



MEASUREMENT REPORT

FCC PART 15.249

FCC ID: 2ANX4FOBF12

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: October 25 ~ November 01, 2018

Reviewed By :

Sunny Sun

(Sunny Sun)

Approved By :

Robin Wu

(Robin Wu)



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

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

Revision History

Report No.	Version	Description	Issue Date	Note
1810RSU031-U1	Rev. 01	Initial Report	11-02-2018	Valid

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§2.1033 General Information

Applicant:	Nationwide Industries Inc
Applicant Address:	10333 Windhorst Road, Tampa, FL 33619, U.S.A
Manufacturer:	Xiamen Xiangyu Industry&Trade Co., Ltd
Manufacturer Address:	No.500 West 2 Jinyuan Rd, Xinglin, Jimei District, Xiamen, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
Test Device Serial No.:	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 ANSI C63.4-2014.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.



1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the 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, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	NWI-IQ-FOB
Model No.	NWI-IQ-F1
Frequency Range	2408 ~ 2476 MHz
Channel Number	69
Type of Modulation	GFSK
Working Voltage	DC 3V
Data Rate	250Kbps
Antenna Type	Integral Antenna

2.2. Operation Frequency and Channel List

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

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, 50 Ω /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

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2019/04/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2019/06/15
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2019/06/15
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2019/08/15
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	N/A	N/A

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2019/09/06
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2019/08/14
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2018/11/20
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2019/10/20
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2019/04/12
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2018/12/14
Amplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2019/06/13
Temperature/Humidity Meter	Testo	608-H1	MRTSUE06403	1 year	2019/08/15
Anechoic Chamber	RIKEN	Chamber-AC1	MRTSUE06213	1 year	2019/05/02

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2019/04/24
Thermohygrometer	Testo	608-H1	MRTSUE06401	1 year	2019/08/15

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% ($U=2Uc(y)$): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 18GHz: 4.76dB
20dB Spectrum Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.28%

7. TEST RESULT

7.1. Summary

Company Name: Nationwide Industries Inc

FCC ID: 2ANX4FOBF12

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	Conducted	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.

7.2. Conducted Emission

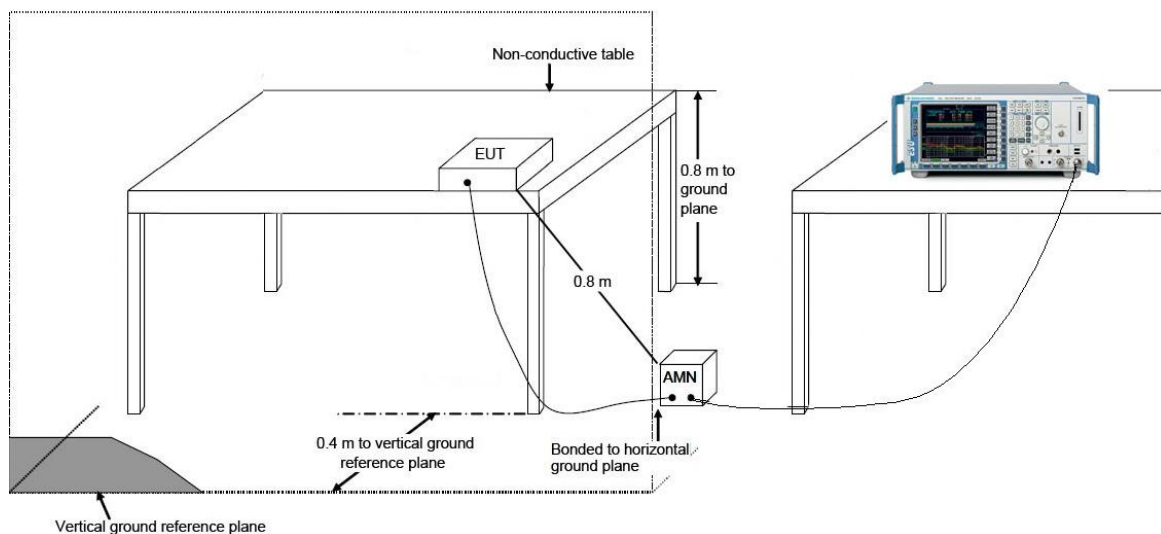
7.2.1. Test Limit

FCC 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.

7.2.2. Test Setup



7.2.3. Test Result

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

7.3. Radiated Emission

7.3.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (uV/m)
902 ~ 908	50	500
2400 ~ 2483.5	50	500
5725 ~ 5875	50	500
24000 ~ 24250	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.

