement					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
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	7/1/2020	6/30/2021
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 Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/1/2020	6/30/2021
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	7/1/2020	6/30/2021
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	7/1/2020	6/30/2021
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 Antenna Requirement

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
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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	7/1/2020	6/30/2021
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2021
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2021
Amplifier	SKET	PA-000318G-45	N/A	7/1/2020	6/30/2021

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	7/1/2020	6/30/2021
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2021
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2021
Amplifier	SKET	PA-000318G-45	N/A	7/1/2020	6/30/2021
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

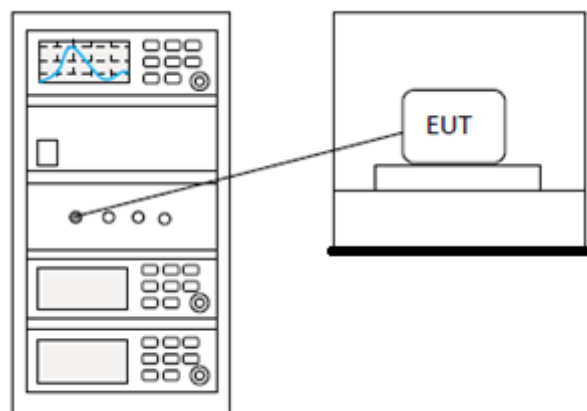
1 CONDUCTED BAND EDGES MEASUREMENT

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%

1.1 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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1.2 BLOCK DIAGRAM OF TEST SETUP



1.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

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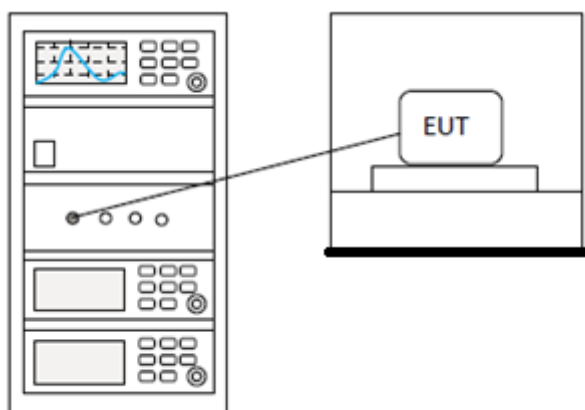
2 CONDUCTED PEAK OUTPUT POWER

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%

2.1 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

2.2 BLOCK DIAGRAM OF TEST SETUP



2.3 EST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

BlueAsia

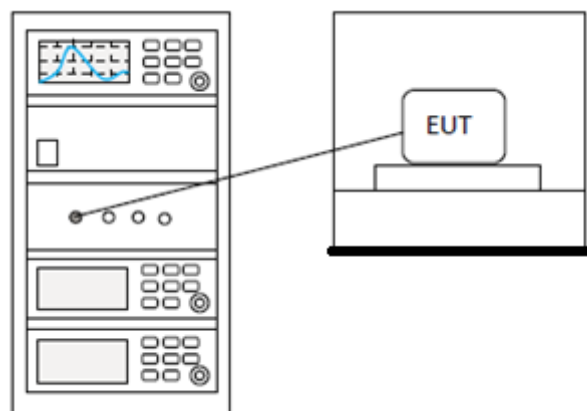
3 CONDUCTED SPURIOUS EMISSIONS

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%

3.1 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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3.2 BLOCK DIAGRAM OF TEST SETUP



3.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

BlueAsia

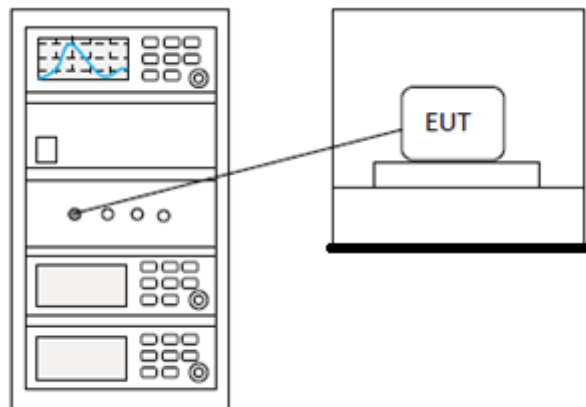
4 POWER SPECTRUM DENSITY

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	Jozu
Temperature	25℃
Humidity	60%

4.1 LIMITS

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



4.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

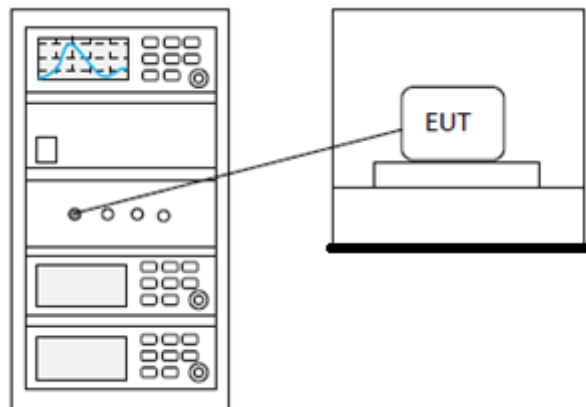
5 MINIMUM 6DB BANDWIDTH

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	Jozu
Temperature	25°C
Humidity	60%

5.1 LIMITS

Limit:	≥ 500 kHz
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5.2 BLOCK DIAGRAM OF TEST SETUP



5.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

6 ANTENNA REQUIREMENT

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

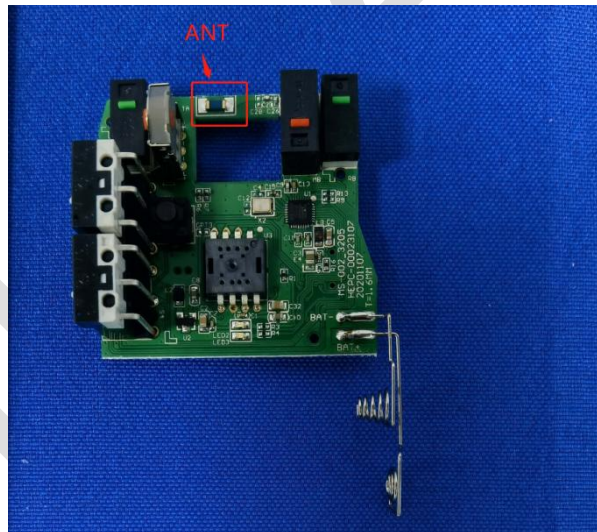
6.1 CONCLUSION

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 2.0dBi.



