

# MEASUREMENT REPORT

## FCC PART 15 Subpart C Bluetooth-LE

**FCC ID:** TE7AX11000

**APPLICANT:** TP-Link Technologies Co., Ltd.

**Application Type:** Certification

**Product:** AX11000 MU-MIMO Tri-Band Gaming Route

**Model No.:** Archer AX11000

**Brand Name:** tp-link

**FCC Classification:** Digital Transmission System (DTS)

**FCC Rule Part(s):** Part15 Subpart C (Section 15.247)

**Test Procedure(s):** ANSI C63.10-2013, KDB 558074 D01v05

**Test Date:** November 23 ~ December 05, 2018

Reviewed By:

*Paddy Chen*

\_\_\_\_\_  
( Paddy Chen )

Approved By:

*Chenz Ker*

\_\_\_\_\_  
(Chenz Ker)



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 (Taiwan) Co., Ltd.

## Revision History

Report No.	Version	Description	Issue Date	Note
1811TW0112-U2	Rev. 01	Initial report	12-05-2018	Valid

## CONTENTS

Description	Page
<b>1. INTRODUCTION .....</b>	<b>6</b>
1.1. Scope .....	6
1.2. MRT Test Location .....	6
<b>2. PRODUCT INFORMATION .....</b>	<b>7</b>
2.1. Feature of Equipment under Test .....	7
2.2. Product Specification Subjective to this Report.....	7
2.3. Working Frequencies for this Report.....	8
2.4. Description of Available Antennas .....	9
2.5. Description of Antenna RF Port .....	10
2.6. Test Mode .....	10
2.7. Device Capabilities .....	11
2.8. Test Configuration .....	11
2.9. EMI Suppression Device(s)/Modifications.....	12
2.10. Description of Test Software.....	12
2.11. Labeling Requirements.....	12
<b>3. DESCRIPTION OF TEST .....</b>	<b>13</b>
3.1. Evaluation Procedure .....	13
3.2. AC Line Conducted Emissions .....	13
3.3. Radiated Emissions .....	14
<b>4. ANTENNA REQUIREMENTS.....</b>	<b>15</b>
<b>5. TEST EQUIPMENT CALIBRATION DATE .....</b>	<b>16</b>
<b>6. MEASUREMENT UNCERTAINTY.....</b>	<b>17</b>
<b>7. TEST RESULT .....</b>	<b>18</b>
7.1. Summary .....	18
7.2. 6dB Bandwidth Measurement.....	19
7.2.1. Test Limit .....	19
7.2.2. Test Procedure used.....	19
7.2.3. Test Setting.....	19
7.2.4. Test Setup.....	19
7.2.5. Test Result.....	20
7.3. Output Power Measurement.....	21
7.3.1. Test Limit .....	21
7.3.2. Test Procedure Used .....	21

7.3.3.	Test Setting.....	21
7.3.4.	Test Setup.....	21
7.3.5.	Test Result of Output Power .....	22
7.4.	Power Spectral Density Measurement .....	23
7.4.1.	Test Limit .....	23
7.4.2.	Test Procedure Used .....	23
7.4.3.	Test Setting.....	23
7.4.4.	Test Setup.....	23
7.4.5.	Test Result.....	24
7.5.	Conducted Band Edge and Out-of-Band Emissions.....	25
7.5.1.	Test Limit .....	25
7.5.2.	Test Procedure Used .....	25
7.5.3.	Test Settiting .....	25
7.5.4.	Test Setup.....	26
7.5.5.	Test Result.....	27
7.6.	Radiated Spurious Emission Measurement .....	29
7.6.1.	Test Limit .....	29
7.6.2.	Test Procedure Used .....	29
7.6.3.	Test Setting.....	29
7.6.4.	Test Setup.....	31
7.6.5.	Test Result.....	33
7.7.	Radiated Restricted Band Edge Measurement .....	38
7.7.1.	Test Limit .....	38
7.7.2.	Test Procedure Used .....	39
7.7.3.	Test Setting.....	39
7.7.4.	Test Setup.....	40
7.7.5.	Test Result.....	41
7.8.	AC Conducted Emissions Measurement.....	49
7.8.1.	Test Limit .....	49
7.8.2.	Test Setup.....	49
7.8.3.	Test Result.....	50
8.	<b>CONCLUSION.....</b>	52
<b>Appendix A - Test Setup Photograph .....</b>		53
<b>Appendix B - EUT Photograph.....</b>		54

## §2.1033 General Information

<b>Applicant:</b>	TP-Link Technologies Co., Ltd.			
<b>Applicant Address:</b>	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China			
<b>Manufacturer:</b>	TP-Link Technologies Co., Ltd.			
<b>Manufacturer Address:</b>	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China			
<b>Test Site:</b>	MRT Technology (Taiwan) Co., Ltd			
<b>Test Site Address:</b>	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)			
<b>FCC Registration No.:</b>	291082			
<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 Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- MRT facility is a FCC registered (Reg. No. 153292 and 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
- MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.

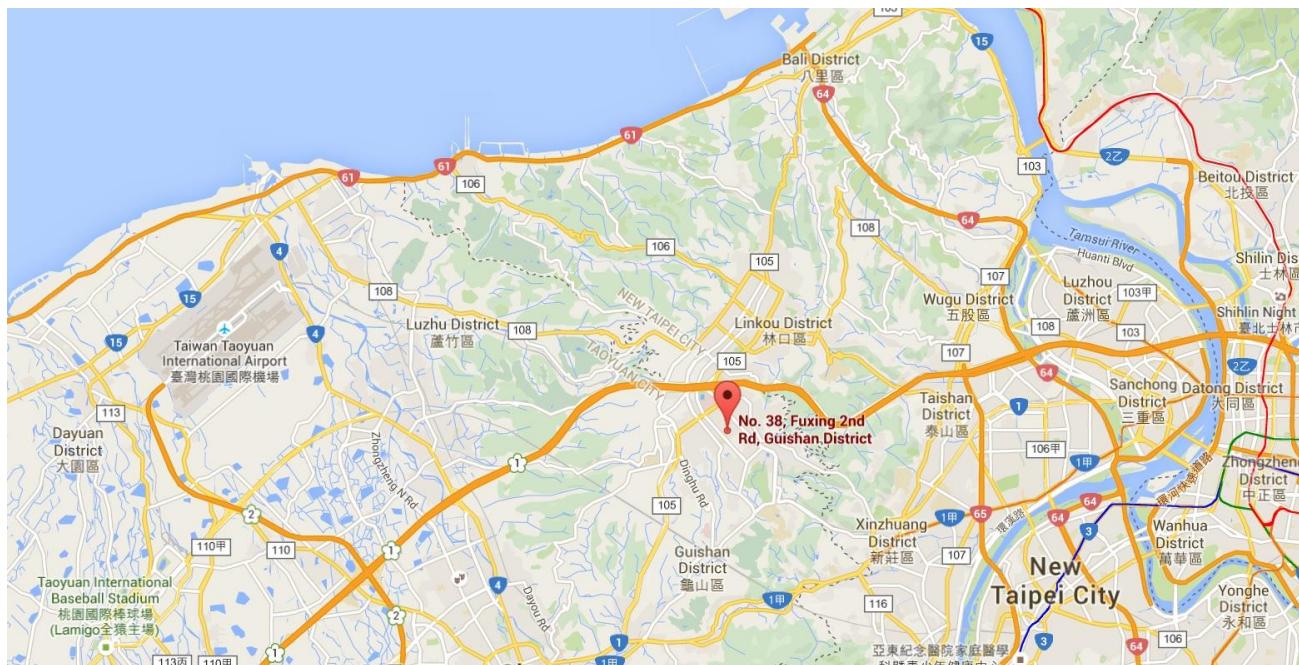
## 1. INTRODUCTION

### 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 Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



## 2. PRODUCT INFORMATION

### 2.1. Feature of Equipment under Test

Product Name:	AX11000 MU-MIMO Tri-Band Gaming Router
Model No.:	Archer AX11000
Brand Name:	tp-link
Wi-Fi Specification:	802.11a/b/g/n/ac/ax
Bluetooth Specification:	v4.1 Dual mode
<b>Accessories</b>	
Adapter:	MODEL: S065PQ1200500 INPUT: 100 - 240V ~ 50/60Hz 1800mA OUTPUT: DC 12.0V 5000mA

### 2.2. Product Specification Subjective to this Report

Bluetooth Frequency	2402~2480MHz
Type of modulation	GFSK
Data Rate	1Mbps

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

### 2.3. 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	--	--	--	--

## 2.4. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Max Antenna Gain (dBi)	BF Directional Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
<b>Wi-Fi External Antenna</b>						
Dipole Antenna	2400 ~ 2500	4	1.80	7.82	1.80	7.82
	5150 ~ 5850	4	1.80	7.82	1.80	7.82
<b>Bluetooth External Antenna</b>						
Dipole Antenna	2400 ~ 2500	1	1.80	--	--	--

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

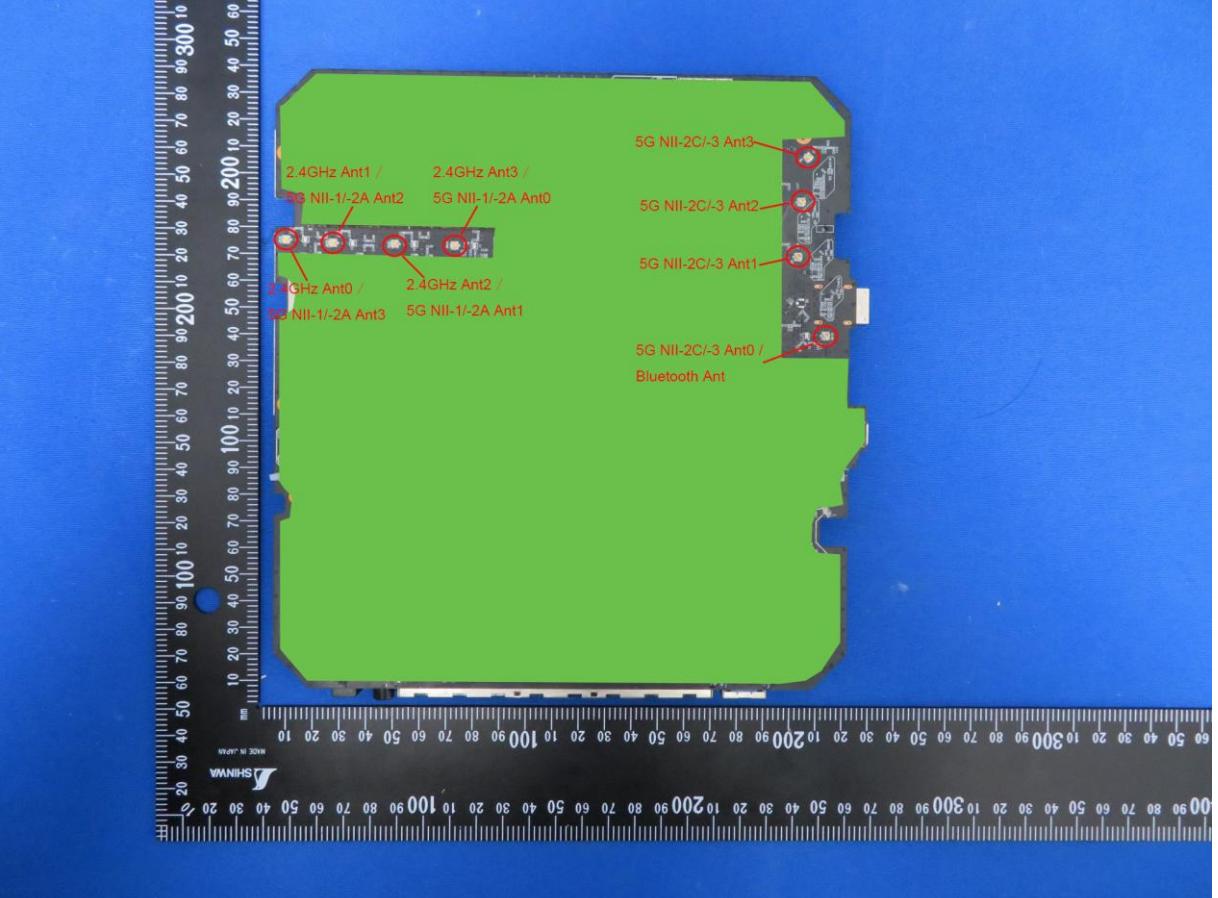
For CDD transmissions, directional gain is calculated as follows,  $N_{ANT} = 4$ ,  $N_{SS} = 1$ .

