# CERTIFICATION TEST REPORT

**Report Number :** R12453250-E1

| | | |
|---|---|---|
| **Applicant** | : | Tosibox Oy<br>Teknologiantie 12A<br>90590 OULU<br>FINLAND |
| **Model** | : | Lock 500, Lock 500iC |
| **FCC ID** | : | 2AHCNLOCK500I |
| **IC** | : | 25009-LOCK500IC |
| **EUT Description** | : | Remote access device with wireless router functionality |
| **Test Standard(s)** | : | FCC 47 CFR PART 15 SUBPART C<br>ISED RSS-247 ISSUE 2<br>ISED RSS-GEN ISSUE 5 |

**Date Of Issue:**
2019-09-04

**Prepared by:**
UL LLC
12 Laboratory Dr.
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Tel: (919) 549-1400

NVLAP Lab code: 200246-0

# REPORT REVISION HISTORY

| Ver. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 1 | 2019-08-30 | Initial Issue | Brian T. Kiewra |
| 2 | 2019-09-04 | Updated IDs | Niklas Haydon |



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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Tosibox Oy
Teknologiantie 12A
90590 OULU
FINLAND

**EUT DESCRIPTION:** Remote access device with wireless router functionality

**MODEL:** Lock 500, Lock 500iC

**SERIAL NUMBER:** Non-Serialized

**DATE TESTED:** 2019-06-24 to 2019-08-28

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 Part 15 Subpart C | Compliant |
| ISED RSS-247 Issue 2 | Compliant |
| ISED RSS-GEN Issue 5 | Compliant |

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Approved & Released
For UL LLC By:

Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5, and RSS-247 Issue 2.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 12 Laboratory Dr. | 2800 Perimeter Park Dr. |
|---|---|
| ISED Site Code: 2180C | |
| ☐ Chamber A RTP | ☒ North Chamber |
| ☐ Chamber C RTP | ☒ South Chamber |

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. SAMPLE CALCULATION

**RADIATED EMISSIONS**

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

**MAINS CONDUCTED EMISSIONS**

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

## 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER | UNCERTAINTY |
|---|---|
| Radio Frequency (Spectrum Analyzer) | 141.2 Hz |
| Occupied Channel Bandwidth | 2.00% |
| RF output power, conducted | 1.3 dB (PK)<br>0.45 dB (AV) |
| Power Spectral Density, conducted | 2.47 dB |
| Unwanted Emissions, conducted | 2.50 dB |
| All emissions, radiated | 4.88 dB |
| Temperature | 2.26°C |
| Humidity | 6.79% |
| DC Supply voltages | 1.70% |
| Time | 3.39% |

Uncertainty figures are valid to a confidence level of 95%.

# 5. EQUIPMENT UNDER TEST

## 5.1. EUT DESCRIPTION

The EUT is a remote access device with wireless router functionality that contains an 802.11b/g/n20 (2x2 SISO) radio.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum PK conducted output power as follows:

Chain 0

| Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|---|---|---|---|
| **1Tx** | | | |
| 2412 - 2462 | 802.11b | 14.26 | 26.67 |
| 2412 - 2462 | 802.11g | 18.67 | 73.62 |
| 2412 - 2462 | 802.11n HT20 | 17.73 | 59.29 |

Chain 1

| Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|---|---|---|---|
| **1Tx** | | | |
| 2412 - 2462 | 802.11b | 14.87 | 30.69 |
| 2412 - 2462 | 802.11g | 19.38 | 86.70 |
| 2412 - 2462 | 802.11n HT20 | 18.91 | 77.80 |

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two identical monopole antennas, with maximum gains of 2 dBi.

## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 4.2.0, rev. 2.
The EUT driver software installed in the host support equipment during testing was MT7620QA, rev. 1.0.6.2

## 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, with the antennas in two orientations, 90° and 180°. It was determined that for chain 0, Y-axis with the antenna at 90° was worst-case orientation. For chain 1, it was determined that Y-Axis with the antenna at 180° was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in these orientatons.

Worst-case data rates were declared as:
802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20mode: MCS0

## 5.6. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Support Equipment List | | | | |
|---|---|---|---|---|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| Laptop | Lenovo | T430 | PB-C346V | N/A |
| Power Supply | Cool Power Solutions | ATS018T-W240V | NA | NA |

**I/O CABLES**

| I/O Cable List | | | | | | |
|---|---|---|---|---|---|---|
| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1 | Ethernet | 5 | Ethernet | Unshielded | <3m | None |
| 2 | Power | 1 | Barrel | Power | <3m | None |

**SETUP DIAGRAM**

Please refer to R12453250-EP1 for setup diagrams.

# 6. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10 Section 11.6

6 dB BW: ANSI C63.10 Subclause -11.8.1

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.1.3 PKPM1

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Out-of-band emissions in non-restricted bands: ANSI C63.10-2013 Section 11.11 & 6.10.4

Out-of-band emissions in restricted bands: ANSI C63.10-2013 Section 11.12.1 & 6.10.5

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.



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# 7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

| Equipment ID | Description | Manufacturer | Model Number | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| 72822 (PRE0100902) | Spectrum Analyzer | Agilent Technologies | E4446A | 2018-11-19 | 2019-11-19 |
| T177 (PRE0079253) | Spectrum Analyzer | Agilent Technologies | E4446A | 2019-04-22 | 2020-04-22 |
| SA0027 | Spectrum Analyzer | KEYSIGHT | N9030A | 2019-05-15 | 2020-05-15 |
| SN 181474341 | Environmental Meter | Fisher Scientific | 15-077-963 | 2018-07-27 | 2020-07-27 |
| 126431 (PRE0128068) | RF Power Meter | Anritsu | ML2495A | 2019-04-30 | 2020-04-30 |
| 126430 (PRE0128067) | Pulse Power Sensor, 300MHz to 40GHz | Anritsu | MA2411B | 2019-04-30 | 2020-04-30 |

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

| Equipment ID | Description | Manufacturer | Model Number | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| CBL087 | Coax cable, RG223, N-male to BNC-male, 20-ft. | Pasternack | PE3W06143-240 | 2019-05-29 | 2020-05-29 |
| s/n 181562858 | Environmental Meter | Fisher Scientific | 14-650-118 | 2018-09-04 | 2020-09-04 |
| LISN003 | LISN, 50-ohm/50-uH, 2-conductor, 25A | Fischer Custom Com. | FCC-LISN-50-25-2-01-550V | 2019-08-19 | 2020-08-19 |
| 75141 (PRE0101521) | EMI Test Receiver 9kHz-7GHz | Rohde & Schwarz | ESCI 7 | 2019-08-20 | 2020-08-20 |
| TL001 | Transient Limiter, 0.009-30MHz | Com-Power | LIT-930A | 2019-05-29 | 2020-05-29 |
| PS214 | AC Power Source | Elgar | CW2501M (s/n 1523A02396) | NA | NA |
| CDECABLE001 | ANSI C63.4 1m extension cable. | UL | Per Annex B of ANSI C63.4 | 2019-07-10 | 2020-07-10 |
| LISN008 | LISN, 50-ohm/50-uH, 2-conductor, 25A (For support gear only.) | Solar Electronics | 8012-50-R-24-BNC | 2019-07-10 | 2020-07-10 |

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

| Equipment ID | Description | Manufacturer | Model Number | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| **0.009-30MHz (Loop Ant.)** | | | | | |
| AT0079 | Active Loop Antenna | ETS-Lindgren | 6502 | 2019-08-08 | 2020-08-08 |
| **30-1000 MHz** | | | | | |
| AT0074 | Hybrid Broadband Antenna | Sunol Sciences Corp. | JB3 | 2019-07-16 | 2020-07-16 |
| **1-18 GHz** | | | | | |
| AT0067 | Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz | ETS Lindgren | 3117 | 2019-03-22 | 2020-03-22 |
| **Gain-Loss Chains** | | | | | |
| N-SAC01 | Gain-loss string: 0.009-30MHz | Various | Various | 2019-05-02 | 2020-05-02 |
| N-SAC02 | Gain-loss string: 25-1000MHz | Various | Various | 2019-05-02 | 2020-05-02 |
| N-SAC03 | Gain-loss string: 1-18GHz | Various | Various | 2019-03-15 | 2020-03-15 |
| **Receiver & Software** | | | | | |
| SA0026 | Spectrum Analyzer | Agilent | N9030A | 2019-03-19 | 2020-03-19 |
| SOFTEMI | EMI Software | UL | Version 9.5 | NA | NA |
| **Additional Equipment used** | | | | | |
| s/n 181474341 | Environmental Meter | Fisher Scientific | 15-077-963 | 2018-07-27 | 2020-07-27 |