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

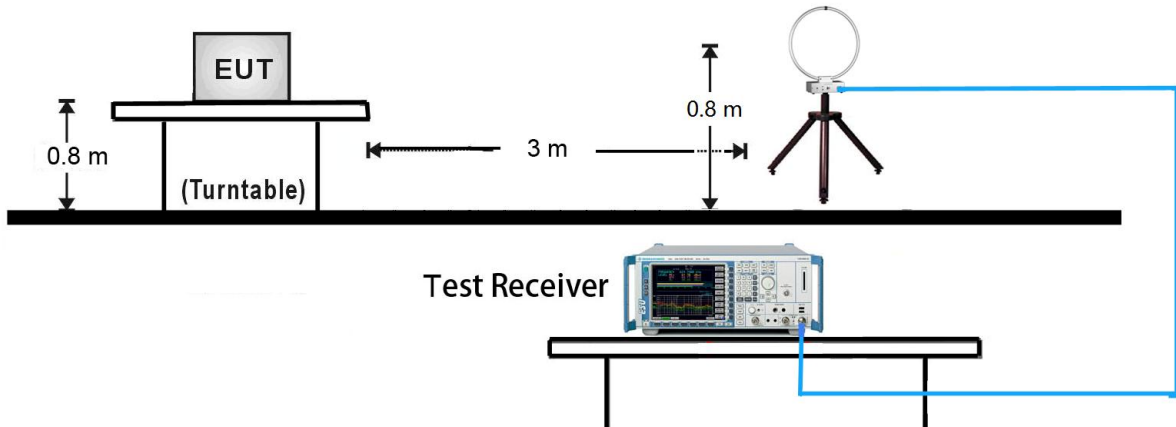
Note 1: The lower limit shall apply at the transition frequency.

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.

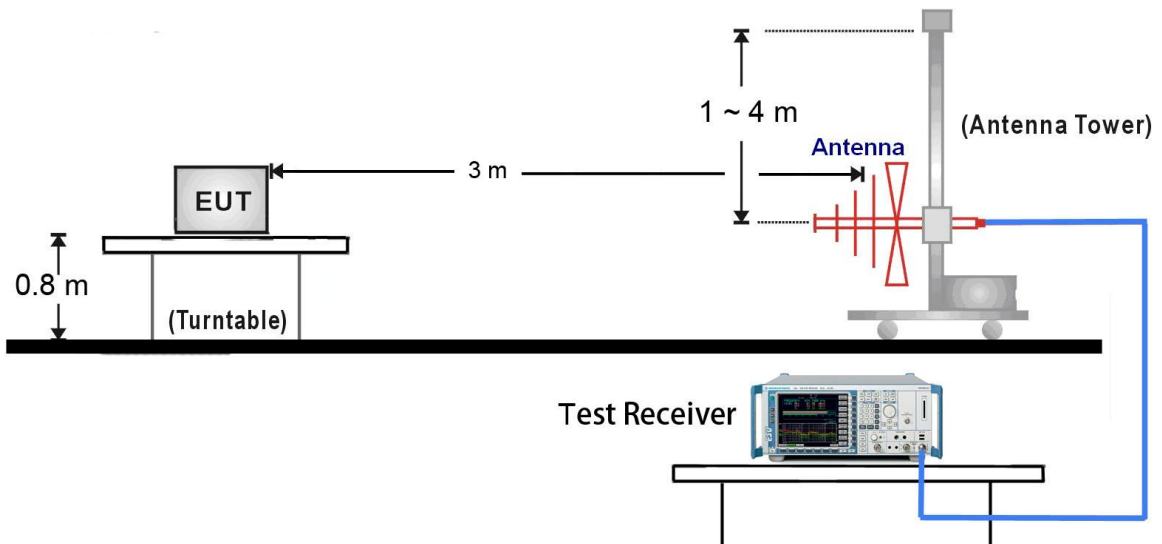
Note 3: E field strength (dBuV/m) = $20 \log E \text{ field strength (uV/m)}$.

7.3.2. Test Setup

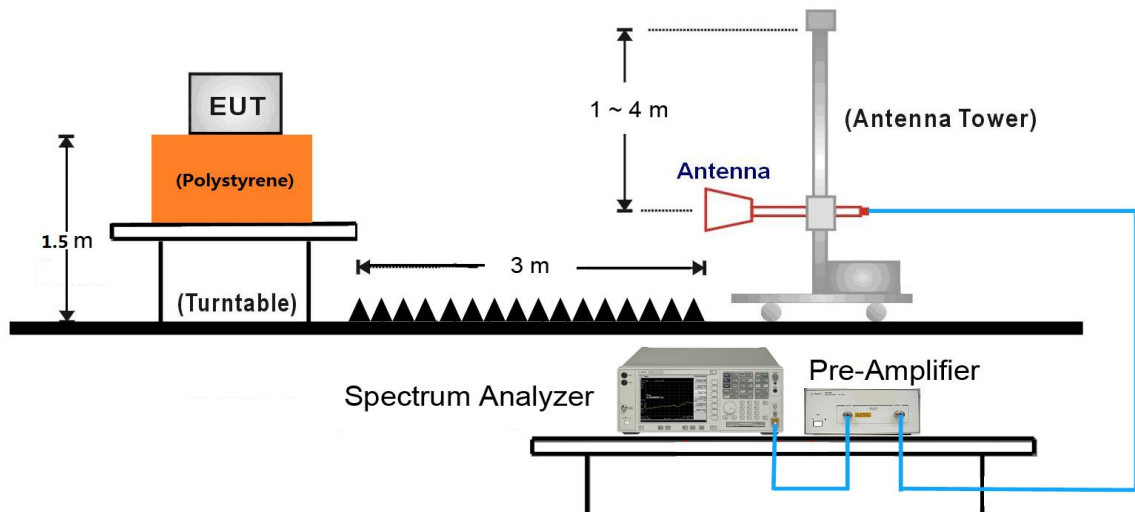
9kHz ~ 30MHz Test Setup:

