



FCC PART 15C TEST REPORT

TESTING
CNAS L3572

Issued to

XSories Hong Kong Ltd.

For

WEYE FEYE

Model Name: WEFE
Trade Name: N/A
Brand Name: XSories
FCC ID: 2AAIKWD001
Standard: 47 CFR Part 15 Subpart C
Test date: 2013-6-18 to 2013-7-17
Issue date: 2013-7-17

By

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Date 2013.7.17

CTIA Authorized Test Lab
LAB CODE 20081223-00
IEEE 1725

OFTA
電訊管理局



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Reg. No.
695796

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| Change History | | |
|----------------|---------------|-------------------|
| Issue | Date | Reason for change |
| 1.0 | July 17, 2013 | First edition |
| | | |
| | | |

1. General Information

1.1. EUT Description

EUT Type: WEYE FEYE
Serial No.....: (n.a, marked #1 by test site)
Hardware Version: Ver1
Software Version: Ver1
Applicant: XSories Hong Kong Ltd.
13/F Fung Woo Centre, 279 -281 Des Voeux Road Central, Sheung Wan, Hong Kong
Manufacturer: SHENZHEN GOSPELL SMARTHOME ELECTRONIC CO . , LTD
F12,F518 Idea land,Baoyuan Road ,BaoAn,Shenzhen,China
Frequency Range.....: 802.11n-20MHz: 2.412GHz - 2.462GHz
802.11n-40MHz: 2.422GHz- 2.452GHz
Channel Number.....: 802.11n-20MHz: 11
802.11n-40MHz: 7
Modulation Type: OFDM (802.11n)
Antenna Type.....: Integral Antenna
Antenna Gain.....: 0.6dBi

Note 1: The EUT is WEYE FEYE, it contains WIFI Module operating at 2.4GHz ISM band; it supports 802.11n and they are all tested in this report.

Note 2: For 802.11n-20MHz, the frequencies allocated is $F \text{ (MHz)} = 2412 + 5 \cdot (n-1)$ ($1 \leq n \leq 11$). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).

For 802.11n-40MHz, the frequencies allocated is $F \text{ (MHz)} = 2412 + 5 \cdot (n-1)$ ($3 \leq n \leq 9$). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 3 (2422MHz), 6 (2437MHz) and 9 (2452MHz).

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 4: The antenna connector of EUT is designed with permanent attachment and no consideration of replacement.

1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Wi-Fi, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

| No. | Identity | Document Title |
|-----|-------------------------------------|-------------------------|
| 1 | 47 CFR Part 15 (10-1-09 Edition) | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Result |
|-----|-----------------------------|------------------------------|--------|
| 1 | 15.203 | Antenna Requirement | PASS |
| 2 | 15.247(b) | Peak Output Power | PASS |
| 3 | 15.247(a) | Bandwidth | PASS |
| 4 | 15.247(d) | Conducted Spurious Emission | PASS |
| 5 | 15.247(d) | Restricted Frequency Bands | PASS |
| 6 | 15.207 | Conducted Emission | PASS |
| 7 | 15.209 ,15.247(d) | Radiated Emission | PASS |
| 8 | 15.247(e) | Power spectral density (PSD) | PASS |
| 9 | 15.247(i), 1.1307&2.1093 | RF exposure evaluation | PASS |

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.4 2009.

These RF tests were performed according to the method of measurements prescribed in KDB558074 D01 V02 10/04/2012.

1.3. Facilities and Accreditations

1.3.1. Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.1, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10 2009, ANSI C63.4 2009 and CISPR Publication 22; the FCC registration number is 695796.

1.3.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|-----------------------------|---------|
| Temperature (°C): | 15 - 35 |
| Relative Humidity (%): | 30 -60 |
| Atmospheric Pressure (kPa): | 86-106 |

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Peak Output Power

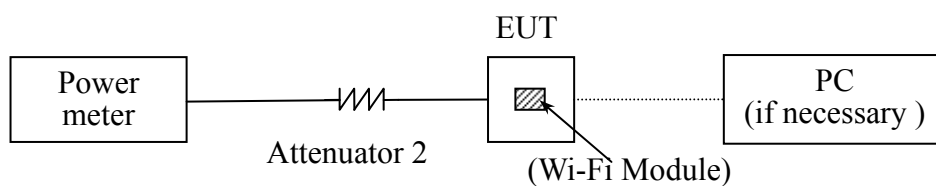
2.2.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

2.2.2. Test Description

The measured output power was calculated by the reading of the Power Meter and calibration.

A. Test Setup:



The EUT (Equipment under the test) which is powered by the Battery is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in power meter.

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|------------------------|--------------|--------|------------|------------|------------|
| EPM Series Power Meter | Agilent | E4418B | GB43318055 | 2012.05.12 | 2013.05.11 |
| Power Sensor | Agilent | 8482A | MY41091706 | 2012.05.12 | 2013.05.11 |

2.2.3. Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

2.2.3.1. 802.11n-20MHz Test mode

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---------|-----------------|----------------------------|----------|-------|---|---------|
| | | dBm | W | dBm | W | |
| 1 | 2412 | 11.65 | 0.014622 | 30 | 1 | PASS |
| 6 | 2437 | 11.25 | 0.013335 | | | PASS |
| 11 | 2462 | 10.40 | 0.010965 | | | PASS |

2.2.3.2. 802.11n-40MHz Test mode

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---------|-----------------|----------------------------|----------|-------|---|---------|
| | | dBm | W | dBm | W | |
| 3 | 2422 | 11.52 | 0.014191 | 30 | 1 | PASS |
| 6 | 2437 | 10.86 | 0.012190 | | | PASS |
| 9 | 2452 | 10.71 | 0.011776 | | | PASS |

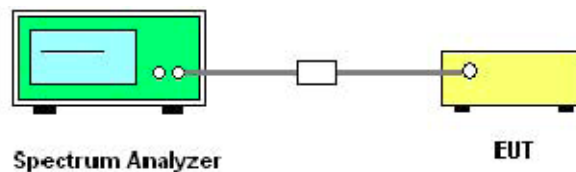
2.3. Bandwidth

2.3.1. Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-------------|--------------|--------|------------|------------|------------|
| Receiver | Agilent | E7405A | US44210471 | 2012.05.12 | 2013.05.11 |

2.3.3. Test Result

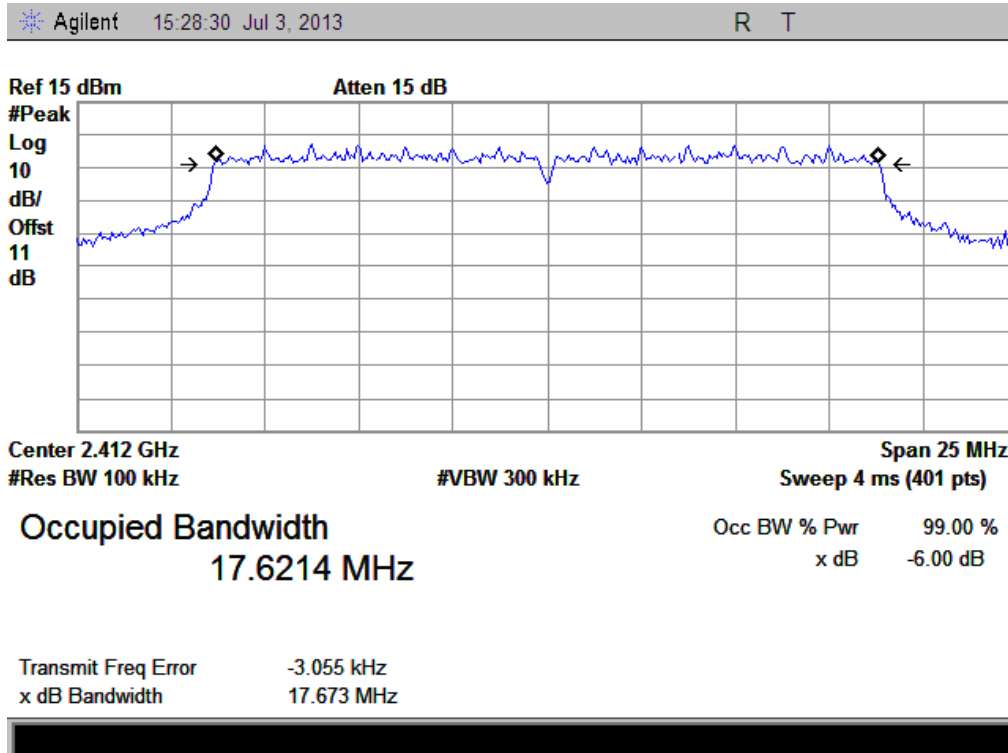
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1. 802.11n-20 Test mode

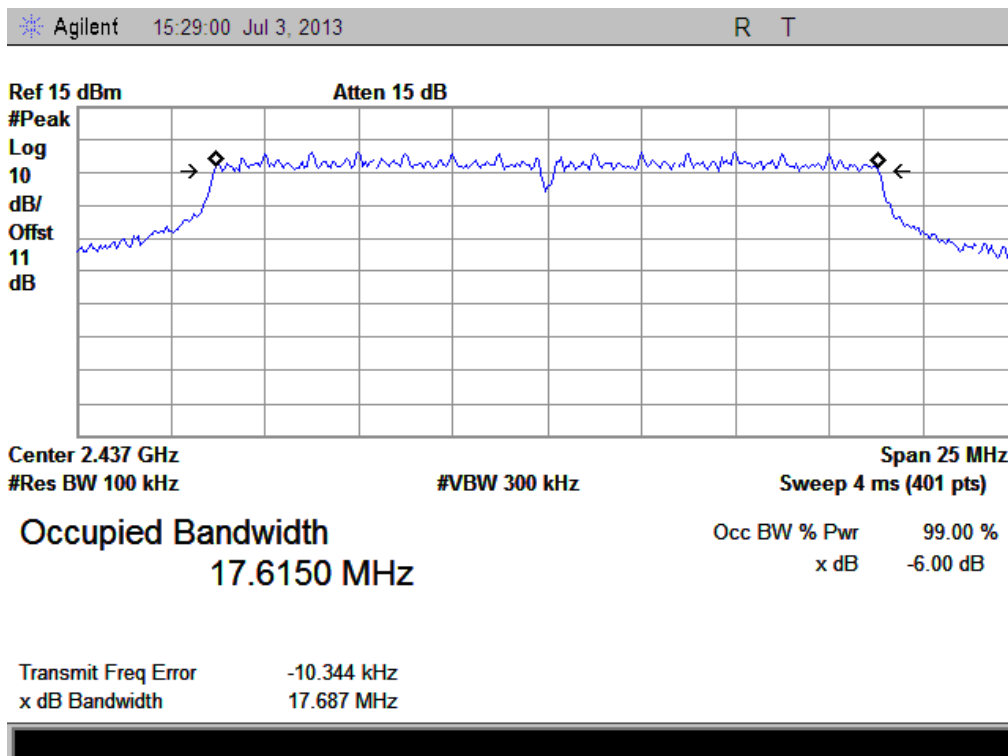
A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Result |
|---------|-----------------|----------------------|---------------|--------------|--------|
| 1 | 2412 | 17.673 | Plot G | ≥ 500 | PASS |
| 6 | 2437 | 17.687 | Plot H | ≥ 500 | PASS |
| 11 | 2462 | 17.687 | Plot I | ≥ 500 | PASS |

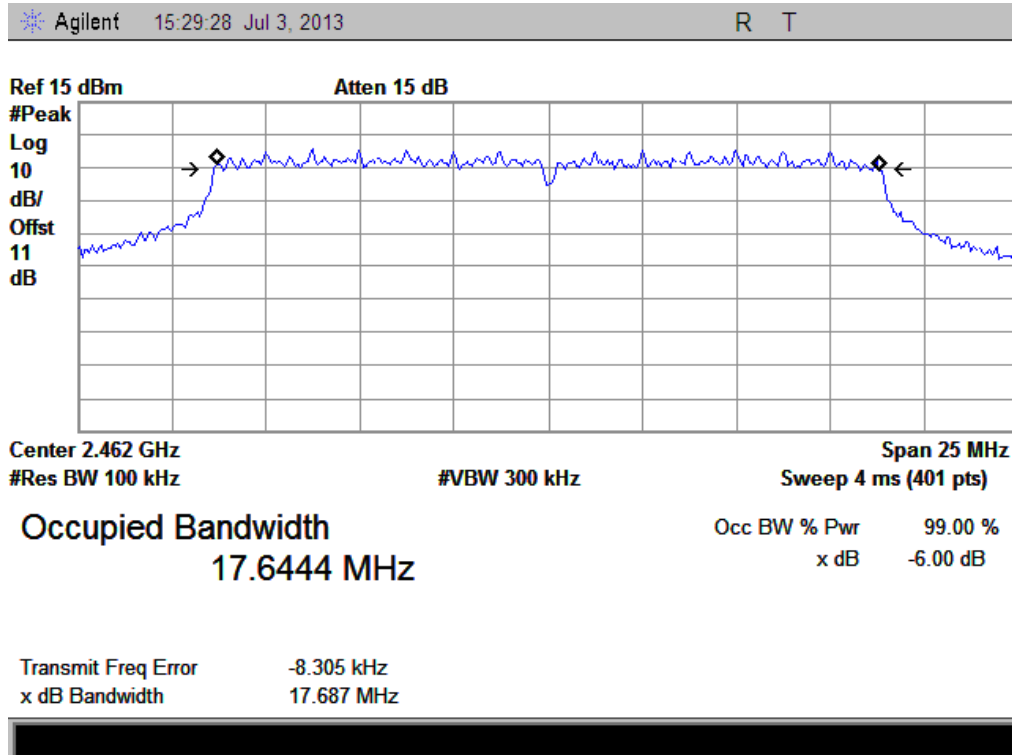
B. Test Plots:



(Plot G: Channel 1: 2412MHz @ 802.11n-20)



(Plot H: Channel 6: 2437MHz @ 802.11n-20)



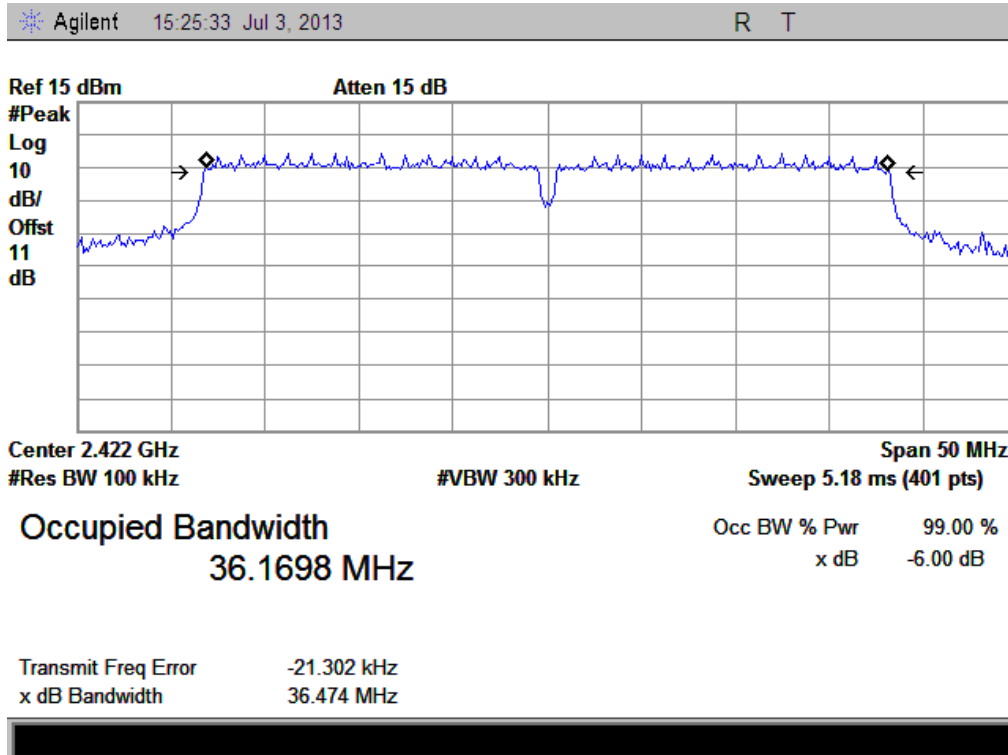
(Plot I: Channel 11: 2462MHz @ 802.11n-20)

2.3.3.2. 802.11n-40 Test mode

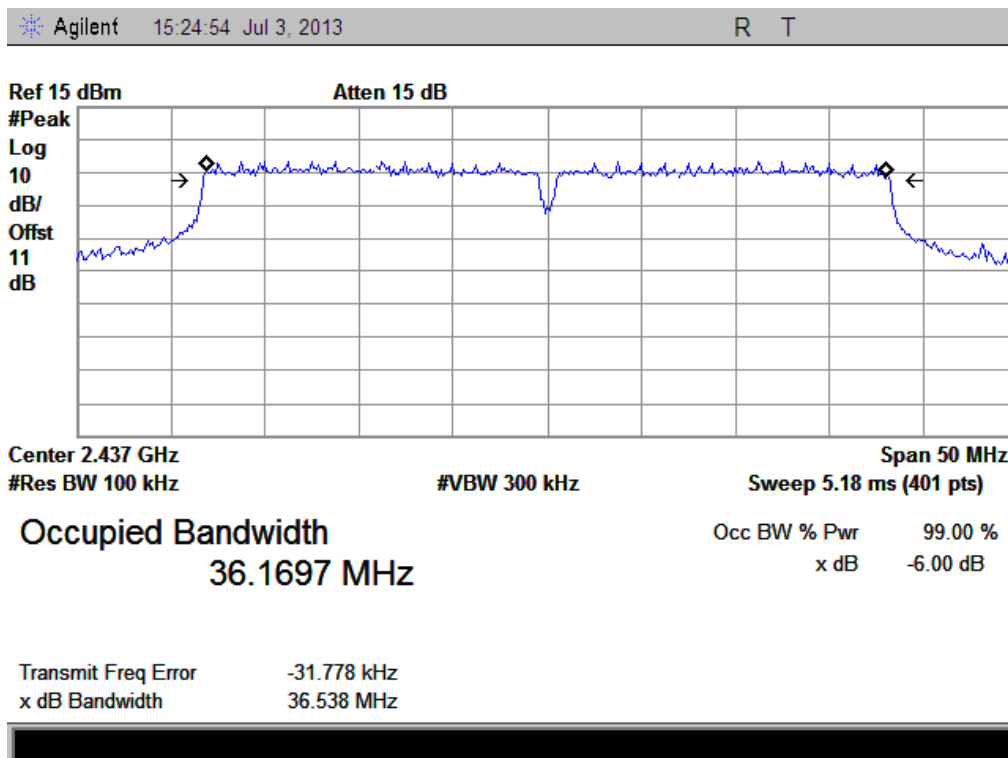
A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Result |
|---------|-----------------|----------------------|---------------|--------------|--------|
| 3 | 2422 | 36.474 | Plot G | ≥ 500 | PASS |
| 6 | 2437 | 36.538 | Plot H | ≥ 500 | PASS |
| 9 | 2452 | 36.544 | Plot I | ≥ 500 | PASS |

