# EMC
# TEST REPORT

**Report No.** : **150400021TWN-001**
**Model No.** : **NBG6515**
**Issued Date** : **May 06, 2015**

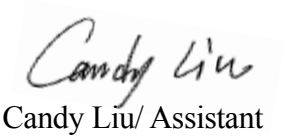
**Applicant:** **ZyXEL Communications Corporation**
**No.2, Gongye E. 9th Road, Hsinchu Science Park, Hsinchu, Taiwan**

**Test Method/ Standard:** **47 CFR FCC Part 15.247 & ANSI C63.10 2013**
**KDB 558074 D01 v03r02**
**KDB 662911 D01 v02r01**

**Registration No.:** **: 93910**
**Test By:** **Intertek Testing Services Taiwan Ltd.**
**No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan**

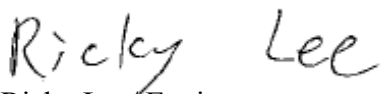


**The test report was prepared by:**



Candy Liu/ Assistant

**These measurements were taken by:**



Ricky Lee/ Engineer

**The test report was reviewed by:**

**Name** Jimmy Yang
**Title** Senior Engineer

# Revision History

| Report No. | Issue Date | Revision Summary |
|---|---|---|
| 150400021TWN-001 | May 06, 2015 | Original report |

# Table of Contents

# 1. Summary of Test Data

| Test Requirement | Applicable Rule (Section 15.247) | Result |
|---|---|---|
| Minimum 6 dB Bandwidth | 15.247(a)(2) | Pass |
| Maximum Peak Conducted Output Power | 15.247(b)(3) | Pass |
| Power Spectral Density | 15.247(e) | Pass |
| Emissions In Non-Restricted Frequency Bands | 15.247(d) | Pass |
| Emissions In Restricted Frequency Bands (Radiated emission measurements) | 15.247(d), 15.205, 15.209 | Pass |
| Emission On The Band Edge | 15.247(d), 15.205 | Pass |
| AC Power Line Conducted Emission | 15.207 | Pass |
| Antenna Requirement | 15.203 | Pass |

# 2. General Information

## 2.1 Identification of the EUT

| | |
|---|---|
| Product: | AC750 Dual-Band Wireless Gigabit Router |
| Model No: | NBG6515 |
| FCC ID: | I88NBG6515 |
| Manufacturer: | ZyXEL Communications Corporation |
| Address: | No.2, Gongye E. 9th Road, Hsinchu Science Park, Hsinchu, Taiwan |
| Operating Frequency: | 1. 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20<br>2. 2422 MHz ~ 2452 MHz for 802.11n HT40 |
| Channel Number: | 1. 11 channels for 2412 MHz ~ 2462 MHz<br>2. 7 channels for 2422 MHz ~ 2452 MHz |
| Frequency of Each Channel: | 1. 2412+5 k, k＝0 ~ 10 for 802.11b, 802.11g, 802.11n HT20<br>2. 2422+5 k, k＝0~6 for 802.11n HT40 |
| Access scheme: | DSSS, OFDM |
| Rated Power: | DC 12 V from adapter |
| Power Cord: | N/A |
| Sample Received: | Mar. 23, 2015 |
| Test Date(s): | Apr. 02, 2015 ~ May 06, 2015 |
| Note 1: | This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. |
| Note 2: | When determining the test conclusion, the Measurement Uncertainty of test has been considered. |

## 2.2 Adapter information

The EUT will be supplied with a power supply from below list:

| No. | Brand | Model no. | Specification |
|---|---|---|---|
| Adapter | APD | WA-12M12FU | I/P: 100-240Vac, 50-60Hz, 0.5A<br>O/P: 12Vdc, 1A |

## 2.3 Description of EUT

| Modulation mode | Transmit path | |
|---|---|---|
| | Chain 0/Main | Chain 1/Aux |
| 802.11b | V | X |
| 802.11g | V | X |
| 802.11 n (HT20) | V | V |
| 802.11 n (HT40) | V | V |

## 2.4 Antenna description

(1). Antenna 1

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 3.0 dBi for 2.4GHz
Antenna Type : Dipole Antenna
Connector Type : I-pex

(2). Antenna 2

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

| | |
|---|---|
| Antenna Gain | : 3.0 dBi for 2.4GHz |
| Antenna Type | : Dipole Antenna |
| Connector Type | : I-pex |

**2.5 Additional information of EUT**

Product SW & HW version : 1.00(AAXS.0)C0
Test SW Version : MT7620 QA V1.0.6.0

**2.6 Peripherals equipment**

| Peripherals | Brand | Model No. | Serial No. | Data cable |
|---|---|---|---|---|
| Notebook PC | DELL | Latitude D610 | 4YWZK1S | RJ-45 STP Cat.5 1 meter × 1 |
| USB Disk | SanDisk | CZ33 | N/A | USB Cable 0.2 meter × 1 |

**2.7 Operation mode**

The EUT was supplied with DC 12 V from adapter (Test voltage: 120 Vac, 60 Hz) and the TX mode is based on a specific test program “MT7620 QA V1.0.6.0”, and the program can select different frequency and modulation.

With individual verifying, the maximum output power were found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n(HT20) mode and 13.5 Mbps data rate for 802.11n(HT40) mode, the final tests were executed under these conditions recorded in this report individually.

The final tests were executed under these conditions recorded in this report individually.

| **802.11b ch6 chain0** | | **802.11g ch6 chain0** | |
|---|---|---|---|
| **Data rate (Mbps)** | **AV (dBm)** | **Data rate (Mbps)** | **AV (dBm)** |
| 1 | 20.56 | 6 | 19.87 |
| 2 | 20.3 | 9 | 19.53 |
| 5.5 | 20.28 | 12 | 18.83 |
| 11 | 20.25 | 18 | 18.15 |
| - | | 24 | 16.63 |
| - | | 36 | 16.48 |
| - | | 48 | 15.6 |
| - | | 54 | 15.52 |

| 802.11n HT20 ch6 chain0 | | 802.11n HT20 ch6 chain1 | | 802.11n HT20 ch6 chain1+chain0 | |
|---|---|---|---|---|---|
| Data rate (Mbps) | AV (dBm) | Data rate (Mbps) | AV (dBm) | Data rate (Mbps) | AV (dBm) |
| MCS0 | 21.37 | MCS0 | 19.6 | MCS0 | 23.58 |
| MCS1 | 21.31 | MCS1 | 19.08 | MCS1 | 23.35 |
| MCS2 | 20.68 | MCS2 | 18.24 | MCS2 | 22.64 |
| MCS3 | 20.63 | MCS3 | 18.17 | MCS3 | 22.47 |
| MCS4 | 18.78 | MCS4 | 16.63 | MCS4 | 20.87 |
| MCS5 | 18.72 | MCS5 | 16.54 | MCS5 | 20.62 |
| MCS6 | 17.77 | MCS6 | 15.63 | MCS6 | 19.91 |
| MCS7 | 17.71 | MCS7 | 15.57 | MCS7 | 19.77 |

| 802.11n HT40 ch6 chain0 | | 802.11n HT40 ch6 chain1 | | 802.11n HT40 ch6 chain1+chain0 | |
|---|---|---|---|---|---|
| Data rate (Mbps) | AV (dBm) | Data rate (Mbps) | AV (dBm) | Data rate (Mbps) | AV (dBm) |
| MCS0 | 20.44 | MCS0 | 18.49 | MCS0 | 22.59 |
| MCS1 | 20.32 | MCS1 | 18.15 | MCS1 | 22.41 |
| MCS2 | 19.58 | MCS2 | 17.3 | MCS2 | 21.31 |
| MCS3 | 19.53 | MCS3 | 17.22 | MCS3 | 21.19 |
| MCS4 | 17.73 | MCS4 | 15.68 | MCS4 | 19.62 |
| MCS5 | 17.68 | MCS5 | 15.61 | MCS5 | 19.48 |
| MCS6 | 16.87 | MCS6 | 14.76 | MCS6 | 18.39 |
| MCS7 | 16.74 | MCS7 | 14.65 | MCS7 | 18.22 |

## 2.8 Applied test modes and channels

| Test items | Mode | Data Rate (Mbps) | Channel | Antenna |
|---|---|---|---|---|
| Minimum 6 dB Bandwidth | 802.11b | 1 | 1, 6 , 11 | Chain0 |
| | 802.11g | 6 | 1, 6, 11 | Chain0 |
| | 802.11n (HT20) | 6.5 | 1, 6, 11 | Chain0/Chain1 |
| | 802.11n (HT40) | 13.5 | 3, 6, 9 | Chain0/Chain1 |
| Maximum peak conducted output power | 802.11b | 1 | 1, 6 , 11 | Chain0 |
| | 802.11g | 6 | 1, 6, 11 | Chain0 |
| | 802.11n (HT20) | 6.5 | 1, 6, 11 | Chain0+Chain1 |
| | 802.11n (HT40) | 13.5 | 3, 6, 9 | Chain0+Chain1 |
| Power Spectral Density | 802.11b | 1 | 1, 6 , 11 | Chain0 |
| | 802.11g | 6 | 1, 6, 11 | Chain0 |
| | 802.11n (HT20) | 6.5 | 1, 6, 11 | Chain0+Chain1 |
| | 802.11n (HT40) | 13.5 | 3, 6, 9 | Chain0+Chain1 |
| RF Antenna Conducted Spurious | 802.11b | 1 | 1, 6 , 11 | Chain0 |
| | 802.11 g | 6 | 1, 6, 11 | Chain0 |
| | 802.11n (HT20) | 6.5 | 1, 6, 11 | Chain0/Chain1 |
| | 802.11n (HT40) | 13.5 | 3, 6, 9 | Chain0/Chain1 |
| Radiated spurious Emission 9kHz~1GHz | 802.11b | 1 | 6 | Chain0 |
| Radiated Spurious Emission 1GHz~10th Harmonic | 802.11b | 1 | 1, 6 , 11 | Chain0 |
| | 802.11g | 6 | 1, 6, 11 | Chain0 |
| | 802.11n (HT20) | 6.5 | 1, 6, 11 | Chain0+Chain1 |
| | 802.11n (HT40) | 13.5 | 3, 6, 9 | Chain0+Chain1 |
| Emission on the Band Edge | 802.11b | 1 | 1, 6 , 11 | Chain0 |
| | 802.11g | 6 | 1, 6, 11 | Chain0 |
| | 802.11n (HT20) | 6.5 | 1, 6, 11 | Chain0+Chain1 |
| | 802.11n (HT40) | 13.5 | 3, 6, 9 | Chain0+Chain1 |
| AC Power Line Conducted Emission | Normal Link | | | |

## 2.9 Power setting of test software

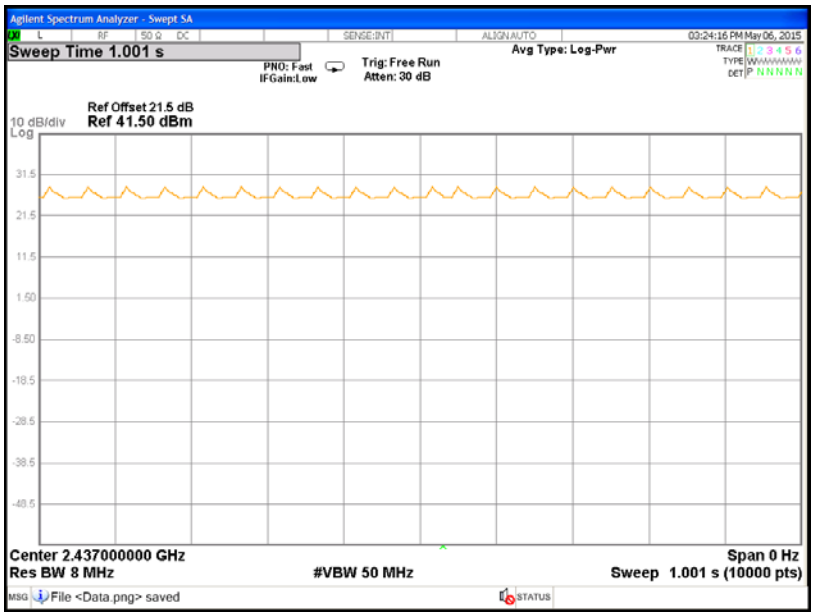
Channels & power setting software provided by the client was used to change the operating channels as well as the output power level and is going to be installed in the final end product.

| Mode | Software Version: MT7620 QA V1.0.6.0 | | |
|---|---|---|---|
| | Channel | Frequency(MHz) | Power setting |
| 802.11b (chain0) | 1 | 2412 | 1F |
| | 6 | 2437 | 20 |
| | 11 | 2462 | 1F |
| 802.11g (chain0) | 1 | 2412 | 1F |
| | 6 | 2437 | 1F |
| | 11 | 2462 | 1F |
| 802.11n (HT20) | 1 | 2412 | 15 |
| | 6 | 2437 | 21 |
| | 11 | 2462 | 15 |
| 802.11n (HT40) | 3 | 2422 | 15 |
| | 6 | 2437 | 1F |
| | 9 | 2452 | 15 |

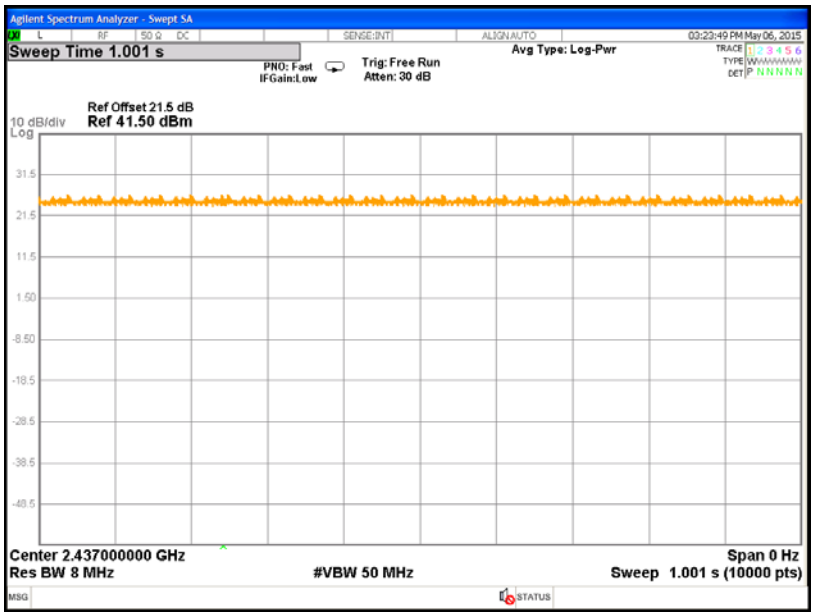
Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

| Mode | Channel | Frequency (MHz) | Data rate | Signal on time(s) | Total signal transmit time(s) | Duty cycle | Duty Cycle factor |
|---|---|---|---|---|---|---|---|
| 802.11b | 6 | 2437 | 1 | 1.001 | 1.001 | 1.000 | 0.000 |
| 802.11g | 6 | 2437 | 6 | 1.001 | 1.001 | 1.000 | 0.000 |
| 802.11n HT20 | 6 | 2437 | 6.5 | 1.001 | 1.001 | 1.000 | 0.000 |
| 802.11n HT40 | 6 | 2437 | 13 | 1.001 | 1.001 | 1.000 | 0.000 |

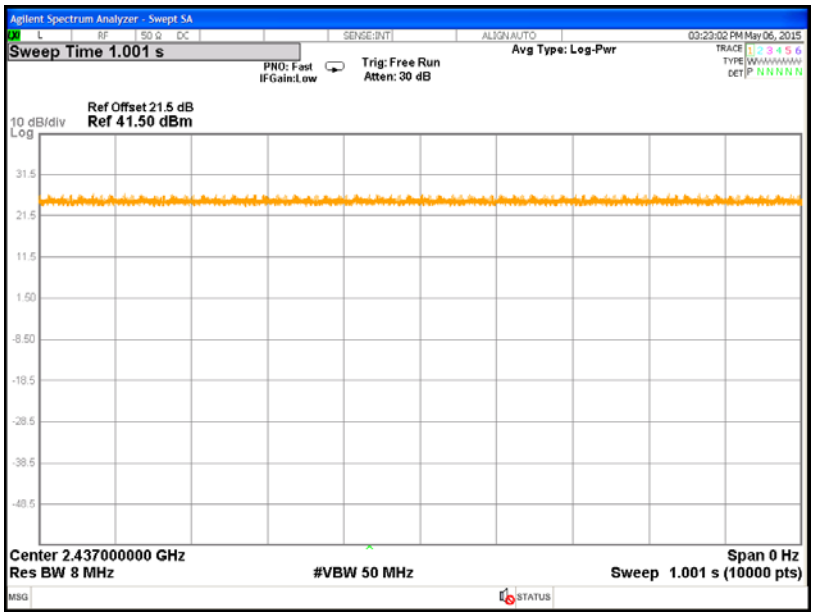
Duty Cycle @ 802.11b mode Ch 6



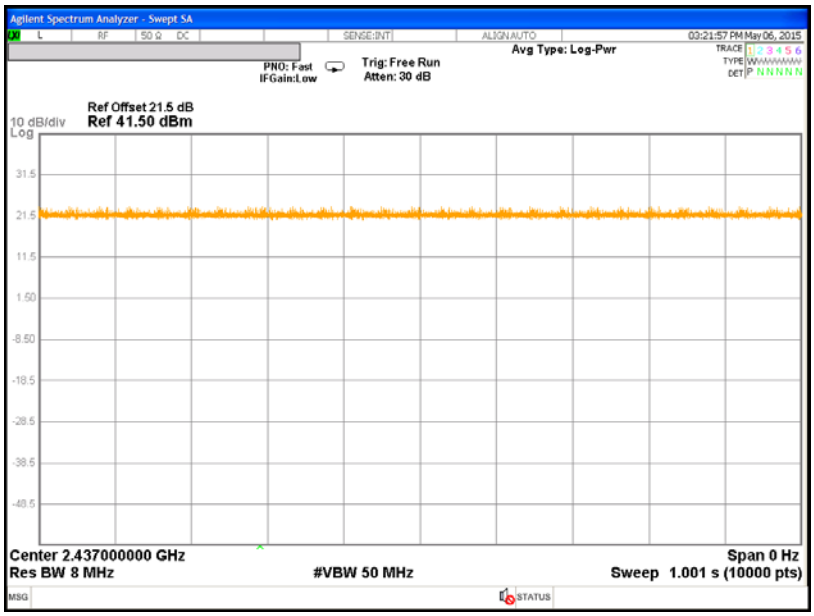

Duty Cycle @ 802.11g mode Ch 6



Duty Cycle @ 802.11n(HT20) mode Ch 6




Duty Cycle @ 802.11n(HT40) mode Ch 6



# 3. Minimum 6 dB Bandwidth

## 3.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Requirement & Test method | 15.247(a)(2)<br>KDB 558074 D01 v03r02 | |

## 3.2 Limit for minimum 6dB bandwidth

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

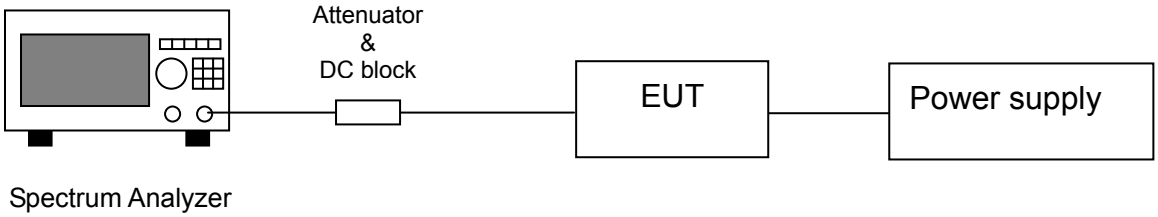
## 3.3 Measuring instrument setting

| Spectrum analyzer settings | |
|---|---|
| **Spectrum Analyzer function** | **Setting** |
| Detector | Peak |
| RBW | 100kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Trace | Allow the trace to stabilize. |
| Span | Between two times and five times the occupied bandwidth |
| Attenuation | Auto |

