



MEASUREMENT REPORT

FCC PART 15.247 / Bluetooth-LE

FCC ID: 2AUXNROXS2
Applicant: A-Champs Ltd.
Application Type: Certification
Product: Interactive Training System
Model No.: ROX Pro
Trade Mark: A-Champs
FCC Classification: Digital Transmission System (DTS)
FCC Rule(s): Part15 Subpart C (Section 15.247)
Test Procedure(s): ANSI C63.10-2013
Test Date: July 16 ~ August 06, 2021

Reviewed By:

Sunny Sun

Approved By:

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
2102RSU052-U1	Rev. 01	Initial Report	12-11-2021	Valid

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1. GENERAL INFORMATION

1.1. Applicant

A-Champs Ltd.

22/F., Bupa Centre, 141 Connaught Road West, HONG KONG, P.R.China

1.2. Manufacturer

A-Champs Ltd.

22/F., Bupa Centre, 141 Connaught Road West, HONG KONG, P.R.China

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	Interactive Training System
Model No.	ROX Pro
Trade Mark	A-Champs
Bluetooth Version	BLE only
Operating temperature	0 ~ 50 °C
Power By	DC 3.7V (Lithium battery)
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 under Test

Bluetooth Frequency	2402~2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	1Mbps
Antenna Type	PCB Antenna
Antenna Gain	0 dBi

1.6. 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	--	--	--	--

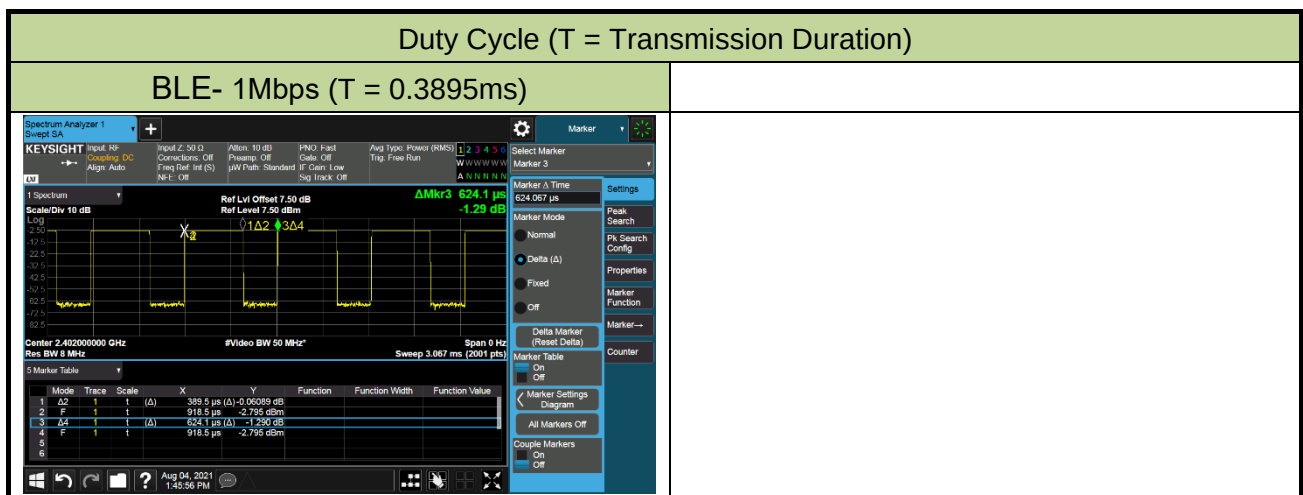
1.7. Test Mode

Test Mode	Mode 1: Transmit by BLE-1Mbps
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1.8. 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	62.41%



1.9. EMI Suppression Device(s)/Modifications

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

1.10. Description of Test Software

The test utility software used during testing was “nRFgo Studio”, and the version was 1.12.1.1992.

1.11. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

1.12. Test Environment Condition

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

2. 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.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

3. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission (SIP-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/1/12
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2021/12/24
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2022/6/24
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2021/11/9
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2021/11/23
Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/9/26
Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2022/8/5
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2022/6/24
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2021/11/25
Thermohygrometer	testo	608-H1	MRTSUE06620	1 year	2021/12/3
Preamplifier	EMCI	EMC001330	MRTSUE06643	1 year	2022/1/14
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06645	1 year	2022/8/26
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2022/3/9

Radiated Emission (SIP-AC3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2022/6/9
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/1/12
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2022/6/24
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2021/11/26
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2021/11/23
Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/9/26
Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2021/9/13
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2022/6/24
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2021/11/25
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2021/12/3
Preamplifier	EMCI	EMC012645S E	MRTSUE06642	1 year	2022/1/14
Preamplifier	EMCI	EMC001330	MRTSUE06643	1 year	2022/1/14
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06646	1 year	2022/8/26
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2021/12/24
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2022/3/9

Conducted Test Equipment (SIP-TR1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2022/8/8
Signal Generator	R&S	SMU200A	MRTSUE06489	1 year	2022/2/23
USB Power Sensor	Keysight	U2021XA	MRTSUE06595	1 year	2021/9/26
USB Power Sensor	Keysight	U2021XA	MRTSUE06596	1 year	2021/9/26
Signal Generator	Keysight	N5182B	MRTSUE06605	1 year	2021/11/23
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2022/2/23
Communication Tester	R&S	CMW500	MRTSUE06881	1 year	2022/6/2
Broadband Field Meter	narda	NBM 550	MRTSUE06897	3 years	2023/2/26
E-Field Probe	narda	EF 0691	MRTSUE06898	3 years	2023/8/13
DECT Tester	RTX	RTX2012	MRTSUE06914	1 year	2022/2/23
B-Field Probe	narda	100 cm ²	MRTSUE06919	3 year	2024/2/14
Exposure Level Tester	narda	ELT-400	MRTSUE06920	3 years	2023/11/29
H-Field Probe	narda	HF 3061	MRTSUE06921	3 years	2023/12/1
H-Field Probe	narda	HF 0191	MRTSUE06922	3 years	2023/5/5
E-Field Probe	narda	EF 9091	MRTSUE06923	3 years	2024/2/15
Thermohygrometer	testo	Testo 608-H1	MRTSUE11022	1 year	2021/11/6

Software	Version	Function
EMI Software	V3	EMI Test Software

4. 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%

5. TEST RESULT

5.1. 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 5.2
15.247(b)(3)	Output Power	$\leq 1\text{Watt}$		Pass	Section 5.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz}$		Pass	Section 5.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\geq 20\text{dBc (Peak)}$		Pass	Section 5.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 5.6 Section 5.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits >	Line Conducted	N/A	Section 5.8

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.

5.2. 6dB Bandwidth Measurement

5.2.1. Test Limit

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

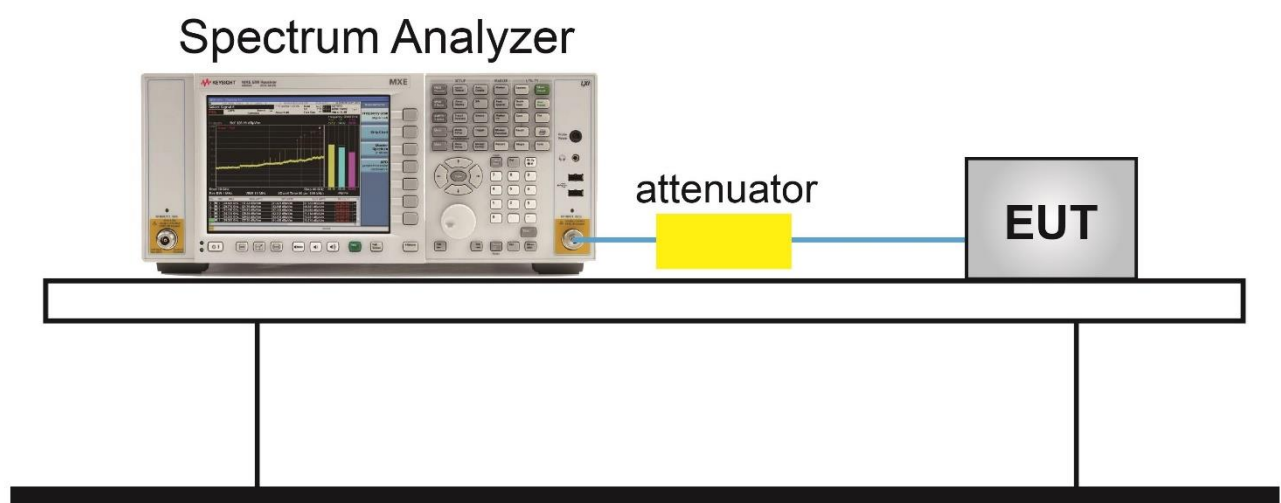
5.2.2. Test Procedure used

ANSI C63.10-2013 - Section 11.8

5.2.3. 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 was allowed to stabilize

