# FCC Test Report
# (Class II Permissive Change)

| | |
|---|---|
| Product Name | NPort Device Server |
| Model No | NPort W2250A, NPort W2150A, NPort W2250A-T, NPort W2150A-T |
| FCC ID. | SLE-W2X50A |

| | |
|---|---|
| Applicant | MOXA Inc. |
| Address | FL.4, NO. 135. LANE 235, BAOQIAO RD. XINDIAN DIST., NEW TAIPEI CITY, TAIWAN |

| | |
|---|---|
| Date of Receipt | Jul. 20, 2018 |
| Issue Date | Nov. 26, 2018 |
| Report No. | 1870341R-RFUSP02V00 |
| Report Version | V1.0 |

Testing Laboratory
3023

# Test Report

Issue Date: Nov. 26, 2018
Report No.: 1870341R-RFUSP02V00

| | |
|---|---|
| Product Name | NPort Device Server |
| Applicant | MOXA Inc. |
| Address | FL.4, NO. 135. LANE 235, BAOQIAO RD. XINDIAN DIST., NEW TAIPEI CITY, TAIWAN |
| Manufacturer | MOXA Inc. |
| Model No. | NPort W2250A, NPort W2150A, NPort W2250A-T, NPort W2150A-T |
| FCC ID. | SLE-W2X50A |
| EUT Rated Voltage | DC 12~48V, AC 110~230V |
| EUT Test Voltage | DC24V, AC 110V/60Hz |
| Trade Name | MOXA |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2016<br>ANSI C63.4: 2014, ANSI C63.10: 2013<br>KDB 558074 D01 DTS Meas Guidance v05 |
| Test Result | Complied |

Documented By : April Chen

(Senior Adm. Specialist / April Chen)

Tested By : Jason Tuan

( Engineer /Jason Tuan)

Approved By :

( Director / Vincent Lin )

# TABLE OF CONTENTS


| | Description | Page |
|---|---|---|
| **1.** | **GENERAL INFORMATION** | **5** |
| 1.1. | EUT Description | 5 |
| 1.2. | Operational Description | 7 |
| 1.3. | Tested System Details | 8 |
| 1.4. | Configuration of Tested System | 9 |
| 1.5. | EUT Exercise Software | 10 |
| 1.6. | Test Facility | 11 |
| 1.7. | Summary of Test Results | 12 |
| 1.8. | List of Test Equipment | 13 |
| **2.** | **Conducted Emission** | **14** |
| 2.1. | Test Setup | 14 |
| 2.2. | Limits | 15 |
| 2.3. | Test Procedure | 15 |
| 2.4. | Uncertainty | 15 |
| 2.5. | Test Result of Conducted Emission | 16 |
| **3.** | **Peak Power Output** | **22** |
| 3.1. | Test Setup | 22 |
| 3.2. | Limits | 22 |
| 3.3. | Test Procedure | 22 |
| 3.4. | Uncertainty | 22 |
| 3.5. | Test Result of Peak Power Output | 23 |
| **4.** | **Radiated Emission** | **26** |
| 4.1. | Test Setup | 26 |
| 4.2. | Limits | 27 |
| 4.3. | Test Procedure | 28 |
| 4.4. | Uncertainty | 29 |
| 4.5. | Test Result of Radiated Emission | 30 |
| **5.** | **RF antenna conducted test** | **60** |
| 5.1. | Test Setup | 60 |
| 5.2. | Limits | 60 |
| 5.3. | Test Procedure | 60 |
| 5.4. | Uncertainty | 60 |
| 5.5. | Test Result of RF antenna conducted test | 61 |
| **6.** | **Band Edge** | **64** |
| 6.1. | Test Setup | 64 |
| 6.2. | Limits | 65 |
| 6.3. | Test Procedure | 65 |
| 6.4. | Uncertainty | 66 |
| 6.5. | Test Result of Band Edge | 67 |
| **7.** | **6dB Bandwidth** | **79** |
| 7.1. | Test Setup | 79 |

7.2. Limits....79
7.3. Test Procedure....79
7.4. Uncertainty....79
7.5. Test Result of 6dB Bandwidth....80

**8. Power Density....86**

8.1. Test Setup....86
8.2. Limits....86
8.3. Test Procedure....86
8.4. Uncertainty....86
8.5. Test Result of Power Density....87

**9. Duty Cycle....93**

9.1. Test Setup....93
9.2. Test Procedure....93
9.3. Uncertainty....93
9.4. Test Result of Duty Cycle....94

**10. EMI Reduction Method During Compliance Testing....96**

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

# 1. GENERAL INFORMATION

## 1.1. EUT Description

| | |
|---|---|
| Product Name | NPort Device Server |
| Trade Name | MOXA |
| Model No. | NPort W2250A, NPort W2150A, NPort W2250A-T, NPort W2150A-T |
| FCC ID. | SLE-W2X50A |
| Frequency Range | 2412-2462MHz for 802.11b/g/n-20BW |
| Number of Channels | 802.11b/g/n-20MHz: 11 |
| Data Speed | 802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 72.2Mbps |
| Channel separation | 802.11b/g/n: 5 MHz |
| 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 |
| Power Adapter (Optional) | MFR: ENG, M/N: 6A-061WP12<br>Input: AC 100-240V, 50-60Hz 0.3A<br>Output: 12V⎓0.5A<br>Cable out: Non-Shielded, 1.6m |

**Antenna List**

| No. | Manufacturer | Part No. | Antenna Type | Peak Gain |
|---|---|---|---|---|
| 1 | KINSUN | ANT-WDB-ARM-02 | Dipole | 2.04dBi in 2.4GHz |

Note:

1. The antenna of EUT conforms to FCC 15.203.
2. Only the higher gain antenna was tested and recorded in this report

802.11b/g/n-20MHz 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 | | |

Note:

1. The EUT is a NPort Device Server with a built-in 802.11a/b/g /nWLAN transceiver, this report for 2.4GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps、802.11g is 6Mbps、802.11n(20M-BW) is 7.2Mbps)
5. This is to request a Class II permissive change for FCC ID: SLE-W2X50A, originally granted on 05/05/2016. (NII of New rule) and 05/30/2012(DTS).
   The major change filed under this application is:
   Change

   #1: Add a new antenna, the antenna type is the same, the 2.4GHz antenna gain is higher than the original application 5GHz antenna gain is lower than the original application.

| Origina (dBi) | New (dBi) | Freq Band |
|---|---|---|
| 1.21 | 2.04 | 2.4GHz |
| 1.73 | 0.81 | 5.150-5.250 GHz |
| 1.73 | 0.38 | 5.250-5.350 GHz |
| 1.73 | -1.39 | 5.470-5.725 GHz |
| 1.73 | -0.39 | 5.725-5.850 GHz |

   #2: To replace some EOL components, we re-design the PCB board which changes the details as below.

| **Components no.** | | **Changes** | **Before** | **New** |
|---|---|---|---|---|
| Flash | U4 | Same electrical characteristics, different capacity | 64Mb | 256Mb |
| RTC Crystal | X1 | Same electrical characteristics | NA | NA |
| Socket connector | JP4 | Removed the connector | NA | NA |
| Ethernet PHY | U15 | Same electrical characteristics | NA | NA |
| CPLD | U21 | Change CPLD to a logic IC, the working voltage is different | CPLD(3.3V) | logic (5V) |

   #3: The originally application of DTS band is 802.11 b/g , add 802.11n-20 mode through Software changes.
   #4: The originally application of NII band is 802.11a , add 802.11n-20 mode through Software changes.
6. The EUT is including series models for different is listed as below:

| Item | Model Type | Description |
|---|---|---|
| 1 | NPort W2150A | 1 Port Wireless Device Server, 3-in-1, 802.11a/b/g/n, 12-48 VDC, 0 to 55℃ |
| 2 | NPort W2150A-T | 1 Port Wireless Device Server, 3-in-1, 802.11a/b/g/n, 12-48 VDC, -40 to 75℃ |
| 3 | NPort W2250A | 2 Port Wireless Device Server, 3-in-1, 802.11a/b/g/n, 12-48 VDC, 0 to 55℃ |
| 4 | NPort W2250A-T | 2 Port Wireless Device Server, 3-in-1, 802.11a/b/g/n, 12-48 VDC, -40 to 75℃ |

| | |
|---|---|
| Test Mode: | Mode 1: Transmit (802.11b 1Mbps) |
| | Mode 2: Transmit (802.11g 6Mbps) |
| | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) |

## 1.3. Tested System Details

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

| **Test Item** | | **AC** | | | |
|---|---|---|---|---|---|
| Product | | Manufacturer | Model No. | Serial No. | Power Cord |
| 1 | Notebook PC | DELL | Latitude E5440 | HG26TZ1 | Non-Shielded, 0 .8m |
| 2 | Test Fixture | MOXA | N/A | N/A | N/A |
| 3 | Notebook PC | DELL | Latitude E5440 | B6TYTZ1 | Non-Shielded, 0 .8m |

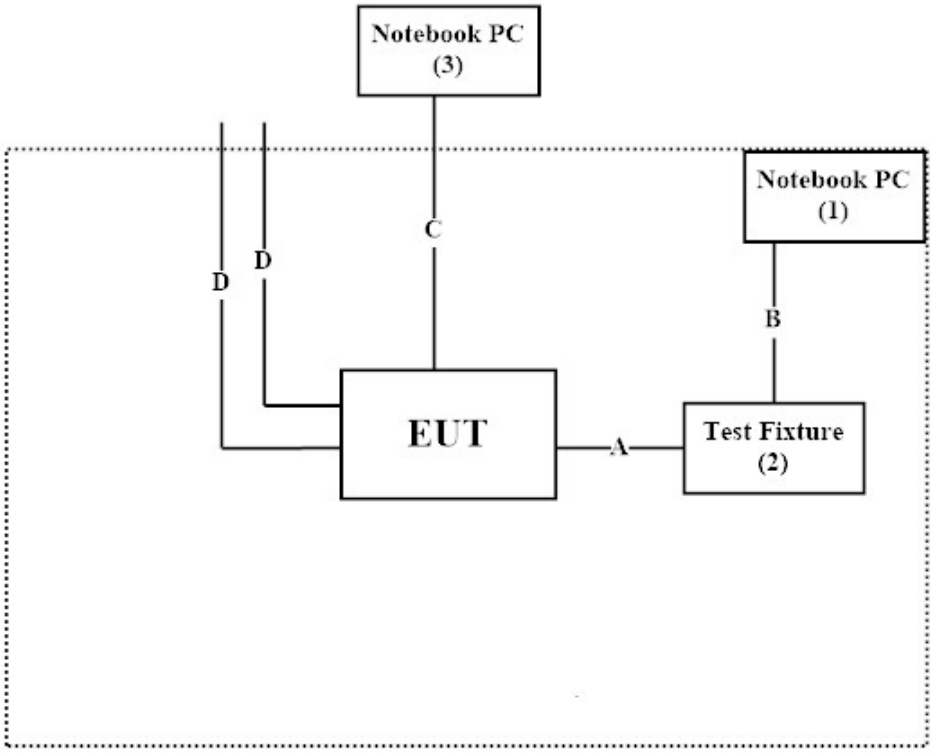
| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | RS-232 to single Cable | Non-Shielded, 0.3m. |
| B | USB Cable | Non-Shielded, 1m |
| C | LAN Cable | Non-Shielded, 2m |
| D | Fiber optic Cable | Non-Shielded, 2m, two PCS. |

| **Test Item** | | **DC** | | | |
|---|---|---|---|---|---|
| Product | | Manufacturer | Model No. | Serial No. | Power Cord |
| 1 | Notebook PC | DELL | Latitude E5440 | HG26TZ1 | Non-Shielded, 0 .8m |
| 2 | Test Fixture | MOXA | N/A | N/A | N/A |
| 3 | DC Power Supply | Agilent | E3646A | MY53020023 | N/A |
| 4 | Notebook PC | DELL | Latitude E5440 | B6TYTZ1 | Non-Shielded, 0 .8m |

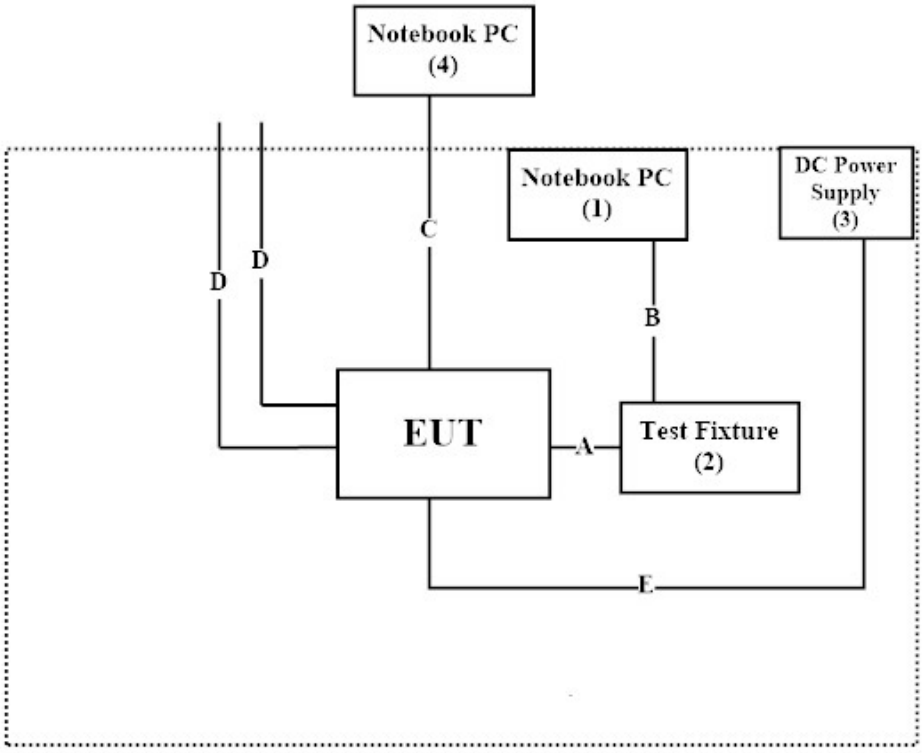
| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | RS-232 to single Cable | Non-Shielded, 0.3m. |
| B | USB Cable | Non-Shielded, 1m |
| C | LAN Cable | Non-Shielded, 2m |
| D | Fiber optic Cable | Non-Shielded, 2m, two PCS. |
| E | Power Cable | Non-Shielded, 1.5m |

## 1.4. Configuration of Tested System

**Test Item AC**




**Test Item DC**



## 1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software “Putty v0.26.0.0“on the EUT.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
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. Summary of Test Results

| Chapter | Clause FCC Part 15 | Test Content | Result |
|---|---|---|---|
| 2 | **15.207** | Conducted Emission | PASS |
| 3 | **15.247(b)(3)** | Peak Power Output | PASS |
| 4 | **15.209** | Radiated Emission | PASS |
| 5 | **15.247(d)** | RF antenna conducted test | PASS |
| 6 | **15.209** | Band Edge | PASS |
| 7 | **15.247(a)(2)** | 6dB Bandwidth | PASS |
| 8 | **15.247(e)** | Power Density | PASS |
| 9 | **--** | Duty Cycle | -- |

## 1.8. 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 | 2018/02/12 | 2019/02/11 |
| X | Spectrum Analyzer | Agilent | N9010A | MY48030495 | 2018/10/13 | 2019/10/12 |
| X | Peak Power Analyzer | Keysight | 8990B | MY51000410 | 2018/08/01 | 2019/07/31 |
| X | Wideband Power Sensor | Keysight | N1923A | MY56080003 | 2018/07/25 | 2019/07/24 |
| X | Wideband Power Sensor | Keysight | N1923A | MY56080004 | 2018/07/25 | 2019/07/24 |
| X | EMI Test Receiver | R&S | ESCS 30 | 100369 | 2018/11/07 | 2019/11/06 |
| X | LISN | R&S | ESH3-Z5 | 836679/017 | 2018/02/09 | 2019/02/08 |
| X | LISN | R&S | ENV216 | 100097 | 2018/02/09 | 2019/02/08 |
| X | Coaxial Cable | DEKRA | RG 400 | LC018-RG | 2018/06/21 | 2019/06/20 |

**For Radiated measurements /Site3/CB8**

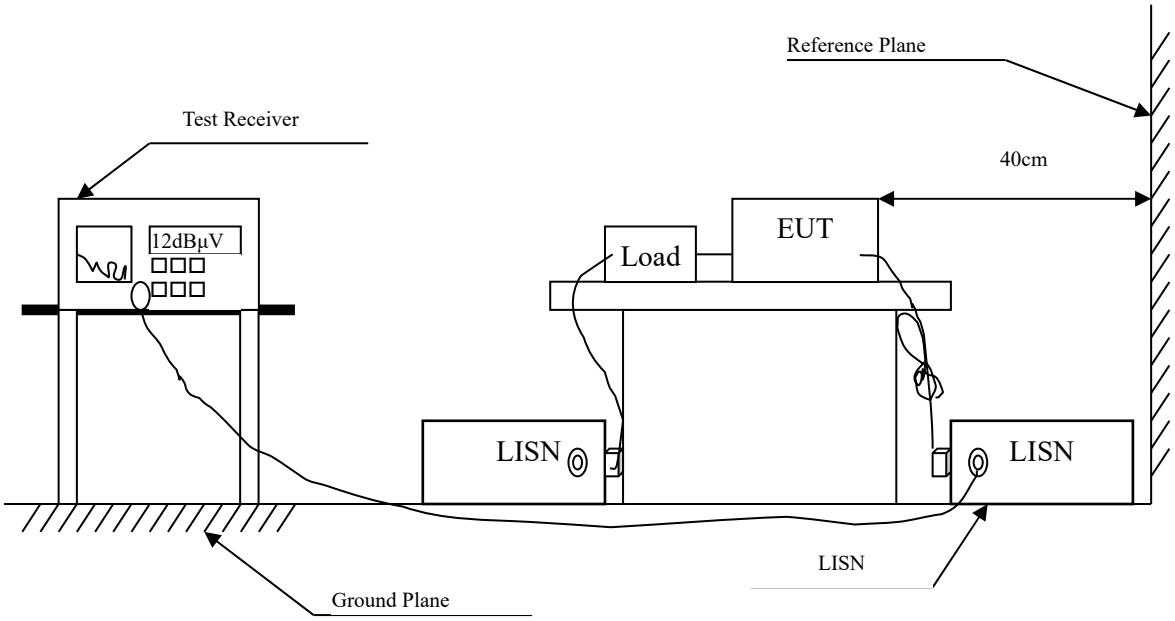
| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Date | Due. Date |
|---|---|---|---|---|---|---|
| X | Spectrum Analyzer | R&S | FSP40 | 100170 | 2018/03/12 | 2019/03/11 |
| X | Loop Antenna | Teseq | HLA6121 | 37133 | 2018/10/13 | 2019/10/12 |
| X | Bilog Antenna | Schaffner Chase | CBL6112B | 2707 | 2018/06/24 | 2019/06/23 |
| X | Coaxial Cable | DEKRA | RG 214 | LC003-RG | 2018/06/14 | 2019/06/13 |
| X | Pre-Amplifier | Jet-Power | JPA-10M1G33 | 170101000330010 | 2018/06/14 | 2019/06/13 |
| X | Horn Antenna | ETS-Lindgren | 3117 | 00135205 | 2018/05/03 | 2019/05/02 |
| X | Horn Antenna | SCHWARZBECK | 9120D | 576 | 2017/11/30 | 2018/11/29 |
| X | Pre-Amplifier | EMCI | EMC012630SE | 980210 | 2018/04/10 | 2019/04/09 |
| X | Horn Antenna | Com-Power | AH-840 | 101043 | 2018/01/09 | 2019/01/08 |
| X | Amplifier + Cable | EMCI | EMC184045SE | 980370 | 2018/03/21 | 2019/03/20 |
| X | Filter | MICRO-TRONICS | BRM50702 | G270 | 2018/08/06 | 2019/08/05 |
| X | Filter | MICRO-TRONICS | BRM50716 | G196 | 2018/08/06 | 2019/08/05 |

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :QuieTek EMI 2.0 V2.1.113.

## 2. Conducted Emission

### 2.1. Test Setup



## 2.2. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit | | |
|---|---|---|
| Frequency MHz | Limits | |
| | QP | AVG |
| 0.15 - 0.50 | 66-56 | 56-46 |
| 0.50-5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

## 2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.4. Uncertainty

± 2.26 dB

## 2.5. Test Result of Conducted Emission

Product : NPort Device Server
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2018/08/31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz) -AC

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV | dB | dBµV |
| **Line 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.150 | 9.749 | 42.420 | 52.169 | -13.831 | 66.000 |
| 0.170 | 9.743 | 40.780 | 50.523 | -14.906 | 65.429 |
| 0.201 | 9.738 | 37.160 | 46.898 | -17.645 | 64.543 |
| 0.216 | 9.738 | 35.640 | 45.378 | -18.736 | 64.114 |
| 0.463 | 9.749 | 37.360 | 47.109 | -9.948 | 57.057 |
| 1.287 | 9.792 | 23.800 | 33.592 | -22.408 | 56.000 |
| **Average** | | | | | |
| 0.150 | 9.749 | 28.840 | 38.589 | -17.411 | 56.000 |
| 0.170 | 9.743 | 27.010 | 36.753 | -18.676 | 55.429 |
| 0.201 | 9.738 | 22.970 | 32.708 | -21.835 | 54.543 |
| 0.216 | 9.738 | 21.370 | 31.108 | -23.006 | 54.114 |
| 0.463 | 9.749 | 27.260 | 37.009 | -10.048 | 47.057 |
| 1.287 | 9.792 | 12.910 | 22.702 | -23.298 | 46.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "  " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

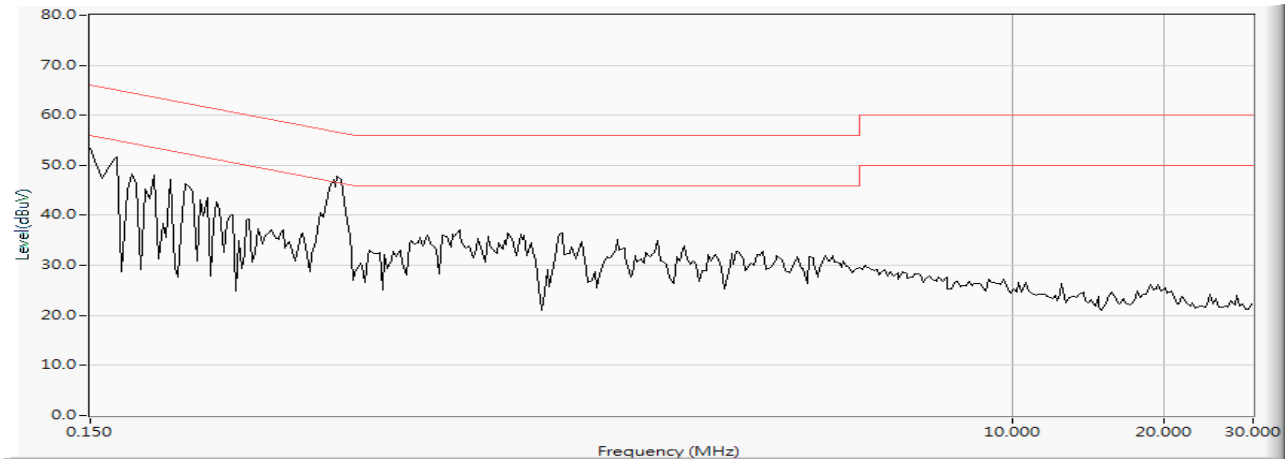
Product : NPort Device Server
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2018/08/31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz) -AC

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV | dB | dBµV |
| **Line 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.158 | 9.736 | 41.280 | 51.016 | -14.755 | 65.771 |
| 0.173 | 9.737 | 39.880 | 49.617 | -15.726 | 65.343 |
| 0.189 | 9.737 | 38.400 | 48.137 | -16.749 | 64.886 |
| 0.216 | 9.738 | 35.060 | 44.798 | -19.316 | 64.114 |
| 0.255 | 9.740 | 31.620 | 41.360 | -21.627 | 62.987 |
| 0.455 | 9.738 | 33.840 | 43.578 | -13.708 | 57.286 |
| **Average** | | | | | |
| 0.158 | 9.736 | 26.420 | 36.156 | -19.615 | 55.771 |
| 0.173 | 9.737 | 25.340 | 35.077 | -20.266 | 55.343 |
| 0.189 | 9.737 | 23.600 | 33.337 | -21.549 | 54.886 |
| 0.216 | 9.738 | 20.670 | 30.408 | -23.706 | 54.114 |
| 0.255 | 9.740 | 19.090 | 28.830 | -24.157 | 52.987 |
| 0.455 | 9.738 | 26.360 | 36.098 | -11.188 | 47.286 |

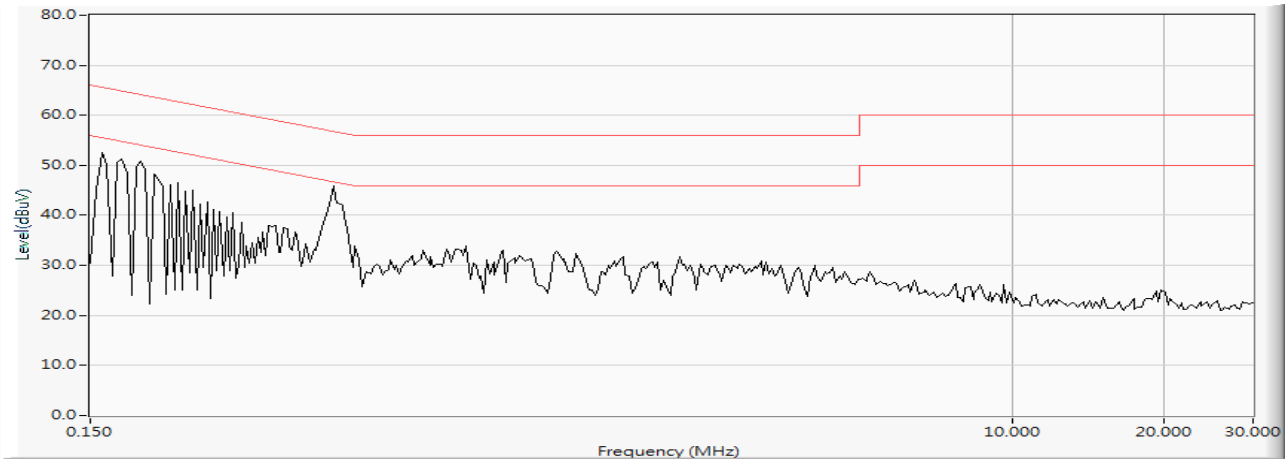
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

**LINE 1**


80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Level(dBuV)
0.150
10.000
20.000
30.000
Frequency (MHz)

**LINE 2**


80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Level(dBuV)
0.150
10.000
20.000
30.000
Frequency (MHz)

Product : NPort Device Server
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2018/08/31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz) -DC

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV | dB | dBµV |
| **Line 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.197 | 9.738 | 39.680 | 49.418 | -15.239 | 64.657 |
| 0.263 | 9.740 | 43.660 | 53.400 | -9.371 | 62.771 |
| 0.392 | 9.746 | 40.200 | 49.946 | -9.140 | 59.086 |
| 0.537 | 9.752 | 37.540 | 47.292 | -8.708 | 56.000 |
| 0.650 | 9.756 | 38.220 | 47.976 | -8.024 | 56.000 |
| 1.884 | 9.817 | 40.720 | 50.537 | -5.463 | 56.000 |
| **Average** | | | | | |
| 0.197 | 9.738 | 23.790 | 33.528 | -21.129 | 54.657 |
| 0.263 | 9.740 | 38.120 | 47.860 | -4.911 | 52.771 |
| 0.392 | 9.746 | 33.710 | 43.456 | -5.630 | 49.086 |
| 0.537 | 9.752 | 29.390 | 39.142 | -6.858 | 46.000 |
| 0.650 | 9.756 | 30.890 | 40.646 | -5.354 | 46.000 |
| 1.884 | 9.817 | 29.810 | 39.627 | -6.373 | 46.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

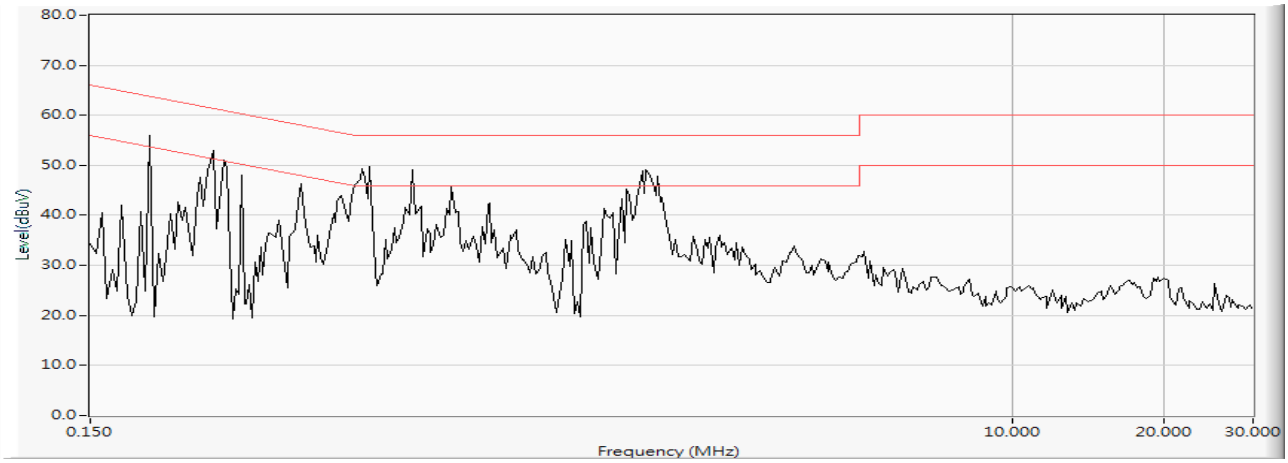
Product : NPort Device Server
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2018/08/31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz) -DC

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV | dB | dBµV |
| **Line 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.189 | 9.737 | 39.940 | 49.677 | -15.209 | 64.886 |
| 0.263 | 9.740 | 41.700 | 51.440 | -11.331 | 62.771 |
| 0.392 | 9.736 | 36.340 | 46.076 | -13.010 | 59.086 |
| 0.529 | 9.741 | 34.800 | 44.541 | -11.459 | 56.000 |
| 0.670 | 9.747 | 33.160 | 42.907 | -13.093 | 56.000 |
| 2.033 | 9.823 | 40.560 | 50.383 | -5.617 | 56.000 |
| **Average** | | | | | |
| 0.189 | 9.737 | 30.930 | 40.667 | -14.219 | 54.886 |
| 0.263 | 9.740 | 33.070 | 42.810 | -9.961 | 52.771 |
| 0.392 | 9.736 | 24.650 | 34.386 | -14.700 | 49.086 |
| 0.529 | 9.741 | 28.680 | 38.421 | -7.579 | 46.000 |
| 0.670 | 9.747 | 23.070 | 32.817 | -13.183 | 46.000 |
| 2.033 | 9.823 | 27.440 | 37.263 | -8.737 | 46.000 |

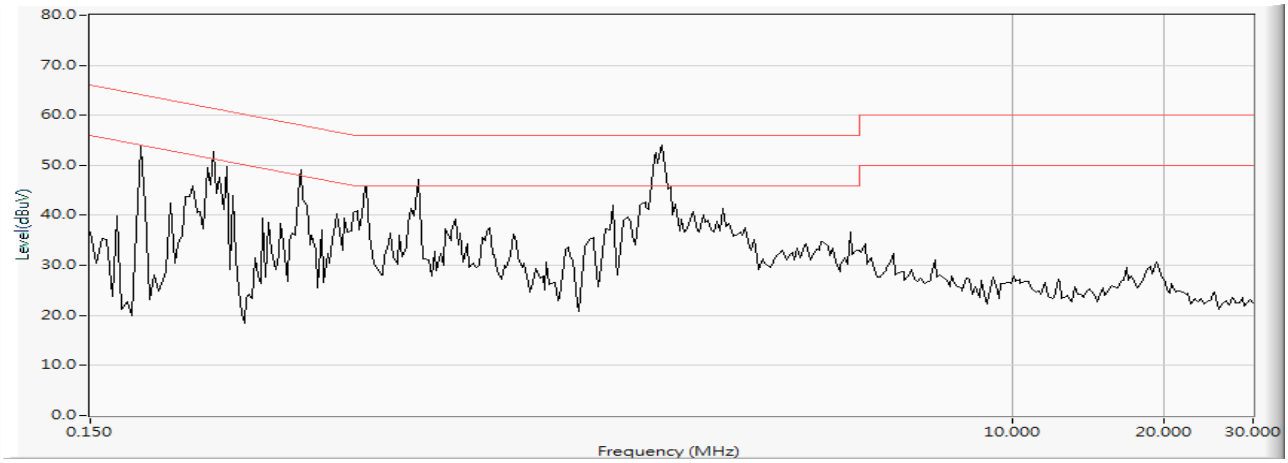
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "  " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

**LINE 1**


80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Level(dBuV)
0.150
10.000
20.000
30.000
Frequency (MHz)

**LINE 2**


80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Level(dBuV)
0.150
10.000
20.000
30.000
Frequency (MHz)

# 3. Peak Power Output

## 3.1. Test Setup


## 3.2. Limits

The maximum peak power shall be less 1 Watt.