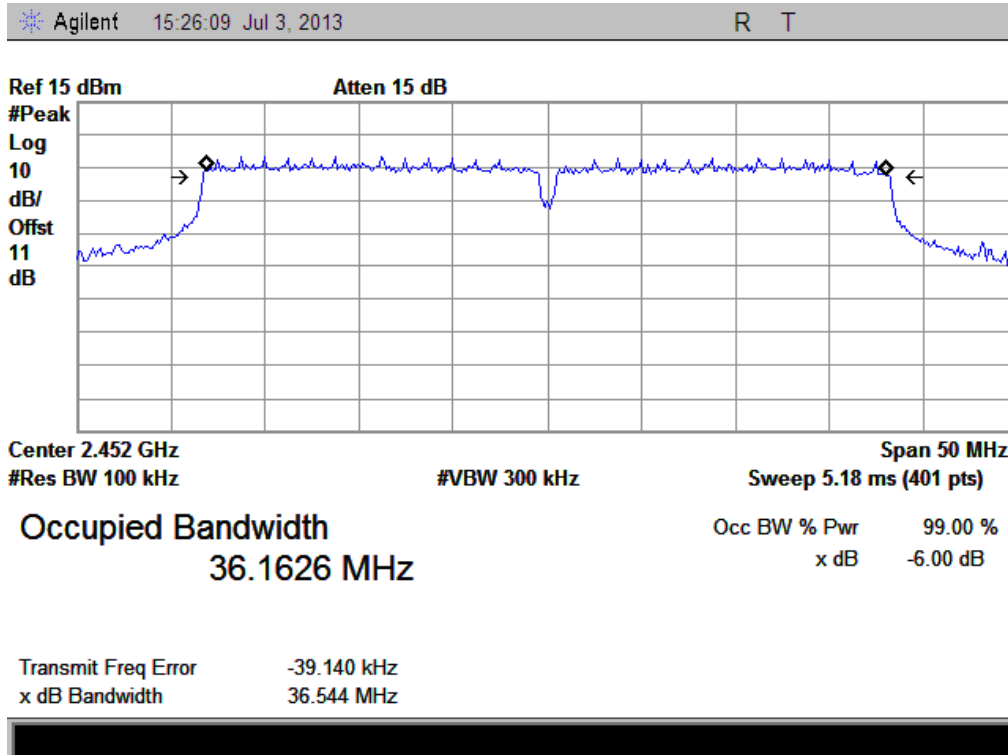
B. Test Plots:



(Plot G: Channel 3: 2422MHz @ 802.11n-40)



(Plot H: Channel 6: 2437MHz @ 802.11n-40)



(Plot I: Channel 9: 2452MHz @ 802.11n-40)

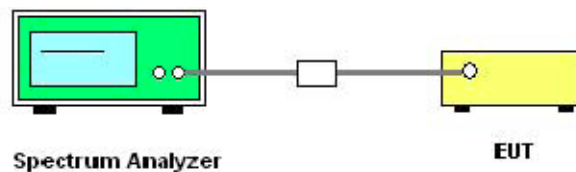
2.4. Conducted Spurious Emissions

2.4.1. Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.4.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-------------|--------------|--------|------------|------------|------------|
| Receiver | Agilent | E7405A | US44210471 | 2012.05.12 | 2013.05.11 |

2.4.3. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

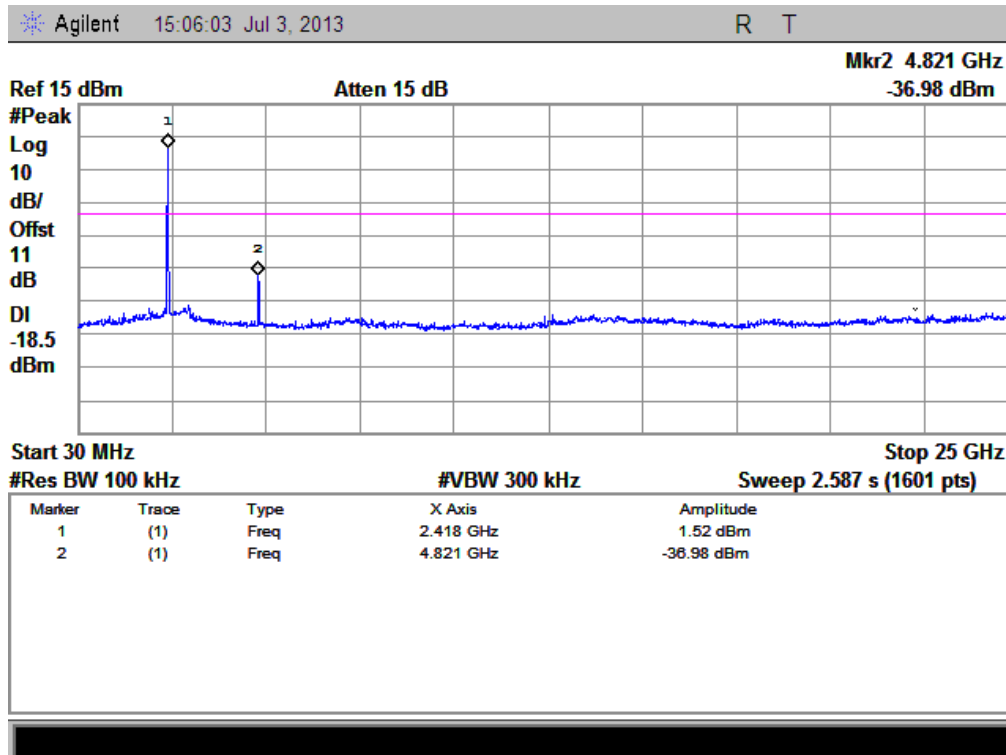
2.4.3.1. 802.11n -20MHz Test mode

A. Test Verdict:

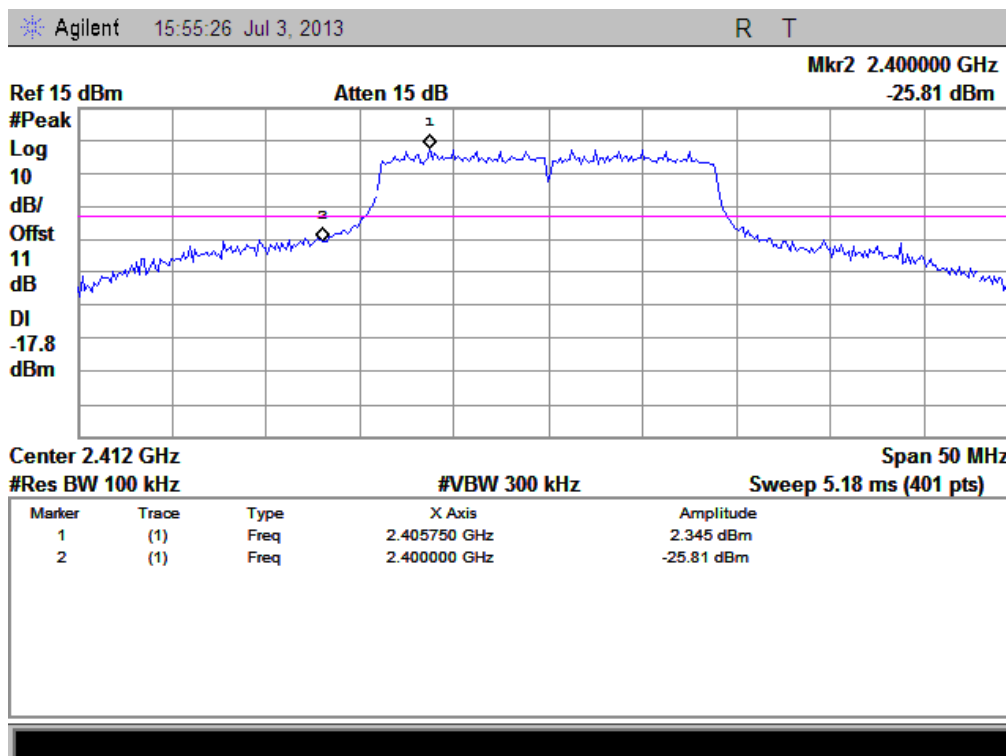
| Channel | Frequency (MHz) | Measured Max. Out of Band Emission (dBm) | Refer to Plot | Limit (dBm) | | Verdict |
|---------|-----------------|--|---------------|---------------|-------------------------|---------|
| | | | | Carrier Level | Calculated -20dBc Limit | |
| 1 | 2412 | -36.98 | Plot G.1 | 1.520 | -18.5 | PASS |
| 6 | 2437 | -40.10 | Plot H.1 | 1.287 | -18.8 | PASS |
| 11 | 2462 | -40.73 | Plot I.1 | 0.386 | -19.6 | PASS |

B. Test Plots:

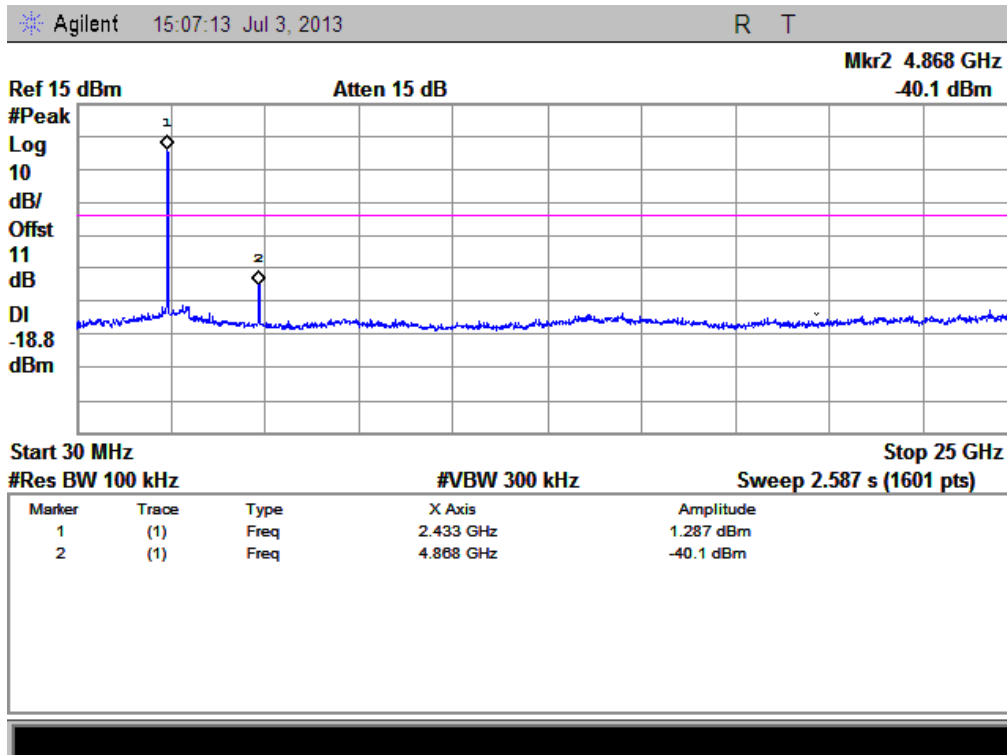
Note: the power of the Module transmitting frequency should be ignored.



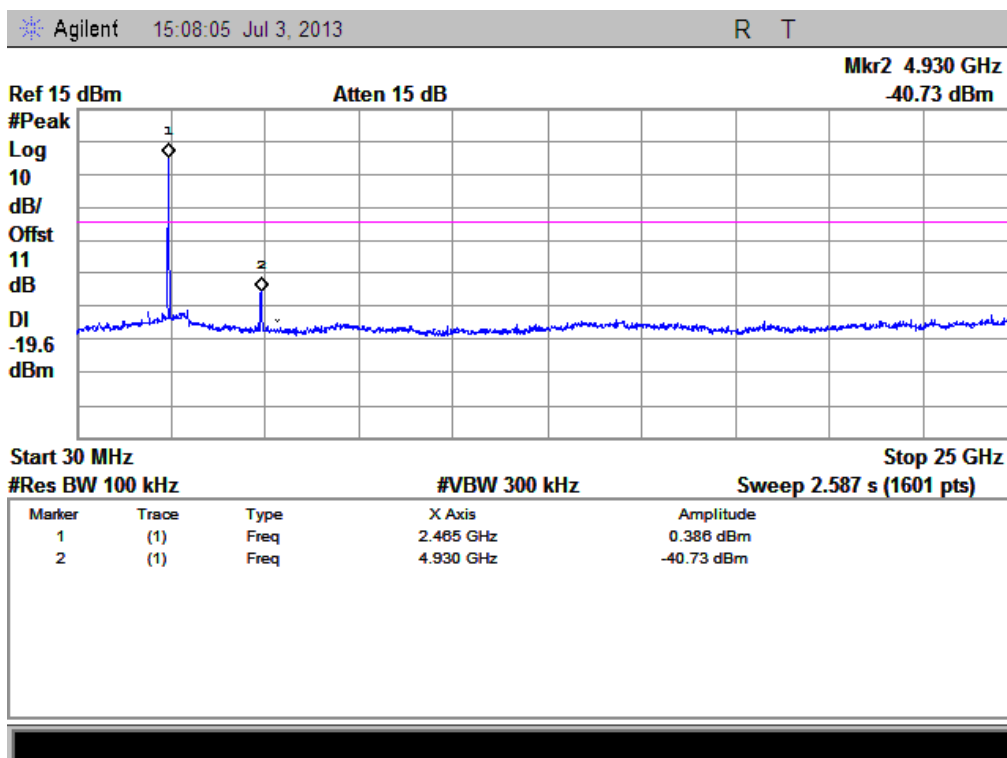
(Plot G.1: Channel = 1, 30MHz to 25GHz)



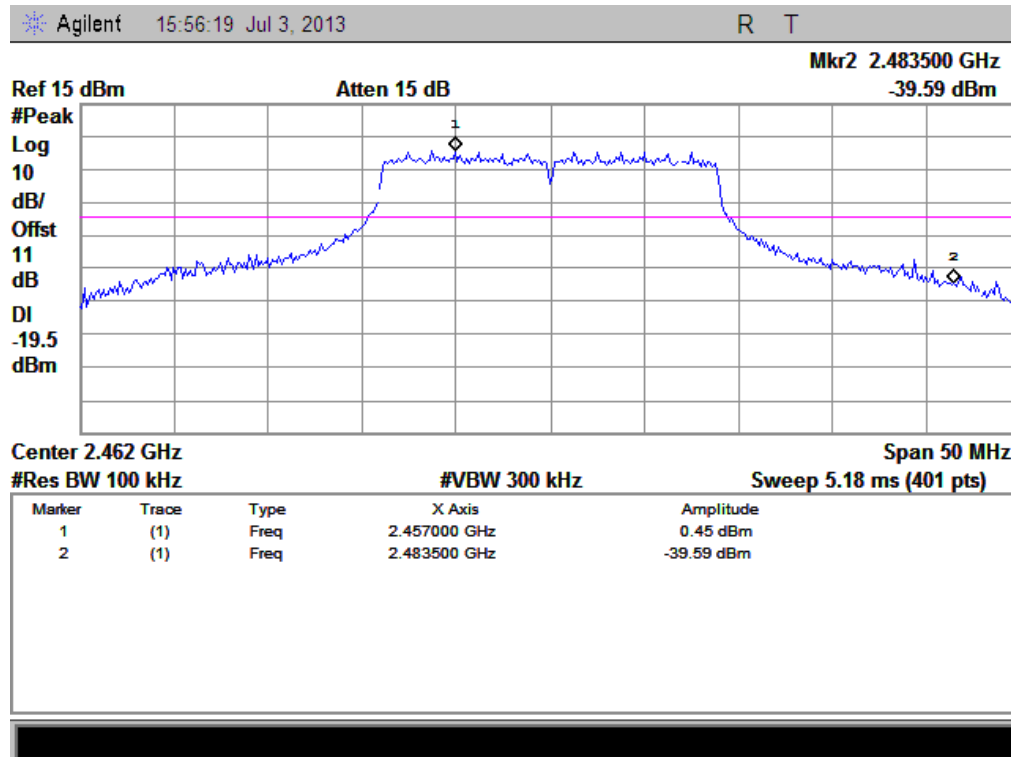
(Band Edge@ Channel = 1)



(Plot H.1: Channel = 6, 30MHz to 25GHz)



(Plot I.1: Channel = 11, 30MHz to 25GHz)



(Band Edge@ Channel = 11)

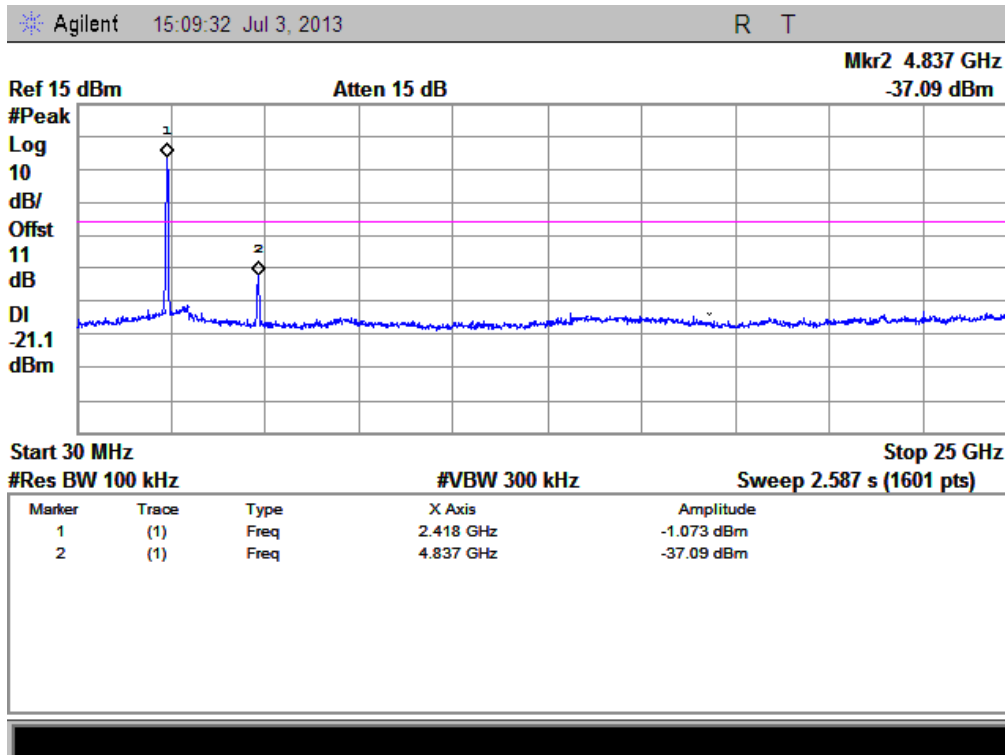
2.4.3.2. 802.11n -40MHz Test mode

A. Test Verdict:

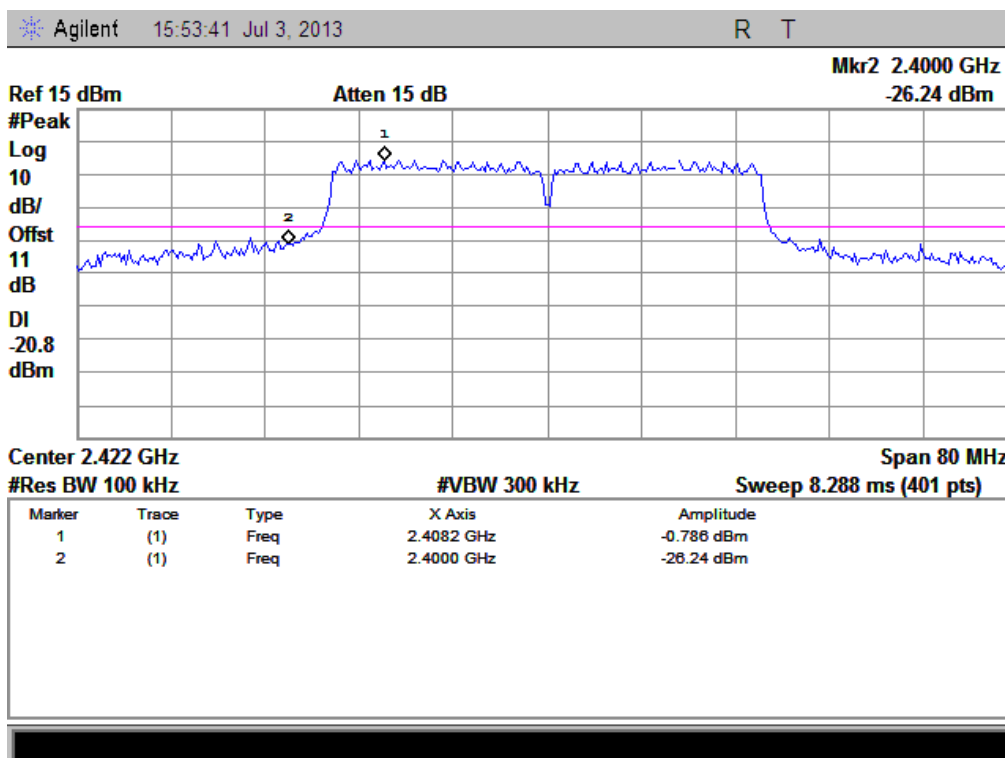
| Channel | Frequency (MHz) | Measured Out of Band Emission (dBm) | Max. Band | Refer to Plot | Limit (dBm) | | Verdict |
|---------|-----------------|-------------------------------------|-----------|---------------|---------------|-------------------------|---------|
| | | | | | Carrier Level | Calculated -20dBc Limit | |
| 3 | 2422 | -37.09 | | Plot G.1 | -1.073 | -21.1 | PASS |
| 6 | 2437 | -37.94 | | Plot H.1 | -1.829 | -21.8 | PASS |
| 9 | 2452 | -39.98 | | Plot I.1 | -1.951 | -22.0 | PASS |

