***Audix Technology Corp.***
*No. 53-11, Dingfu, Linkou, Dist.,*
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# FCC 15.247
# 2.4 GHz Report

# for

# Tatung Company

# 22, Chungshan N. Rd., 3rd Sec. Taipei Taiwan

**Product Name : IOT Gateway**
**Model Name : IOT-3352**
**Brand : TATUNG**
**FCC ID : BJM-IOT3352**

**Prepared by: : AUDIX Technology Corporation,**
**EMC Department**

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# TEST REPORT CERTIFICATION

| | | |
|---|---|---|
| Applicant | : | Tatung Company |
| EUT Description | | |
| (1) Product | : | IOT Gateway |
| (2) Model | : | IOT-3352 |
| (3) Brand | : | TATUNG |

Applicable Standards:

47 CFR FCC Part 15 Subpart C
ANSI C63.10:2013
KDB 558074 D01 DTS Meas Guidance v04

***Audix Technology Corp.*** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
***Audix Technology Corp.*** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2017. 05. 19

Reviewed by: (Annie Yu/Administrator)

Approved by: (Ben Cheng/Manager)

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# 1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Data | Revision Summary | Report Number |
|---|---|---|---|
| 0 | 2017. 05. 19 | Original Report | EM-F170245 |

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# 2. SUMMARY OF TEST RESULTS

| Rule | Description | Results |
|---|---|---|
| 15.207 | Conducted Emission | **PASS** |
| 15.247(d)/15.205 | Radiated Band Edge and Radiated Spurious Emission | **PASS** |
| 15.247(a)(2) | 6dB Bandwidth | **PASS** |
| 15.247(b)(3) | Maximum Peak Output | **PASS** |
| 15.247(d) | Conducted Band Edges and Conducted Spurious Emission | **PASS** |
| 15.247 (e) | Peak Power Spectral Density | **PASS** |
| 15.203 | Antenna Requirement | **PASS** |

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# 3. GENERAL INFORMATION

## 3.1. Description of Application

| | |
|---|---|
| Applicant | Tatung Company<br>22, Chungshan N. Rd., 3rd Sec. Taipei Taiwan |
| Product | IOT Gateway |
| Model | IOT-3352 |
| Brand | TATUNG |

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## 3.2. Description of EUT

| | |
|---|---|
| Test Model | IOT-3352 |
| Serial Number | N/A |
| Power Rating | DC 12V |
| RF Features | WLAN:802.11/b/g/n<br>Bluetooth: BT and BLE |
| Transmit Type | 2.4 GHz<br>802.11b: 1T1R<br>802.11g: 1T1R<br>802.11n-HT20: 1T1R<br>802.11n-HT40: 1T1R<br>BT/BLE: 1T1R |
| Interface Ports of EUT | One DC IN port<br>One LAN port<br>Two USB ports |
| Accessories | • LTE USB Stick<br>(HUAWEI, Model: E3327h-510, FCC ID: QISE3372H-510)<br>• I.T.E. Power Supply (Wall-mount, 2C)<br>(UNIFIVE, M/N:UV324-1220,<br>Input: AC 100-240V, 50/60Hz, 0.6A, Output: DC 12V, 2A,<br>Power Cord: Unshielded, Ubdetachable, 1.1m) |
| Date of Receipt | 2017. 03. 23 |
| Date of Test | 2017. 04. 14 ~ 05. 15 |

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## 3.3. Antenna Information

| Antenna Part Number | Manufacture | Antenna Type | Frequency (MHz) | Max Gain (dBi) |
|---|---|---|---|---|
| AN2400-5533RS | INVAX System Technology Corp. | Omni-Directional | 2400 to 2500 | **2.2** |

## 3.4. EUT Specifications Assessed in Current Report

| Mode | Fundamental Range (MHz) | Channel Number |
|---|---|---|
| 802.11b | 2412-2462 | 11 |
| 802.11g | | 11 |
| 802.11n-HT20 | | 11 |
| 802.11n-HT40 | 2422-2452 | 7 |
| BLE | 2402-2480 | 40 |

| Mode | Modulation | Data Rate (Mbps) |
|---|---|---|
| 802.11b | DSSS (DBPSK/DQPSK/CCK) | Up to 11 |
| 802.11g | OFDM (BPSK/QPSK/16QAM/64QAM) | Up to 54 |
| 802.11n-HT20 | | Up to 144.4 |
| 802.11n-HT40 | | Up to 150 |
| BLE | GFSK | 1 |

| Channel List | | | |
|---|---|---|---|
| 802.11 b/g/n-HT20 | | 802.11n-HT40 | |
| Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) |
| 1 | 2412 | | |
| 2 | 2417 | | |
| 3 | 2422 | 3 | 2422 |
| 4 | 2427 | 4 | 2427 |
| 5 | 2432 | 5 | 2432 |
| 6 | 2437 | 6 | 2437 |
| 7 | 2442 | 7 | 2442 |
| 8 | 2447 | 8 | 2447 |
| 9 | 2452 | 9 | 2452 |
| 10 | 2457 | | |
| 11 | 2462 | | |

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| Channel List | | | |
|---|---|---|---|
| BLE | | | |
| Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) |
| 37 | 2402 | 18 | 2442 |
| 00 | 2404 | 19 | 2444 |
| 01 | 2406 | 20 | 2446 |
| 02 | 2408 | 21 | 2448 |
| 03 | 2410 | 22 | 2450 |
| 04 | 2412 | 23 | 2452 |
| 05 | 2414 | 24 | 2454 |
| 06 | 2416 | 25 | 2456 |
| 07 | 2418 | 26 | 2458 |
| 08 | 2420 | 27 | 2460 |
| 09 | 2422 | 28 | 2462 |
| 10 | 2424 | 29 | 2464 |
| 38 | 2426 | 30 | 2466 |
| 11 | 2428 | 31 | 2468 |
| 12 | 2430 | 32 | 2470 |
| 13 | 2432 | 33 | 2472 |
| 14 | 2434 | 34 | 2474 |
| 15 | 2436 | 35 | 2476 |
| 16 | 2438 | 36 | 2478 |
| 17 | 2440 | 39 | 2480 |

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## 3.5. Data Rate Relative to Output Power

| 802.11b | | | |
|---|---|---|---|
| Channel | Modulation | Date Rate (Mbps) | **Power (dBm)** |
| 1 | DBPSK | 1 | **17.23** |
| 1 | DQPSK | 2 | **17.22** |
| 1 | CCK | 5.5 | **17.20** |
| 1 | CCK | 11 | **17.18** |

| 802.11g | | | |
|---|---|---|---|
| Channel | Modulation | Date Rate (Mbps) | **Power (dBm)** |
| 1 | BPSK | 6 | **14.23** |
| 1 | BPSK | 9 | **14.23** |
| 1 | QPSK | 12 | **14.22** |
| 1 | QPSK | 18 | **14.22** |
| 1 | 16-QAM | 24 | **14.22** |
| 1 | 16-QAM | 36 | **14.21** |
| 1 | 64-QAM | 48 | **14.21** |
| 1 | 64-QAM | 54 | **14.20** |

| 802.11n-HT20 | | | | 802.11n-HT40 | | | |
|---|---|---|---|---|---|---|---|
| Channel | Modulation | Date Rate | **Power (dBm)** | Channel | Modulation | Date Rate | **Power (dBm)** |
| 1 | BPSK | MCS0 | **13.76** | 3 | BPSK | MCS0 | **13.21** |
| 1 | QPSK | MCS1 | **13.75** | 3 | QPSK | MCS1 | **13.21** |
| 1 | QPSK | MCS2 | **13.75** | 3 | QPSK | MCS2 | **13.20** |
| 1 | 16-QAM | MCS3 | **13.74** | 3 | 16-QAM | MCS3 | **13.20** |
| 1 | 16-QAM | MCS4 | **13.74** | 3 | 16-QAM | MCS4 | **13.19** |
| 1 | 64-QAM | MCS5 | **13.74** | 3 | 64-QAM | MCS5 | **13.19** |
| 1 | 64-QAM | MCS6 | **13.74** | 3 | 64-QAM | MCS6 | **13.19** |
| 1 | 64-QAM | MCS7 | **13.73** | 3 | 64-QAM | MCS7 | **13.18** |

Note: Above results are assessed in peak power.

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## 3.6. Test Configuration

| Mode | Duty Cycle (x) | T (ms) | Duty Cycle Factor (dB) |
|---|---|---|---|
| 802.11b | 0.89 | 1.304 | 0.51 |
| 802.11g | 0.64 | 0.2448 | 1.94 |
| 802.11n-HT20 | 0.57 | 0.2272 | 2.44 |
| 802.11n-HT40 | 0.52 | 0.128 | 2.84 |
| BLE | 0.64 | 0.400 | 1.94 |

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.

| AC Conduction | |
|---|---|
| Test Case | Normal operation |

| Item | | Mode | Data Rate | Test Channel |
|---|---|---|---|---|
| Radiated Test Case | Radiated Band Edge Note1 | 802.11b | 1Mbps | 1/11 |
| | | 802.11g | 6Mbps | 1/11 |
| | | 802.11n-HT20 | MCS7 | 1/11 |
| | | 802.11n-HT40 | MCS7 | 3/9 |
| | | BLE | 1Mbps | 37/39 |
| | Radiated Spurious Emission Note1 & 2 | 802.11b | 1 Mbps | 6 |
| | | 802.11g | 6Mbps | 6 |
| | | 802.11n-HT20 | MCS7 | 11 |
| | | 802.11n-HT40 | MCS7 | 9 |
| | | BLE | 1Mbps | 37/17/39 |

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| Item | | Mode | Data Rate | Test Channel |
|---|---|---|---|---|
| Conducted Test Case | 6dB Bandwidth | 802.11b | 1Mbps | 1/6/11 |
| | | 802.11g | 6Mbps | 1/6/11 |
| | | 802.11n-HT20 | MCS8 | 1/6/11 |
| | | 802.11n-HT40 | MCS8 | 3/6/9 |
| | | BLE | 1Mbps | 37/17/39 |
| | Peak Power Spectral Density | 802.11b | 1Mbps | 1/6/11 |
| | | 802.11g | 6Mbps | 1/6/11 |
| | | 802.11n-HT20 | MCS8 | 1/6/11 |
| | | 802.11n-HT40 | MCS8 | 3/6/9 |
| | | BLE | 1Mbps | 37/17/39 |
| | Peak Output Power | 802.11b | 1Mbps | 1/6/11 |
| | | 802.11g | 6Mbps | 1/6/11 |
| | | 802.11n-HT20 | MCS8 | 1/6/11 |
| | | 802.11n-HT40 | MCS8 | 3/6/9 |
| | | BLE | 1Mbps | 37/17/39 |
| | Band Edge | 802.11b | 1Mbps | 1/11 |
| | | 802.11g | 6Mbps | 1/11 |
| | | 802.11n-HT20 | MCS8 | 1/11 |
| | | 802.11n-HT40 | MCS8 | 3/9 |
| | | BLE | 1Mbps | 37/17/39 |
| | Spurious Emission | 802.11b | 1Mbps | 1/6/11 |
| | | 802.11g | 6Mbps | 1/6/11 |
| | | 802.11n-HT20 | MCS8 | 1/6/11 |
| | | 802.11n-HT40 | MCS8 | 3/6/9 |
| | | BLE | 1Mbps | 37/17/39 |

Note 1:
■Mobile Device
☐Portable Device, and 3 axis were assessed.
- ☐ Lie
- ☐ Side
- ☐ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

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## 3.7. Tested Supporting System List

### 3.7.1. Support Peripheral Unit

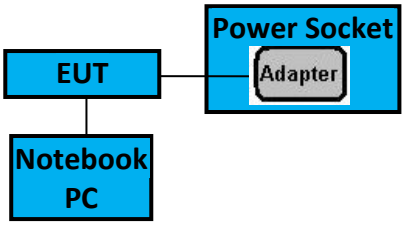
| No. | Product | Brand | Model No. | Serial No. | FCC ID |
|---|---|---|---|---|---|
| 1. | Notebook PC | ASUS | PU301L | N/A | N/A |
| 2. | Power Socket | N/A | N/A | N/A | N/A |

### 3.7.2. Cable Lists

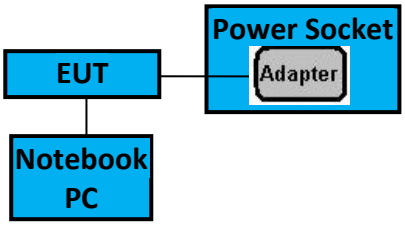
| No. | Cable Description Of The Above Support Units |
|---|---|
| 1. | LAN Cable: Shielded, Detachable, 1.5m<br>Adapter: ACBEL, M/N AA90PM111<br>Cord: Unshielded, Detachable, 1.8m<br>AC Power Cord: Shielded, Undetachable, 1.8m, with one ferrite core |
| 2. | Power Cable: Unshielded, Detachable, 1.5m |

## 3.8. Setup Configuration

### 3.8.1. EUT Configuration for Power Line & Radiated Emission




### 3.8.2. EUT Configuration for RF Conducted Test Items




## 3.9. Operating Condition of EUT

Test programs ”tftpd32” and ”PuTTY” are used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

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## 3.10.Description of Test Facility

| | |
|---|---|
| Name of Test Firm | Audix Technology Corporation / EMC Department<br>No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan<br>Tel: +886-2-26092133<br>Fax: +886-2-26099303<br>Website : www.audixtech.com<br>Contact e-mail: sales@audixtech.com |
| Accreditations | The laboratory is accredited by following organizations under ISO/IEC 17025:2005<br>(1) NVLAP(USA)<br>NVLAP Lab Code 200077-0<br>(2) TAF(Taiwan)<br>No. 1724<br>(3) FCC OET Designation<br>No. TW1004 & TW1090 |
| Test Facilities | (1) No. 8 Shielding Room<br>(2) Semi-Anechoic Chamber<br>(IC Test Site Registration No.: 5183B-1)<br>(3) Fully Anechoic Chamber<br>(IC Test Site Registration No.: 5183B-4) |

## 3.11.Measurement Uncertainty

| Test Item | Frequency Range | Uncertainty |
|---|---|---|
| Conduction Test | 150kHz~30MHz | ±3.50dB |
| Radiation Test (Distance: 3m) | 30MHz~1000MHz | ± 3.68dB |
| | Above 1GHz | ± 5.82dB |

Remark：Uncertainty = $ku_c(y)$

| Test Item | Uncertainty |
|---|---|
| 6dB Bandwidth | ± 0.05kHz |
| Maximum peak output power | ± 0.33dB |
| Power spectral density | ± 0.13dB |
| Conducted Emission Limitations | ± 0.13dB |

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# 4. MEASUREMENT EQUIPMENT LIST

## 4.1. Conducted Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | Test Receiver | R&S | ESR3 | 101774 | 2017. 02. 07 | 1 Year |
| 2. | A.M.N. | R&S | ENV4200 | 100169 | 2016 .11. 11 | 1 Year |
| 3. | L.I.S.N. | Kyoritsu | KNW-407 | 8-855-9 | 2016. 12. 23 | 1 Year |
| 4. | Pulse Limiter | R&S | ESH3-Z2 | 100354 | 2017. 01. 16 | 1 Year |
| 5. | Test Software | Audix | e3 | V.6.120424 | N.C.R. | N.C.R. |

## 4.2. Radiated Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | Agilent | N9010A-526 | MY53400071 | 2016. 09. 19 | 1 Year |
| 2. | Test Receiver | R&S | ESCS30 | 100338 | 2016. 06. 22 | 1 Year |
| 3. | Amplifier | HP | 8447D | 2944A06305 | 2017. 02. 16 | 1 Year |
| 4. | Amplifier | HP | 8449B | 3008A00529 | 2017. 02. 08 | 1 Year |
| 5. | Bilog Antenna | CHASE | CBL6112D | 33821 | 2017. 01. 21 | 1 Year |
| 6. | Loop Antenna | R&S | HFH2-Z2 | 891847/27 | 2016. 12. 23 | 1 Year |
| 7. | Double-Ridged Waveguide Horn | ETS-Lindgren | 3117 | 00135902 | 2017. 03. 07 | 1 Year |
| 8. | 2.4GHz Notch Filter | K&L | 7NSL10-244 1.5E130.5-00 | 1 | 2016. 07. 28 | 1 Year |
| 9. | Test Software | Audix | e3 | V.6.110601 | N.C.R. | N.C.R. |

## 4.3. RF Conducted Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | Agilent | N9010A-526 | MY52220368 | 2016. 12. 01 | 1 Year |
| 2. | Power Meter | Anritsu | ML2495A | 1145008 | 2016. 10. 27 | 1 Year |
| 3. | Power Sensor | Anritsu | MA2411B | 1126096 | 2016. 10. 27 | 1 Year |

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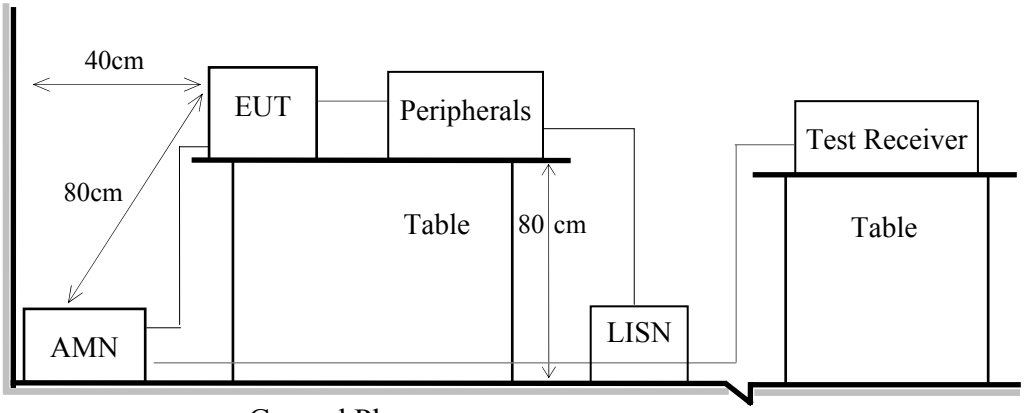
# 5. CONDUCTED EMISSION

## 5.1. Block Diagram of Test Setup

### 5.1.1. Block Diagram of EUT

Indicated as section 3.9

### 5.1.2. Shielded Room Setup Diagram




## 5.2. Conducted Emission Limit

| Frequency | Conducted Limit | |
|---|---|---|
| | Quasi-Peak Level | Average Level |
| 150kHz ~ 500kHz | 66 ~ 56 dBμV | 56 ~ 46 dBμV |
| 500kHz ~ 5MHz | 56 dBμV | 46 dBμV |
| 5MHz ~ 30MHz | 60 dBμV | 50 dBμV |

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.
2.: The lower limit applies to the band edges.

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## 5.3. Test Procedure

5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.

5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).

5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)

5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

## 5.4. Test Results

Please refer to Appendix A.

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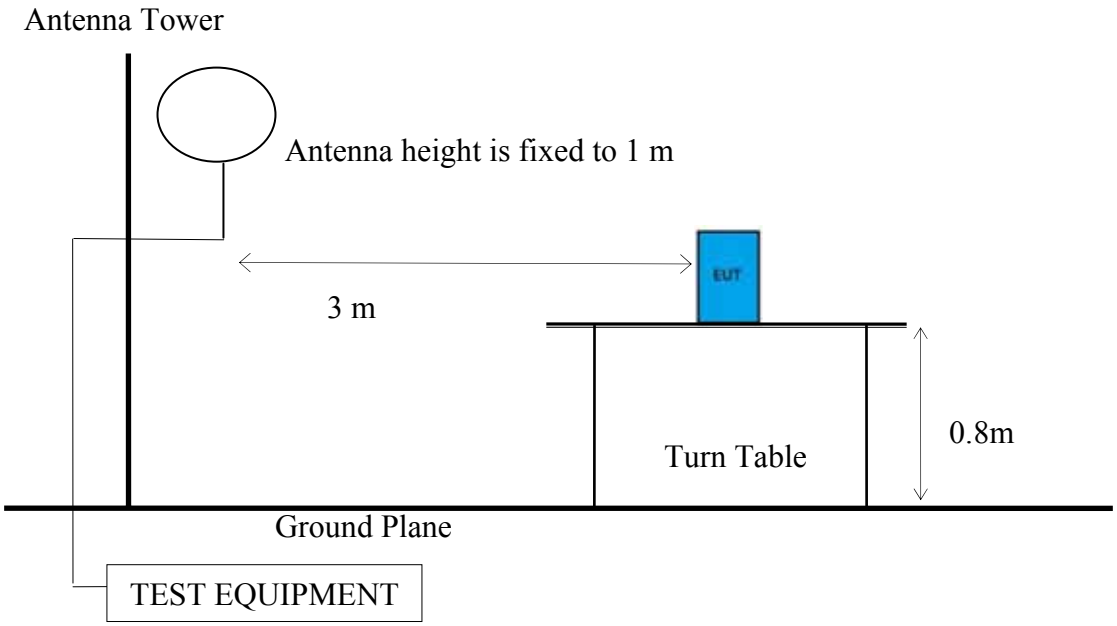
# 6. RADIATED EMISSION

## 6.1. Block Diagram of Test Setup

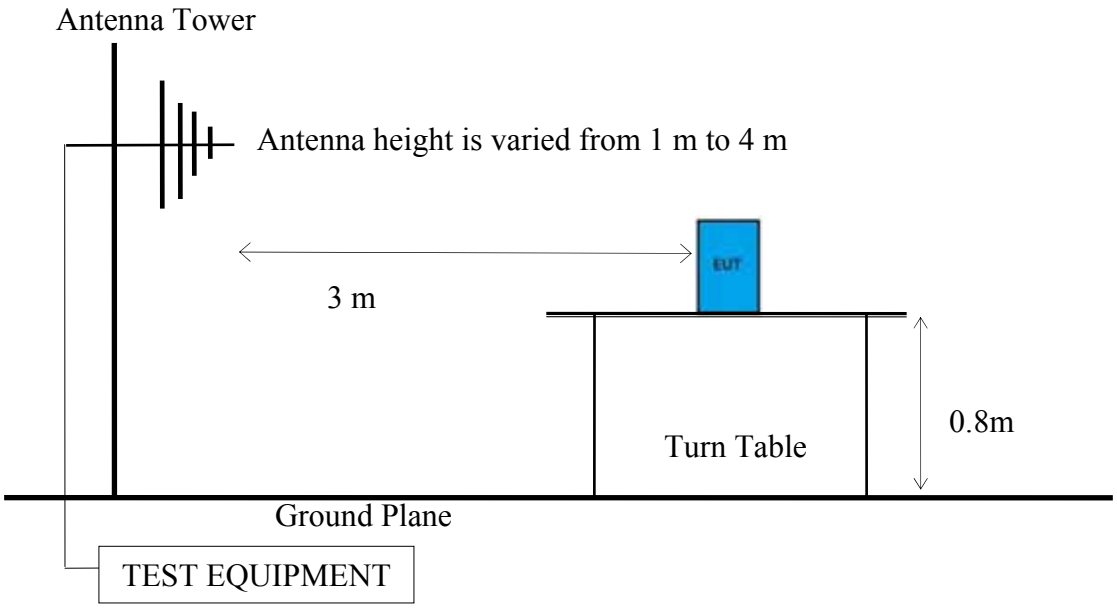
### 6.1.1. Block Diagram of EUT

Indicated as section 3.9

### 6.1.2. Setup Diagram for 9kHz-30MHz




### 6.1.3. Setup Diagram for 30-1000 MHz



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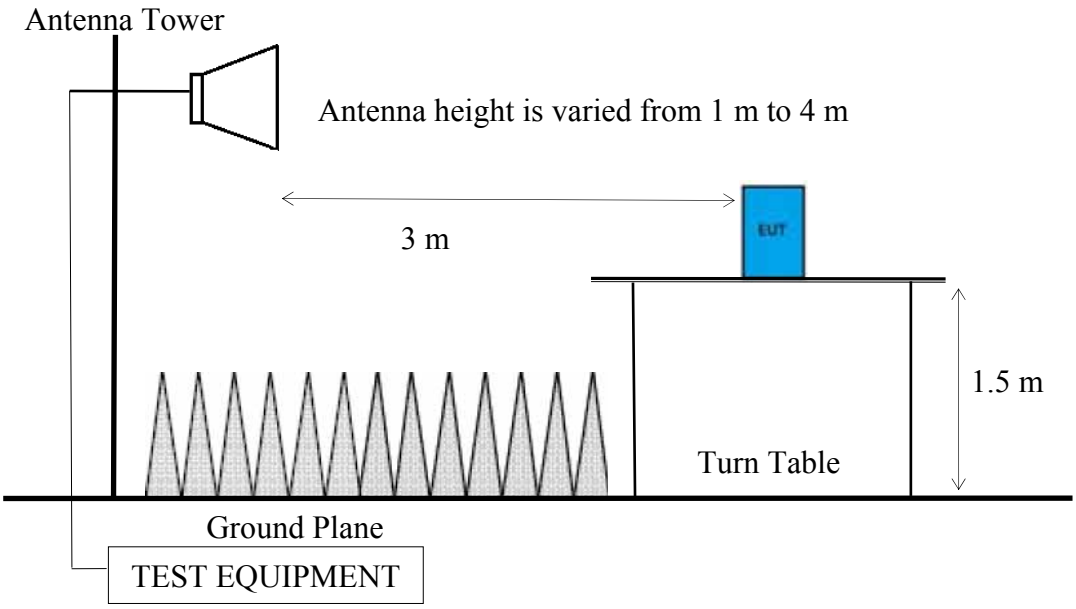
6.1.4. Setup Diagram for above 1GHz




## 6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205 must also comply with the radiated emission limits specified as below.

| Frequency (MHz) | Distance (m) | Limits | |
|---|---|---|---|
| | | dBμV/m | μV/m |
| 0.009 - 0.490 | 300 | 67.6 | 2400/kHz |
| 0.490 - 1.705 | 30 | 87.6 | 24000/kHz |
| 1.705 - 30 | 30 | 29.5 | 30 |
| 30 - 88 | 3 | 40.0 | 100 |
| 88- 216 | 3 | 43.5 | 150 |
| 216- 960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |
| Above 1000 | 3 | 74.0 dBμV/m (Peak)<br>54.0 dBμV/m (Average) | |

Remark：(1) dBμV/m = 20 log (μV/m)
(2) The tighter limit applies to the edge between two frequency bands.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(4) Fundamental and emission fall within operation band are exempted from this section.
(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

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## 6.3. Test Procedure

**Frequency Range 9kHz~30MHz:**
The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.
In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.
(2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

**Frequency Range 30MHz ~ 25GHz:**
The EUT setup on the turn find table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

**Frequency below 1 GHz:**
Spectrum Analyzer is used for pre-testing with following setting:
(1)RBW = 120KHz
(2)VBW ≥ 3 x RBW.
(3)Detector = Peak.
(4)Sweep time = auto.
(5)Trace mode = max hold.
(6)Allow sweeps to continue until the trace stabilizes.
(7)When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

**Frequency above 1GHz to 10th harmonic (up to 25 GHz):**
**Peak Detector:**
(1)RBW = 1MHz
(2)VBW ≥ 3 x RBW.
(3)Detector = Peak.
(4)Sweep time = auto.
(5)Trace mode = max hold.
(6)Allow sweeps to continue until the trace stabilizes.
(7)When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average detector for finally measurement.