If all antennas have the same gain,  $G_{ANT}$ , Directional gain =  $G_{ANT} + \text{Array Gain}$ , where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,  
 $\text{Array Gain} = 10 \log (N_{ANT}/ N_{SS}) \text{ dB} = 6.02$ ;
- For power measurements on IEEE 802.11 devices,  
 $\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4$ ;

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11ac/ax, not include 802.11a/b/g/n. BF Directional gain =  $G_{ANT} + 10 \log (N_{ANT})$ .

## 2.5. Description of Antenna RF Port

Antenna RF Port												
Software Control Port	2.4GHz RF Port				5GHz RF Port (NII-1 & NII-2A)				Bluetooth & 5GHz RF Port (NII-2C & NII-3)			
	Ant 0	Ant 1	Ant 2	Ant 3	Ant 0	Ant 1	Ant 2	Ant 3	Ant 0 / BT	Ant 1	Ant 2	Ant 3
												

## 2.6. Test Mode

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

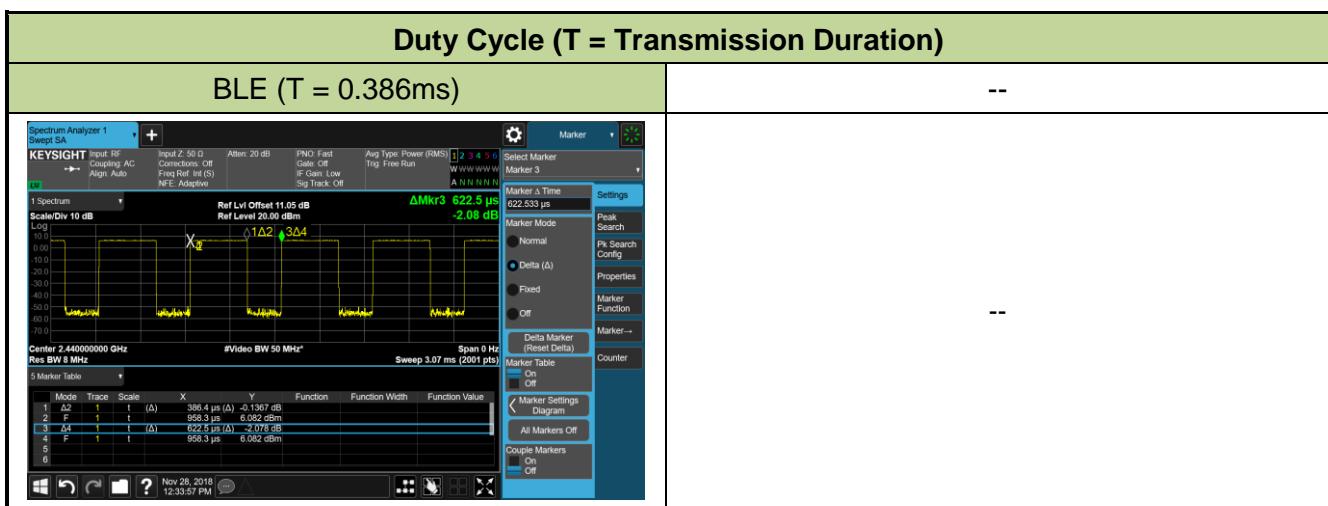
## 2.7. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS), 5GHz WLAN (UNII), Bluetooth v4.1 (Dual mode)

**Note:** The maximum achievable duty cycles was 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	62.07%



## 2.8. Test Configuration

The **AX11000 MU-MIMO Tri-Band Gaming Router** was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

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

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

## **2.10. Description of Test Software**

The engineering commands used in the test were provided by the customer.

## **2.11. 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.

### 3. DESCRIPTION OF TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance was used in the measurement of the **AX11000 MU-MIMO Tri-Band Gaming Router**.

Deviation from measurement procedure.....**None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the Antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive Antenna height using a broadband Antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn Antennas were used. For frequencies below 30MHz, a calibrated loop Antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband Antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive Antenna height was noted for each frequency found.

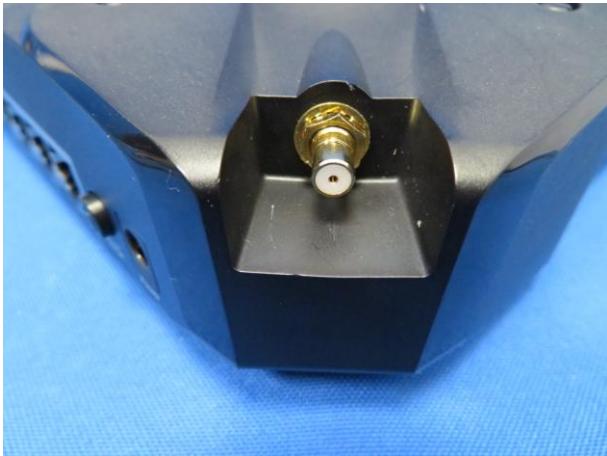
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn Antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive Antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive Antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn Antenna, the horn Antenna should be always directed to the EUT when rising height.

## 4. 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 **AX11000 MU-MIMO Tri-Band Gaming Router** uses a unique connector.



### **Conclusion:**

The unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATE

### Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2019/3/20
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2019/3/20
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2019/4/24
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2019/5/14
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2019/5/21

### Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Acitve Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2019/4/24
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2019/5/22
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2019/4/24
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2019/4/23
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2019/4/23
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2019/4/23
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2019/3/19
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/7/30
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2019/5/18
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2019/5/21

### Conducted Test Equipment - SR1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/7/30
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTSUE06457	1 year	2019/7/19
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2019/4/24
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2019/5/21

Software	Version	Function
e3	9.160520a	EMI Test Software

## 6. 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 - SR2
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 150kHz~30MHz: 2.53dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 9kHz ~ 1GHz: 4.25dB 1GHz ~ 25GHz: 4.45dB
Spurious Emissions, Conducted - SR1
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 2.65dB
Output Power - SR1
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 0.84dB
Power Spectrum Density - SR1
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 2.65dB
Occupied Bandwidth - SR1
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 3.3%

## 7. TEST RESULT

### 7.1. Summary

**Product Name:** AX11000 MU-MIMO Tri-Band Gaming Router

**FCC ID:** TE7AX11000

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 7.2
15.247(b)(3)	Output Power	$\leq 1\text{Watt}$		PASS	Section 7.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz}$		PASS	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\geq 20\text{dBc}(\text{Peak})$		PASS	Section 7.5
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 7.6&7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	PASS	Section 7.8

#### 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 and Z) was also verified. The test results shown in the following sections represent the worst case emissions.

## 7.2. 6dB Bandwidth Measurement

### 7.2.1. Test Limit

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

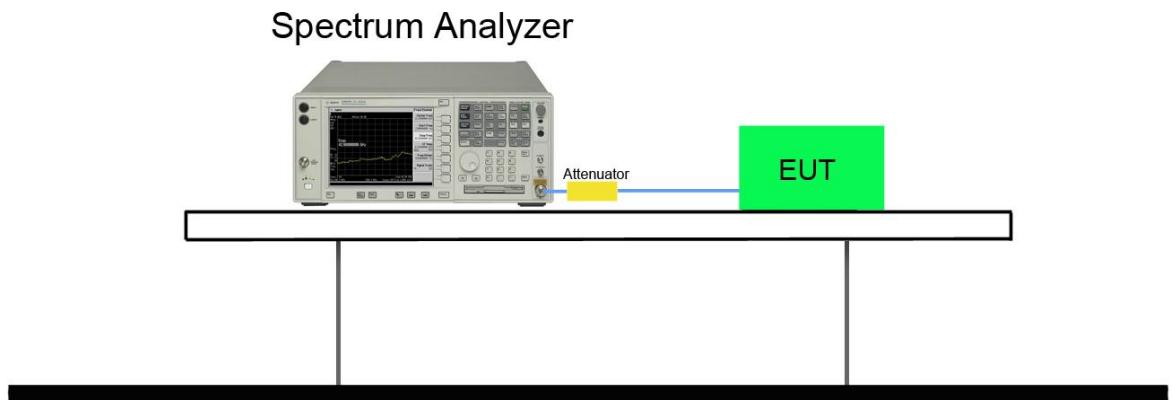
### 7.2.2. Test Procedure used

ANSI C63.10-2013 Section 11.8

### 7.2.3. 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

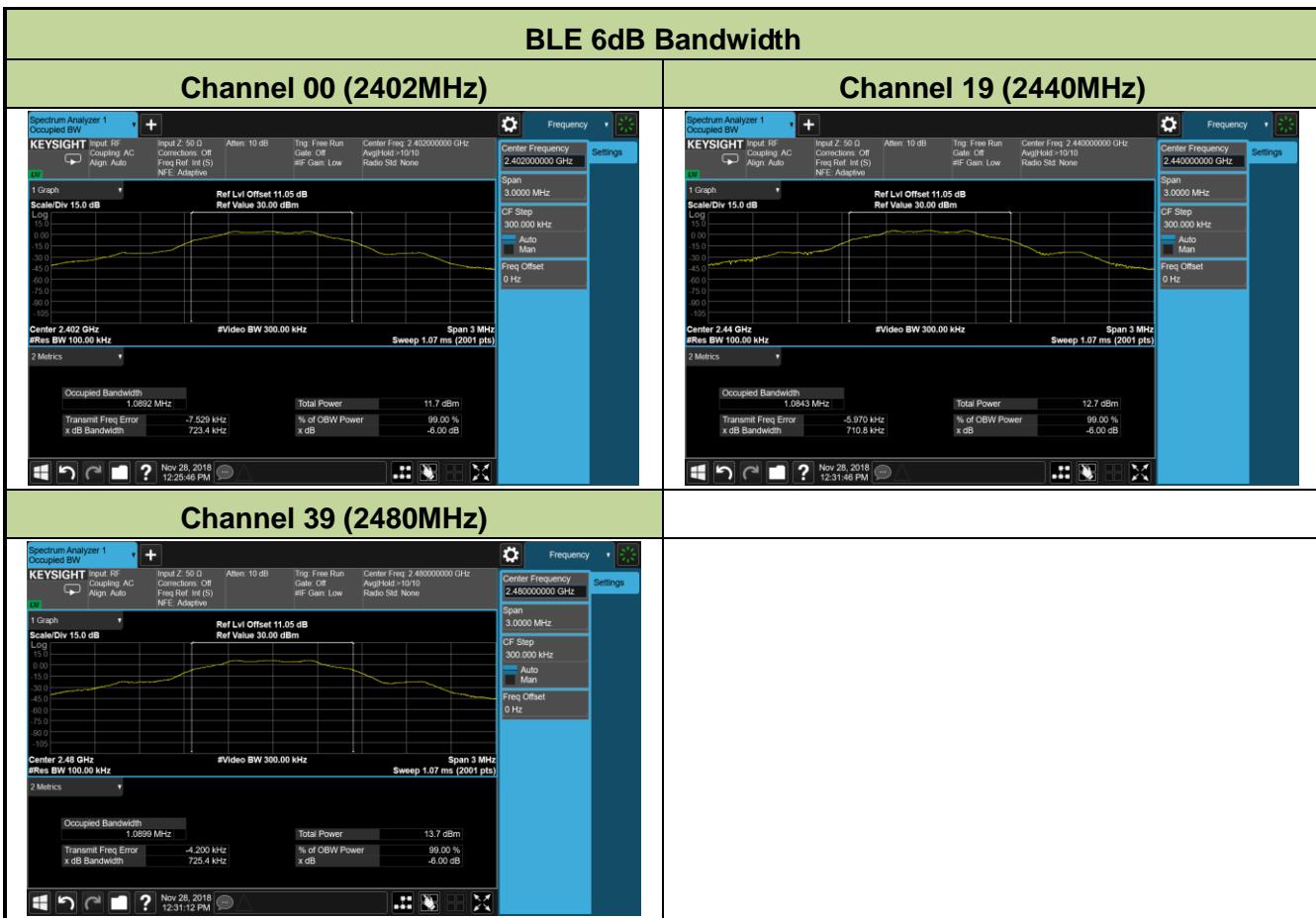
### 7.2.4. Test Setup



### 7.2.5. Test Result

Product	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	SR1	Test Date	2018/11/28