B. Test Plots:

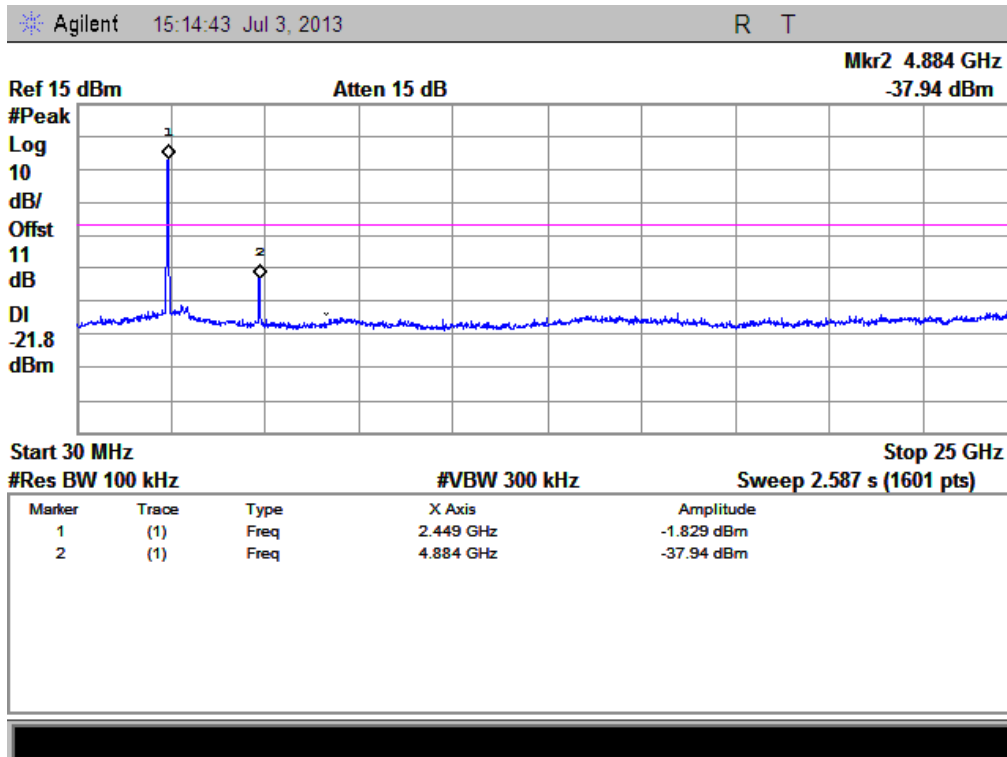
Note: the power of the Module transmitting frequency should be ignored.



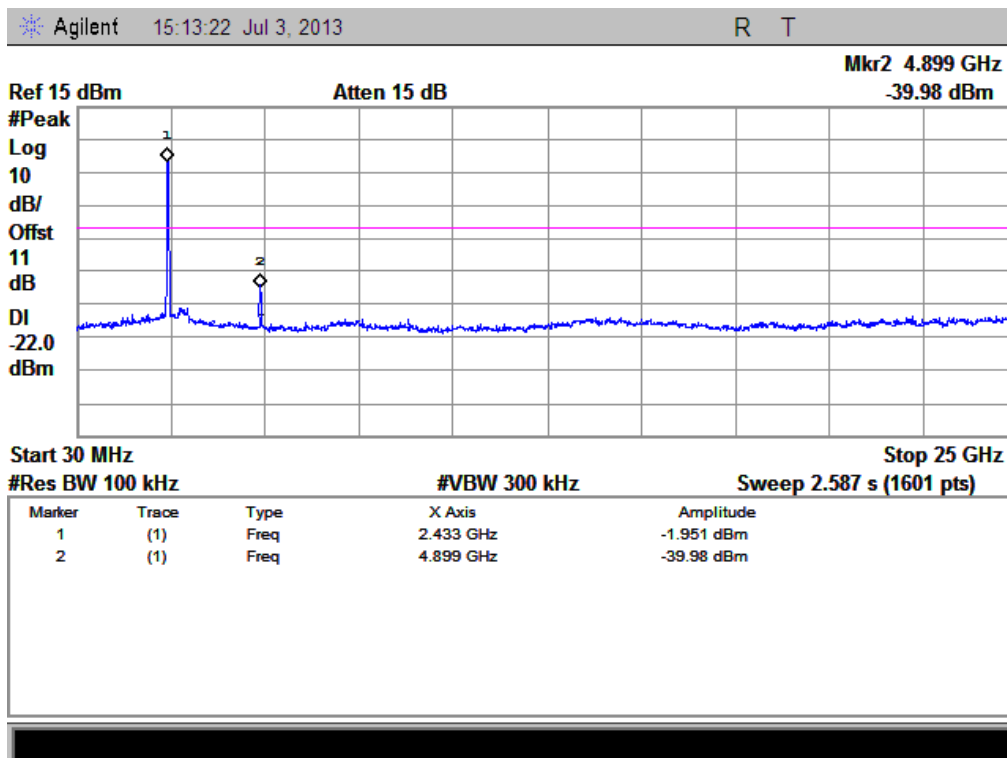
(Plot G.1: Channel = 3, 30MHz to 25GHz)



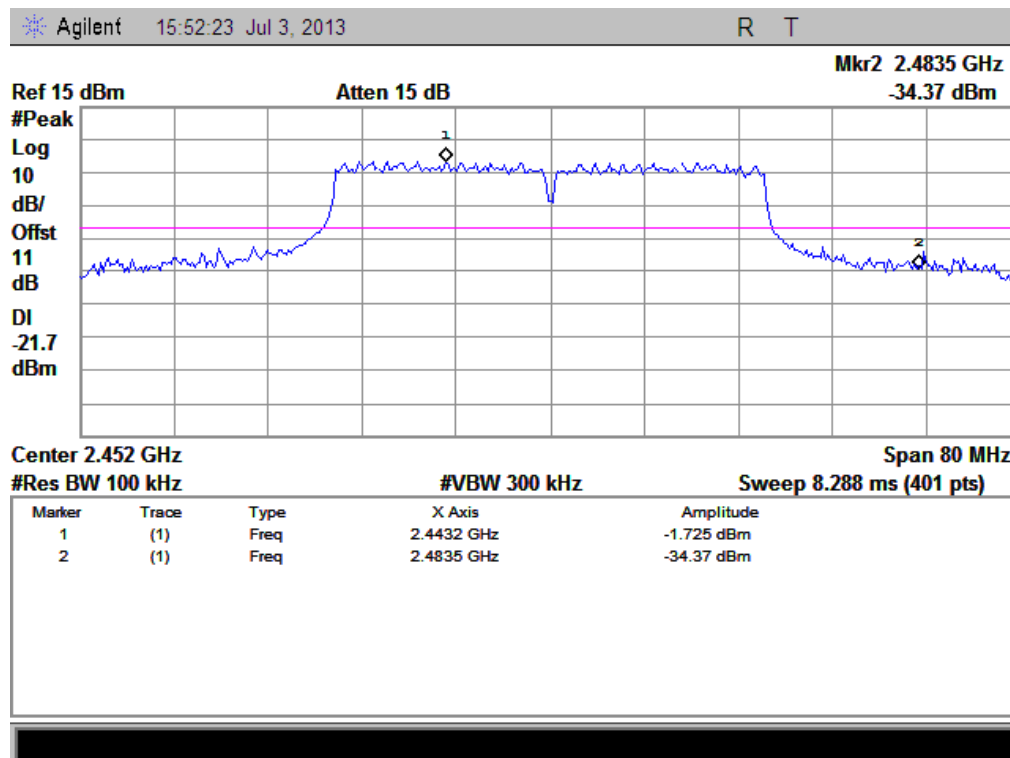
(Band Edge@ Channel = 1)



(Plot H.1: Channel = 6, 30MHz to 25GHz)



(Plot I.1: Channel = 9, 30MHz to 25GHz)



(Band Edge@ Channel = 9)

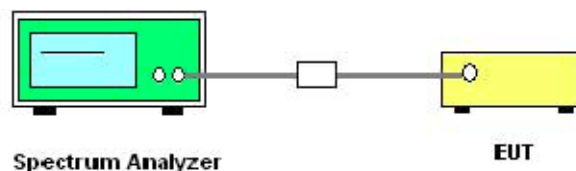
2.5. Power spectral density (PSD)

2.5.1. Requirement

According to FCC section 15.247(e), the same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

2.5.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-------------|--------------|--------|------------|------------|------------|
| Receiver | Agilent | E7405A | US44210471 | 2012.05.12 | 2013.05.11 |

2.5.3. Test Result

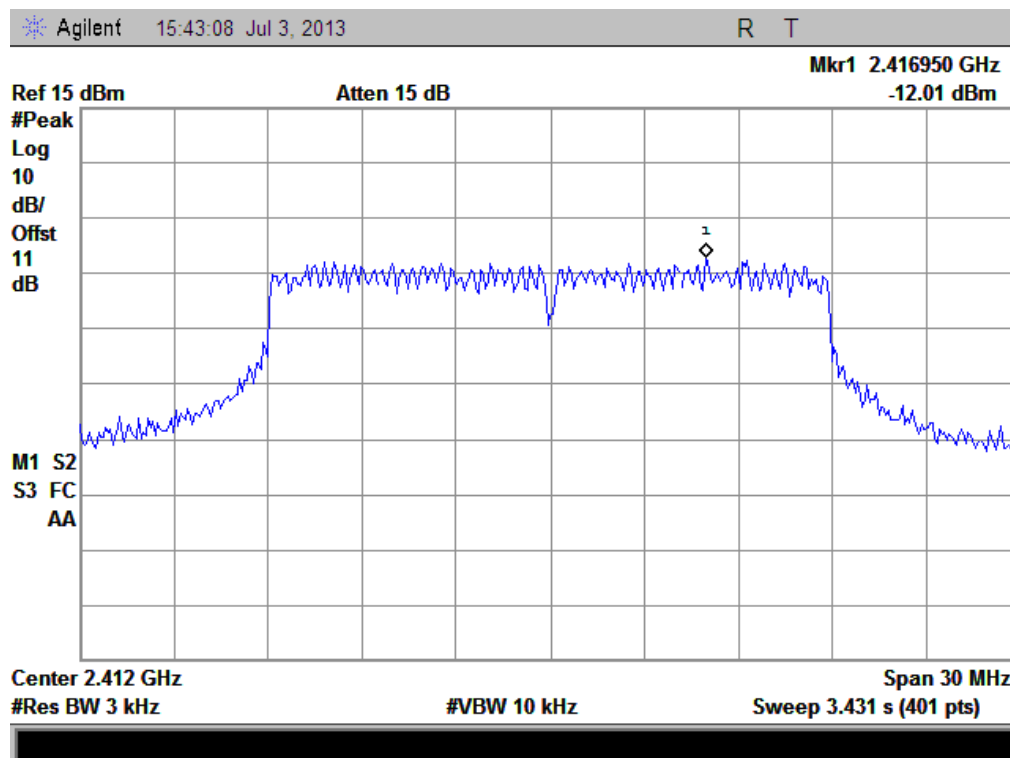
The lowest, middle and highest channels are tested to verify the band edge emissions.

2.5.3.1. 802.11n-20MHz Test mode

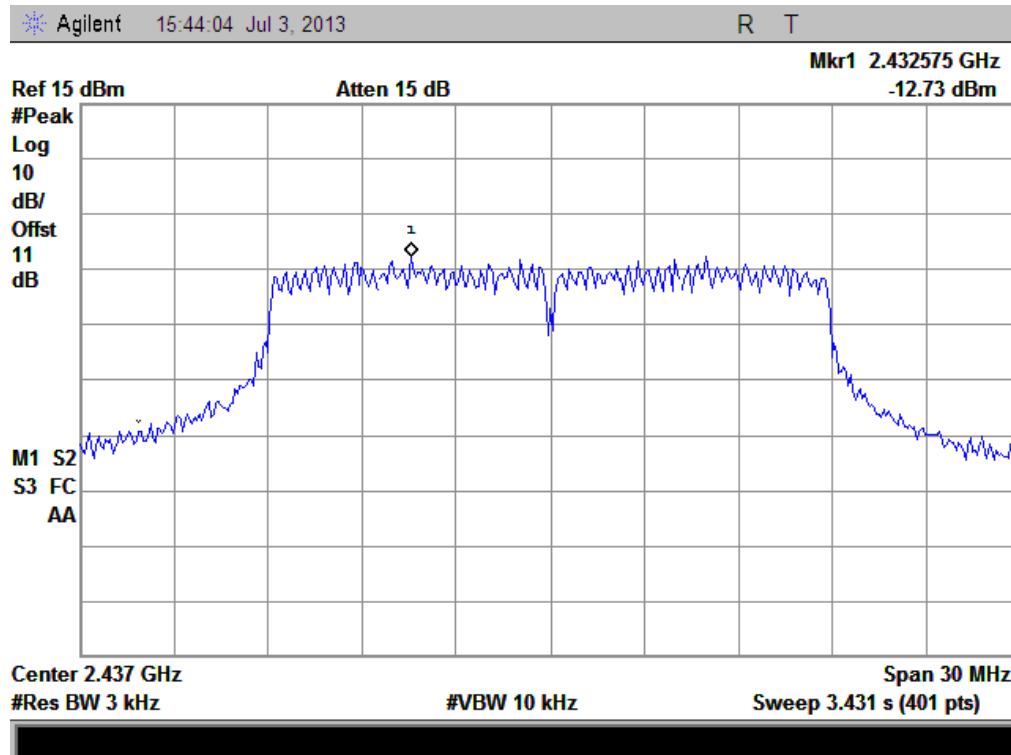
A. Test Verdict:

| Spectral power density (dBm/3kHz) | | | | | |
|---------------------------------------|-----------------|-------------------------|---------------|------------------|---------|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Refer to Plot | Limit (dBm/3kHz) | Verdict |
| 1 | 2412 | -12.01 | Plot A | 8 | PASS |
| 6 | 2437 | -12.73 | Plot B | 8 | PASS |
| 11 | 2462 | -12.93 | Plot C | 8 | PASS |
| Measurement uncertainty: ± 1.3 dB | | | | | |

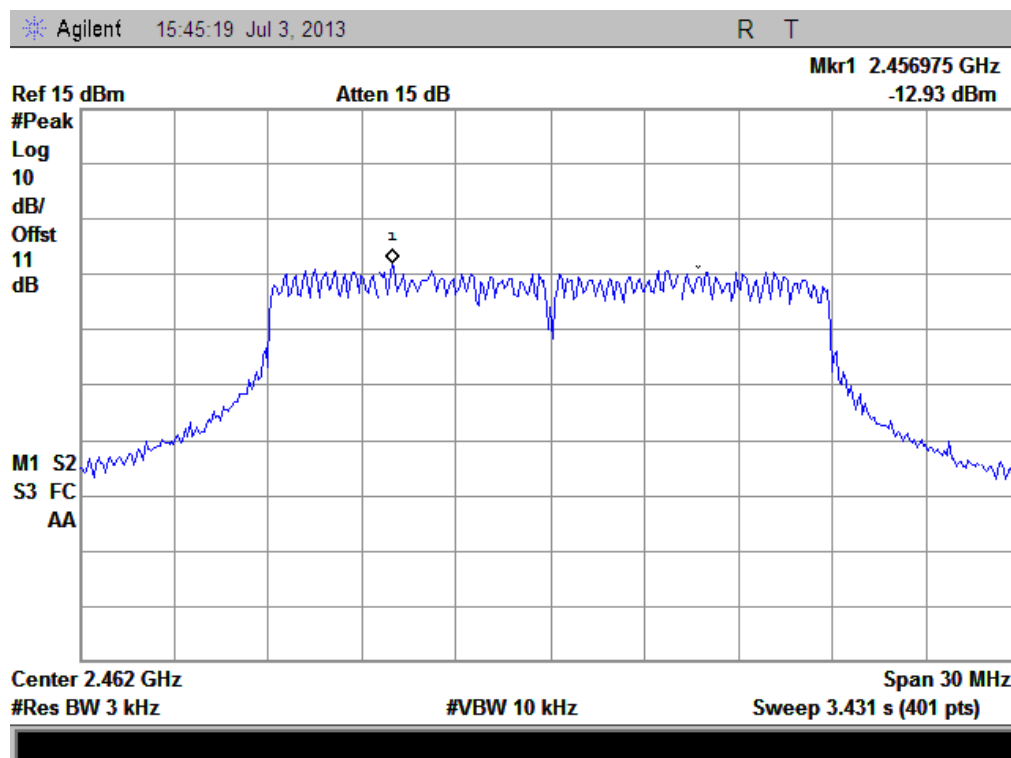
B. Test Plots:



(Plot G: Channel = 1 @ 802.11n-20MHz)



(Plot H: Channel = 6 @ 802.11n-20MHz)