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**Average Detector:**

■**Option 1:**

(1)RBW = 1MHz

(2)VBW ≥ 1/ T.

| Modulation Type | T (ms) | 1/ T (kHz) | VBW Setting (kHz) |
|---|---|---|---|
| 802.11b | 1.304 | 0.7686 | 0.767 |
| 802.11g | 0.2448 | 4.0850 | 4.085 |
| 802.11n-HT20 | 0.2272 | 4.4014 | 4.400 |
| 802.11n-HT40 | 0.128 | 7.8125 | 7.810 |
| BLE | 0.400 | 2.500 | 2.500 |

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is ≥98 %.

(1)Detector = Peak.

(2)Sweep time = auto.

(3)Trace mode = max hold.

(4)Allow sweeps to continue until the trace stabilizes.

☐**Option 2:**

Average Emission Level= Peak Emission Level+ D.C.C.F.

## 6.4. Measurement Result Explanation

■Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading

■Average Emission Level l=Antenna Factor + Cable Loss + Meter Reading

☐Average Emission Level= Peak Emission Level+ DCCF

Duty Cycle Correction Factor (DCCF)= 20log ($TX_{on}/TX_{on+off}$) presented in section 3.7

☐ERP= Peak Emission Level-95.2dB-2.14dB

## 6.5. Test Results

Please refer to Appendix A.

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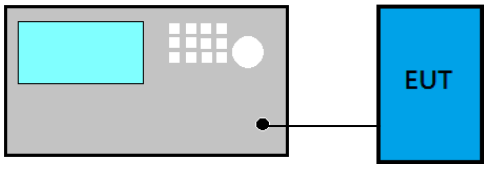
# 7. 6dB BANDWIDTH

## 7.1. Block Diagram of Test Setup




## 7.2. Specification Limits

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

## 7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

(1) Set RBW = 100 kHz.
(2) Set the video bandwidth (VBW) ≥ 3 × RBW.
(3) Detector = Peak.
(4) Trace mode = max hold.
(5) Sweep = auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

## 7.4. Test Results

Please refer to Appendix A

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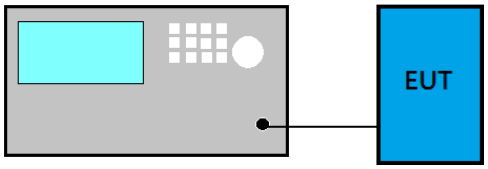
# 8. MAXIMUM PEAK OUTPUT POWER

## 8.1. Block Diagram of Test Setup

8.1.1. For WLAN Function


8.1.2. For BLE Function




## 8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

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## 8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■**PKPM1 Peak power meter method:**

EUT is connected to power sensor and record the maximum output power.

□**Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

■**Method AVGSA-2 (Spectrum channel power)**

(1) Set span to at least 1.5 times the OBW
(2) Set RBW = 1 -5% of OBW
(3) Set the video bandwidth (VBW) ≥ 3 × RBW.
(4) Detector = RMS.
(5) Trace mode = trace average at least 100 traces
(6) Sweep = auto couple.
(7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
(8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

## 8.4. Test Results

Please refer to Appendix A

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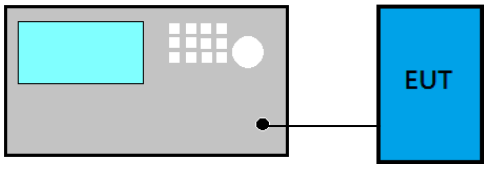
# 9. EMISSION LIMITATIONS

## 9.1. Block Diagram of Test Setup




## 9.2. Specification Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in 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)).

## 9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

**■Reference Level**

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize to find the max PSD as reference level.

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**■Emission Level Measurement**

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize to find the max level.

## 9.4. Test Results

Please refer to Appendix A

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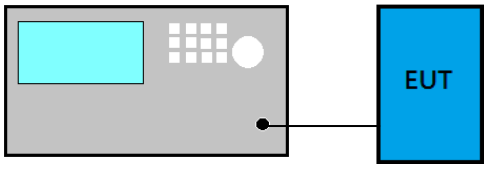
# 10. POWER SPECTRAL DENSITY

## 10.1. Block Diagram of Test Setup




## 10.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

## 10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

**■Method PKPSD (peak PSD)**

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize.
(9) Use the peak marker function to determine the maximum amplitude level.
(10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

**□Method AVGPSD-2**

(1) Using peak PSD procedure step 1 to step 4.
(2) Detector= RMS detector
(3) Sweep time = auto couple
(4) Trace mode = trace averaging over a minimum of 100 traces
(5) Use the peak marker function to determine the maximum amplitude level.
(6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
(7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## 10.4. Test Results

Please refer to Appendix A

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# 11. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: IOT-3352)

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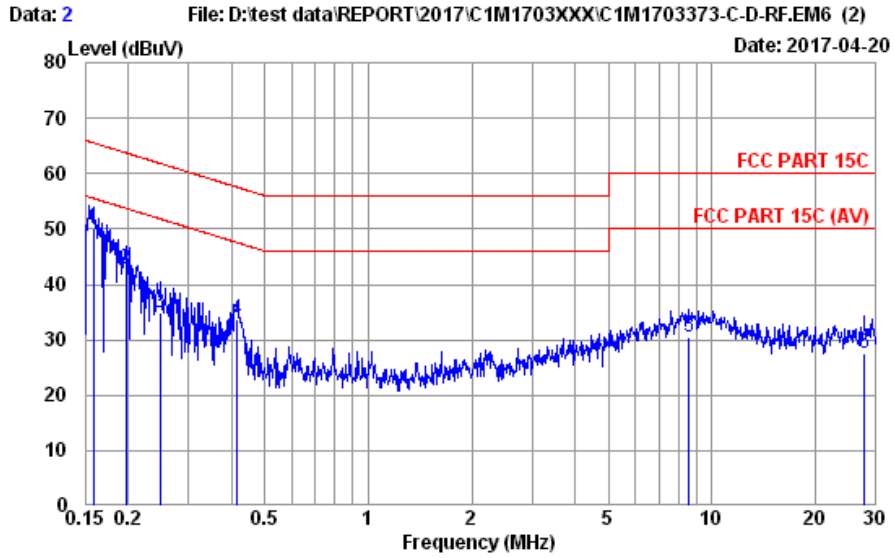
# A.1 CONDUCTED EMISSION

| Test Date | 2017/04/20 | Temp./Hum. | 22℃/57% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz (Via Power Supply) | | |




```
Site no.      : No.8 Shielded Room          Data no.   : 2
Condition     : ENV4200 100169              LISN Phase : NEUTRAL
Limit         : FCC PART 15C
Env. / Ins.   : 22°C / 57% ESR3 (1774)      Engineer   : Jemy
EUT           : IOT-3352
Power Rating  : 120Vac/60Hz
Test Mode     : Operating
```

| | Freq. (MHz) | AMN Factor (dB) | Cable Loss (dB) | Pulse Att. (dB) | Emission Reading (dBµV) | Emission Level (dBµV) | Limits (dBµV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.158 | 11.47 | 0.03 | 9.86 | 28.76 | 50.12 | 65.56 | 15.44 | QP |
| 2 | 0.197 | 11.30 | 0.03 | 9.86 | 21.74 | 42.93 | 63.76 | 20.83 | QP |
| 3 | 0.248 | 11.21 | 0.03 | 9.86 | 13.72 | 34.82 | 61.82 | 27.00 | QP |
| 4 | 0.415 | 11.05 | 0.04 | 9.86 | 12.67 | 33.62 | 57.55 | 23.93 | QP |
| 5 | 8.592 | 11.98 | 0.18 | 9.88 | 8.40 | 30.44 | 60.00 | 29.56 | QP |
| 6 | 27.855 | 16.35 | 0.32 | 9.98 | 0.99 | 27.64 | 60.00 | 32.36 | QP |

```
Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
         2. If the average limit is met when useing a quasi-peak detector,
            the EUT shall be deemed to meet both limits and measurement
            with average detector is unnecessary.
```

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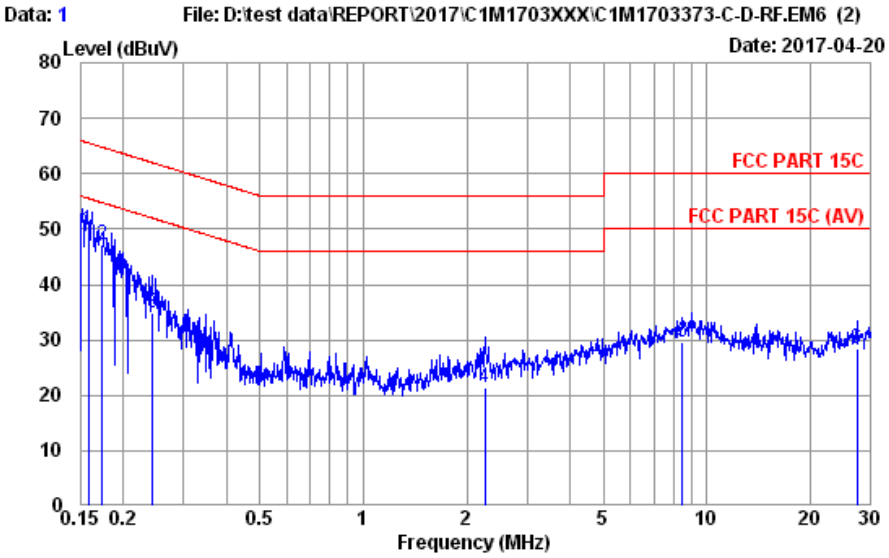
| Test Date | 2017/04/20 | Temp./Hum. | 23℃/52% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz (Via Power Supply) | | |




Site no. : No.8 Shielded Room Data no. : 1
Condition : ENV4200 100169 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 22*C / 57% ESR3 (1774) Engineer : Jemy
EUT : IOT-3352
Power Rating : 120Vac/60Hz
Test Mode : Operating

| | Freq. (MHz) | AMN Factor (dB) | Cable Loss (dB) | Pulse Att. (dB) | Reading (dBµV) | Emission Level (dBµV) | Limits (dBµV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.158 | 10.78 | 0.03 | 9.86 | 29.19 | 49.86 | 65.56 | 15.70 | QP |
| 2 | 0.174 | 10.77 | 0.03 | 9.86 | 26.55 | 47.21 | 64.77 | 17.56 | QP |
| 3 | 0.243 | 10.71 | 0.03 | 9.86 | 14.25 | 34.85 | 62.00 | 27.15 | QP |
| 4 | 2.261 | 10.61 | 0.09 | 9.86 | 0.88 | 21.44 | 56.00 | 34.56 | QP |
| 5 | 8.501 | 11.18 | 0.18 | 9.88 | 8.33 | 29.57 | 60.00 | 30.43 | QP |
| 6 | 27.271 | 15.31 | 0.32 | 9.98 | 2.71 | 28.32 | 60.00 | 31.68 | QP |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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# A.2 RADIATED EMISSION

| Test Date | 2017/04/20 ~ 05/15 | Temp./Hum. | 24~26℃/41~43% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz (Via Power Supply) | | |

A.2.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

**The emissions (9kHz~30MHz) not reported for there is no emission be found.**

A.2.1.2 Frequency Below 1 GHz

| Mode | 802.11g | Frequency | TX 2437MHz |
|---|---|---|---|

Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 335.55 | 20.95 | 4.80 | 17.22 | 42.97 | 46.00 | 3.03 | Peak |
| 384.05 | 22.32 | 5.38 | 10.88 | 38.58 | 46.00 | 7.42 | Peak |
| 749.74 | 26.12 | 7.35 | 11.11 | 44.58 | 46.00 | 1.42 | Peak |

Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 335.55 | 20.95 | 4.80 | 10.04 | 35.79 | 46.00 | 10.21 | Peak |
| 418.00 | 22.94 | 5.72 | 7.63 | 36.29 | 46.00 | 9.71 | Peak |
| 626.55 | 25.01 | 6.85 | 2.79 | 34.65 | 46.00 | 11.35 | Peak |

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| Mode | BLE | Frequency | TX 2402MHz |
|---|---|---|---|

Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 335.55 | 20.95 | 4.80 | 17.22 | 42.97 | 46.00 | 3.03 | Peak |
| 384.05 | 22.32 | 5.38 | 10.88 | 38.58 | 46.00 | 7.42 | Peak |
| 500.45 | 23.77 | 6.43 | 5.73 | 35.93 | 46.00 | 10.07 | Peak |
| 749.74 | 26.12 | 7.35 | 11.11 | 44.58 | 46.00 | 1.42 | Peak |

Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 335.55 | 20.95 | 4.80 | 10.04 | 35.79 | 46.00 | 10.21 | Peak |
| 418.00 | 22.94 | 5.72 | 7.63 | 36.29 | 46.00 | 9.71 | Peak |
| 626.55 | 25.01 | 6.85 | 2.79 | 34.65 | 46.00 | 11.35 | Peak |
| 749.74 | 26.12 | 7.35 | 3.60 | 37.07 | 46.00 | 8.93 | Peak |

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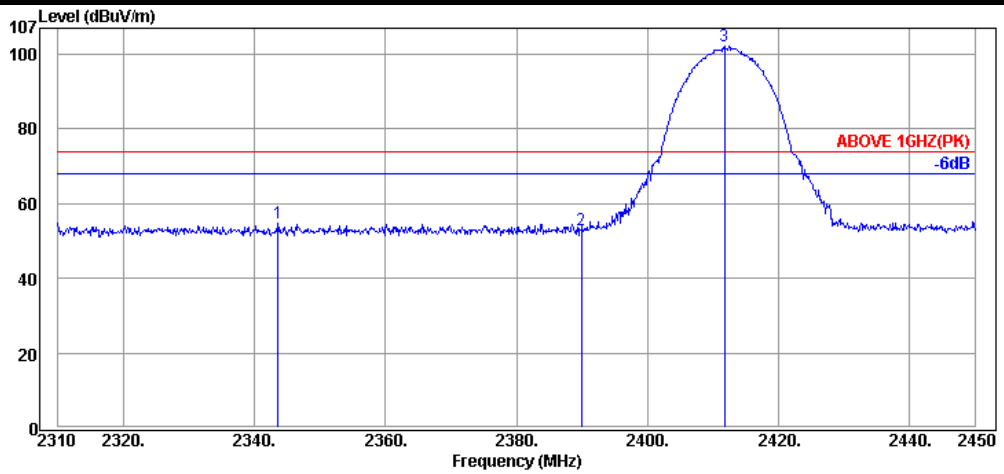
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

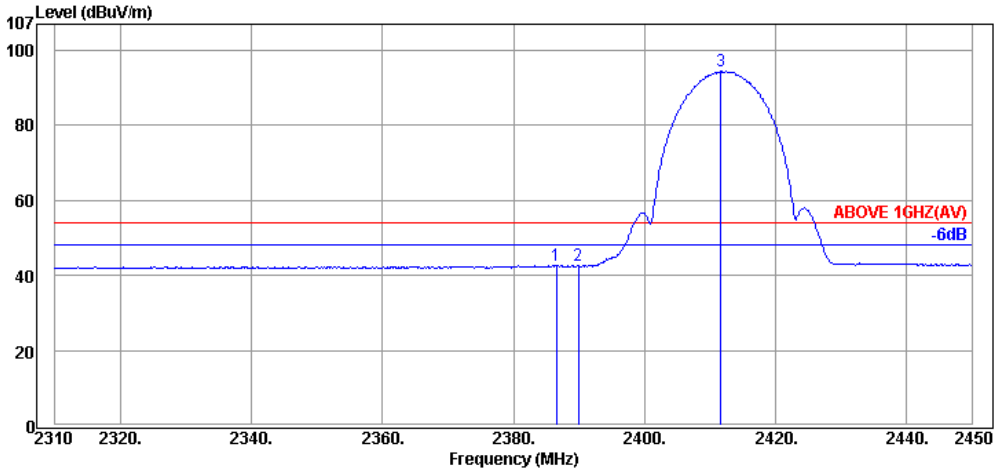
**Band Edge:**

| Mode | 802.11b | Frequency | TX 2412MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2343.60 | 31.63 | 6.02 | 17.07 | 54.72 | 74.00 | 19.28 | Peak |
| 2389.94 | 31.68 | 6.08 | 15.06 | 52.82 | 74.00 | 21.18 | Peak |
| 2411.78 | 31.71 | 6.11 | 64.28 | 102.10 | --- | --- | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2386.58 | 31.68 | 6.07 | 4.95 | 42.70 | 54.00 | 11.30 | Average |
| 2389.94 | 31.68 | 6.08 | 4.91 | 42.67 | 54.00 | 11.33 | Average |
| 2411.64 | 31.71 | 6.11 | 56.64 | 94.46 | --- | --- | Average |

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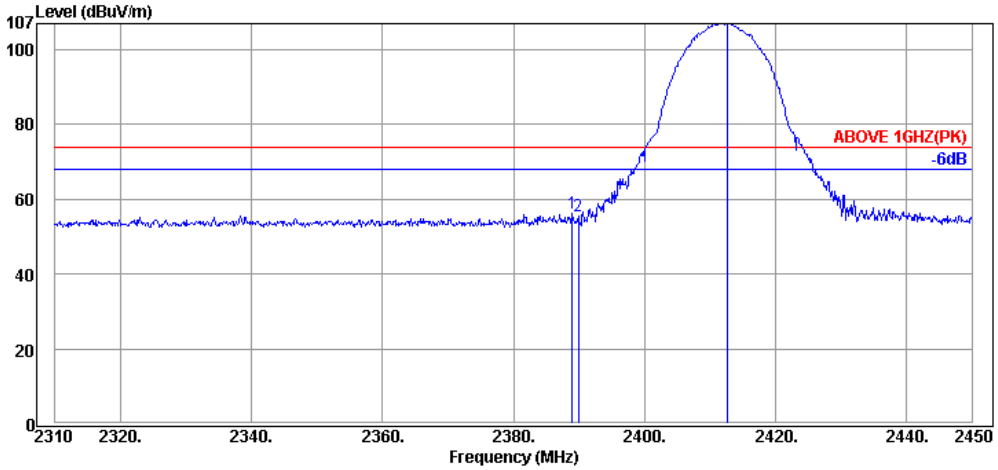
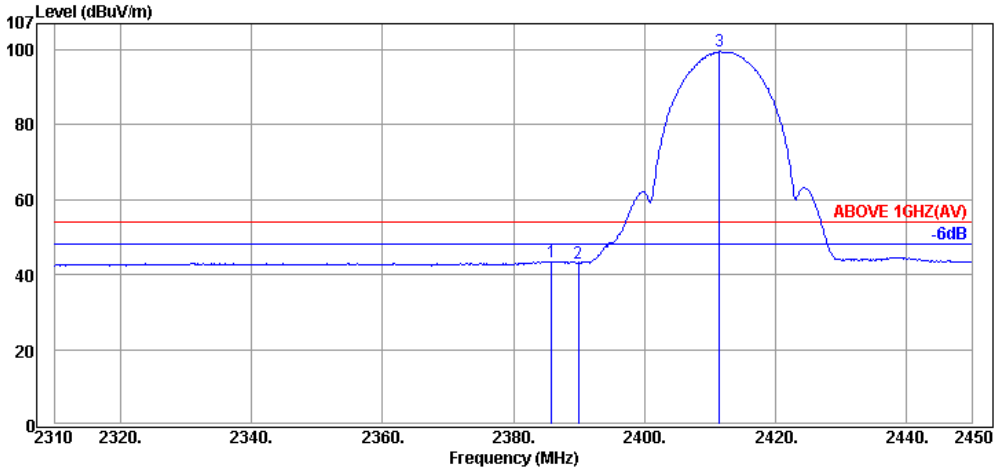
| Mode | 802.11b | Frequency | TX 2412MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2388.96 | 31.68 | 6.08 | 18.63 | 56.39 | 74.00 | 17.61 | Peak |
| 2389.94 | 31.68 | 6.08 | 17.81 | 55.57 | 74.00 | 18.43 | Peak |
| 2412.76 | 31.71 | 6.11 | 69.71 | 107.53 | --- | --- | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2385.88 | 31.68 | 6.07 | 5.73 | 43.48 | 54.00 | 10.52 | Average |
| 2389.94 | 31.68 | 6.08 | 5.44 | 43.20 | 54.00 | 10.80 | Average |
| 2411.50 | 31.71 | 6.11 | 61.79 | 99.61 | --- | --- | Average |

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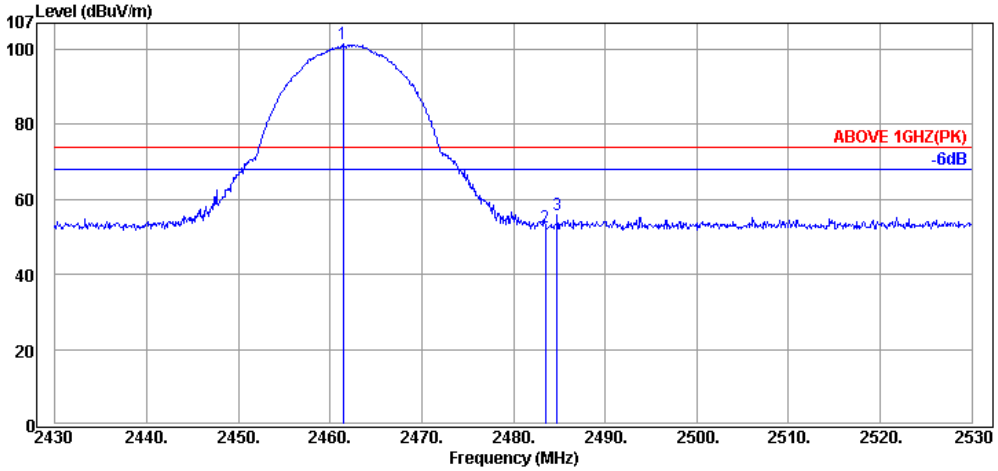
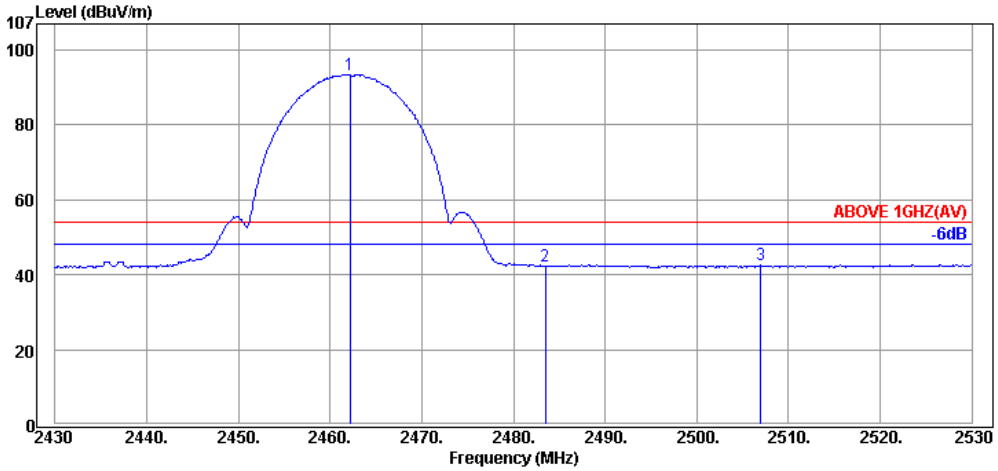
| Mode | 802.11b | Frequency | TX 2462MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2461.40 | 31.76 | 6.16 | 63.50 | 101.42 | --- | --- | Peak |
| 2483.50 | 31.78 | 6.19 | 14.49 | 52.46 | 74.00 | 21.54 | Peak |
| 2484.80 | 31.78 | 6.19 | 17.98 | 55.95 | 74.00 | 18.05 | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2462.20 | 31.76 | 6.16 | 55.47 | 93.39 | --- | --- | Average |
| 2483.50 | 31.78 | 6.19 | 4.43 | 42.40 | 54.00 | 11.60 | Average |
| 2507.00 | 31.81 | 6.21 | 4.57 | 42.59 | 54.00 | 11.41 | Average |

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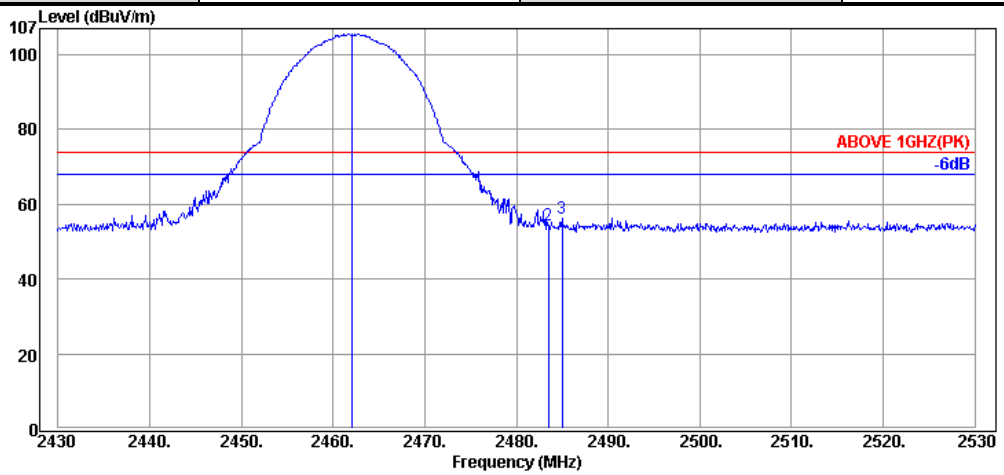
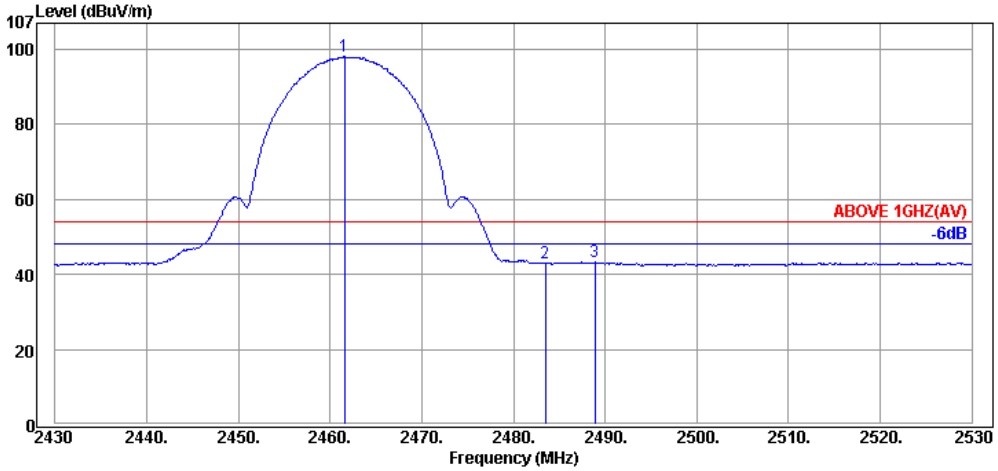
| Mode | 802.11b | Frequency | TX 2462MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2462.10 | 31.76 | 6.16 | 67.73 | 105.65 | --- | --- | Peak |
| 2483.50 | 31.78 | 6.19 | 16.51 | 54.48 | 74.00 | 19.52 | Peak |
| 2485.00 | 31.78 | 6.19 | 18.45 | 56.42 | 74.00 | 17.58 | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2461.60 | 31.76 | 6.16 | 60.10 | 98.02 | --- | --- | Average |
| 2483.50 | 31.78 | 6.19 | 5.02 | 42.99 | 54.00 | 11.01 | Average |
| 2488.90 | 31.78 | 6.19 | 5.27 | 43.24 | 54.00 | 10.76 | Average |

