


# MEASUREMENT REPORT

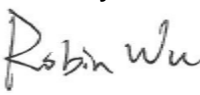
## FCC PART 15.247 / RSS-247 Bluetooth BLE

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**FCC ID:** SFK-WF402A  
**IC:** 12668A-WF402A  
**Applicant:** CIG Shanghai Co., Ltd.

**Application Type:** Certification  
**Product:** Access Point  
**Model No.:** WF-402A  
**FCC Classification:** Digital Transmission System (DTS)  
**FCC Rule Part(s):** Part 15 Subpart C (Section 15.247)  
**ISED Rule(s):** RSS-247 Issue 2, RSS-GEN Issue 5  
**Test Procedure(s):** ANSI C63.10-2013  
**Test Date:** July 07 ~ 13, 2020

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.

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### Revision History

Report No.	Version	Description	Issue Date	Note
2007RSU007-U1	Rev. 01	Initial Report	08-11-2020	Valid

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## General Information

<b>Applicant:</b>	CIG Shanghai Co., Ltd.
<b>FCC Address:</b>	5F, Building 8, No.2388 ChenHang Road, Minghang Di, SHANGHAI, China
<b>ISED Address:</b>	F/23, No.889 yishan Road, Xuhui District, Shanghai
<b>Manufacturer:</b>	CIG Shanghai Co., Ltd.
<b>FCC Address:</b>	5F, Building 8, No.2388 ChenHang Road, Minghang Di, SHANGHAI, China
<b>ISED Address:</b>	F/23, No.889 yishan Road, Xuhui District, Shanghai
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering

## Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is an FCC accredited (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.



## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



## 2. PRODUCT INFORMATION

### 2.1. Feature of Equipment under Test

Product Name (PMN)	Access Point
Model No. (HVIN)	WF-402A
Serial No.	Sample #11
Bluetooth Version	v4.2, BLE only
Operating Frequency	2402 ~ 2480MHz
Type of modulation	GFSK
Data Rate	1Mbps
Antenna Specification	PCB Antenna, 2.01dBi

### 2.2. 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	--	--	--	--

### 2.3. Test Mode

Test Mode	Mode 1: Transmit by BLE
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### 2.4. Test Software

The test utility software used during testing was “nRFGo Studio”, and the version was “1.12.1.1992”.  
The power setting in test software is “Default”.

## **2.5. EMI Suppression Device(s)/Modifications**

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

## **2.6. 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.

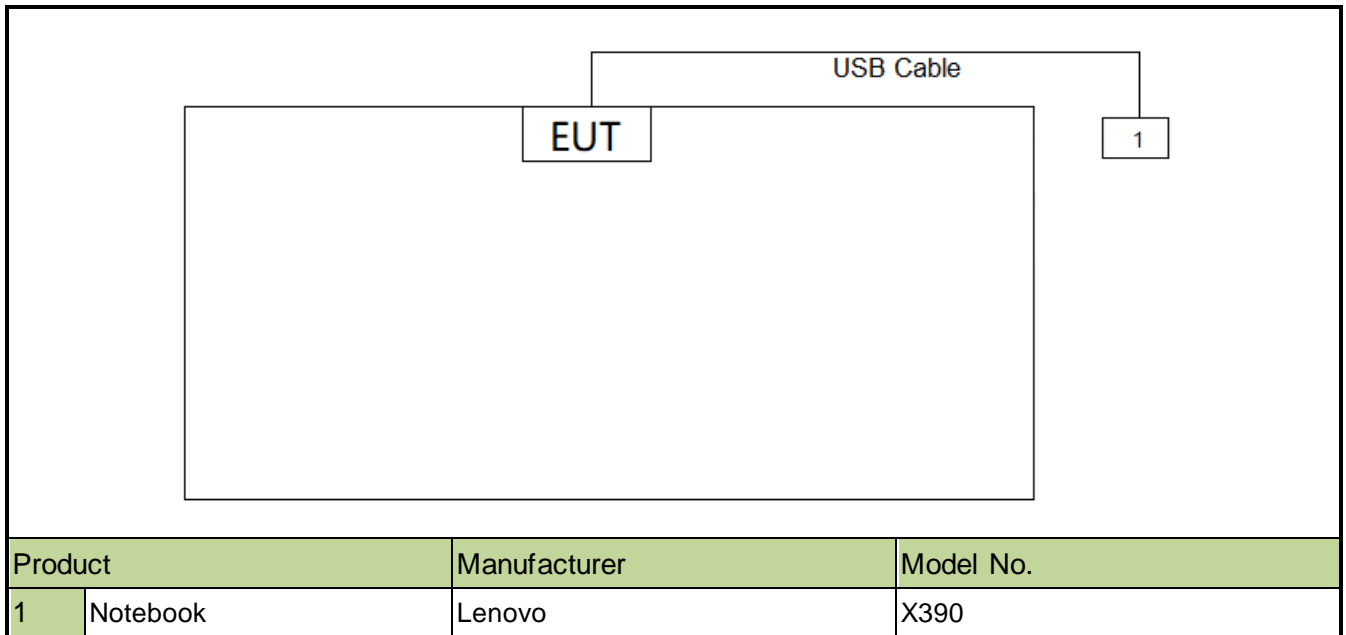
RSP-100 Issue 12 Section 5

In addition to complying with the applicable RSSs and RSP-100, each unit of a product model (i.e. of a radio apparatus) shall meet the labelling requirements set out in this section prior to being marketed in Canada or imported into Canada.

If the dimensions of the product are extremely small or it is not practical to place the label or marking on the product, and if electronic labelling cannot be implemented, the label shall be placed in a prominent location in the user manual supplied with the product, as agreed upon with ISED prior to the certification application. The user manual may be in an electronic format; if it is not supplied to the user, the user manual must be readily available.



## 2.7. Configuration of Tested System



## 2.8. 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**.
- There are no provisions for connection to an external antenna.

**Conclusion:**

The device unit complies with the requirement of §15.203.

#### 4. TEST EQUIPMENT CALIBRATION DATE

##### Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2021/01/18
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2021/06/11
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2020/08/08
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

##### Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/01/18
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/04/03
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2020/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2020/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

##### Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2020/08/01
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2020/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

## Conducted Test Equipment

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	MRTSUE06452	1 year	2021/01/08
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	2021/06/11
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/06/11
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	8901A	MRTSUE06098	1 year	2020/10/10
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
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2020/08/08

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  $k = 2$ .

<b>Conducted Emission Measurement - SR2</b>
<p>The maximum measurement uncertainty is evaluated as:</p> <p>9kHz~150kHz: 3.84dB</p> <p>150kHz~30MHz: 3.46dB</p>
<b>Radiated Emission Measurement - AC1</b>
<p>The maximum measurement uncertainty is evaluated as:</p> <p>Horizontal: 30MHz~300MHz: 4.07dB</p> <p>                  300MHz~1GHz: 3.63dB</p> <p>                  1GHz~18GHz: 4.16dB</p> <p>Vertical: 30MHz~300MHz: 4.18dB</p> <p>                  300MHz~1GHz: 3.60dB</p> <p>                  1GHz~18GHz: 4.76dB</p>
<b>Radiated Emission Measurement - AC2</b>
<p>The maximum measurement uncertainty is evaluated as:</p> <p>Horizontal: 30MHz~300MHz: 3.75dB</p> <p>                  300MHz~1GHz: 3.53dB</p> <p>                  1GHz~18GHz: 4.28dB</p> <p>Vertical: 30MHz~300MHz: 3.86dB</p> <p>                  300MHz~1GHz: 3.53dB</p> <p>                  1GHz~18GHz: 4.33dB</p>

## 6. TEST RESULT

### 6.1. Summary

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB & 99% Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 6.2
15.247(b)(3)	RSS-247 [5.4(d)]	Output Power	Refer to Section 6.3		Pass	Section 6.3
15.247(e)	RSS-247 [5.2]	Power Spectral Density	Refer to Section 6.4		Pass	Section 6.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	$\leq 20\text{dBc (Peak)}$		Pass	Section 6.5
15.205 15.209	RSS-247 [5.5]	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 6.6 & 6.7
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 6.8

#### Notes:

- 1) 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.
- 2) 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.

## **6.2. 6dB & 99% 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 & 6.9.3

### **6.2.3. Test Setting**

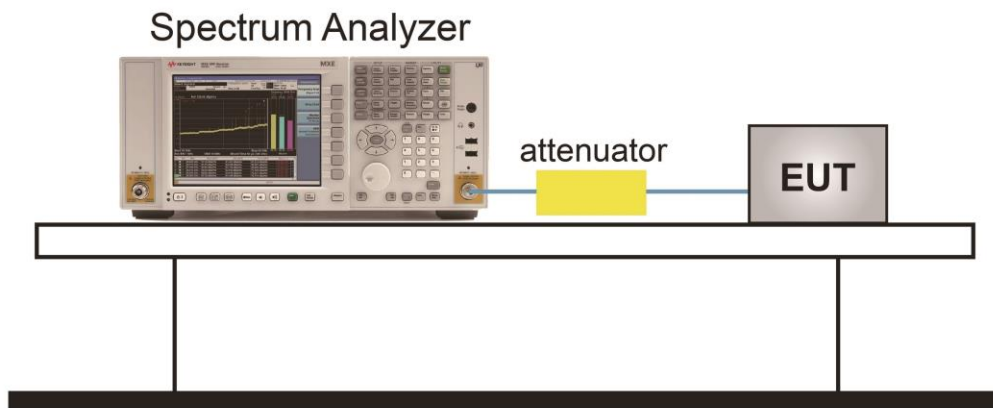
#### 6dB Bandwidth

1. Set RBW = 100 kHz
2. VBW  $\geq 3 \times$  RBW
3. Detector = Peak
4. Trace mode = max hold
5. Sweep = auto couple
6. Allow the trace was allowed to stabilize
7. 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.

#### 99% Bandwidth

1. Set RBW = 1% to 5% of the OBW
2. VBW  $\geq 3 \times$  RBW
3. Detector = Peak
4. Trace mode = max hold
5. Sweep = auto couple
6. Allow the trace was allowed to stabilize
7. The Spectrum's 99% power bandwidth function shall be used to perform the 99% bandwidth measurement.

