

MEASUREMENT REPORT

FCC PART 15.247 / Bluetooth-LE

FCC ID: 2AXD8-BLUECONTROL
APPLICANT: Suzhou EICCOMM Technology CO., Ltd.

Application Type: Certification
Product: BLE Controller
Model No.: LCBLUECONTROL/W
Serial Model No.: LCBLUECONTROL/SS/W
Brand Name: RAB
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part15 Subpart C (Section 15.247)
Test Procedure(s): ANSI C63.10-2013
Test Date: December 16, 2020 ~ February 05, 2021

Reviewed By: Sherry Jiang
Sherry Jiang
Approved By: Robin Wu
Robin Wu



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
2012RSU046-U2	Rev. 01	Initial Report	02-22-2021	Valid

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1. General Information

1.1. Applicant

Suzhou EICCOMM Technology CO., Ltd.

Room 304, Building 4, Zhuyuan Road 209, GAOXIN District, Suzhou, Jiangsu Province, China

1.2. Manufacturer

RAB LIGHTING INC

170 Ludlow Ave, PO BOX 970, Northvale, NJ 07647-2305 USA

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 FCC: CN1166 VCCI: R-20025, G-20034, C-20020, T-20020
	CNAS: L10551 ISED: CN0001
☐	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 FCC: CN1284
	CNAS: L10551 ISED: CN0105
☐	Test Site – MRT Taiwan Laboratory
	Laboratory Location (Taiwan) No. 38, Fuxing 2 nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: L3261-190725 FCC: 291082, TW3261
	ISED: TW3261

2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

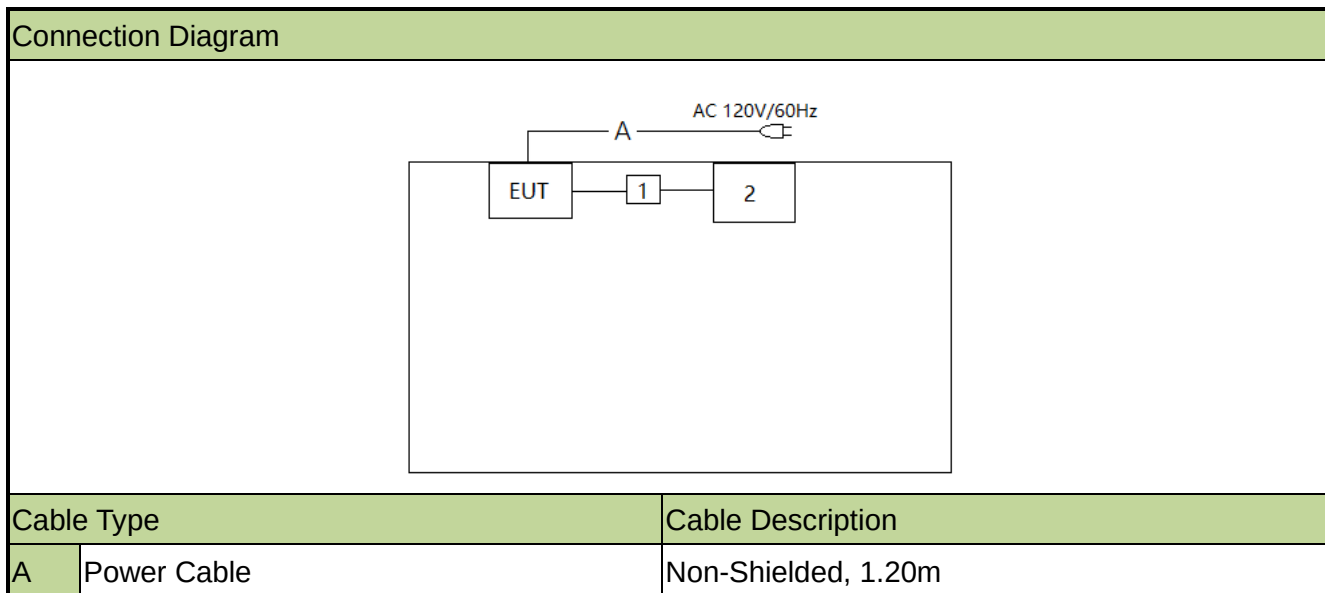
Product Name	BLE Controller
Model No.	LCBLUECONTROL/W
Serial Model No.	LCBLUECONTROL/SS/W
Serial No.	20201214Sample#03
Brand Name	RAB
Hardware Version	3.0
Software Version	V1.0.0
Power Supply	Input :120-277Vac 50/60Hz
Operating Temp.	-40°C to +50°C
Bluetooth Version	v5.0 single mode, LE only
Remark	LCBLUECONTROL/SS/W has 3 more lines than LCBLUECONTROL/W, used to adjust the color of the product, the other parts are the same.

2.2. Product Specification Subjective to this Report

Bluetooth Frequency	2402~2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	Up to 2Mbps
Antenna Type	External PCB Antenna
Antenna Gain	2dBi

2.3. Test Configuration

The EUT was tested per the guidance FCC Part 15 Subpart C: 2020 and ANSI C63.10:2013 which used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.



2.4. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.
1	Console	Telink
2	PC	Lenovo
		ThinkPad X240

2.5. Working Frequencies for this Report

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	--	--	--	--

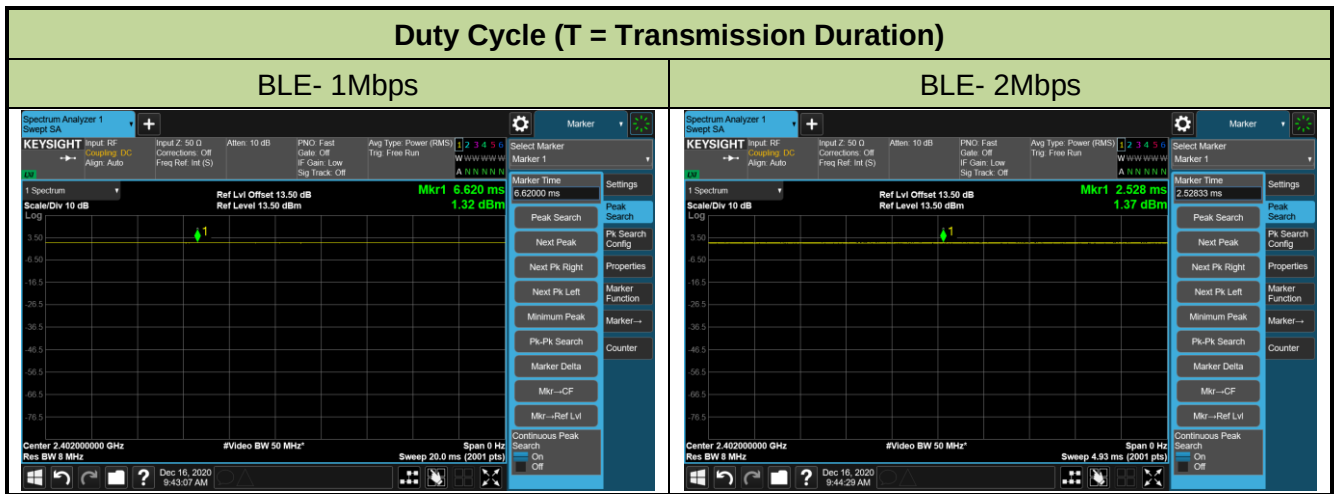
2.6. Test Mode

Test Mode	Mode 1: Transmit by BLE-1Mbps
	Mode 2: Transmit by BLE-2Mbps

2.7. Duty Cycle

The maximum achievable duty cycles were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
BLE- 1Mbps	100%
BLE- 2Mbps	100%



2.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.9. Description of Test Software

The test utility software used during testing was “EMI_TEST_TOOL”, and the version was v1.8.

2.10. Test Environment Condition

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

3. 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.”

- The antenna of the device is **permanently attached**.

Conclusion:

The unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission (WZ-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/01/12
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Conducted Emission (SIP-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06621	1 year	2021/12/03

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/04
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/08/08
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/09/27
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/05/26
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2021/10/25
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2021/12/08
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Radiated Emission (SIP-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06645	1 year	2021/08/30
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2021/08/30
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2021/11/09
Thermal Hygrometer	testo	608-H1	MRTSUE06620	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2021/12/24

Radiated Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
MXA Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/09/26
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2021/08/30
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06648	1 year	2021/11/26
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06599	1 year	2021/11/26
Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2021/11/09
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2021/10/12
Thermal Hygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/24

Radiated Emission (SIP-AC3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06647	1 year	2021/08/08
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2021/09/13
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06598	1 year	2021/11/26
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2022/01/15
Preamplifier	EMCI	EMC184045SE	MRTSUE06641	1 year	2022/01/15
Thermal Hygrometer	testo	608-H1	MRTSUE06622	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2021/12/24

Conducted Test Equipment (WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022/01/07
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/18
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/08/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/08/08
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
Modulation Analyzer	HP	HP8901A	MRTSUE06098	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermal Hygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Conducted Test Equipment (SIP-SR5)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
USB wideband power sensor	Agilent	U2021XA	MRTSUE06595	1 year	2021/09/26
USB wideband power sensor	Agilent	U2021XA	MRTSUE06596	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2021/03/31
Thermal Hygrometer	testo	622	MRTSUE06629	1 year	2020/12/30

Software	Version	Function
EMI Software	V3	EMI Test Software

5. 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% ($U=2U_c(y)$): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 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% ($U=2U_c(y)$): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.28%

6. TEST RESULT

6.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 6.2
15.247(b)(3)	Output Power	$\leq 1\text{Watt}$		Pass	Section 6.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz}$		Pass	Section 6.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\geq 20\text{dBc (Peak)}$		Pass	Section 6.5
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 6.6 Section 6.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits >	Line Conducted	N/A	Section 6.8

Notes:

- 1) 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.
- 2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
- 3) "N/A" means that the test item is not applicable, and the detailed information refers to relevant section.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

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

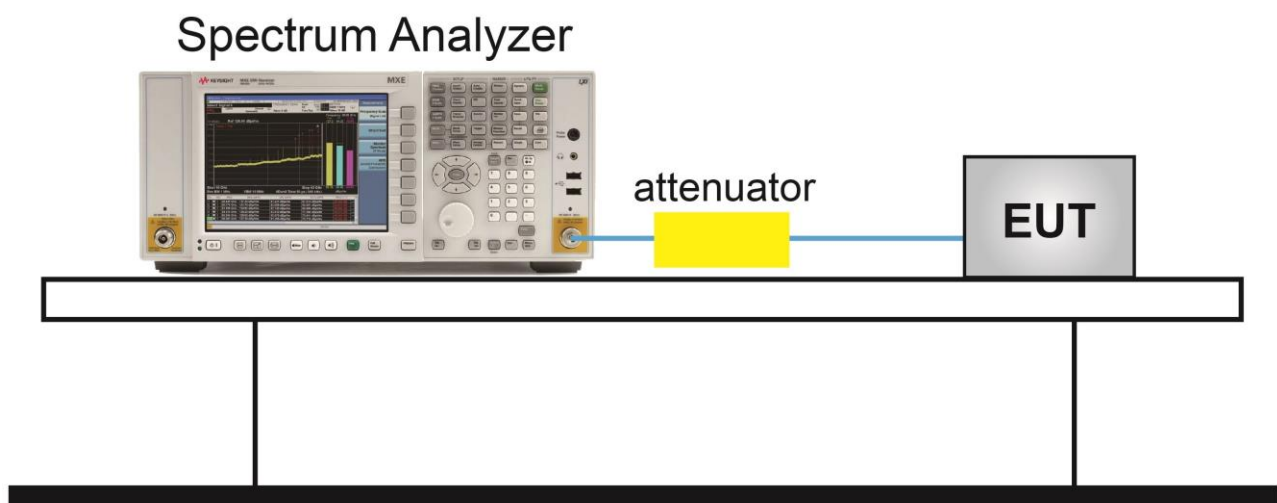
6.2.2. Test Procedure used

ANSI C63.10-2013 - Section 11.8

6.2.3. 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. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

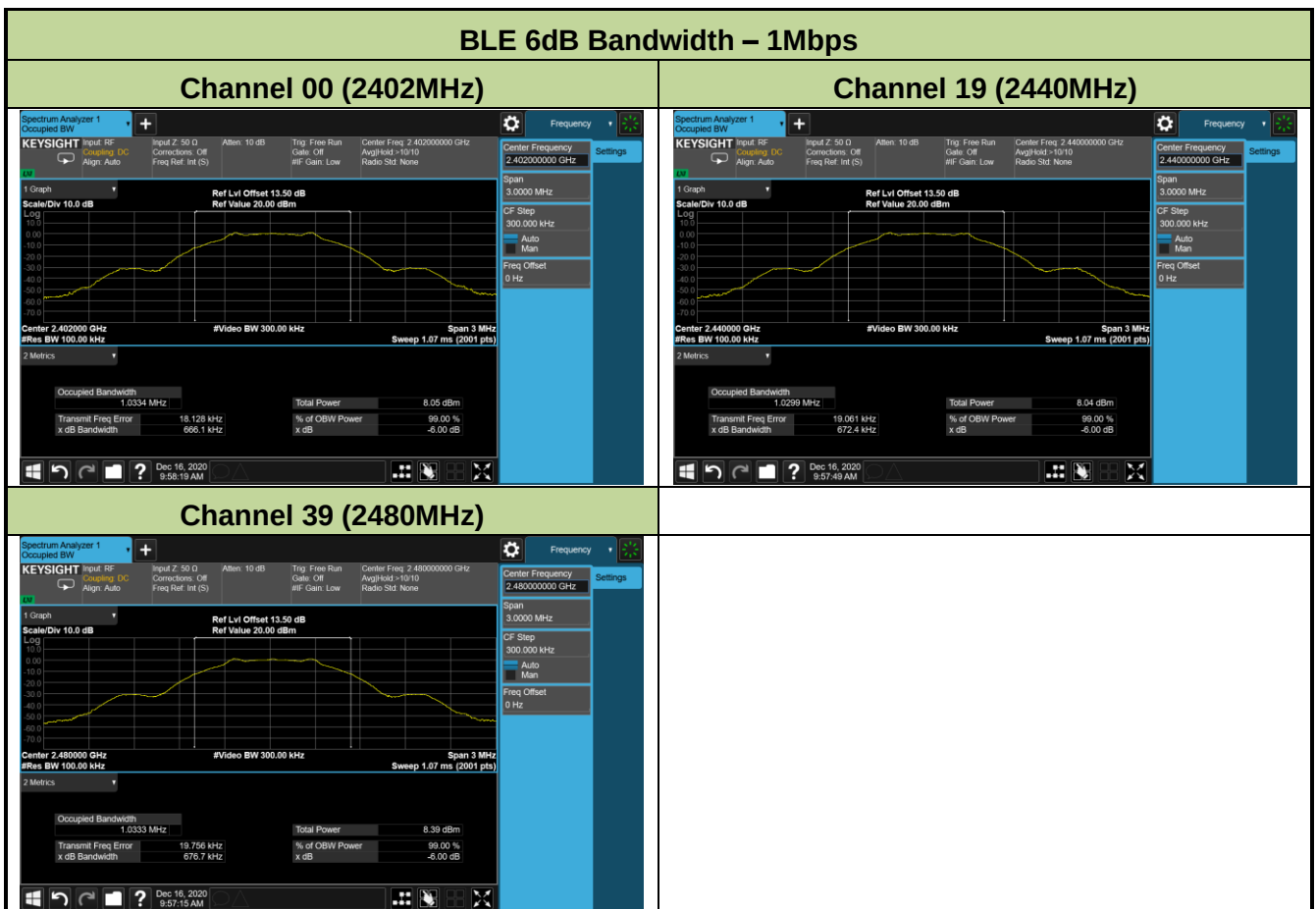
6.2.4. Test Setup



6.2.5. Test Result

Test Site	SIP-TR2	Test Engineer	Chase Zhu
Test Date	2020/12/16		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.666	≥ 0.5	Pass
BLE	1	19	2440	0.672	≥ 0.5	Pass
BLE	1	39	2480	0.677	≥ 0.5	Pass
BLE	2	00	2402	1.396	≥ 0.5	Pass
BLE	2	19	2440	1.378	≥ 0.5	Pass
BLE	2	39	2480	1.339	≥ 0.5	Pass



