# FCC Test Report
## (Class II Permissive Change)

| | |
|---|---|
| Product Name | WAH0001 |
| Model No | QI-150P |
| FCC ID. | 2AOV3QI-150P |

| | |
|---|---|
| Applicant | Hitachi Information & Telecommunication Engineering, Ltd. |
| Address | Queen's Tower B 22F, 2-3-3, Minatomirai, Nishi-ku, Yokohama 220-6122, Japan |

| | |
|---|---|
| Date of Receipt | May. 10, 2018 |
| Issue Date | Jul. 16, 2018 |
| Report No. | 1850118R-RFUSP27V00 |
| Report Version | V1.0 |

Testing Laboratory
3023

# Test Report

Issue Date: Jul. 16, 2018
Report No.: 1850118R-RFUSP27V00

| | |
|---|---|
| Product Name | WAH0001 |
| Applicant | Hitachi Information & Telecommunication Engineering, Ltd. |
| Address | Queen's Tower B 22F, 2-3-3, Minatomirai, Nishi-ku, Yokohama 220-6122, Japan |
| Manufacturer | Hitachi Information & Telecommunication Engineering, Ltd. |
| Model No. | QI-150P |
| FCC ID. | 2AOV3QI-150P |
| EUT Rated Voltage | DC 3.3V |
| EUT Test Voltage | DC 3.3V |
| Trade Name | Hitachi Information & Telecommuniation Engineering, Ltd |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2017<br>ANSI C63.4: 2014, ANSI C63.10: 2013<br>KDB 558074 D01 DTS Meas Guidance v04 |
| Test Result | Complied |

Documented By : Anny Chou

( Senior Adm. Specialist / Anny Chou )

Tested By : Paul Jiang

( Engineer / Paul Jiang )

Approved By :

( Director / Vincent Lin )

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# 1. GENERAL INFORMATION

## 1.1. EUT Description

| | |
|---|---|
| Product Name | WAH0001 |
| Trade Name | Hitachi Information & Telecommuniation Engineering, Ltd |
| Model No. | QI-150P |
| FCC ID. | 2AOV3QI-150P |
| Frequency Range | 802.11b/g/n-20/VHT20 MHz:2412-2472MHz,<br>802.11n-40/VHT40 MHz:2422-2462MHz |
| Number of Channels | 802.11b/g/n-20/VHT20MHz: 13, n-40/VHT40MHz: 11 |
| Data Speed | 802.11b: 1-11Mbps, 802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps |
| Type of Modulation | 802.11b:DSSS, DBPSK, DQPSK, CCK<br>802.11g/n: OFDM, BPSK, QPSK, 16QAM, 64QAM |
| Antenna Type | Dipole Antenna |
| Antenna Gain | Refer to the table “Antenna List” |
| Channel Control | Auto |

**Antenna List**

| No. | Manufacturer | Part No. | Antenna Type | Peak Gain |
|---|---|---|---|---|
| 1 | STAF | T17-002-1054 | Dipole Antenna | 0.65dBi for 2.4 GHz |

Note: The antenna of EUT is conforming to FCC 15.203.

802.11b/g/n-20/VHT20 MHz Center Frequency of Each Channel:

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| Channel 01: | 2412 MHz | Channel 02: | 2417 MHz | Channel 03: | 2422 MHz | Channel 04: | 2427 MHz |
| Channel 05: | 2432 MHz | Channel 06: | 2437 MHz | Channel 07: | 2442 MHz | Channel 08: | 2447 MHz |
| Channel 09: | 2452 MHz | Channel 10: | 2457 MHz | Channel 11: | 2462 MHz | Channel 12: | 2467 MHz |
| Channel 13: | 2472 MHz | | | | | | |

802.11n-40/VHT40 MHz Center Frequency of Each Channel:

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| Channel 03: | 2422 MHz | Channel 04: | 2427 MHz | Channel 05: | 2432 MHz | Channel 06: | 2437 MHz |
| Channel 07: | 2442 MHz | Channel 08: | 2447 MHz | Channel 09: | 2452 MHz | Channel 10: | 2457 MHz |
| Channel 11: | 2462 MHz | | | | | | |

Note:

1. This EUT is an WAH0001 with a built-in WiGig、WLAN and Bluetooth transceiver, this report for WLAN 2.4GHz.
2. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.
3. This is to request a Class II permissive change for FCC ID: 2AOV3QI-150P, originally granted on 07/25/2018.

   The major change filed under this application is:

   Change #1: Reduce the Output Power through firmware(only reduce Bluetooth Output Power, WLAN Output Power haven't changes), All other hardware is identical with original granted.

   #2: Addition one new antenna(WLAN and Bluetooth), the antenna type is different, the antenna gain is lower than the original application.

| | |
|---|---|
| Test Mode: | Mode 1: Transmit (802.11b 1Mbps) |
| | Mode 2: Transmit (802.11g 6Mbps) |
| | Mode 3: Transmit - (VHT 20BW) |
| | Mode 4: Transmit - (VHT 40BW) |

## 1.2. Operational Description

The EUT is a WAH0001 with a built-in 2.4GHz and 5GHz WLAN transceiver. This device provided four kinds of transmitting speed 1, 2, 5.5 and 11Mbps and the device of RF carrier is DBPSK, DQPSK and CCK (IEEE 802.11b). The device provided of eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11g).

The device provided of eight kinds of transmitting speed 14.4,28.9,43.3,57.8,86.7,115.6,130 and 144.4Mbps in 802.11n(20M-BW)/VHT20 mode and 30,60,90,120,180,240,270 and 300 Mbps(40M-BW)/VHT40 the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11n), the IEEE 802.11n is Multiple In, Multiple Out" (MIMO) technology.

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function and the antennas to support 2(Transmit) × 2(Receive) MIMO technology.

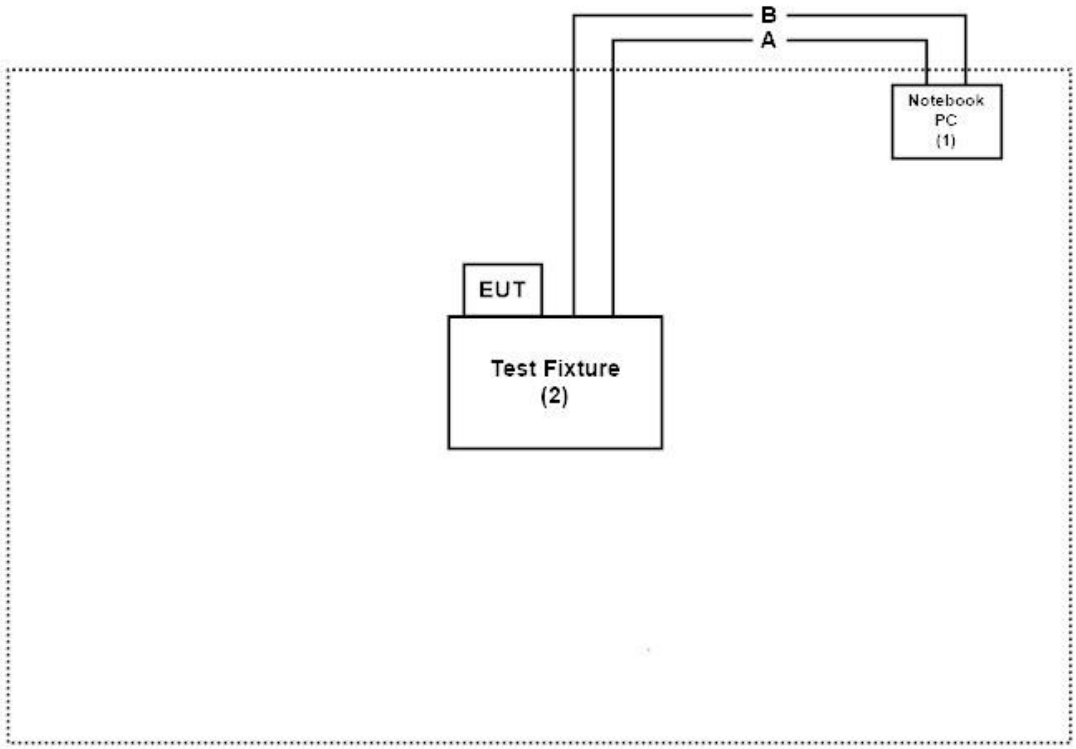
## 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | | Manufacturer | Model No. | Serial No. | Power Cord |
|---|---|---|---|---|---|
| 1 | Notebook PC | DELL | Latitude E5440 | B6TYTZ1 | Non-shielded, 1.8m |
| 2 | Test Fixture | Hitachi Information & Telecommuniation Engineering, Ltd | N/A | N/A | Non-shielded, 1.8m |

| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | LAN Cable | Non-shielded, 3m |
| B | USB Cable | Shielded, 1.2m |

## 1.4. Configuration of Tested System




## 1.5. EUT Exercise Software

(1) Setup the EUT as shown on 1.4

(2) Execute “Qualcomm v3.0.244.0” program on the Notebook PC.

(3) Configure the test mode, the test channel, and the data rate.

(4) Start the continuous transmission.

(5) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items | Required (IEC 68-1) | Actual |
|---|---|---|
| Temperature (°C) | 15-35 | 20-35 |
| Humidity (%RH) | 25-75 | 50-65 |
| Barometric pressure (mbar) | 860-1060 | 950-1000 |

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
Site Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

## 1.7. List of Test Equipment

**For Conducted measurements /CB3/SR8**

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Date | Due. Date |
|---|---|---|---|---|---|---|
| | Temperature Chamber | WIT GROUP | TH-1S-B | EQ-201-00146 | 2018/2/12 | 2019/2/11 |
| X | Spectrum Analyzer | Agilent | N9010A | MY48030495 | 2017/10/13 | 2018/10/12 |
| X | Peak Power Analyzer | Keysight | 8990B | MY51000410 | 2017/7/19 | 2018/7/18 |
| X | Wideband Power Sensor | Keysight | N1923A | MY56080003 | 2018/7/6 | 2019/7/5 |
| X | Wideband Power Sensor | Keysight | N1923A | MY56080004 | 2018/7/6 | 2019/7/5 |
| | EMI Test Receiver | R&S | ESCS 30 | 100369 | 2017/11/7 | 2018/11/6 |
| | LISN | R&S | ESH3-Z5 | 836679/017 | 2018/2/9 | 2019/2/8 |
| | LISN | R&S | ENV216 | 100097 | 2018/2/9 | 2019/2/8 |
| | Coaxial Cable | DEKRA | RG 400 | LC018-RG | 2018/6/22 | 2019/6/21 |

**For Radiated measurements /Site3/CB8**

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Date | Due. Date |
|---|---|---|---|---|---|---|
| X | Spectrum Analyzer | R&S | FSP40 | 100170 | 2018/3/12 | 2019/3/11 |
| | Loop Antenna | Teseq | HLA6121 | 37133 | 2017/10/13 | 2018/10/12 |
| X | Bilog Antenna | Schaffner Chase | CBL6112B | 2707 | 2018/6/25 | 2019/6/24 |
| X | Coaxial Cable | DEKRA | RG 214 | LC003-RG | 2018/6/15 | 2019/6/14 |
| X | Pre-Amplifier | Jet-Power | JPA-10M1G33 | 170101000330010 | 2017/7/19 | 2018/7/18 |
| X | Horn Antenna | ETS-Lindgren | 3117 | 00135205 | 2018/5/3 | 2019/5/2 |
| X | Pre-Amplifier | EMCI | EMC012630SE | 980210 | 2018/4/10 | 2019/4/9 |
| X | Coaxial Cable | QuieTek | SF-106 | LC035/37/41-SF<br>LC038-SF,LC037-SF | 2018/6/21 | 2019/6/20 |
| | Amplifier + Cable | EMCI | EMC184045SE | 980370 | 2018/3/21 | 2019/3/20 |
| | Horn Antenna | Com-Power | AH-840 | 101043 | 2018/1/9 | 2019/1/8 |
| X | Filter | MicroTRON | BRM50701 | 019 | 2017/11/21 | 2018/11/20 |
| | Filter | Microwave Circuits | N0257881 | 36681 | 2018/1/22 | 2019/1/21 |

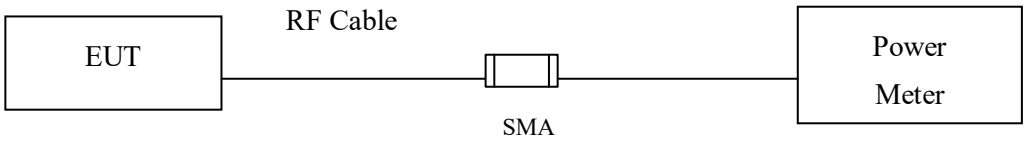
Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.

Test Software version :QuieTek EMI 2.0 V2.1.113.

# 2. Maximum Conducted Power

## 2.1. Test Setup




## 2.2. Limits

The maximum average power shall be less 1 Watt. (Section 15.247 (b)(3))

## 2.3. Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

## 2.4. Uncertainty

± 1.19 dB

## 2.5. Test Result of Maximum Conducted Power

Product : WAH0001
Test Item : Maximum Conducted Power
Test Site : No.3 OATS
Test Date : 2018/07/10
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

**CHAIN A**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | Peak Power | Required Limit | Result |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 5.5 | 11 | 1 | | |
| | | Measurement Level (dBm) | | | | | | |
| 01 | 2412 | 19.25 | -- | -- | -- | 21.3 | <30dBm | Pass |
| 06 | 2437 | 20.03 | 19.94 | 19.86 | 19.81 | 22.01 | <30dBm | Pass |
| 11 | 2462 | 19.81 | -- | -- | -- | 21.75 | <30dBm | Pass |
| 12 | 2467 | 15.74 | -- | -- | -- | 18.03 | <30dBm | Pass |
| 13 | 2472 | 10.96 | -- | -- | -- | 13.51 | <30dBm | Pass |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**CHAIN B**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | Peak Power | Required Limit | Result |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 5.5 | 11 | 1 | | |
| | | Measurement Level (dBm) | | | | | | |
| 01 | 2412 | 18.01 | -- | -- | -- | 20.22 | <30dBm | Pass |
| 06 | 2437 | 18.26 | 18.22 | 18.15 | 18.09 | 20.53 | <30dBm | Pass |
| 11 | 2462 | 18.21 | -- | -- | -- | 20.37 | <30dBm | Pass |
| 12 | 2467 | 13.38 | -- | -- | -- | 16.05 | <30dBm | Pass |
| 13 | 2472 | 9.78 | -- | -- | -- | 12.34 | <30dBm | Pass |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**Chain A+B**

| Channel | Frequency (MHz) | Data Rate (Mbps) | Chain A Power (dBm) | Chain B Power (dBm) | Chain A+B Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 1 | 21.30 | 20.22 | 23.80 | <30dBm | Pass |
| 6 | 2437 | 1 | 22.01 | 20.53 | 24.34 | <30dBm | Pass |
| 11 | 2462 | 1 | 21.75 | 20.37 | 24.12 | <30dBm | Pass |
| 12 | 2467 | 1 | 18.03 | 16.05 | 20.16 | <30dBm | Pass |
| 13 | 2472 | 1 | 13.51 | 12.34 | 15.97 | <30dBm | Pass |

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : WAH0001
Test Item : Maximum Conducted Power
Test Site : No.3 OATS
Test Date : 2018/07/10
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

**CHAIN A**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power | Required Limit | Result |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6 | 9 | 12 | 18 | 24 | 36 | 48 | 54 | 6 | | |
| | | Measurement Level (dBm) | | | | | | | | | | |
| 01 | 2412 | 15.06 | -- | -- | -- | -- | -- | -- | -- | 21.24 | <30dBm | Pass |
| 06 | 2437 | 19.25 | 19.21 | 19.17 | 19.12 | 19.08 | 19.05 | 19.01 | 18.95 | 23.58 | <30dBm | Pass |
| 11 | 2462 | 14.51 | -- | -- | -- | -- | -- | -- | -- | 20.25 | <30dBm | Pass |
| 12 | 2467 | 11.22 | -- | -- | -- | -- | -- | -- | -- | 17.05 | <30dBm | Pass |
| 13 | 2472 | 2.23 | -- | -- | -- | -- | -- | -- | -- | 8.19 | <30dBm | Pass |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**CHAIN B**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power | Required Limit | Result |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6 | 9 | 12 | 18 | 24 | 36 | 48 | 54 | 6 | | |
| | | Measurement Level (dBm) | | | | | | | | | | |
| 01 | 2412 | 14.02 | -- | -- | -- | -- | -- | -- | -- | 19.89 | <30dBm | Pass |
| 06 | 2437 | 17.48 | 17.43 | 17.39 | 17.34 | 17.31 | 17.27 | 17.23 | 17.19 | 22.34 | <30dBm | Pass |
| 11 | 2462 | 13.31 | -- | -- | -- | -- | -- | -- | -- | 19.21 | <30dBm | Pass |
| 12 | 2467 | 9.94 | -- | -- | -- | -- | -- | -- | -- | 16.13 | <30dBm | Pass |
| 13 | 2472 | 0.94 | -- | -- | -- | -- | -- | -- | -- | 7.01 | <30dBm | Pass |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**Chain A+B**

| Channel | Frequency (MHz) | Data Rate (Mbps) | Chain A Power (dBm) | Chain B Power (dBm) | Chain A+B Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 6 | 21.24 | 19.89 | 23.63 | <30dBm | Pass |
| 6 | 2437 | 6 | 23.58 | 22.34 | 26.01 | <30dBm | Pass |
| 11 | 2462 | 6 | 20.25 | 19.21 | 22.77 | <30dBm | Pass |
| 12 | 2467 | 6 | 17.05 | 16.13 | 19.62 | <30dBm | Pass |
| 13 | 2472 | 6 | 8.19 | 7.01 | 10.65 | <30dBm | Pass |

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : WAH0001
Test Item : Maximum Conducted Power
Test Site : No.3 OATS
Test Date : 2018/07/10
Test Mode : Mode 3: Transmit - (VHT 20BW)

**CHAIN A**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power |
|---|---|---|---|---|---|---|---|---|---|---|
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH0 |
| | | Measurement Level (dBm) | | | | | | | | |
| 01 | 2412 | 13.72 | -- | -- | -- | -- | -- | -- | -- | 20.18 |
| 06 | 2437 | 19.14 | 19.08 | 19.03 | 19.01 | 18.97 | 18.93 | 18.91 | 18.87 | 23.72 |
| 11 | 2462 | 13.25 | -- | -- | -- | -- | -- | -- | -- | 19.4 |
| 12 | 2467 | 10.92 | -- | -- | -- | -- | -- | -- | -- | 17.19 |
| 13 | 2472 | 0.97 | -- | -- | -- | -- | -- | -- | -- | 6.64 |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**CHAIN B**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power |
|---|---|---|---|---|---|---|---|---|---|---|
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH0 |
| | | Measurement Level (dBm) | | | | | | | | |
| 01 | 2412 | 13.45 | -- | -- | -- | -- | -- | -- | -- | 19.48 |
| 06 | 2437 | 17.25 | 17.21 | 17.15 | 17.11 | 17.07 | 17.02 | 16.97 | 16.93 | 22.46 |
| 11 | 2462 | 12.14 | -- | -- | -- | -- | -- | -- | -- | 18.34 |
| 06 | 2437 | 9.74 | -- | -- | -- | -- | -- | -- | -- | 16.11 |
| 11 | 2462 | -0.53 | -- | -- | -- | -- | -- | -- | -- | 5.86 |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**Chain A+B**

| Channel | Frequency (MHz) | Data Rate (Mbps) | Chain A Power (dBm) | Chain B Power (dBm) | Chain A+B Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | VTH0 | 20.18 | 19.48 | 22.85 | <30dBm | Pass |
| 6 | 2437 | VTH0 | 23.72 | 22.46 | 26.15 | <30dBm | Pass |
| 11 | 2462 | VTH0 | 19.40 | 18.34 | 21.91 | <30dBm | Pass |
| 12 | 2467 | VTH0 | 17.19 | 16.11 | 19.69 | <30dBm | Pass |
| 13 | 2472 | VTH0 | 6.64 | 5.86 | 9.28 | <30dBm | Pass |

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : WAH0001
Test Item : Maximum Conducted Power
Test Site : No.3 OATS
Test Date : 2018/07/10
Test Mode : Mode 4: Transmit - (VHT 40BW)

**CHAIN A**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power |
|---|---|---|---|---|---|---|---|---|---|---|
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH0 |
| | | Measurement Level (dBm) | | | | | | | | |
| 03 | 2422 | 11.95 | -- | -- | -- | -- | -- | -- | -- | 18.58 |
| 06 | 2437 | 17.95 | 17.91 | 17.88 | 17.82 | 17.78 | 17.74 | 17.71 | 17.69 | 23.52 |
| 09 | 2452 | 10.62 | -- | -- | -- | -- | -- | -- | -- | 17.62 |
| 10 | 2457 | 8.61 | -- | -- | -- | -- | -- | -- | -- | 15.54 |
| 11 | 2462 | 1.62 | -- | -- | -- | -- | -- | -- | -- | 7.78 |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**CHAIN B**

| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power |
|---|---|---|---|---|---|---|---|---|---|---|
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH0 |
| | | Measurement Level (dBm) | | | | | | | | |
| 03 | 2422 | 11.62 | -- | -- | -- | -- | -- | -- | -- | 17.82 |
| 06 | 2437 | 16.98 | 16.94 | 16.91 | 16.87 | 16.83 | 16.81 | 16.77 | 16.72 | 22.28 |
| 9 | 2452 | 9.17 | -- | -- | -- | -- | -- | -- | -- | 16.24 |
| 10 | 2457 | 7.44 | -- | -- | -- | -- | -- | -- | -- | 14.32 |
| 11 | 2462 | 0.23 | -- | -- | -- | -- | -- | -- | -- | 7.07 |

Note: Peak Power Output Value =Reading value on power meter + cable loss

**Chain A+B**

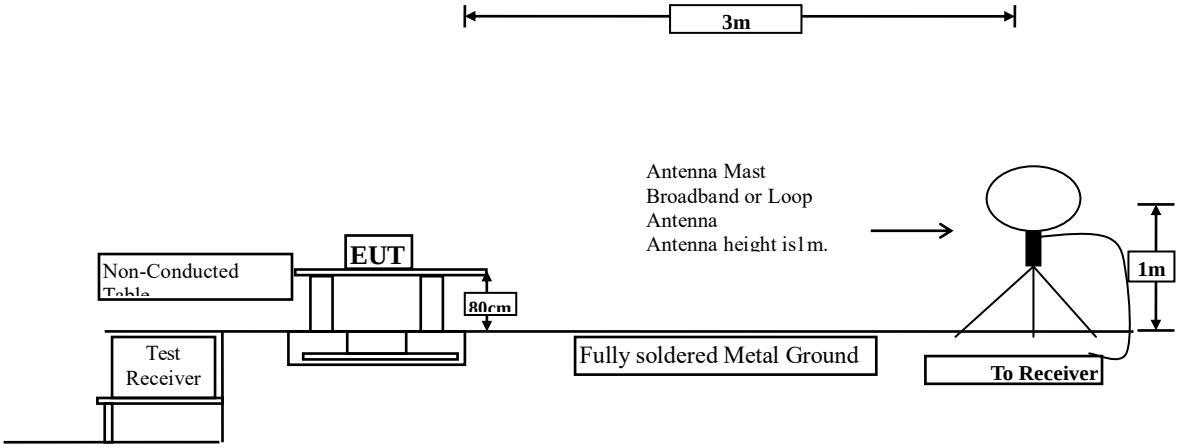
| Channel | Frequency (MHz) | Data Rate (Mbps) | Chain A Power (dBm) | Chain B Power (dBm) | Chain A+B Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 3 | 2422 | VTH0 | 18.58 | 17.82 | 21.23 | <30dBm | Pass |
| 6 | 2437 | VTH0 | 23.52 | 22.28 | 25.95 | <30dBm | Pass |
| 9 | 2452 | VTH0 | 17.62 | 16.24 | 19.99 | <30dBm | Pass |
| 10 | 2457 | VTH0 | 15.54 | 14.32 | 17.98 | <30dBm | Pass |
| 11 | 2462 | VTH0 | 7.78 | 7.07 | 10.45 | <30dBm | Pass |