5.2.4. Test Setup



5.2.5. Test Result

Test Site	SIP-TR1	Test Engineer	Chase Zhu
Test Date	2021/08/04		

Test Mode	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Mode 1	00	2402	0.703	≥ 0.5	Pass
Mode 1	19	2440	0.723	≥ 0.5	Pass
Mode 1	39	2480	0.709	≥ 0.5	Pass



5.3. Output Power Measurement

5.3.1. Test Limit

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

5.3.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.9.1.3

ANSI C63.10-2013 - Section 11.9.2.3.2

5.3.3. Test Setting

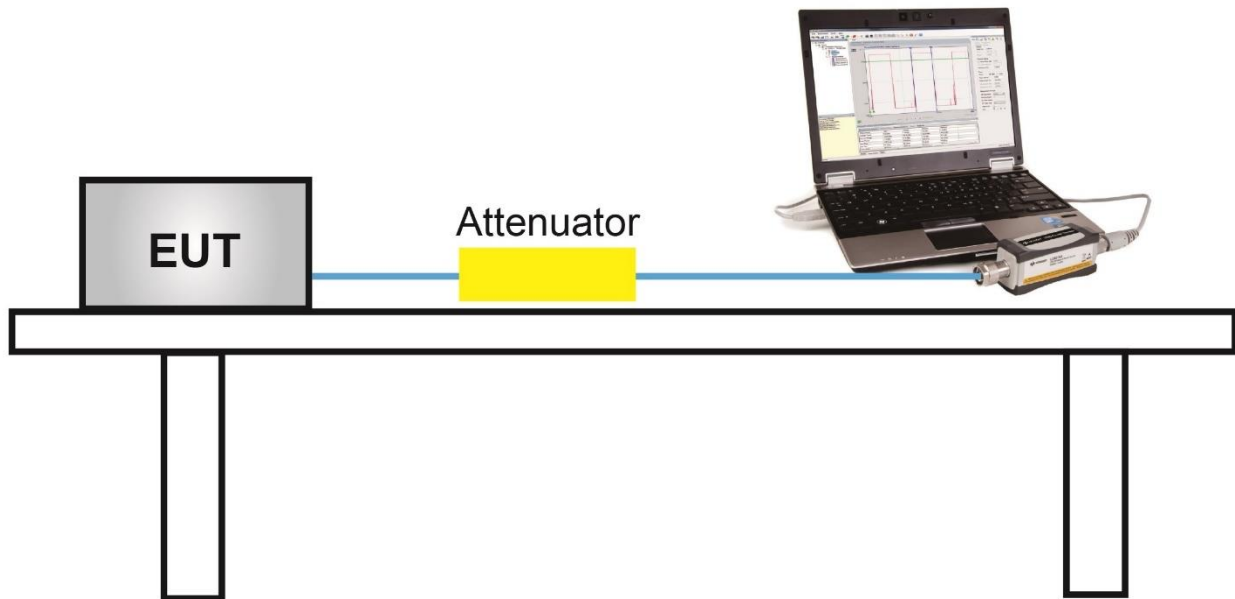
Method PKPM1 (Peak Power Measurement)

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.

5.3.4. Test Setup



5.3.5. Test Result

Test Site	SIP-TR1	Test Engineer	Chase Zhu
Test Date	2021/08/04		

Test Mode	Channel No.	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Peak Output Power					
Mode 1	00	2402	-1.74	≤ 30.00	Pass
Mode 1	19	2440	-2.05	≤ 30.00	Pass
Mode 1	39	2480	-2.14	≤ 30.00	Pass
Average Output Power					
Mode 1	00	2402	-1.88	≤ 30.00	Pass
Mode 1	19	2440	-2.20	≤ 30.00	Pass
Mode 1	39	2480	-2.33	≤ 30.00	Pass

5.4. Power Spectral Density Measurement

5.4.1. 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.

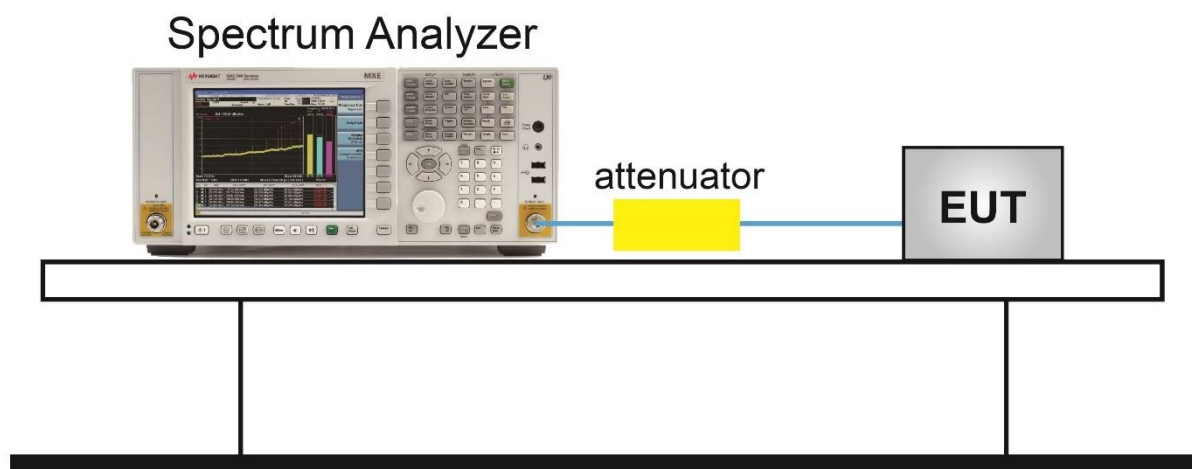
5.4.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.10.2

5.4.3. 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. Trace was allowed to stabilize