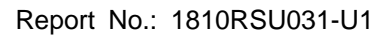


30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:





Product	NWI-IQ-FOB	Temperature	24°C
Test Engineer	Dandy Li	Relative Humidity	59%
Test Site	AC1	Test Date	2018/11/01

Note:

-
- Channel 69 (2476MHz)
- Keysight Spectrum Analyzer 1
Sweep SA
- Input 50 Ω
Coupling AC
Align Auto
- Input Z: 50 Ω
Connect: Off
Freq Ref: Int (S)
N/E: Adaptive
- Att: 10 dB
- PN1: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
- Avg Type: Log Power
Trig: Free Run
- Marker 1
Select Marker
Marker 1
P N N N N N N N
- Marker & Time
500.000 μs
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker →
Counter
- 1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 10.17 dB
Ref Level 10.00 dBm
ΔMkr1 500.0 μs
-0.01 dB
- Center 2476000000 GHz
Res BW 1.0 MHz
#Video BW 3.0 MHz
Sweep 500 ms (2001 pts)
Span 0 Hz
- 5 Marker Table
- | Mode | Trace | Scale | X | Y | Function | Function Width | Function Value |
|------|-------|-------|---|-----|----------------------------|----------------|----------------|
| 1 | Δ | 1 | 1 | (Δ) | 500.0 μs (Δ) = 0.011707 dB | | |
| 2 | F | 1 | 1 | | 207.3 ms | | -27.22 dBm |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
- Nov 01, 2018
9:38:16 AM

Product	NWI-IQ-FOB	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	52%
Test Site	AC1	Test Date	2018/11/01
Remark:	Fundamental Radiated Emission		

Channel No.	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
1	37.6	32.3	N/A	69.9	114.0	-44.4	PK	Horizontal
	37.6	32.3	-46.0	23.9	94.0	-70.1	AV	Horizontal
	43.3	32.3	N/A	75.6	114.0	-38.4	PK	Vertical
	43.3	32.3	-46.0	29.6	94.0	-64.4	AV	Vertical
35	37.6	32.4	N/A	70.0	114.0	-44.0	PK	Horizontal
	37.6	32.4	-46.0	24.0	94.0	-70.0	AV	Horizontal
	42.5	32.4	N/A	75.9	114.0	-38.1	PK	Vertical
	42.5	32.4	-46.0	29.9	94.0	-64.1	AV	Vertical
69	37.4	32.3	N/A	69.7	114.0	-44.3	PK	Horizontal
	37.4	32.3	-46.0	23.7	94.0	-70.3	AV	Horizontal
	41.3	32.3	N/A	73.6	114.0	-40.4	PK	Vertical
	41.3	32.3	-46.0	27.6	94.0	-66.4	AV	Vertical

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

Average Measure Level = Peak Measure Level + Duty Cycle Factor

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

Product	NWI-IQ-FOB	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	52%
Test Site	AC1	Test Date	2018/10/26
Remark:	Harmonics Radiated Emission - Channel 1 (2408MHz)		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
126.0	3.8	13.6	17.4	40.0	-22.6	QP	Horizontal
446.6	1.0	17.8	18.8	46.0	-27.2	QP	Horizontal
126.0	5.3	13.6	18.9	40.0	-21.1	QP	Vertical
728.9	1.5	22.5	24.0	46.0	-22.0	QP	Vertical
4816.5	37.3	5.9	43.2	74.0 (Note 2)	-30.8	PK	Horizontal
7224.0	35.7	12.7	48.4	74.0 (Note 2)	-25.6	PK	Horizontal
9632.0	35.4	15.5	50.9	74.0 (Note 2)	-23.1	PK	Horizontal
12040.0	33.2	17.4	50.6	74.0 (Note 2)	-23.4	PK	Horizontal
4816.5	37.6	5.9	43.5	74.0 (Note 2)	-30.5	PK	Vertical
7224.0	34.1	12.7	46.8	74.0 (Note 2)	-27.2	PK	Vertical
9632.0	34.1	15.5	49.6	74.0 (Note 2)	-24.4	PK	Vertical
12040.0	33.7	17.4	51.1	74.0 (Note 2)	-22.9	PK	Vertical

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Note 2: Average measurement was not performed when the peak level lower than average limit.