BLE 6dB Bandwidth – 2Mbps

Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



6.3. Output Power Measurement

6.3.1. Test Limit

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

6.3.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.9.1.3

ANSI C63.10-2013 - Section 11.9.2.3.2

6.3.3. Test Setting

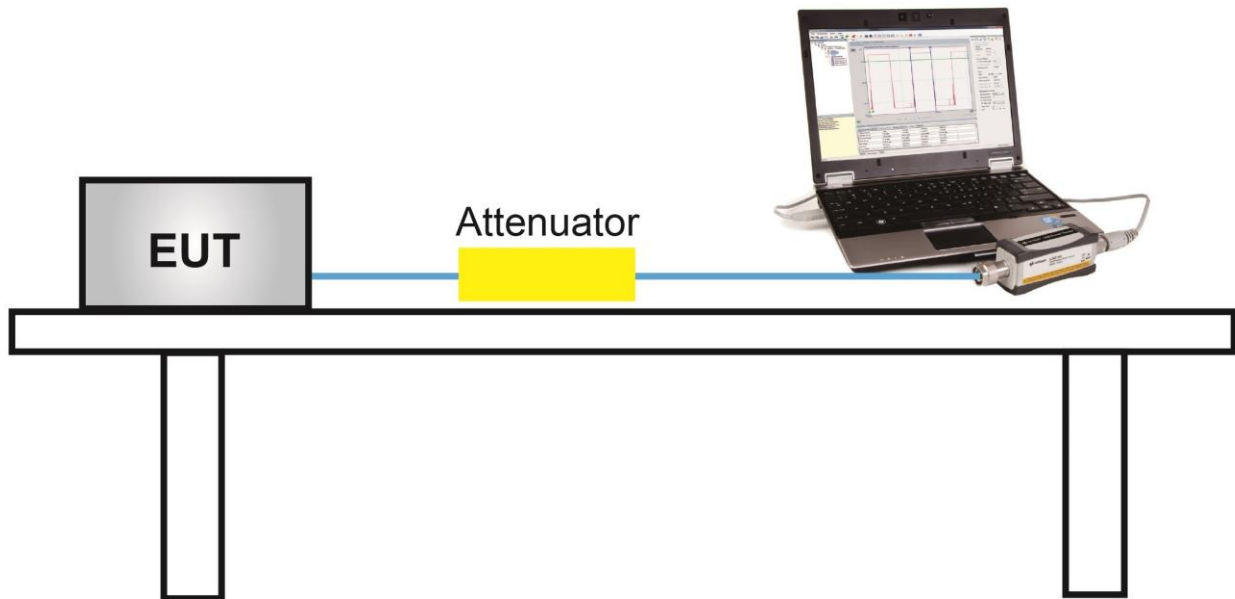
Method PKPM1 (Peak Power Measurement)

Peak 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 pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Method AVGPM-G (Measurement using a gated RF average-reading power meter)

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

6.3.4. Test Setup



6.3.5. Test Result of Output Power

Test Site	SIP-TR2	Test Engineer	Chase Zhu
Test Date	2020/12/16		

Test Result of Peak Output Power

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	1.64	≤ 30.00	Pass
BLE	1	19	2440	1.67	≤ 30.00	Pass
BLE	1	39	2480	1.85	≤ 30.00	Pass
BLE	2	00	2402	1.65	≤ 30.00	Pass
BLE	2	19	2440	1.71	≤ 30.00	Pass
BLE	2	39	2480	1.83	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	1.32	≤ 30.00	Pass
BLE	1	19	2440	1.34	≤ 30.00	Pass
BLE	1	39	2480	1.53	≤ 30.00	Pass
BLE	2	00	2402	1.34	≤ 30.00	Pass
BLE	2	19	2440	1.35	≤ 30.00	Pass
BLE	2	39	2480	1.54	≤ 30.00	Pass

6.4. Power Spectral Density Measurement

6.4.1. 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.

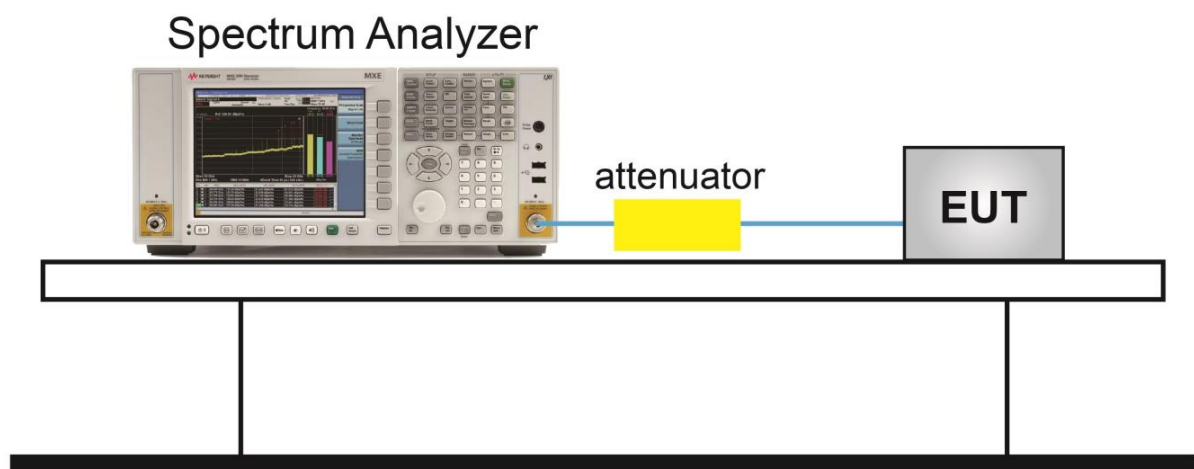
6.4.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.10.2

6.4.3. Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the OBW
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = Peak
6. Sweep time = Auto couple
7. Trace mode = Max hold
8. Allow the trace to stabilize

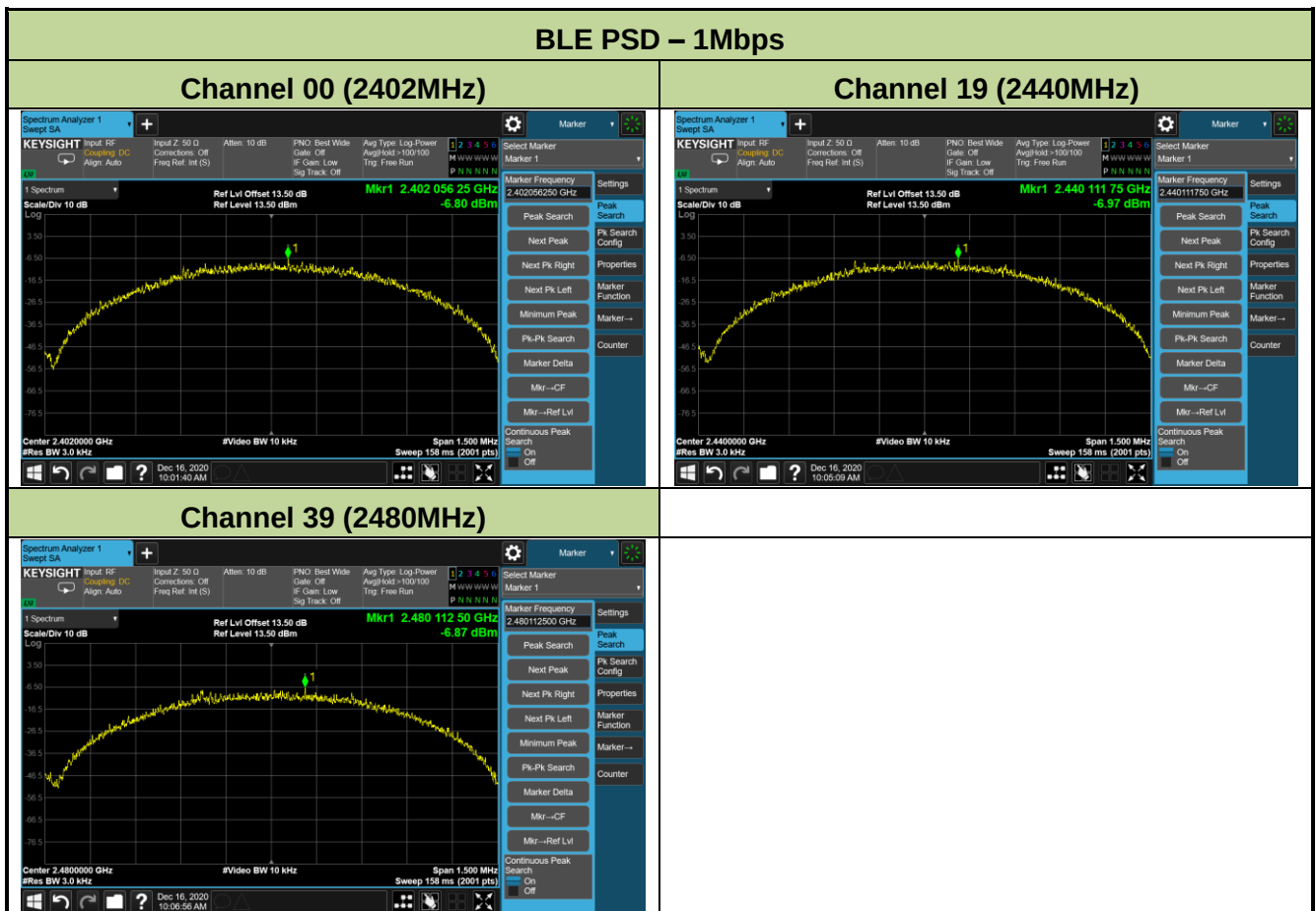
6.4.4. Test Setup



6.4.5. Test Result

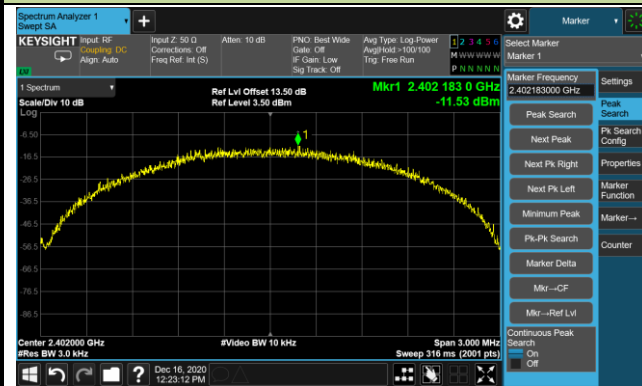
Test Site	SIP-TR2	Test Engineer	Chase Zhu
Test Date	2020/12/16		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-6.80	≤ 8.00	Pass
BLE	1	19	2440	-6.97	≤ 8.00	Pass
BLE	1	39	2480	-6.87	≤ 8.00	Pass
BLE	2	00	2402	-11.53	≤ 8.00	Pass
BLE	2	19	2440	-11.11	≤ 8.00	Pass
BLE	2	39	2480	-10.58	≤ 8.00	Pass

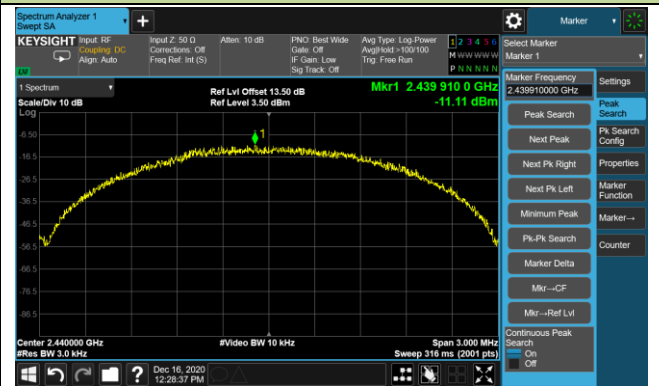


BLE PSD – 2Mbps

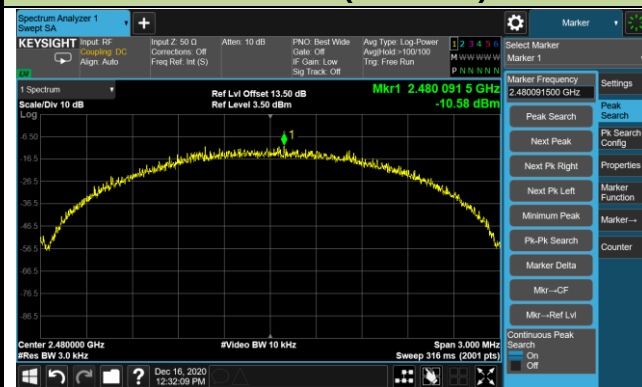
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



6.5. Conducted Band Edge and Out-of-Band Emissions

6.5.1. 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 100kHz bandwidth per the PSD procedure.