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

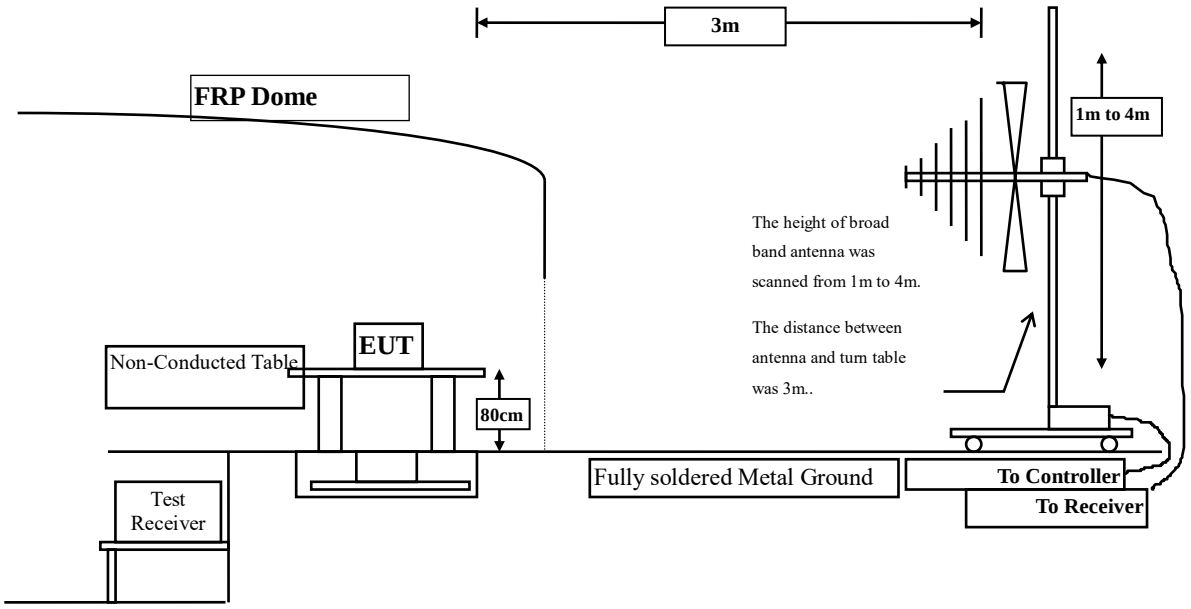
# 3. Radiated Emission

## 3.1. Test Setup

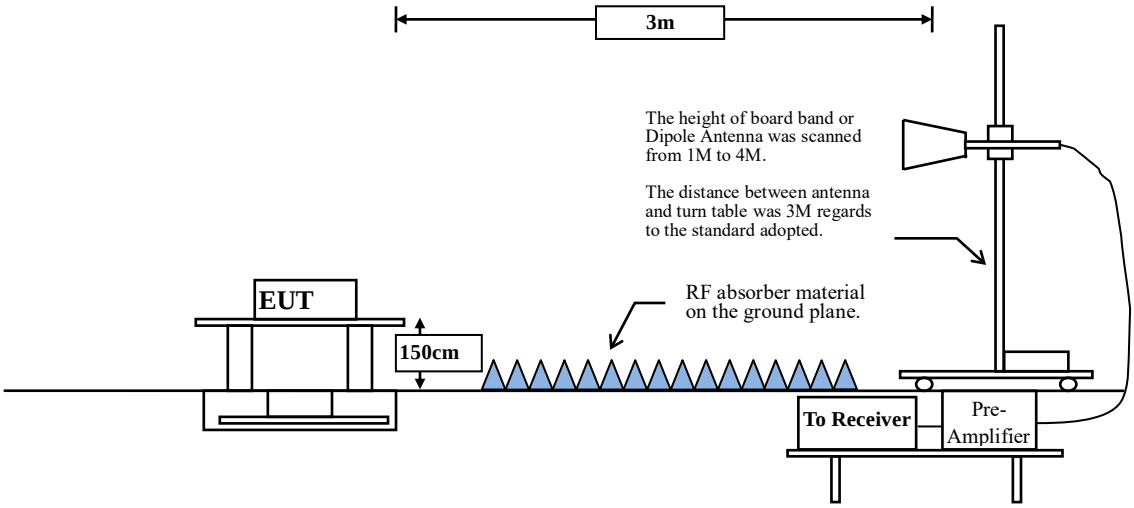
Radiated Emission Under 30MHz




Radiated Emission Below 1GHz



Radiated Emission Above 1GHz




## 3.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

| FCC Part 15 Subpart C Paragraph 15.209(a) Limits | | |
|---|---|---|
| Frequency MHz | Field strength (microvolts/meter) | Measurement distance (meter) |
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

## 3.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

**RBW and VBW Parameter setting:**

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

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

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

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

( T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

| 2.4GHz band | Duty Cycle (%) | T (ms) | 1/T (Hz) | VBW (Hz) |
|---|---|---|---|---|
| 802.11 b | 98.84 | 12.3913 | 81 | 100 |
| 802.11 g | 92.21 | 2.0580 | 486 | 500 |
| VHT20 | 92.36 | 1.9275 | 519 | 1000 |
| VHT40 | 83.89 | 0.9058 | 1104 | 2000 |

Note: Duty Cycle Refer to Section 5.

## 3.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

## 3.5. Test Result of Radiated Emission

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.428 | 41.340 | 43.769 | -30.231 | 74.000 |
| 7236.000 | 9.177 | 39.510 | 48.687 | -25.313 | 74.000 |
| 9648.000 | 10.019 | 38.890 | 48.910 | -25.090 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.837 | 45.160 | 47.997 | -26.003 | 74.000 |
| 7236.000 | 9.676 | 38.970 | 48.646 | -25.354 | 74.000 |
| 9648.000 | 10.557 | 39.240 | 49.797 | -24.203 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 41.450 | 43.527 | -30.473 | 74.000 |
| 7311.000 | 9.512 | 39.630 | 49.142 | -24.858 | 74.000 |
| 9748.000 | 9.630 | 39.810 | 49.440 | -24.560 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 47.440 | 49.972 | -24.028 | 74.000 |
| 7311.000 | 10.089 | 39.580 | 49.669 | -24.331 | 74.000 |
| 9748.000 | 10.266 | 40.790 | 51.057 | -22.943 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 42.990 | 45.181 | -28.819 | 74.000 |
| 7386.000 | 10.373 | 39.380 | 49.754 | -24.246 | 74.000 |
| 9848.000 | 9.964 | 38.790 | 48.754 | -25.246 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 48.370 | 51.175 | -22.825 | 74.000 |
| 7386.000 | 11.180 | 38.910 | 50.090 | -23.910 | 74.000 |
| 9848.000 | 10.801 | 39.010 | 49.811 | -24.189 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2467 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4934.000 | 2.307 | 41.030 | 43.337 | -30.663 | 74.000 |
| 7401.000 | 10.407 | 38.270 | 48.677 | -25.323 | 74.000 |
| 9868.000 | 10.040 | 39.480 | 49.520 | -24.480 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4934.000 | 2.977 | 41.430 | 44.408 | -29.592 | 74.000 |
| 7401.000 | 11.222 | 38.970 | 50.192 | -23.808 | 74.000 |
| 9868.000 | 10.964 | 39.050 | 50.014 | -23.986 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2472 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4944.000 | 2.423 | 41.050 | 43.473 | -30.527 | 74.000 |
| 7416.000 | 10.458 | 38.690 | 49.148 | -24.852 | 74.000 |
| 9888.000 | 10.123 | 39.030 | 49.153 | -24.847 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4944.000 | 3.150 | 43.420 | 46.570 | -27.430 | 74.000 |
| 7416.000 | 11.231 | 38.920 | 50.151 | -23.849 | 74.000 |
| 9888.000 | 11.133 | 39.820 | 50.953 | -23.047 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.428 | 42.090 | 44.519 | -29.481 | 74.000 |
| 7236.000 | 9.177 | 39.250 | 48.427 | -25.573 | 74.000 |
| 9648.000 | 10.019 | 39.260 | 49.280 | -24.720 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.836 | 48.950 | 51.787 | -22.213 | 74.000 |
| 7236.000 | 9.676 | 39.360 | 49.036 | -24.964 | 74.000 |
| 9648.000 | 10.556 | 39.220 | 49.777 | -24.223 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 46.840 | 48.917 | -25.083 | 74.000 |
| 7311.000 | 9.512 | 39.460 | 48.972 | -25.028 | 74.000 |
| 9748.000 | 9.630 | 39.190 | 48.820 | -25.180 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 52.730 | 55.262 | -18.738 | 74.000 |
| 7311.000 | 10.089 | 39.510 | 49.599 | -24.401 | 74.000 |
| 9748.000 | 10.266 | 39.840 | 50.107 | -23.893 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| 4874.000 | 2.532 | 38.450 | 40.982 | -13.018 | 54.000 |

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 41.670 | 43.861 | -30.139 | 74.000 |
| 7386.000 | 10.373 | 38.920 | 49.294 | -24.706 | 74.000 |
| 9848.000 | 9.964 | 39.430 | 49.394 | -24.606 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 48.430 | 51.235 | -22.765 | 74.000 |
| 7386.000 | 11.180 | 38.600 | 49.780 | -24.220 | 74.000 |
| 9848.000 | 10.801 | 38.640 | 49.441 | -24.559 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2467 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4934.000 | 2.307 | 41.260 | 43.567 | -30.433 | 74.000 |
| 7401.000 | 10.407 | 38.830 | 49.237 | -24.763 | 74.000 |
| 9868.000 | 10.040 | 39.710 | 49.750 | -24.250 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4934.000 | 2.977 | 44.940 | 47.918 | -26.082 | 74.000 |
| 7401.000 | 11.222 | 38.960 | 50.182 | -23.818 | 74.000 |
| 9868.000 | 10.964 | 39.170 | 50.134 | -23.866 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2472 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4944.000 | 2.423 | 40.810 | 43.233 | -30.767 | 74.000 |
| 7416.000 | 10.458 | 38.540 | 48.998 | -25.002 | 74.000 |
| 9888.000 | 10.123 | 39.590 | 49.713 | -24.287 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4944.000 | 3.150 | 42.620 | 45.770 | -28.230 | 74.000 |
| 7416.000 | 11.231 | 38.950 | 50.181 | -23.819 | 74.000 |
| 9888.000 | 11.133 | 39.320 | 50.453 | -23.547 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 3: Transmit - (VHT 20BW) (2412MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.428 | 42.630 | 45.059 | -28.941 | 74.000 |
| 7236.000 | 9.177 | 39.580 | 48.757 | -25.243 | 74.000 |
| 9648.000 | 10.019 | 38.860 | 48.880 | -25.120 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.837 | 48.440 | 51.277 | -22.723 | 74.000 |
| 7236.000 | 9.676 | 39.310 | 48.986 | -25.014 | 74.000 |
| 9648.000 | 10.557 | 38.980 | 49.537 | -24.463 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 3: Transmit - (VHT 20BW) (2437 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 45.350 | 47.427 | -26.573 | 74.000 |
| 7311.000 | 9.512 | 39.630 | 49.142 | -24.858 | 74.000 |
| 9748.000 | 9.630 | 39.710 | 49.340 | -24.660 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 52.850 | 55.382 | -18.618 | 74.000 |
| 7311.000 | 10.089 | 39.620 | 49.709 | -24.291 | 74.000 |
| 9748.000 | 10.266 | 39.820 | 50.087 | -23.913 | 74.000 |
| **Average Detector:** | | | | | |
| 4874.000 | 2.532 | 38.020 | 40.552 | -13.448 | 54.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 3: Transmit - (VHT 20BW) (2462 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 42.130 | 44.321 | -29.679 | 74.000 |
| 7386.000 | 10.373 | 39.140 | 49.514 | -24.486 | 74.000 |
| 9848.000 | 9.964 | 39.750 | 49.714 | -24.286 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 46.840 | 49.645 | -24.355 | 74.000 |
| 7386.000 | 11.180 | 38.810 | 49.990 | -24.010 | 74.000 |
| 9848.000 | 10.801 | 38.590 | 49.391 | -24.609 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 3: Transmit - (VHT 20BW) (2467 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4934.000 | 2.307 | 40.950 | 43.257 | -30.743 | 74.000 |
| 7401.000 | 10.407 | 39.130 | 49.537 | -24.463 | 74.000 |
| 9868.000 | 10.040 | 39.620 | 49.660 | -24.340 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4934.000 | 2.977 | 43.970 | 46.948 | -27.052 | 74.000 |
| 7401.000 | 11.222 | 39.240 | 50.462 | -23.538 | 74.000 |
| 9868.000 | 10.964 | 39.270 | 50.234 | -23.766 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 3: Transmit - (VHT 20BW) (2472 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4944.000 | 2.423 | 41.320 | 43.743 | -30.257 | 74.000 |
| 7416.000 | 10.458 | 38.940 | 49.398 | -24.602 | 74.000 |
| 9888.000 | 10.123 | 39.510 | 49.633 | -24.367 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4944.000 | 3.150 | 42.570 | 45.720 | -28.280 | 74.000 |
| 7416.000 | 11.231 | 39.050 | 50.281 | -23.719 | 74.000 |
| 9888.000 | 11.133 | 39.410 | 50.543 | -23.457 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 4: Transmit - (VHT 40BW) (2422MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4844.000 | 2.280 | 41.560 | 43.841 | -30.159 | 74.000 |
| 7266.000 | 9.106 | 39.440 | 48.546 | -25.454 | 74.000 |
| 9688.000 | 9.663 | 38.970 | 48.633 | -25.367 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4844.000 | 2.707 | 43.630 | 46.338 | -27.662 | 74.000 |
| 7266.000 | 9.626 | 39.560 | 49.186 | -24.814 | 74.000 |
| 9688.000 | 10.284 | 39.740 | 50.024 | -23.976 | 74.000 |
| **Average** | | | | | |
| **Detector:** | | | | | |
| -- | | | | | |
| -- | | | | | |

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 4: Transmit - (VHT 40BW) (2437 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 42.800 | 44.877 | -29.123 | 74.000 |
| 7311.000 | 9.512 | 39.160 | 48.672 | -25.328 | 74.000 |
| 9748.000 | 9.630 | 38.920 | 48.550 | -25.450 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 48.220 | 50.752 | -23.248 | 74.000 |
| 7311.000 | 10.089 | 39.210 | 49.299 | -24.701 | 74.000 |
| 9748.000 | 10.266 | 39.750 | 50.017 | -23.983 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 4: Transmit - (VHT 40BW) (2452 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4904.000 | 2.000 | 40.120 | 42.121 | -31.879 | 74.000 |
| 7356.000 | 10.308 | 38.710 | 49.018 | -24.982 | 74.000 |
| 9808.000 | 9.850 | 38.150 | 48.000 | -26.000 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4904.000 | 2.513 | 45.380 | 47.894 | -26.106 | 74.000 |
| 7356.000 | 11.022 | 38.310 | 49.332 | -24.668 | 74.000 |
| 9808.000 | 10.512 | 38.170 | 48.682 | -25.318 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 4: Transmit - (VHT 40BW) (2457 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4914.000 | 2.073 | 40.190 | 42.263 | -31.737 | 74.000 |
| 7371.000 | 10.352 | 38.620 | 48.971 | -25.029 | 74.000 |
| 9828.000 | 9.905 | 38.910 | 48.815 | -25.185 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4914.000 | 2.630 | 41.860 | 44.490 | -29.510 | 74.000 |
| 7371.000 | 11.112 | 38.920 | 50.031 | -23.969 | 74.000 |
| 9828.000 | 10.655 | 38.630 | 49.284 | -24.716 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 4: Transmit - (VHT 40BW) (2462 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 40.250 | 42.441 | -31.559 | 74.000 |
| 7386.000 | 10.373 | 38.560 | 48.934 | -25.066 | 74.000 |
| 9848.000 | 9.964 | 39.240 | 49.204 | -24.796 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 41.570 | 44.375 | -29.625 | 74.000 |
| 7386.000 | 11.180 | 38.610 | 49.790 | -24.210 | 74.000 |
| 9848.000 | 10.801 | 38.980 | 49.781 | -24.219 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 72.680 | -8.373 | 41.002 | 32.629 | -7.371 | 40.000 |
| 220.120 | -19.395 | 46.984 | 27.589 | -18.411 | 46.000 |
| 499.480 | -7.470 | 46.850 | 39.380 | -6.620 | 46.000 |
| 749.740 | -5.955 | 39.463 | 33.508 | -12.492 | 46.000 |
| 875.840 | -4.310 | 42.708 | 38.398 | -7.602 | 46.000 |
| 961.200 | -3.242 | 34.827 | 31.585 | -22.415 | 54.000 |
| **Vertical** | | | | | |
| 88.200 | -5.862 | 39.841 | 33.979 | -9.521 | 43.500 |
| 288.020 | -14.743 | 39.507 | 24.764 | -21.236 | 46.000 |
| 499.480 | -9.660 | 41.870 | 32.210 | -13.790 | 46.000 |
| 600.360 | -8.328 | 35.884 | 27.556 | -18.444 | 46.000 |
| 749.740 | -7.895 | 38.121 | 30.226 | -15.774 | 46.000 |
| 875.840 | -9.610 | 40.836 | 31.226 | -14.774 | 46.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 72.680 | -8.373 | 42.541 | 34.168 | -5.832 | 40.000 |
| 299.660 | -14.011 | 40.369 | 26.358 | -19.642 | 46.000 |
| 499.480 | -7.470 | 47.281 | 39.811 | -6.189 | 46.000 |
| 749.740 | -5.955 | 40.903 | 34.948 | -11.052 | 46.000 |
| 875.840 | -4.310 | 43.150 | 38.840 | -7.160 | 46.000 |
| 961.200 | -3.242 | 35.300 | 32.058 | -21.942 | 54.000 |
| **Vertical** | | | | | |
| 88.200 | -5.862 | 38.689 | 32.827 | -10.673 | 43.500 |
| 499.480 | -9.660 | 41.819 | 32.159 | -13.841 | 46.000 |
| 600.360 | -8.328 | 36.936 | 28.608 | -17.392 | 46.000 |
| 749.740 | -7.895 | 39.121 | 31.226 | -14.774 | 46.000 |
| 875.840 | -9.610 | 41.213 | 31.603 | -14.397 | 46.000 |
| 1000.000 | -11.160 | 38.091 | 26.931 | -27.069 | 54.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

| | | |
|---|---|---|
| Product | : | WAH0001 |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/07/06 |
| Test Mode | : | Mode 3: Transmit - (VHT 20BW) (2437 MHz) |

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 74.620 | -10.424 | 43.856 | 33.432 | -6.568 | 40.000 |
| 220.120 | -19.395 | 47.232 | 27.837 | -18.163 | 46.000 |
| 499.480 | -7.470 | 46.713 | 39.243 | -6.757 | 46.000 |
| 749.740 | -5.955 | 39.569 | 33.614 | -12.386 | 46.000 |
| 875.840 | -4.310 | 42.580 | 38.270 | -7.730 | 46.000 |
| 961.200 | -3.242 | 35.037 | 31.795 | -22.205 | 54.000 |
| **Vertical** | | | | | |
| 88.200 | -5.862 | 39.551 | 33.689 | -9.811 | 43.500 |
| 288.020 | -14.743 | 40.055 | 25.312 | -20.688 | 46.000 |
| 499.480 | -9.660 | 41.895 | 32.235 | -13.765 | 46.000 |
| 749.740 | -7.895 | 39.279 | 31.384 | -14.616 | 46.000 |
| 875.840 | -9.610 | 40.885 | 31.275 | -14.725 | 46.000 |
| 1000.000 | -11.160 | 38.259 | 27.099 | -26.901 | 54.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WAH0001
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/07/06
Test Mode : Mode 4: Transmit - (VHT 40BW) (2437 MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 72.680 | -8.373 | 42.730 | 34.357 | -5.643 | 40.000 |
| 220.120 | -19.395 | 47.574 | 28.179 | -17.821 | 46.000 |
| 499.480 | -7.470 | 47.463 | 39.993 | -6.007 | 46.000 |
| 749.740 | -5.955 | 39.296 | 33.341 | -12.659 | 46.000 |
| 875.840 | -4.310 | 43.228 | 38.918 | -7.082 | 46.000 |
| 1000.000 | -0.430 | 41.763 | 41.333 | -12.667 | 54.000 |
| **Vertical** | | | | | |
| 90.140 | -7.193 | 42.896 | 35.703 | -7.797 | 43.500 |
| 299.660 | -13.321 | 39.670 | 26.349 | -19.651 | 46.000 |
| 499.480 | -9.660 | 41.685 | 32.025 | -13.975 | 46.000 |
| 749.740 | -7.895 | 38.357 | 30.462 | -15.538 | 46.000 |
| 875.840 | -9.610 | 40.378 | 30.768 | -15.232 | 46.000 |
| 1000.000 | -11.160 | 38.702 | 27.542 | -26.458 | 54.000 |

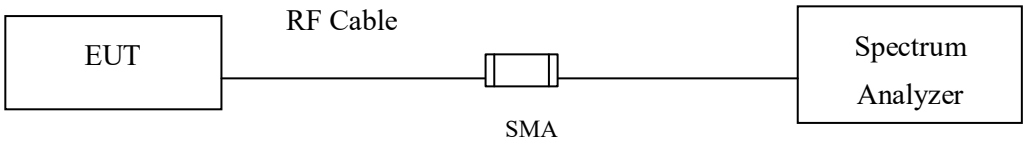
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

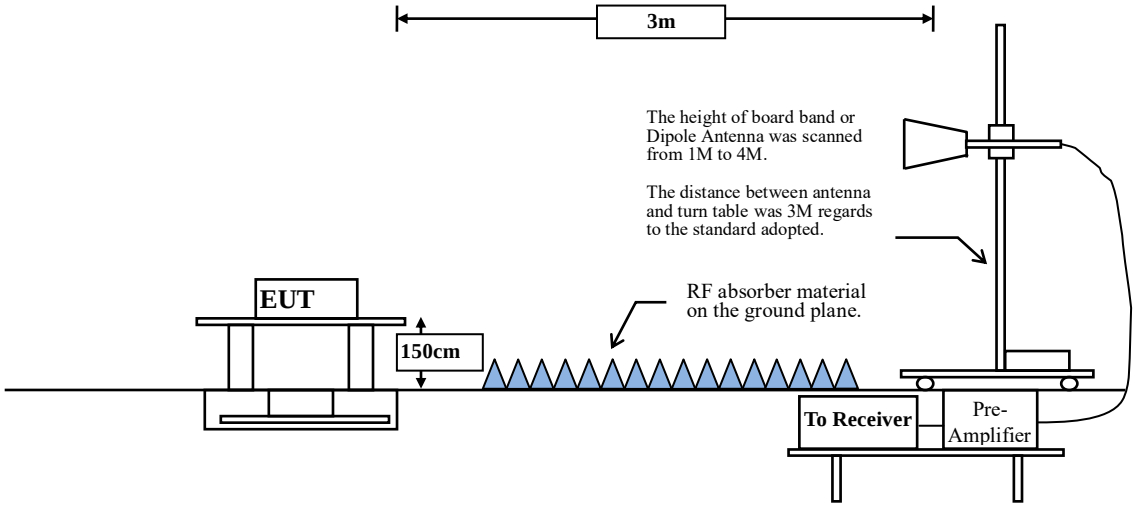
# 4. Band Edge

## 4.1. Test Setup

**RF Conducted Measurement**




**RF Radiated Measurement:**



## 4.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

## 4.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

**RBW and VBW Parameter setting:**

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

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

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

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

( T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

| 2.4GHz band | Duty Cycle (%) | T (ms) | 1/T (Hz) | VBW (Hz) |
|---|---|---|---|---|
| 802.11 b | 98.84 | 12.3913 | 81 | 100 |
| 802.11 g | 92.21 | 2.0580 | 486 | 500 |
| VHT20 | 92.36 | 1.9275 | 519 | 1000 |
| VHT40 | 83.89 | 0.9058 | 1104 | 2000 |

Note: Duty Cycle Refer to Section 5.