## 3.4 Test procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Test was performed in accordance with clause 8.1 option1 of KDB 558074 D01
3. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

### 3.5 Test diagram




### 3.6 Test results

**Single TX**

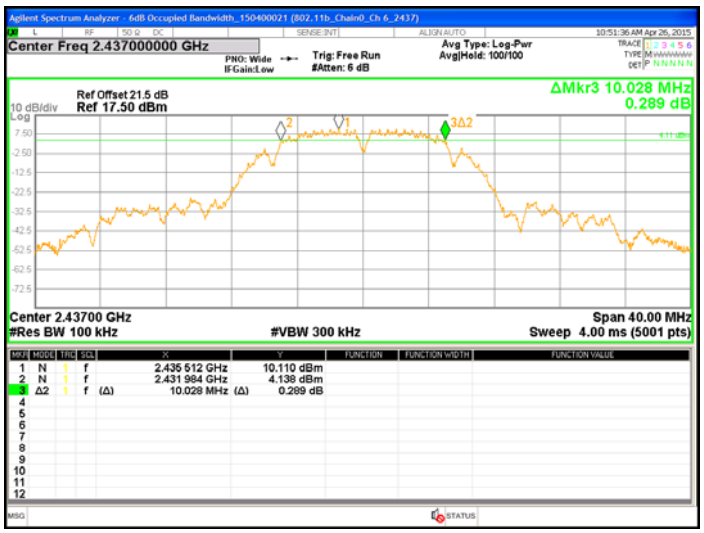
| Mode | Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Pass/Fail |
|---|---|---|---|---|---|
| 802.11b (chain0) | 1 | 2412 | 10.071 | 0.5 | Pass |
| | 6 | 2437 | 10.028 | 0.5 | Pass |
| | 11 | 2462 | 10.071 | 0.5 | Pass |
| 802.11g (chain0) | 1 | 2412 | 16.327 | 0.5 | Pass |
| | 6 | 2437 | 16.374 | 0.5 | Pass |
| | 11 | 2462 | 16.357 | 0.5 | Pass |

**2TX**

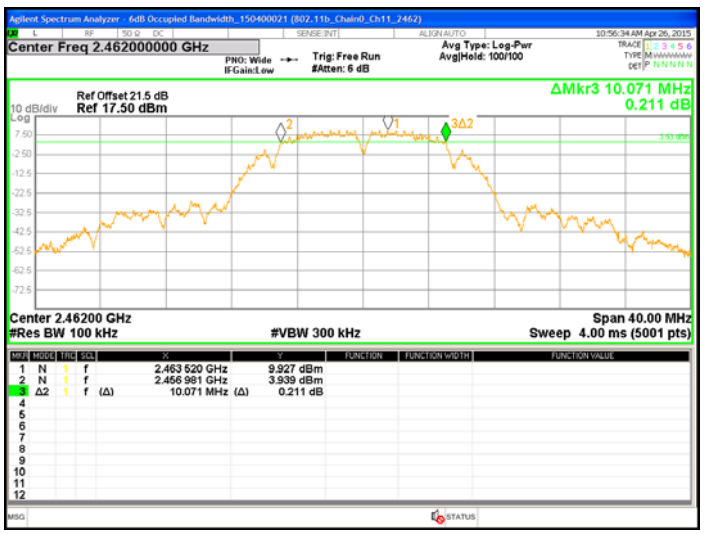
| Mode | Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | | Limit (MHz) | Pass/Fail |
|---|---|---|---|---|---|---|
| | | | chain0 | chain1 | | |
| 802.11n (HT20) | 1 | 2412 | 17.264 | 17.056 | 0.5 | Pass |
| | 6 | 2437 | 17.528 | 16.945 | 0.5 | Pass |
| | 11 | 2462 | 17.014 | 16.93 | 0.5 | Pass |
| 802.11n (HT40) | 3 | 2422 | 36.345 | 35.683 | 0.5 | Pass |
| | 6 | 2437 | 36.379 | 36.279 | 0.5 | Pass |
| | 9 | 2452 | 36.003 | 35.309 | 0.5 | Pass |

Chain0 : 6dB Bandwidth @ 802.11b mode Ch 1

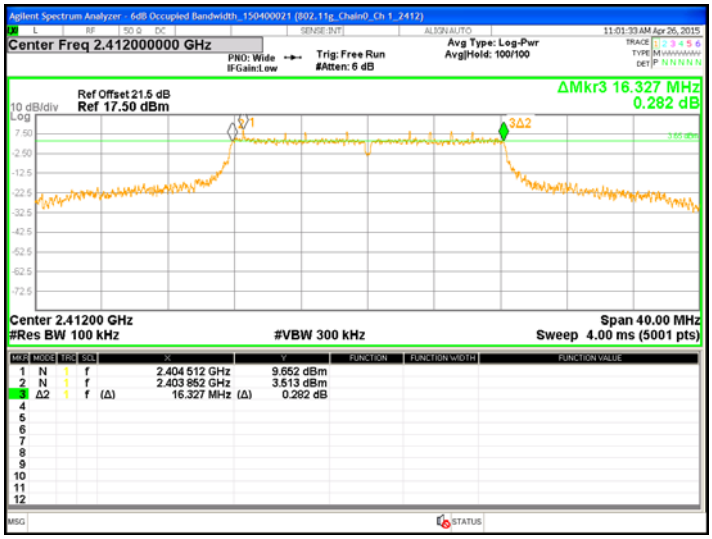

Chain0 : 6dB Bandwidth @ 802.11b mode Ch 6



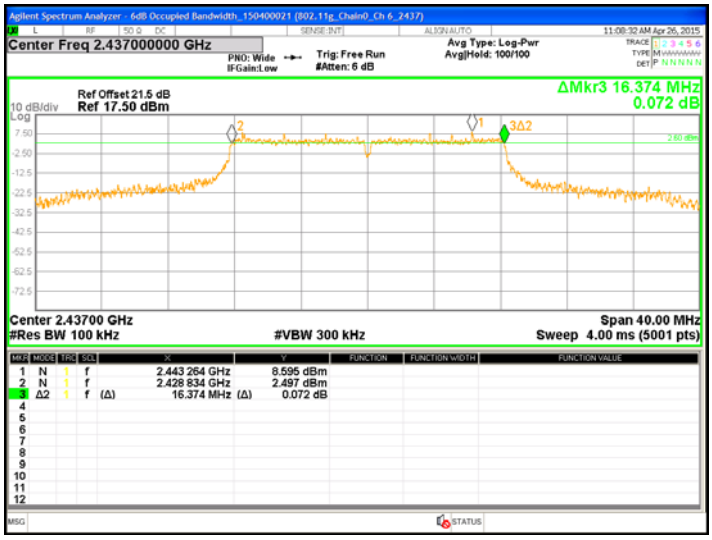

Chain0 : 6dB Bandwidth @ 802.11b mode Ch11



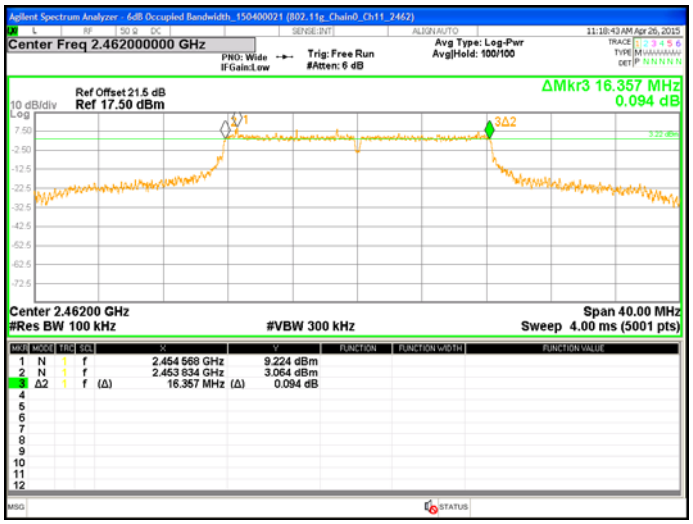
Chain0 : 6dB Bandwidth @ 802.11g mode Ch 1



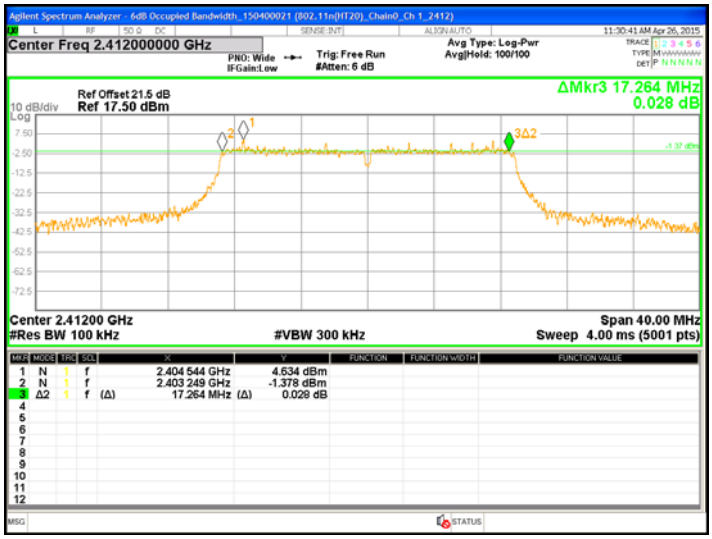

Chain0 : 6dB Bandwidth @ 802.11g mode Ch 6



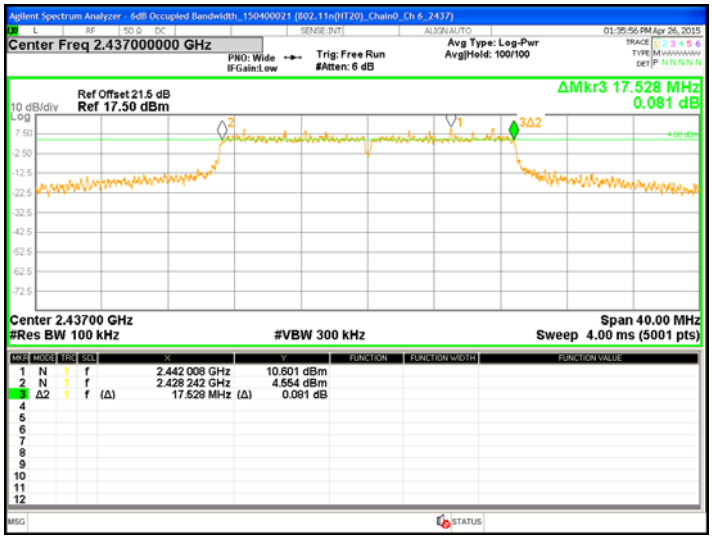

Chain0 : 6dB Bandwidth @ 802.11g mode Ch11



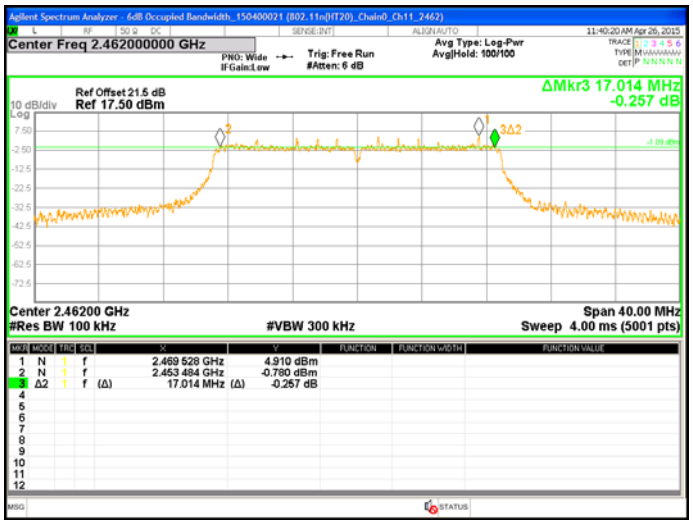
Chain0 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 1



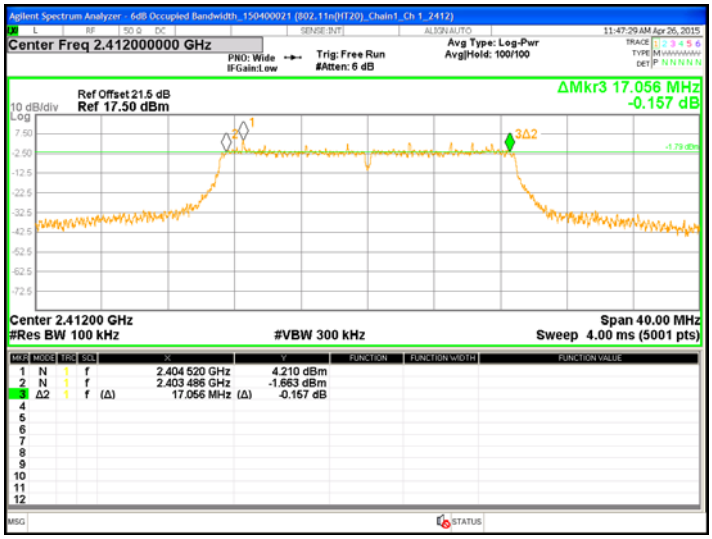

Chain0 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 6



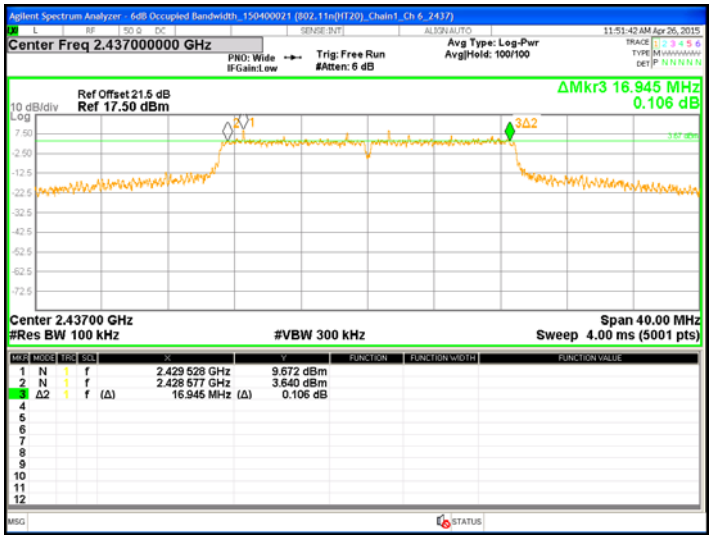

Chain0 : 6dB Bandwidth @ 802.11n(HT20) mode Ch11



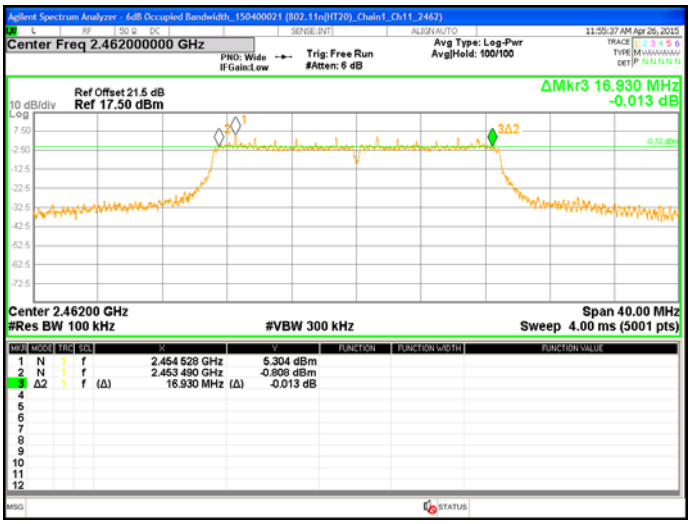
Chain1 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 1



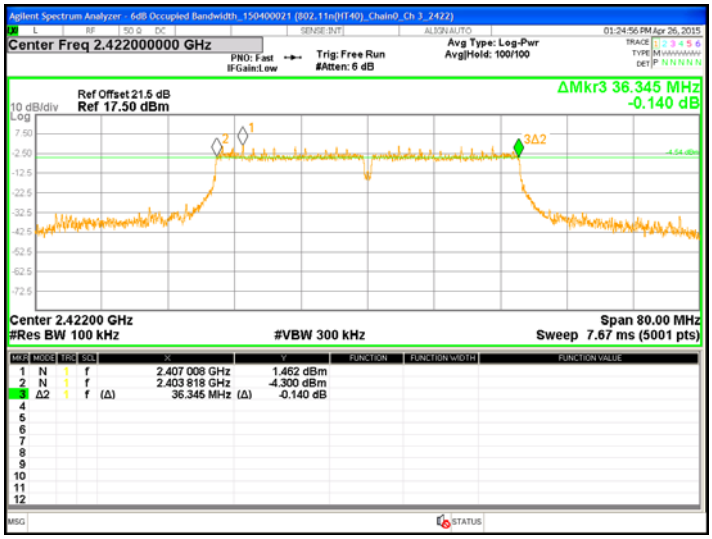

Chain1 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 6



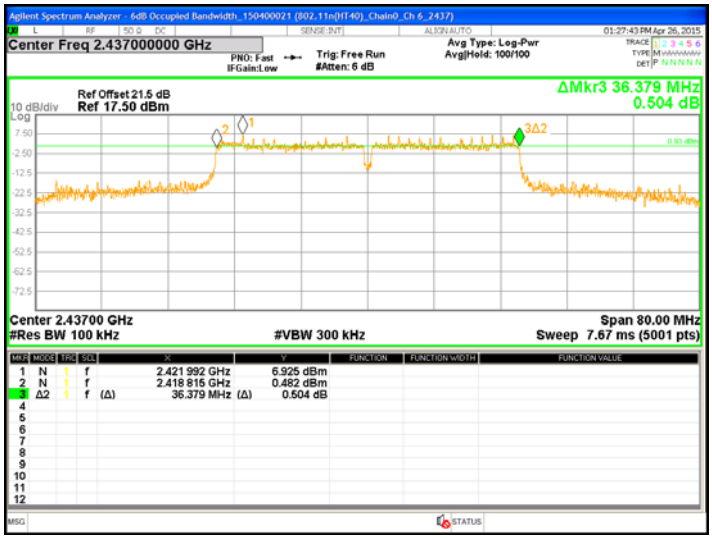

Chain1 : 6dB Bandwidth @ 802.11n(HT20) mode Ch11



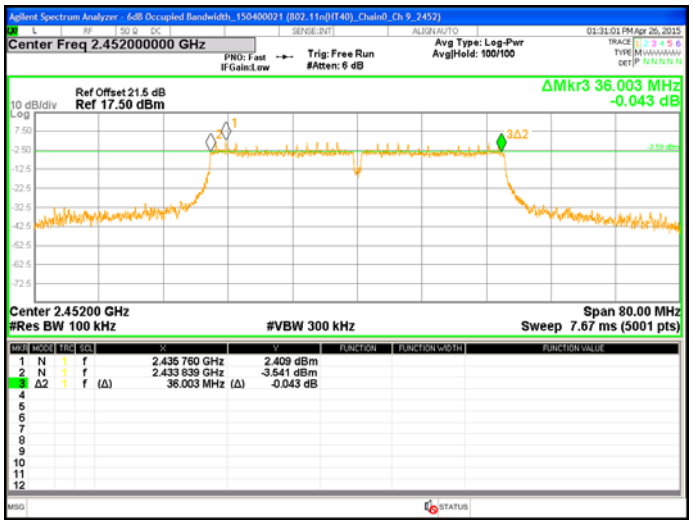
Chain0 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 3