7 RADIATED SPURIOUS EMISSIONS

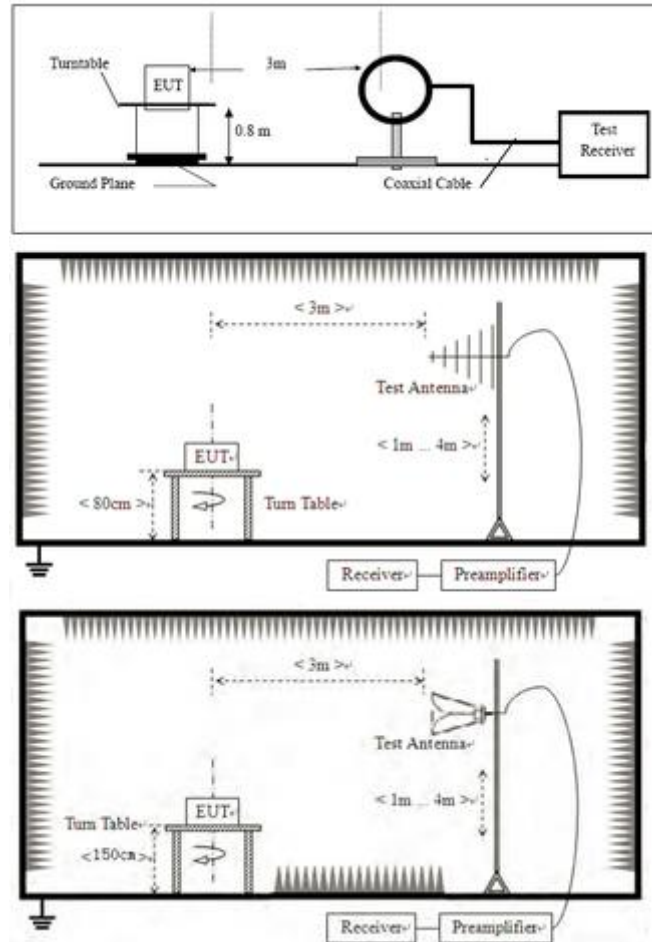
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Test Mode (Pre-Scan)	TX mode (SE) below 1G; TX mode (SE) above 1G
Test Mode (Final Test)	TX mode (SE) below 1G; TX mode (SE) above 1G
Tester	Jozu
Temperature	25℃
Humidity	60%

7.1 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.

7.2 BLOCK DIAGRAM OF TEST SETUP



7.3 PROCEDURE

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

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

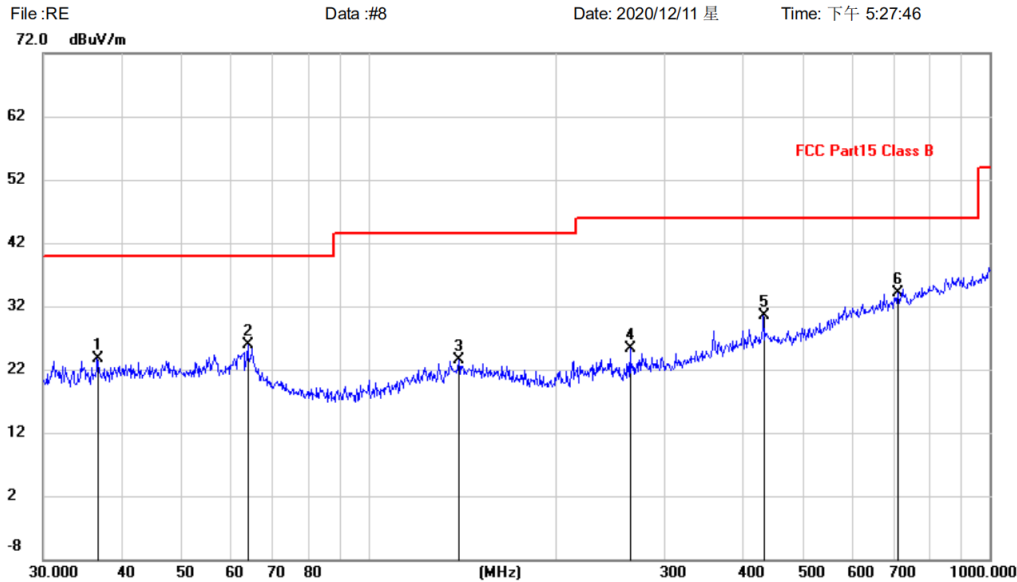
Remark:

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

7.4 TEST DATA

[TestMode: TX mode (SE) below 1G]; [Polarity: Horizontal]

Radiated Emission Measurement



Site

Limit: FCC Part15 Class B

EUT: Wireless Mouse

M/N: EWM01004

Mode: BT mode

Note:

Polarization: **Horizontal**

Temperature:

Power:

Humidity: %

Distance: 3m

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		36.6375	0.19	23.58	23.77	40.00	-16.23	QP		
2		63.9828	3.28	22.60	25.88	40.00	-14.12	QP		
3		139.8508	0.11	23.38	23.49	43.50	-20.01	QP		
4		263.8190	2.43	22.93	25.36	46.00	-20.64	QP		
5		432.5457	2.62	27.92	30.54	46.00	-15.46	QP		
6	*	711.6734	1.34	32.70	34.04	46.00	-11.96	QP		

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

<Reference Only

Test Result: Pass

[TestMode: TX mode (SE) below 1G]; [Polarity: Vertical]

Radiated Emission Measurement

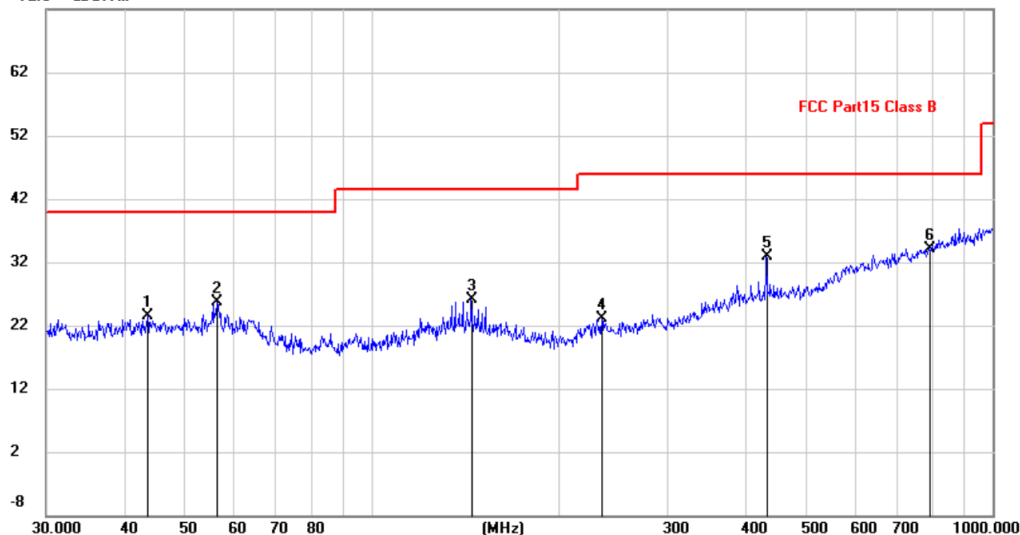
File : RE

Data : #7

Date: 2020/12/11 星

Time: 下午 5:24:45

72.0 dBuV/m



Site

Polarization: **Vertical**

Temperature:

Limit: FCC Part15 Class B

Power:

Humidity: %

EUT: Wireless Mouse

Distance: 3m

M/N: EWM01004

Mode: BT mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		43.6584	-0.36	23.94	23.58	40.00	-16.42	QP		
2		56.3948	2.18	23.57	25.75	40.00	-14.25	QP		
3		144.8418	2.73	23.34	26.07	43.50	-17.43	QP		
4		234.9909	0.52	22.64	23.16	46.00	-22.84	QP		
5		432.5457	4.99	27.92	32.91	46.00	-13.09	QP		
6	*	790.6188	-0.30	34.45	34.15	46.00	-11.85	QP		

