



# MEASUREMENT REPORT

## FCC PART 15.249

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**FCC ID:** 2ANX4FOBF11

**APPLICANT:** Nationwide Industries Inc

**Application Type:** Certification

**Product:** NWI-IQ-FOB

**Model No.:** NWI-IQ-F1

**FCC Classification:** Low Power Communication Device Transmitter (DXX)

**FCC Rule Part(s):** Part 15.249

**Test Procedure(s):** ANSI C63.10 – 2013

**Test Date:** February 23 ~ March 16, 2018

Reviewed By : Kevin Guo  
( Kevin Guo )

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 ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

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

### Revision History

Report No.	Version	Description	Issue Date	Note
1802RSU009-U1	Rev. 01	Initial report	03-16-2018	Valid

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## §2.1033 General Information

<b>Applicant:</b>	Nationwide Industries Inc
<b>Applicant Address:</b>	10333 Windhorst Road, Tampa, FL 33619, U.S.A.
<b>Manufacturer:</b>	Xiamen Xiangyu Industry&Trade Co., Ltd
<b>Manufacturer Address:</b>	No.500 West 2 Jinyuan Rd, Xinglin, Jimei District, Xiamen, China
<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>FCC Registration No.:</b>	893164
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering

### Test Facility / Accreditations

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

- MRT facility is a FCC registered (MRT Reg. No. 893164) 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. Equipment Description

Product Name	NWI-IQ-FOB
Model No.	NWI-IQ-F1
Frequency Range	2408 ~ 2476 MHz
Data Rate	250Kbps
Channel Space	1MHz
Type of Modulation	GFSK
Data Rate	250Kbps
Antenna Type	INTEGRAL
Antenna Gain	0dBi

## 2.2. Operation Frequency and Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2408MHz	2	2409MHz	3	2410MHz
4	2411MHz	5	2412MHz	6	2413MHz
7	2414MHz	8	2415MHz	9	2416MHz
10	2417MHz	11	2418MHz	12	2419MHz
13	2420MHz	14	2421MHz	15	2422MHz
16	2423MHz	17	2424MHz	18	2425MHz
19	2426MHz	20	2427MHz	21	2428MHz
22	2429MHz	23	2430MHz	24	2431MHz
25	2432MHz	26	2433MHz	27	2434MHz
28	2435MHz	29	2436MHz	30	2437MHz
31	2438MHz	32	2439MHz	33	2440MHz
34	2441MHz	35	2442MHz	36	2443MHz
37	2444MHz	38	2445MHz	39	2446MHz
40	2447MHz	41	2448MHz	42	2449MHz
43	2450MHz	44	2451MHz	45	2452MHz
46	2453MHz	47	2454MHz	48	2455MHz
49	2456MHz	50	2457MHz	51	2458MHz
52	2459MHz	53	2460MHz	54	2461MHz
55	2462MHz	56	2463MHz	57	2464MHz
58	2465MHz	59	2466MHz	60	2467MHz
61	2468MHz	62	2469MHz	63	2470MHz
64	2471MHz	65	2472MHz	66	2473MHz
67	2474MHz	68	2475MHz	69	2476MHz

## 2.3. Test Configuration

The EUT was tested as described in this report is in compliance with the requirements limits of FCC Rules Part 15.207,15.209, 15.215 and 15.249. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.



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

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

## **2.5. 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 requirements provided in FCC 15.207, 15.209, 15.215 and 15.249 were performed in the report of the EUT.

**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 are 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 1-25GHz 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 EUT **is permanently attached.**
- There are no provisions for connection to an external antenna.

### **Conclusion:**

This unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATE

### 6. Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2018/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2018/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2018/06/20
Hygrothermograph	Testo	608-H1	MRTSUE06404	1 year	2018/08/14
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/10

### Radiated Emission – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2018/08/18
Broadband Coaxial Preamp	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2018/11/17
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2018/11/20
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2018/10/21
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2018/11/18
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2018/12/14
Digital Thermometer & Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2018/12/12
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2018/05/10

Software	Version	Function
e3	V8.3.5	EMI Test Software

## 7. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

<b>AC Conducted Emission Measurement - SR2</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 150kHz~30MHz: 3.46dB
<b>Radiated Emission Measurement – AC1</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB
<b>Radiated Emission Measurement – AC2</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 9kHz ~ 1GHz: 3.85dB 1GHz ~ 25GHz: 4.32dB
<b>20dB Spectrum Bandwidth - TR3</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 0.28%

## 8. TEST RESULT

### 8.1. Summary

**Company Name:** Nationwide Industries Inc

**Product:** NWI-IQ-FOB

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	N/A	Section 7.2
15.209 15.249	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 7.3 & 7.4
15.215(c)	20dB Spectrum Bandwidth	20 dB bandwidth of the emission in the specific band		Pass	Section 7.5

**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.

## 8.2. Conducted Emission

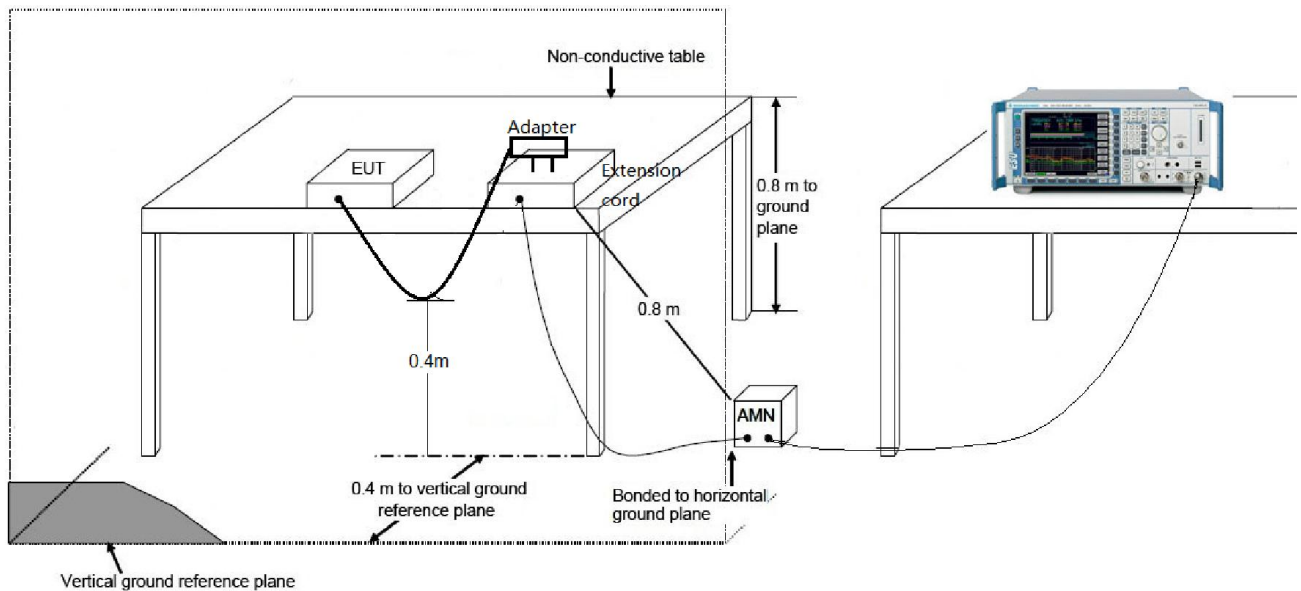
### 8.2.1. Test Limit

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 0.15 MHz to 0.5 MHz.