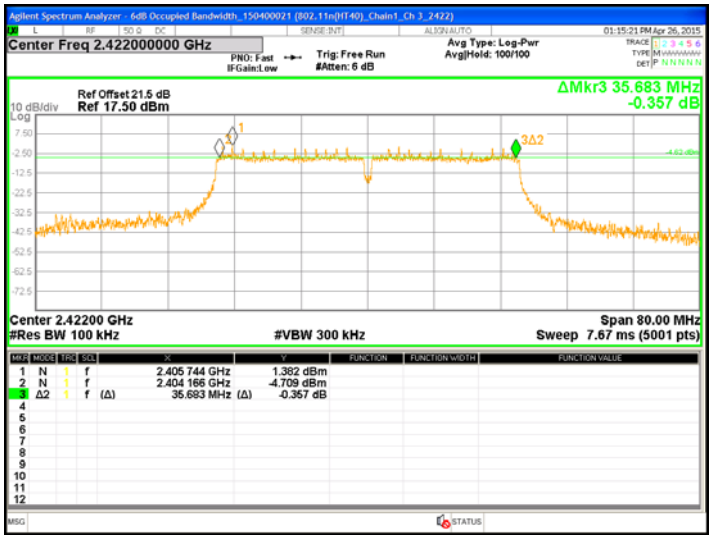

Chain0 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 6



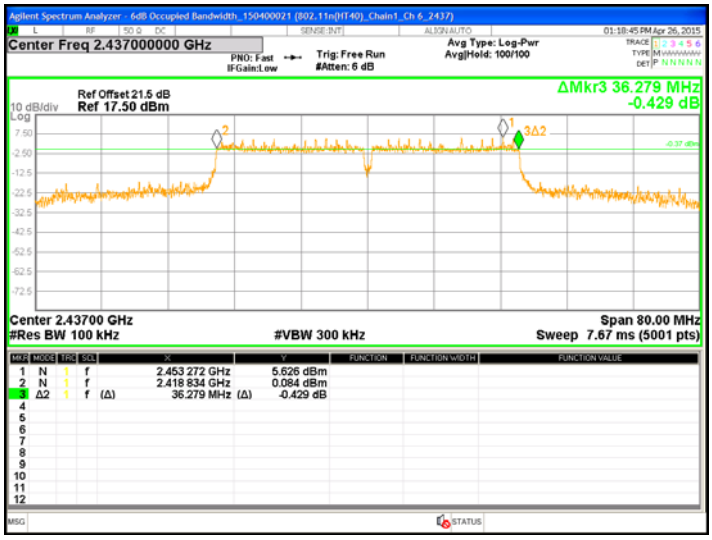

Chain0 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 9



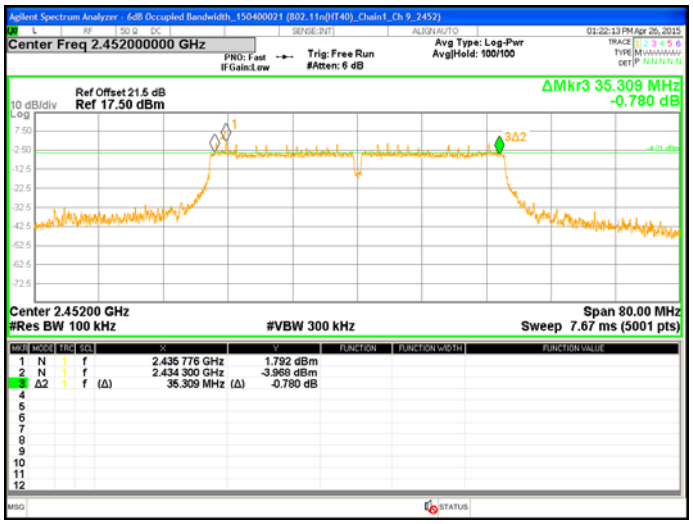
Chain1 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 3




Chain1 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 6




Chain1 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 9



# 4. Maximum Peak Conducted Output Power

## 4.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Requirement & Test method | 15.247(b)(3)<br>KDB 558074 D01 v03r02 | |

## 4.2 Limit for maximum peak conducted output power

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

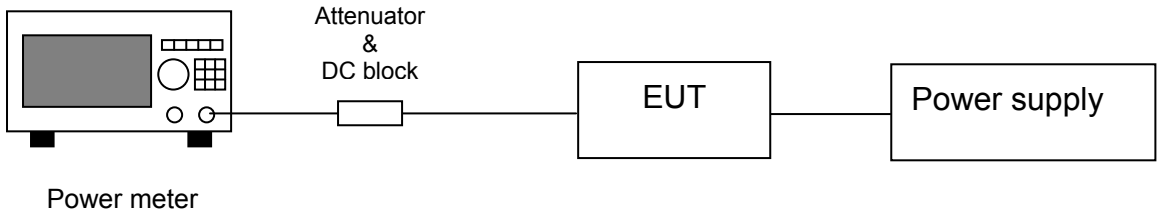
## 4.3 Measuring instrument setting

| **Power meter** | |
|---|---|
| **Power meter** | **Setting** |
| Bandwidth | 65MHz bandwidth is greater than the EUT emission bandwidth |
| Detector | Peak & Average |

## 4.4 Test procedure

Test procedures refer to clause 9.1.2 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01.

## 4.5 Test diagram



**4.6 Test result**

Single TX

| Mode | Ch | Freq. (MHz) | Output Power (AV) (dBm) | Total Power (AV) (mW) | Maximun power (PK) (dBm) | Maximun power (PK) (mW) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 802.11b (chain0) | 1 | 2412 | 19.35 | 86.10 | 23.02 | 200.447 | 30 | -6.98 |
| | 6 | 2437 | 20.56 | 113.76 | 23.12 | 205.116 | 30 | -6.88 |
| | 11 | 2462 | 19.47 | 88.51 | 23.01 | 199.986 | 30 | -6.99 |
| 802.11g (chain0) | 1 | 2412 | 19.21 | 83.37 | 22.44 | 175.388 | 30 | -7.56 |
| | 6 | 2437 | 19.87 | 97.05 | 22.52 | 178.649 | 30 | -7.48 |
| | 11 | 2462 | 19.44 | 87.90 | 22.21 | 166.341 | 30 | -7.79 |

2TX

| Mode | Ch | Freq. (MHz) | Output Power (dBm) | | | | Output Power (mW) | | | | Total Power (dBm) | | | | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chian 0 | | Chain 1 | | Chain 0 | | Chian 1 | | AV | | PK | | | |
| | | | AV | PK | AV | PK | AV | PK | AV | PK | 0+1 (mW) | 0+1 (dBm) | 0+1 (mW) | 0+1 (dBm) | | |
| 802.11n (HT20) | 1 | 2412 | 14.96 | 23.76 | 14.84 | 23.16 | 31.33 | 237.68 | 30.48 | 207.01 | 61.81 | 17.91 | 444.70 | 26.48 | 30 | -3.52 |
| | 6 | 2437 | 21.37 | 25.24 | 19.6 | 23.68 | 137.09 | 334.20 | 91.20 | 233.35 | 228.29 | 23.58 | 567.54 | 27.54 | 30 | -2.46 |
| | 11 | 2462 | 14.42 | 23.34 | 14.24 | 23.16 | 27.67 | 215.77 | 26.55 | 207.01 | 54.22 | 17.34 | 422.79 | 26.26 | 30 | -3.74 |
| 802.11n (HT40) | 3 | 2422 | 13.9 | 22.44 | 13.6 | 21.26 | 24.55 | 175.39 | 22.91 | 133.66 | 47.46 | 16.76 | 309.05 | 24.90 | 30 | -5.10 |
| | 6 | 2437 | 20.44 | 25.61 | 18.49 | 23.85 | 110.66 | 363.92 | 70.63 | 242.66 | 181.29 | 22.58 | 606.58 | 27.83 | 30 | -2.17 |
| | 9 | 2452 | 13.42 | 22 | 13.22 | 21.01 | 21.98 | 158.49 | 20.99 | 126.18 | 42.97 | 16.33 | 284.67 | 24.54 | 30 | -5.46 |

# 5. Power Spectral Density

## 5.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Requirement & Test method | 15.247(e)<br>KDB 558074 D01 v03r02 | |

## 5.2 Limit for power spectrum density

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

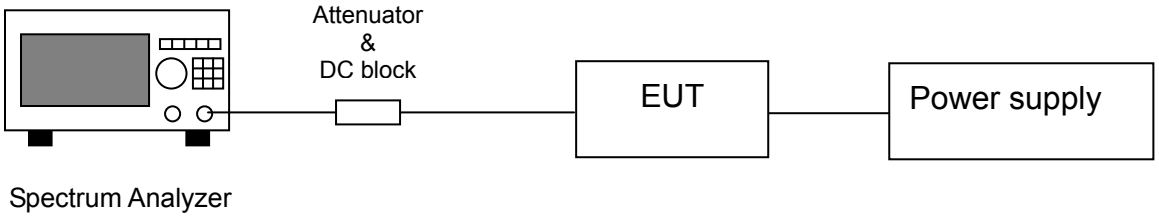
## 5.3 Measuring instrument setting

| Spectrum analyzer settings | |
|---|---|
| **Spectrum Analyzer function** | **Setting** |
| Detector | Peak |
| RBW | ≧3 kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Trace | Max hold |
| Span | 1.5 times x 6dB bandwidth |
| Attenuation | Auto |

### 5.4 Test procedure

1. Test procedure refer to clause 10.2 method PKPSD (peak PSD) of KDB 558074 D01 and clause E) 2) b) measure and sum spectral maxima across the outputs.
2. Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Use the peak marker function to determine the maximum amplitude level within the RBW.

### 5.5 Test diagram




### 5.6 Test results

**Single TX**

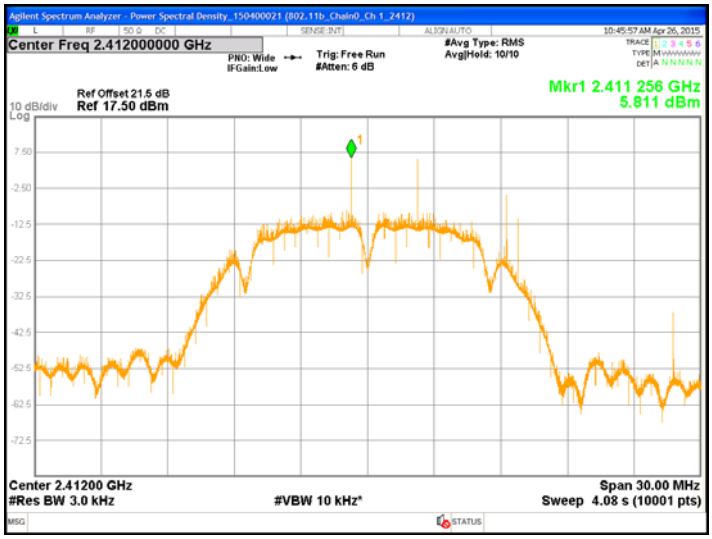
| Mode | Channel | Frequency (MHz) | PSD | | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | | (dBm) | (mw) | | |
| 802.11b (chain0) | 1 | 2412 | 5.811 | 3.81 | 8 | -2.19 |
| | 6 | 2437 | 7.472 | 5.59 | 8 | -0.53 |
| | 11 | 2462 | 6.919 | 4.92 | 8 | -1.08 |
| 802.11g (chain0) | 1 | 2412 | -10.34 | 0.09 | 8 | -18.34 |
| | 6 | 2437 | -10.125 | 0.10 | 8 | -18.13 |
| | 11 | 2462 | -9.97 | 0.10 | 8 | -17.97 |

**2TX**

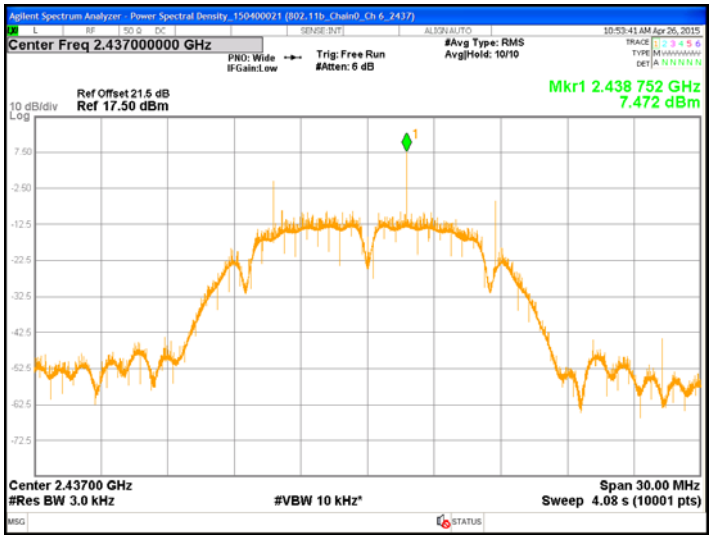
| Mode | Channel | Frequency (MHz) | PSD (dBm) | | Total PSD | | MIMO Correction | Result | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | chain0 | chain1 | mW | dBm | | | | |
| 11n (HT20) | 1 | 2412 | -14.805 | -14.89 | 0.07 | -11.84 | 10Log(2) | -8.83 | 8 | -16.83 |
| | 6 | 2437 | -8.791 | -9.972 | 0.23 | -6.33 | 10Log(2) | -3.32 | 8 | -11.32 |
| | 11 | 2462 | -14.877 | -14.3 | 0.07 | -11.57 | 10Log(2) | -8.56 | 8 | -16.56 |
| 11n (HT40) | 3 | 2422 | -17.465 | -18.021 | 0.03 | -14.72 | 10Log(2) | -11.71 | 8 | -19.71 |
| | 6 | 2437 | -11.617 | -12.827 | 0.12 | -9.17 | 10Log(2) | -6.16 | 8 | -14.16 |
| | 9 | 2452 | -17.503 | -17.585 | 0.04 | -14.53 | 10Log(2) | -11.52 | 8 | -19.52 |

Note: MIMO Correction: 10log(Nant)

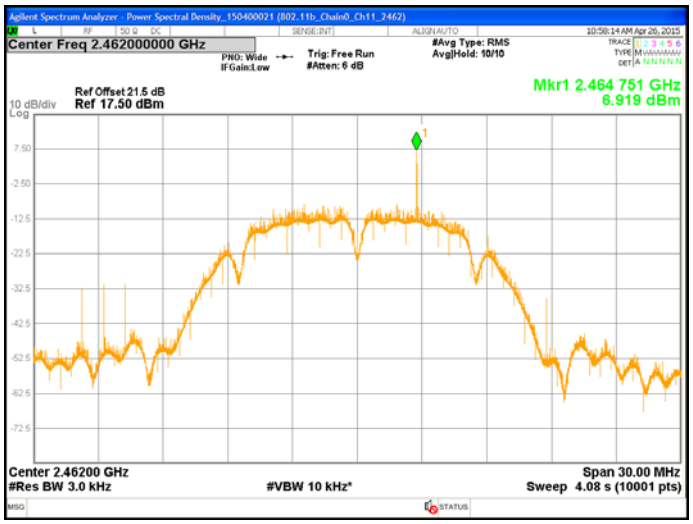
Chain0 : Power Spectral Density @ 802.11b mode Ch 1



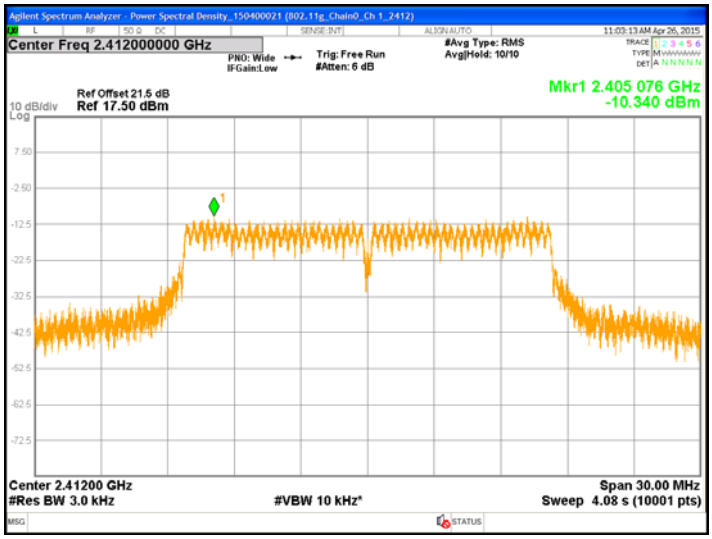

Chain0 : Power Spectral Density @ 802.11b mode Ch 6



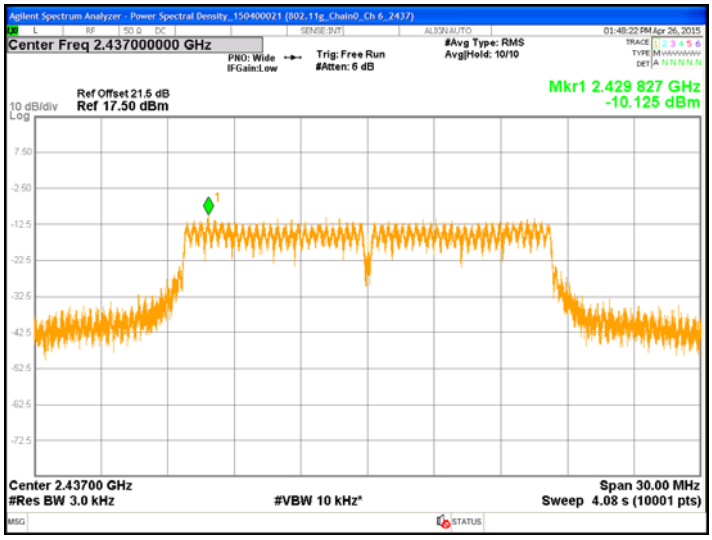

Chain0 : Power Spectral Density @ 802.11b mode Ch11



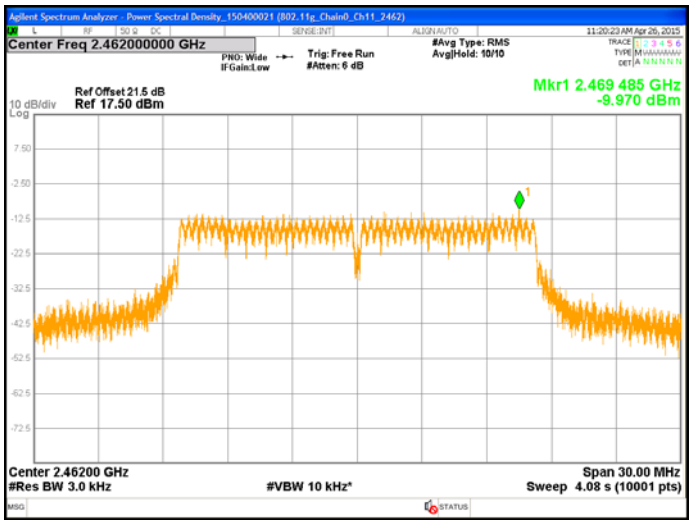
Chain0 : Power Spectral Density @ 802.11g mode Ch 1