## 3.3. 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.

## 3.4. Uncertainty

± 1.19 dB

## 3.5. Test Result of Peak Power Output

Product : NPort Device Server
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Date : 2018/08/24
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

| 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 | 15.23 | -- | -- | -- | 17.18 | <30dBm | Pass |
| 06 | 2437 | 15.16 | 15.02 | 14.93 | 14.81 | 17.45 | <30dBm | Pass |
| 11 | 2462 | 14.6 | -- | -- | -- | 16.88 | <30dBm | Pass |

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

Product : NPort Device Server
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Date : 2018/08/24
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

| 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 | 12.68 | -- | -- | -- | -- | -- | -- | -- | 19.58 | <30dBm | Pass |
| 06 | 2437 | 14.57 | 14.42 | 14.31 | 14.16 | 14.01 | 13.9 | 13.79 | 13.65 | 21.35 | <30dBm | Pass |
| 11 | 2462 | 12.46 | -- | -- | -- | -- | -- | -- | -- | 19.17 | <30dBm | Pass |

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

Product : NPort Device Server
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Date : 2018/11/15
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

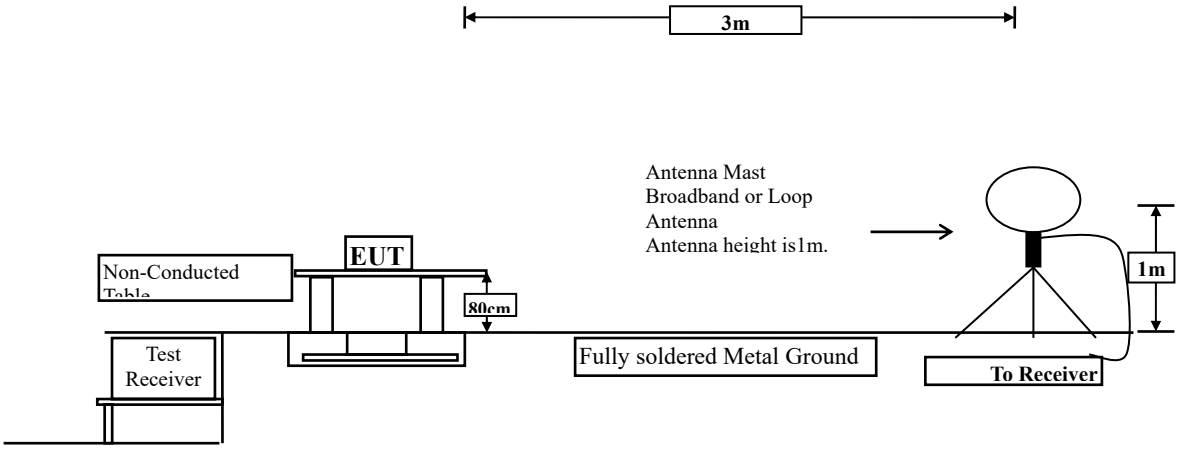
| Channel No | Frequency (MHz) | Average Power For different Data Rate (Mbps) | | | | | | | | Peak Power | Required Limit | Result |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 7.2 | 14.4 | 21.7 | 28.9 | 43.3 | 57.8 | 65 | 72.2 | 7.2 | | |
| | | Measurement Level (dBm) | | | | | | | | | | |
| 01 | 2412 | 13.62 | -- | -- | -- | -- | -- | -- | -- | 20.81 | <30dBm | Pass |
| 06 | 2437 | 15.76 | 15.64 | 15.52 | 15.4 | 15.29 | 15.15 | 15.04 | 14.92 | 21.87 | <30dBm | Pass |
| 11 | 2462 | 14.1 | -- | -- | -- | -- | -- | -- | -- | 20.91 | <30dBm | Pass |

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

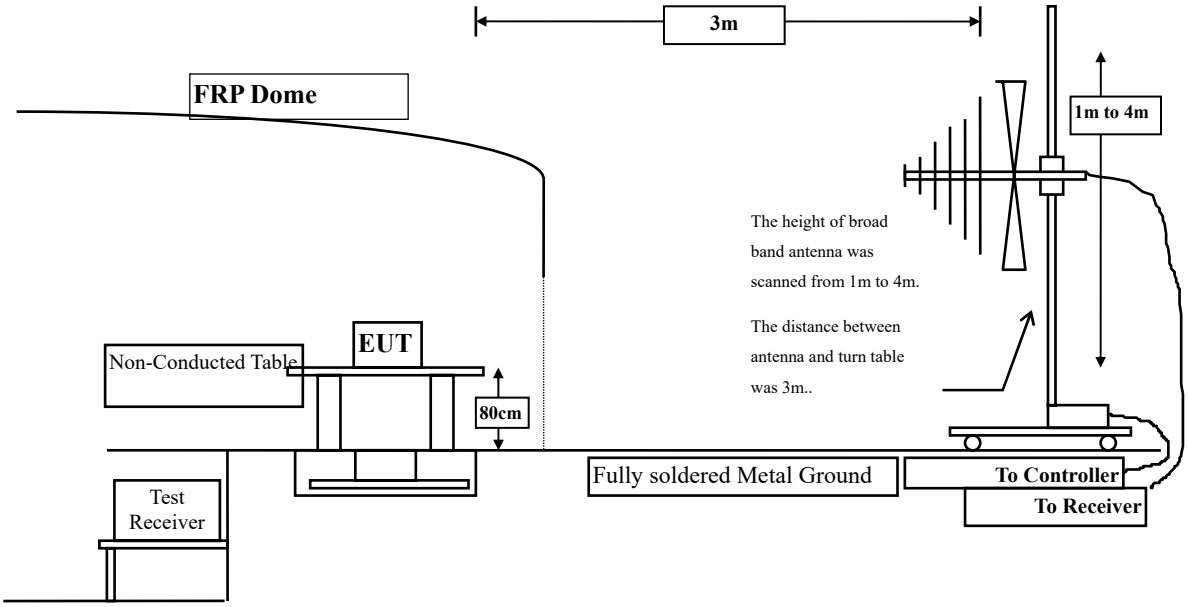
# 4. Radiated Emission

## 4.1. Test Setup

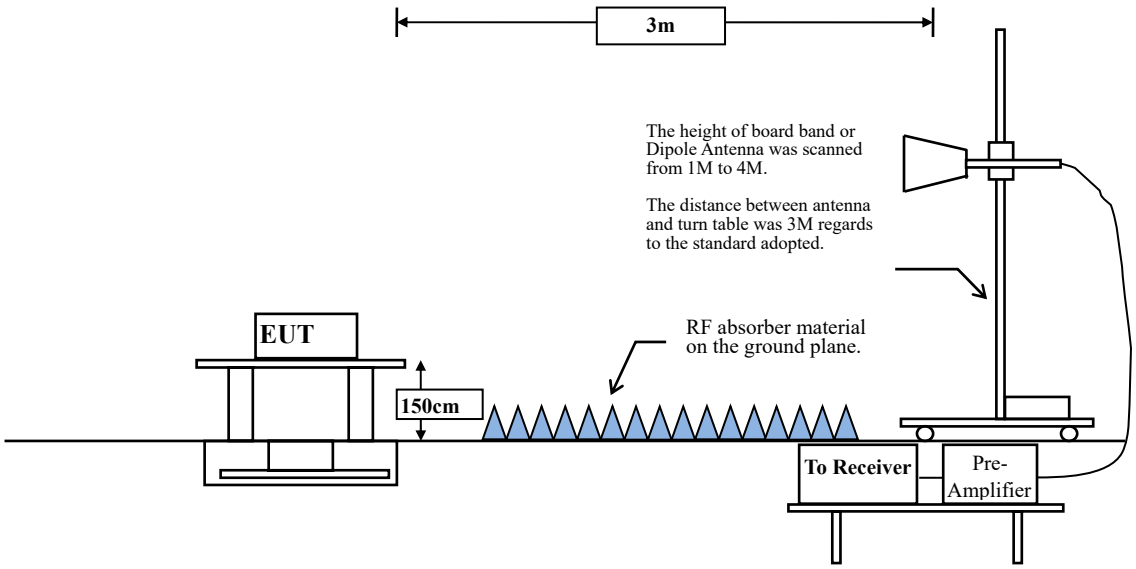
Radiated Emission Under 30MHz




Radiated Emission Below 1GHz



Radiated Emission Above 1GHz




## 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.

| 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 (dBμV/m) = 20 log E field strength (uV/m)

## 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.

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) |
|---|---|---|---|---|
| 802.11b | 100 | -- | -- | 10 |
| 802.11g | 98.10 | 2.0600 | 485 | 500 |
| 802.11n20 | 97.91 | 1.9100 | 524 | 600 |

Note: Duty Cycle Refer to Section 9

## 4.4. Uncertainty

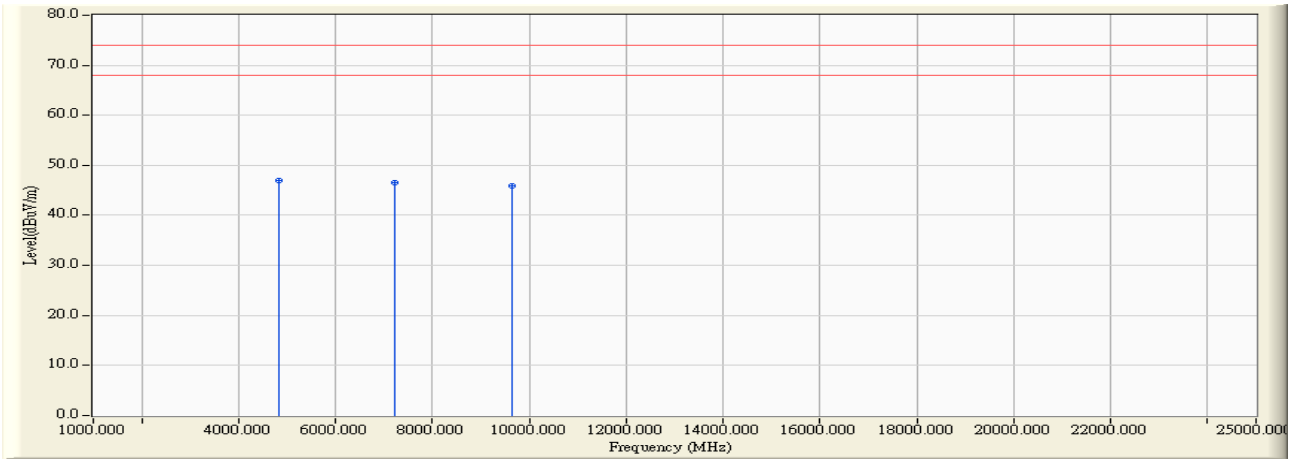
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

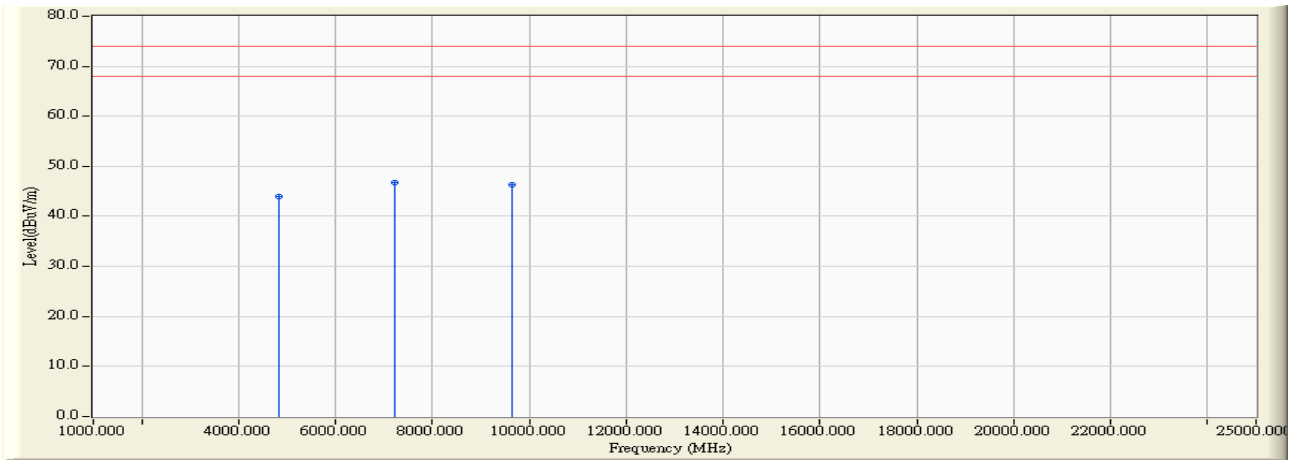
## 4.5. Test Result of Radiated Emission

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/07 |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps) (2412MHz) |

**Horizontal:**




**Vertical:**



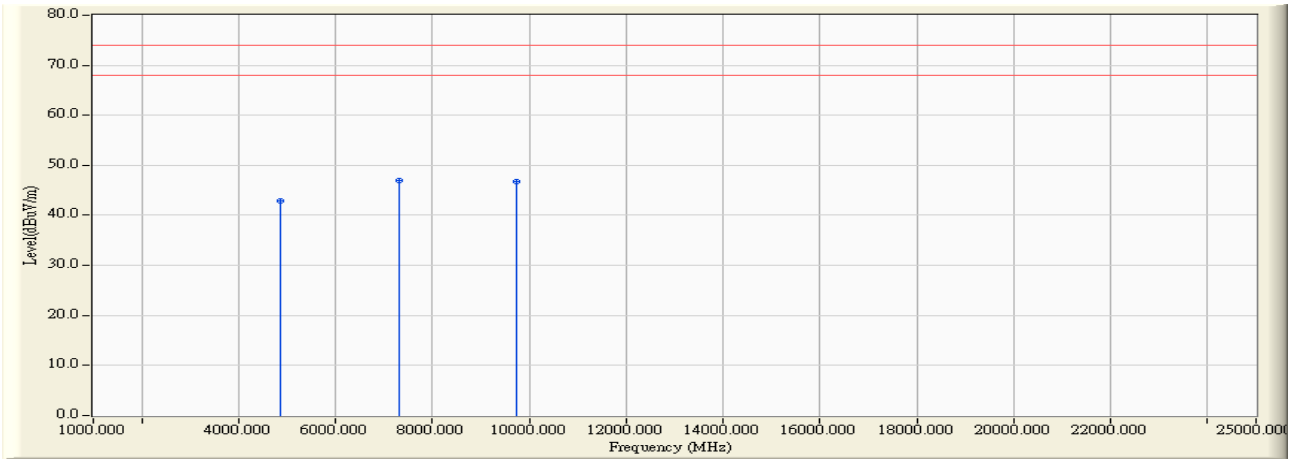
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.428 | 44.441 | 46.870 | -27.130 | 74.000 |
| 7236.000 | 9.177 | 37.392 | 46.569 | -27.431 | 74.000 |
| 9648.000 | 10.019 | 35.866 | 45.886 | -28.114 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.836 | 41.164 | 44.001 | -29.999 | 74.000 |
| 7236.000 | 9.676 | 37.041 | 46.717 | -27.283 | 74.000 |
| 9648.000 | 10.556 | 35.868 | 46.425 | -27.575 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

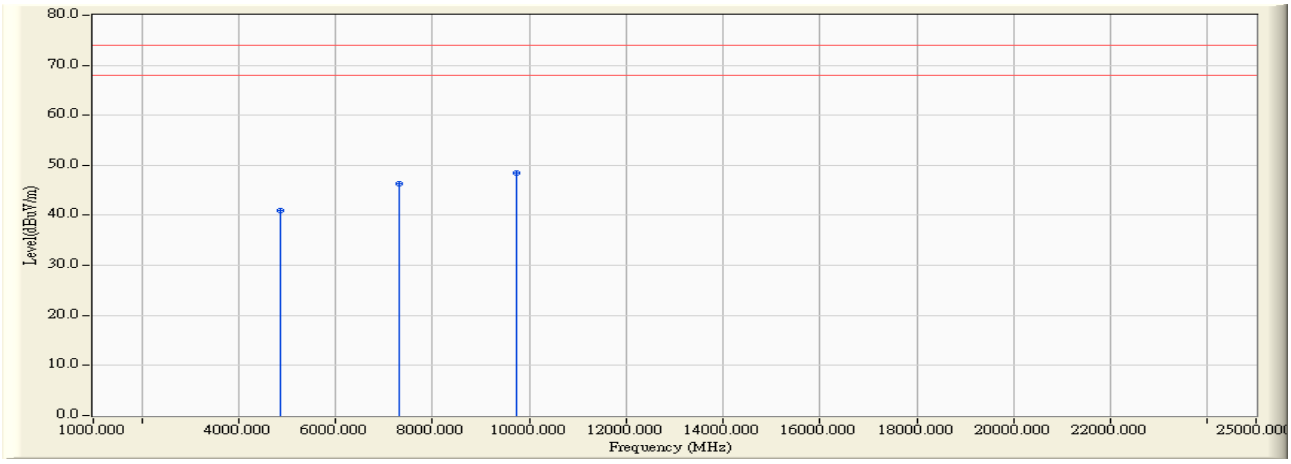
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/07 |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps) (2437 MHz) |

**Horizontal:**




**Vertical:**



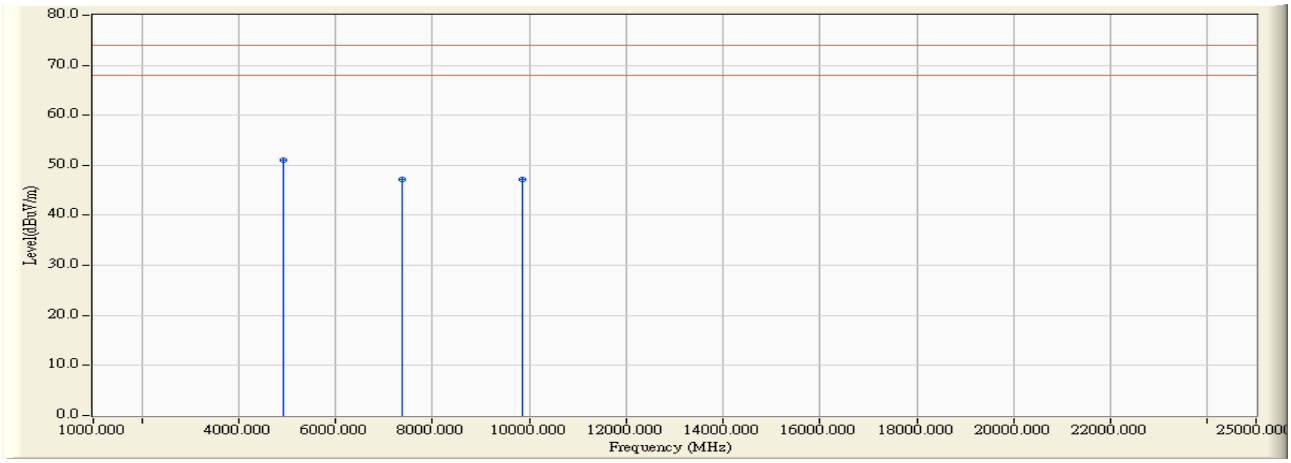
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 40.828 | 42.905 | -31.095 | 74.000 |
| 7311.000 | 9.512 | 37.406 | 46.918 | -27.082 | 74.000 |
| 9748.000 | 9.630 | 37.155 | 46.785 | -27.215 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 38.375 | 40.907 | -33.093 | 74.000 |
| 7311.000 | 10.089 | 36.297 | 46.386 | -27.614 | 74.000 |
| 9748.000 | 10.266 | 38.115 | 48.382 | -25.618 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

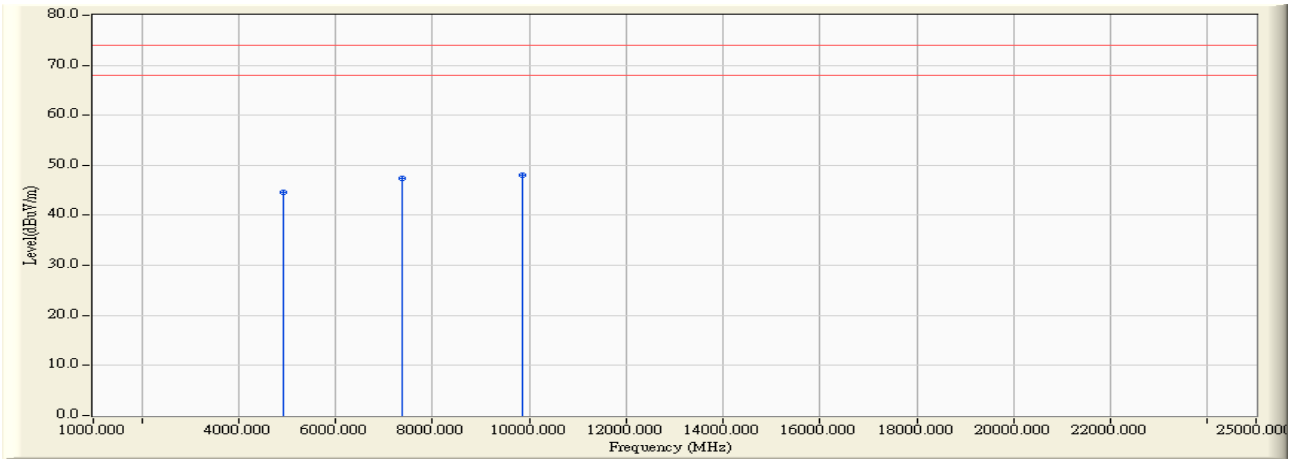
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/07 |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps) (2462 MHz) |

**Horizontal:**




**Vertical:**



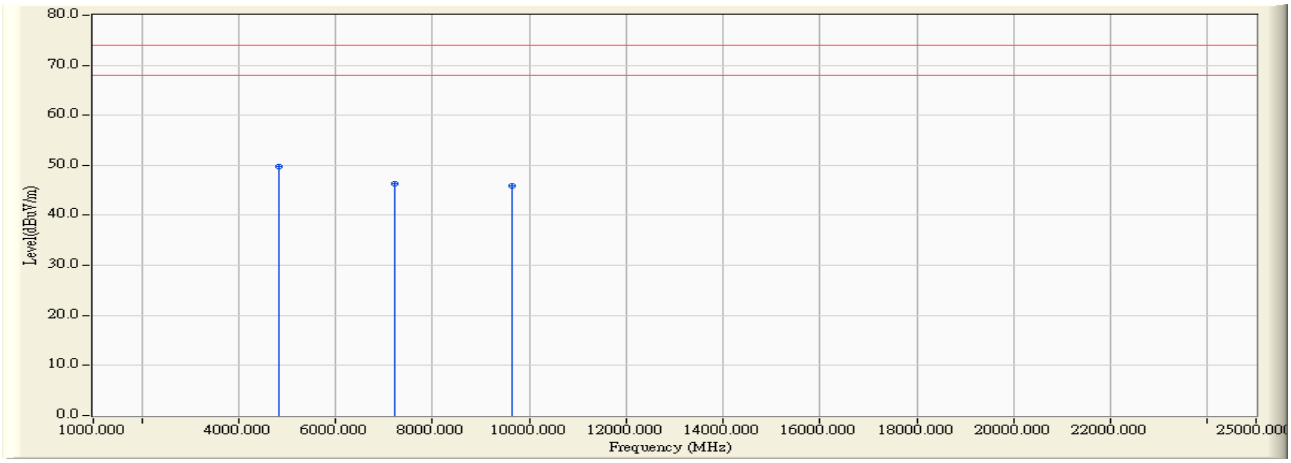
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 48.870 | 51.061 | -22.939 | 74.000 |
| 7386.000 | 10.373 | 36.834 | 47.208 | -26.792 | 74.000 |
| 9848.000 | 9.964 | 37.307 | 47.271 | -26.729 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 41.817 | 44.622 | -29.378 | 74.000 |
| 7386.000 | 11.180 | 36.218 | 47.398 | -26.602 | 74.000 |
| 9848.000 | 10.801 | 37.328 | 48.129 | -25.871 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

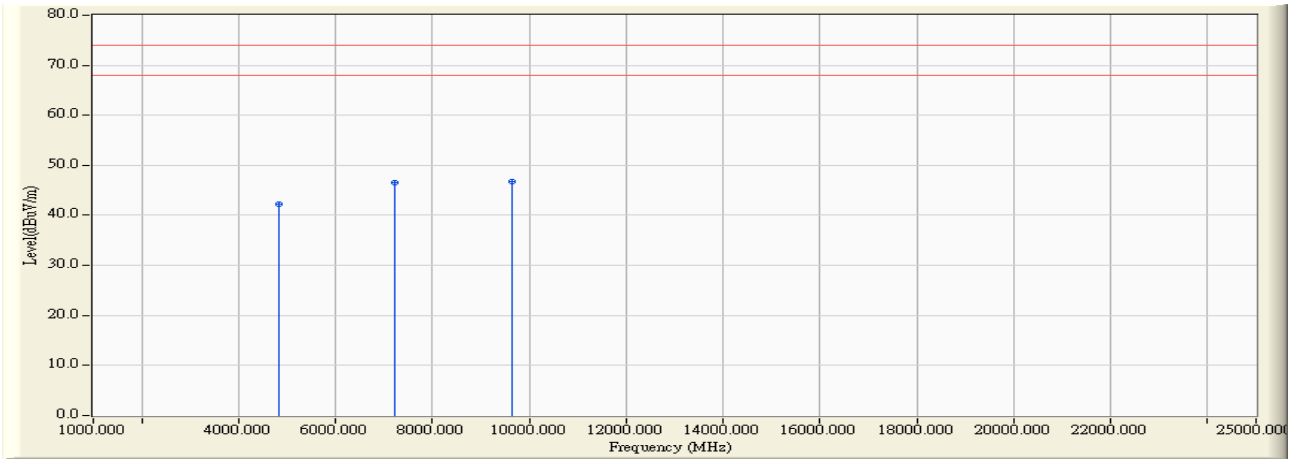
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/07 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps) (2412MHz) |