### 8.2.2. Test Setup



### 8.2.3. Test Result

The EUT is powered by Cell battery, so this requirement does not apply.



### 8.3. Radiated Emission

#### 8.3.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (uV/m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-80	100**	3
80-216	150**	3
216-960	200**	3
Above 960	500	3

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

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

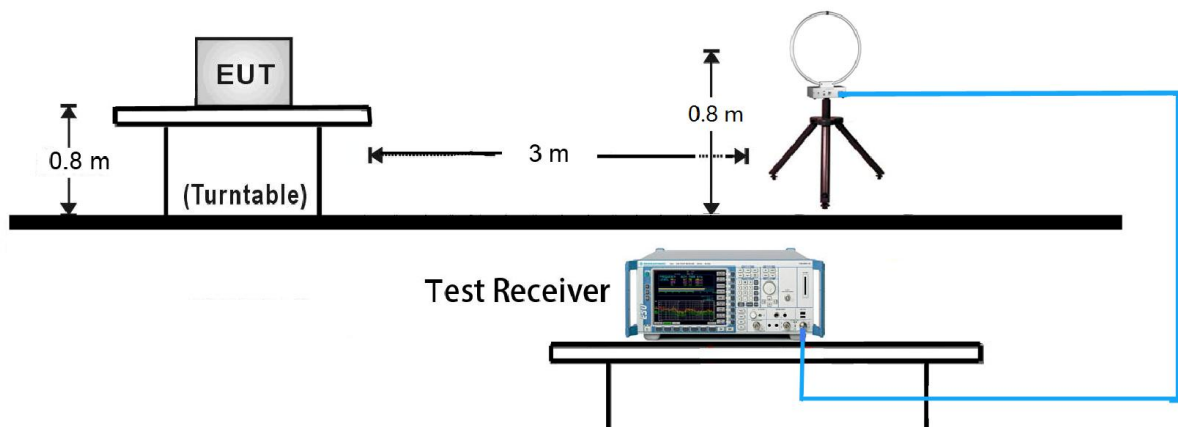
Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).

FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928(MHz)	50	500
2400-2483.5(MHz)	50	500
5725-5875(MHz)	50	500
24.0-24.25(GHz)	250	2500

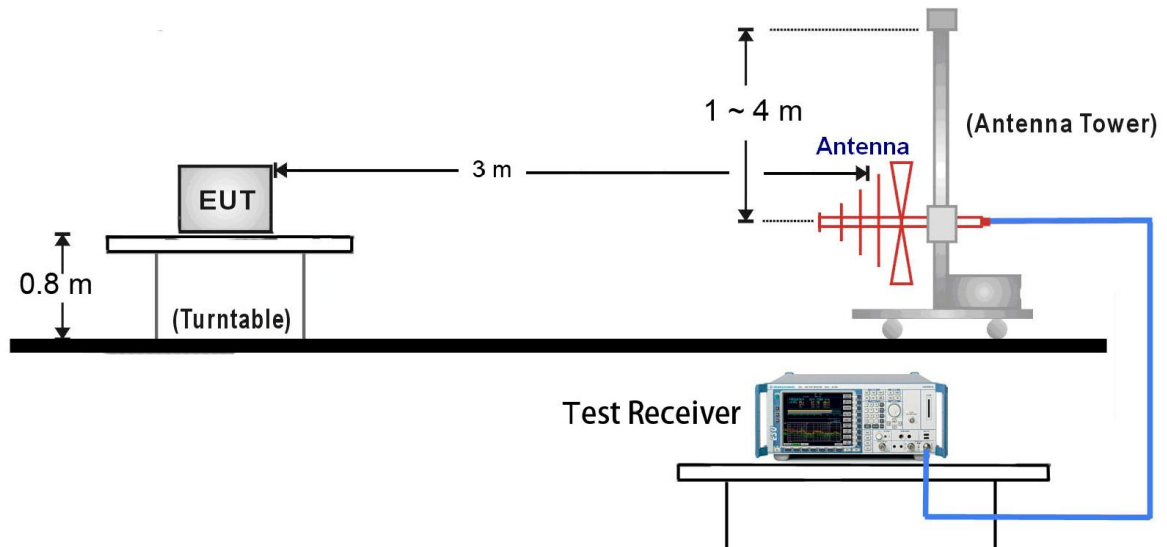
FCC Part 15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

### 8.3.2.Test Setup

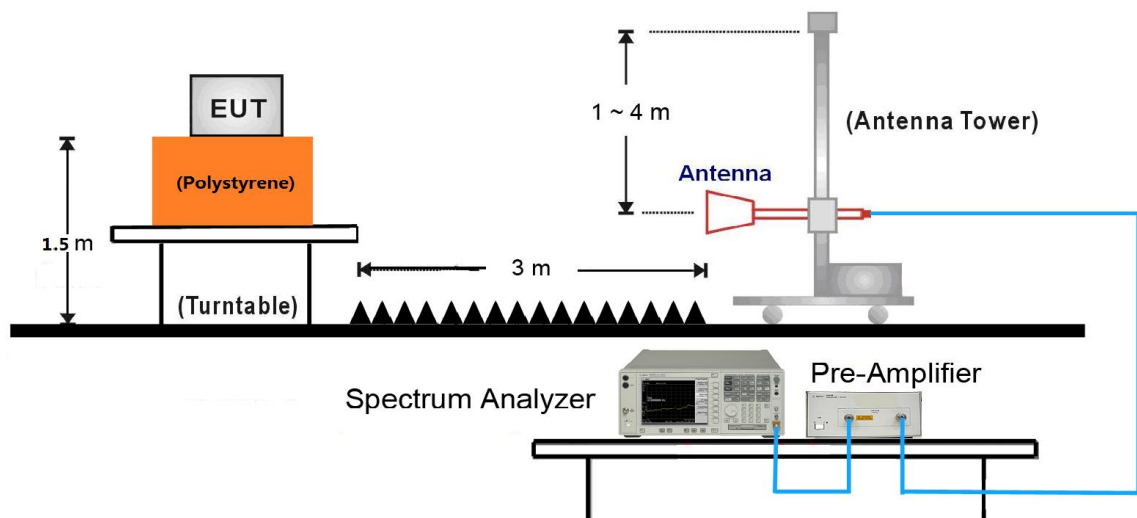
9kHz ~ 30MHz Test Setup:



### 30MHz ~ 1GHz Test Setup:



### 1GHz ~ 25GHz Test Setup:



### 8.3.3. Test Result

Test Mode:	Transmission	Test Site:	AC2
Remark:	<b>Fundamental</b> Radiated Emission	Test Engineer:	Flag Yang

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
2408	61.9	-0.4	61.5	114	-52.5	PK	Horizontal
	56.1	-0.4	55.7	114	-58.3	PK	Vertical
2442	60.0	-0.5	59.5	114	-54.5	PK	Horizontal
	55.1	-0.5	54.6	114	-59.4	PK	Vertical
2476	60.8	-0.5	60.3	114	-53.7	PK	Horizontal
	53.0	-0.5	52.5	114	-61.5	PK	Vertical

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

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

Note 2: All readings below 1GHz are peak, above 1GHz are performed with peak and/or average measurements as necessary.

Note 3: Average measurement was not performed when the peak level lower than average limit.