Note 3: The test trace is same as the ambient noise (the test frequency range: 9 kHz ~ 30 MHz and 18 GHz ~ 25 GHz), therefore no data appear in the report.

Product	NWI-IQ-FOB	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	52%
Test Site	AC1	Test Date	2018/10/26
Remark:	Harmonics Radiated Emission - Channel 35 (2442MHz)		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
126.5	3.8	13.6	17.4	40.0	-22.6	QP	Horizontal
436.9	1.9	17.6	19.5	46.0	-26.5	QP	Horizontal
126.5	6.9	13.6	20.5	40.0	-19.5	QP	Vertical
418.5	1.0	17.1	18.1	46.0	-27.9	QP	Vertical
4884.0	35.3	6.0	41.3	74.0 (Note 2)	-32.7	PK	Horizontal
7326.0	37.3	12.6	49.9	74.0 (Note 2)	-24.1	PK	Horizontal
9768.0	33.1	16.2	49.3	74.0 (Note 2)	-24.7	PK	Horizontal
12210.0	33.5	17.4	50.9	74.0 (Note 2)	-23.1	PK	Horizontal
4884.0	35.4	6.0	41.4	74.0 (Note 2)	-32.6	PK	Vertical
7326.0	35.3	12.6	47.9	74.0 (Note 2)	-26.1	PK	Vertical
9768.0	32.8	16.2	49.0	74.0 (Note 2)	-25.0	PK	Vertical
12210.0	33.2	17.4	50.6	74.0 (Note 2)	-23.4	PK	Vertical

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Note 2: Average measurement was not performed when the peak level lower than average limit.

Note 3: The test trace is same as the ambient noise (the test frequency range: 9 kHz ~ 30 MHz and 18 GHz ~ 25 GHz), therefore no data appear in the report.

Product	NWI-IQ-FOB	Temperature	25°C
Test Engineer	Dandy Li	Relative Humidity	52%
Test Site	AC1	Test Date	2018/10/26
Remark:	Harmonics Radiated Emission - Channel 69 (2476MHz)		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
119.2	3.0	13.1	16.1	40.0	-23.9	QP	Horizontal
430.1	1.1	17.4	18.5	46.0	-27.5	QP	Horizontal
126.5	7.0	13.6	20.6	40.0	-19.4	QP	Vertical
442.3	0.6	17.7	18.3	46.0	-27.7	QP	Vertical
4952.5	41.2	6.1	47.3	74.0 (Note 2)	-26.7	PK	Horizontal
7428.0	35.1	12.8	47.9	74.0 (Note 2)	-26.1	PK	Horizontal
9904.0	33.2	16.6	49.8	74.0 (Note 2)	-24.2	PK	Horizontal
12380.0	32.8	17.2	50.0	74.0 (Note 2)	-24.0	PK	Horizontal
4952.5	40.6	6.1	46.7	74.0 (Note 2)	-27.3	PK	Vertical
7428.0	35.8	12.8	48.6	74.0 (Note 2)	-25.4	PK	Vertical
9904.0	33.8	16.6	50.4	74.0 (Note 2)	-23.6	PK	Vertical
12380.0	33.4	17.2	50.6	74.0 (Note 2)	-23.4	PK	Vertical

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Note 2: Average measurement was not performed when the peak level lower than average limit.

Note 3: The test trace is same as the ambient noise (the test frequency range: 9 kHz ~ 30 MHz and 18 GHz ~ 25 GHz), therefore no data appear in the report.

