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Report No.: 1507RSU00812  
Report Version: V02  
Issue Date: 01-20-2016

## MEASUREMENT REPORT

### FCC PART 15.247 Bluetooth v4.0

**FCC ID:** H8N-BLT2010

**APPLICANT:** ASKEY COMPUTER CORP

**Application Type:** Certification

**Product:** Bluetooth Module

**Model No.:** BLT2010(RoHS)

**Brand Name:** ASKEY

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

**FCC Rule Part(s):** Part 15.247

**Test Procedure(s):** ANSI C63.10-2013, KDB 558074 D01v03r04

**Test Date:** November 16 ~ December 07, 2015

Reviewed By : Robin Wu  
( Robin Wu )

Approved By : Marlin Chen  
( Marlin Chen )



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 KDB 558074 D01v03r04. Test results reported herein relate only to the item(s) tested.

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

## Revision History

Report No.	Version	Description	Issue Date
1507RSU00812	Rev. 01	Initial report	01-12-2016
1507RSU00812	Rev. 02	Revised the detector of 9kHz ~ 30MHz	01-20-2016

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## §2.1033 General Information

<b>Applicant:</b>	ASKEY COMPUTER CORP
<b>Applicant Address:</b>	10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY 23585, TAIWAN, R.O.C.
<b>Manufacturer:</b>	ASKEY COMPUTER CORP
<b>Manufacturer Address:</b>	10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY 23585, TAIWAN, R.O.C.
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
<b>MRT Registration No.:</b>	809388
<b>FCC Rule Part(s):</b>	Part 15.247
<b>Model No.:</b>	BLT2010(RoHS)
<b>FCC ID:</b>	H8N-BLT2010
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
<b>FCC Classification:</b>	Digital Transmission System (DTS)

### Test Facility / Accreditations

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

- MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- 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-4179, G-814, C-4664, T-2206) 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 and Radio testing for FCC, Industry Canada, 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 Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



## 2. PRODUCT INFORMATION

### 2.1. Feature of Equipment under Test

Product Name	Bluetooth Module
Model No.	BLT2010(RoHS)
Bluetooth Frequency	2402~2480MHz
Bluetooth Version	v3.0 + HS, v4.0
Type of modulation	FHSS

### 2.2. Product Specification Subjective to this Report

Bluetooth v4.0	
Bluetooth Frequency	2402~2480MHz
Bluetooth Version	v4.0
Type of modulation	FHSS
Data Rate	1Mbps(GFSK)

### 2.3. Working Frequencies for this Report

Channel List for BLE

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. Device Capabilities

This device contains the following capabilities:

Bluetooth (v3.0 + HS, v4.0)

## 2.5. Test Configuration

The **Bluetooth Module FCC ID: H8N-BLT2010** was tested per the guidance of KDB 558074 D01v03r04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

## 2.6. EMI Suppression Device(s)/Modifications

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

## 2.7. 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.

## 2.8. Test Software

The test utility software used during testing was “BlueTest3”.

### 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 provided in KDB 558074 D01v03r04 were used in the measurement of the **Bluetooth Module FCC ID: H8N-BLT2010**.

**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 at Clause 6.2.

Line conducted emissions test results are shown in Section 7.8.

### 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 **Bluetooth Module** is **permanently attached**.
- There are no provisions for connection to an external antenna.

### **Conclusion:**

The **Bluetooth Module FCC ID: H8N-BLT2010** 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
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2016/11/03
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06114	1 year	2016/11/20

Radiated Emissions – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MRTSUE06028	1 year	2016/06/23
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Preamplifier	Agilent	83017A	MRTSUE06020	1 year	2016/03/29
Preamplifier	Schwarzbeck	BBV9721	MRTSUE06121	1 year	2015/12/09
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2016/11/07
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2016/01/05
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2016/11/20
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06115	1 year	2016/11/20

Conducted Test Equipment – TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2016/05/08
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2016/05/08
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06112	1 year	2016/11/20

Software	Version	Function
e3	V8.3.5	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: 3.46dB
Radiated Emission Measurement – AC1
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{c(y)}$ ): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB

## 7. TEST RESULT

### 7.1. Summary

Company Name: ASKEY COMPUTER CORP  
FCC ID: H8N-BLT2010  
FCC Classification: Digital Transmission System (DTS)  
Data Rate(s) Tested: 1Mbps(GFSK) (BLE)

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	$\leq 8\text{dBm} / 3\text{kHz Band}$		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\geq 20\text{dBc(Peak)}$		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) 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.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

## 7.2. 6dB Bandwidth Measurement

### 7.2.1. Test Limit

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

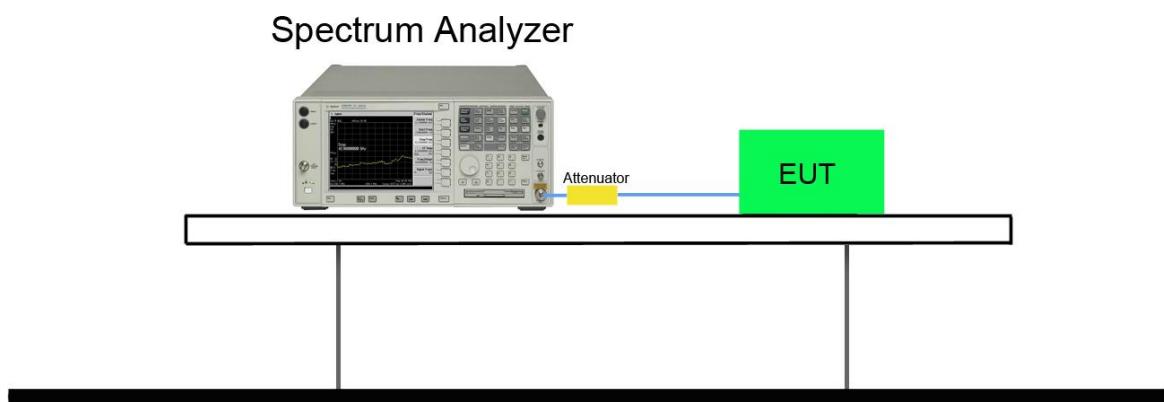
### 7.2.2. Test Procedure used

KDB 558074 D01v03r04 - Section 8.2 Option 2

### 7.2.3. Test Setting

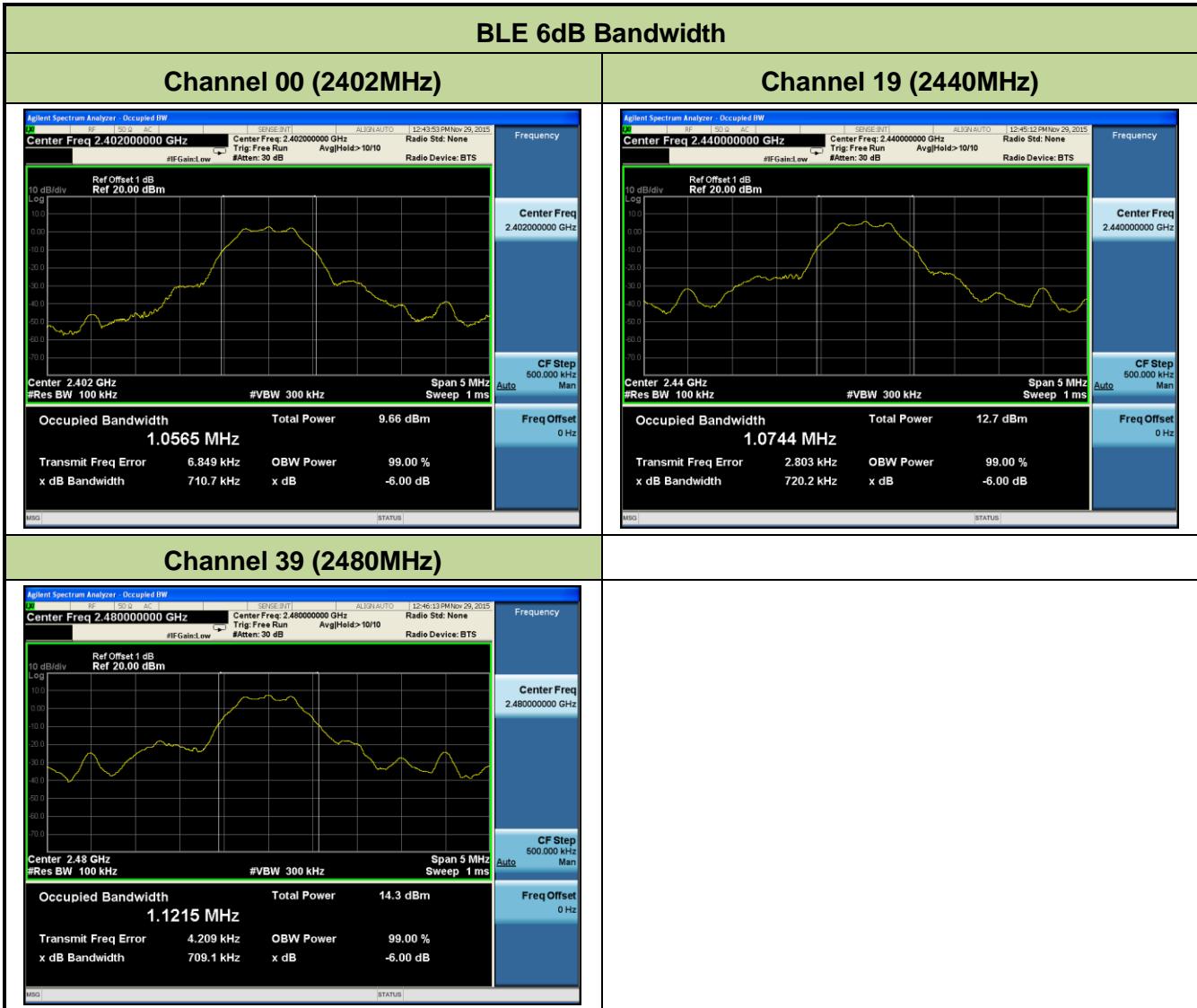
1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW  $\geq 3 \times$  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

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.71	≥ 0.5	Pass
BLE	1	19	2440	0.72	≥ 0.5	Pass
BLE	1	39	2480	0.71	≥ 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

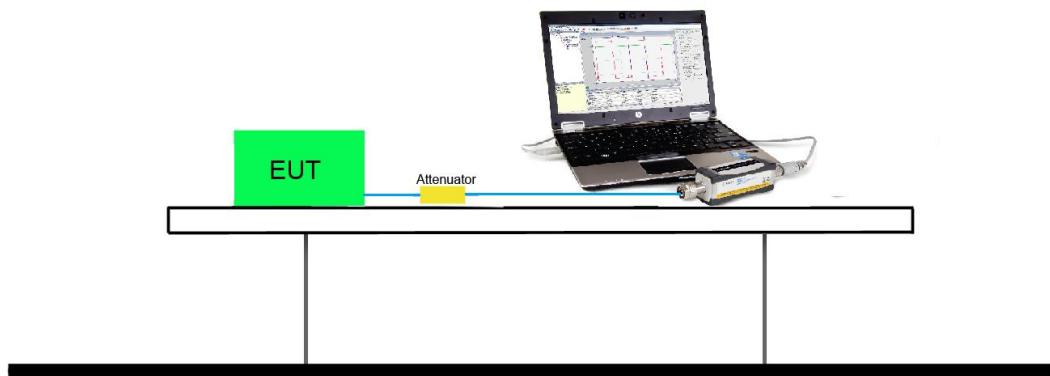
KDB 558074 D01v03r04 - Section 9.1.2 PKPM1 - Peak Power Method

#### 7.3.3. Test Setting

##### **Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 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.

#### 7.3.4. Test Setup



### 7.3.5. Test Result of Output Power

#### 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	4.70	≤ 30	Pass
BLE	1	19	2440	7.64	≤ 30	Pass
BLE	1	39	2480	9.33	≤ 30	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	3.56	≤ 30	Pass
BLE	1	19	2440	6.04	≤ 30	Pass
BLE	1	39	2480	8.83	≤ 30	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.