Test Mode:	Transmission	Test Site:	AC2
Test Channel:	2408MHz	Test Engineer:	Flag Yang
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4816.5	41.6	5.5	47.1	74.0	-26.9	Peak	Horizontal
	6746.0	32.4	10.8	43.2	74.0	-30.8	Peak	Horizontal
	9763.5	31.0	17.0	48.0	74.0	-26.0	Peak	Horizontal
	11633.5	29.2	21.0	50.2	74.0	-23.8	Peak	Horizontal
	4816.5	46.4	5.5	51.9	74.0	-22.1	Peak	Vertical
	6661.0	32.6	10.8	43.4	74.0	-30.6	Peak	Vertical
	9636.0	32.1	16.2	48.3	74.0	-25.7	Peak	Vertical
	11548.5	30.3	20.9	51.2	74.0	-22.8	Peak	Vertical

Note 1: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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

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

Test Mode:	Transmission	Test Site:	AC2
Test Channel:	2442MHz	Test Engineer:	Flag Yang
Remark:	3. Average measurement was not performed if peak level lower than average limit. 4. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4884.5	44.5	5.6	50.1	74	-23.9	Peak	Horizontal
	6678.0	32.8	10.8	43.6	74	-30.4	Peak	Horizontal
	10112.0	30.7	18.0	48.7	74	-25.3	Peak	Horizontal
	11659.0	30.1	20.9	51.0	74	-23.0	Peak	Horizontal
	4884.5	44.5	5.6	50.1	74	-23.9	Peak	Vertical
	8624.5	32.2	14.3	46.5	74	-27.5	Peak	Vertical
	10112.0	30.8	18.0	48.8	74	-25.2	Peak	Vertical
	11642.0	29.8	21.0	50.8	74	-23.2	Peak	Vertical

Note 1: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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

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

Test Mode:	Transmission	Test Site:	AC2
Test Channel:	2476MHz	Test Engineer:	Flag Yang
Remark:	5. Average measurement was not performed if peak level lower than average limit. 6. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4952.5	41.0	5.7	46.7	74	-27.3	Peak	Horizontal
	6516.5	33.8	10.5	44.3	74	-29.7	Peak	Horizontal
	8735.0	31.0	14.6	45.6	74	-28.4	Peak	Horizontal
	11565.5	30.6	20.8	51.4	74	-22.6	Peak	Horizontal
	4952.5	42.5	5.7	48.2	74	-25.8	Peak	Vertical
	6559.0	33.6	10.6	44.2	74	-29.8	Peak	Vertical
	9687.0	33.1	16.4	49.5	74	-24.5	Peak	Vertical
	11599.5	30.6	20.7	51.3	74	-22.7	Peak	Vertical

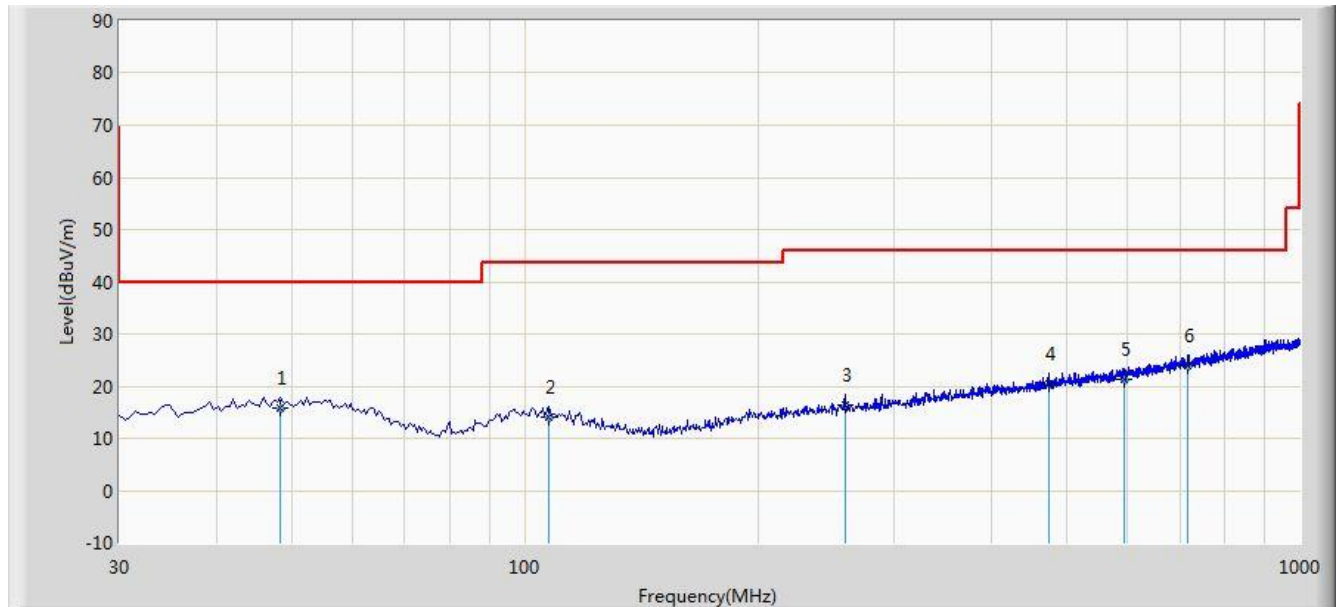
Note 1: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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

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

### The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2018/03/03 - 14:53
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
<b>Worst Case Mode:</b> Transmit at Channel 2408MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			48.430	15.930	0.861	-24.070	40.000	15.069	QP
2			107.600	14.146	0.945	-29.354	43.500	13.200	QP
3			258.920	16.417	2.284	-29.583	46.000	14.133	QP
4			475.230	20.534	2.295	-25.466	46.000	18.239	QP
5			592.600	21.416	1.078	-24.584	46.000	20.338	QP
6		*	717.730	23.930	1.685	-22.070	46.000	22.245	QP

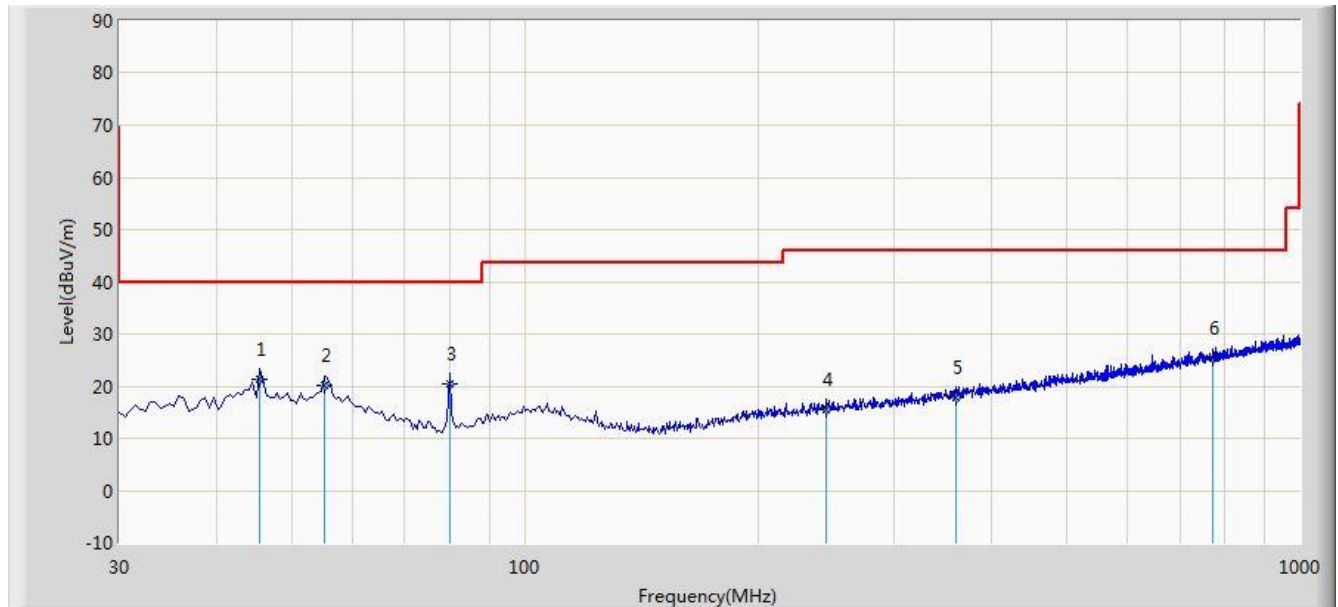
Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