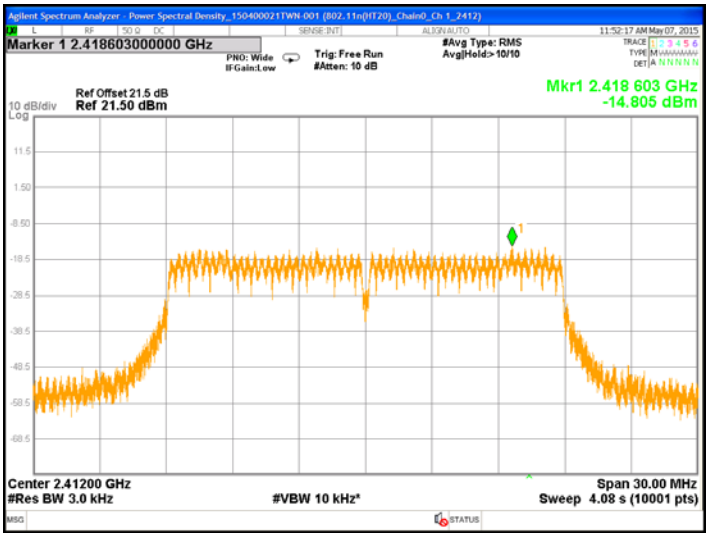

Chain0 : Power Spectral Density @ 802.11g mode Ch 6



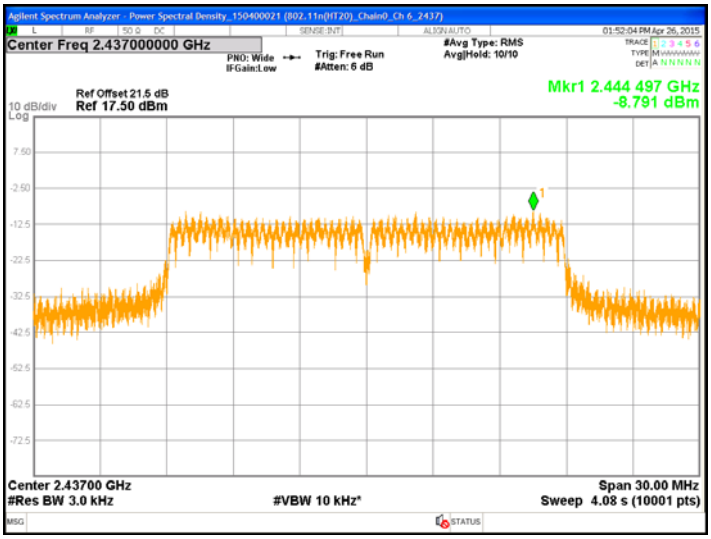

Chain0 : Power Spectral Density @ 802.11g mode Ch11



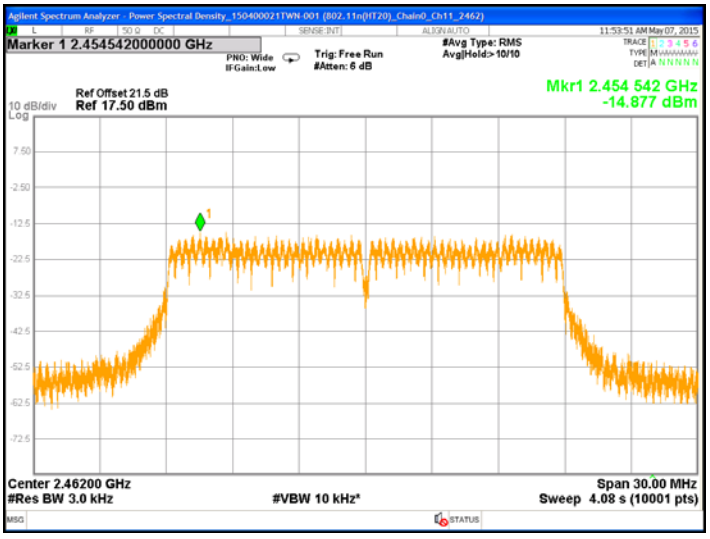
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch 1



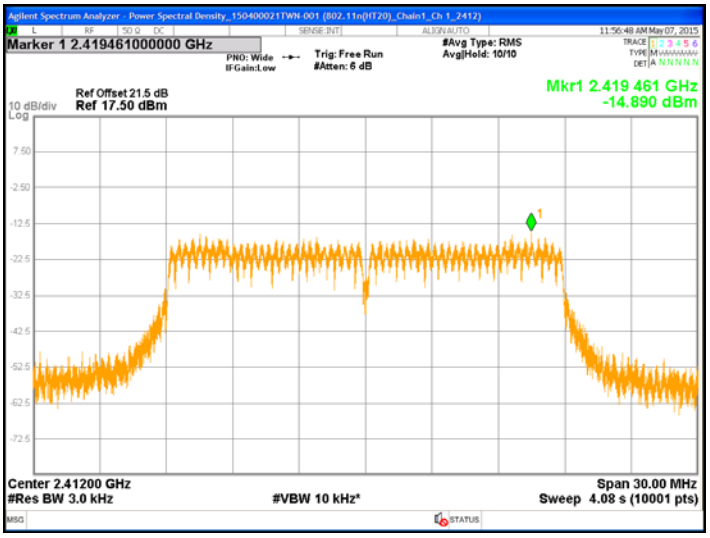

Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch 6



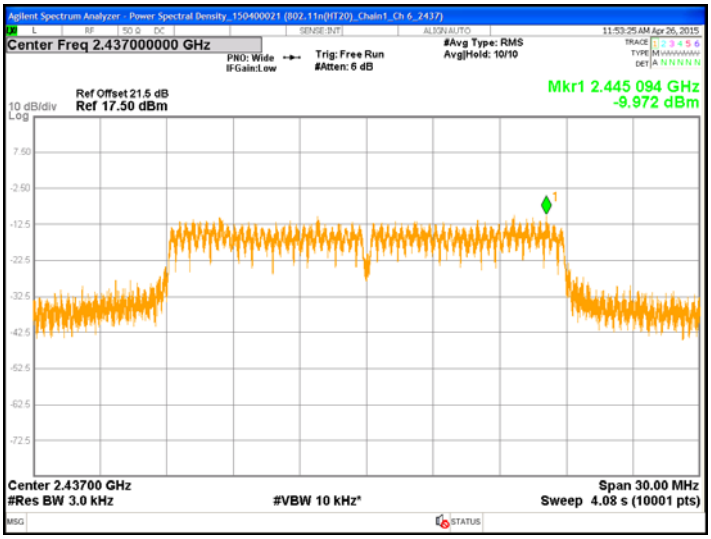

Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch11



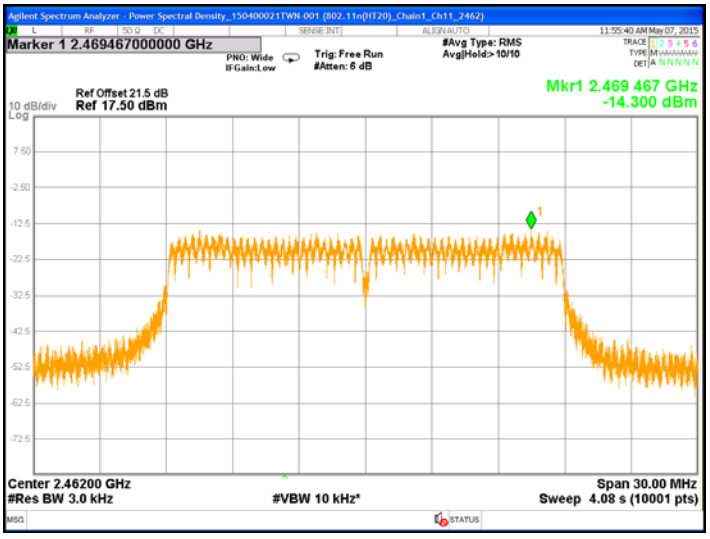
Chain1 : Power Spectral Density @ 802.11n(HT20) mode Ch 1



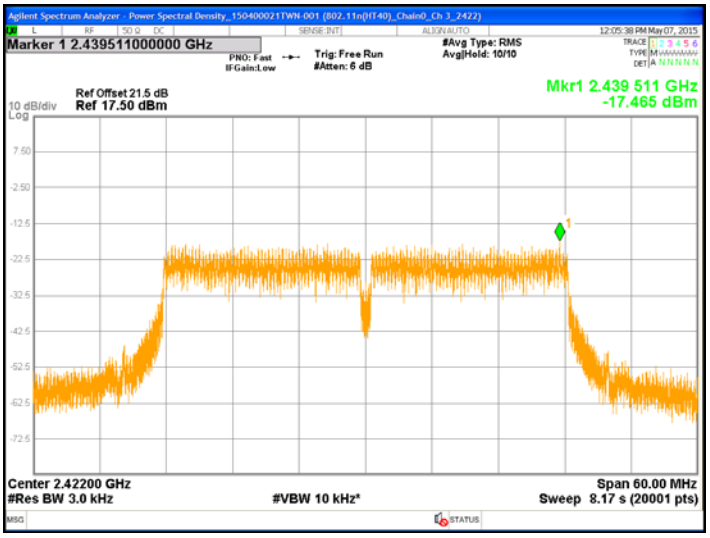

Chain1 : Power Spectral Density @ 802.11n(HT20) mode Ch 6



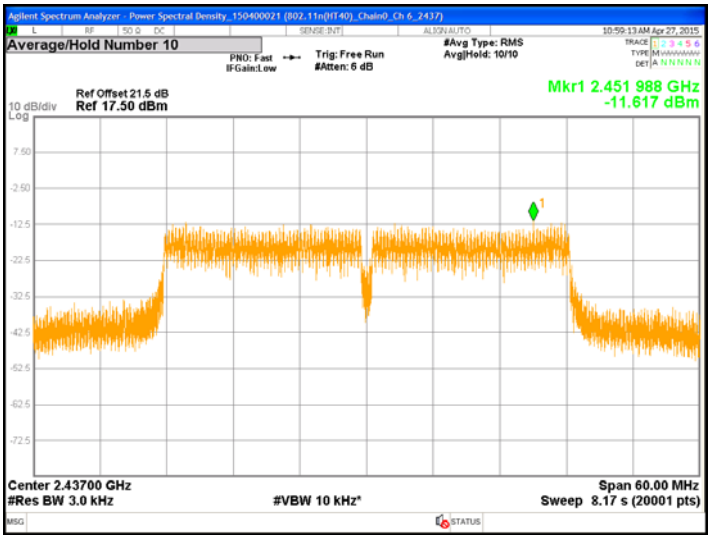

Chain1 : Power Spectral Density @ 802.11n(HT20) mode Ch11



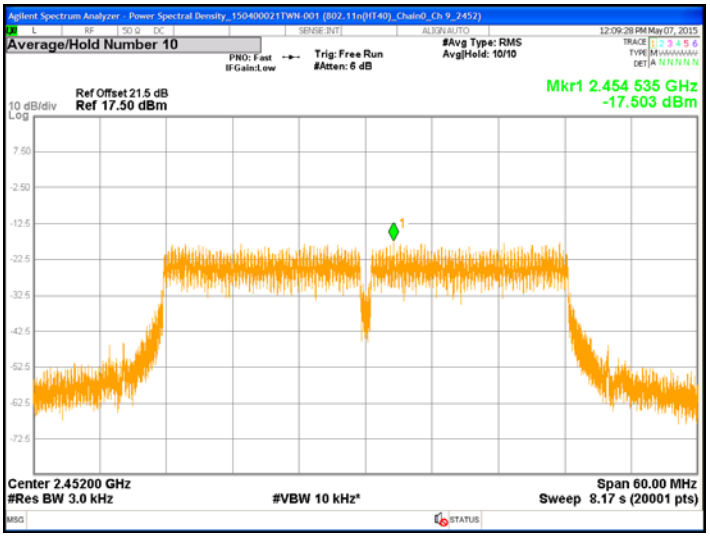
Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch 3



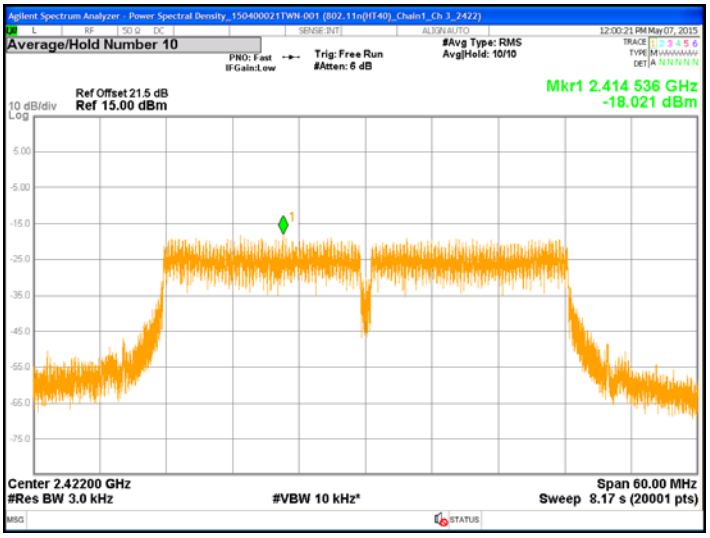

Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch 6



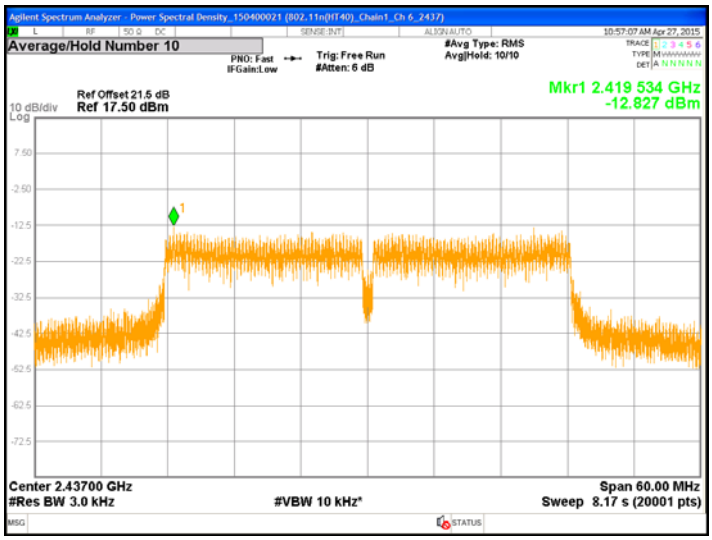

Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch 9



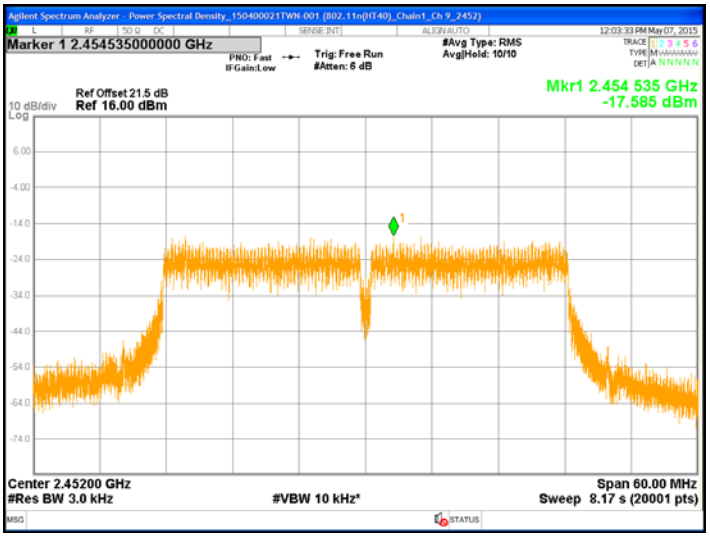
Chain1 : Power Spectral Density @ 802.11n(HT40) mode Ch 3




Chain1 : Power Spectral Density @ 802.11n(HT40) mode Ch 6




Chain1 : Power Spectral Density @ 802.11n(HT40) mode Ch 9



# 6. Emissions In Non-Restricted Frequency Bands

## 6.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Requirement | 15.247(d) | |
| Channel number | 1、6、11 | |

## 6.2 Limit for emissions in non-restricted frequency bands

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

## 6.3 Measuring instruments setting

**Reference level measurement**

| **Spectrum analyzer settings** | |
|---|---|
| **Spectrum Analyzer function** | **Setting** |
| Detector | Peak |
| RBW | ≧100 kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Trace | Max hold |
| Span | ≧1.5 time 6dB bandwidth |
| Attenuation | Auto |

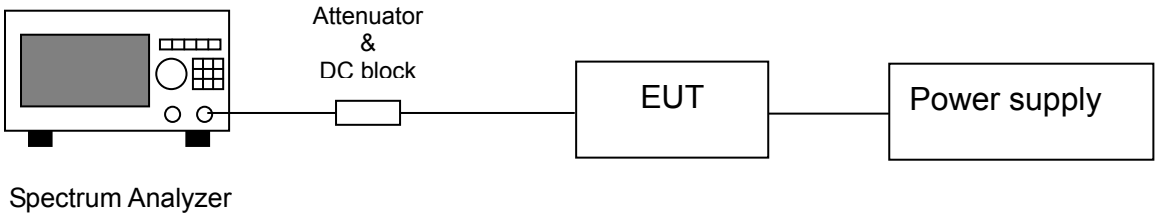
**Emission level measurement**

| Spectrum analyzer settings | |
|---|---|
| **Spectrum Analyzer function** | **Setting** |
| Detector | Peak |
| RBW | ≧100 kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Trace | Max hold |
| Attenuation | Auto |

## 6.4 Test procedure

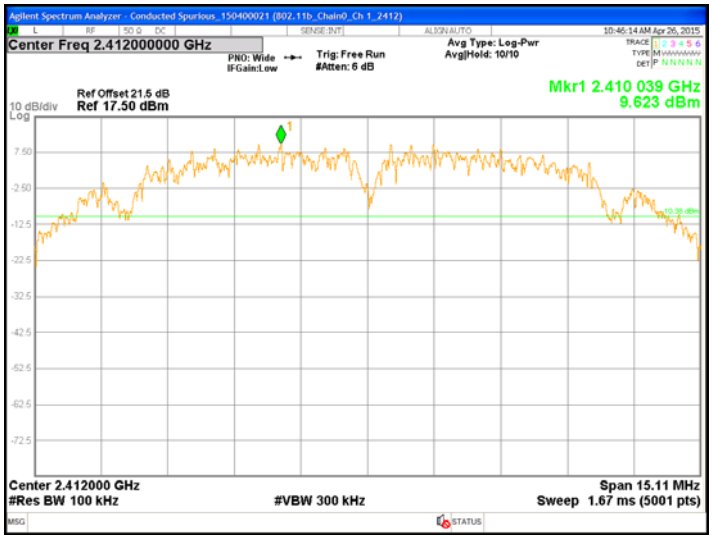
1. The procedure was used in antenna-port conducted and connected to the spectrum analyzer.
2. Set instrument center frequency to center frequency
3. Use the parameter configured in clause 6.3 to measure
4. Use the peak marker function to determine the maximum amplitude level.