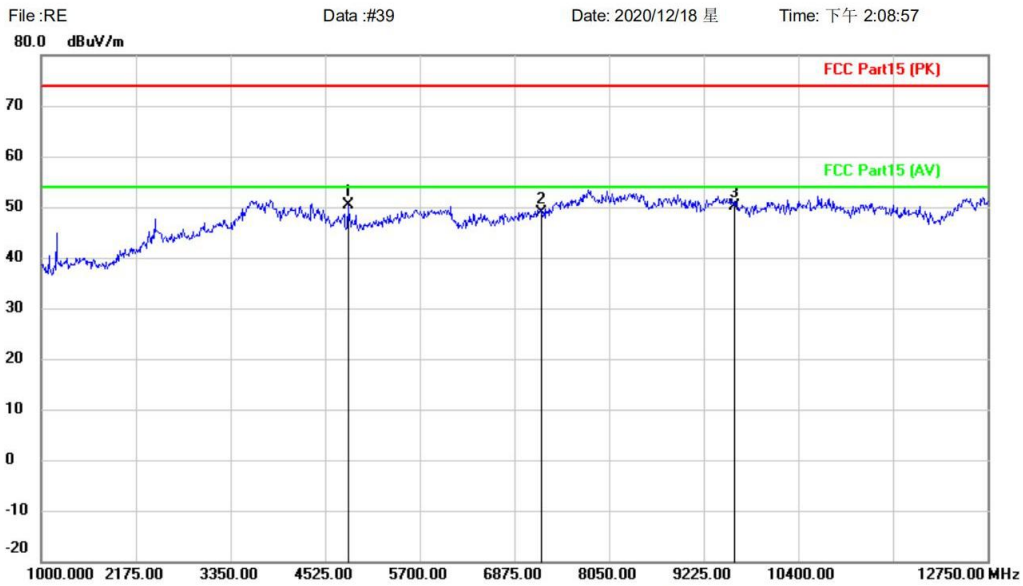
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

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

Radiated Emission Measurement



Site: Polarization: **Horizontal** Temperature:
Limit: FCC Part15 (PK) Power: Humidity: %
EUT: Wireless Mouse Distance: 3m
M/N: EWM01004
Mode: TX-L
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	Comment
1	*	4807.000	54.98	-4.54	50.44	74.00	-23.56	peak		
2		7206.000	51.03	-2.27	48.76	74.00	-25.24	peak		
3		9608.000	49.32	0.81	50.13	74.00	-23.87	peak		

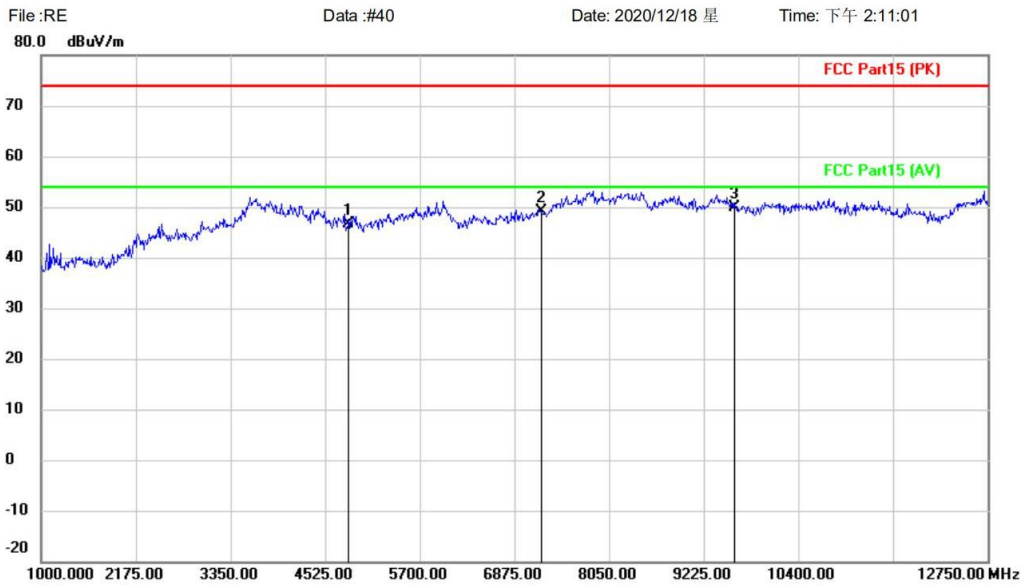
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

TestMode: TX Low channel] [Polarity: Vertical]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-L
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	Comment
1		4807.000	51.13	-4.54	46.59	74.00	-27.41	peak		
2		7206.000	51.05	-2.02	49.03	74.00	-24.97	peak		
3	*	9608.000	49.35	0.62	49.97	74.00	-24.03	peak		

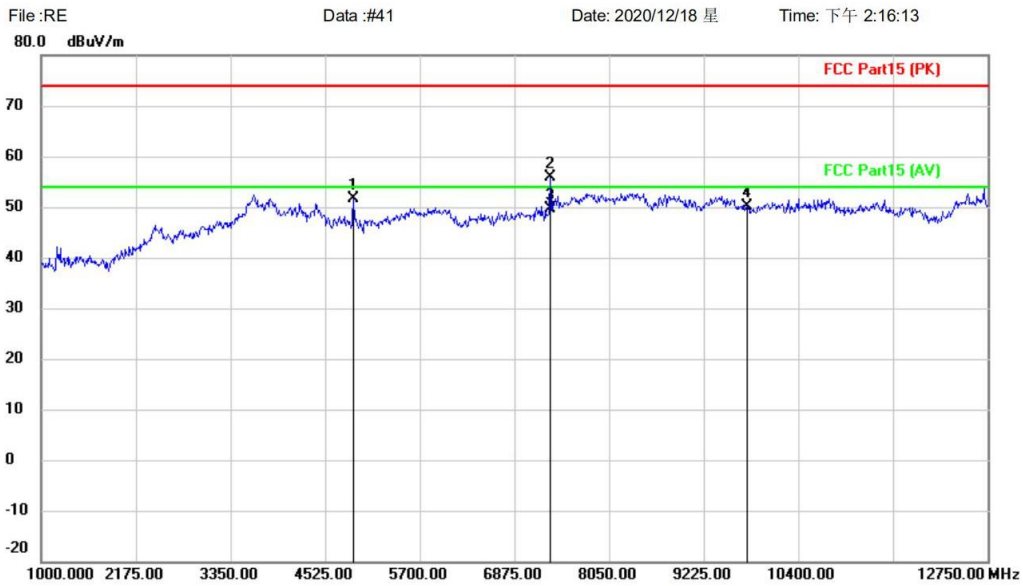
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

TestMode:TX middle channel] [Polarity: Horizontal]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Horizontal** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-M
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	Comment
1		4877.500	56.67	-5.04	51.63	74.00	-22.37	peak		
2		7321.500	57.11	-1.35	55.76	74.00	-18.24	peak		
3	*	7321.500	51.10	-1.35	49.75	54.00	-4.25	AVG		
4		9764.000	49.18	0.94	50.12	74.00	-23.88	peak		