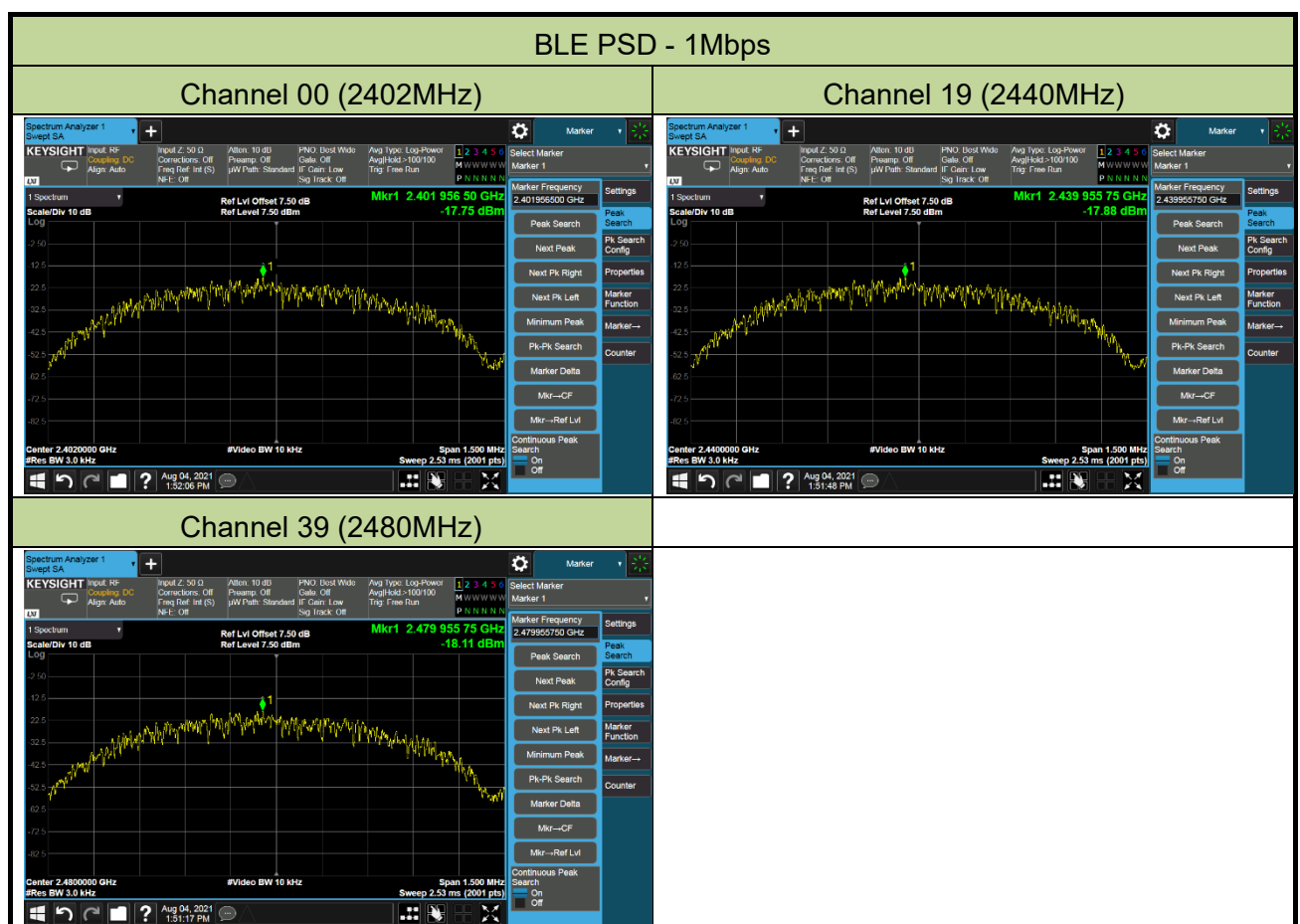
5.4.4. Test Setup



5.4.5. Test Result

Test Site	SIP-TR1	Test Engineer	Chase Zhu
Test Date	2021/08/04		

Test Mode	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
Mode 1	00	2402	-17.75	≤ 8.00	Pass
Mode 1	19	2440	-17.88	≤ 8.00	Pass
Mode 1	39	2480	-18.11	≤ 8.00	Pass



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

5.5.1. 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.

5.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.11

5.5.3. Test Setting

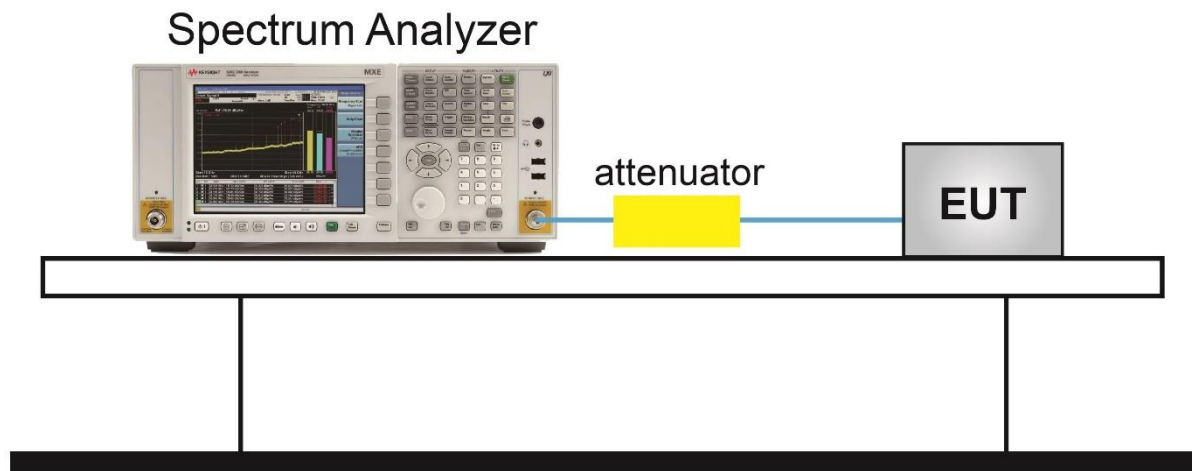
Reference level measurement

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 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

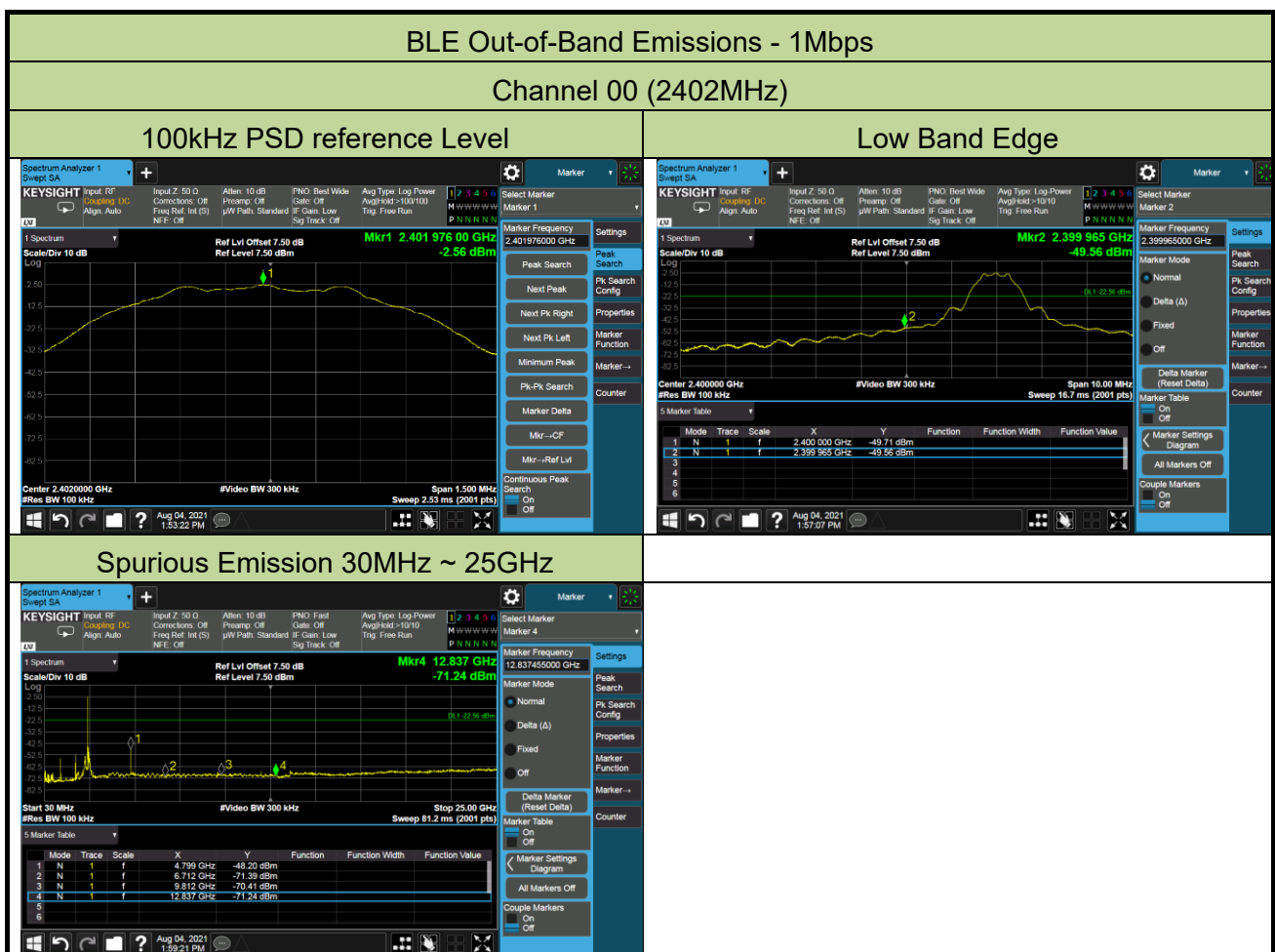
5.5.4. Test Setup



5.5.5. Test Result

Test Site	SIP-TR1	Test Engineer	Chase Zhu
Test Date	2021/08/04		

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

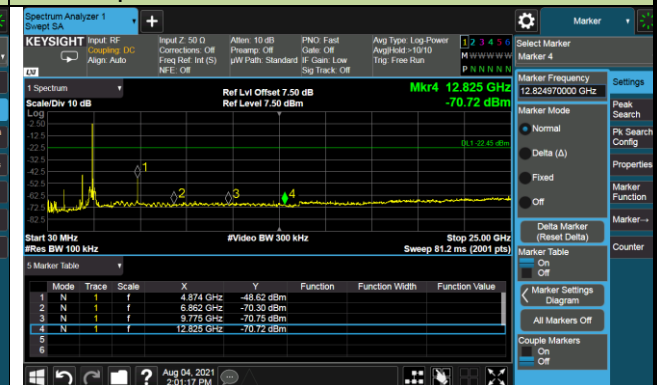


Channel 19 (2440MHz)