### 6.2.4. Test Setup

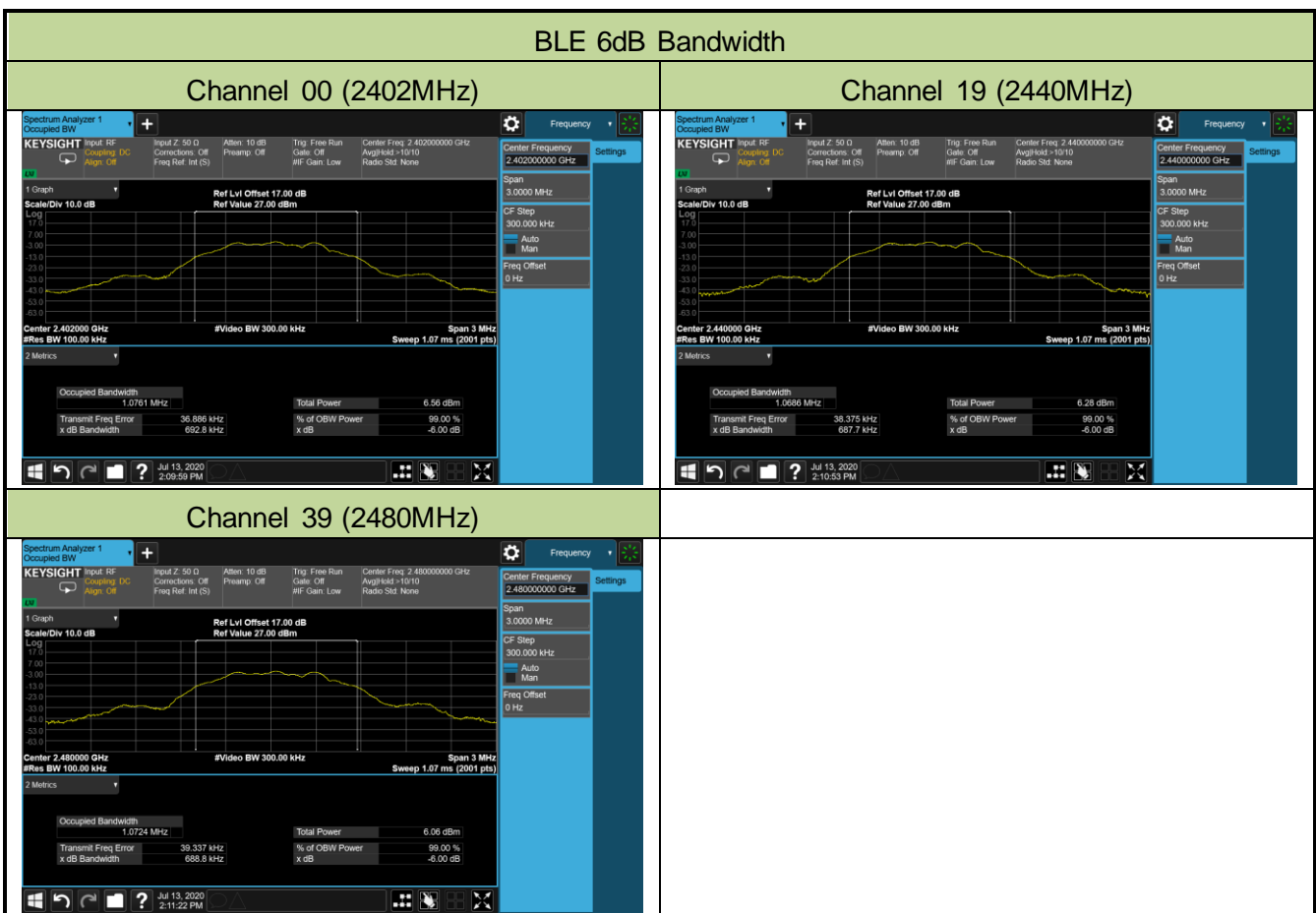




**6.2.5. Test Result**

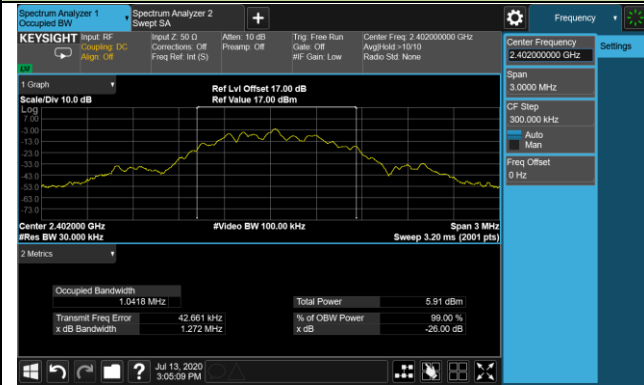
Product	Access Point	Test Engineer	Amy Zhang
Test Site	SR5	Test Date	2020/07/13

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.69	1.04	≥ 0.5	Pass
BLE	1	19	2440	0.69	1.04	≥ 0.5	Pass
BLE	1	39	2480	0.69	1.04	≥ 0.5	Pass



BLE 99% Bandwidth

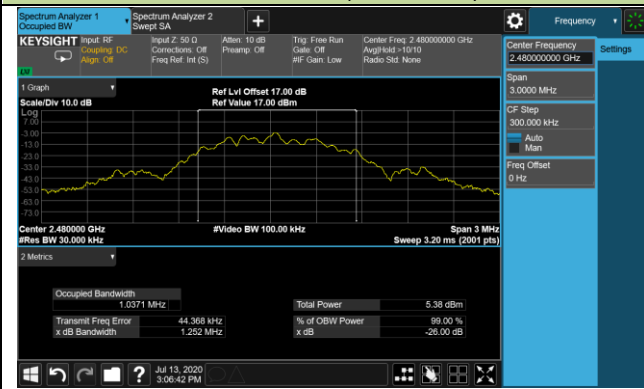
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



### 6.3. Output Power Measurement

#### 6.3.1. Test Limit

The maximum out power shall be less 1 Watt (30dBm) and the E.I.R.P shall not exceed 4 Watt (36dBm).

#### 6.3.2. Test Procedure Used

ANSI C63.10 Section 11.9.1.3 & 11.9.2.3

#### 6.3.3. Test Setting

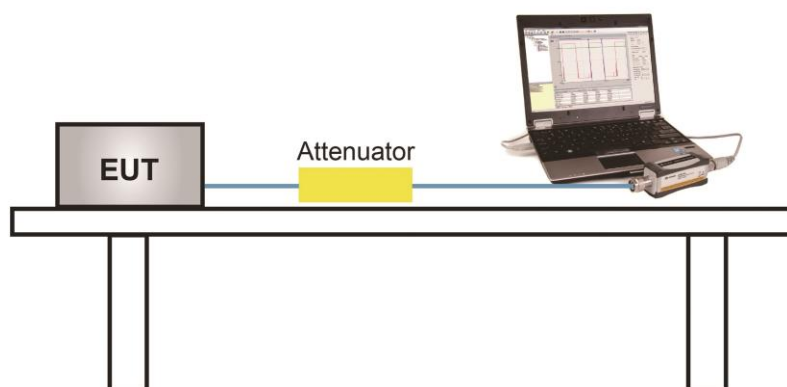
##### Method PKPM1 (Peak Power Measurement of Signals with DTS BW $\leq$ 50MHz)

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

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.

#### 6.3.4. Test Setup



### 6.3.5. Test Result of Output Power

Product	Access Point	Test Engineer	Amy Zhang
Test Site	SR5	Test Date	2020/07/13
Test Result	Peak Output Power		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
BLE	1	00	2402	0.83	≤ 30.00	2.84	≤ 36.00	Pass
BLE	1	19	2440	0.68	≤ 30.00	2.69	≤ 36.00	Pass
BLE	1	39	2480	0.49	≤ 30.00	2.50	≤ 36.00	Pass

Note: Max EIRP (dBm) = Peak Power (dBm) + Antenna Gain (dBi), Antenna Gain = 2.01dBi.

Product	Access Point	Test Engineer	Amy Zhang
Test Site	SR5	Test Date	2020/07/13
Test Result	Average Output Power (Reporting Only)		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
BLE	1	00	2402	0.14	≤ 30.00	2.15	≤ 36.00	Pass
BLE	1	19	2440	0.00	≤ 30.00	2.01	≤ 36.00	Pass
BLE	1	39	2480	-0.20	≤ 30.00	1.81	≤ 36.00	Pass

Note: Max EIRP (dBm) = Peak Power (dBm) + Antenna Gain (dBi), Antenna Gain = 2.01dBi.

## 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.

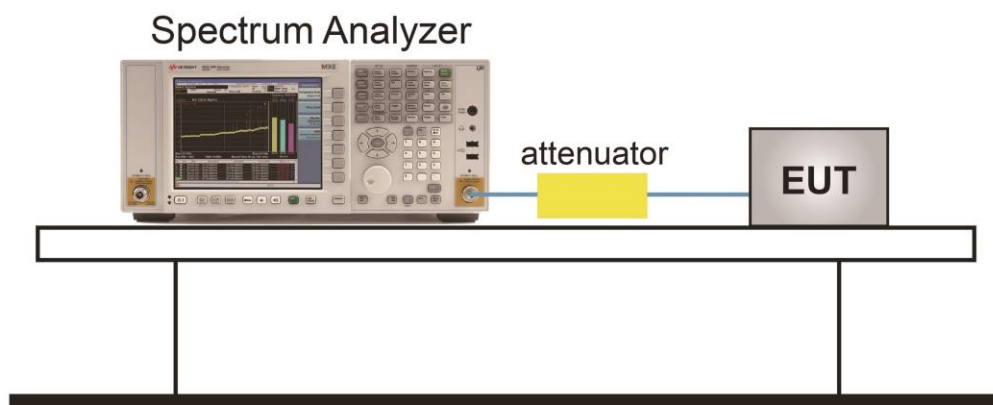
### 6.4.2. Test Procedure Used

ANSI C63.10 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 DTS channel bandwidth
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