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.723	≥ 0.5	Pass
BLE	1	19	2440	0.711	≥ 0.5	Pass
BLE	1	39	2480	0.725	≥ 0.5	Pass



### 7.3. Output Power Measurement

#### 7.3.1. Test Limit

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

#### 7.3.2. Test Procedure Used

ANSI C63.10 Section 11.9.1.3

ANSI C63.10 Section 11.9.2.3

#### 7.3.3. Test Setting

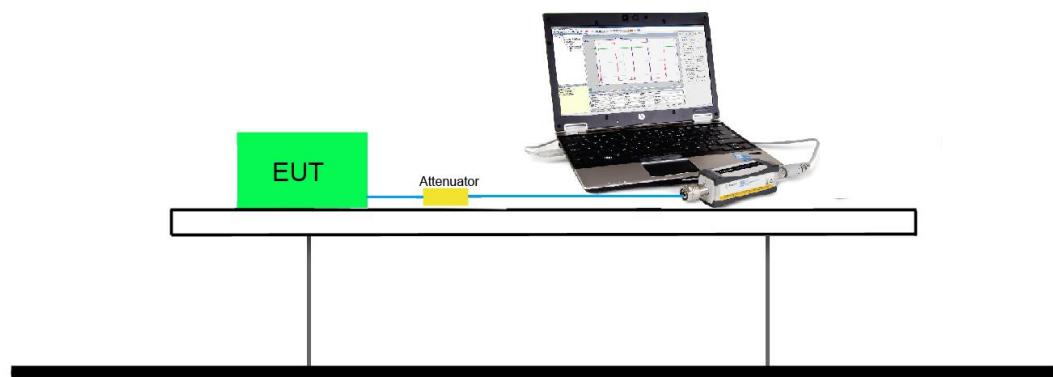
##### Method PKPM1 (Peak Power Measurement)

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  $VBW = 50\text{MHz}$  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.

#### 7.3.4. Test Setup



### 7.3.5. Test Result of Output Power

Product	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	SR1	Test Date	2018/11/28

#### 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	5.26	≤ 30.00	Pass
BLE	1	19	2440	6.54	≤ 30.00	Pass
BLE	1	39	2480	7.40	≤ 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	5.11	≤ 30.00	Pass
BLE	1	19	2440	6.40	≤ 30.00	Pass
BLE	1	39	2480	7.24	≤ 30.00	Pass

## 7.4. Power Spectral Density Measurement

### 7.4.1. Test Limit

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

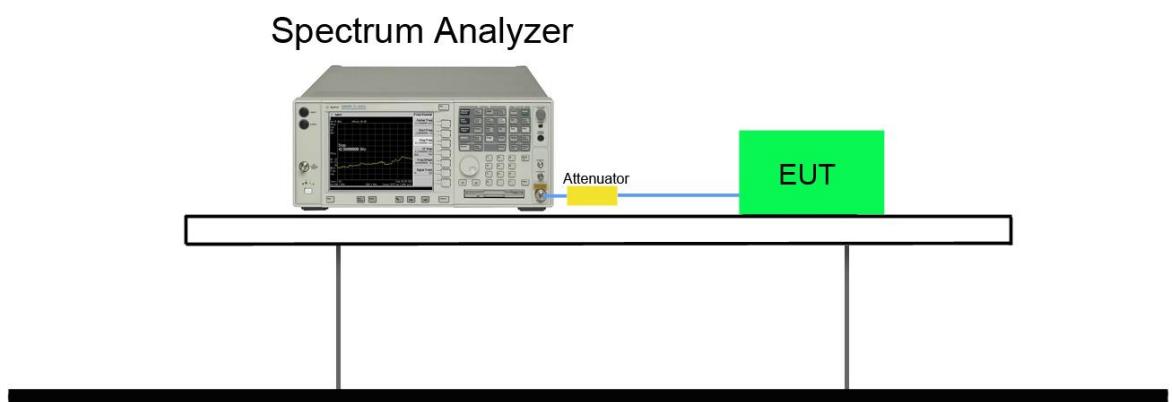
### 7.4.2. Test Procedure Used

ANSI C63.10 Section 11.10.6

### 7.4.3. 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

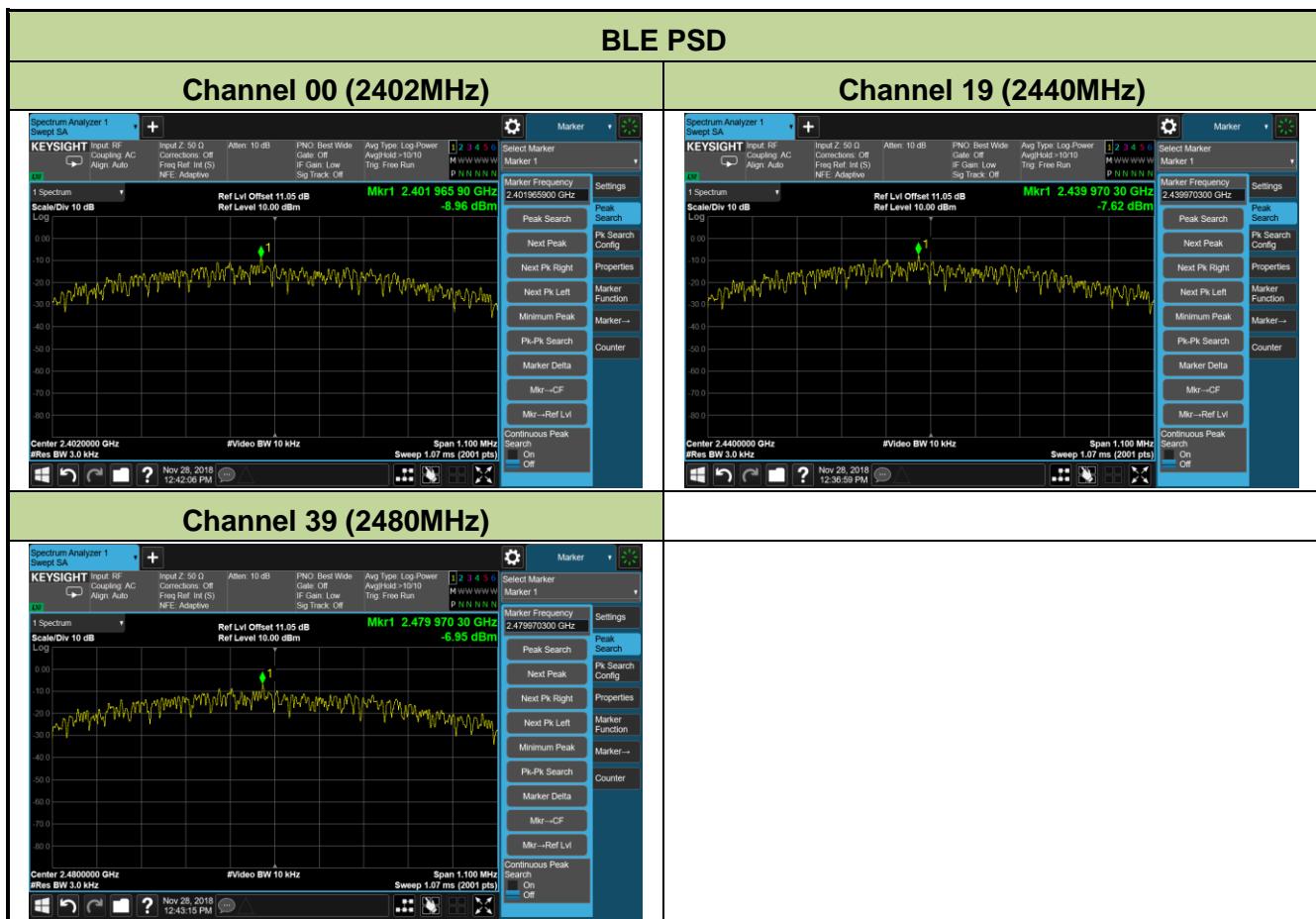
### 7.4.4. Test Setup



### 7.4.5. Test Result

Product	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	SR1	Test Date	2018/11/28

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-8.96	≤ 8.00	Pass
BLE	1	19	2440	-7.62	≤ 8.00	Pass
BLE	1	39	2480	-6.95	≤ 8.00	Pass



## **7.5. Conducted Band Edge and Out-of-Band Emissions**

### **7.5.1. 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.

### **7.5.2. Test Procedure Used**

ANSI C63.10 Section 11.11

### **7.5.3. Test Setting**

#### **Reference level measurement**

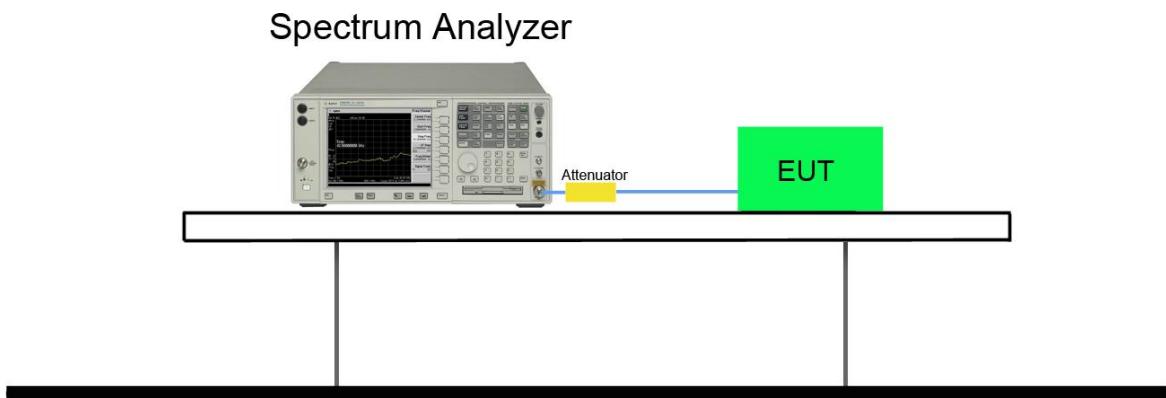
1. Set instrument center frequency to DTS channel center frequency
2. Set the span to  $\geq$  1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW  $\geq$  3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

#### **Emission level measurement**

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 1.3MHz
3. VBW = 4MHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