**Horizontal:**




**Vertical:**



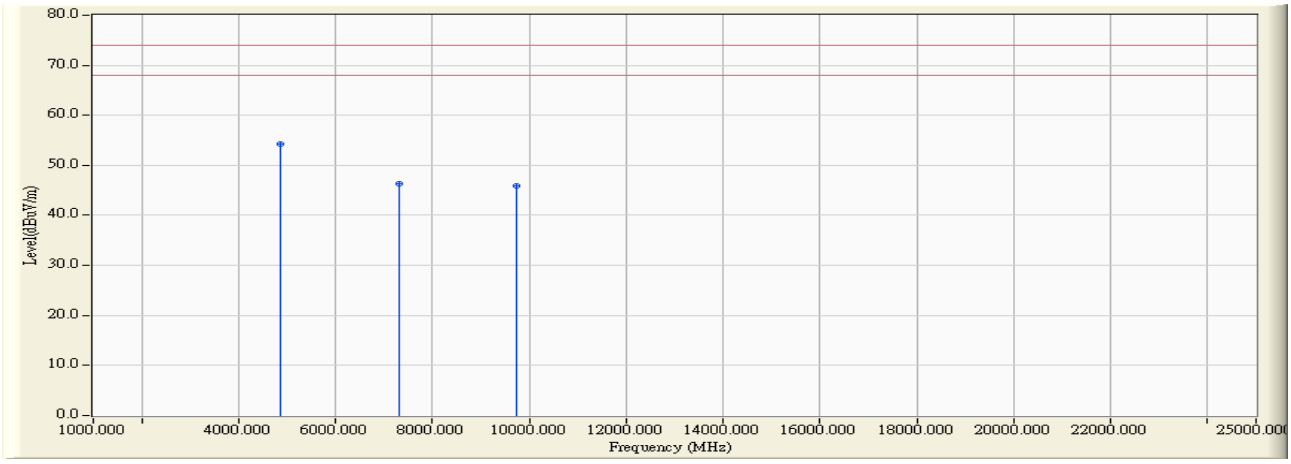
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.428 | 47.375 | 49.804 | -24.196 | 74.000 |
| 7236.000 | 9.177 | 37.194 | 46.371 | -27.629 | 74.000 |
| 9648.000 | 10.019 | 35.816 | 45.836 | -28.164 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.836 | 39.351 | 42.188 | -31.812 | 74.000 |
| 7236.000 | 9.676 | 36.820 | 46.496 | -27.504 | 74.000 |
| 9648.000 | 10.556 | 36.163 | 46.720 | -27.280 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

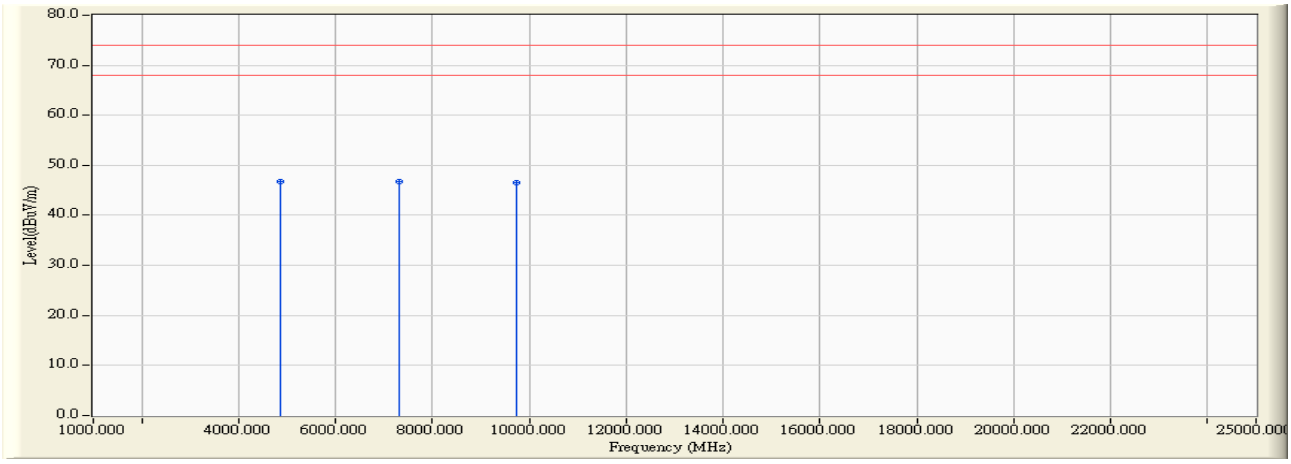
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/07 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps) (2437 MHz) |

**Horizontal:**




**Vertical:**



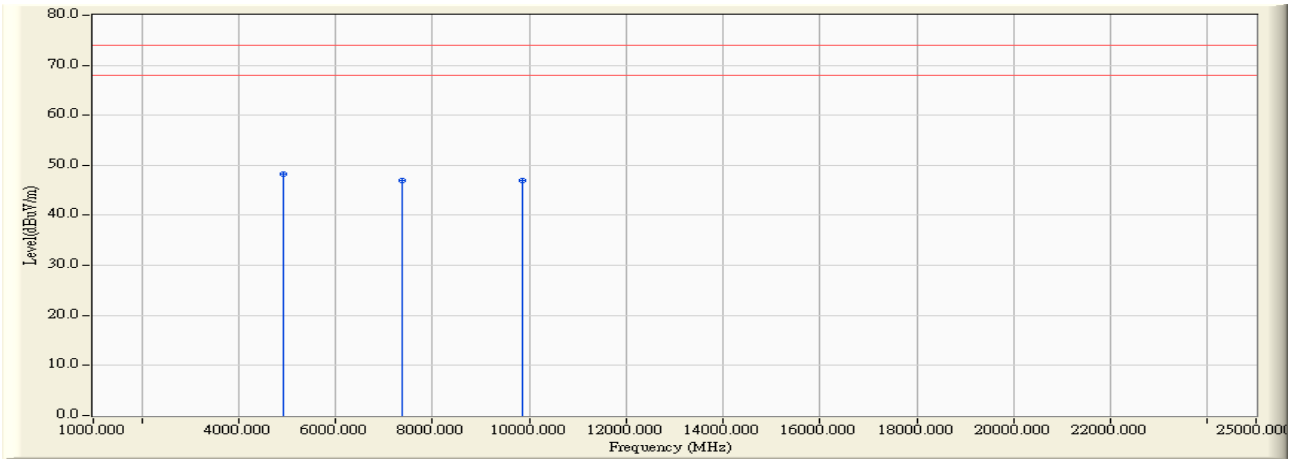
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 52.148 | 54.225 | -19.775 | 74.000 |
| 7311.000 | 9.512 | 36.917 | 46.429 | -27.571 | 74.000 |
| 9748.000 | 9.630 | 36.203 | 45.833 | -28.167 | 74.000 |
| **Average Detector:** | | | | | |
| 4874.000 | 2.076 | 34.571 | 36.648 | -17.352 | 74.000 |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 44.257 | 46.789 | -27.211 | 74.000 |
| 7311.000 | 10.089 | 36.740 | 46.829 | -27.171 | 74.000 |
| 9748.000 | 10.266 | 36.282 | 46.549 | -27.451 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

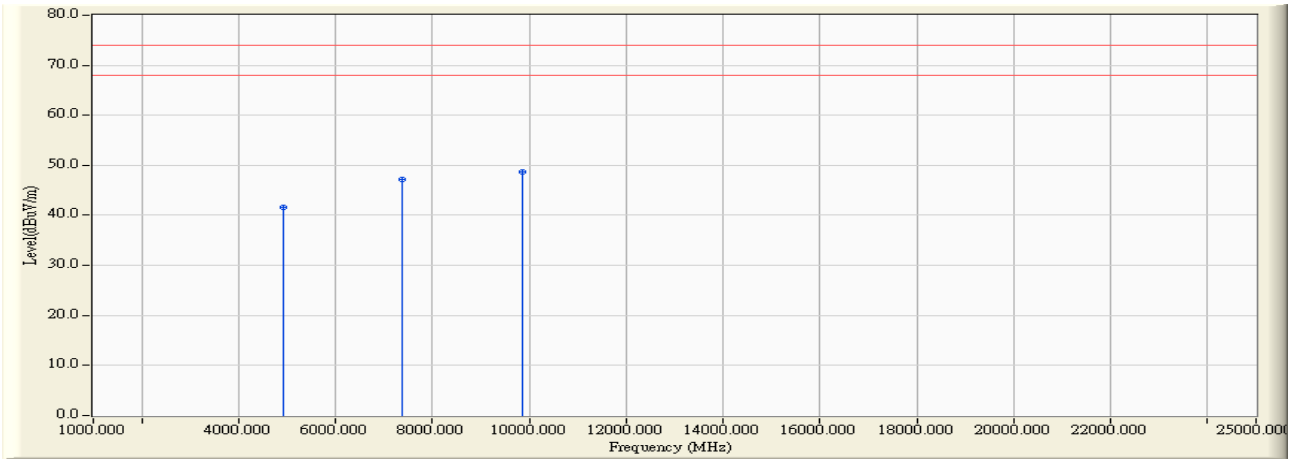
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/07 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps) (2462 MHz) |

**Horizontal:**




**Vertical:**



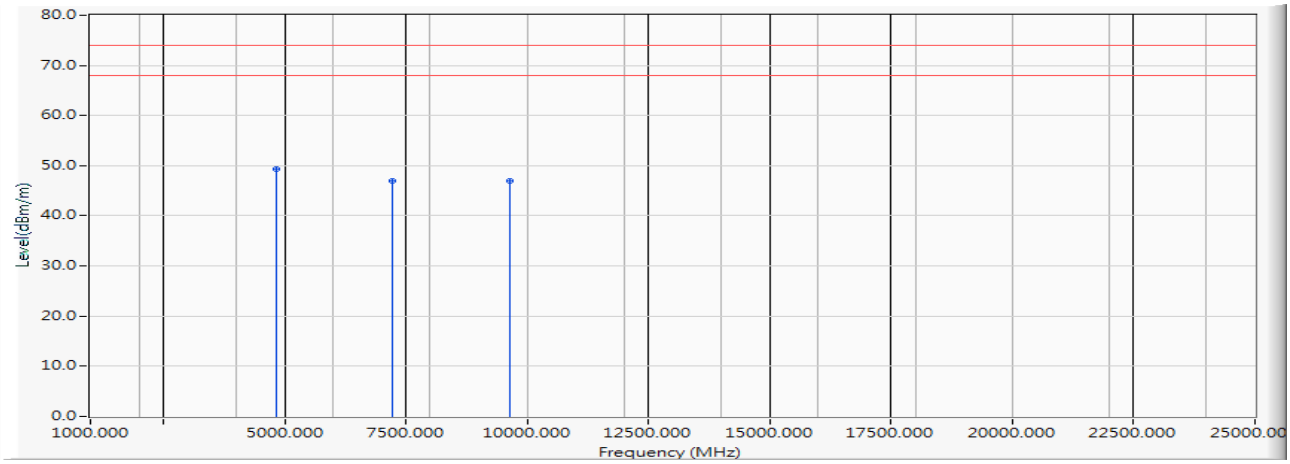
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 46.143 | 48.334 | -25.666 | 74.000 |
| 7386.000 | 10.373 | 36.685 | 47.059 | -26.941 | 74.000 |
| 9848.000 | 9.964 | 36.929 | 46.893 | -27.107 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 38.803 | 41.608 | -32.392 | 74.000 |
| 7386.000 | 11.180 | 36.083 | 47.263 | -26.737 | 74.000 |
| 9848.000 | 10.801 | 37.905 | 48.706 | -25.294 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

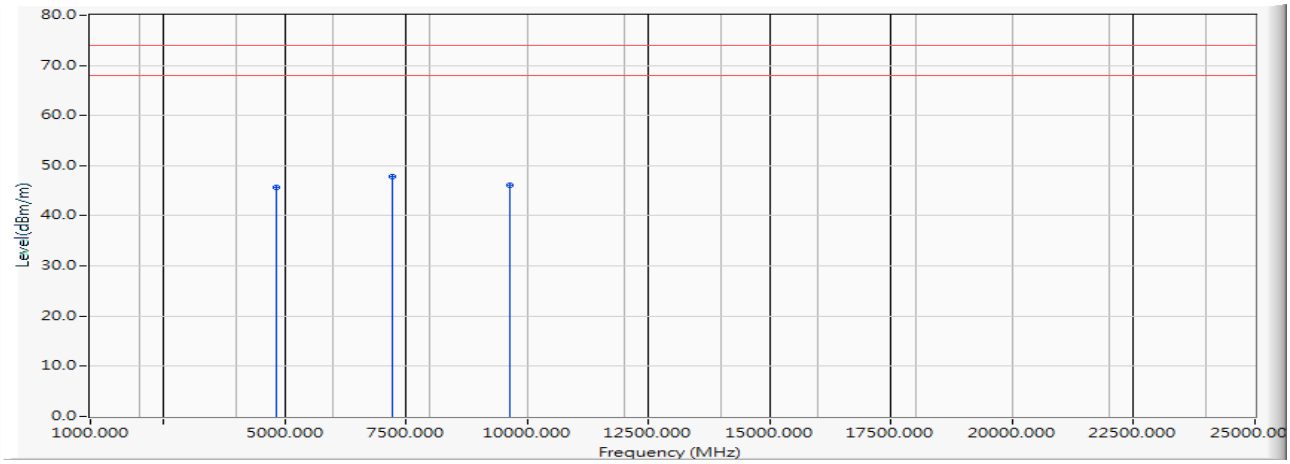
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/09 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2412MHz) |

**Horizontal:**




**Vertical:**



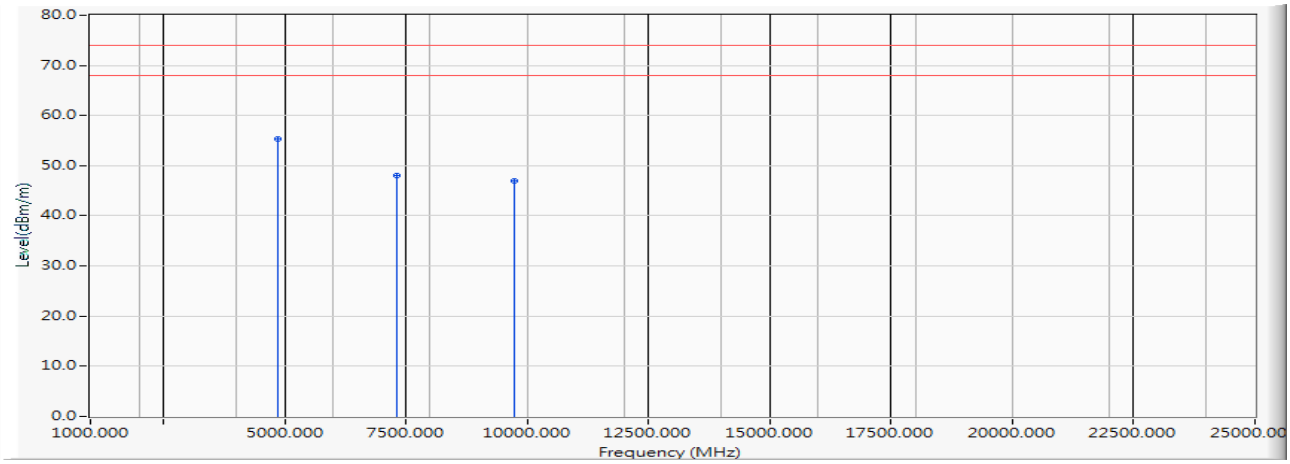
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.428 | 46.841 | 49.270 | -24.730 | 74.000 |
| 7236.000 | 9.177 | 37.880 | 47.057 | -26.943 | 74.000 |
| 9648.000 | 10.019 | 37.025 | 47.045 | -26.955 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4824.000 | 2.836 | 42.878 | 45.715 | -28.285 | 74.000 |
| 7236.000 | 9.676 | 38.175 | 47.851 | -26.149 | 74.000 |
| 9648.000 | 10.556 | 35.529 | 46.086 | -27.914 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

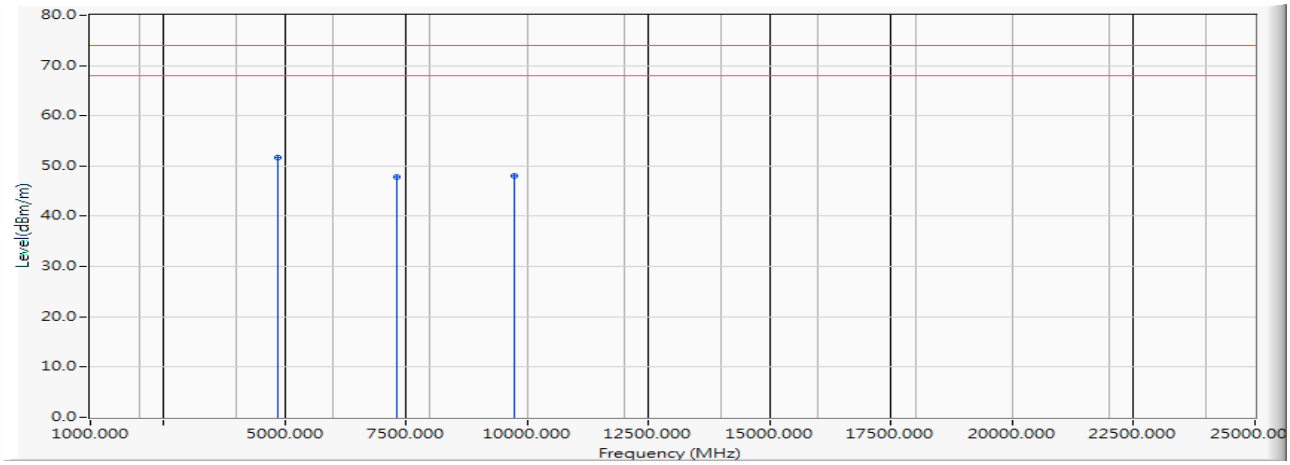
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | Harmonic Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/09 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz) |

**Horizontal:**




**Vertical:**



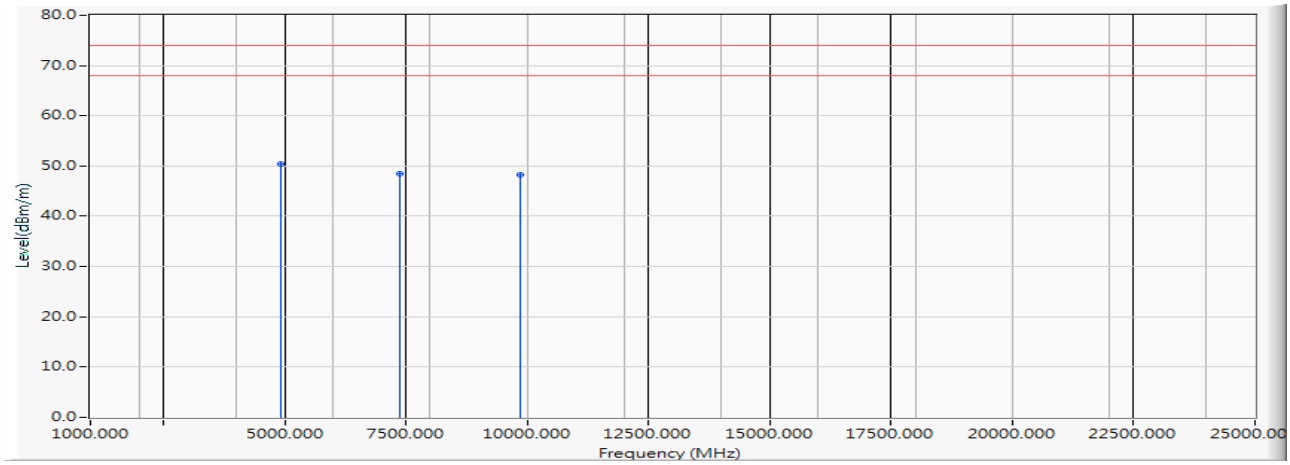
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.076 | 53.234 | 55.311 | -18.689 | 74.000 |
| 7311.000 | 9.512 | 38.563 | 48.075 | -25.925 | 74.000 |
| 9748.000 | 9.630 | 37.278 | 46.908 | -27.092 | 74.000 |
| **Average Detector:** | | | | | |
| 4874.000 | 2.076 | 38.545 | 40.622 | -13.378 | 54.000 |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4874.000 | 2.532 | 49.161 | 51.693 | -22.307 | 74.000 |
| 7311.000 | 10.089 | 37.797 | 47.886 | -26.114 | 74.000 |
| 9748.000 | 10.266 | 37.800 | 48.067 | -25.933 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

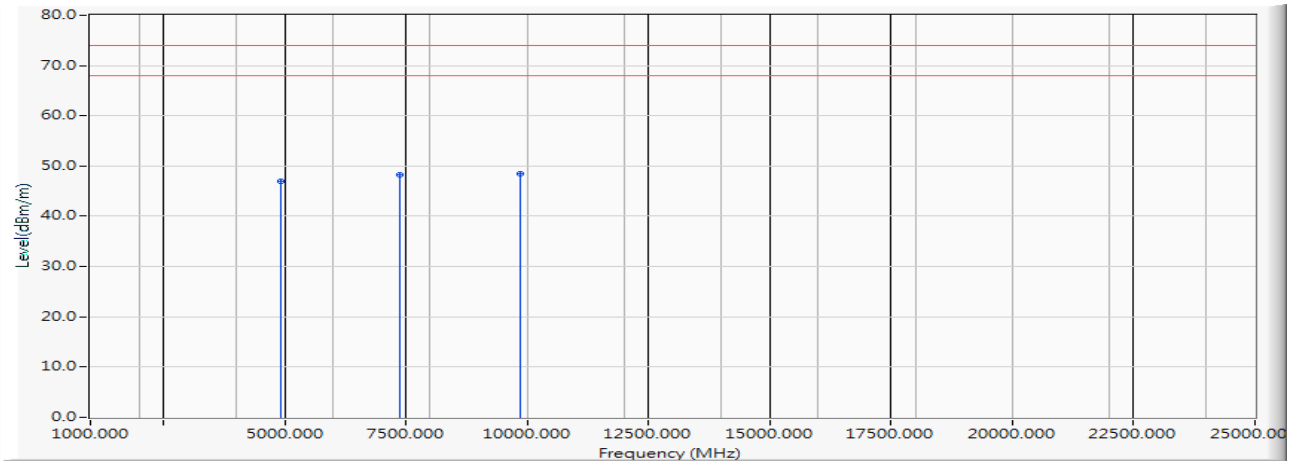
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : NPort Device Server
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/11/09
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz)

**Horizontal:**




**Vertical:**



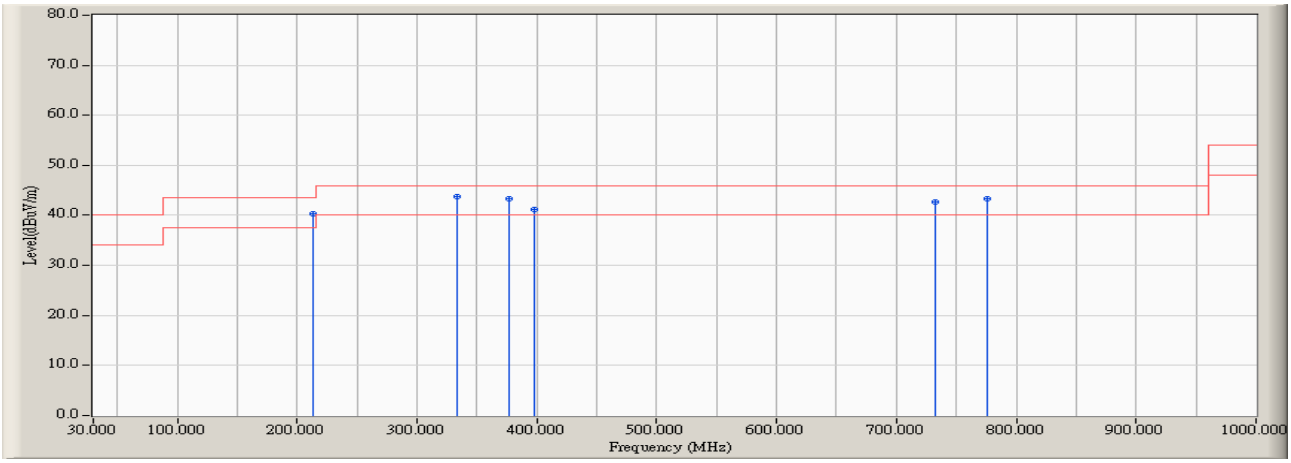
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 4924.000 | 2.191 | 48.224 | 50.415 | -23.585 | 74.000 |
| 7386.000 | 10.373 | 38.074 | 48.448 | -25.552 | 74.000 |
| 9848.000 | 9.964 | 38.201 | 48.165 | -25.835 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 4924.000 | 2.805 | 44.163 | 46.968 | -27.032 | 74.000 |
| 7386.000 | 11.180 | 36.999 | 48.179 | -25.821 | 74.000 |
| 9848.000 | 10.801 | 37.711 | 48.512 | -25.488 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

Note:

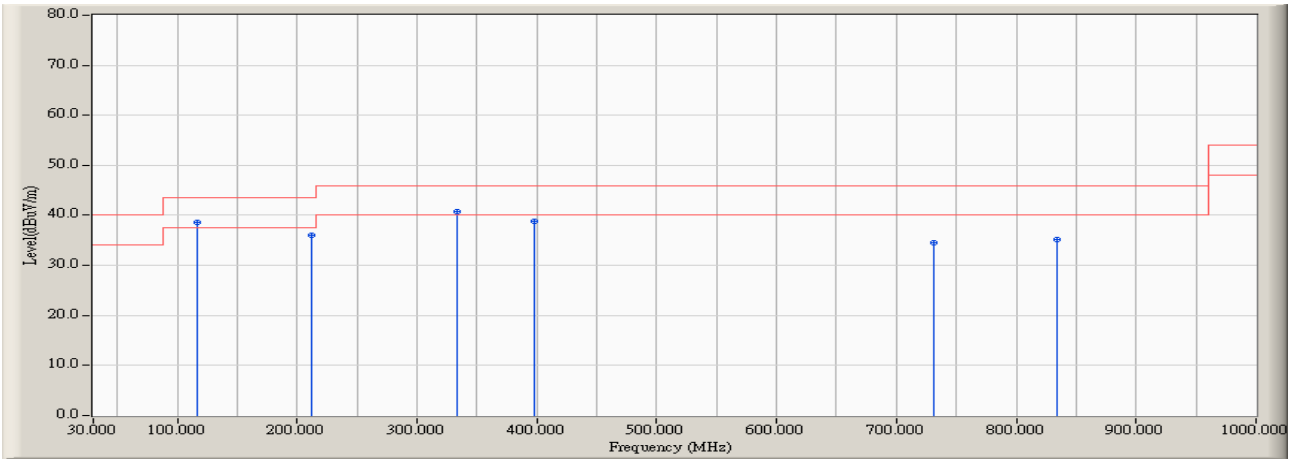
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/16 |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps)(2437 MHz) -AC |

**Horizontal:**




**Vertical:**



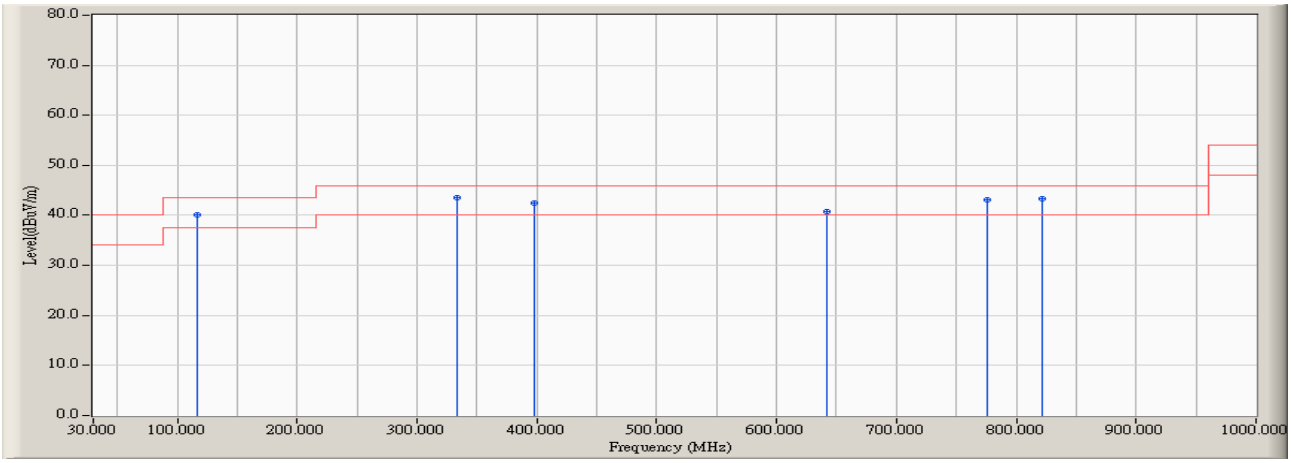
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| 213.429 | -8.148 | 48.503 | 40.355 | -3.145 | 43.500 |
| 333.125 | -2.872 | 46.607 | 43.735 | -2.265 | 46.000 |
| 376.651 | 0.091 | 43.206 | 43.297 | -2.703 | 46.000 |
| 398.413 | 1.556 | 39.684 | 41.241 | -4.759 | 46.000 |
| 732.628 | 6.645 | 35.979 | 42.624 | -3.376 | 46.000 |
| 776.154 | 7.440 | 35.816 | 43.257 | -2.743 | 46.000 |
| **Vertical** | | | | | |
| 117.051 | -6.625 | 45.336 | 38.710 | -4.790 | 43.500 |
| 211.875 | 0.168 | 35.809 | 35.977 | -7.523 | 43.500 |
| 333.125 | -3.977 | 44.730 | 40.753 | -5.247 | 46.000 |
| 398.413 | 0.785 | 37.997 | 38.782 | -7.218 | 46.000 |
| 731.074 | 4.869 | 29.709 | 34.577 | -11.423 | 46.000 |
| 833.670 | 6.985 | 28.272 | 35.257 | -10.743 | 46.000 |