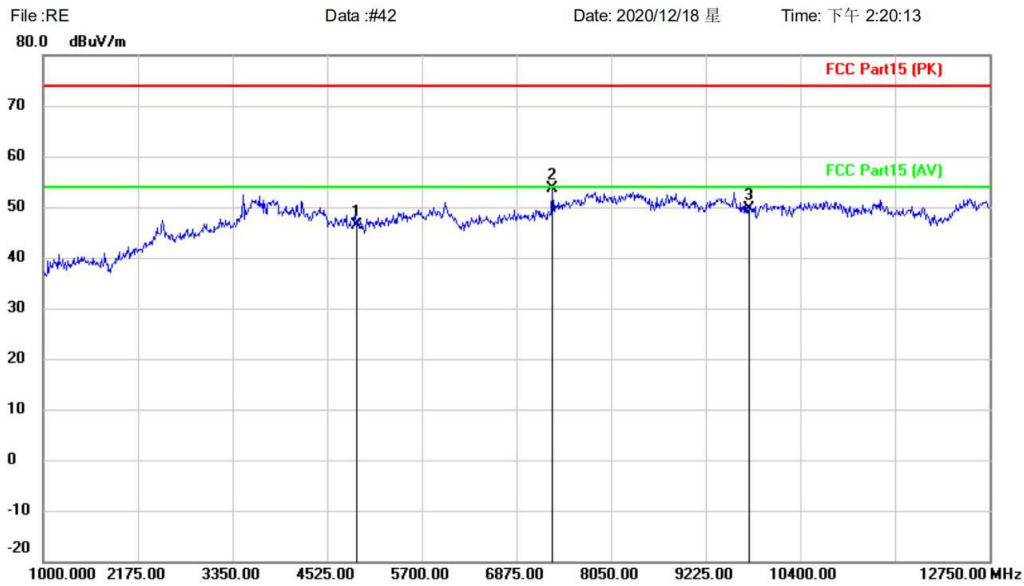
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

TestMode:TX middle channel][Polarity: Vertical]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-M
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	Comment
1		4882.000	51.53	-5.07	46.46	74.00	-27.54	peak		
2	*	7321.500	55.05	-1.48	53.57	74.00	-20.43	peak		
3		9764.000	48.61	0.91	49.52	74.00	-24.48	peak		

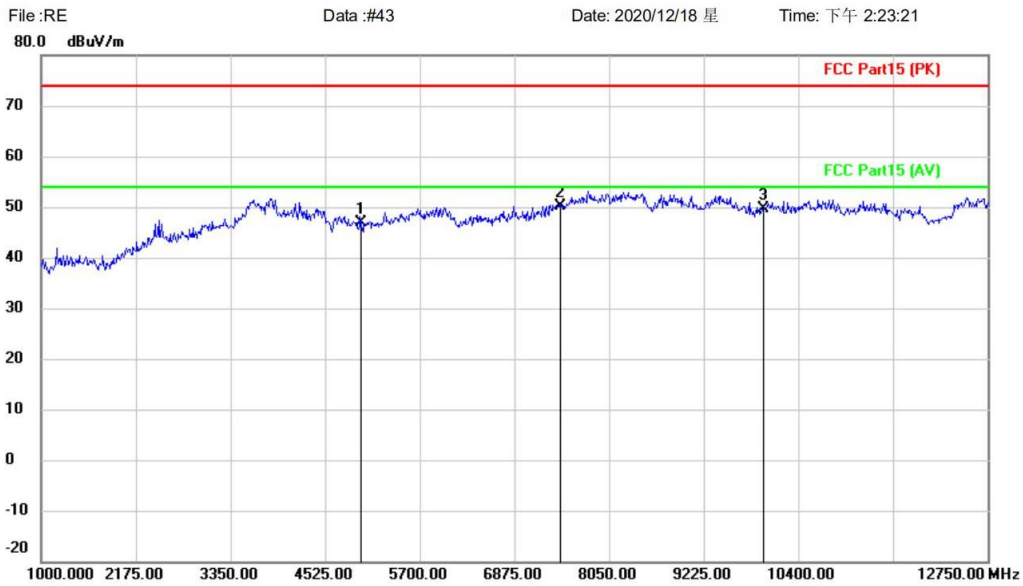
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

TestMode:TX high channel][Polarity: Horizontal]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Horizontal** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-H
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	Comment
1		4960.000	51.79	-4.84	46.95	74.00	-27.05	peak		
2	*	7440.000	50.70	-0.56	50.14	74.00	-23.86	peak		
3		9960.000	48.29	1.40	49.69	74.00	-24.31	peak		

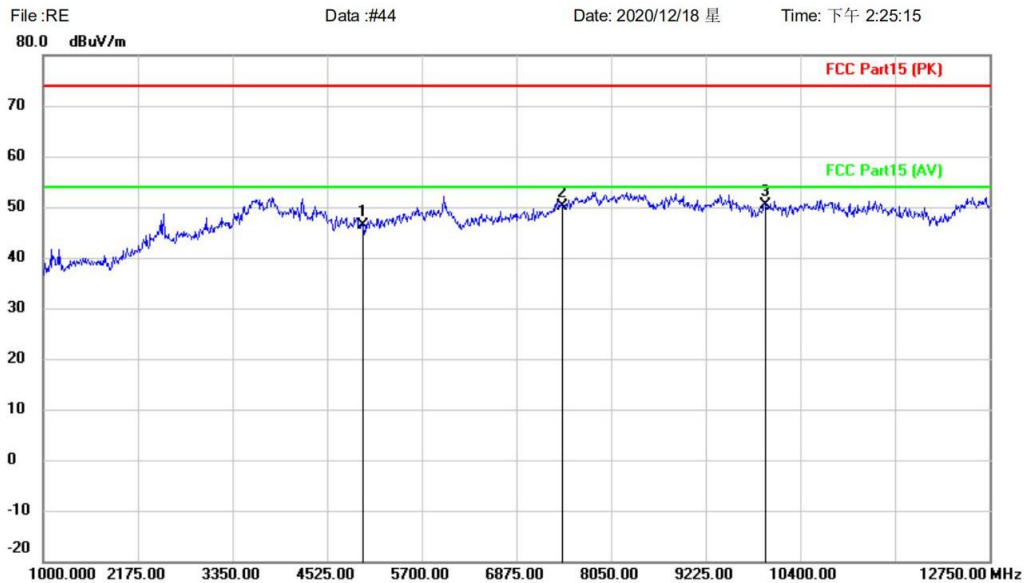
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

TestMode:TX high channel][Polarity: Vertical]

Radiated Emission Measurement



Site: Polarization: **Vertical** Temperature:
Limit: FCC Part15 (PK) Power: Humidity: %
EUT: Wireless Mouse Distance: 3m
M/N: EWM01004
Mode: TX-H
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		4960.000	51.27	-4.84	46.43	74.00	-27.57	peak		
2		7440.000	51.23	-1.07	50.16	74.00	-23.84	peak		
3	*	9960.000	48.81	1.56	50.37	74.00	-23.63	peak		