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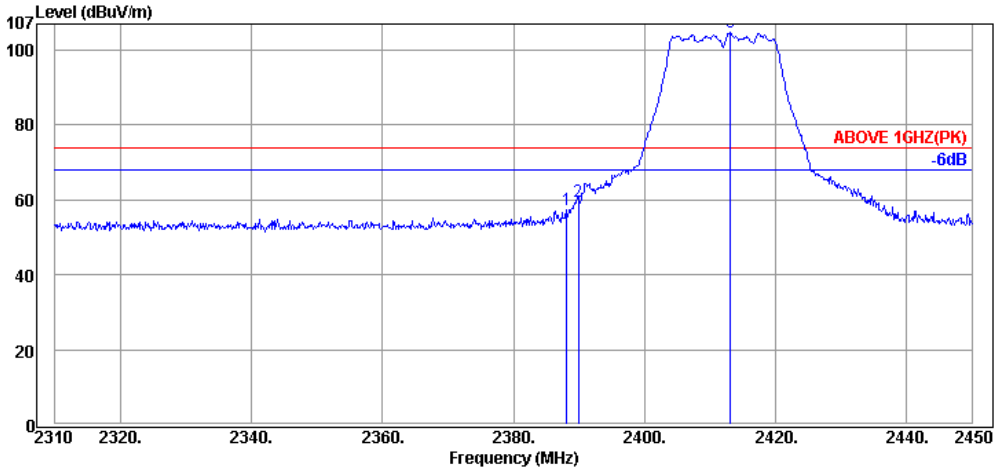
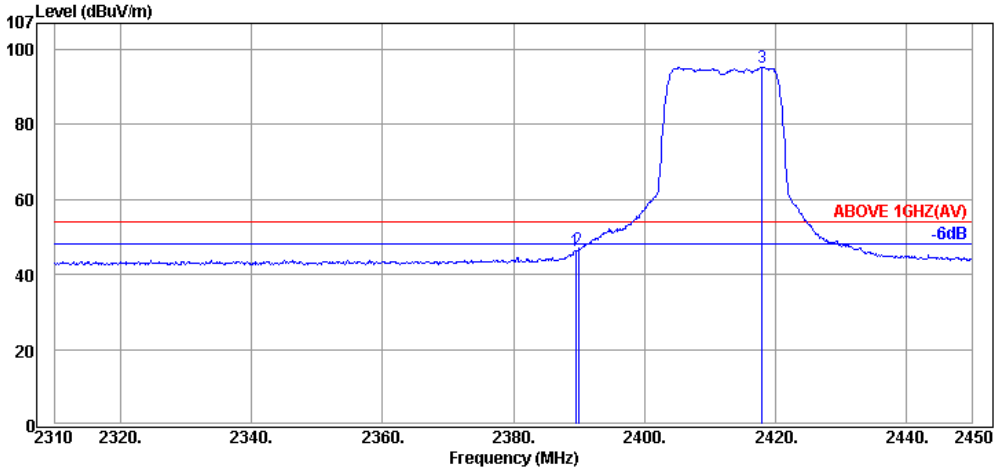
| Mode | 802.11g | Frequency | TX 2412MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2388.12 | 31.68 | 6.08 | 19.52 | 57.28 | 74.00 | 16.72 | Peak |
| 2389.94 | 31.68 | 6.08 | 21.93 | 59.69 | 74.00 | 14.31 | Peak |
| 2413.18 | 31.71 | 6.11 | 67.05 | 104.87 | --- | --- | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2389.52 | 31.68 | 6.08 | 8.62 | 46.38 | 54.00 | 7.62 | Average |
| 2389.94 | 31.68 | 6.08 | 8.89 | 46.65 | 54.00 | 7.35 | Average |
| 2417.94 | 31.71 | 6.11 | 57.53 | 95.35 | --- | --- | Average |

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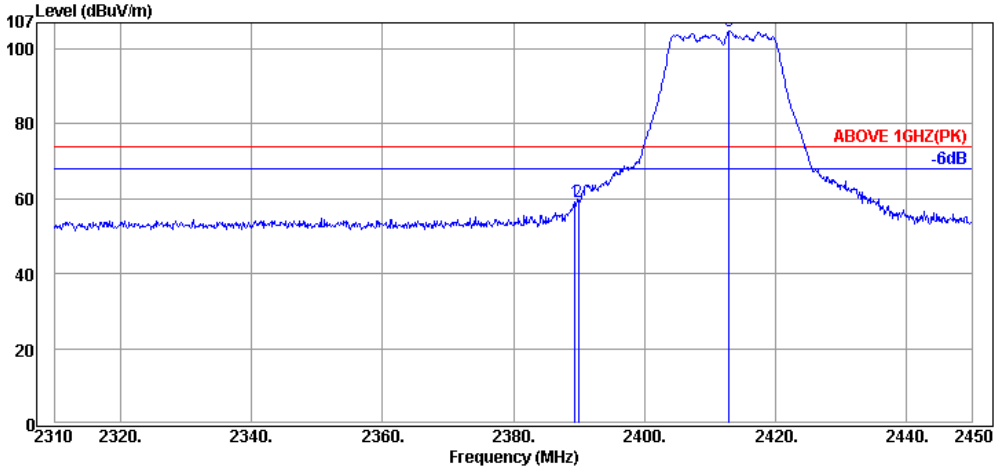
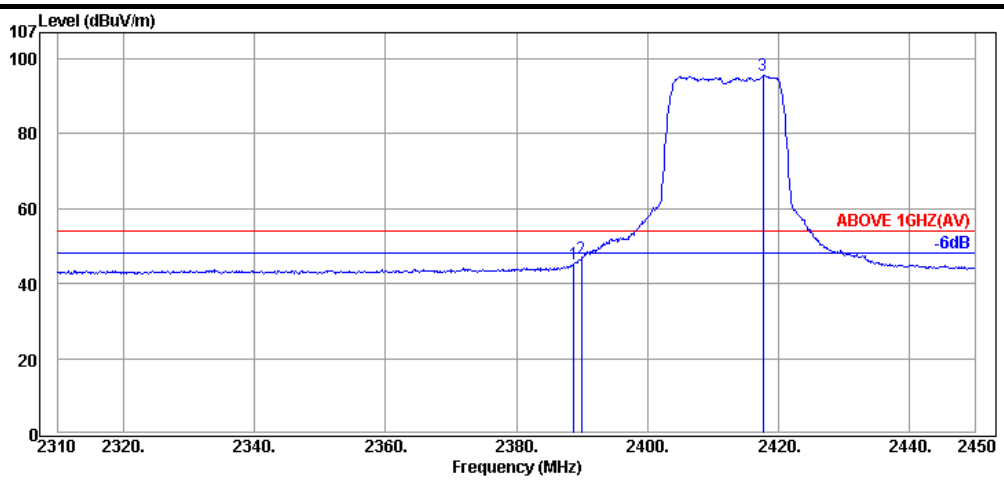
| Mode | 802.11g | Frequency | TX 2412MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2389.38 | 31.68 | 6.08 | 21.31 | 59.07 | 74.00 | 14.93 | Peak |
| 2389.94 | 31.68 | 6.08 | 21.45 | 59.21 | 74.00 | 14.79 | Peak |
| 2412.90 | 31.71 | 6.11 | 67.06 | 104.88 | --- | --- | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2388.82 | 31.68 | 6.08 | 7.56 | 45.32 | 54.00 | 8.68 | Average |
| 2389.94 | 31.68 | 6.08 | 9.06 | 46.82 | 54.00 | 7.18 | Average |
| 2417.66 | 31.71 | 6.11 | 57.79 | 95.61 | --- | --- | Average |

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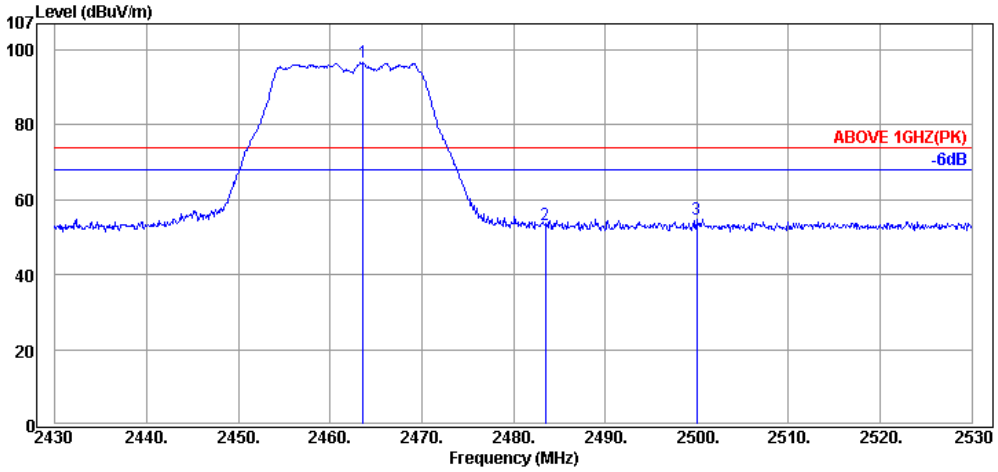
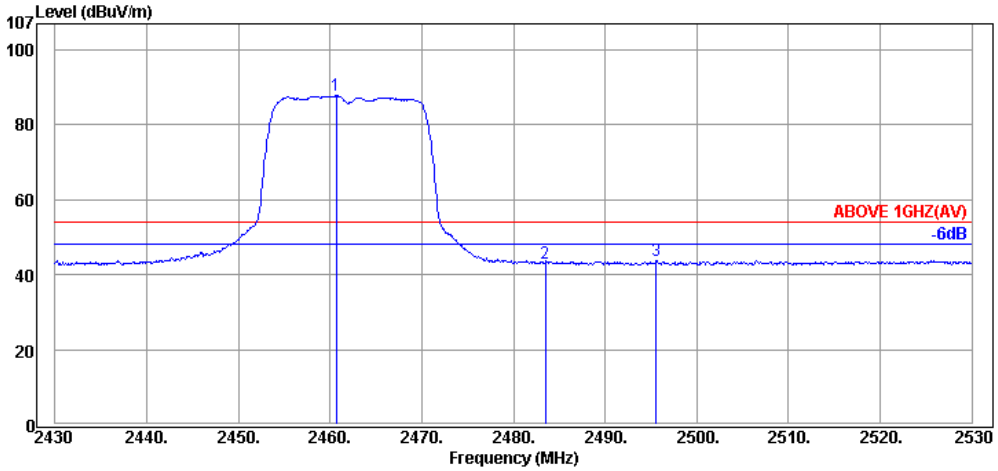
| Mode | 802.11g | Frequency | TX 2462MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2463.60 | 31.76 | 6.16 | 58.78 | 96.70 | --- | --- | Peak |
| 2483.50 | 31.78 | 6.19 | 15.29 | 53.26 | 74.00 | 20.74 | Peak |
| 2500.00 | 31.80 | 6.21 | 16.72 | 54.73 | 74.00 | 19.27 | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2460.70 | 31.76 | 6.16 | 49.90 | 87.82 | --- | --- | Average |
| 2483.50 | 31.78 | 6.19 | 5.05 | 43.02 | 54.00 | 10.98 | Average |
| 2495.60 | 31.79 | 6.20 | 5.66 | 43.65 | 54.00 | 10.35 | Average |

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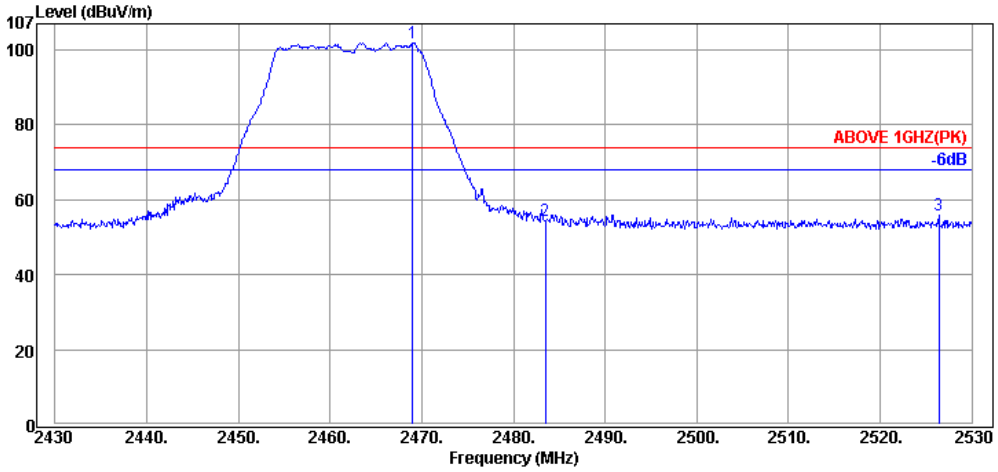
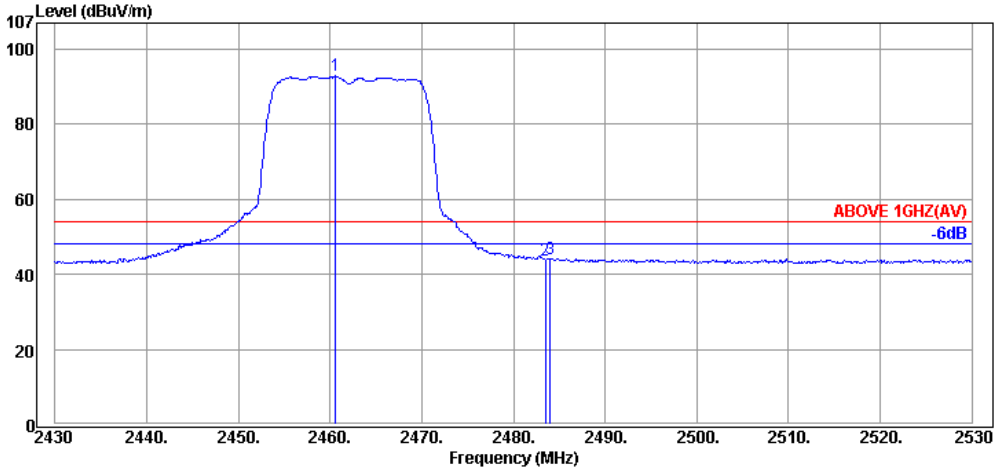
| Mode | 802.11g | Frequency | TX 2462MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2469.00 | 31.77 | 6.17 | 63.94 | 101.88 | --- | --- | Peak |
| 2483.50 | 31.78 | 6.19 | 16.56 | 54.53 | 74.00 | 19.47 | Peak |
| 2526.40 | 31.83 | 6.25 | 17.91 | 55.99 | 74.00 | 18.01 | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2460.60 | 31.76 | 6.16 | 54.94 | 92.86 | --- | --- | Average |
| 2483.50 | 31.78 | 6.19 | 5.96 | 43.93 | 54.00 | 10.07 | Average |
| 2484.00 | 31.78 | 6.19 | 6.23 | 44.20 | 54.00 | 9.80 | Average |

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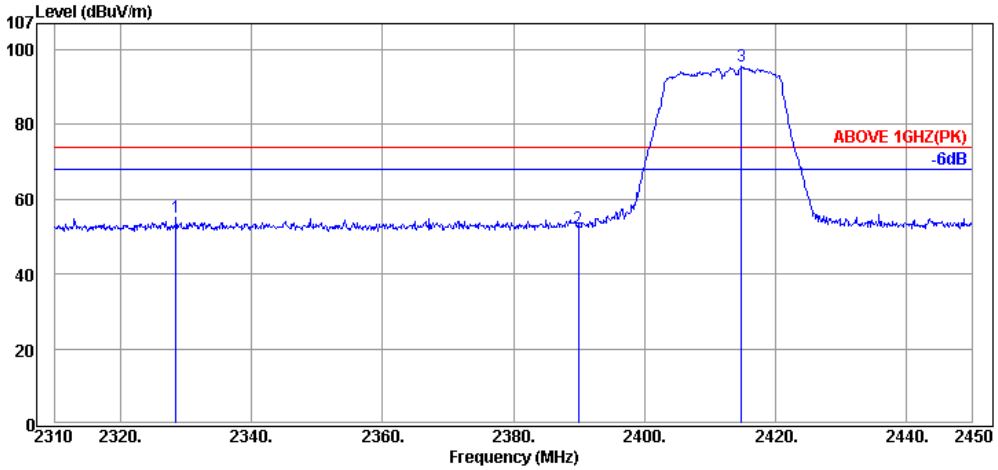
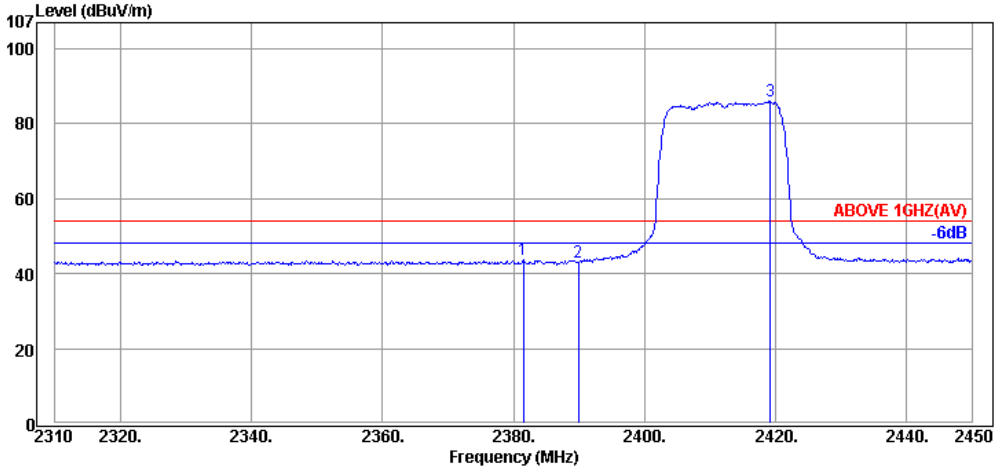
| Mode | 802.11n-HT20 | Frequency | TX 2412MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2328.48 | 31.61 | 6.00 | 17.62 | 55.23 | 74.00 | 18.77 | Peak |
| 2389.94 | 31.68 | 6.08 | 14.63 | 52.39 | 74.00 | 21.61 | Peak |
| 2414.86 | 31.71 | 6.11 | 57.62 | 95.44 | --- | --- | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2381.54 | 31.67 | 6.07 | 5.84 | 43.58 | 54.00 | 10.42 | Average |
| 2389.94 | 31.68 | 6.08 | 5.42 | 43.18 | 54.00 | 10.82 | Average |
| 2419.20 | 31.71 | 6.12 | 48.31 | 86.14 | --- | --- | Average |

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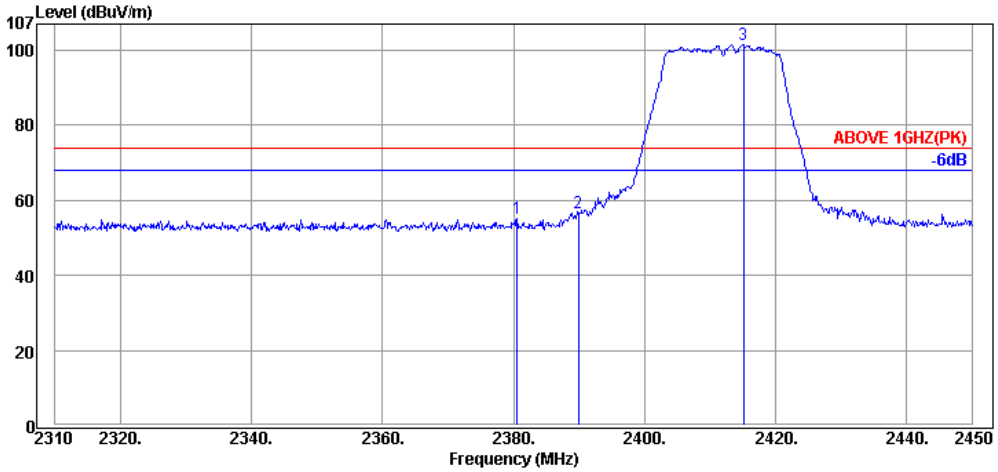
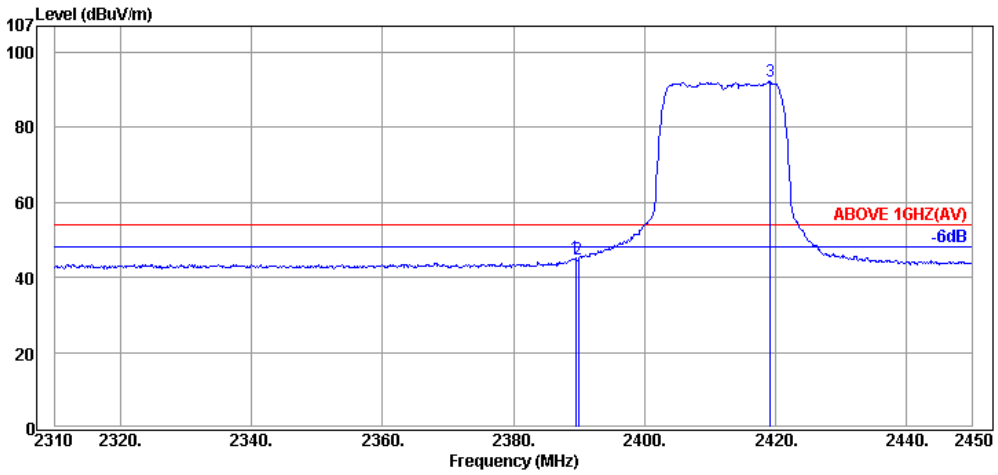
| Mode | 802.11n-HT20 | Frequency | TX 2412MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2380.56 | 31.67 | 6.07 | 17.31 | 55.05 | 74.00 | 18.95 | Peak |
| 2389.94 | 31.68 | 6.08 | 18.87 | 56.63 | 74.00 | 17.37 | Peak |
| 2415.14 | 31.71 | 6.11 | 63.53 | 101.35 | --- | --- | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2389.52 | 31.68 | 6.08 | 7.57 | 45.33 | 54.00 | 8.67 | Average |
| 2389.94 | 31.68 | 6.08 | 7.12 | 44.88 | 54.00 | 9.12 | Average |
| 2419.20 | 31.71 | 6.12 | 54.43 | 92.26 | --- | --- | Average |

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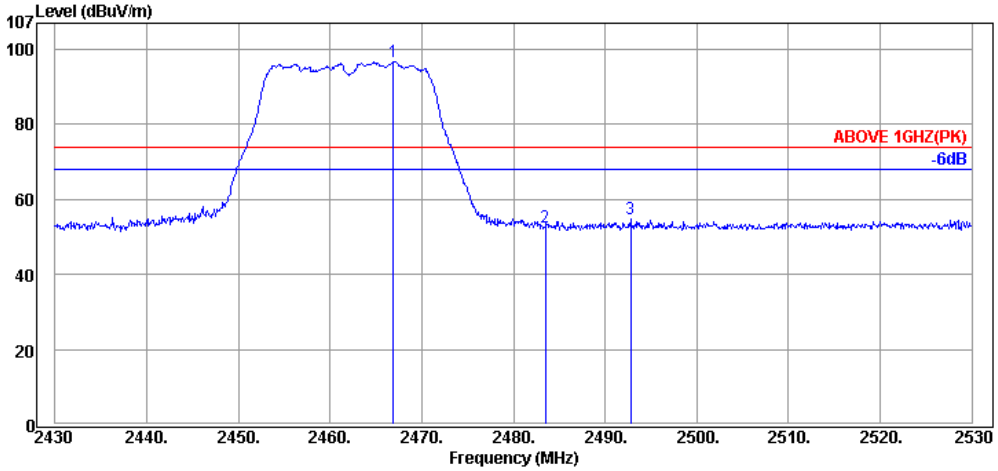
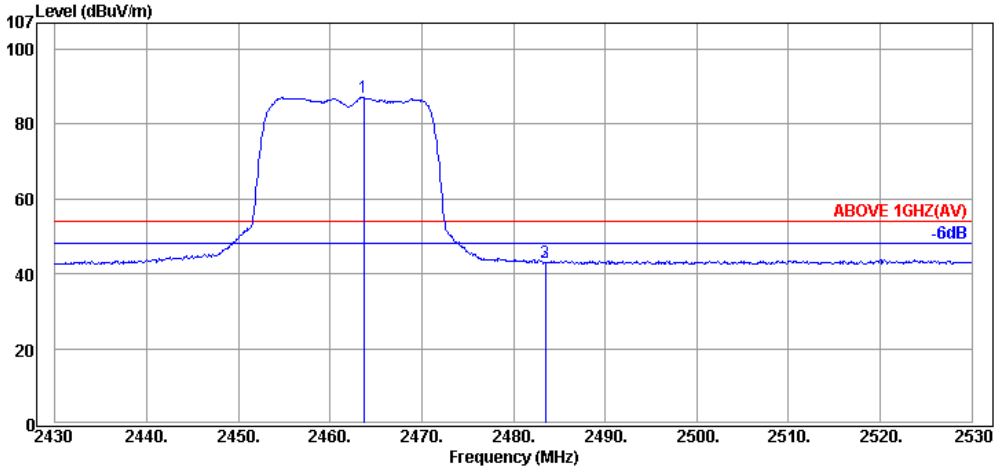
| Mode | 802.11n-HT20 | Frequency | TX 2462MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2466.90 | 31.76 | 6.17 | 58.95 | 96.88 | --- | --- | Peak |
| 2483.50 | 31.78 | 6.19 | 14.73 | 52.70 | 74.00 | 21.30 | Peak |
| 2492.80 | 31.79 | 6.20 | 16.63 | 54.62 | 74.00 | 19.38 | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2463.70 | 31.76 | 6.16 | 49.19 | 87.11 | --- | --- | Average |
| 2483.50 | 31.78 | 6.19 | 5.19 | 43.16 | 54.00 | 10.84 | Average |
| 2483.50 | 31.78 | 6.19 | 5.19 | 43.16 | 54.00 | 10.84 | Average |