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

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



Site: AC2	Time: 2018/03/03 - 14:55
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: NWI-IQ-FOB	Power: By Battery
<b>Worst Case Mode:</b> Transmit at Channel 2408MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	45.520	21.305	6.276	-18.695	40.000	15.029	QP
2			55.220	20.011	5.237	-19.989	40.000	14.774	QP
3			79.955	20.574	11.041	-19.426	40.000	9.533	QP
4			244.855	15.397	1.580	-30.603	46.000	13.817	QP
5			360.285	17.839	1.526	-28.161	46.000	16.314	QP
6			772.535	25.226	2.303	-20.774	46.000	22.923	QP

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

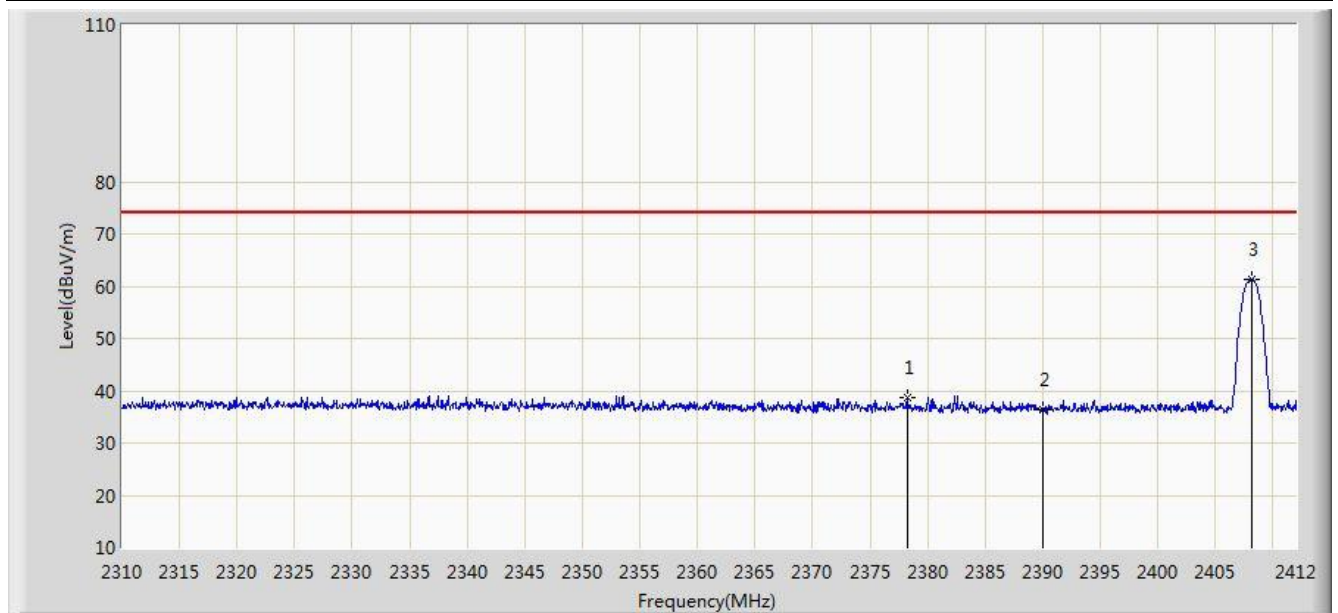
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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

## 8.4. Radiated Restricted Band Edge Measurement

### 8.4.1. Test Result

Site: AC2	Time: 2018/03/15 - 23:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2408MHz	

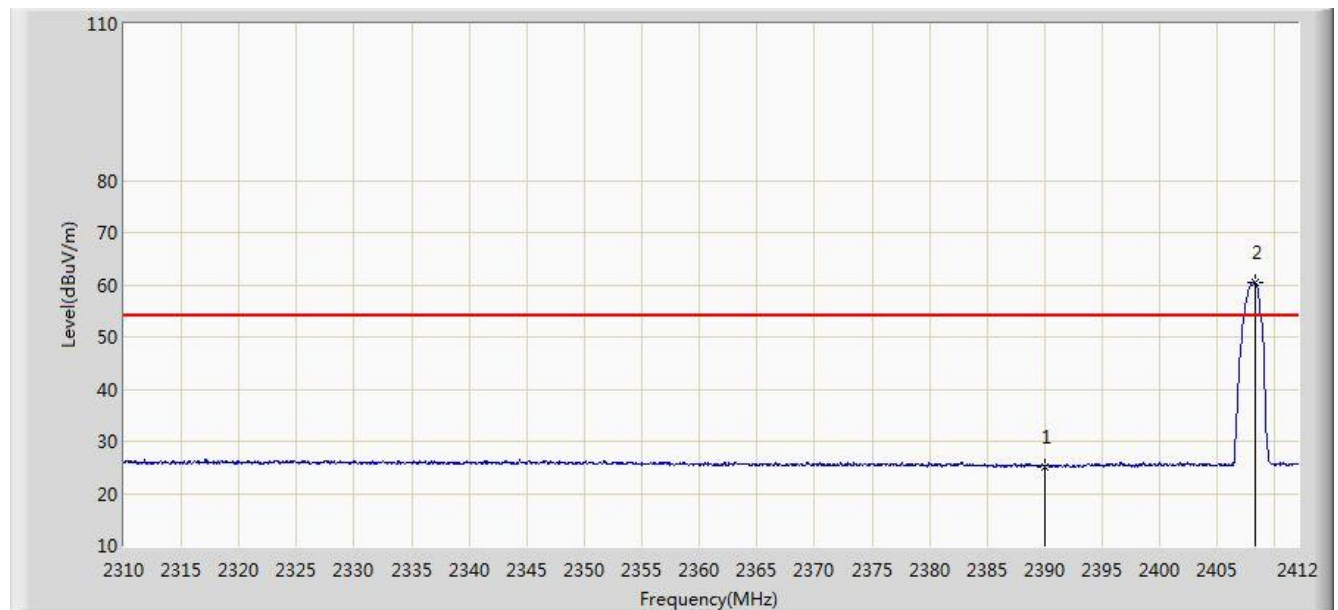


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2378.238	38.834	39.145	-35.166	74.000	-0.312	PK
2			2390.000	36.418	36.786	-37.582	74.000	-0.368	PK
3		*	2408.124	61.433	61.876	-12.567	74.000	-0.444	PK