## 6.5 Test diagram

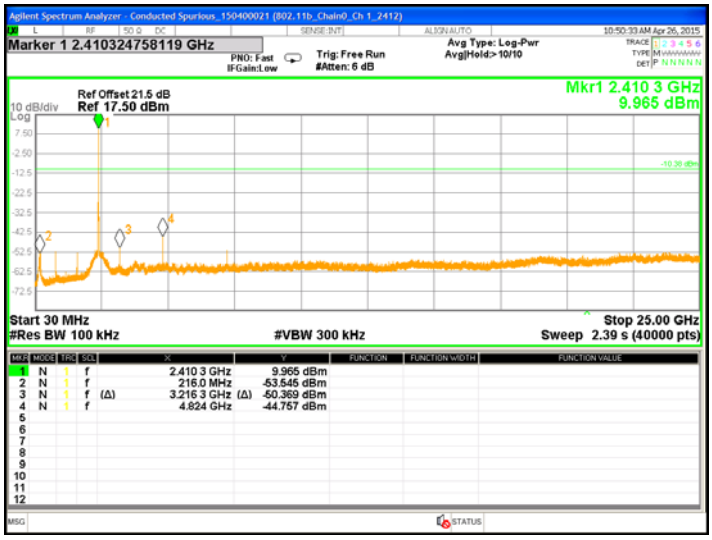



## 6.6 Test results

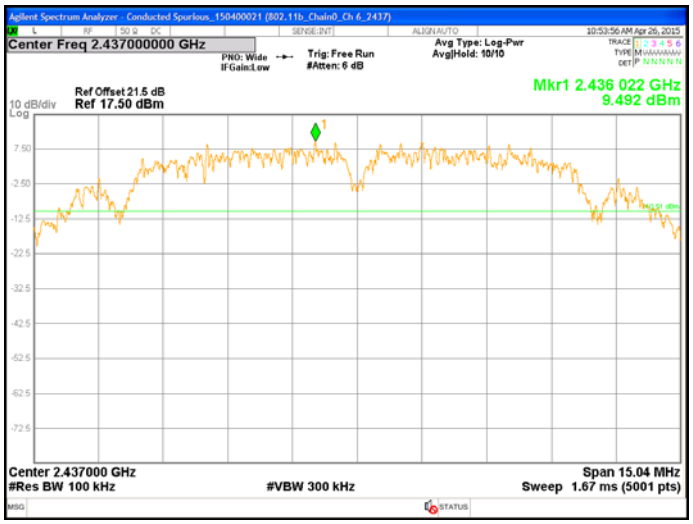
Chain0 : Conducted Spurious @ 802.11b mode Ch 1



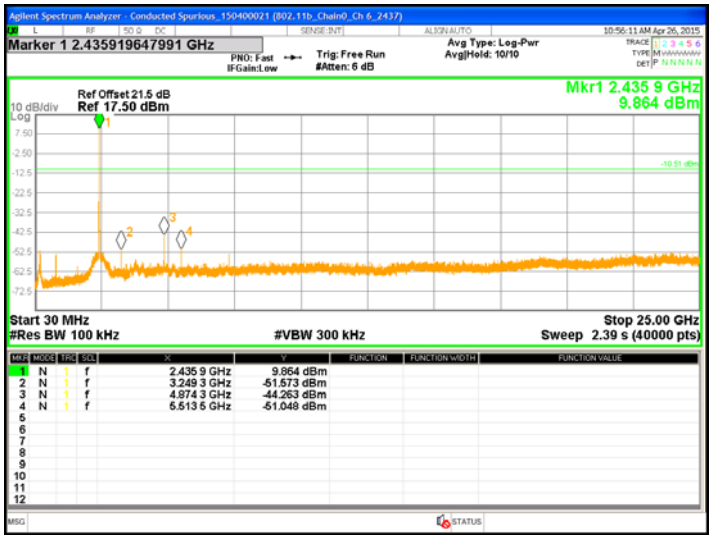

Chain0 : Conducted Spurious @ 802.11b mode Ch 1



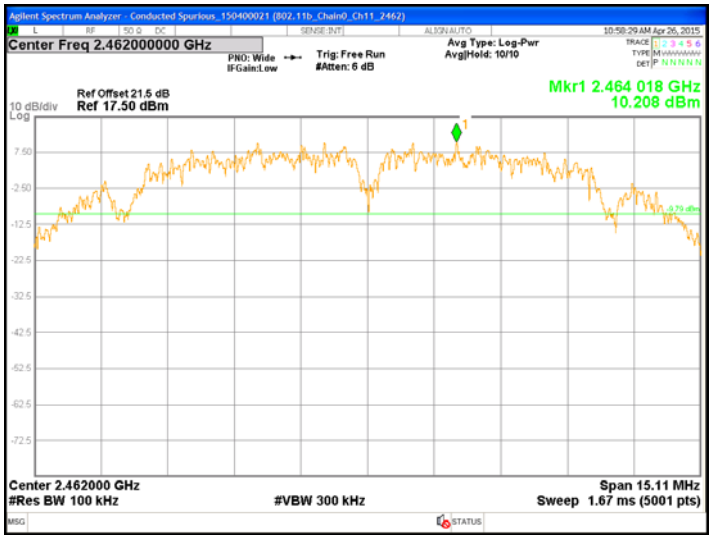

Chain0 : Conducted Spurious @ 802.11b mode Ch 6



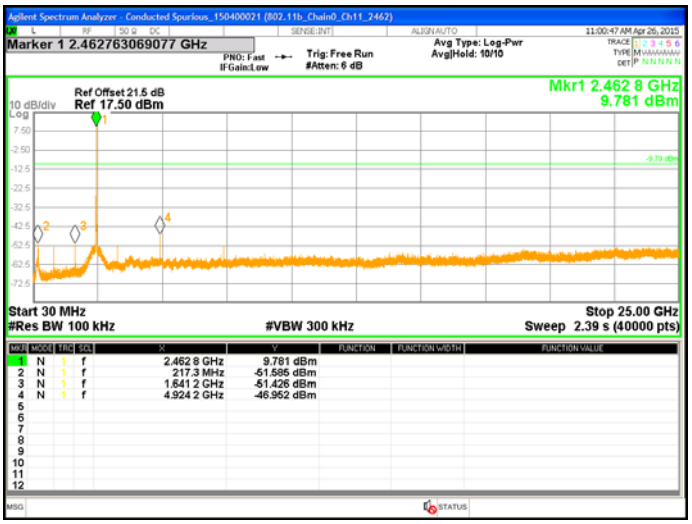
Chain0 : Conducted Spurious @ 802.11b mode Ch 6



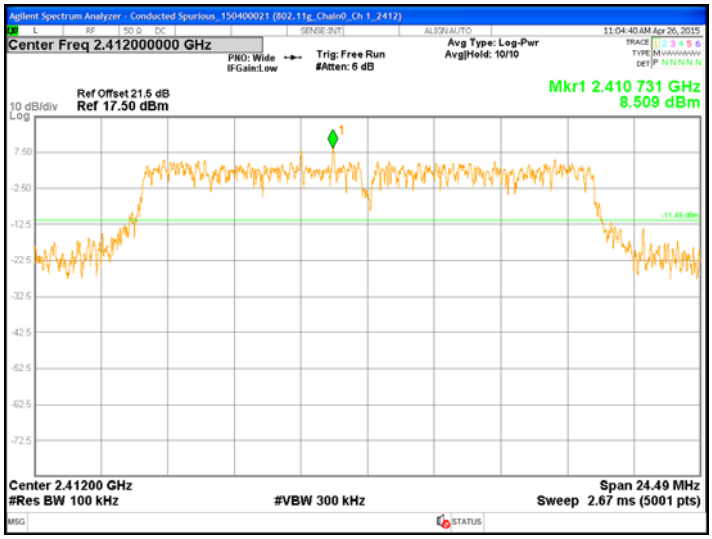

Chain0 : Conducted Spurious @ 802.11b mode Ch11



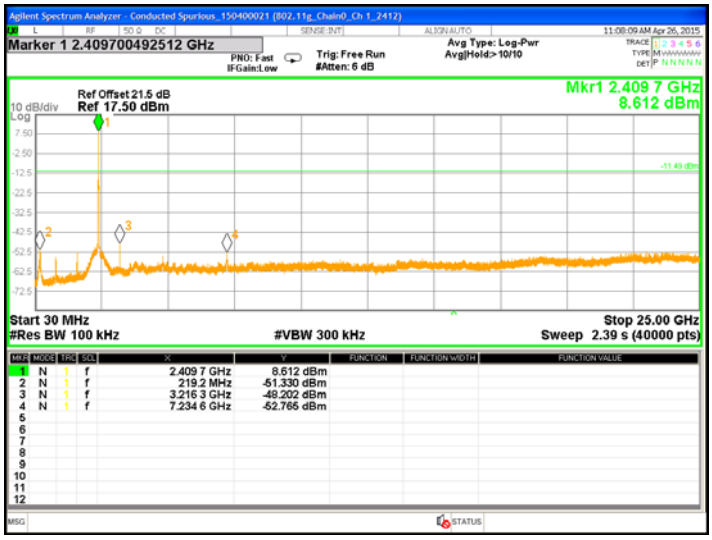

Chain0 : Conducted Spurious @ 802.11b mode Ch11



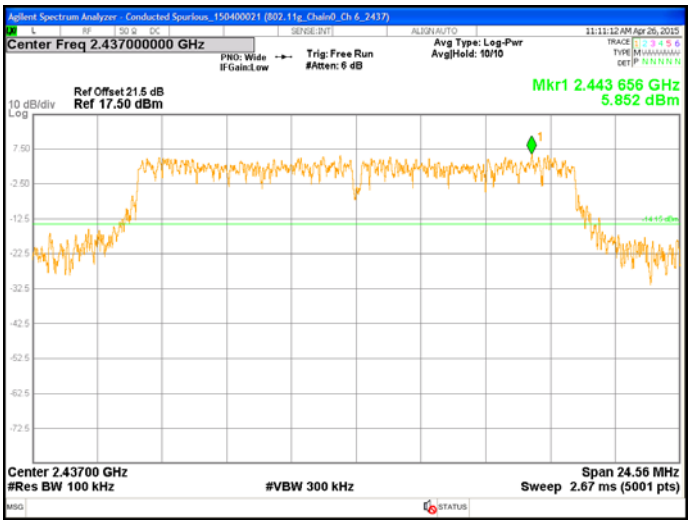
Chain0 : Conducted Spurious @ 802.11g mode Ch 1



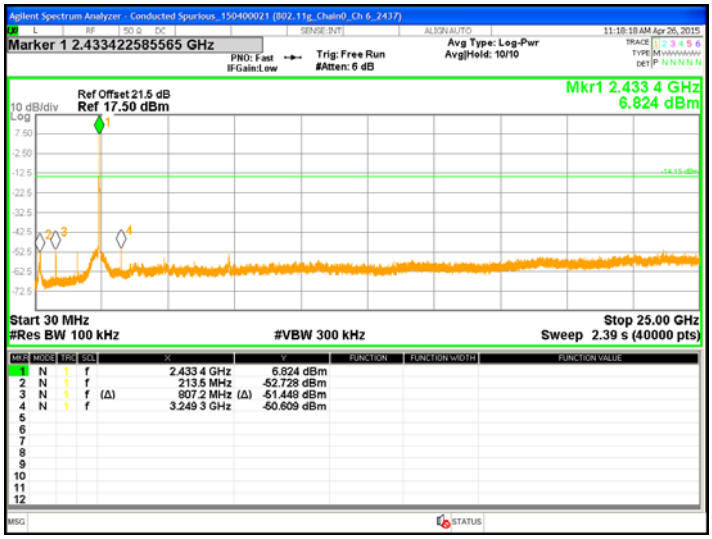

Chain0 : Conducted Spurious @ 802.11g mode Ch 1



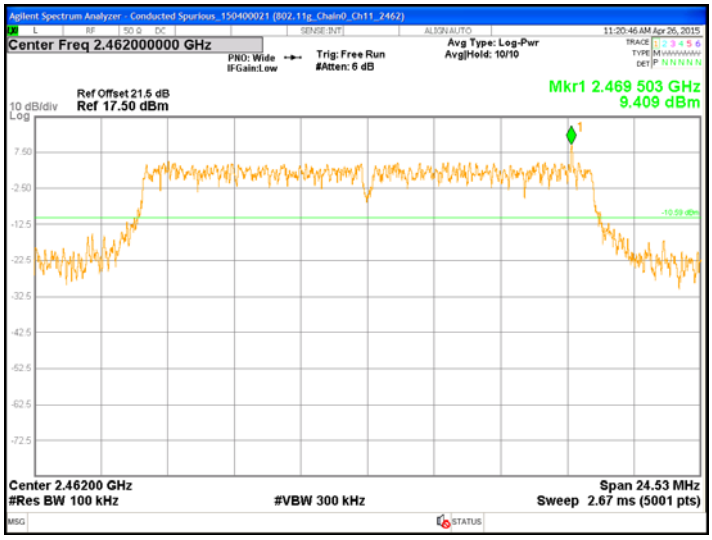

Chain0 : Conducted Spurious @ 802.11g mode Ch 6



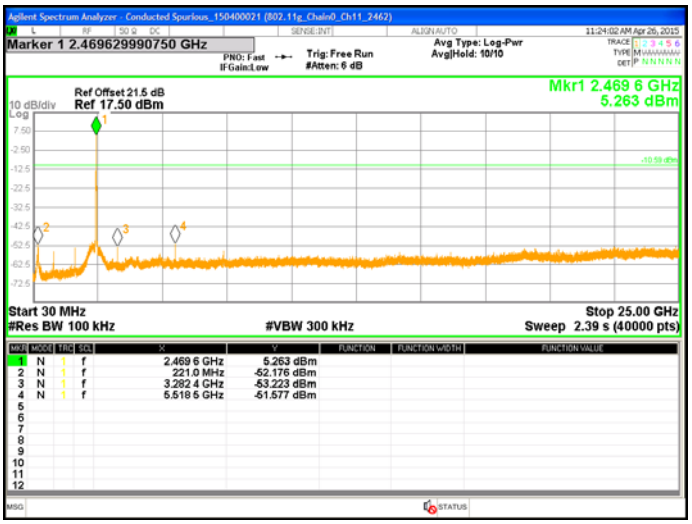
Chain0 : Conducted Spurious @ 802.11g mode Ch 6



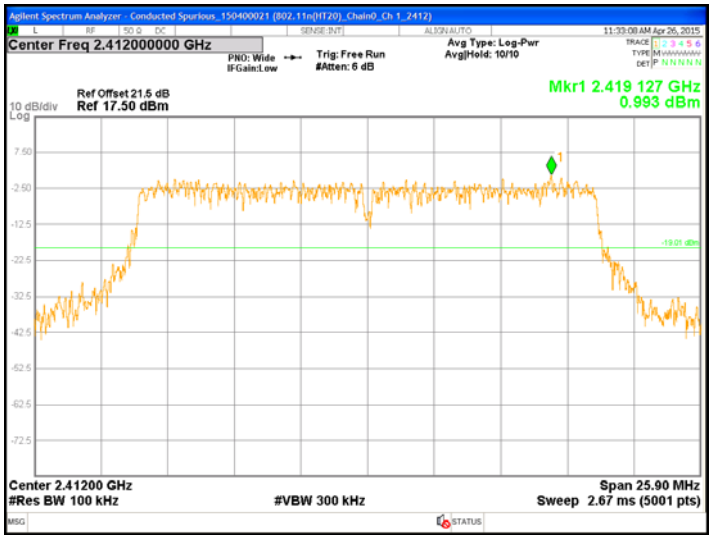

Chain0 : Conducted Spurious @ 802.11g mode Ch11



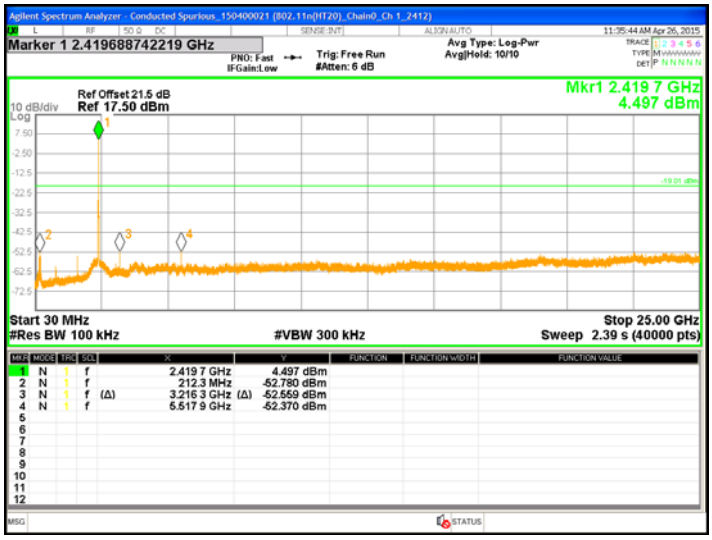

Chain0 : Conducted Spurious @ 802.11g mode Ch11



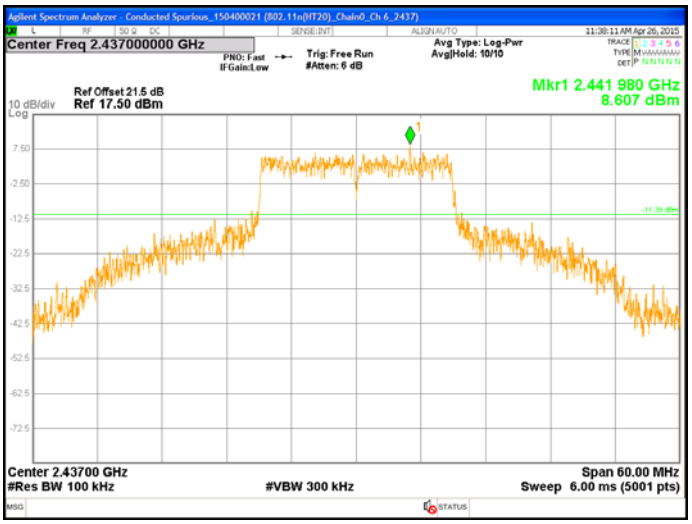
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



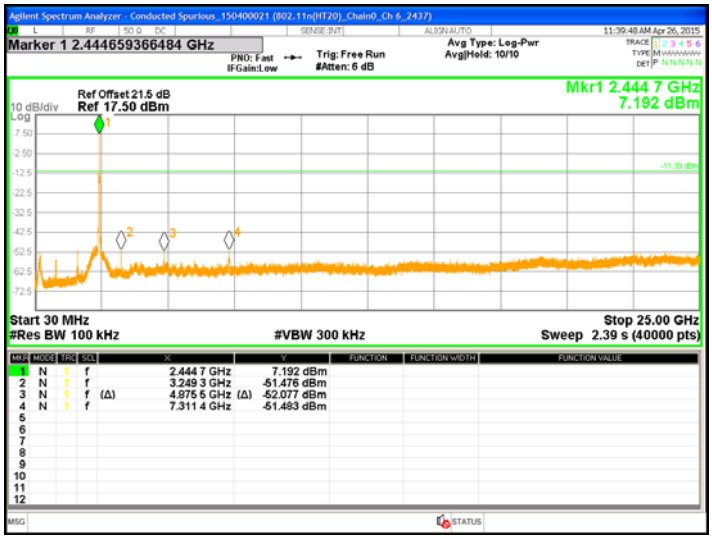

Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



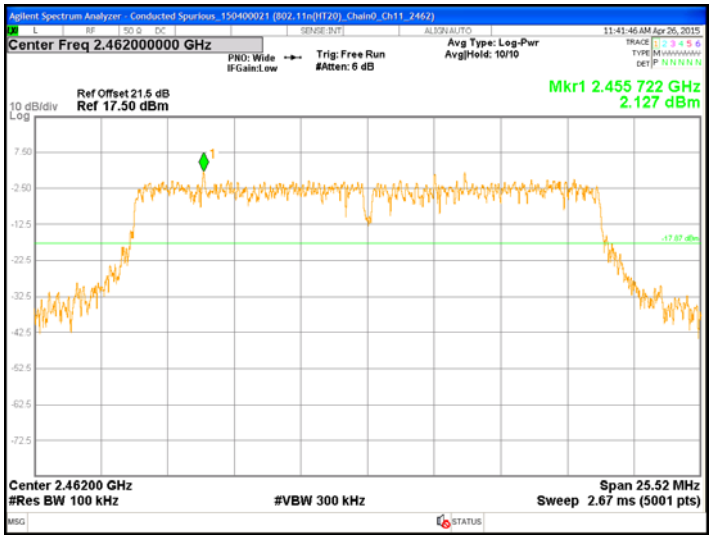

Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



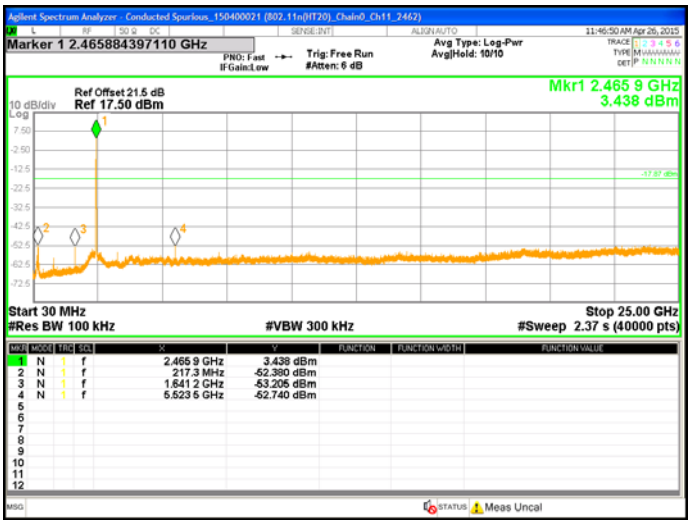
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