**Test Notes**

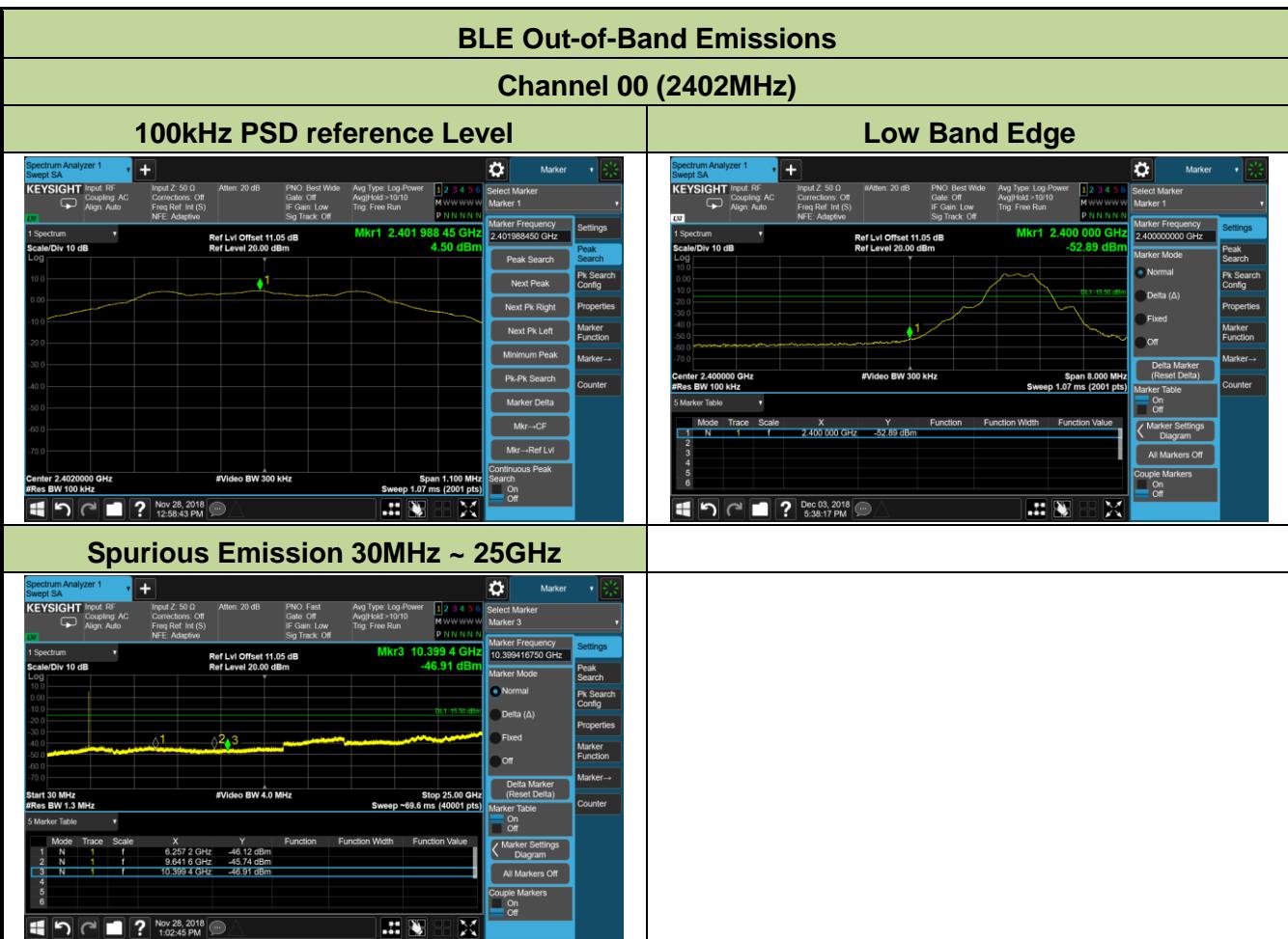
1. RBW was set to 1.3MHz rather than 100 kHz in order to increase the measurement speed.
2. The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100 kHz bandwidth. However, since the traces in the following plots are measured with a 1.3MHz RBW, the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1.3MHz bandwidth.
3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

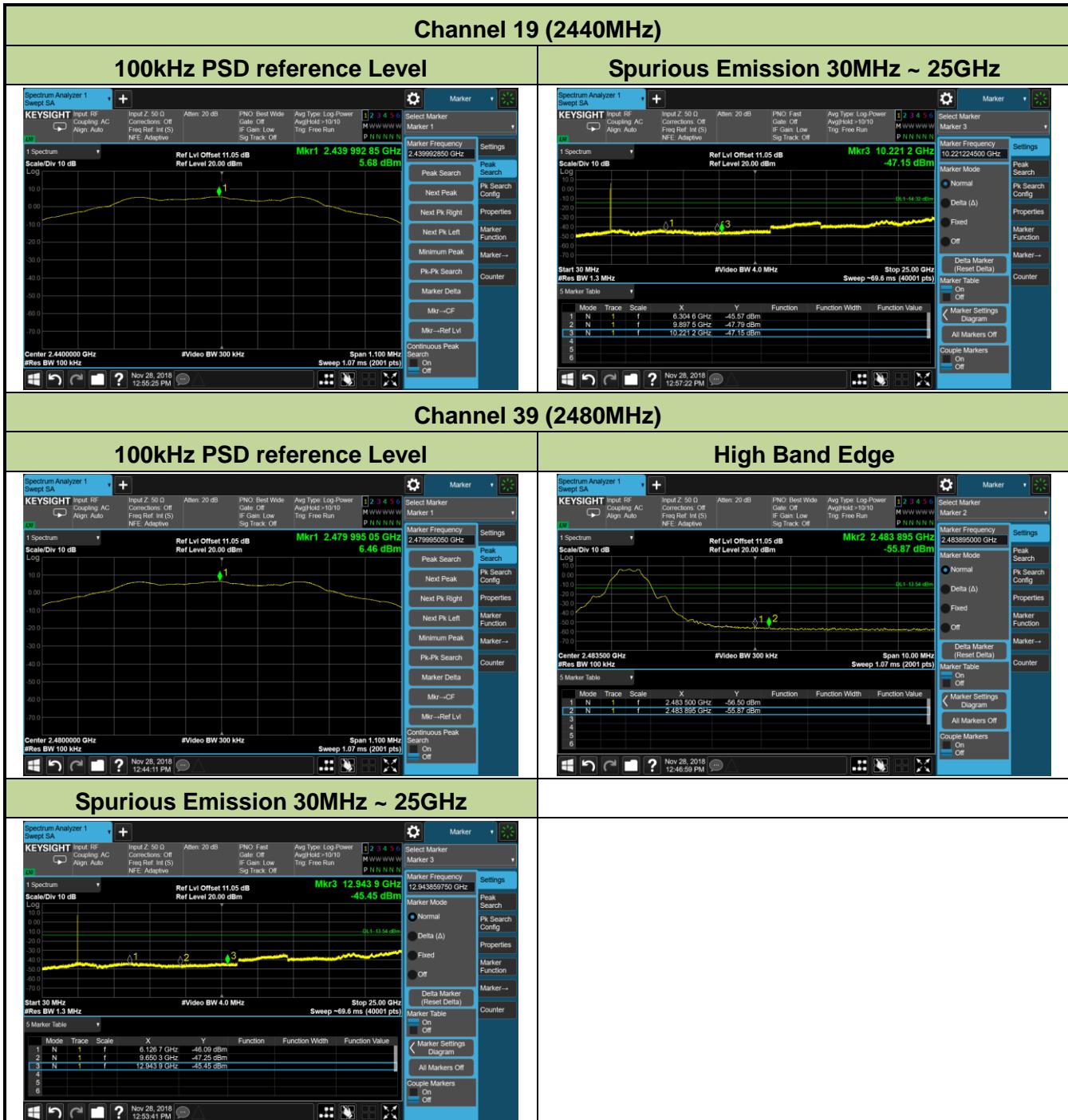
**7.5.4. Test Setup**

### 7.5.5. Test Result

Product	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	54%
Test Site	SR1	Test Date	2018/11/28 ~ 2018/12/03

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





## 7.6. Radiated Spurious Emission Measurement

### 7.6.1. Test Limit

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

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

### 7.6.2. 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)

### 7.6.3. 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 or average
5. Sweep time = auto couple
6. Trace was allowed to stabilize

**Peak Measurements above 1GHz**

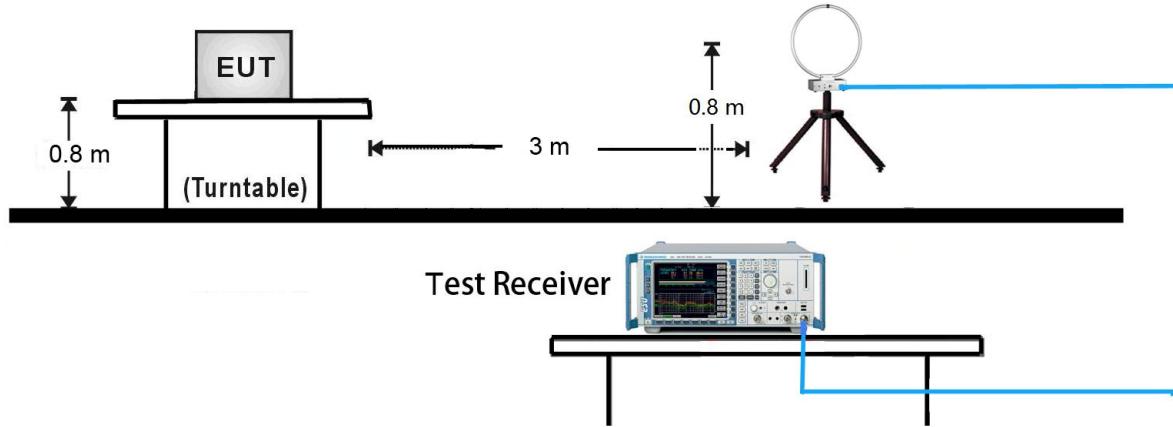
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Average Measurements above 1GHz (Method VB)**

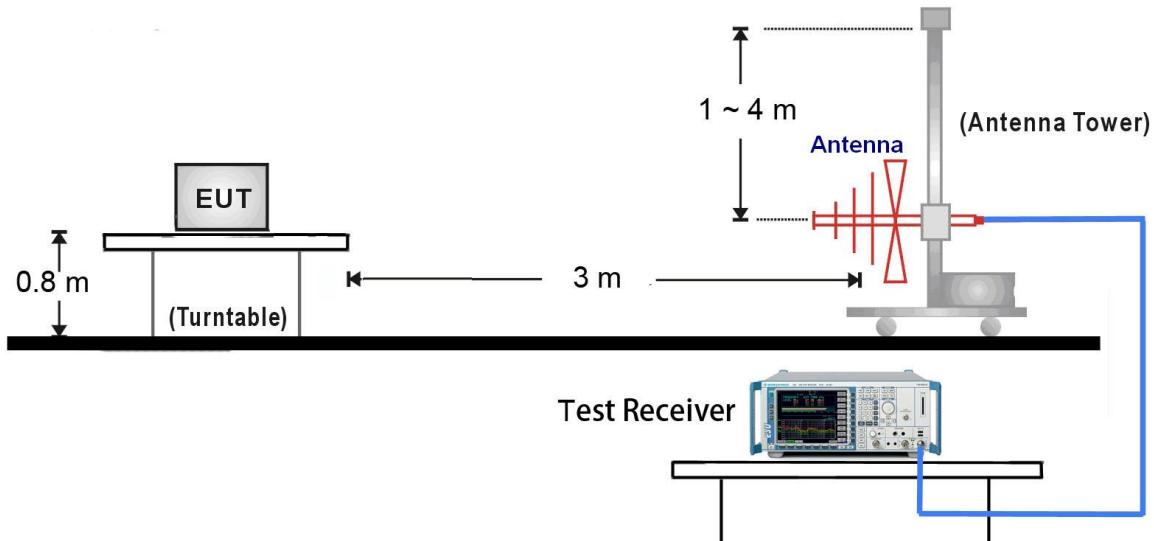
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10 Hz.  
If the EUT duty cycle is  $< 98\%$ , set  $VBW \geq 1/T$ . T is the minimum transmission duration.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