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

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

Site: AC2	Time: 2018/03/15 - 23:07
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2408MHz	

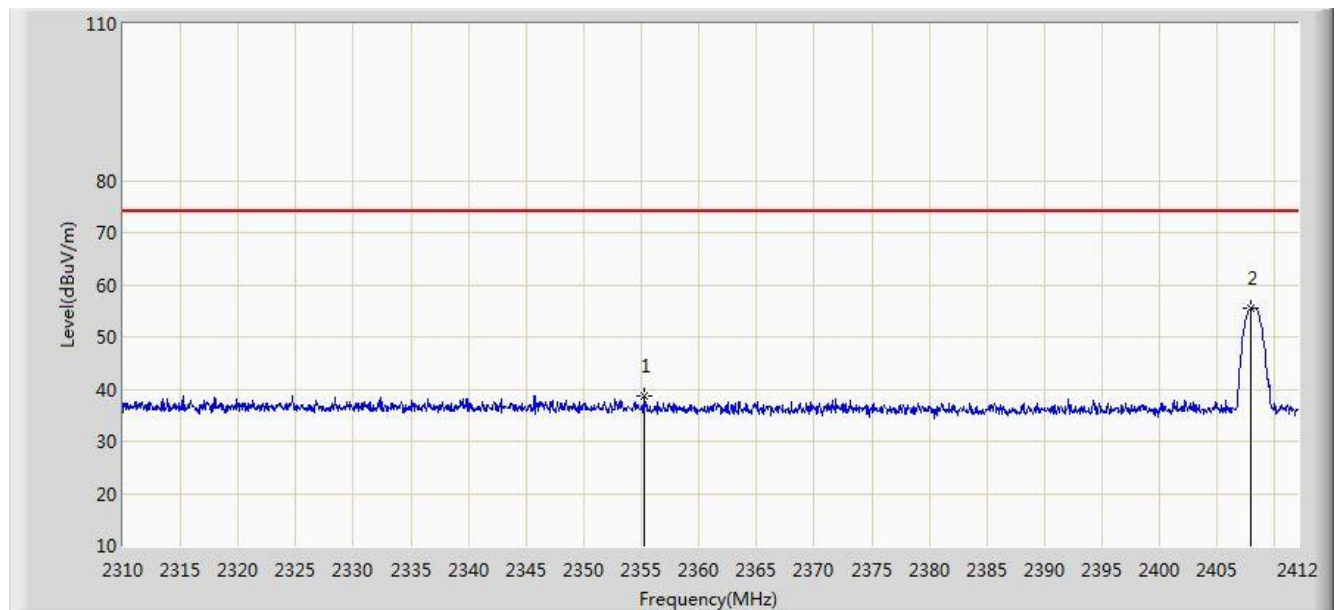


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	25.161	25.529	-28.839	54.000	-0.368	AV
2		*	2408.277	60.507	60.951	6.507	54.000	-0.444	AV

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

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

Site: AC2	Time: 2018/03/15 - 23:09
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2408MHz	

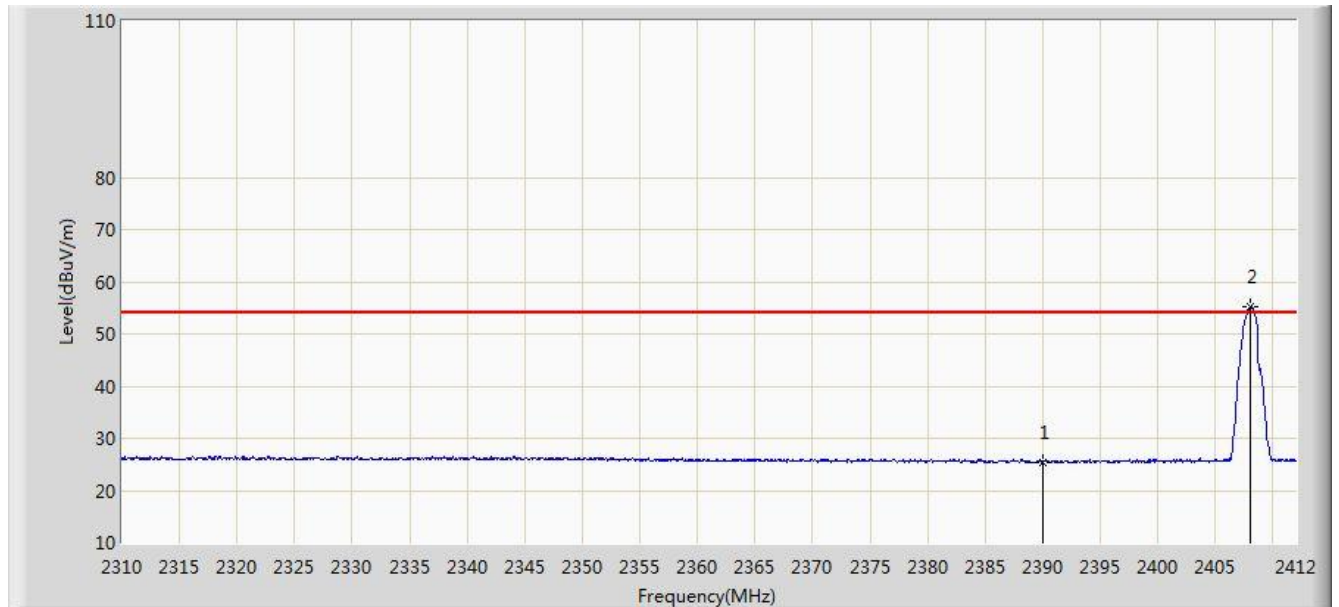


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2355.288	38.586	38.844	-35.414	74.000	-0.257	PK
2		*	2407.971	55.639	56.082	-18.361	74.000	-0.442	PK

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

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

Site: AC2	Time: 2018/03/15 - 23:12
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2408MHz	