Note:

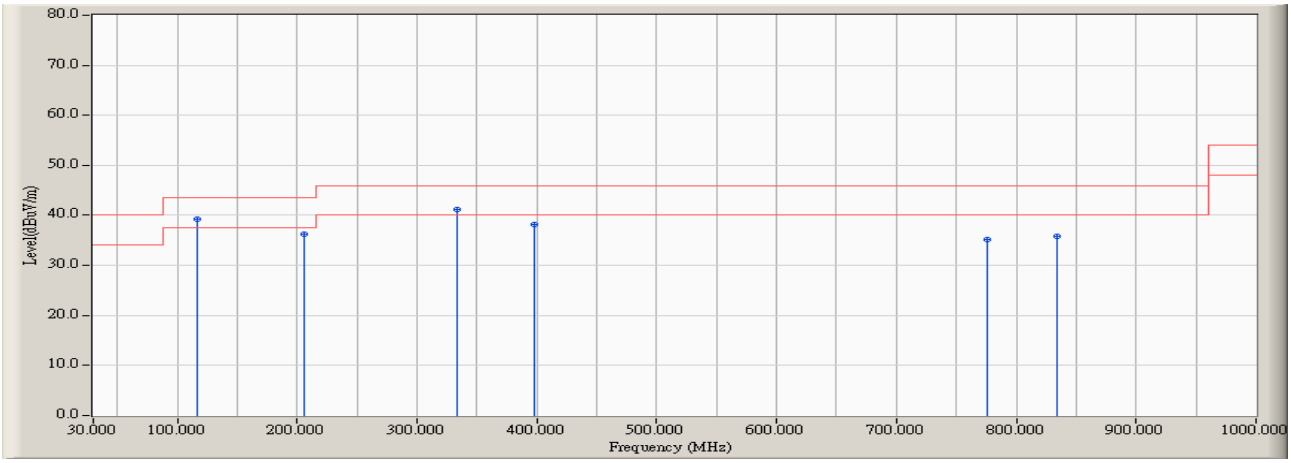
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/16 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps)(2437 MHz) -AC |

**Horizontal:**




**Vertical:**



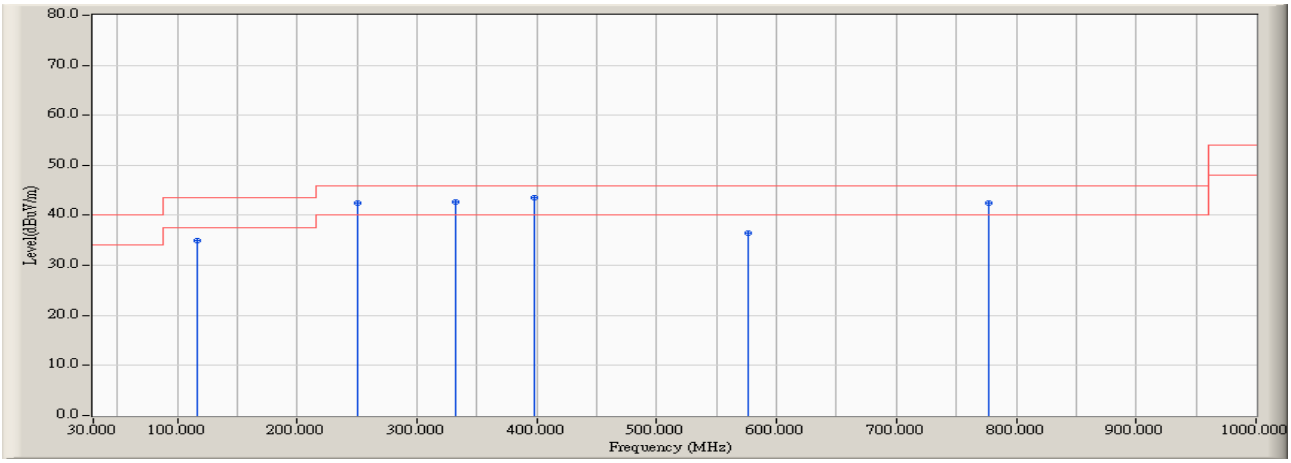
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| 117.051 | -8.210 | 48.346 | 40.136 | -3.364 | 43.500 |
| 333.125 | -2.872 | 46.412 | 43.540 | -2.460 | 46.000 |
| 398.413 | 1.556 | 40.942 | 42.499 | -3.501 | 46.000 |
| 642.468 | 6.725 | 33.976 | 40.701 | -5.299 | 46.000 |
| 776.154 | 7.440 | 35.576 | 43.017 | -2.983 | 46.000 |
| 821.234 | 7.864 | 35.418 | 43.282 | -2.718 | 46.000 |
| **Vertical** | | | | | |
| 117.051 | -6.625 | 45.928 | 39.302 | -4.198 | 43.500 |
| 205.657 | 0.245 | 36.089 | 36.334 | -7.166 | 43.500 |
| 333.125 | -3.977 | 45.065 | 41.088 | -4.912 | 46.000 |
| 398.413 | 0.785 | 37.344 | 38.129 | -7.871 | 46.000 |
| 776.154 | 5.600 | 29.648 | 35.249 | -10.751 | 46.000 |
| 833.670 | 6.985 | 28.798 | 35.783 | -10.217 | 46.000 |

Note:

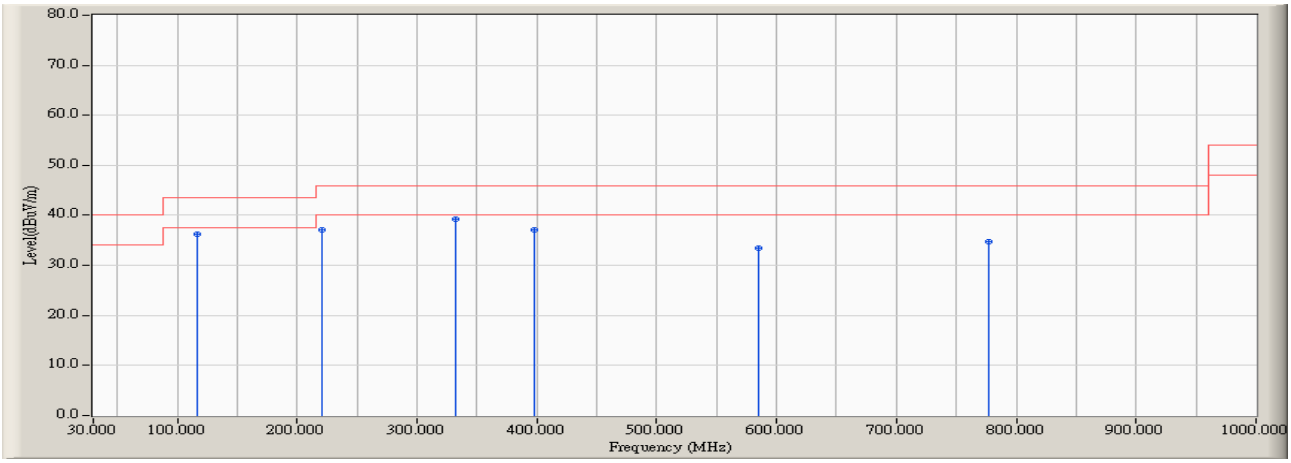
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/07 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2437 MHz) -AC |

**Horizontal:**




**Vertical:**



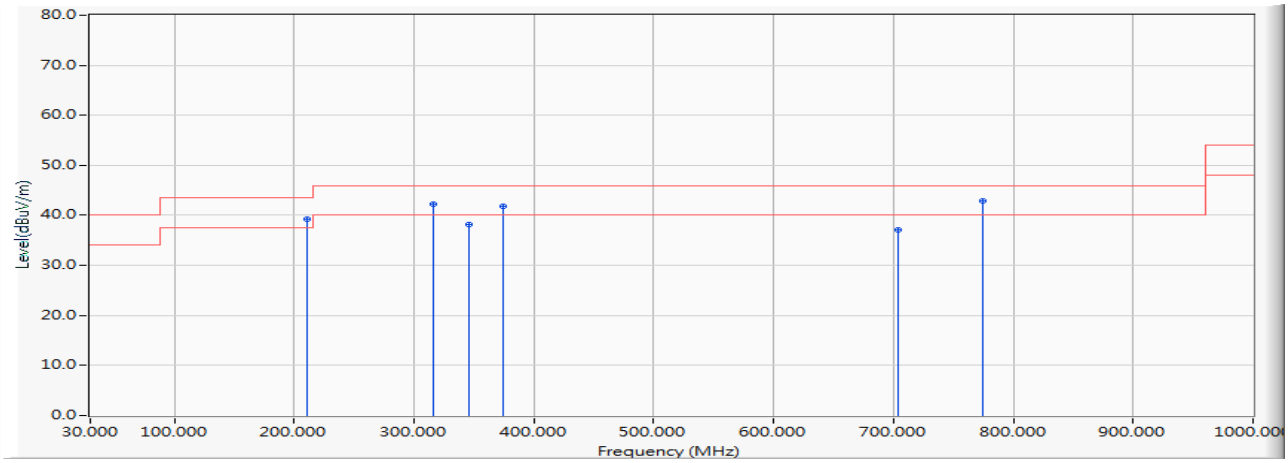
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| 117.159 | -8.247 | 43.292 | 35.045 | -8.455 | 43.500 |
| 250.710 | -5.268 | 47.772 | 42.504 | -3.496 | 46.000 |
| 332.246 | -2.933 | 45.708 | 42.775 | -3.225 | 46.000 |
| 398.319 | 1.550 | 41.995 | 43.545 | -2.455 | 46.000 |
| 576.855 | 6.161 | 30.301 | 36.462 | -9.538 | 46.000 |
| 776.478 | 7.449 | 34.969 | 42.417 | -3.583 | 46.000 |
| **Vertical** | | | | | |
| 117.159 | -6.651 | 42.942 | 36.290 | -7.210 | 43.500 |
| 221.188 | 0.045 | 36.992 | 37.037 | -8.963 | 46.000 |
| 332.246 | -4.047 | 43.246 | 39.199 | -6.801 | 46.000 |
| 398.319 | 0.777 | 36.301 | 37.078 | -8.922 | 46.000 |
| 585.290 | 3.506 | 29.909 | 33.415 | -12.585 | 46.000 |
| 776.478 | 5.609 | 29.190 | 34.798 | -11.202 | 46.000 |

Note:

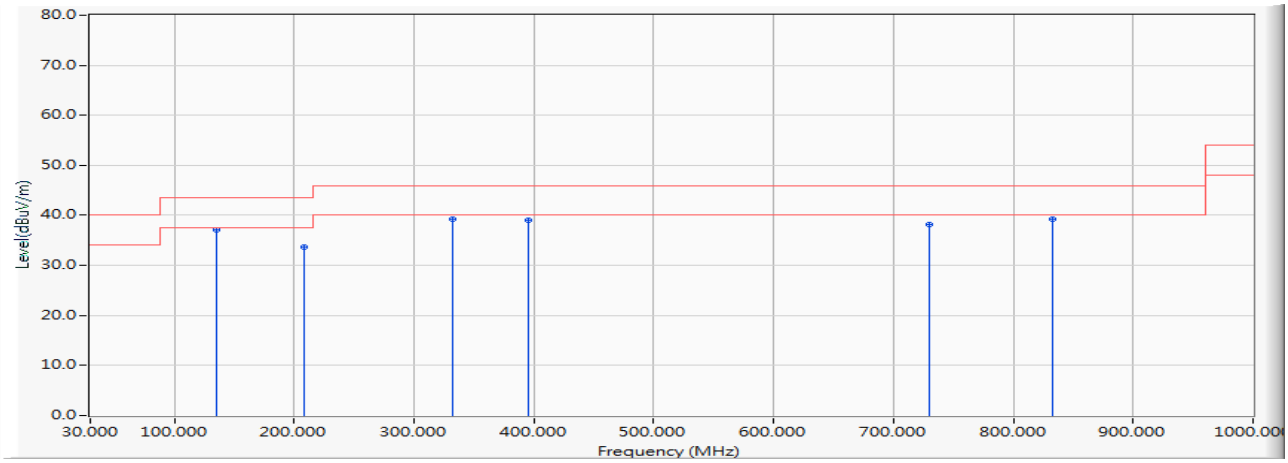
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/16 |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps)(2437 MHz) -DC |

**Horizontal:**




**Vertical:**



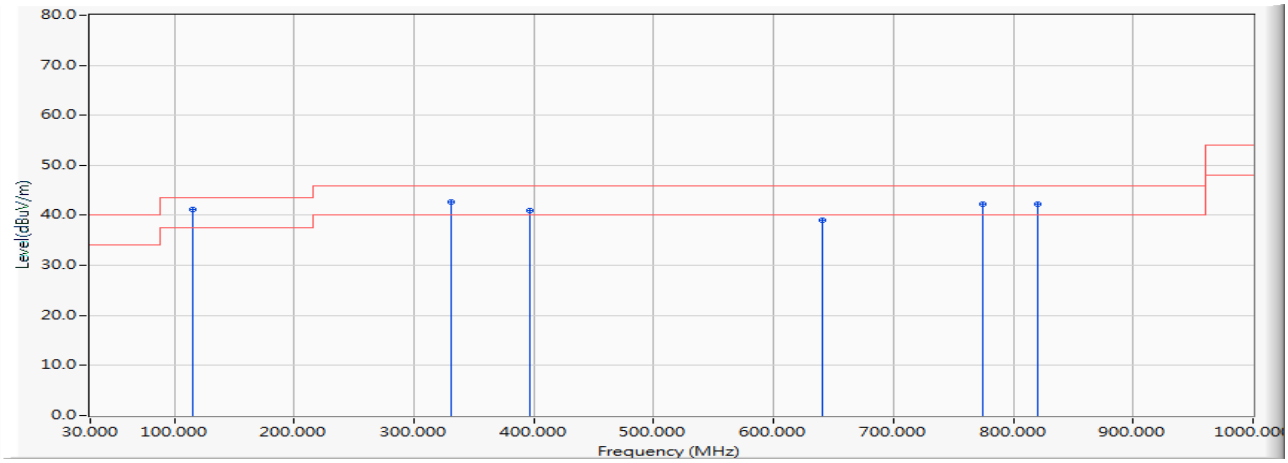
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| 211.406 | -8.516 | 47.691 | 39.175 | -4.325 | 43.500 |
| 316.415 | -4.197 | 46.384 | 42.187 | -3.813 | 46.000 |
| 346.108 | -2.179 | 40.326 | 38.147 | -7.853 | 46.000 |
| 374.914 | -0.211 | 42.052 | 41.840 | -4.160 | 46.000 |
| 703.982 | 5.992 | 31.175 | 37.167 | -8.833 | 46.000 |
| 774.157 | 7.308 | 35.509 | 42.817 | -3.183 | 46.000 |
| **Vertical** | | | | | |
| 135.482 | -5.516 | 42.670 | 37.154 | -6.346 | 43.500 |
| 208.140 | 0.010 | 33.607 | 33.617 | -9.883 | 43.500 |
| 331.921 | -4.254 | 43.418 | 39.164 | -6.836 | 46.000 |
| 395.461 | 0.393 | 38.721 | 39.115 | -6.885 | 46.000 |
| 730.548 | 4.763 | 33.436 | 38.199 | -7.801 | 46.000 |
| 832.197 | 6.869 | 32.278 | 39.147 | -6.853 | 46.000 |

Note:

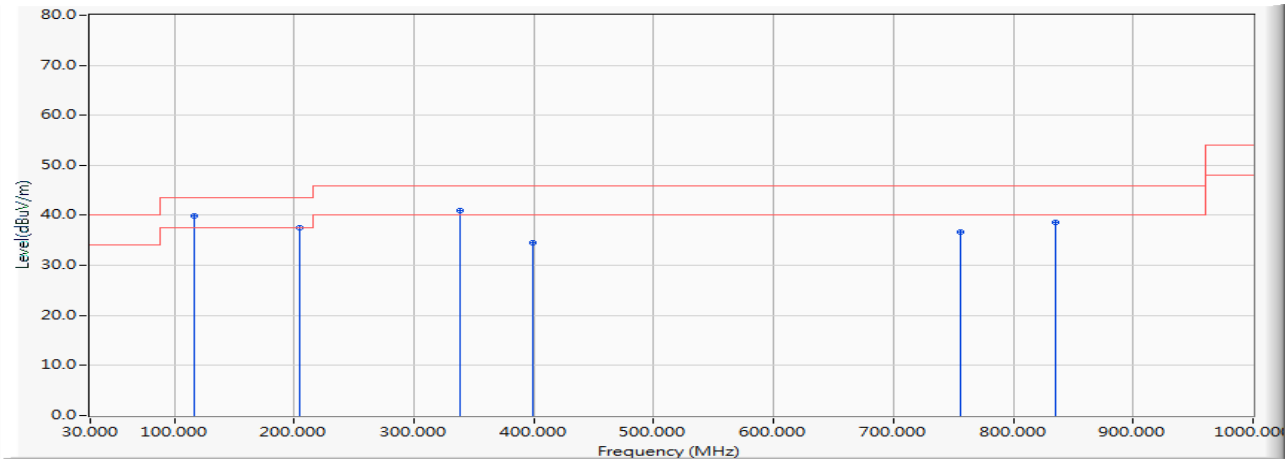
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/16 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps)(2437 MHz) -DC |

**Horizontal:**




**Vertical:**



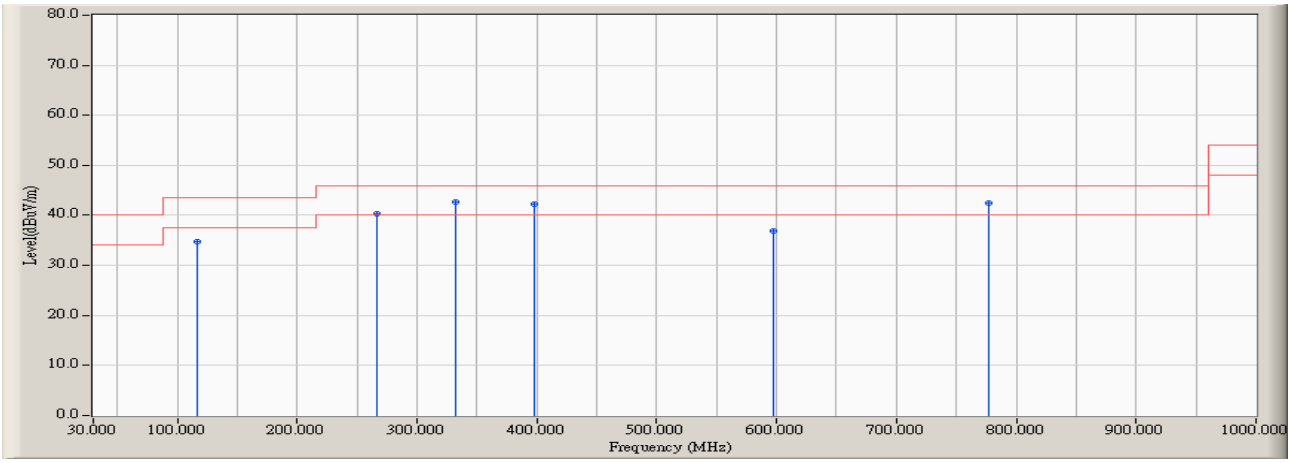
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| 115.173 | -7.840 | 49.007 | 41.167 | -2.333 | 43.500 |
| 331.184 | -3.184 | 45.951 | 42.767 | -3.233 | 46.000 |
| 397.064 | 1.291 | 39.776 | 41.067 | -4.933 | 46.000 |
| 640.318 | 6.606 | 32.510 | 39.116 | -6.884 | 46.000 |
| 774.188 | 7.309 | 34.848 | 42.157 | -3.843 | 46.000 |
| 820.847 | 7.787 | 34.407 | 42.194 | -3.806 | 46.000 |
| **Vertical** | | | | | |
| 116.499 | -6.761 | 46.641 | 39.881 | -3.619 | 43.500 |
| 204.922 | 0.052 | 37.466 | 37.518 | -5.982 | 43.500 |
| 338.174 | -3.797 | 44.860 | 41.064 | -4.936 | 46.000 |
| 398.818 | 0.640 | 33.950 | 34.590 | -11.410 | 46.000 |
| 756.193 | 5.185 | 31.586 | 36.771 | -9.229 | 46.000 |
| 835.157 | 6.955 | 31.594 | 38.549 | -7.451 | 46.000 |

Note:

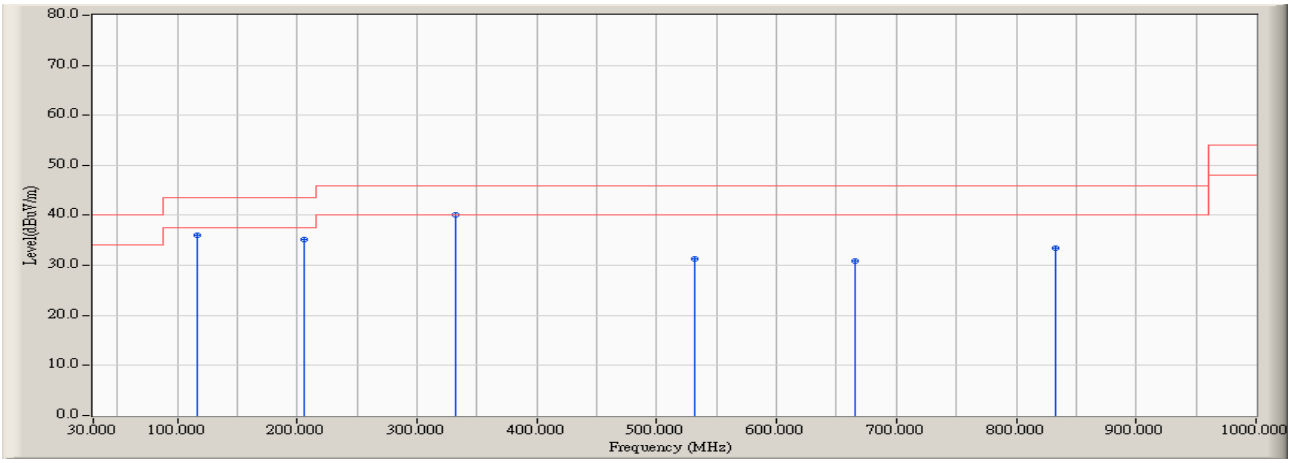
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | General Radiated Emission Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/07 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2437 MHz) -DC |

**Horizontal:**




**Vertical:**



| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBµV | dBµV/m | dB | dBµV/m |
| **Horizontal** | | | | | |
| 117.159 | -8.247 | 42.973 | 34.726 | -8.774 | 43.500 |
| 266.174 | -5.210 | 45.485 | 40.275 | -5.725 | 46.000 |
| 332.246 | -2.933 | 45.719 | 42.786 | -3.214 | 46.000 |
| 398.319 | 1.550 | 40.787 | 42.337 | -3.663 | 46.000 |
| 597.942 | 7.158 | 29.753 | 36.911 | -9.089 | 46.000 |
| 776.478 | 7.449 | 35.083 | 42.531 | -3.469 | 46.000 |
| **Vertical** | | | | | |
| 117.159 | -6.651 | 42.736 | 36.084 | -7.416 | 43.500 |
| 205.725 | 0.244 | 34.998 | 35.242 | -8.258 | 43.500 |
| 332.246 | -4.047 | 44.124 | 40.077 | -5.923 | 46.000 |
| 531.870 | 2.070 | 29.256 | 31.326 | -14.674 | 46.000 |
| 665.420 | 4.195 | 26.683 | 30.878 | -15.122 | 46.000 |
| 832.710 | 6.959 | 26.507 | 33.466 | -12.534 | 46.000 |

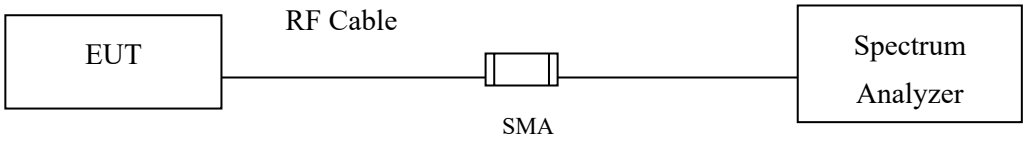
Note:

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 emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

# 5. RF antenna conducted test

## 5.1. Test Setup

**RF antenna Conducted Measurement:**




## 5.2. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

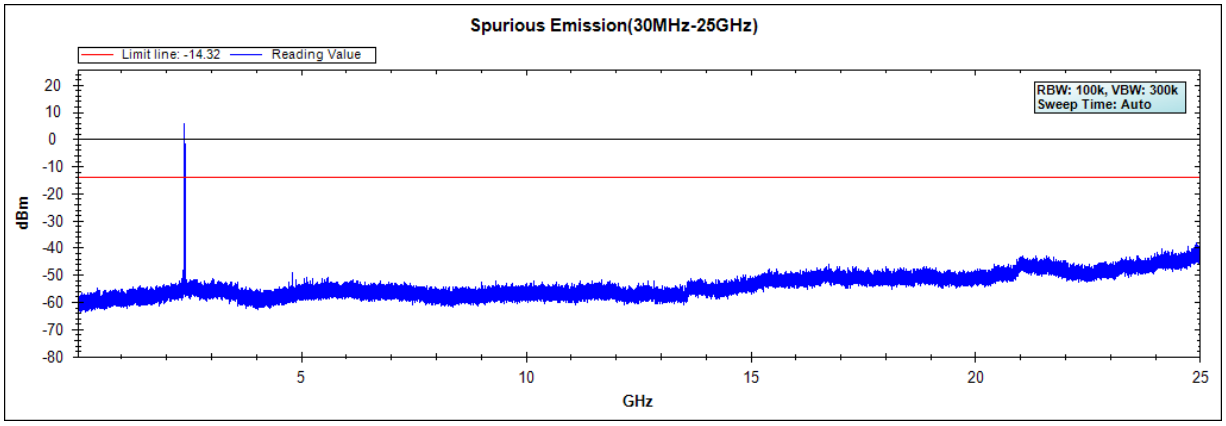
## 5.4. Uncertainty

The measurement uncertainty
Conducted is defined as ± 1.20dB

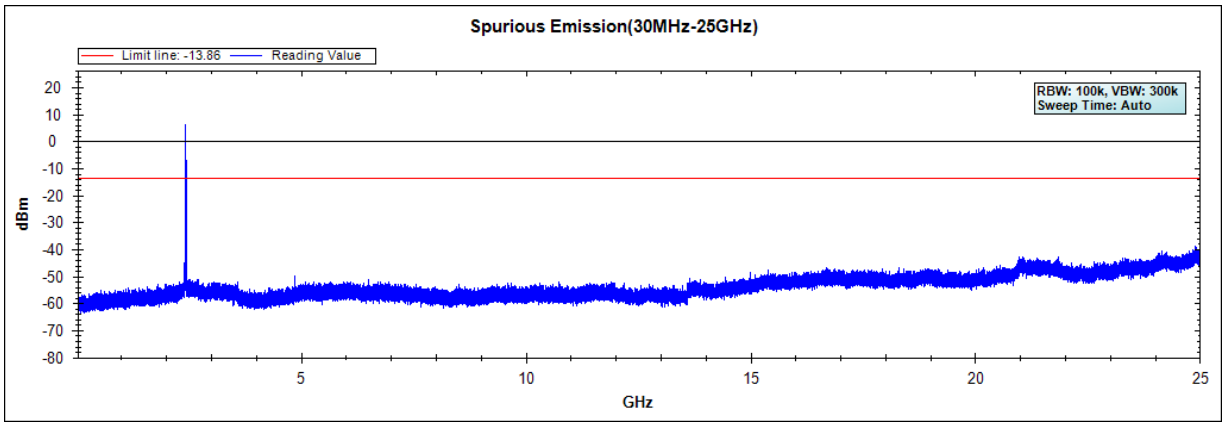
## 5.5. Test Result of RF antenna conducted test

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | RF antenna conducted test |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/24 |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps) |