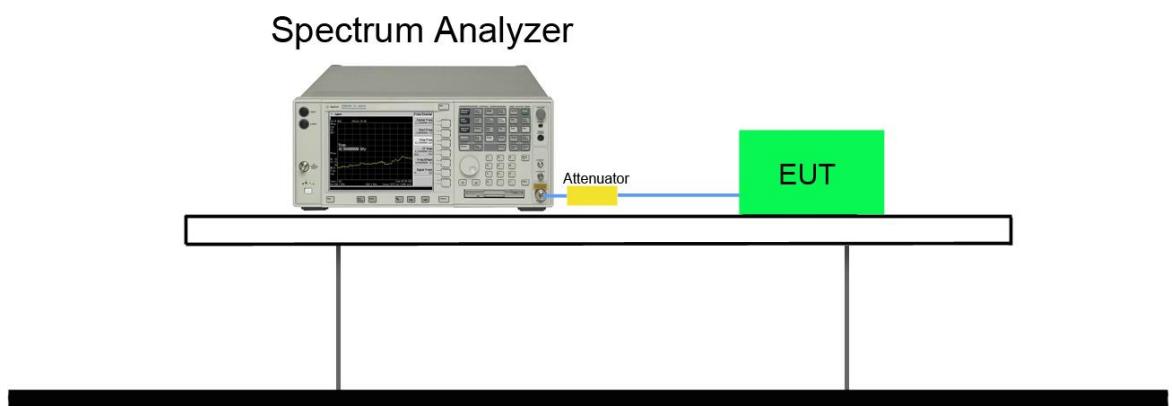
### 7.4.2. Test Procedure Used

KDB 558074 D01v03r04 - Section 10.2 Method PKPSD

### 7.4.3. Test Setting

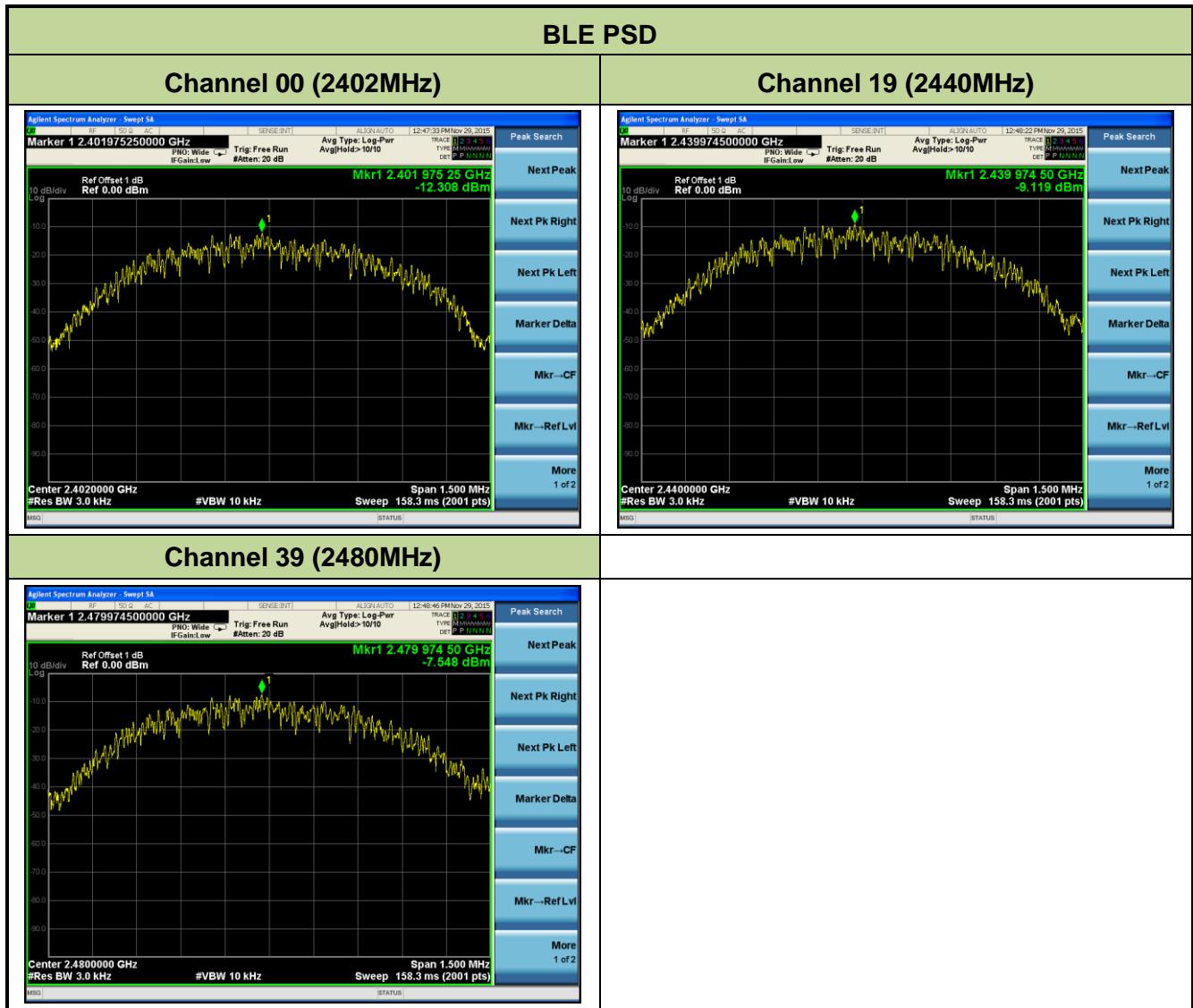
1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

### 7.4.4. Test Setup



#### 7.4.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-12.31	≤ 8	Pass
BLE	1	19	2440	-9.12	≤ 8	Pass
BLE	1	39	2480	-7.55	≤ 8	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

KDB 558074 D01v03r04 - Section 11.2 & Section 11.3

### 7.5.3. Test Setting

#### 1. Reference level measurement

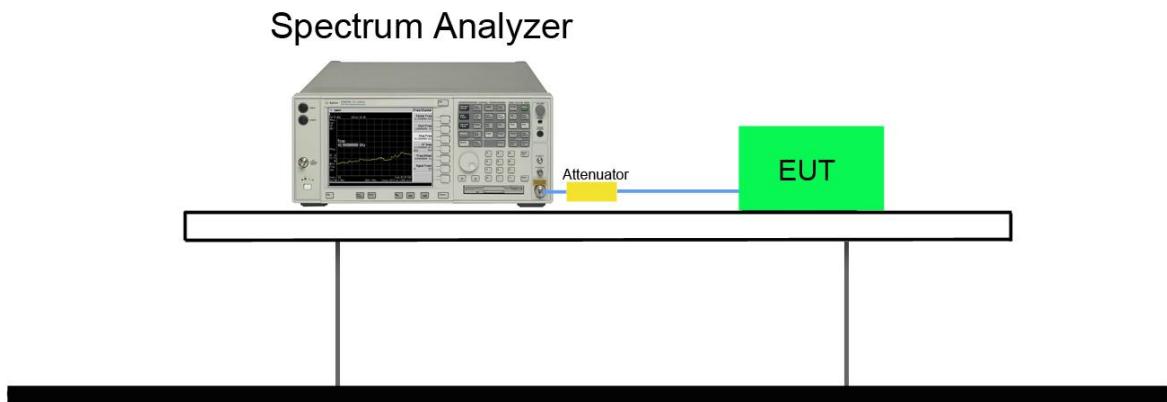
- (a) Set instrument center frequency to DTS channel center frequency
- (b) Set the span to  $\geq$  1.5 times the DTS bandwidth
- (c) Set the RBW = 100 kHz
- (d) Set the VBW  $\geq$  3 x RBW
- (e) Detector = peak
- (f) Sweep time = auto couple
- (g) Trace mode = max hold
- (h) Allow trace to fully stabilize

#### 2. Emission level measurement

- (a) Set the center frequency and span to encompass frequency range to be measured
- (b) RBW = 100kHz
- (c) VBW = 300kHz
- (d) Detector = Peak
- (e) Number of sweep points  $\geq$  2 x Span/RBW
- (f) Trace mode = max hold
- (g) Sweep time = auto couple

