RF MEASUREMENT REPORT

FCC ID:	XMR202205EC200UAU
Applicant:	Quectel Wireless Solutions Co., Ltd
Product:	LTE Module
Model No.:	EC200U-AU
Brand Name:	Quectel
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Test Date:	April 10 ~ 12, 2022

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2203RSU034-U2	Rev. 01	Initial Report	04-13-2022	Valid

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1. General Information

1.1. Applicant

Quectel Wireless Solutions Co., Ltd
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.2. Manufacturer

Quectel Wireless Solutions Co., Ltd
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong)				
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China				
	Laboratory Location (Suzhou - SIP)				
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen)				
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan)				
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	LTE Module
Model No.	EC200U-AU
IMEI	Conducted Measurement: 867869060001682 Radiated Measurement: 867869060001626
Wi-Fi Specification	802.11b Rx Scan
Bluetooth Specification	V4.2 BR/EDR
GSM Specification	GSM 850/1900
LTE Specification	LTE Band 2/4/5/7/38/41/66
Working Voltage	3.3 ~ 4.3Vdc, 3.8Vdc Typ.
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification

Bluetooth Frequency	2402 ~ 2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	1Mbps
Antenna Information	Dipole Antenna, 0.5dBi

Note: For other features of this EUT, test report will be issued separately.

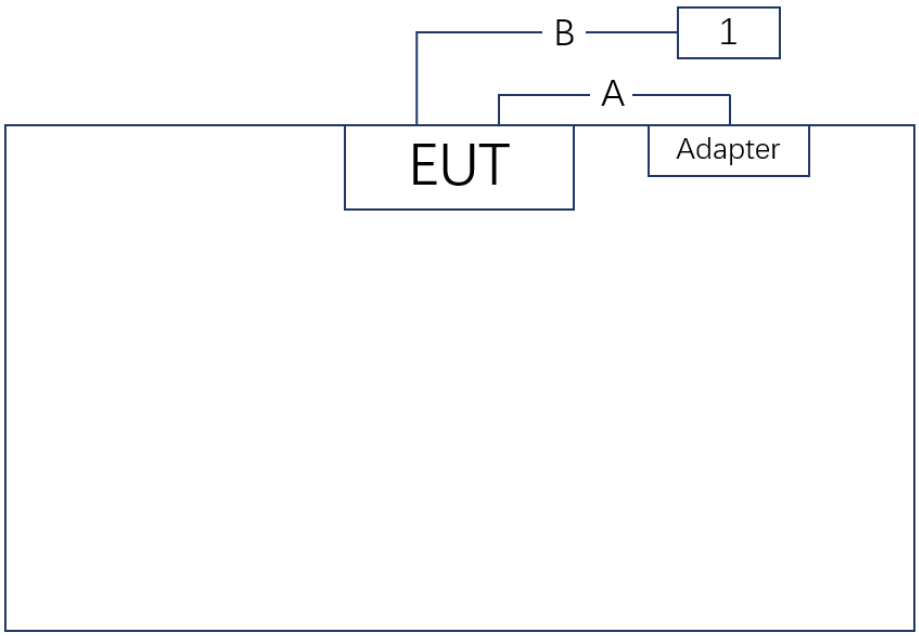
1.6. Working Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

1.7. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram



Cable Type		Cable Description	
A	Power Cable	Non-Shielding, 1.1m	
B	USB Cable	Shielding, 1.2m	
Product		Manufacturer	Model No.
1	Notebook	Lenovo	E431

1.8. Test Software

The test utility software used during testing was “QCOM”, and the version was V1.6.

1.9. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

1.10. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~75%RH

1.11. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

Conclusion:

The unit complies with the requirement of §15.203.

2. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/12/29	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022/12/29	WZ-AC1
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2022/10/28	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2022/8/5	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2022/9/16	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2022/12/1	WZ-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2023/1/13	WZ-AC1
Preamplifier	EMCI	EMC051845SE	MRTSUE06987	1 year	2022/9/9	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2022/11/12	WZ-AC1
Thermohygrometer	testo	Testo 608-H1	MRTSUE11039	1 year	2022/11/11	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2022/6/28	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2022/4/29	WZ-AC1
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2022/6/8	WZ-SR2
Shielding Room	MIX-BEP	WZ-SR2	MRTSUE06215	5 years	2026/12/20	WZ-SR2
Thermohygrometer	testo	608-H1	MRTSUE06404	1 year	2022/6/28	WZ-SR2
Four-Line V-Network	R&S	ENV432	MRTSUE06615	1 year	2022/10/13	WZ-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06909	1 year	2022/11/1	WZ-SR2
Thermohygrometer	testo	608-H1	MRTSUE06222	1 year	2022/10/10	WZ-SR4
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2022/6/8	WZ-SR4
Shielding Room	HUAMING	WZ-SR4	MRTSUE06441	/	/	WZ-SR4
Signal Analyzer	Keysight	N9010B	MRTSUE06558	1 year	2022/6/24	WZ-SR4

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software

3. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

4. Test Result

4.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	6dB Bandwidth	Conducted	Pass
15.247(b)(3)	Output Power		Pass
15.247(e)	Power Spectral Density		Pass
15.247(d)	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Remark:

The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

4.2. 6dB Bandwidth Measurement

4.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

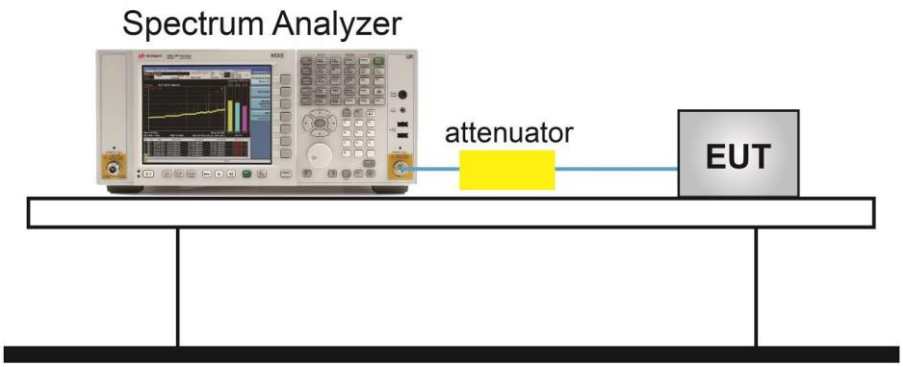
4.2.2. Test Procedure

ANSI C63.10-2013 - Section 11.8

4.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

4.2.4. Test Setup



4.2.5. Test Result

Refer to Appendix A.2.

4.3. Output Power Measurement

4.3.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.3.2. Test Procedure

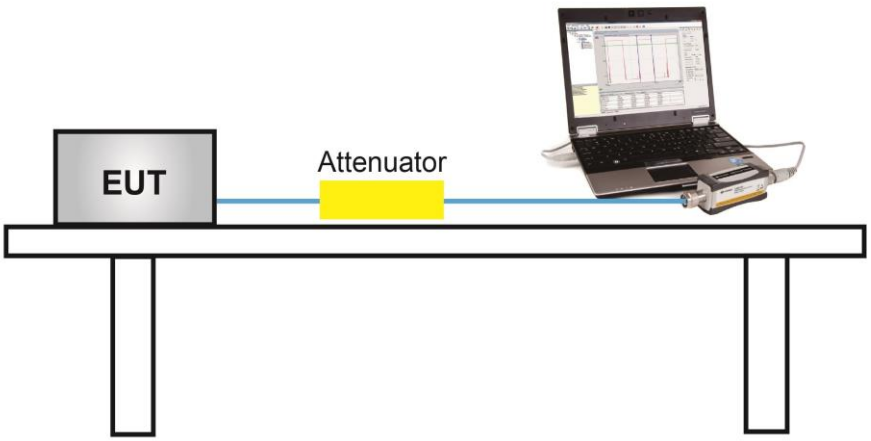
ANSI C63.10-2013 - Section 11.9.2.3.2

4.3.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

4.3.4. Test Setup



4.3.5. Test Result

Refer to Appendix A.3.

4.4. Power Spectral Density Measurement

4.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

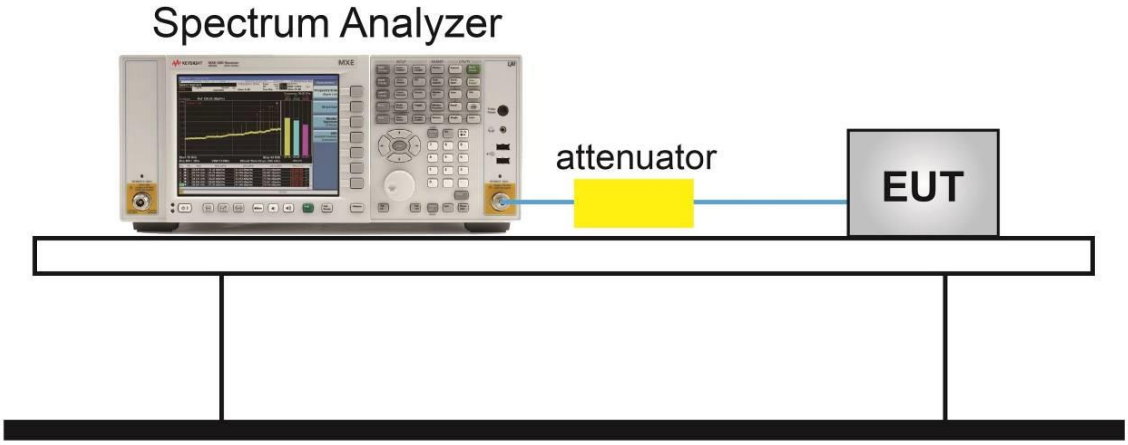
4.4.2. Test Procedure

ANSI C63.10-2013 - Section 11.10.5

4.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10 kHz.
5. VBW = 30 kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
8. Sweep time = auto couple.
9. Don’t use sweep triggering. Allow sweep to “free run”.
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

4.4.4. Test Setup



4.4.5. Test Result

Refer to Appendix A.4.