7.4. Radiated Restricted Band Edge Measurement

7.4.1. Test Limit

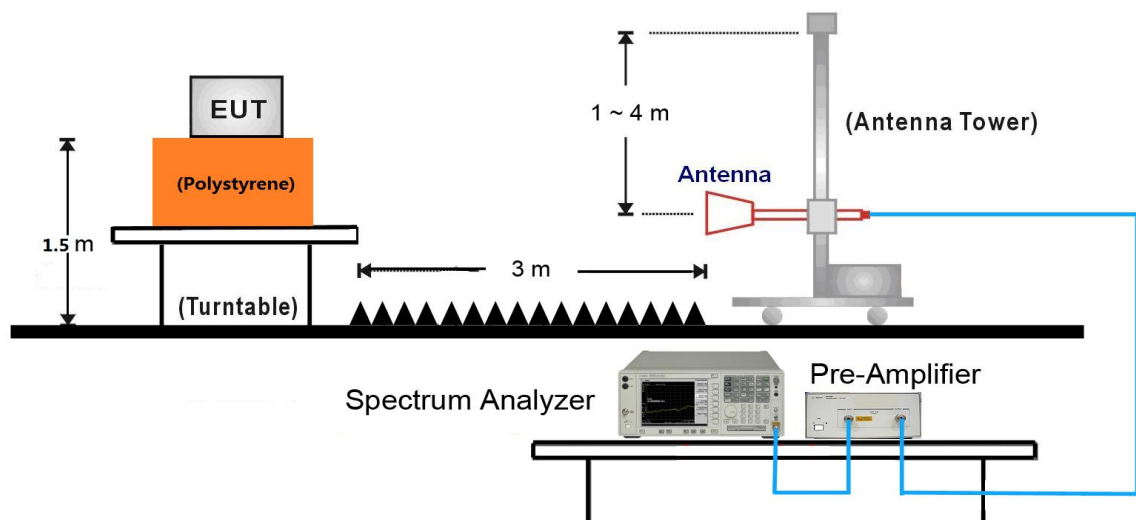
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.25 - 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	(²)
13.36 - 13.41	--	--	--

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

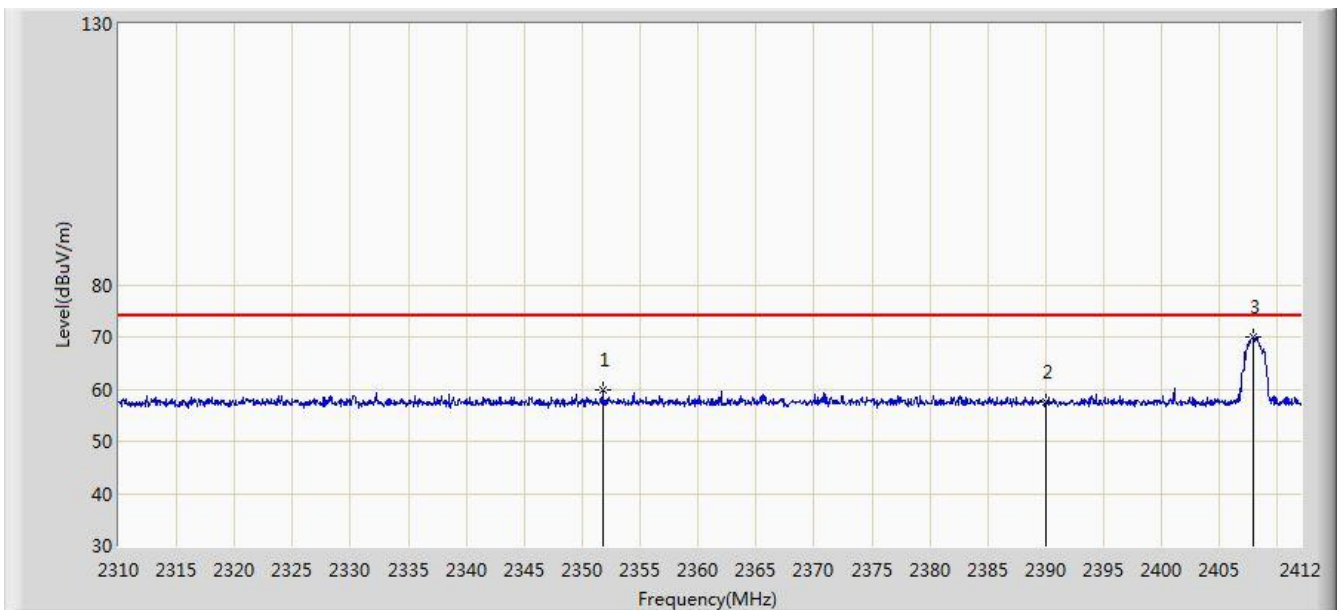
FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [$\mu\text{V}/\text{m}$]	Measured Distance [Meters]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

7.4.2. Test Setup



7.4.3. Test Result

Site: AC1	Time: 2018/10/26 - 02:06
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at low channel 1 (2408MHz)	