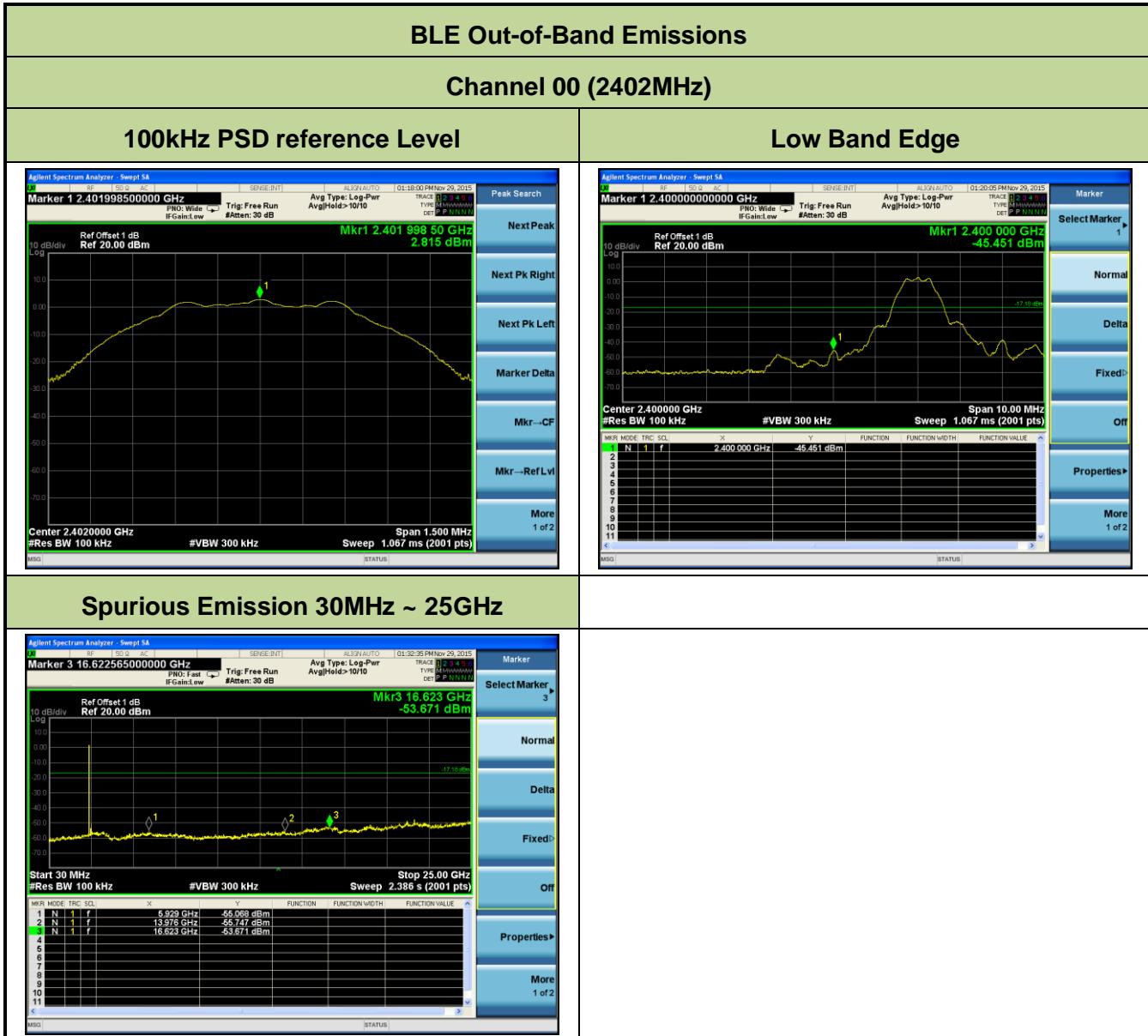
(h) The trace was allowed to stabilize

#### 7.5.4. Test Setup



### 7.5.5. Test Result

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



### Channel 19 (2440MHz)

#### 100kHz PSD reference Level



#### Spurious Emission 30MHz ~ 25GHz



### Channel 39 (2480MHz)

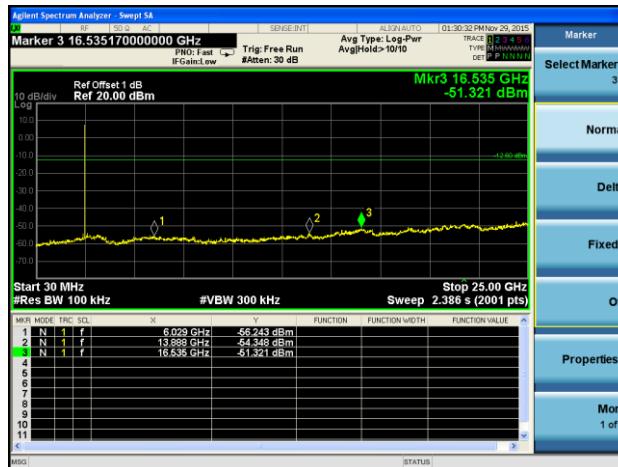
#### 100kHz PSD reference Level



#### High Band Edge



#### Spurious Emission 30MHz ~ 25GHz



## 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 [V/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

KDB 558074 D01v03r04 - Section 12.2.3 (quasi-peak measurements)

KDB 558074 D01v03r04 - Section 12.2.4 (peak power measurements)

KDB 558074 D01v03r04 - Section 12.2.5 (average power measurements)

### 7.6.3. Test Setting

#### Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 D01v03r04

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple

6. Trace mode = max hold
7. Trace was allowed to stabilize

**Table 1 - RBW as a function of frequency**

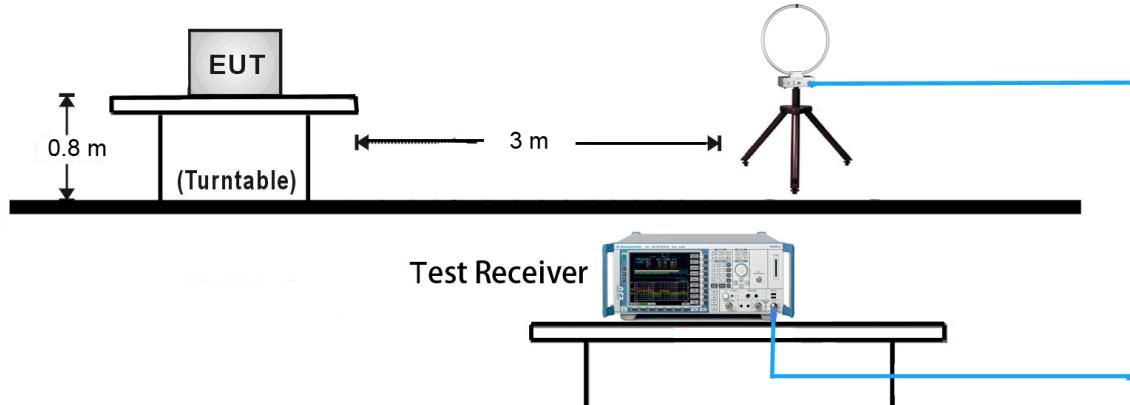
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

**Average Field Strength Measurements per Section 12.2.4 of KDB 558074 D01v03r04**

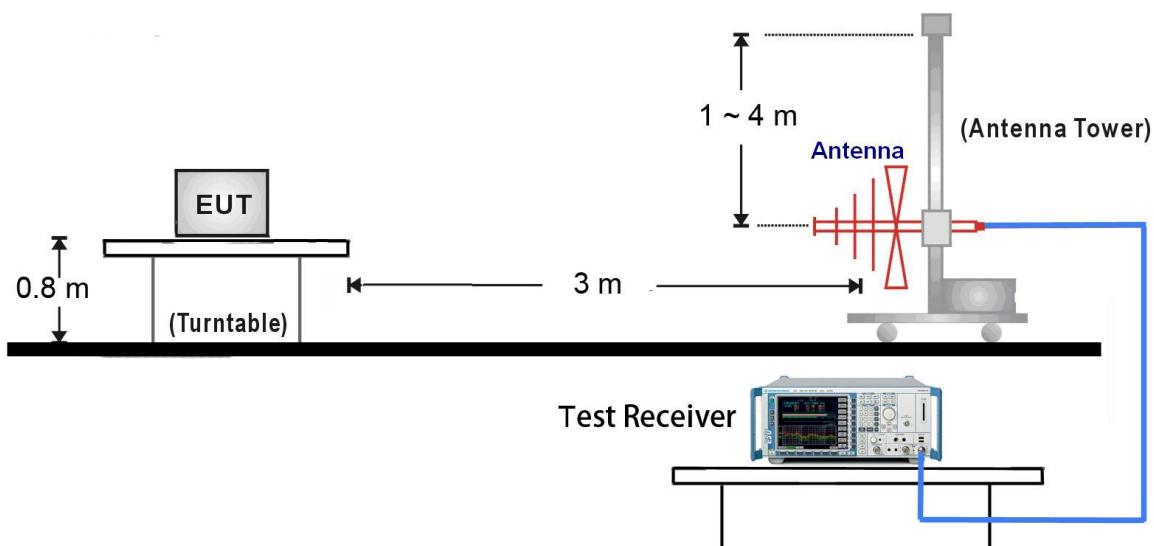
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW  $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB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

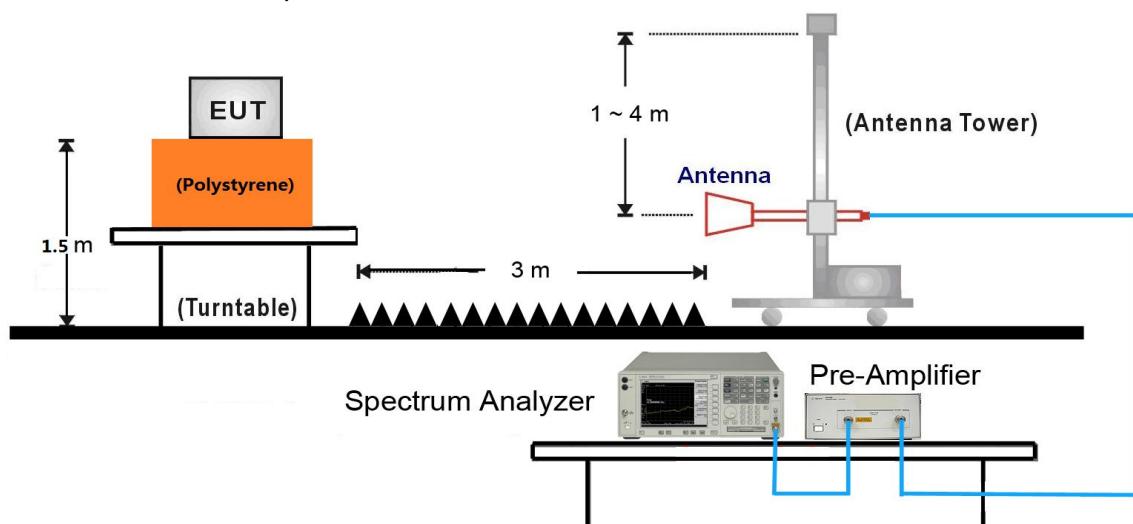
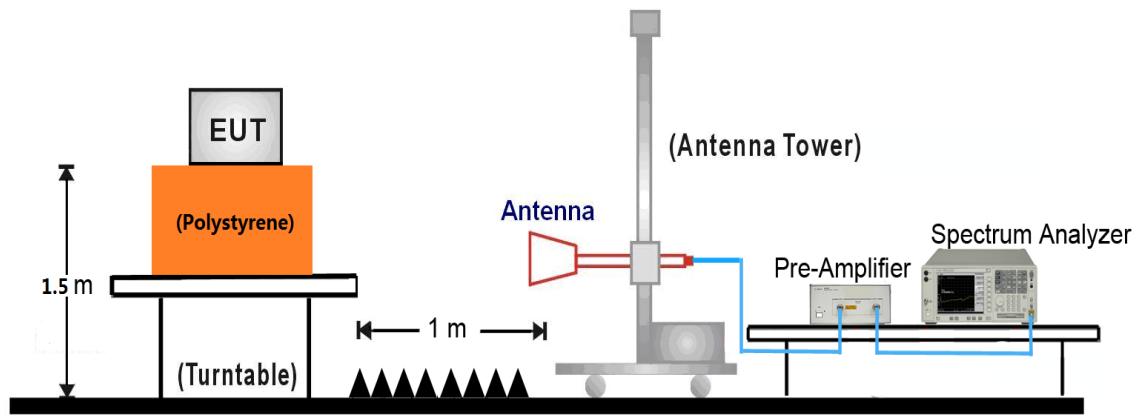
#### 7.6.4. Test Setup

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



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



1GHz ~ 18GHz Test Setup:

18GHz ~25GHz Test Setup:


### 7.6.5. Test Result

Test Mode:	BLE	Test Site:	AC1
Test Channel:	00	Test Engineer:	Roy Cheng
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
	4799.5	40.2	2.7	42.9	54	-11.1	Peak	Horizontal
	4799.5	53.3	2.7	56.0	74	-18.0	Average	Horizontal
*	6253.6	35.2	4.7	39.9	74	-34.1	Peak	Horizontal
	9152.9	34.7	9.8	44.5	74	-29.5	Peak	Horizontal
*	12865.3	33.9	12.0	45.9	74	-28.1	Peak	Horizontal
	4804.2	51.4	2.7	54.1	74	-19.9	Peak	Vertical
	4804.2	38.6	2.7	41.3	54	-12.7	Average	Vertical
*	6142.3	35.4	4.5	39.9	74	-34.1	Peak	Vertical
	9142.9	34.2	9.8	44.0	74	-30.0	Peak	Vertical
*	12714.7	33.9	11.7	45.6	74	-28.4	Peak	Vertical

Note 1: “\*\*” is not in restricted band, its limit is 20dBc of the fundamental emission level (83.2dB $\mu$ 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)

Test Mode:	BLE	Test Site:	AC1
Test Channel:	19	Test Engineer:	Roy Cheng
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
	4880.0	51.4	2.7	54.1	74	-19.9	Peak	Horizontal
	4880.0	38.4	2.7	41.1	54	-12.9	Average	Horizontal
*	6754.3	35.1	5.7	40.8	74	-33.2	Peak	Horizontal
	9147.9	34.1	9.8	43.9	74	-30.1	Peak	Horizontal
*	12741.6	34.2	11.7	45.9	74	-28.1	Peak	Horizontal
	4876.0	49.3	2.7	52.0	74	-22.0	Peak	Vertical
*	6824.7	34.7	6.2	40.9	74	-33.1	Peak	Vertical
	9423.6	33.7	10.6	44.3	74	-29.7	Peak	Vertical
*	12748.6	32.7	11.7	44.4	74	-29.6	Peak	Vertical

Note 1: “\*” is not in restricted band, its limit is 20dBc of the fundamental emission level (86.5dB $\mu$ 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)

Test Mode:	BLE	Test Site:	AC1
Test Channel:	39	Test Engineer:	Roy Cheng
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
	4961.0	41.9	2.9	44.8	74	-29.2	Peak	Horizontal
*	6853.5	35.5	6.4	41.9	74	-32.1	Peak	Horizontal
	9424.8	33.7	10.6	44.3	74	-29.7	Peak	Horizontal
*	12795.8	33.3	11.7	45.0	74	-29.0	Peak	Horizontal
	4961.0	41.5	2.9	44.4	74	-29.6	Peak	Vertical
*	6482.4	35.6	5.9	41.5	74	-32.5	Peak	Vertical
	9427.4	34.1	10.6	44.7	74	-29.3	Peak	Vertical
*	12745.4	33.6	11.7	45.3	74	-28.7	Peak	Vertical

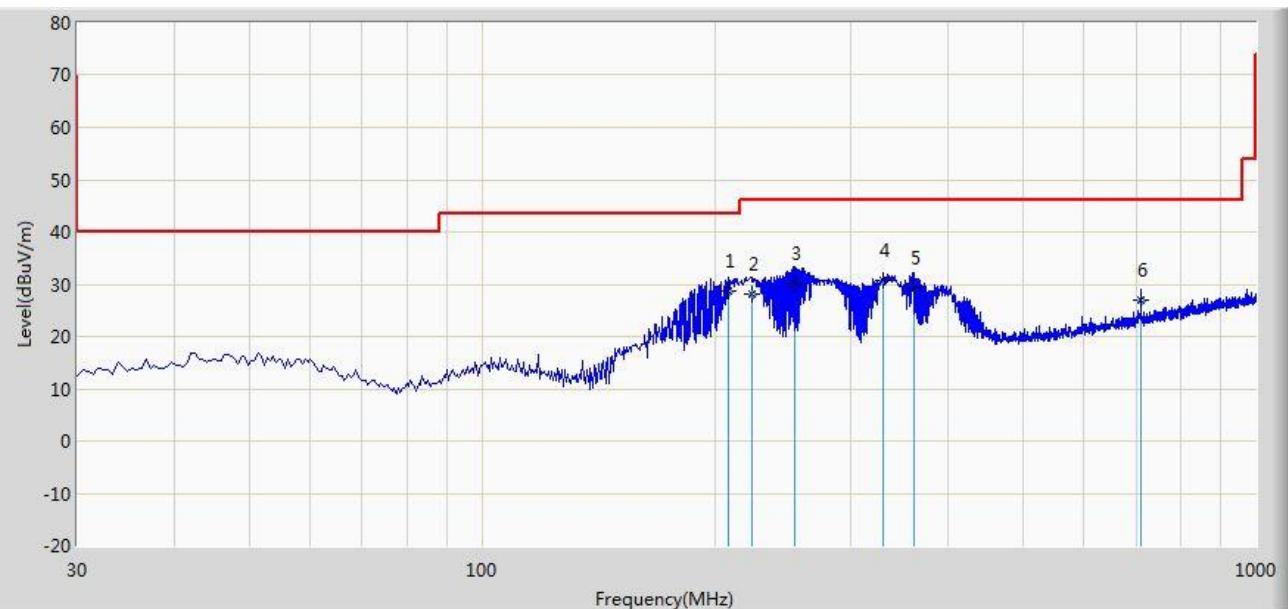
Note 1: “\*” is not in restricted band, its limit is 20dBc of the fundamental emission level (89.5dB $\mu$ V/m) or 15.209 which is higher.

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: 2015/11/25 - 21:45
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Bluetooth Module	Power: DC 3.3V
<b>Worse Case Mode:</b> Transmit by BLE at channel 2402MHz	

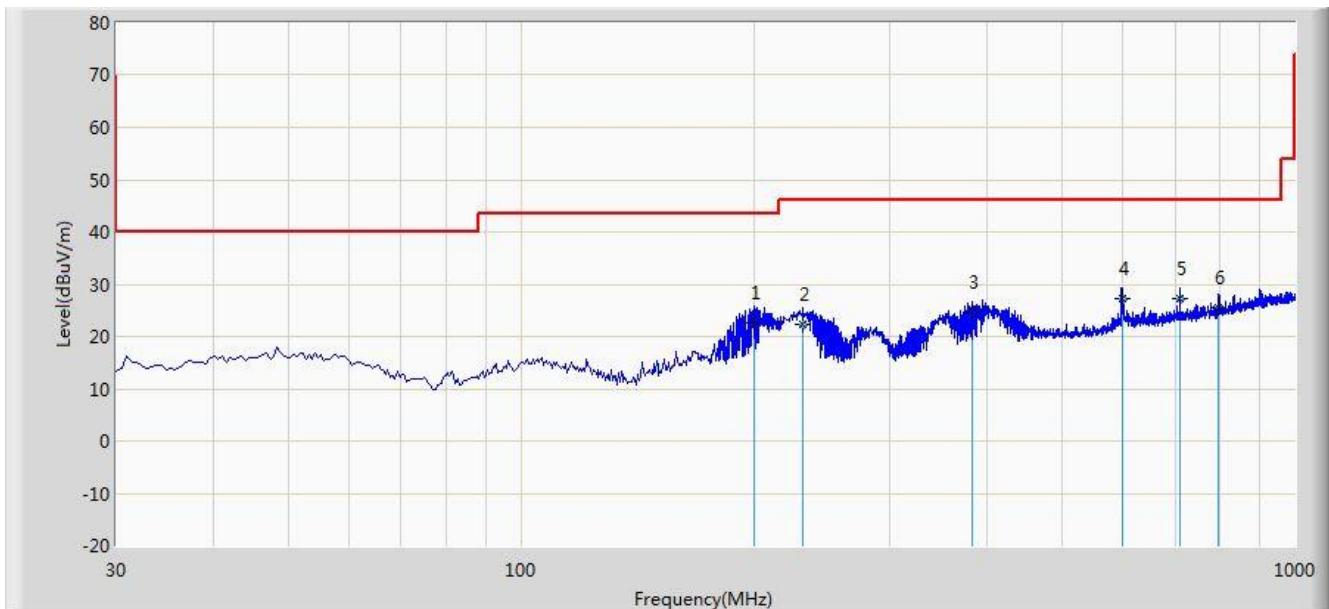


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dB $\mu$ V/m)	Factor (dB)	Type
1		*	207.995	28.617	16.250	-14.883	43.500	12.367	QP
2			223.030	28.006	15.258	-17.994	46.000	12.748	QP
3			253.100	30.001	16.258	-15.999	46.000	13.743	QP
4			329.730	30.687	15.326	-15.313	46.000	15.361	QP
5			361.750	29.274	13.257	-16.726	46.000	16.017	QP
6			709.970	27.019	5.264	-18.981	46.000	21.755	QP

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: 2015/11/25 - 21:53
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Bluetooth Module	Power: DC 3.3V
<b>Worse Case Mode:</b> Transmit by BLE at channel 2402MHz	



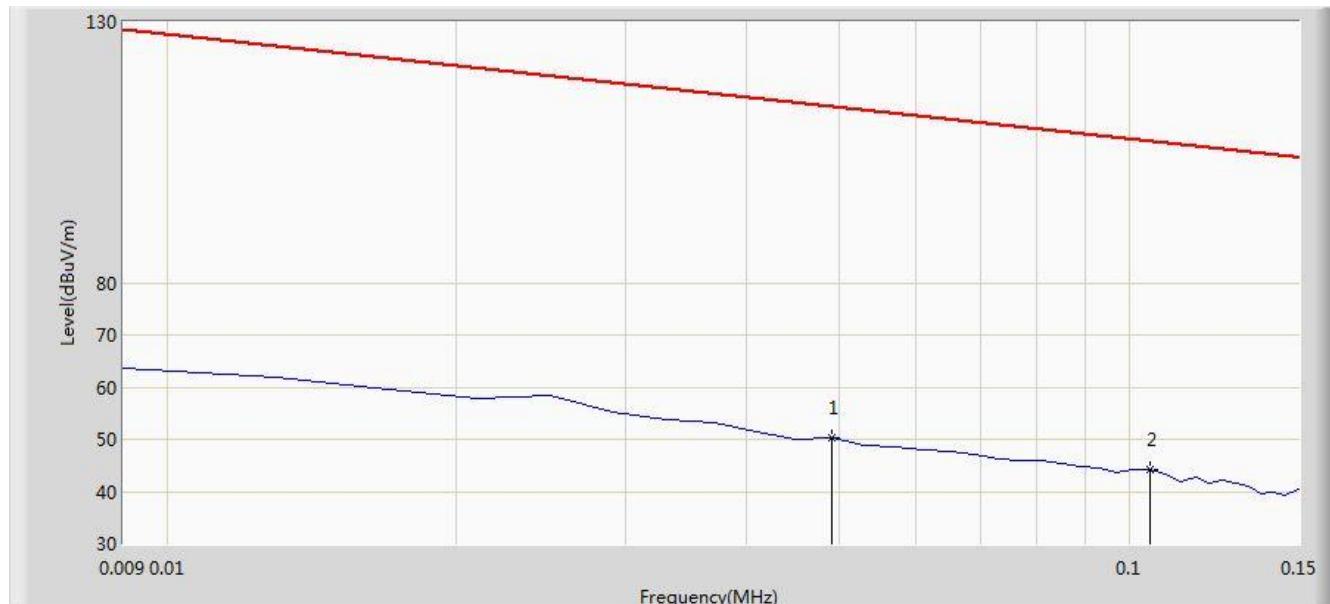
No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dB $\mu$ V/m)	Factor (dB)	Type
1			200.235	22.472	10.240	-21.028	43.500	12.231	QP
2			231.750	22.452	9.355	-23.548	46.000	13.096	QP
3			382.110	24.582	8.250	-21.418	46.000	16.332	QP
4			599.875	27.343	7.254	-18.657	46.000	20.089	QP
5		*	709.970	27.390	5.635	-18.610	46.000	21.755	QP
6			796.785	25.514	2.680	-20.486	46.000	22.834	QP