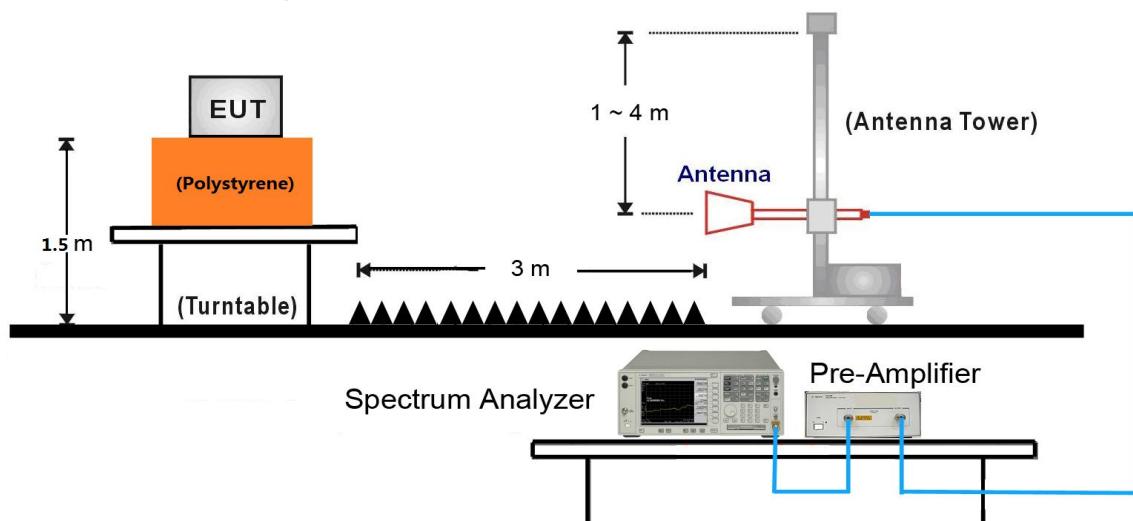
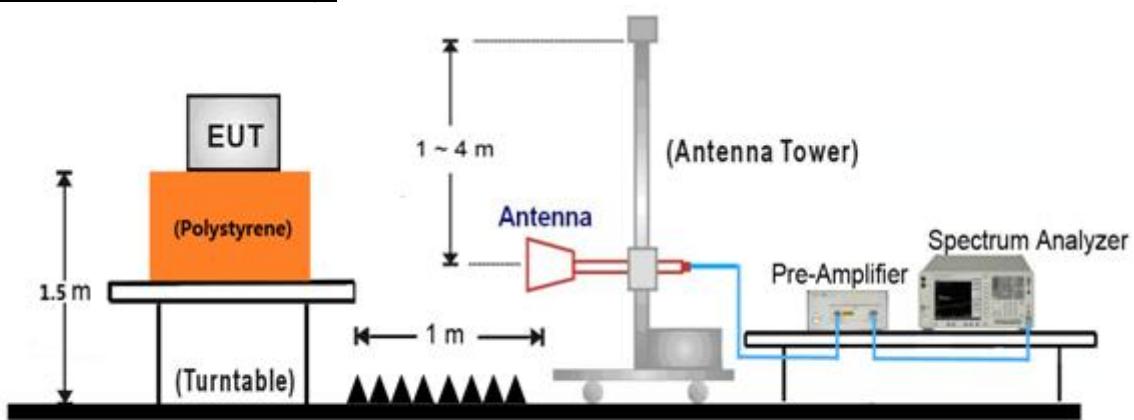
#### 7.6.4. Test Setup

##### 9kHz ~ 30MHz Test Setup:



##### 30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:

18GHz ~25GHz Test Setup:


### 7.6.5. Test Result

Product	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	56%
Test Site	AC1	Test Date	2018/11/29
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
	3992.0	40.5	0.4	40.9	74.0	-33.1	Peak	Horizontal
	4961.0	38.7	3.7	42.4	74.0	-31.6	Peak	Horizontal
*	5777.0	39.0	5.3	44.3	75.0	-30.7	Peak	Horizontal
*	6499.5	38.2	8.4	46.6	75.0	-28.4	Peak	Horizontal
	4128.0	40.3	0.8	41.1	74.0	-32.9	Peak	Vertical
	4876.0	40.2	3.7	43.9	74.0	-30.1	Peak	Vertical
*	6032.0	37.9	6.2	44.1	75.0	-30.9	Peak	Vertical
*	7086.0	37.3	11.3	48.6	75.0	-26.4	Peak	Vertical

Note 1: “\*” is not in restricted band, its limit is 20dBc of the fundamental emission level (95.0dB $\mu$ V/m) or 15.209 which is higher.

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	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	56%
Test Site	AC1	Test Date	2018/11/29
Test Mode:	BLE	Test Channel:	19
Remark:	1. Average measurement was not performed if peak level lower than average limit. So the margin was calculated using the average limit for emissions fall within the restricted bands. 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
	4009.0	40.8	0.4	41.2	74.0	-32.8	Peak	Horizontal
	4876.0	38.7	3.7	42.4	74.0	-31.6	Peak	Horizontal
*	5717.5	39.0	5.0	44.0	77.7	-33.7	Peak	Horizontal
*	6678.0	37.5	8.7	46.2	77.7	-31.5	Peak	Horizontal
	4077.0	40.8	0.6	41.4	74.0	-32.6	Peak	Vertical
	4825.0	37.9	3.7	41.6	74.0	-32.4	Peak	Vertical
*	5989.5	37.6	6.1	43.7	77.7	-34.0	Peak	Vertical
*	7196.5	36.1	12.1	48.2	77.7	-29.5	Peak	Vertical

Note 1: “\*” is not in restricted band, its limit is 20dBc of the fundamental emission level (97.7dB $\mu$ V/m) or 15.209 which is higher.

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	AX11000 MU-MIMO Tri-Band Gaming Router	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	56%
Test Site	AC1	Test Date	2018/11/29
Test Mode:	BLE	Test Channel:	39
Remark:	1. Average measurement was not performed if peak level lower than average limit. So the margin was calculated using the average limit for emissions fall within the restricted bands. 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
	3932.5	40.5	0.3	40.8	74.0	-33.2	Peak	Horizontal
	4833.5	38.7	3.7	42.4	74.0	-31.6	Peak	Horizontal
*	5794.0	38.6	5.4	44.0	78.9	-34.9	Peak	Horizontal
*	6941.5	36.9	10.1	47.0	78.9	-31.9	Peak	Horizontal
	4068.5	40.4	0.6	41.0	74.0	-33.0	Peak	Vertical
	4850.5	39.1	3.7	42.8	74.0	-31.2	Peak	Vertical
*	5887.5	37.3	5.9	43.2	78.9	-35.7	Peak	Vertical
*	7052.0	36.7	11.0	47.7	78.9	-31.2	Peak	Vertical

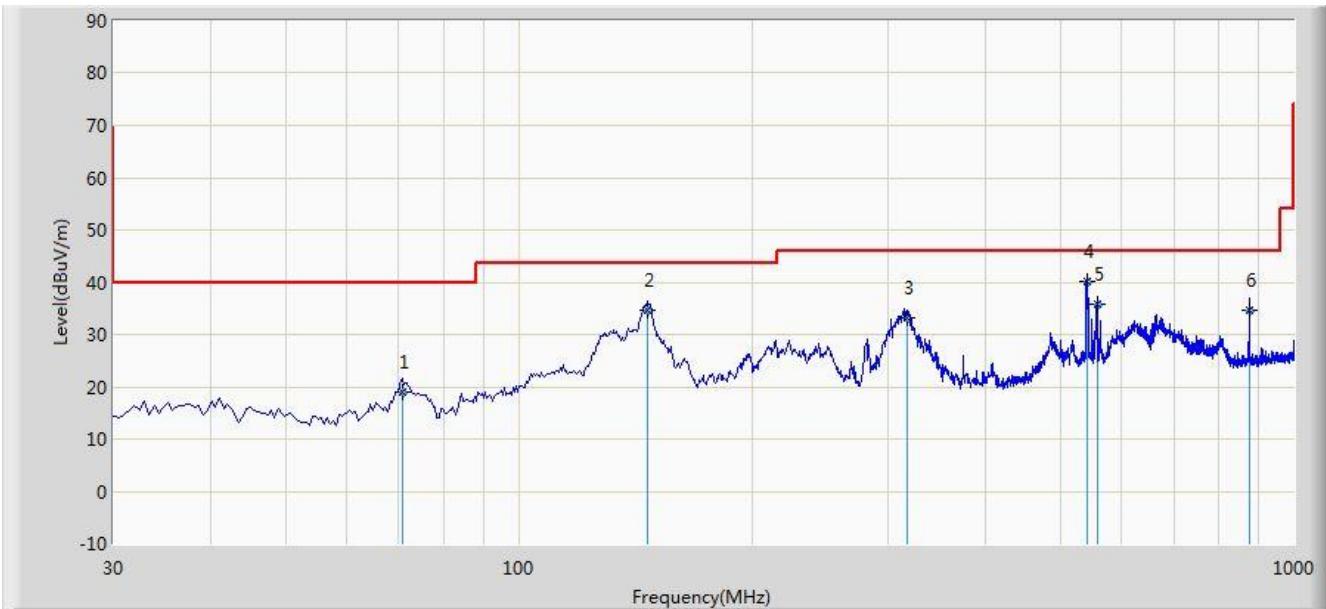
Note 1: “\*” is not in restricted band, its limit is 20dBc of the fundamental emission level (98.9dB $\mu$ V/m) or 15.209 which is higher.

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)

### The Worst Case of Radiated Emission below 1GHz:

Site: AC1	Time: 2018/12/01 - 01:10
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03GHz_8GHz	Polarity: Horizontal
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test mode 1	



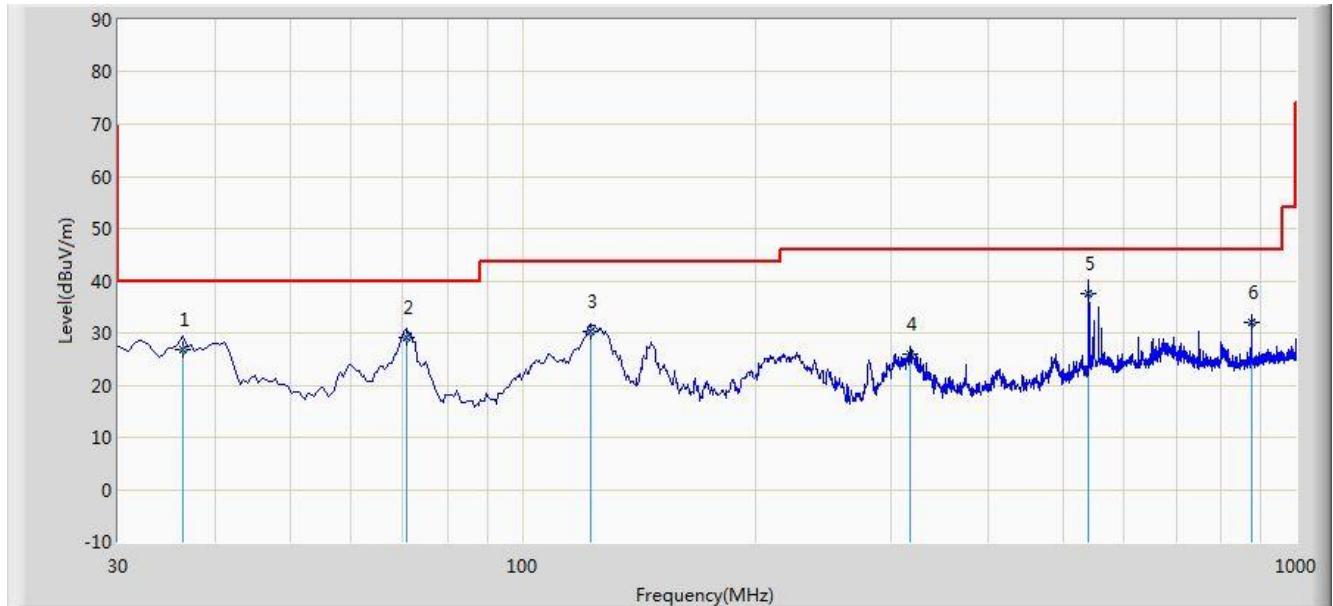
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			70.740	18.915	8.140	-21.085	40.000	10.775	QP
2			146.400	34.526	24.960	-8.974	43.500	9.566	QP
3			316.635	33.058	17.880	-12.942	46.000	15.178	QP
4	*		540.705	40.263	21.075	-5.737	46.000	19.187	QP
5			557.195	35.659	16.114	-10.341	46.000	19.545	QP
6			875.355	34.612	10.394	-11.388	46.000	24.218	QP

Note 1: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + 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: 2018/12/01 - 01:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03GHz_8GHz	Polarity: Vertical
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			36.305	26.833	13.650	-13.167	40.000	13.182	QP
2			70.740	29.252	18.477	-10.748	40.000	10.775	QP
3			122.635	30.431	19.443	-13.069	43.500	10.988	QP
4			316.635	26.011	10.833	-19.989	46.000	15.178	QP
5	*		539.250	37.401	18.240	-8.599	46.000	19.161	QP
6			875.355	31.908	7.690	-14.092	46.000	24.218	QP

Note 1: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + 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.