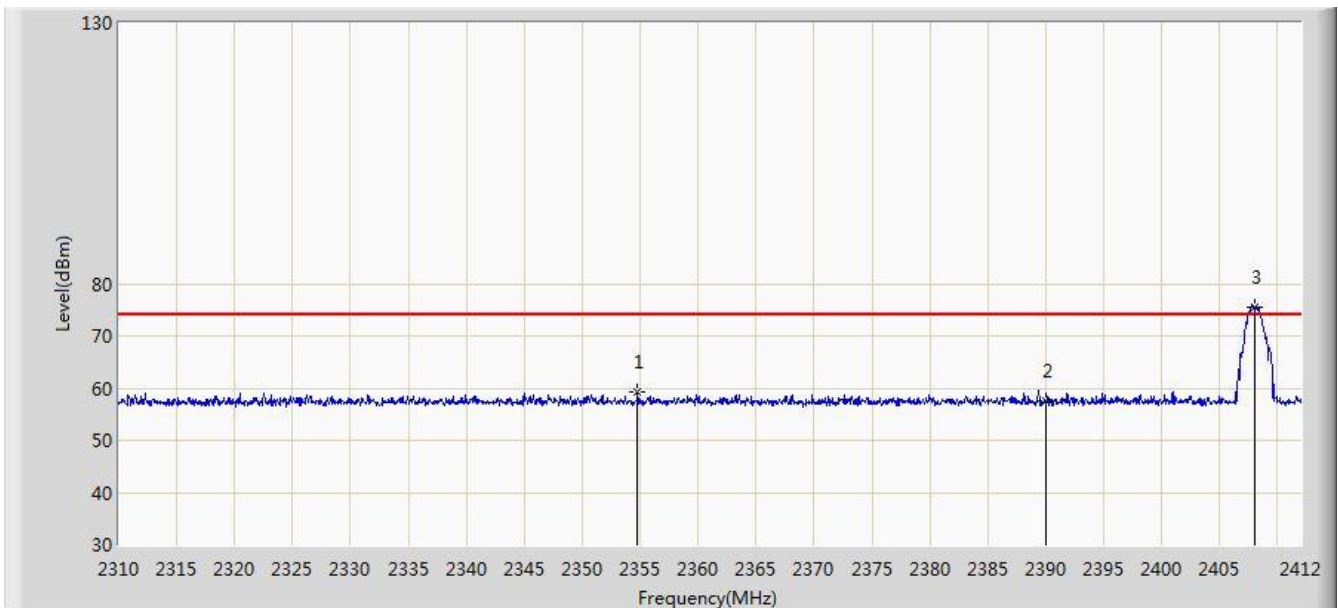
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Duty Cycle Factor (dB)	Type
1			2351.769	59.727	27.331	-14.273	74.000	32.396	N/A	PK
			2351.769	13.727	27.331	-40.273	54.000	32.396	-46.0	AV
2			2390.000	57.427	25.100	-16.573	74.000	32.327	N/A	PK
			2390.000	11.427	25.100	-42.573	54.000	32.327	-46.0	AV
3		*	2407.971	69.938	37.646	N/A	N/A	32.292	N/A	PK

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

Average Measure Level = Peak Measure Level + Duty Cycle Factor

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

Site: AC1	Time: 2018/10/26 - 02:17
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at low channel 1 (2408MHz)	



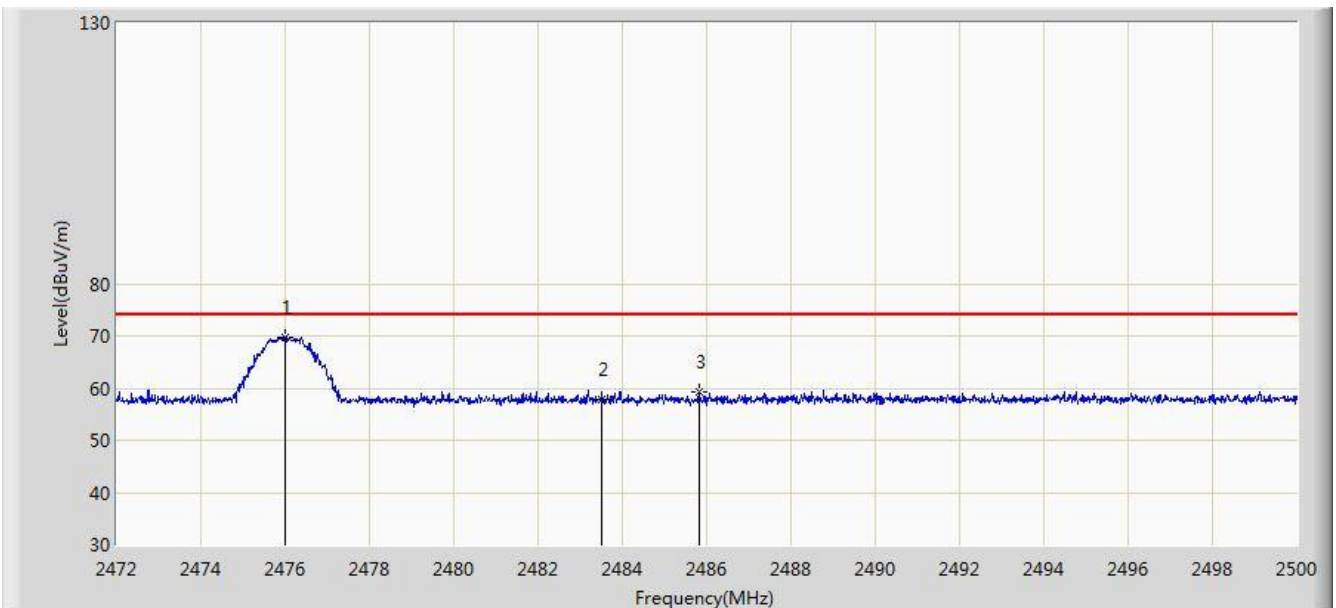
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Duty Cycle Factor (dB)	Type
1			2354.727	59.376	26.989	-14.624	74.000	32.387	N/A	PK
			2354.727	13.376	26.989	-40.624	54.000	32.387	-46.0	AV
2			2390.000	57.470	25.143	-16.530	74.000	32.327	N/A	PK
			2390.000	11.470	25.143	-42.530	54.000	32.327	-46.0	AV
3		*	2408.073	75.553	43.262	N/A	N/A	32.292	N/A	PK