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

〈Reference Only

Test Result: Pass

8 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

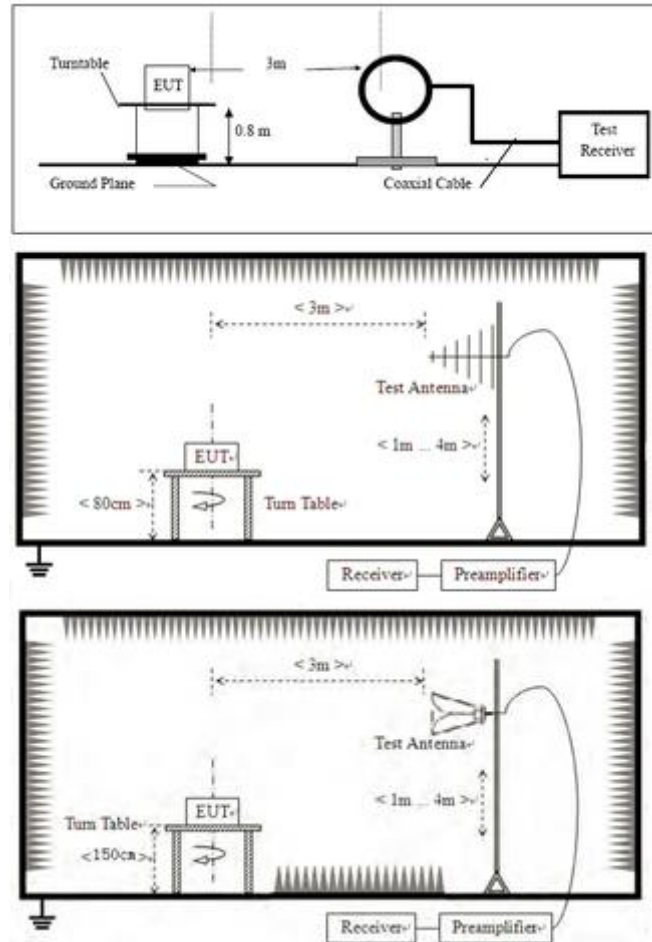
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.10.5
Test Mode (Pre-Scan)	TX Low channel;TX high channel
Test Mode (Final Test)	TX Low channel;TX high channel
Tester	Jozu
Temperature	25℃
Humidity	60%

8.1 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.

8.2 BLOCK DIAGRAM OF TEST SETUP



8.3 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: $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamplifier Factor}$

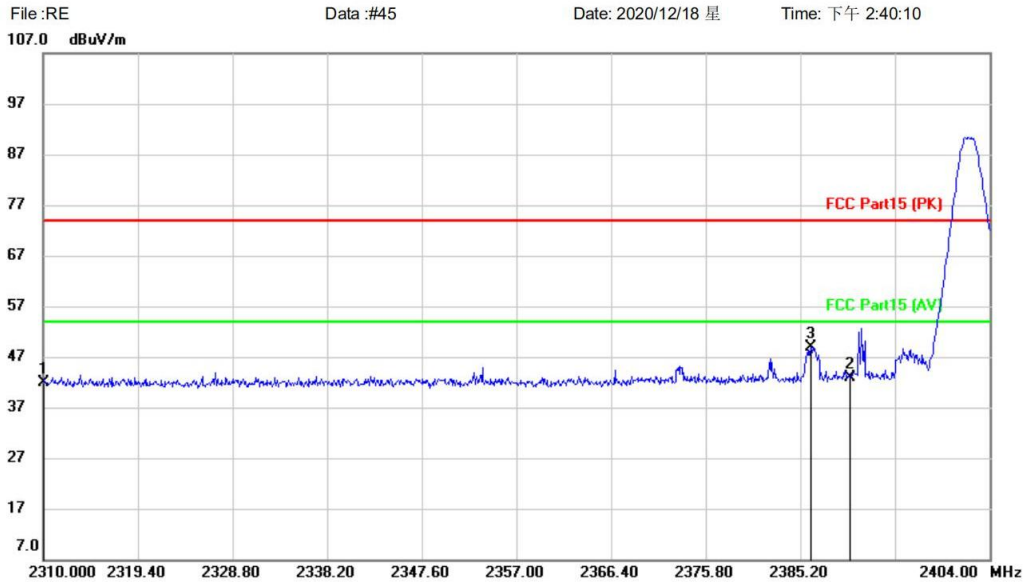
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level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

BlueAsia

8.4 TEST DATA

TestMode:TX Low channel][Polarity: Horizontal]

Radiated Emission Measurement



Site: Polarization: **Horizontal** Temperature:
Limit: FCC Part15 (PK) Power: Humidity: %
EUT: Wireless Mouse Distance: 3m
M/N: EWM01004
Mode: TX-L
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2310.000	55.79	-14.01	41.78	74.00	-32.22	peak		
2		2390.000	56.53	-13.62	42.91	74.00	-31.09	peak		
3	*	2386.234	62.47	-13.63	48.84	74.00	-25.16	peak		

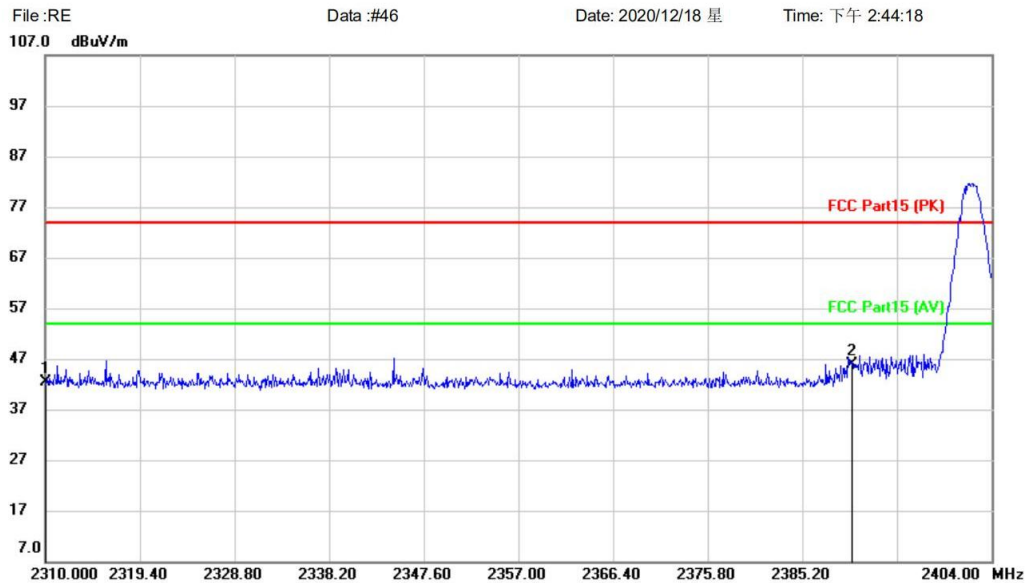
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

TestMode:TX Low channel][Polarity: Vertical]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-L
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2310.000	56.60	-14.30	42.30	74.00	-31.70	peak		
2	*	2390.000	59.85	-13.95	45.90	74.00	-28.10	peak		