4.5. Conducted Band Edge and Out-of-Band Emissions Measurement

4.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

4.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

4.5.3. Test Settitng

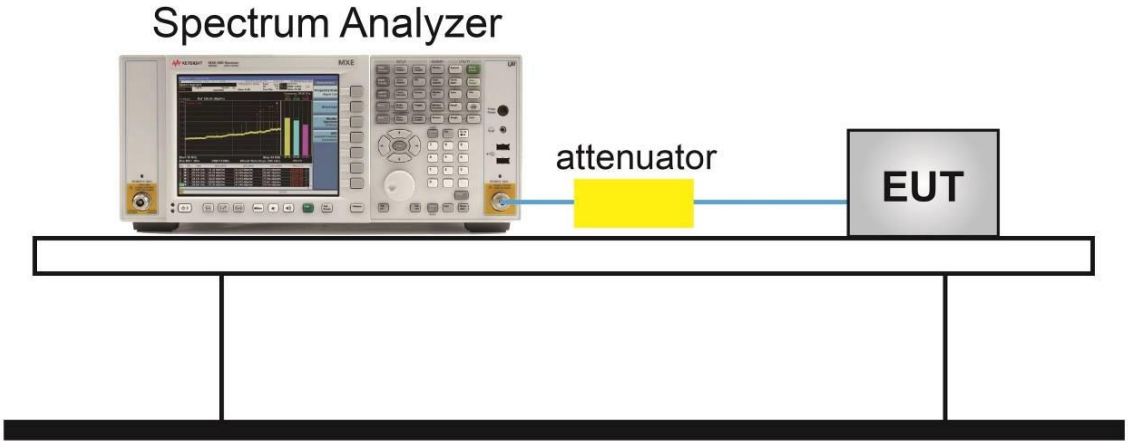
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

4.5.4. Test Setup



4.5.5. Test Result

Refer to Appendix A.5.

4.6. Radiated Spurious Emission Measurement

4.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

4.6.2. Test Procedure

ANSI C63.10-2013 - Section 11.11 & 11.12

ANSI C63.10-2013 - Section 6.3 (General Requirements)

ANSI C63.10-2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10-2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10-2013 - Section 6.6 (Standard test method above 1GHz)

4.6.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. Span was set greater than 1MHz

3. RBW = as specified in Table 1

4. Detector = CISPR quasi-peak

5. Sweep time = auto couple

6. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.

If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

4. Detector = Peak

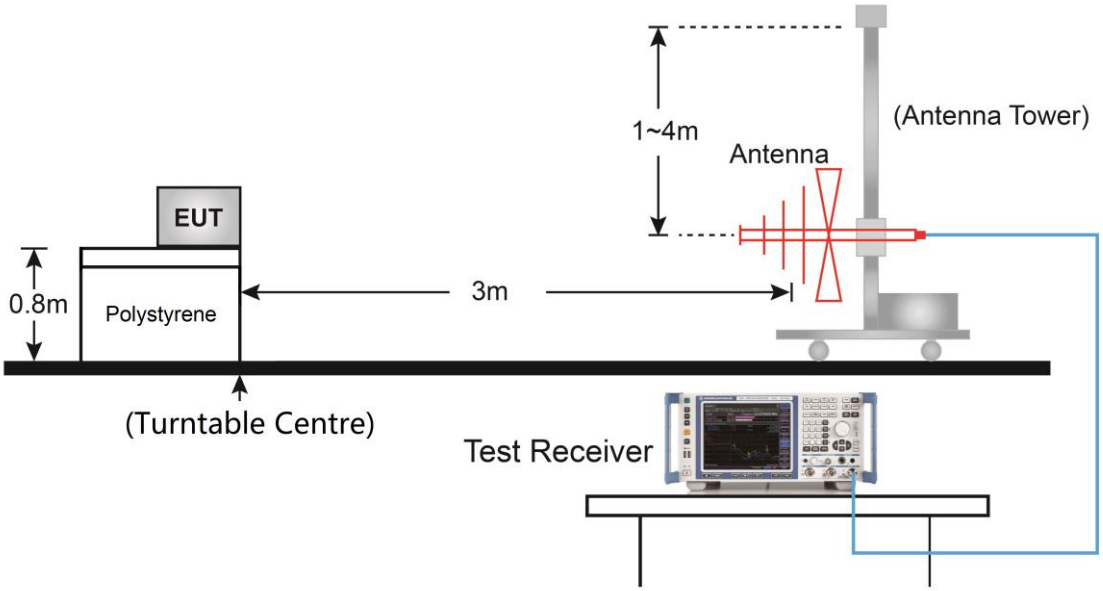
5. Sweep time = auto

6. Trace mode = max hold

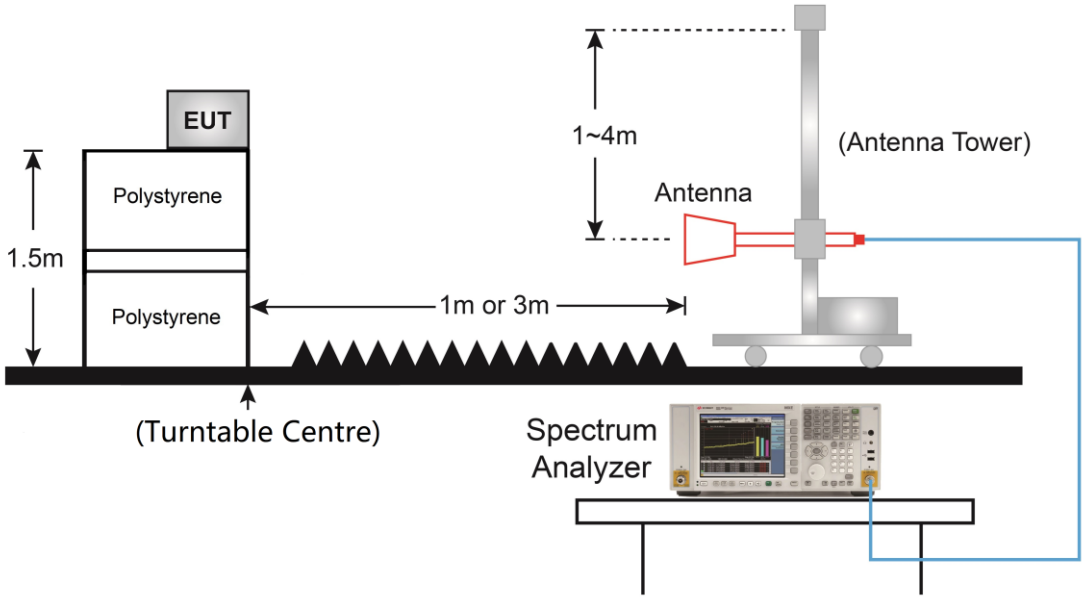
7. Trace was allowed to stabilize

4.6.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.6.5. Test Result

Refer to Appendix A.6.

4.7. Radiated Restricted Band Edge Measurement

4.7.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

4.7.2. Test Procedure

ANSI C63.10-2013 - Section 6.3

ANSI C63.10-2013 - Section 6.6

ANSI C63.10-2013 - Section 11.13

4.7.3. Test Setting

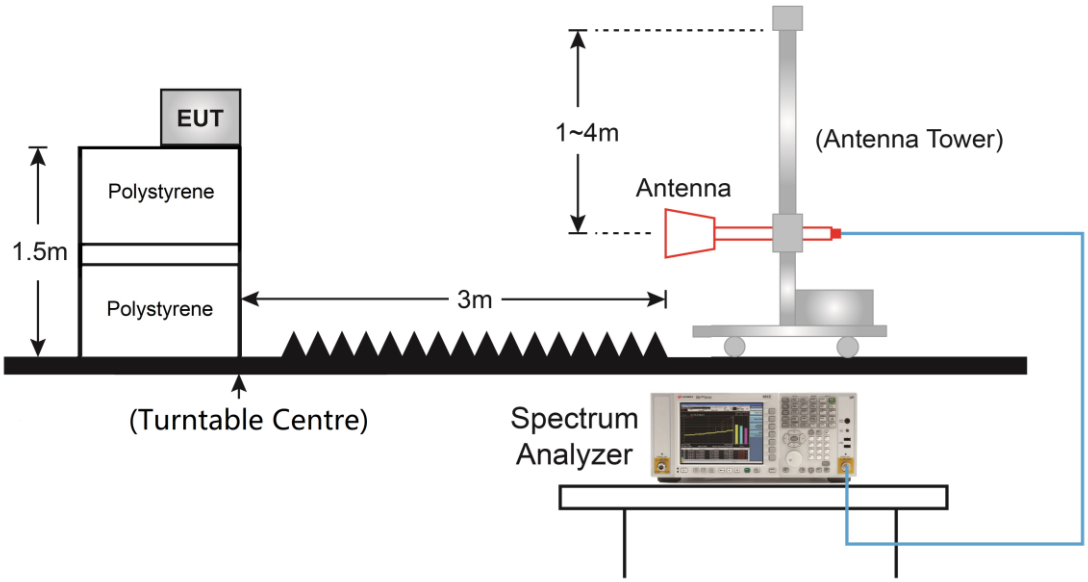
Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