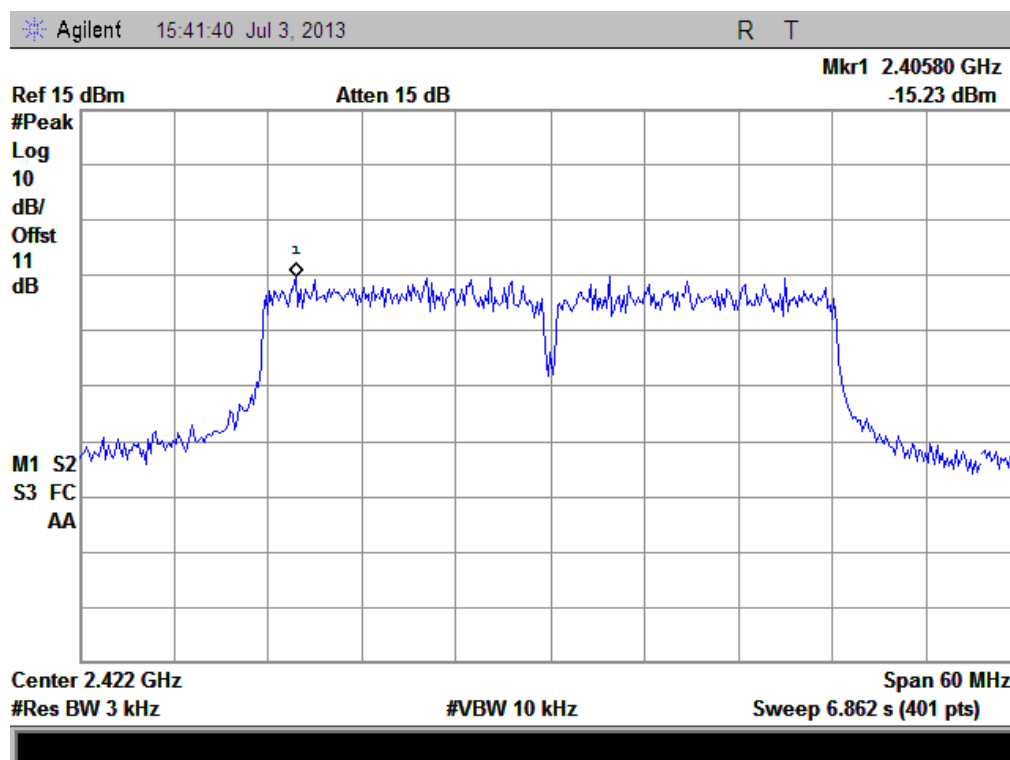
(Plot I: Channel = 11 @ 802.11n-20MHz)

2.5.3.2. 802.11n-40MHz Test mode

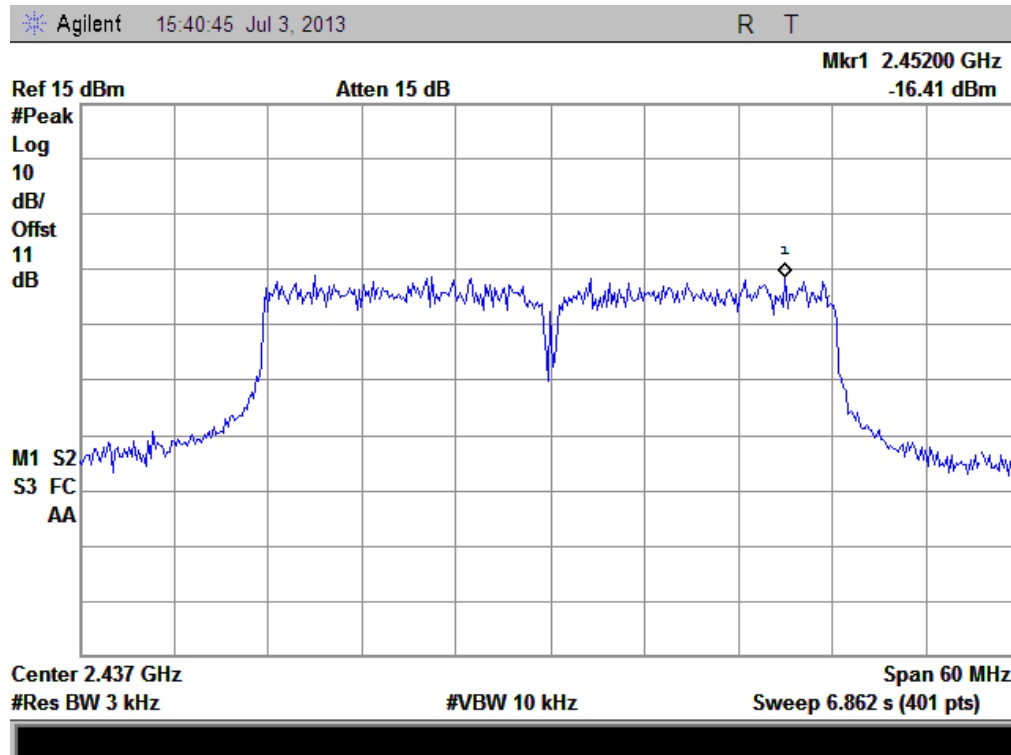
A. Test Verdict:

| Spectral power density (dBm/3kHz) | | | | | |
|---------------------------------------|-----------------|-------------------------|---------------|------------------|---------|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Refer to Plot | Limit (dBm/3kHz) | Verdict |
| 3 | 2422 | -15.23 | Plot A | 8 | PASS |
| 6 | 2437 | -16.41 | Plot B | 8 | PASS |
| 9 | 2452 | -15.01 | Plot C | 8 | PASS |
| Measurement uncertainty: ± 1.3 dB | | | | | |

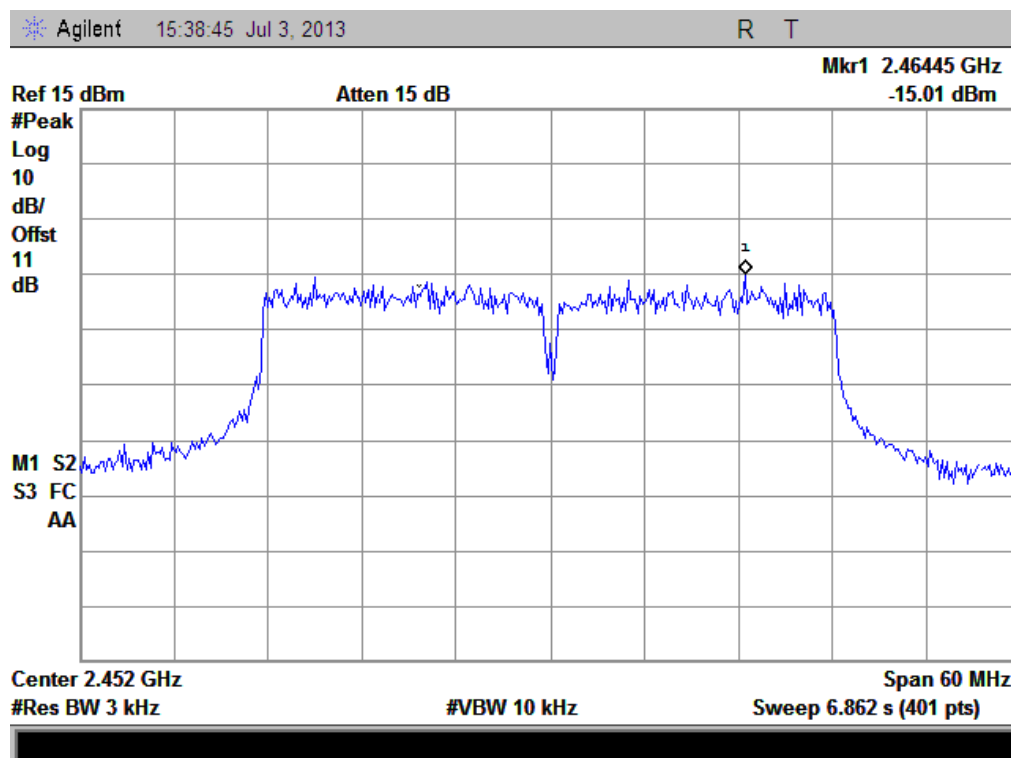
B. Test Plots:



(Plot G: Channel = 3 @ 802.11n-40MHz)



(Plot H: Channel = 6 @ 802.11n-40MHz)



(Plot I: Channel = 9 @ 802.11n-40MHz)

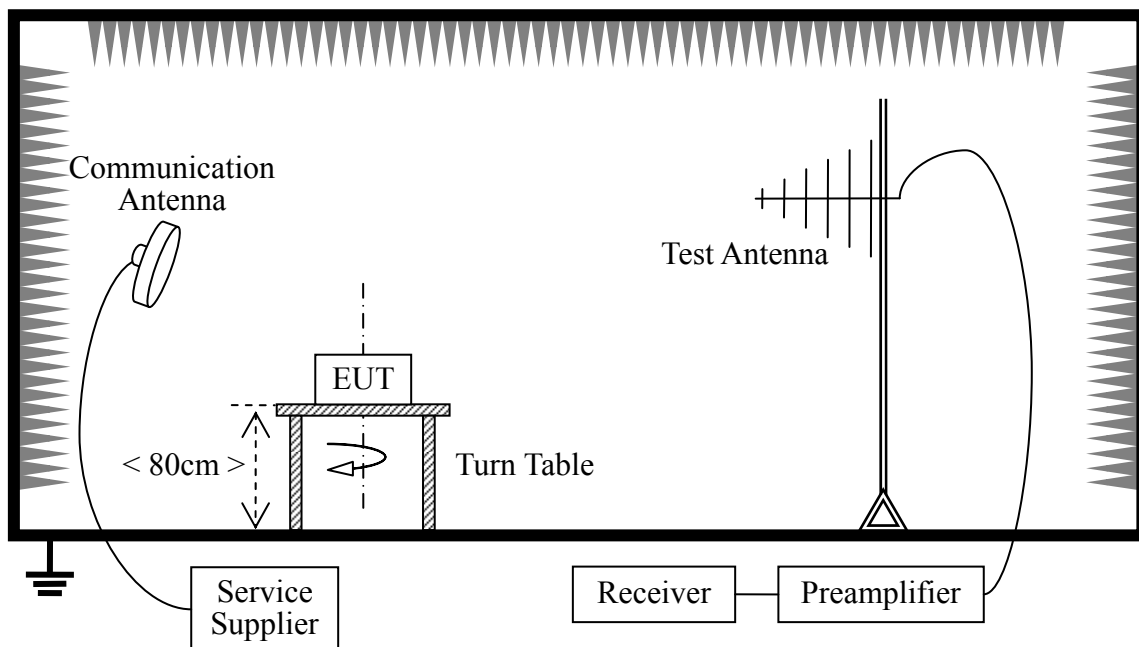
2.6. Restricted Frequency Bands

2.6.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.6.2. Test Description

A. Test Setup



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-----------------------|--------------|------------|------------|------------|------------|
| Receiver | Agilent | E7405A | US44210471 | 2012.05.12 | 2013.05.11 |
| Full-Anechoic Chamber | Albatross | 9m*6m*6m | (n.a.) | 2012.05.12 | 2014.05.11 |
| Test Antenna | Schwarzbeck | BBHA 9120C | 9120C-384 | 2012.02.12 | 2013.05.11 |

2.6.3. Test Result

The lowest and highest channels are tested to verify the Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB } \mu \text{ V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

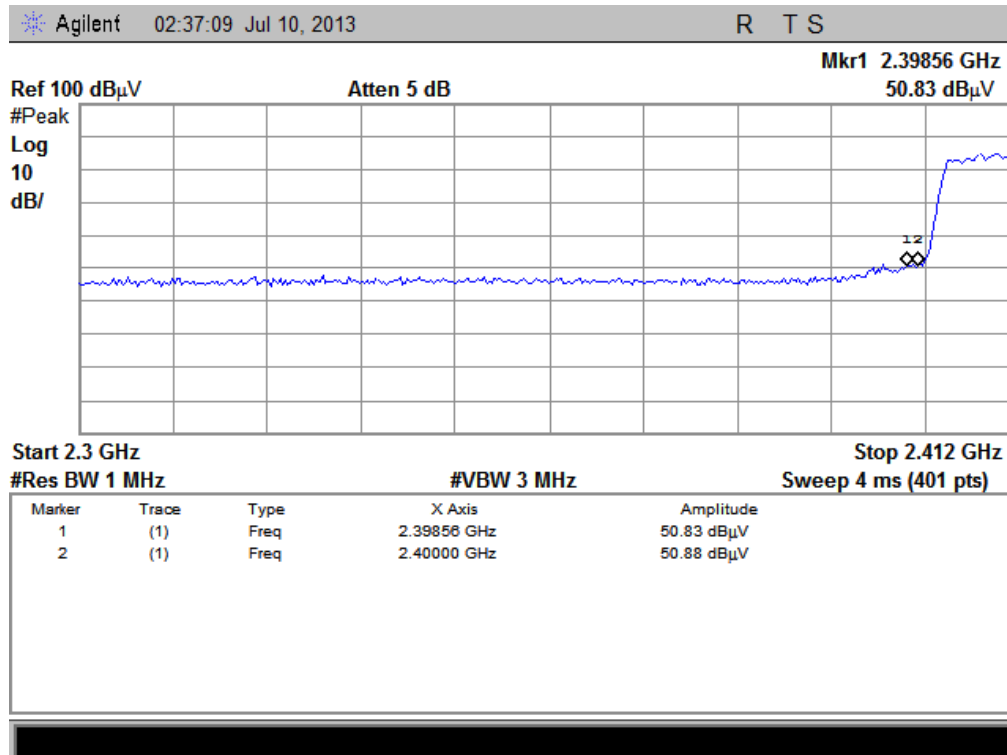
Note: restricted frequency bands tests were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

2.6.3.1. 802.11n-20MHz Test mode

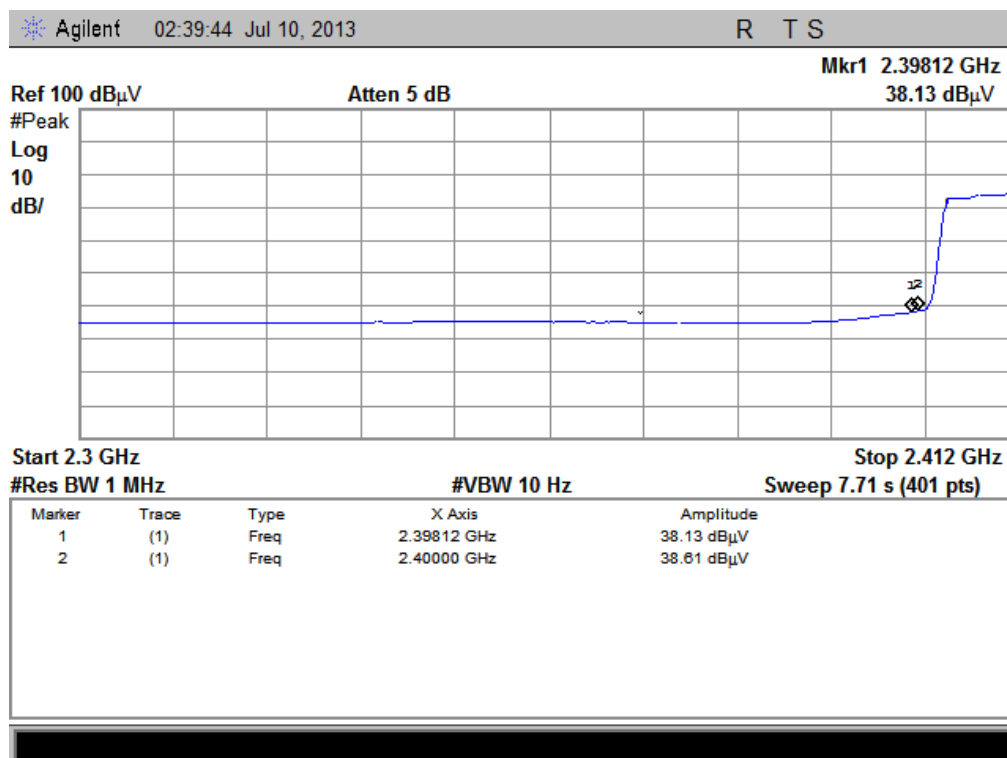
A. Test Verdict:

| Channel | Frequency (MHz) | Detector | Receiver Reading UR (dBuV) | AT (dB) | AFactor (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---------|-----------------|----------|----------------------------|---------|-----------------|--------------------------|----------------|---------|
| | | PK/ AV | | | | | | |
| 1 | 2398.56 | PK | 50.83 | -30.93 | 32.56 | 52.46 | 74 | Pass |
| 1 | 2398.12 | AV | 38.13 | -30.93 | 32.56 | 39.76 | 54 | Pass |
| 11 | 2484.63 | PK | 49.14 | -29.05 | 32.50 | 52.59 | 74 | Pass |
| 11 | 2484.72 | AV | 35.47 | -29.05 | 32.50 | 38.92 | 54 | Pass |

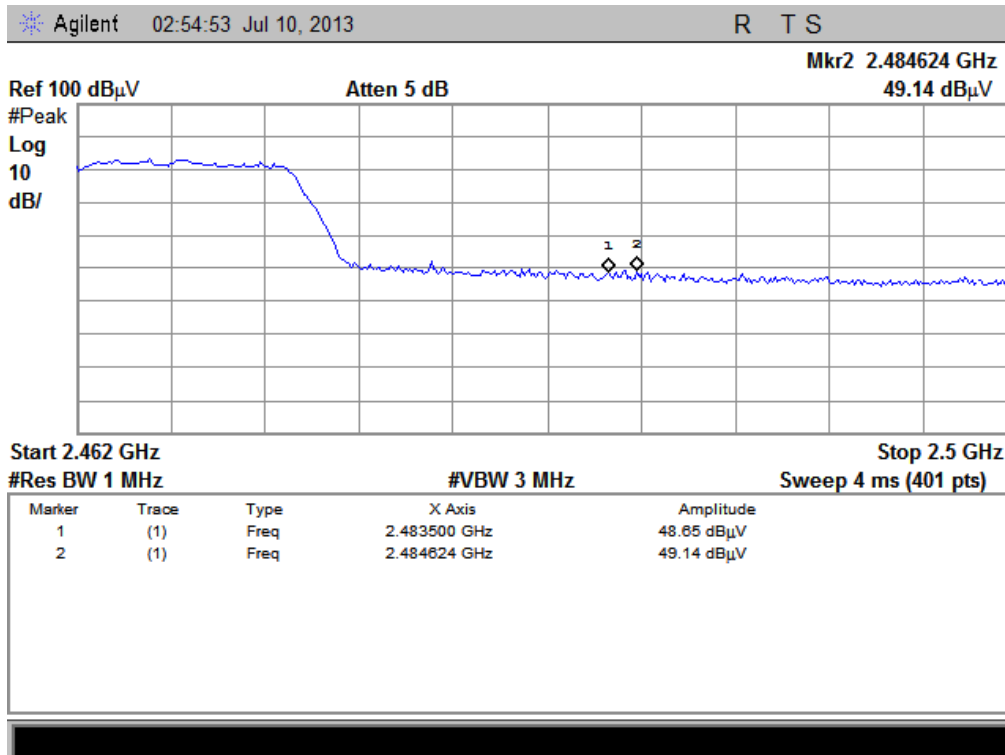
B. Test Plots:



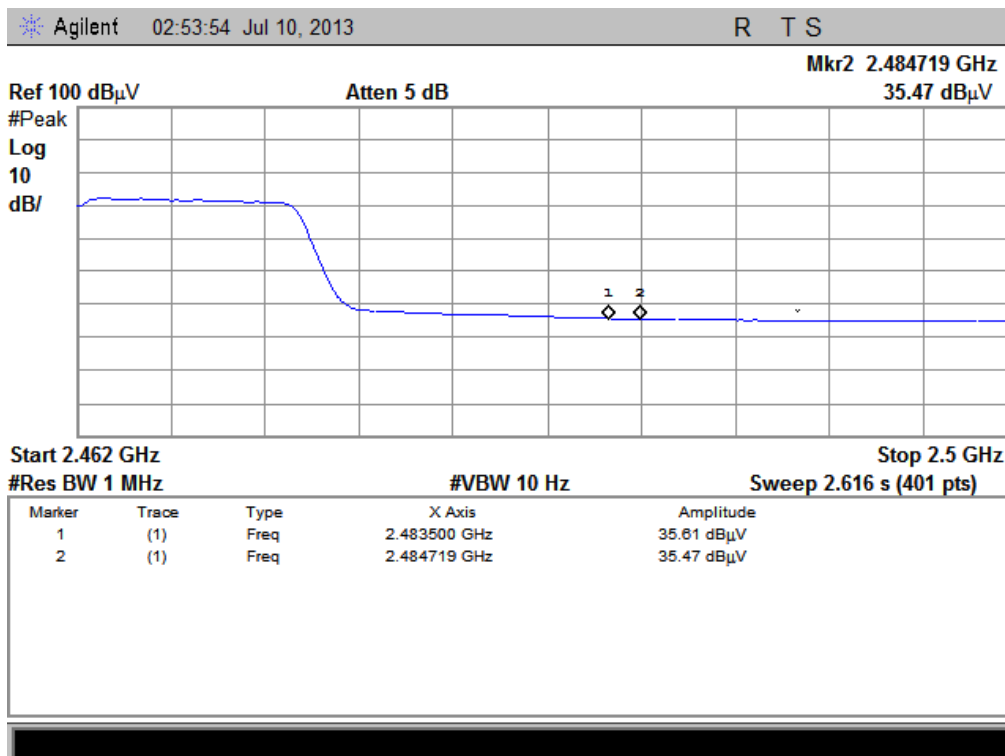
(Plot E1: Channel = 1 PEAK @ 802.11n-20)