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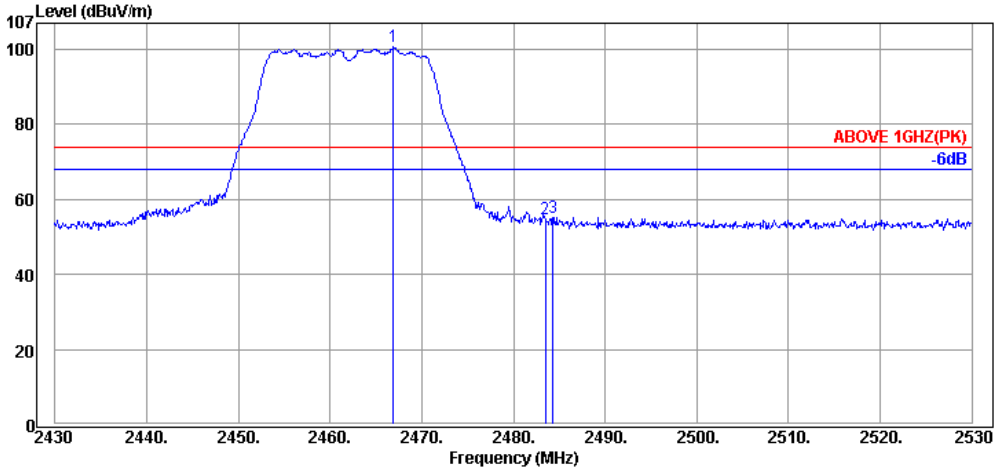
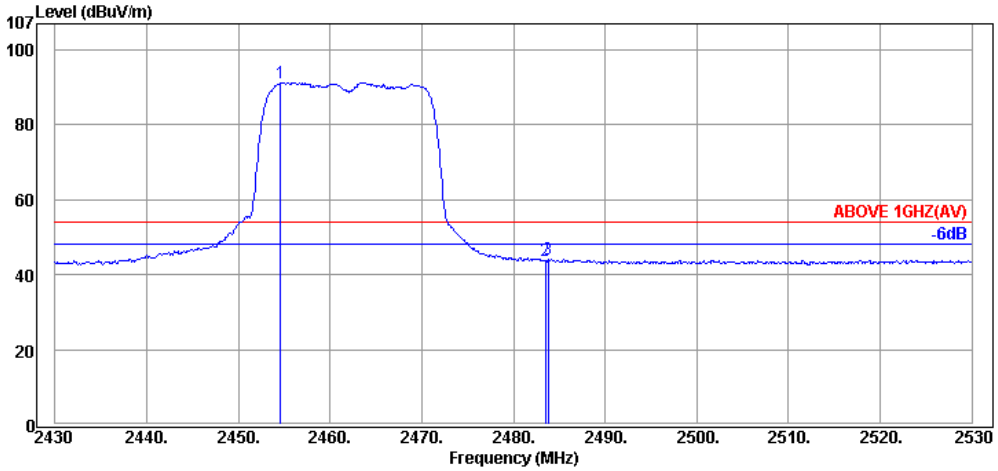
| Mode | 802.11n-HT20 | Frequency | TX 2462MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2466.90 | 31.76 | 6.17 | 62.65 | 100.58 | --- | --- | Peak |
| 2483.50 | 31.78 | 6.19 | 16.97 | 54.94 | 74.00 | 19.06 | Peak |
| 2484.30 | 31.78 | 6.19 | 17.36 | 55.33 | 74.00 | 18.67 | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2454.60 | 31.75 | 6.15 | 53.41 | 91.31 | --- | --- | Average |
| 2483.50 | 31.78 | 6.19 | 5.83 | 43.80 | 54.00 | 10.20 | Average |
| 2483.80 | 31.78 | 6.19 | 6.23 | 44.20 | 54.00 | 9.80 | Average |

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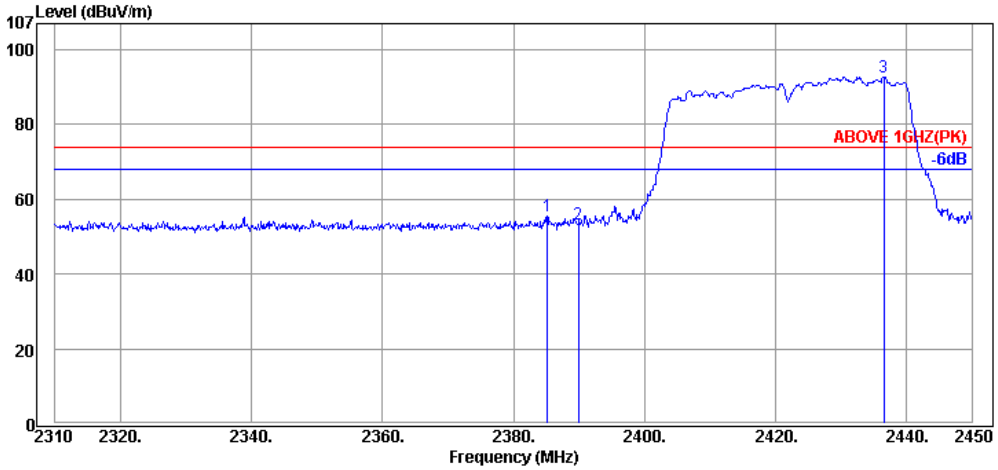
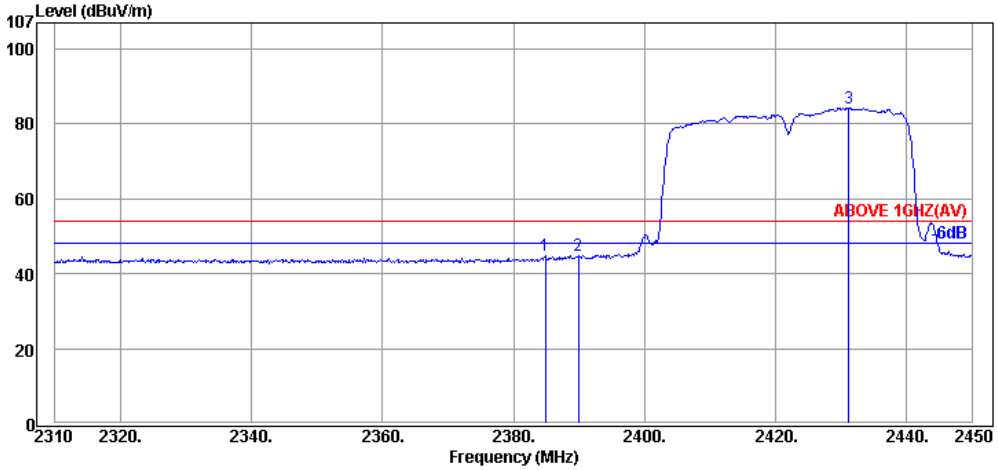
| Mode | 802.11n-HT40 | Frequency | TX 2422MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2385.18 | 31.68 | 6.07 | 17.62 | 55.37 | 74.00 | 18.63 | Peak |
| 2389.94 | 31.68 | 6.08 | 15.66 | 53.42 | 74.00 | 20.58 | Peak |
| 2436.56 | 31.73 | 6.13 | 54.87 | 92.73 | --- | --- | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2384.90 | 31.68 | 6.07 | 7.02 | 44.77 | 54.00 | 9.23 | Average |
| 2389.94 | 31.68 | 6.08 | 7.10 | 44.86 | 54.00 | 9.14 | Average |
| 2431.24 | 31.72 | 6.13 | 46.46 | 84.31 | --- | --- | Average |

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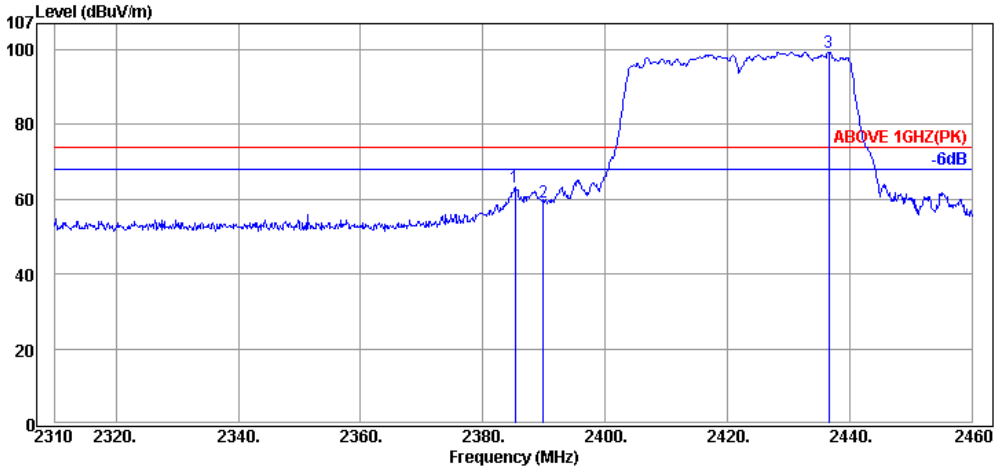
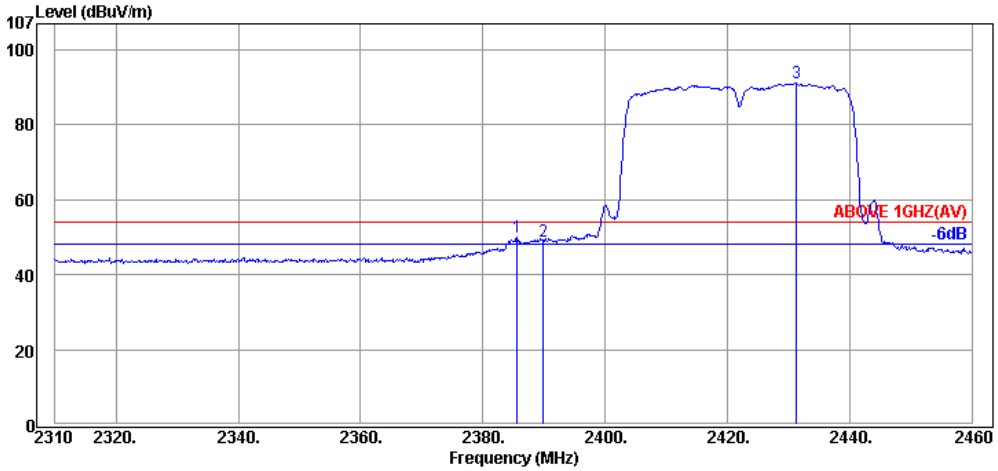
| Mode | 802.11n-HT40 | Frequency | TX 2422MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2385.30 | 31.68 | 6.07 | 25.57 | 63.32 | 74.00 | 10.68 | Peak |
| 2389.95 | 31.68 | 6.08 | 21.57 | 59.33 | 74.00 | 14.67 | Peak |
| 2436.60 | 31.73 | 6.13 | 61.58 | 99.44 | --- | --- | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2385.60 | 31.68 | 6.07 | 12.13 | 49.88 | 54.00 | 4.12 | Average |
| 2389.95 | 31.68 | 6.08 | 11.22 | 48.98 | 54.00 | 5.02 | Average |
| 2431.35 | 31.72 | 6.13 | 53.25 | 91.10 | --- | --- | Average |

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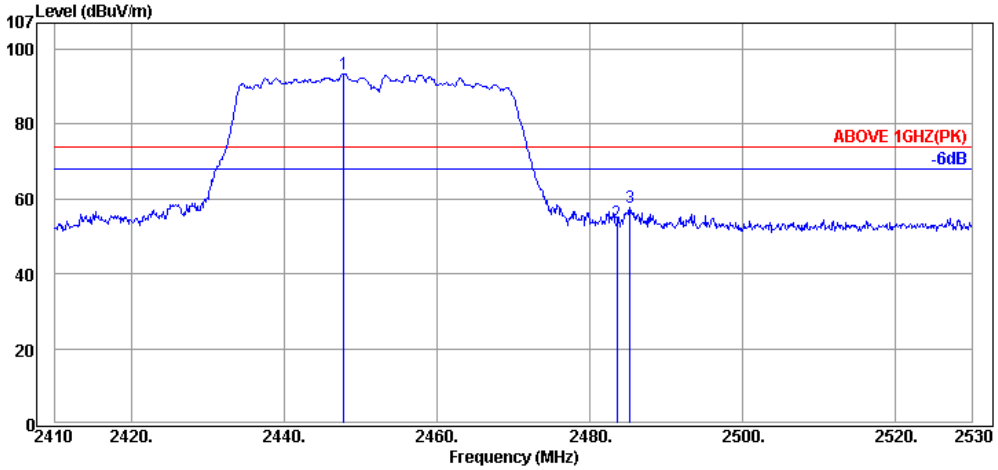
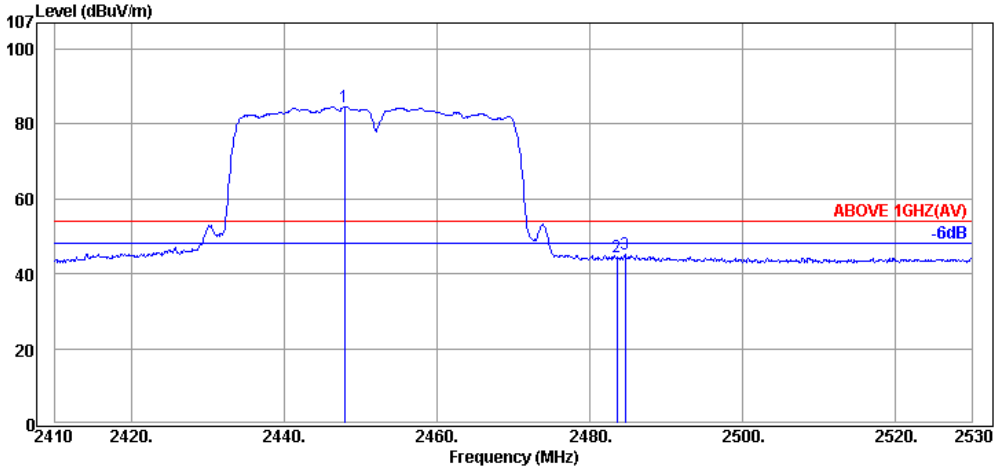
| Mode | 802.11n-HT40 | Frequency | TX 2452MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2447.80 | 31.75 | 6.14 | 55.66 | 93.55 | --- | --- | Peak |
| 2483.56 | 31.78 | 6.19 | 15.82 | 53.79 | 74.00 | 20.21 | Peak |
| 2485.24 | 31.78 | 6.19 | 19.86 | 57.83 | 74.00 | 16.17 | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2447.92 | 31.75 | 6.14 | 46.82 | 84.71 | --- | --- | Average |
| 2483.56 | 31.78 | 6.19 | 6.54 | 44.51 | 54.00 | 9.49 | Average |
| 2484.64 | 31.78 | 6.19 | 7.17 | 45.14 | 54.00 | 8.86 | Average |

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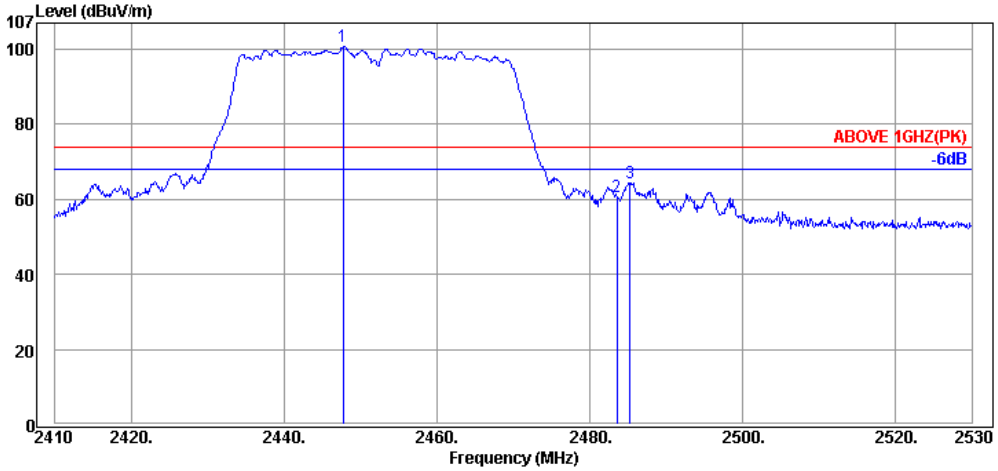
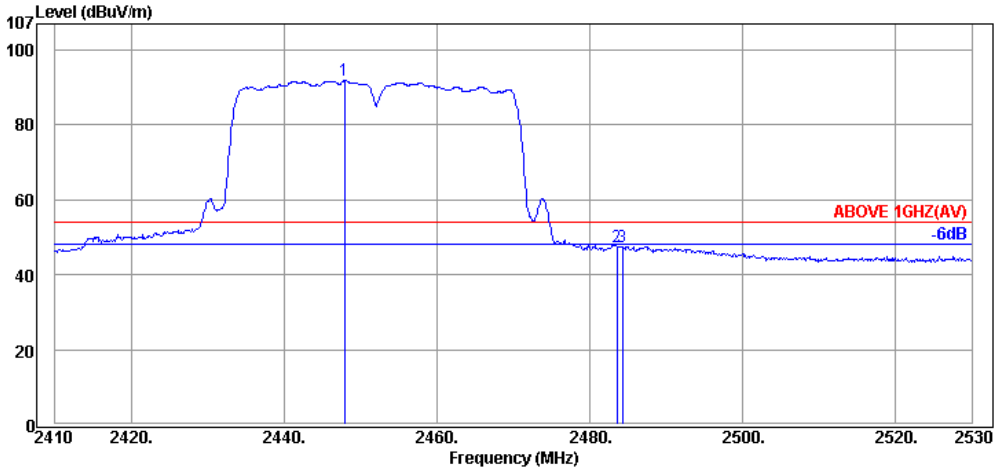
| Mode | 802.11n-HT40 | Frequency | TX 2452MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2447.68 | 31.75 | 6.14 | 62.83 | 100.72 | --- | --- | Peak |
| 2483.56 | 31.78 | 6.19 | 22.56 | 60.53 | 74.00 | 13.47 | Peak |
| 2485.24 | 31.78 | 6.19 | 26.53 | 64.50 | 74.00 | 9.50 | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2447.92 | 31.75 | 6.14 | 53.97 | 91.86 | --- | --- | Average |
| 2483.56 | 31.78 | 6.19 | 9.59 | 47.56 | 54.00 | 6.44 | Average |
| 2484.28 | 31.78 | 6.19 | 9.57 | 47.54 | 54.00 | 6.46 | Average |

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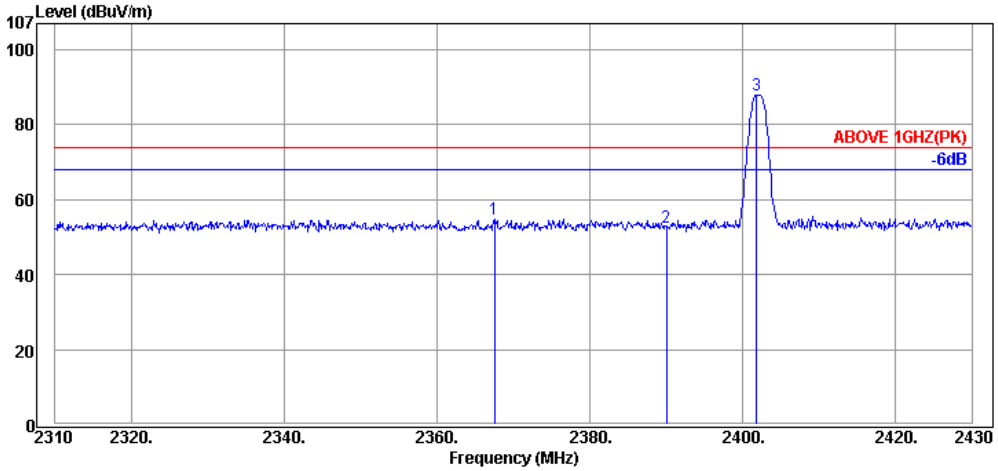
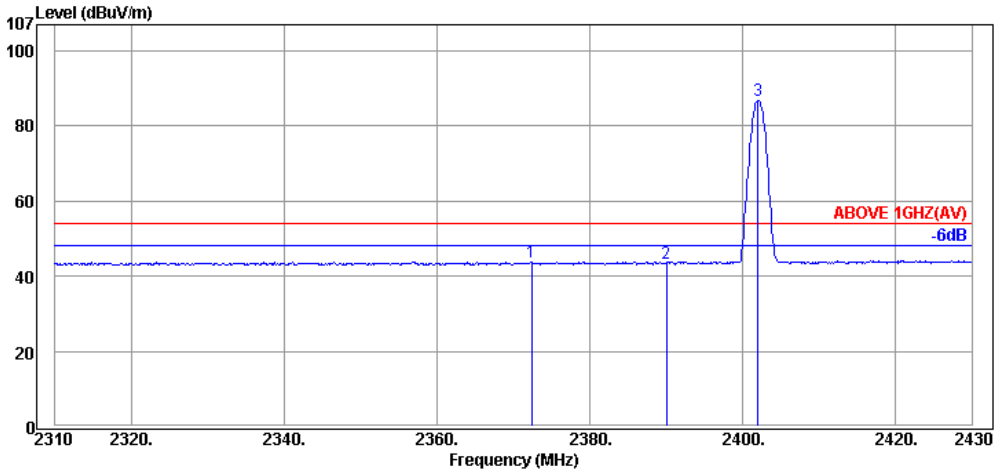
| Mode | BLE | Frequency | TX 2402MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2367.48 | 31.65 | 6.05 | 17.06 | 54.76 | 74.00 | 19.24 | Peak |
| 2390.04 | 31.68 | 6.08 | 14.98 | 52.74 | 74.00 | 21.26 | Peak |
| 2401.80 | 31.69 | 6.09 | 50.07 | 87.85 | --- | --- | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2372.40 | 31.66 | 6.06 | 6.20 | 43.92 | 54.00 | 10.08 | Average |
| 2390.04 | 31.68 | 6.08 | 5.70 | 43.46 | 54.00 | 10.54 | Average |
| 2402.04 | 31.69 | 6.09 | 49.05 | 86.83 | --- | --- | Average |

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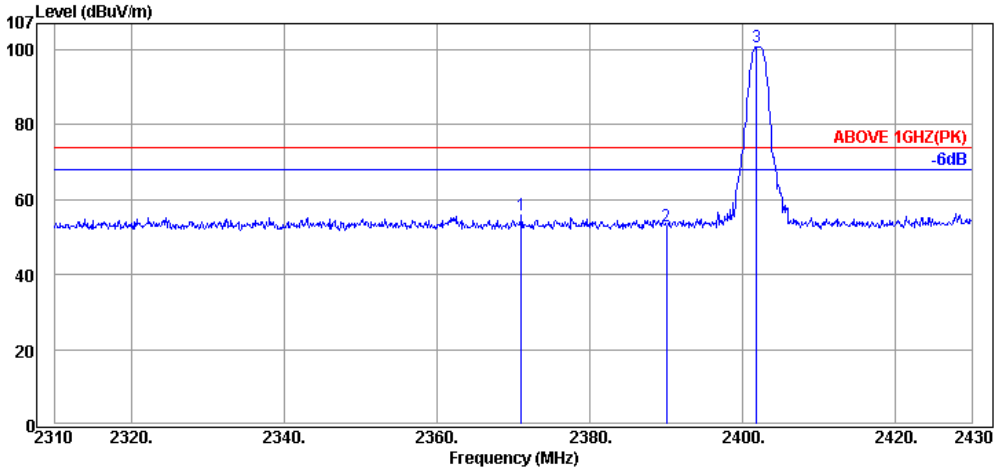
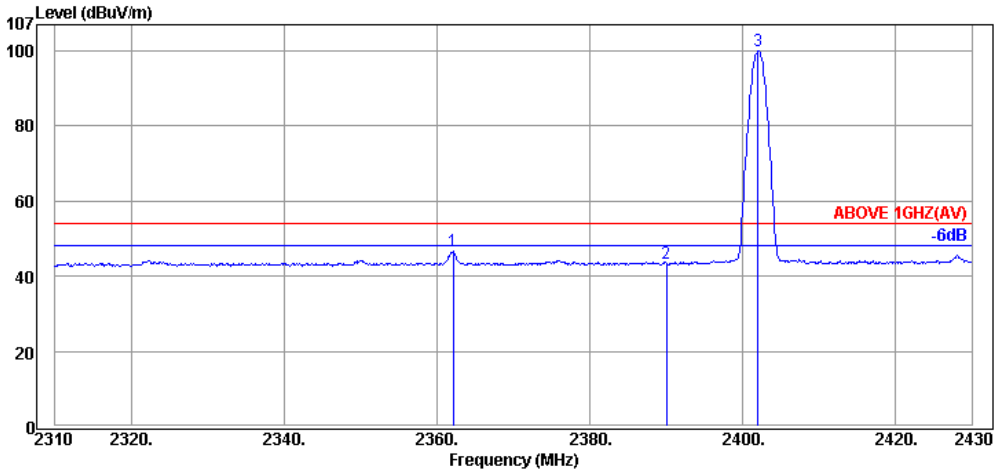
| Mode | BLE | Frequency | TX 2402MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2371.08 | 31.66 | 6.05 | 18.32 | 56.03 | 74.00 | 17.97 | Peak |
| 2390.04 | 31.68 | 6.08 | 15.33 | 53.09 | 74.00 | 20.91 | Peak |
| 2401.80 | 31.69 | 6.09 | 63.09 | 100.87 | --- | --- | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2362.08 | 31.64 | 6.04 | 8.85 | 46.53 | 54.00 | 7.47 | Average |
| 2390.04 | 31.68 | 6.08 | 5.79 | 43.55 | 54.00 | 10.45 | Average |
| 2402.04 | 31.69 | 6.09 | 62.12 | 99.90 | --- | --- | Average |