6.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.11

6.5.3. Test Setting

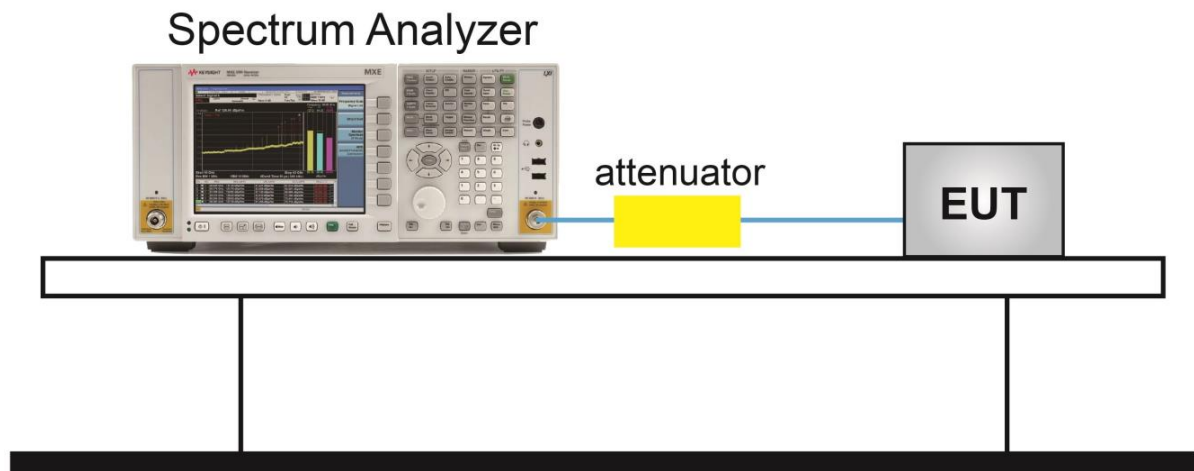
Reference level measurement

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 $\geq 3 \times$ RBW
5. Detector = Peak
6. Sweep time = Auto couple
7. Trace mode = Max hold
8. Allow the trace to 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. Allow the trace to stabilize

6.5.4. Test Setup



6.5.5. Test Result

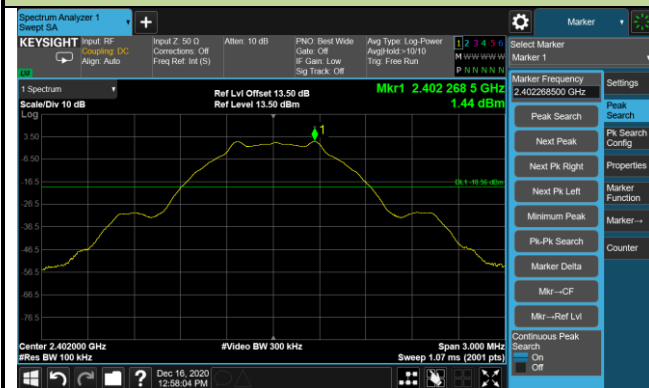
Test Site	SIP-TR2	Test Engineer	Chase Zhu
Test Date	2020/12/16		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
BLE	1	00	2402	20dBc	Pass
BLE	1	19	2440	20dBc	Pass
BLE	1	39	2480	20dBc	Pass
BLE	2	00	2402	20dBc	Pass
BLE	2	19	2440	20dBc	Pass
BLE	2	39	2480	20dBc	Pass

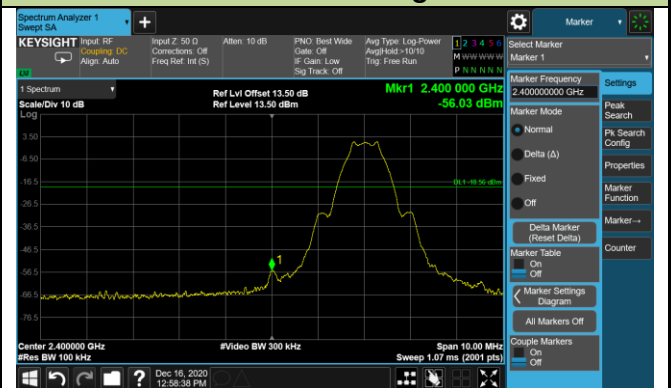
BLE Out-of-Band Emissions – 1Mbps

Channel 00 (2402MHz)

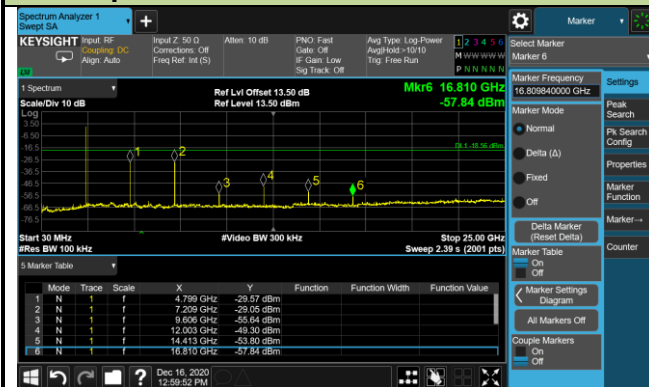
100kHz PSD reference Level



Low Band Edge

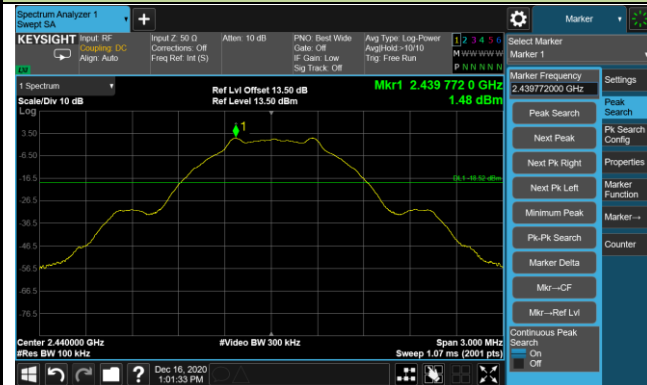


Spurious Emission 30MHz ~ 25GHz

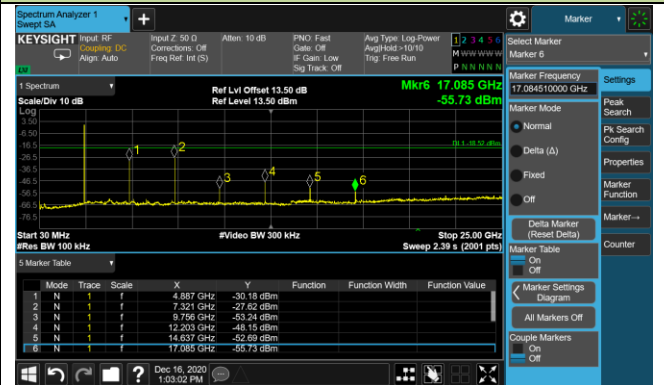


Channel 19 (2440MHz)

100kHz PSD reference Level

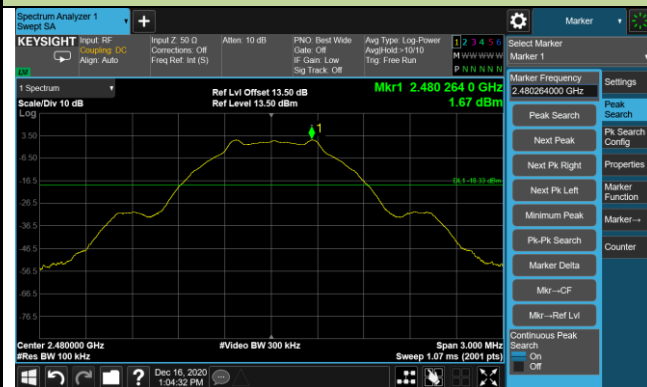


Spurious Emission 30MHz ~ 25GHz

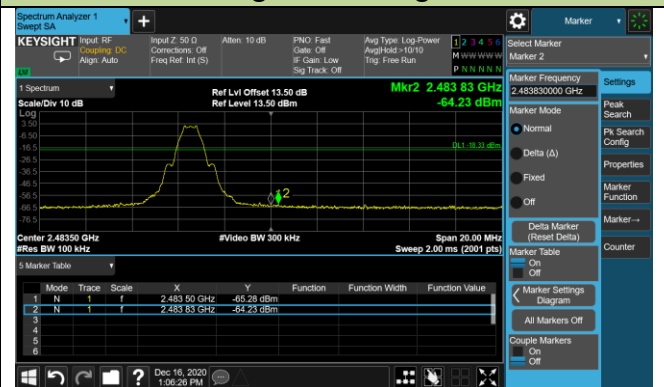


Channel 39 (2480MHz)

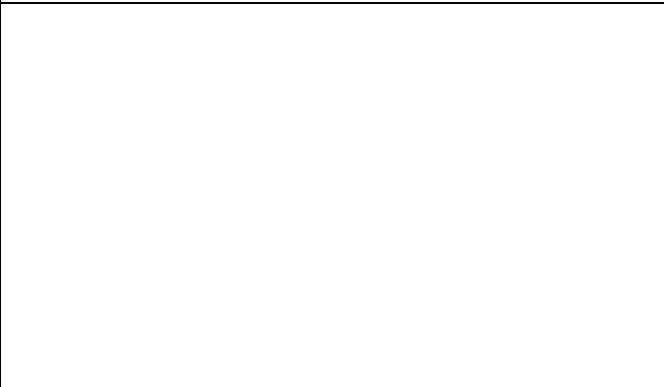
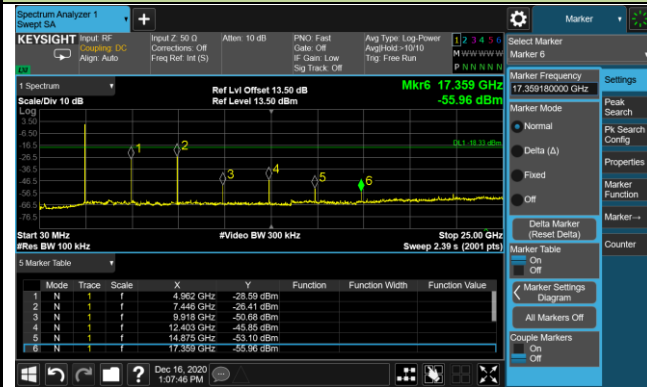
100kHz PSD reference Level



High Band Edge



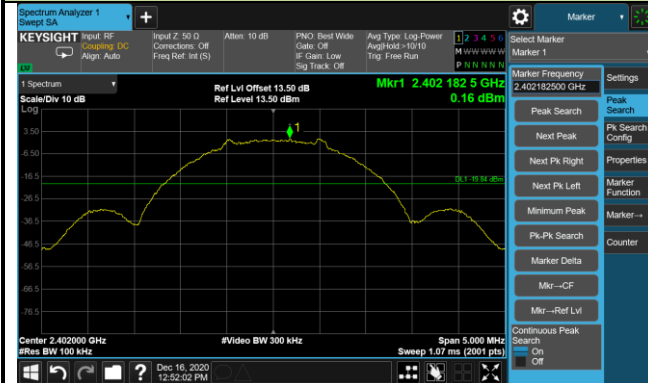
Spurious Emission 30MHz ~ 25GHz



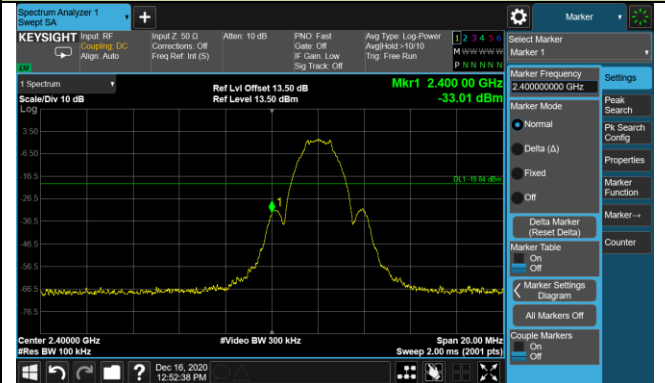
BLE Out-of-Band Emissions – 2Mbps

Channel 00 (2402MHz)

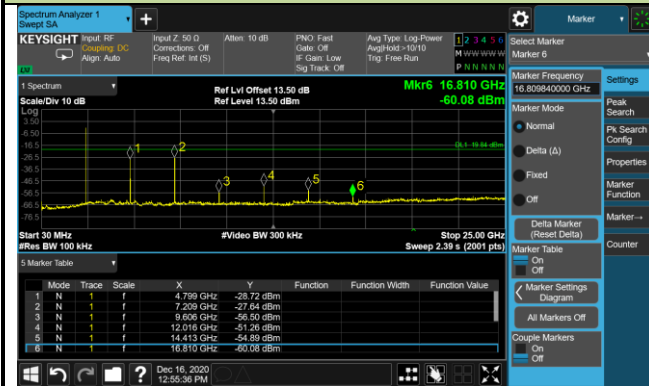
100kHz PSD reference Level



Low Band Edge



Spurious Emission 30MHz ~ 25GHz

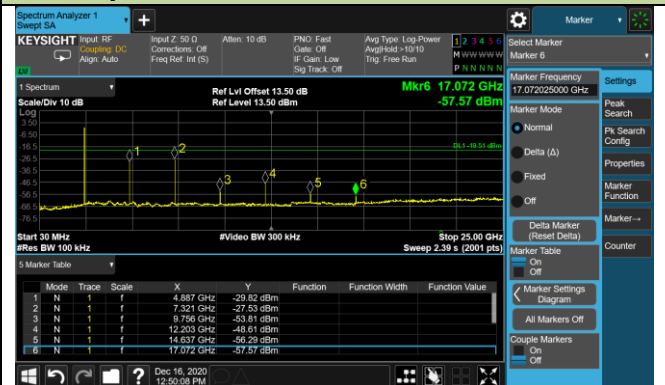


Channel 19 (2440MHz)

100kHz PSD reference Level



Spurious Emission 30MHz ~ 25GHz

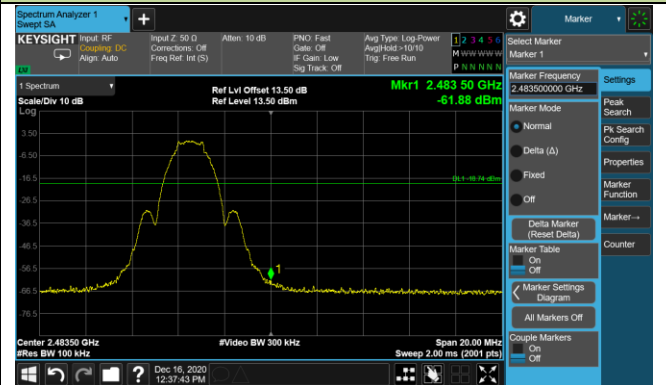


Channel 39 (2480MHz)

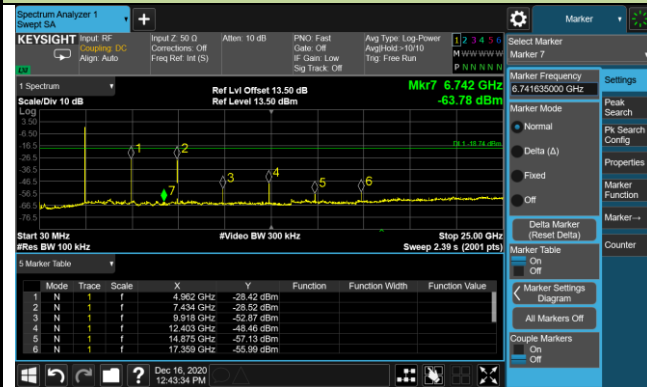
100kHz PSD reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



6.6. Radiated Spurious Emission Measurement

6.6.1. 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 ($\mu\text{V/m}$)	Measured Distance (m)
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

6.6.2. Test Procedure Used

ANSI C63.10-2013 - Section 6.3

ANSI C63.10-2013 - Section 6.4

ANSI C63.10-2013 - Section 6.5

ANSI C63.10-2013 - Section 6.6

6.6.3. 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
> 1000 MHz	1 MHz

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. Allow the trace to stabilize