(Plot E2: Channel = 1 AVG @ 802.11n-20)



(Plot F1: Channel = 11 PEAK @ 802.11n-20)



(Plot F2: Channel = 11 AVG @ 802.11n-20)

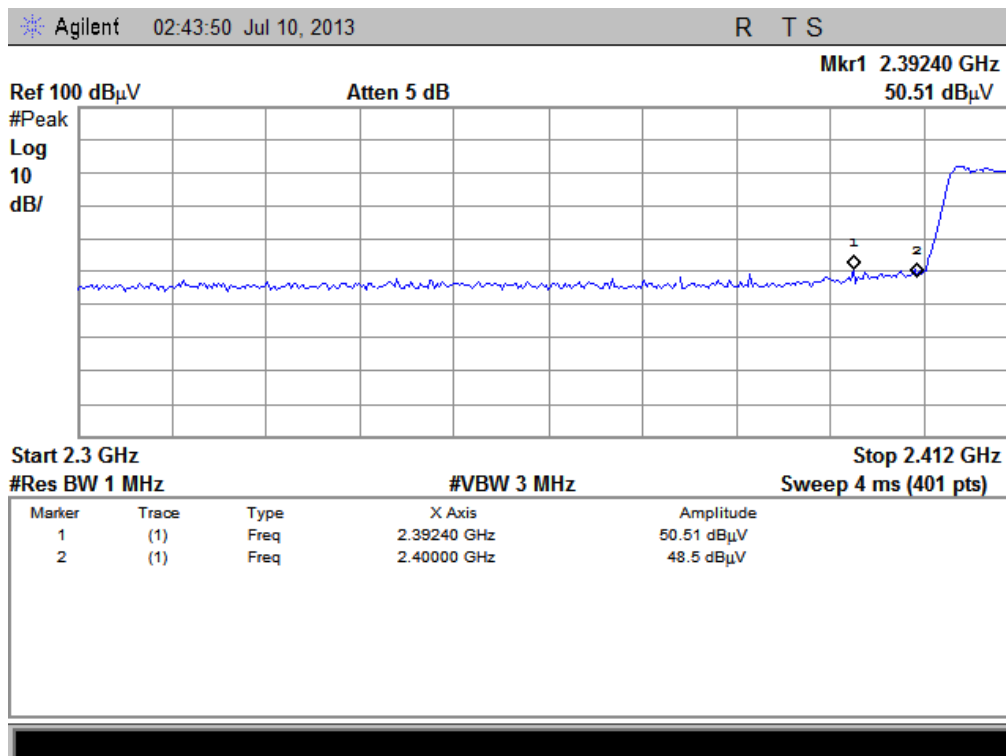
2.6.3.2. 802.11n-40MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

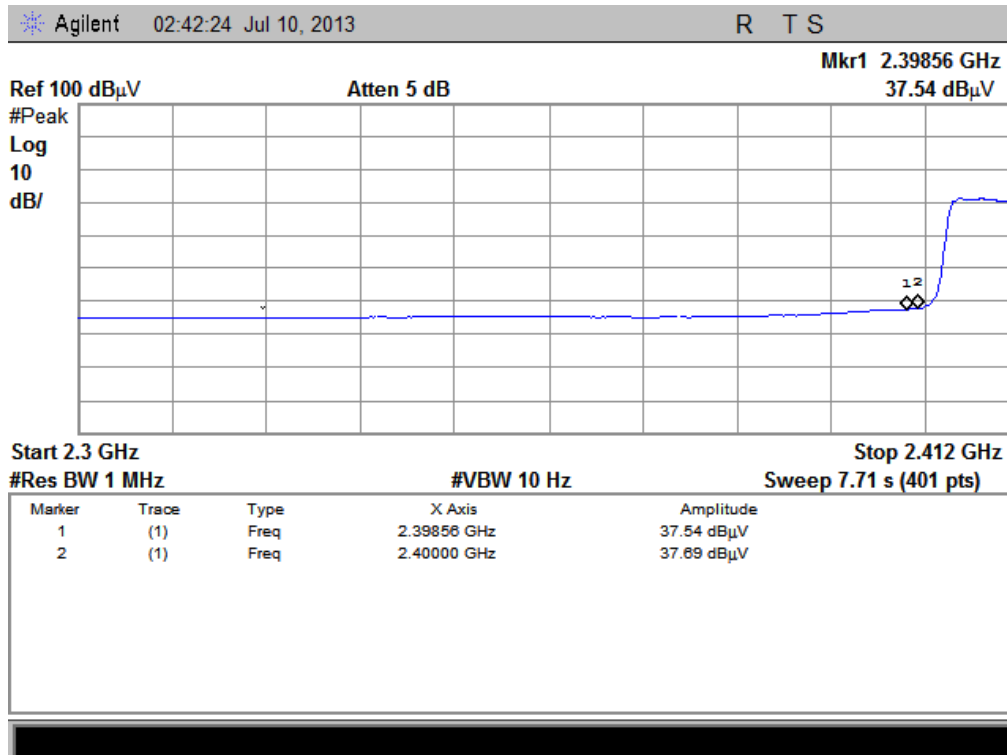
A. Test Verdict:

| Channel | Frequency (MHz) | Detector | Receiver Reading UR (dBuV) | AT (dB) | AFactor (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---------|-----------------|----------|----------------------------|---------|-----------------|--------------------------|----------------|---------|
| | | PK/ AV | | | | | | |
| 3 | 2392.40 | PK | 50.51 | -30.93 | 32.56 | 52.14 | 74 | Pass |
| 3 | 2398.56 | AV | 37.54 | -30.93 | 32.56 | 39.17 | 54 | Pass |
| 9 | 2486.71 | PK | 47.90 | -29.05 | 32.50 | 51.35 | 74 | Pass |
| 9 | 2485.29 | AV | 35.91 | -29.05 | 32.50 | 39.36 | 54 | Pass |

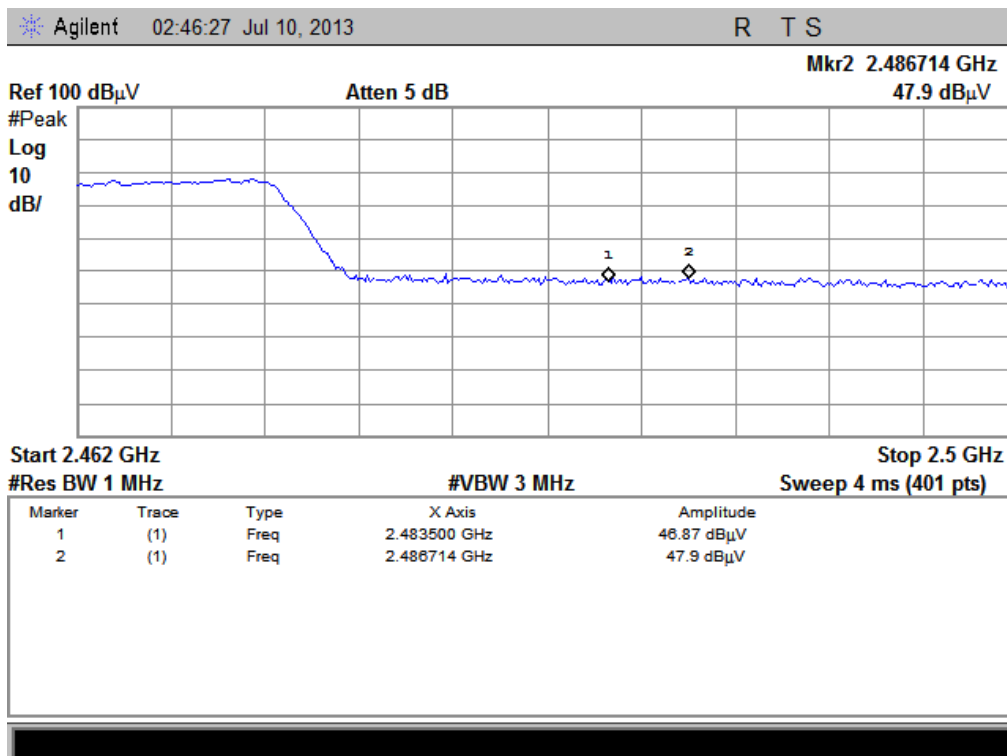
B. Test Plots:



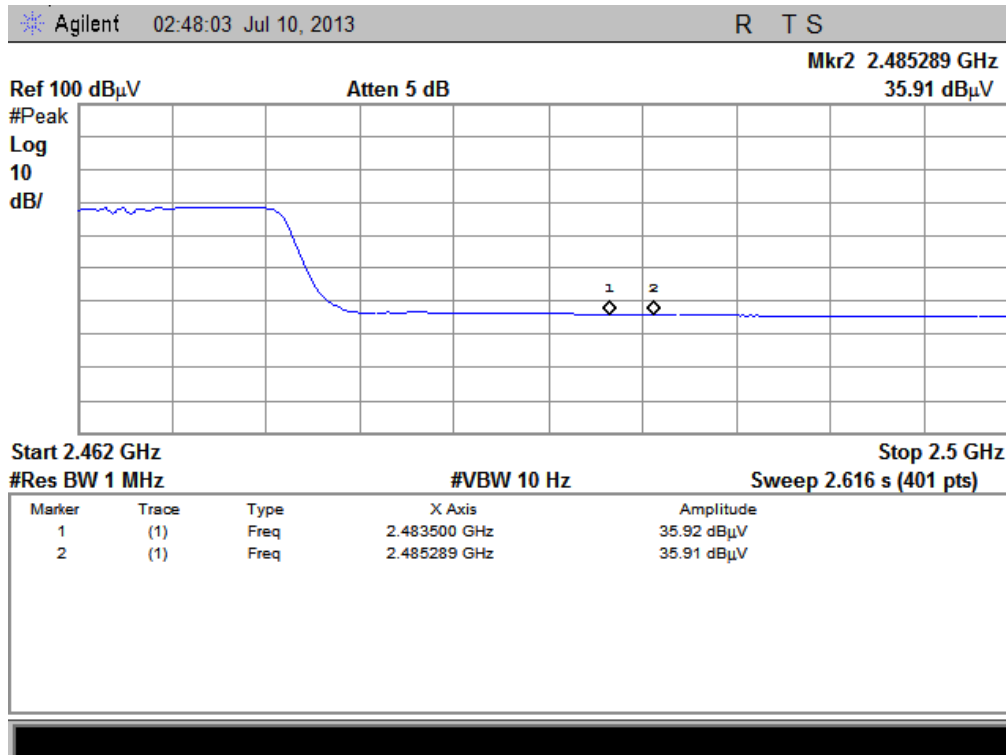
(Plot E1: Channel = 3 PEAK @ 802.11n-40)



(Plot E2: Channel = 3 AVG @ 802.11n-40)



(Plot F1: Channel = 9 PEAK @ 802.11n-40)



(Plot F2: Channel = 9 AVG @ 802.11n-40)

2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

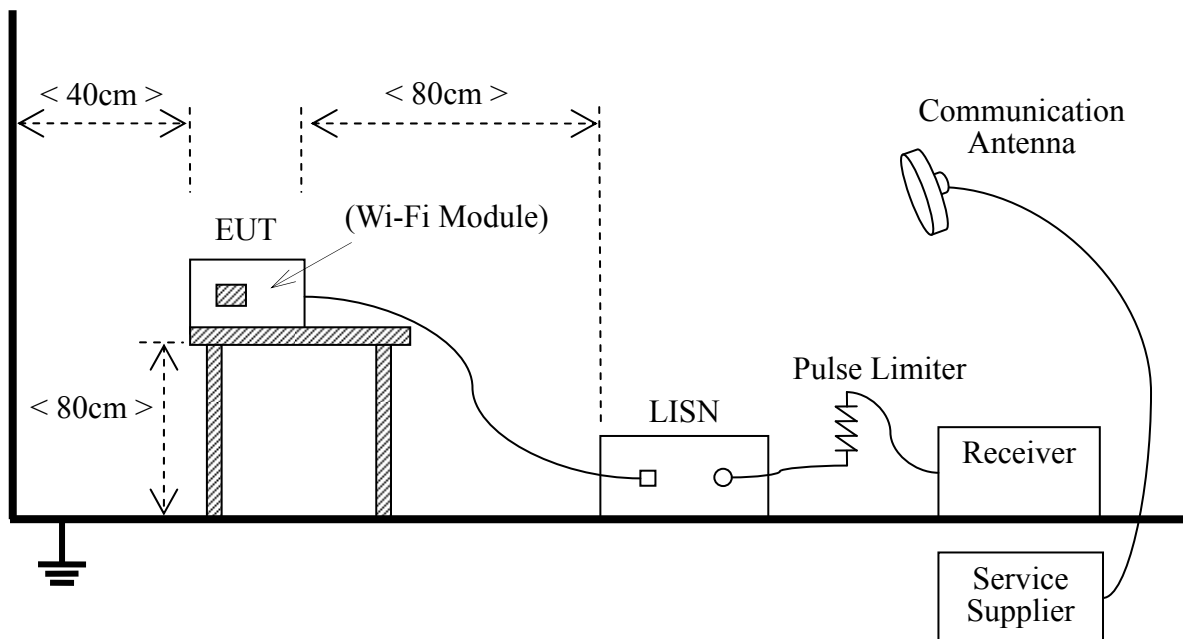
| Frequency range (MHz) | Conducted Limit (dB μ V) | |
|-----------------------|------------------------------|----------|
| | Quai-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

NOTE:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2009

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-------------|--------------|----------|------------|------------|------------|
| Receiver | Narda | PMM 9010 | 595WX11007 | 2012.11.12 | 2013.11.11 |

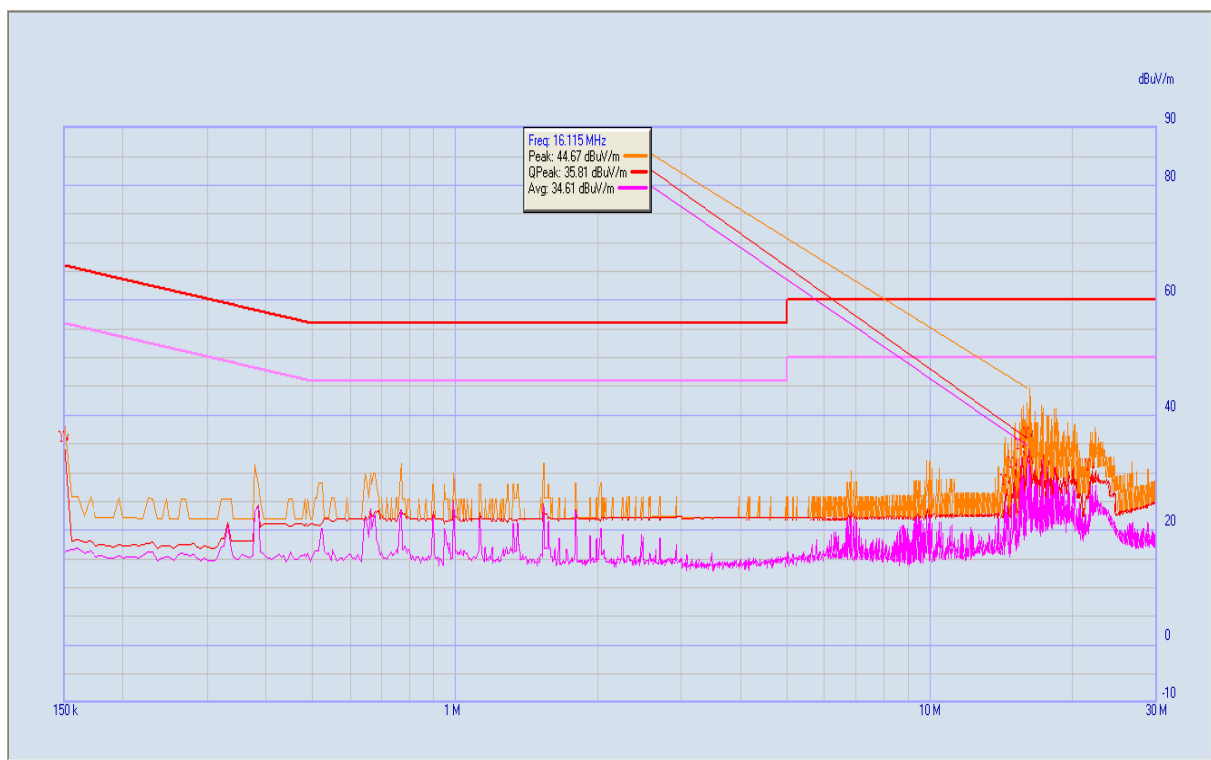
| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|----------------------|--------------|-------------|------------|------------|------------|
| LISN | Schwarzbeck | NSLK 8127 | 812744 | 2013.05.12 | 2014.05.11 |
| Pulse Limiter (20dB) | Schwarzbeck | VTSD 9561-D | 9391 | (n.a.) | (n.a.) |

2.7.3. Test Result

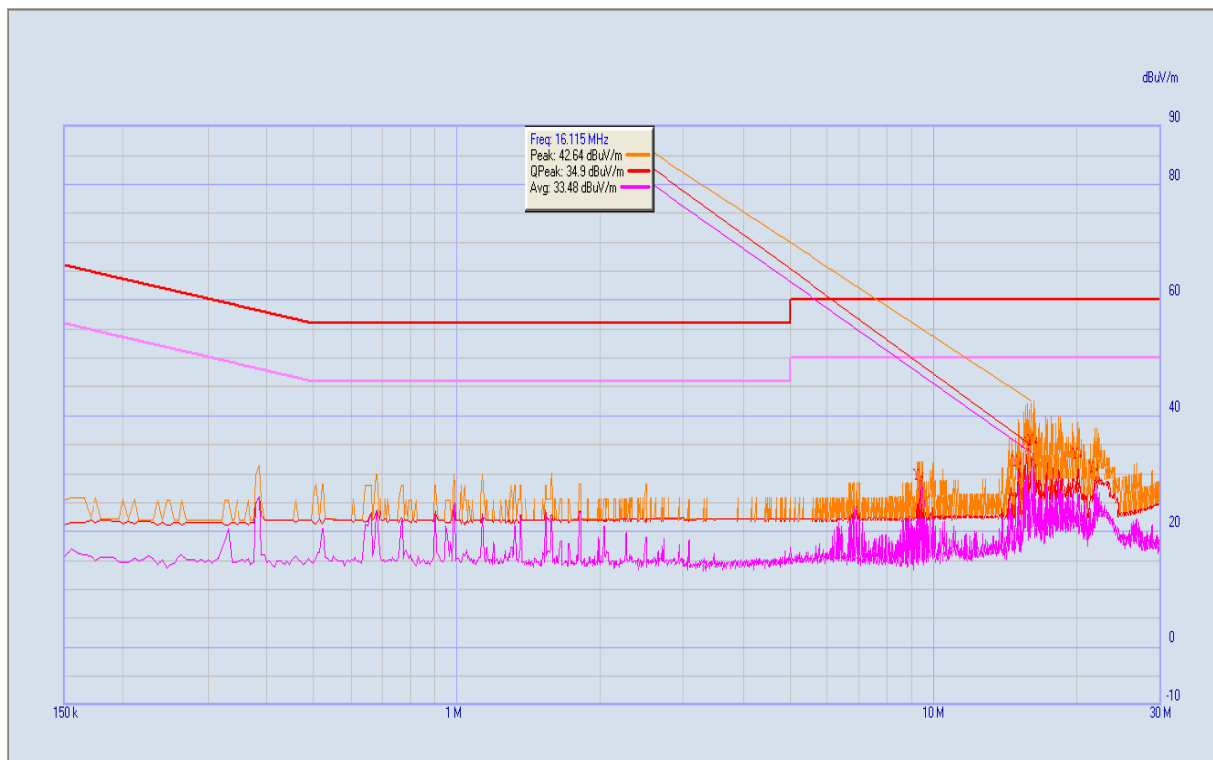
A. Test setup:

The EUT configuration of the emission tests is EUT+ Link.