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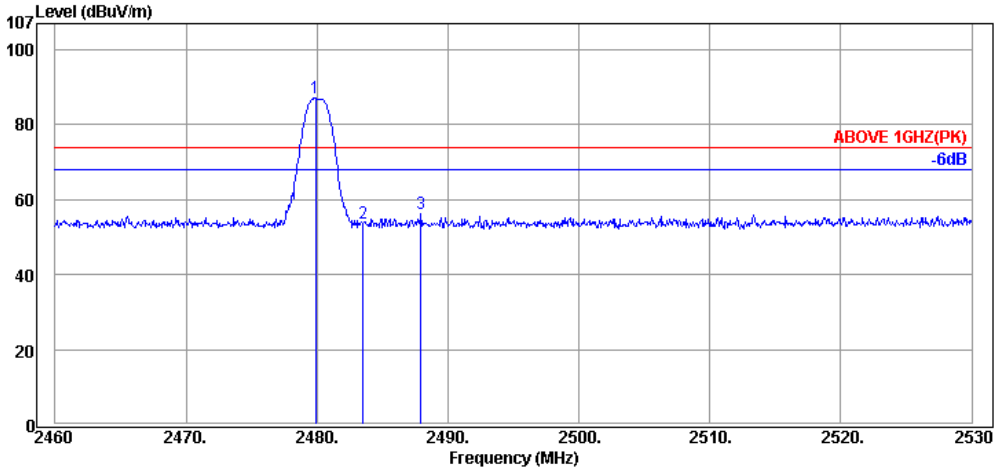
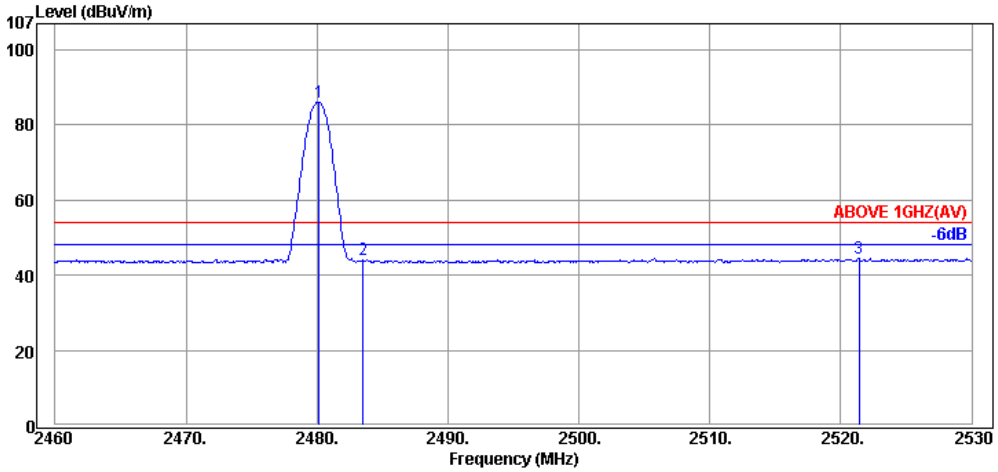
| Mode | BLE | Frequency | TX 2480MHz |
|---|---|---|---|




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2479.88 | 31.78 | 6.18 | 49.05 | 87.01 | --- | --- | Peak |
| 2483.52 | 31.78 | 6.19 | 15.85 | 53.82 | 74.00 | 20.18 | Peak |
| 2487.93 | 31.78 | 6.19 | 18.16 | 56.13 | 74.00 | 17.87 | Peak |




**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2480.16 | 31.78 | 6.18 | 48.17 | 86.13 | --- | --- | Average |
| 2483.52 | 31.78 | 6.19 | 5.98 | 43.95 | 54.00 | 10.05 | Average |
| 2521.39 | 31.82 | 6.23 | 6.44 | 44.49 | 54.00 | 9.51 | Average |

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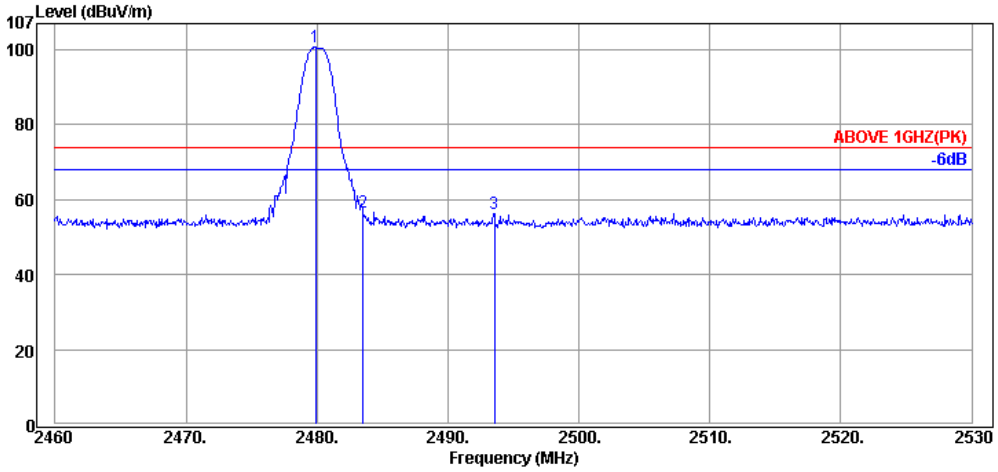
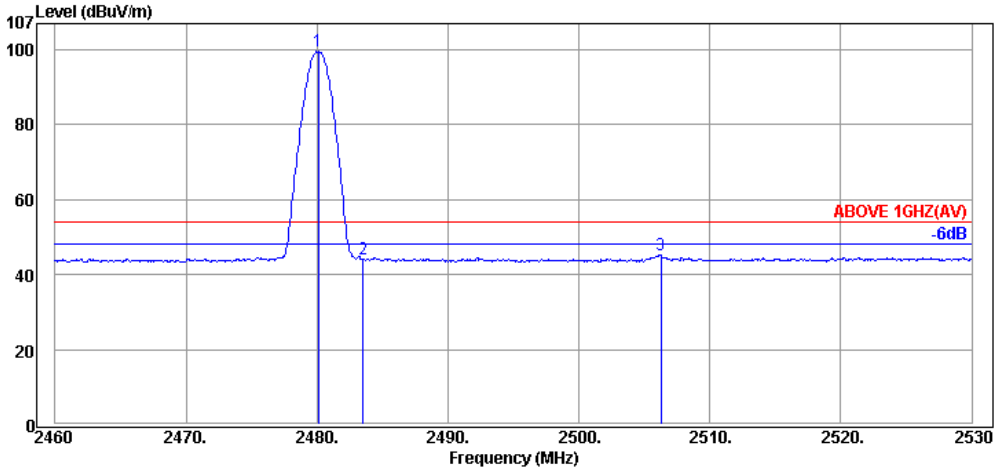
| Mode | BLE | Frequency | TX 2480MHz |
|---|---|---|---|




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2479.88 | 31.78 | 6.18 | 62.64 | 100.60 | --- | --- | Peak |
| 2483.52 | 31.78 | 6.19 | 18.60 | 56.57 | 74.00 | 17.43 | Peak |
| 2493.53 | 31.79 | 6.20 | 18.43 | 56.42 | 74.00 | 17.58 | Peak |




**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2480.09 | 31.78 | 6.18 | 61.60 | 99.56 | --- | --- | Average |
| 2483.52 | 31.78 | 6.19 | 6.05 | 44.02 | 54.00 | 9.98 | Average |
| 2506.27 | 31.81 | 6.21 | 7.24 | 45.26 | 54.00 | 8.74 | Average |

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A.2.2 Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

| Mode | 802.11b | Frequency | TX 2437MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1996.00 | 31.17 | 5.28 | 4.38 | 40.83 | 54.00 | 13.17 | Peak |
| 4875.00 | 33.85 | 9.09 | 1.15 | 44.09 | 54.00 | 9.91 | Peak |
| 7310.00 | 35.64 | 11.80 | -0.88 | 46.56 | 54.00 | 7.44 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1996.00 | 31.17 | 5.28 | 10.84 | 47.29 | 54.00 | 6.71 | Peak |
| 4875.00 | 33.85 | 9.09 | -0.05 | 42.89 | 54.00 | 11.11 | Peak |
| 6000.00 | 35.40 | 9.91 | 4.78 | 50.09 | 54.00 | 3.91 | Peak |

| Mode | 802.11g | Frequency | TX 2437MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1948.00 | 30.89 | 5.20 | 9.67 | 45.76 | 54.00 | 8.24 | Peak |
| 4875.00 | 33.85 | 9.09 | -1.22 | 41.72 | 54.00 | 12.28 | Peak |
| 7310.00 | 35.64 | 11.80 | -0.73 | 46.71 | 54.00 | 7.29 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1994.00 | 31.17 | 5.28 | 9.49 | 45.94 | 54.00 | 8.06 | Peak |
| 4875.00 | 33.85 | 9.09 | -0.41 | 42.53 | 54.00 | 11.47 | Peak |
| 7310.00 | 35.64 | 11.80 | -0.35 | 47.09 | 54.00 | 6.91 | Peak |

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| Mode | 802.11n-HT20 | Frequency | TX 2462MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2084.00 | 31.31 | 5.50 | 5.99 | 42.80 | 54.00 | 11.20 | Peak |
| 4925.00 | 33.87 | 9.24 | -0.32 | 42.79 | 54.00 | 11.21 | Peak |
| 7385.00 | 35.62 | 12.26 | -0.01 | 47.87 | 54.00 | 6.13 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2000.00 | 31.20 | 5.29 | 13.10 | 49.59 | 54.00 | 4.41 | Peak |
| 4925.00 | 33.87 | 9.24 | 0.23 | 43.34 | 54.00 | 10.66 | Peak |
| 7385.00 | 35.62 | 12.26 | -0.35 | 47.53 | 54.00 | 6.47 | Peak |

| Mode | 802.11n-HT40 | Frequency | TX 2452MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 2046.00 | 31.26 | 5.39 | 6.17 | 42.82 | 54.00 | 11.18 | Peak |
| 4905.00 | 33.86 | 9.19 | -0.47 | 42.58 | 54.00 | 11.42 | Peak |
| 7355.00 | 35.63 | 12.10 | -0.15 | 47.58 | 54.00 | 6.42 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1992.00 | 31.13 | 5.27 | 14.07 | 50.47 | 54.00 | 3.53 | Peak |
| 4905.00 | 33.86 | 9.19 | -0.49 | 42.56 | 54.00 | 11.44 | Peak |
| 7355.00 | 35.63 | 12.10 | -0.67 | 47.06 | 54.00 | 6.94 | Peak |

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| Mode | BLE | Frequency | TX 2402MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 4805.00 | 33.82 | 8.87 | 1.10 | 43.79 | 54.00 | 10.21 | Peak |
| 7205.00 | 35.66 | 11.27 | -0.29 | 46.64 | 54.00 | 7.36 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 4805.00 | 33.82 | 8.87 | 1.34 | 44.03 | 54.00 | 9.97 | Peak |
| 7205.00 | 35.66 | 11.27 | 0.48 | 47.41 | 54.00 | 6.59 | Peak |

| Mode | BLE | Frequency | TX 2440MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 4880.00 | 33.85 | 9.14 | 1.66 | 44.65 | 54.00 | 9.35 | Peak |
| 7320.00 | 35.63 | 11.80 | 0.61 | 48.04 | 54.00 | 5.96 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 4880.00 | 33.85 | 9.14 | 0.82 | 43.81 | 54.00 | 10.19 | Peak |
| 7320.00 | 35.63 | 11.80 | 0.48 | 47.91 | 54.00 | 6.09 | Peak |

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| Mode | BLE | Frequency | TX 2480MHz |
|---|---|---|---|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 4960.00 | 33.88 | 9.40 | 1.05 | 44.33 | 54.00 | 9.67 | Peak |
| 7440.00 | 35.61 | 12.56 | 0.50 | 48.67 | 54.00 | 5.33 | Peak |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 4960.00 | 33.88 | 9.40 | 1.47 | 44.75 | 54.00 | 9.25 | Peak |
| 7440.00 | 35.61 | 12.56 | 1.58 | 49.75 | 54.00 | 4.25 | Peak |

A.2.3 Emissions in Non-restricted Frequency Bands:

Pursuant to KDB 558074 D01 DTS Meas Guidance v04 that emission levels below the 15.209 general radiated emissions limits is not required.

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# A.3 6dB BANDWIDTH

| Test Date | 2017/04/14 ~ 05/11 | Temp./Hum. | 26°C/42 ~ 43% |
|---|---|---|---|
| Cable Loss | WLAN: 0.4dB<br>BLE: 1.5dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |

A.3.1 6dB Bandwidth Result

| Mode | Centre Frequency (MHz) | 6 dB Bandwidth (MHz) | Limit |
|---|---|---|---|
| 802.11b | 2412 | 9.880 | >500kHz |
| | 2437 | 9.850 | |
| | 2462 | 9.741 | |
| 802.11g | 2412 | 16.53 | |
| | 2437 | 16.53 | |
| | 2462 | 16.48 | |
| 802.11n-HT20 | 2412 | 17.69 | |
| | 2437 | 17.74 | |
| | 2462 | 17.71 | |
| 802.11n-HT40 | 2422 | 36.03 | |
| | 2437 | 35.86 | |
| | 2452 | 36.41 | |
| BLE | 2402 | 0.7314 | |
| | 2440 | 0.7067 | |
| | 2480 | 0.7271 | |

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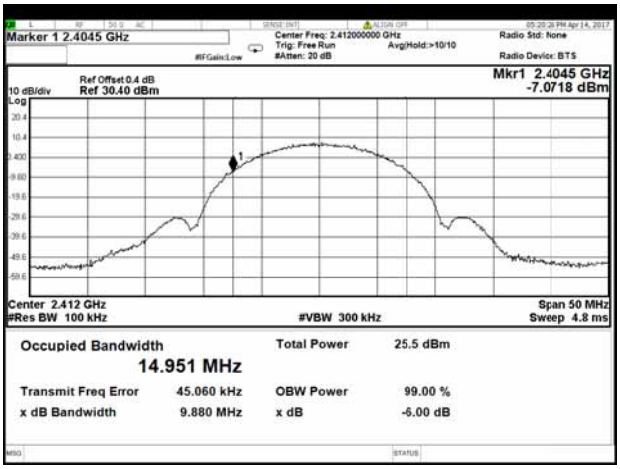
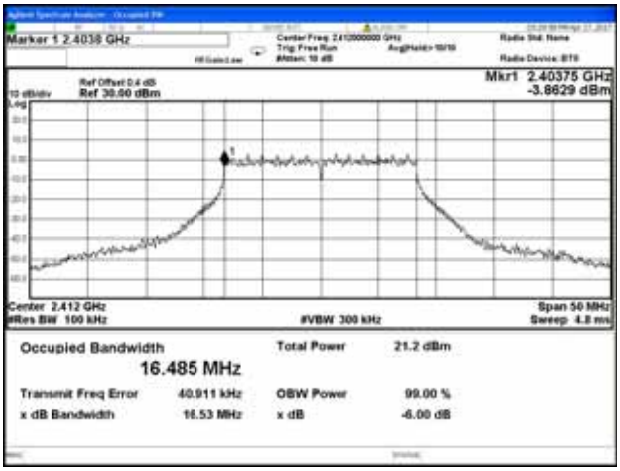
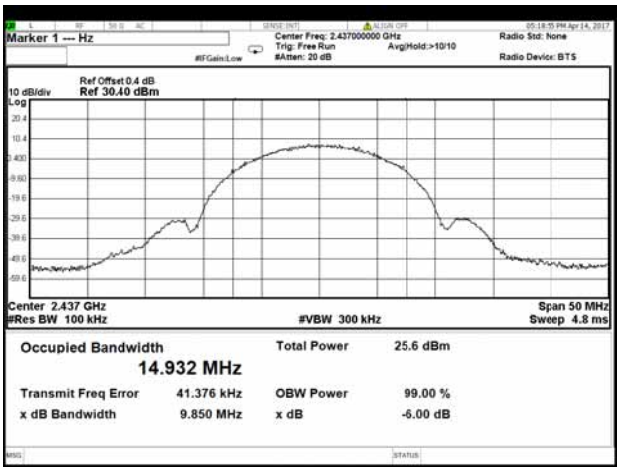
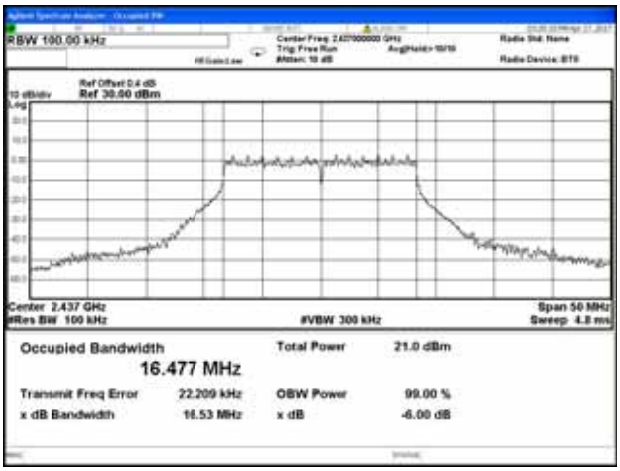
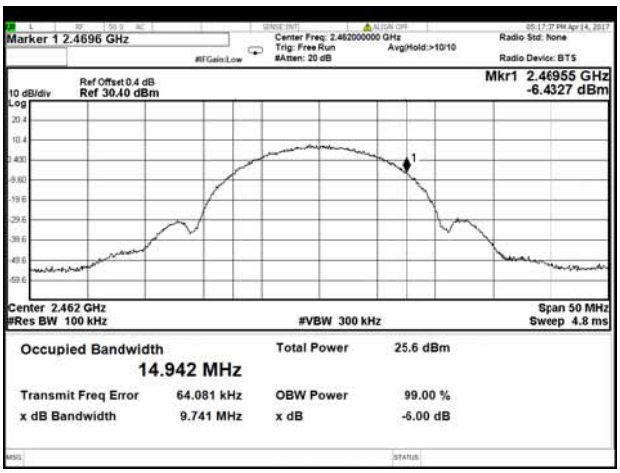
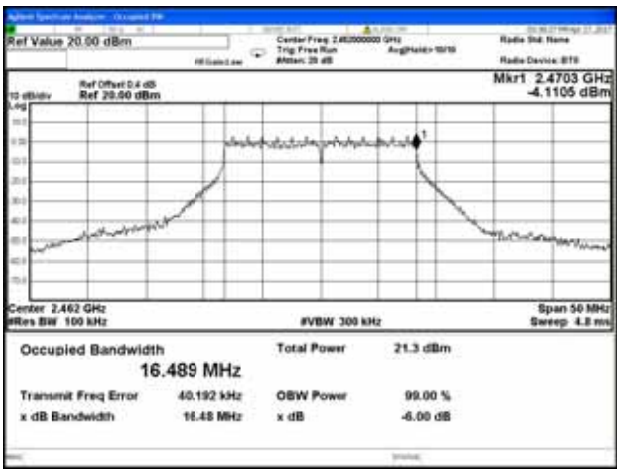
## A.3.2 Measurement Plots

| 802.11b | 802.11g |
|---|---|
|  |  |
|  |  |
|  |  |

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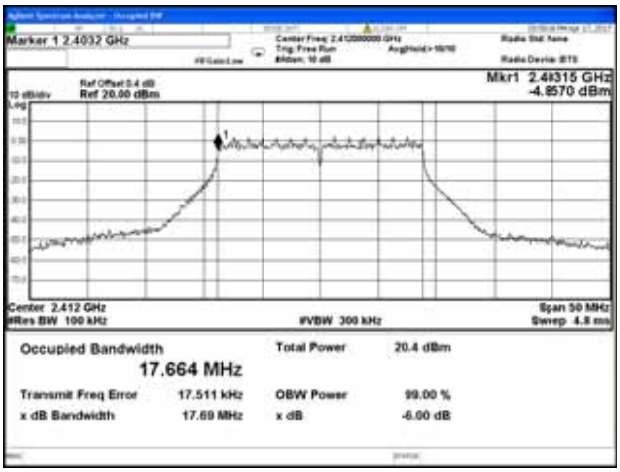
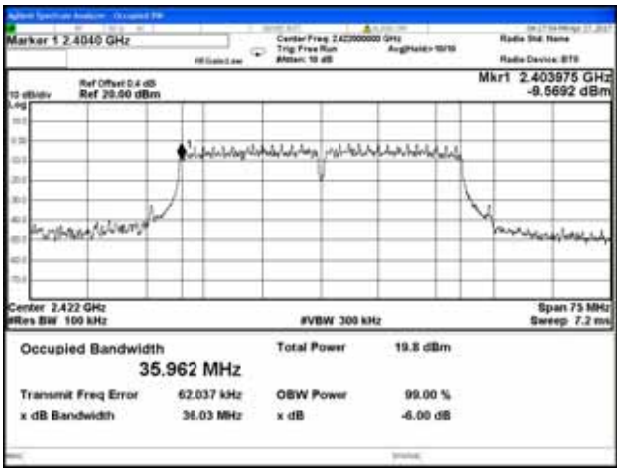
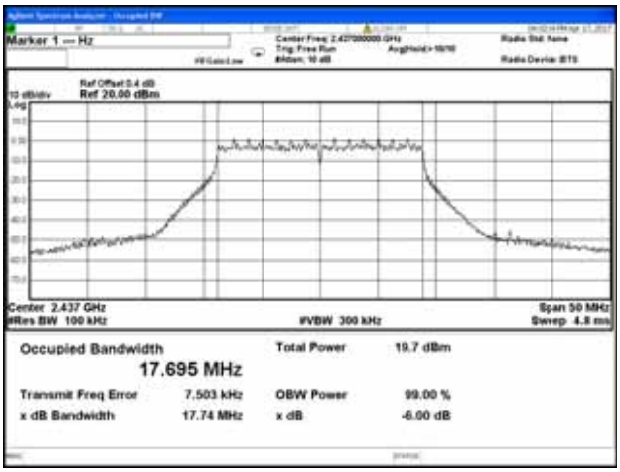
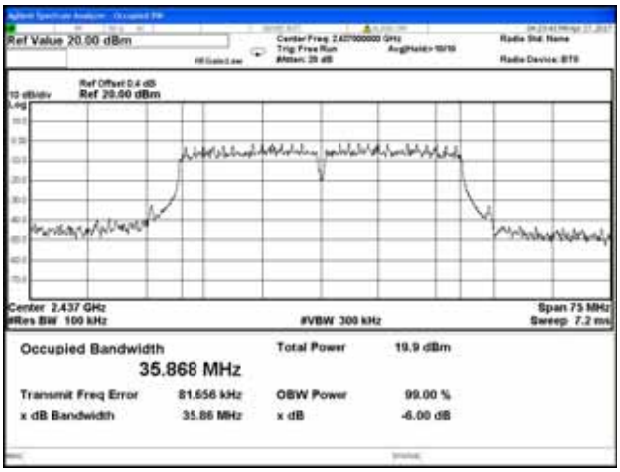
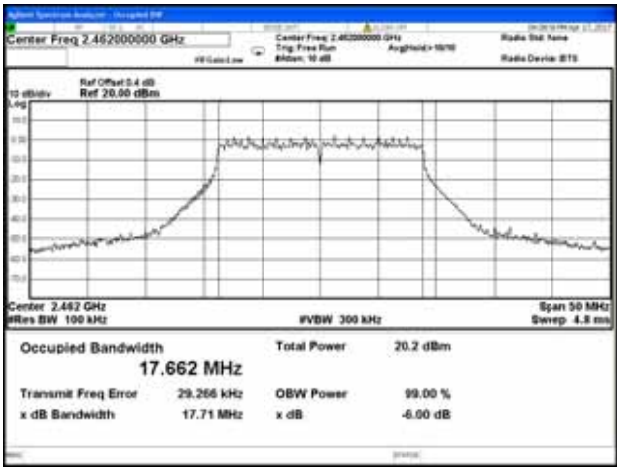
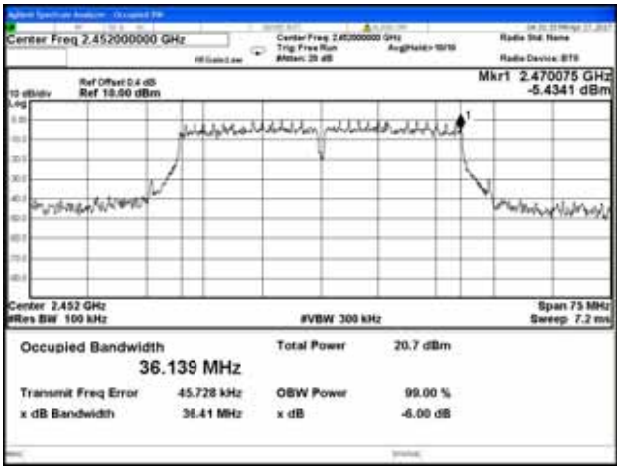
| 802.11n-HT20 | 802.11n-HT40 |
|---|---|
|  |  |
|  |  |
|  |  |

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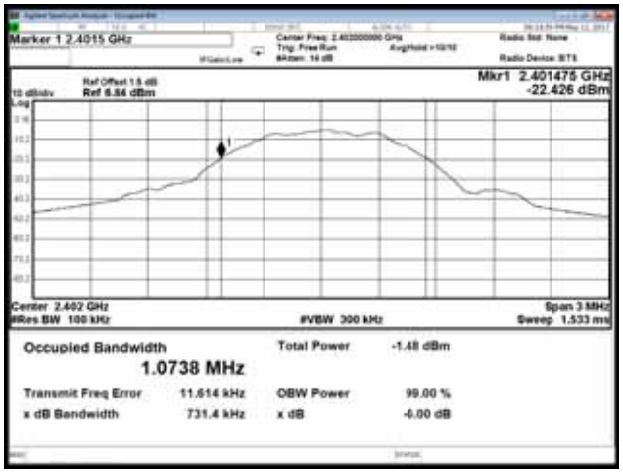
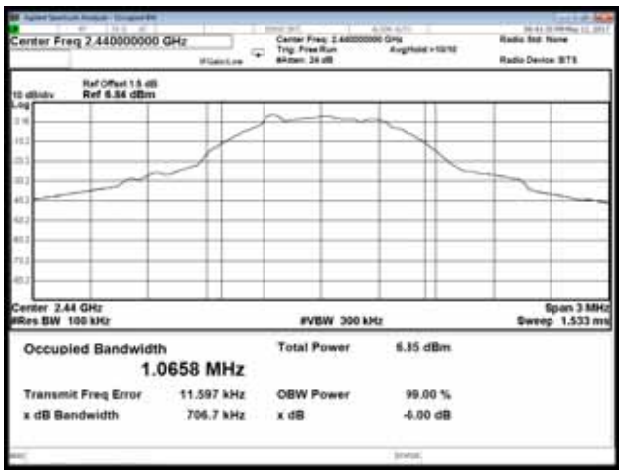
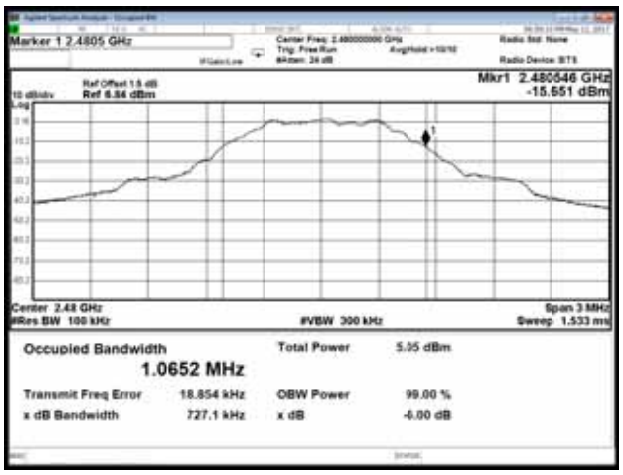
BLE



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# A.4 MAXIMUM PEAK OUTPUT POWER

| Test Date | 2017/04/14 ~ 05/11 | Temp./Hum. | 26℃/42 ~ 43% |
|---|---|---|---|
| Cable Loss | WLAN: 0.4dB<br>BLE: 1.5dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |

A.4.1 Peak Output Power

| Modulation Type | Centre Frequency (MHz) | MAX Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | |
| 802.11b | 2412 | 19.33 | 0.085704 | < 30dBm (1W) |
| | 2437 | 19.48 | 0.088716 | |
| | 2462 | 19.23 | 0.083753 | |
| 802.11g | 2412 | 22.34 | 0.171396 | |
| | 2437 | 23.04 | 0.201372 | |
| | 2462 | 22.99 | 0.199067 | |
| 802.11n-HT20 | 2412 | 21.76 | 0.149968 | |
| | 2437 | 21.42 | 0.138676 | |
| | 2462 | 22.05 | 0.160325 | |
| 802.11n-HT40 | 2422 | 21.89 | 0.154525 | |
| | 2437 | 22.31 | 0.170216 | |
| | 2452 | 22.53 | 0.179061 | |

Note: The results have been included cable loss.

| Mode | Centre Frequency (MHz) | MAX Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | |
| BLE | 2402 | 0.697 | 0.001174 | < 30dBm (1W) |
| | 2440 | 0.625 | 0.001155 | |
| | 2480 | 0.311 | 0.001074 | |

Note: The results have been included cable loss.