100kHz PSD reference Level



Spurious Emission 30MHz ~ 25GHz



Channel 39 (2480MHz)

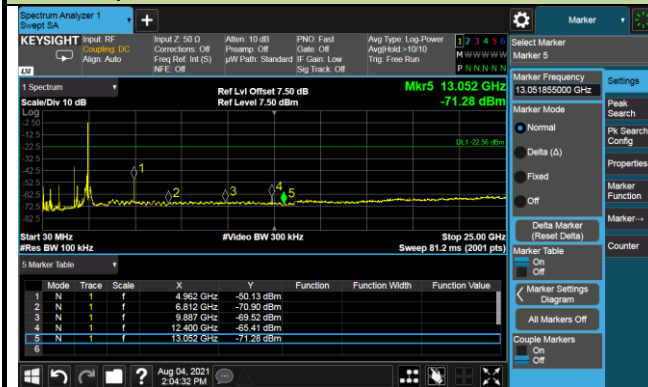
100kHz PSD reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



5.6. Radiated Spurious Emission Measurement

5.6.1. 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

5.6.2. 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

5.6.3. 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. Trace was allowed to stabilize

Peak Measurements above 1GHz

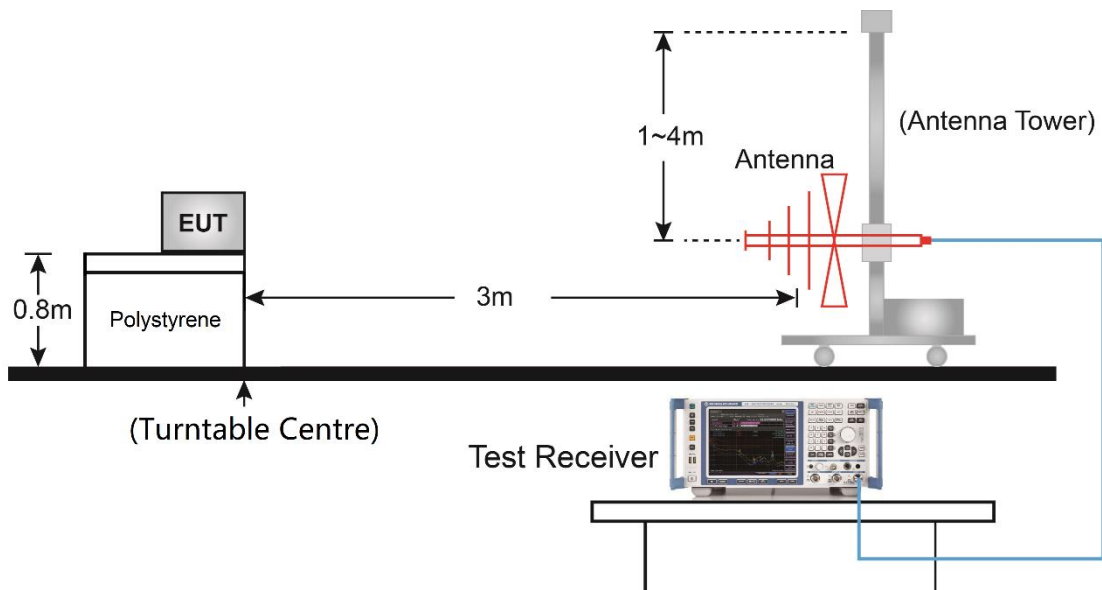
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

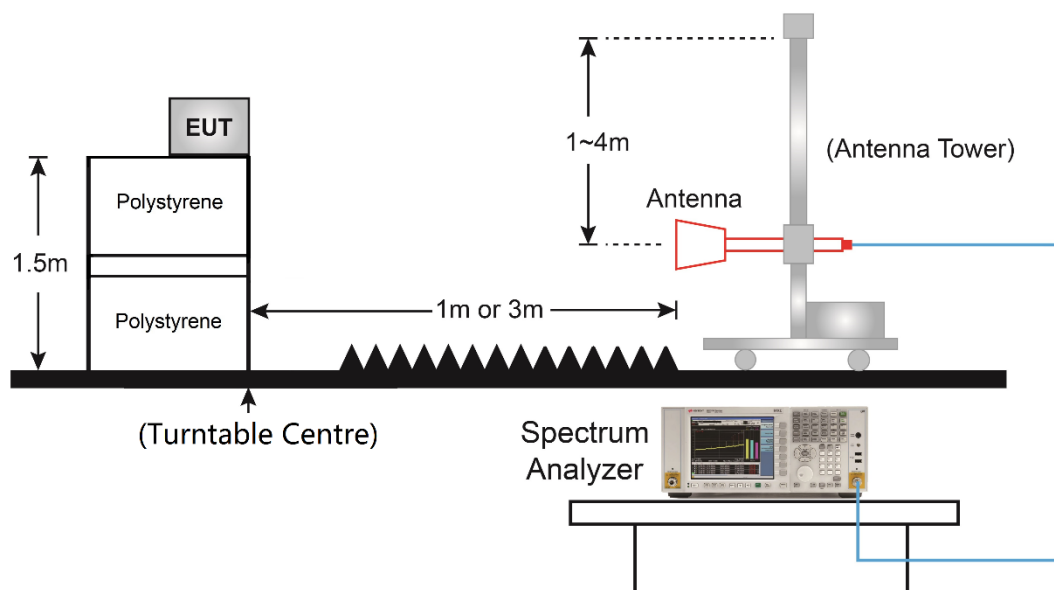
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10Hz
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration
4. Detector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