4.7.4. Test Setup



4.7.5. Test Result

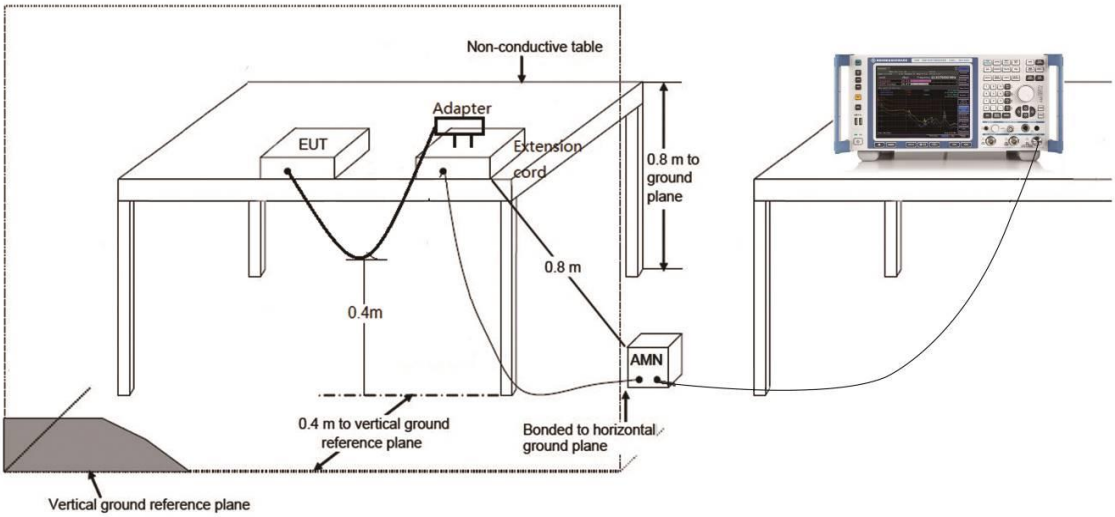
Refer to Appendix A.7.

4.8. AC Conducted Emissions Measurement

4.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

4.8.2. Test Setup



4.8.3. Test Result

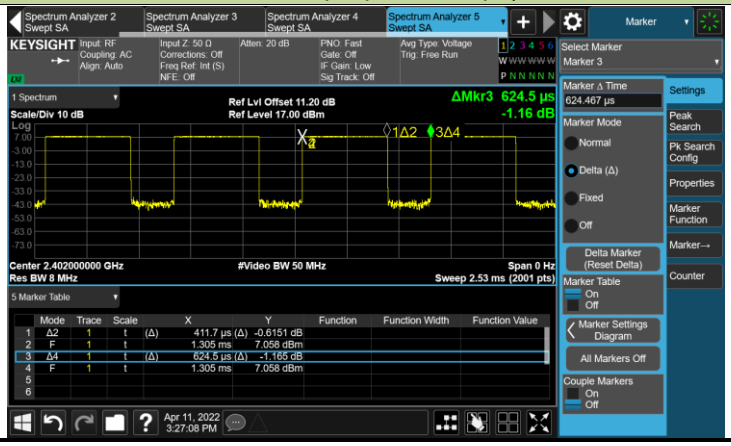
Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2022/04/11		

Test Mode	Duty Cycle
BLE-1Mbps	65.92%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 411.7μs)	



A.2 6dB Bandwidth Test Result

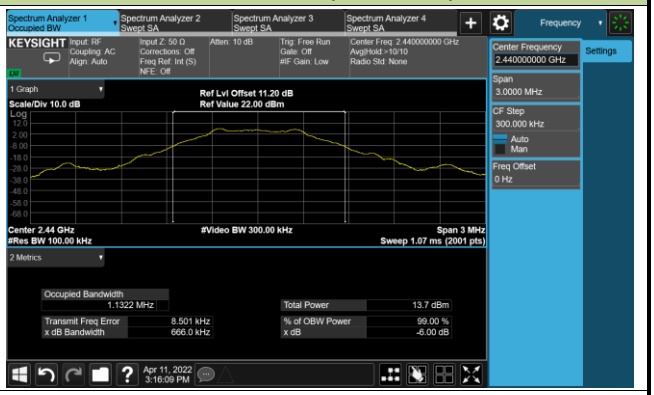
Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2022/04/11		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.667	≥ 0.5
BLE	1Mbps	19	2440	0.666	≥ 0.5
BLE	1Mbps	39	2480	0.665	≥ 0.5

BLE-1Mbps 6dB Bandwidth

Channel 00 (2402MHz)

Channel 19 (2440MHz)



Channel 39 (2480MHz)

A.3 Output Power Test Result

Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2022/04/11		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
Peak Output Power						
BLE	1Mbps	00	2402	7.68	≤ 30.00	Pass
BLE	1Mbps	19	2440	7.91	≤ 30.00	Pass
BLE	1Mbps	39	2480	6.10	≤ 30.00	Pass
Average Output Power						
BLE	1Mbps	00	2402	6.77	≤ 30.00	Pass
BLE	1Mbps	19	2440	6.95	≤ 30.00	Pass
BLE	1Mbps	39	2480	5.12	≤ 30.00	Pass

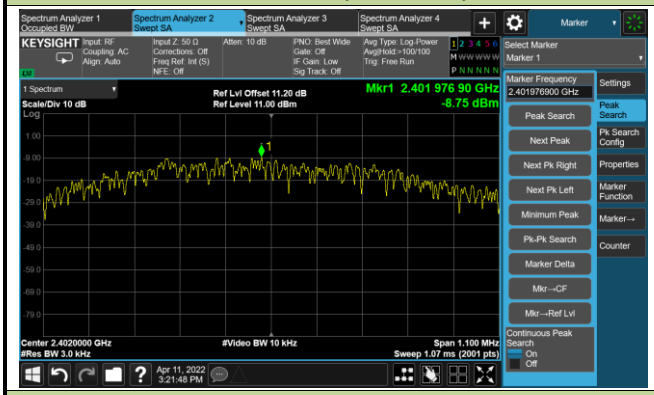
A.4 Power Spectral Density Test Result

Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2022/04/11		

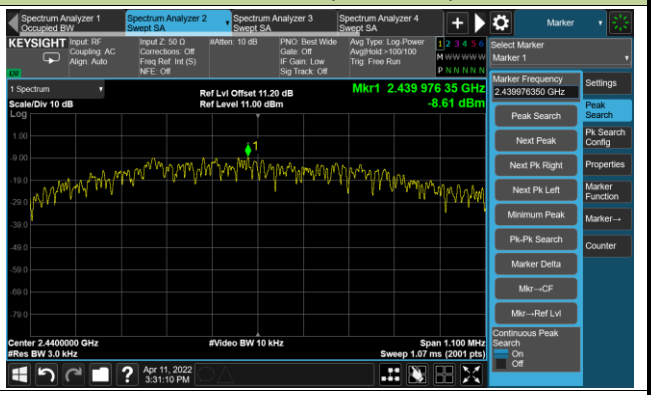
Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-8.75	≤ 8.00	Pass
BLE	1Mbps	19	2440	-8.61	≤ 8.00	Pass
BLE	1Mbps	39	2480	-10.37	≤ 8.00	Pass

BLE-1Mbps PSD

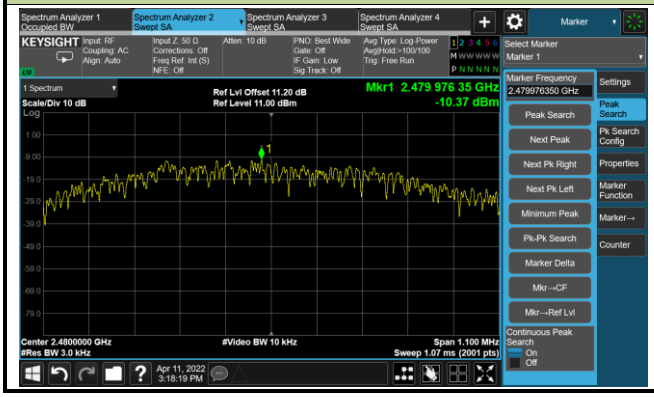
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