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## A.4.2 Average Output Power (Reporting only)

| Mode | Centre Frequency (MHz) | Average Output Power (dBm) | 10log (1/X) | Total Average Output Power | | Limit |
|---|---|---|---|---|---|---|
| | | | | (dBm) | (W) | |
| 802.11b | 2412 | 16.72 | 0.51 | 17.23 | 0.052845 | < 30dBm (1W) |
| | 2437 | 16.29 | | 16.80 | 0.047863 | |
| | 2462 | 16.42 | | 16.93 | 0.049317 | |
| 802.11g | 2412 | 12.29 | 1.91 | 14.23 | 0.026485 | |
| | 2437 | 12.16 | | 14.10 | 0.025704 | |
| | 2462 | 12.77 | | 14.71 | 0.029580 | |
| 802.11n-HT20 | 2412 | 11.32 | 2.44 | 13.76 | 0.023768 | |
| | 2437 | 10.98 | | 13.42 | 0.021979 | |
| | 2462 | 11.17 | | 13.61 | 0.022961 | |
| 802.11n-HT40 | 2422 | 10.37 | 2.84 | 13.21 | 0.020941 | |
| | 2437 | 10.60 | | 13.44 | 0.022080 | |
| | 2452 | 11.01 | | 13.85 | 0.024266 | |

Note: The results have been included cable loss.

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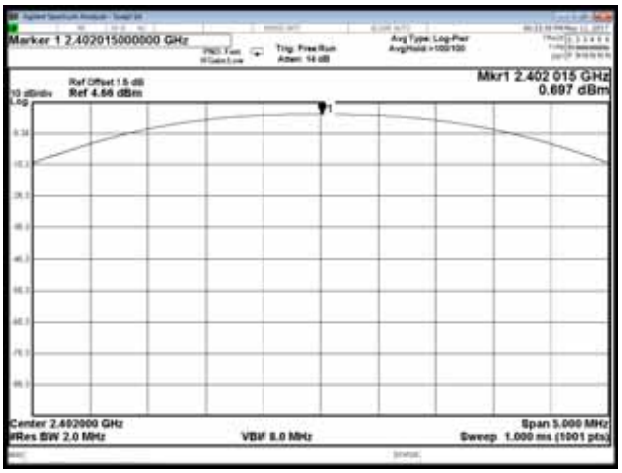
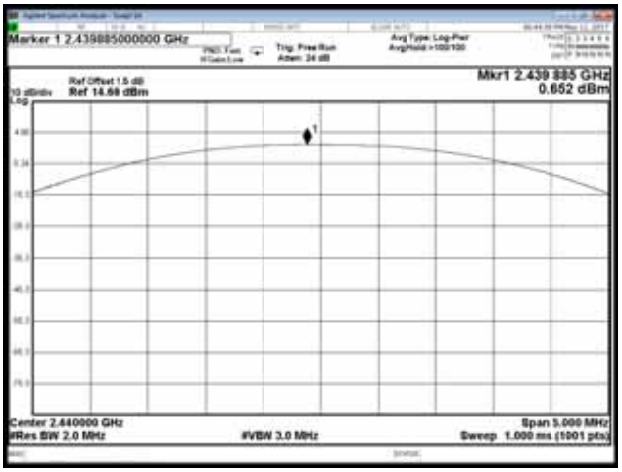
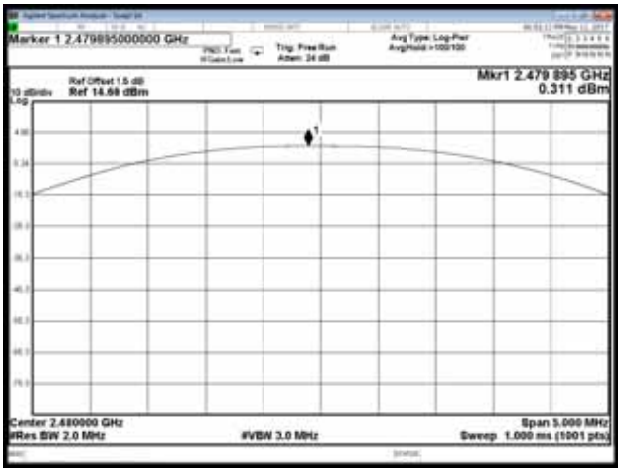
## A.4.3 Measurement Plots

| BLE |
| --- |
|  |
|  |
|  |

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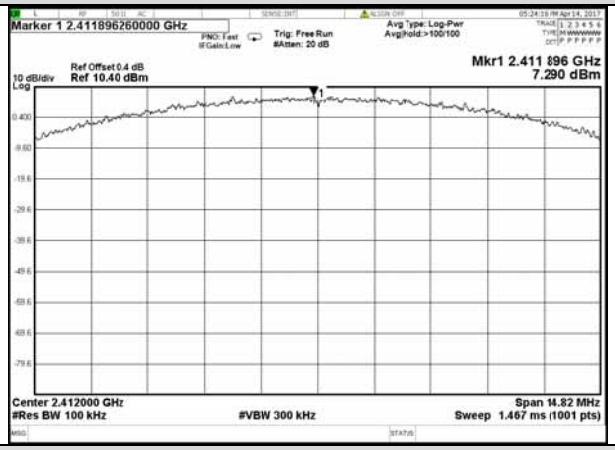
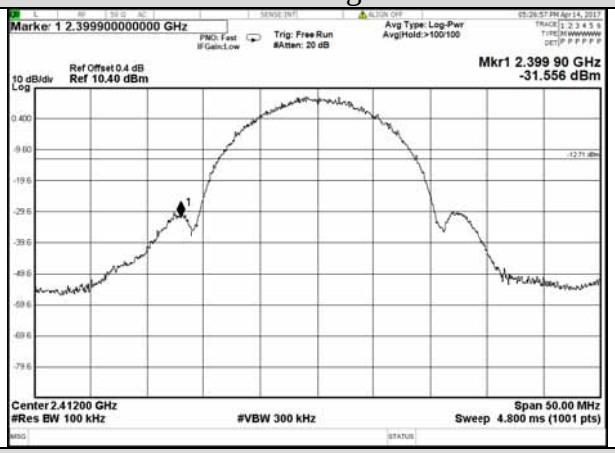
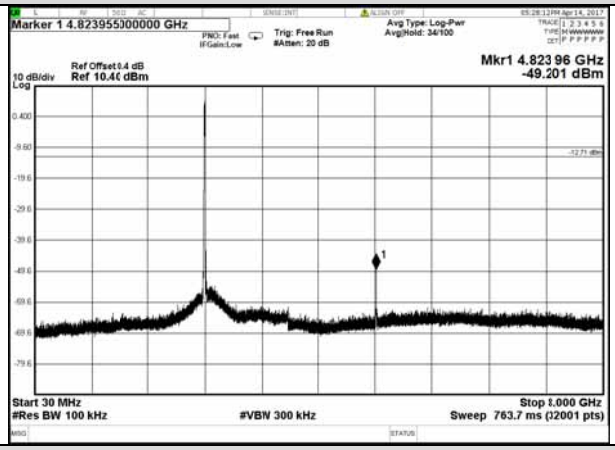
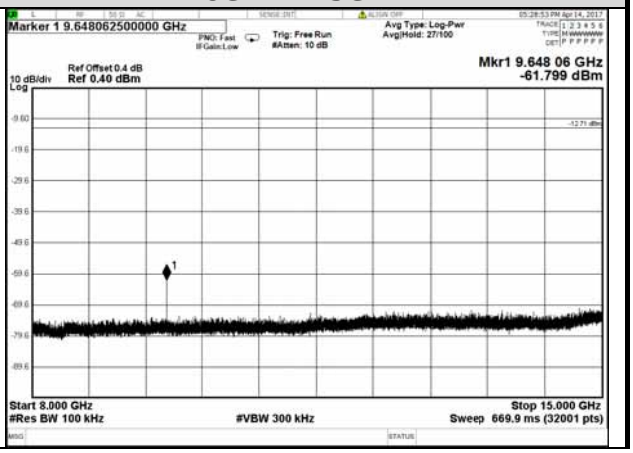
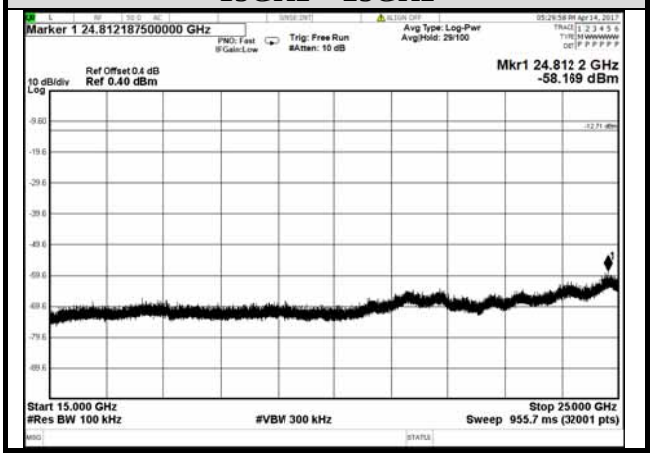
# A.5 EMISSION LIMITATIONS

| | | | |
|---|---|---|---|
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11b | Frequency | TX 2412MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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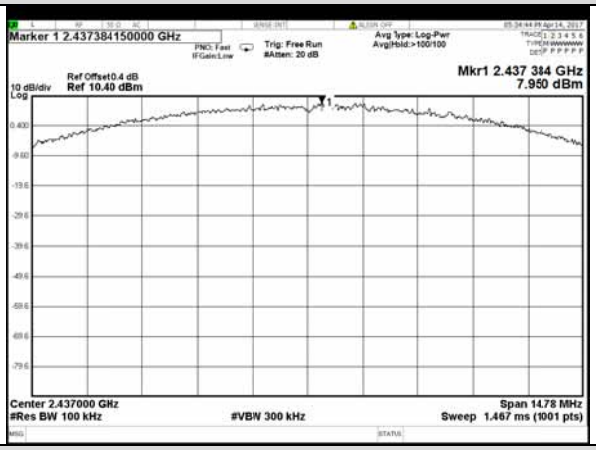
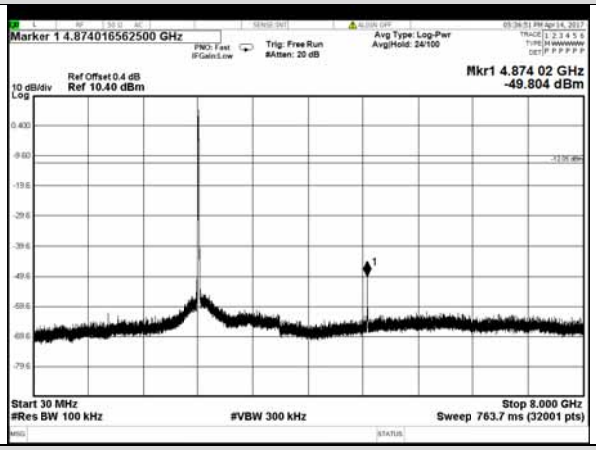
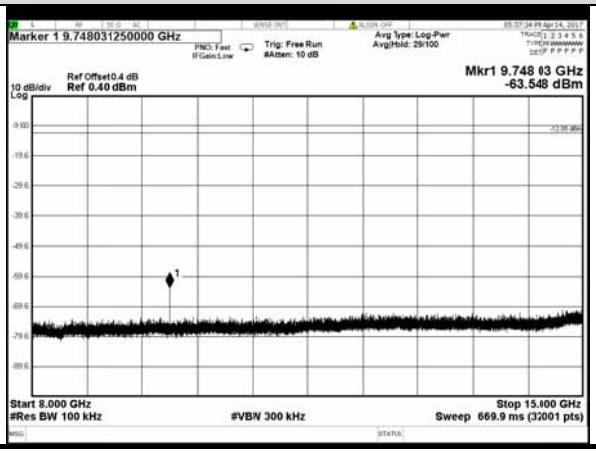
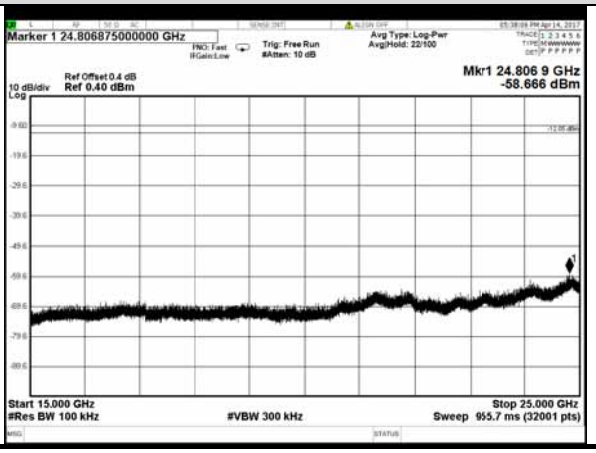
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11b | Frequency | TX 2437MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | 30MHz – 8GHz |
|---|---|
|  |  |
| 8GHz – 15GHz | 15GHz – 25GHz |
|  |  |

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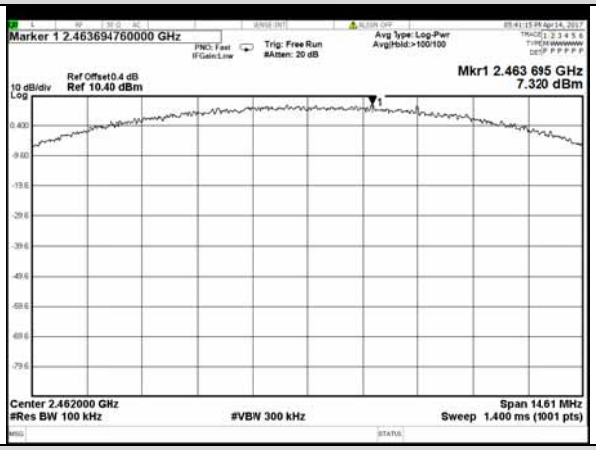
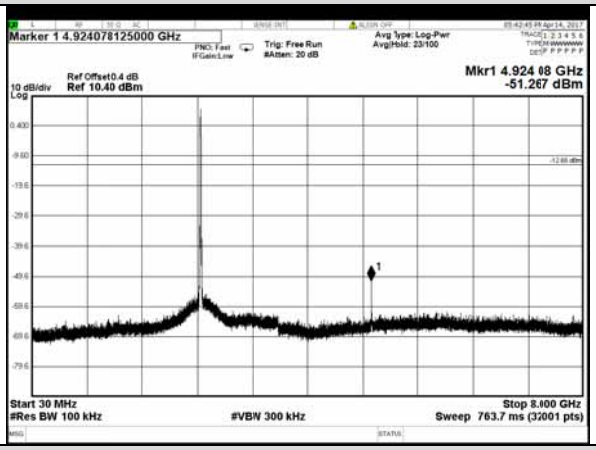
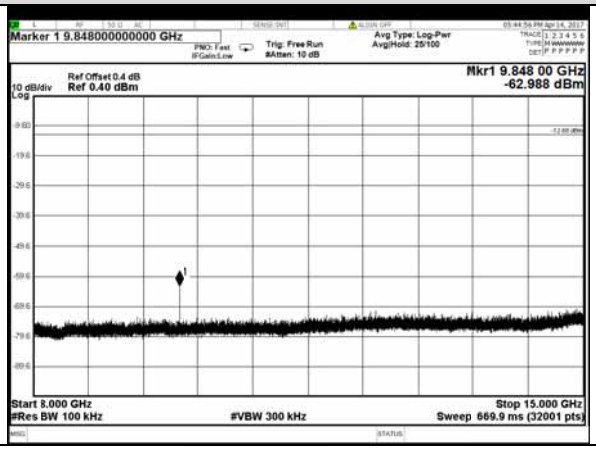
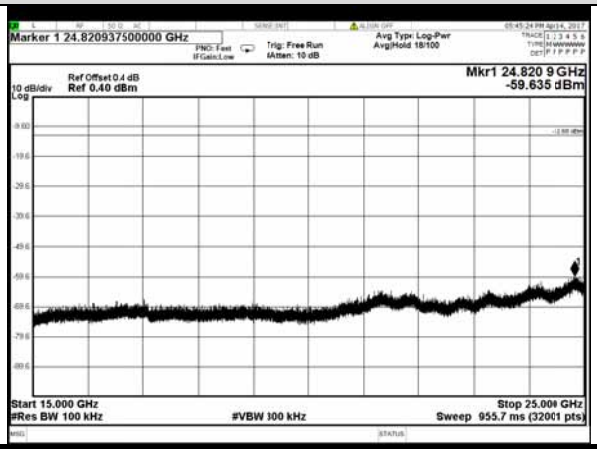
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11b | Frequency | TX 2462MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| 30MHz – 8GHz | 8GHz – 15GHz |
|  |  |
| 15GHz – 25GHz | |
|  | |

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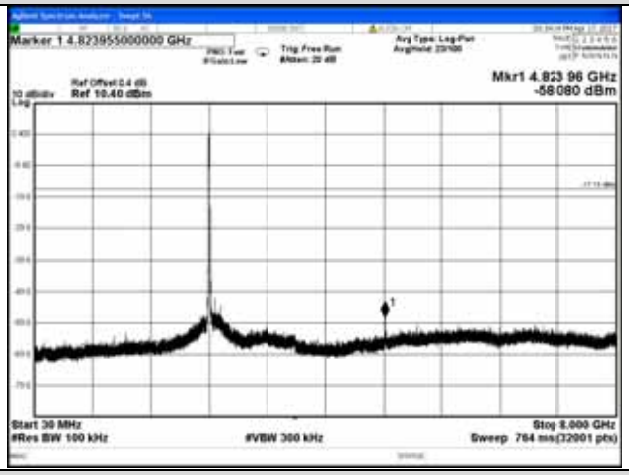
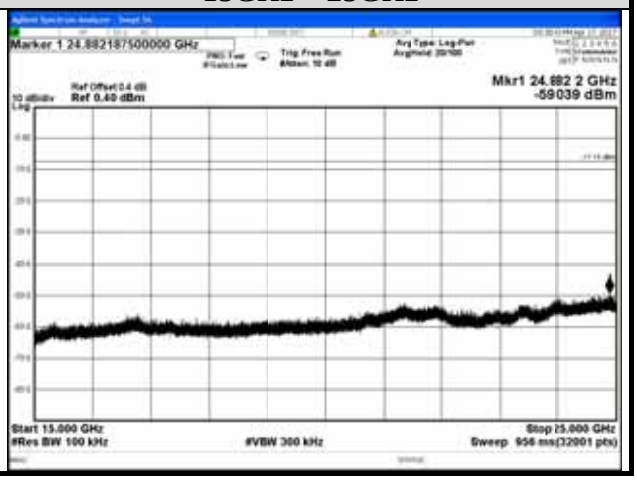
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11g | Frequency | TX 2412MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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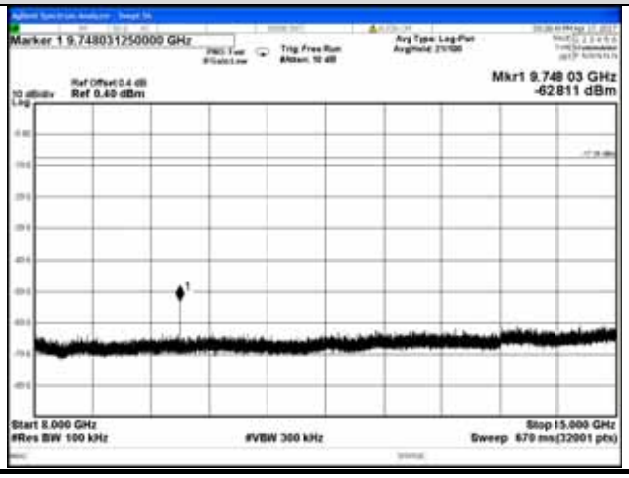
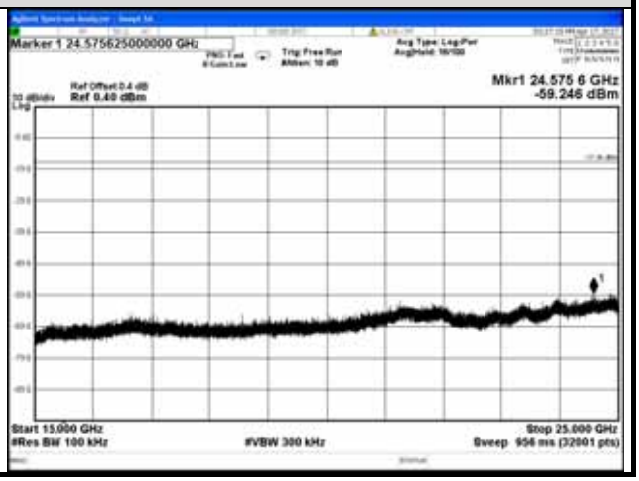
| | | | |
|---|---|---|---|
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11g | Frequency | TX 2437MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | 30MHz – 8GHz |
|---|---|
|  |  |
| **8GHz – 15GHz** | **15GHz – 25GHz** |
|  |  |