## 7.7. Radiated Restricted Band Edge Measurement

### 7.7.1. 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	--	--	--

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

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

### 7.7.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

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

### 7.7.3. Test Setting

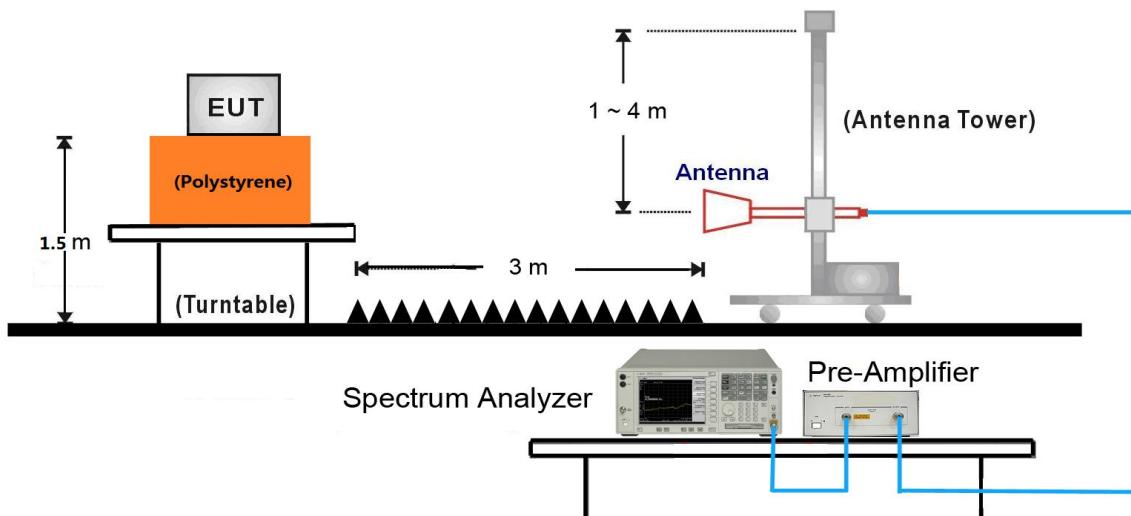
#### Peak Field Strength Measurements

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**

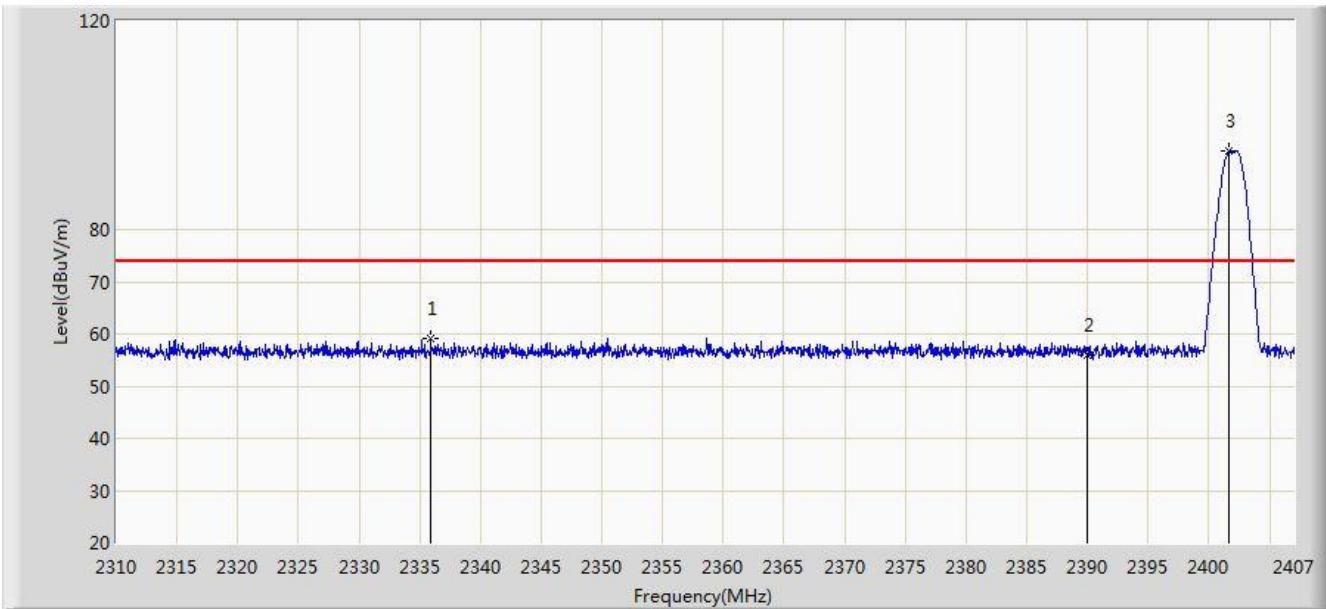
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10 Hz.  
If the EUT duty cycle is  $< 98\%$ , set VBW  $\geq 1/T$ . T is the minimum transmission duration.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

#### **7.7.4. Test Setup**



### 7.7.5. Test Result

Site: AC1	Time: 2018/11/28 - 16:15
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2402MHz	

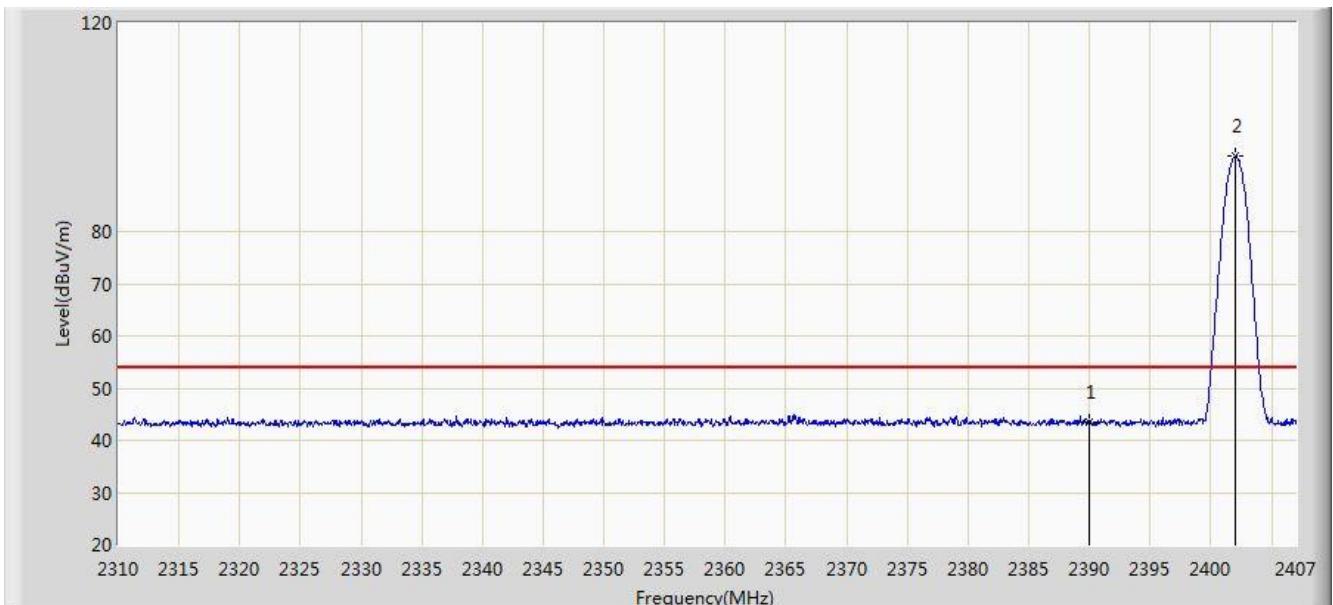


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dB $\mu$ V/m)	Factor (dB)	Type
1			2335.899	59.268	26.599	-14.732	74.000	32.669	PK
2			2390.000	55.955	23.401	-18.045	74.000	32.554	PK
3		*	2401.665	95.045	62.506	N/A	N/A	32.539	PK

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: 2018/11/28 - 16:33
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2402MHz	

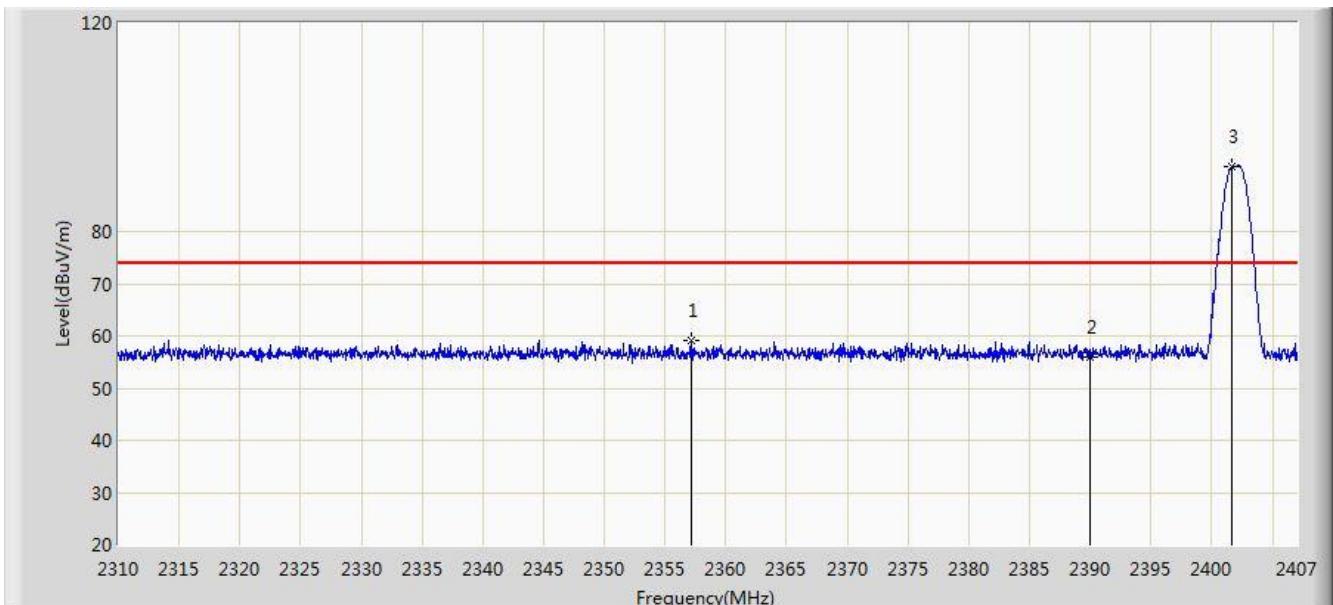


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.519	10.965	-10.481	54.000	32.554	AV
2	*		2402.053	94.531	61.993	N/A	N/A	32.538	AV

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: 2018/11/28 - 16:33
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2402MHz	