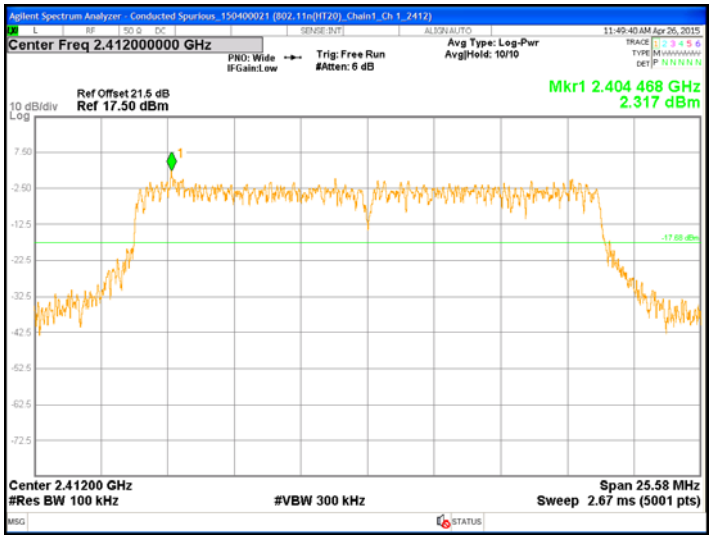

Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch11



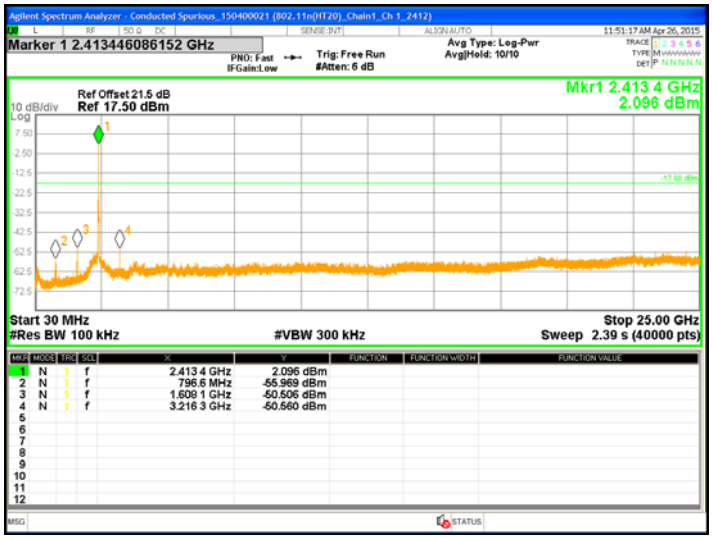

Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch11



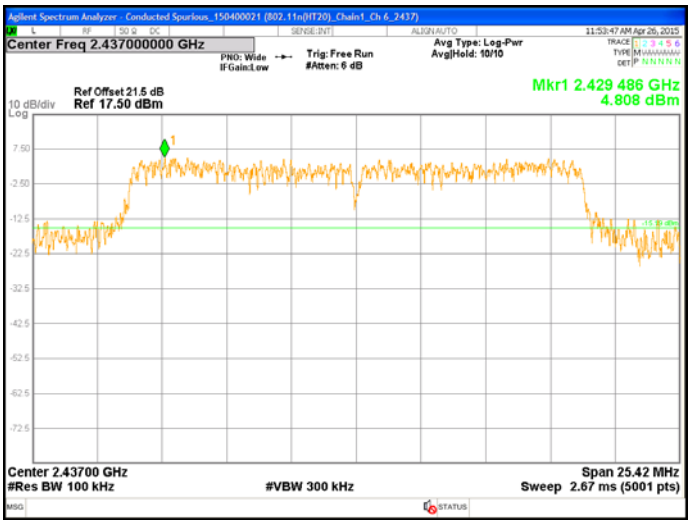
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



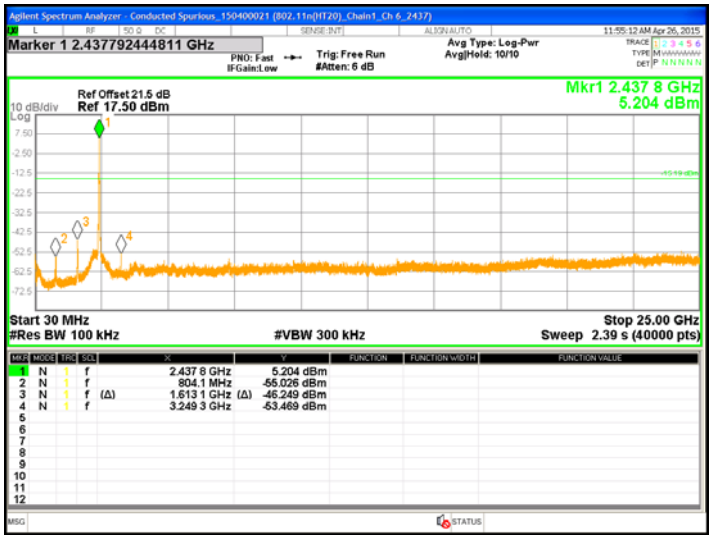

Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



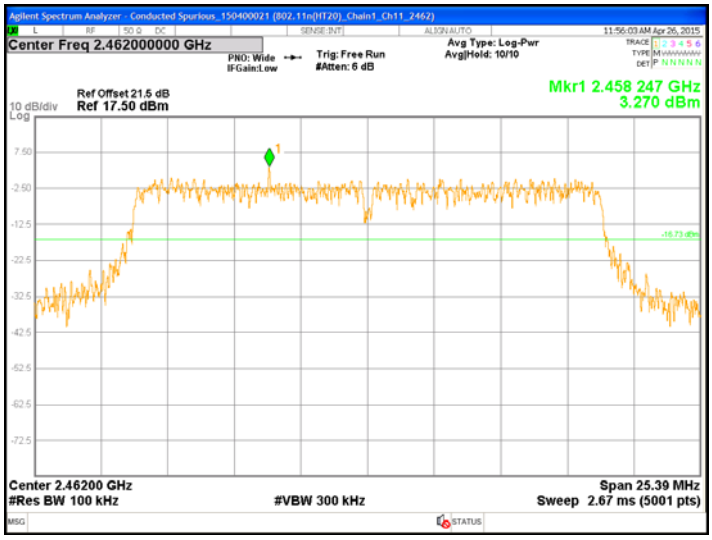

Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



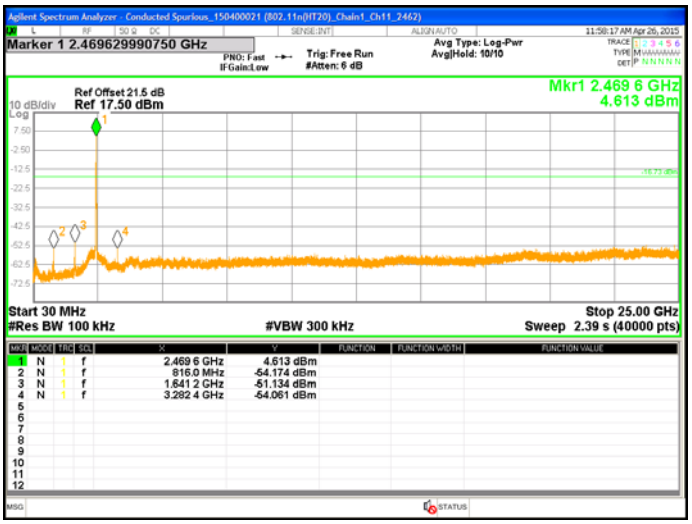
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



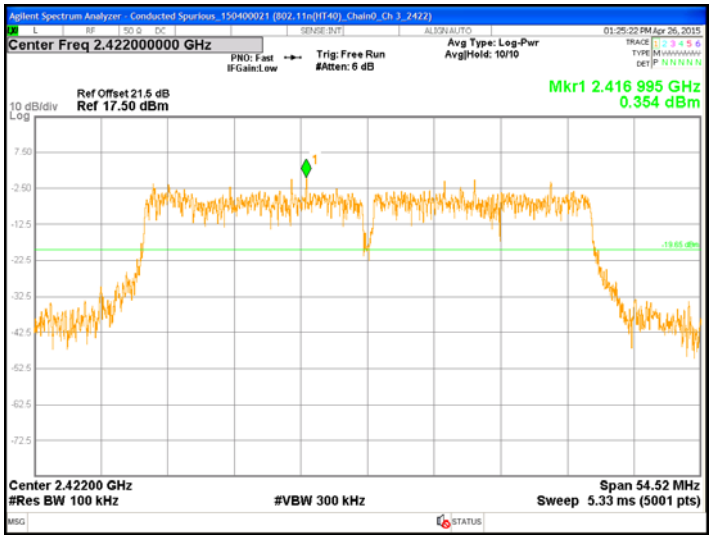

Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch11



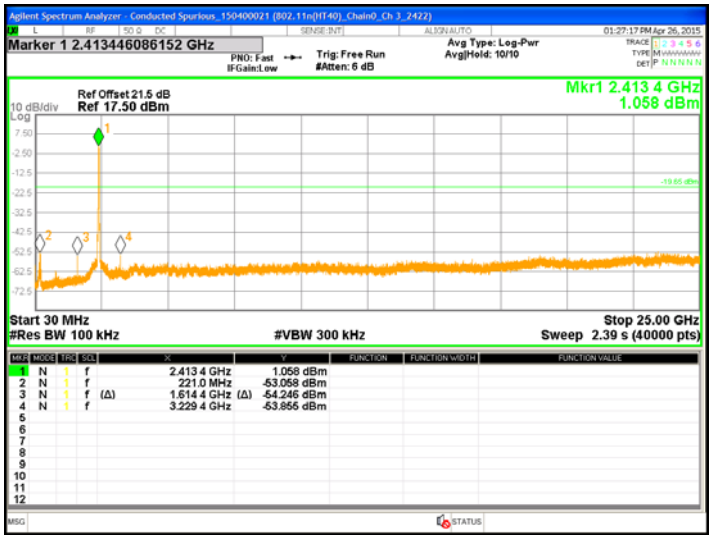

Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch11



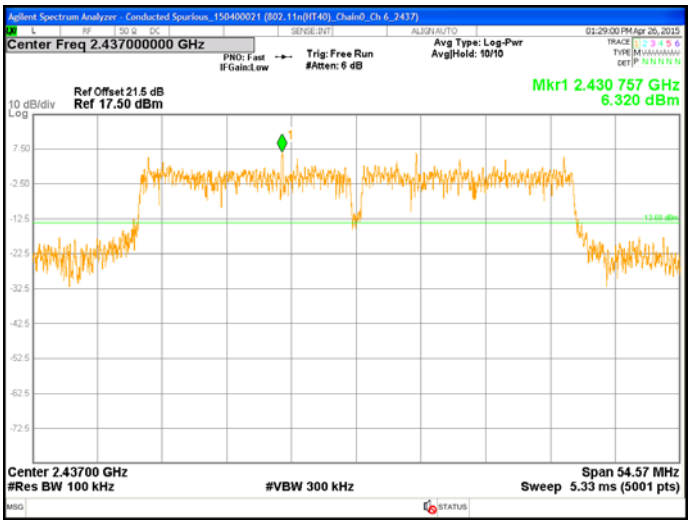
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



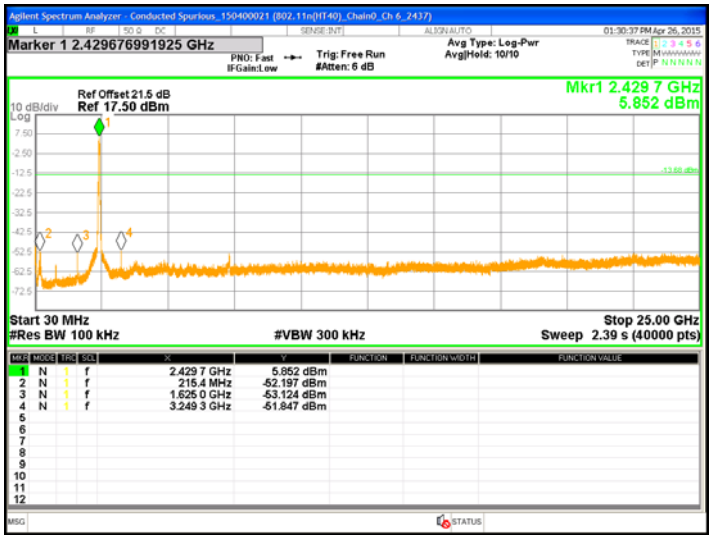

Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



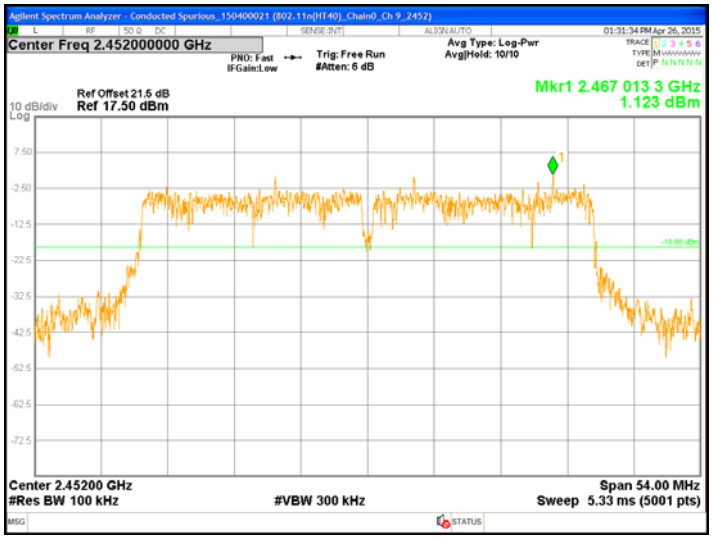

Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



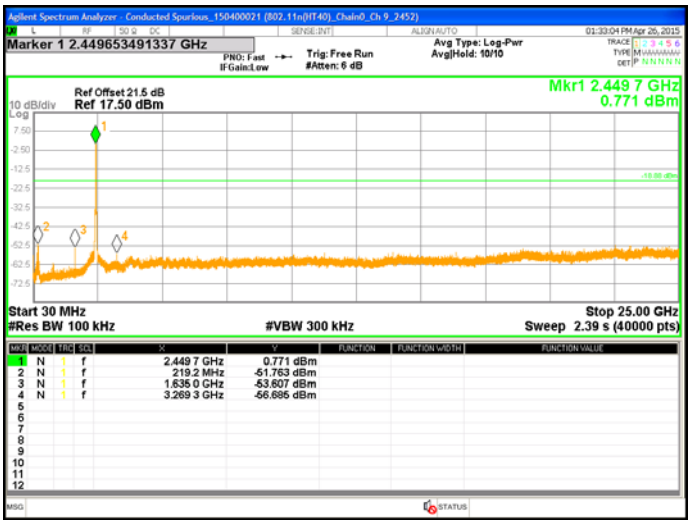
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



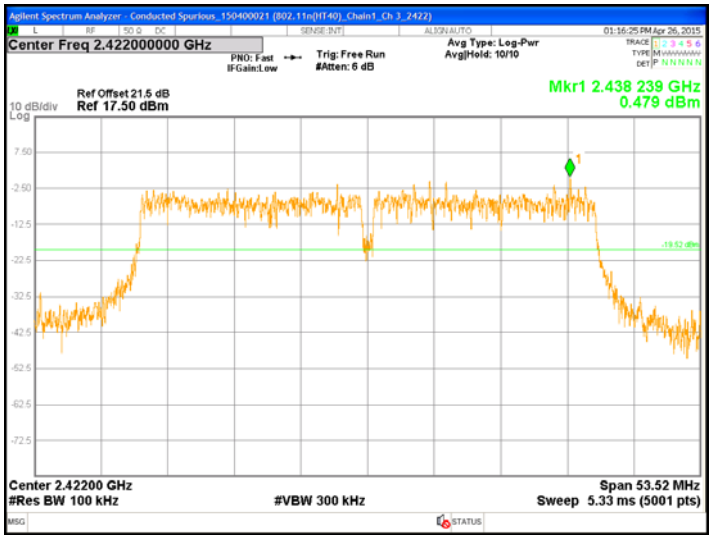

Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



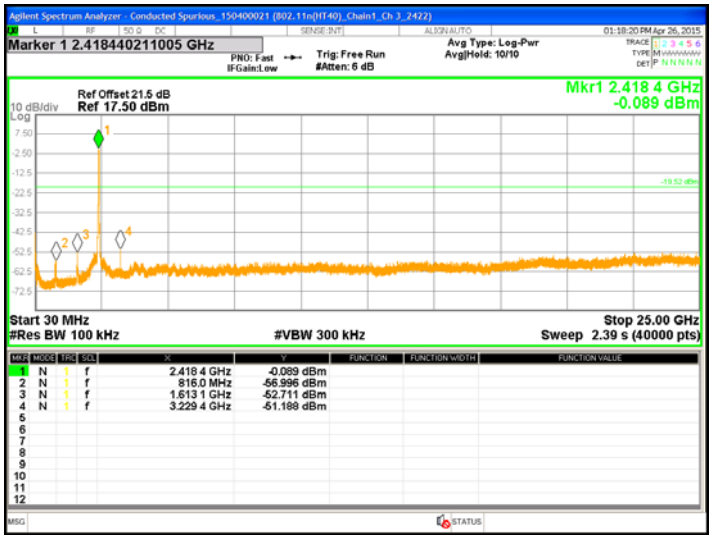

Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



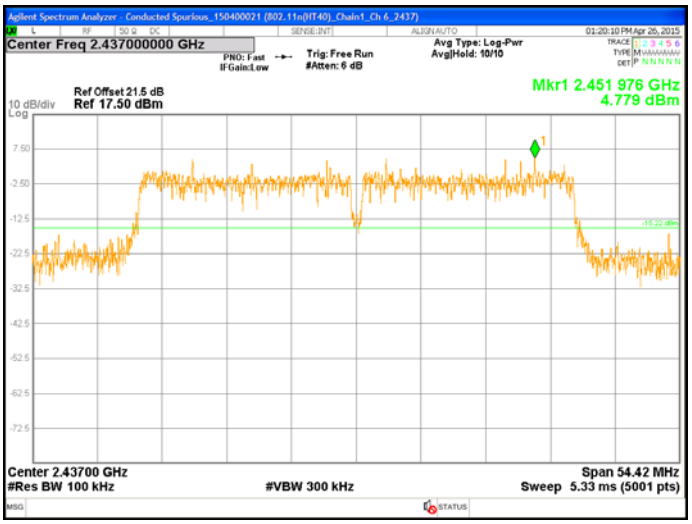
Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