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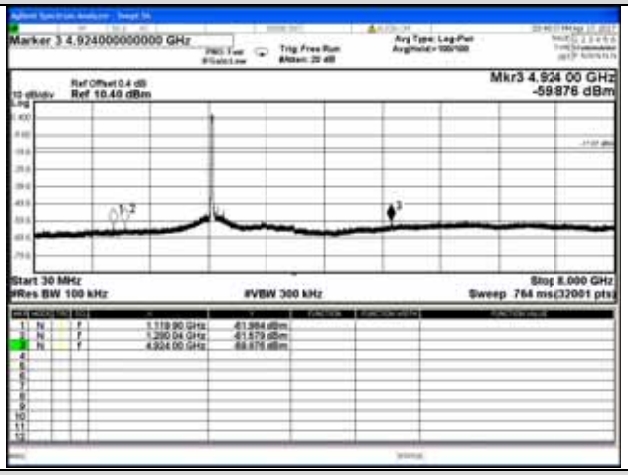
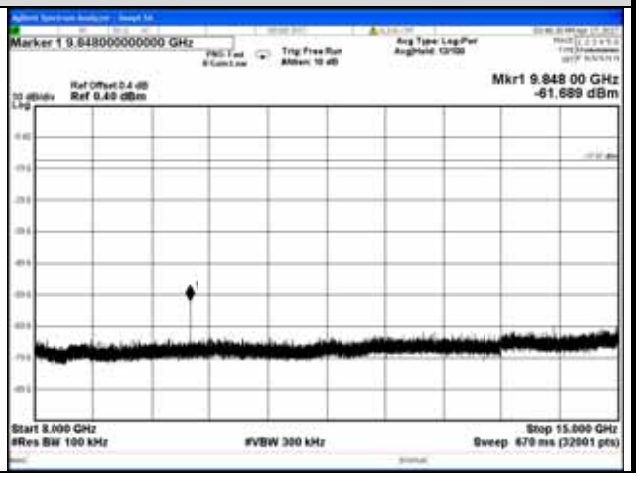
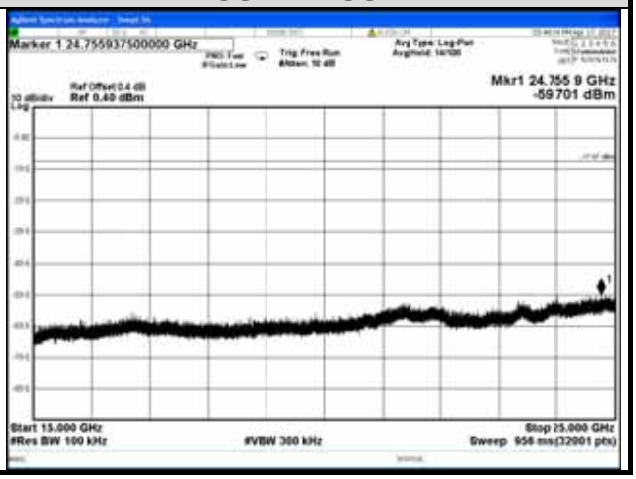
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11g | Frequency | TX 2462MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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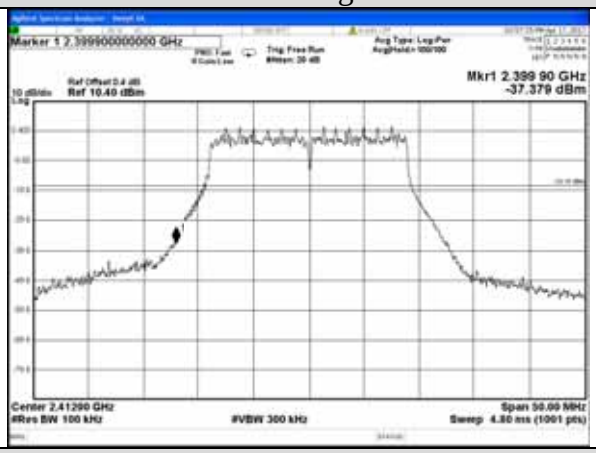
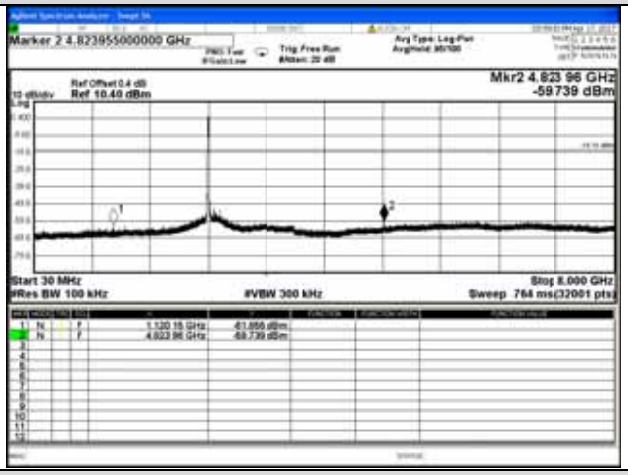
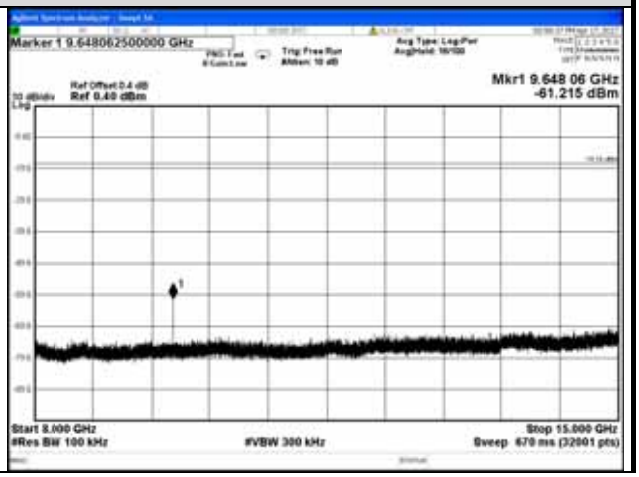
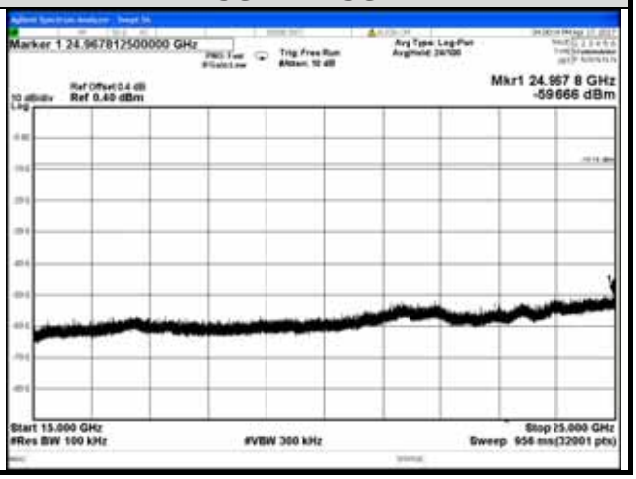
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11n-HT20 | Frequency | TX 2412MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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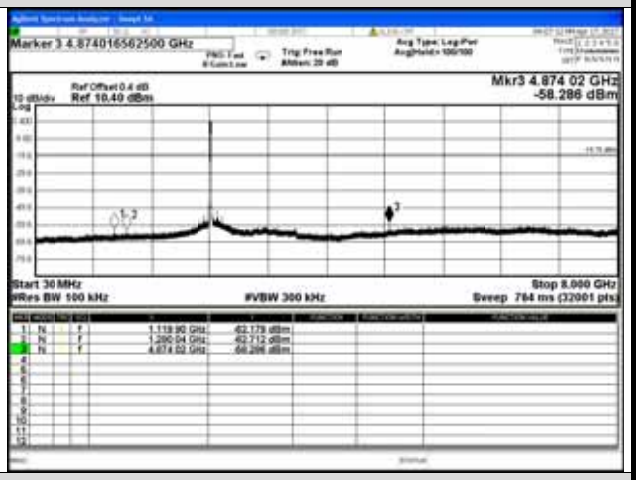
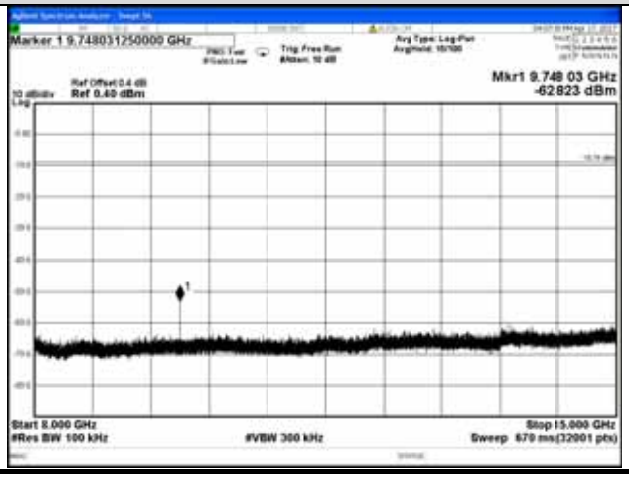
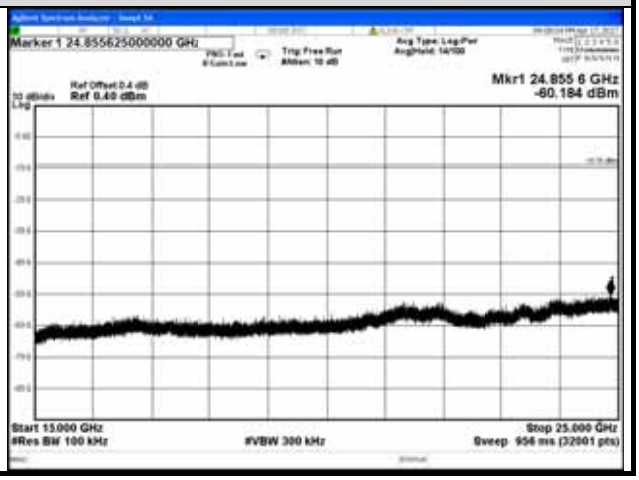
| | | | |
|---|---|---|---|
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/42% |
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11n-HT20 | Frequency | TX 2437MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | 30MHz – 8GHz |
|---|---|
|  |  |
| **8GHz – 15GHz** | **15GHz – 25GHz** |
|  |  |

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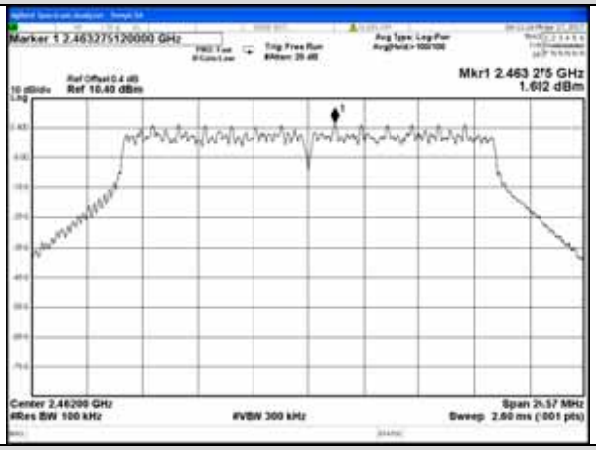
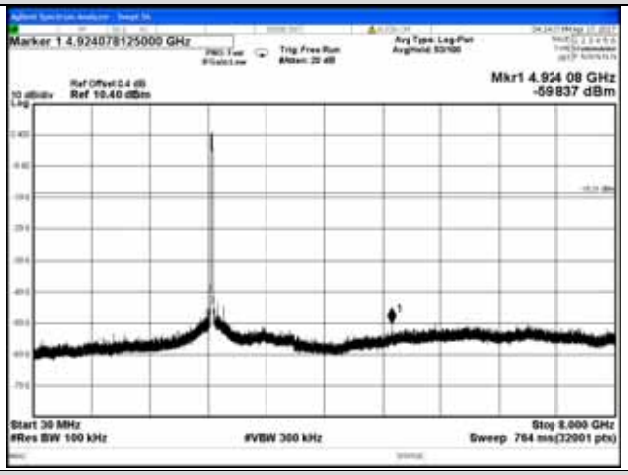
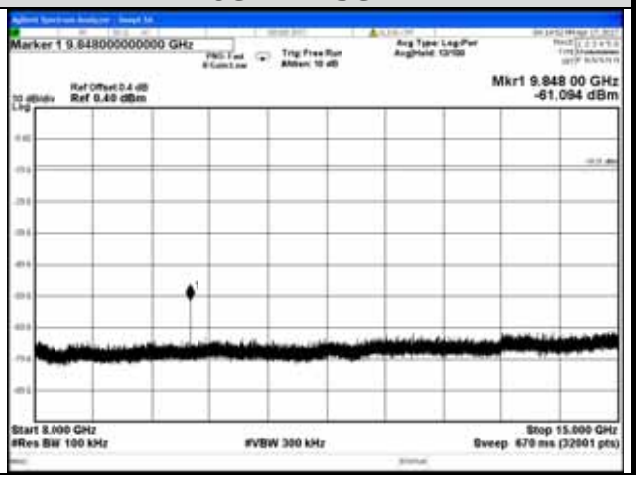
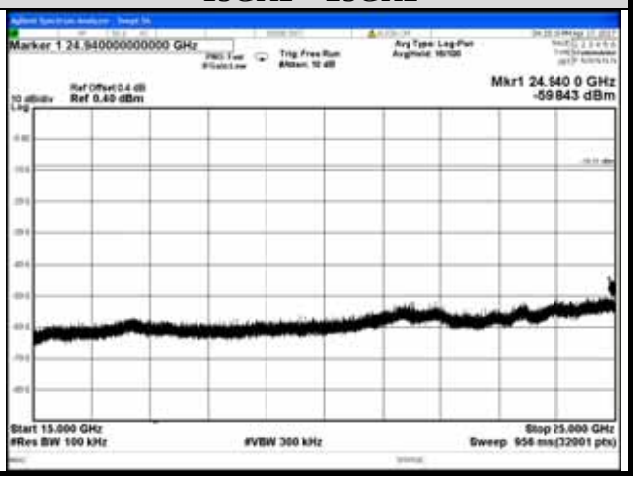
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/43% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11n-HT20 | Frequency | TX 2462MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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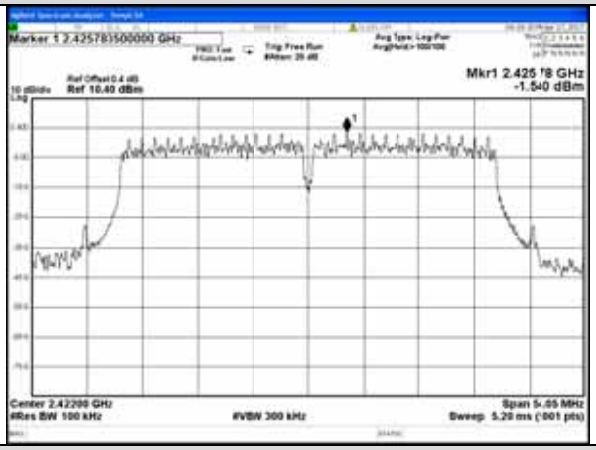
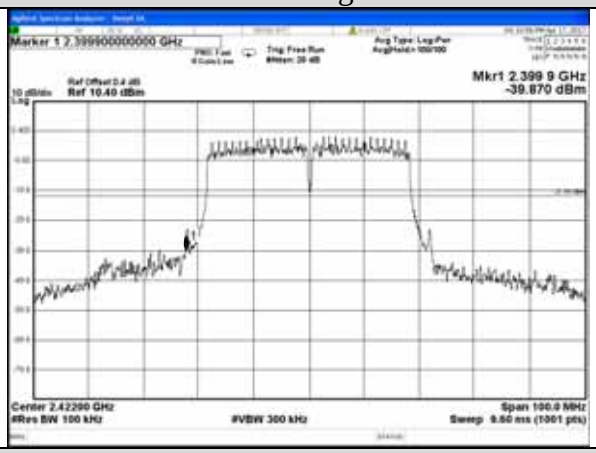
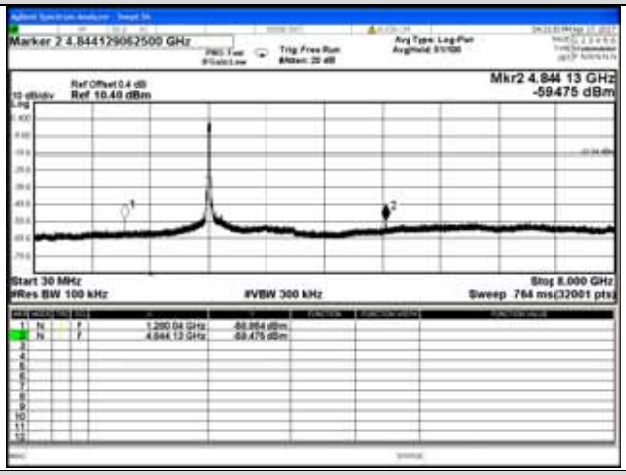
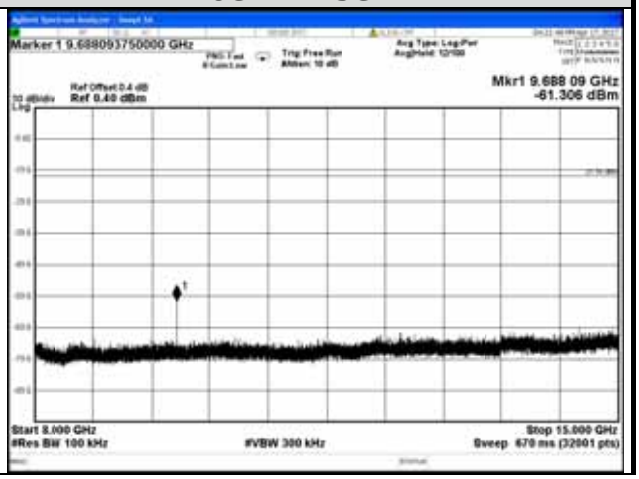
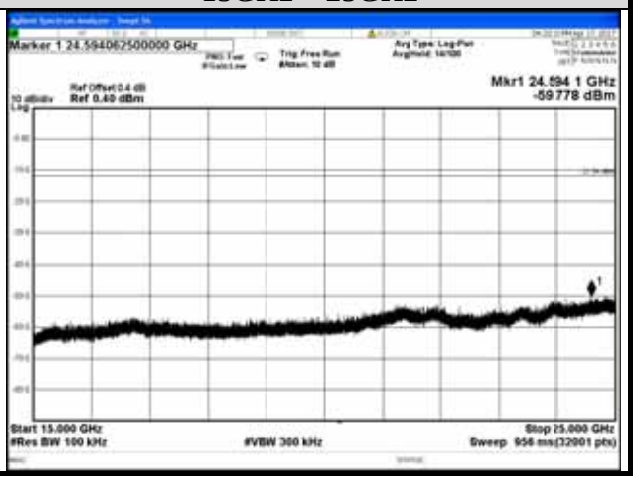
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/43% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11n-HT40 | Frequency | TX 2422MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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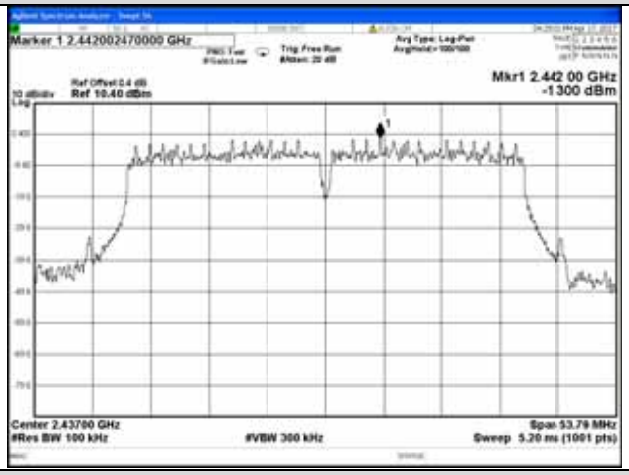
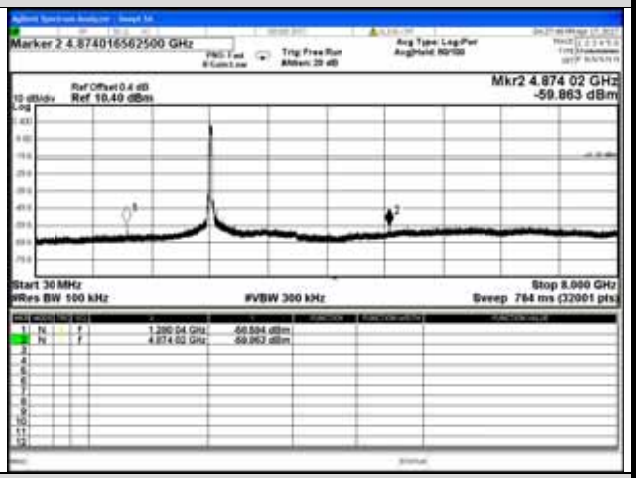
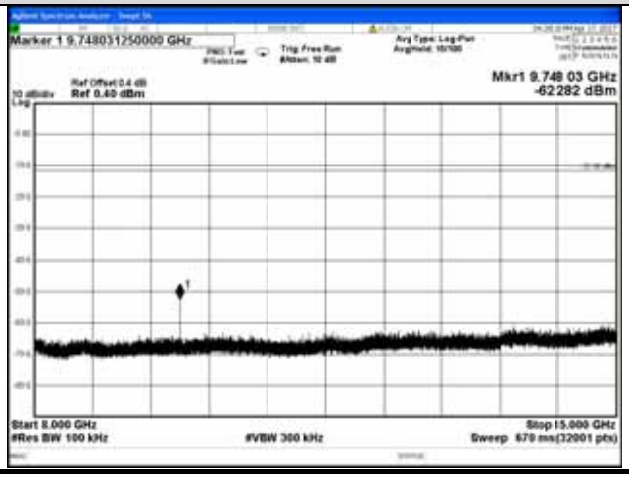
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/43% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11n-HT40 | Frequency | TX 2437MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | 30MHz – 8GHz |
|---|---|
|  |  |
| **8GHz – 15GHz** | **15GHz – 25GHz** |
|  |  |

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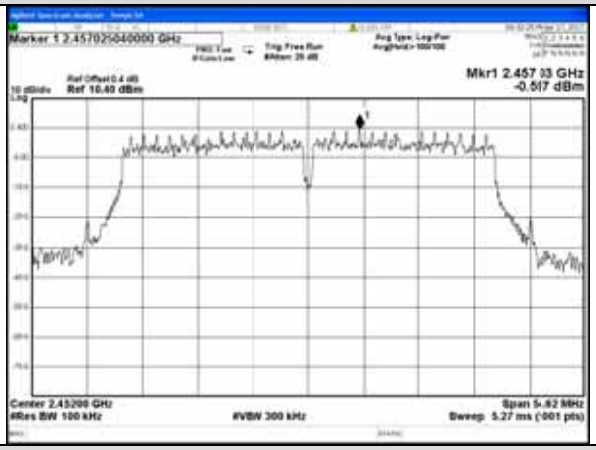
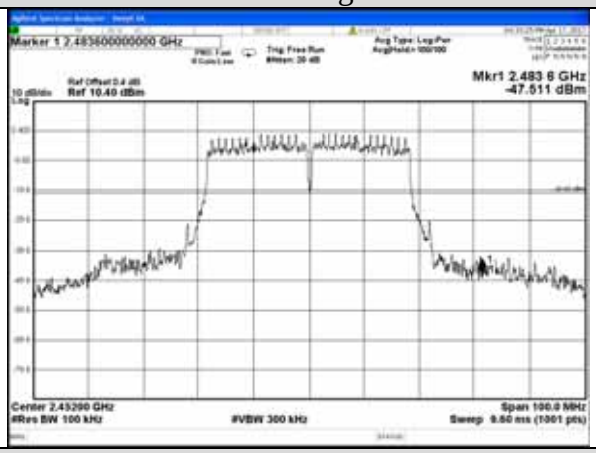
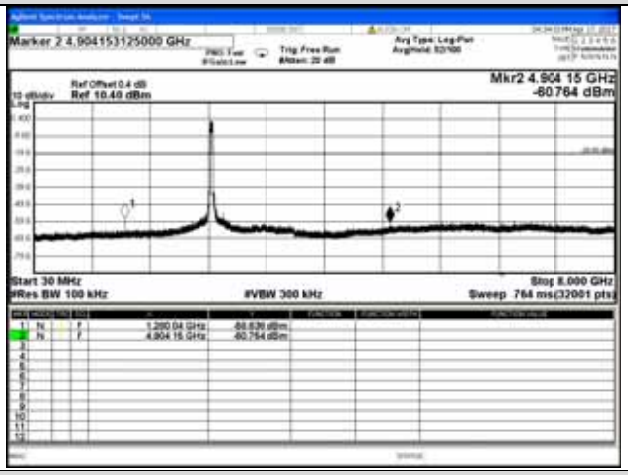
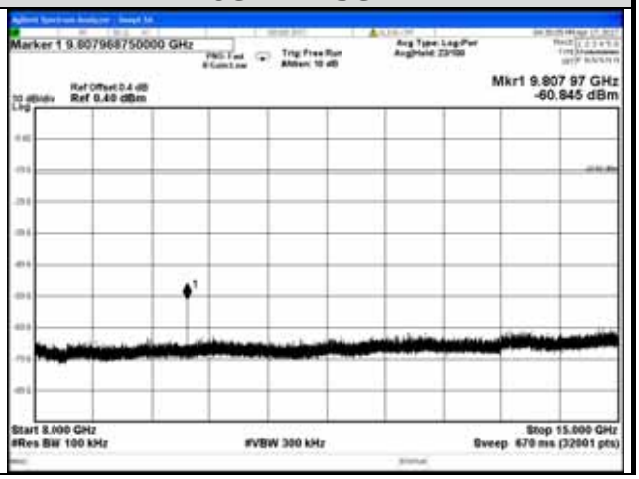
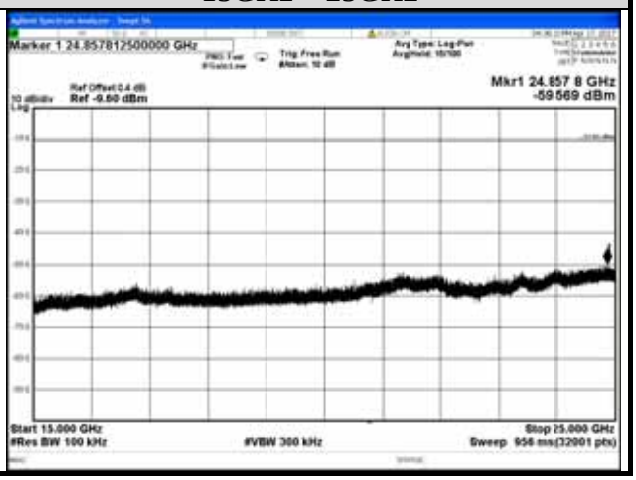
| Test Date | 2017/04/14 | Temp./Hum. | 26℃/43% |
|---|---|---|---|
| Cable Loss | 0.4dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | 802.11n-HT40 | Frequency | TX 2452MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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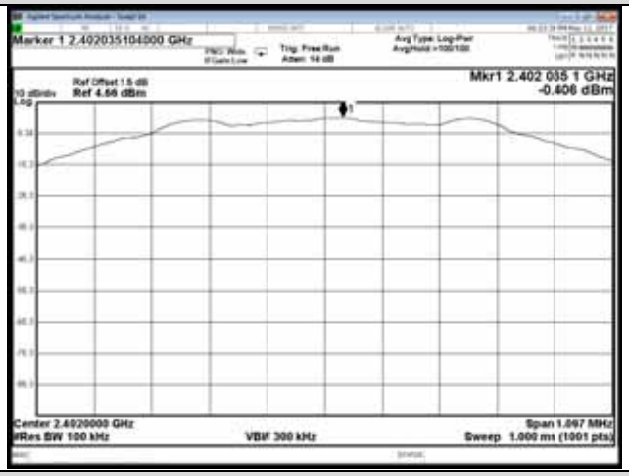
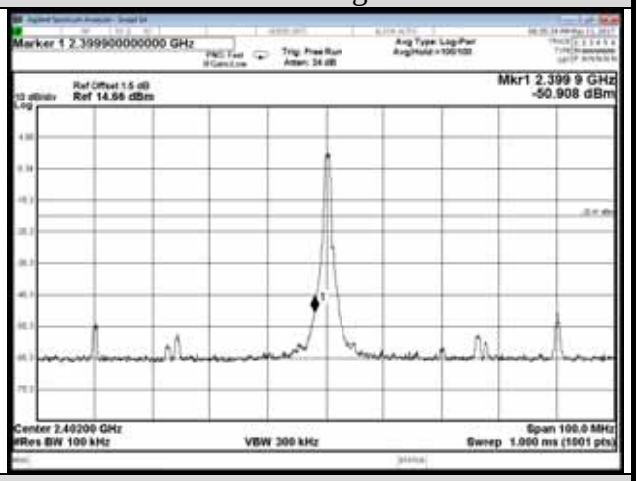
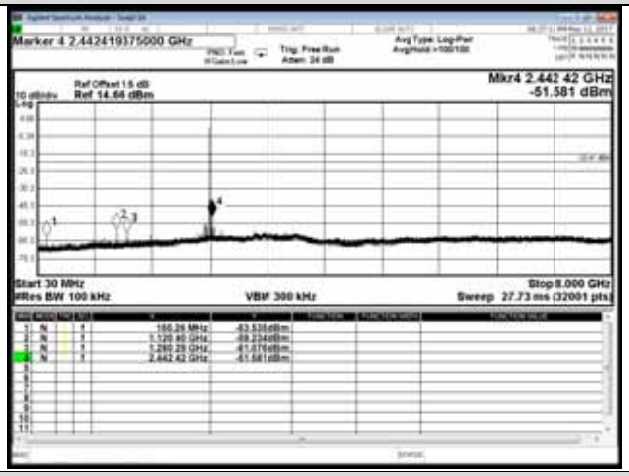
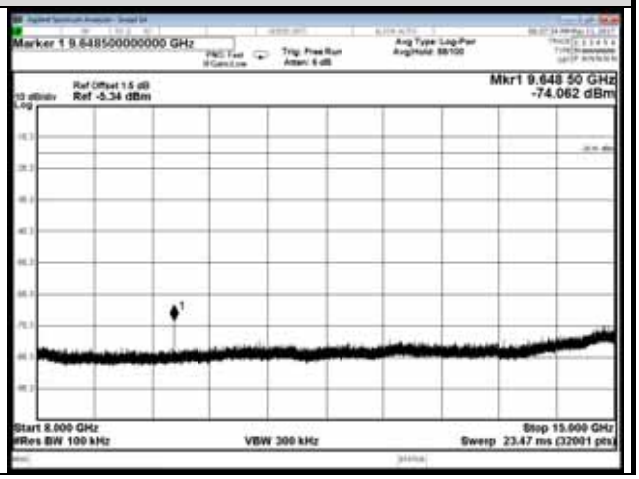
| Test Date | 2017/05/11 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 1.5dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | BLE | Frequency | TX 2402MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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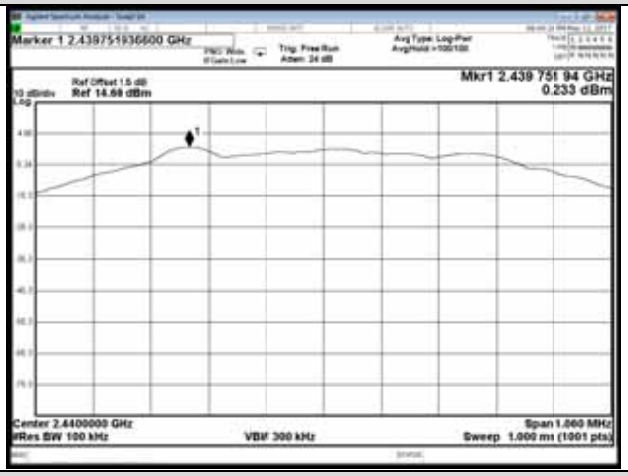
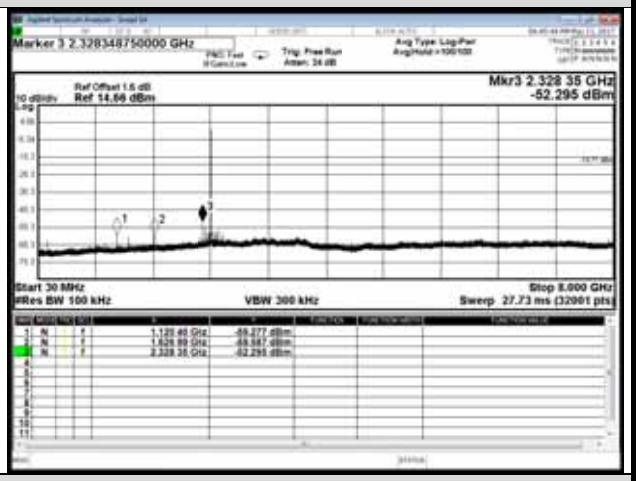
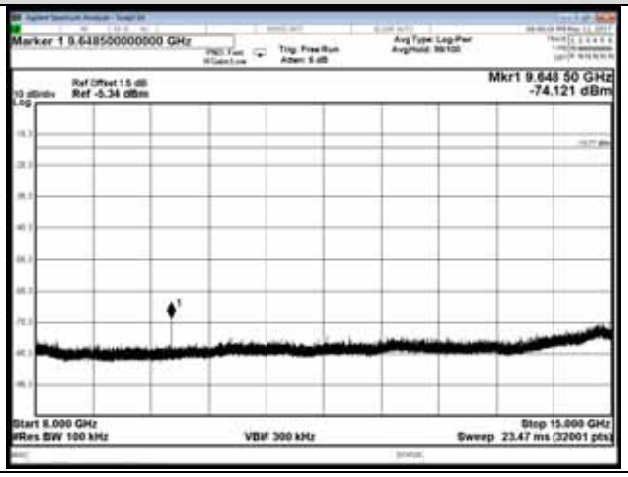
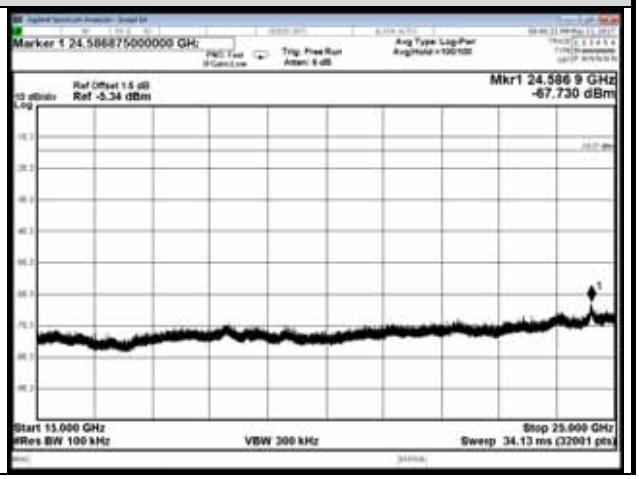
| Test Date | 2017/05/11 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 1.5dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | BLE | Frequency | TX 2440MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | 30MHz – 8GHz |
|---|---|
|  |  |
| **8GHz – 15GHz** | **15GHz – 25GHz** |
|  |  |