Peak Measurements above 1GHz

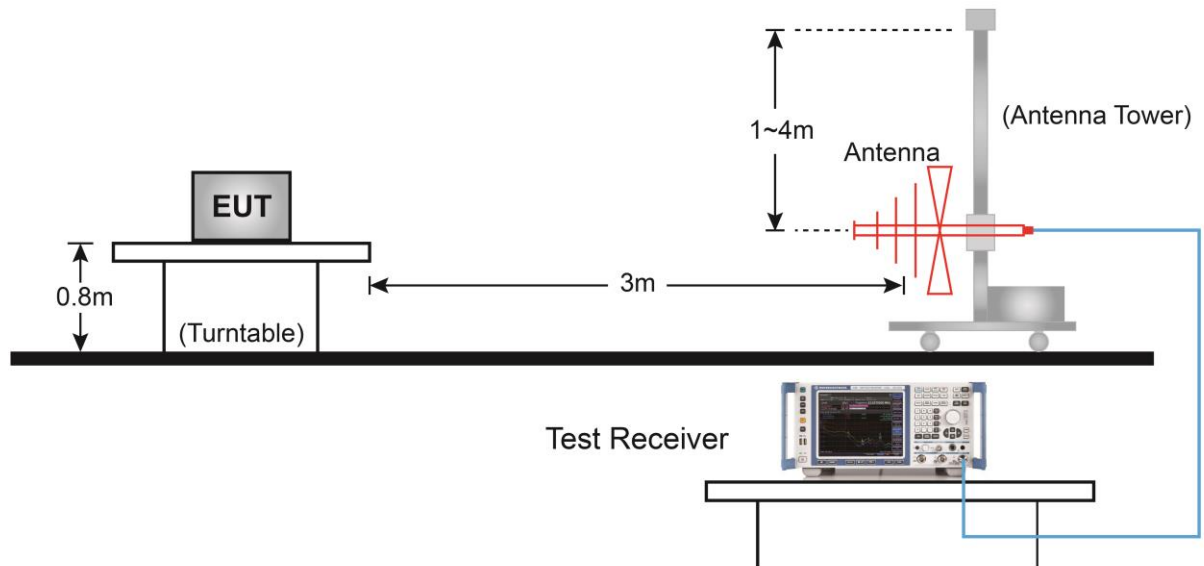
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Allow the trace to stabilize

Average Measurements above 1GHz (Method VB)

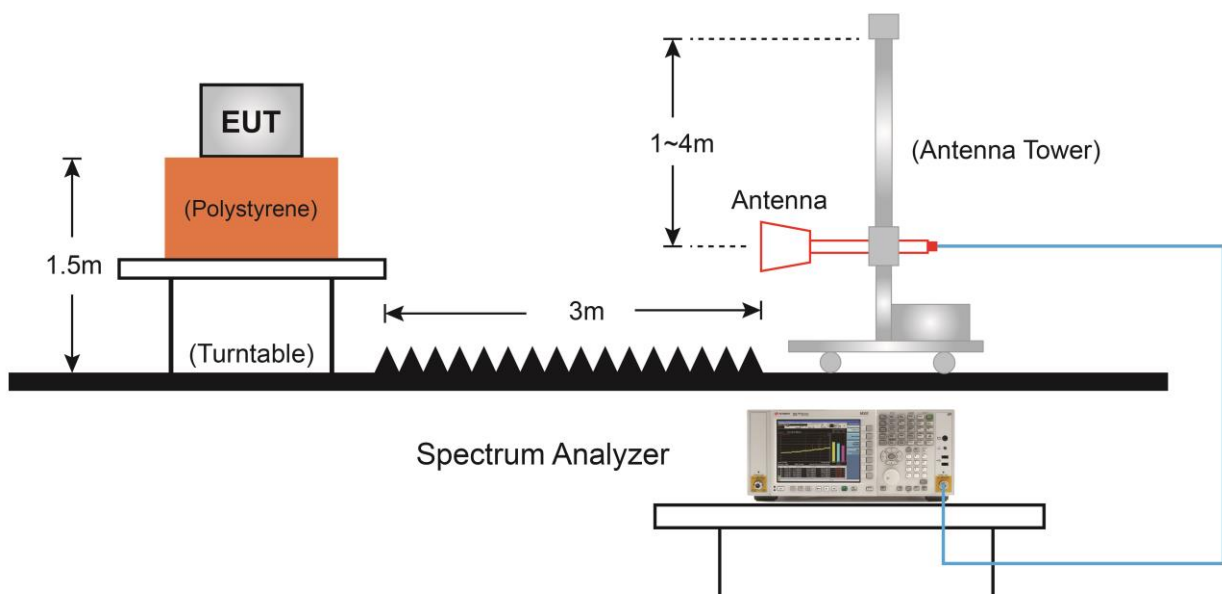
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10Hz
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow the trace to stabilize

6.6.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.6.5. Test Result

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2020/12/24	Test Channel	00
Test Mode	BLE - 1Mbps		
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.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4918.5	53.0	-9.2	43.8	74.0	-30.2	Peak	Horizontal
	8174.0	50.4	-5.0	45.4	74.0	-28.6	Peak	Horizontal
	9704.0	49.4	-3.6	45.8	74.0	-28.2	Peak	Horizontal
*	14141.0	49.2	1.2	50.4	74.0	-23.6	Peak	Horizontal
	6287.0	51.9	-8.4	43.5	74.0	-30.5	Peak	Vertical
*	6644.0	51.6	-7.6	44.0	74.0	-30.0	Peak	Vertical
	11489.0	50.1	-3.1	47.0	74.0	-27.0	Peak	Vertical
	12220.0	50.9	-3.2	47.7	74.0	-26.3	Peak	Vertical

Note 1: "*" means test frequency didn't fall into restricted band.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2020/12/24	Test Channel	19
Test Mode	BLE - 1Mbps		
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.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	5921.5	52.5	-8.8	43.7	74.0	-30.3	Peak	Horizontal
*	6618.5	51.8	-7.6	44.2	74.0	-29.8	Peak	Horizontal
	8174.0	50.4	-5.0	45.4	74.0	-28.6	Peak	Horizontal
	11990.5	49.7	-3.2	46.5	74.0	-27.5	Peak	Horizontal
	6550.5	52.1	-7.9	44.2	74.0	-29.8	Peak	Vertical
*	10401.0	49.5	-2.8	46.7	74.0	-27.3	Peak	Vertical
	11489.0	49.6	-3.1	46.5	74.0	-27.5	Peak	Vertical
	12126.5	50.6	-3.2	47.4	74.0	-26.6	Peak	Vertical

Note 1: "*" means test frequency didn't fall into restricted band.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2020/12/24	Test Channel	39
Test Mode	BLE - 1Mbps		
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.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	5896.0	52.5	-8.8	43.7	74.0	-30.3	Peak	Horizontal
*	6423.0	52.6	-8.4	44.2	74.0	-29.8	Peak	Horizontal
	8471.5	50.6	-4.8	45.8	74.0	-28.2	Peak	Horizontal
	11557.0	51.1	-3.8	47.3	74.0	-26.7	Peak	Horizontal
	7077.5	52.0	-7.0	45.0	74.0	-29.0	Peak	Vertical
*	9695.5	49.3	-3.5	45.8	74.0	-28.2	Peak	Vertical
	10724.0	50.8	-3.3	47.5	74.0	-26.5	Peak	Vertical
	11965.0	50.8	-4.0	46.8	74.0	-27.2	Peak	Vertical

Note 1: "*" means test frequency didn't fall into restricted band.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2020/12/24	Test Channel	00
Test Mode	BLE - 2Mbps		
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.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	6618.5	52.4	-7.6	44.8	74.0	-29.2	Peak	Horizontal
*	10188.5	50.1	-3.1	47.0	74.0	-27.0	Peak	Horizontal
	11591.0	50.6	-3.7	46.9	74.0	-27.1	Peak	Horizontal
	15577.5	48.2	2.6	50.8	74.0	-23.2	Peak	Horizontal
	7732.0	50.9	-5.7	45.2	74.0	-28.8	Peak	Vertical
	11489.0	49.4	-3.1	46.3	74.0	-27.7	Peak	Vertical
	12755.5	49.8	-2.7	47.1	74.0	-26.9	Peak	Vertical
*	13988.0	49.1	0.6	49.7	74.0	-24.3	Peak	Vertical

Note 1: "*" means test frequency didn't fall into restricted band.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2020/12/24	Test Channel	19
Test Mode	BLE - 2Mbps		
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.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	10953.5	50.2	-3.5	46.7	74.0	-27.3	Peak	Horizontal
	12067.0	50.3	-3.4	46.9	74.0	-27.1	Peak	Horizontal
	13979.5	50.4	0.7	51.1	74.0	-22.9	Peak	Horizontal
*	16546.5	47.5	4.3	51.8	74.0	-22.2	Peak	Horizontal
	8293.0	50.4	-4.9	45.5	74.0	-28.5	Peak	Vertical
	10197.0	49.6	-2.9	46.7	74.0	-27.3	Peak	Vertical
*	14005.0	49.0	0.5	49.5	74.0	-24.5	Peak	Vertical
	15781.5	47.7	3.2	50.9	74.0	-23.1	Peak	Vertical

Note 1: "*" means test frequency didn't fall into restricted band.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2020/12/24	Test Channel	39
Test Mode	BLE - 2Mbps		
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.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	5887.5	51.8	-8.9	42.9	74.0	-31.1	Peak	Horizontal
*	6533.5	51.7	-7.9	43.8	74.0	-30.2	Peak	Horizontal
	7723.5	50.9	-6.0	44.9	74.0	-29.1	Peak	Horizontal
	11659.0	50.3	-3.2	47.1	74.0	-26.9	Peak	Horizontal
*	6508.0	54.7	-8.1	46.6	74.0	-27.4	Peak	Vertical
	7077.5	51.8	-7.0	44.8	74.0	-29.2	Peak	Vertical
	8386.5	51.3	-5.0	46.3	74.0	-27.7	Peak	Vertical
	10953.5	50.1	-3.5	46.6	74.0	-27.4	Peak	Vertical

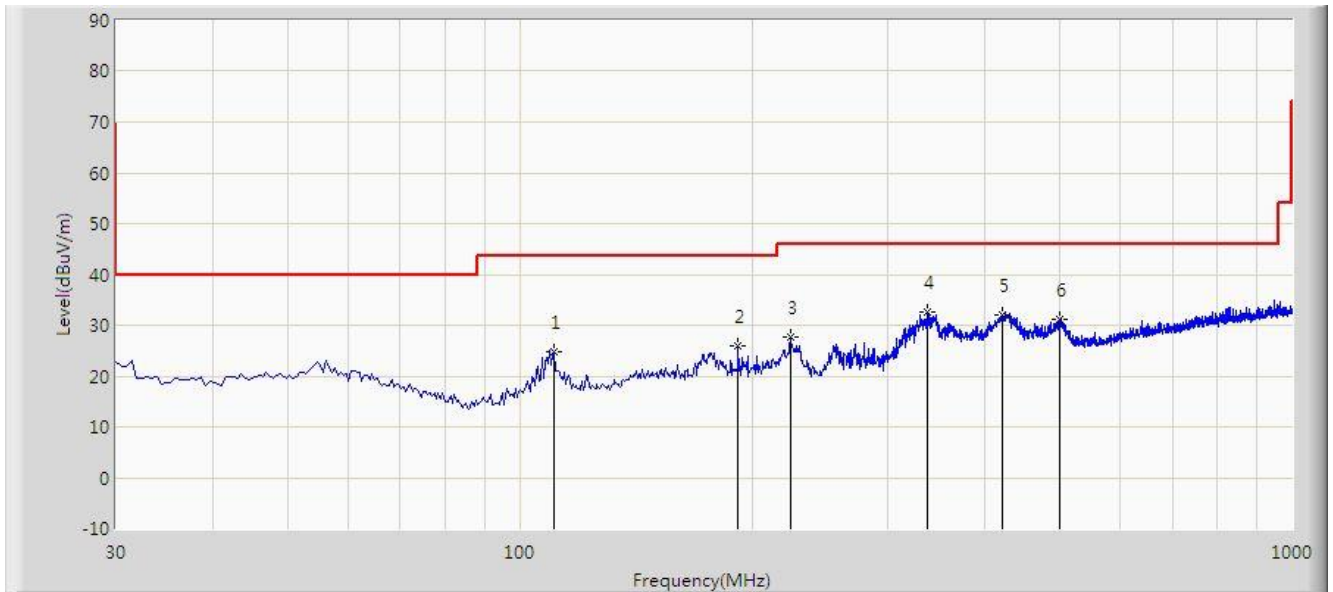
Note 1: "*" means test frequency didn't fall into restricted band.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

The Result of Radiated Emission below 1GHz:

Site: SIP-AC3	Test Date: 2021/01/26
Limit: FCC_Part15.209_RE(3m)	Engineer: White Wang
Probe: SIP-AC3_VULB 9168 _20-2000MHz_4dB	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
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)	Type
1			110.995	24.742	9.962	-18.758	43.500	14.780	PK
2			191.990	25.906	10.717	-17.594	43.500	15.189	PK
3			224.000	27.661	13.229	-18.339	46.000	14.432	PK
4		*	337.490	32.600	13.381	-13.400	46.000	19.219	PK
5			422.365	32.126	10.845	-13.874	46.000	21.280	PK
6			500.450	31.252	8.333	-14.748	46.000	22.919	PK

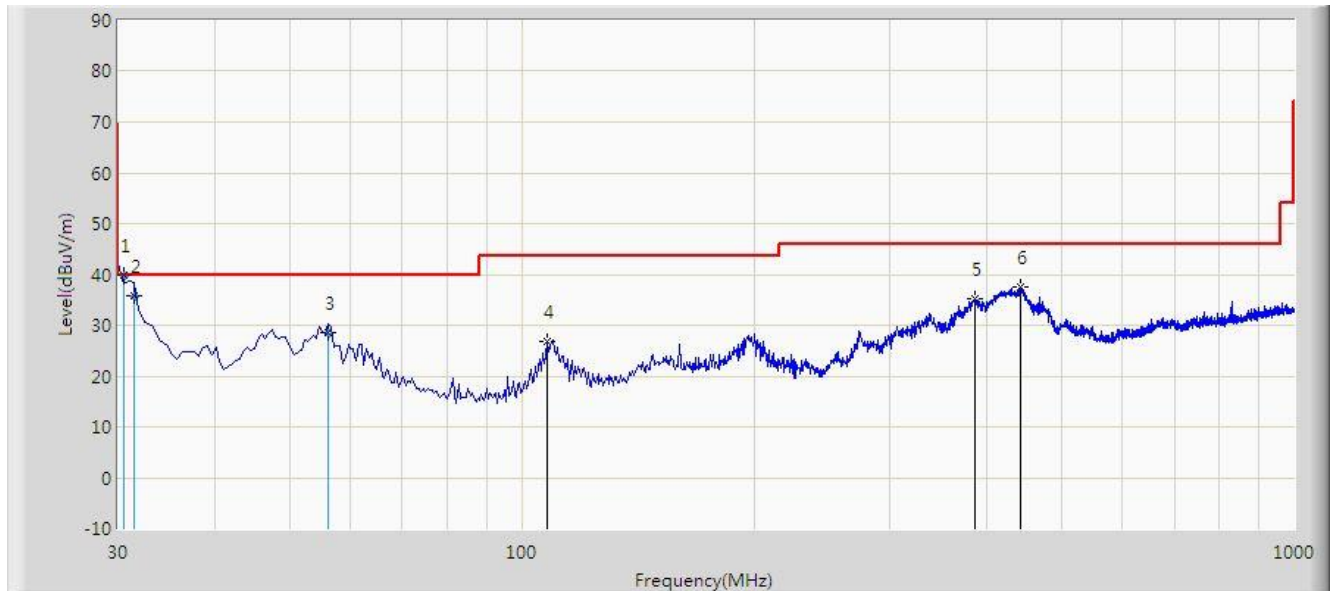
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

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

Note 2: 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: SIP-AC3	Test Date: 2021/01/26
Limit: FCC_Part15.209_RE(3m)	Engineer: White Wang
Probe: SIP-AC3_VULB 9168 _20-2000MHz_4dB	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Test Mode: Transmit by BLE at channel 2402MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	30.553	39.804	23.300	-0.196	40.000	16.504	QP
2			31.455	35.680	19.200	-4.320	40.000	16.480	QP
3			56.190	28.561	10.700	-11.439	40.000	17.861	QP
4			108.085	26.846	12.264	-16.654	43.500	14.583	PK
5			386.960	35.317	14.892	-10.683	46.000	20.425	PK
6			442.735	37.395	15.399	-8.605	46.000	21.996	PK

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

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

Note 2: 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.