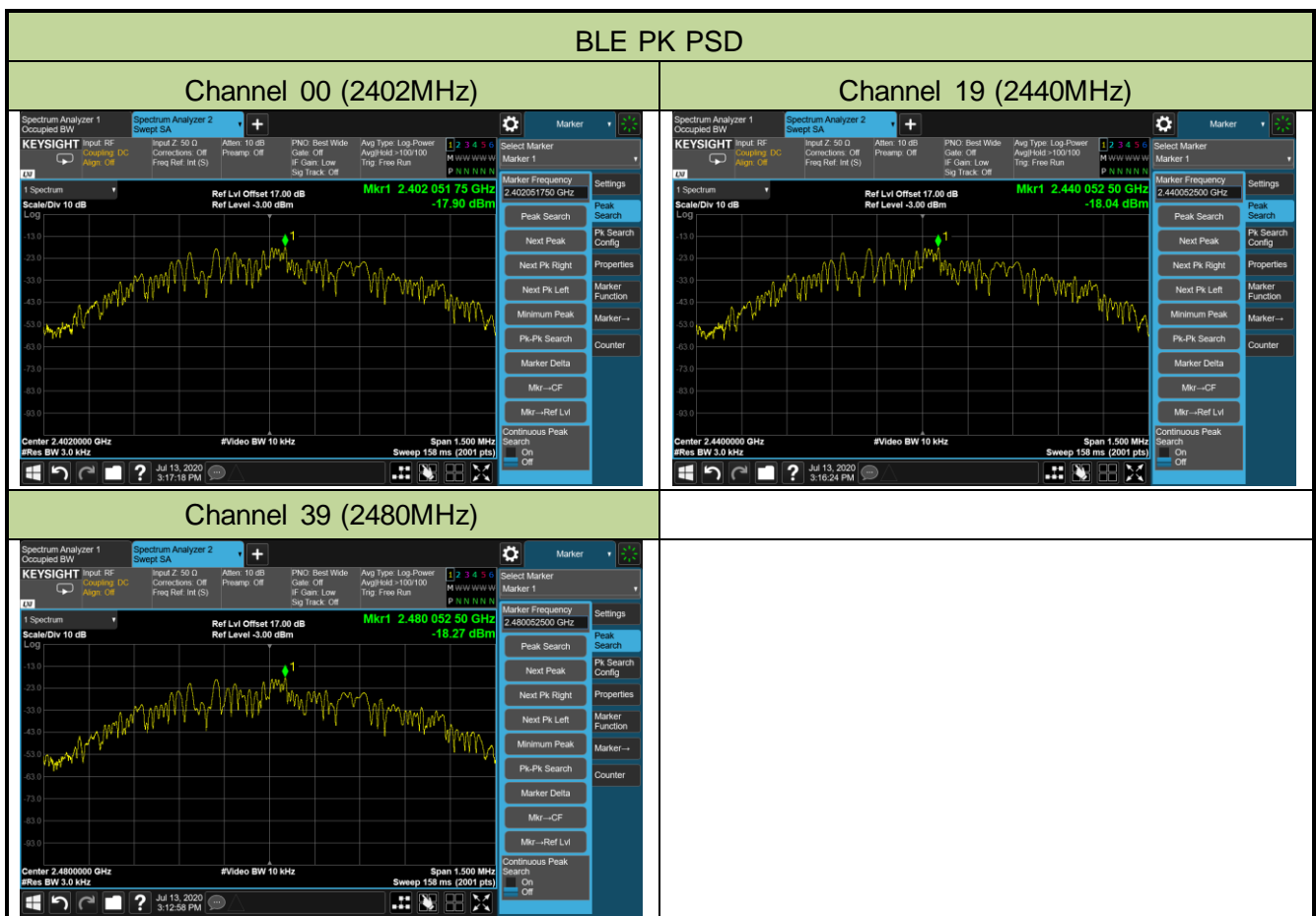
### 6.4.4. Test Setup



### 6.4.5. Test Result

Product	Access Point	Test Engineer	Amy Zhang
Test Site	SR5	Test Date	2020/07/13

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PK PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-17.90	≤ 8.00	Pass
BLE	1	19	2440	-18.04	≤ 8.00	Pass
BLE	1	39	2480	-18.27	≤ 8.00	Pass



## **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 Section 11.11

### **6.5.3. Test Setting**

#### **Reference level measurement**

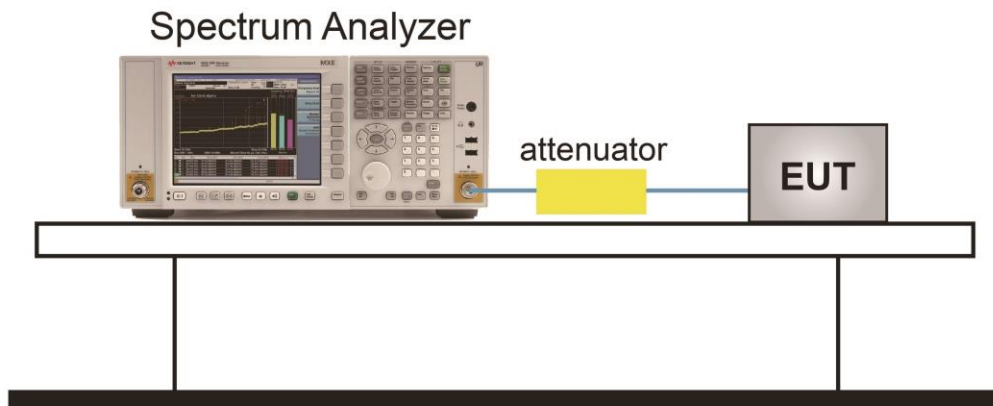
1. Set instrument center frequency to DTS channel center frequency
2. Set the span to  $\geq 1.5$  times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW  $\geq 3 \times$  RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize
9. Use the peak marker function to determine the maximum PSD level.

#### **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

8. Use the peak marker function to determine the maximum amplitude level.

#### 6.5.4. Test Setup





### 6.5.5. Test Result

Product	Access Point	Test Engineer	Amy Zhang
Test Site	SR5	Test Date	2020/07/13

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 Out-of-Band Emissions**  
**Channel 00 (2402MHz)**

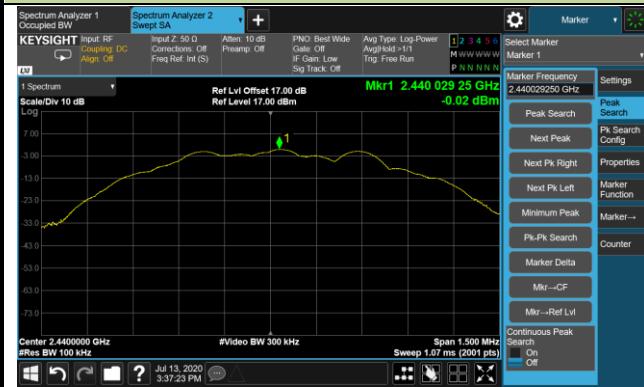
100kHz PSD reference Level

Low Band Edge

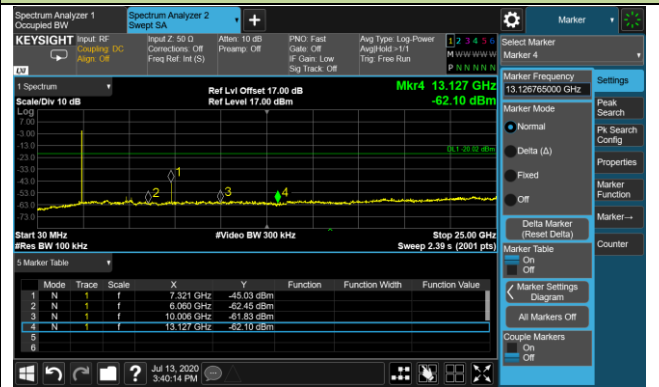
Spurious Emission

Channel 19 (2440MHz)

100kHz PSD reference Level

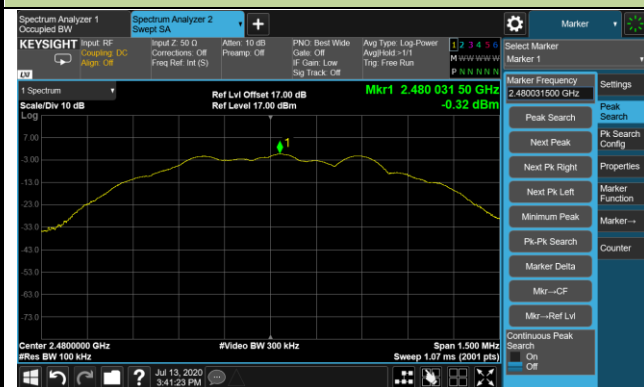


Spurious Emission

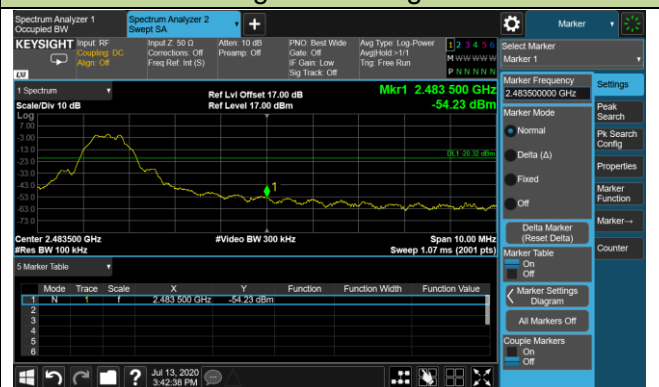


Channel 39 (2480MHz)

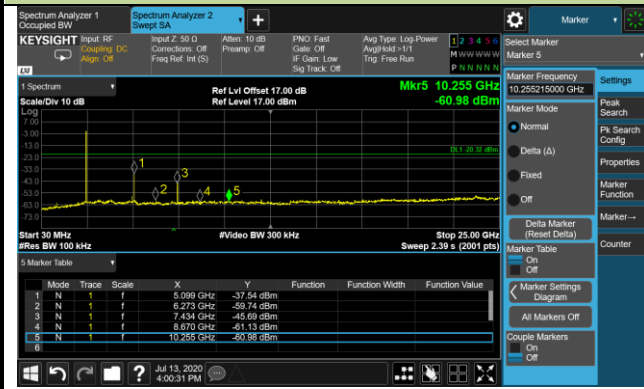
100kHz PSD reference Level



High Band Edge



Spurious Emission



## 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 and in Section 8.10 of the RSS-Gen Issue 5 must not exceed the limits shown in Table.

FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen Section 8.9		
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

### 6.6.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

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

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

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

### 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

**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**

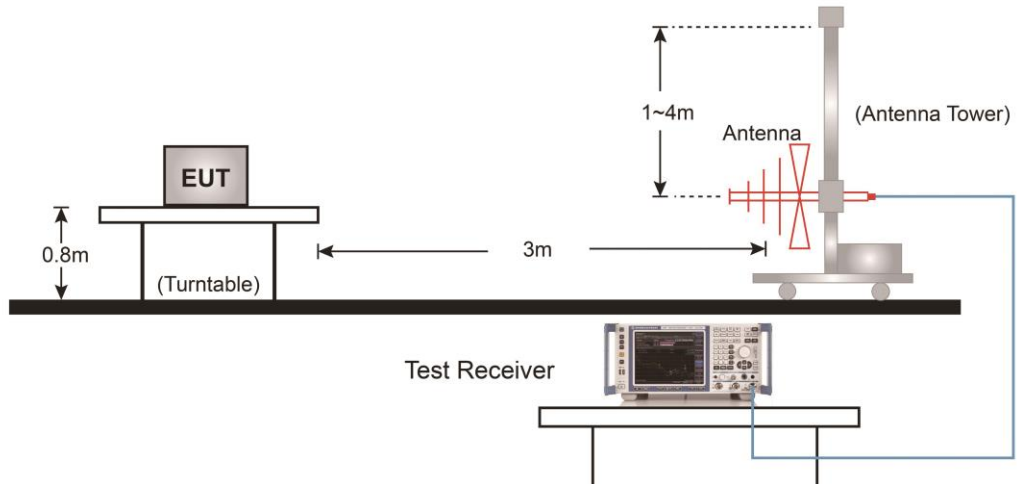
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Average Measurements above 1GHz**

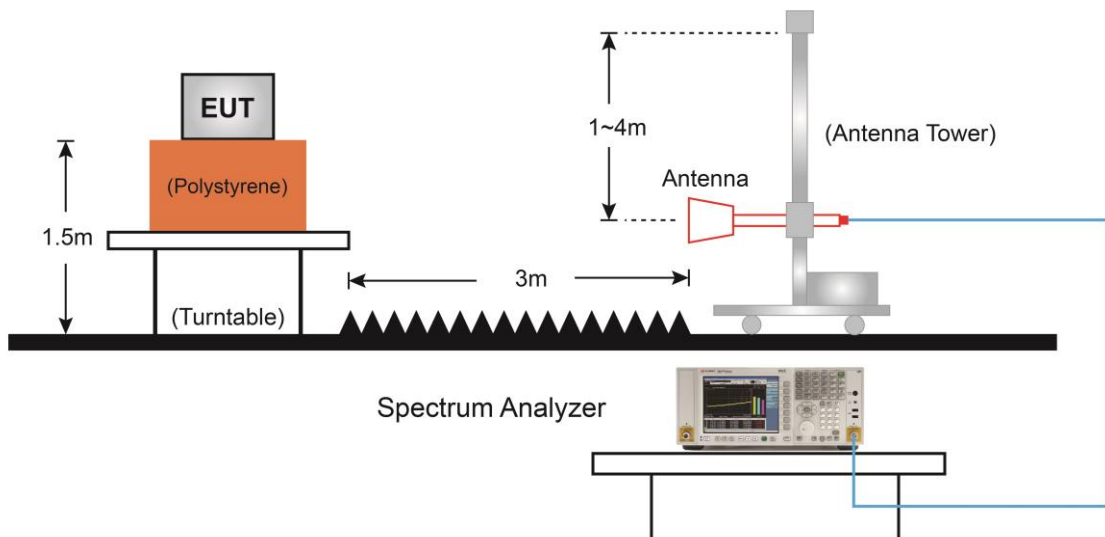
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10 Hz.  
If the EUT duty cycle is  $< 98\%$ , set VBW  $\geq 1/T$ . T is the minimum transmission duration.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

### 6.6.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



### 6.6.5. Test Result

Product	Access Point	Test Engineer	Buter Shi
Test Site	AC1	Test Date	2020/07/07
Test Mode	BLE	Test Channel	00
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 (dB $\mu$ V)	Factor (dB)	Measure Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector	Polarization
	7358.0	37.0	11.0	47.9	74.0	-26.1	Peak	Horizontal
	8165.5	36.0	11.5	47.5	74.0	-26.5	Peak	Horizontal
*	8616.0	35.9	12.4	48.3	74.0	-25.7	Peak	Horizontal
*	9670.0	36.9	14.5	51.4	74.0	-22.6	Peak	Horizontal
	7400.5	38.2	10.7	48.9	74.0	-25.1	Peak	Vertical
	8352.5	36.5	11.2	47.7	74.0	-26.3	Peak	Vertical
*	8769.0	35.8	12.9	48.7	74.0	-25.3	Peak	Vertical
*	9899.5	35.2	15.1	50.3	74.0	-23.7	Peak	Vertical

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

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Product	Access Point	Test Engineer	Buter Shi
Test Site	AC1	Test Date	2020/07/07
Test Mode	BLE	Test Channel	19
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
	7375.0	38.0	10.8	48.9	74.0	-25.1	Peak	Horizontal
	8429.0	37.6	11.4	49.1	74.0	-24.9	Peak	Horizontal
*	8862.5	36.0	12.9	48.9	74.0	-25.1	Peak	Horizontal
*	9644.5	36.3	14.4	50.7	74.0	-23.3	Peak	Horizontal
	7434.5	37.6	10.9	48.5	74.0	-25.5	Peak	Vertical
	8165.5	36.3	11.5	47.8	74.0	-26.2	Peak	Vertical
*	8777.5	35.8	12.8	48.6	74.0	-25.4	Peak	Vertical
*	9814.5	35.6	15.3	50.8	74.0	-23.2	Peak	Vertical

Note 1: "\*" means test frequency didn't fall into restricted frequency 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)

Product	Access Point	Test Engineer	Buter Shi
Test Site	AC1	Test Date	2020/07/07
Test Mode	BLE	Test Channel	39
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
	7468.5	38.1	10.9	49.0	74.0	-25.0	Peak	Horizontal
	8208.0	37.6	11.4	49.0	74.0	-25.0	Peak	Horizontal
*	8701.0	35.5	13.0	48.6	74.0	-25.4	Peak	Horizontal
*	9806.0	35.4	15.2	50.6	74.0	-23.4	Peak	Horizontal
	7630.0	37.5	10.5	48.0	74.0	-26.0	Peak	Vertical
	8242.0	38.2	11.2	49.4	74.0	-24.6	Peak	Vertical
*	8854.0	36.1	12.8	48.9	74.0	-25.1	Peak	Vertical
*	9874.0	34.8	15.6	50.4	74.0	-23.6	Peak	Vertical

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

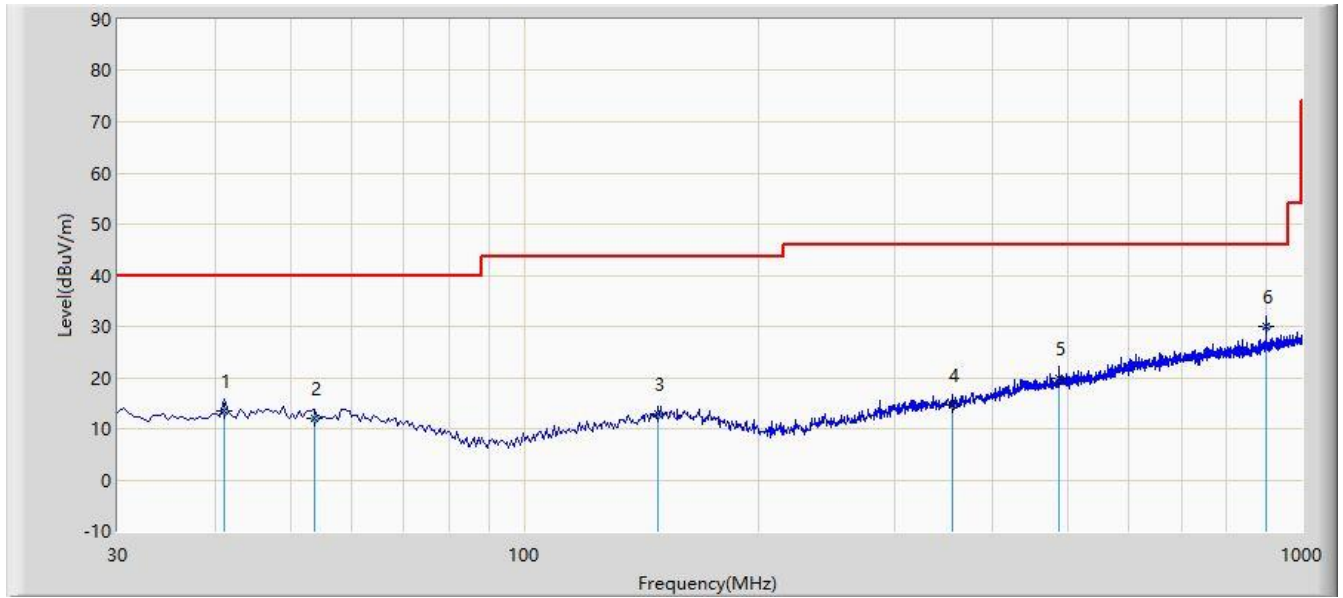
Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)



**The test mode of Radiated Emission below 1GHz:**

Site: AC1	Time: 2020/07/14 - 11:35
Limit: FCC_Part15.209_RE(3m)	Engineer: Antony Yang
Probe: AC1_VULB 9168 _30-1000MHz	Polarity: Horizontal
EUT: Access Point	Power: By USB
<b>Test Mode:</b> Transmit by BLE at channel 2402MHz	