## 4.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

## 4.5. Test Result of Band Edge

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2386.812 | 6.461 | 53.933 | 60.394 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2390.000 | 6.474 | 52.688 | 59.163 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2397.681 | 6.514 | 71.669 | 78.183 | -- | -- | -- |
| 01 (Peak) | 2400.000 | 6.528 | 67.816 | 74.344 | -- | -- | -- |
| 01 (Peak) | 2411.159 | 6.597 | 104.984 | 111.581 | -- | -- | -- |
| 01 (Average) | 2387.391 | 6.463 | 42.898 | 49.361 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2390.000 | 6.474 | 38.016 | 44.491 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2397.826 | 6.515 | 68.844 | 75.359 | -- | -- | -- |
| 01 (Average) | 2400.000 | 6.528 | 64.578 | 71.106 | -- | -- | -- |
| 01 (Average) | 2411.449 | 6.599 | 101.440 | 108.039 | -- | -- | -- |

**Figure Channel 01: Horizontal (Peak)**

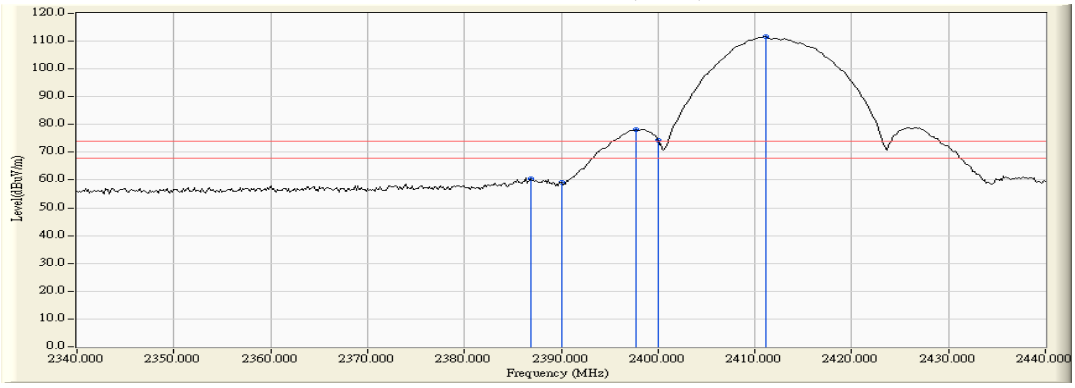
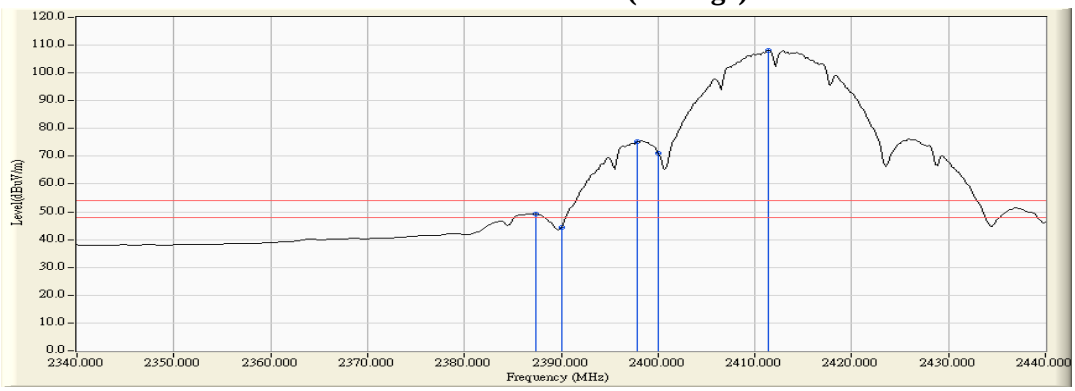



**Figure Channel 01: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2366.957 | 5.974 | 52.348 | 58.323 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2390.000 | 5.880 | 50.615 | 56.496 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2398.406 | 5.876 | 63.718 | 69.593 | -- | -- | -- |
| 01 (Peak) | 2400.000 | 5.879 | 60.683 | 66.562 | -- | -- | -- |
| 01 (Peak) | 2413.188 | 5.921 | 102.147 | 108.068 | -- | -- | -- |
| 01 (Average) | 2383.188 | 5.910 | 35.952 | 41.861 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2390.000 | 5.880 | 34.390 | 40.271 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2398.261 | 5.876 | 59.411 | 65.286 | -- | -- | -- |
| 01 (Average) | 2400.000 | 5.879 | 54.898 | 60.777 | -- | -- | -- |
| 01 (Average) | 2412.899 | 5.920 | 98.265 | 104.184 | -- | -- | -- |

**Figure Channel 01: Vertical (Peak)**

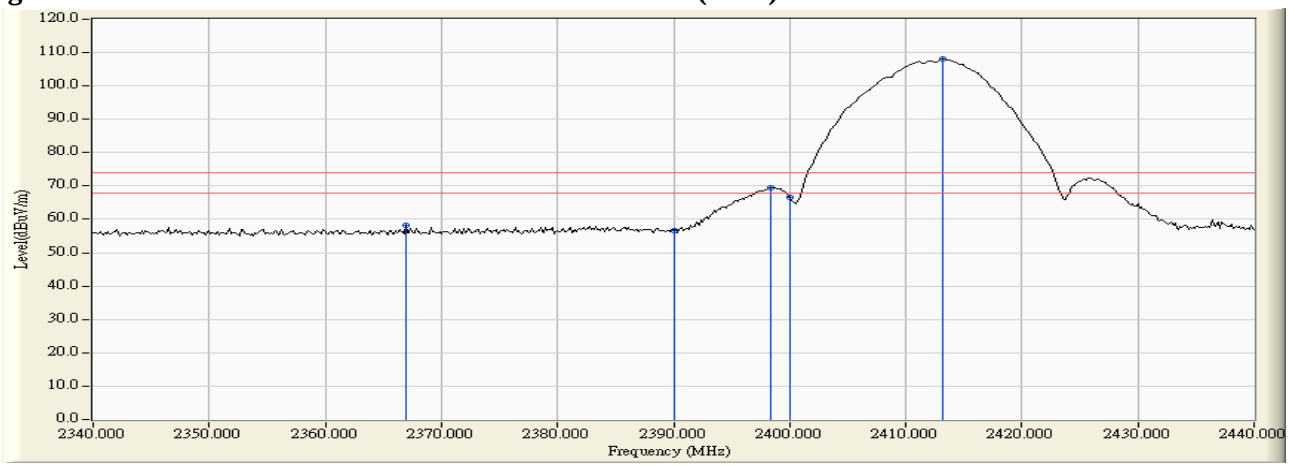
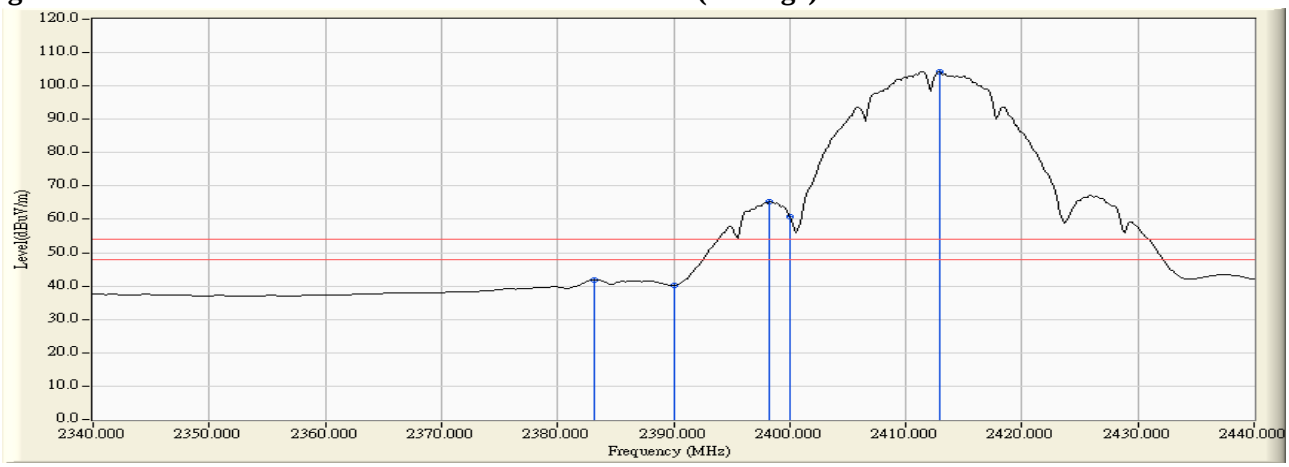



**Figure Channel 01: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2461.036 | 6.952 | 105.522 | 112.474 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 54.558 | 61.668 | 74.00 | 54.00 | Pass |
| 11 (Peak) | 2485.964 | 7.127 | 55.138 | 62.265 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2461.326 | 6.954 | 102.544 | 109.498 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 44.213 | 51.323 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2486.833 | 7.134 | 45.531 | 52.665 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Horizontal (Peak)**

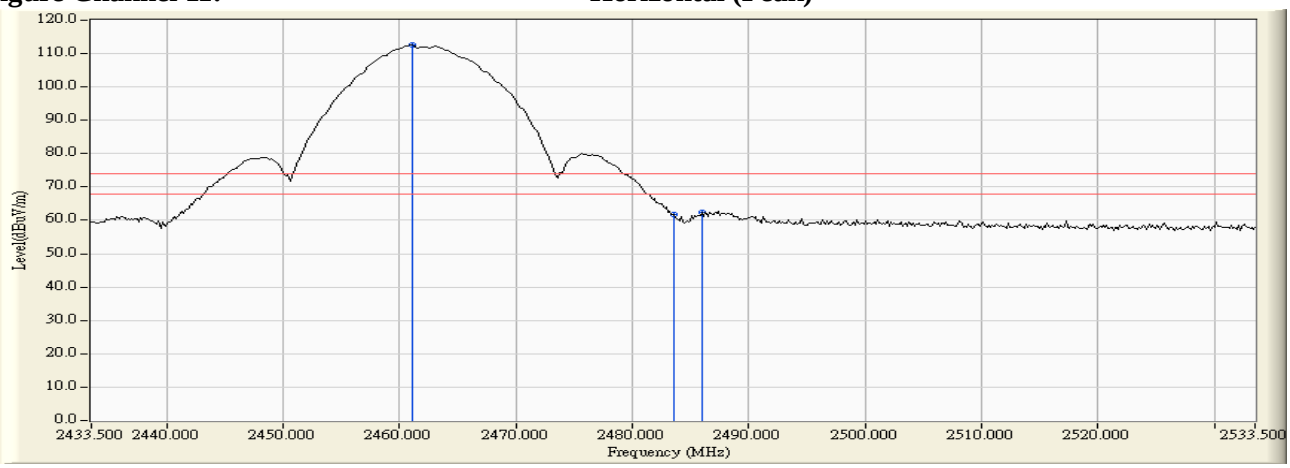
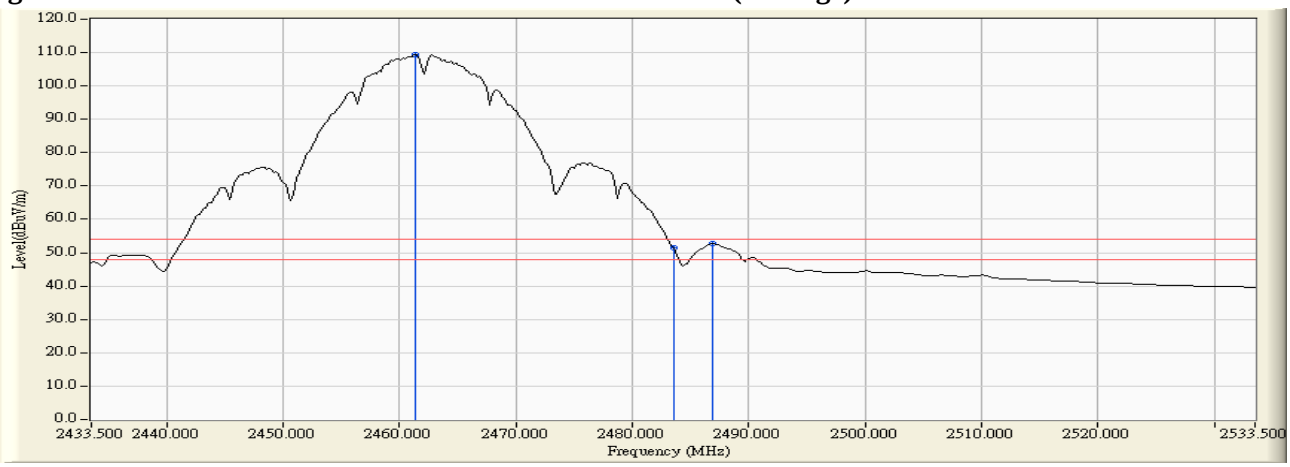



**Figure Channel 11: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2461.036 | 6.223 | 104.136 | 110.359 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 6.363 | 52.522 | 58.885 | 74.00 | 54.00 | Pass |
| 11 (Peak) | 2484.659 | 6.371 | 53.991 | 60.362 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2462.775 | 6.234 | 99.553 | 105.787 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 37.227 | 43.590 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2485.819 | 6.378 | 37.478 | 43.856 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Vertical (Peak)**

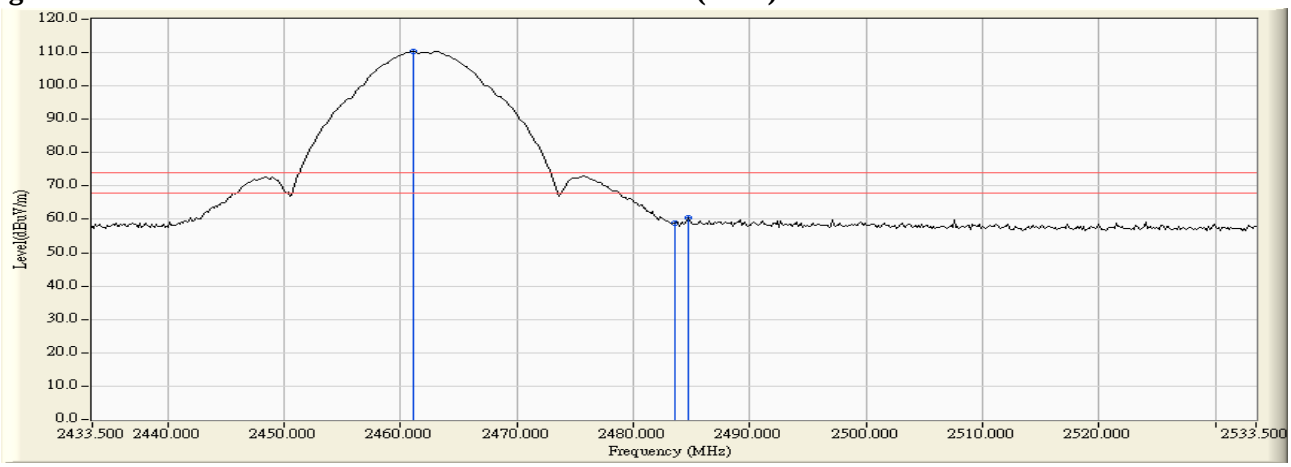
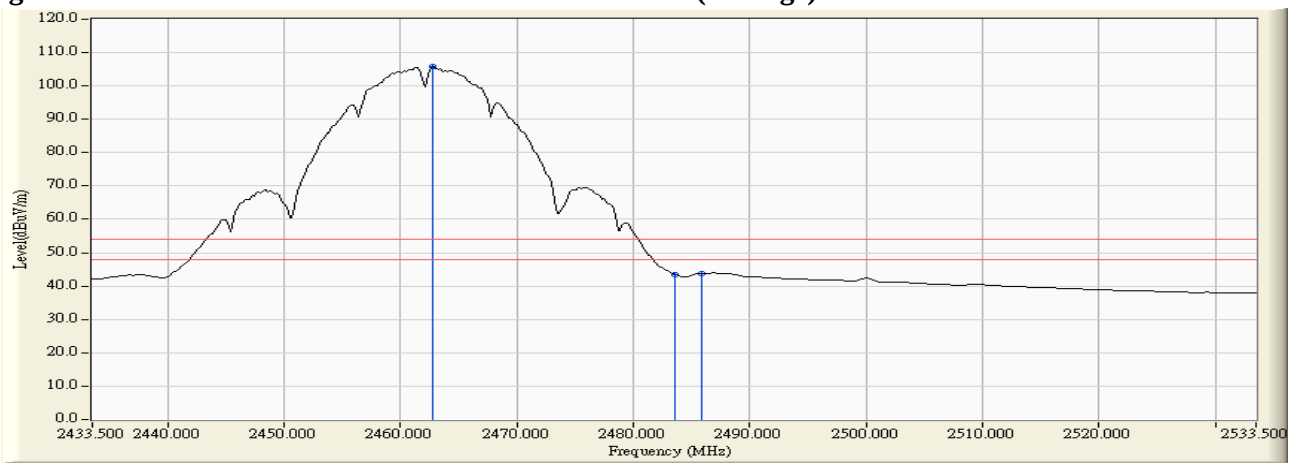



**Figure Channel 11: Vertical (Average)**




Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2467MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 12 (Peak) | 2465.964 | 6.987 | 101.769 | 108.755 | -- | -- | -- |
| 12 (Peak) | 2483.500 | 7.110 | 56.041 | 63.151 | 74.00 | 54.00 | Pass |
| 12 (Average) | 2467.848 | 7.000 | 97.531 | 104.530 | -- | -- | -- |
| 12 (Average) | 2483.500 | 7.110 | 46.829 | 53.939 | 74.00 | 54.00 | Pass |

**Figure Channel 12: Horizontal (Peak)**

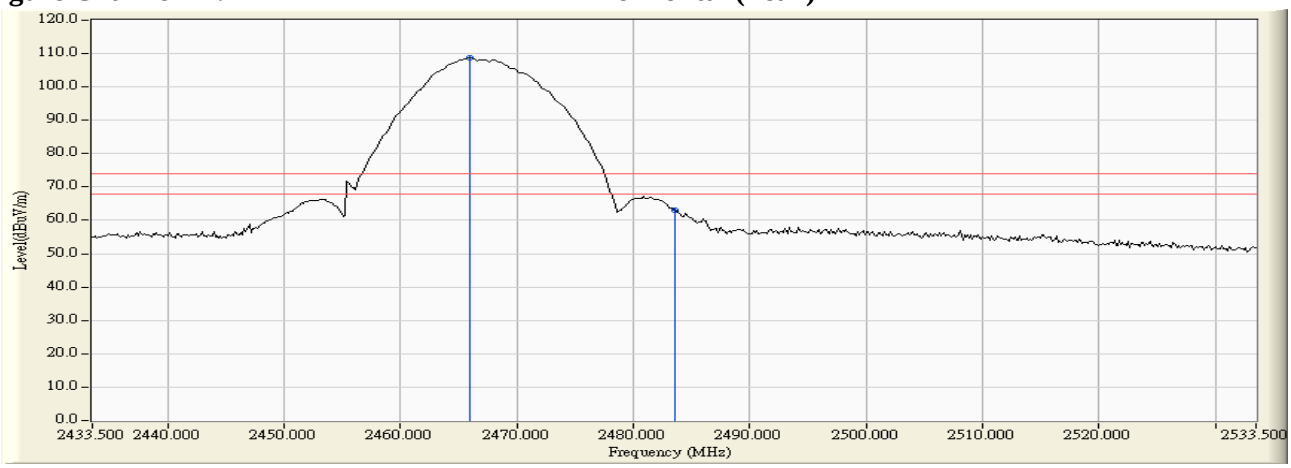
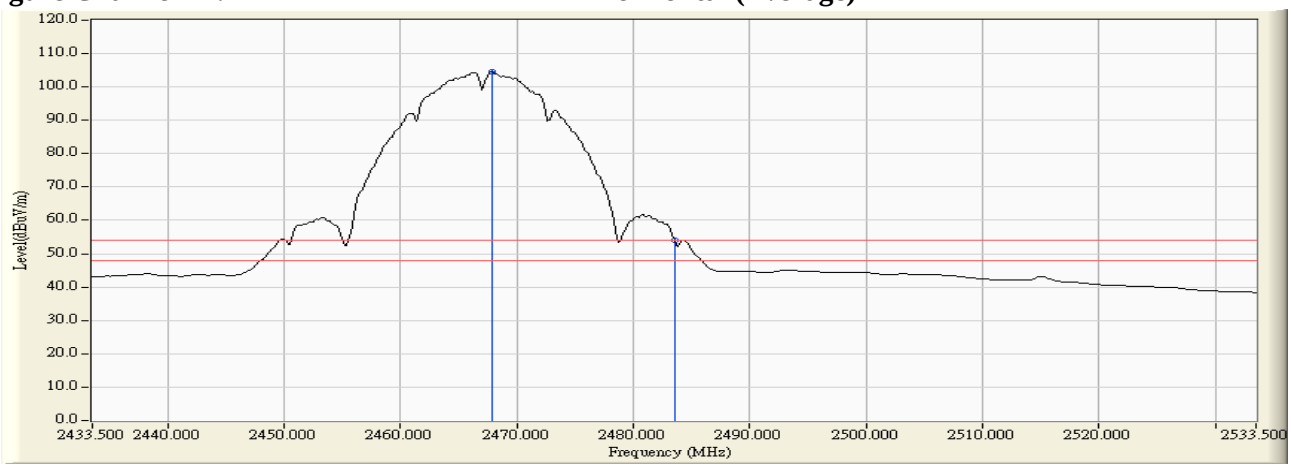



**Figure Channel 12: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2467MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 12 (Peak) | 2465.964 | 6.254 | 99.193 | 105.447 | -- | -- | -- |
| 12 (Peak) | 2483.500 | 6.363 | 50.019 | 56.382 | 74.00 | 54.00 | Pass |
| 12 (Peak) | 2484.080 | 6.367 | 51.193 | 57.560 | 74.00 | 54.00 | Pass |
| 12 (Average) | 2466.254 | 6.256 | 95.138 | 101.394 | -- | -- | -- |
| 12 (Average) | 2483.500 | 6.363 | 38.967 | 45.330 | 74.00 | 54.00 | Pass |

**Figure Channel 12: Vertical (Peak)**

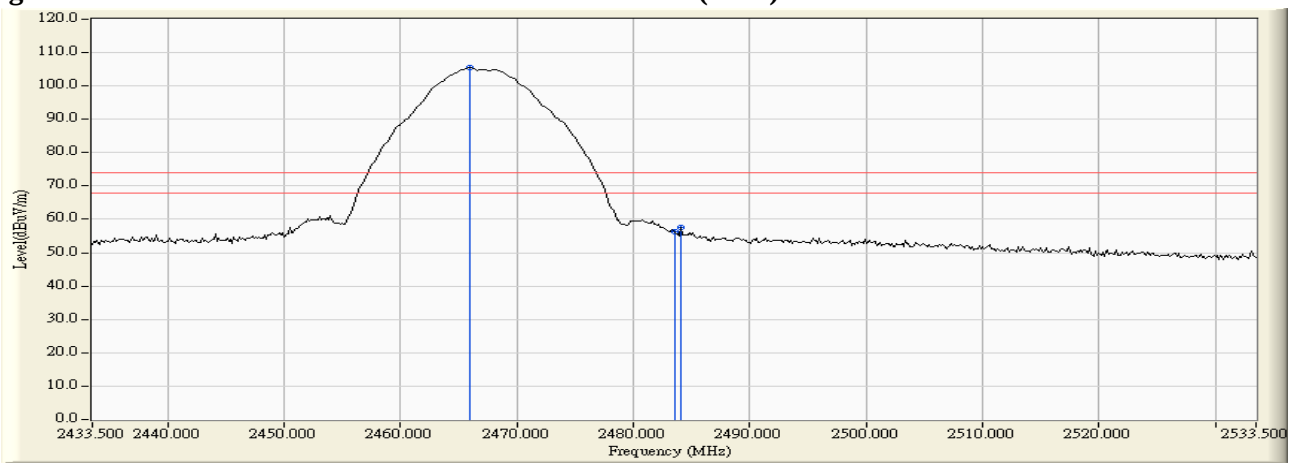
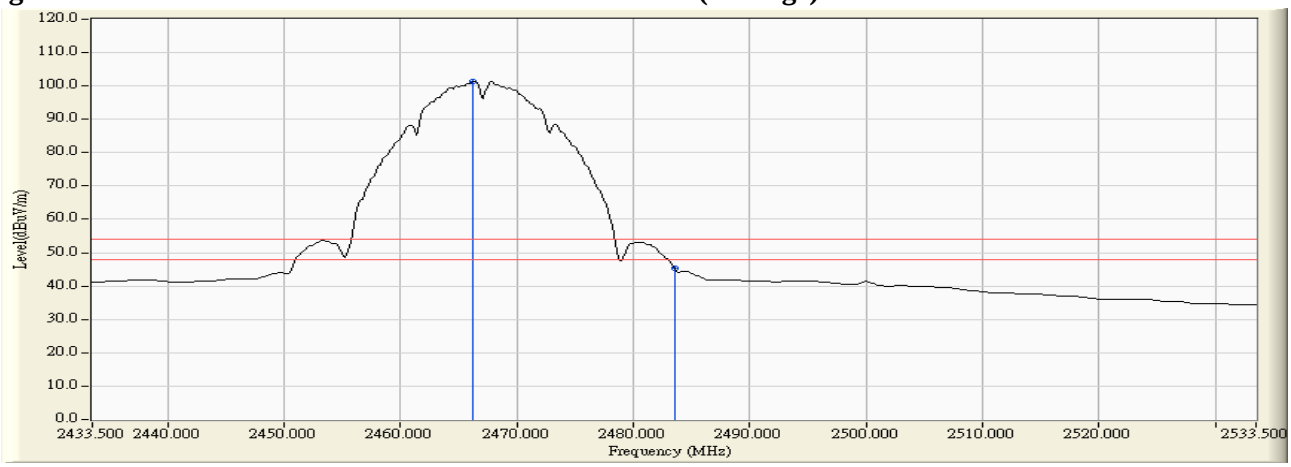



**Figure Channel 12: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2472MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 13 (Peak) | 2470.891 | 7.021 | 97.115 | 104.136 | -- | -- | -- |
| 13 (Peak) | 2483.500 | 7.110 | 52.474 | 59.584 | 74.00 | 54.00 | Pass |
| 13 (Average) | 2472.775 | 7.034 | 93.678 | 100.712 | -- | -- | -- |
| 13 (Average) | 2483.500 | 7.110 | 41.458 | 48.568 | 74.00 | 54.00 | Pass |