5.6.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



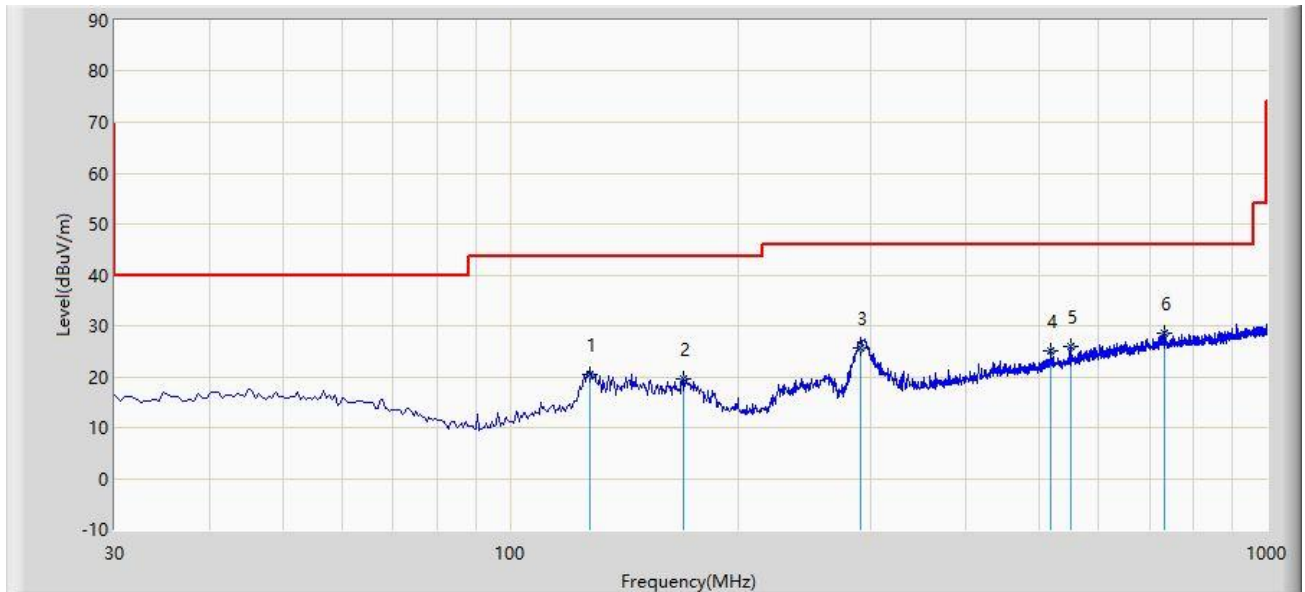
5.6.5. Test Result

Test Site	SIP-AC3	Test Engineer	White Wang
Test Date	2021/07/16		
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 shown in the report.		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Channel 00							
4808.0	61.5	-8.9	52.6	74.0	-21.4	Peak	Horizontal
12007.5	54.1	-2.1	52.0	74.0	-22.0	Peak	Horizontal
15849.5	48.0	4.3	52.3	74.0	-21.7	Peak	Horizontal
4808.0	59.4	-8.9	50.5	74.0	-23.5	Peak	Vertical
8284.5	51.6	-4.1	47.5	74.0	-26.5	Peak	Vertical
15926.0	49.2	3.9	53.1	74.0	-20.9	Peak	Vertical
Channel 19							
4876.0	61.4	-8.7	52.7	74.0	-21.3	Peak	Horizontal
12194.5	54.3	-2.1	52.2	74.0	-21.8	Peak	Horizontal
15747.5	48.1	4.3	52.4	74.0	-21.6	Peak	Horizontal
4876.0	59.6	-8.7	50.9	74.0	-23.1	Peak	Vertical
11999.0	50.3	-2.0	48.3	74.0	-25.7	Peak	Vertical
16062.0	48.2	5.2	53.4	74.0	-20.6	Peak	Vertical
Channel 39							
4961.0	63.8	-8.6	55.2	74.0	-18.8	Peak	Horizontal
4961.0	62.2	-8.6	53.6	54.0	-0.4	Average	Horizontal
12398.5	52.8	-1.7	51.1	74.0	-22.9	Peak	Horizontal
15730.5	47.4	3.8	51.2	74.0	-22.8	Peak	Horizontal
4961.0	60.0	-8.6	51.4	74.0	-22.6	Peak	Vertical
7443.0	53.9	-5.6	48.3	74.0	-25.7	Peak	Vertical
15815.5	47.6	4.3	51.9	74.0	-22.1	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 Radiated Emission below 1GHz:

Site: SIP-AC1	Test Date: 2021/08/06
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_VULB 9168 _30-1000MHz	Polarity: Horizontal
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE 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			127.467	20.430	4.216	-23.070	43.500	16.214	QP
2			169.247	19.628	2.170	-23.872	43.500	17.457	QP
3			290.640	25.545	7.490	-20.455	46.000	18.055	QP
4			517.946	25.064	1.879	-20.936	46.000	23.184	QP
5			551.497	25.848	2.164	-20.152	46.000	23.684	QP
6		*	733.716	28.621	1.460	-17.379	46.000	27.161	QP

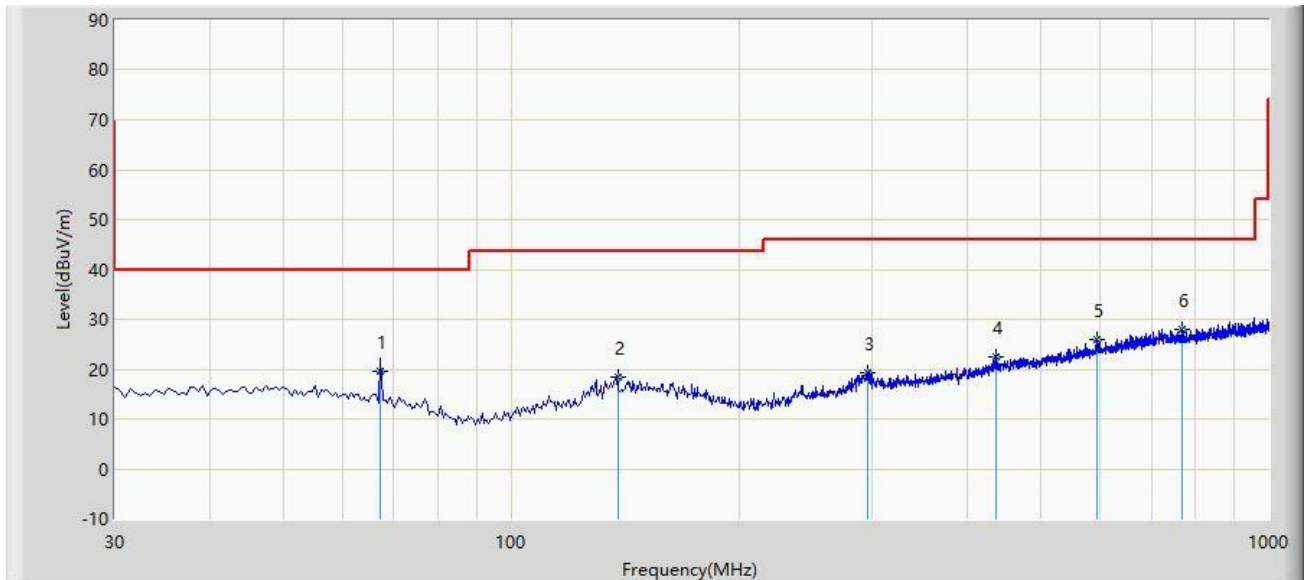
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

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

Note 2: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 26GHz) 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-AC1	Test Date: 2021/08/06
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_VULB 9168 _30-1000MHz	Polarity: Vertical
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at Channel 2440MHz	



No.	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1			67.343	19.520	3.641	-20.480	40.000	15.879	QP
2			138.246	18.497	1.240	-25.003	43.500	17.257	QP
3			295.978	19.373	1.240	-26.627	46.000	18.133	QP
4			436.370	22.487	0.697	-23.513	46.000	21.790	QP
5			592.457	25.857	1.033	-20.143	46.000	24.823	QP
6		*	768.241	28.108	0.450	-17.892	46.000	27.658	QP

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

Factor (dB/m) = 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.