6.7. Radiated Restricted Band Edge Measurement

6.7.1. 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 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

6.7.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.3

ANSI C63.10-2013 - Section 6.6

ANSI C63.10-2013 - Section 11.13

6.7.3.Test Setting

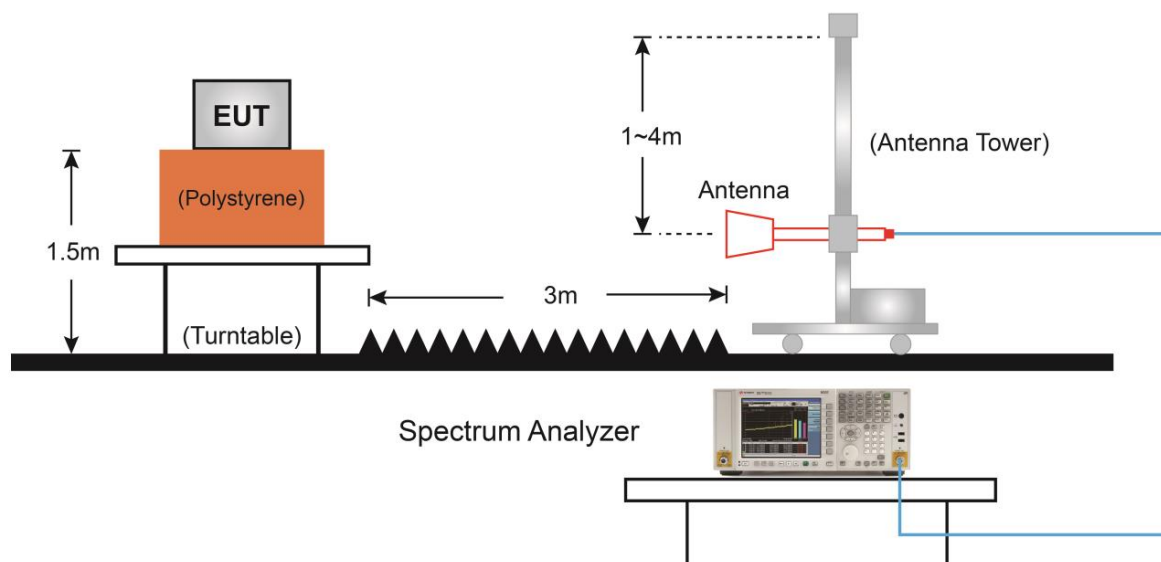
Peak Field Strength Measurements

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. Allow the trace to stabilize

Average Field Strength Measurements

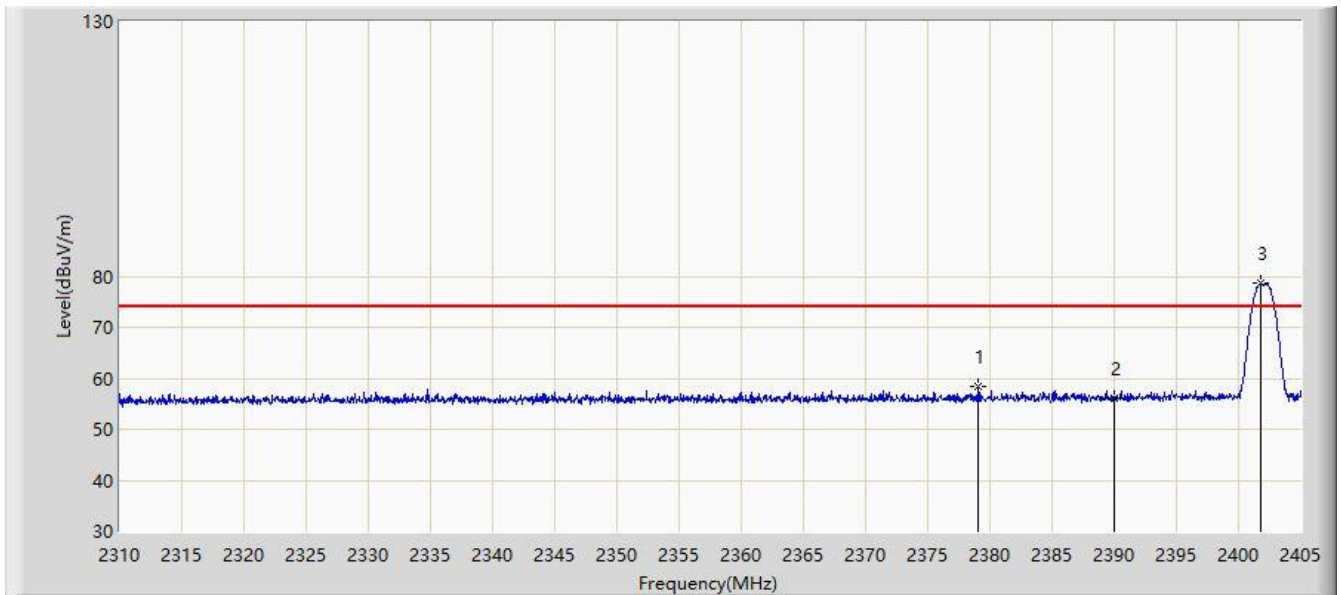
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). 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

6.7.4.Test Setup



6.7.5.Test Result

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2402MHz	

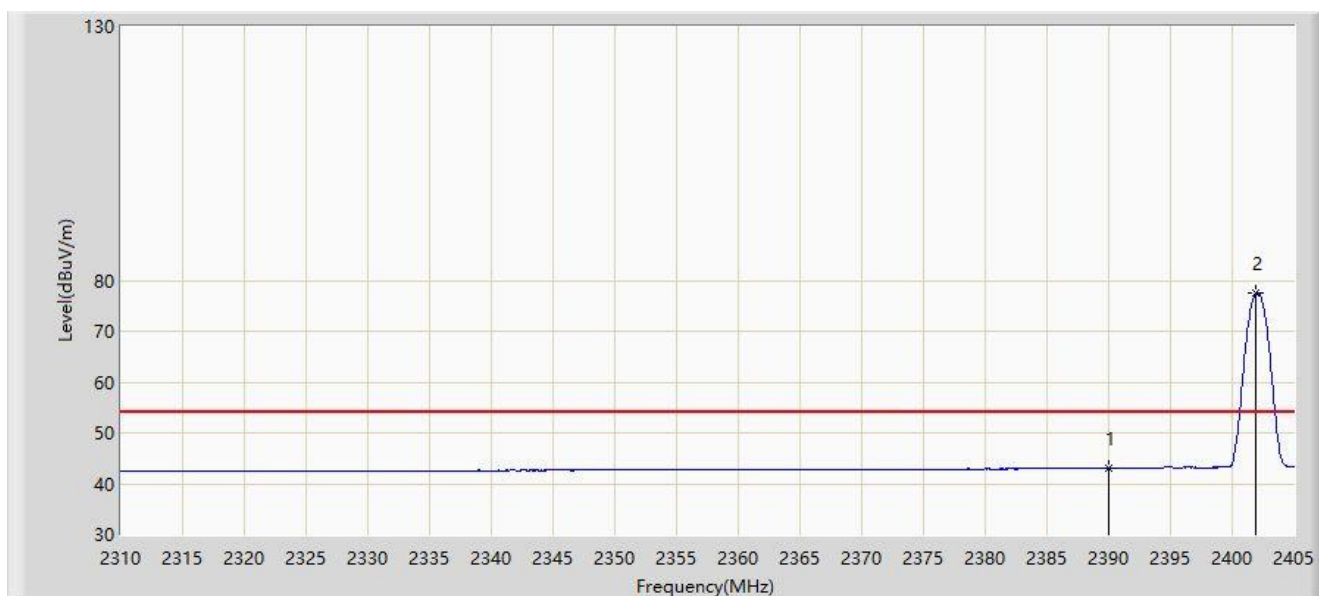


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2379.065	58.303	27.550	-15.697	74.000	30.753	PK
2			2390.000	56.219	25.393	-17.781	74.000	30.826	PK
3		*	2401.770	78.629	47.738	N/A	N/A	30.891	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2402MHz	

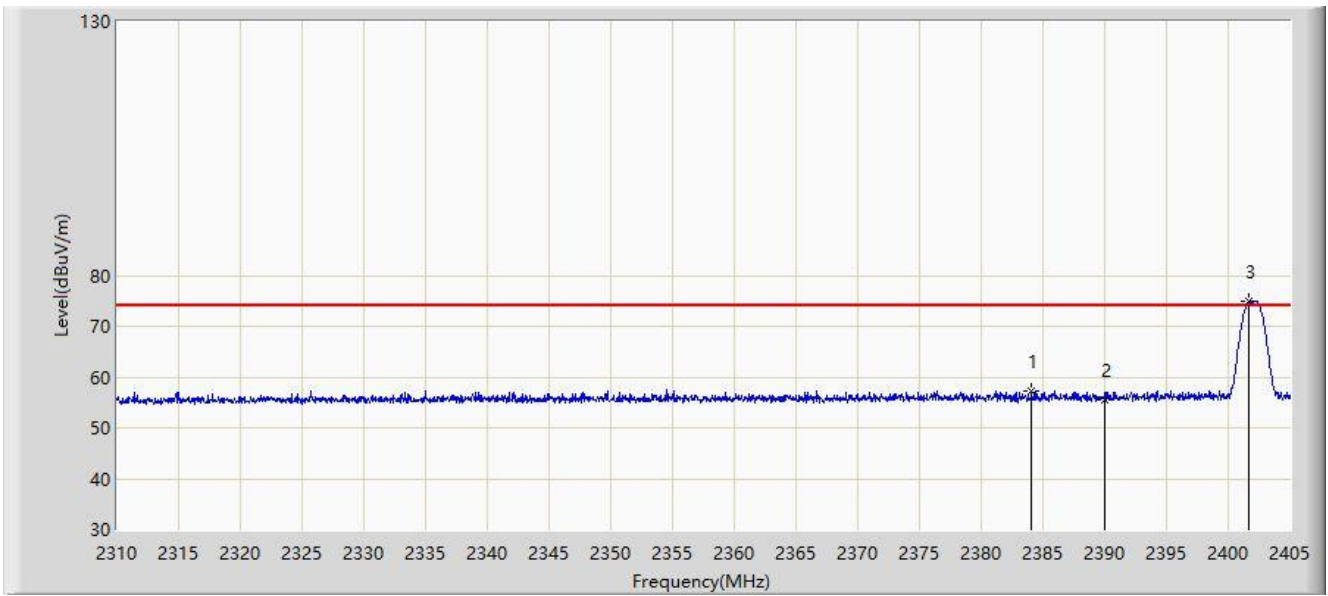


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	42.973	12.147	-11.027	54.000	30.826	AV
2		*	2401.913	77.437	46.545	N/A	N/A	30.892	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2402MHz	

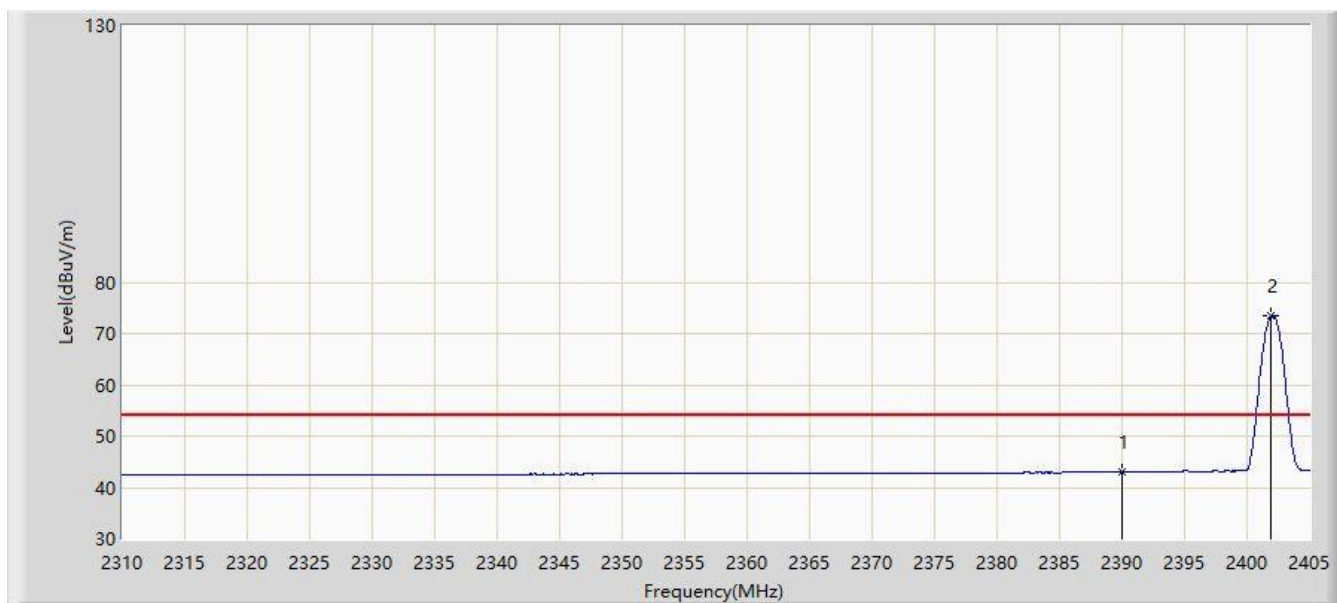


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2384.100	57.191	26.404	-16.809	74.000	30.787	PK
2			2390.000	55.564	24.738	-18.436	74.000	30.826	PK
3		*	2401.675	74.940	44.049	N/A	N/A	30.891	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2402MHz	