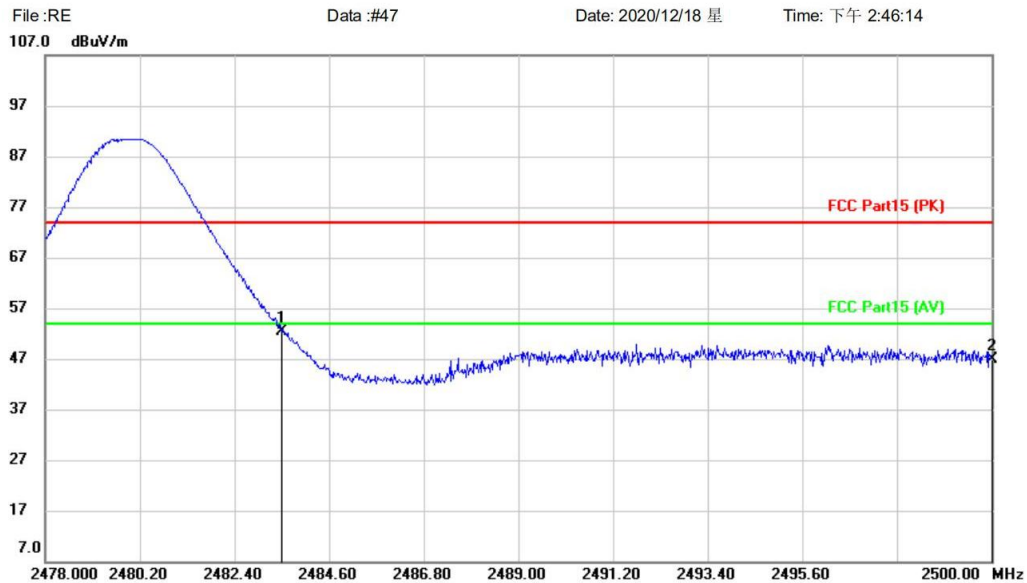
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

TestMode:TX high channel][Polarity: Horizontal]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Horizontal** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-H
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	Comment
1	*	2483.500	65.61	-13.11	52.50	74.00	-21.50	peak		
2		2500.000	59.79	-13.02	46.77	74.00	-27.23	peak		

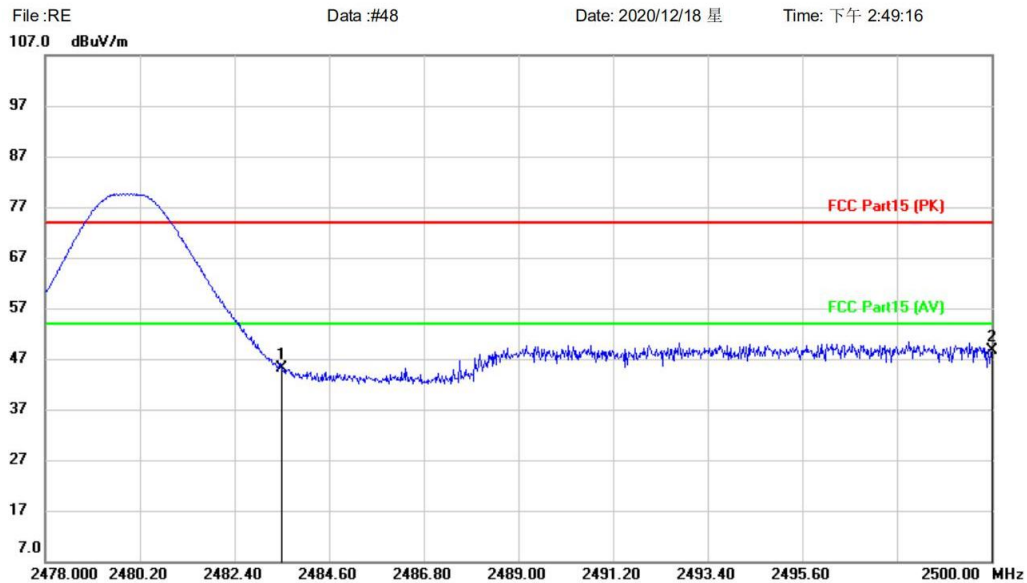
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

TestMode:TX high channel][Polarity: Vertical]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature:
EUT: Wireless Mouse Power: Humidity: %
M/N: EWM01004 Distance: 3m
Mode: TX-H
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	Comment
1		2483.500	58.62	-13.50	45.12	74.00	-28.88	peak		
2	*	2500.000	61.94	-13.42	48.52	74.00	-25.48	peak		

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

〈Reference Only

Test Result: Pass

10 APPENDIX

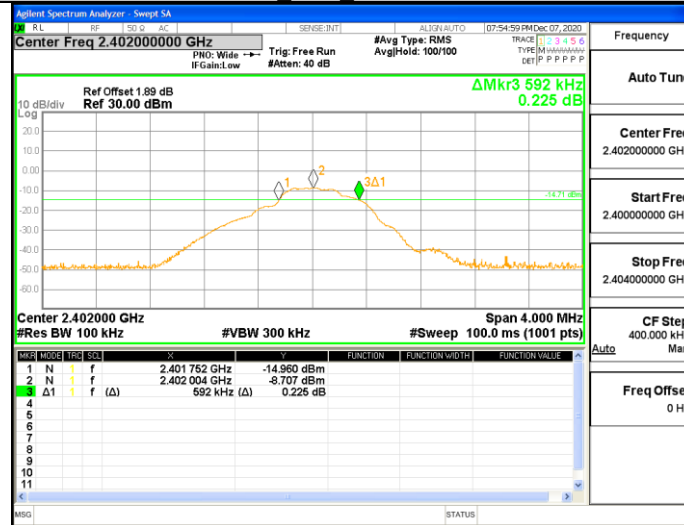
10.1 APPENDIX: DTS BANDWIDTH

Test Result

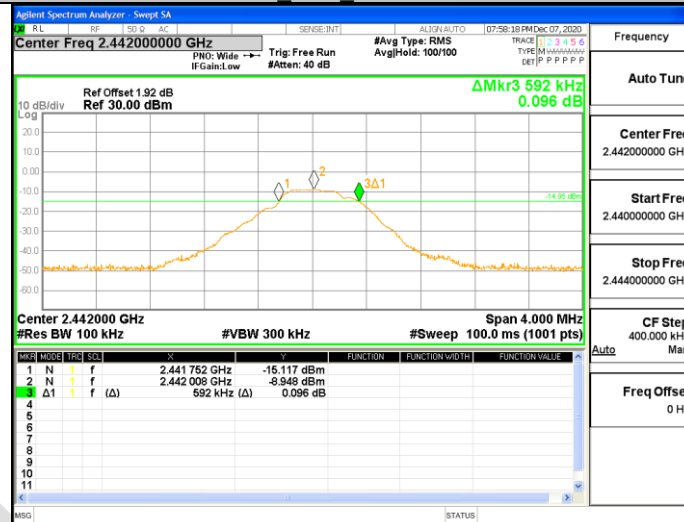
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	0.592	2401.752	2402.344	≥ 0.5	PASS
		2442	0.592	2441.752	2442.344	≥ 0.5	PASS
		2480	0.560	2479.752	2480.312	≥ 0.5	PASS