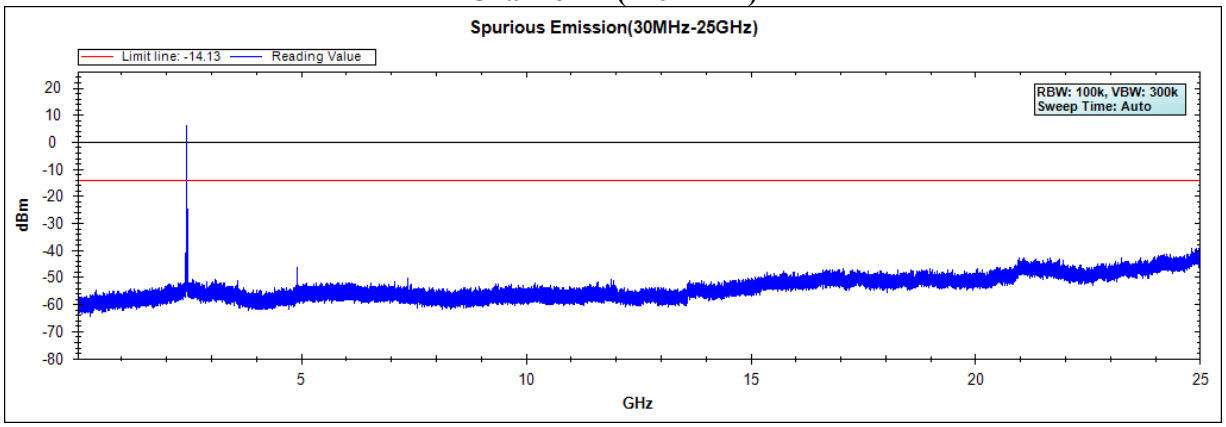
**Channel 01 (2412MHz)**




**Channel 06 (2437MHz)**



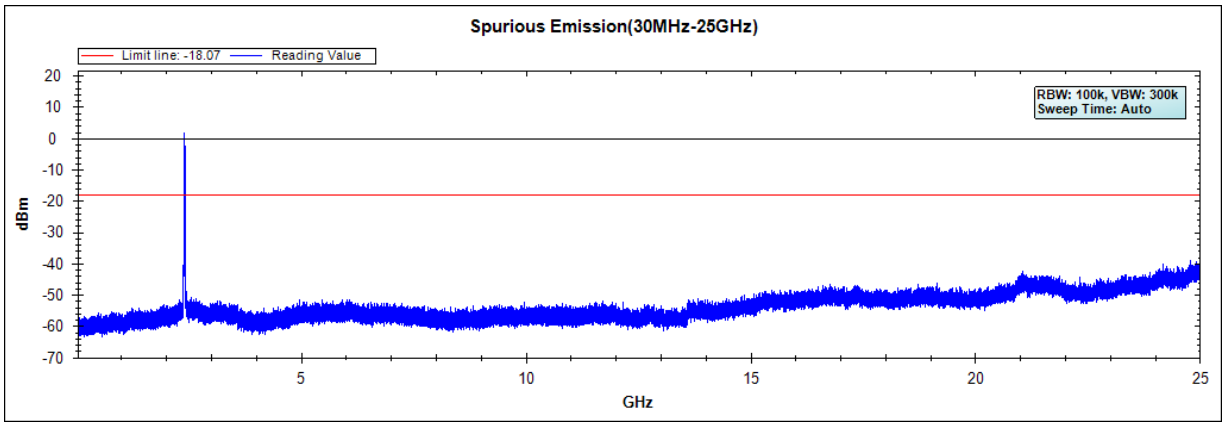

**Channel 11 (2462MHz)**



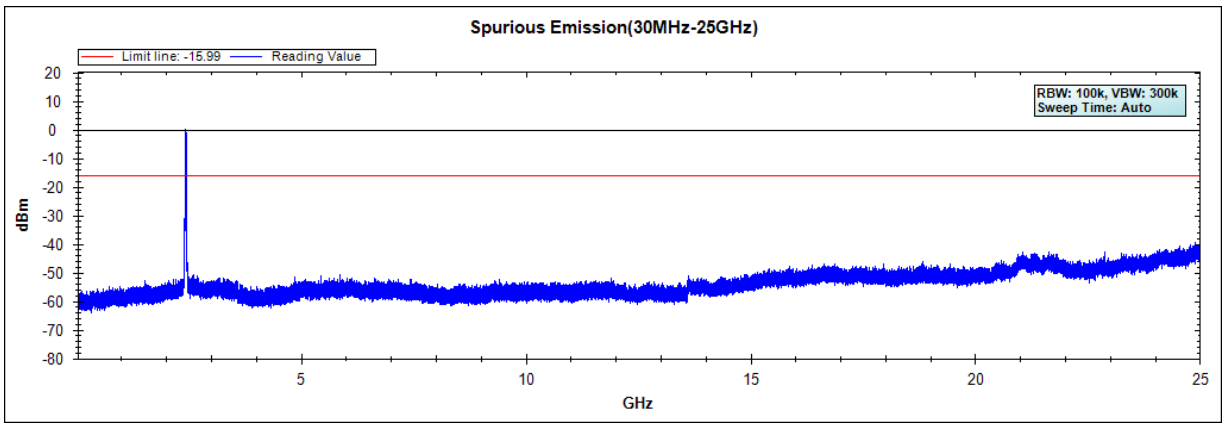

Note: The above test pattern is synthesized by multiple of the frequency range.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | RF Antenna Conducted Spurious |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/24 |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps) |

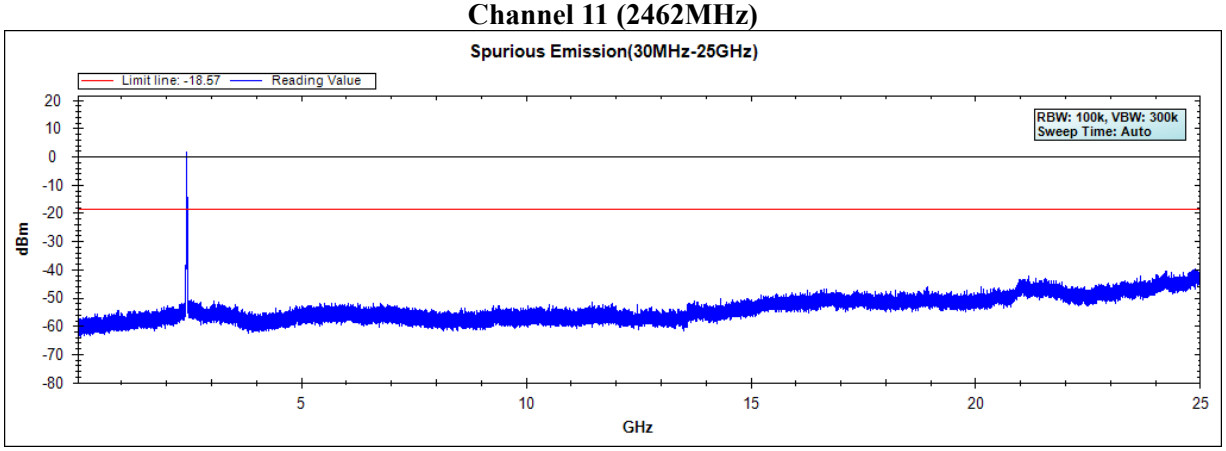
**Channel 01 (2412MHz)**




**Channel 06 (2437MHz)**



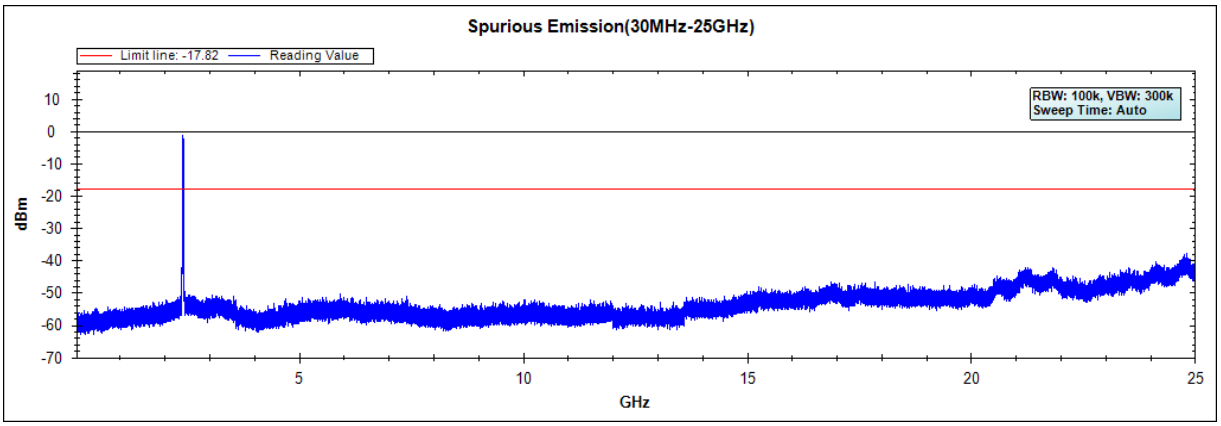

**Channel 11 (2462MHz)**



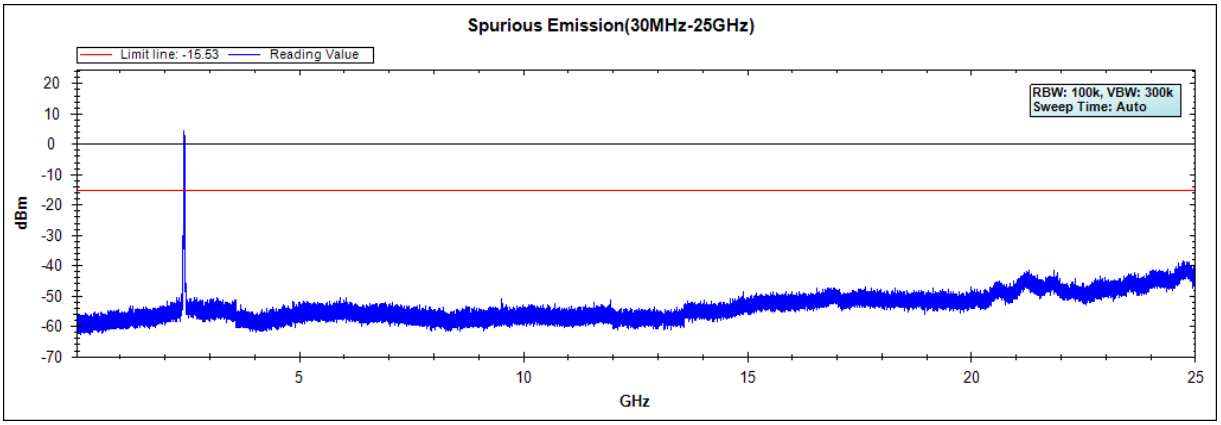

Note: The above test pattern is synthesized by multiple of the frequency range.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | RF Antenna Conducted Spurious |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/14 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) |

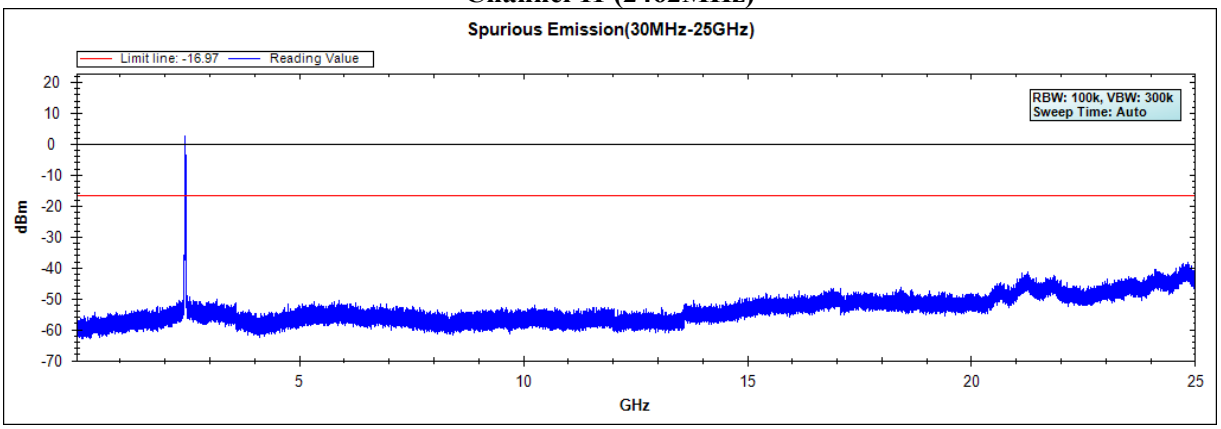
**Channel 01 (2412MHz)**




**Channel 06 (2437MHz)**




**Channel 11 (2462MHz)**

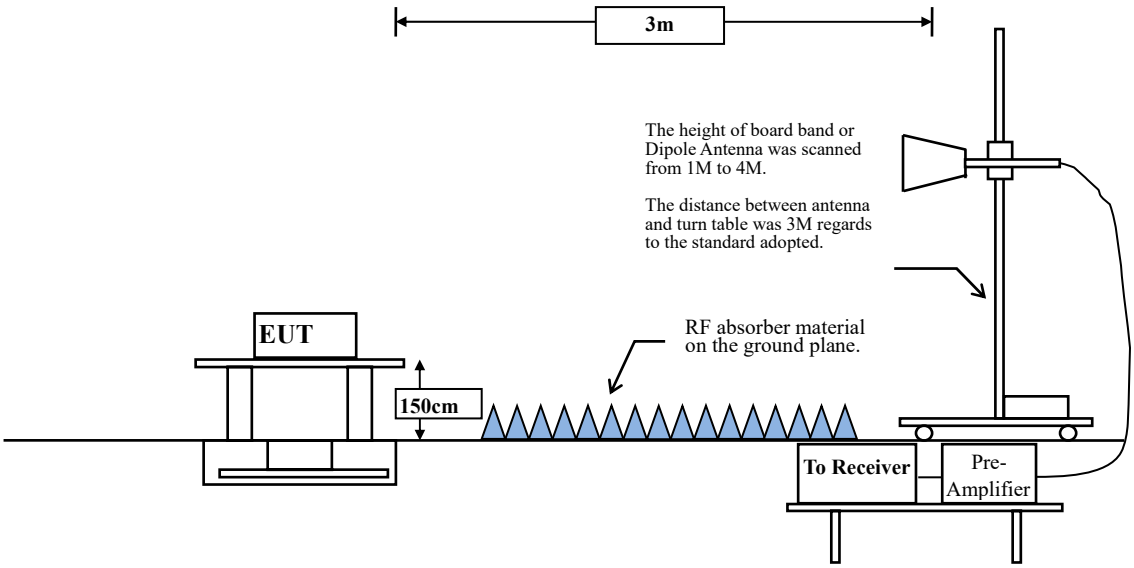



Note: The above test pattern is synthesized by multiple of the frequency range.

# 6. Band Edge

## 6.1. Test Setup

**RF Radiated Measurement:**



## 6.2. 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.

## 6.3. 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) |
|---|---|---|---|---|
| 802.11b | 100 | -- | -- | 10 |
| 802.11g | 98.10 | 2.0600 | 485 | 10 |
| 802.11n20 | 97.91 | 1.9100 | 524 | 600 |

Note: Duty Cycle Refer to Section 9

## 6.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

## 6.5. Test Result of Band Edge

Product : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2389.710 | 30.414 | 54.938 | 61.411 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2390.000 | 30.415 | 52.322 | 58.797 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2400.000 | 30.468 | 64.474 | 71.002 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2410.580 | 30.533 | 99.518 | 106.111 | -- | -- | -- |
| 01 (Average) | 2385.942 | 6.457 | 42.018 | 48.475 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2390.000 | 6.474 | 34.841 | 41.316 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2397.971 | 6.516 | 53.298 | 59.814 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2400.000 | 6.528 | 41.482 | 48.010 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2413.043 | 6.610 | 94.746 | 101.356 | -- | -- | -- |

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

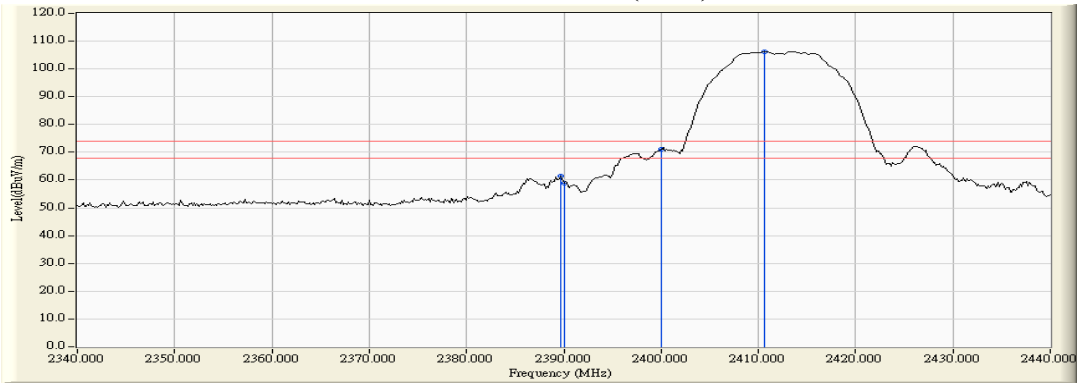
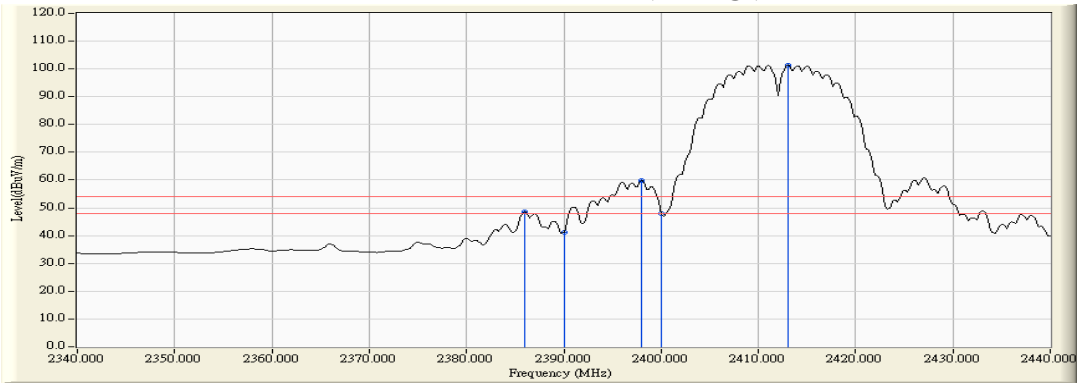



**Figure Channel 01: Horizontal (Average)**




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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2388.986 | 29.826 | 47.744 | 53.629 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2390.000 | 29.821 | 46.873 | 52.754 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2400.000 | 29.819 | 58.323 | 64.202 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2413.188 | 29.861 | 93.375 | 99.296 | -- | -- | -- |
| 01 (Average) | 2386.957 | 5.893 | 34.040 | 39.933 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2390.000 | 5.880 | 28.928 | 34.809 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2397.971 | 5.874 | 46.615 | 52.489 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2400.000 | 5.879 | 35.074 | 40.953 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2413.043 | 5.921 | 88.645 | 94.565 | -- | -- | -- |

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

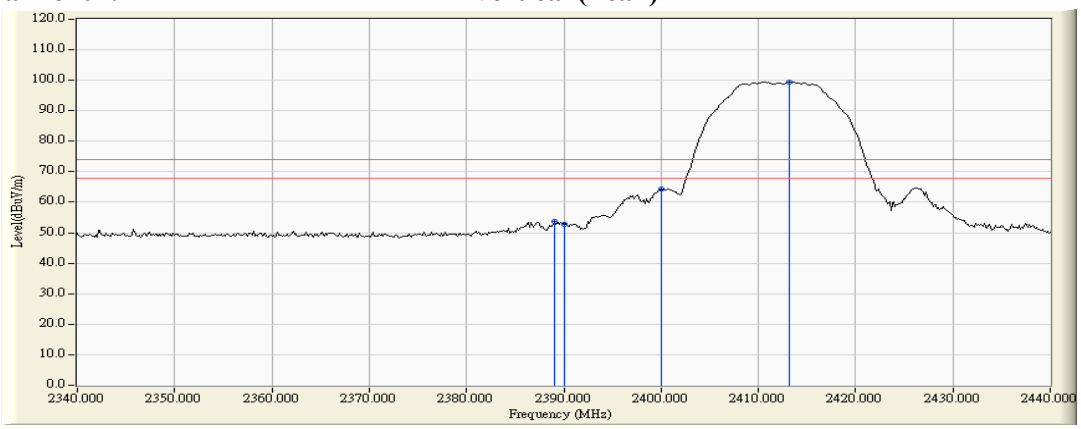
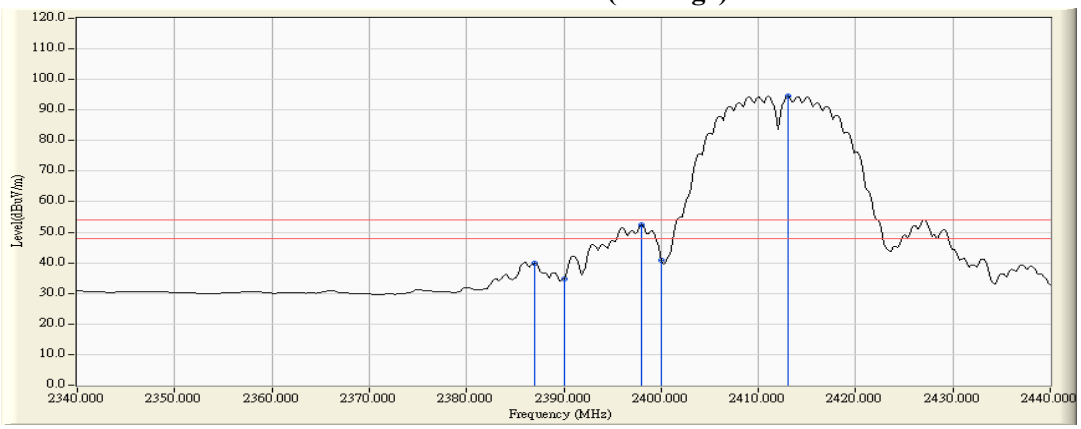



**Figure Channel 01: Vertical (Average)**




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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2463.500 | 6.969 | 99.874 | 106.843 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 51.747 | 58.857 | 74.000 | 54.000 | Pass |
| 11 (Peak) | 2487.268 | 7.136 | 53.024 | 60.161 | 74.000 | 54.000 | Pass |
| 11 (Average) | 2462.920 | 6.965 | 95.336 | 102.301 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 39.730 | 46.840 | 74.000 | 54.000 | Pass |
| 11 (Average) | 2486.978 | 7.135 | 40.003 | 47.138 | 74.000 | 54.000 | Pass |

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

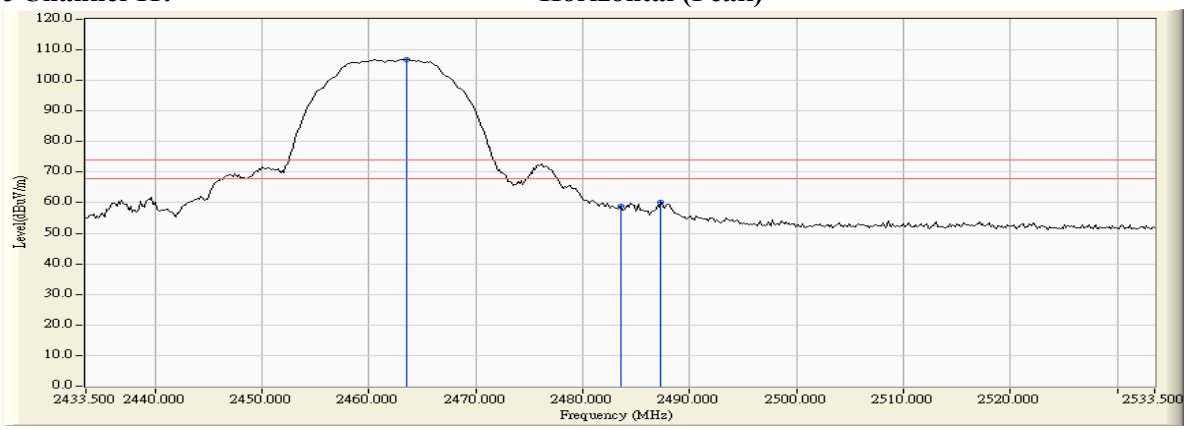



**Figure Channel 11: Horizontal (Average)**


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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2463.500 | 30.178 | 92.210 | 98.449 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 30.303 | 45.738 | 52.101 | 74.000 | 54.000 | Pass |
| 11 (Peak) | 2484.370 | 30.308 | 46.698 | 53.067 | 74.000 | 54.000 | Pass |
| 11 (Average) | 2462.920 | 6.235 | 87.549 | 93.784 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 32.194 | 38.557 | 74.000 | 54.000 | Pass |
| 11 (Average) | 2487.848 | 6.391 | 32.531 | 38.921 | 74.000 | 54.000 | Pass |

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

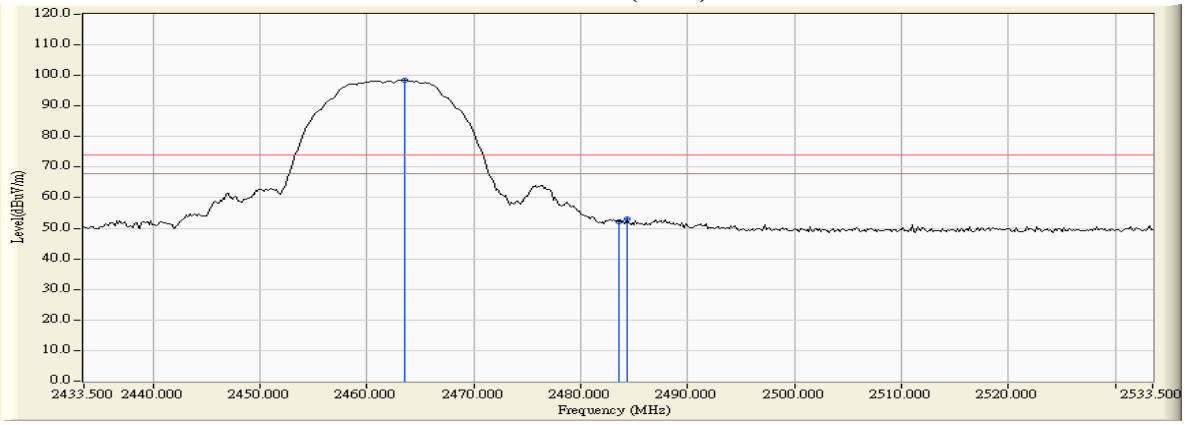
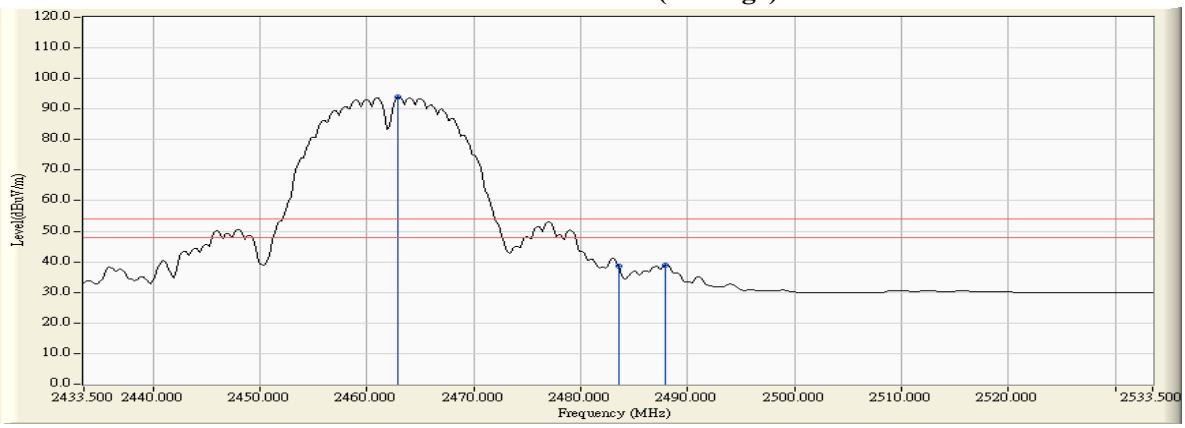



**Figure Channel 11: Vertical (Average)**




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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2389.130 | 30.412 | 63.369 | 69.840 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2390.000 | 30.415 | 62.527 | 69.002 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2400.000 | 30.468 | 78.784 | 85.312 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2415.797 | 30.569 | 101.336 | 107.966 | -- | -- | -- |
| 01 (Average) | 2390.000 | 6.474 | 43.702 | 50.177 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2400.000 | 6.528 | 54.928 | 61.456 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2417.246 | 6.640 | 88.041 | 94.681 | -- | -- | -- |