**Figure Channel 13: Horizontal (Peak)**

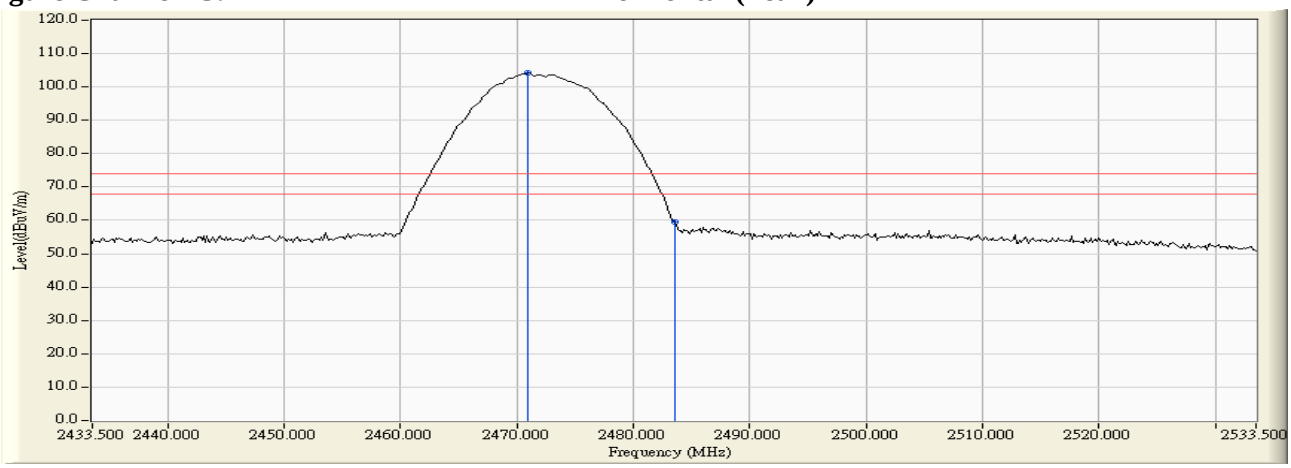
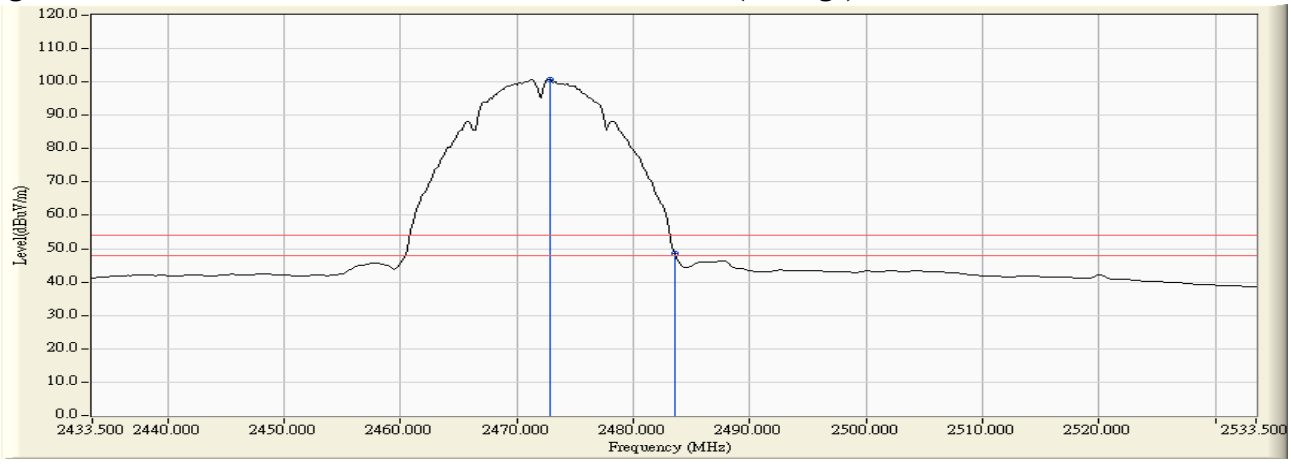



**Figure Channel 13: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2472MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 13 (Peak) | 2471.036 | 6.285 | 94.904 | 101.189 | -- | -- | -- |
| 13 (Peak) | 2483.500 | 6.363 | 48.989 | 55.352 | 74.00 | 54.00 | Pass |
| 13 (Average) | 2472.775 | 6.296 | 91.474 | 97.770 | -- | -- | -- |
| 13 (Average) | 2483.500 | 6.363 | 37.825 | 44.188 | 74.00 | 54.00 | Pass |

**Figure Channel 13: Vertical (Peak)**

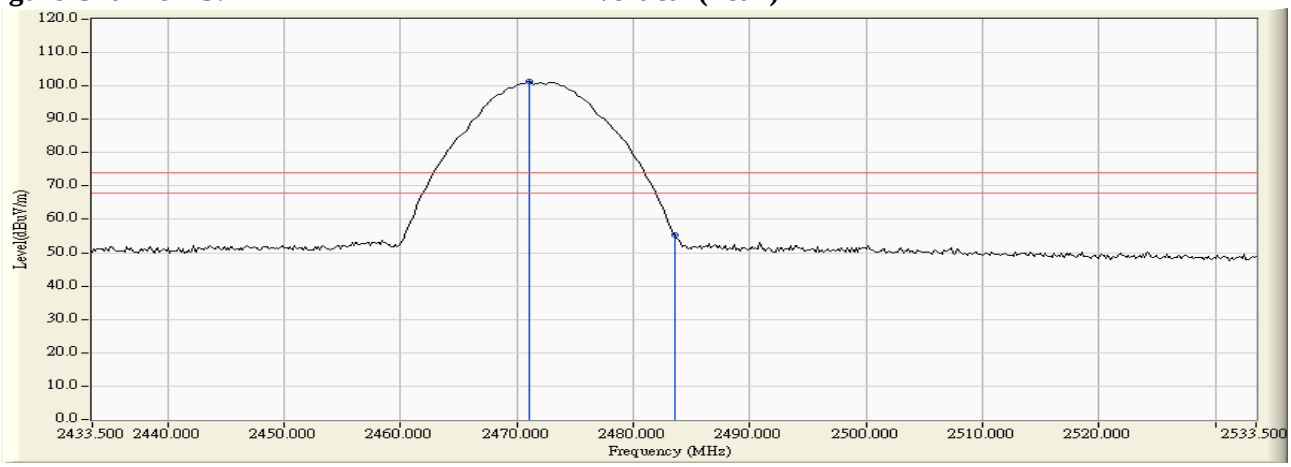
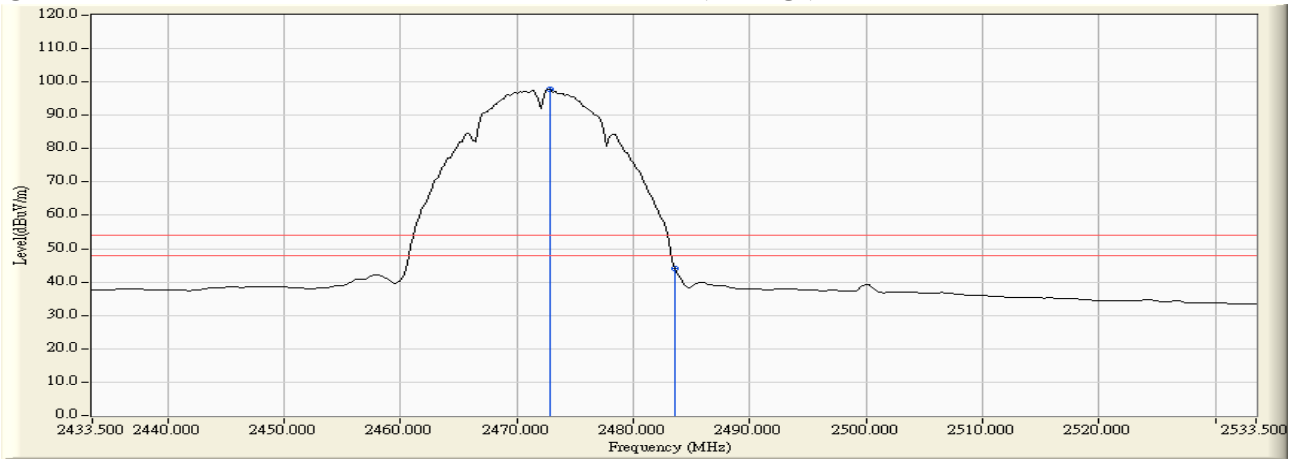



**Figure Channel 13: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2390.000 | 6.474 | 56.351 | 62.826 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2400.000 | 6.528 | 72.787 | 79.315 | -- | -- | -- |
| 01 (Peak) | 2409.710 | 6.588 | 104.301 | 110.889 | -- | -- | -- |
| 01(Average) | 2390.000 | 6.474 | 42.159 | 48.634 | 74.00 | 54.00 | Pass |
| 01(Average) | 2400.000 | 6.528 | 60.109 | 66.637 | -- | -- | -- |
| 01(Average) | 2413.043 | 6.610 | 95.271 | 101.881 | -- | -- | -- |

**Figure Channel 01: Horizontal (Peak)**

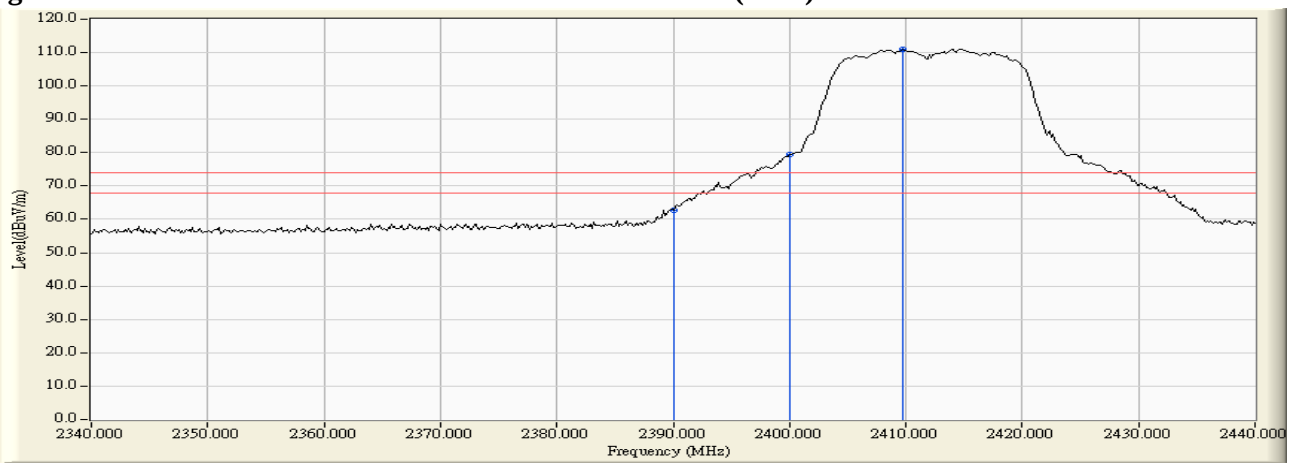
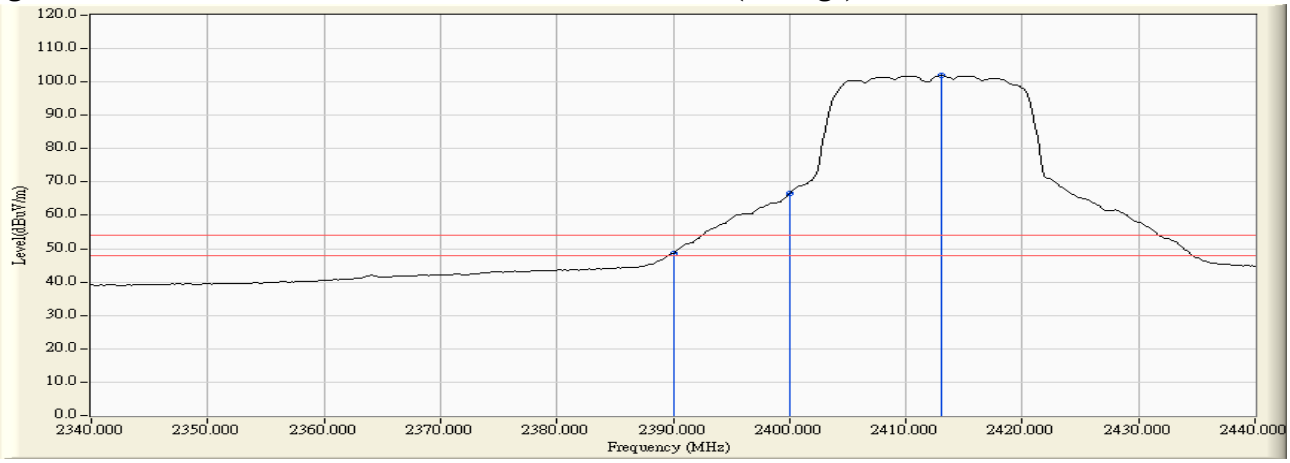



**Figure Channel 01: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2390.000 | 5.880 | 52.600 | 58.481 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2399.710 | 5.878 | 67.307 | 73.185 | -- | -- | -- |
| 01 (Peak) | 2400.000 | 5.879 | 66.787 | 72.666 | -- | -- | -- |
| 01 (Peak) | 2414.203 | 5.927 | 101.000 | 106.928 | -- | -- | -- |
| 01 (Average) | 2390.000 | 5.880 | 37.259 | 43.140 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2400.000 | 5.879 | 53.585 | 59.464 | -- | -- | -- |
| 01 (Average) | 2414.203 | 5.927 | 92.307 | 98.235 | -- | -- | -- |

**Figure Channel 01: Vertical (Peak)**

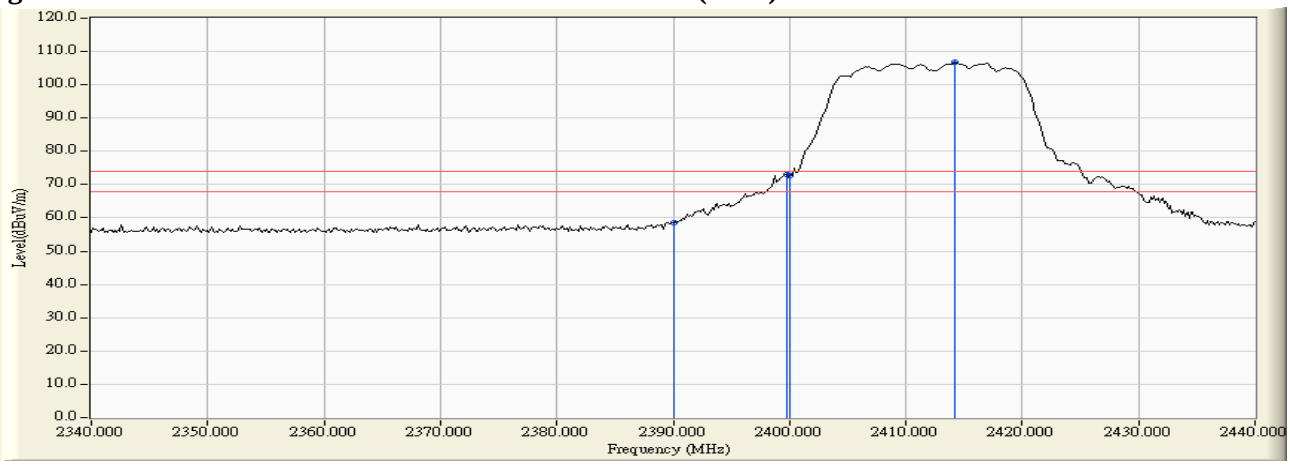
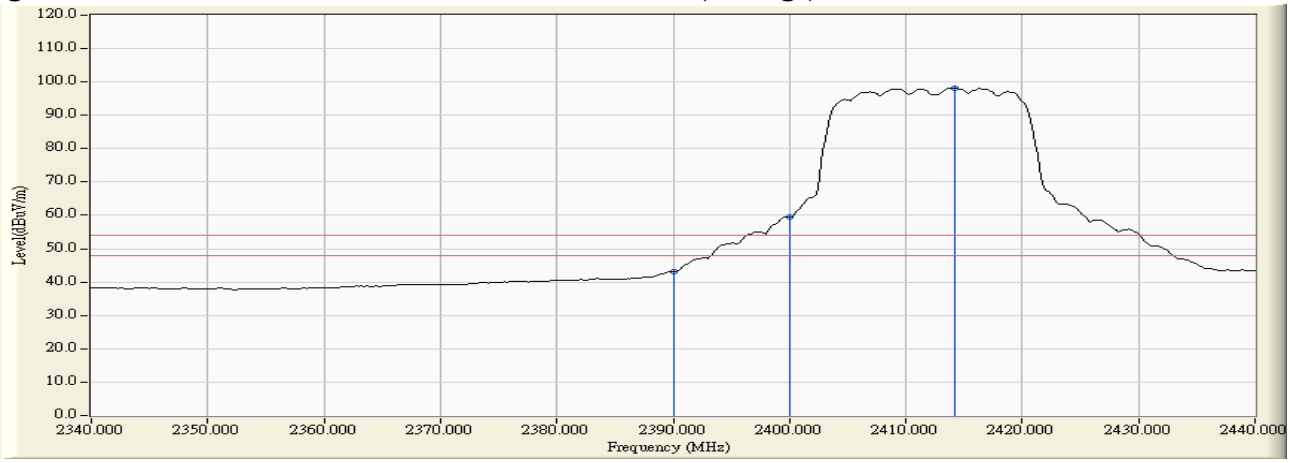



**Figure Channel 01: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2463.790 | 6.971 | 103.937 | 110.908 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 57.273 | 64.383 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2464.949 | 6.979 | 94.703 | 101.682 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 42.615 | 49.725 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Horizontal (Peak)**

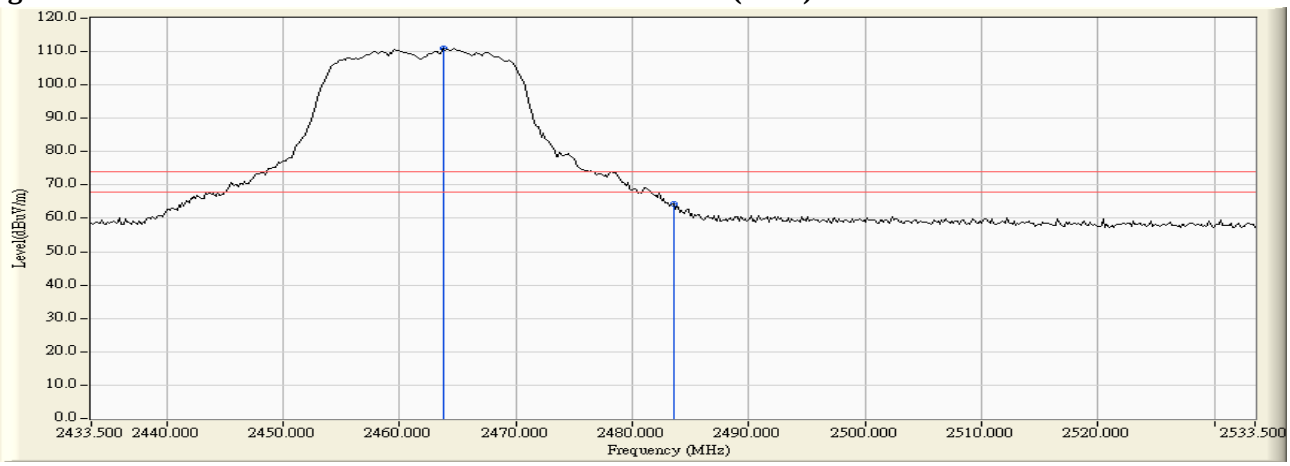
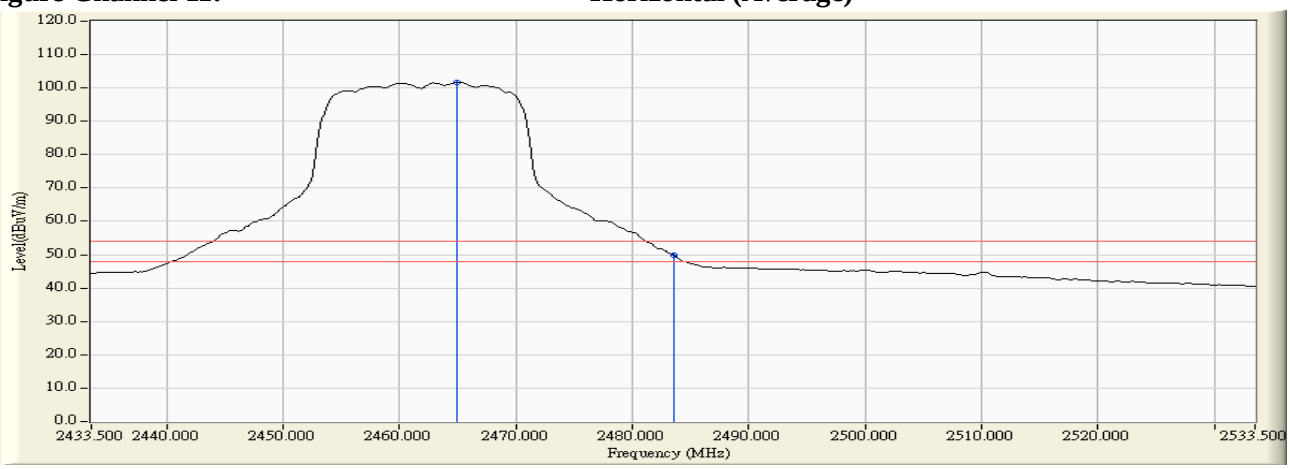



**Figure Channel 11: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2464.225 | 6.244 | 101.721 | 107.964 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 6.363 | 53.712 | 60.075 | 74.00 | 54.00 | Pass |
| 11 (Peak) | 2483.645 | 6.364 | 54.229 | 60.593 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2464.659 | 6.246 | 92.836 | 99.082 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 38.749 | 45.112 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Vertical (Peak)**

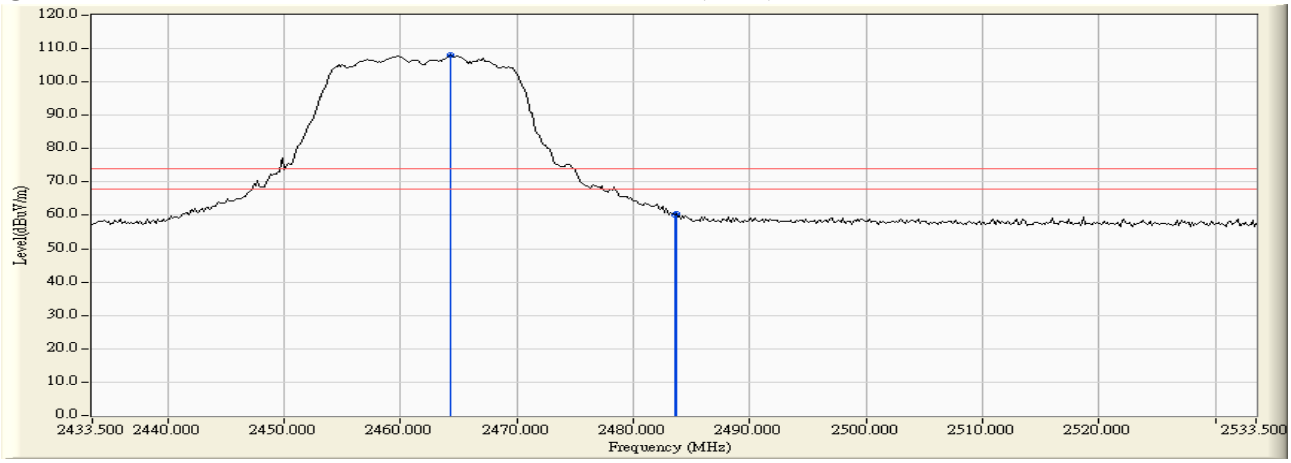
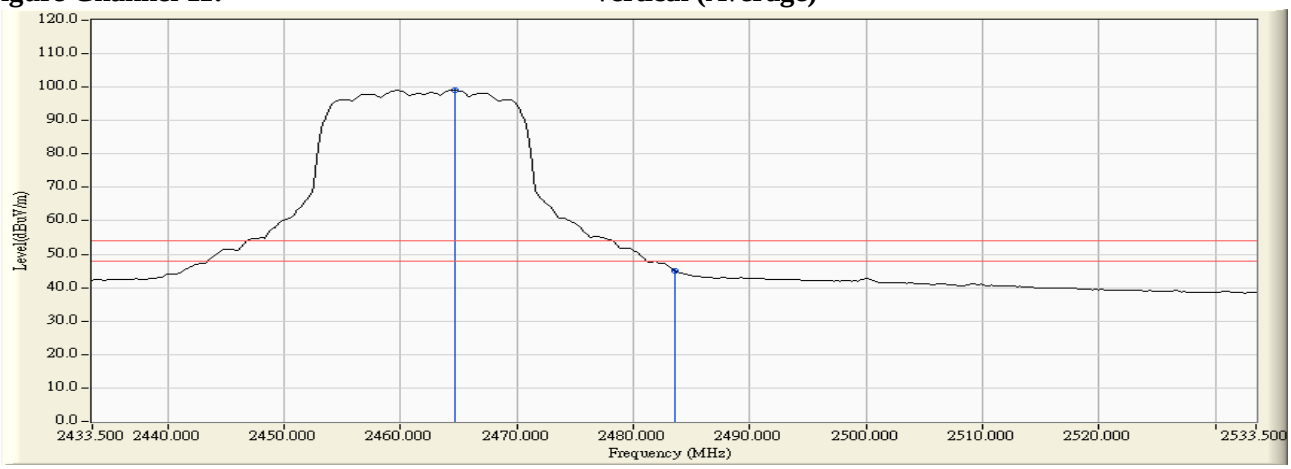



**Figure Channel 11: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

| | | |
|---|---|---|
| Product | : | WAH0001 |
| Test Item | : | Band Edge |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/07/03 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps) (2467MHz) |