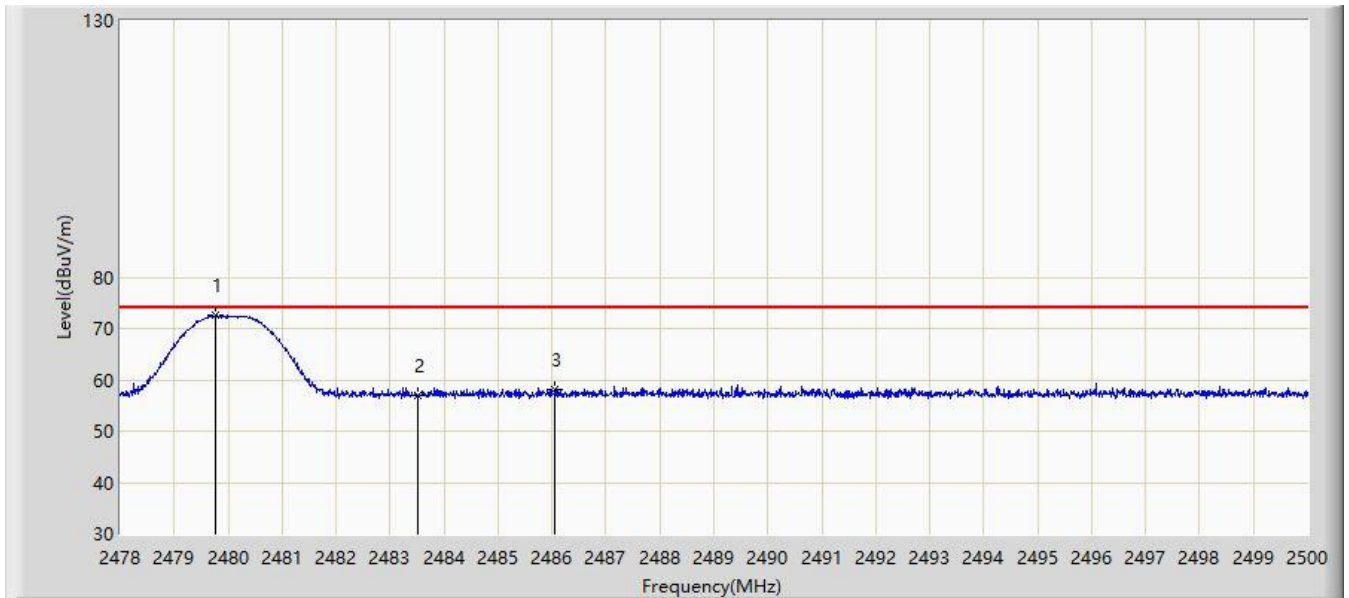


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	42.975	12.149	-11.025	54.000	30.826	AV
2		*	2401.960	73.432	42.540	N/A	N/A	30.892	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2480MHz	

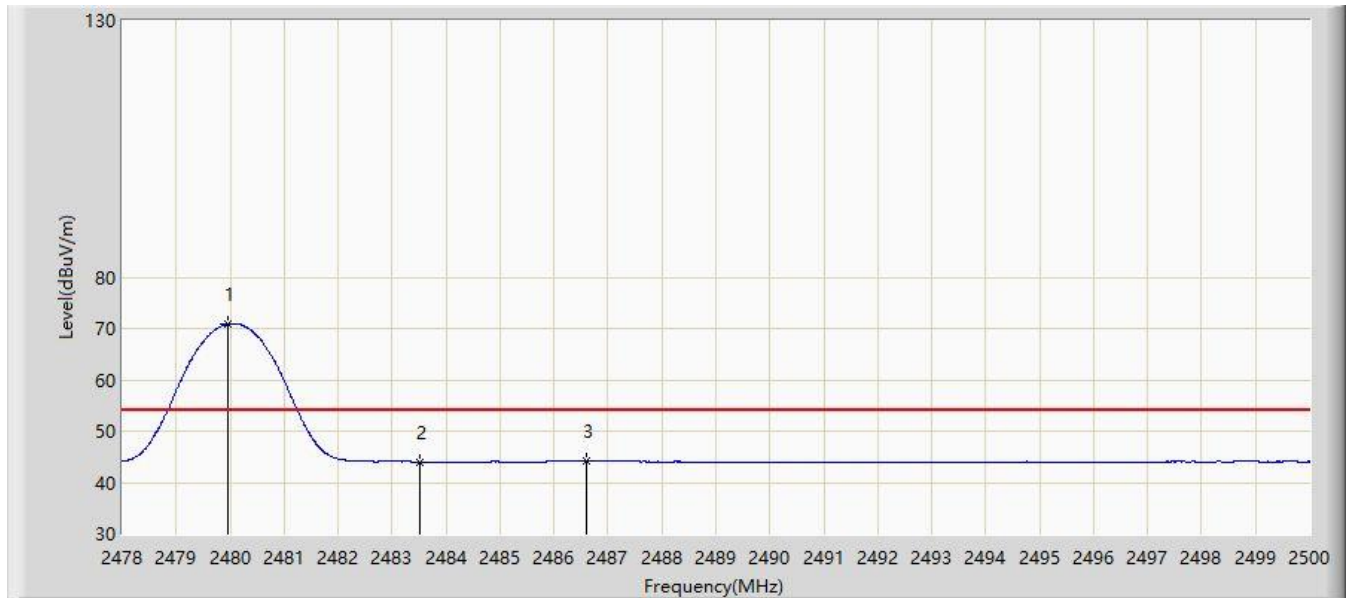


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.771	72.678	41.420	N/A	N/A	31.258	PK
2			2483.500	56.848	25.575	-17.152	74.000	31.273	PK
3			2486.052	58.147	26.864	-15.853	74.000	31.283	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2480MHz	

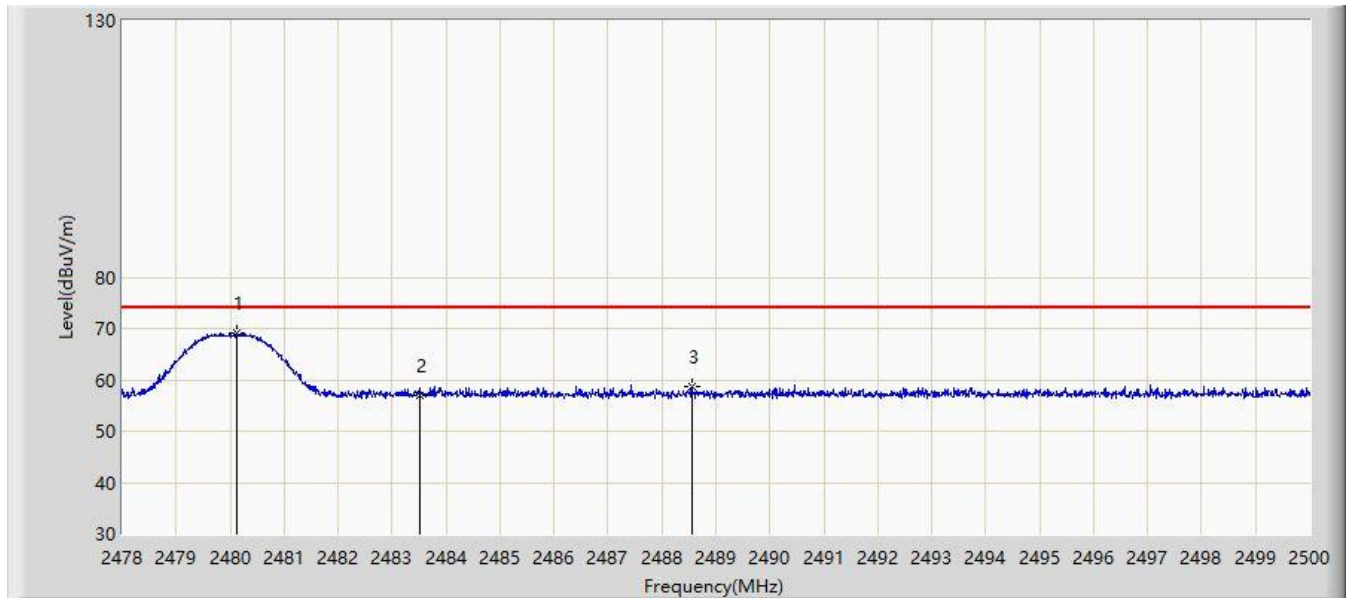


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.947	70.856	39.597	N/A	N/A	31.259	AV
2			2483.500	44.018	12.745	-9.982	54.000	31.273	AV
3			2486.613	44.158	12.873	-9.842	54.000	31.285	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2480MHz	

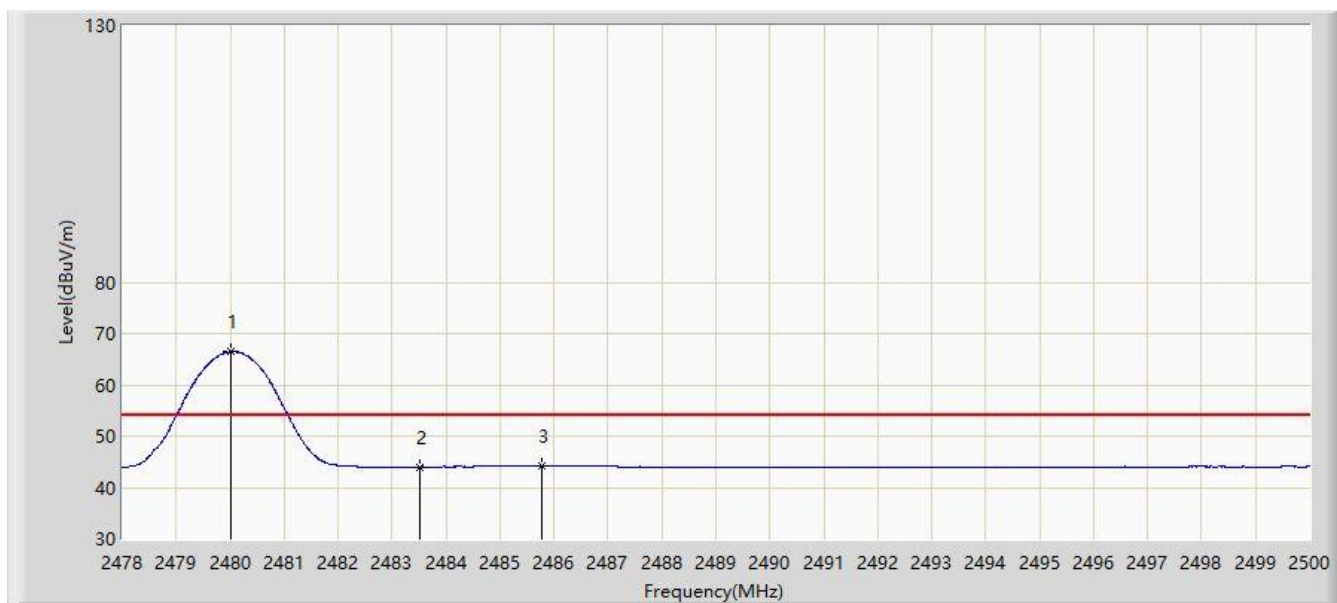


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.134	69.113	37.853	N/A	N/A	31.259	PK
2			2483.500	56.815	25.542	-17.185	74.000	31.273	PK
3			2488.560	58.764	27.471	-15.236	74.000	31.293	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 1M at Channel 2480MHz	

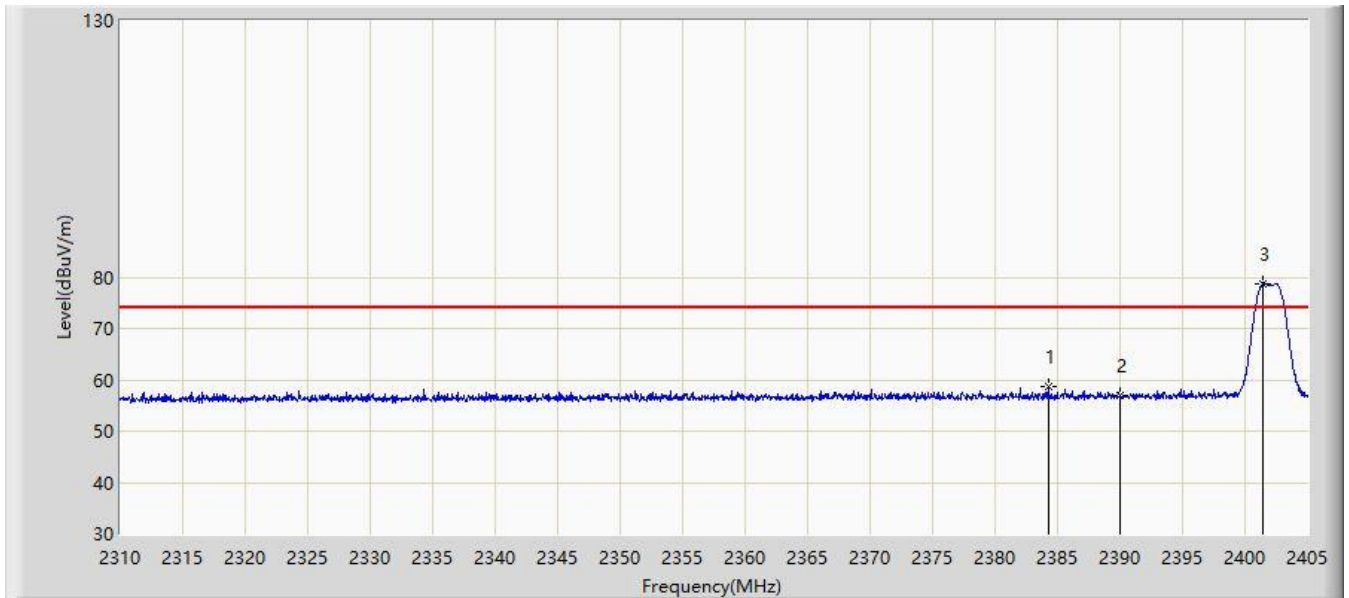


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.002	66.402	35.143	N/A	N/A	31.259	AV
2			2483.500	44.037	12.764	-9.963	54.000	31.273	AV
3			2485.788	44.157	12.875	-9.843	54.000	31.282	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2402MHz	