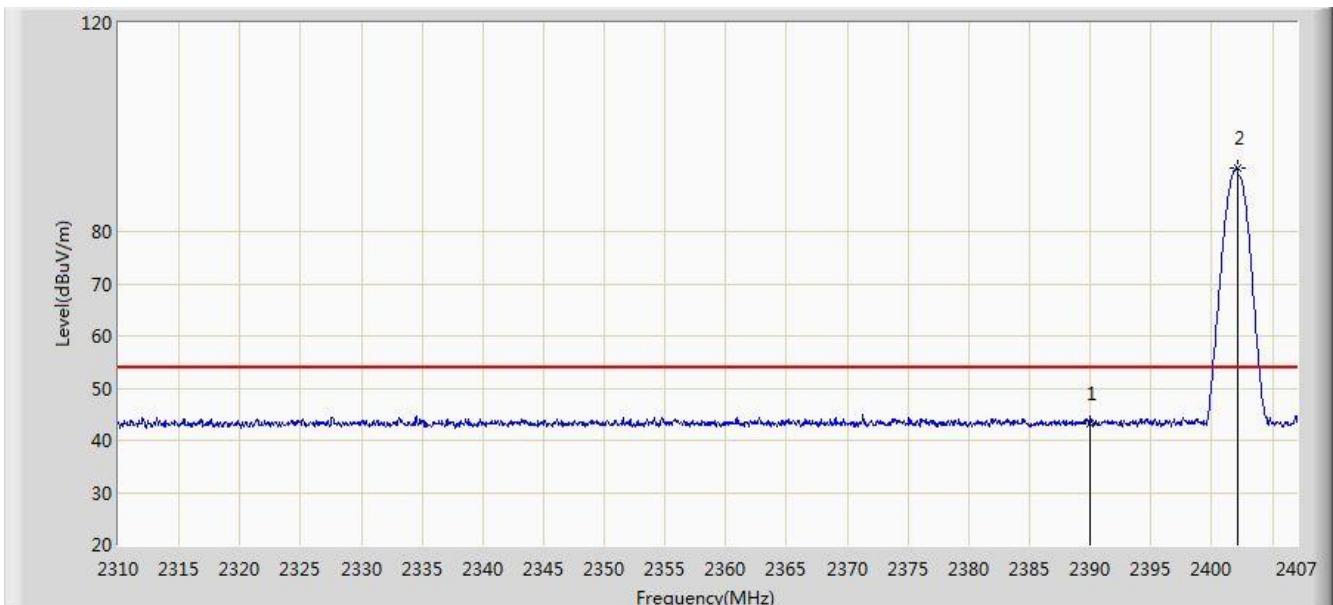


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2357.142	59.012	26.408	-14.988	74.000	32.604	PK
2			2390.000	55.931	23.377	-18.069	74.000	32.554	PK
3		*	2401.665	92.548	60.009	N/A	N/A	32.539	PK

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: 2018/11/28 - 16:35
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2402MHz	

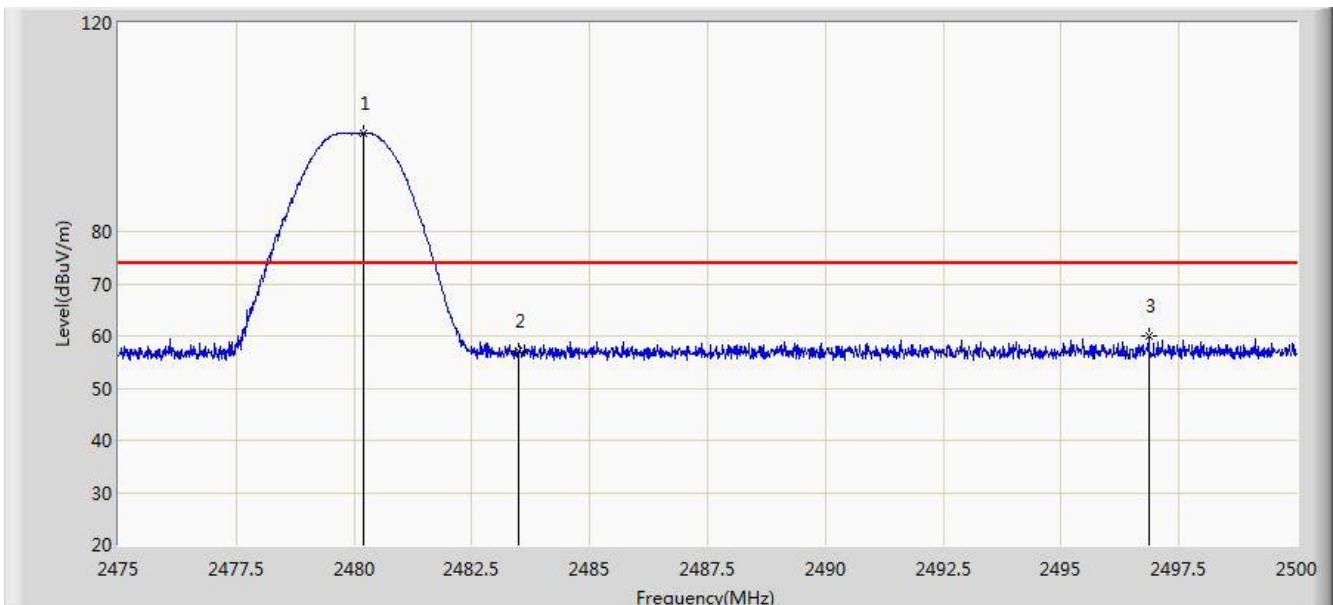


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.236	10.682	-10.764	54.000	32.554	AV
2		*	2402.102	92.038	59.500	N/A	N/A	32.538	AV

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: 2018/11/28 - 16:44
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2480MHz	

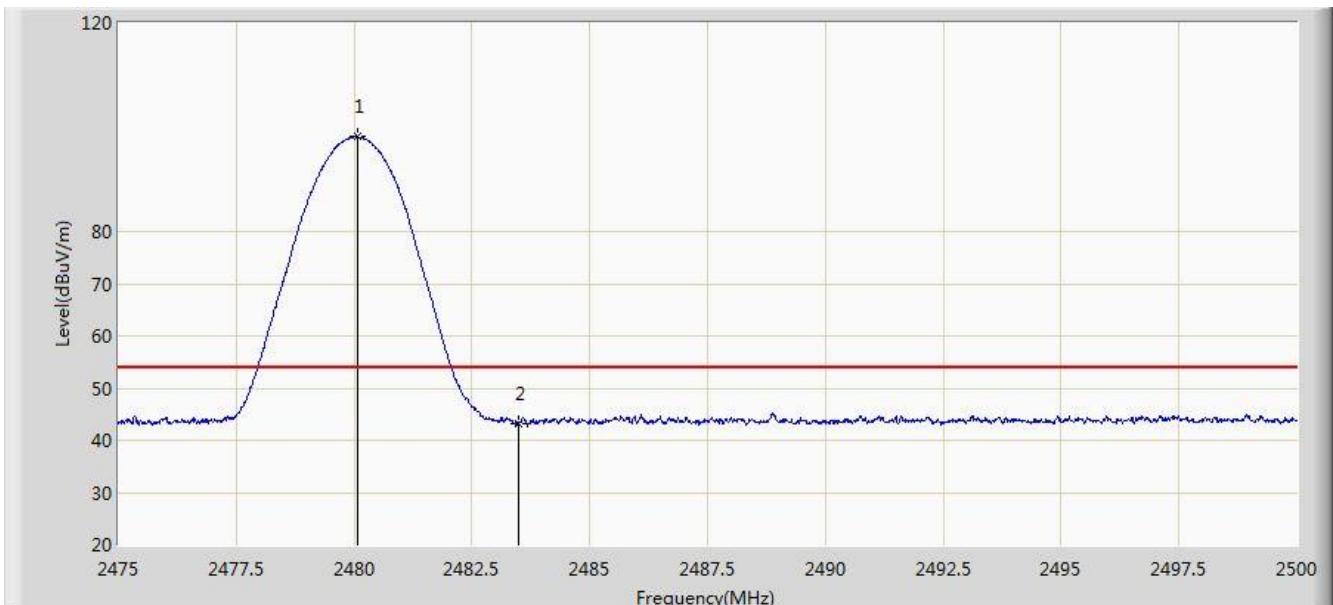


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.200	98.944	66.373	N/A	N/A	32.570	PK
2			2483.500	57.086	24.505	-16.914	74.000	32.580	PK
3			2496.863	59.925	27.305	-14.075	74.000	32.620	PK

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: 2018/11/28 - 16:45
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2480MHz	

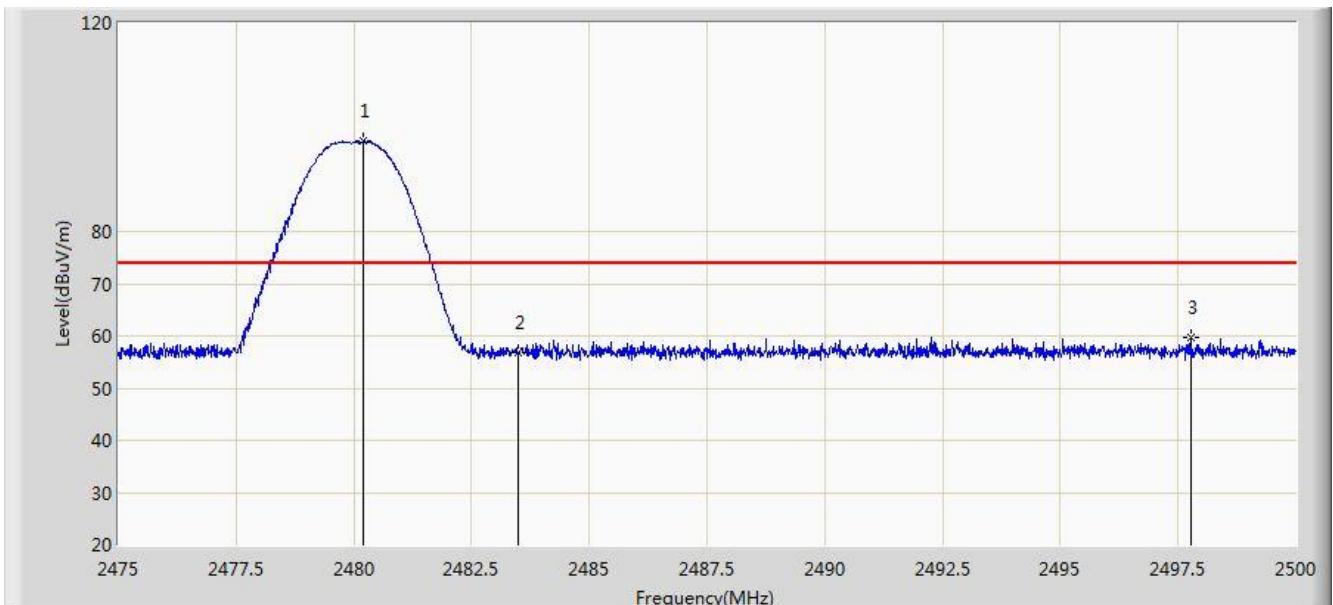


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.062	98.238	65.668	N/A	N/A	32.570	AV
2			2483.500	43.319	10.738	-10.681	54.000	32.580	AV

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: 2018/11/28 - 16:46
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2480MHz	

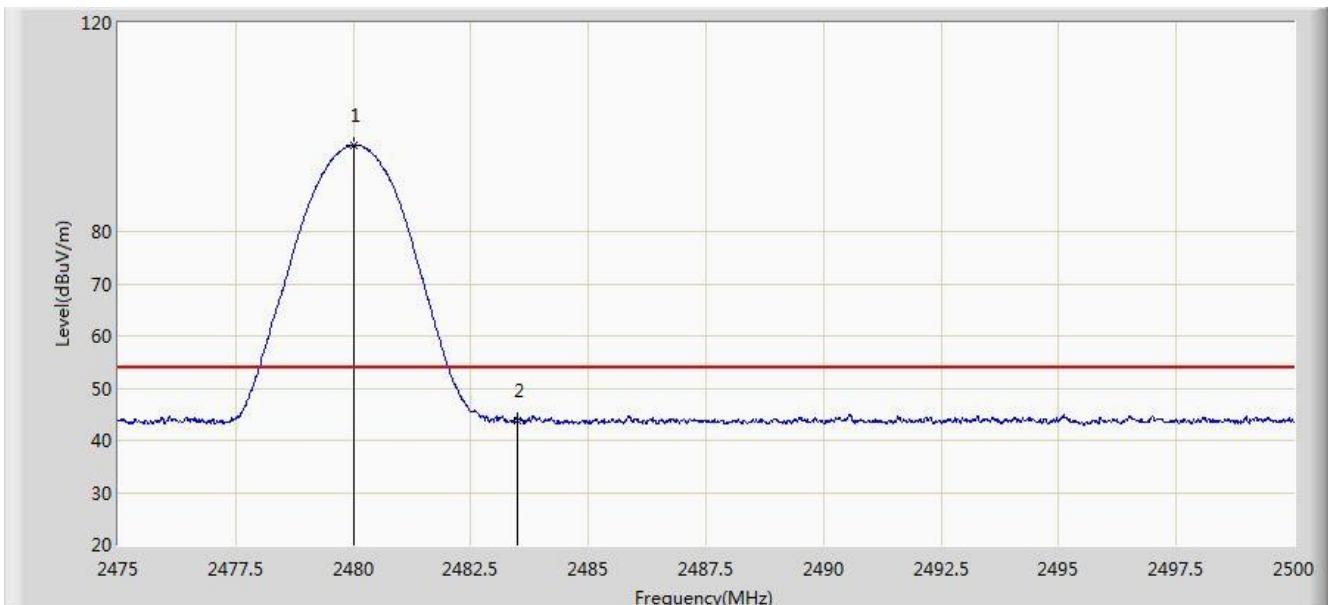


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.212	97.277	64.706	N/A	N/A	32.570	PK
2			2483.500	56.695	24.114	-17.305	74.000	32.580	PK
3			2497.775	59.820	27.197	-14.180	74.000	32.623	PK