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: 2015/11/25 - 15:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: FMZB1519_0.009-30MHz	Polarity: Face On
EUT: Bluetooth Module	Power: DC 3.3V

**Note: There is the ambient noise within frequency range 9kHz~30MHz.**

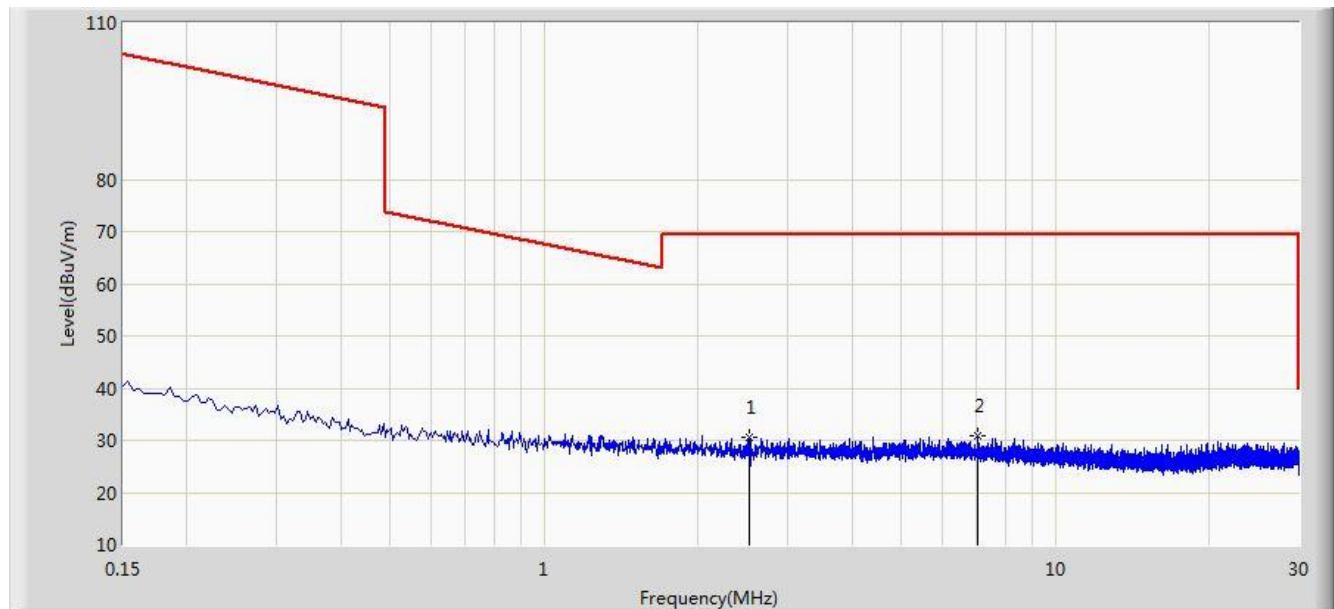


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			0.049	50.367	29.861	-63.422	113.789	20.505	PK
2		*	0.105	44.143	23.996	-63.029	107.173	20.147	PK

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: 2015/11/25 - 15:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: FMZB1519_0.009-30MHz	Polarity: Face On
EUT: Bluetooth Module	Power: DC 3.3V
<b>Note:</b> There is the ambient noise within frequency range 9kHz~30MHz.	



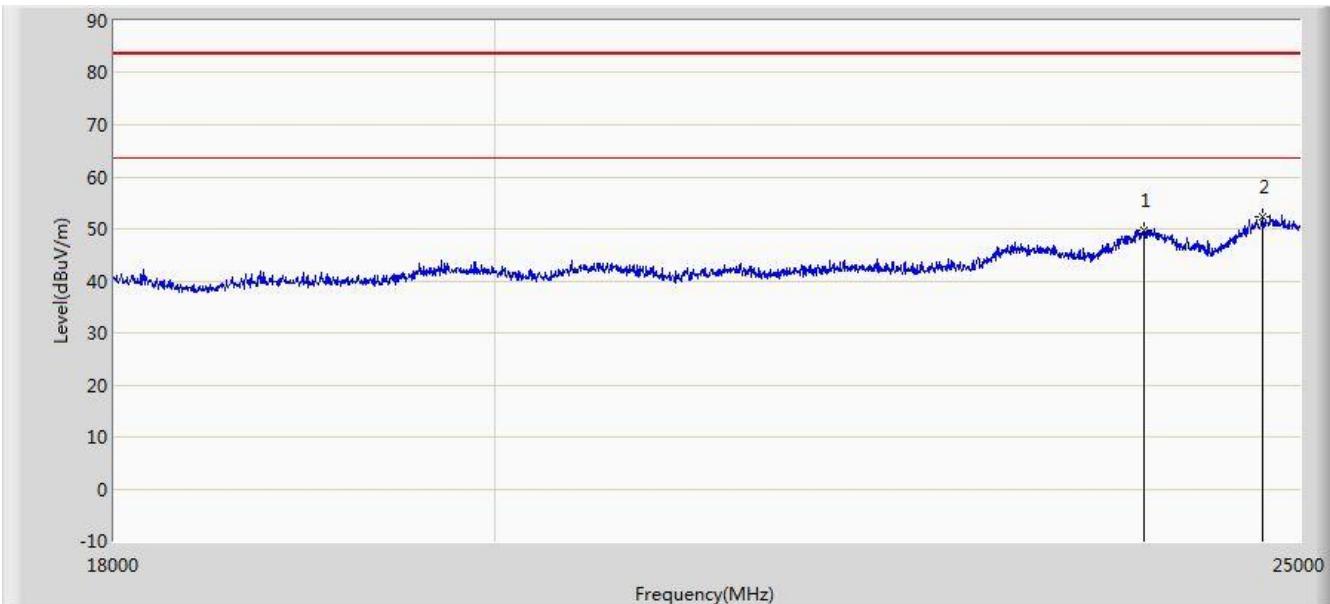
No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2.513	30.495	10.336	-39.005	69.500	20.159	QP
2		*	7.041	30.974	10.579	-38.526	69.500	20.395	QP

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: 2015/11/25 - 15:32
Limit: FCC_Part15.209_RE(1m)	Engineer: Roy Cheng
Probe: BBHA9170_18-40GHz	Polarity: Horizontal
EUT: Bluetooth Module	Power: DC 3.3V

**Note: There is the ambient noise within frequency range 18GHz~25GHz.**



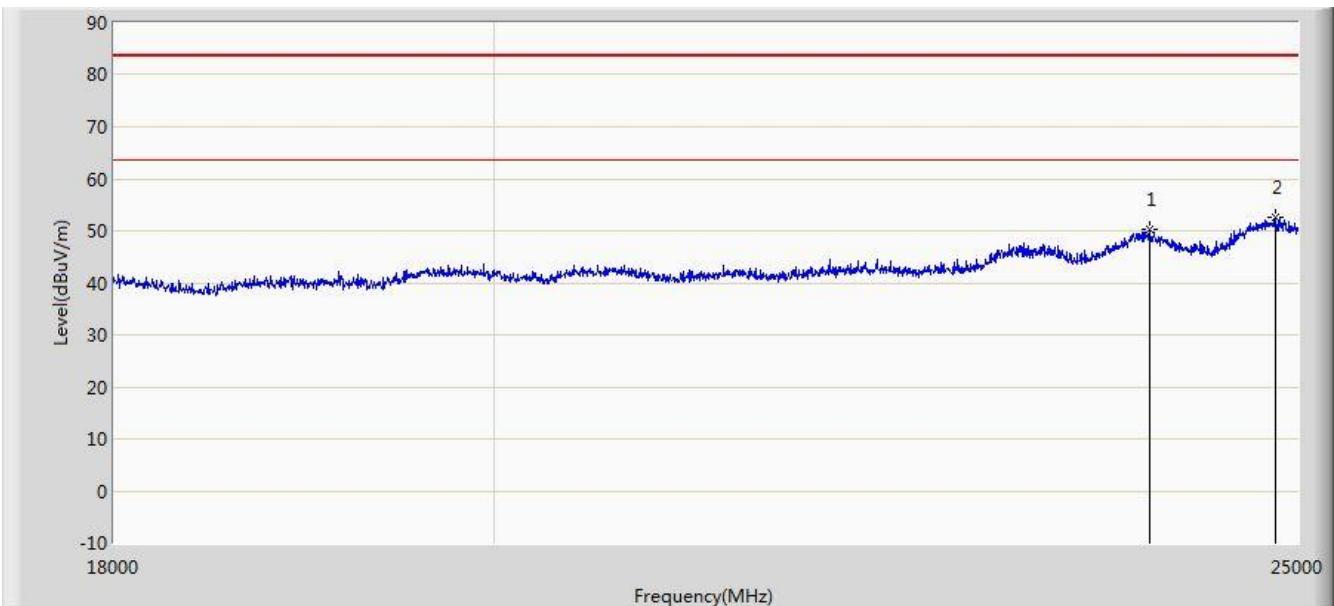
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			23943.000	49.776	35.866	-33.724	83.500	13.910	PK
2		*	24741.000	52.375	37.681	-31.125	83.500	14.694	PK

Note: 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)

Site: AC1	Time: 2015/11/25 - 15:32
Limit: FCC_Part15.209_RE(1m)	Engineer: Roy Cheng
Probe: BBHA9170_18-40GHz	Polarity: Vertical
EUT: Bluetooth Module	Power: DC 3.3V

**Note: There is the ambient noise within frequency range 18GHz~25GHz.**



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			23999.000	50.379	36.435	-33.121	83.500	13.944	PK
2		*	24846.000	52.503	37.735	-30.997	83.500	14.768	PK