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

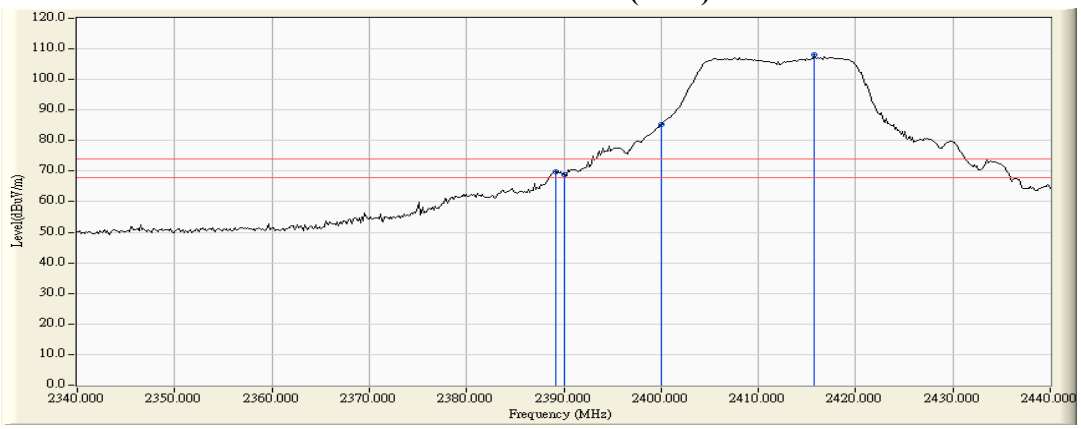
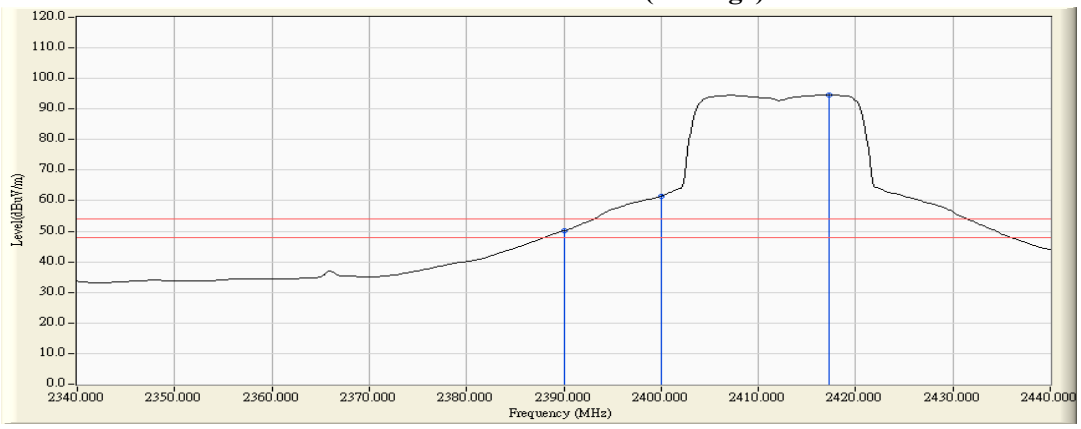



**Figure Channel 01: Horizontal (Average)**




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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2389.710 | 29.823 | 57.416 | 63.298 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2390.000 | 29.821 | 55.944 | 61.825 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2400.000 | 29.819 | 71.883 | 77.762 | 74.000 | 54.000 | Pass |
| 01 (Peak) | 2418.116 | 29.892 | 94.647 | 100.599 | -- | -- | -- |
| 01 (Average) | 2390.000 | 5.880 | 36.988 | 42.869 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2400.000 | 5.879 | 48.624 | 54.503 | 74.000 | 54.000 | Pass |
| 01 (Average) | 2407.391 | 5.898 | 81.721 | 87.619 | -- | -- | -- |

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

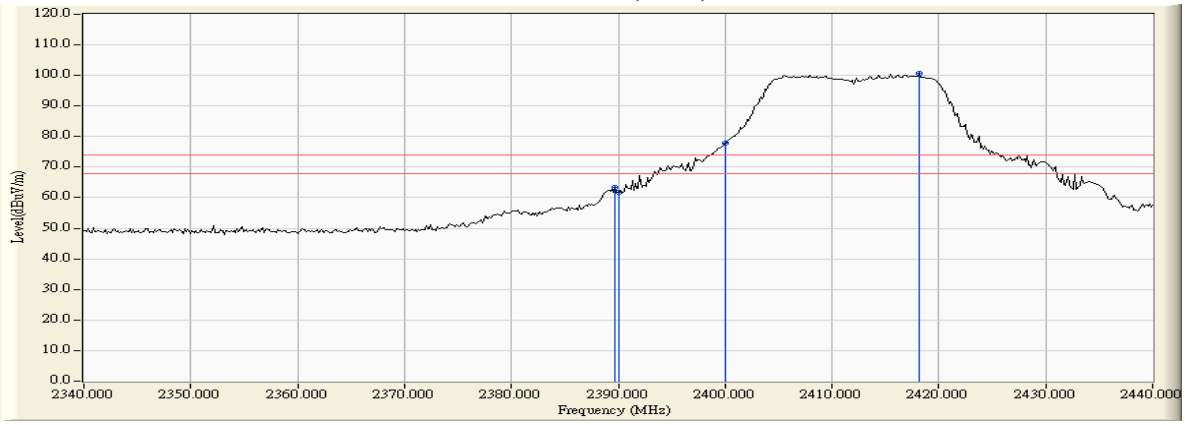
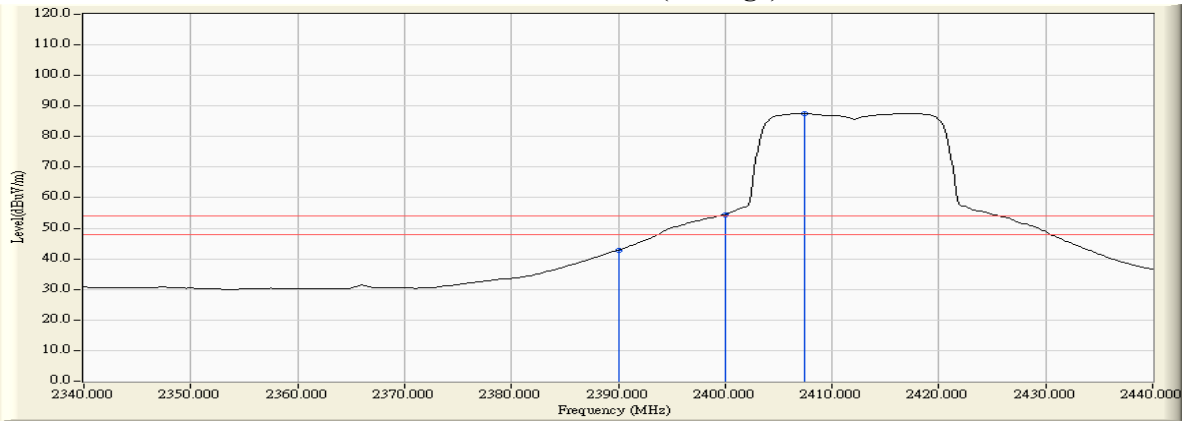



**Figure Channel 01: Vertical (Average)**




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 | : | NPort Device Server |
| Test Item | : | Band Edge Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/08/09 |
| 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) | 2464.370 | 6.975 | 99.740 | 106.715 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 64.669 | 71.779 | 74.000 | 54.000 | Pass |
| 11 (Peak) | 2484.514 | 7.117 | 65.202 | 72.319 | 74.000 | 54.000 | Pass |
| 11 (Average) | 2466.109 | 6.988 | 87.023 | 94.010 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 43.228 | 50.338 | 74.000 | 54.000 | Pass |

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

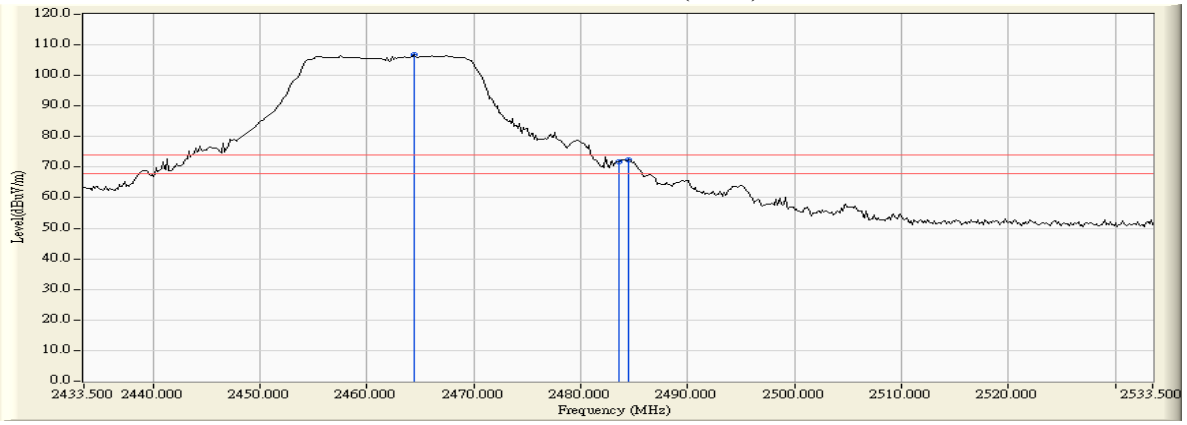
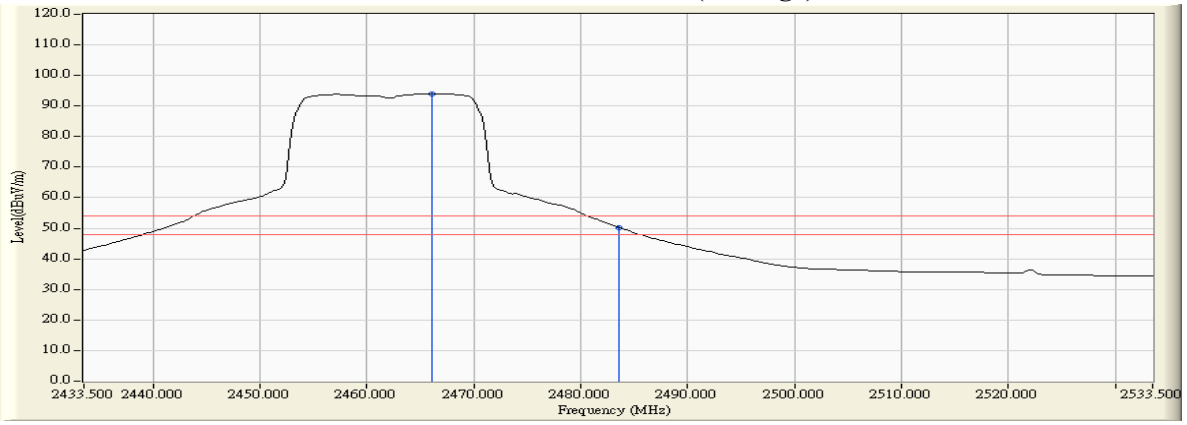



**Figure Channel 11: Horizontal (Average)**




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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/08/09
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) | 2467.413 | 6.263 | 91.810 | 98.073 | -- | -- | -- |
| 11 (Peak) | 2483.500 | -3.966 | 56.967 | 53.000 | 74.000 | 54.000 | Pass |
| 11 (Average) | 2466.109 | 6.255 | 79.552 | 85.807 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 35.393 | 41.756 | 74.000 | 54.000 | Pass |

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

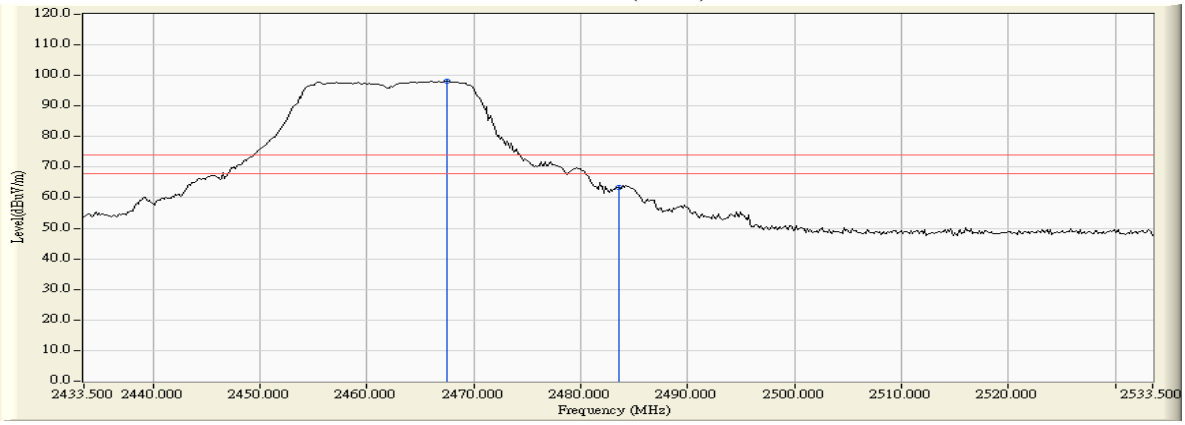
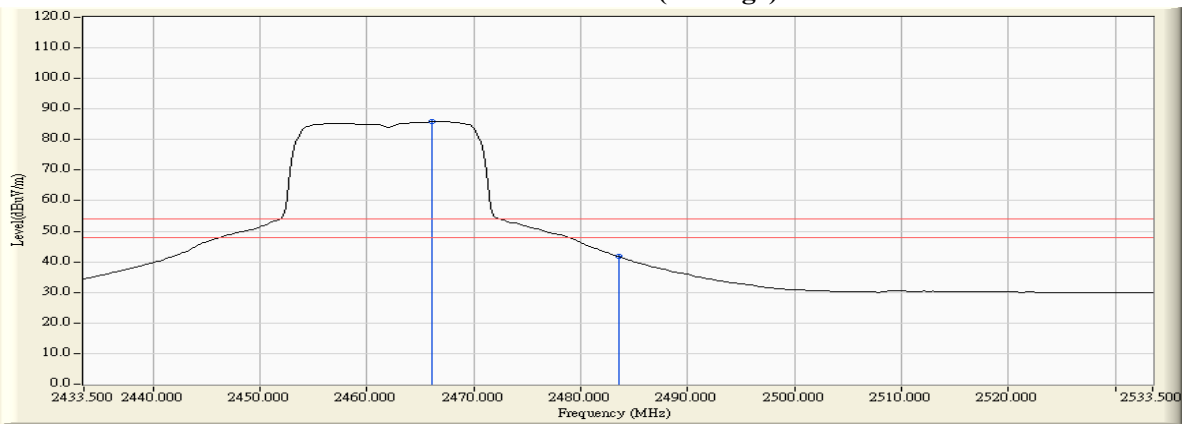



**Figure Channel 11: Vertical (Average)**




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 : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/11/09
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Peak Limit (dBμV/m) | Average Limit (dBμV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2390.000 | 6.474 | 66.176 | 72.651 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2400.000 | 6.528 | 77.080 | 83.608 | -- | -- | -- |
| 01 (Peak) | 2416.087 | 6.632 | 98.292 | 104.924 | -- | -- | -- |
| 01 (Average) | 2390.000 | 6.474 | 44.238 | 50.713 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2400.000 | 6.528 | 55.358 | 61.886 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2417.536 | 6.642 | 88.373 | 95.015 | -- | -- | -- |

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

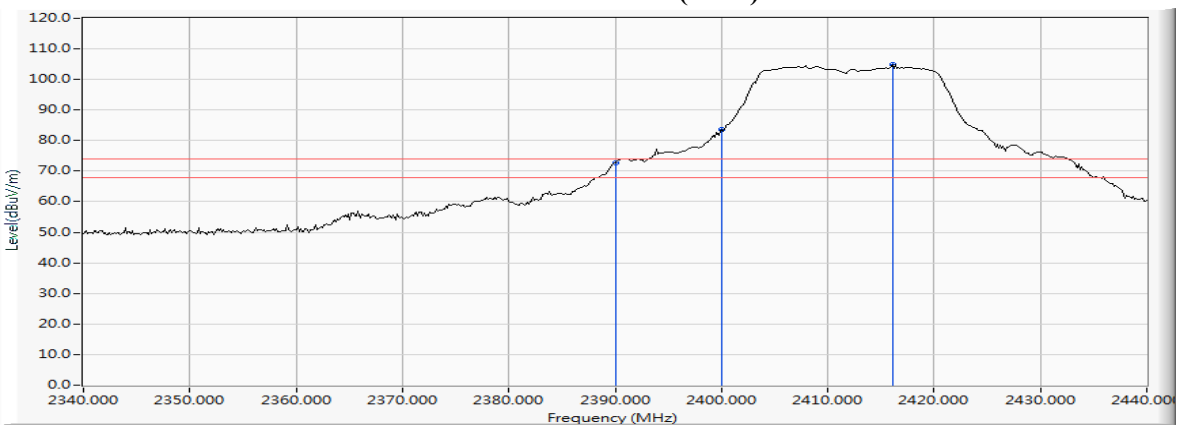
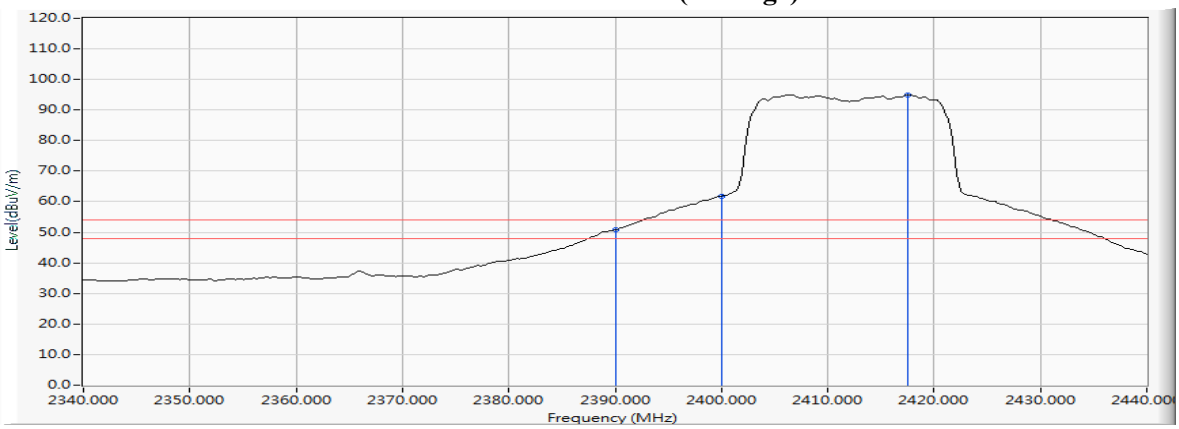



**Figure Channel 01: Horizontal (Average)**




Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : NPort Device Server
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/11/09
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

**RF Radiated Measurement (VERTICAL):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Peak Limit (dBμV/m) | Average Limit (dBμV/m) | Result |
|---|---|---|---|---|---|---|---|
| 01 (Peak) | 2390.000 | 5.880 | 62.473 | 68.354 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2400.000 | 5.879 | 73.054 | 78.933 | 74.00 | 54.00 | Pass |
| 01 (Peak) | 2416.232 | 5.941 | 95.910 | 101.850 | -- | -- | -- |
| 01 (Average) | 2390.000 | 5.880 | 41.408 | 47.289 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2400.000 | 5.879 | 52.089 | 57.968 | 74.00 | 54.00 | Pass |
| 01 (Average) | 2417.536 | 5.948 | 85.965 | 91.913 | -- | -- | -- |

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

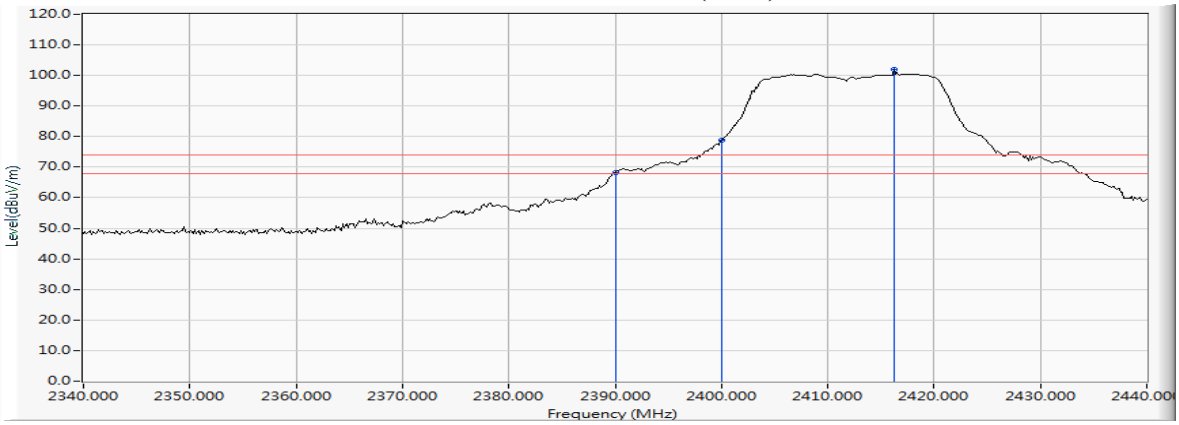
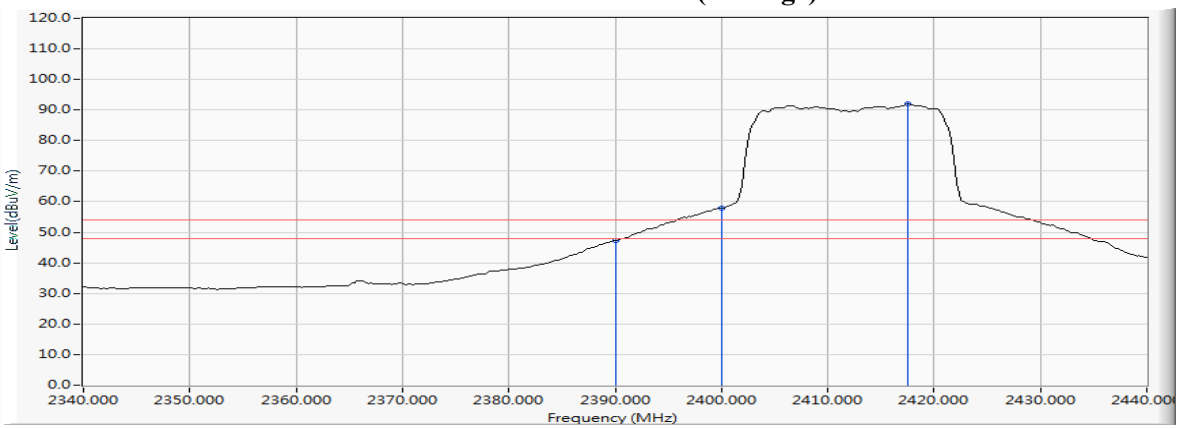



**Figure Channel 01: VERTICAL (Average)**




Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | Band Edge Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/09 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz) |

**RF Radiated Measurement (Horizontal):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBµV) | Emission Level (dBµV/m) | Peak Limit (dBµV/m) | Average Limit (dBµV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2466.254 | 6.989 | 97.256 | 104.244 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 7.110 | 64.491 | 71.601 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2465.094 | 6.980 | 87.881 | 94.861 | -- | -- | -- |
| 11 (Average) | 2483.500 | 7.110 | 45.898 | 53.008 | 74.00 | 54.00 | Pass |

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

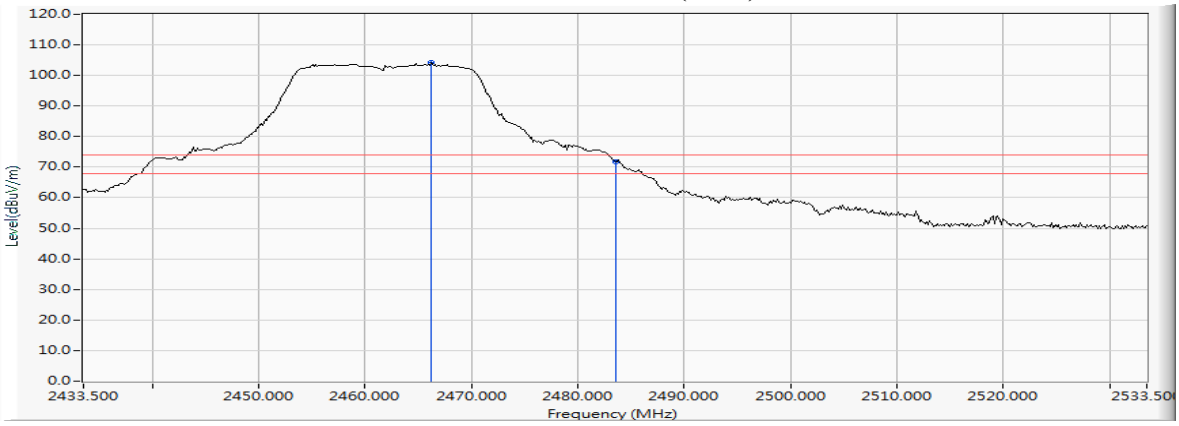
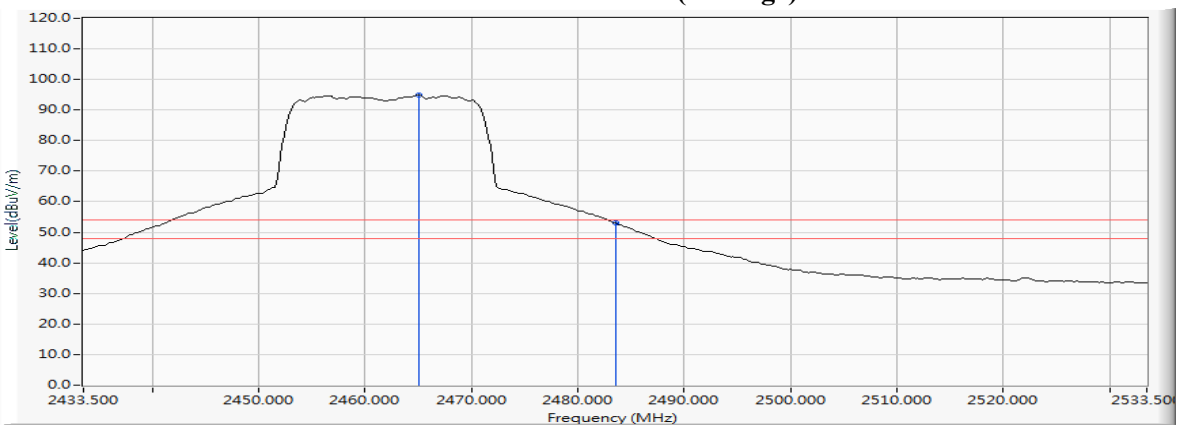



**Figure Channel 11: Horizontal (Average)**




Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

| | | |
|---|---|---|
| Product | : | NPort Device Server |
| Test Item | : | Band Edge Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2018/11/09 |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz) |

**RF Radiated Measurement (VERTICAL):**

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Peak Limit (dBμV/m) | Average Limit (dBμV/m) | Result |
|---|---|---|---|---|---|---|---|
| 11 (Peak) | 2458.862 | 6.210 | 94.901 | 101.110 | -- | -- | -- |
| 11 (Peak) | 2483.500 | 6.363 | 61.463 | 67.826 | 74.00 | 54.00 | Pass |
| 11 (Average) | 2467.268 | 6.262 | 85.678 | 91.940 | -- | -- | -- |
| 11 (Average) | 2483.500 | 6.363 | 42.898 | 49.261 | 74.00 | 54.00 | Pass |

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

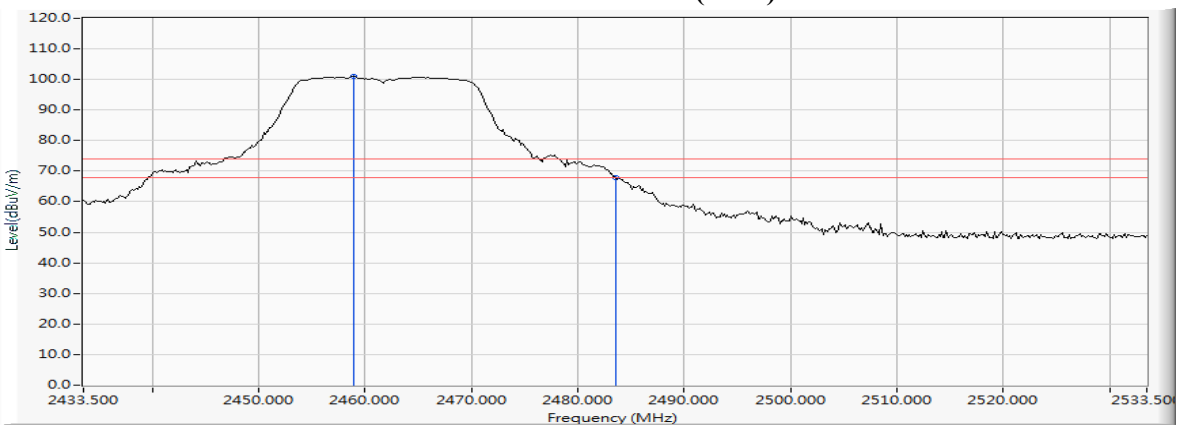
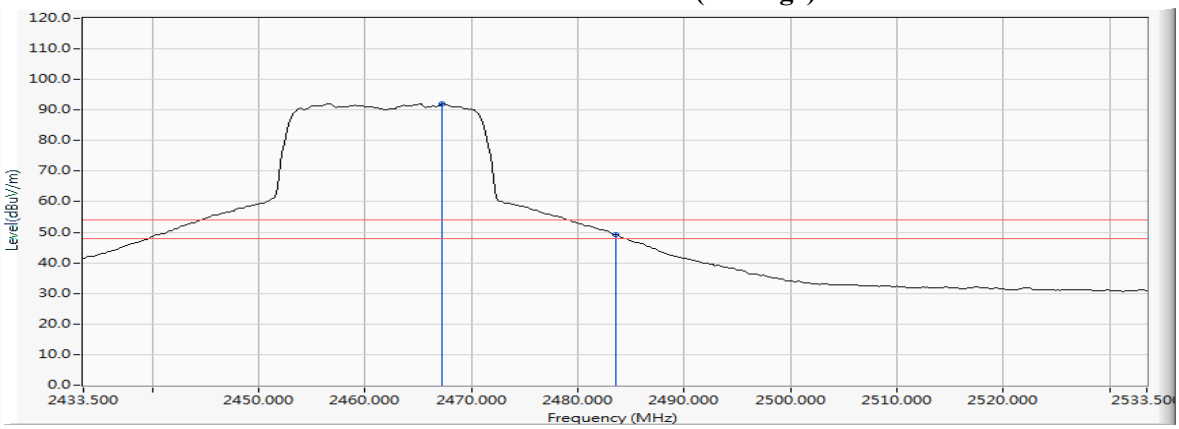


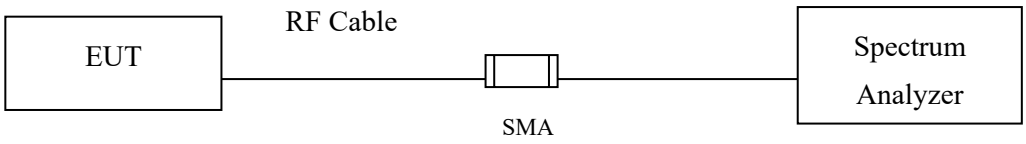

**Figure Channel 11: VERTICAL (Average)**




Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

# 7. 6dB Bandwidth

## 7.1. Test Setup




## 7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

## 7.3. Test Procedure

The EUT was setup according to ANSI C63.4: 2014; tested according to DTS test procedure of Jan KDB558074 for compliance to FCC 47CFR 15.247 requirements.