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Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

| Equipment ID | Description | Manufacturer | Model Number | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| **1-18 GHz** | | | | | |
| AT0072 | Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz | ETS Lindgren | 3117 | 2019-04-22 | 2020-04-22 |
| **18-40 GHz** | | | | | |
| AT0076 | Horn Antenna, 18-26.5GHz | ARA | MWH-1826/B | 2018-11-08 | 2019-11-08 |
| **Gain-Loss Chains** | | | | | |
| S-SAC03 | Gain-loss string: 1-18GHz | Various | Various | 2019-03-13 | 2020-03-13 |
| S-SAC04 | Gain-loss string: 18-40GHz | Various | Various | 2018-09-30 | 2019-09-30 |
| **Receiver & Software** | | | | | |
| SA0025 | Spectrum Analyzer | Agilent | N9030A | 2019-02-28 | 2020-02-28 |
| SA0027 (18-40GHz RSE) | Spectrum Analyzer | Agilent | N9030A | 2019-05-15 | 2020-05-15 |
| SOFTEMI | EMI Software | UL | Version 9.5 | NA | NA |
| **Additional Equipment used** | | | | | |
| s/n 181474409 | Environmental Meter | Fisher Scientific | 15-077-963 | 2018-07-27 | 2020-07-27 |


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# 8. ANTENNA PORT TEST RESULTS

## 8.1. ON TIME AND DUTY CYCLE

**LIMITS**

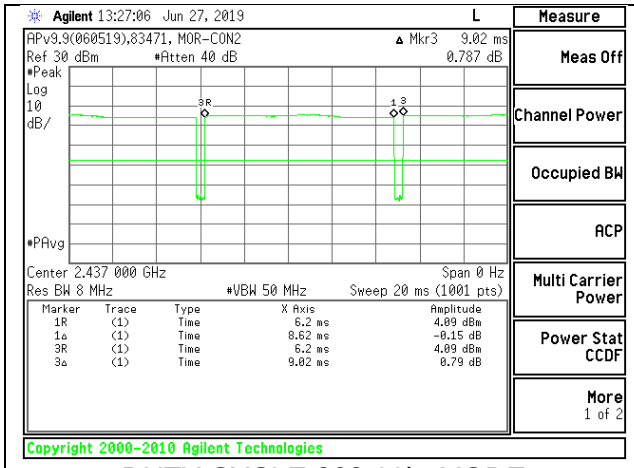
None; for reporting purposes only.

**PROCEDURE**

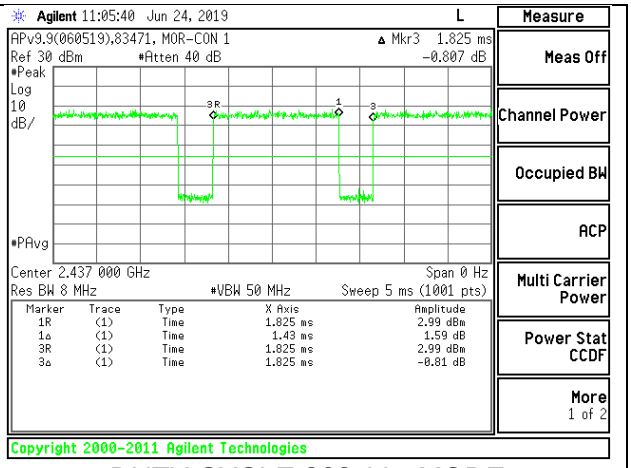
KDB 558074 Zero-Span Spectrum Analyzer Method.

**ON TIME AND DUTY CYCLE RESULTS**

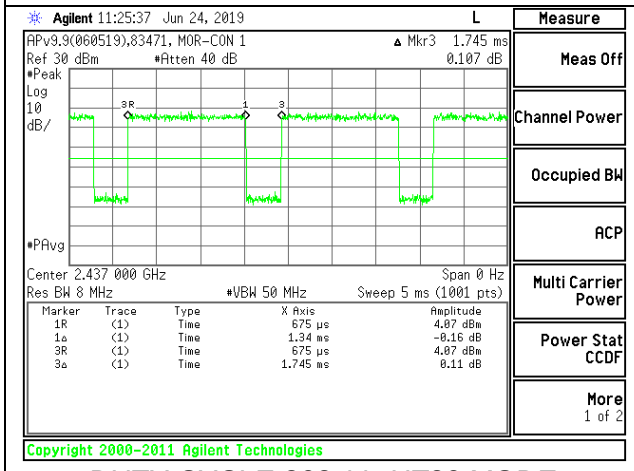
| Mode | ON Time B (msec) | Period (msec) | Duty Cycle x (linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/B Minimum VBW (kHz) |
|---|---|---|---|---|---|---|
| **2.4GHz Band** | | | | | | |
| 802.11b 1TX | 8.620 | 9.020 | 0.956 | 95.57% | 0.20 | 0.116 |
| 802.11g 1TX | 1.430 | 1.825 | 0.784 | 78.36% | 1.06 | 0.699 |
| 802.11n HT20 1TX | 1.340 | 1.745 | 0.768 | 76.79% | 1.15 | 0.746 |




DUTY CYCLE 802.11b MODE




DUTY CYCLE 802.11g MODE




DUTY CYCLE 802.11nHT20 MODE

Tested by: 83471/40882

## 8.2. 99% BANDWIDTH

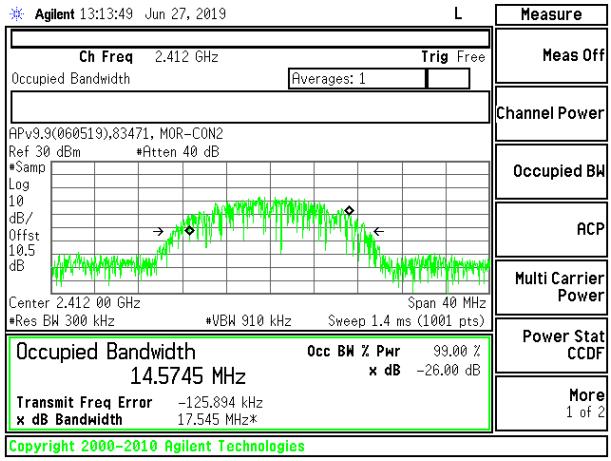
**LIMITS**

None; for reporting purposes only.

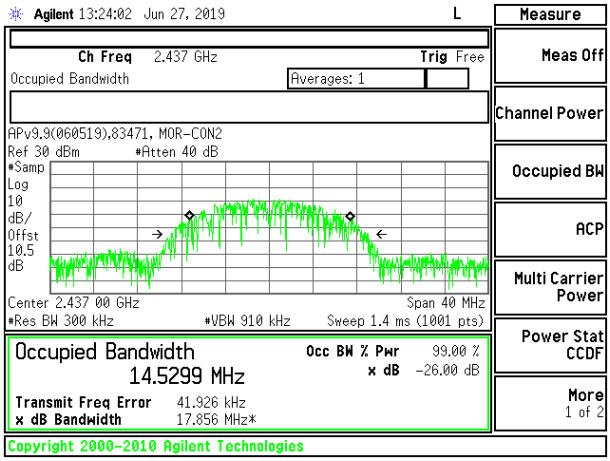
### 8.2.1. 802.11b MODE

**CHAIN 0**

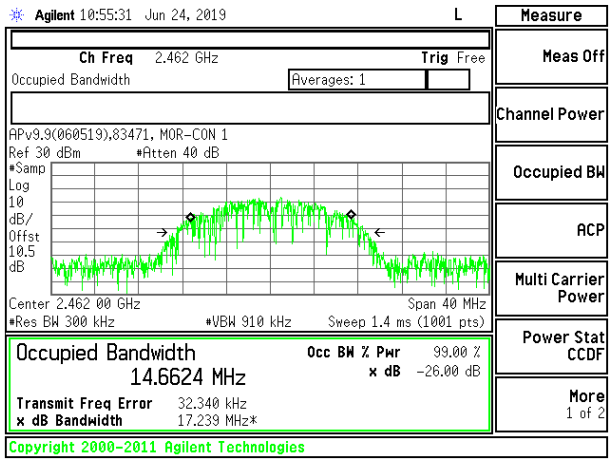
| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low 1 | 2412 | 14.5745 |
| Mid 6 | 2437 | 14.5299 |
| High 11 | 2462 | 14.6624 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