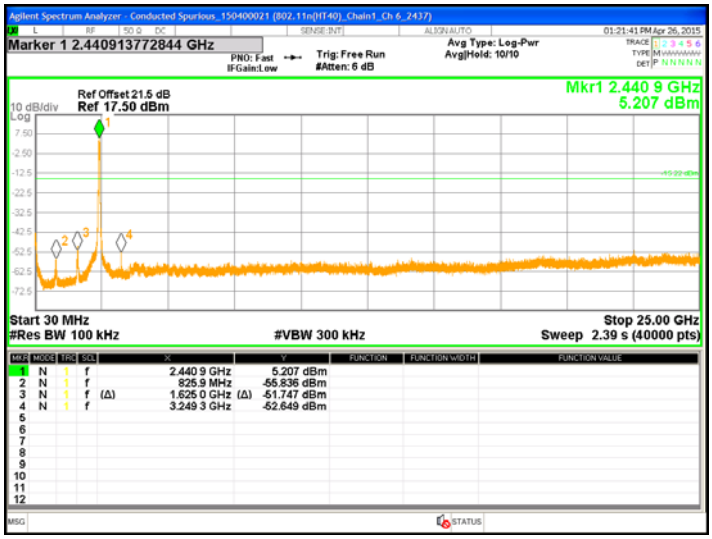

Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



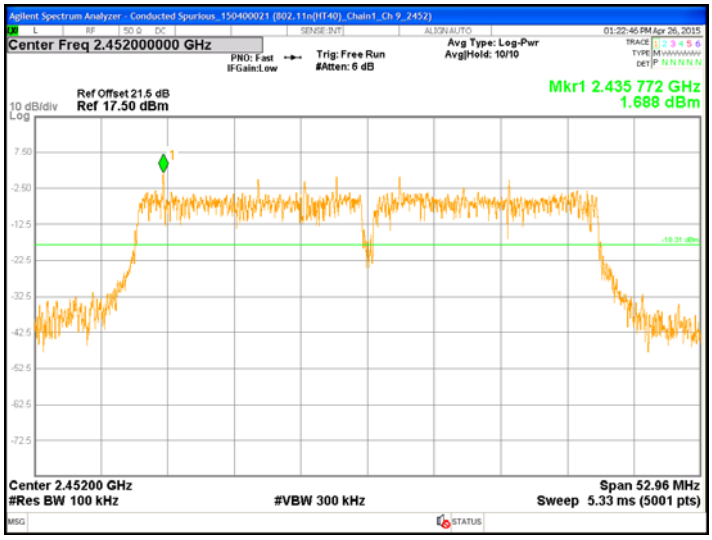

Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



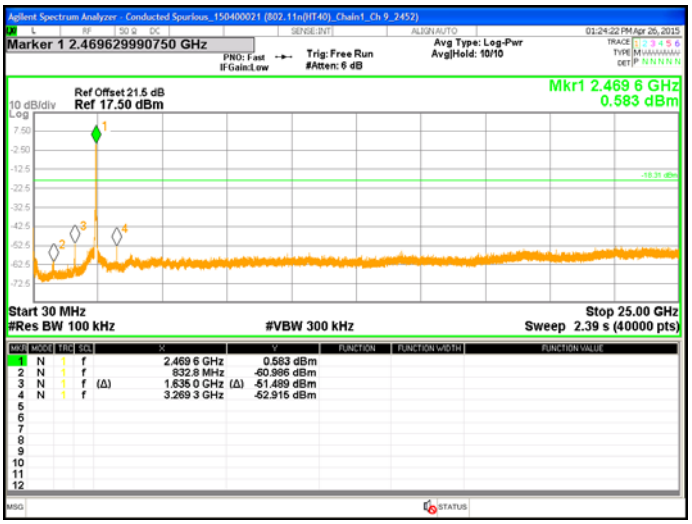
Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 6




Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 9




Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



# 7. Emissions In Restricted Frequency Bands (Radiated emission measurements)

## 7.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Requirement | 15.247(d), 15.205, 15.209 | |

## 7.2 Limit for emission in restricted frequency bands (Radiated emission measurement)

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 2400/F(kHz) | 30 |
| 1.705~30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Remark:

1. In the above table, the tighter limit applies at the band edges.
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

### 7.3 Measuring instrument setting

**Below 1GHz measurement**

| Receiver settings | |
|---|---|
| **Receiver function** | **Setting** |
| Detector | QP |
| RBW | 9-150 kHz ; 200-300 Hz<br>0.15-30 MHz; 9-10 kHz<br>30-1000 MHz; 100-120 kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Attenuation | Auto |

**Above 1GHz measurement**

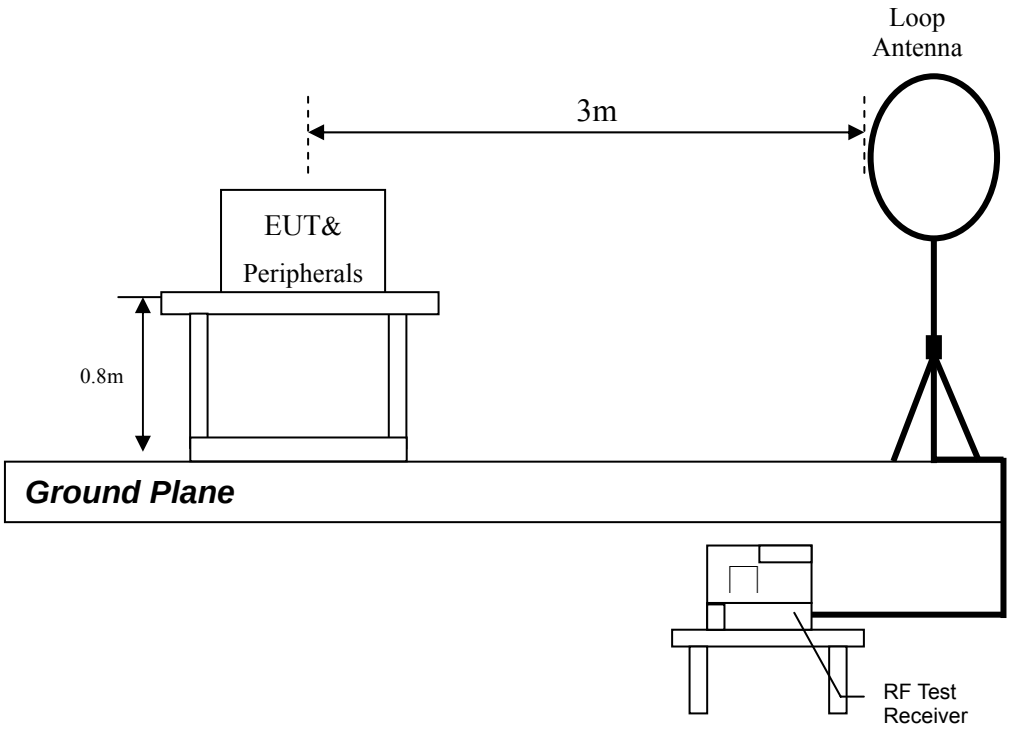
| Spectrum analyzer settings | |
|---|---|
| **Spectrum Analyzer function** | **Setting** |
| Detector | Peak |
| RBW | 1MHz |
| VBW | 3MHz for Peak; 10Hz for Average |
| Sweep | Auto couple |
| Start Frequency | 1GHz |
| Stop Frequency | Tenth harmonic |
| Attenuation | Auto |

**7.4 Test procedure**

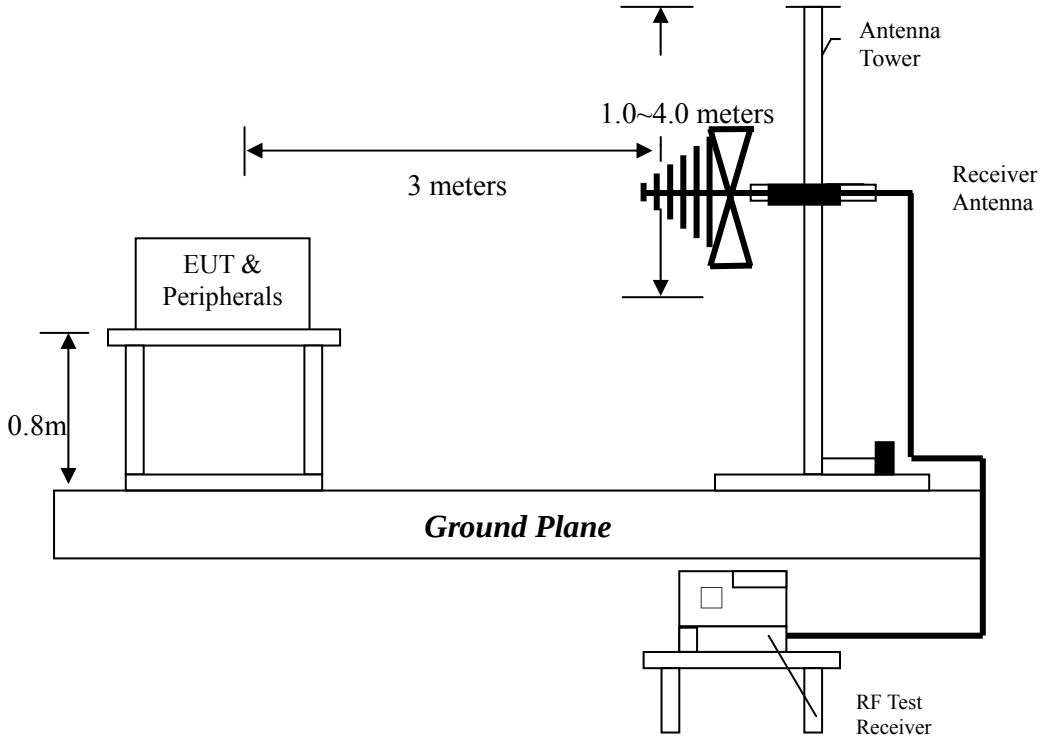
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
3. The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization
4. If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.
5. Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
   Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
7. If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

## 7.5 Test configuration

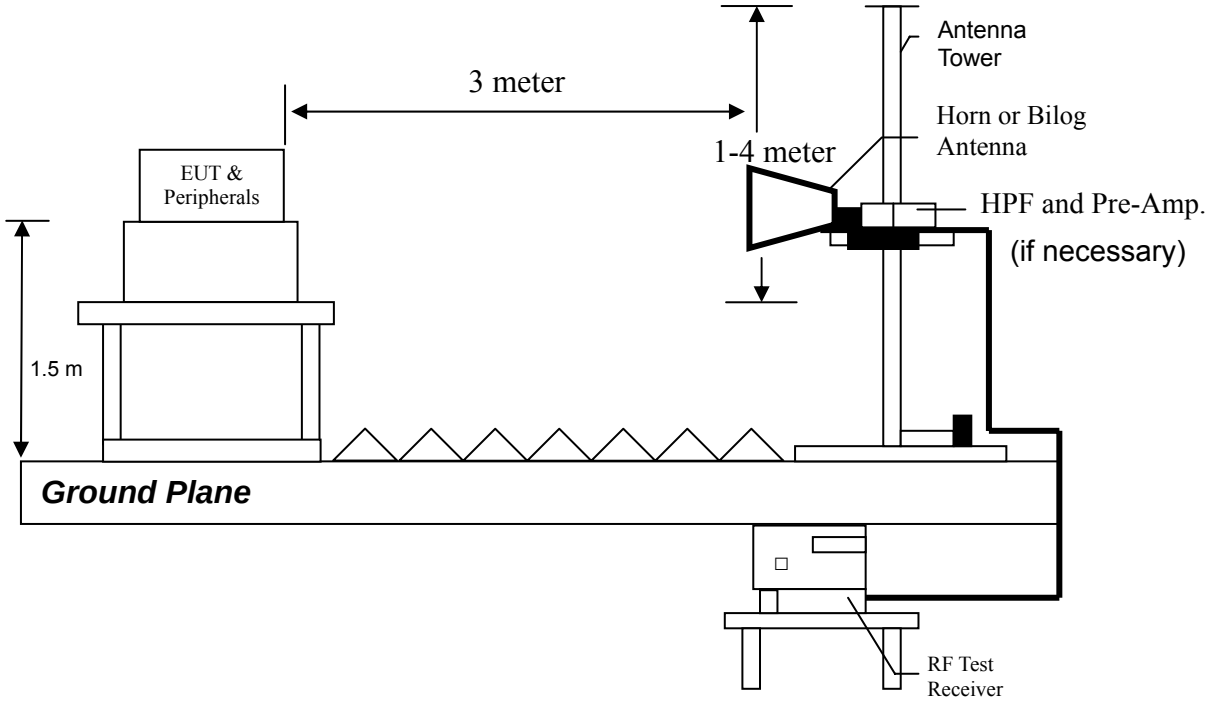
### 7.5.1 Radiated emission from 9kHz to 30MHz uses Loop Antenna:



### 7.5.2 Radiated emission below 1GHz using Bilog Antenna




### 7.5.3 Radiated emission above 1GHz using Horn Antenna



## 7.6 Test result

### 7.6.1 Measurement results: frequencies 9kHz to 30MHz

EUT : NBG6515
Test mode : 802.11b Tx channel 6

| Frequency (MHz) | Detection value | factor (dB/m) | Reading (dBμV) | value (dBμV/m) | Limit @ 3m (dBμV/m) | Tolerance (dB) |
|---|---|---|---|---|---|---|
| 2.15 | QP | 18.17 | 36.61 | 54.78 | 69.54 | -14.76 |
| 16.36 | QP | 7.15 | 26.36 | 33.51 | 69.54 | -36.03 |
| 20.00 | QP | 6.60 | 20.33 | 26.93 | 69.54 | -42.61 |
| 2.06 | QP | 18.58 | 33.53 | 52.11 | 69.54 | -17.43 |
| 14.48 | QP | 7.44 | 23.25 | 30.69 | 69.54 | -38.85 |
| 21.10 | QP | 6.57 | 15.74 | 22.31 | 69.54 | -47.23 |

Remark: Corr. Factor = Antenna Factor + Cable Loss - PreAmplifier Gain

### 7.6.2 Measurement results: frequencies below 1 GHz

The test was performed on EUT under 802.11b/g/n continuously transmitting mode. The worst case occurred at 802.11b Tx channel 6.

EUT : NBG6515
Worst Case : 802.11b Tx channel 6

| Antenna Polariz. (V/H) | Freq. (MHz) | Receiver Detector | Corr. Factor (dB/m) | Reading (dBµV) | Corrected Level (dBµV/m) | Limit @ 3 m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Vertical | 255.04 | QP | 16.01 | 16.52 | 32.53 | 46.00 | -13.47 |
| Vertical | 321.00 | QP | 17.97 | 19.59 | 37.56 | 46.00 | -8.44 |
| Vertical | 375.32 | QP | 19.33 | 16.63 | 35.96 | 46.00 | -10.04 |
| Vertical | 385.02 | QP | 19.56 | 17.15 | 36.71 | 46.00 | -9.29 |
| Vertical | 449.04 | QP | 21.18 | 19.16 | 40.34 | 46.00 | -5.66 |
| Vertical | 513.06 | QP | 22.29 | 16.38 | 38.67 | 46.00 | -7.33 |
| Horizontal | 255.04 | QP | 17.12 | 16.55 | 33.67 | 46.00 | -12.33 |
| Horizontal | 321.00 | QP | 18.28 | 18.18 | 36.46 | 46.00 | -9.54 |
| Horizontal | 385.02 | QP | 19.40 | 15.76 | 35.16 | 46.00 | -10.84 |
| Horizontal | 449.04 | QP | 20.52 | 18.79 | 39.31 | 46.00 | -6.69 |
| Horizontal | 513.06 | QP | 21.65 | 15.01 | 36.66 | 46.00 | -9.34 |
| Horizontal | 613.94 | QP | 23.42 | 14.27 | 37.69 | 46.00 | -8.31 |

Remark: Corr. Factor = Antenna Factor + Cable Loss

### 7.6.3 Measurement results: frequency above 1GHz to 25GHz

EUT : NBG6515

| Mode | Frequency | Spectrum Analyzer | Ant. Pol. | Preamp. Gain | Correction Factor | Reading | Corrected Reading | Limit @ 3 m | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | Detector | (H/V) | (dB) | (dB/m) | (dBμV) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11b Ch 1 | 4824 | PK | V | 40.10 | -0.04 | 54.55 | 54.51 | 74.00 | -19.49 |
| | 4824 | AV | V | 40.10 | -0.04 | 51.52 | 51.48 | 54.00 | -2.52 |
| | 7236 | PK | V | 38.08 | 8.19 | 47.33 | 55.52 | 74.00 | -18.48 |
| | 7236 | AV | V | 38.08 | 8.19 | 44.33 | 52.52 | 54.00 | -1.48 |
| | 4824 | PK | H | 40.10 | -0.04 | 53.73 | 53.69 | 74.00 | -20.31 |
| | 4824 | AV | H | 40.10 | -0.04 | 50.52 | 50.48 | 54.00 | -3.52 |
| | 7236 | PK | H | 38.08 | 8.19 | 46.54 | 54.73 | 74.00 | -19.27 |
| | 7236 | AV | H | 38.08 | 8.19 | 43.50 | 51.69 | 54.00 | -2.31 |
| 802.11b Ch 6 | 4874 | PK | V | 40.00 | 0.13 | 52.02 | 52.15 | 74.00 | -21.85 |
| | 7311 | PK | V | 38.02 | 8.42 | 48.64 | 57.06 | 74.00 | -16.94 |
| | 7311 | AV | V | 38.02 | 8.42 | 44.79 | 53.21 | 54.00 | -0.79 |
| | 4874 | PK | H | 40.00 | 0.13 | 51.89 | 52.02 | 74.00 | -21.98 |
| | 7311 | PK | H | 38.02 | 8.42 | 47.95 | 56.37 | 74.00 | -17.63 |
| | 7311 | AV | H | 38.02 | 8.42 | 44.51 | 52.93 | 54.00 | -1.07 |
| 802.11b Ch 11 | 4924 | PK | V | 39.91 | 0.30 | 51.76 | 52.06 | 74.00 | -21.94 |
| | 7386 | PK | V | 37.96 | 8.66 | 47.52 | 56.18 | 74.00 | -17.82 |
| | 7386 | AV | V | 37.96 | 8.66 | 44.07 | 52.73 | 54.00 | -1.27 |
| | 4924 | PK | H | 39.91 | 0.30 | 47.24 | 47.54 | 74.00 | -26.46 |
| | 7386 | PK | H | 37.96 | 8.66 | 45.77 | 54.43 | 74.00 | -19.57 |
| | 7386 | AV | H | 37.96 | 8.66 | 40.96 | 49.62 | 54.00 | -4.38 |

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

| Mode | Frequency | Spectrum Analyzer | Ant. Pol. | Preamp. Gain | Correction Factor | Reading | Corrected Reading | Limit @ 3 m | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | Detector | (H/V) | (dB) | (dB/m) | (dBμV) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11g Ch 1 | 4824 | PK | V | 40.10 | -0.04 | 49.24 | 49.20 | 74.00 | -24.80 |
| | 7236 | PK | V | 38.08 | 8.19 | 50.74 | 58.93 | 74.00 | -15.07 |
| | 7236 | AV | V | 38.08 | 8.19 | 35.69 | 43.88 | 54.00 | -10.12 |
| | 4824 | PK | H | 40.10 | -0.04 | 49.53 | 49.49 | 74.00 | -24.51 |
| | 7236 | PK | H | 38.08 | 8.19 | 52.17 | 60.36 | 74.00 | -13.64 |
| | 7236 | AV | H | 38.08 | 8.19 | 37.51 | 45.70 | 54.00 | -8.30 |
| 802.11g Ch 6 | 4874 | PK | V | 40.00 | 0.13 | 47.04 | 47.17 | 74.00 | -26.83 |
| | 7311 | PK | V | 38.02 | 8.42 | 51.17 | 59.59 | 74.00 | -14.41 |
| | 7311 | AV | V | 38.02 | 8.42 | 36.84 | 45.26 | 54.00 | -8.74 |
| | 4874 | PK | H | 40.00 | 0.13 | 47.67 | 47.80 | 74.00 | -26.20 |
| | 7311 | PK | H | 38.02 | 8.42 | 51.51 | 59.93 | 74.00 | -14.07 |
| | 7311 | AV | H | 38.02 | 8.42 | 36.26 | 44.68 | 54.00 | -9.32 |
| 802.11g Ch 11 | 4924 | PK | V | 39.91 | 0.30 | 47.32 | 47.62 | 74.00 | -26.38 |
| | 7386 | PK | V | 37.96 | 8.66 | 53.33 | 61.99 | 74.00 | -12.01 |
| | 7386 | AV | V | 37.96 | 8.66 | 37.20 | 45.86 | 54.00 | -8.14 |
| | 4924 | PK | H | 39.91 | 0.30 | 46.28 | 46.58 | 74.00 | -27.42 |
| | 7386 | PK | H | 37.96 | 8.66 | 50.89 | 59.55 | 74.00 | -14.45 |
| | 7386 | AV | H | 37.96 | 8.66 | 34.46 | 43.12 | 54.00 | -10.88 |