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

Average Measure Level = Peak Measure Level + Duty Cycle Factor

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

Site: AC1	Time: 2018/10/26 - 01:58
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at high channel 69 (2476MHz)	



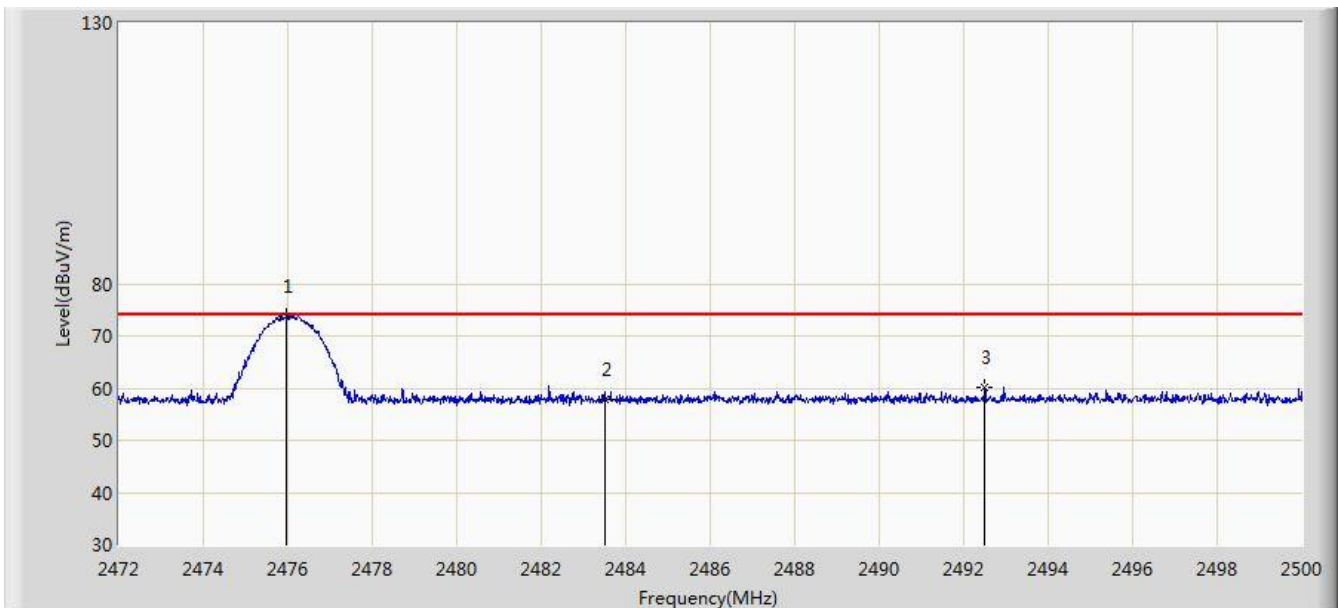
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Duty Cycle Factor (dB)	Type
1		*	2476.004	69.677	37.363	N/A	N/A	32.314	N/A	PK
2			2483.500	57.909	25.570	-16.091	74.000	32.340	N/A	PK
			2483.500	11.909	25.570	-42.091	54.000	32.340	-46.0	AV
3			2485.818	59.329	26.981	-14.671	74.000	32.348	N/A	PK
			2485.818	13.329	26.981	-40.671	54.000	32.348	-46.0	AV

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

Average Measure Level = Peak Measure Level + Duty Cycle Factor

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

Site: AC1	Time: 2018/10/26 - 02:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NWI-IQ-FOB	Power: By Battery
Test Mode: Transmit at high channel 69 (2476MHz)	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Duty Cycle Factor (dB)	Type
1		*	2475.948	73.661	41.347	N/A	N/A	32.314	N/A	PK
2			2483.500	57.773	25.434	-16.227	74.000	32.340	N/A	PK
			2483.500	11.773	25.434	-42.227	54.000	32.340	-46.0	AV
3			2492.496	60.060	27.686	-13.940	74.000	32.375	N/A	PK
			2492.496	14.060	27.686	-39.940	54.000	32.375	-46.0	AV