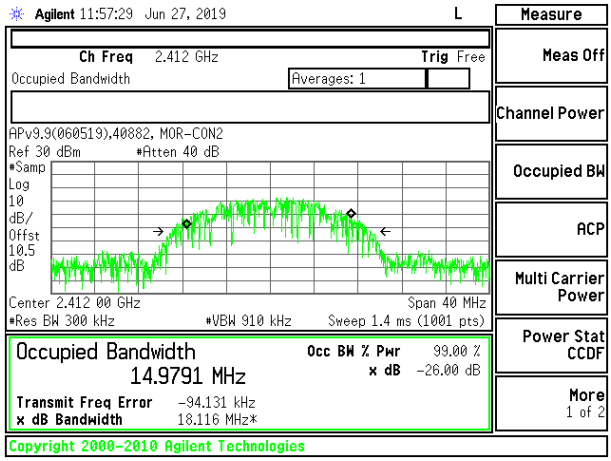



**HIGH CHANNEL 11**

Tested by: 83471/40882

**CHAIN 1**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low 1 | 2412 | 14.9791 |
| Mid 6 | 2437 | 14.8929 |
| High 11 | 2462 | 14.9575 |

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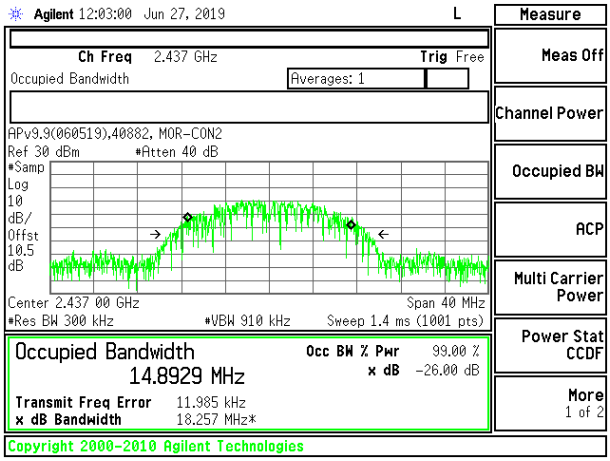


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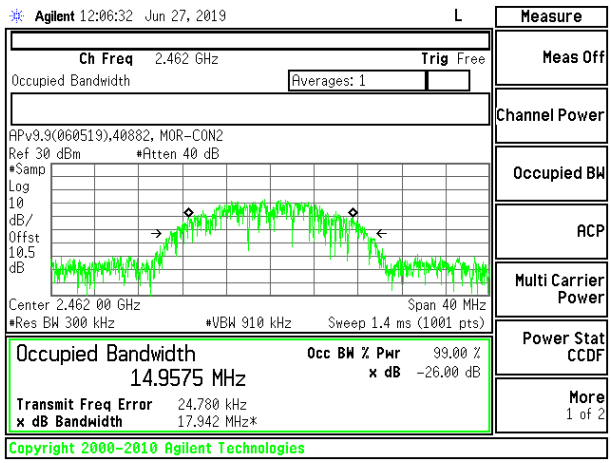
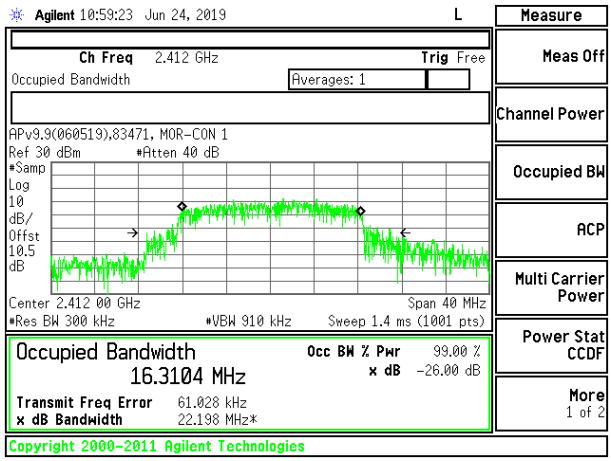



**HIGH CHANNEL 11**

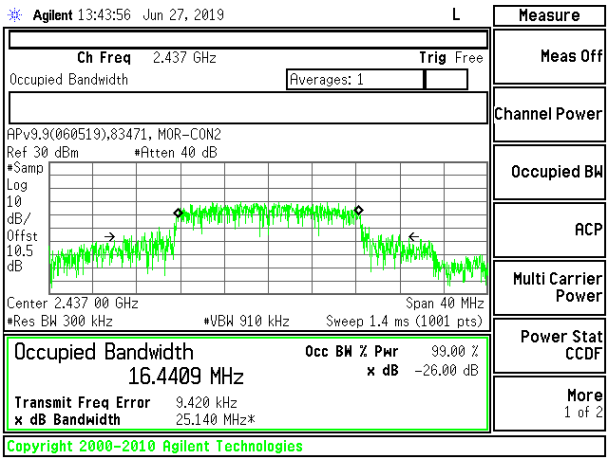
### 8.2.2. 802.11g MODE

**CHAIN 0**

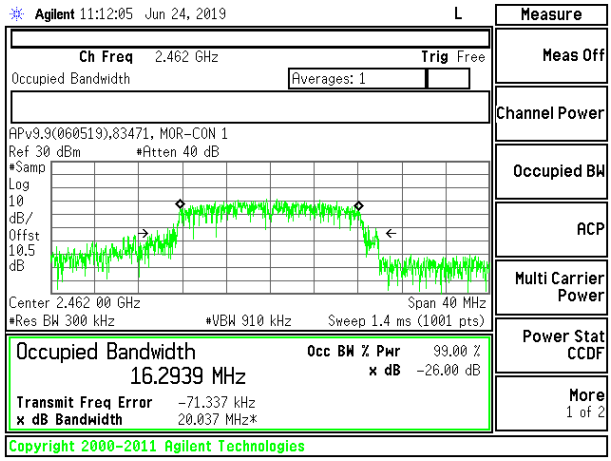
| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low 1 | 2412 | 16.3104 |
| Mid 6 | 2437 | 16.4409 |
| High 11 | 2462 | 16.2939 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

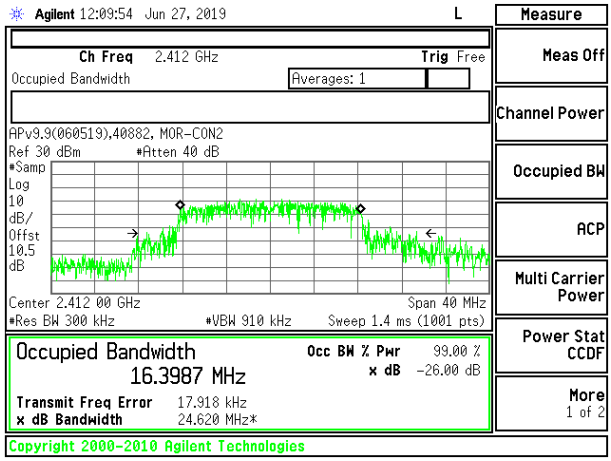



**HIGH CHANNEL 11**

Tested by: 83471/40882

**CHAIN 1**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low 1 | 2412 | 16.3987 |
| Mid 6 | 2437 | 16.5305 |
| High 11 | 2462 | 16.3102 |

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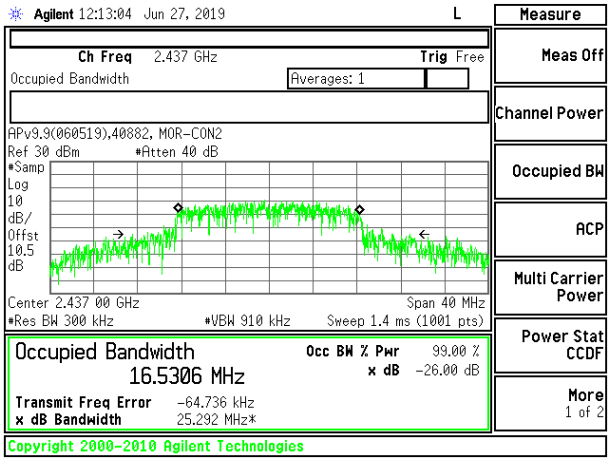
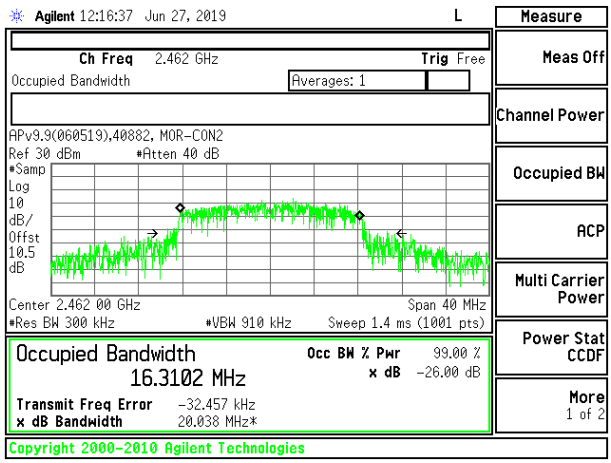