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 12 (Peak) | 2464.514 | 6.976 | 99.935 | 106.911 | -- | -- | -- |
| 12 (Peak) | 2483.500 | 7.110 | 57.466 | 64.576 | 74.00 | 54.00 | Pass |
| 12 (Average) | 2465.239 | 6.981 | 90.745 | 97.726 | -- | -- | -- |
| 12 (Average) | 2483.500 | 7.110 | 42.851 | 49.961 | 74.00 | 54.00 | Pass |

**Figure Channel 12: Horizontal (Peak)**

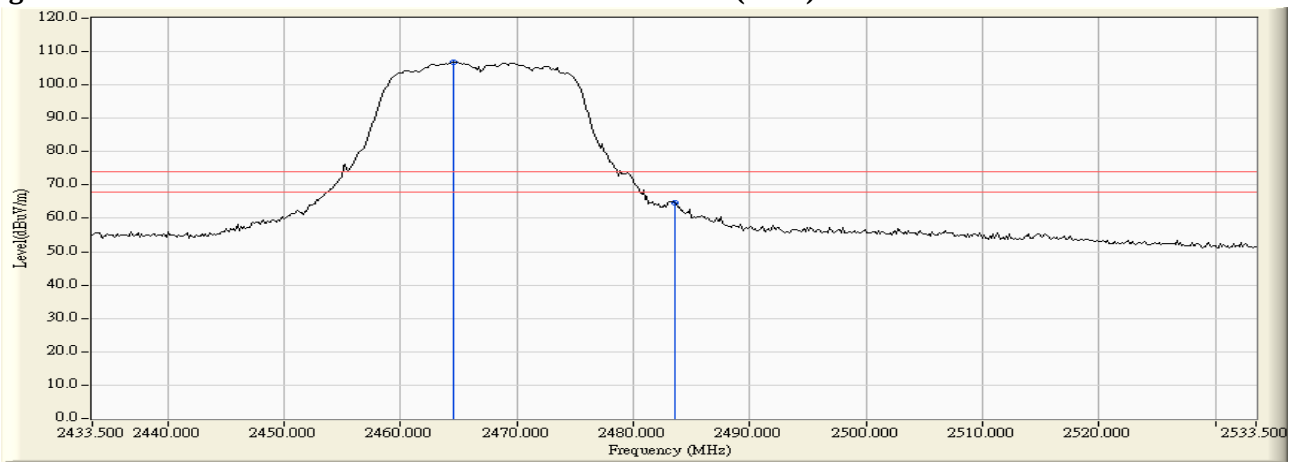
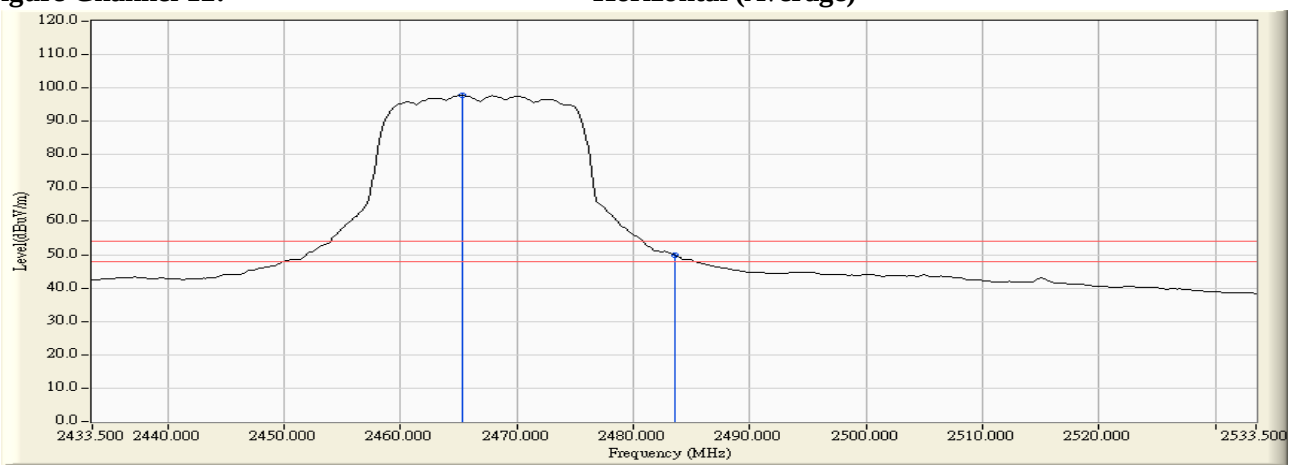



**Figure Channel 12: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2467MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 12 (Peak) | 2464.514 | 6.245 | 97.521 | 103.766 | -- | -- | -- |
| 12 (Peak) | 2483.500 | 6.363 | 50.694 | 57.057 | 74.00 | 54.00 | Pass |
| 12 (Peak) | 2483.645 | 6.364 | 52.417 | 58.781 | 74.00 | 54.00 | Pass |
| 12 (Average) | 2464.804 | 6.247 | 88.940 | 95.187 | -- | -- | -- |
| 12 (Average) | 2483.500 | 6.363 | 37.904 | 44.267 | 74.00 | 54.00 | Pass |

**Figure Channel 12: Vertical (Peak)**

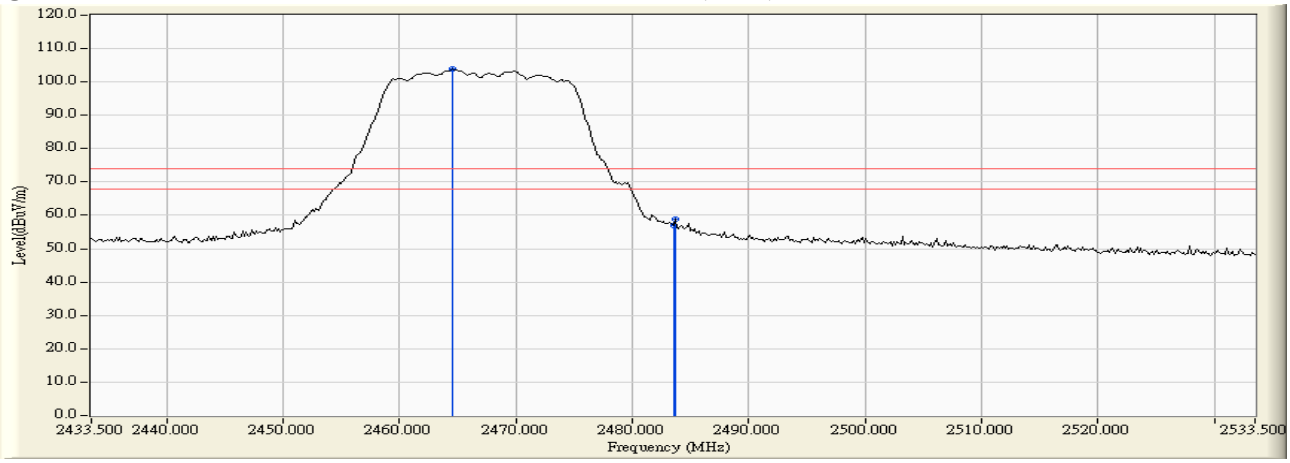
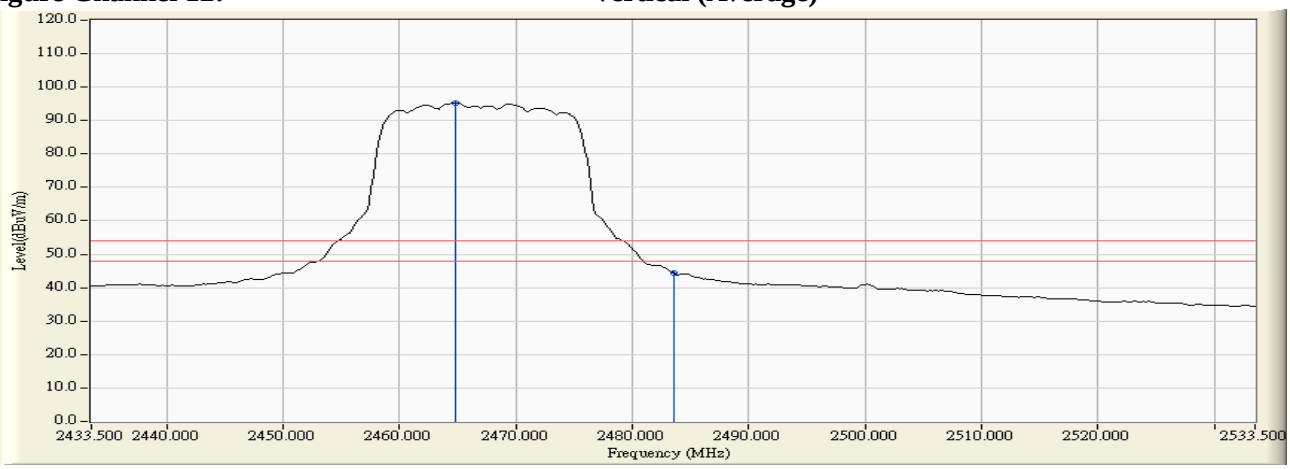



**Figure Channel 12: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2472MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 13 (Peak) | 2474.659 | 7.047 | 91.042 | 98.089 | -- | -- | -- |
| 13 (Peak) | 2483.500 | 7.110 | 56.168 | 63.278 | 74.00 | 54.00 | Pass |
| 13 (Average) | 2475.239 | 7.052 | 81.909 | 88.960 | -- | -- | -- |
| 13 (Average) | 2483.500 | 7.110 | 41.624 | 48.734 | 74.00 | 54.00 | Pass |

**Figure Channel 13: Horizontal (Peak)**

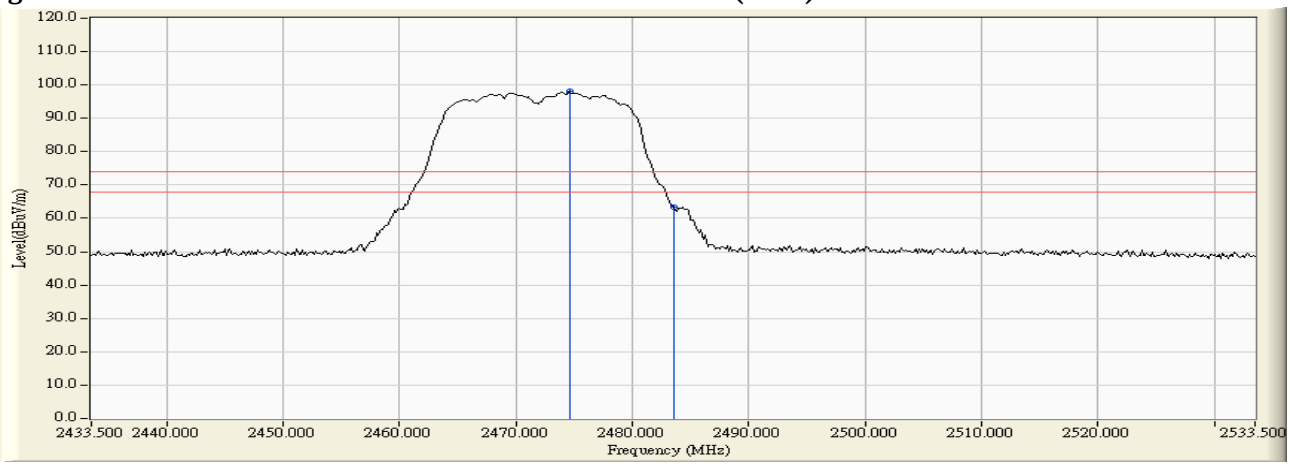
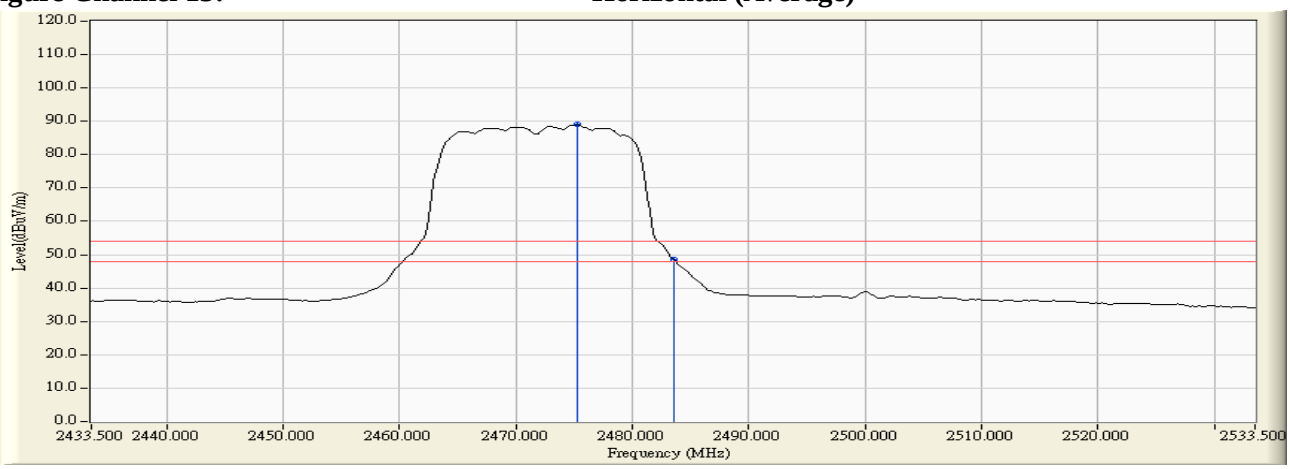



**Figure Channel 13: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2472MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 13 (Peak) | 2474.949 | 6.310 | 87.627 | 93.937 | -- | -- | -- |
| 13 (Peak) | 2483.500 | 6.363 | 53.873 | 60.236 | 74.00 | 54.00 | Pass |
| 13 (Average) | 2474.514 | 6.307 | 79.296 | 85.603 | -- | -- | -- |
| 13 (Average) | 2483.500 | 6.363 | 37.845 | 44.208 | 74.00 | 54.00 | Pass |

**Figure Channel 13: Vertical (Peak)**

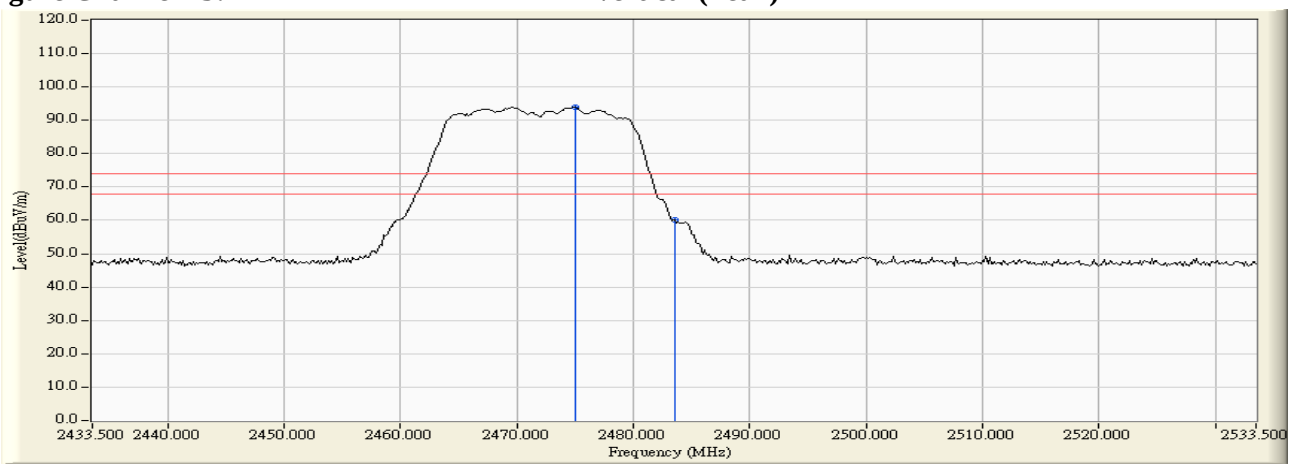
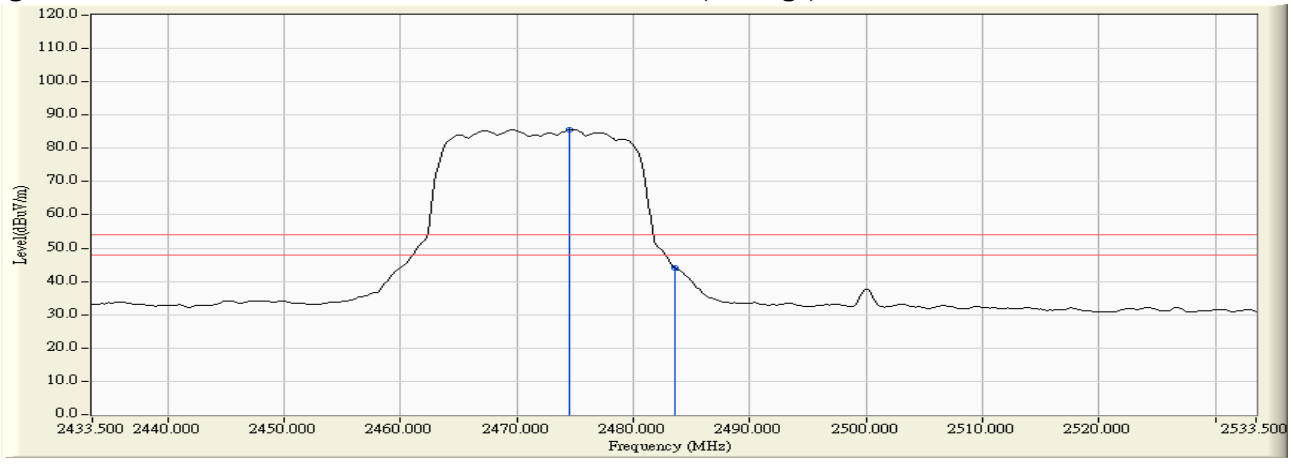



**Figure Channel 13: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2412MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2389.565 | 6.473 | 57.005 | 63.478 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2390.000 | 6.474 | 56.740 | 63.215 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2400.000 | 6.528 | 70.313 | 76.841 | -- | -- | -- |
| 01 (Peak) | 2413.623 | 6.614 | 104.216 | 110.830 | -- | -- | -- |
| 01 (Average) | 2390.000 | 6.474 | 43.135 | 49.610 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2400.000 | 6.528 | 57.334 | 63.862 | -- | -- | -- |
| 01 (Average) | 2414.783 | 6.623 | 95.037 | 101.660 | -- | -- | -- |

**Figure Channel 01: Horizontal (Peak)**

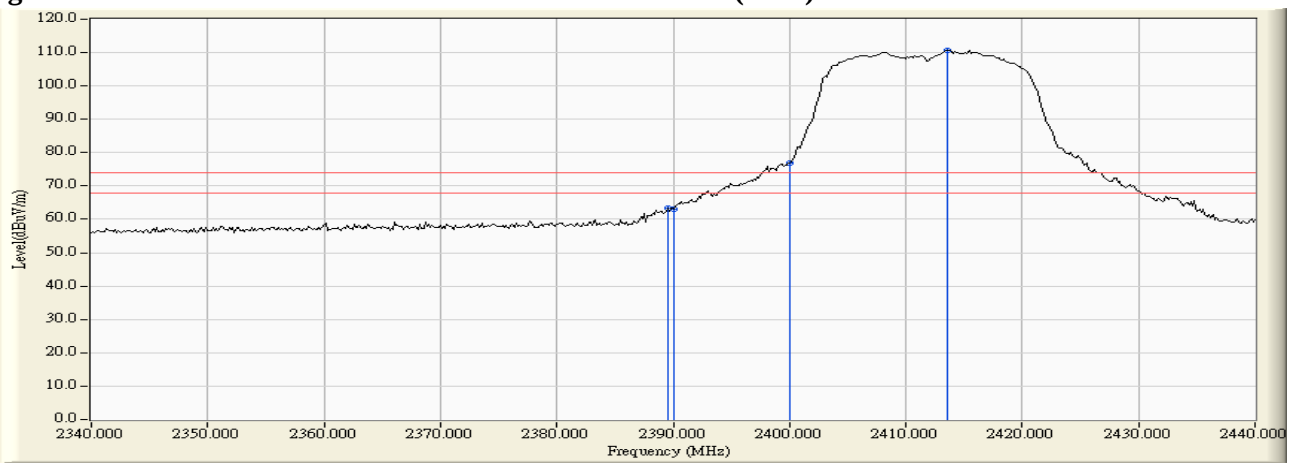
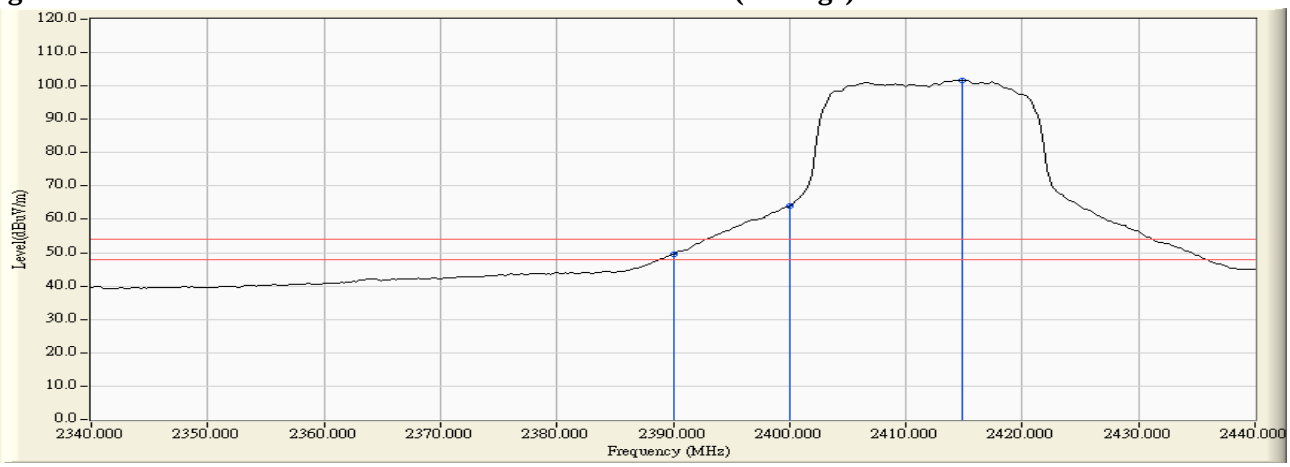



**Figure Channel 01: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2412MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2390.000 | 29.821 | 53.831 | 59.712 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2400.000 | 29.819 | 66.760 | 72.639 | -- | -- | -- |
| 01 (Peak) | 2410.870 | 29.847 | 99.759 | 105.666 | -- | -- | -- |
| 01 (Average) | 2390.000 | 5.880 | 38.867 | 44.748 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2400.000 | 5.879 | 52.788 | 58.667 | -- | -- | -- |
| 01 (Average) | 2410.580 | 5.906 | 91.588 | 97.494 | -- | -- | -- |

**Figure Channel 01: Vertical (Peak)**

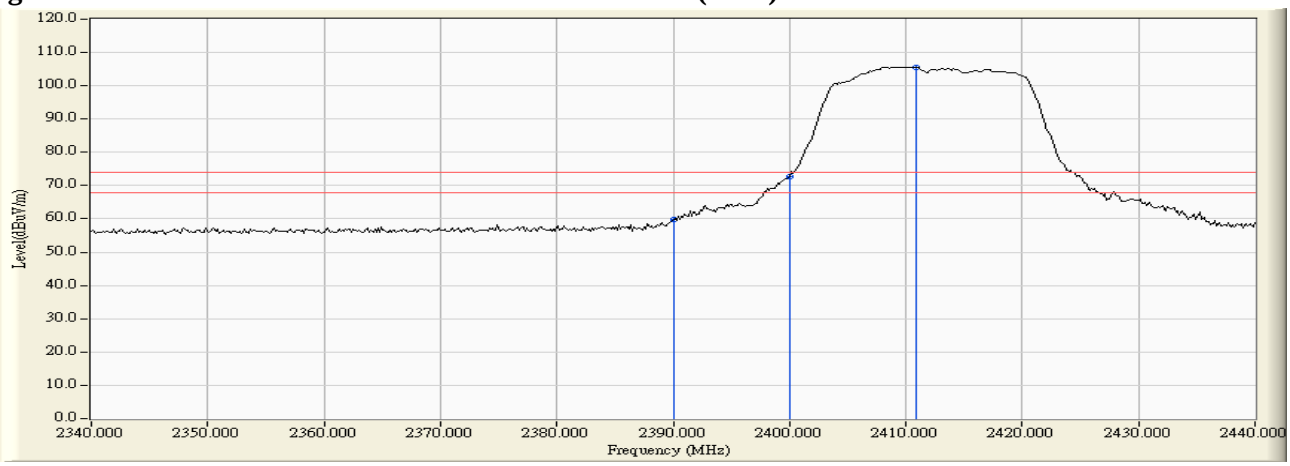
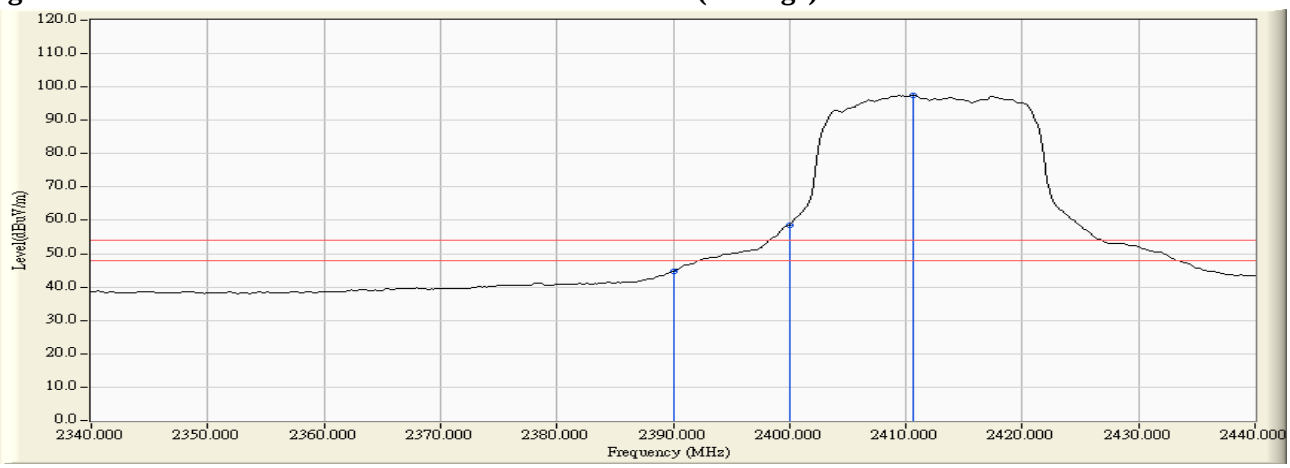