5.7. Radiated Restricted Band Edge Measurement

5.7.1. 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

5.7.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.3

ANSI C63.10-2013 - Section 6.6

ANSI C63.10-2013 - Section 11.13

5.7.3.Test Setting

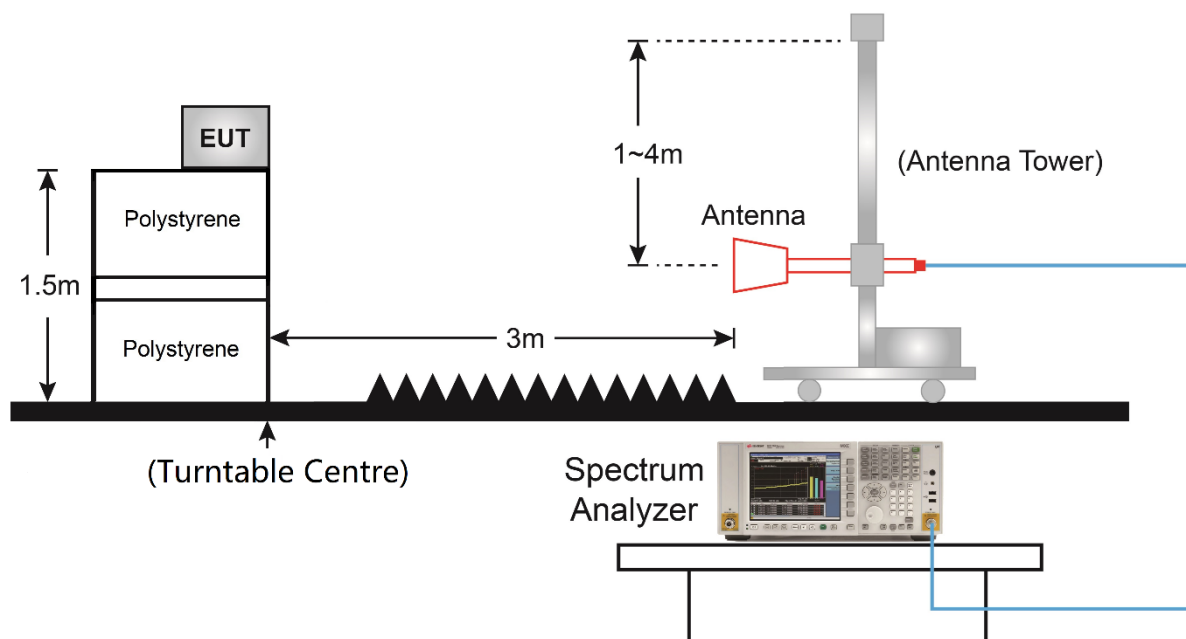
Peak Field Strength Measurements

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

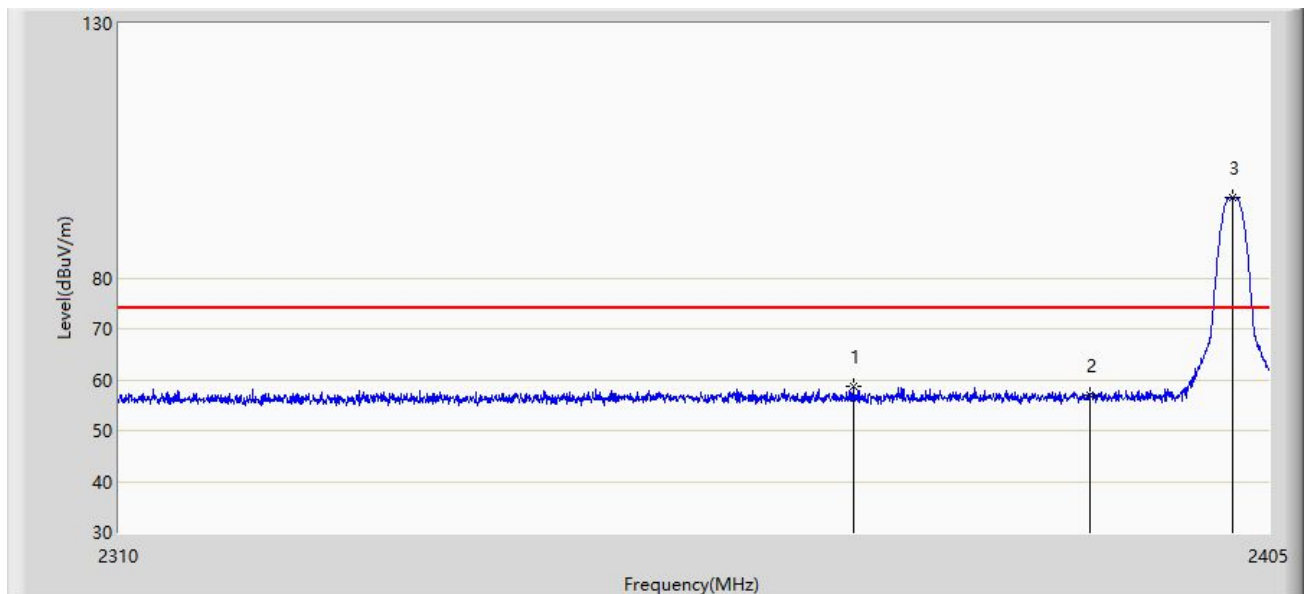
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain).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

5.7.4.Test Setup



5.7.5. Test Result

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2402MHz	

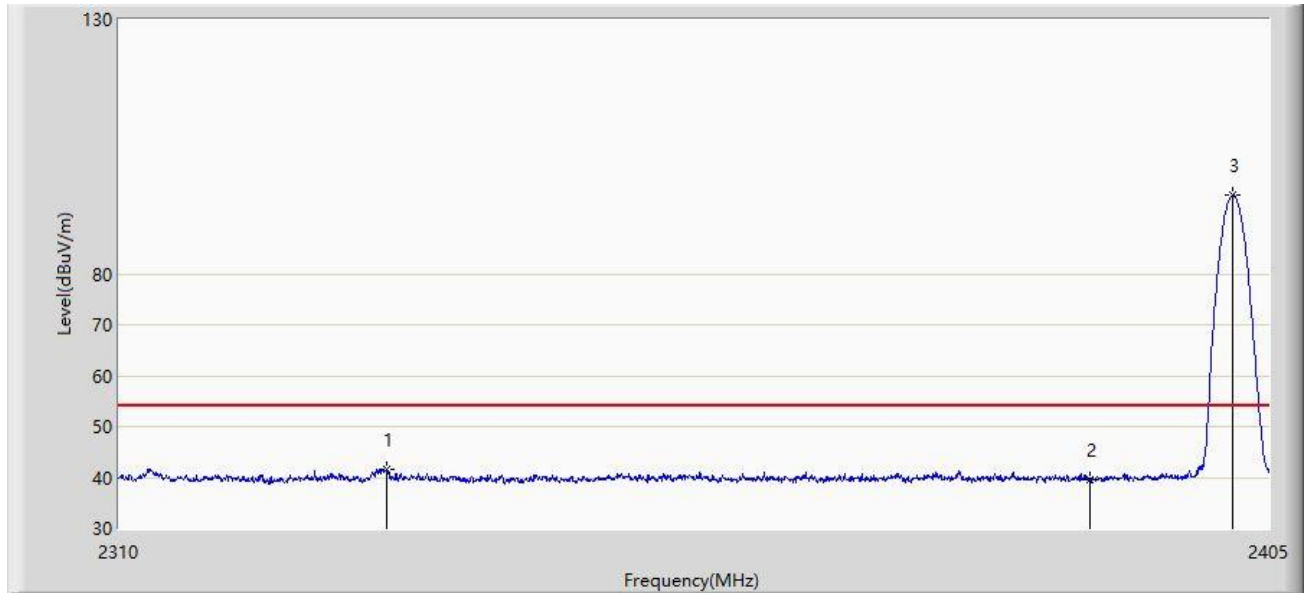


No.	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1			2370.278	58.795	27.614	-15.205	74.000	31.181	PK
2			2390.000	57.003	25.731	-16.997	74.000	31.272	PK
3		*	2401.913	95.733	64.393	21.733	74.000	31.340	PK

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2402MHz	

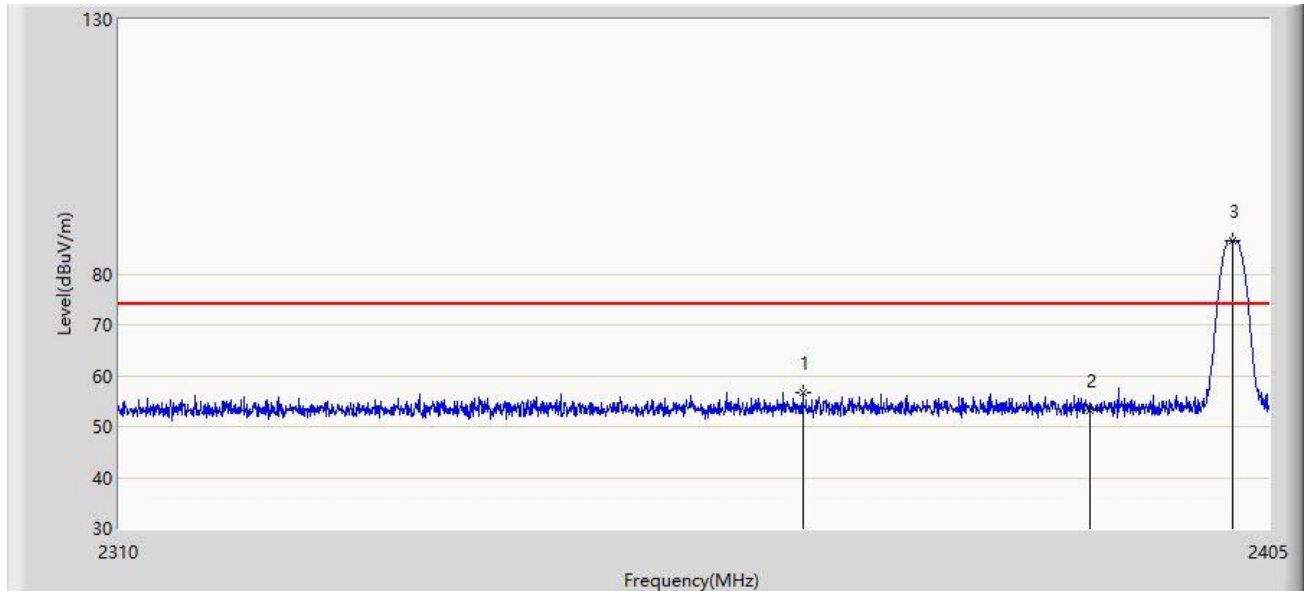


No.	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1			2331.802	41.450	10.395	-12.550	54.000	31.055	AV
2			2390.000	39.647	8.375	-14.353	54.000	31.272	AV
3		*	2402.008	95.373	64.033	41.373	54.000	31.340	AV

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Vertical
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2402MHz	