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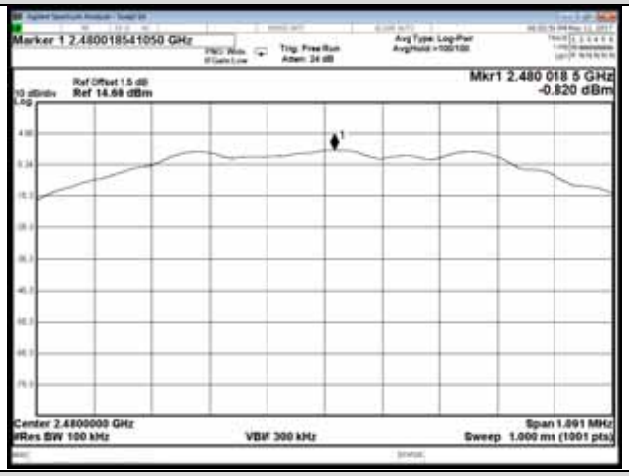
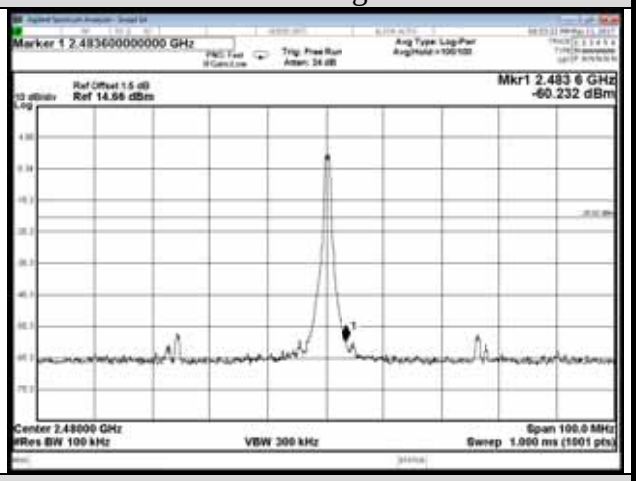
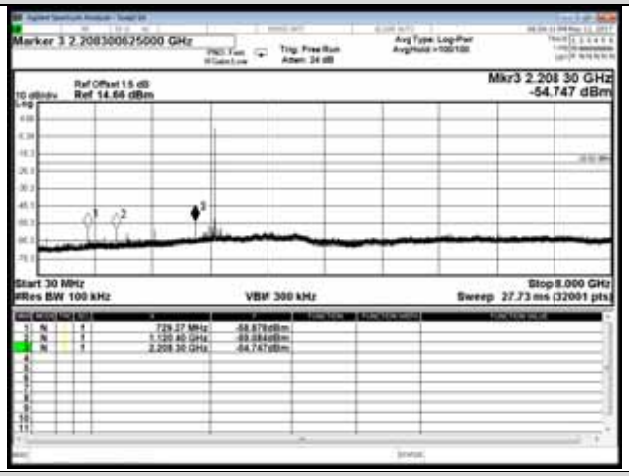
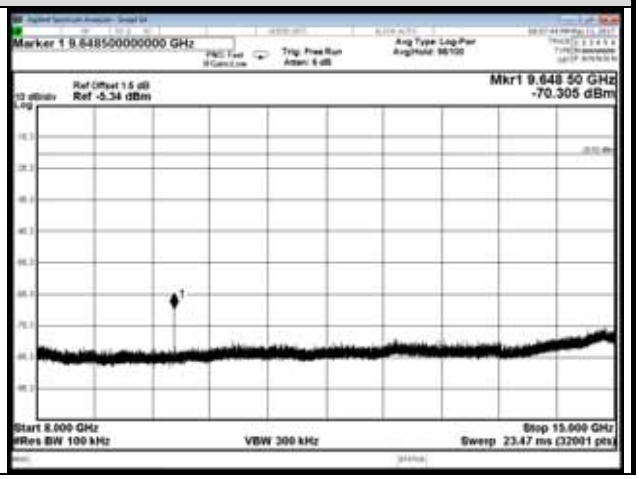
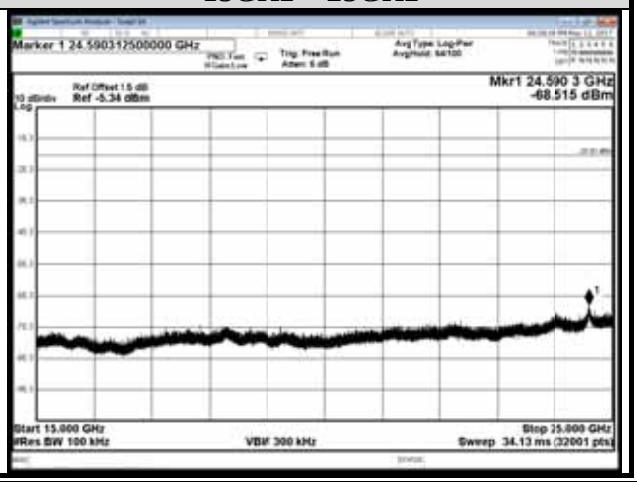
| Test Date | 2017/05/11 | Temp./Hum. | 26℃/42% |
|---|---|---|---|
| Cable Loss | 1.5dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Mode | BLE | Frequency | TX 2480MHz |
| Simultaneous Factor10 log(n) (Note: “n” is antenna number) | | | 0 |

| Reference Level | Band Edge |
|---|---|
|  |  |
| **30MHz – 8GHz** | **8GHz – 15GHz** |
|  |  |
| **15GHz – 25GHz** | |
|  | |

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# A.6 POWER SPECTRAL DENSITY

| | | | |
|---|---|---|---|
| Test Date | 2017/04/14 ~ 05/11 | Temp./Hum. | 26℃/42 ~ 43% |
| Cable Loss | WLAN: 0.4dB<br>BLE: 1.5dB | Test Voltage | AC 120V, 60Hz<br>(Via Power Supply) |
| Simultaneous Factor10 log(n) (Note: "n" is antenna number) | | | 0 |

A.6.1 Power Spectral Density Result

| Mode | Centre Frequency (MHz) | Power Spectral Density (dBm) | Limit |
|---|---|---|---|
| 802.11b | 2412 | 7.290 | < 8 dBm/3kHz |
| | 2437 | 7.950 | |
| | 2462 | 7.320 | |
| 802.11g | 2412 | 2.852 | |
| | 2437 | 2.636 | |
| | 2462 | 2.927 | |
| 802.11n-HT20 | 2412 | 1.839 | |
| | 2437 | 1.235 | |
| | 2462 | 1.692 | |
| 802.11n-HT40 | 2422 | -1.540 | |
| | 2437 | -1.300 | |
| | 2452 | -0.597 | |
| BLE | 2402 | -0.406 | |
| | 2440 | 0.233 | |
| | 2480 | -0.820 | |

Note: All results have been included cable loss and Simultaneous Factor.

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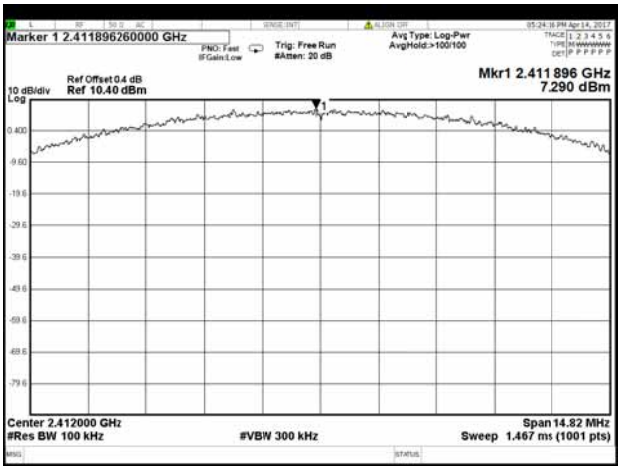
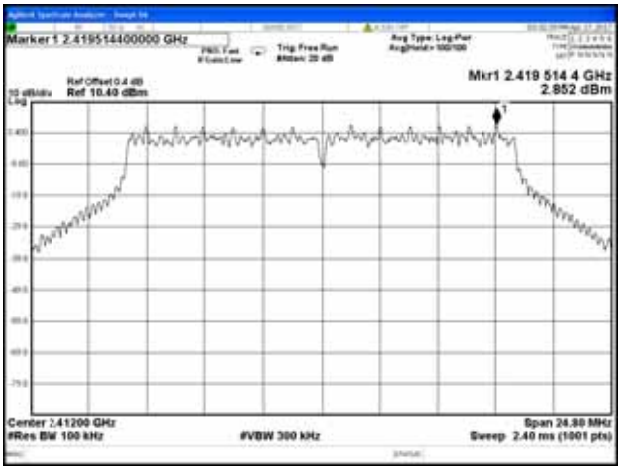
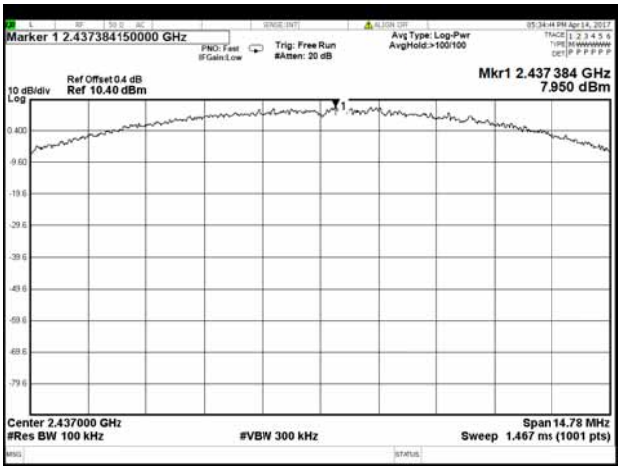
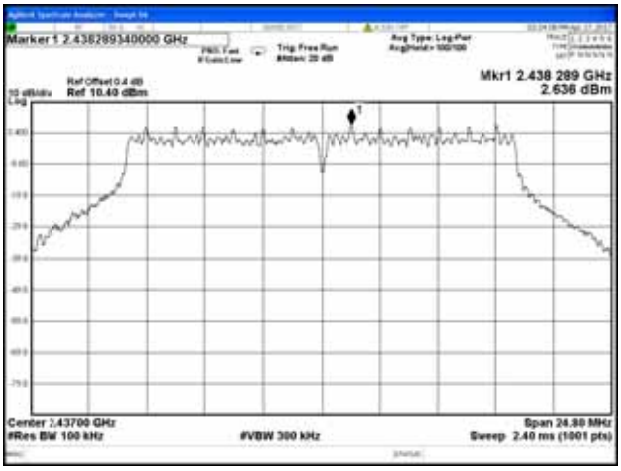
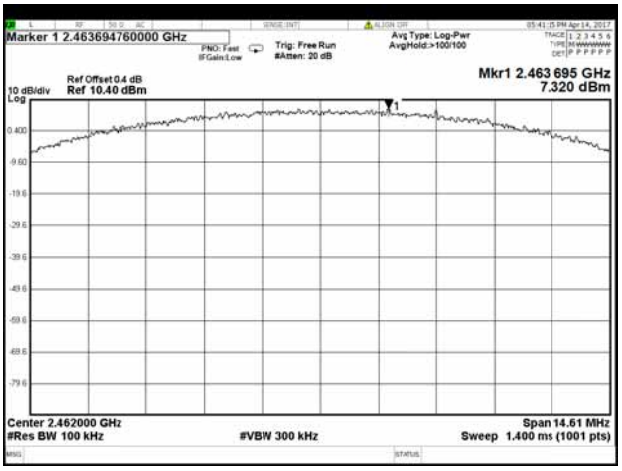
## A.6.2 Measurement Plots

| 802.11b | 802.11g |
|---|---|
|  |  |
|  |  |
|  |  |

Note: All results have been included cable loss and Simultaneous Factor.

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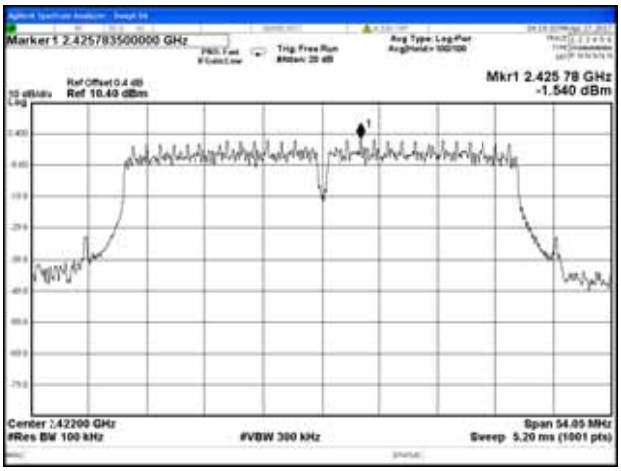
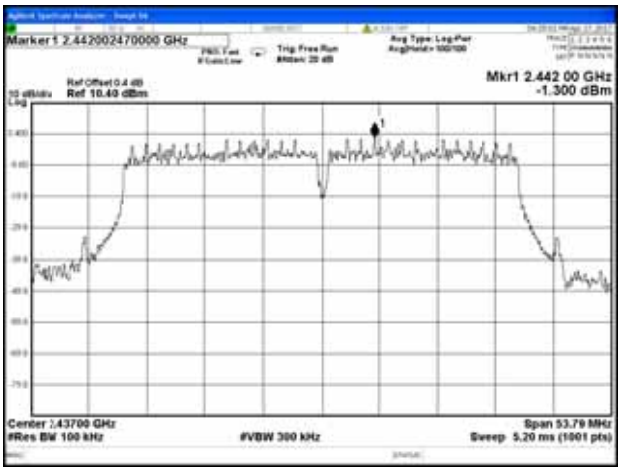
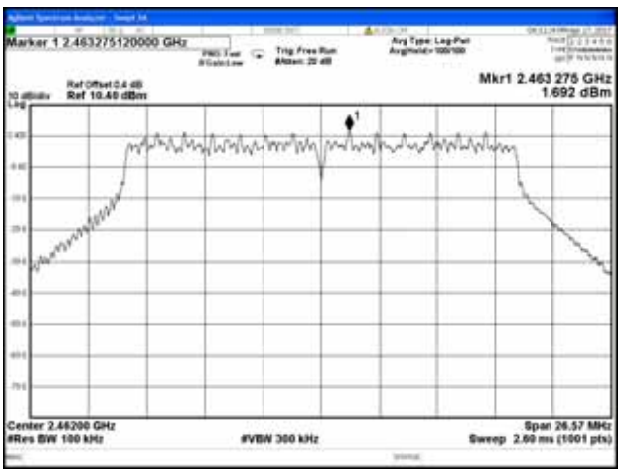
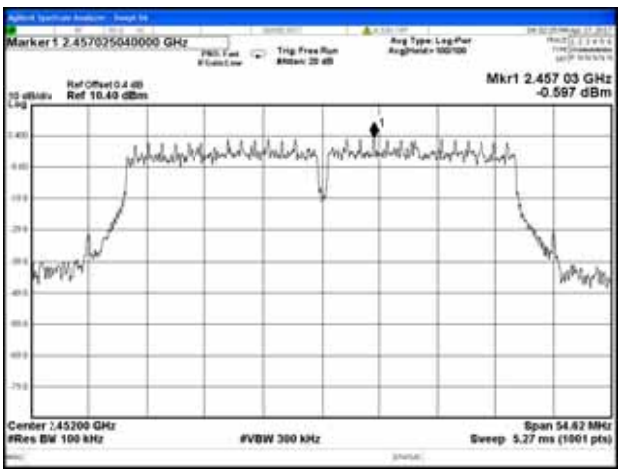
| 802.11n-HT20 | 802.11n-HT40 |
|---|---|
|  |  |
|  |  |
|  |  |

Note: All results have been included cable loss and Simultaneous Factor.

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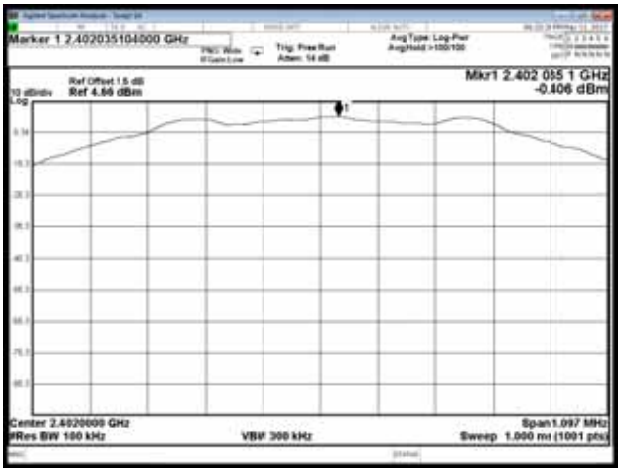
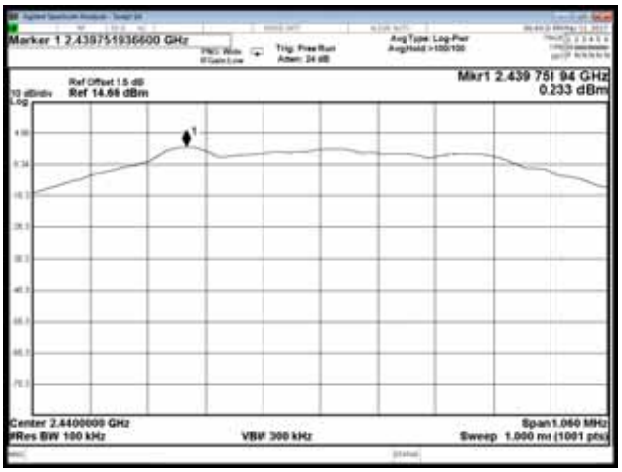
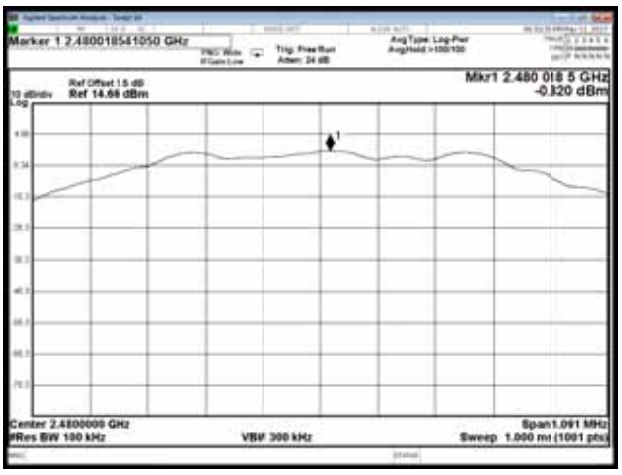
| BLE |
| --- |
|  |
|  |
|  |

Note: All results have been included cable loss and Simultaneous Factor.

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# APPDNDIX B

## TEST PHOTOGRAPHS

(Model: IOT-3352)

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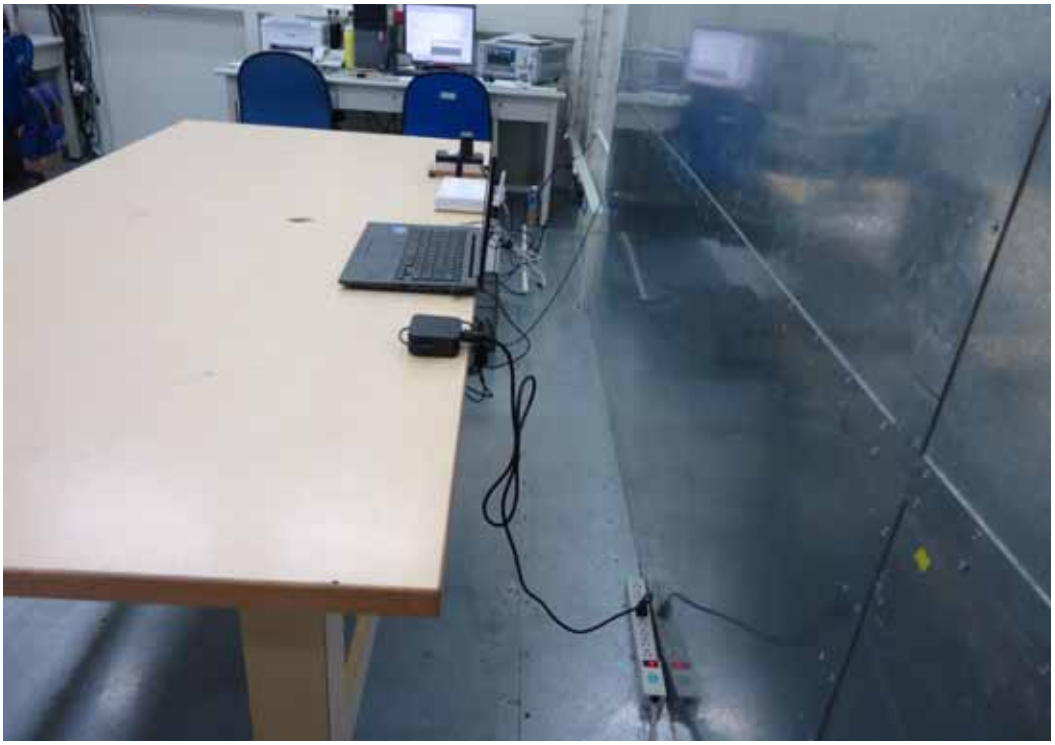
# B.1 Conducted Emission Measurement

FRONT VIEW



BACK VIEW

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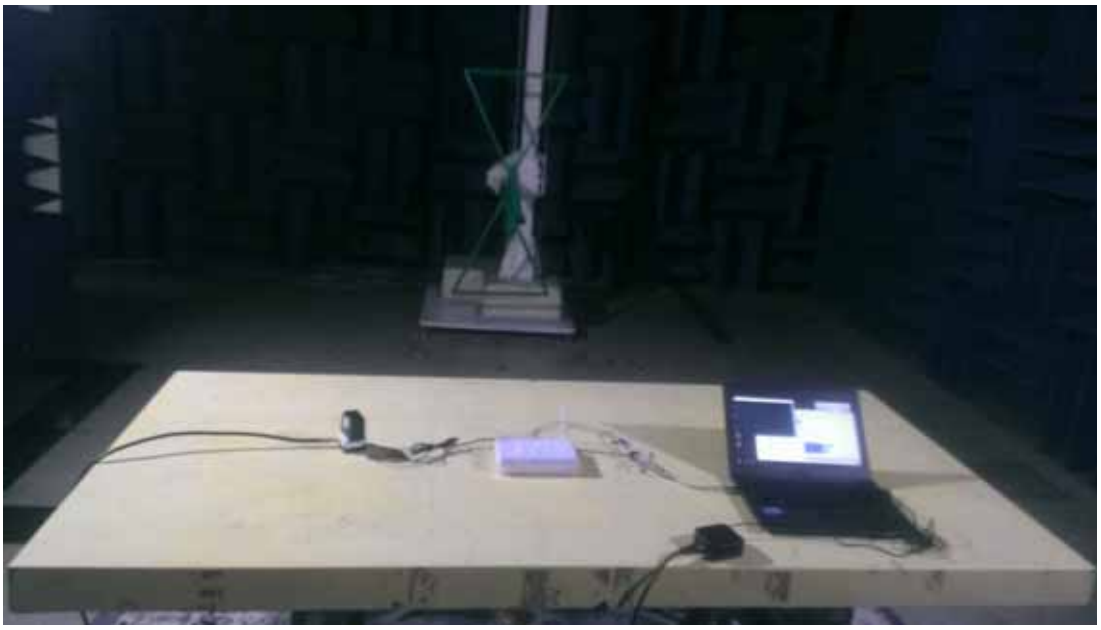
# B.2 Radiated Measurement at Chamber

Frequency Below to 1GHz



Frequency Above to 1GHz

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# B.3 RF Conducted Measurement