**MID CHANNEL 6**

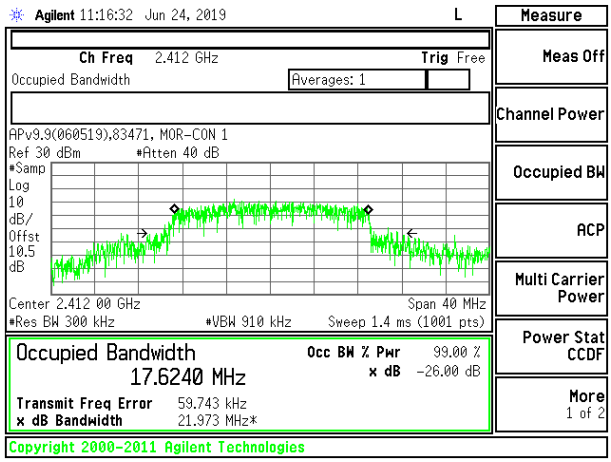



**HIGH CHANNEL 11**

### 8.2.3. 802.11n HT20 MODE

**CHAIN 0**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low 1 | 2412 | 17.6240 |
| Mid 6 | 2437 | 17.5520 |
| High 11 | 2462 | 17.4690 |

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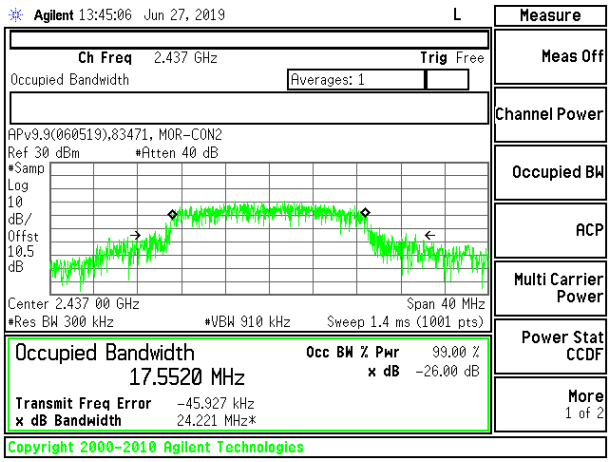


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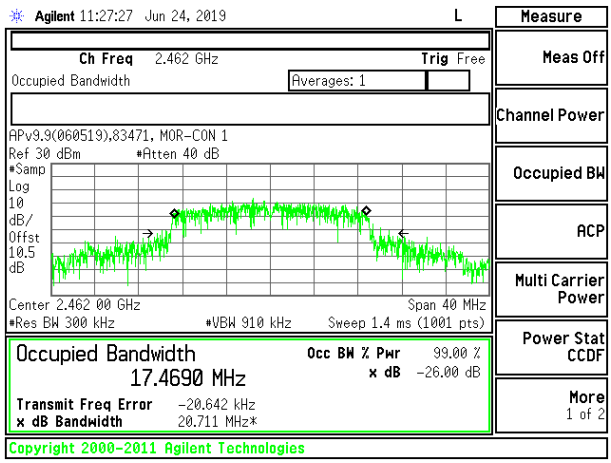
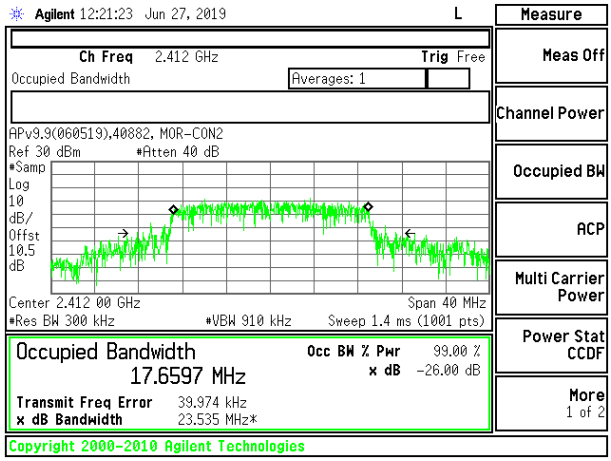



**HIGH CHANNEL 11**

Tested by: 83471/40882

**CHAIN 1**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low 1 | 2412 | 17.6597 |
| Mid 6 | 2437 | 17.5123 |
| High 11 | 2462 | 17.4638 |

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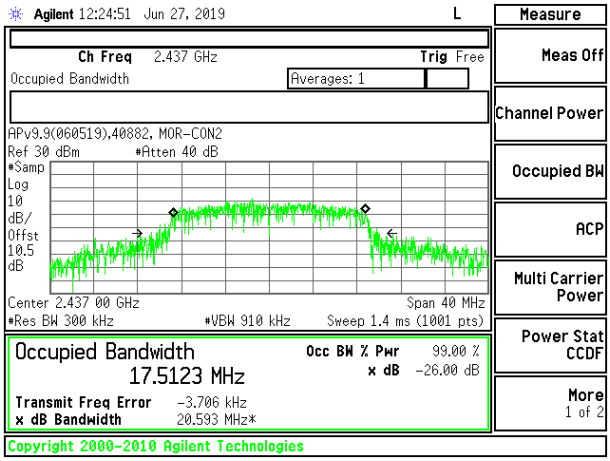


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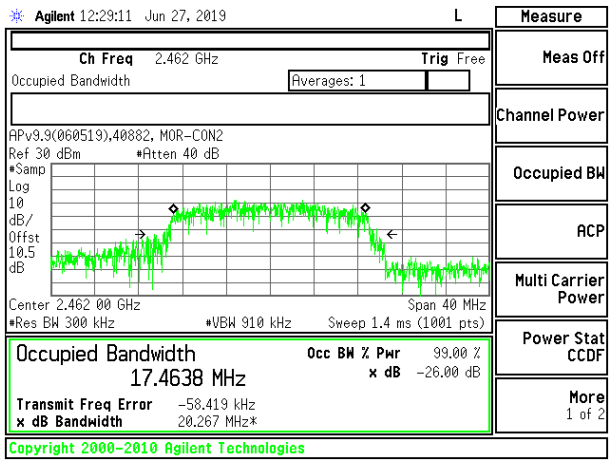



**HIGH CHANNEL 11**

## 8.3. 6 dB BANDWIDTH

**LIMITS**

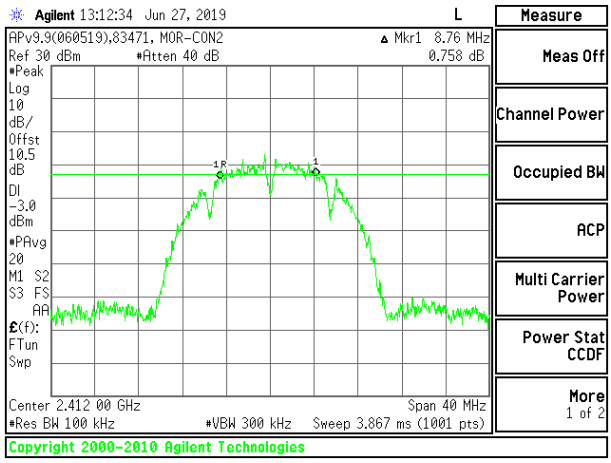
FCC §15.247 (a) (2)
RSS-247 5.2 (a)

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

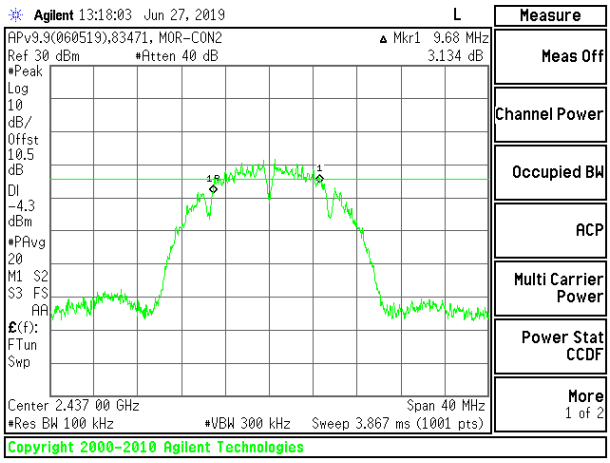
### 8.3.1. 802.11b MODE

**CHAIN 0**

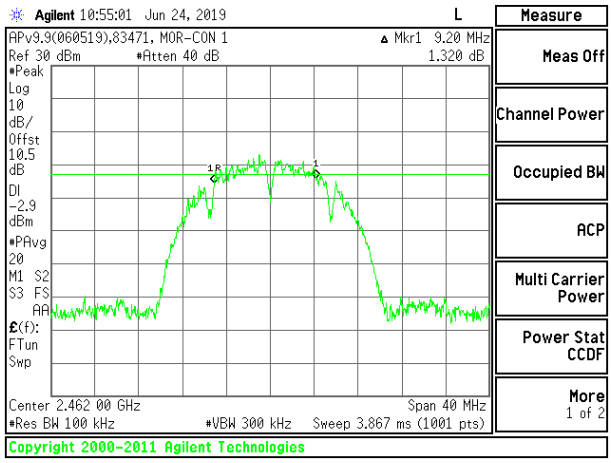
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low 1 | 2412 | 8.76 | 0.5 |
| Mid 6 | 2437 | 9.68 | 0.5 |
| High 11 | 2462 | 9.20 | 0.5 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