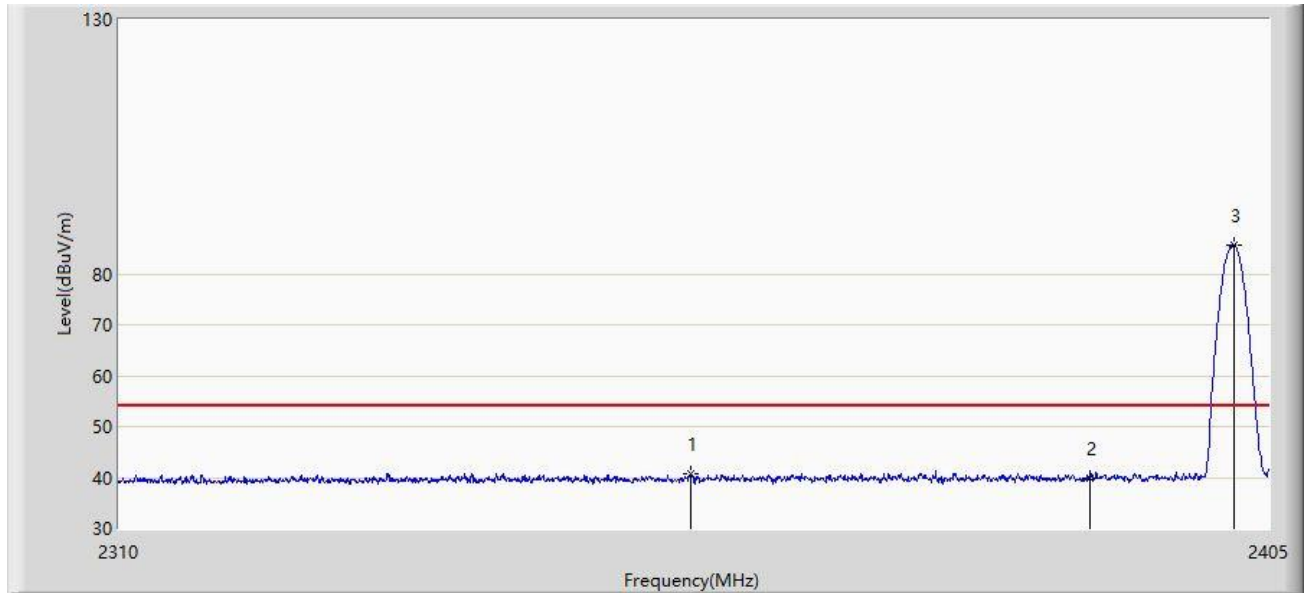


No.	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1			2366.050	56.625	25.455	-17.375	74.000	31.170	PK
2			2390.000	53.049	21.777	-20.951	74.000	31.272	PK
3		*	2401.913	86.438	55.098	12.438	74.000	31.340	PK

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Vertical
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2402MHz	

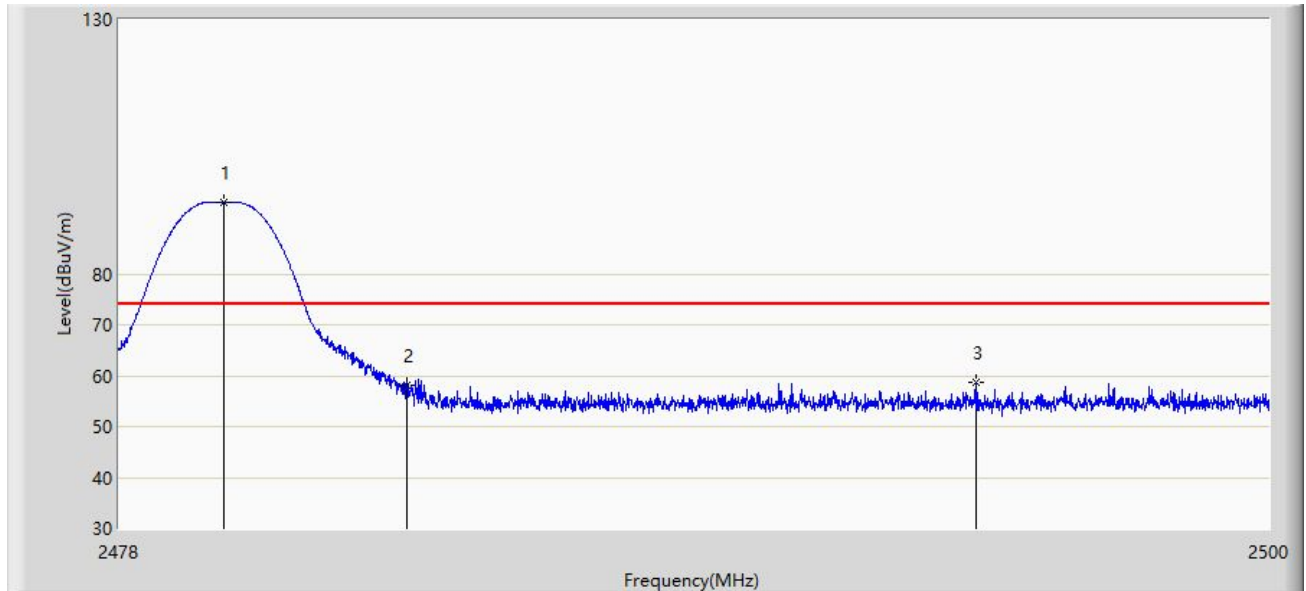


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1			2356.740	40.827	9.688	-13.173	54.000	31.139	AV
2			2390.000	39.928	8.656	-14.072	54.000	31.272	AV
3		*	2402.055	85.755	54.414	31.755	54.000	31.341	AV

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2480MHz	

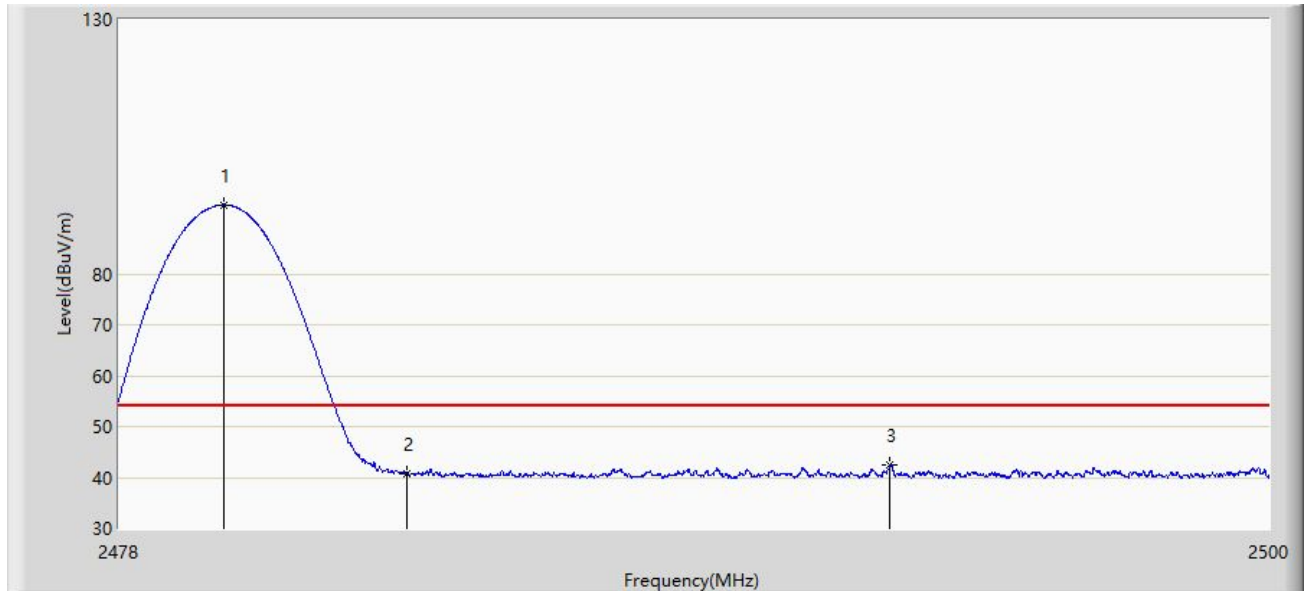


No.	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		*	2480.002	94.008	62.345	20.008	74.000	31.663	PK
2			2483.500	58.108	26.430	-15.892	74.000	31.678	PK
3			2494.379	58.770	27.044	-15.230	74.000	31.726	PK