B. Test Plots:



(Plot A: L Phase)



(Plot B: N Phase)

2.8. Radiated Emission

2.8.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ($\mu\text{V/m}$) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

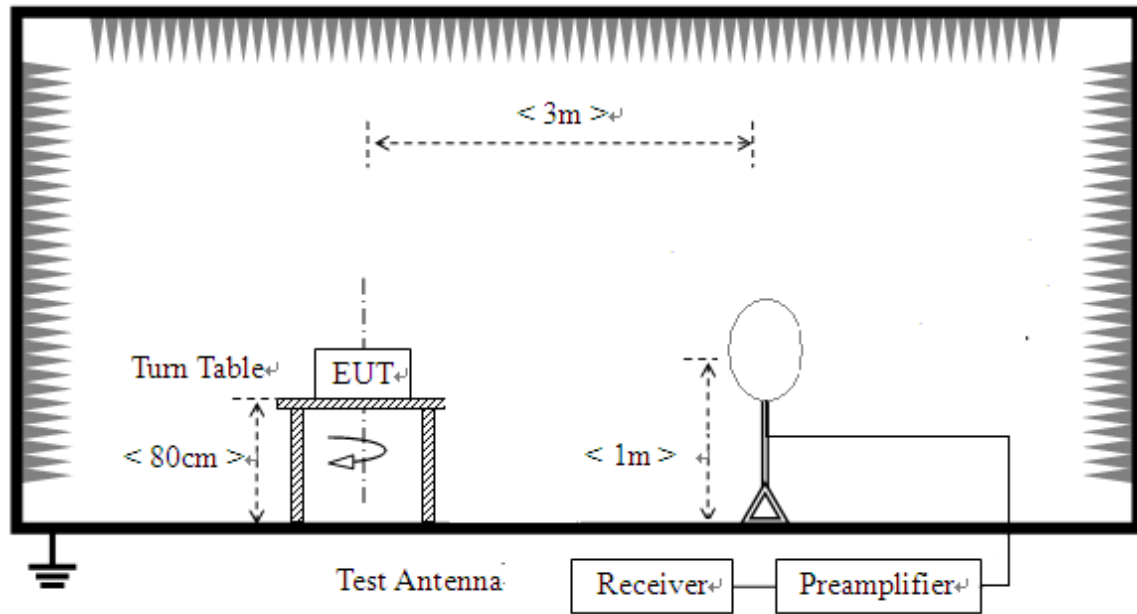
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

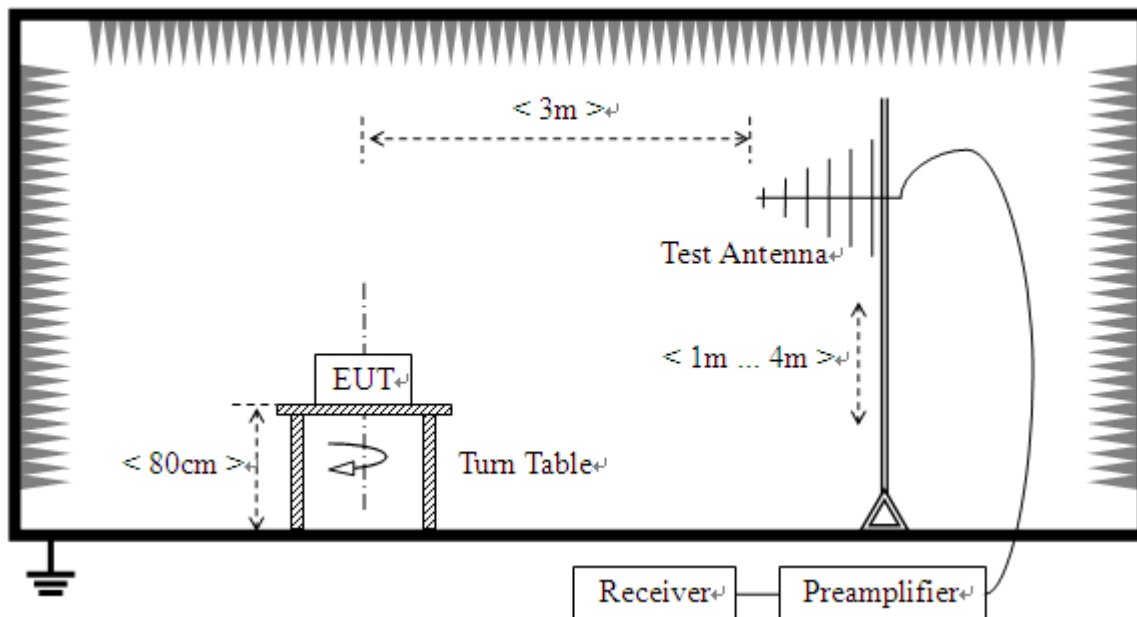
2.8.2. Test Description

A. Test Setup:

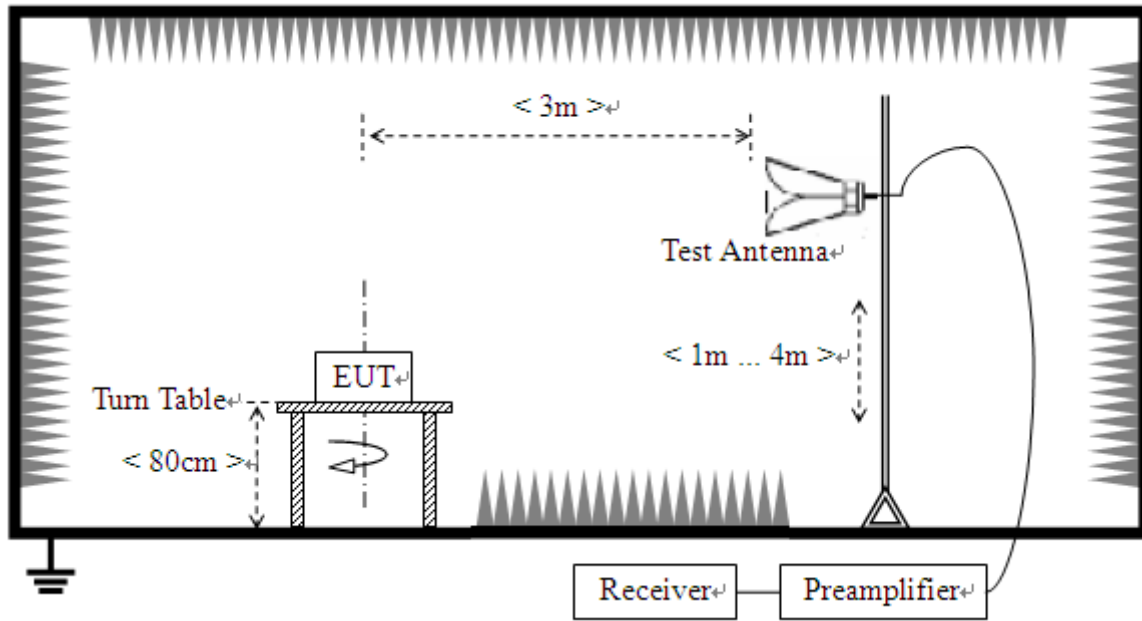
- 1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

For the Test Antenna:

- In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 2GHz) and Horn Test Antenna (above 2GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-----------------------|--------------|------------|------------|------------|------------|
| System Simulator | R&S | CMU200 | 100448 | 2012.05.12 | 2013.05.11 |
| Receiver | Agilent | E7405A | US44210471 | 2012.05.12 | 2013.05.11 |
| Full-Anechoic Chamber | Albatross | 9m*6m*6m | (n.a.) | 2012.05.12 | 2014.05.11 |
| Test Antenna - Bi-Log | Schwarzbeck | VULB 9163 | 9163-274 | 2012.05.12 | 2013.05.11 |
| Test Antenna - Horn | Schwarzbeck | BBHA 9120D | 9120C-963 | 2012.05.12 | 2013.05.11 |
| Test Antenna - Horn | R&S | HL050S7 | 71688 | 2012.05.12 | 2013.05.11 |
| Test Antenna -Loop | Schwarzbeck | FMZB 1519 | 1519-022 | 2012.05.12 | 2013.05.11 |

2.8.3. Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$$E \text{ [dB } \mu \text{ V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

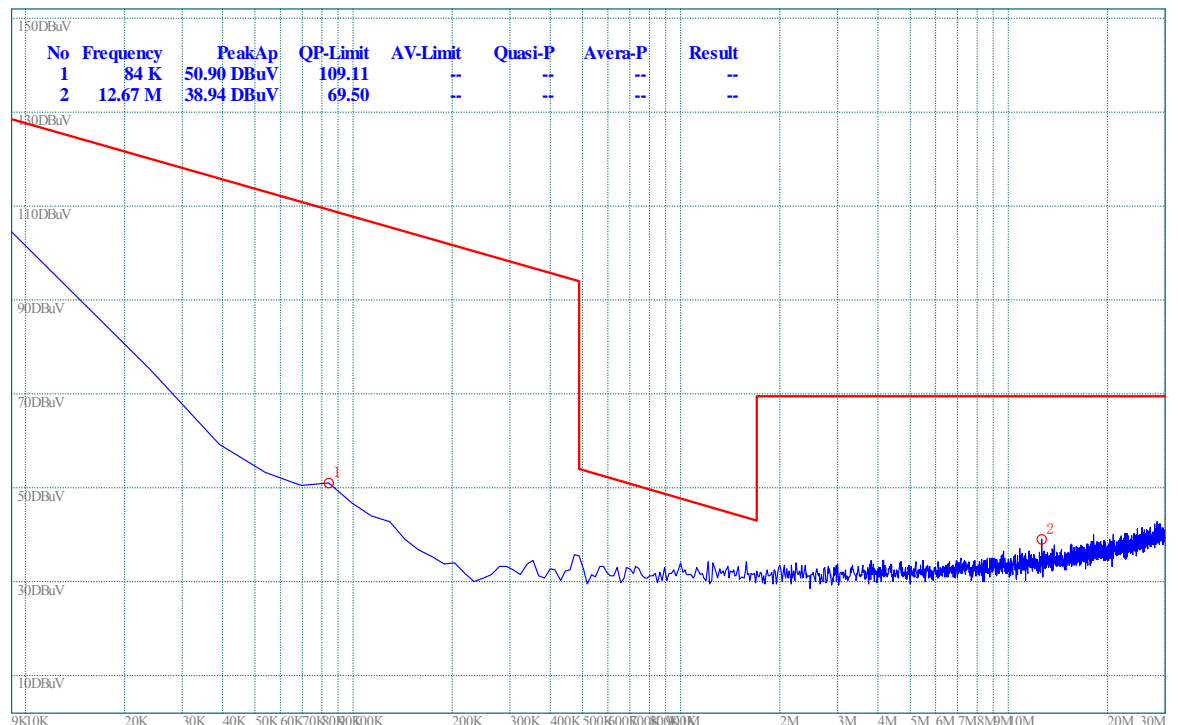
During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

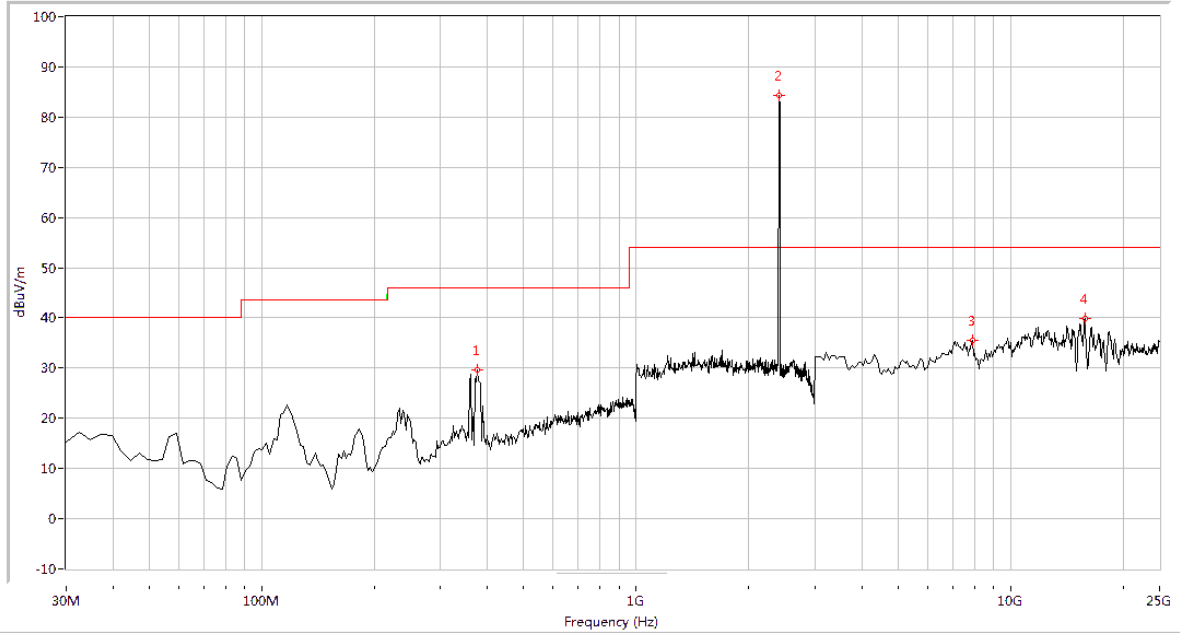
2.8.3.1. 802.11n-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

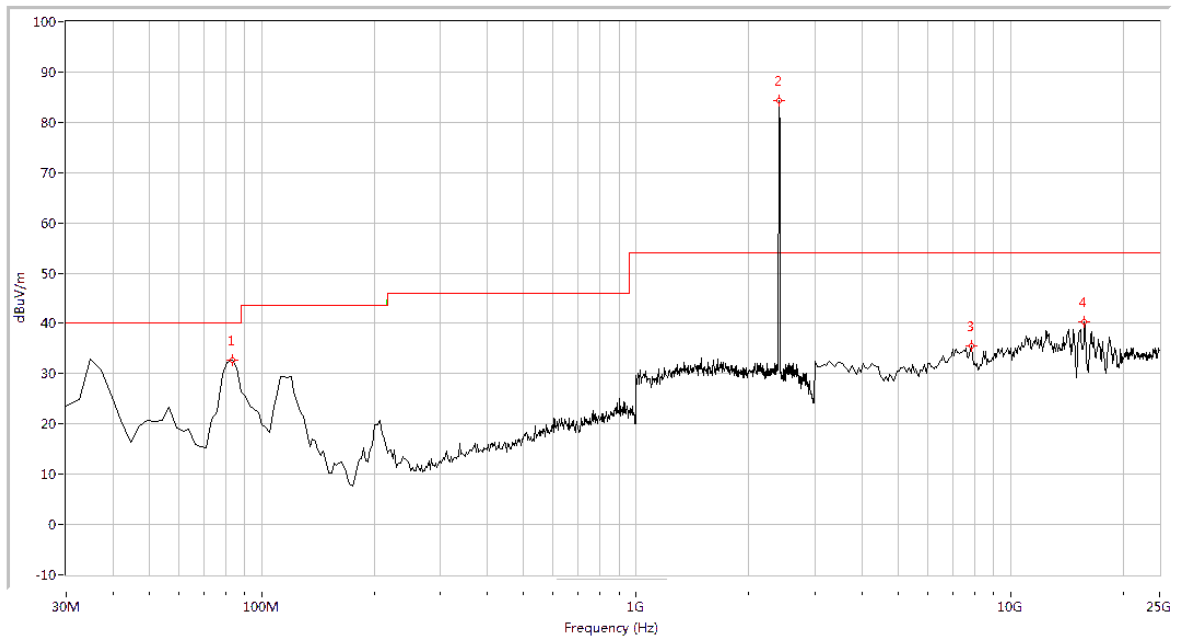


(Plot G.1: 9kHz to 30MHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|------------|---------|
| 375.910 | 29.54 | N.A | N.A | N.A | 46.0 | N.A | Horizontal | PASS |
| 2412.000 | 84.33 | N.A | N.A | N.A | N.A | N.A | Horizontal | N.A |
| 7937.656 | 35.44 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |
| 15783.042 | 39.91 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |

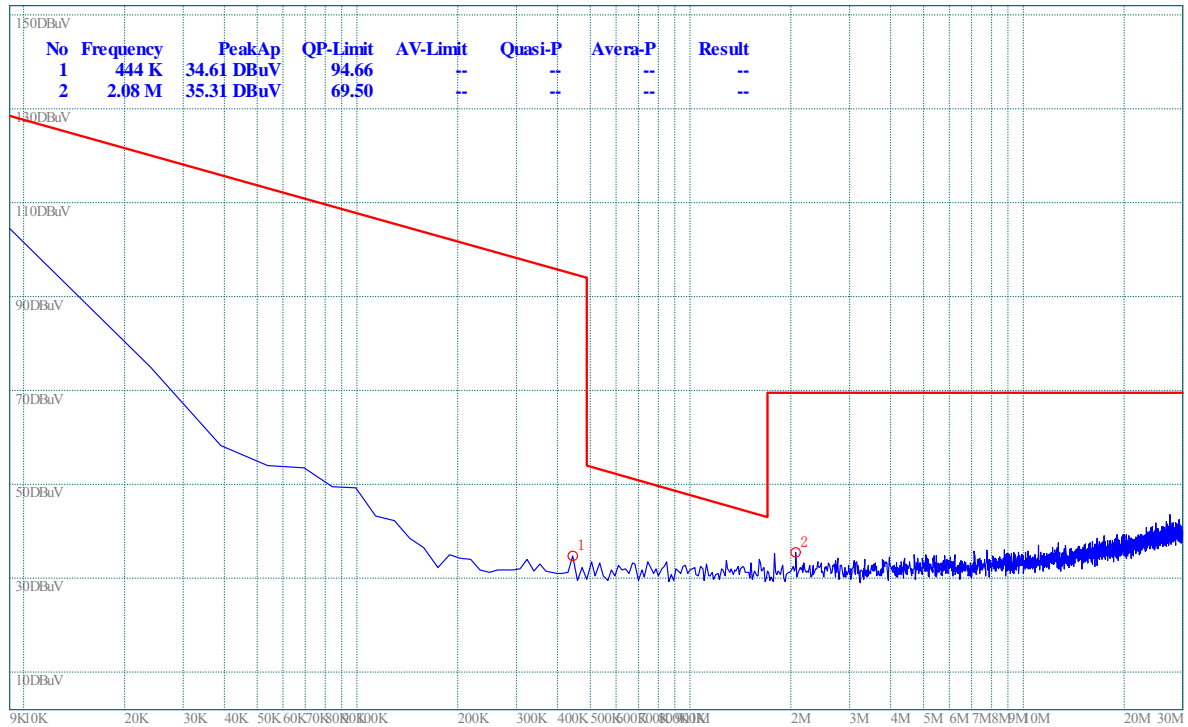
(Plot G.2: Antenna Horizontal, 30MHz to 25GHz)