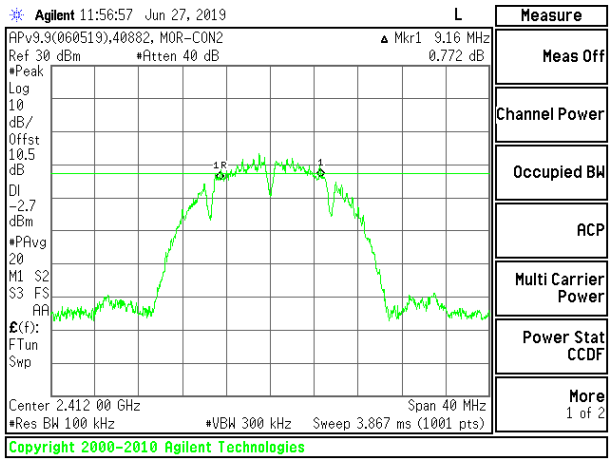



**HIGH CHANNEL 11**

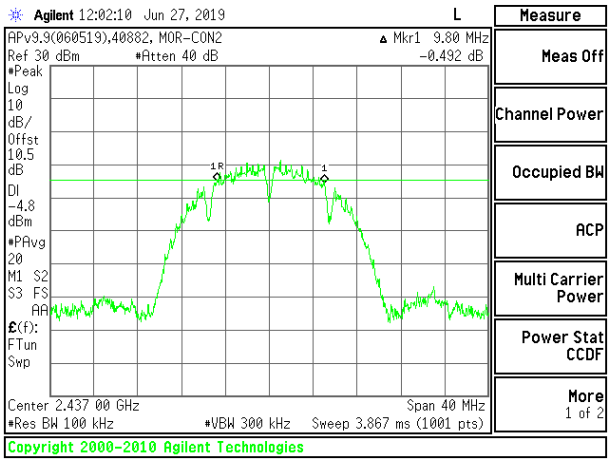
Tested by: 83471/40882

**CHAIN 1**

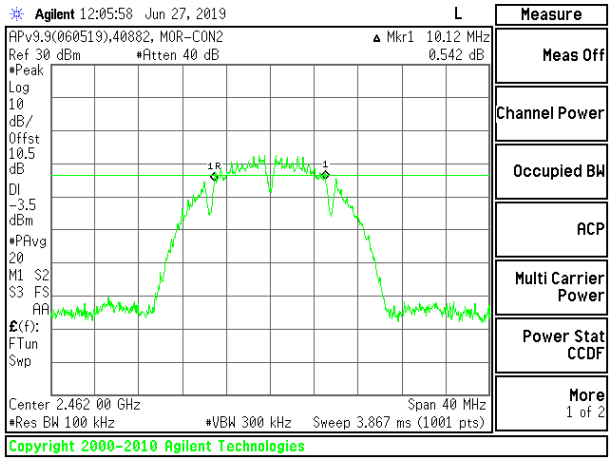
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low 1 | 2412 | 9.16 | 0.5 |
| Mid 6 | 2437 | 9.80 | 0.5 |
| High 11 | 2462 | 10.12 | 0.5 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

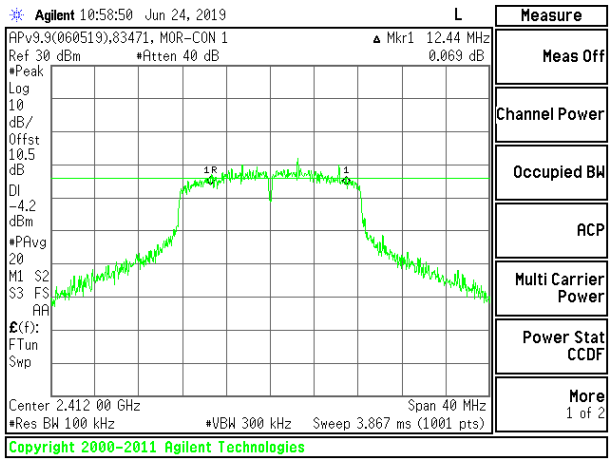



**HIGH CHANNEL 11**

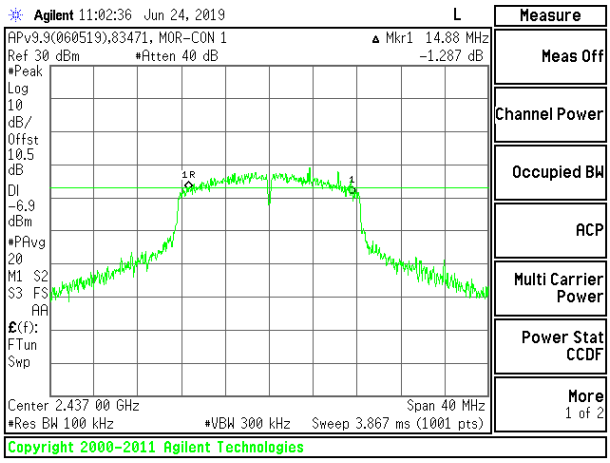
### 8.3.2. 802.11g MODE

**CHAIN 0**

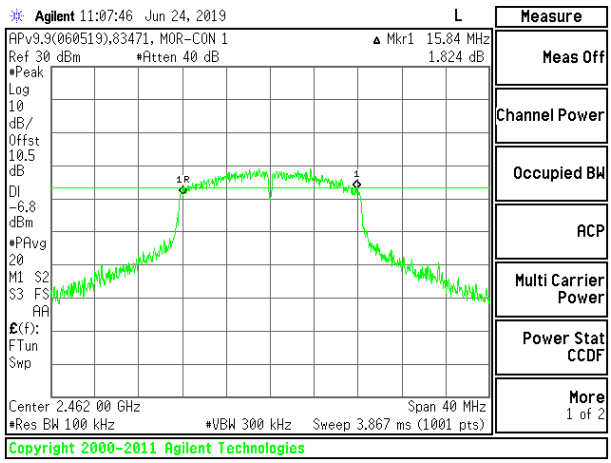
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low 1 | 2412 | 12.44 | 0.5 |
| Mid 6 | 2437 | 14.88 | 0.5 |
| High 11 | 2462 | 15.84 | 0.5 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

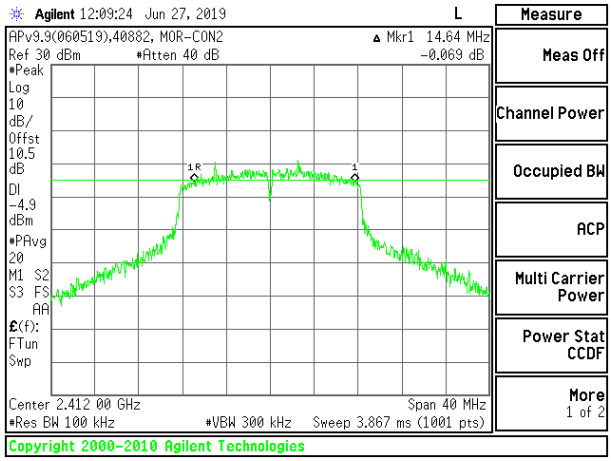



**HIGH CHANNEL 11**

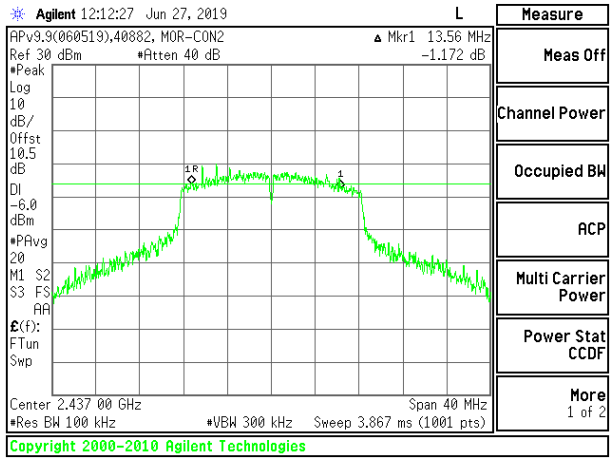
Tested by: 83471/40882

**CHAIN 1**

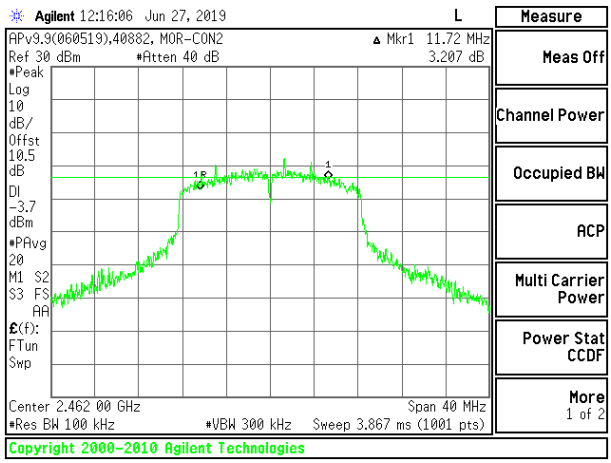
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low 1 | 2412 | 14.64 | 0.5 |
| Mid 6 | 2437 | 13.56 | 0.5 |
| High 11 | 2462 | 11.72 | 0.5 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