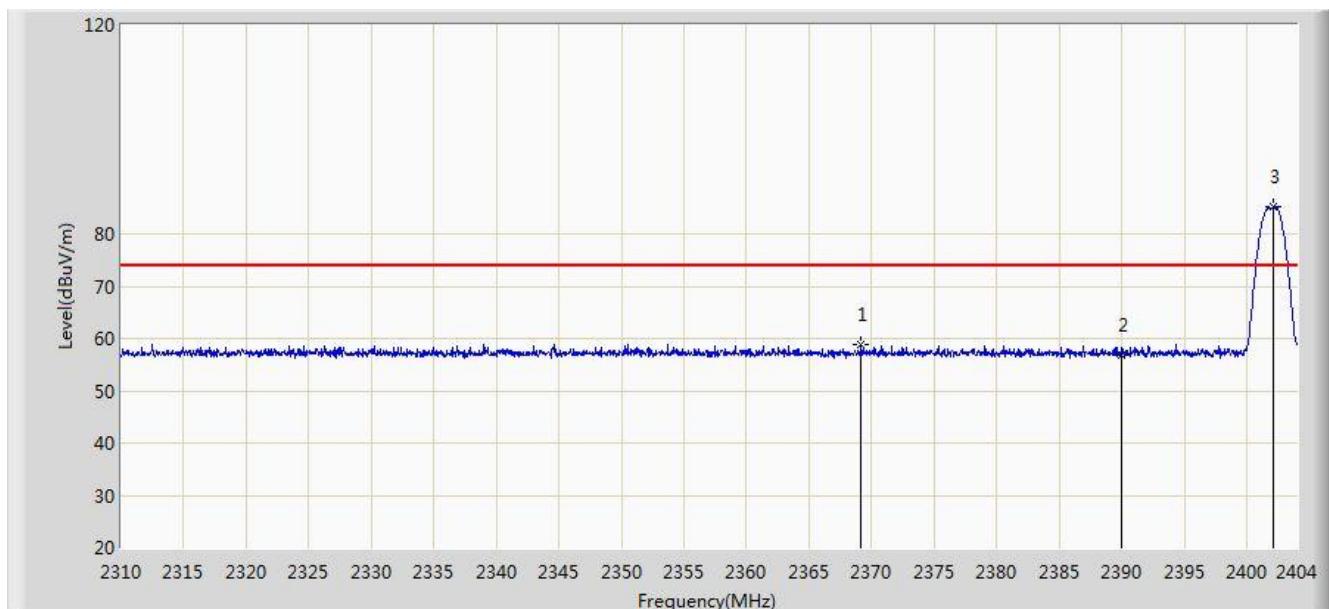
Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

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

## 7.7. Radiated Restricted Band Edge Measurement

### 7.7.1. Test Result

Site: AC1	Time: 2015/11/27 - 16:57
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2402MHz	

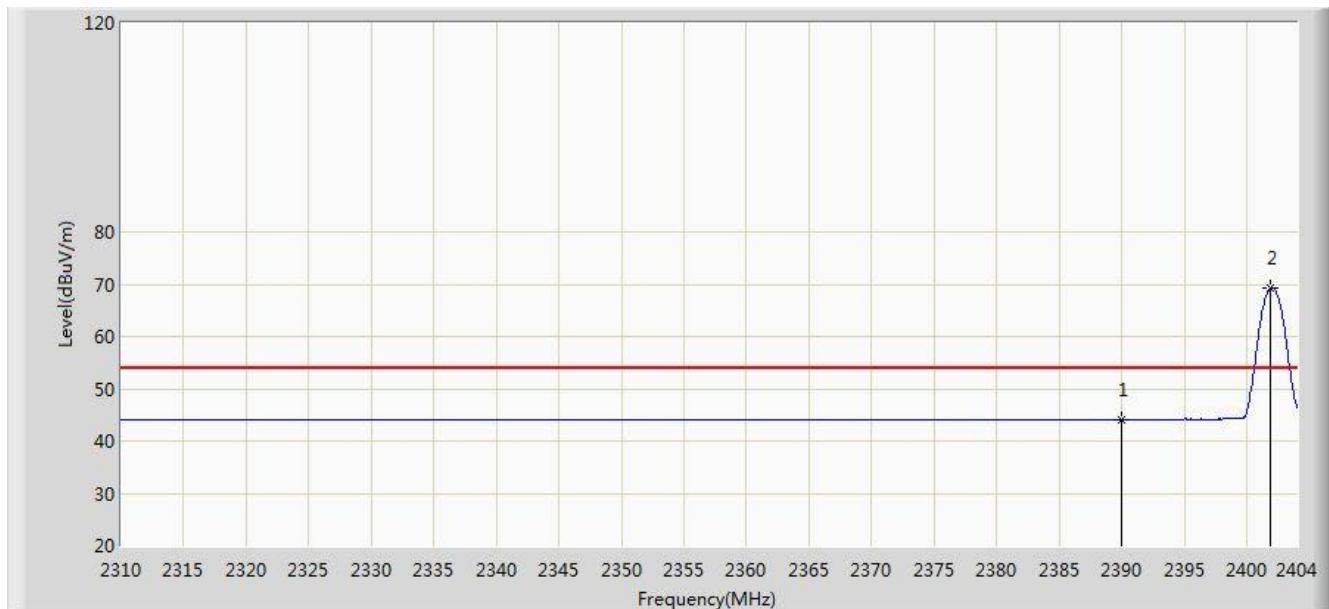


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2369.173	58.793	27.552	-15.207	74.000	31.241	PK
2			2390.000	56.877	25.674	-17.123	74.000	31.203	PK
3	*	*	2402.120	85.078	53.894	N/A	N/A	31.184	PK

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: 2015/11/27 - 17:01
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2402MHz	

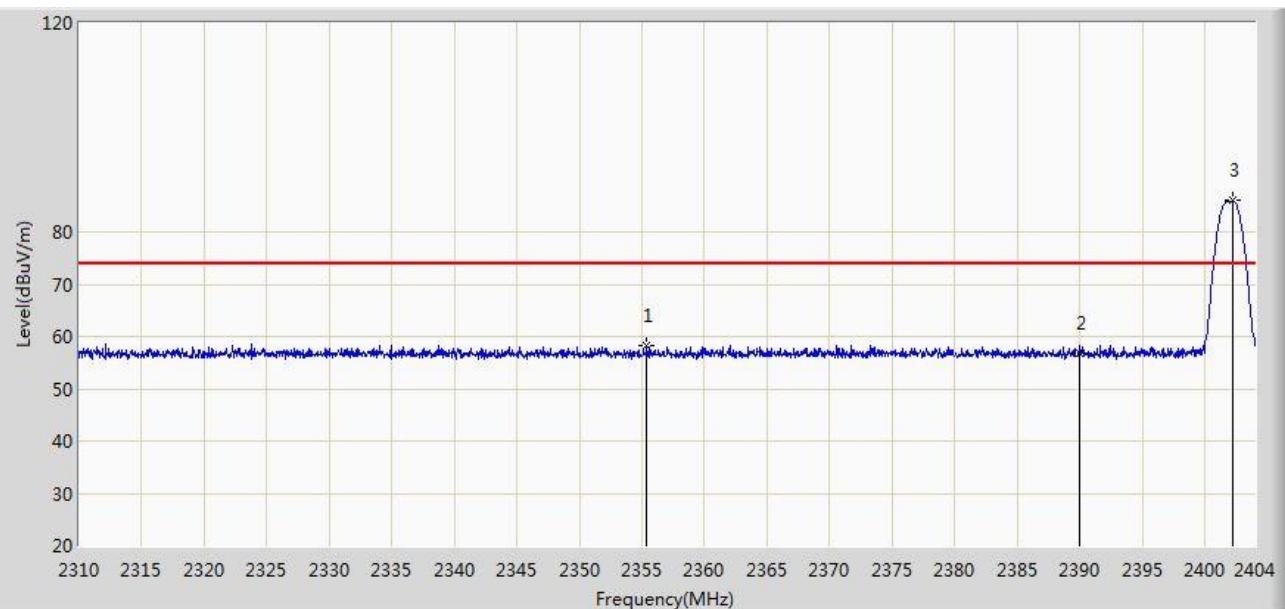


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	44.124	12.921	-9.876	54.000	31.203	AV
2		*	2401.932	69.237	38.053	N/A	N/A	31.184	AV

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: 2015/11/27 - 17:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2402MHz	

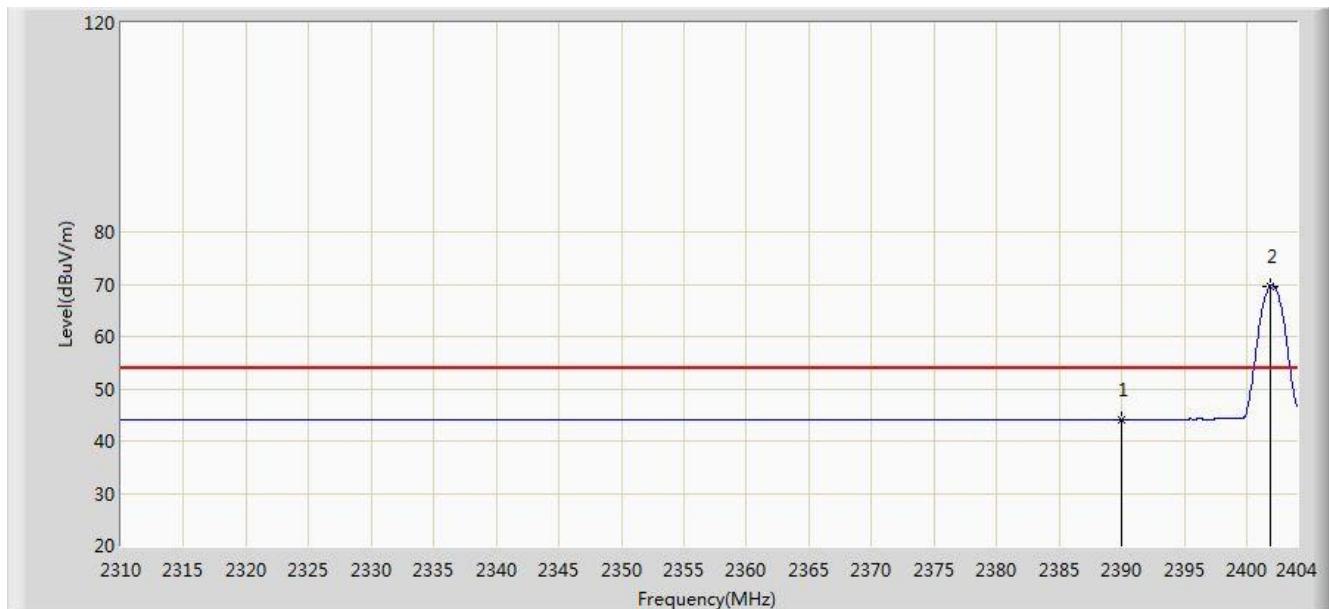


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2355.402	58.135	26.863	-15.865	74.000	31.272	PK
2			2390.000	56.697	25.494	-17.303	74.000	31.203	PK
3		*	2402.214	85.947	54.763	N/A	N/A	31.184	PK

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: 2015/11/27 - 17:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2402MHz	