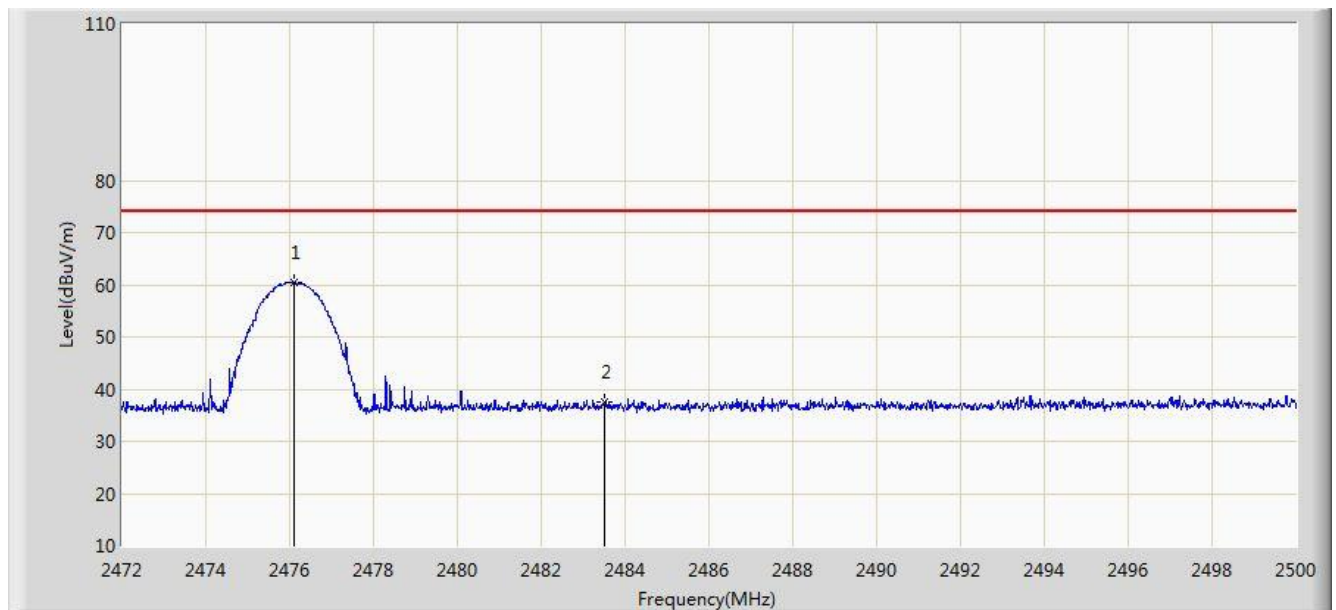


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	25.409	25.777	-28.591	54.000	-0.368	AV
2		*	2408.073	55.228	55.671	1.228	54.000	-0.443	AV

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

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

Site: AC2	Time: 2018/03/15 - 22:47
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2476MHz	

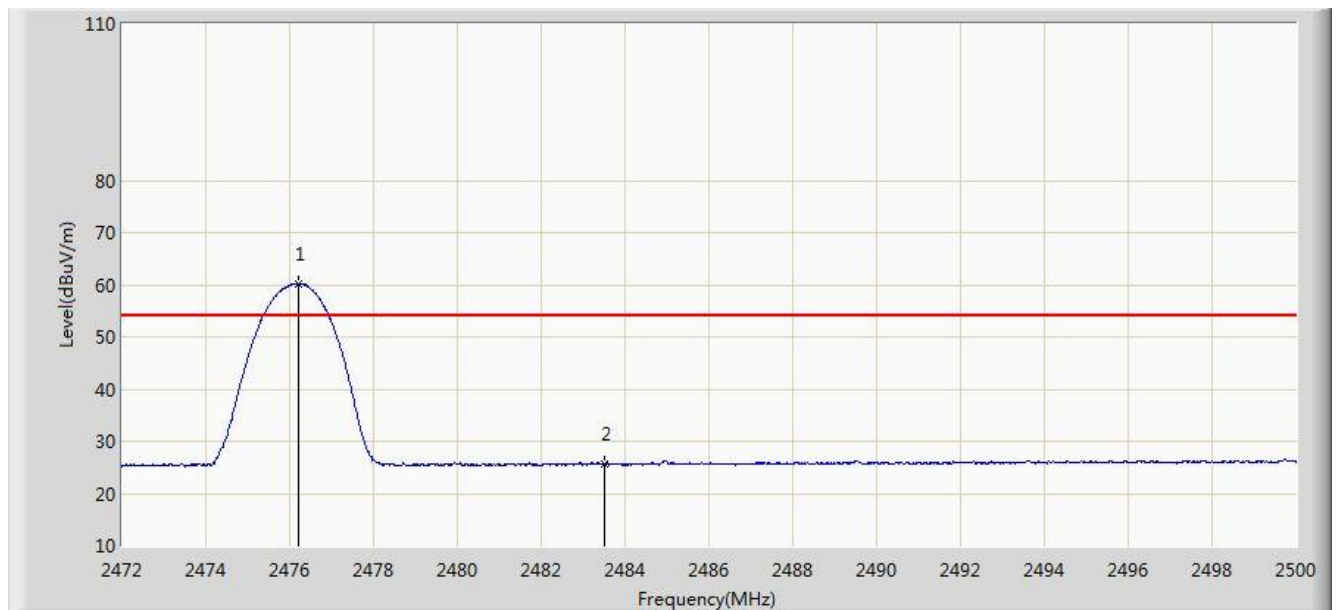


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2476.116	60.344	60.848	-13.656	74.000	-0.504	PK
2			2483.500	37.528	38.035	-36.472	74.000	-0.506	PK

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

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

Site: AC2	Time: 2018/03/15 - 22:54
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2476MHz	

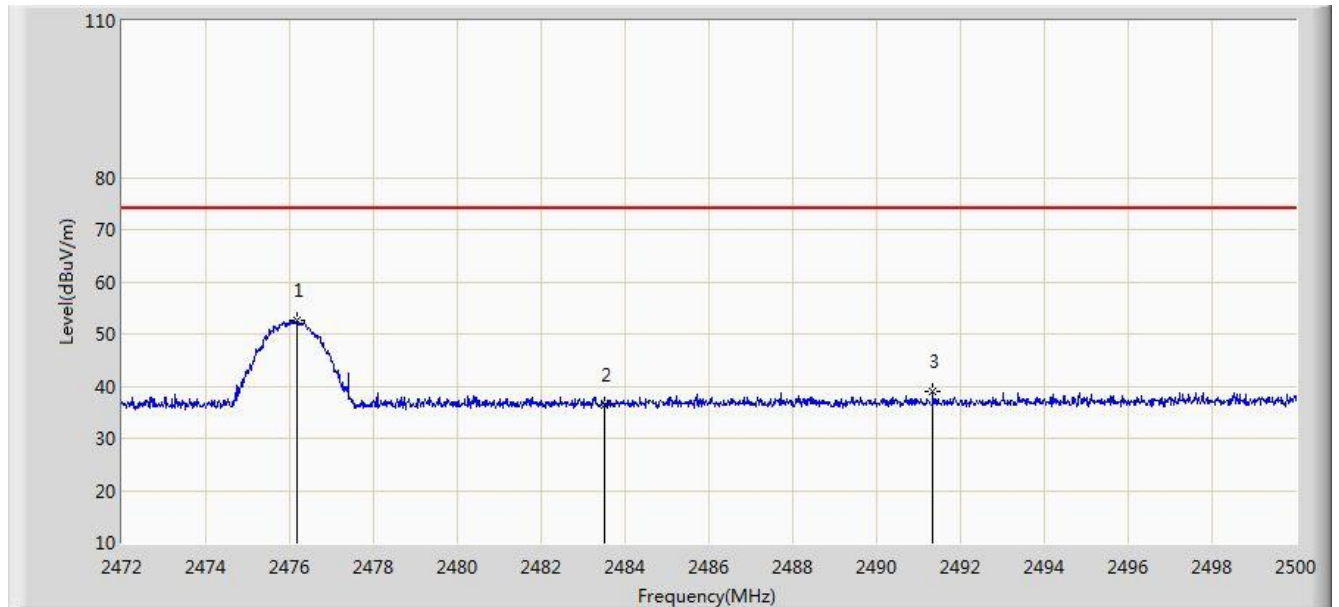


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2476.214	60.182	60.685	6.182	54.000	-0.503	AV
2			2483.500	25.742	26.249	-28.258	54.000	-0.506	AV

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

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

Site: AC2	Time: 2018/03/15 - 22:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2476MHz	