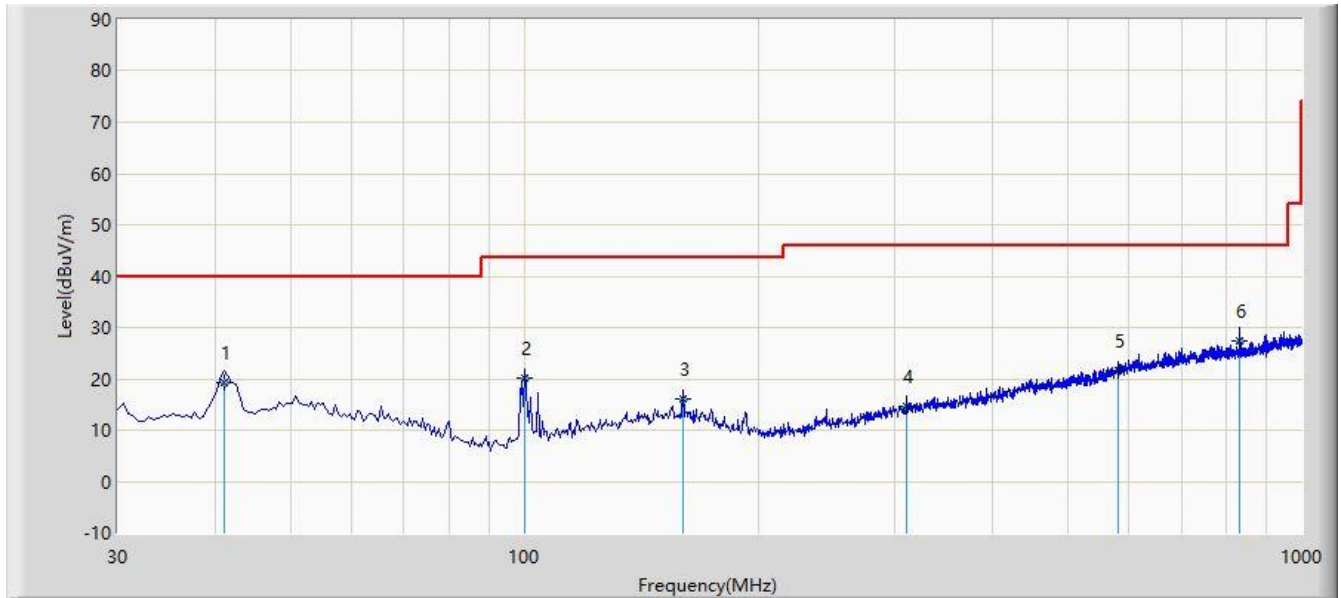
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			41.155	13.457	-0.540	-26.543	40.000	13.997	QP
2			53.765	12.155	-2.300	-27.845	40.000	14.456	QP
3			148.340	12.883	-1.500	-30.617	43.500	14.383	QP
4			355.920	14.779	-1.200	-31.221	46.000	15.979	QP
5			487.840	19.789	0.458	-26.211	46.000	19.331	QP
6		*	900.090	30.022	4.020	-15.978	46.000	26.002	QP

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

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

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC1	Time: 2020/07/14 - 11:37
Limit: FCC_Part15.209_RE(3m)	Engineer: Antony Yang
Probe: AC1_VULB 9168 _30-1000MHz	Polarity: Vertical
EUT: Access Point	Power: By USB
<b>Test Mode:</b> 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			41.155	19.147	5.150	-20.853	40.000	13.997	QP
2			100.325	20.198	10.546	-23.302	43.500	9.652	QP
3			159.980	15.992	1.560	-27.508	43.500	14.432	QP
4			310.815	14.667	-0.500	-31.333	46.000	15.167	QP
5			580.450	21.455	0.150	-24.545	46.000	21.305	QP
6		*	832.675	27.355	2.150	-18.645	46.000	25.205	QP

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

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

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear 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
<sup>1</sup> 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 - 156.525	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	( <sup>2</sup> )
13.36 - 13.41	--	--	--

**For RSS-Gen Section 8.10 Requirement**

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.009 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.525225	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	--
8.37625 - 8.38675	1718.8 - 1722.2	--
8.41425 - 8.41475	2200 - 2300	--
12.29 - 12.293	2310 - 2390	--
12.51975 - 12.52025	2483.5 - 2500	--
12.57675 - 12.57725	2655 - 2900	--
13.36 - 13.41	3260 - 3267	--
16.42 - 16.423	3332 - 3339	--
16.69475 - 16.69525	3345.8 - 3358	--
16.80425 - 16.80475	3500 - 4400	--
25.5 - 25.67	4500 - 5150	--
37.5 - 38.25	5350 - 5460	--
73 - 74.6	7250 - 7750	--
74.8 - 75.2	8025 - 8500	--
108 - 138	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR and in Section 8.10 of the RSS-Gen must not exceed the limits shown in Table.

FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen Section 8.9		
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 Section 6.3 (General Requirements)

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

**6.7.3. Test Setting**

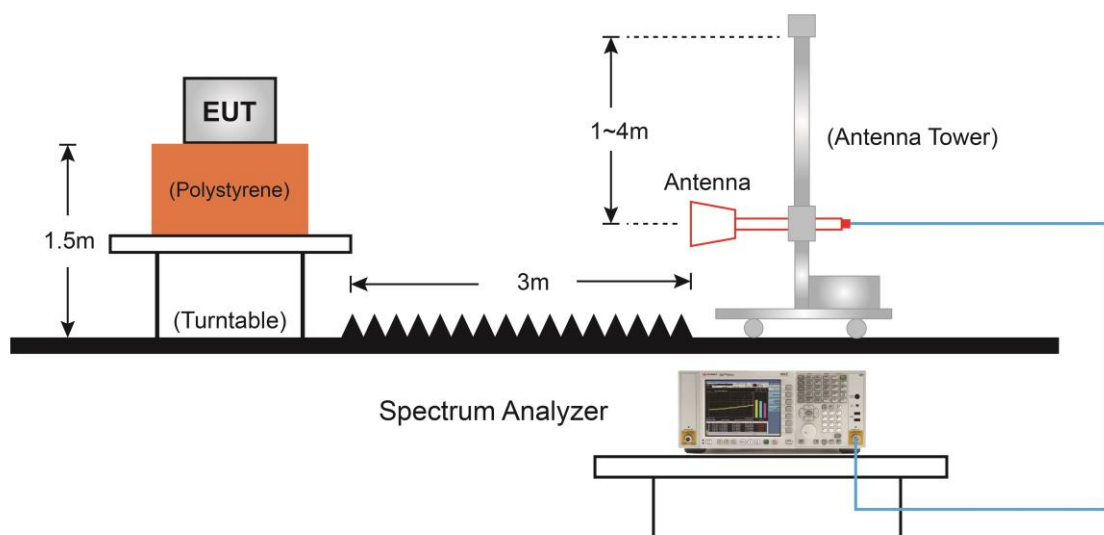
**Peak Field Strength Measurements**

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. Trace was allowed to stabilize

### Average Field Strength Measurements

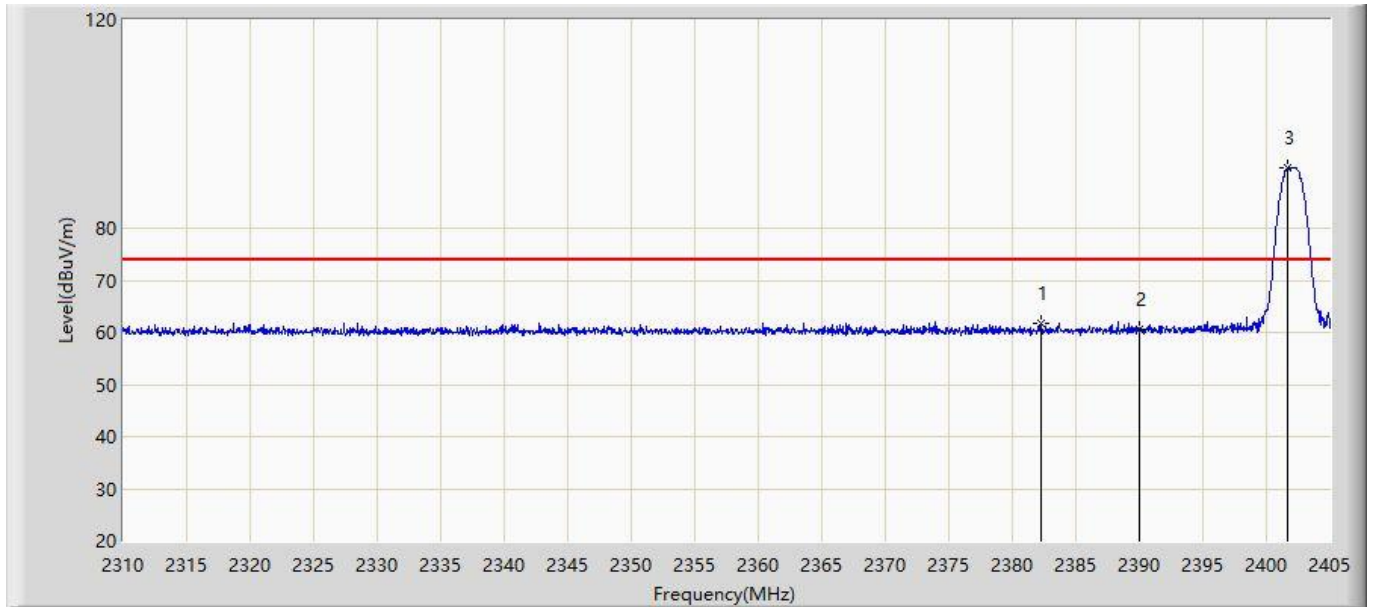
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW  $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB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

#### 6.7.4. Test Setup



### 6.7.5. Test Result

Site: AC1	Time: 2020/07/07 - 02:19
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2402 MHz	