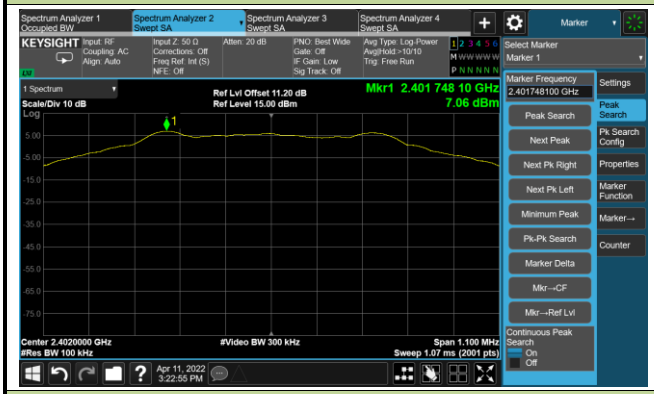
Test Site	WZ-SR4	Test Engineer	Lynn Yang
Test Date	2022/04/11		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Limit (dBc)	Result
BLE	1Mbps	00	2402	20	Pass
BLE	1Mbps	19	2440	20	Pass
BLE	1Mbps	39	2480	20	Pass

BLE- Out-of-Band Emissions

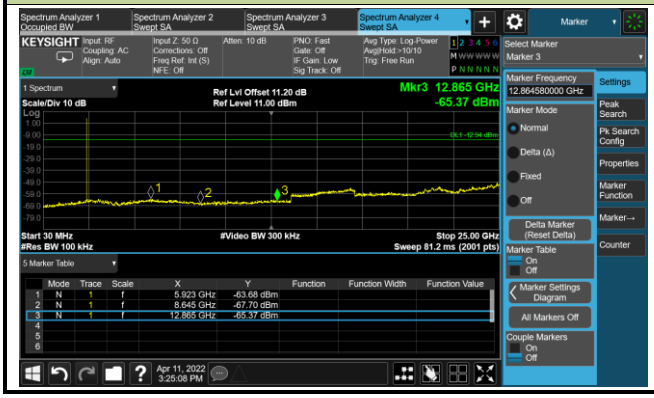
Channel 00 (2402MHz)

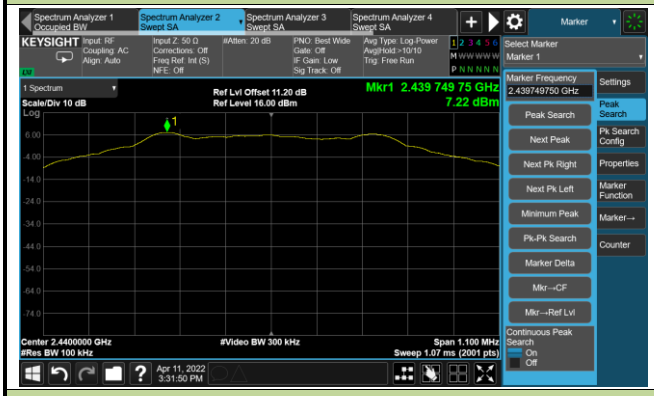
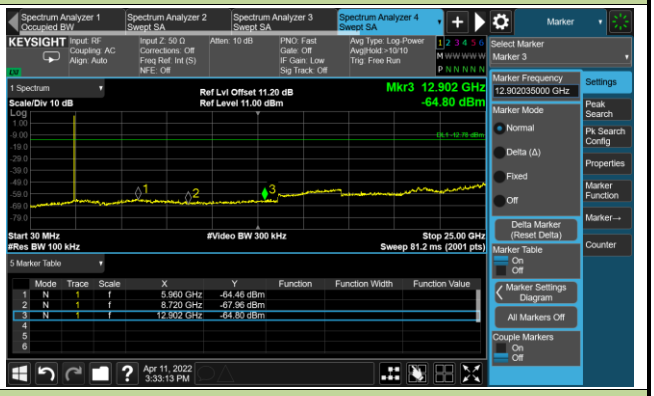
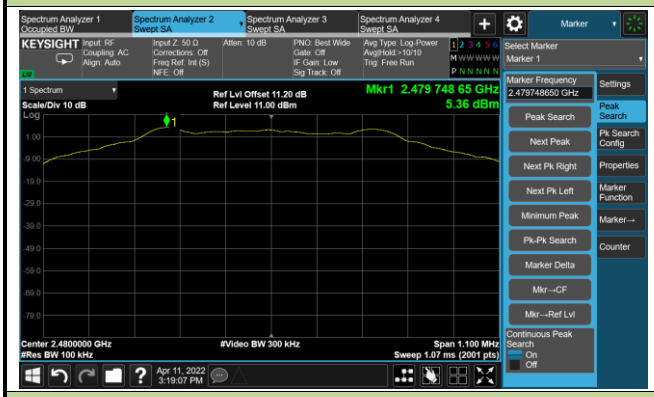
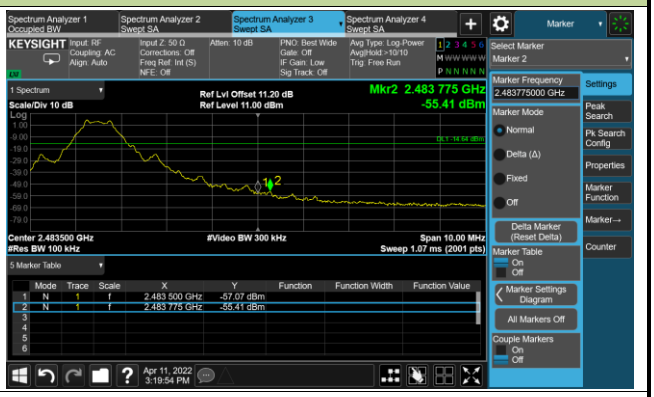
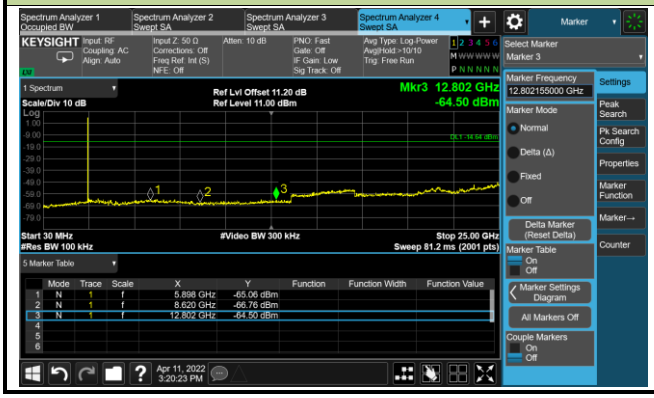
100kHz PSD Reference Level



Low Band Edge

Spurious Emission 30MHz ~ 25GHz



Channel 19 (2440MHz)	
100kHz PSD Reference Level	Spurious Emission 30MHz ~ 25GHz
	
Channel 39 (2480MHz)	
100kHz PSD Reference Level	High Band Edge
	
Spurious Emission 30MHz ~ 25GHz	
	

A.6 Radiated Spurious Emission Test Result

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2022/04/10	Test Mode	BLE
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

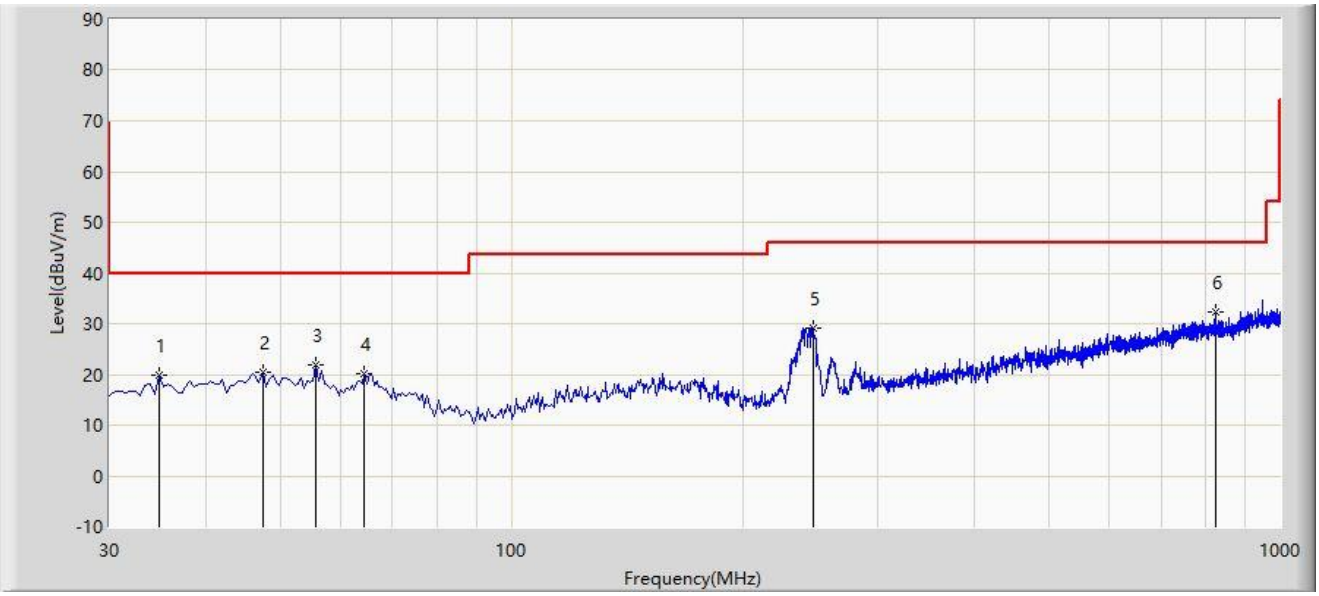
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
00	8199.5	35.6	9.5	45.1	74.0	-28.9	Peak	Horizontal
	11157.5	37.1	13.2	50.3	74.0	-23.7	Peak	Horizontal
	12033.0	38.3	12.7	51.0	74.0	-23.0	Peak	Horizontal
	8208.0	35.5	9.6	45.1	74.0	-28.9	Peak	Vertical
	11523.0	36.1	13.1	49.2	74.0	-24.8	Peak	Vertical
	12254.0	36.5	12.9	49.4	74.0	-24.6	Peak	Vertical
19	8318.5	36.8	9.5	46.4	74.0	-27.6	Peak	Horizontal
	10715.5	35.5	13.5	49.0	74.0	-25.0	Peak	Horizontal
	11540.0	36.9	13.0	49.9	74.0	-24.1	Peak	Horizontal
	8225.0	36.1	9.6	45.6	74.0	-28.4	Peak	Vertical
	11480.5	35.7	13.2	48.9	74.0	-25.1	Peak	Vertical
	12160.5	36.3	12.7	49.0	74.0	-25.0	Peak	Vertical
39	9066.5	35.5	11.3	46.8	74.0	-27.2	Peak	Horizontal
	10945.0	36.0	13.7	49.6	74.0	-24.4	Peak	Horizontal
	12143.5	36.4	12.8	49.2	74.0	-24.8	Peak	Horizontal
	8199.5	36.9	9.5	46.4	74.0	-27.6	Peak	Vertical
	10953.5	36.2	13.6	49.8	74.0	-24.2	Peak	Vertical
	12611.0	37.0	12.8	49.8	74.0	-24.2	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The Result of Radiated Emission below 1GHz:

Site: WZ-AC1	Time: 2022/04/10 - 15:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_VULB 9168 _30-1000MHz	Polarity: Horizontal
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			34.850	19.825	2.807	-20.175	40.000	17.018	PK
2			47.460	20.407	1.627	-19.593	40.000	18.780	PK
3			55.705	21.754	3.613	-18.246	40.000	18.141	PK
4			64.435	20.196	3.183	-19.804	40.000	17.013	PK
5			246.795	29.029	12.789	-16.971	46.000	16.240	PK
6		*	822.975	32.340	3.436	-13.660	46.000	28.904	PK

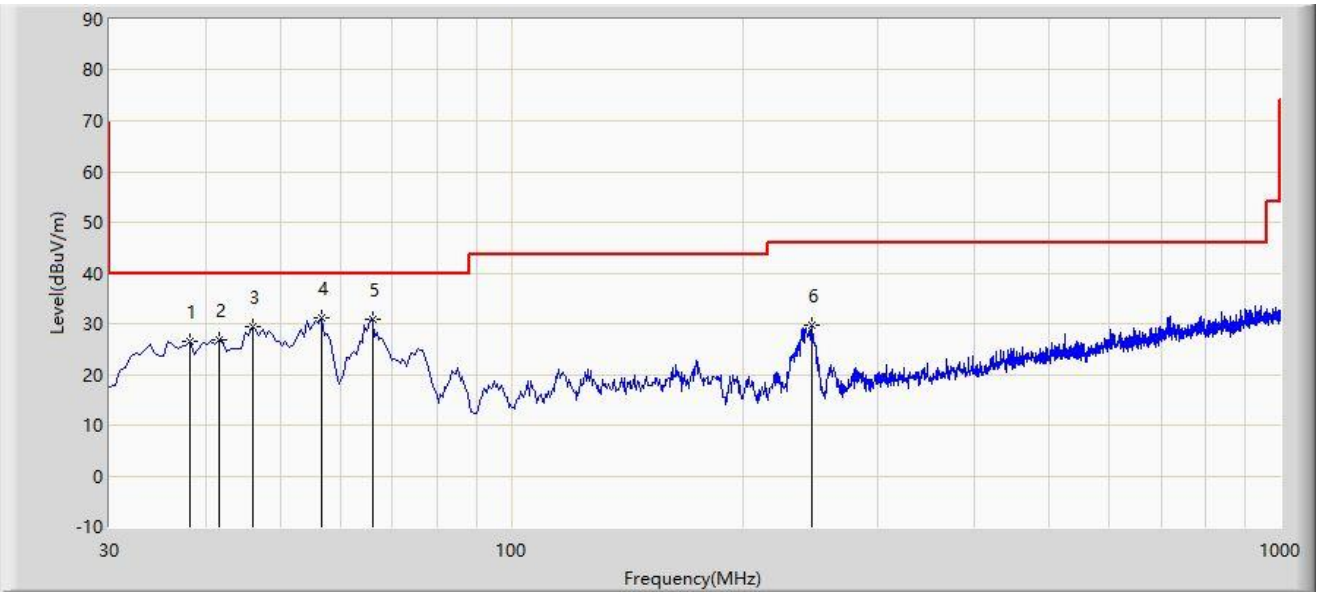
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: QP measurement was not performed when peak measure level was lower than the QP limit.

Note 3: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Site: WZ-AC1	Time: 2022/04/10 - 15:06
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_VULB 9168 _30-1000MHz	Polarity: Vertical
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			38.245	26.581	9.087	-13.419	40.000	17.495	PK
2			41.640	26.822	8.816	-13.178	40.000	18.006	PK
3			46.005	29.278	10.505	-10.722	40.000	18.773	PK
4		*	56.675	31.139	13.079	-8.861	40.000	18.060	PK
5			65.890	30.875	14.122	-9.125	40.000	16.753	PK
6			245.825	29.799	13.582	-16.201	46.000	16.217	PK

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

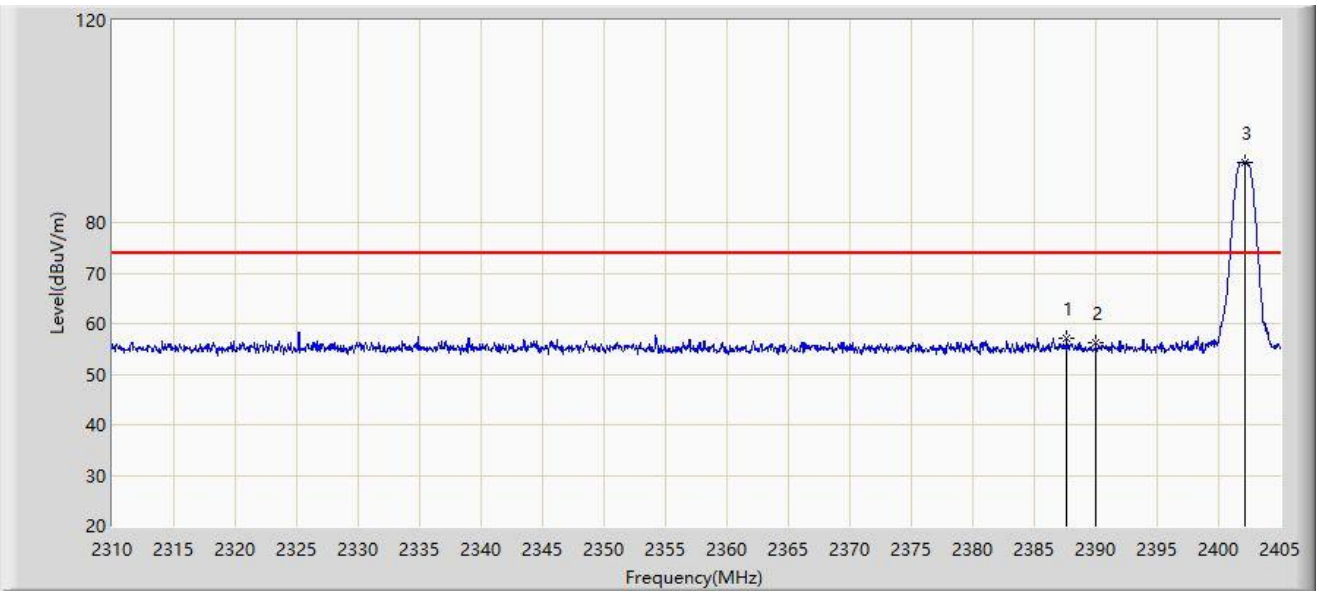
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: QP measurement was not performed when peak measure level was lower than the QP limit.