**Figure Channel 01: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2462MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2463.500 | 6.969 | 103.106 | 110.075 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 54.663 | 61.773 | 74.00 | 54.00 | Pass |
| 11 (Peak) | 2483.790 | 7.112 | 56.158 | 63.270 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2464.949 | 6.979 | 94.055 | 101.034 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 42.137 | 49.247 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Horizontal (Peak)**

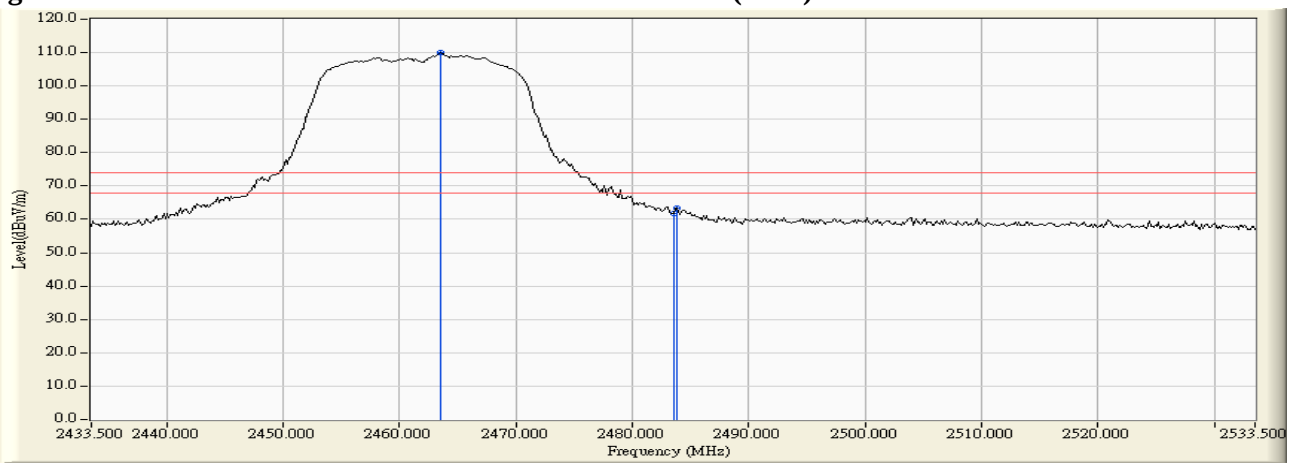
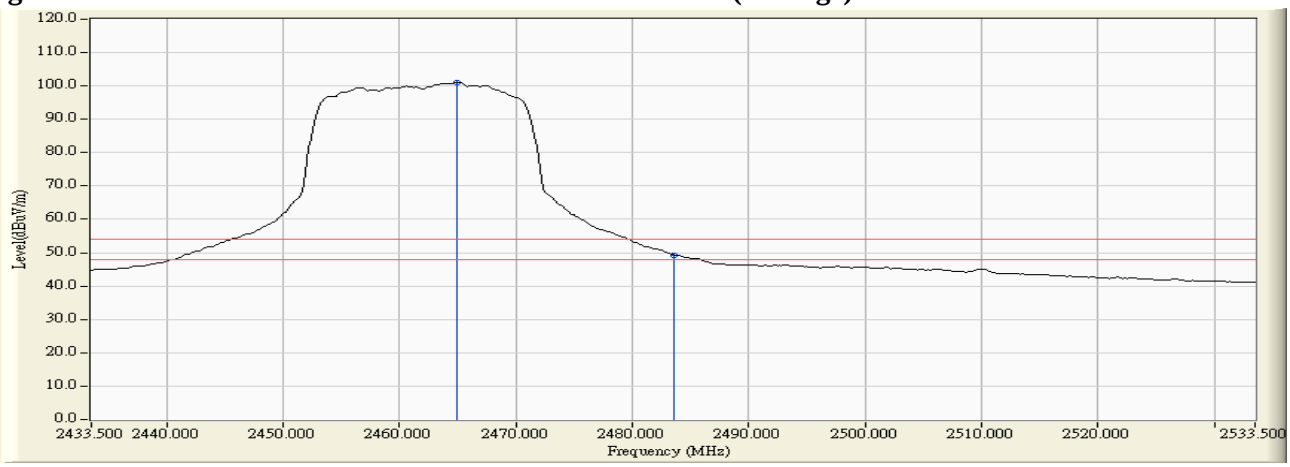



**Figure Channel 11: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2462MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2462.920 | 6.235 | 99.818 | 106.053 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 6.363 | 53.280 | 59.643 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2463.500 | 6.238 | 91.484 | 97.723 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 38.987 | 45.350 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Vertical (Peak)**

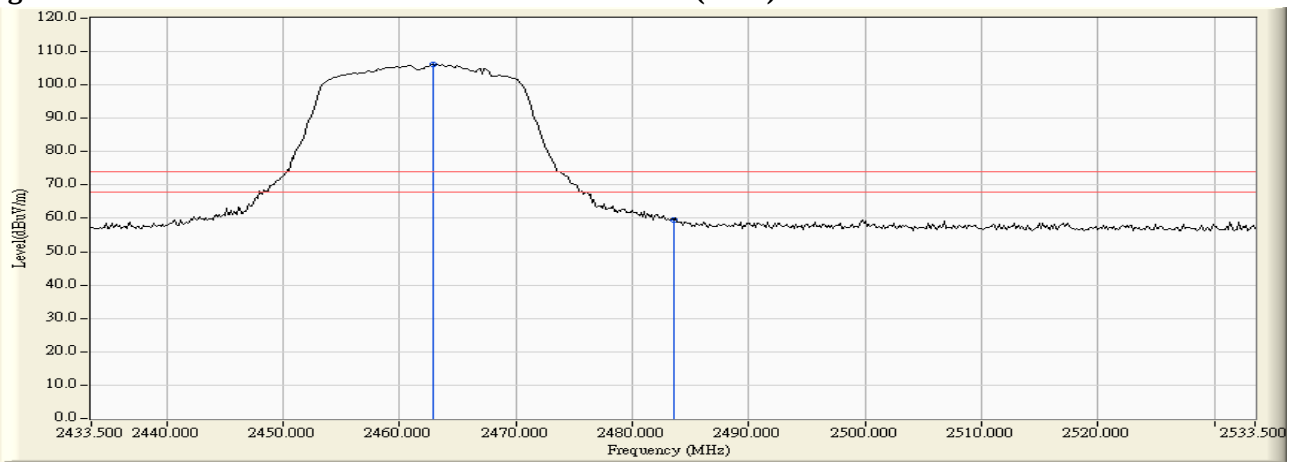
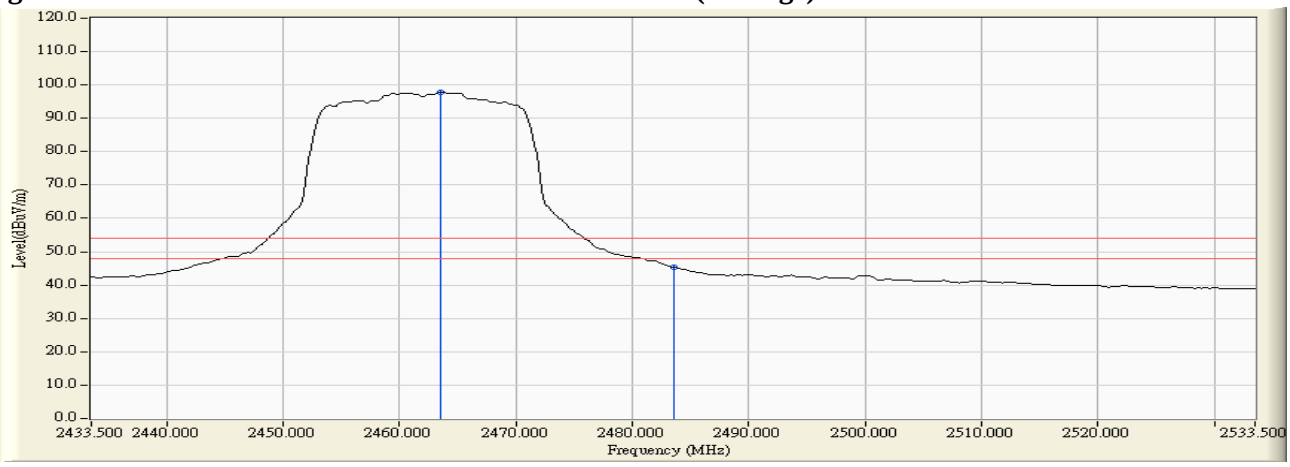



**Figure Channel 11: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

| | | |
|---|---|---|
| Product | : | WAH0001 |
| Test Item | : | Band Edge |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/07/03 |
| Test Mode | : | Mode 3: Transmit - (VHT 20BW) (2467MHz) |

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 12 (Peak) | 2468.572 | 7.005 | 99.978 | 106.983 | -- | -- | -- |
| 12 (Peak) | 2483.500 | 7.110 | 55.799 | 62.909 | 74.00 | 54.00 | Pass |
| 12 (Peak) | 2484.370 | 7.116 | 55.987 | 63.103 | 74.00 | 54.00 | Pass |
| 12 (Average) | 2470.022 | 7.015 | 90.938 | 97.953 | -- | -- | -- |
| 12 (Average) | 2483.500 | 7.110 | 42.104 | 49.214 | 74.00 | 54.00 | Pass |

**Figure Channel 12: Horizontal (Peak)**

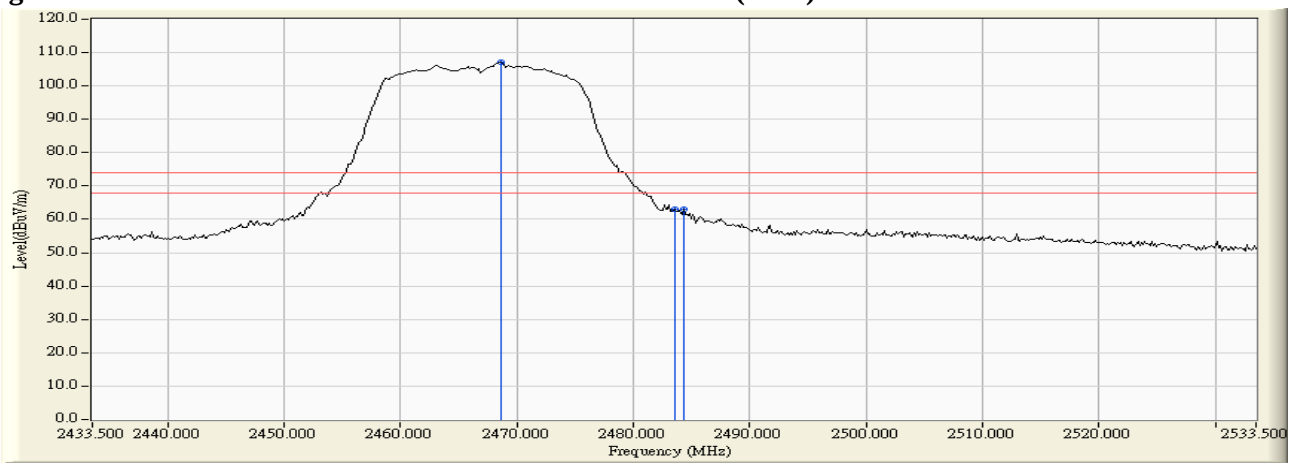
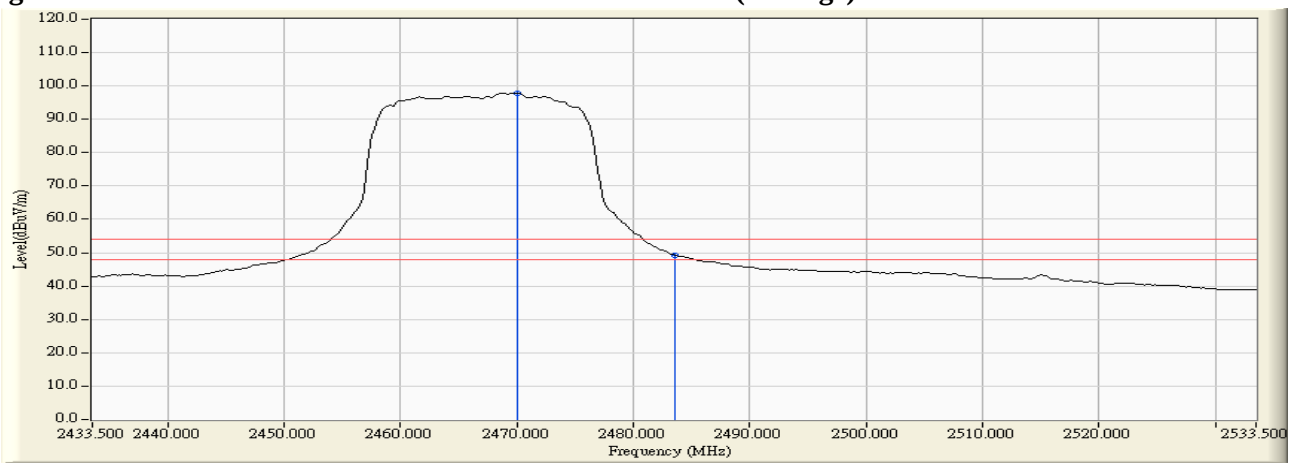



**Figure Channel 12: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2467MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 12 (Peak) | 2465.674 | 6.252 | 97.350 | 103.602 | -- | -- | -- |
| 12 (Peak) | 2483.500 | 6.363 | 49.431 | 55.794 | 74.00 | 54.00 | Pass |
| 12 (Peak) | 2484.514 | 6.369 | 50.480 | 56.850 | 74.00 | 54.00 | Pass |
| 12 (Average) | 2465.529 | 6.251 | 89.126 | 95.377 | -- | -- | -- |
| 12 (Average) | 2483.500 | 6.363 | 37.540 | 43.903 | 74.00 | 54.00 | Pass |

**Figure Channel 12: Vertical (Peak)**

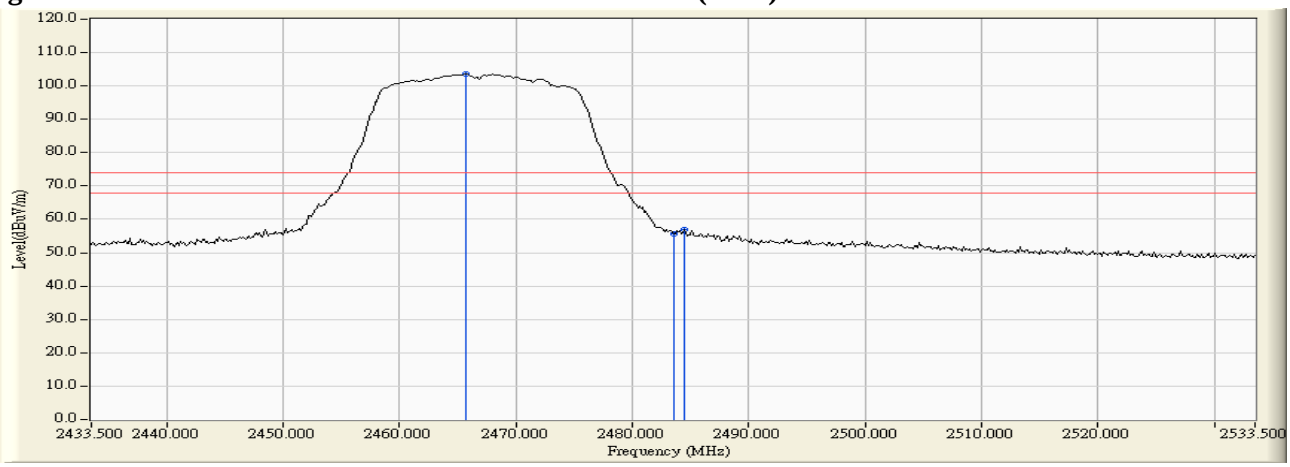
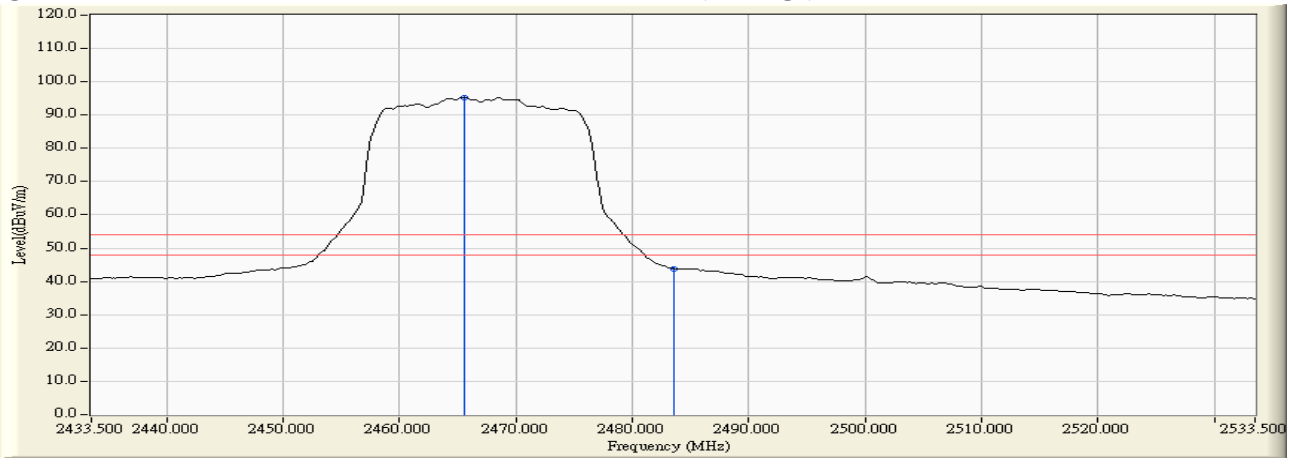



**Figure Channel 12: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2472MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 13 (Peak) | 2473.645 | 7.040 | 89.362 | 96.402 | -- | -- | -- |
| 13 (Peak) | 2483.500 | 7.110 | 56.778 | 63.888 | 74.00 | 54.00 | Pass |
| 13 (Average) | 2474.949 | 7.050 | 80.604 | 87.653 | -- | -- | -- |
| 13 (Average) | 2483.500 | 7.110 | 41.449 | 48.559 | 74.00 | 54.00 | Pass |

**Figure Channel 13: Horizontal (Peak)**

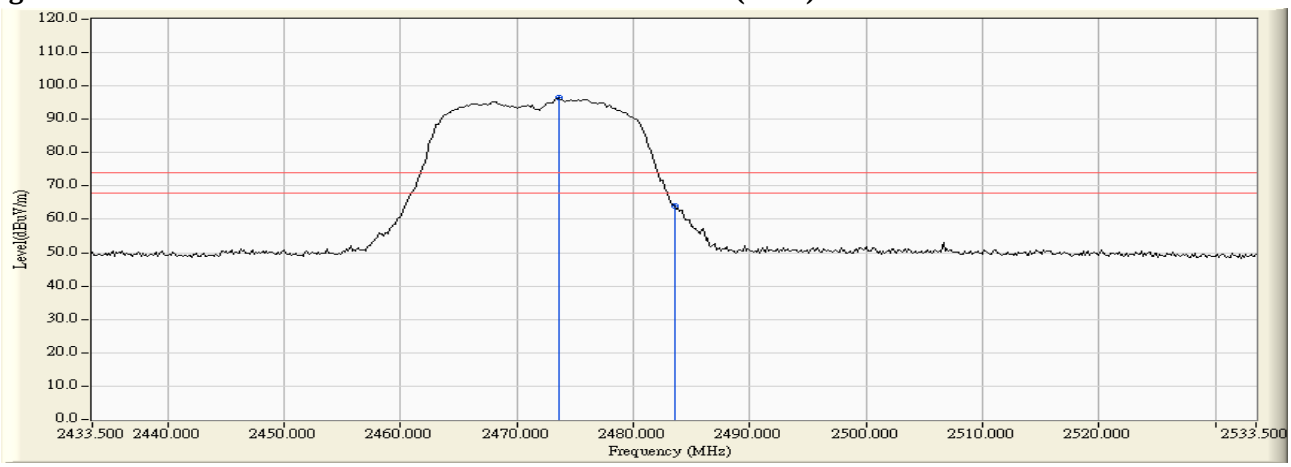
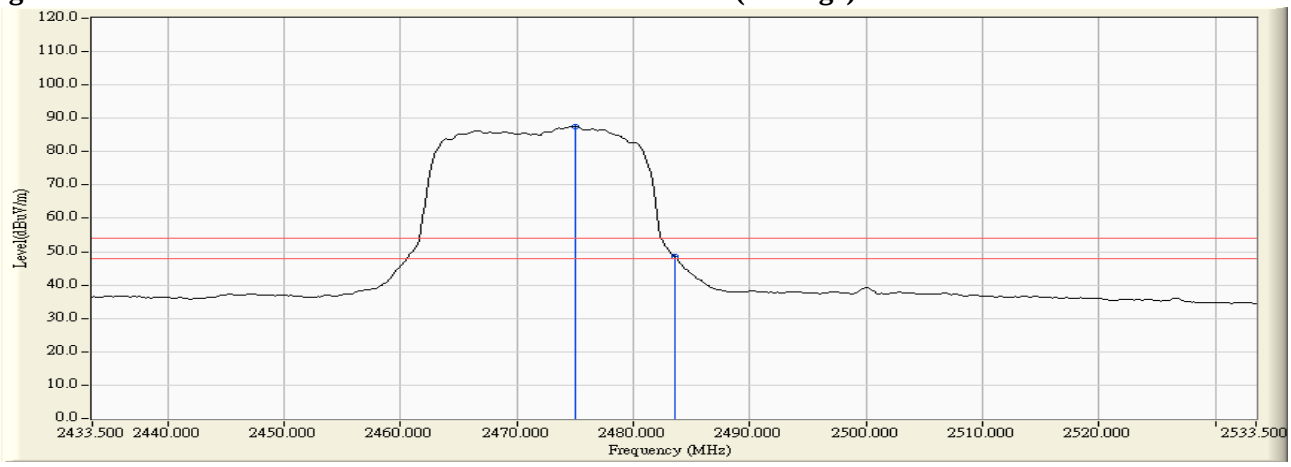



**Figure Channel 13: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 3: Transmit - (VHT 20BW) (2472MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 13 (Peak) | 2472.920 | 6.297 | 86.387 | 92.684 | -- | -- | -- |
| 13 (Peak) | 2483.500 | 6.363 | 54.613 | 60.976 | 74.00 | 54.00 | Pass |
| 13 (Average) | 2475.094 | 6.311 | 77.822 | 84.133 | -- | -- | -- |
| 13 (Average) | 2483.500 | 6.363 | 38.492 | 44.855 | 74.00 | 54.00 | Pass |