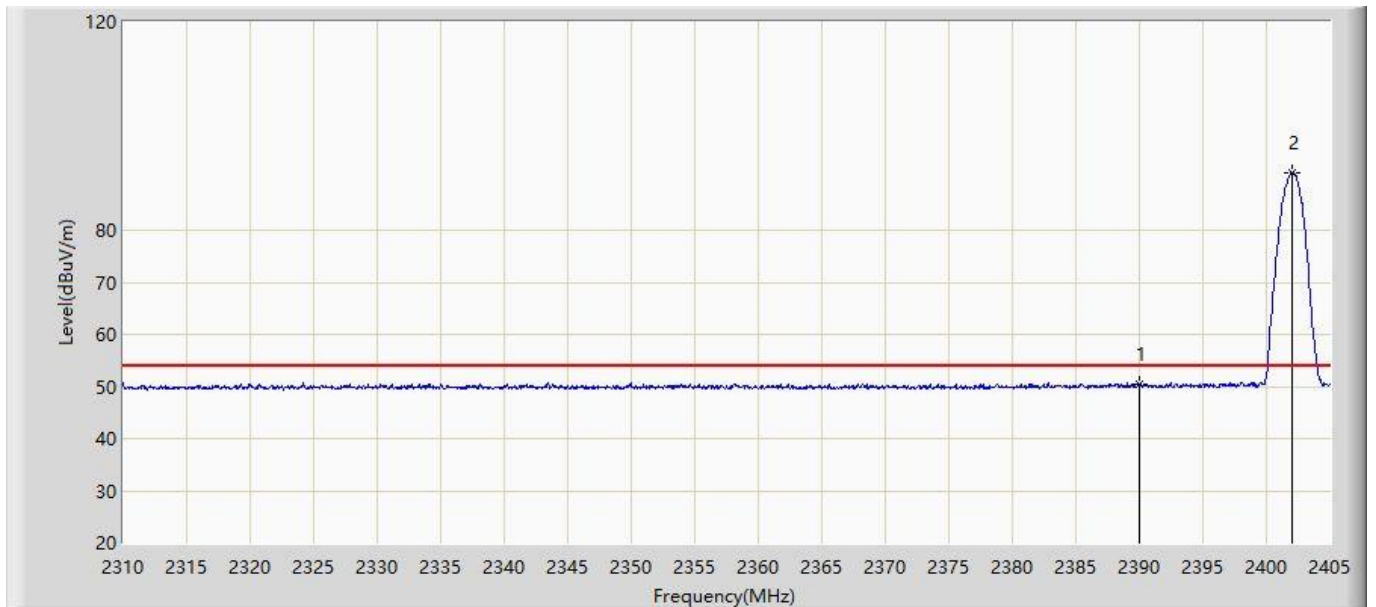


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1			2382.248	61.659	28.983	-12.341	74.000	32.675	PK
2			2390.000	60.553	27.841	-13.447	74.000	32.712	PK
3		*	2401.722	91.620	58.876	N/A	N/A	32.744	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

Site: AC1	Time: 2020/07/07 - 02:23
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2402 MHz	



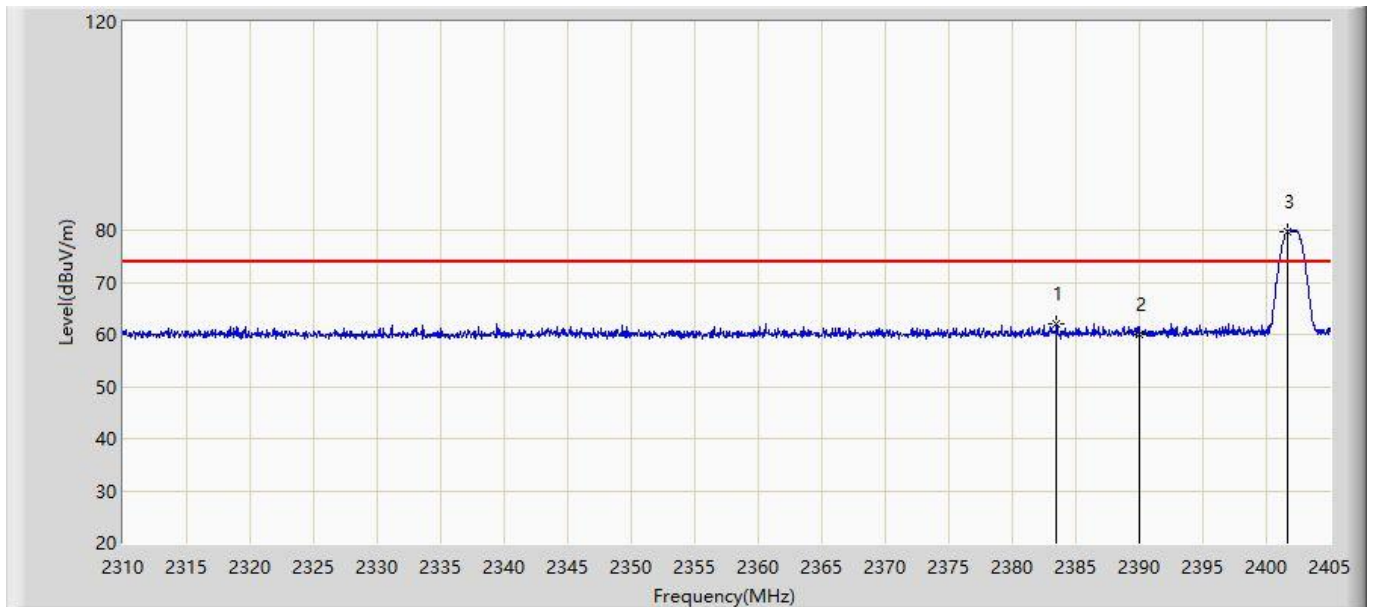
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	50.338	17.626	-3.662	54.000	32.712	AV
2		*	2402.008	91.004	58.260	N/A	N/A	32.744	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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



Site: AC1	Time: 2020/07/07 - 02:25
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2402 MHz	

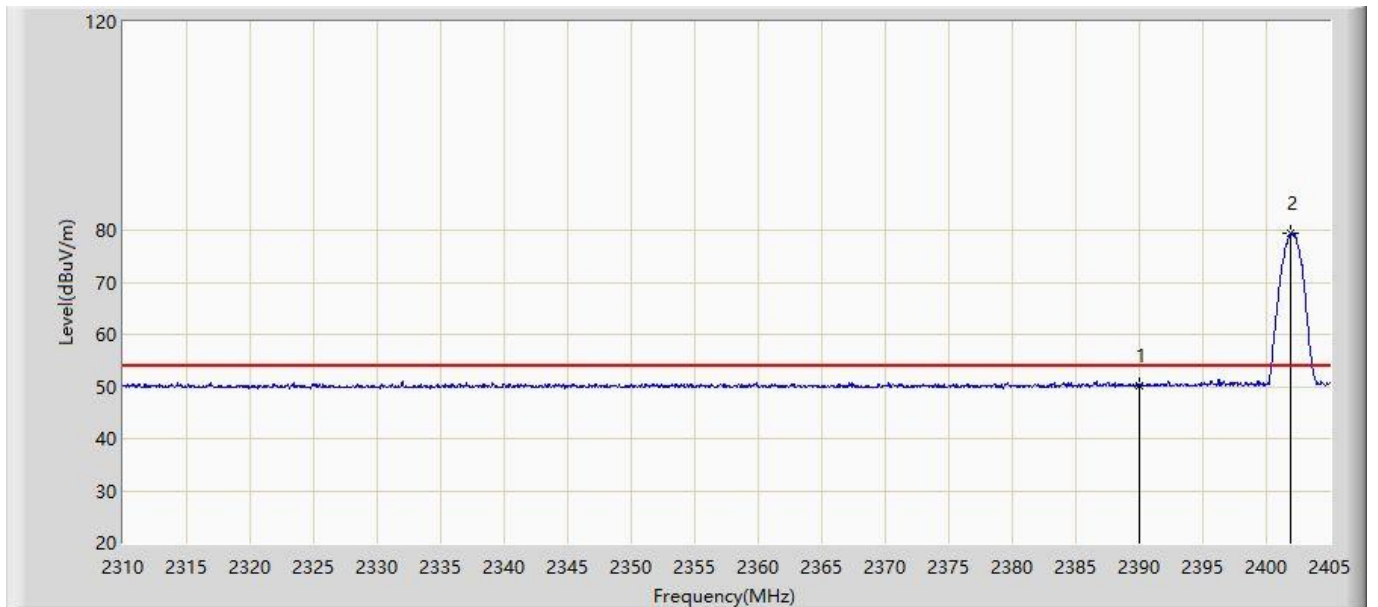


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1			2383.482	62.093	29.412	-11.907	74.000	32.682	PK
2			2390.000	60.101	27.389	-13.899	74.000	32.712	PK
3		*	2401.627	79.812	47.068	N/A	N/A	32.744	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

Site: AC1	Time: 2020/07/07 - 02:25
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2402 MHz	

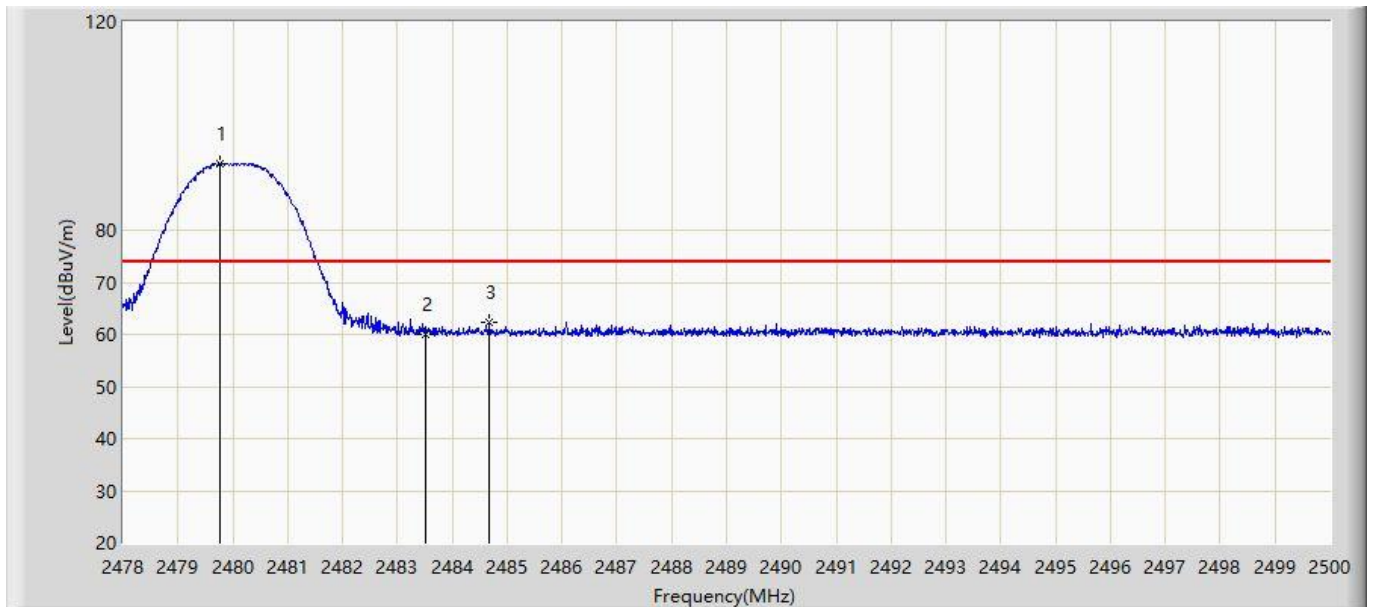


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	50.160	17.448	-3.840	54.000	32.712	AV
2		*	2401.960	79.279	46.535	N/A	N/A	32.744	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