Note 3: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

A.7 Radiated Restricted Band Edge Test Result

Site: WZ-AC1	Time: 2022/04/10 - 13:23
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2402MHz	

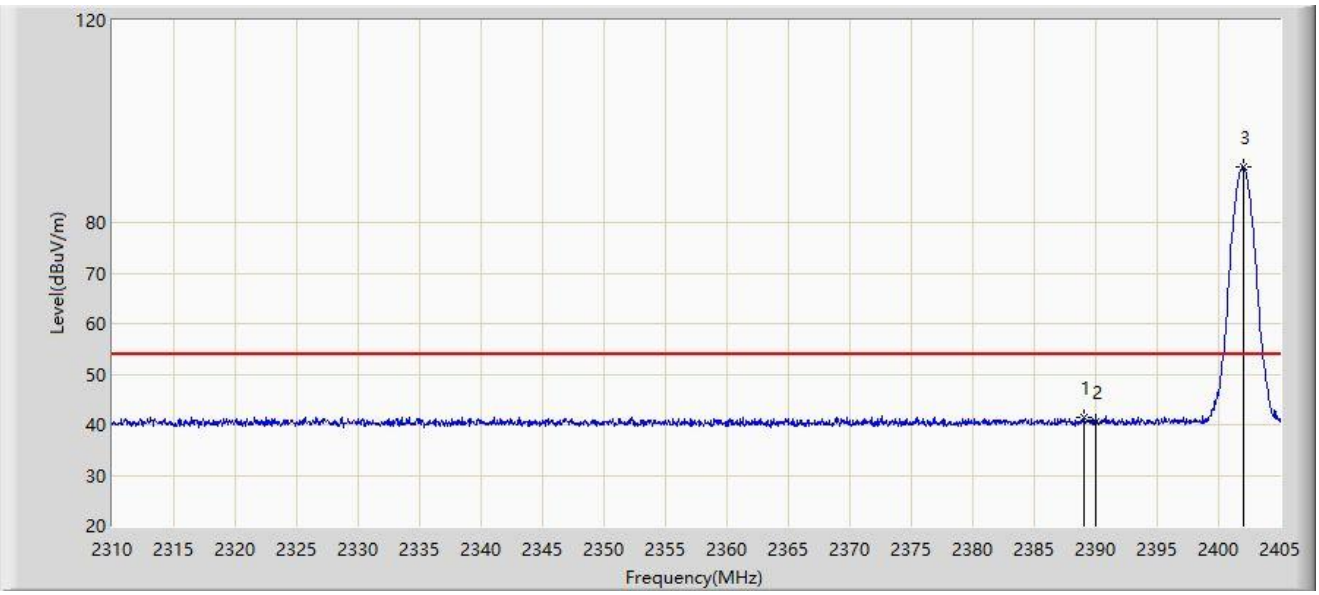


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			2387.663	57.106	26.293	-16.894	74.000	30.813	PK
2			2390.000	56.347	25.531	-17.653	74.000	30.816	PK
3		*	2402.103	92.017	61.178	N/A	N/A	30.839	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:26
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2402MHz	

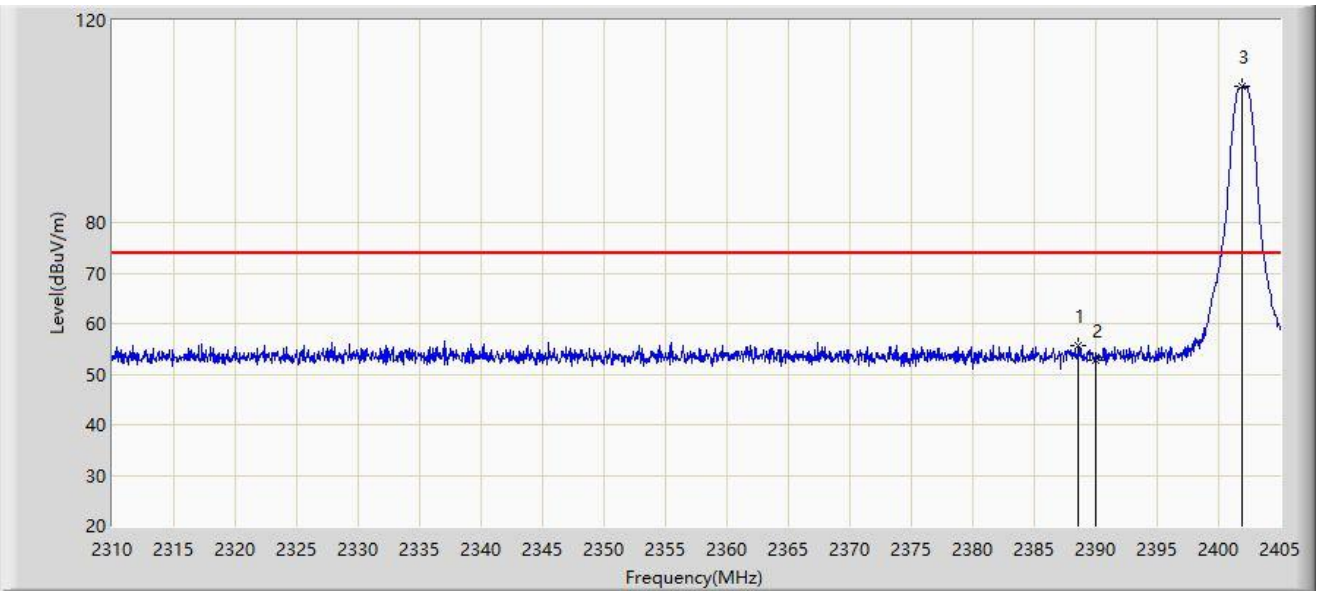


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			2389.040	41.553	10.738	-12.447	54.000	30.815	AV
2			2390.000	40.461	9.645	-13.539	54.000	30.816	AV
3		*	2402.008	90.944	60.105	N/A	N/A	30.839	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:30
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2402MHz	

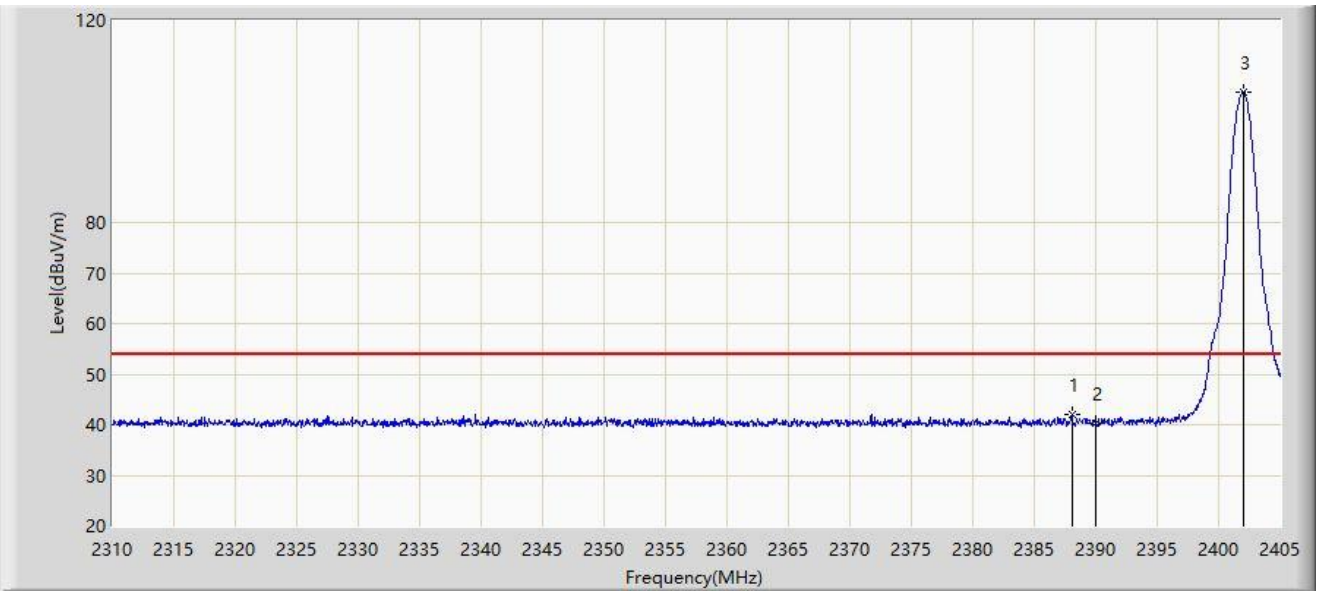


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			2388.613	55.783	24.969	-18.217	74.000	30.814	PK
2			2390.000	52.631	21.815	-21.369	74.000	30.816	PK
3		*	2401.960	106.937	76.098	N/A	N/A	30.839	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2402MHz	