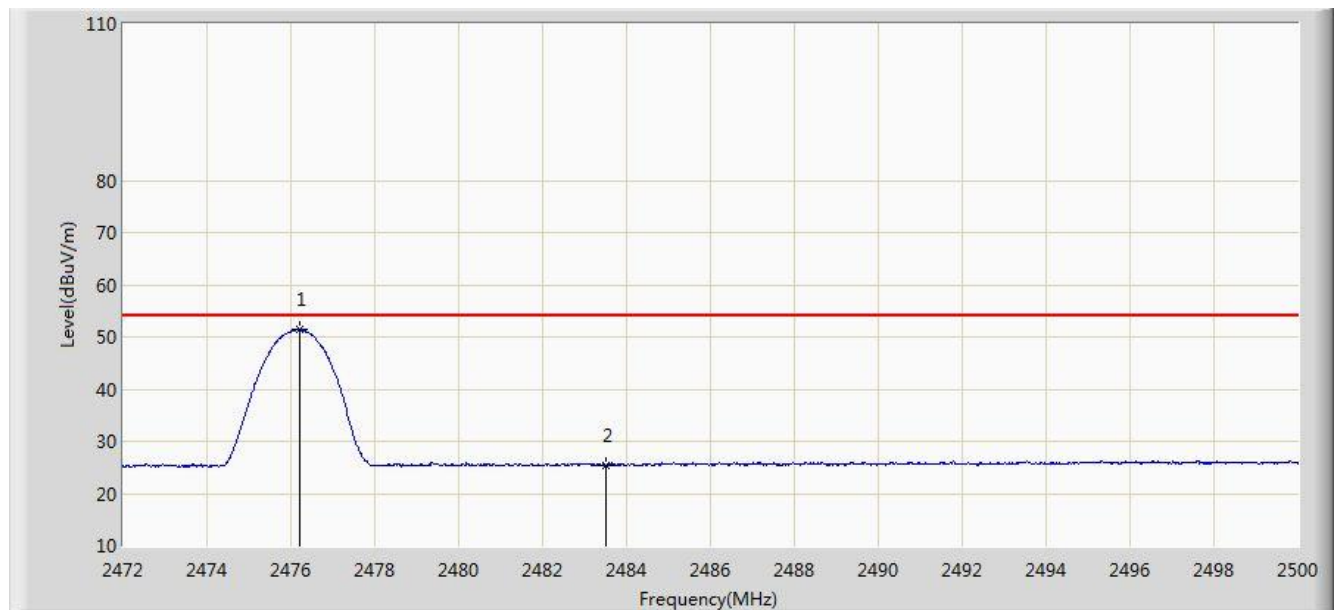
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2476.172	52.465	52.968	-21.535	74.000	-0.503	PK
2			2483.500	36.511	37.018	-37.489	74.000	-0.506	PK
3			2491.348	38.961	39.477	-35.039	74.000	-0.515	PK

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

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



Site: AC2	Time: 2018/03/15 - 23:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Flag Yang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at Channel 2476MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2476.214	51.347	51.850	-2.653	54.000	-0.503	AV
2			2483.500	25.376	25.883	-28.624	54.000	-0.506	AV

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

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

## 8.5. 20dB Spectrum Bandwidth Measurement

### 8.5.1. Test Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission in the specific band (2400 ~ 2483.5).

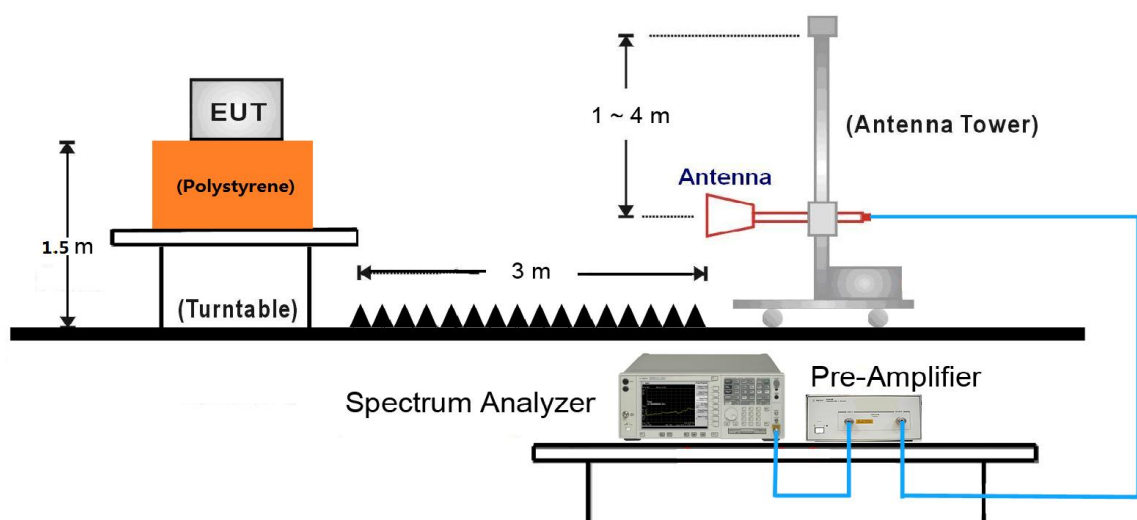
### 8.5.2. Test Procedure used

ANSI C63.10 Clause 6.9.2

### 8.5.3. Test Setting

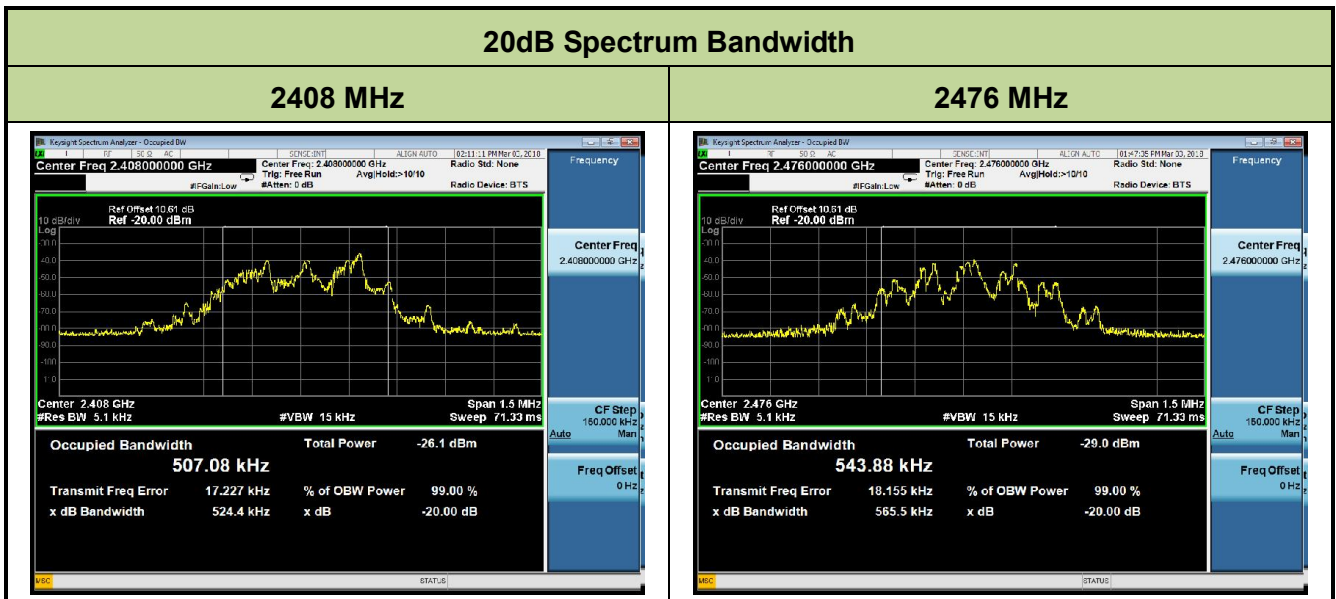
1. Set the spectrum span range to overlap the nominal center frequency
2. Set RBW = 100 kHz
3. VBW  $\geq 3 \times$  RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize and marker the highest level.
8. Determine the display level (the highest level - 20dB) and place two markers, one at the lowest frequency and the other at the highest frequency.