Site: AC1	Time: 2020/07/07 - 02:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2480 MHz	

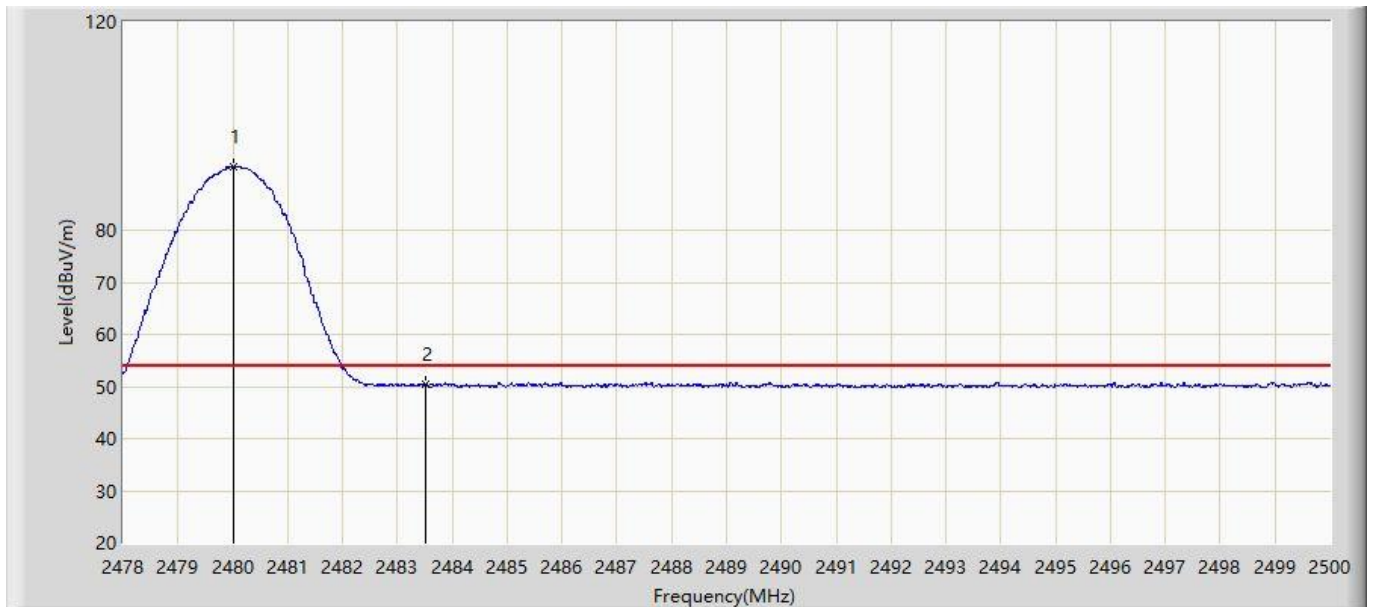


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.760	92.856	60.173	N/A	N/A	32.683	PK
2			2483.500	59.895	27.245	-14.105	74.000	32.651	PK
3			2484.677	62.288	29.648	-11.712	74.000	32.640	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

Site: AC1	Time: 2020/07/07 - 02:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2480 MHz	

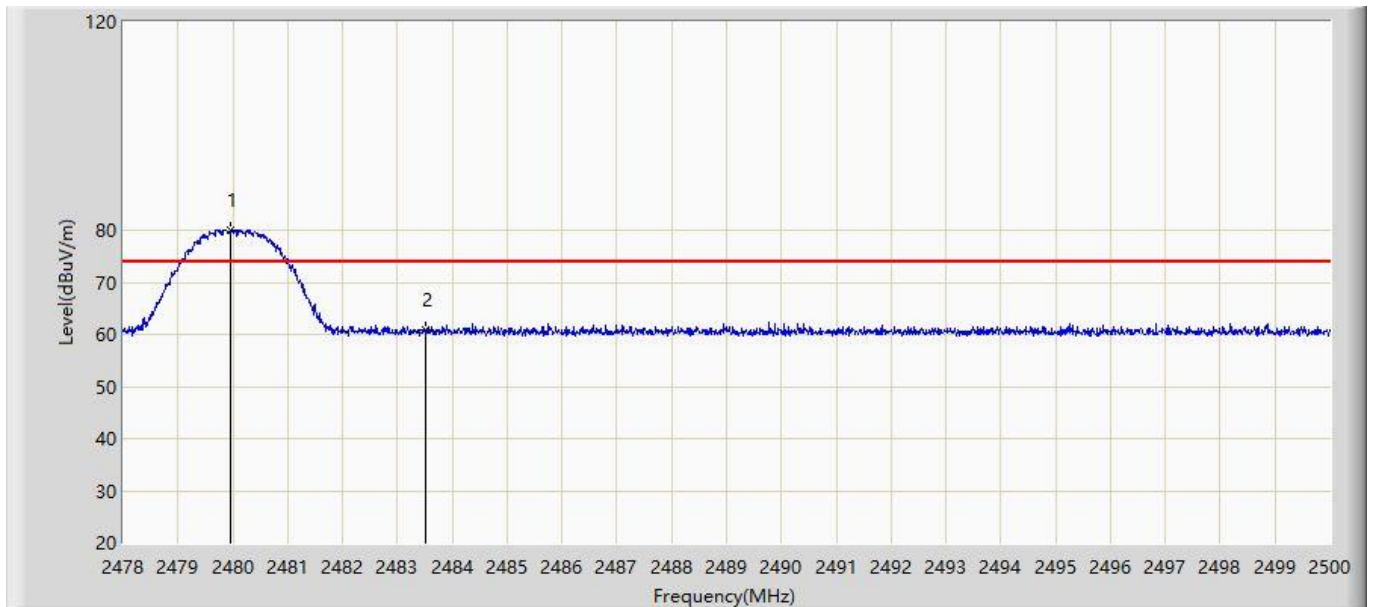


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.024	92.220	59.539	N/A	N/A	32.681	AV
2			2483.500	50.411	17.761	-3.589	54.000	32.651	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

Site: AC1	Time: 2020/07/07 - 02:35
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2480 MHz	

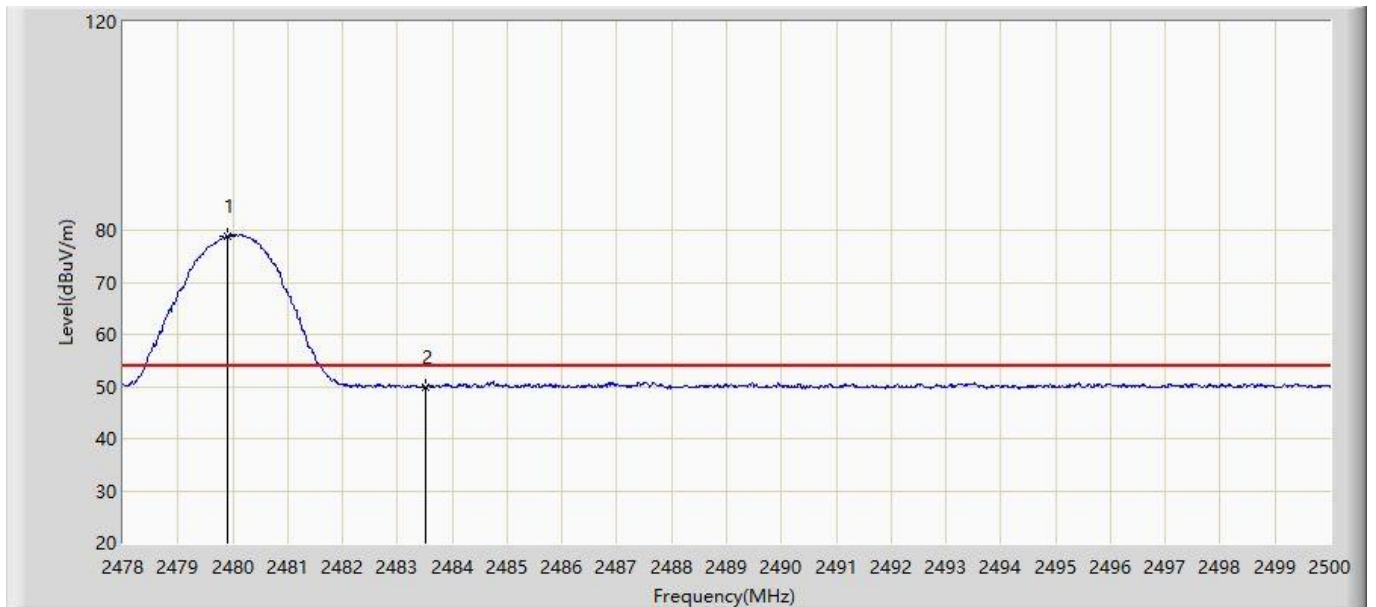


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.969	80.121	47.440	N/A	N/A	32.681	PK
2			2483.500	60.820	28.170	-13.180	74.000	32.651	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