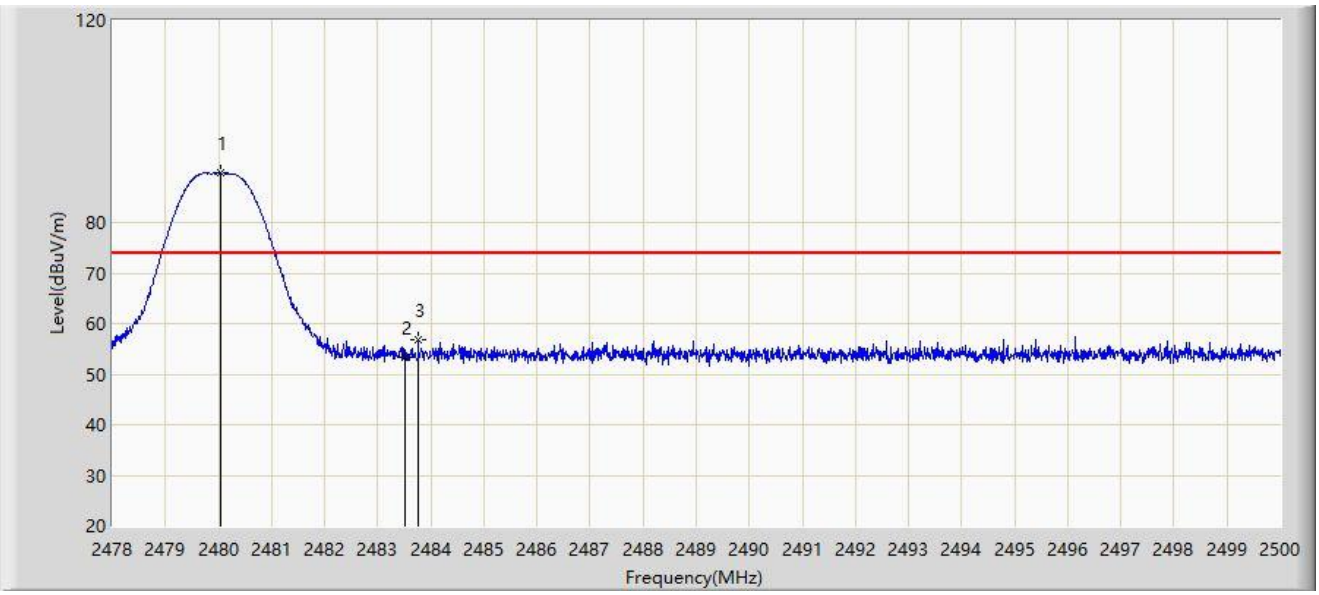


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1			2388.042	41.908	11.094	-12.092	54.000	30.814	AV
2			2390.000	40.157	9.341	-13.843	54.000	30.816	AV
3		*	2402.055	105.770	74.931	N/A	N/A	30.839	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:36
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2480MHz	

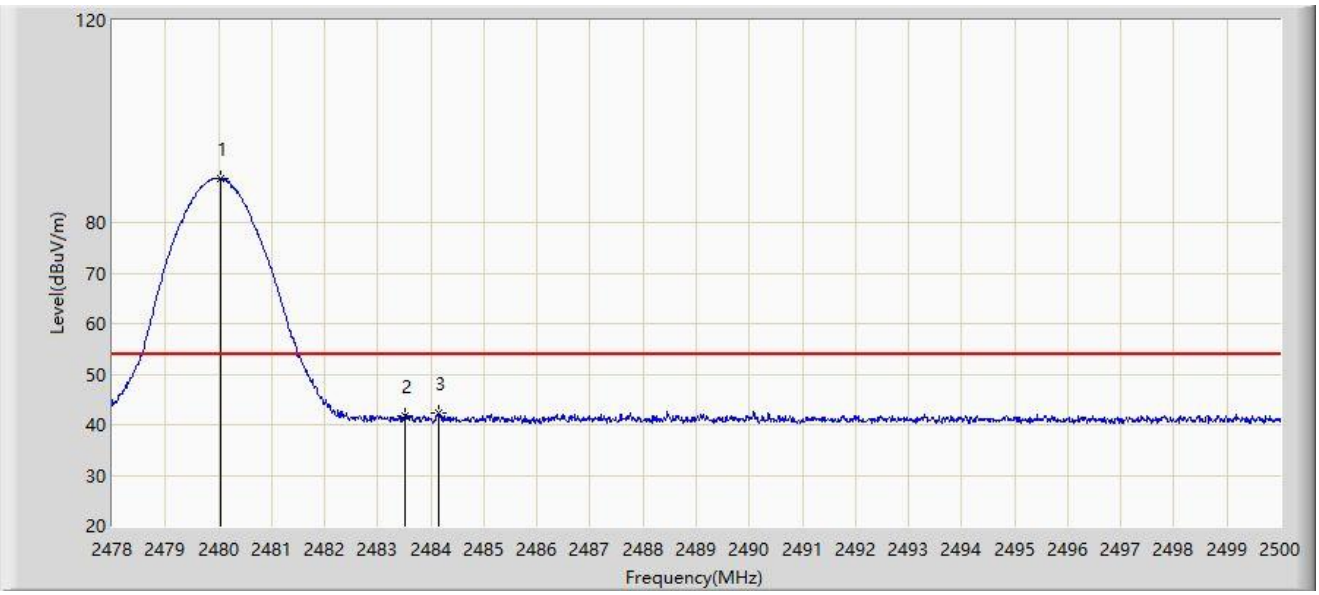


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		*	2480.046	89.828	58.822	N/A	N/A	31.006	PK
2			2483.500	53.444	22.423	-20.556	74.000	31.021	PK
3			2483.764	56.837	25.815	-17.163	74.000	31.022	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2480MHz	

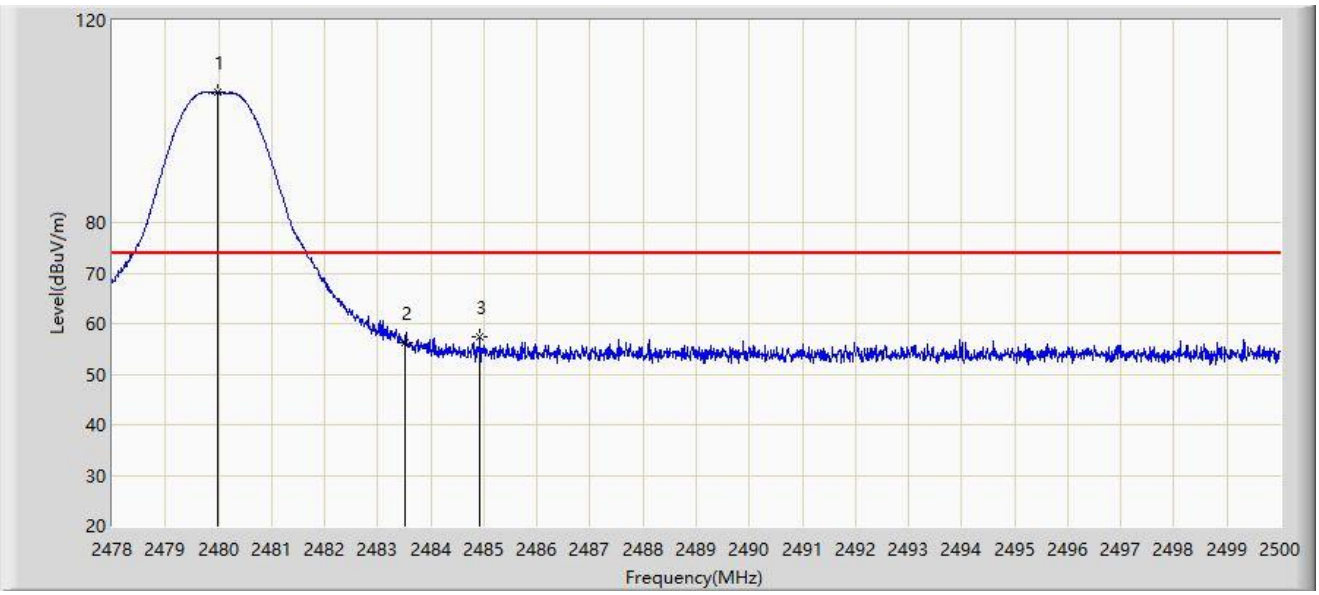


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		*	2480.046	88.635	57.629	N/A	N/A	31.006	AV
2			2483.500	41.731	10.710	-12.269	54.000	31.021	AV
3			2484.160	42.233	11.209	-11.767	54.000	31.023	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:44
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2480MHz	

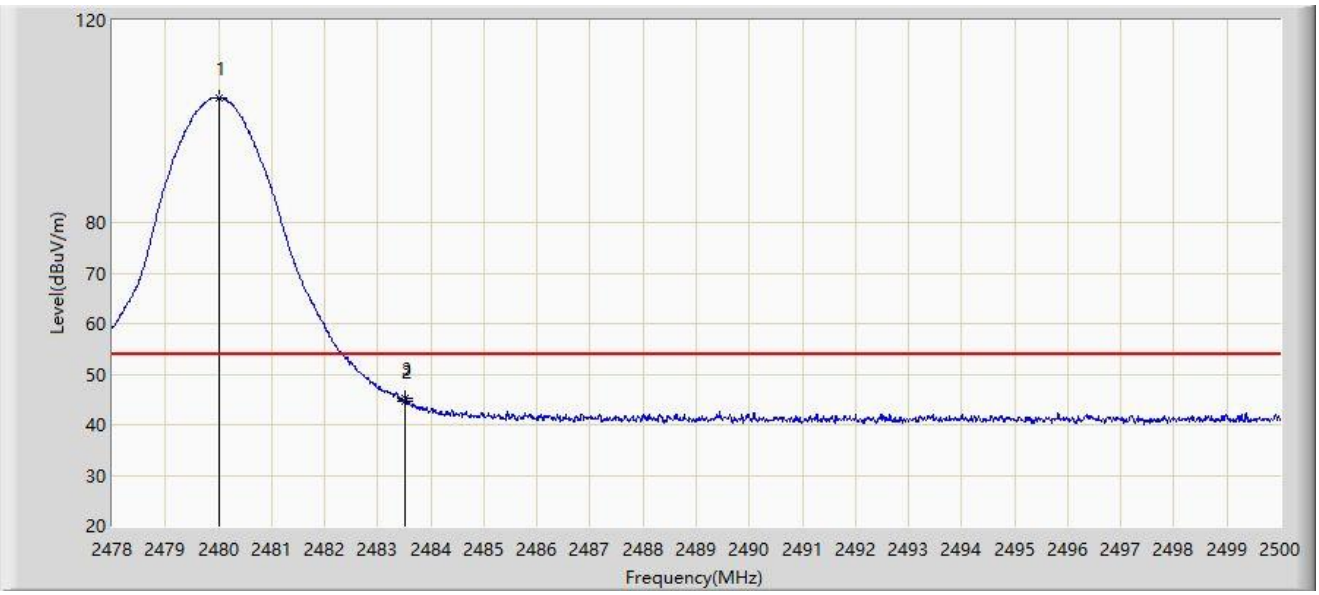


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		*	2479.991	105.916	74.910	N/A	N/A	31.005	PK
2			2483.500	56.099	25.078	-17.901	74.000	31.021	PK
3			2484.919	57.495	26.468	-16.505	74.000	31.027	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: WZ-AC1	Time: 2022/04/10 - 13:48
Limit: FCC_Part15.209_RE(3m)	Engineer: Charles Zhang
Probe: WZ-AC1_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2480MHz	