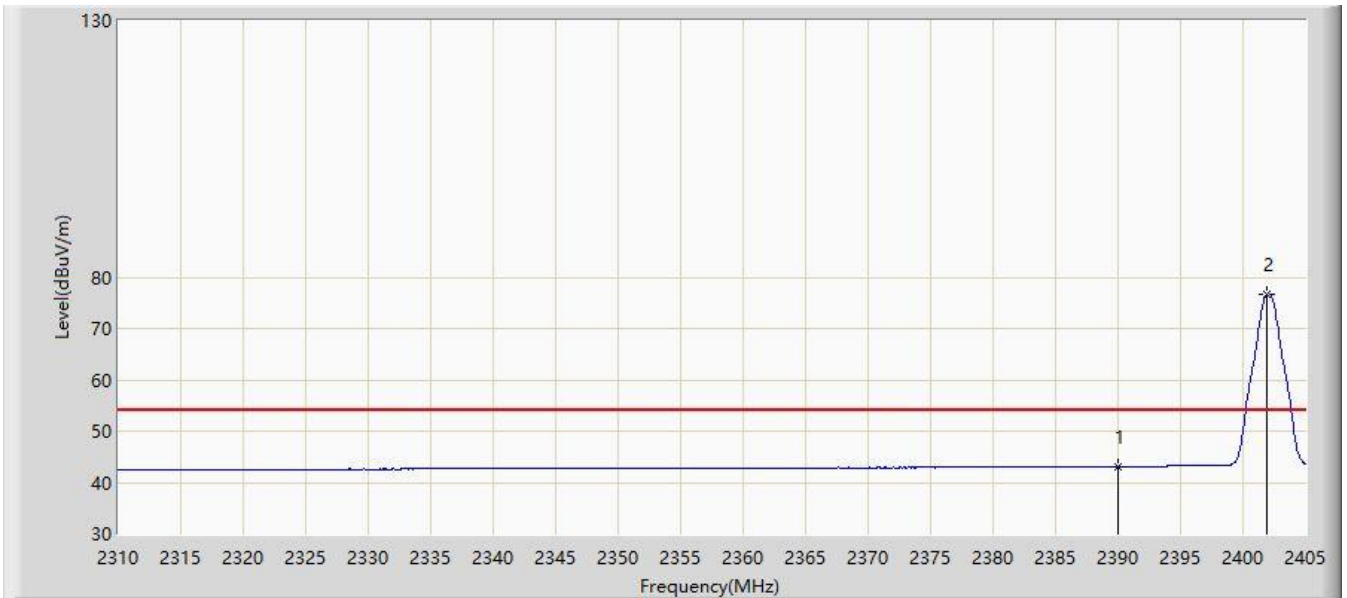


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2384.242	58.607	27.819	-15.393	74.000	30.788	PK
2			2390.000	56.932	26.106	-17.068	74.000	30.826	PK
3		*	2401.390	78.750	47.860	N/A	N/A	30.889	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2402MHz	

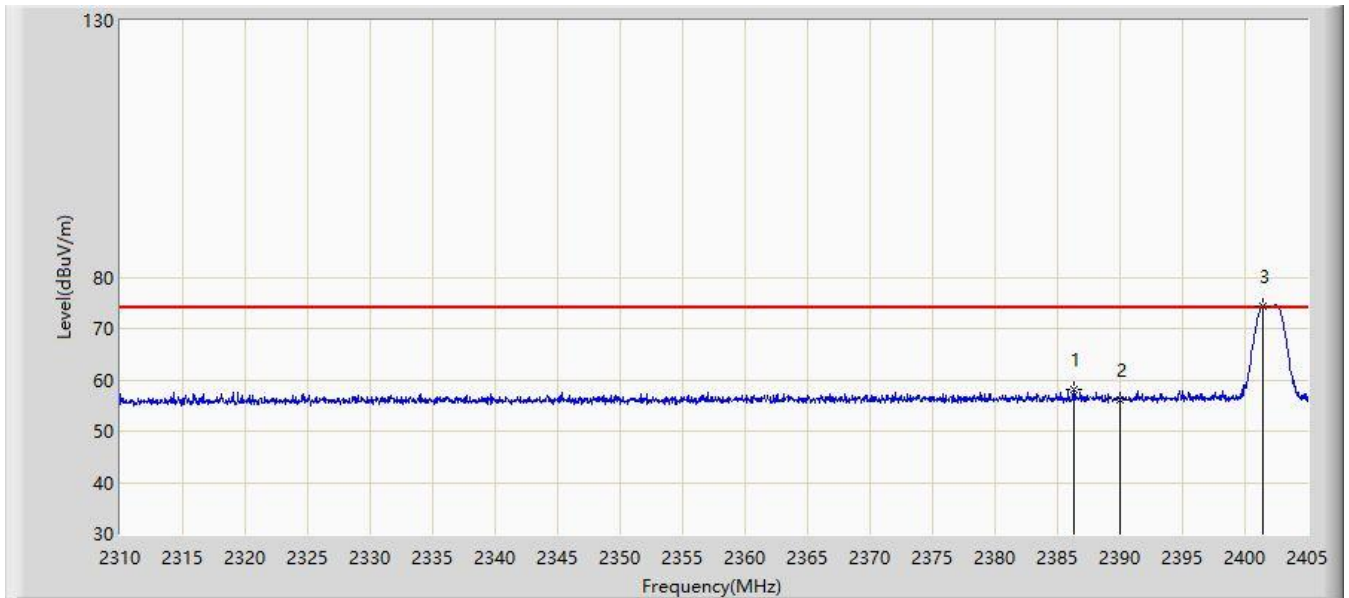


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.082	12.256	-10.918	54.000	30.826	AV
2		*	2401.960	76.786	45.894	N/A	N/A	30.892	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2402MHz	

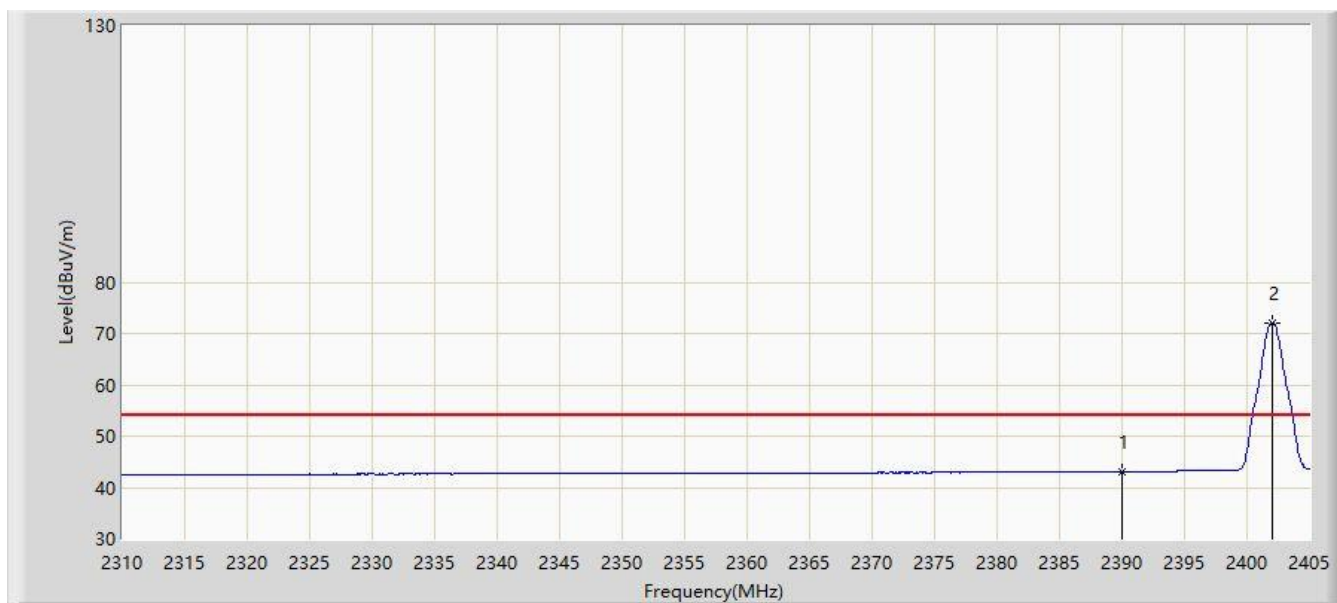


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2386.285	58.224	27.423	-15.776	74.000	30.802	PK
2			2390.000	55.987	25.161	-18.013	74.000	30.826	PK
3		*	2401.390	74.330	43.440	N/A	N/A	30.889	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2402MHz	

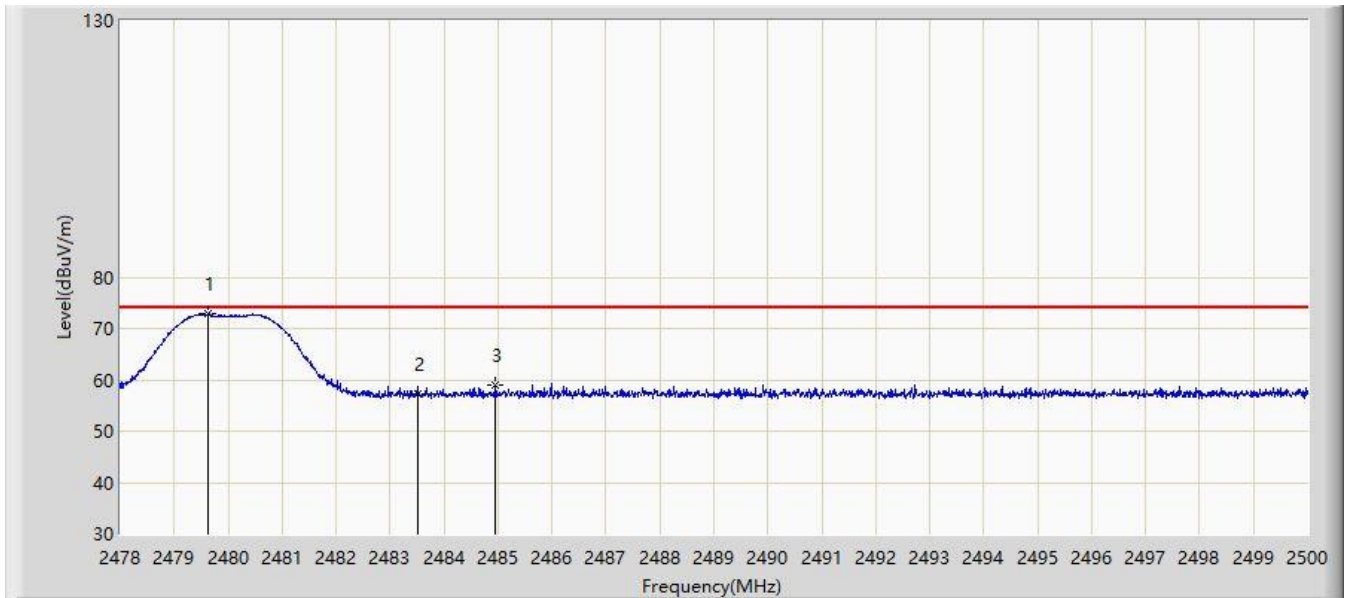


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.058	12.232	-10.942	54.000	30.826	AV
2		*	2402.008	72.115	41.222	N/A	N/A	30.892	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2480MHz	

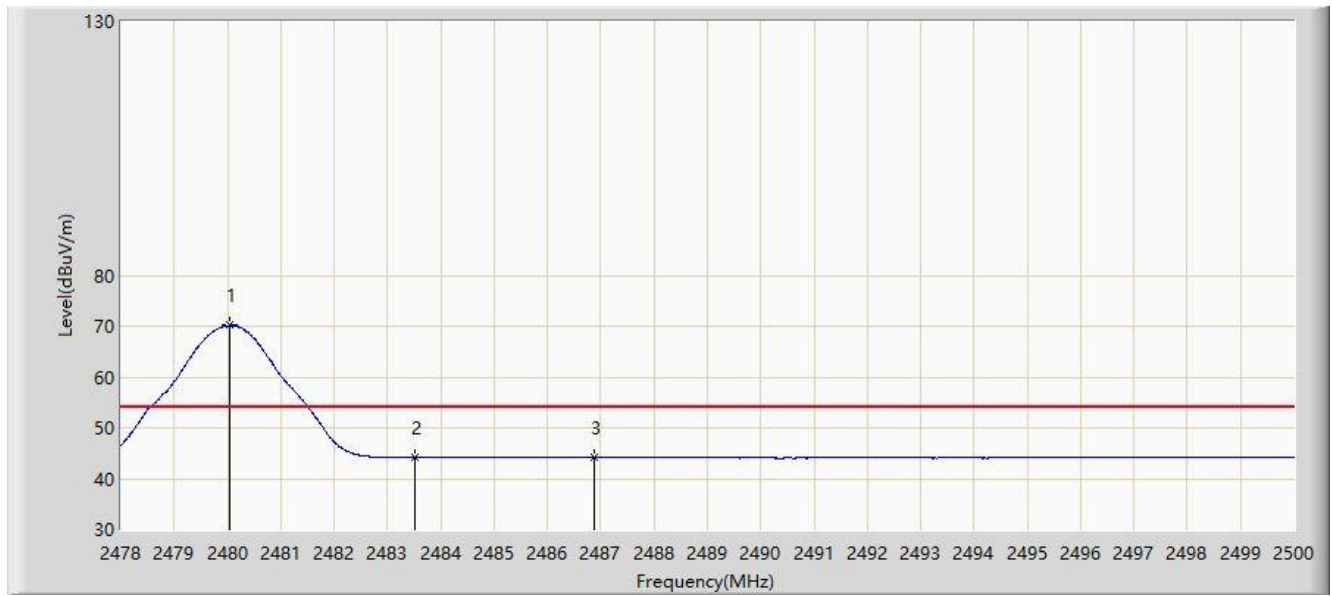


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.617	72.799	41.542	N/A	N/A	31.257	PK
2			2483.500	57.171	25.898	-16.829	74.000	31.273	PK
3			2484.952	58.930	27.651	-15.070	74.000	31.279	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2480MHz	

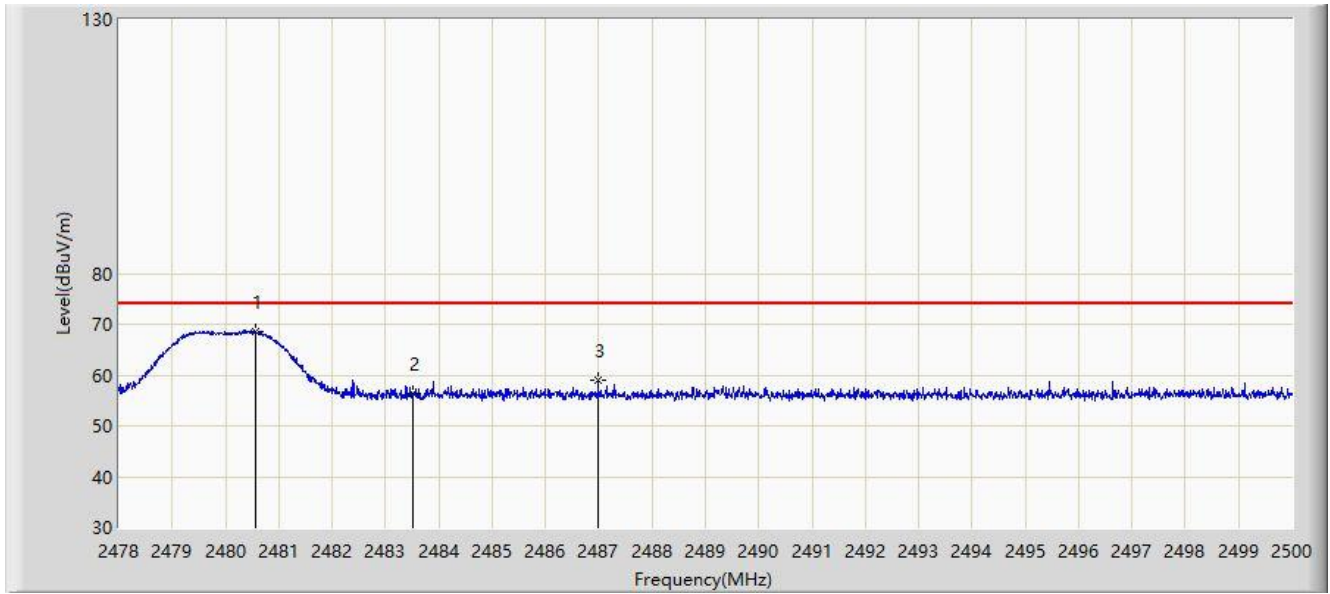


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	70.158	38.899	N/A	N/A	31.259	AV
2			2483.500	44.132	12.859	-9.868	54.000	31.273	AV
3			2486.888	44.187	12.900	-9.813	54.000	31.286	AV