Site: AC1	Time: 2020/07/07 - 02:35
Limit: FCC_Part15.209_RE(3m)	Engineer: Buter Shi
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Access Point	Power: By USB
Test Mode: Transmit by BLE at Channel 2480 MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.903	78.877	46.195	N/A	N/A	32.682	AV
2			2483.500	49.916	17.266	-4.084	54.000	32.651	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

## 6.8. AC Conducted Emissions Measurement

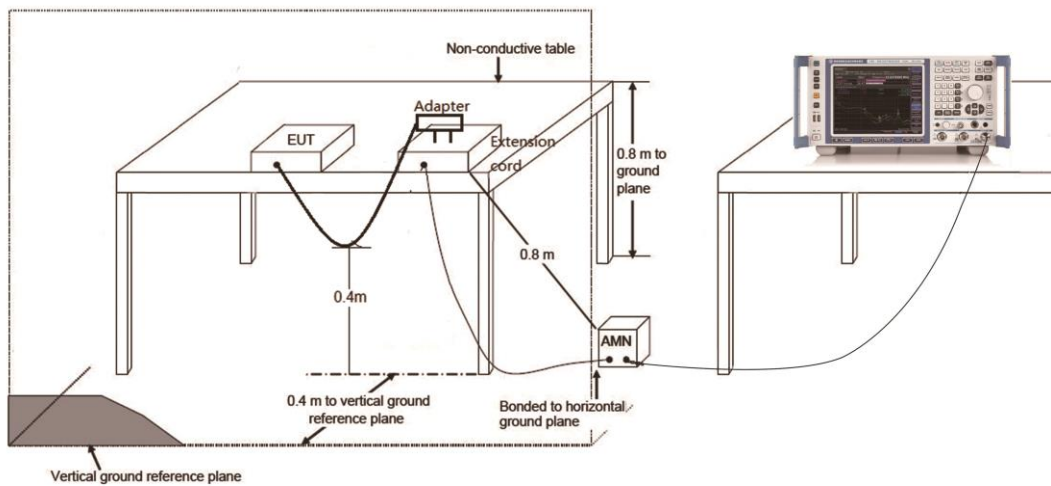
### 6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 & RSS-Gen Issue 5 Section 7.2.4 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.

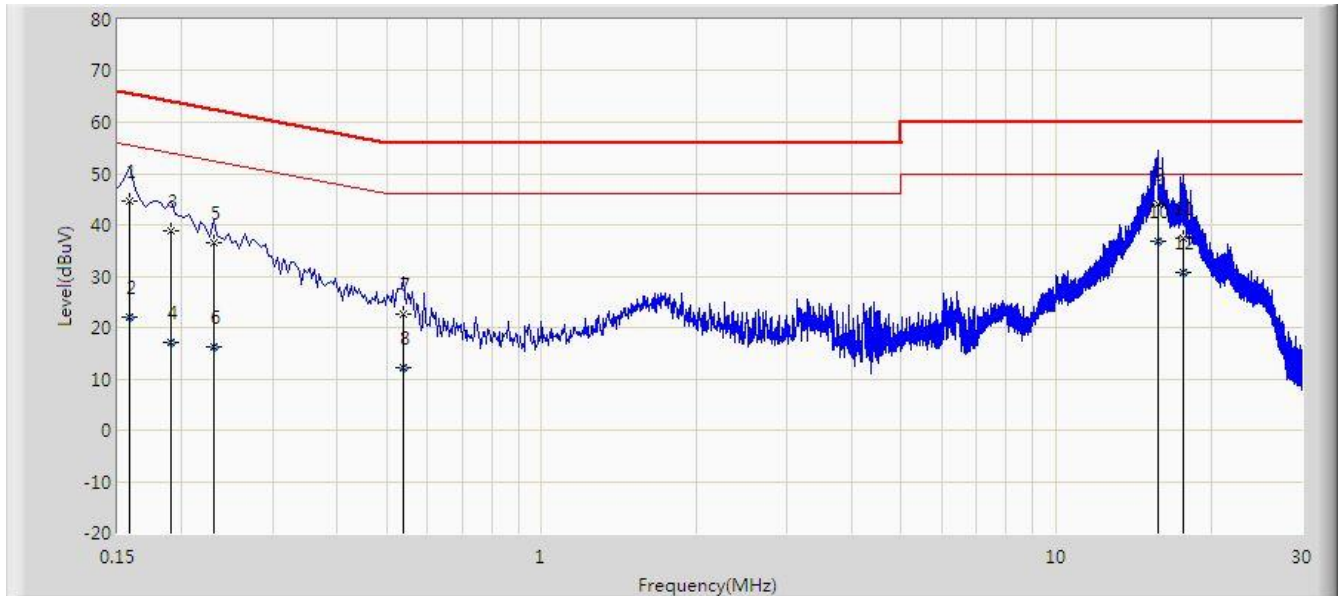
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 6.8.2. Test Setup



### 6.8.3. Test Result

Site: SR2	Time: 2020/07/13 - 19:37
Limit: FCC_Part15.207_CE	Engineer: Dandy Li
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Access Point	Power: AC 120V/60Hz
<b>Test Mode:</b> Transmit by BLE at channel 2402MHz	



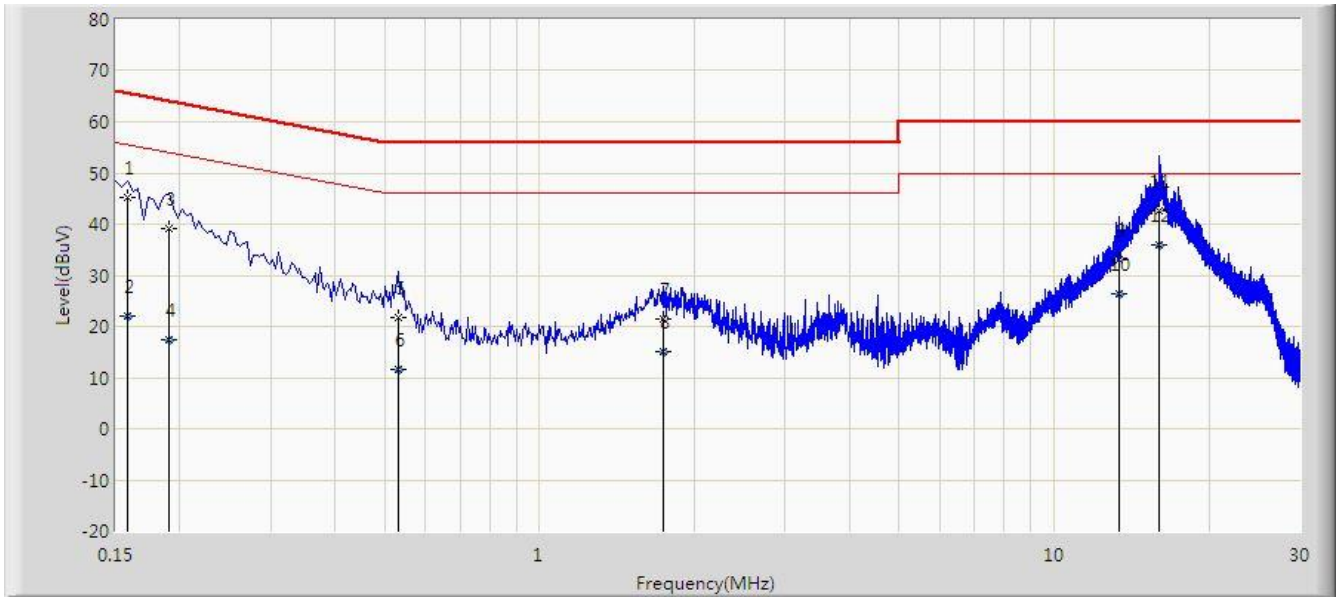
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.158	44.544	34.898	-21.024	65.568	9.646	QP
2			0.158	21.939	12.292	-33.629	55.568	9.646	AV
3			0.190	38.708	29.049	-25.329	64.037	9.658	QP
4			0.190	17.183	7.525	-36.854	54.037	9.658	AV
5			0.230	36.441	26.778	-26.009	62.450	9.663	QP
6			0.230	16.255	6.592	-36.195	52.450	9.663	AV
7			0.538	22.481	12.737	-33.519	56.000	9.745	QP
8			0.538	12.155	2.410	-33.845	46.000	9.745	AV
9			15.730	44.023	33.713	-15.977	60.000	10.309	QP
10		*	15.730	36.767	26.457	-13.233	50.000	10.309	AV
11			17.718	37.272	26.961	-22.728	60.000	10.312	QP
12			17.718	30.831	20.519	-19.169	50.000	10.312	AV

Note: Measure Level (dB $\mu$ V) = Reading Level (dB $\mu$ V) + Factor (dB)

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



Site: SR2	Time: 2020/07/13 - 19:37
Limit: FCC_Part15.207_CE	Engineer: Dandy Li
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Access Point	Power: AC 120V/60Hz
<b>Test Mode:</b> Transmit by BLE at channel 2402MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.158	45.101	35.495	-20.467	65.568	9.606	QP
2			0.158	21.951	12.344	-33.617	55.568	9.606	AV
3			0.190	39.079	29.459	-24.958	64.037	9.619	QP
4			0.190	17.316	7.697	-36.721	54.037	9.619	AV
5			0.530	21.762	12.099	-34.238	56.000	9.662	QP
6			0.530	11.454	1.792	-34.546	46.000	9.662	AV
7			1.734	21.349	11.594	-34.651	56.000	9.756	QP
8			1.734	15.206	5.450	-30.794	46.000	9.756	AV
9			13.410	33.054	22.866	-26.946	60.000	10.189	QP
10			13.410	26.310	16.121	-23.690	50.000	10.189	AV
11			16.034	42.473	32.269	-17.527	60.000	10.204	QP
12		*	16.034	36.001	25.797	-13.999	50.000	10.204	AV

Note: Measure Level (dB $\mu$ V) = Reading Level (dB $\mu$ V) + Factor (dB)

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

## 7. CONCLUSION

The data collected relate only the item(s) tested and show that the unit is compliance with Part 15C of the FCC Rules and RSS-247 of the ISED Rules.

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The End

## **Appendix A - Test Setup Photograph**

Refer to "2007RSU007-UT" file.

## **Appendix B - EUT Photograph**

Refer to "2007RSU007-UE" file.