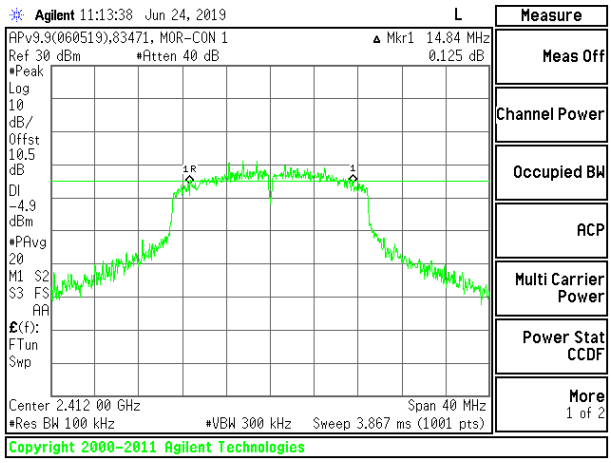



**HIGH CHANNEL 11**

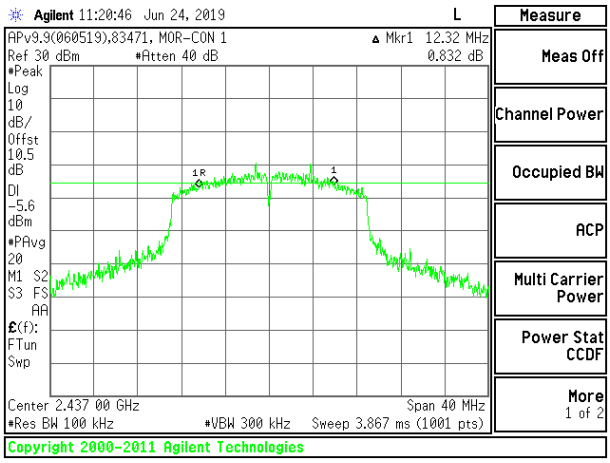
### 8.3.3. 802.11n HT20 MODE

**CHAIN 0**

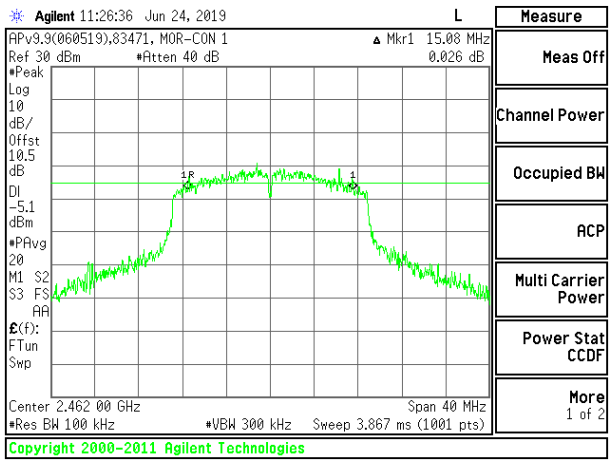
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low 1 | 2412 | 14.84 | 0.5 |
| Mid 6 | 2437 | 12.32 | 0.5 |
| High 11 | 2462 | 15.08 | 0.5 |




**LOW CHANNEL 1**




**MID CHANNEL 6**

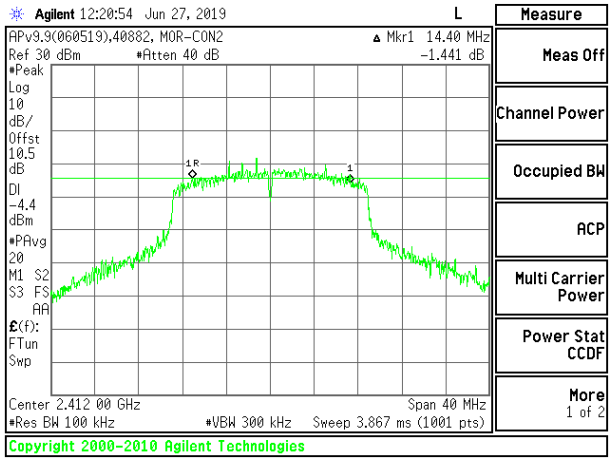



**HIGH CHANNEL 11**

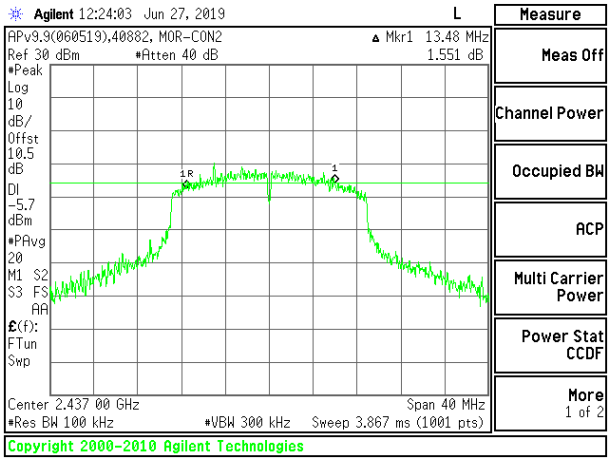
Tested by: 83471/40882

**CHAIN 1**

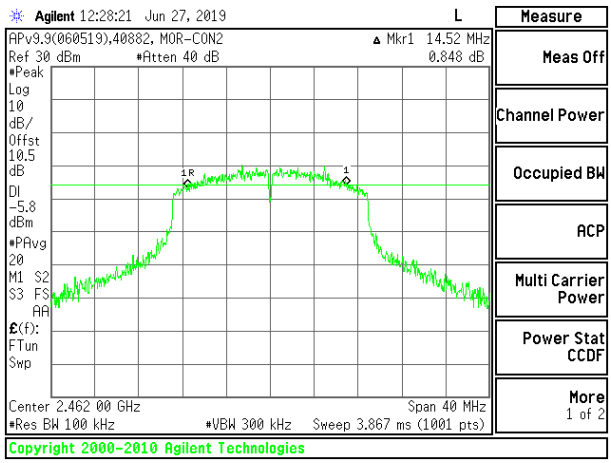
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low 1 | 2412 | 14.40 | 0.5 |
| Mid 6 | 2437 | 13.48 | 0.5 |
| High 11 | 2462 | 14.52 | 0.5 |




**LOW CHANNEL 1**




**MID CHANNEL 6**




**HIGH CHANNEL 11**

## 8.4. OUTPUT POWER

**LIMITS**

FCC §15.247 (b) (3)
RSS-247 5.4 (d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**TEST PROCEDURE**

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.26 dB (including 10 dB pad and 0.26 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

**DIRECTIONAL ANTENNA GAIN**

Unit is SISO with 2 antenna ports, therefore directional gain is equal to antenna gain.