**Figure Channel 13: Vertical (Peak)**

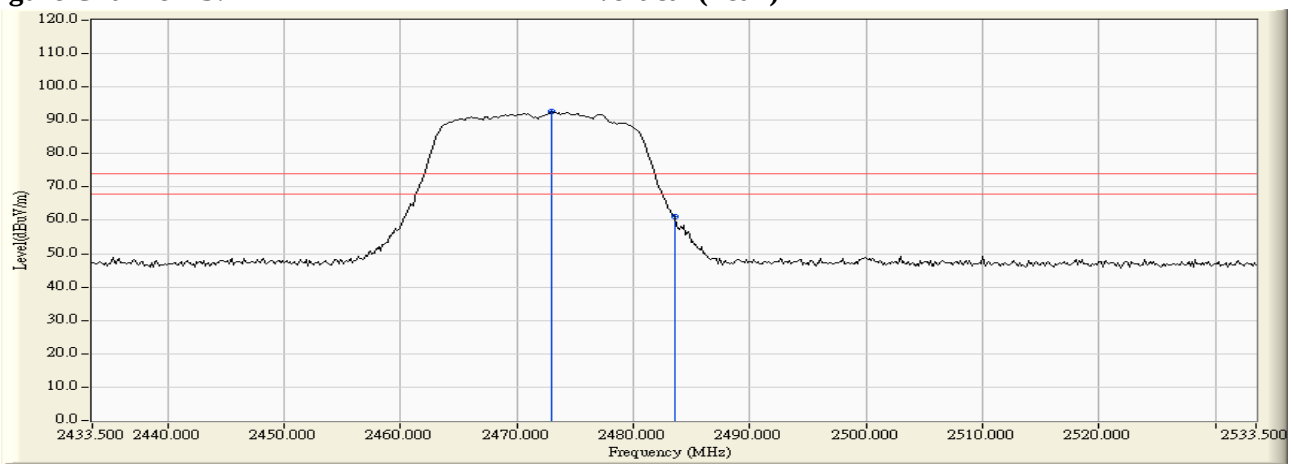
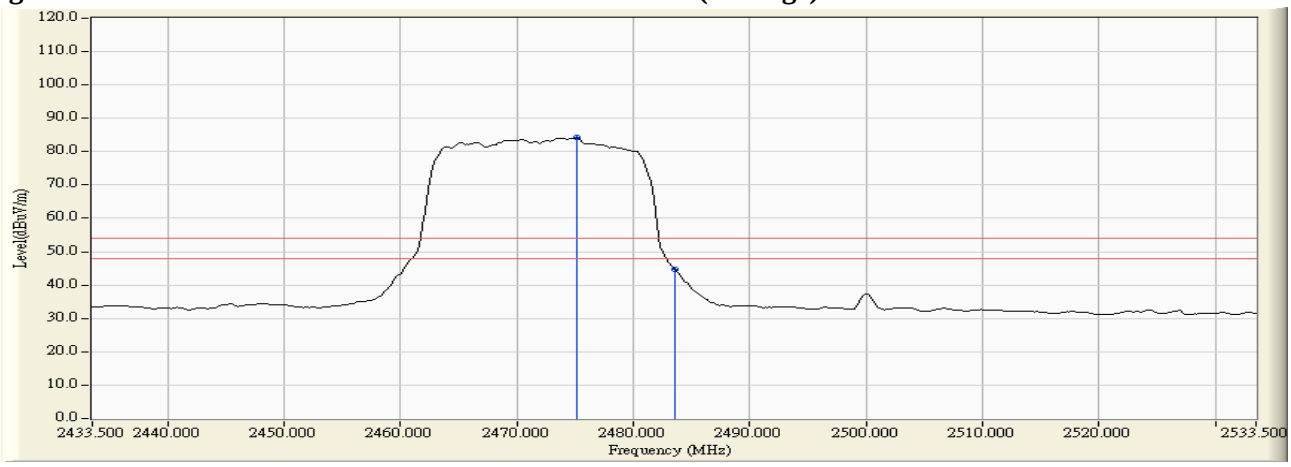



**Figure Channel 13: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2422MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 03 (Peak) | 2388.841 | 6.470 | 63.950 | 70.420 | 74.00 | 54.00 | Pass |
| 03 (Peak) | 2390.000 | 6.474 | 59.046 | 65.521 | 74.00 | 54.00 | Pass |
| 03 (Peak) | 2399.420 | 6.525 | 71.775 | 78.300 | -- | -- | -- |
| 03 (Peak) | 2400.000 | 6.528 | 67.566 | 74.094 | -- | -- | -- |
| 03 (Peak) | 2426.522 | 6.706 | 97.781 | 104.487 | -- | -- | -- |
| 03 (Average) | 2389.420 | 6.472 | 44.703 | 51.175 | 74.00 | 54.00 | Pass |
| 03 (Average) | 2390.000 | 6.474 | 44.285 | 50.760 | 74.00 | 54.00 | Pass |
| 03 (Average) | 2400.000 | 6.528 | 53.380 | 59.908 | -- | -- | -- |
| 03 (Average) | 2426.667 | 6.707 | 90.209 | 96.916 | -- | -- | -- |

**Figure Channel 03: Horizontal (Peak)**

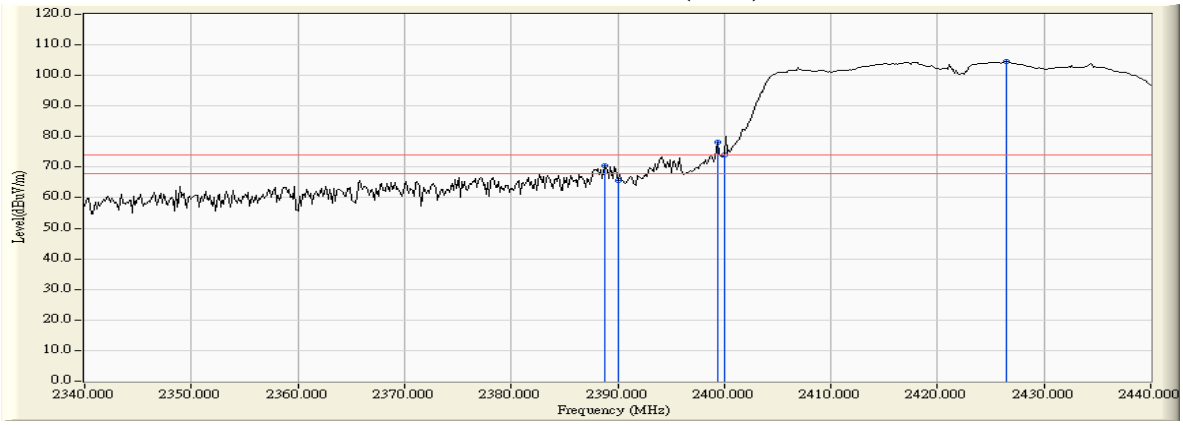
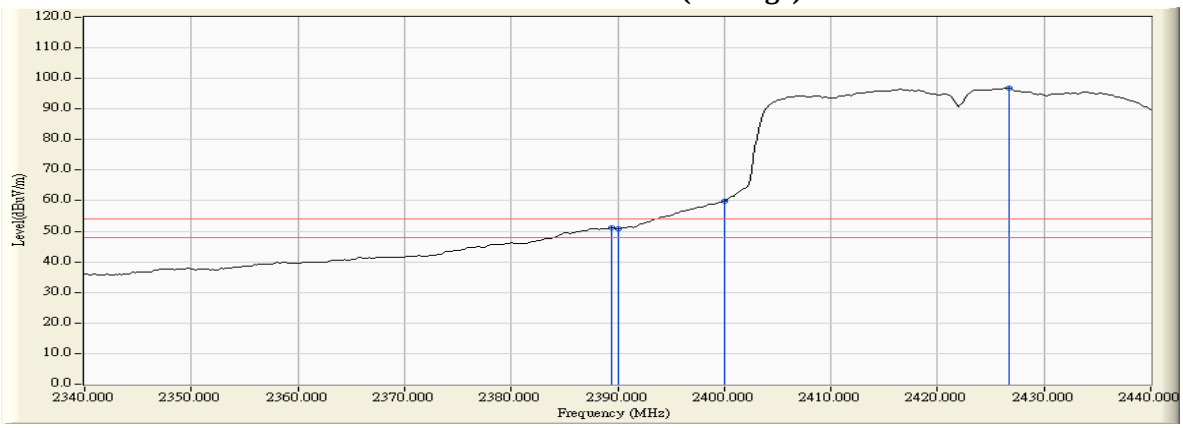



**Figure Channel 03: Horizontal (Average)**




Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2422MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 03 (Peak) | 2388.116 | 5.889 | 60.124 | 66.013 | 74.00 | 54.00 | Pass |
| 03 (Peak) | 2390.000 | 5.880 | 54.616 | 60.497 | 74.00 | 54.00 | Pass |
| 03 (Peak) | 2399.275 | 5.878 | 66.647 | 72.524 | -- | -- | -- |
| 03 (Peak) | 2400.000 | 5.879 | 63.901 | 69.780 | -- | -- | -- |
| 03 (Peak) | 2420.000 | 5.964 | 94.814 | 100.778 | -- | -- | -- |
| 03 (Average) | 2390.000 | 5.880 | 39.177 | 45.058 | 74.00 | 54.00 | Pass |
| 03 (Average) | 2400.000 | 5.879 | 50.162 | 56.041 | -- | -- | -- |
| 03 (Average) | 2418.696 | 5.955 | 87.097 | 93.053 | -- | -- | -- |

**Figure Channel 03: Vertical (Peak)**

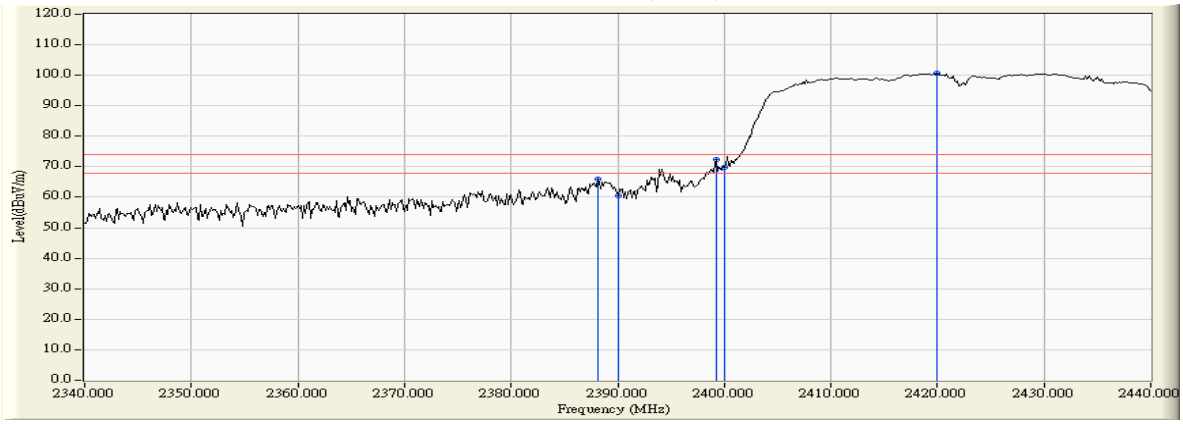
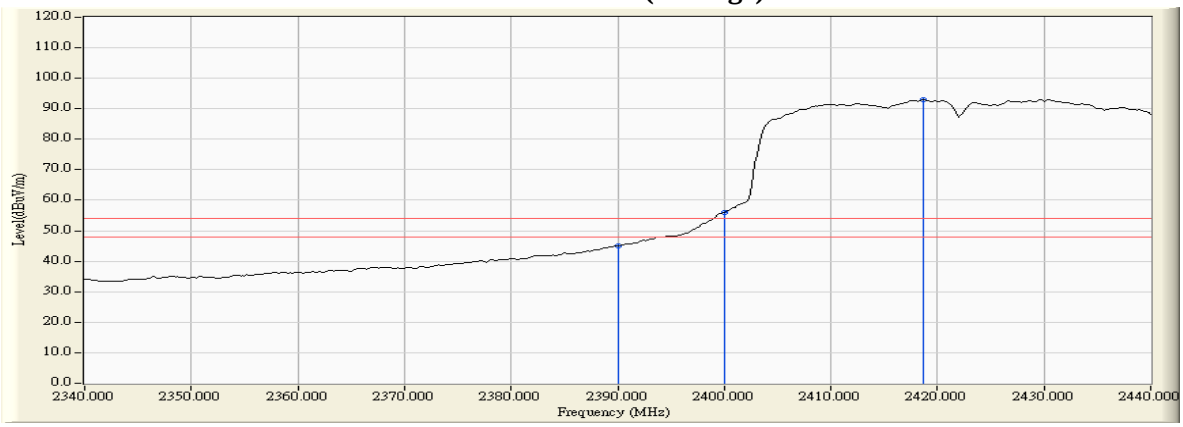



**Figure Channel 03: Vertical (Average)**




Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2452MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 09 (Peak) | 2462.775 | 6.964 | 96.418 | 103.382 | -- | -- | -- |
| 09 (Peak) | 2483.500 | 7.110 | 58.892 | 66.002 | 74.00 | 54.00 | Pass |
| 09 (Peak) | 2485.384 | 7.123 | 63.003 | 70.126 | 74.00 | 54.00 | Pass |
| 09 (Average) | 2456.688 | 6.920 | 87.788 | 94.709 | -- | -- | -- |
| 09 (Average) | 2483.500 | 7.110 | 43.466 | 50.576 | 74.00 | 54.00 | Pass |
| 09 (Average) | 2484.080 | 7.114 | 43.468 | 50.582 | 74.00 | 54.00 | Pass |

**Figure Channel 09: Horizontal (Peak)**

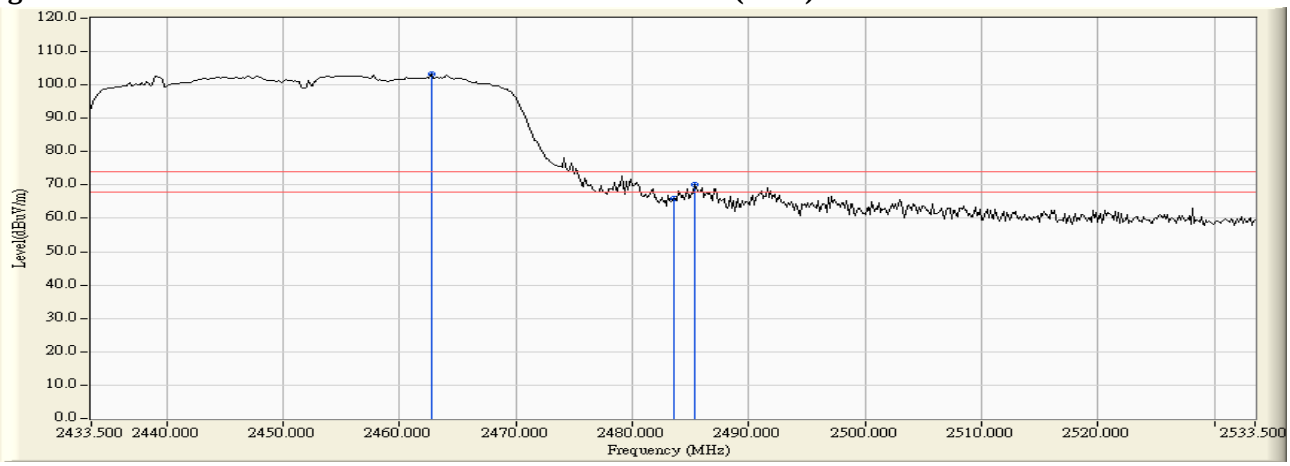
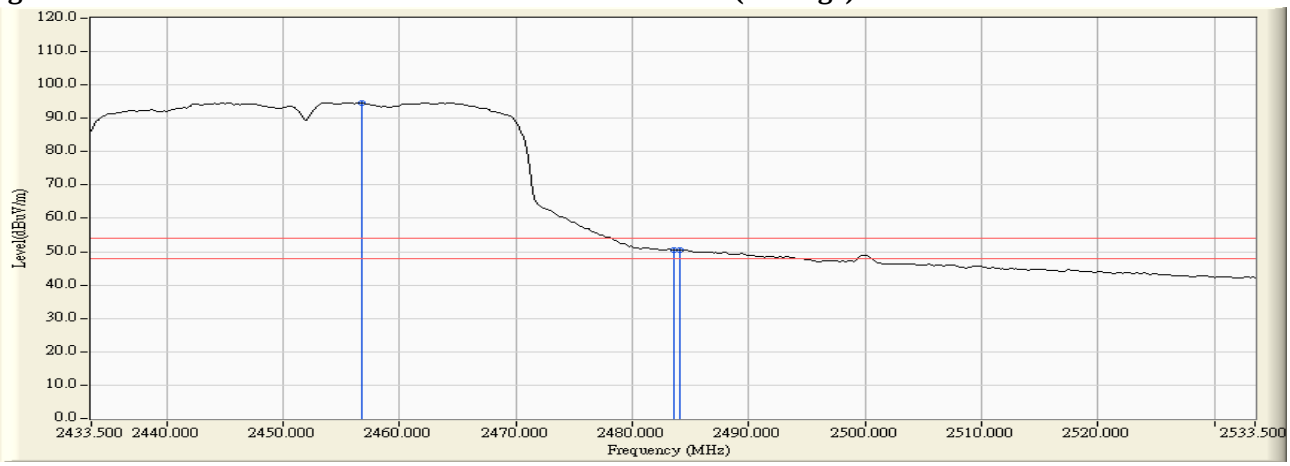



**Figure Channel 09: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2452MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 09 (Peak) | 2446.833 | 6.132 | 93.983 | 100.115 | -- | -- | -- |
| 09 (Peak) | 2483.500 | 6.363 | 53.394 | 59.757 | 74.00 | 54.00 | Pass |
| 09 (Peak) | 2486.399 | 6.382 | 58.769 | 65.150 | 74.00 | 54.00 | Pass |
| 09 (Average) | 2460.746 | 6.222 | 86.183 | 92.404 | -- | -- | -- |
| 09 (Average) | 2483.500 | 6.363 | 39.262 | 45.625 | 74.00 | 54.00 | Pass |
| 09 (Average) | 2484.225 | 6.368 | 39.694 | 46.062 | 74.00 | 54.00 | Pass |

**Figure Channel 09: Vertical (Peak)**

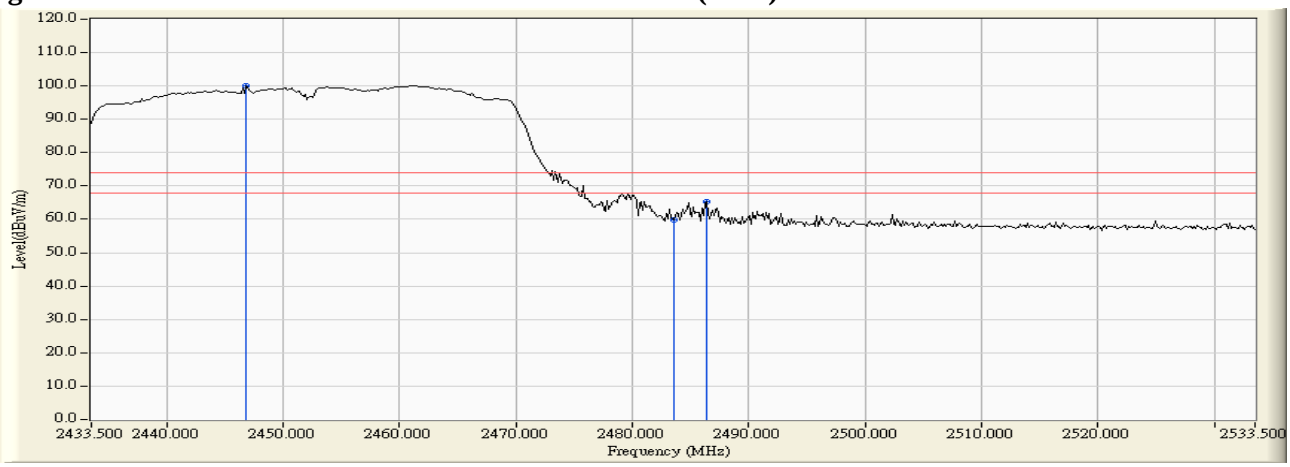
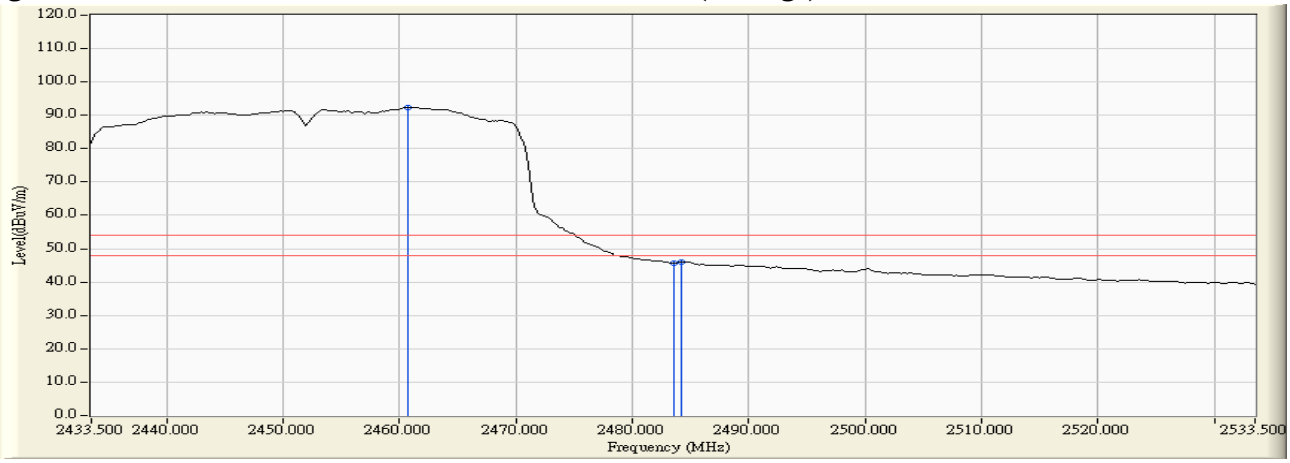



**Figure Channel 09: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2457MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 10 (Peak) | 2447.268 | 6.854 | 94.819 | 101.672 | -- | -- | -- |
| 10 (Peak) | 2483.500 | 7.110 | 57.415 | 64.525 | 74.00 | 54.00 | Pass |
| 10 (Peak) | 2484.804 | 7.120 | 62.294 | 69.413 | 74.00 | 54.00 | Pass |
| 10 (Average) | 2461.471 | 6.955 | 85.522 | 92.477 | -- | -- | -- |
| 10 (Average) | 2483.500 | 7.110 | 42.145 | 49.255 | 74.00 | 54.00 | Pass |

**Figure Channel 10: Horizontal (Peak)**

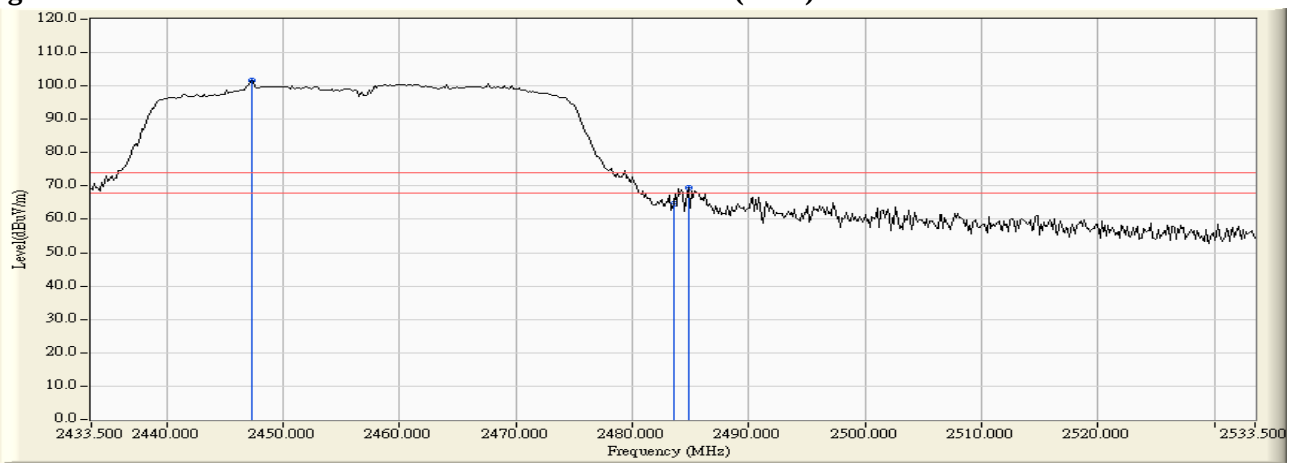
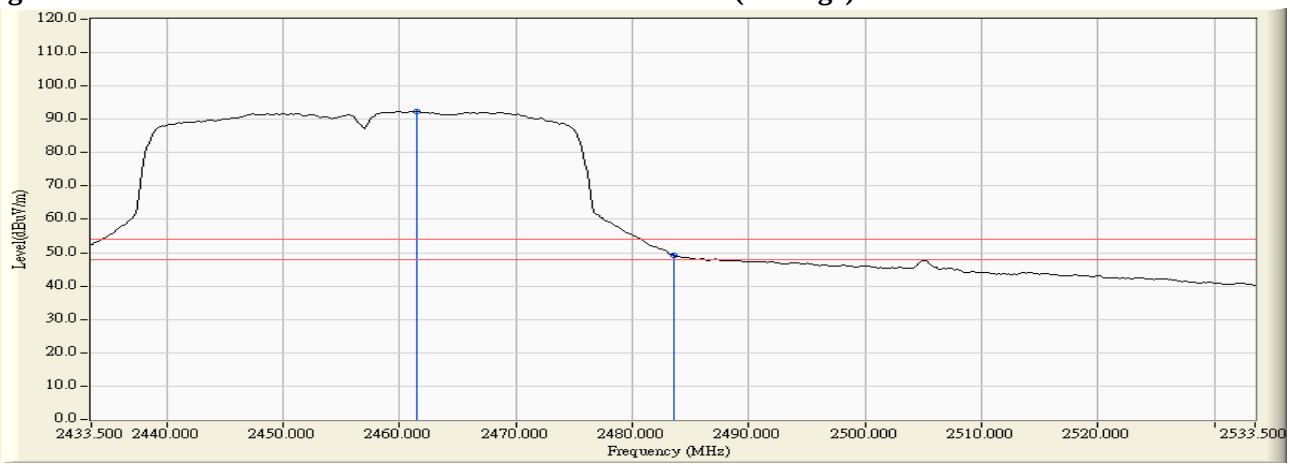