Test Graphs

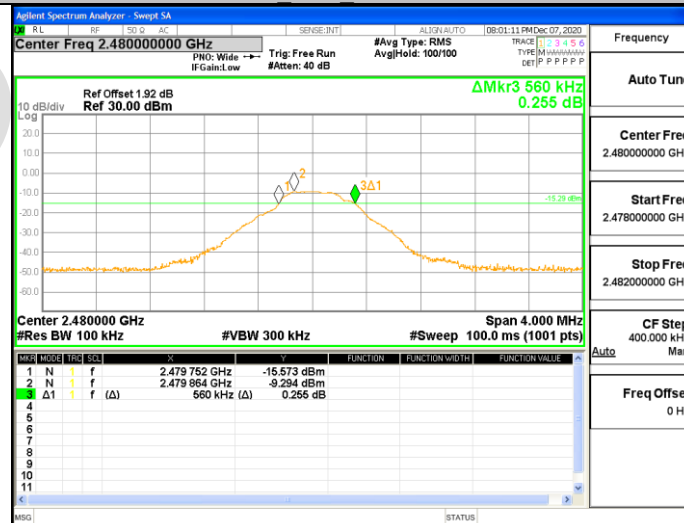
BLE Ant1 2402



BLE Ant1 2442



BLE Ant1 2480



10.2 APPENDIX: OCCUPIED CHANNEL BANDWIDTH**Test Result**

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	0.96600	2401.500	2402.466	---	PASS
		2442	0.92277	2441.542	2442.465	---	PASS
		2480	0.92038	2479.545	2480.465	---	PASS

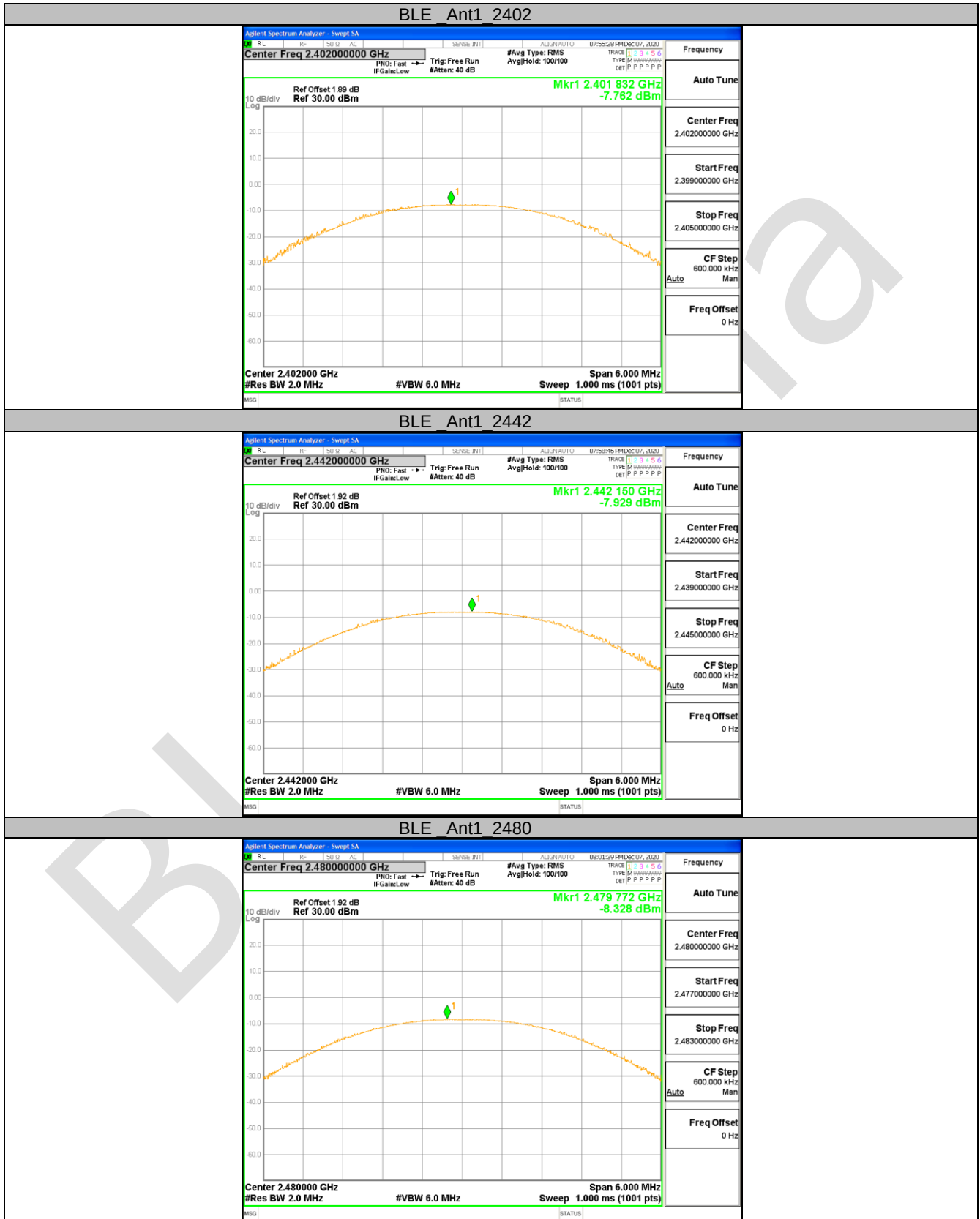
Test Graphs



10.3 APPENDIX: MAXIMUM CONDUCTED OUTPUT POWER**Test Result**

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	-7.76	<=30	PASS
		2442	-7.93	<=30	PASS
		2480	-8.33	<=30	PASS