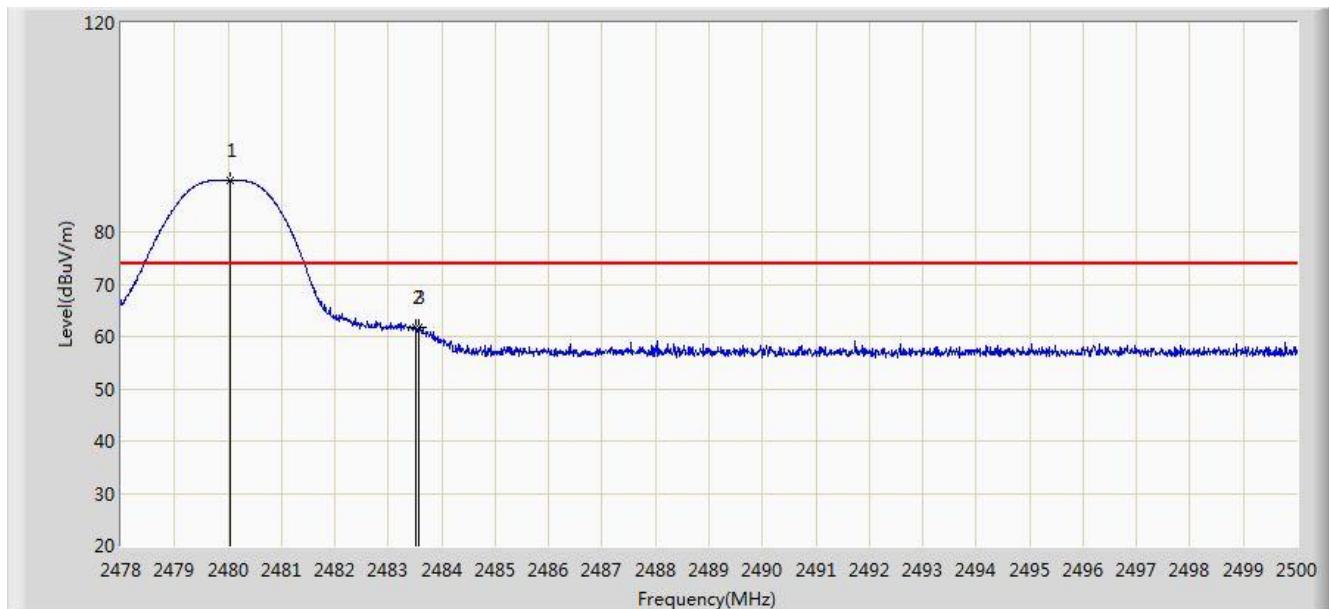


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	44.108	12.905	-9.892	54.000	31.203	AV
2		*	2401.838	69.598	38.414	N/A	N/A	31.184	AV

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: 2015/11/27 - 17:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2480MHz	

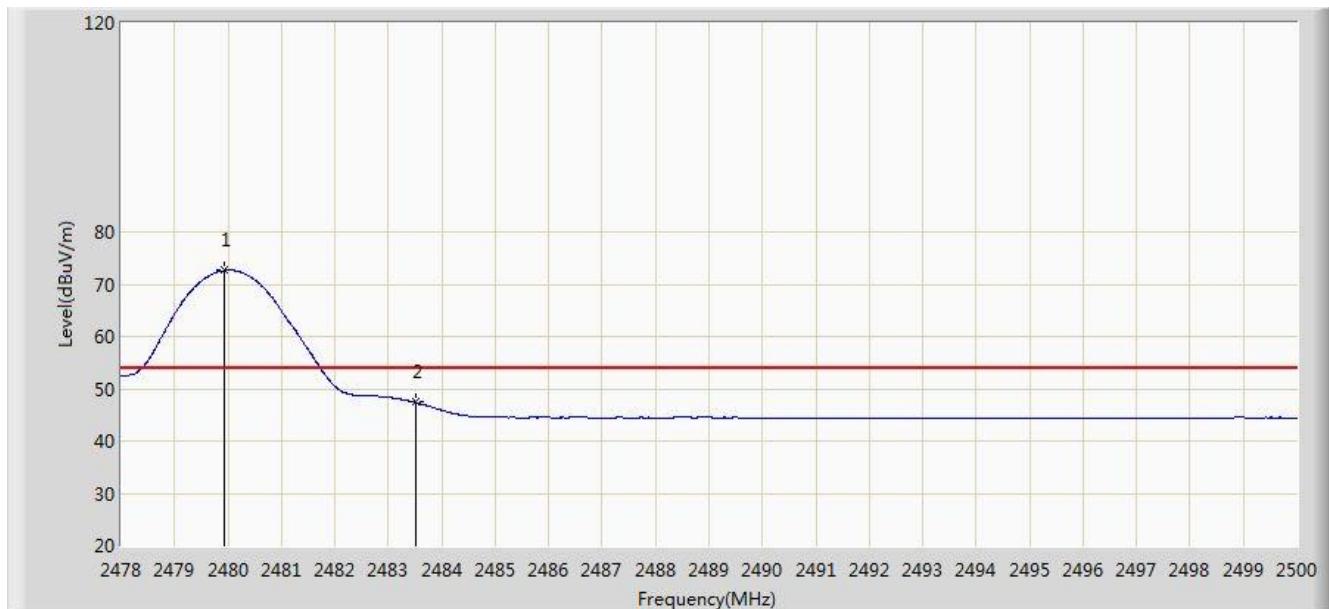


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	89.760	58.576	N/A	N/A	31.184	PK
2			2483.500	61.612	30.419	-12.388	74.000	31.194	PK
3			2483.566	61.737	30.544	-12.263	74.000	31.194	PK

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: 2015/11/27 - 17:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2480MHz	

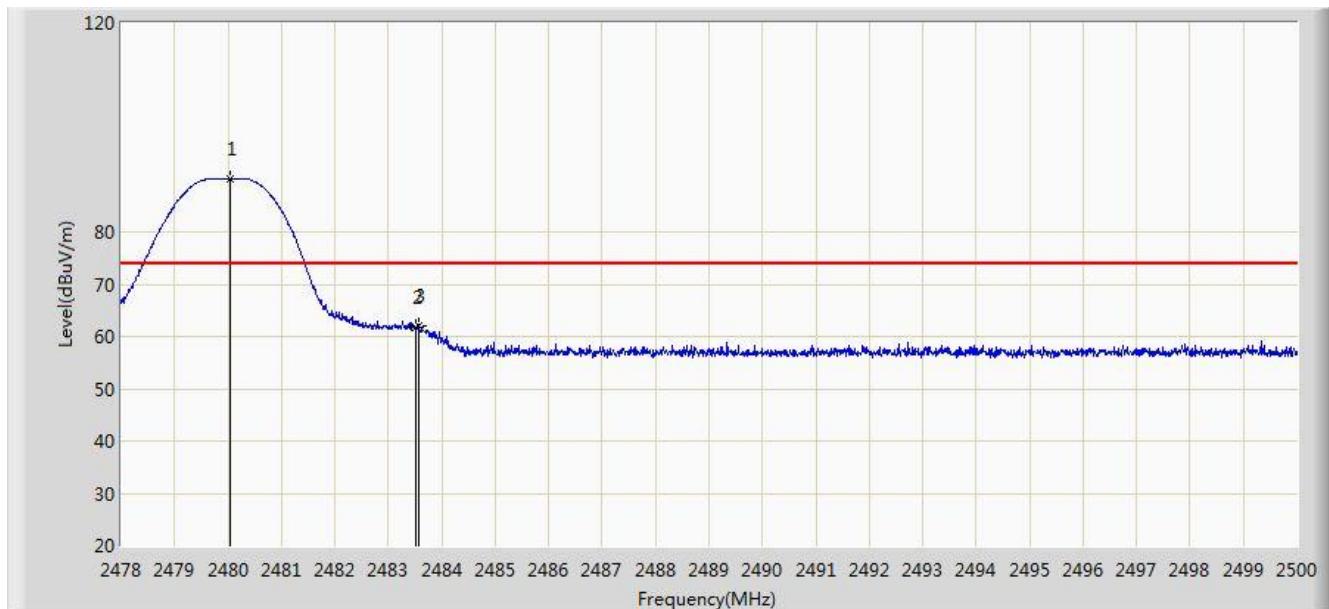


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V/m)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.936	72.646	41.462	N/A	N/A	31.184	AV
2			2483.500	47.401	16.208	-6.599	54.000	31.194	AV

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: 2015/11/27 - 17:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Bluetooth Module	Power: DC 3.3V
Test Mode: Transmit by BLE at Channel 2480MHz	

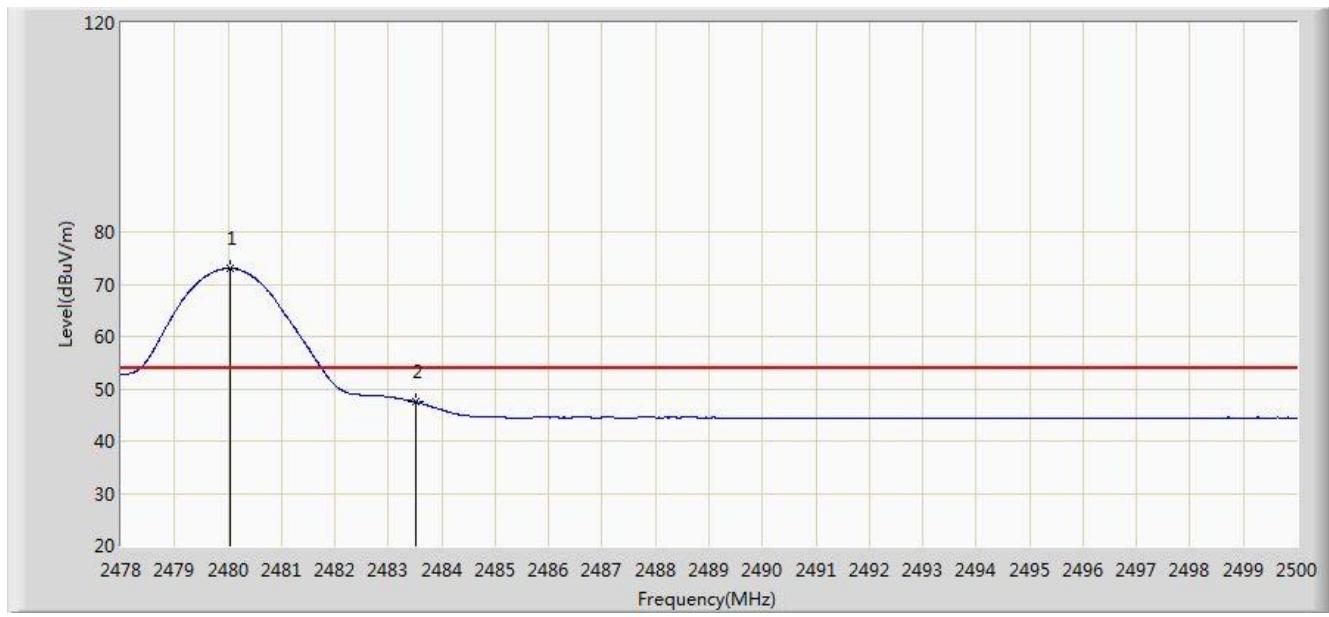


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	90.176	58.992	N/A	N/A	31.184	PK
2			2483.500	61.622	30.429	-12.378	74.000	31.194	PK
3			2483.577	62.057	30.863	-11.943	74.000	31.194	PK