**Figure Channel 10: Horizontal (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2457MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 10 (Peak) | 2465.964 | 6.254 | 91.722 | 97.976 | -- | -- | -- |
| 10 (Peak) | 2483.500 | 6.363 | 55.571 | 61.934 | 74.00 | 54.00 | Pass |
| 10 (Peak) | 2484.659 | 6.371 | 58.607 | 64.978 | 74.00 | 54.00 | Pass |
| 10 (Average) | 2465.529 | 6.251 | 84.148 | 90.399 | -- | -- | -- |
| 10 (Average) | 2483.500 | 6.363 | 37.373 | 43.736 | 74.00 | 54.00 | Pass |

**Figure Channel 10: Vertical (Peak)**

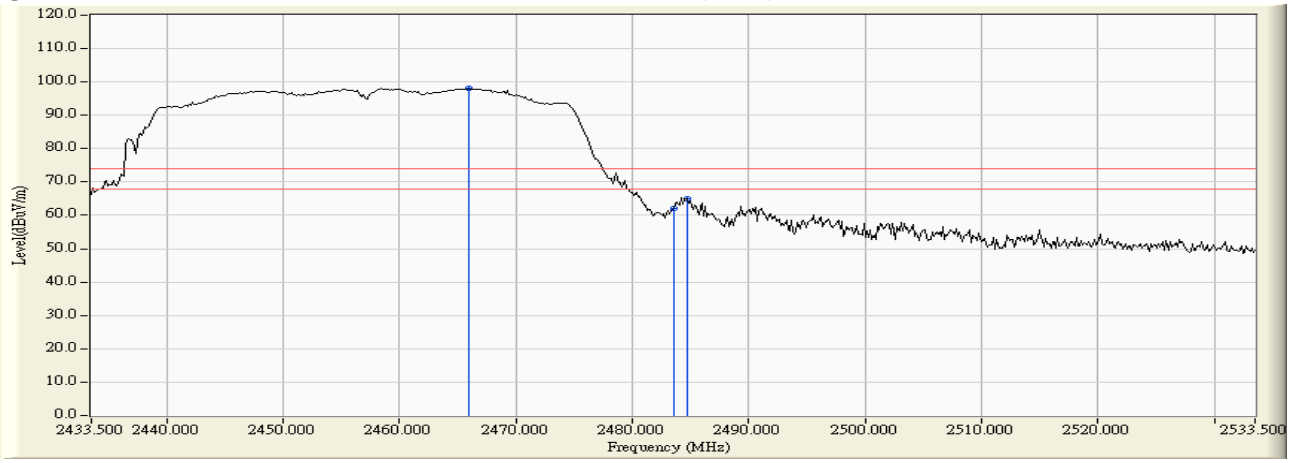
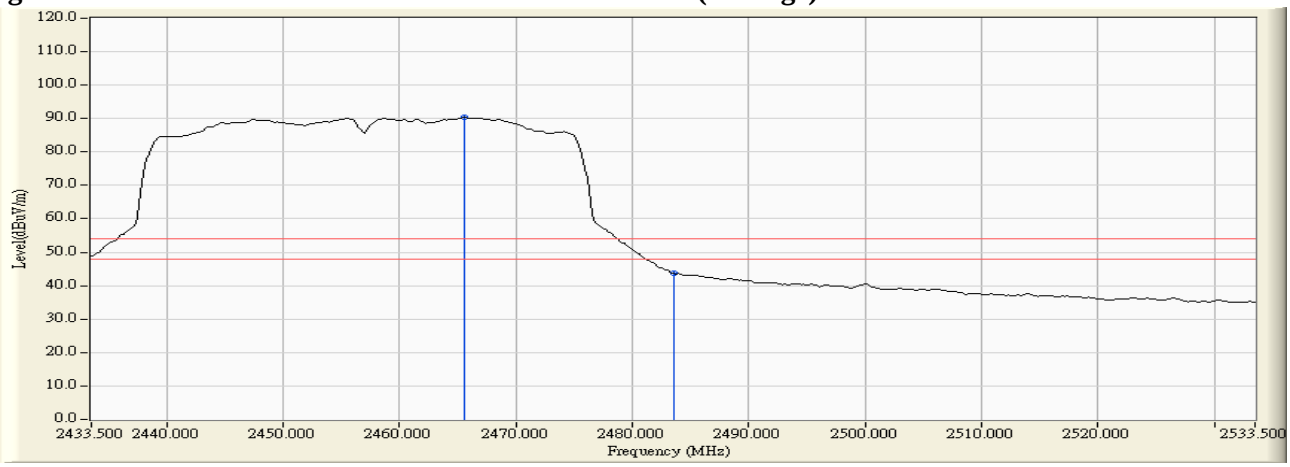



**Figure Channel 10: Vertical (Average)**




Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2462MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2465.239 | 6.981 | 85.764 | 92.745 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 57.602 | 64.712 | 74.00 | 54.00 | Pass |
| 11 (Peak) | 2484.225 | 7.115 | 58.921 | 66.036 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2466.543 | 6.990 | 78.299 | 85.289 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 42.117 | 49.227 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Horizontal (Peak)**

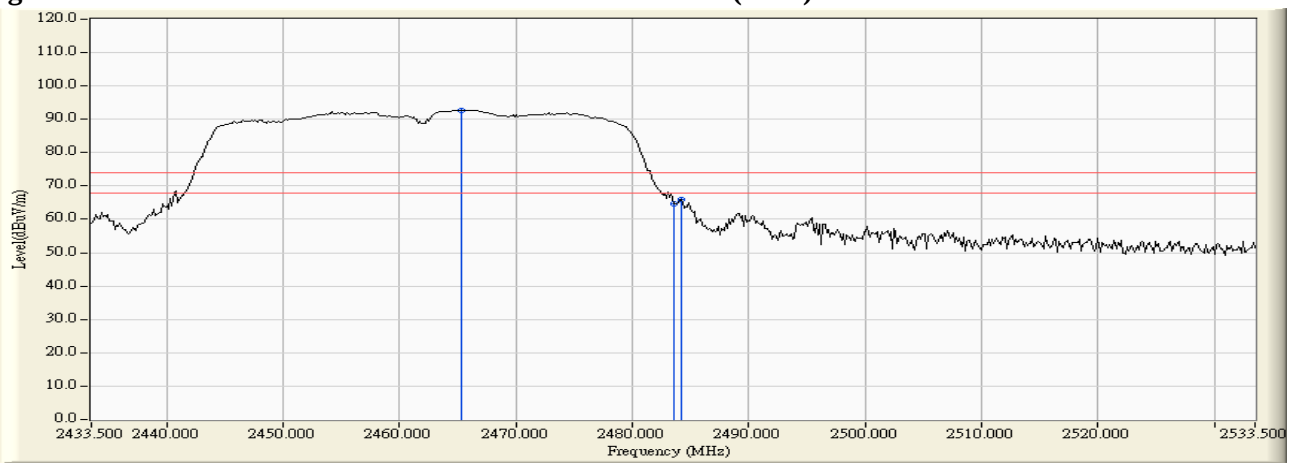
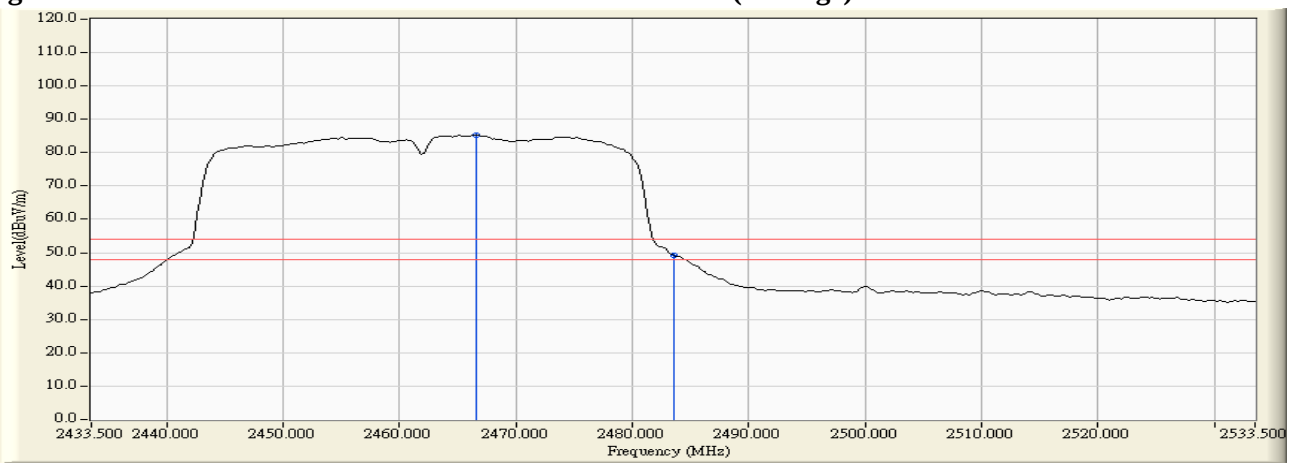



**Figure Channel 11: Horizontal (Average)**




Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : WAH0001
Test Item : Band Edge
Test Site : No.3 OATS
Test Date : 2018/07/03
Test Mode : Mode 4: Transmit - (VHT 40BW) (2462MHz)

**RF Radiated Measurement (Vertical):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2463.355 | 6.238 | 84.153 | 90.391 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 6.363 | 54.578 | 60.941 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2463.355 | 6.238 | 76.422 | 82.660 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 39.296 | 45.659 | 74.00 | 54.00 | Pass |

**Figure Channel 11: Vertical (Peak)**

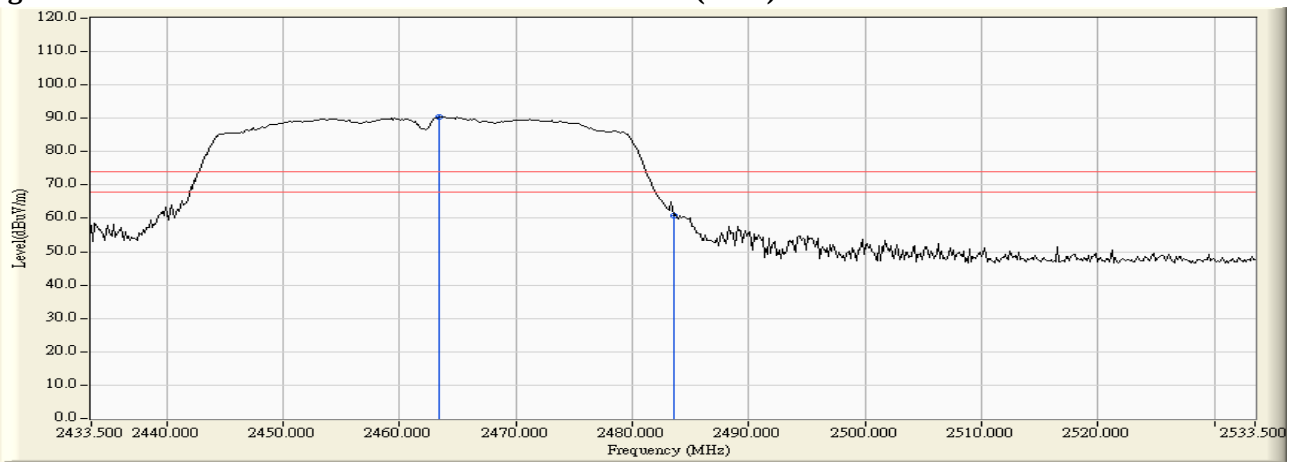
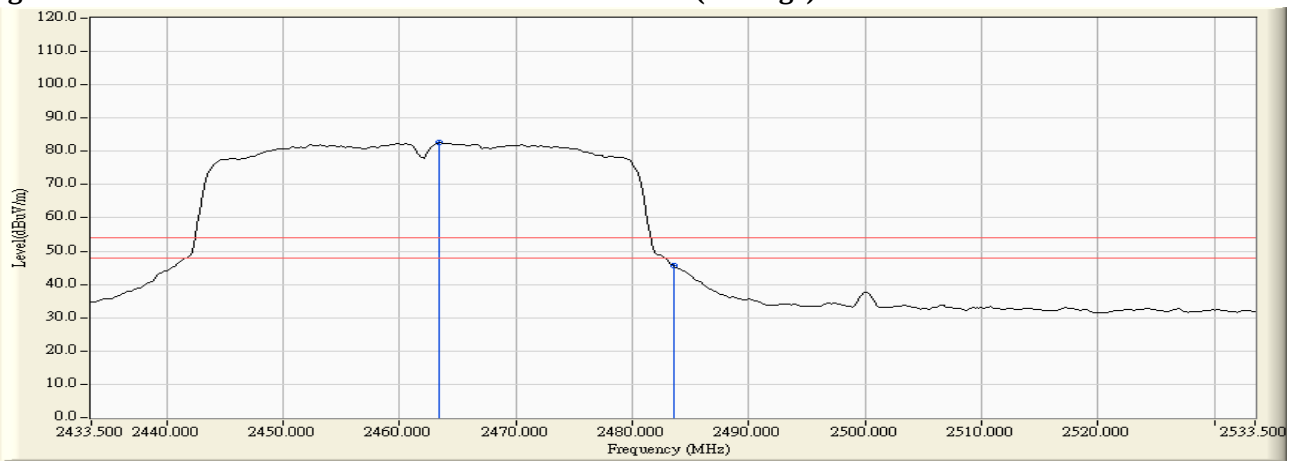



**Figure Channel 11: Vertical (Average)**

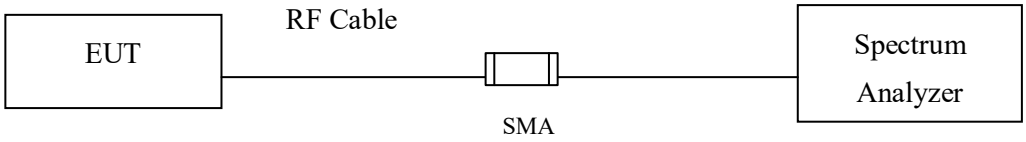



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

# 5. Duty Cycle

## 5.1. Test Setup




## 5.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

## 5.3. Uncertainty

± 25msec

## 5.4. Test Result of Duty Cycle

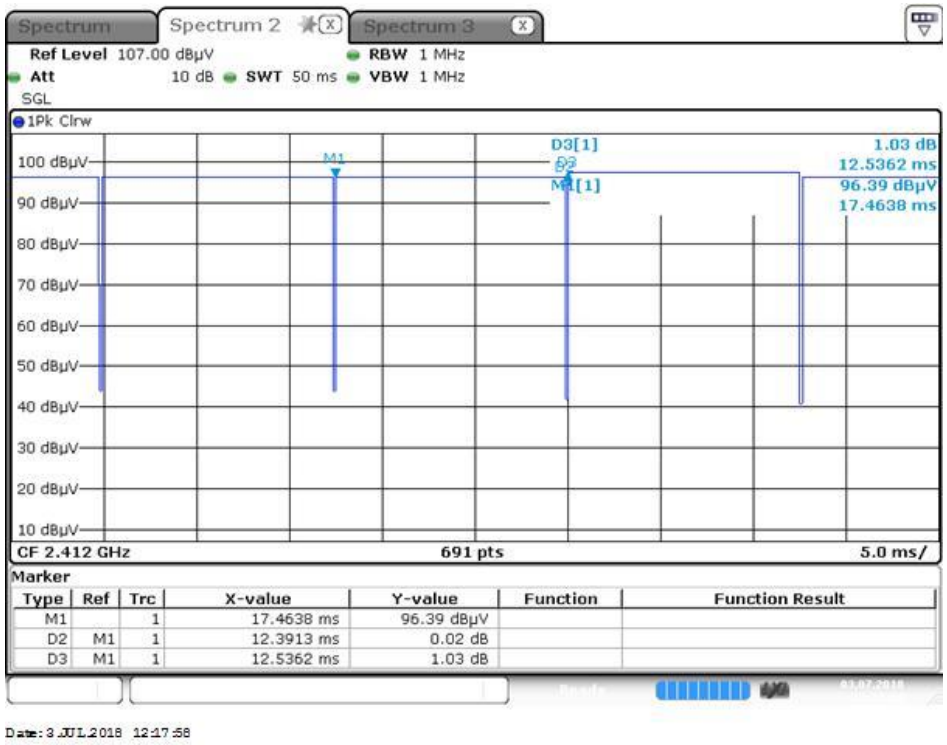
Product : WAH0001
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:
Duty Cycle = Ton / (Ton + Toff)
Duty Factor = 10 Log (1/Duty Cycle)

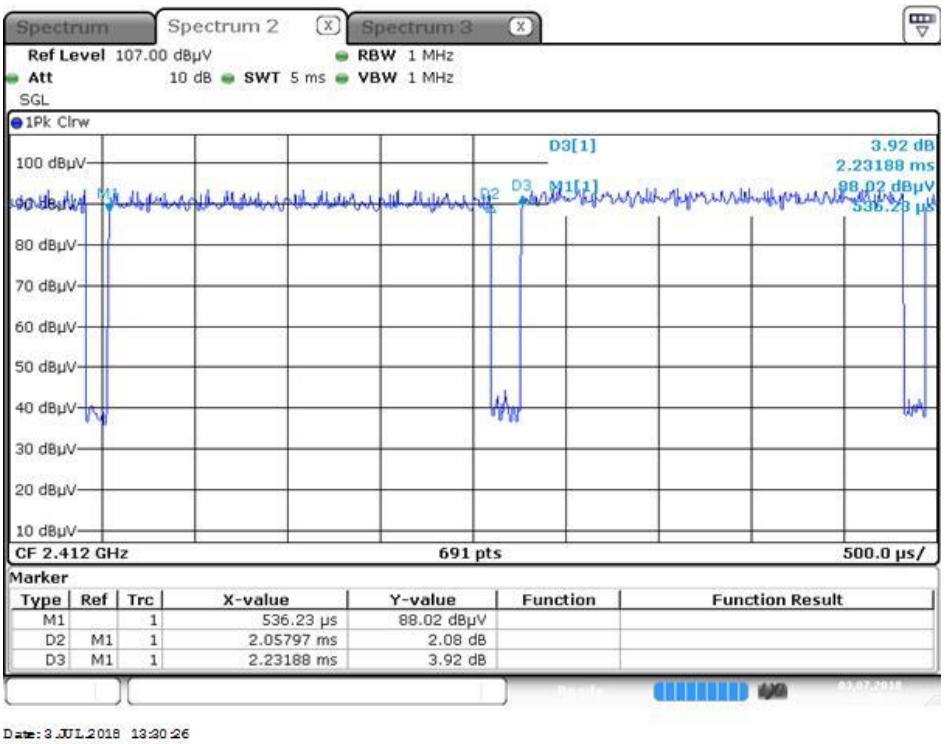
Results:

| 2.4GHz band | Ton (ms) | Ton + Toff (ms) | Duty Cycle (%) | Duty Factor (dB) |
|---|---|---|---|---|
| 802.11 b | 12.3913 | 12.5362 | 98.84 | 0.05 |
| 802.11 g | 2.0580 | 2.2319 | 92.21 | 0.35 |
| VHT20 | 1.9275 | 2.0870 | 92.36 | 0.35 |
| VHT40 | 0.9058 | 1.0797 | 83.89 | 0.76 |

802.11b

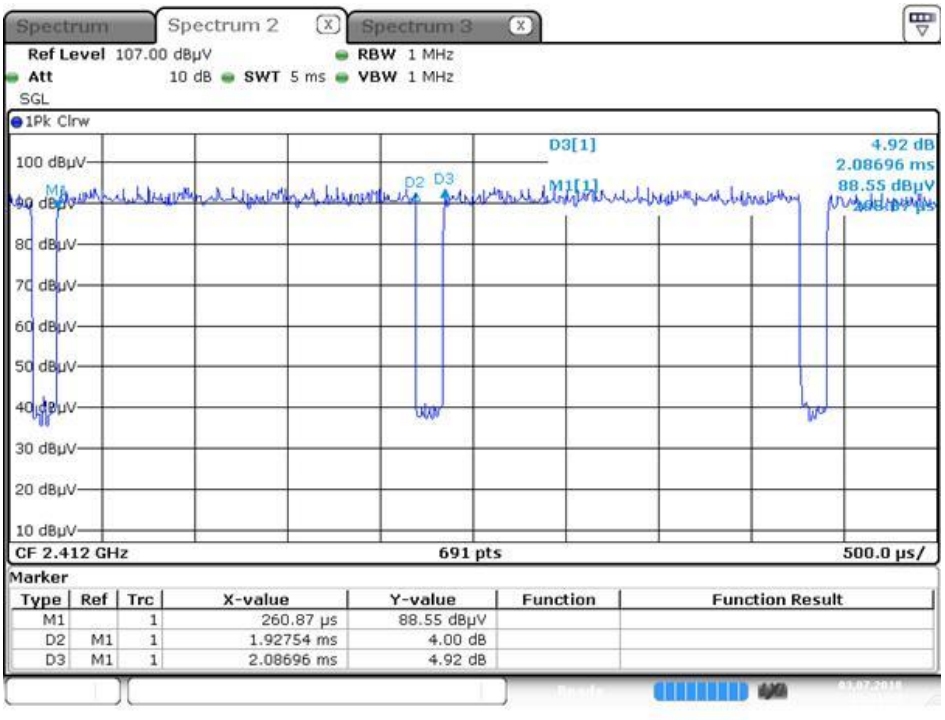


802.11g



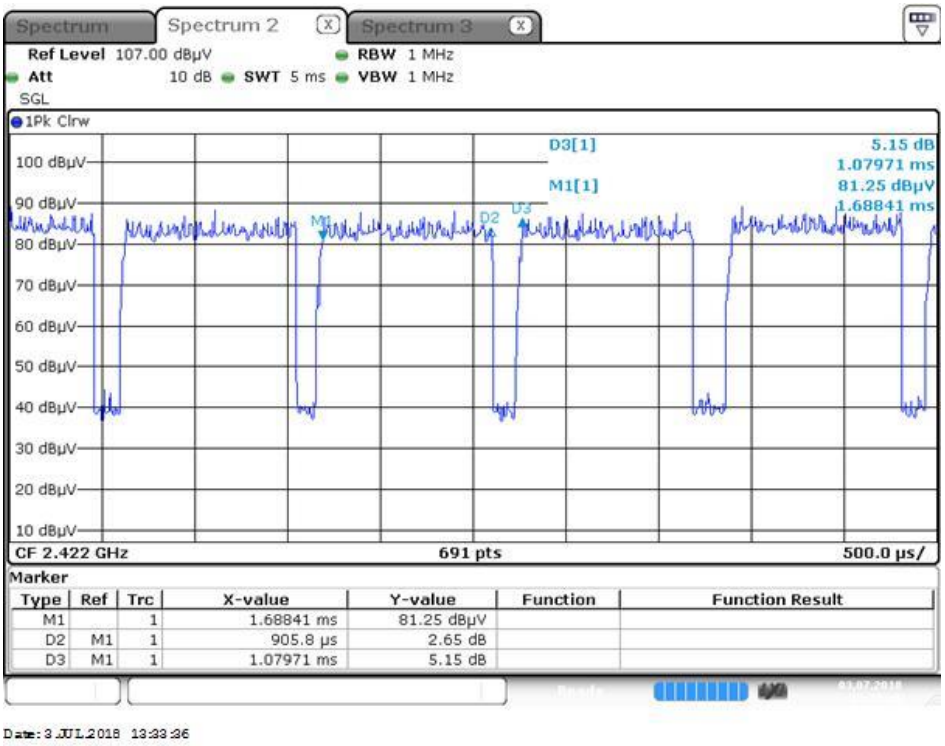

Date: 3.JUL.2018 13:30:26

VHT20




Date: 3.JUL.2018 13:31:53

VHT40


Spectrum
Spectrum 2
Spectrum 3
Ref Level 107.00 dBµV
RBW 1 MHz
Att 10 dB SWT 5 ms VBW 1 MHz
SGL
1Pk Clrw
D3[1] 5.15 dB
1.07971 ms
M1[1] 81.25 dBµV
1.68841 ms
100 dBµV
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
CF 2.422 GHz
691 pts
500.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 1.68841 ms 81.25 dBµV
D2 M1 1 905.8 µs 2.65 dB
D3 M1 1 1.07971 ms 5.15 dB
Date: 3.JUL.2018 13:33:36

## 6. EMI Reduction Method During Compliance Testing

No modification was made during testing.