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2480MHz	

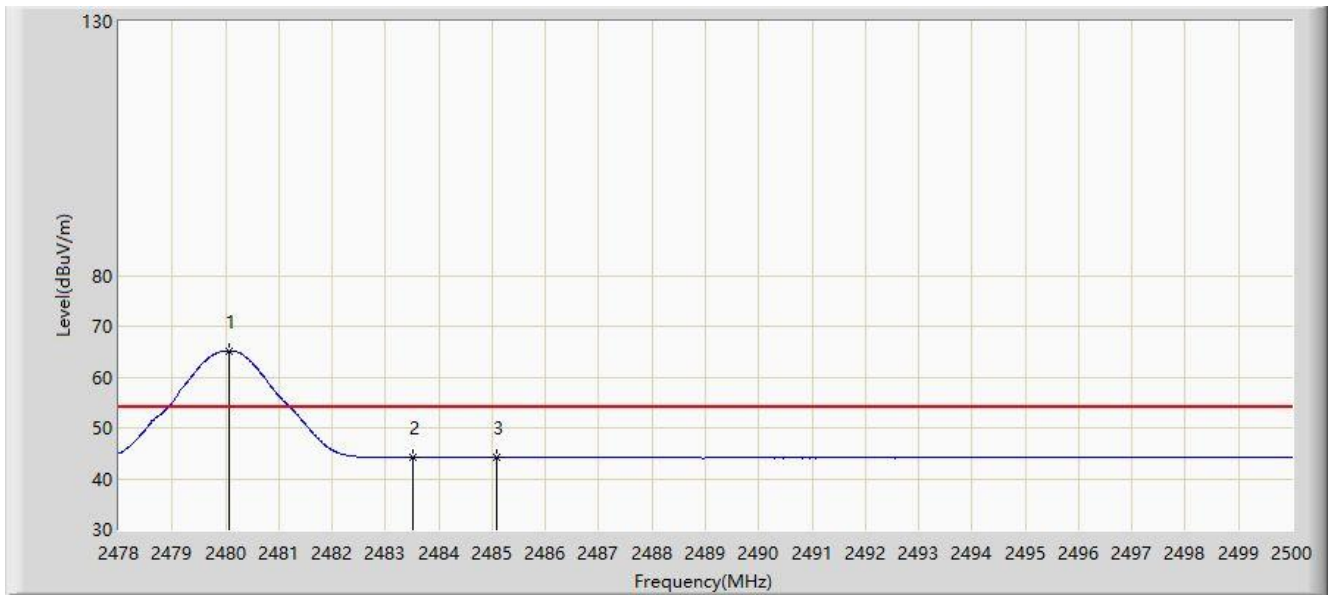


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.563	68.683	37.422	N/A	N/A	31.261	PK
2			2483.500	56.357	25.084	-17.643	74.000	31.273	PK
3			2486.987	58.950	27.663	-15.050	74.000	31.287	PK

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

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

Site: SIP-AC1	Test Date: 2020/12/23
Limit: FCC_Part15.209_RE(3m)	Engineer: Stephen Dong
Probe: SIP-AC1_HF907_1-18GHz	Polarity: Vertical
EUT: BLE Controller	Power: By USB
Note: Transmit by BLE 2M at Channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.079	65.186	33.927	N/A	N/A	31.259	AV
2			2483.500	44.118	12.845	-9.882	54.000	31.273	AV
3			2485.073	44.168	12.889	-9.832	54.000	31.280	AV

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

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

6.8. AC Conducted Emissions Measurement

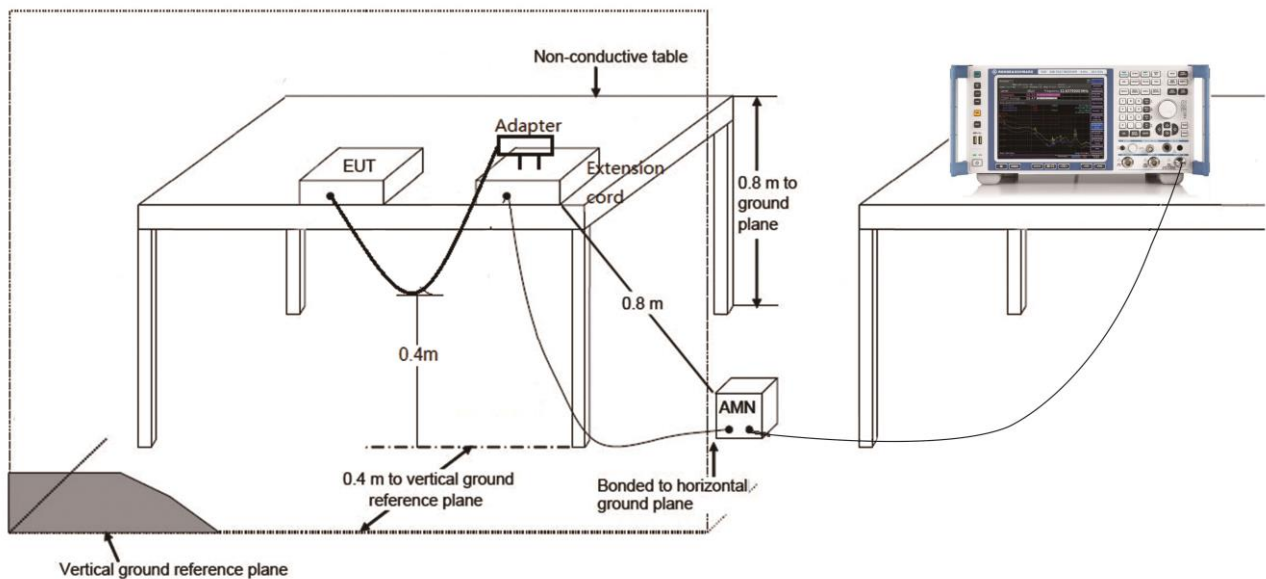
6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	Average (dB μ V)
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 Transmission frequencies.

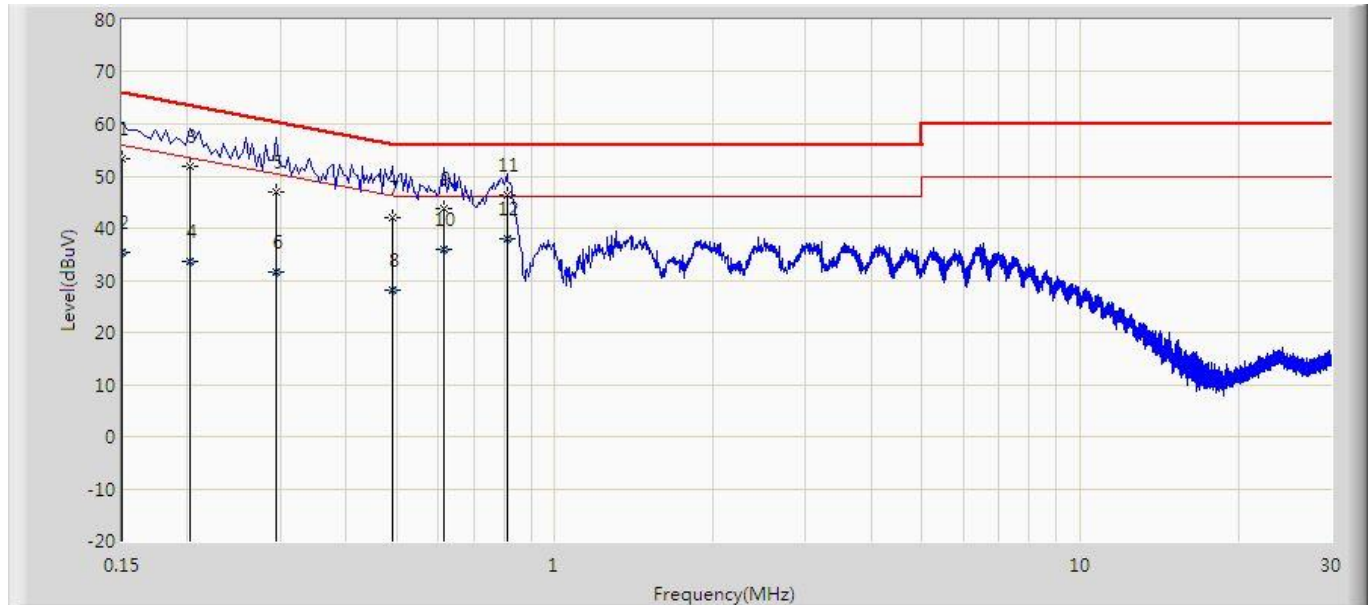
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.8.2. Test Setup



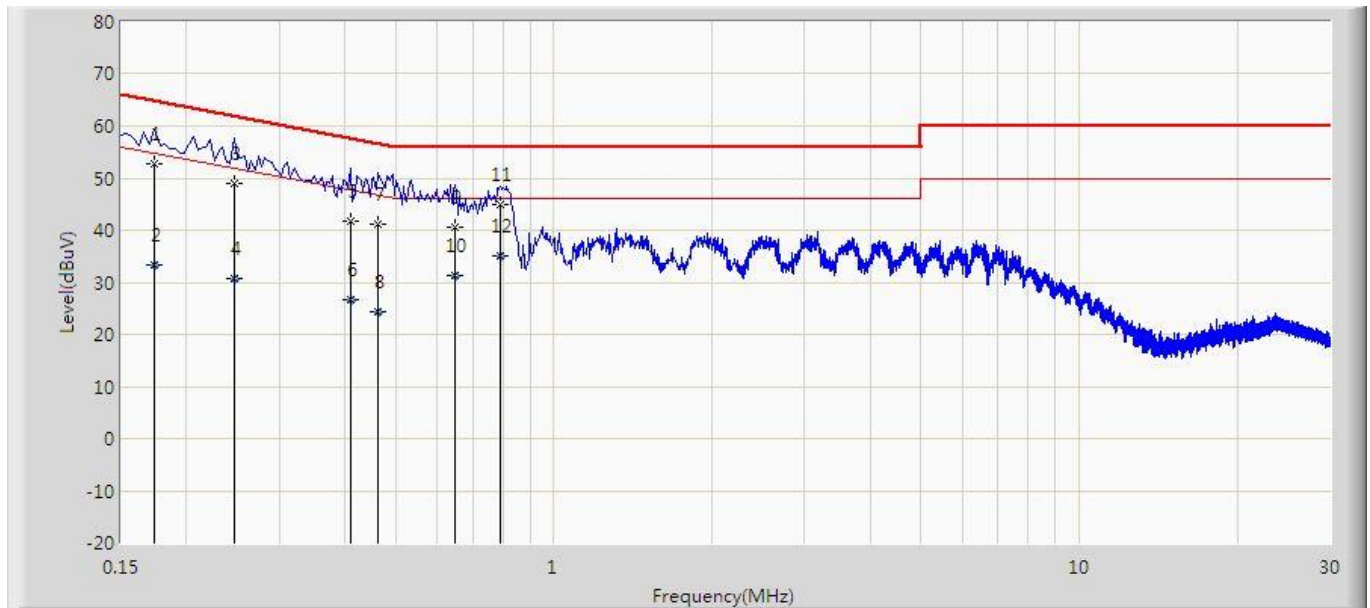
6.8.3.Test Result

Site: SIP-SR2	Test Date: 2021/02/05
Limit: FCC_Part15.207_CE_AC Power	Engineer: Kyrie Xie
Probe: SIP-SR2-ENV216_101684_With Connect	Polarity: Line
EUT: BLE Controller	Power: AC 120V/60Hz
Note: Transmit by BLE 1M at channel 2402MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.150	53.454	44.003	-12.546	66.000	9.451	QP
2			0.150	35.284	25.832	-20.716	56.000	9.451	AV
3			0.202	51.826	42.337	-11.702	63.528	9.489	QP
4			0.202	33.682	24.193	-19.846	53.528	9.489	AV
5			0.294	46.982	37.448	-13.428	60.411	9.534	QP
6			0.294	31.520	21.986	-18.891	50.411	9.534	AV
7			0.490	42.122	32.563	-14.046	56.168	9.559	QP
8			0.490	28.145	18.586	-18.023	46.168	9.559	AV
9			0.614	43.671	34.111	-12.329	56.000	9.560	QP
10			0.614	36.082	26.522	-9.918	46.000	9.560	AV
11			0.810	46.418	36.859	-9.582	56.000	9.559	QP
12		*	0.810	37.991	28.432	-8.009	46.000	9.559	AV

Site: SIP-SR2	Test Date: 2021/02/05
Limit: FCC_Part15.207_CE_AC Power	Engineer: Kyrie Xie
Probe: SIP-SR2-ENV216_101684_With Connect	Polarity: Neutral
EUT: BLE Controller	Power: AC 120V/60Hz
Note: Transmit by BLE 1M at channel 2402MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.174	52.869	43.434	-11.898	64.767	9.435	QP
2			0.174	33.208	23.773	-21.559	54.767	9.435	AV
3			0.246	48.919	39.416	-12.972	61.891	9.503	QP
4			0.246	30.625	21.123	-21.266	51.891	9.503	AV
5			0.410	41.676	32.142	-15.972	57.648	9.534	QP
6			0.410	26.634	17.100	-21.014	47.648	9.534	AV
7			0.462	41.216	31.679	-15.440	56.657	9.537	QP
8			0.462	24.307	14.770	-22.350	46.657	9.537	AV
9			0.650	40.541	31.001	-15.459	56.000	9.540	QP
10			0.650	31.173	21.633	-14.827	46.000	9.540	AV
11			0.790	44.865	35.325	-11.135	56.000	9.540	QP
12		*	0.790	35.084	25.544	-10.916	46.000	9.540	AV

7. CONCLUSION

The data collected relate only the item(s) tested and show that the device is in compliance with Part 15C of the FCC rules.

The End

Appendix A - Test Setup Photograph

Refer to “2012RSU046-UT” file.

Appendix B - EUT Photograph

Refer to "2012RSU046-UE" file.