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2480MHz	

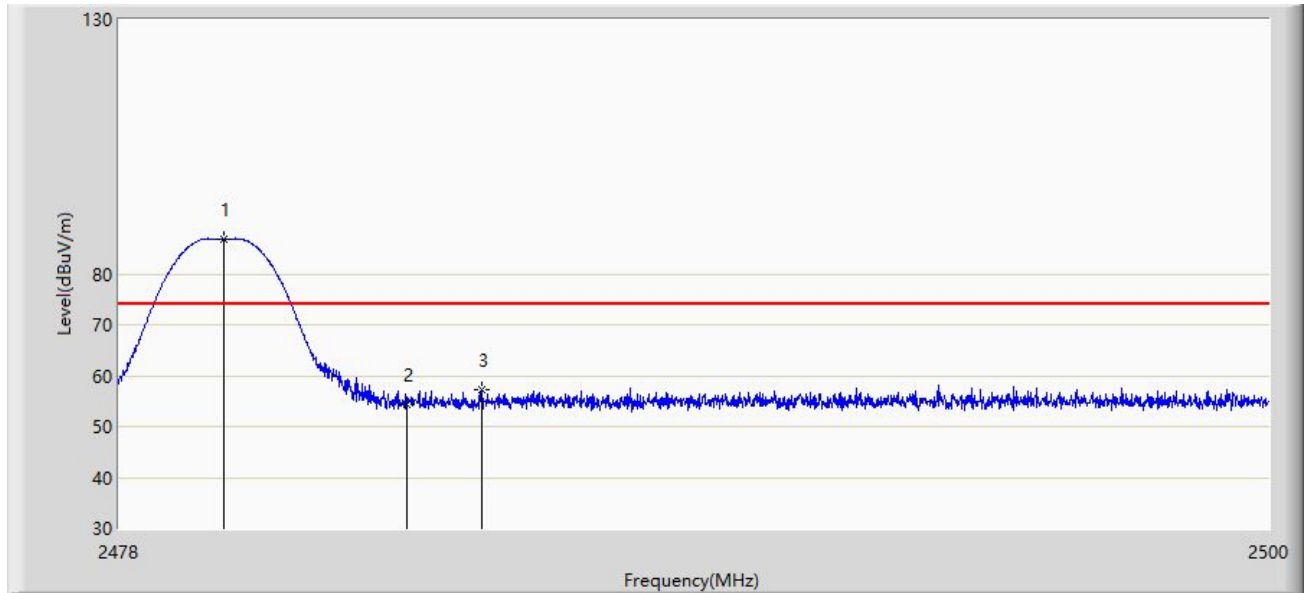


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		*	2480.002	93.611	61.948	39.611	54.000	31.663	AV
2			2483.500	40.712	9.034	-13.288	54.000	31.678	AV
3			2492.740	42.412	10.693	-11.588	54.000	31.719	AV

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Vertical
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2480MHz	

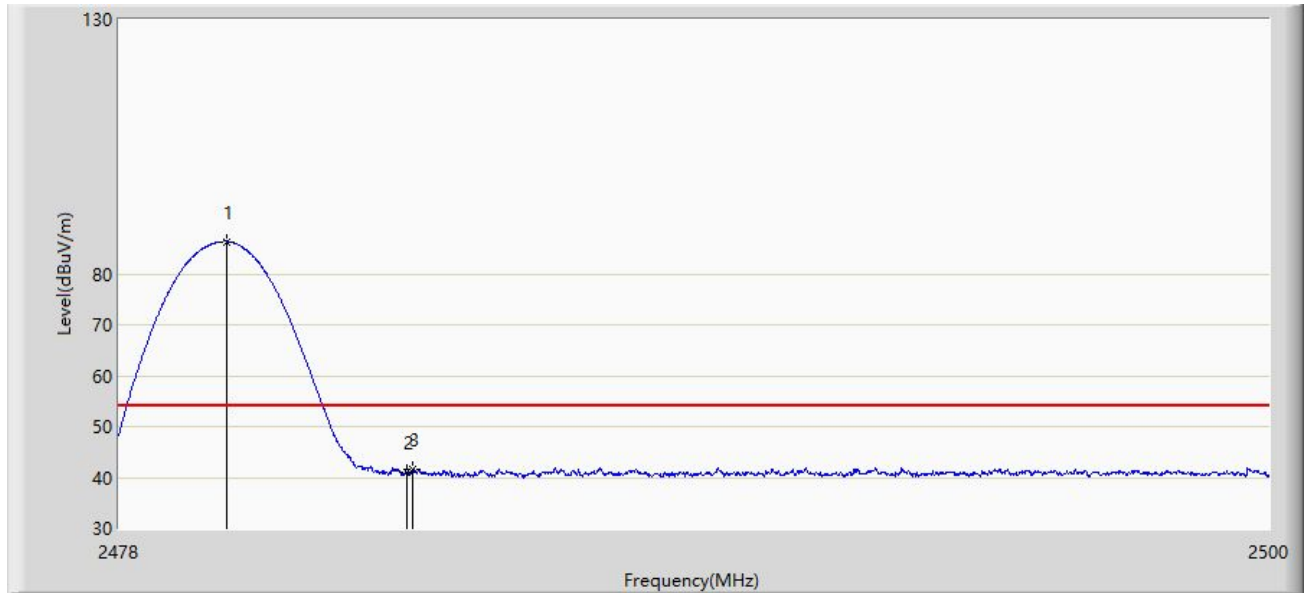


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		*	2480.002	86.850	55.187	12.850	74.000	31.663	PK
2			2483.500	54.370	22.692	-19.630	74.000	31.678	PK
3			2484.930	57.290	25.605	-16.710	74.000	31.685	PK

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

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

Site: SIP-AC1	Test Date: 2021/08/05
Limit: FCC_Part15.209_RE(3m)	Engineer: Yien Qian
Probe: SIP-AC1_HF907_102862_1-18GHz	Polarity: Vertical
EUT: Interactive Training System	Power: DC 3.7V
Test Mode: Transmit by Bluetooth LE at channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		*	2480.068	86.375	54.712	32.375	54.000	31.663	AV
2			2483.500	41.144	9.466	-12.856	54.000	31.678	AV
3			2483.610	41.464	9.785	-12.536	54.000	31.679	AV

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

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

5.8. AC Conducted Emissions Measurement

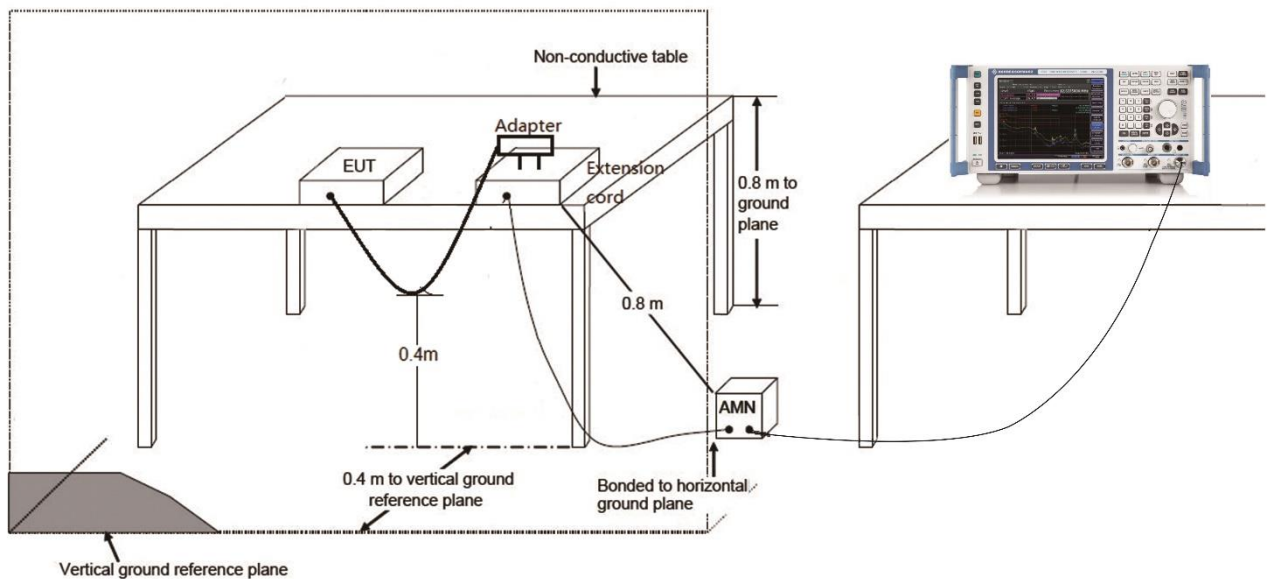
5.8.1. Test Limit

FCC Part 15.207 Class B Limits		
Frequency (MHz)	QP (dB μ V)	AV (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 transition frequencies.

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

5.8.2. Test Setup



5.8.3. Test Result

The EUT is powered by lithium battery, so this item is not applicable.

6. CONCLUSION

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

_____ The End _____

Appendix A - Test Setup Photograph

Refer to “2102RSU052-UT” file.

Appendix B - EUT Photograph

Refer to “2102RSU052-UE” file.