**Test information**
Test date: 2019-06-25 and 2019-08-28
Tested By: 83471/44389 and 40882

### 8.4.1. 802.11b MODE

**CHAIN 0**

**Limits**

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | ISED Power Limit (dBm) | ISED EIRP Limit (dBm) | Max Power (dBm) |
|---|---|---|---|---|---|---|
| Low 1 | 2412 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| Mid 6 | 2437 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| High 11 | 2462 | 2.00 | 30.00 | 30 | 36 | 30.00 |

**Results**

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | 14.26 | 14.26 | 30.00 | -15.74 |
| Mid 6 | 2437 | 13.27 | 13.27 | 30.00 | -16.73 |
| High 11 | 2462 | 14.19 | 14.19 | 30.00 | -15.81 |

**CHAIN 1**

**Limits**

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | ISED Power Limit (dBm) | ISED EIRP Limit (dBm) | Max Power (dBm) |
|---|---|---|---|---|---|---|
| Low 1 | 2412 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| Mid 6 | 2437 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| High 11 | 2462 | 2.00 | 30.00 | 30 | 36 | 30.00 |

**Results**

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | 14.61 | 14.61 | 30.00 | -15.39 |
| Mid 6 | 2437 | 13.51 | 13.51 | 30.00 | -16.49 |
| High 11 | 2462 | 14.87 | 14.87 | 30.00 | -15.13 |

### 8.4.2. 802.11g MODE

**CHAIN 0**

**Limits**

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | ISED Power Limit (dBm) | ISED EIRP Limit (dBm) | Max Power (dBm) |
|---|---|---|---|---|---|---|
| Low 1 | 2412 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| Mid 6 | 2437 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| High 11 | 2462 | 2.00 | 30.00 | 30 | 36 | 30.00 |

**Results**

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | 18.67 | 18.67 | 30.00 | -11.33 |
| Mid 6 | 2437 | 17.73 | 17.73 | 30.00 | -12.27 |
| High 11 | 2462 | 18.39 | 18.39 | 30.00 | -11.61 |

**CHAIN 1**

**Limits**

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | ISED Power Limit (dBm) | ISED EIRP Limit (dBm) | Max Power (dBm) |
|---|---|---|---|---|---|---|
| Low 1 | 2412 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| Mid 6 | 2437 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| High 11 | 2462 | 2.00 | 30.00 | 30 | 36 | 30.00 |

**Results**

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | 19.30 | 19.30 | 30.00 | -10.70 |
| Mid 6 | 2437 | 16.67 | 16.67 | 30.00 | -13.33 |
| High 11 | 2462 | 19.38 | 19.38 | 30.00 | -10.62 |

### 8.4.3. 802.11n HT20 MODE

**CHAIN 0**

**Limits**

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | ISED Power Limit (dBm) | ISED EIRP Limit (dBm) | Max Power (dBm) |
|---|---|---|---|---|---|---|
| Low 1 | 2412 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| Mid 6 | 2437 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| High 11 | 2462 | 2.00 | 30.00 | 30 | 36 | 30.00 |

**Results**

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | 17.48 | 17.48 | 30.00 | -12.52 |
| Mid 6 | 2437 | 16.73 | 16.73 | 30.00 | -13.27 |
| High 11 | 2462 | 17.73 | 17.73 | 30.00 | -12.27 |

**CHAIN 1**

**Limits**

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | ISED Power Limit (dBm) | ISED EIRP Limit (dBm) | Max Power (dBm) |
|---|---|---|---|---|---|---|
| Low 1 | 2412 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| Mid 6 | 2437 | 2.00 | 30.00 | 30 | 36 | 30.00 |
| High 11 | 2462 | 2.00 | 30.00 | 30 | 36 | 30.00 |

**Results**

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | 18.91 | 18.91 | 30.00 | -11.09 |
| Mid 6 | 2437 | 17.59 | 17.59 | 30.00 | -12.41 |
| High 11 | 2462 | 18.52 | 18.52 | 30.00 | -11.48 |

## 8.5. AVERAGE POWER

**LIMITS**

None; for reporting purposes only

**TEST PROCEDURE**

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power

**Test information**
Test date: 2019-06-25 and 2019-08-28
Tested By: 83471/44389 and 40882

### 8.5.1. 802.11b MODE

**CHAIN 0**

| Channel | Frequency (MHz) | Chain 0 Power (dBm) |
|---|---|---|
| Low 1 | 2412 | 12.4200 |
| Mid 6 | 2437 | 11.1600 |
| High 11 | 2462 | 12.1500 |

**CHAIN 1**

| Channel | Frequency (MHz) | Chain 1 Power (dBm) |
|---|---|---|
| Low 1 | 2412 | 12.8200 |
| Mid 6 | 2437 | 11.4700 |
| High 11 | 2462 | 12.6400 |

### 8.5.2. 802.11g MODE

**CHAIN 0**

| Channel | Frequency (MHz) | Chain 0 Power (dBm) |
|---|---|---|
| Low 1 | 2412 | 12.0500 |
| Mid 6 | 2437 | 10.1300 |
| High 11 | 2462 | 10.7500 |

**CHAIN 1**

| Channel | Frequency (MHz) | Chain 1 Power (dBm) |
|---|---|---|
| Low 1 | 2412 | 11.7200 |
| Mid 6 | 2437 | 11.5800 |
| High 11 | 2462 | 12.4800 |

### 8.5.3. 802.11n HT20 MODE

**CHAIN 0**

| Channel | Frequency (MHz) | Chain 0 Power (dBm) |
|---|---|---|
| Low 1 | 2412 | 10.85 |
| Mid 6 | 2437 | 9.72 |
| High 11 | 2462 | 11.22 |

**CHAIN 1**

| Channel | Frequency (MHz) | Chain 1 Power (dBm) |
|---|---|---|
| Low 1 | 2412 | 10.43 |
| Mid 6 | 2437 | 9.69 |
| High 11 | 2462 | 10.51 |

## 8.6. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)
RSS-247 (5.2) (b)

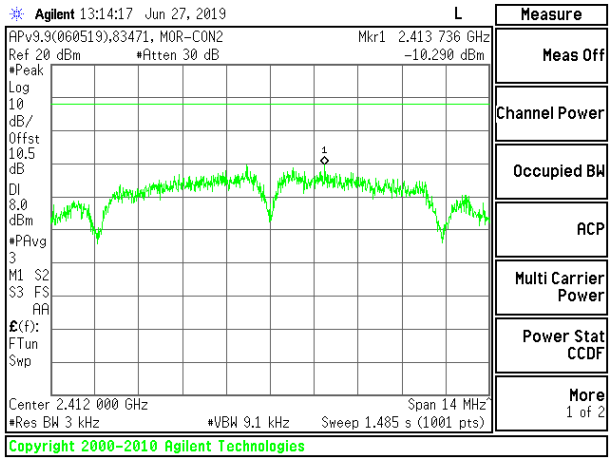
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 8.6.1. 802.11b MODE

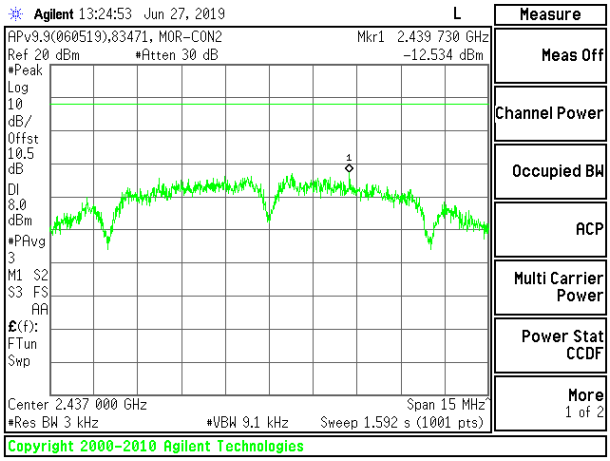
**CHAIN 0**

**PSD Results**

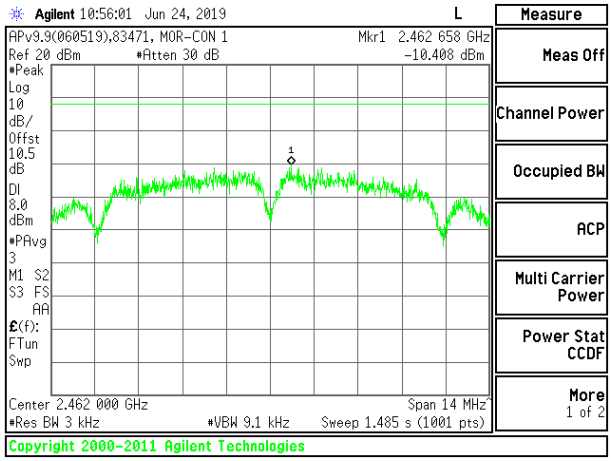
| Channel | Frequency (MHz) | Chain 0 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | -10.290 | -10.29 | 8.0 | -18.3 |
| Mid 6 | 2437 | -12.534 | -12.53 | 8.0 | -20.5 |
| High 11 | 2462 | -10.408 | -10.41 | 8.0 | -18.4 |