## 7.4. Uncertainty

± 283Hz

## 7.5. Test Result of 6dB Bandwidth

Product : NPort Device Server
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/08/24
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 01 | 2412 | 10200 | >500 | Pass |
| 06 | 2437 | 10200 | >500 | Pass |
| 11 | 2462 | 10200 | >500 | Pass |

**Figure Channel 01:**

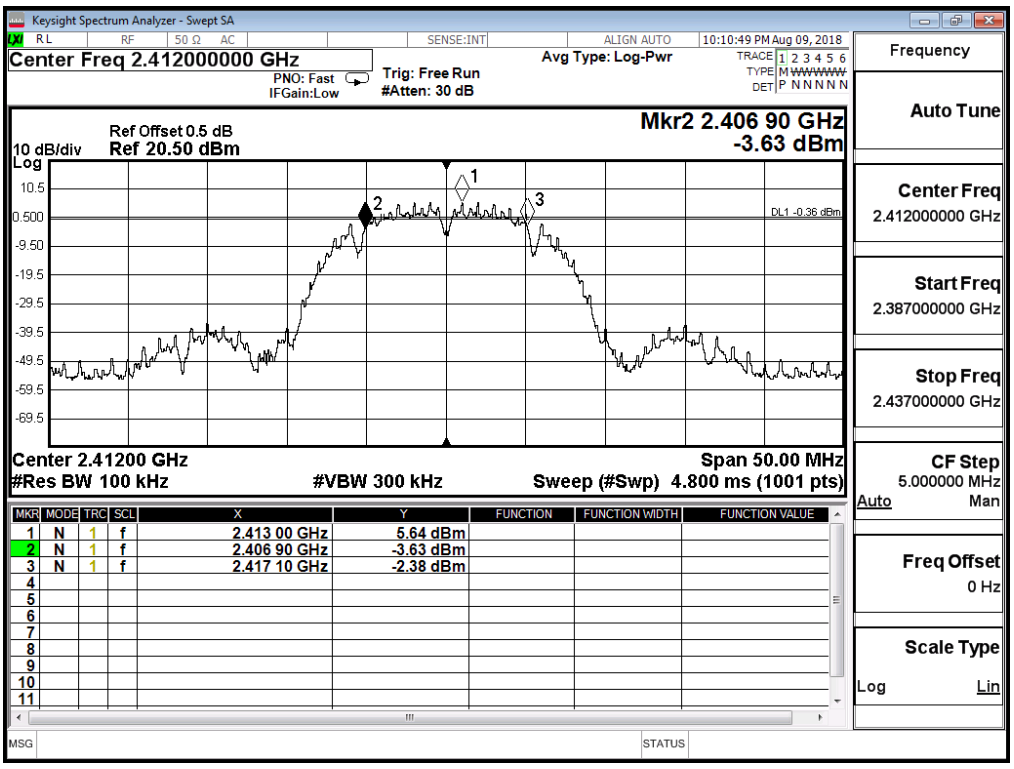


**Figure Channel 06:**

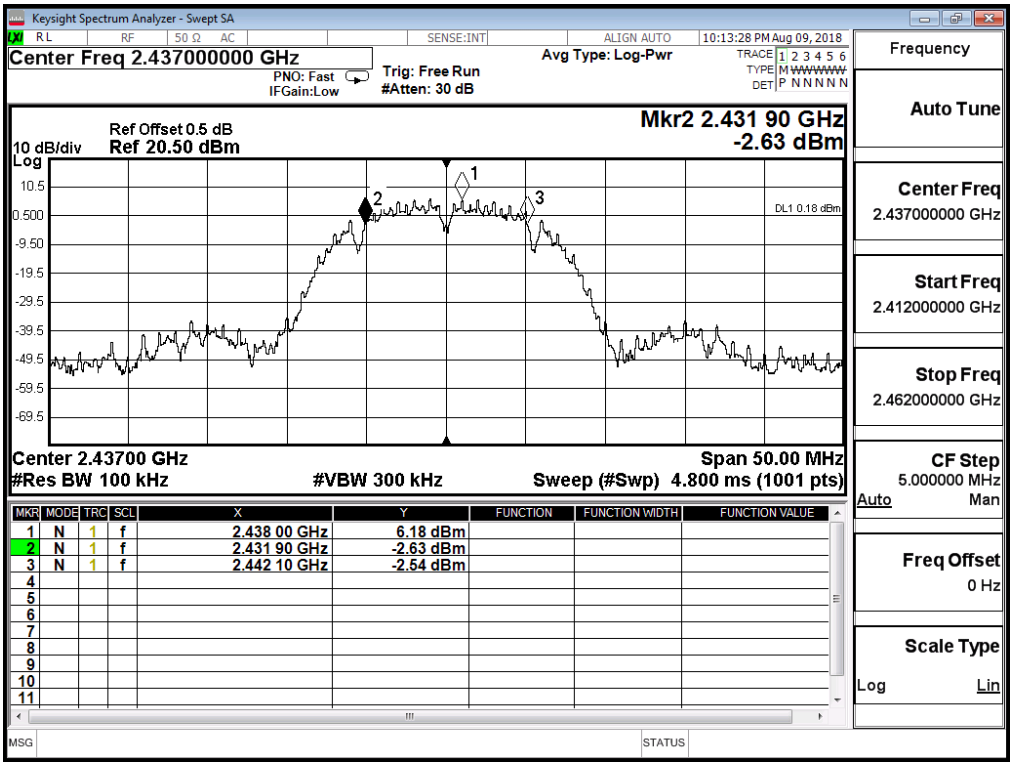
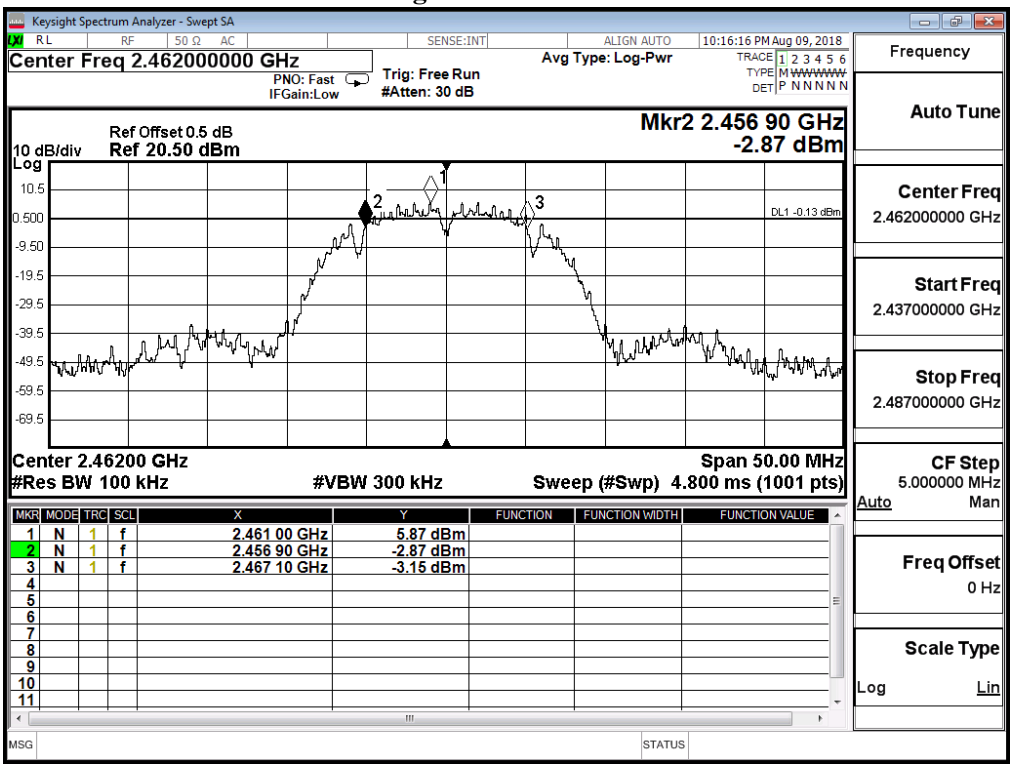



**Figure Channel 11:**



Product : NPort Device Server
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/08/24
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 01 | 2412 | 16400 | >500 | Pass |
| 06 | 2437 | 16400 | >500 | Pass |
| 11 | 2462 | 16400 | >500 | Pass |

**Figure Channel 01:**

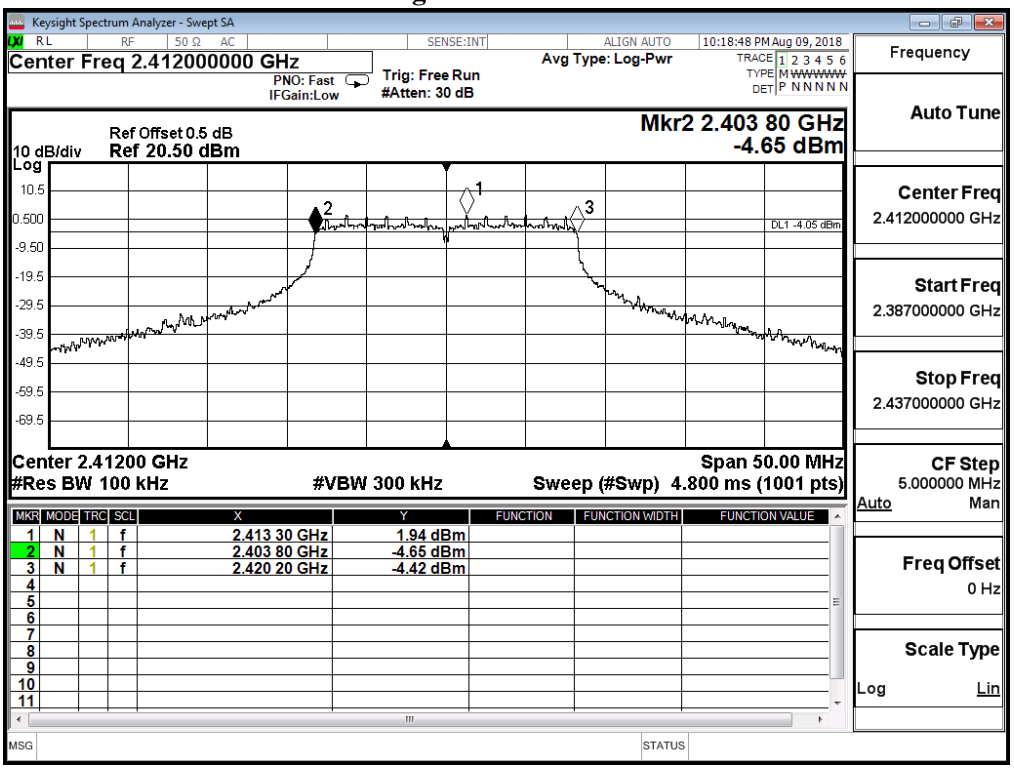


**Figure Channel 06:**

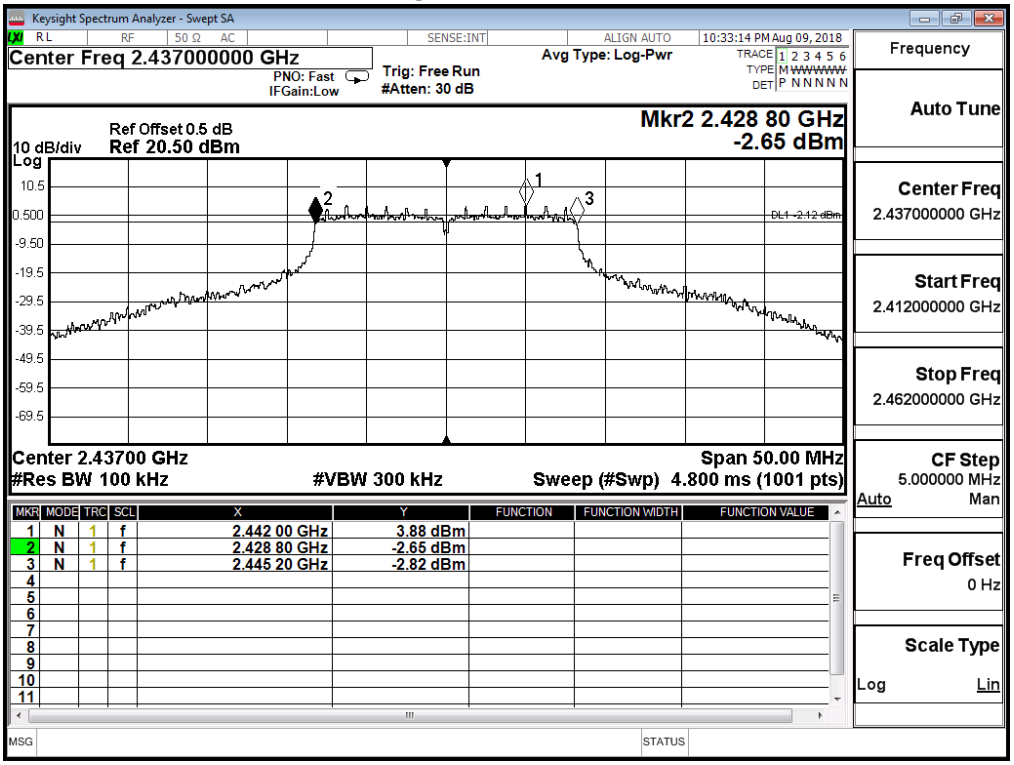
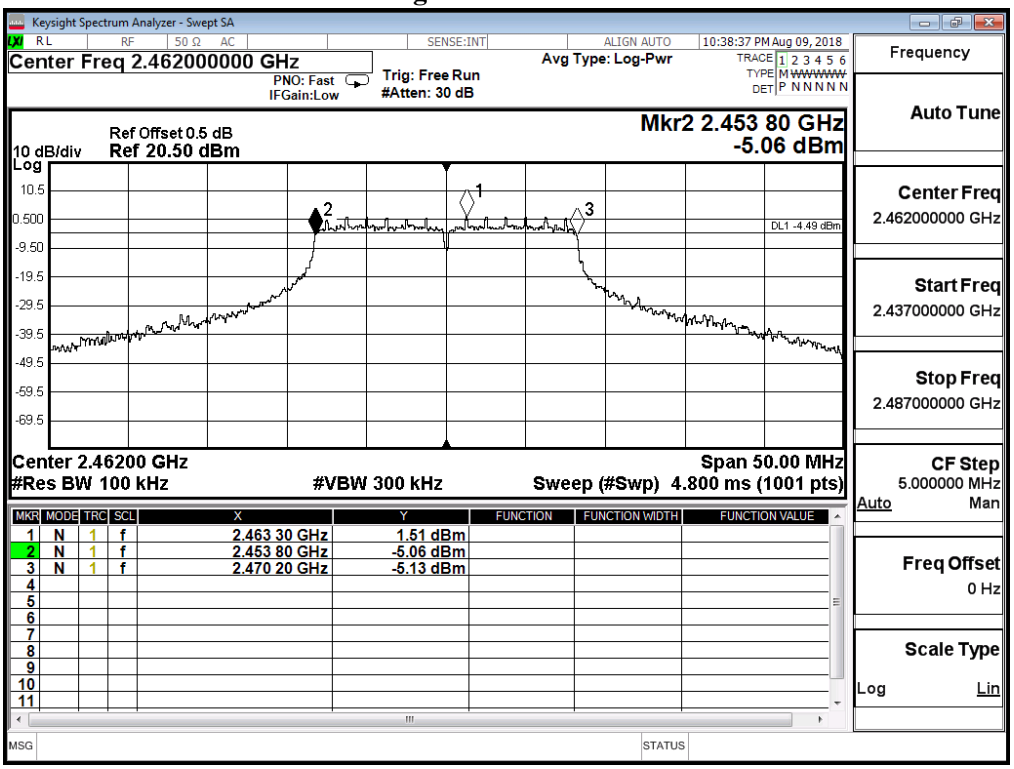



**Figure Channel 11:**



Product : NPort Device Server
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/11/15
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 01 | 2412 | 17600 | >500 | Pass |
| 06 | 2437 | 17400 | >500 | Pass |
| 11 | 2462 | 17600 | >500 | Pass |

**Figure Channel 01:**

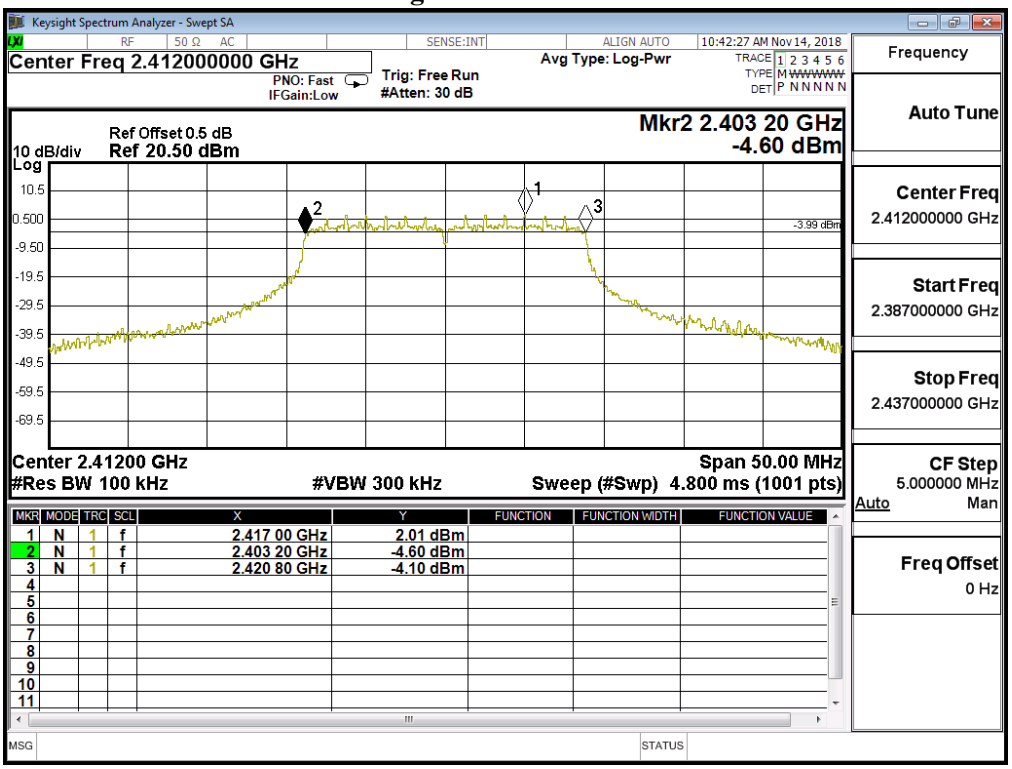


**Figure Channel 06:**

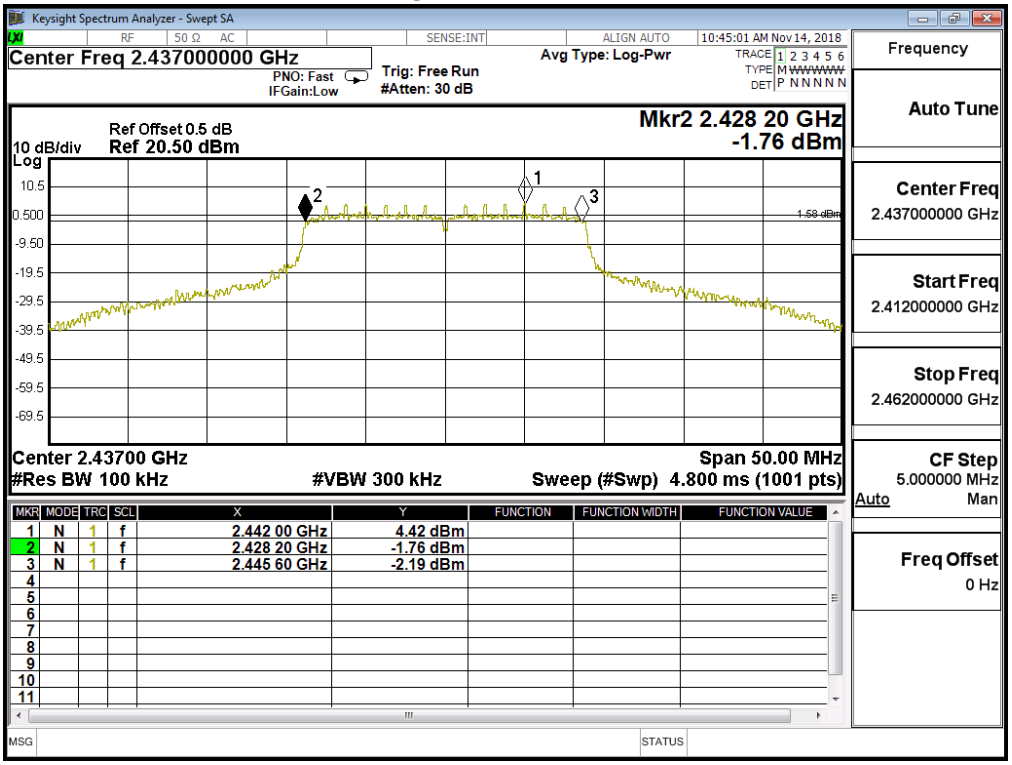
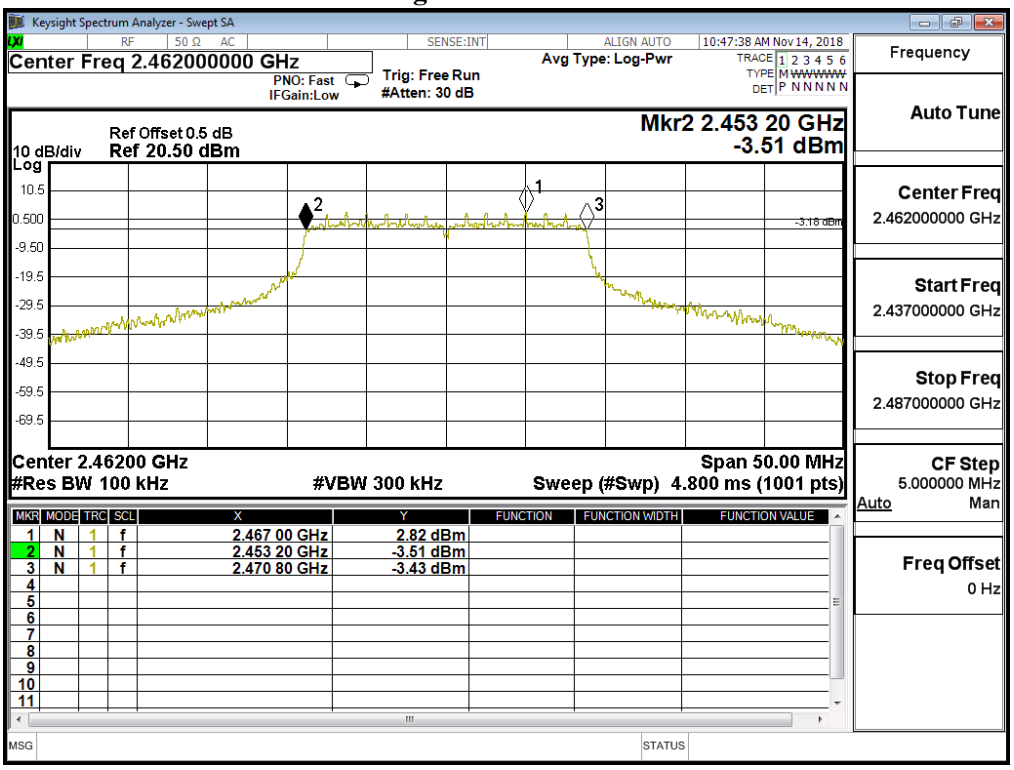
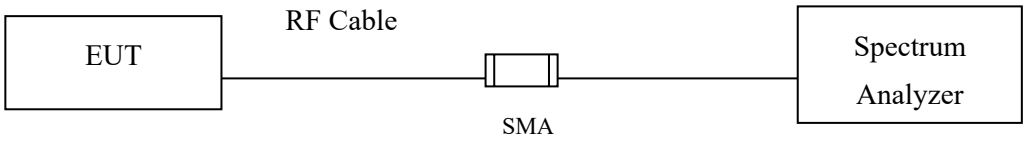



**Figure Channel 11:**



# 8. Power Density

## 8.1. Test Setup




## 8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

## 8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.
The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

## 8.4. Uncertainty

± 1.20 dB

## 8.5. Test Result of Power Density

Product : NPort Device Server
Test Item : Power Density Data
Test Site : No.3 OATS
Test Date : 2018/08/24
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

| Channel No. | Frequency (MHz) | Measure Level (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| 01 | 2412 | 5.680 | ≦8dBm | Pass |
| 06 | 2437 | 6.140 | ≦8dBm | Pass |
| 11 | 2462 | 5.870 | ≦8dBm | Pass |