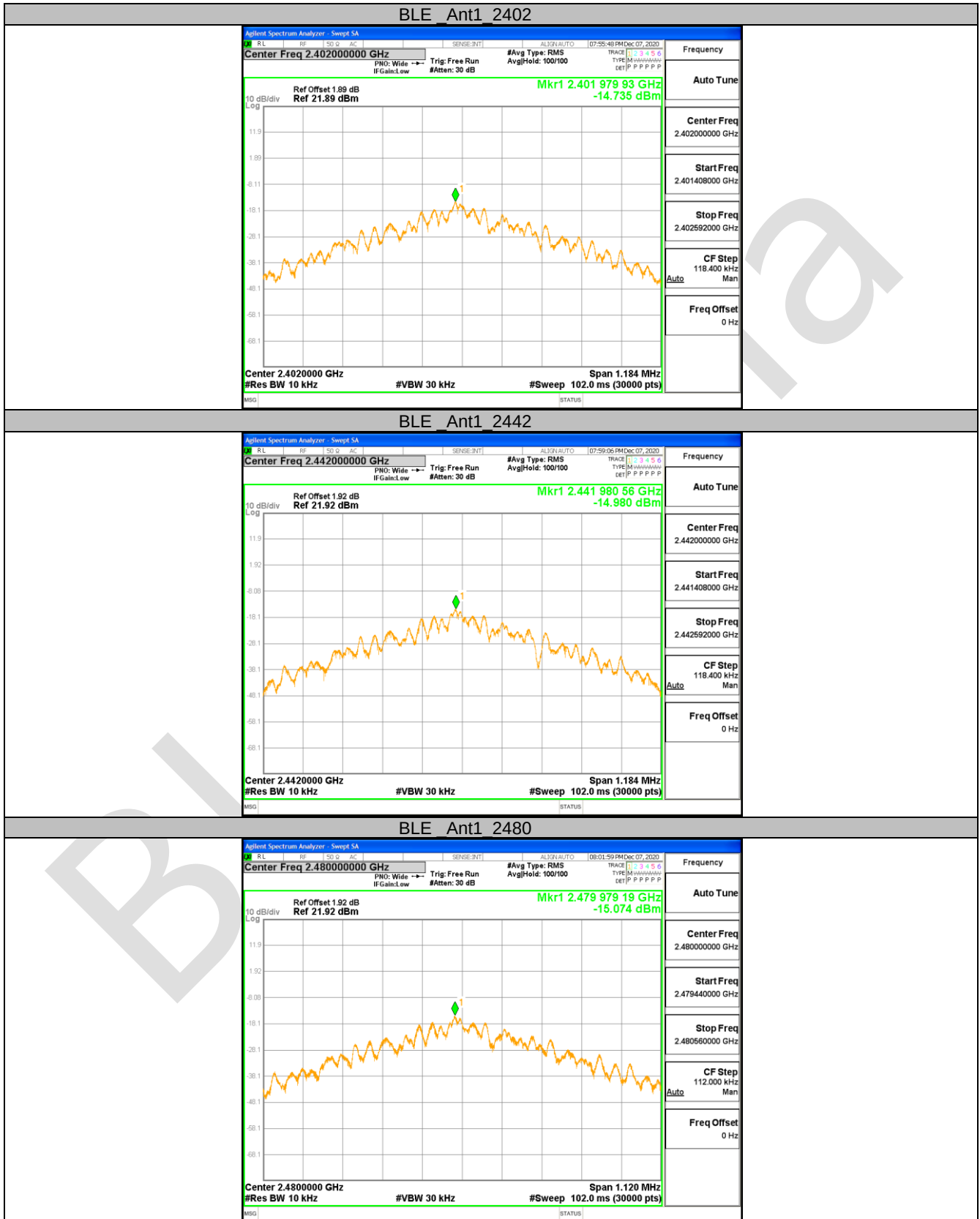
Test Graphs



10.4 APPENDIX: MAXIMUM POWER SPECTRAL DENSITY**Test Result**

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE	Ant1	2402	-14.74	<=8	PASS
		2442	-14.98	<=8	PASS
		2480	-15.07	<=8	PASS

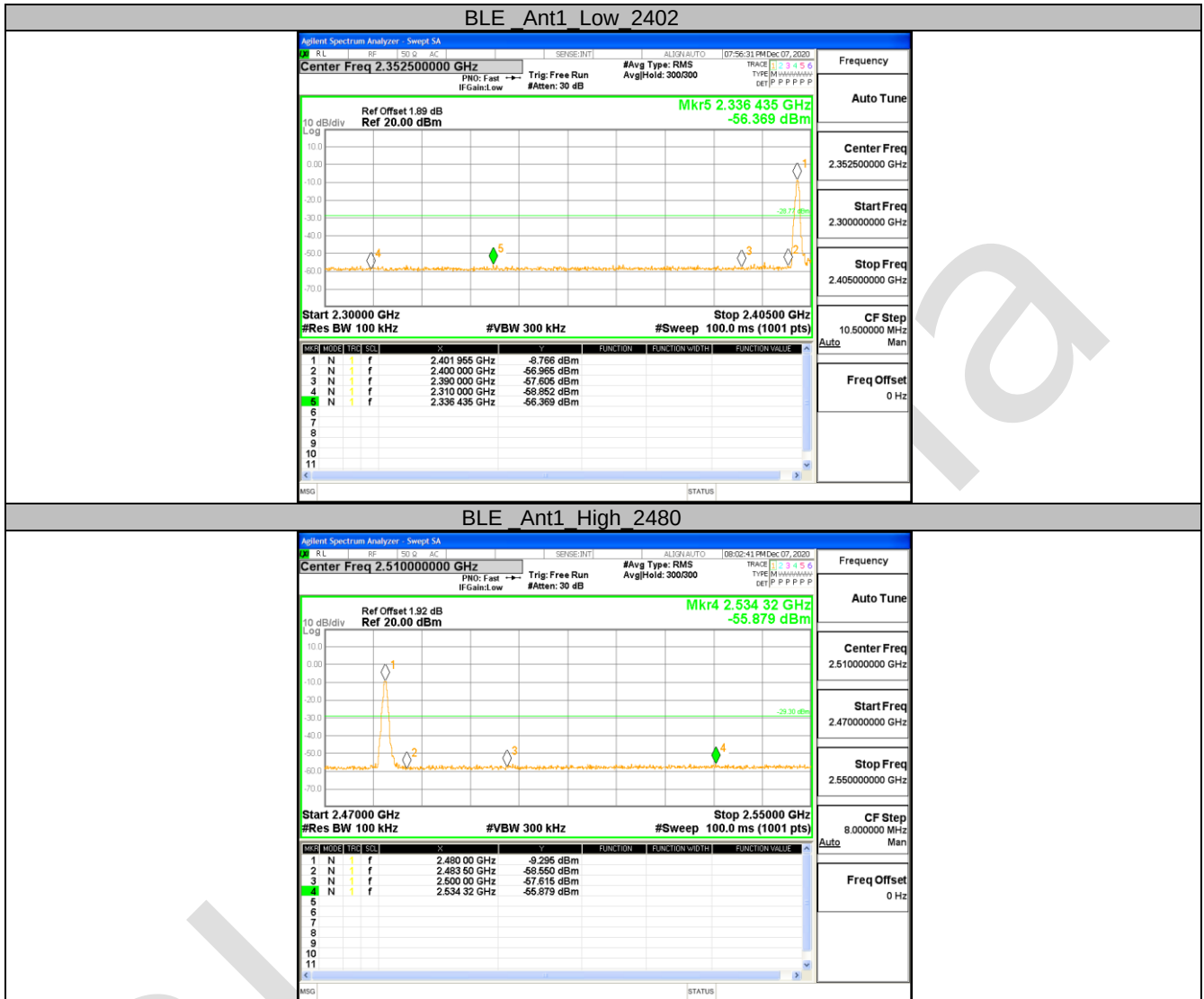
Test Graphs



10.5 APPENDIX: BAND EDGE MEASUREMENTS**Test Result**

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	Low	2402	-8.77	-56.37	≤ -28.77	PASS
		High	2480	-9.30	-55.88	≤ -29.3	PASS

Test Graphs



10.6 APPENDIX F: CONDUCTED SPURIOUS EMISSION

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	Reference	-9.10	-9.10	---	PASS
			30~1000	30~1000	-67.675	<=-29.096	PASS
			1000~26500	1000~26500	-37.125	<=-29.096	PASS
		2442	Reference	-8.98	-8.98	---	PASS
			30~1000	30~1000	-67.729	<=-28.976	PASS
			1000~26500	1000~26500	-45.153	<=-28.976	PASS
		2480	Reference	-9.41	-9.41	---	PASS
			30~1000	30~1000	-64.49	<=-29.411	PASS
			1000~26500	1000~26500	-41.015	<=-29.411	PASS

Test Graphs