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: 2015/11/27 - 17:06
Limit: FCC_Part15.209_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Bluetooth Module	Power: DC 3.3V
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 (dB $\mu$ V/m)	Factor (dB)	Type
1		*	2480.046	73.016	41.832	N/A	N/A	31.184	AV
2			2483.500	47.496	16.303	-6.504	54.000	31.194	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

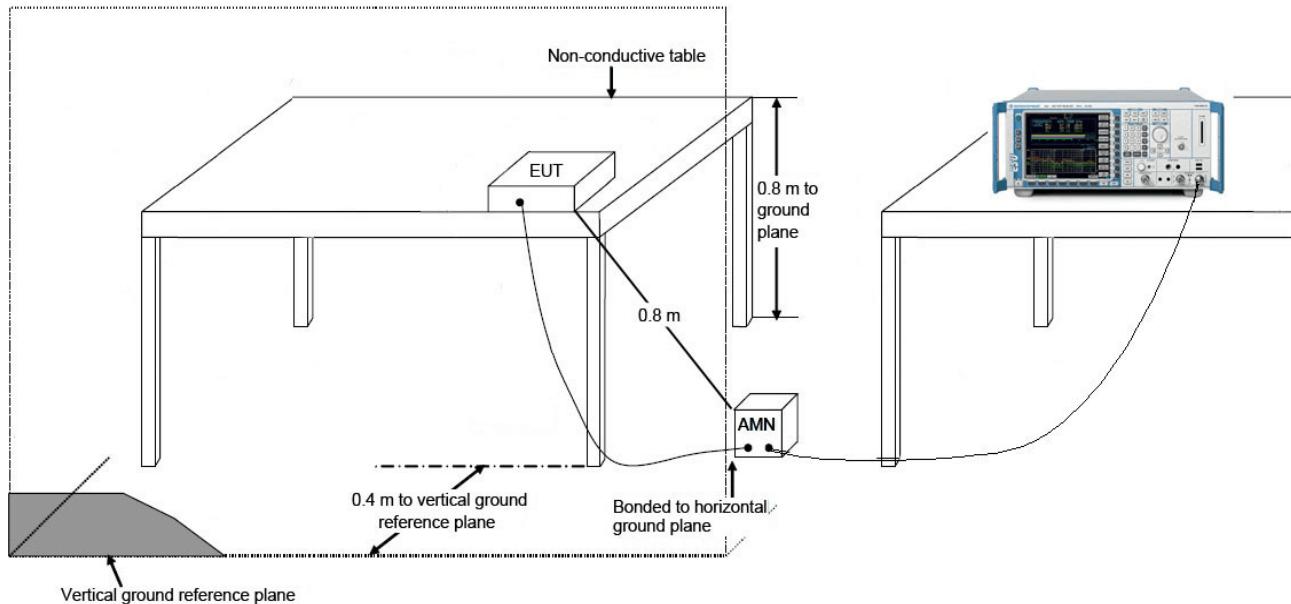
### 7.8.1. Test Limit

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.

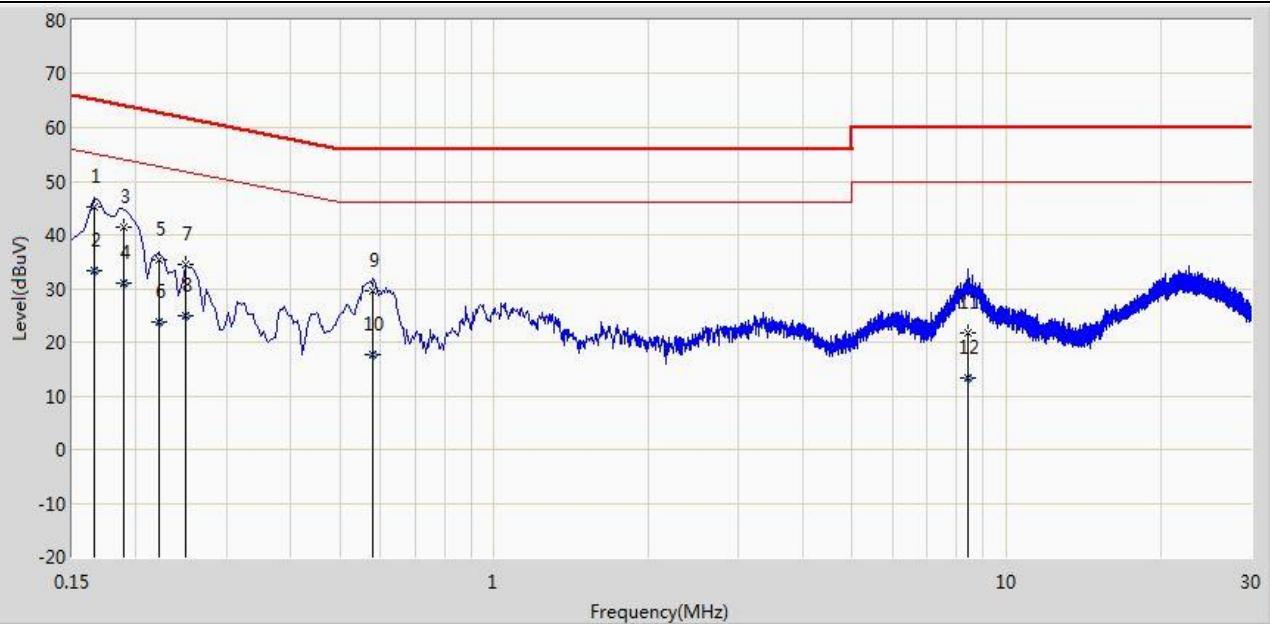
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 7.8.2. Test Setup



### 7.8.3. Test Result

Site: SR2	Time: 2015/12/01 - 09:32
Limit: FCC_Part15.207_CE_AC Power	Engineer: Roy Cheng
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Bluetooth Module	Power: AC 120V/60Hz
<b>Test Mode:</b> Transmit by BLE at channel 2402MHz	

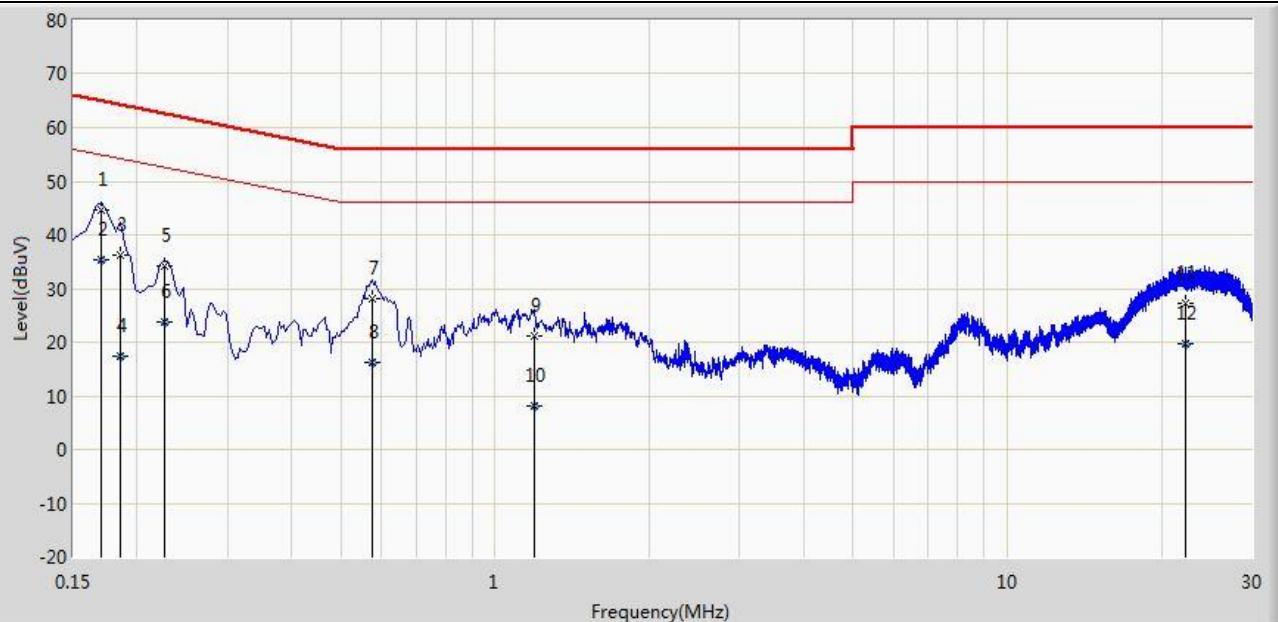


No	Flag	Mark	Frequency (MHz)	Measure Level (dB $\mu$ V)	Reading Level (dB $\mu$ V)	Over Limit (dB)	Limit (dB $\mu$ V)	Factor (dB)	Type
1		*	0.166	45.193	35.106	-19.965	65.158	10.087	QP
2			0.166	33.458	23.371	-21.700	55.158	10.087	AV
3			0.189	41.431	31.400	-22.649	64.080	10.031	QP
4			0.189	31.131	21.100	-22.949	54.080	10.031	AV
5			0.222	35.261	25.321	-27.482	62.744	9.941	QP
6			0.222	23.796	13.855	-28.948	52.744	9.941	AV
7			0.250	34.364	24.400	-27.393	61.757	9.964	QP
8			0.250	25.064	15.100	-26.693	51.757	9.964	AV
9			0.578	29.516	19.390	-26.484	56.000	10.126	QP
10			0.578	17.804	7.678	-28.196	46.000	10.126	AV
11			8.438	21.878	11.703	-38.122	60.000	10.175	QP
12			8.438	13.225	3.050	-36.775	50.000	10.175	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: 2015/12/01 - 09:46
Limit: FCC_Part15.207_CE_AC Power	Engineer: Roy Cheng
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Bluetooth Module	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)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.170	44.698	34.634	-20.263	64.960	10.064	QP
2	*		0.170	35.261	25.197	-19.700	54.960	10.064	AV
3			0.186	36.241	26.206	-27.973	64.213	10.035	QP
4			0.186	17.483	7.448	-36.731	54.213	10.035	AV
5			0.226	34.155	24.172	-28.441	62.595	9.982	QP
6			0.226	23.731	13.749	-28.864	52.595	9.982	AV
7			0.574	28.128	17.983	-27.872	56.000	10.145	QP
8			0.574	16.244	6.098	-29.756	46.000	10.145	AV
9			1.190	21.123	11.220	-34.877	56.000	9.903	QP
10			1.190	8.003	-1.900	-37.997	46.000	9.903	AV
11			22.270	27.177	16.961	-32.823	60.000	10.216	QP
12			22.270	19.649	9.432	-30.351	50.000	10.216	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 **Bluetooth Module FCC ID: H8N-BLT2010** is in compliance with Part 15C of the FCC Rules.

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The End

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