**Figure Channel 01:**

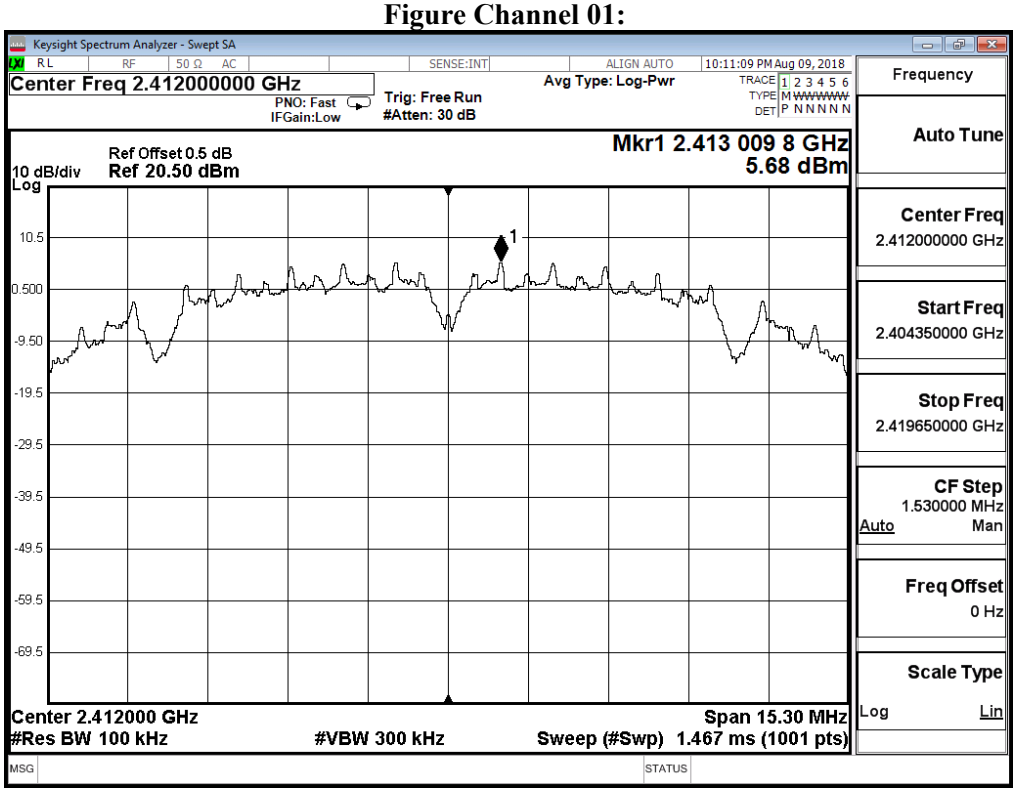


**Figure Channel 06:**

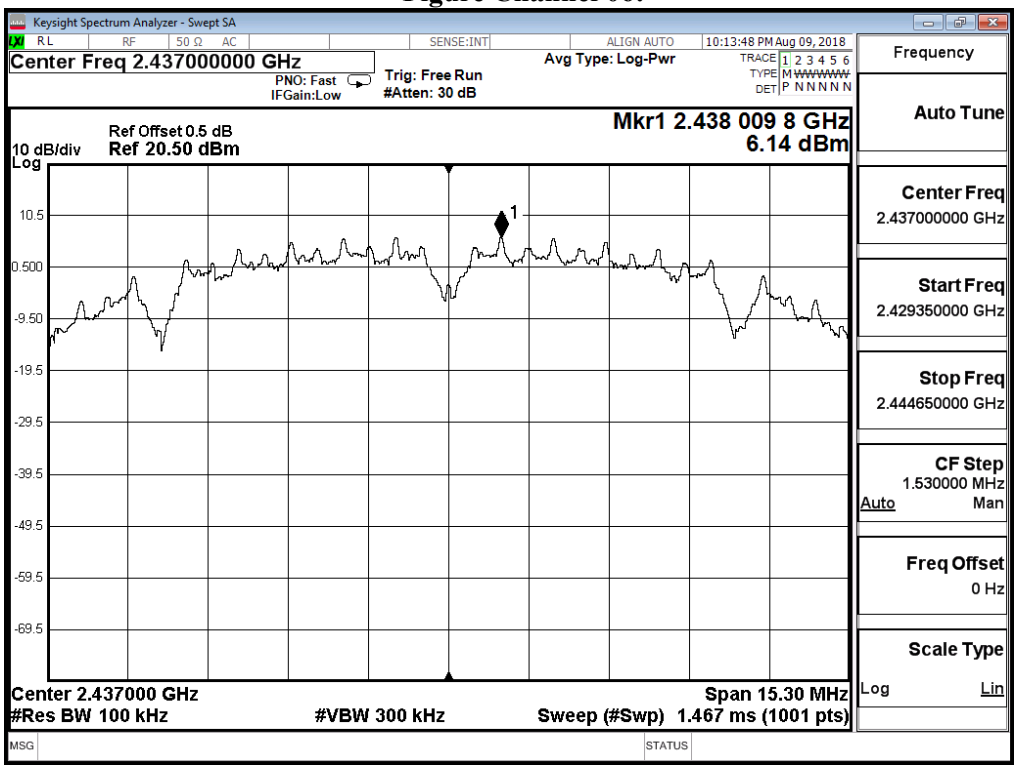
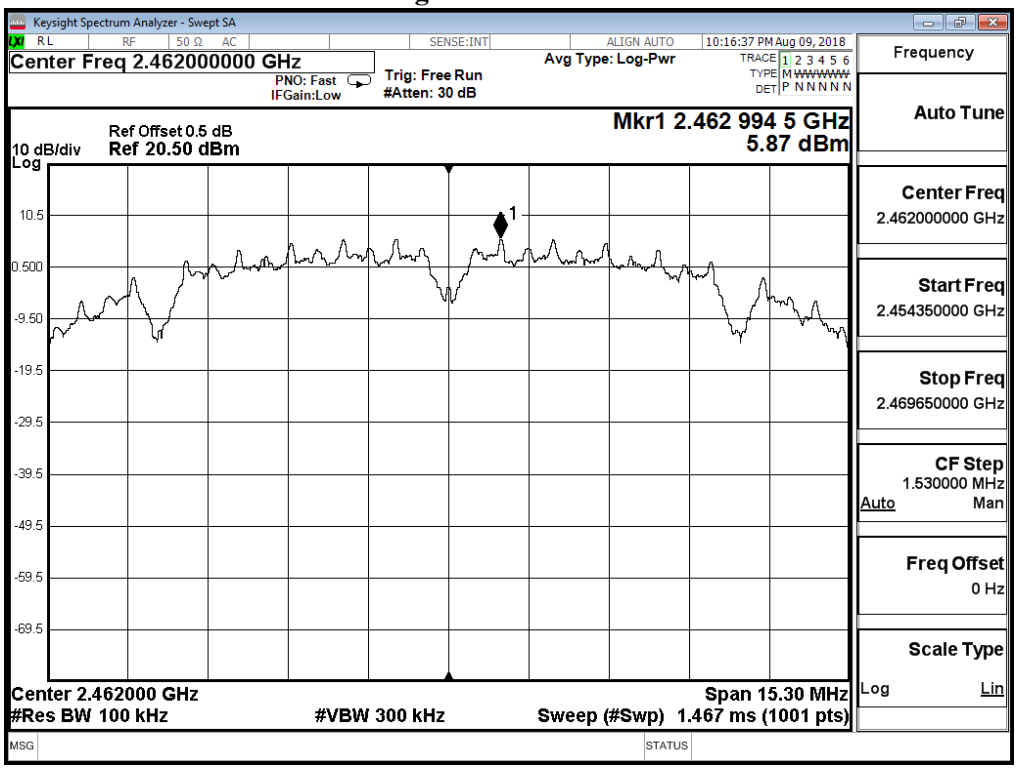



**Figure Channel 11:**



Product : NPort Device Server
Test Item : Power Density Data
Test Site : No.3 OATS
Test Date : 2018/08/24
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

| Channel No. | Frequency (MHz) | Measure Level (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| 01 | 2412 | 1.930 | ≦8dBm | Pass |
| 06 | 2437 | 4.010 | ≦8dBm | Pass |
| 11 | 2462 | 1.430 | ≦8dBm | Pass |

**Figure Channel 01:**

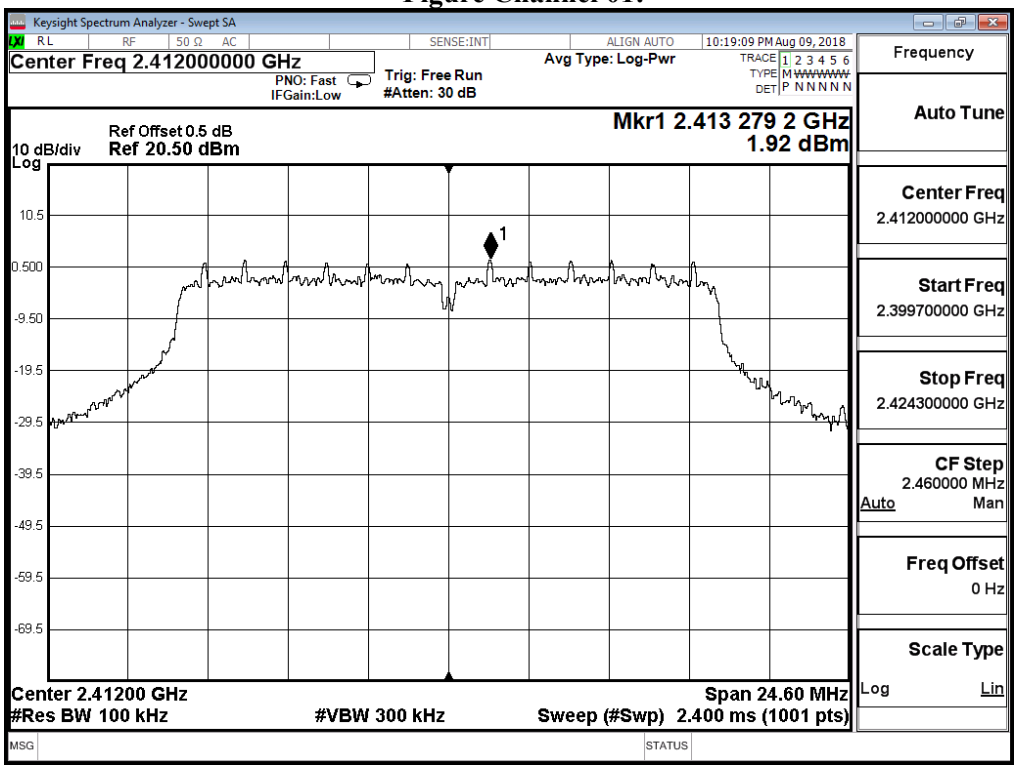


**Figure Channel 06:**

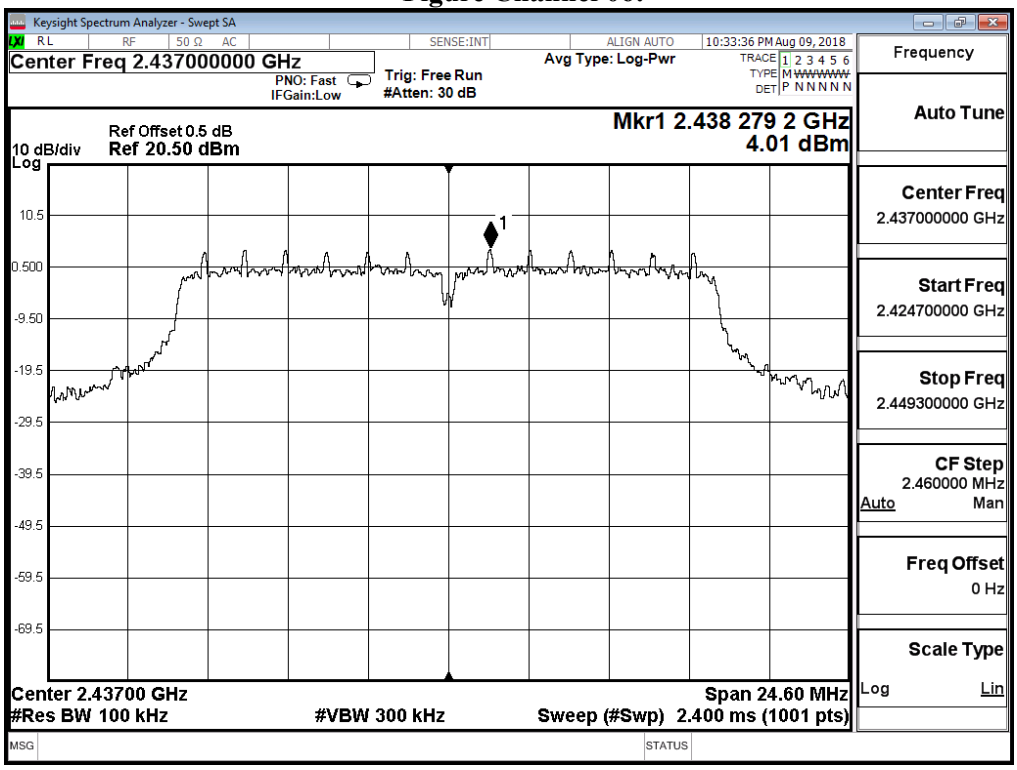
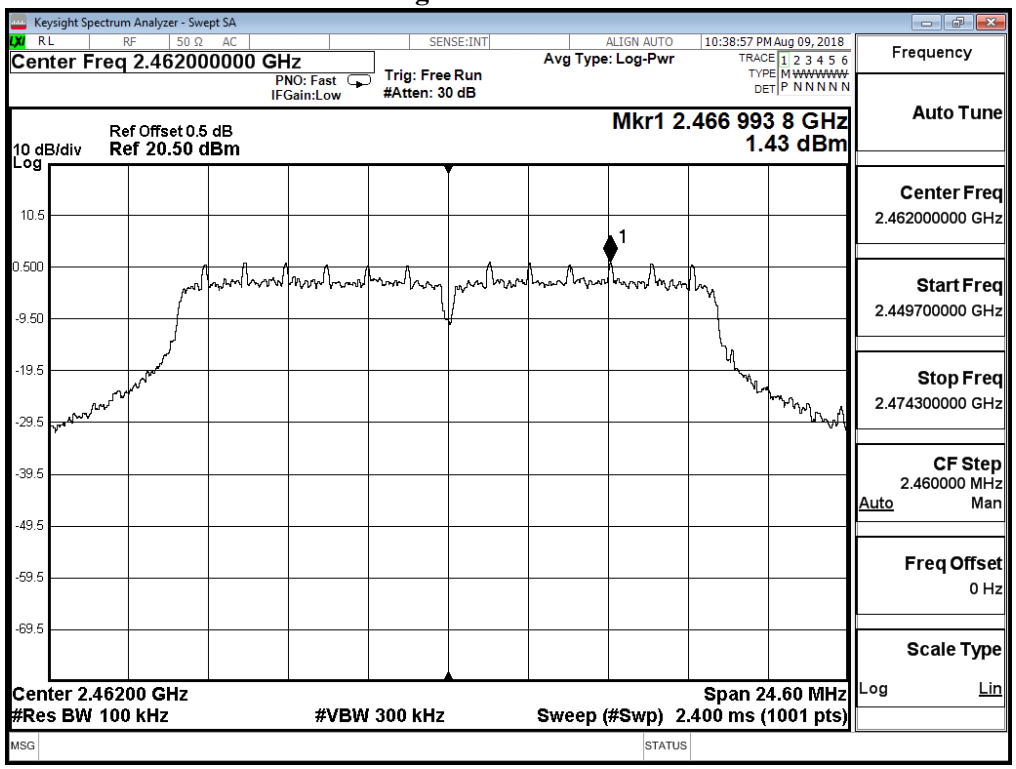



**Figure Channel 11:**



Product : NPort Device Server
Test Item : Power Density Data
Test Site : No.3 OATS
Test Date : 2018/11/15
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

| Channel No. | Frequency (MHz) | Measure Level (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| 01 | 2412 | 2.180 | ≦8dBm | Pass |
| 06 | 2437 | 4.470 | ≦8dBm | Pass |
| 11 | 2462 | 3.030 | ≦8dBm | Pass |

**Figure Channel 01:**

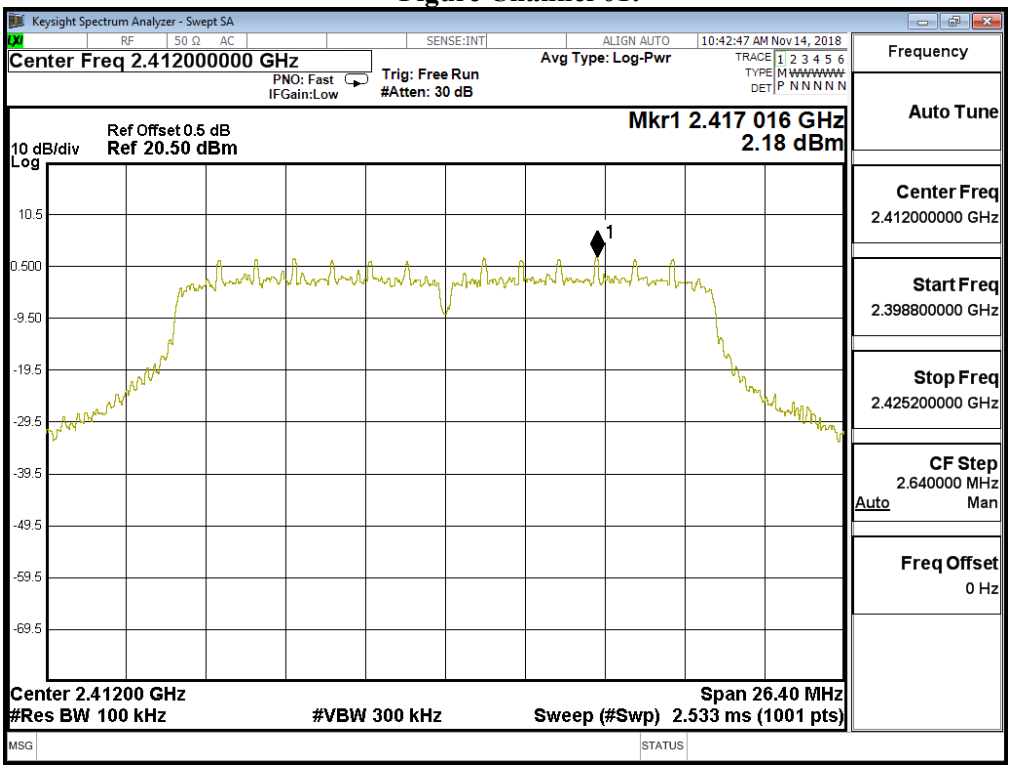


**Figure Channel 06:**

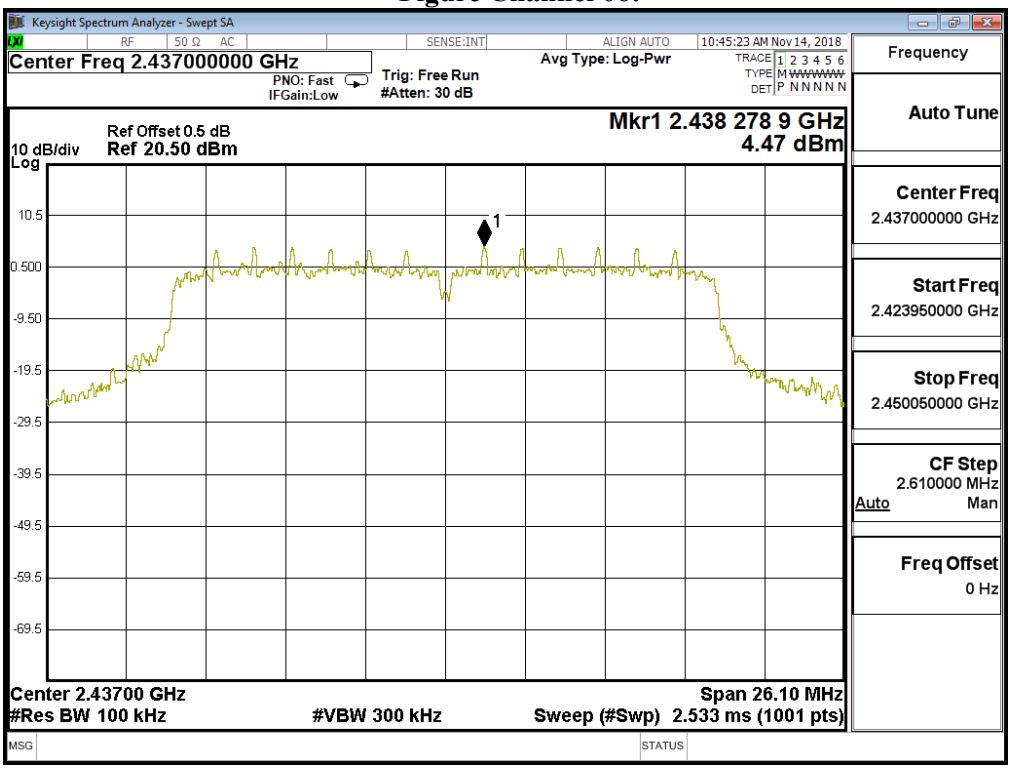
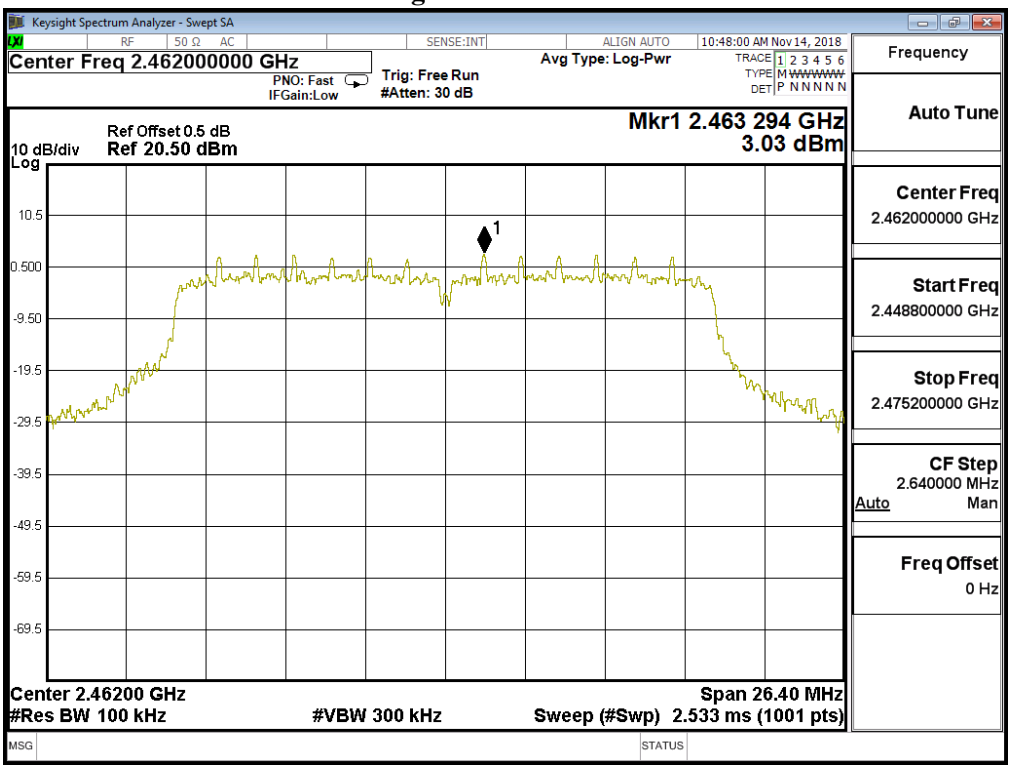
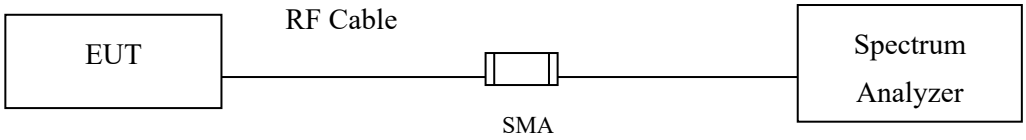



**Figure Channel 11:**



# 9. Duty Cycle

## 9.1. Test Setup




## 9.2. 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.

## 9.3. Uncertainty

± 2.31msec

## 9.4. Test Result of Duty Cycle

Product : NPort Device Server
Test Item : Duty Cycle
Test Mode : Transmit
Test Date : 2018/11/07

Duty Cycle Formula:

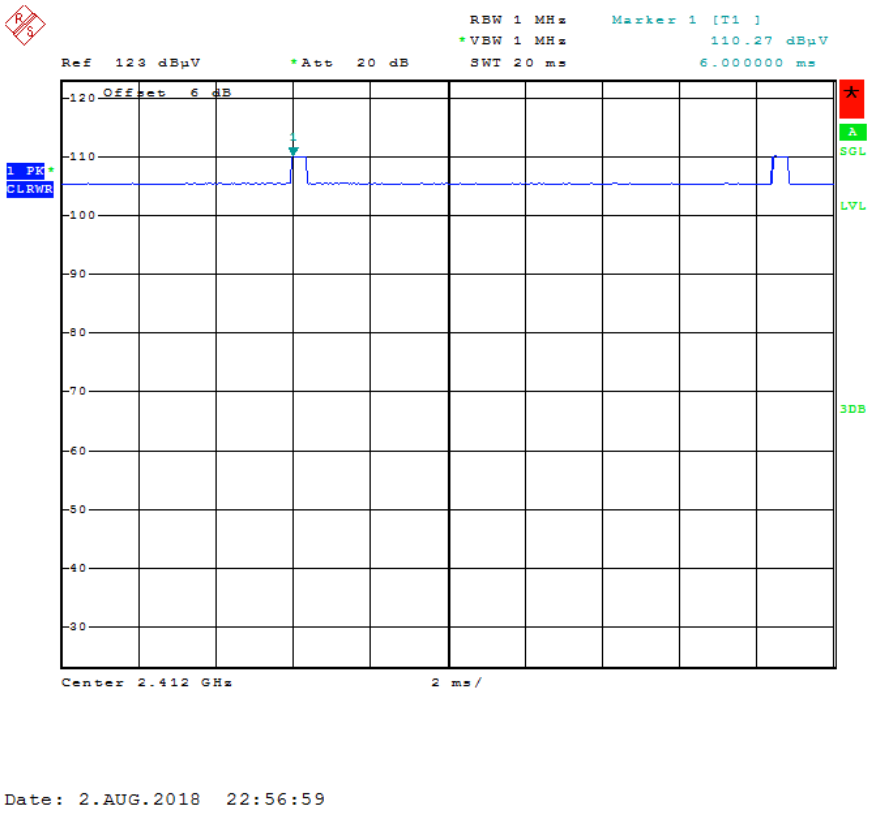
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

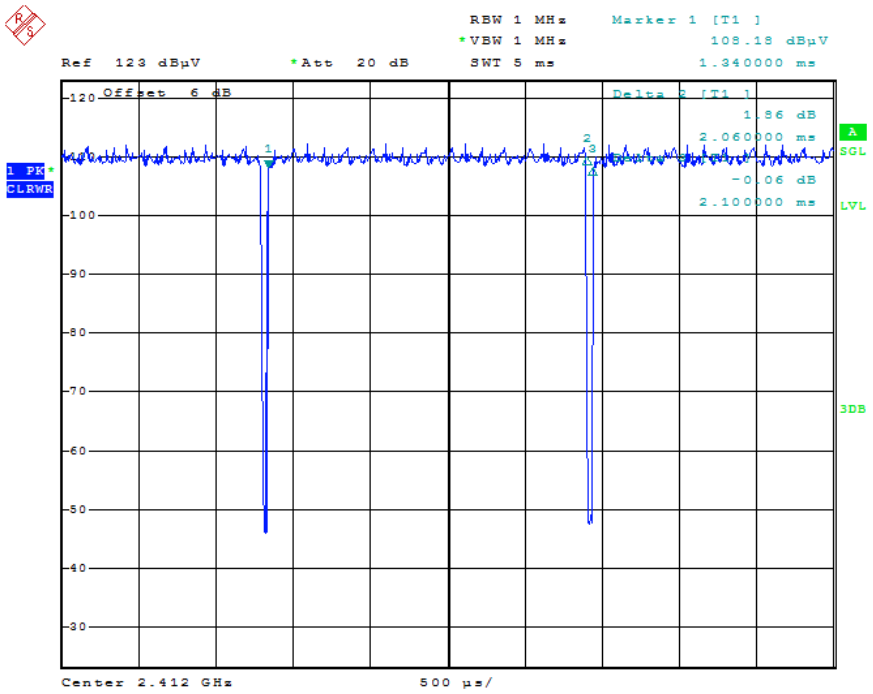
Results:

| 2.4GHz band | Ton (ms) | Ton + Toff (ms) | Duty Cycle (%) | Duty Factor (dB) |
|---|---|---|---|---|
| 802.11b | -- | -- | 100.00 | -- |
| 802.11g | 2.0600 | 2.1000 | 98.10 | 0.08 |
| 802.11 n20 | 1.917 | 1.9580 | 97.91 | 0.09 |

802.11b

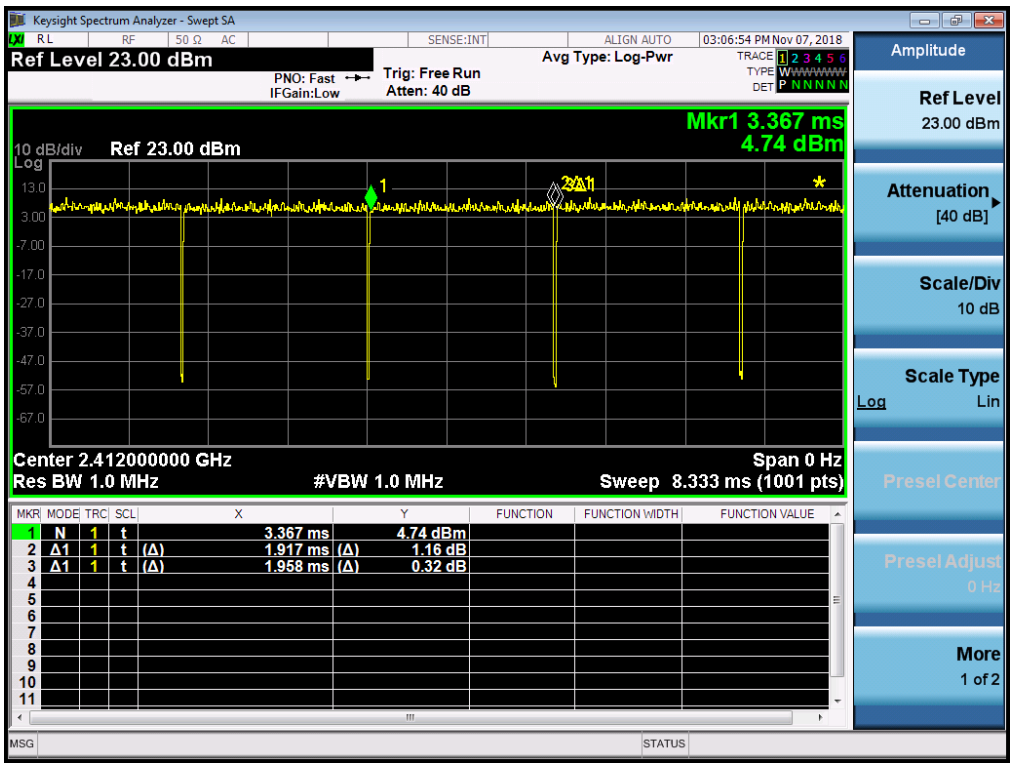


802.11g




Date: 2.AUG.2018 23:11:41

802.11n20



## 10. EMI Reduction Method During Compliance Testing

No modification was made during testing.