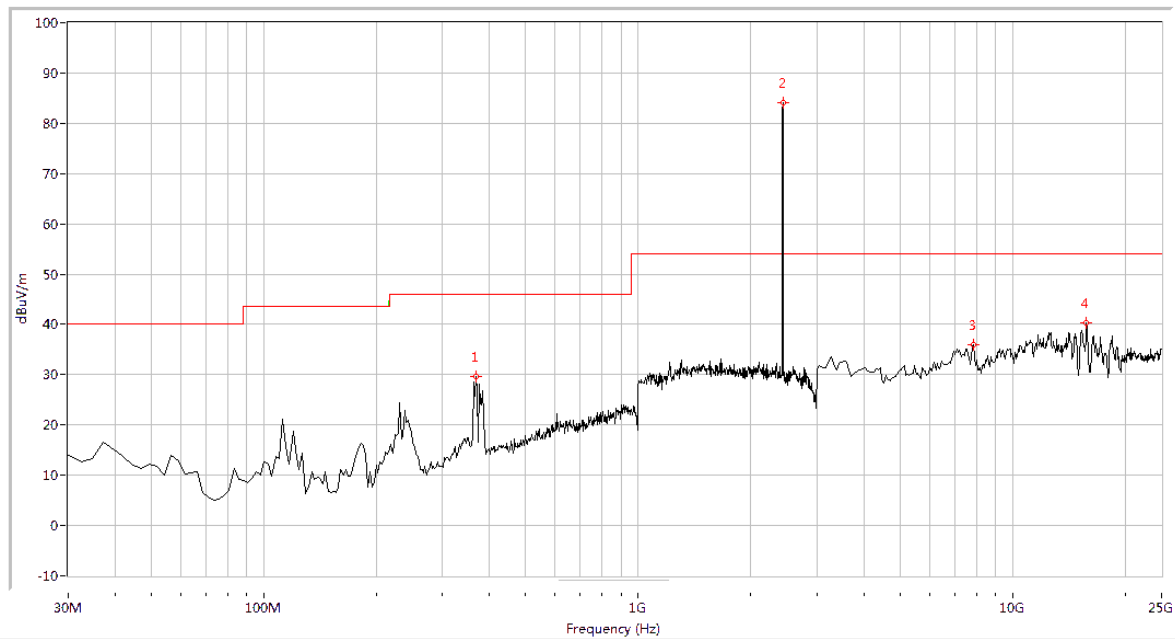
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|----------|---------|
| 83.217 | 32.70 | N.A | N.A | N.A | 40.0 | N.A | Vertical | PASS |
| 2412.000 | 84.32 | N.A | N.A | N.A | N.A | N.A | Vertical | N.A |
| 7882.793 | 35.58 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |
| 15728.180 | 40.29 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |

(Plot G.3: Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6

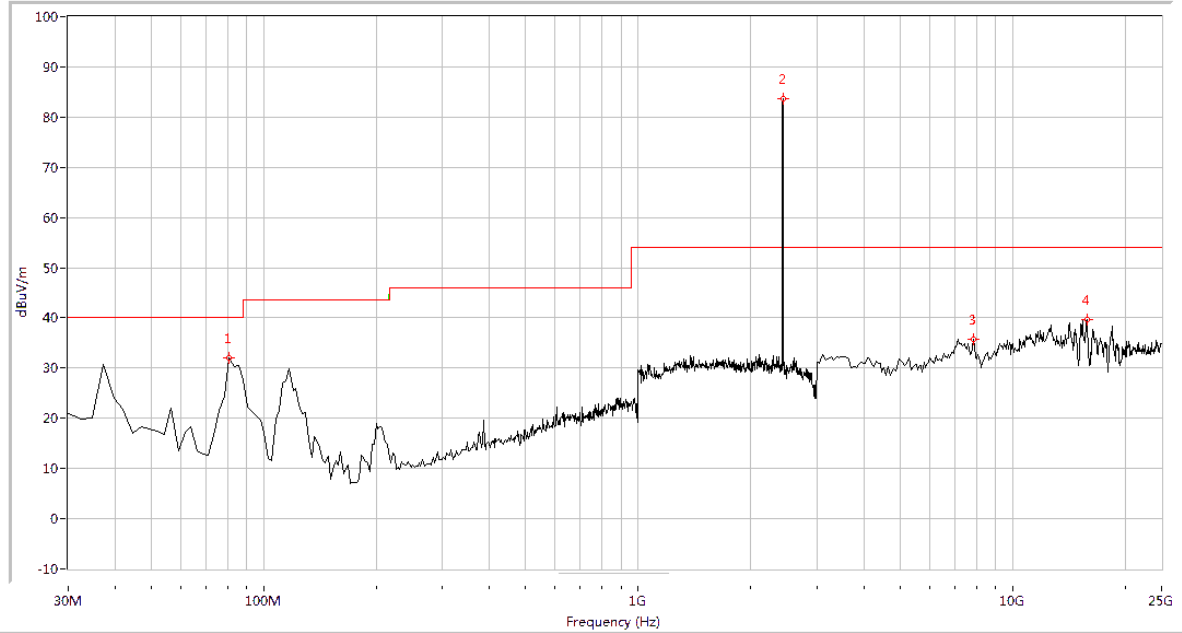


(Plot H.1: 9kHz to 30MHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|------------|---------|
| 368.653 | 29.56 | N.A | N.A | N.A | 46.0 | N.A | Horizontal | PASS |
| 2437.000 | 84.18 | N.A | N.A | N.A | N.A | N.A | Horizontal | N.A |
| 7882.793 | 35.90 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |
| 15728.180 | 40.33 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |

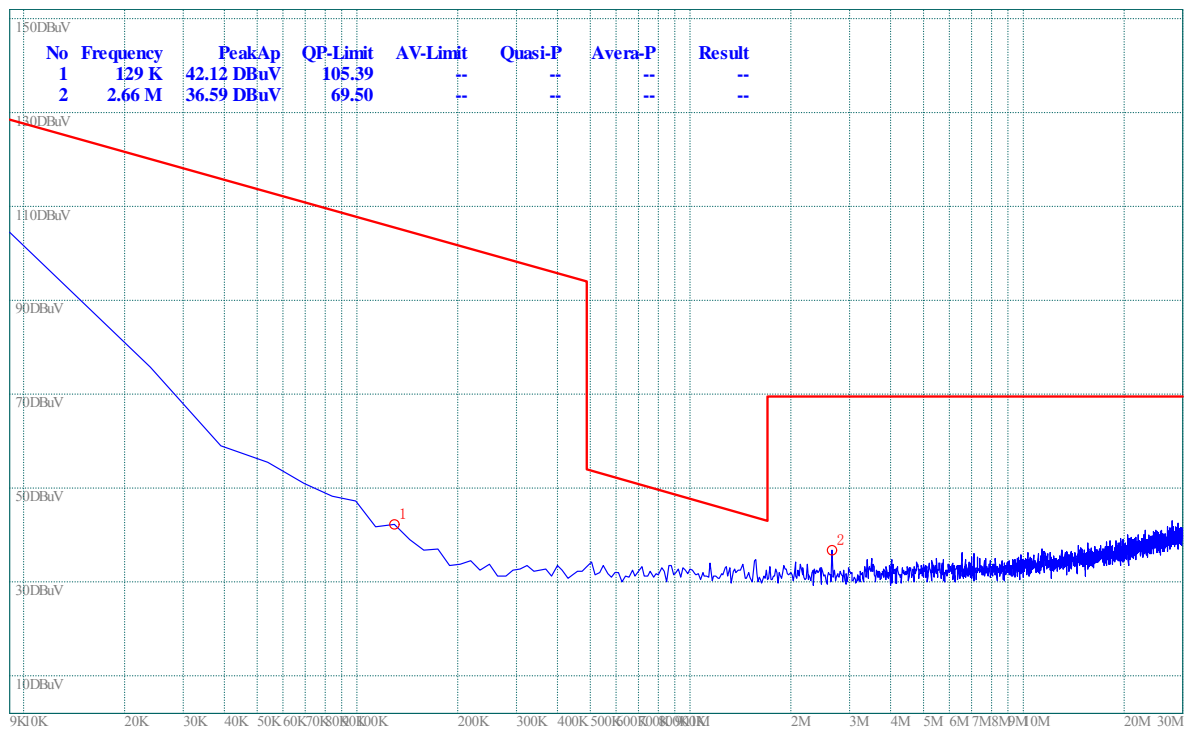
(Plot H.2: Antenna Horizontal, 30MHz to 25GHz)



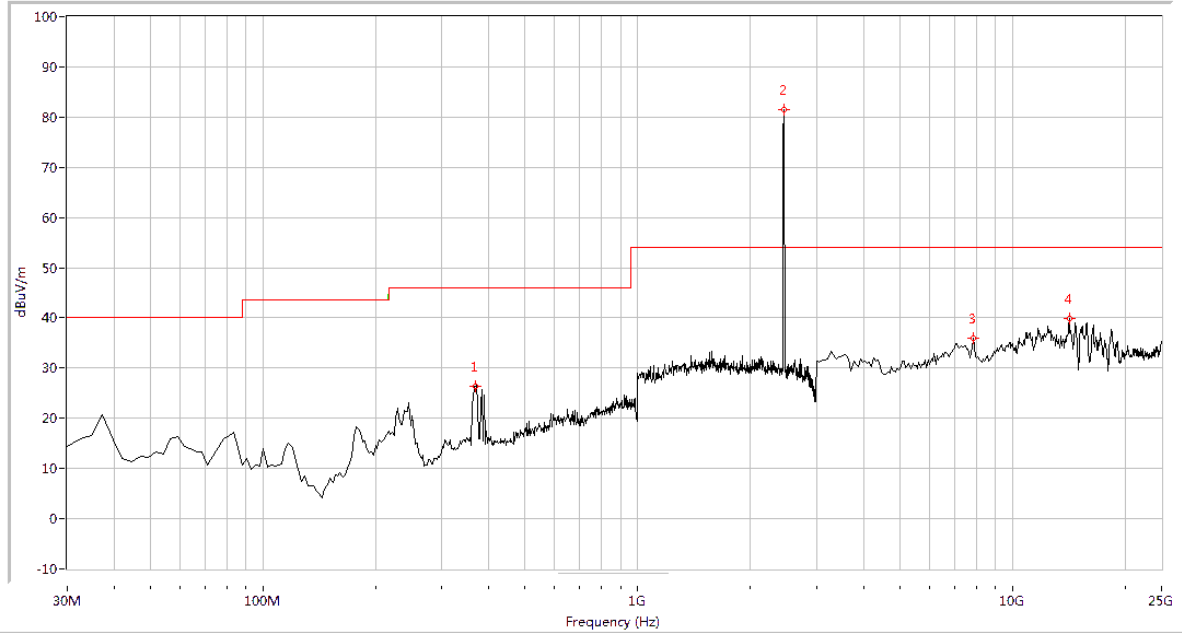
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|----------|---------|
| 80.798 | 32.04 | N.A | N.A | N.A | 40.0 | N.A | Vertical | PASS |
| 2437.000 | 83.61 | N.A | N.A | N.A | N.A | N.A | Vertical | N.A |
| 7882.793 | 35.70 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |
| 15783.042 | 39.72 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |

(Plot H.3: Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11

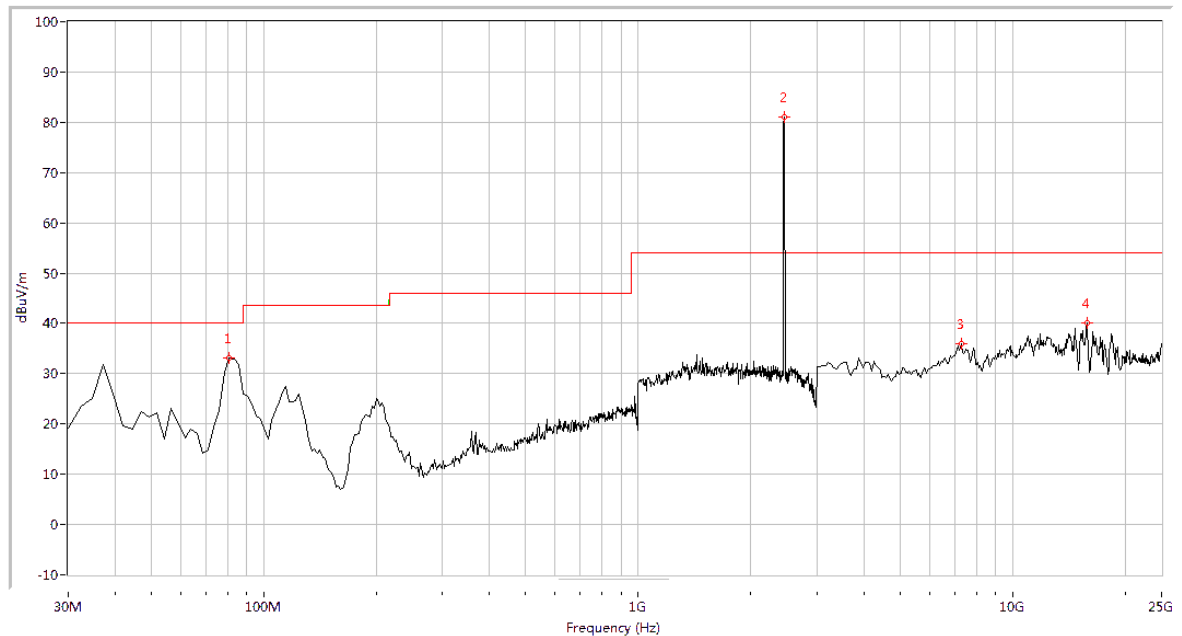


(Plot I.1: 9kHz to 30MHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|------------|---------|
| 368.653 | 26.42 | N.A | N.A | N.A | 46.0 | N.A | Horizontal | PASS |
| 2462.000 | 81.58 | N.A | N.A | N.A | N.A | N.A | Horizontal | N.A |
| 7882.793 | 35.88 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |
| 14192.020 | 39.86 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |

(Plot I.2: Antenna Horizontal, 30MHz to 25GHz)



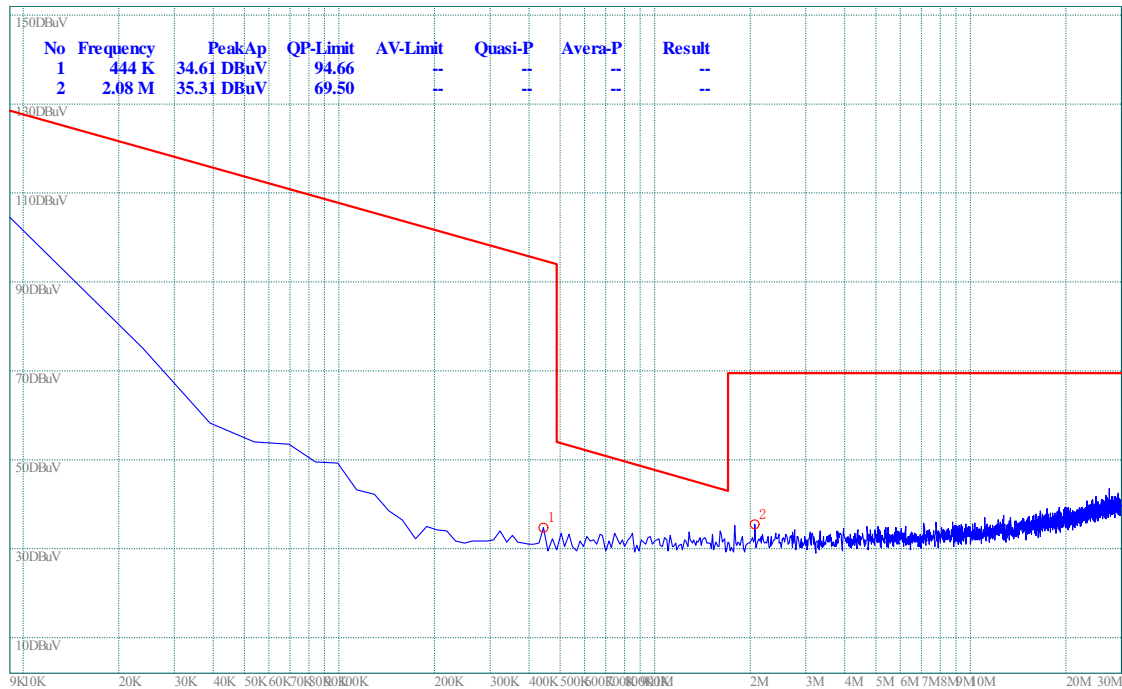
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|----------|---------|
| 80.798 | 33.02 | N.A | N.A | N.A | 40.0 | N.A | Vertical | PASS |
| 2462.000 | 81.10 | N.A | N.A | N.A | N.A | N.A | Vertical | N.A |
| 7279.302 | 35.97 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |
| 15783.042 | 40.15 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |

(Plot I.3: Antenna Vertical, 30MHz to 25GHz)

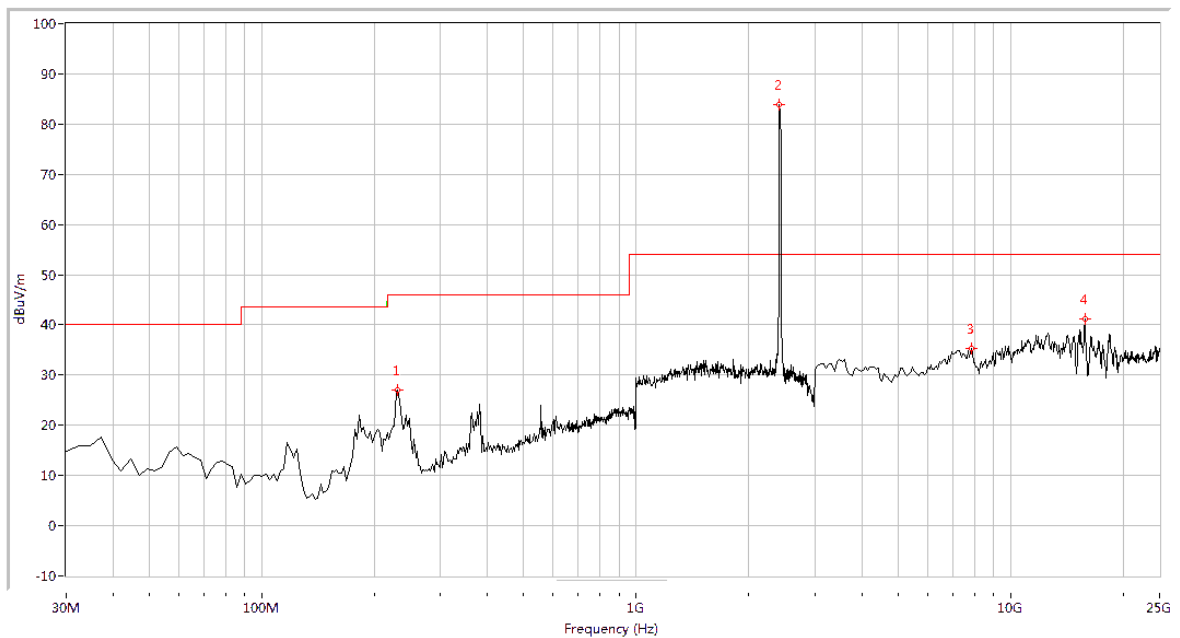
2.8.3.2. 802.11n-40MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 3