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: 2018/11/28 - 16:47
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.012	96.649	64.079	N/A	N/A	32.570	AV
2			2483.500	43.855	11.274	-10.145	54.000	32.580	AV

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

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

## 7.8. AC Conducted Emissions Measurement

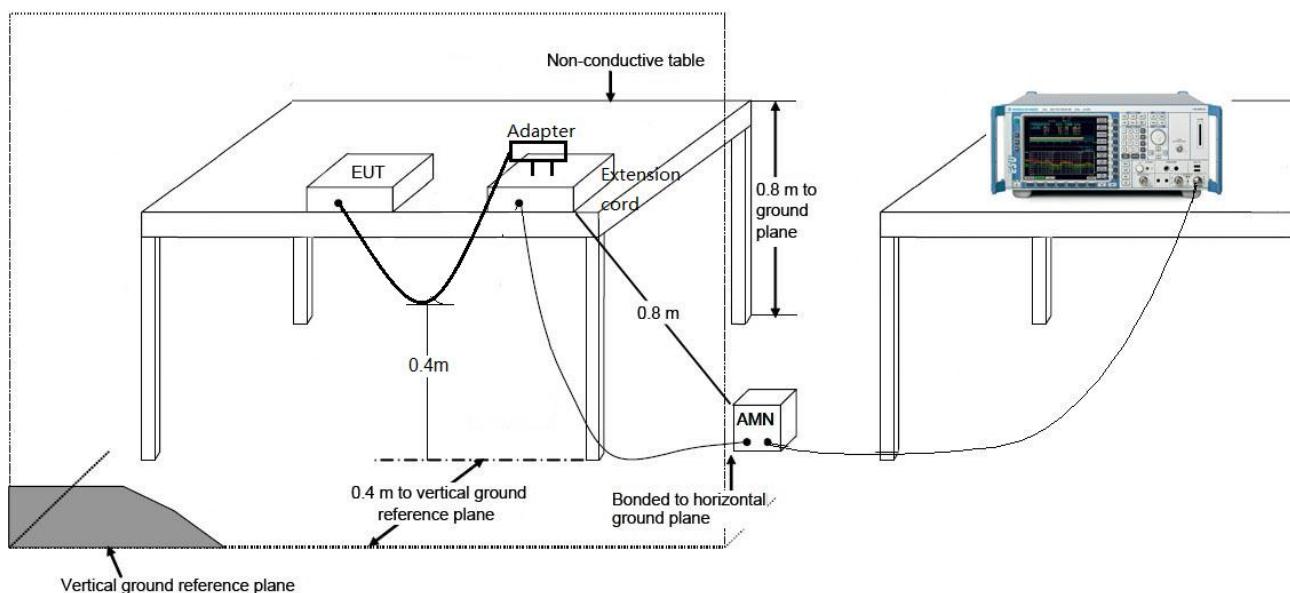
### 7.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

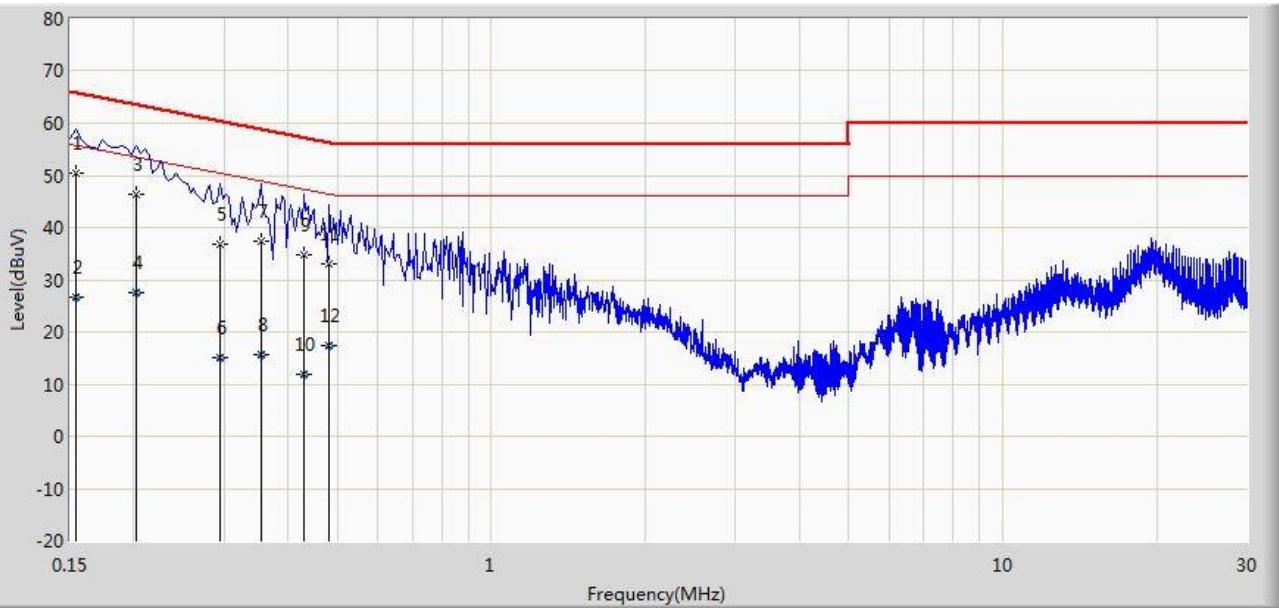
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 7.8.2. Test Setup



### 7.8.3. Test Result

Site: SR2	Time: 2018/11/27 - 15:18
Limit: FCC_Part15.207_CE_AC Power	Engineer: Kevin Ker
Probe: ENV216_Filter On	Polarity: Line
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode 1	

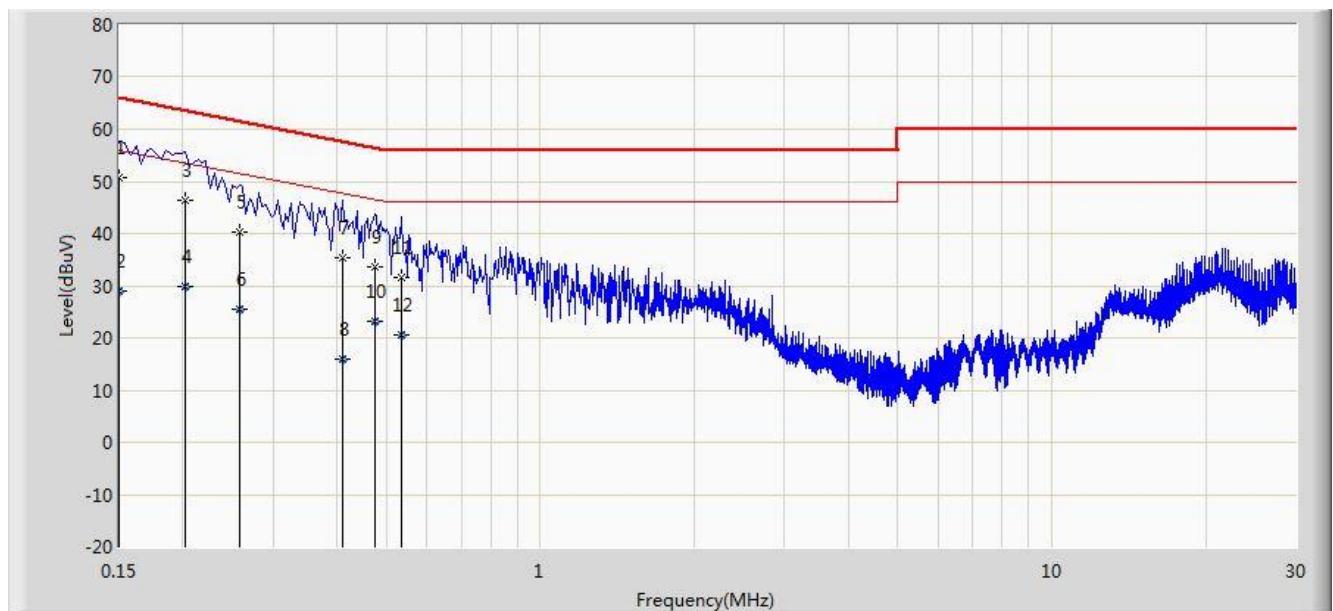


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.154	50.495	39.786	-15.286	65.781	10.709	QP
2			0.154	26.778	16.069	-29.003	55.781	10.709	AV
3			0.202	46.320	36.302	-17.208	63.528	10.018	QP
4			0.202	27.396	17.378	-26.132	53.528	10.018	AV
5			0.294	36.737	26.748	-23.674	60.411	9.989	QP
6			0.294	15.165	5.176	-35.246	50.411	9.989	AV
7			0.354	37.308	27.289	-21.561	58.868	10.019	QP
8			0.354	15.516	5.497	-33.353	48.868	10.019	AV
9			0.430	34.900	24.844	-22.353	57.253	10.055	QP
10			0.430	11.801	1.745	-35.452	47.253	10.055	AV
11			0.482	33.080	22.999	-23.225	56.305	10.081	QP
12			0.482	17.367	7.286	-28.938	46.305	10.081	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: 2018/11/27 - 15:21
Limit: FCC_Part15.207_CE_AC Power	Engineer: Kevin Ker
Probe: ENV216_Filter On	Polarity: Neutral
EUT: AX11000 MU-MIMO Tri-Band Gaming Router	Power: AC 120V/60Hz
Test Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dB $\mu$ V)	Factor (dB)	Type
1		*	0.150	50.615	39.347	-15.385	66.000	11.268	QP
2			0.150	29.058	17.790	-26.942	56.000	11.268	AV
3			0.202	46.361	36.364	-17.167	63.528	9.997	QP
4			0.202	29.797	19.800	-23.731	53.528	9.997	AV
5			0.258	40.321	30.352	-21.174	61.496	9.969	QP
6			0.258	25.445	15.476	-26.050	51.496	9.969	AV
7			0.410	35.419	25.355	-22.229	57.648	10.064	QP
8			0.410	15.830	5.766	-31.818	47.648	10.064	AV
9			0.474	33.670	23.566	-22.773	56.444	10.105	QP
10			0.474	23.102	12.998	-23.341	46.444	10.105	AV
11			0.534	31.647	21.543	-24.353	56.000	10.104	QP
12			0.534	20.643	10.539	-25.357	46.000	10.104	AV

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

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

## 8. CONCLUSION

The data collected relate only the item(s) tested and show that the **AX11000 MU-MIMO Tri-Band Gaming Router** is in compliance with Part 15C of the FCC rules.

---

The End

## Appendix A - Test Setup Photograph

Refer to "1811TW0112-UT" file.

## Appendix B - EUT Photograph

Refer to "1811TW0112-UE" file.