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

Average Measure Level = Peak Measure Level + Duty Cycle Factor

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

7.5. 20dB Spectrum Bandwidth Measurement

7.5.1. Test Limit

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

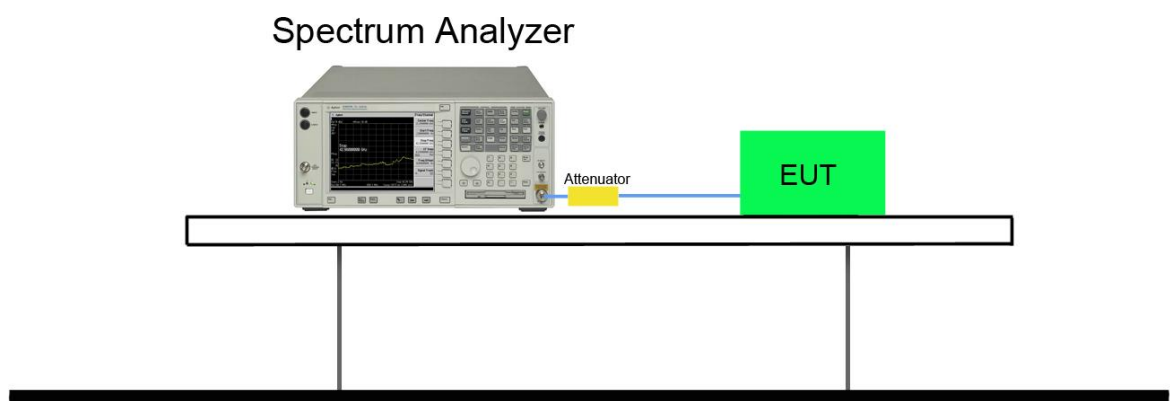
7.5.2. Test Procedure used

ANSI C63.10 Section 6.9.2

7.5.3. Test Setting

1. Set RBW = 1% to 5% of the 20dB bandwidth
2. VBW = approximately three times RBW
3. Span = approximately 2 to 5 times the 20dB bandwidth
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize

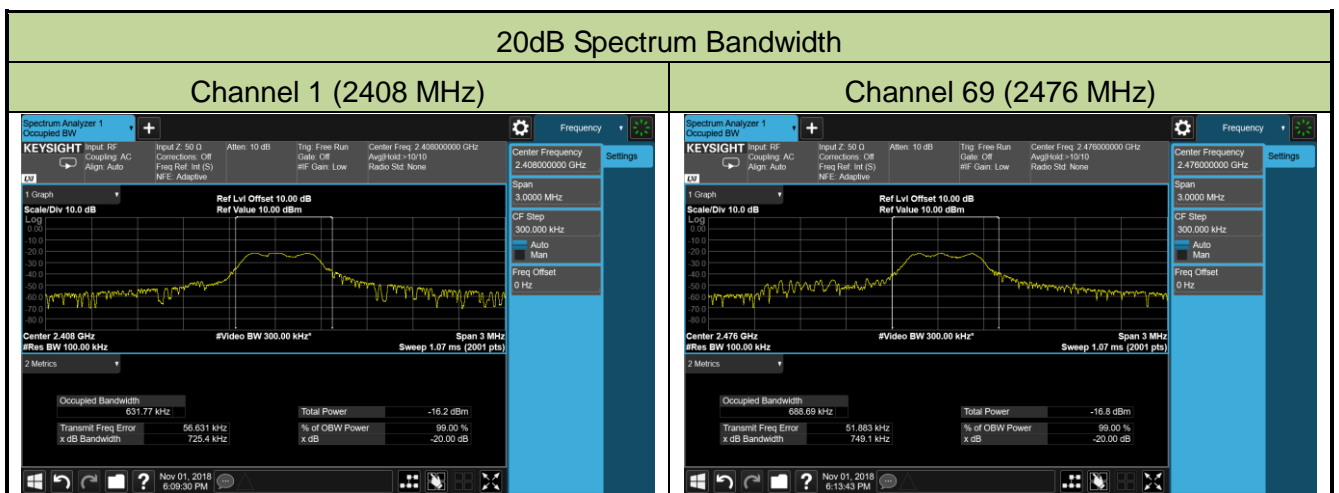
7.1.1. Test Setup



7.1.2. Test Result

Product	NWI-IQ-FOB	Temperature	24°C
Test Engineer	Dandy Li	Relative Humidity	59%
Test Site	TR3	Test Date	2018/11/01

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	Result
1	2408	725.4	Pass
69	2476	749.1	Pass



8. CONCLUSION

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

The End

APPENDIX A – TEST SETUP PHOTOGRAPHS

Refer to “1810RSU031-UT” file.

APPENDIX B – EUT PHOTOGRAPHS

Refer to “1810RSU031-UE” file.