### 8.5.4. Test Setup



### 8.5.5.Test Result

Frequency (MHz)	Frequency Range_Low (MHz)	Frequency Range_High (MHz)	Result
2408	2407.738	---	Pass
2476	---	2476.283	Pass



## 8.6. 99% Bandwidth Measurement

### 8.6.1.Test Limit

N/A

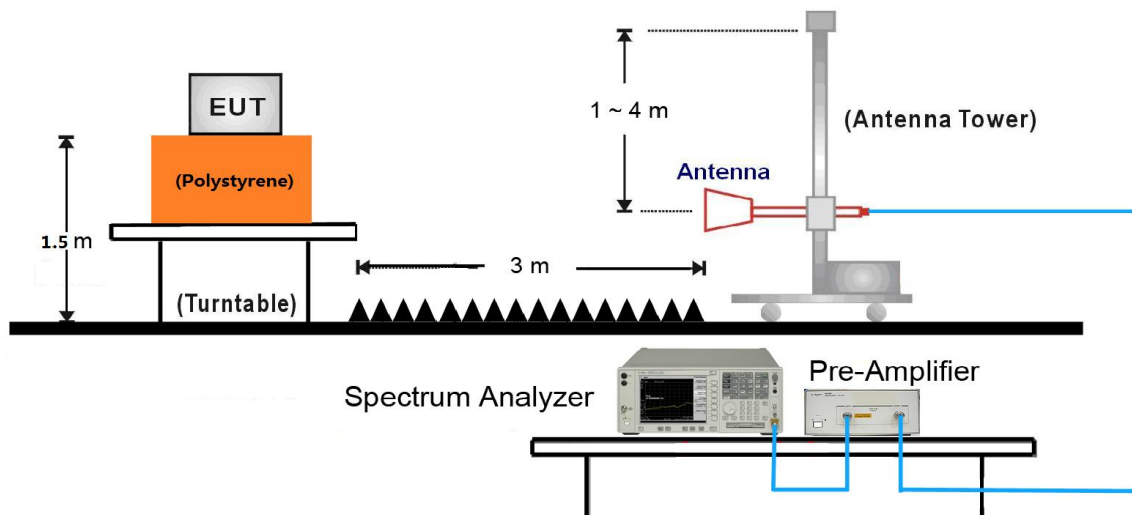
### 8.6.2.Test Procedure used

ANSI C63.10 Section 6.9

### 8.6.3.Test Setting

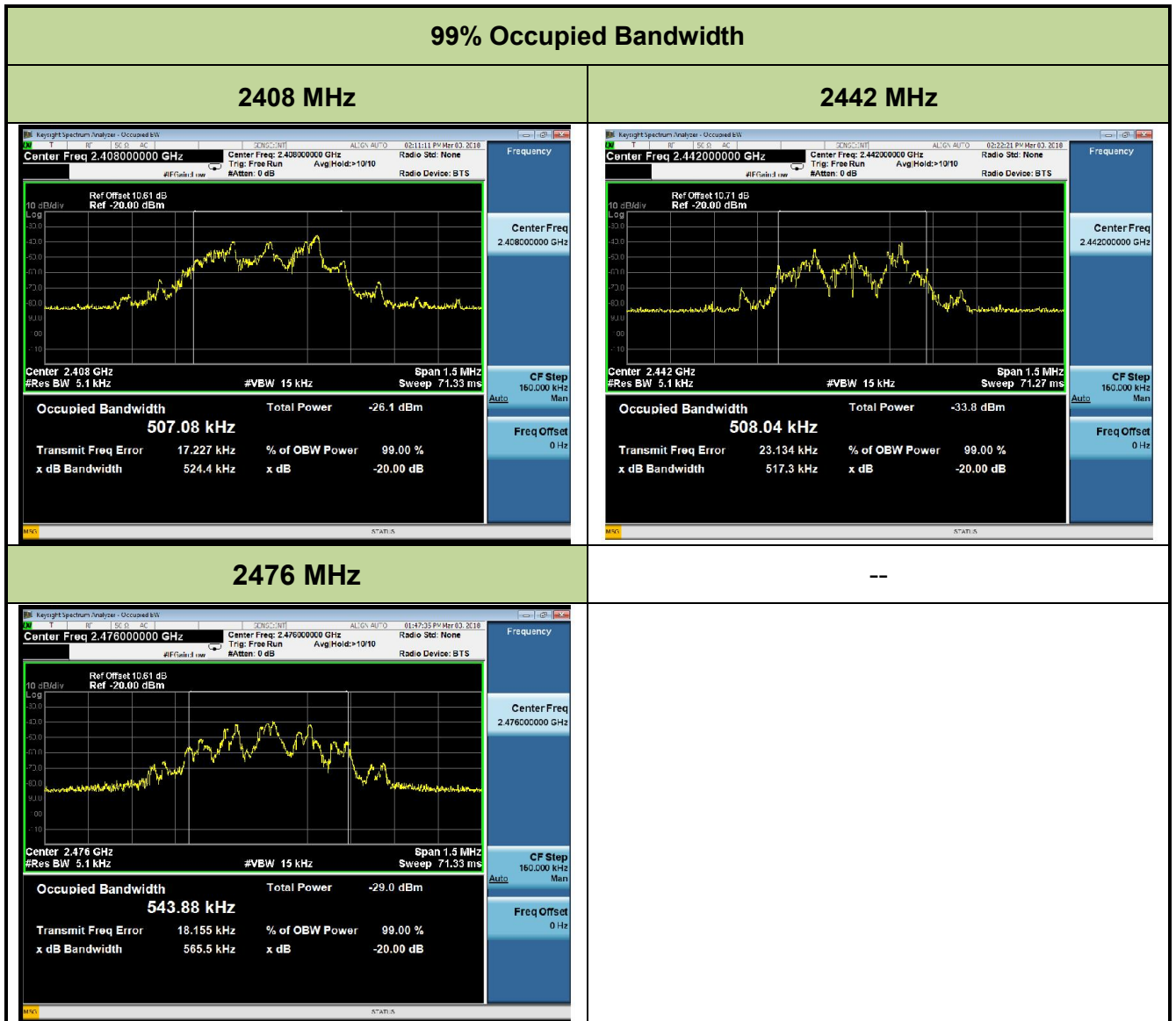
1. The analyzers' automatic bandwidth measurement capability was used to perform the 99% bandwidth measurement. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% to 5% of the OBW.
3. VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.

### 8.6.4.Test Setup



### 8.6.5. Test Result

Frequency (MHz)	99% Bandwidth (MHz)
2408	0.507
2442	0.508
2476	0.544



## 9. CONCLUSION

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

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The End