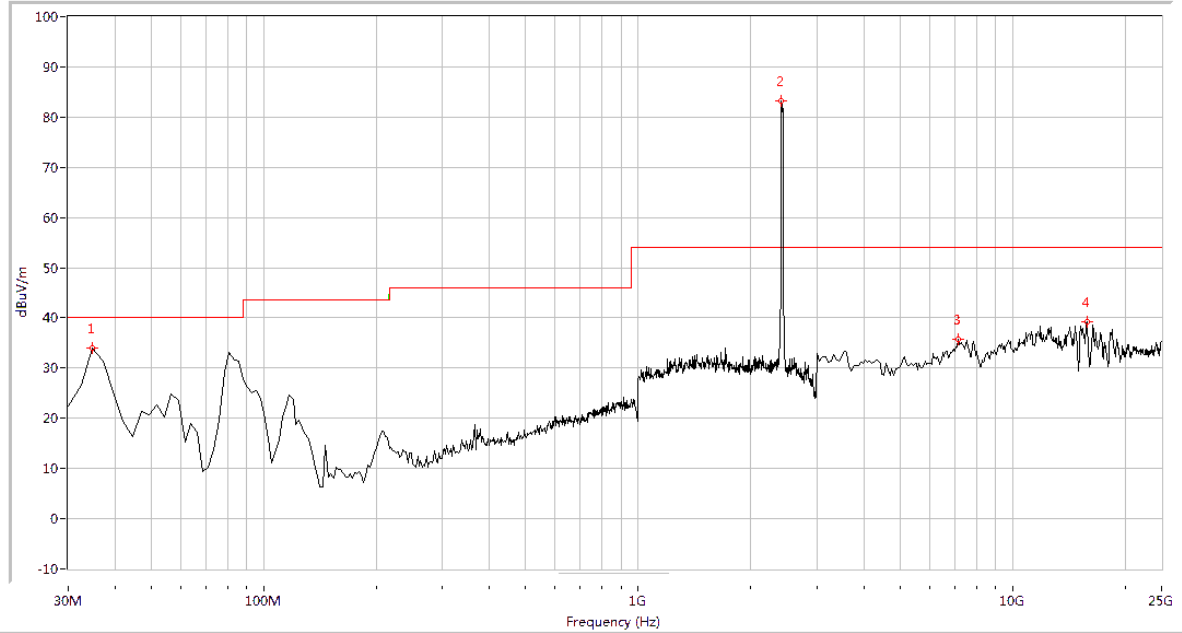


(Plot A.1: 9kHz to 30MHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|------------|---------|
| 230.773 | 26.93 | N.A | N.A | N.A | 46.0 | N.A | Horizontal | PASS |
| 2422.000 | 83.89 | N.A | N.A | N.A | N.A | N.A | Horizontal | N.A |
| 7882.793 | 35.26 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |
| 15783.042 | 41.16 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |

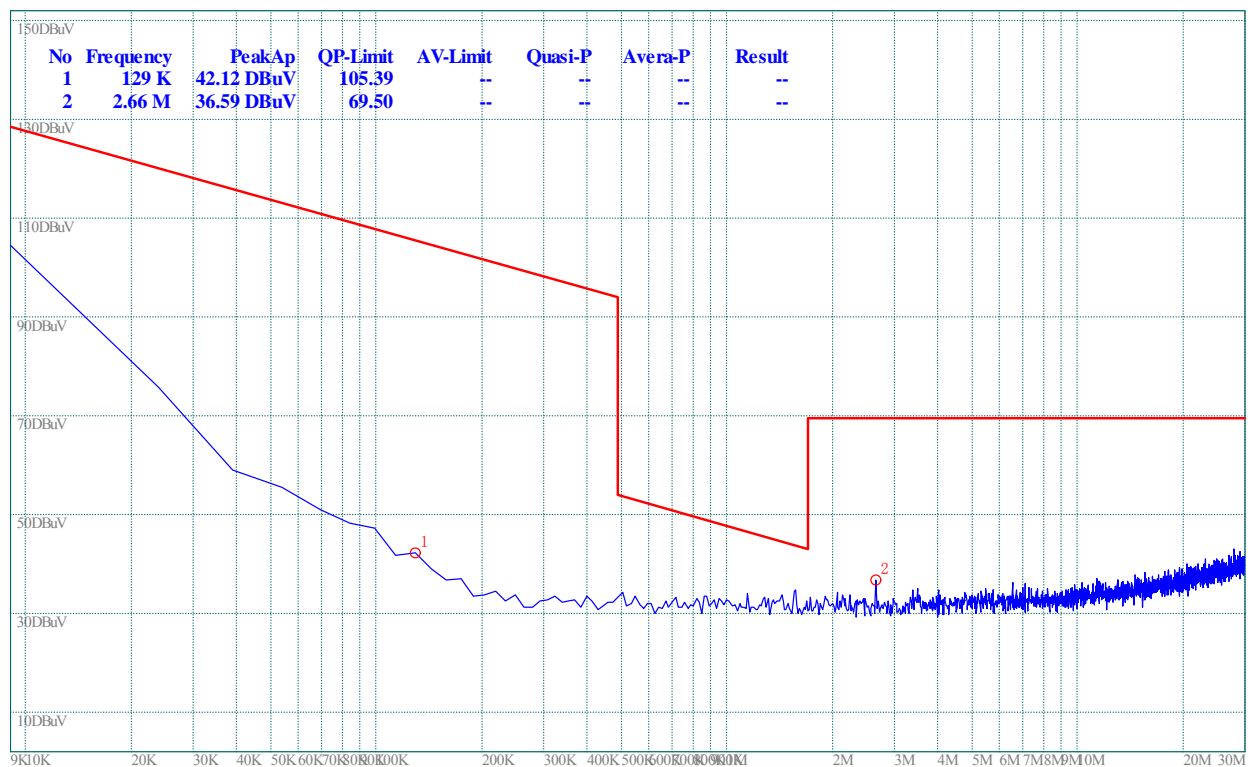
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



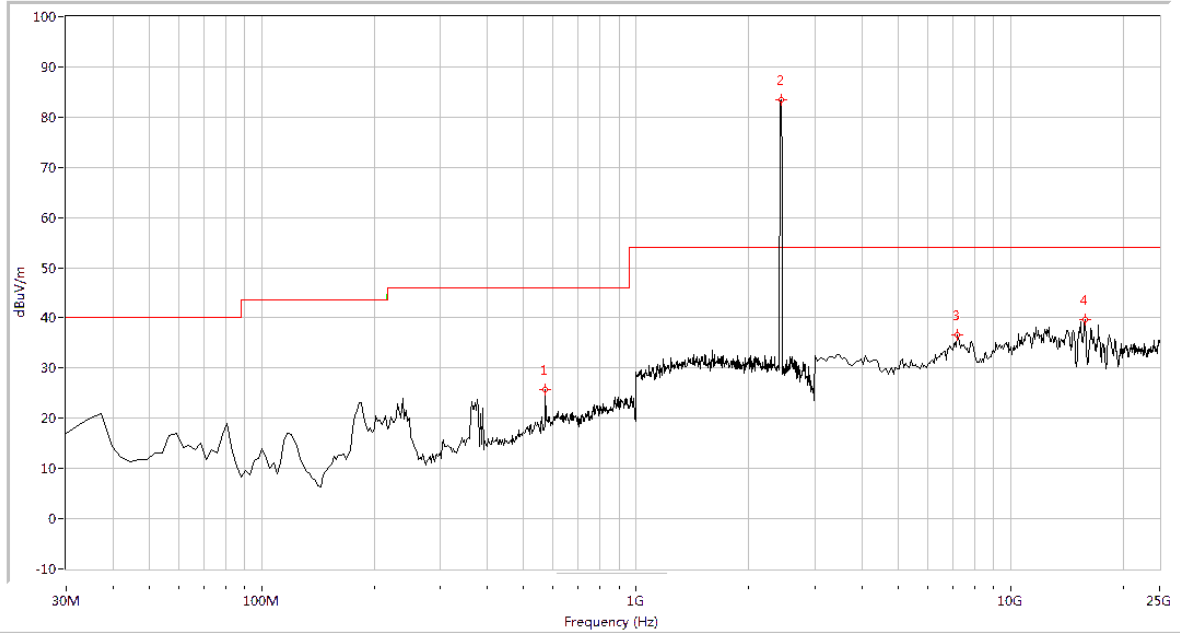
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|----------|---------|
| 34.838 | 34.11 | N.A | N.A | N.A | 40.0 | N.A | Vertical | PASS |
| 2422.000 | 83.26 | N.A | N.A | N.A | N.A | N.A | Vertical | N.A |
| 7169.576 | 35.76 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |
| 15783.042 | 39.22 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |

(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 6

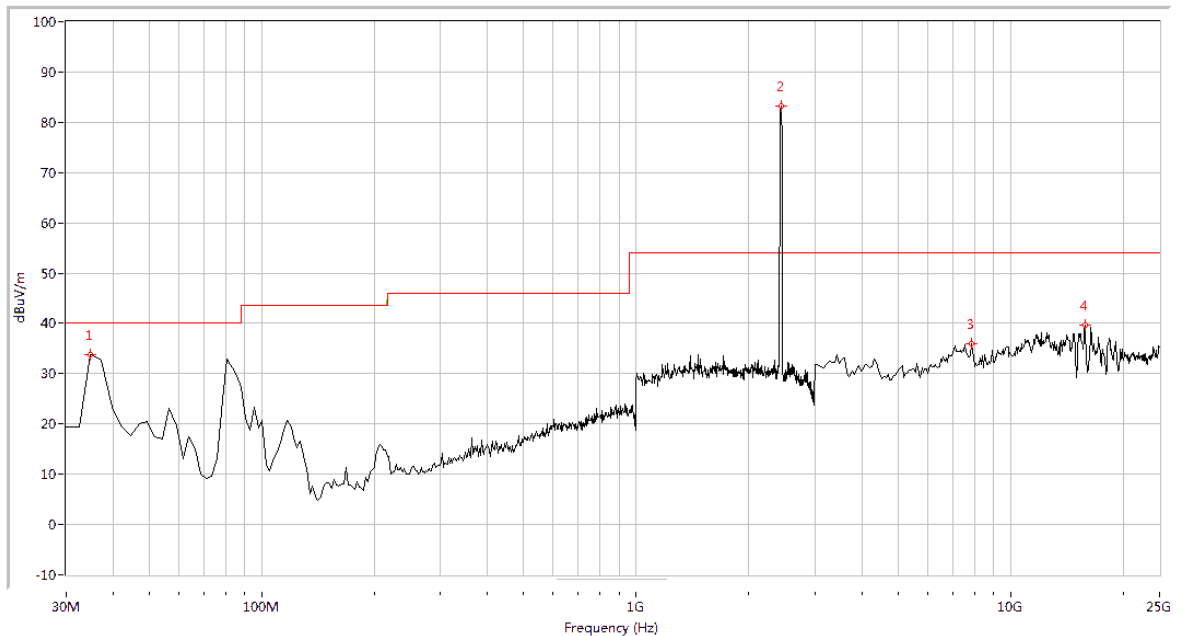


(Plot B.1: 9kHz to 30MHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|------------|---------|
| 571.845 | 25.73 | N.A | N.A | N.A | 46.0 | N.A | Horizontal | PASS |
| 2437.000 | 83.36 | N.A | N.A | 83.36 | N.A | 83.36 | Horizontal | 83.36 |
| 7224.439 | 36.60 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |
| 15783.042 | 39.57 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |

(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



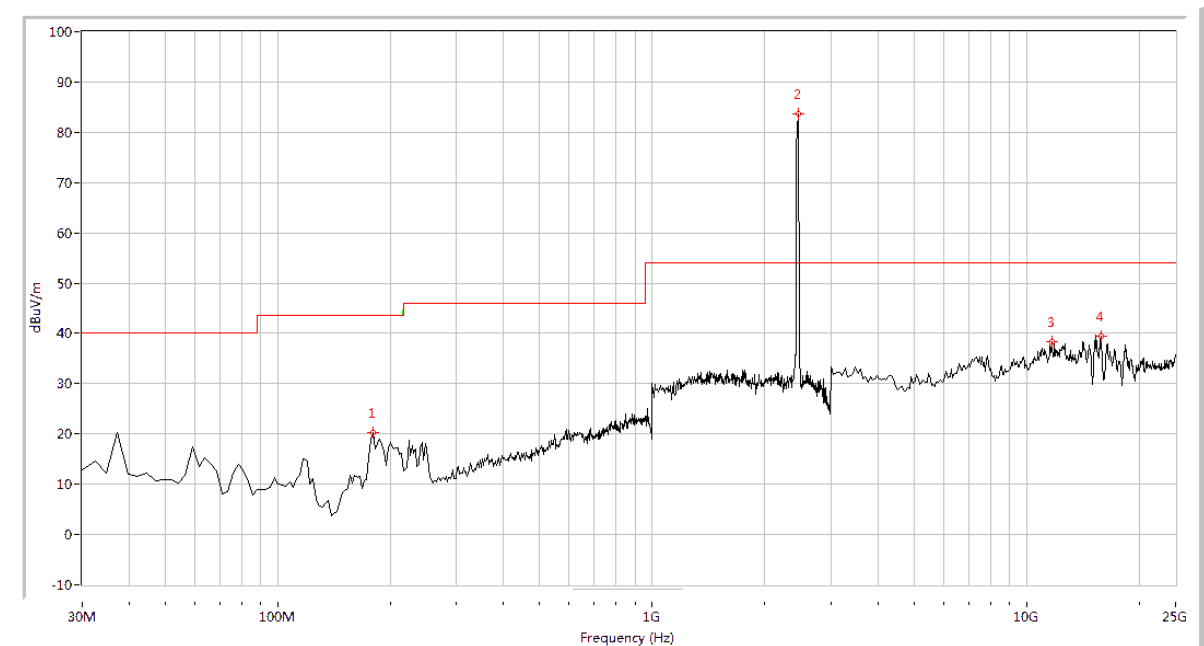
| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|----------|---------|
| 34.838 | 33.71 | N.A | N.A | N.A | 40.0 | N.A | Vertical | PASS |
| 2437.000 | 83.19 | N.A | N.A | N.A | N.A | N.A | Vertical | N.A |
| 7882.793 | 35.98 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |
| 15783.042 | 39.57 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |

(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 9

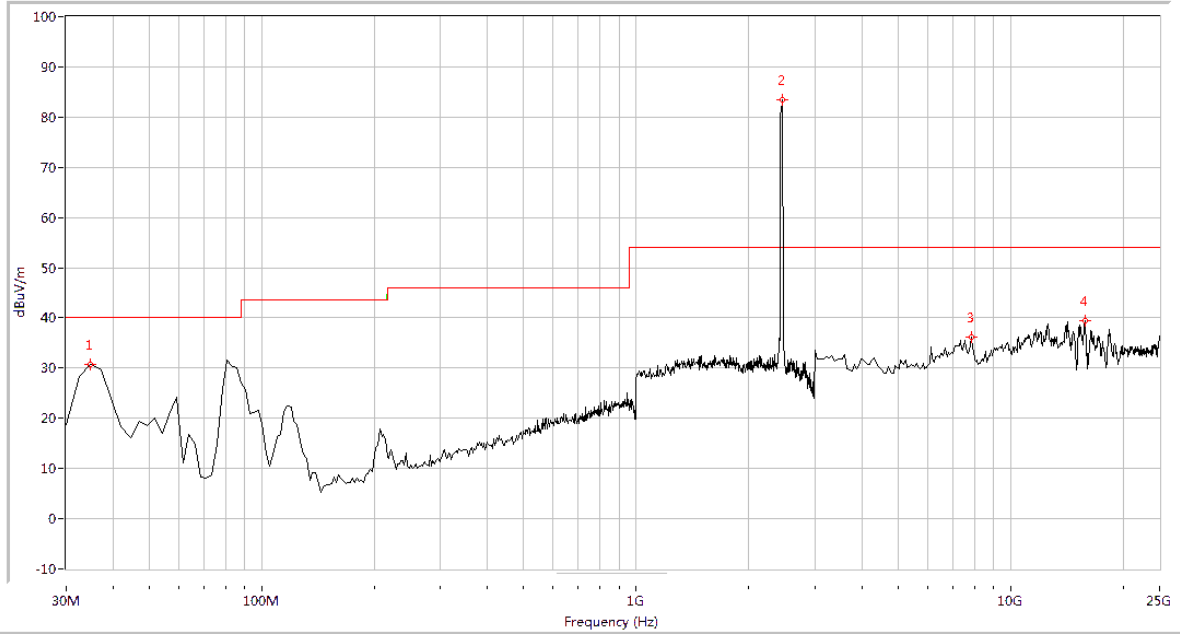


(Plot C.1: 9kHz to 30MHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|------------|---------|
| 179.975 | 20.30 | N.A | N.A | N.A | 43.5 | N.A | Horizontal | PASS |
| 2452.000 | 83.76 | N.A | N.A | N.A | N.A | N.A | Horizontal | N.A |
| 11668.329 | 38.31 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |
| 15783.042 | 39.43 | N.A | N.A | 74.0 | N.A | 54.0 | Horizontal | PASS |

(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



| Fre. (MHz) | Pk | QP | AV | Limit-PK | Limit-QP | Limit-AV | Antenna | Verdict |
|------------|-------|-----|-----|----------|----------|----------|----------|---------|
| 34.838 | 30.77 | N.A | N.A | N.A | 40.0 | N.A | Vertical | PASS |
| 2452.000 | 83.46 | N.A | N.A | N.A | N.A | N.A | Vertical | N.A |
| 7882.793 | 36.25 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |
| 15783.042 | 39.37 | N.A | N.A | 74.0 | N.A | 54.0 | Vertical | PASS |

(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

2.9. RF exposure evaluation

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4 \pi R^2}$$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

2.9.1. Limits for Maximum Permissible Exposure

According to FCC Part 1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the commission's guidelines.

According to FCC Part 1.1310 RF exposure is calculated.

| Limits for General Population/ Uncontrolled Exposure | | | |
|--|------------------------------------|-------------------------------------|---|
| Frequency Range (MHz) | Electric Field Strength(E)(V/m) | Magnetic Field Strength (H)(A/m) | Power Density (S)(mW/cm ²) |
| 0.3-1.34 | 614 | 1.63 | (100)* |
| 1.34-30 | 824/f | 2.19/f | (180/f ²)* |
| 30-300 | 27.5 | 0.073 | 0.2 |
| 300-1500 | | | f/1500 |
| 1500-100,000 | | | 1.0 |

2.9.1.1. Test result

| | |
|--|---------|
| Maximum peak output power at antenna input terminal(dBm): | 11.65 |
| Maximum peak output power at antenna input terminal(mW): | 14.622 |
| Source-based time-averaged output power: | -- |
| Prediction distance(cm): | 20 |
| Predication frequency(MHz): | 2412 |
| Antenna Gain (typical) (dBi): | 0.6 |
| Power density at predication frequency at <u>20</u> cm(mW/cm ²): | 0.00334 |
| MPE limit for RF exposure at prediction frequency(mW/cm ²): | 1.0 |

2.9.2. Conclusion

Since the test result is passed, the SAR measurement is not required.

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