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

| Mode | Frequency | Spectrum Analyzer | Ant. Pol. | Preamp. Gain | Correction Factor | Reading | Corrected Reading | Limit @ 3 m | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | Detector | (H/V) | (dB) | (dB/m) | (dBμV) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11n (HT20) Ch 1 | 4824 | PK | V | 40.10 | -0.04 | 51.54 | 51.50 | 74.00 | -22.50 |
| | 7236 | PK | V | 38.08 | 8.19 | 41.41 | 49.60 | 74.00 | -24.40 |
| | 4824 | PK | H | 40.10 | -0.04 | 49.97 | 49.93 | 74.00 | -24.07 |
| | 7236 | PK | H | 38.08 | 8.19 | 42.21 | 50.40 | 74.00 | -23.60 |
| 802.11n (HT20) Ch 6 | 4874 | PK | V | 40.00 | 0.13 | 55.16 | 55.29 | 74.00 | -18.71 |
| | 4874 | AV | V | 40.00 | 0.13 | 40.04 | 40.17 | 54.00 | -13.83 |
| | 7311 | PK | V | 38.02 | 8.42 | 53.19 | 61.61 | 74.00 | -12.39 |
| | 7311 | AV | V | 38.02 | 8.42 | 38.39 | 46.81 | 54.00 | -7.19 |
| | 4874 | PK | H | 40.00 | 0.13 | 54.85 | 54.98 | 74.00 | -19.02 |
| | 4874 | AV | H | 40.00 | 0.13 | 39.69 | 39.82 | 54.00 | -14.18 |
| | 7311 | PK | H | 38.02 | 8.42 | 53.08 | 61.50 | 74.00 | -12.50 |
| | 7311 | AV | H | 38.02 | 8.42 | 37.07 | 45.49 | 54.00 | -8.51 |
| 802.11n (HT20) Ch 11 | 4924 | PK | V | 39.91 | 0.30 | 52.00 | 52.30 | 74.00 | -21.70 |
| | 7386 | PK | V | 37.96 | 8.66 | 42.34 | 51.00 | 74.00 | -23.00 |
| | 4924 | PK | H | 39.91 | 0.30 | 51.26 | 51.56 | 74.00 | -22.44 |
| | 7386 | PK | H | 37.96 | 8.66 | 41.36 | 50.02 | 74.00 | -23.98 |
| 802.11n (HT40) Ch 3 | 4844 | PK | V | 40.06 | 0.03 | 47.68 | 47.71 | 74.00 | -26.29 |
| | 7266 | PK | V | 38.06 | 8.28 | 38.64 | 46.92 | 74.00 | -27.08 |
| | 4844 | PK | H | 40.06 | 0.03 | 47.41 | 47.44 | 74.00 | -26.56 |
| | 7266 | PK | H | 38.06 | 8.28 | 38.93 | 47.21 | 74.00 | -26.79 |
| 802.11n (HT40) Ch 6 | 4874 | PK | V | 40.00 | 0.13 | 49.88 | 50.01 | 74.00 | -23.99 |
| | 7311 | PK | V | 38.02 | 8.42 | 49.26 | 57.68 | 74.00 | -16.32 |
| | 7311 | AV | V | 38.02 | 8.42 | 32.92 | 41.34 | 54.00 | -12.66 |
| | 4874 | PK | H | 40.00 | 0.13 | 50.65 | 50.78 | 74.00 | -23.22 |
| | 7311 | PK | H | 38.02 | 8.42 | 50.93 | 59.35 | 74.00 | -14.65 |
| | 7311 | AV | H | 38.02 | 8.42 | 35.20 | 43.62 | 54.00 | -10.38 |
| 802.11n (HT40) Ch 9 | 4904 | PK | V | 39.95 | 0.23 | 47.66 | 47.89 | 74.00 | -26.11 |
| | 7356 | PK | V | 37.98 | 8.56 | 39.33 | 47.89 | 74.00 | -26.11 |
| | 4904 | PK | H | 39.95 | 0.23 | 47.67 | 47.90 | 74.00 | -26.10 |
| | 7356 | PK | H | 37.98 | 8.56 | 37.96 | 46.52 | 74.00 | -27.48 |

Remark 1: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

Remark 2:The test mode of 802.11nHT20 & 802.11nHT40 are both “Chain 0 & Chain 1” on.

# 8. Emission On Band Edge

## 8.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Requirement | 15.247(d), 15.205, | |

## 8.2 Measuring instrument setting

| Spectrum analyzer settings | |
|---|---|
| **Spectrum Analyzer function** | **Setting** |
| Detector | Peak |
| RBW | 1MHz |
| VBW | 3MHz for Peak; 10Hz for Average |
| Sweep | Auto couple |
| Restrict bands | 2310~2390MHz |
| | 2483.5 ~2500MHz |
| Attenuation | Auto |

## 8.3 Test procedure

The test procedure is the same as clause 7.4

## 8.4 Test results

| Mode | Frequency (MHz) | Spectrum Analyzer Detector | Ant. Pol. (H/V) | Correction Factor (dB/m) | Reading (dBμV) | Corrected Reading (dBμV/m) | Limit @ 3 m (dBμV/m) | Margin (dB) | Restricted band (MHz) |
|---|---|---|---|---|---|---|---|---|---|
| 802.11b | 2387.76 | PK | V | 33.84 | 28.16 | 62.00 | 74 | -12.00 | 2310~2390 |
| | 2390.00 | AV | V | 33.85 | 13.55 | 47.40 | 54 | -6.60 | |
| | 2486.20 | PK | V | 34.31 | 28.29 | 62.60 | 74 | -11.40 | 2483.5~2500 |
| | 2483.50 | AV | V | 34.30 | 18.24 | 52.54 | 54 | -1.46 | |
| 802.11g | 2389.74 | PK | V | 33.85 | 38.12 | 71.97 | 74 | -2.03 | 2310~2390 |
| | 2390.00 | AV | V | 33.85 | 18.42 | 52.27 | 54 | -1.73 | |
| | 2484.04 | PK | V | 34.30 | 37.92 | 72.22 | 74 | -1.78 | 2483.5~2500 |
| | 2483.50 | AV | V | 34.30 | 18.24 | 52.54 | 54 | -1.46 | |
| 802.11n HT 20 | 2389.20 | PK | V | 33.85 | 39.46 | 73.31 | 74 | -0.69 | 2310~2390 |
| | 2390.00 | AV | V | 33.85 | 19.22 | 53.07 | 54 | -0.93 | |
| | 2483.92 | PK | V | 34.30 | 38.21 | 72.51 | 74 | -1.49 | 2483.5~2500 |
| | 2483.50 | AV | V | 34.30 | 18.88 | 53.18 | 54 | -0.82 | |
| 802.11n HT 40 | 2388.30 | PK | V | 33.84 | 39.05 | 72.89 | 74 | -1.11 | 2310~2390 |
| | 2390.00 | AV | V | 33.85 | 16.88 | 50.73 | 54 | -3.27 | |
| | 2484.00 | PK | V | 34.30 | 38.58 | 72.88 | 74 | -1.12 | 2483.5~2500 |
| | 2483.50 | AV | V | 34.30 | 16.53 | 50.83 | 54 | -3.17 | |

Remark 1:The test mode of 802.11nHT20 & 802.11nHT40 are both “Chain 0 & Chain 1” on.

# 9. AC Power Line Conducted Emission

## 9.1 Operating environment

| | | |
|---|---|---|
| Temperature: | 25 | ℃ |
| Relative Humidity: | 50 | % |
| Atmospheric Pressure | 1008 | hPa |
| Test Voltage | 120V, 60Hz | |
| Requirement | 15.207 | |
| Date of test | Apr. 02, 2015 | |

## 9.2 Limit for AC power line conducted emission

| Freq. (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Q.P. | Ave. |
| 0.15~0.50 | 66 – 56* | 56 – 46* |
| 0.50~5.00 | 56 | 46 |
| 5.00~30.0 | 60 | 50 |

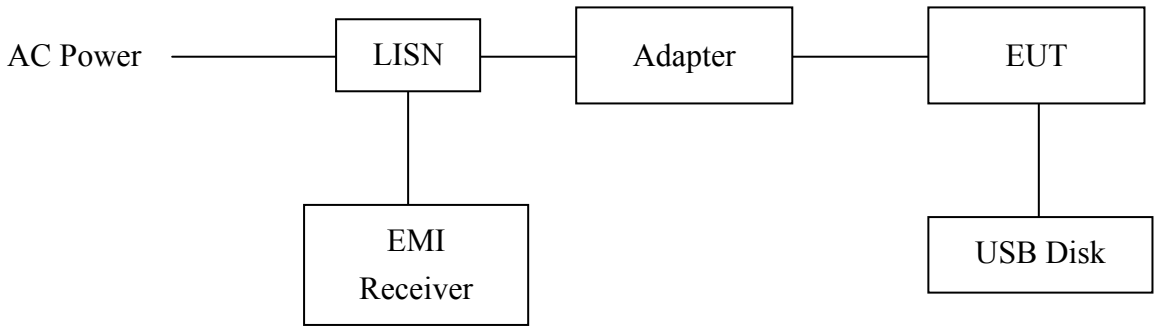
## 9.3 Measuring instrument setting

| **Receiver settings** | |
|---|---|
| **Receiver function** | **Setting** |
| Detector | QP |
| Start frequency | 0.15MHz |
| Stop frequency | 30MHz |
| IF bandwidth | 9 kHz |
| Attenuation | 10dB |

**9.4 Test procedure**

1. Configure the EUT according to ANSI C63.10. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
3. All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30MHz was searched
5. Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
6. The measurement has to be done between each power line and ground at the power terminal.

**9.5 Test diagram**



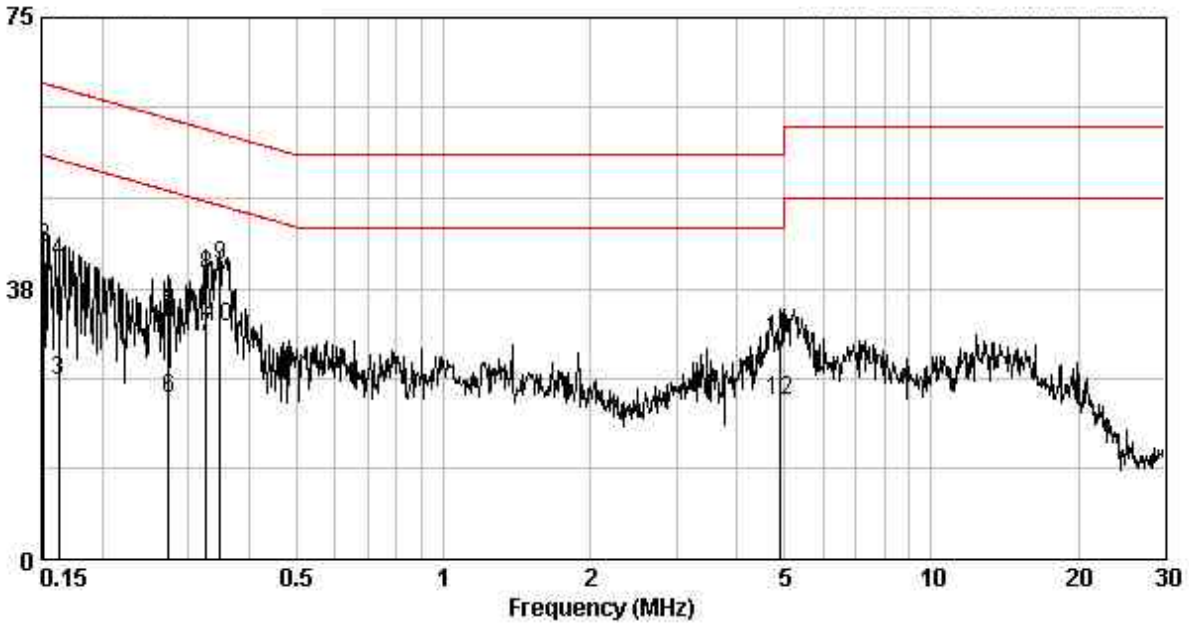

**Note:** The EUT was tested while in normal communication mode.

**9.6 Test results**

Phase : Line
EUT : NBG6515
Test Condition : Normal communication mode

| Frequency (MHz) | Corr. Factor (dB) | Level Qp (dBuV) | Limit Qp (dBuV) | Level Av (dBuV) | Limit Av (dBuV) | Over Limit (dB) Qp | Av |
|---|---|---|---|---|---|---|---|
| 0.152 | 9.74 | 43.09 | 65.91 | 30.68 | 55.91 | -22.83 | -25.23 |
| 0.162 | 9.74 | 41.08 | 65.34 | 24.67 | 55.34 | -24.26 | -30.67 |
| 0.273 | 9.74 | 34.14 | 61.03 | 22.37 | 51.03 | -26.89 | -28.66 |
| 0.327 | 9.73 | 39.20 | 59.53 | 30.82 | 49.53 | -20.33 | -18.71 |
| 0.348 | 9.73 | 40.78 | 59.00 | 32.18 | 49.00 | -18.22 | -16.82 |
| 4.874 | 9.86 | 30.41 | 56.00 | 22.05 | 46.00 | -25.59 | -23.95 |

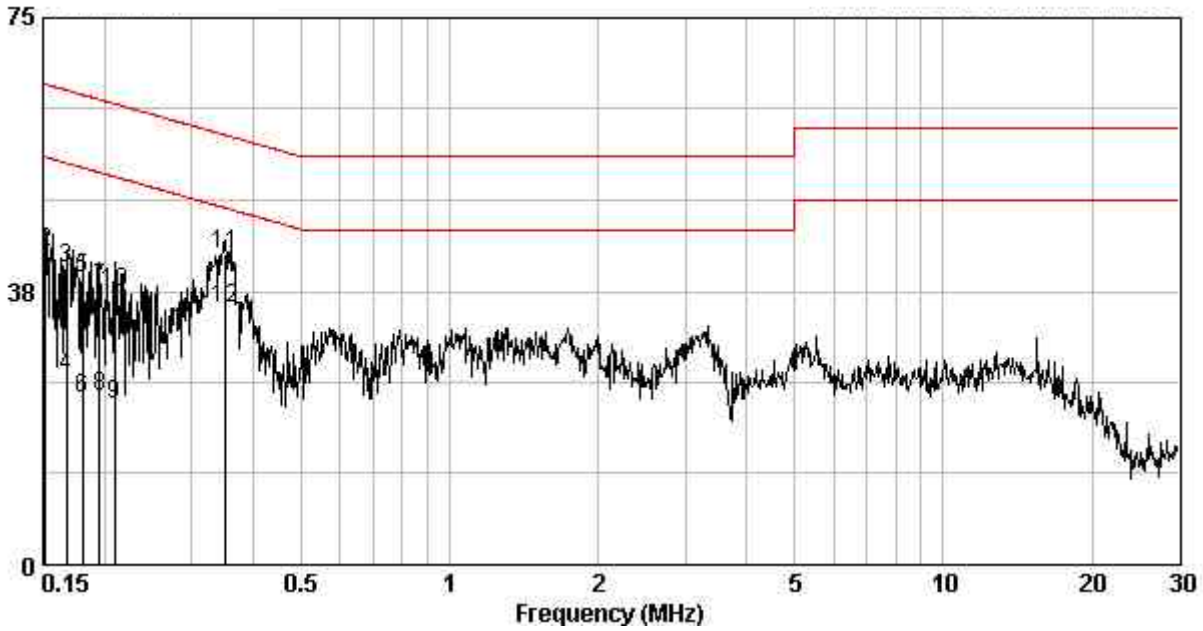
Remark:
1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)



Phase : Neutral
EUT : NBG6515
Test Condition : Normal communication mode

| Frequency (MHz) | Corr. Factor (dB) | Level Qp (dBuV) | Limit Qp (dBuV) | Level Av (dBuV) | Limit Av (dBuV) | Over Limit (dB) Qp | Av |
|---|---|---|---|---|---|---|---|
| 0.152 | 9.75 | 42.85 | 65.91 | 29.64 | 55.91 | -23.06 | -26.28 |
| 0.168 | 9.75 | 40.77 | 65.08 | 25.70 | 55.08 | -24.31 | -29.38 |
| 0.181 | 9.74 | 39.37 | 64.46 | 22.87 | 54.46 | -25.09 | -31.59 |
| 0.195 | 9.74 | 37.85 | 63.80 | 23.20 | 53.80 | -25.95 | -30.60 |
| 0.209 | 9.74 | 37.32 | 63.23 | 22.02 | 53.23 | -25.90 | -31.21 |
| 0.350 | 9.73 | 42.64 | 58.96 | 35.26 | 48.96 | -16.32 | -13.69 |

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)



# Appendix A1: Test equipment list

| Equipment | Brand | Model No. | Serial No. | Calibration Date | Next Calibration Date |
|---|---|---|---|---|---|
| ESCI EMI Test Receiver | Rohde & Schwarz | ESCI | 100018 | 2014/12/02 | 2015/12/01 |
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | 100137 | 2014/06/16 | 2015/06/15 |
| Horn Antenna (1-18G) | Schwarzbeck | BBHA 9120 D | 9120D-456 | 2014/08/29 | 2017/08/27 |
| Horn Antenna (14-42G) | SHWARZBECK | BBHA 9170 | BBHA9170159 | 2014/09/16 | 2017/09/14 |
| Broadband Antenna | Schwarzbeck | VULB 9168 | 9168-172 | 2013/08/08 | 2015/08/07 |
| Loop Antenna | RolfHeine | LA-285 | 02/10033 | 2014/03/18 | 2016/03/16 |
| Pre-Amplifier | MITEQ | JS4-26004000--27-8A | 828825 | 2014/09/15 | 2015/09/14 |
| Power Meter | Anritsu | ML2495A | 0844001 | 2014/11/12 | 2015/11/11 |
| Power Senor | Anritsu | MA2411B | 0738452 | 2014/11/12 | 2015/11/11 |
| Two-Line V-Network | Rohde & Schwarz | ESH3-Z5 | 838979/014 | 2014/10/05 | 2015/10/04 |
| Signal Analyzer | Agilent | N9030A | MY51380492 | 2014/09/19 | 2015/09/18 |
| 966-2_3m Semi-Anechoic Chamber | 966_2 | CEM-966_2 | N/A | 2015/02/24 | 2016/02/23 |

| Brand | Software | Version |
|---|---|---|
| ADT | Radiated test system | 7.5.14 |
| Audix | e3 | 4.2004-1-12k |

# Appendix A2: Test equipment list

| Equipment | Brand | Model No. | Serial No. | Calibration Date | Next Calibration Date |
|---|---|---|---|---|---|
| 966-2(A) Cable 9kHz~26.5GHz | SUHNER | SMA / EX 100 | N/A | 2014/05/06 | 2015/05/05 |
| 966-2(B) Cable 9kHz~26.5GHz | JUNFLON | SMA / J12J100880-00 | AUG-26-08-002 | 2014/05/06 | 2015/05/05 |
| 966-2(A) Cable 9kHz~26.5GHz | SUHNER | SMA / EX 100 | N/A | 2015/05/06 | 2016/05/05 |
| 966-2(B) Cable 9kHz~26.5GHz | JUNFLON | SMA / J12J100880-00 | AUG-26-08-002 | 2015/05/06 | 2016/05/05 |
| RF Cable 9kHz~26.5GHz | SUHNER | SUCOFLEX 102 | CB0006 | 2014/05/06 | 2015/05/05 |
| RF Cable 9kHz~26.5GHz | SUHNER | SUCOFLEX 102 | CB0006 | 2015/05/06 | 2016/05/05 |

## Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of *k*=2.

| Item | Uncertainty |
|---|---|
| Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m | 5.15 dB |
| Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m | 5.23 dB |
| Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m | 4.19 dB |
| Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m | 4.3 dB |
| Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m | 4.19 dB |
| Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m | 4.3 dB |
| Conducted Output power | 0.86 dB |
| Radiated electromagnetic disturbances in the frequency range from 9kHz to 30MHz | 2.92 dB |
| Conducted disturbance measurements at a mains port from 9 kHz to 30 MHz using a 50 Ω/50 μH +5Ω artificial mains network (AMN) | 2.5dB |