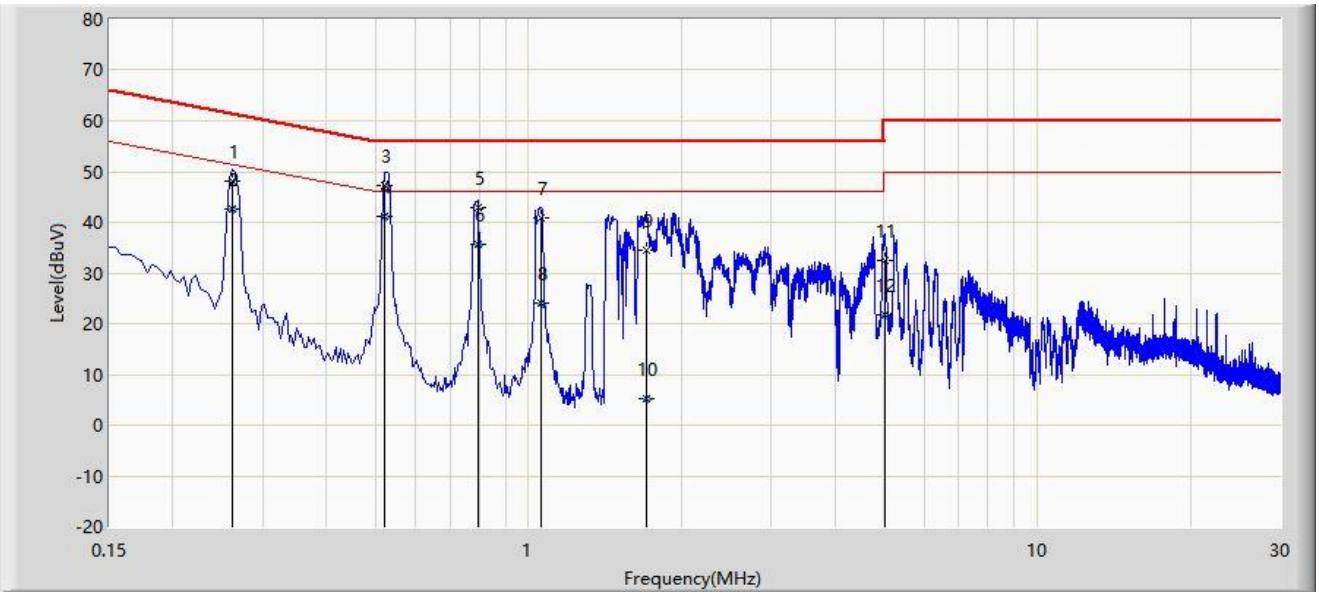
No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		*	2480.024	104.742	73.736	N/A	N/A	31.006	AV
2			2483.500	44.645	13.624	-9.355	54.000	31.021	AV
3			2483.522	45.196	14.175	-8.804	54.000	31.021	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

A.8 AC Conducted Emissions Test Result

Site: WZ-SR2	Time: 2022/04/12 - 09:37
Temperature: 21.8°C	Humidity: 50.7%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Helen Han
Probe: ENV216_101683_Filter Off_E	Polarity: Line
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2440MHz	

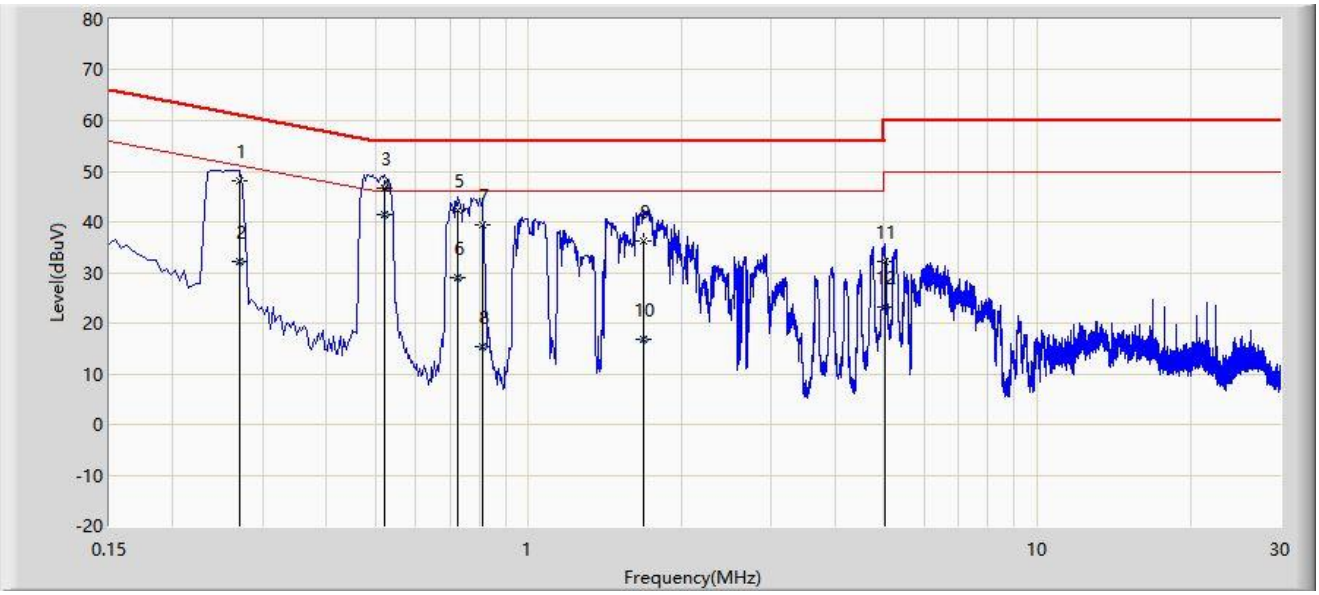


No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1			0.262	48.203	38.300	-13.164	61.368	9.904	QP
2			0.262	42.621	32.718	-8.746	51.368	9.904	AV
3			0.522	47.137	37.215	-8.863	56.000	9.921	QP
4		*	0.522	41.285	31.364	-4.715	46.000	9.921	AV
5			0.794	42.782	32.847	-13.218	56.000	9.935	QP
6			0.794	35.771	25.836	-10.229	46.000	9.935	AV
7			1.058	40.738	30.787	-15.262	56.000	9.951	QP
8			1.058	24.119	14.168	-21.881	46.000	9.951	AV
9			1.710	34.450	24.486	-21.550	56.000	9.964	QP
10			1.710	5.356	-4.608	-40.644	46.000	9.964	AV
11			5.030	32.428	21.907	-27.572	60.000	10.521	QP
12			5.030	21.805	11.283	-28.195	50.000	10.521	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Site: WZ-SR2	Time: 2022/04/12 - 10:23
Temperature: 21.8°C	Humidity: 50.7%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Helen Han
Probe: ENV216_101683_Filter Off_E	Polarity: Neutral
EUT: LTE Module	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at Channel 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1			0.270	48.079	38.165	-13.039	61.118	9.914	QP
2			0.270	32.104	22.189	-19.014	51.118	9.914	AV
3			0.522	46.699	36.767	-9.301	56.000	9.932	QP
4		*	0.522	41.446	31.514	-4.554	46.000	9.932	AV
5			0.726	42.342	32.393	-13.658	56.000	9.949	QP
6			0.726	28.968	19.019	-17.032	46.000	9.949	AV
7			0.810	39.554	29.601	-16.446	56.000	9.953	QP
8			0.810	15.418	5.465	-30.582	46.000	9.953	AV
9			1.682	36.248	26.268	-19.752	56.000	9.981	QP
10			1.682	16.934	6.953	-29.066	46.000	9.981	AV
11			5.018	32.070	21.539	-27.930	60.000	10.531	QP
12			5.018	23.051	12.520	-26.949	50.000	10.531	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Appendix B - Test Setup Photograph

Refer to “2203RSU034-UT” file.

Appendix C - EUT Photograph

Refer to “2203RSU034-UE” file.

The End