**LOW CHANNEL 1**




**MID CHANNEL 6**



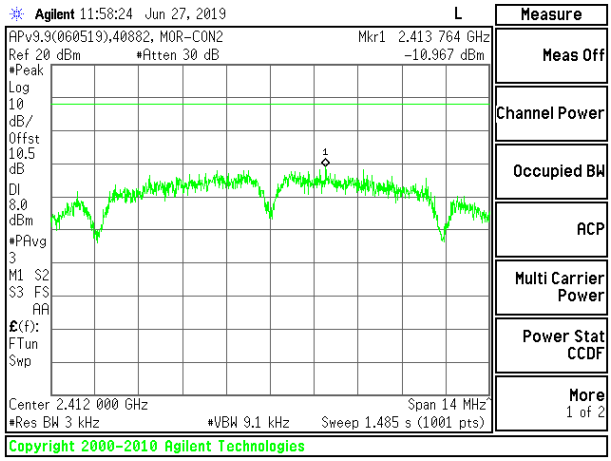

**HIGH CHANNEL 11**

Tested by: 83471/40882

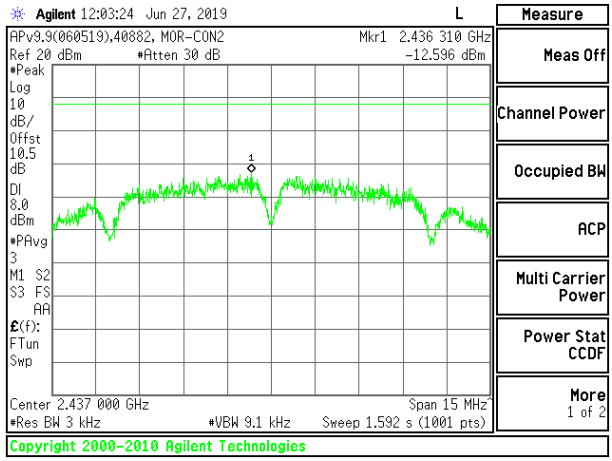
**CHAIN 1**

**PSD Results**

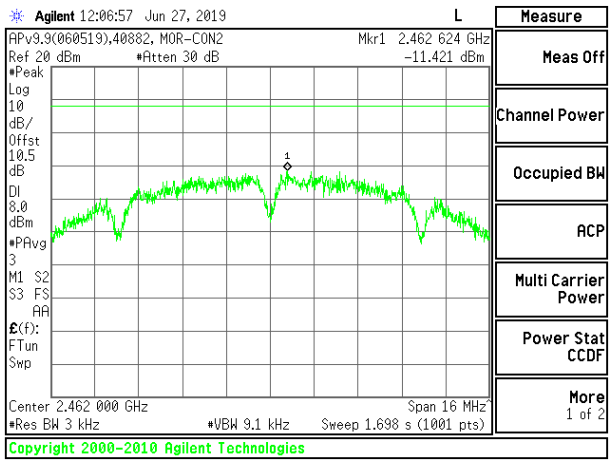
| Channel | Frequency (MHz) | Chain 1 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | -10.967 | -10.97 | 8.0 | -19.0 |
| Mid 6 | 2437 | -12.596 | -12.60 | 8.0 | -20.6 |
| High 11 | 2462 | -11.421 | -11.42 | 8.0 | -19.4 |




**LOW CHANNEL 1**




**MID CHANNEL 6**



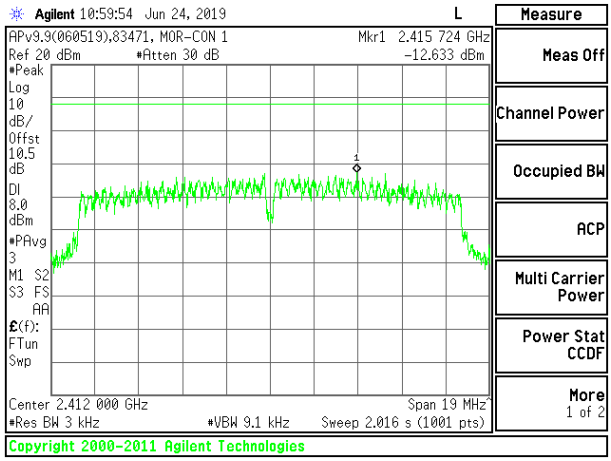

**HIGH CHANNEL 11**

## 8.6.2. 802.11g MODE

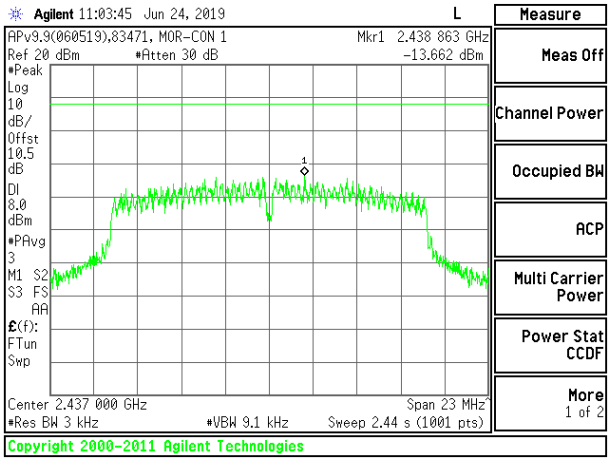
**CHAIN 0**

**PSD Results**

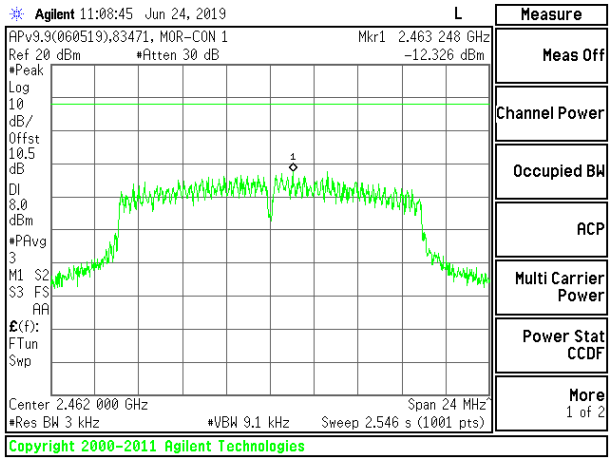
| Channel | Frequency (MHz) | Chain 0 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | -12.633 | -12.63 | 8.0 | -20.6 |
| Mid 6 | 2437 | -13.662 | -13.66 | 8.0 | -21.7 |
| High 11 | 2462 | 12.326 | 12.33 | 8.0 | 4.3 |




**LOW CHANNEL 1**




**MID CHANNEL 6**



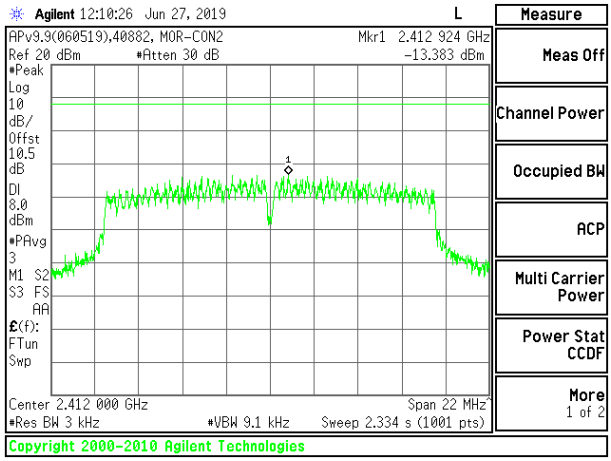

**HIGH CHANNEL 11**

Tested by: 83471/40882

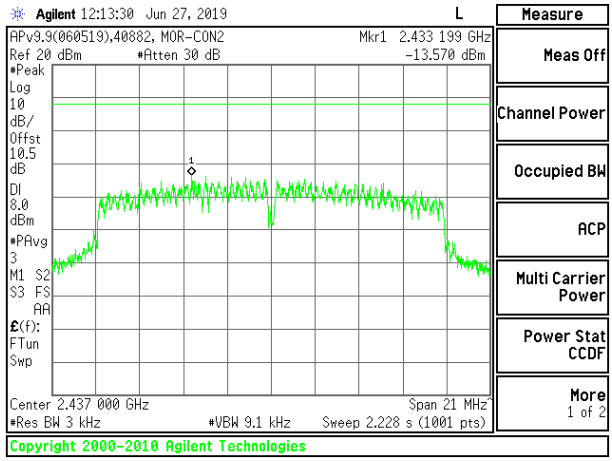
**CHAIN 1**

**PSD Results**

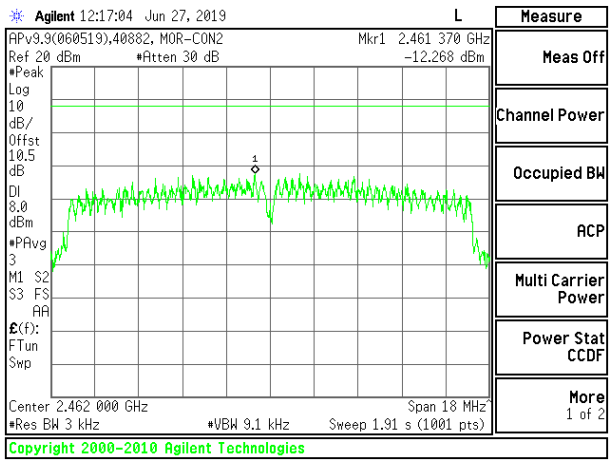
| Channel | Frequency (MHz) | Chain 1 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | -13.383 | -13.38 | 8.0 | -21.4 |
| Mid 6 | 2437 | -13.570 | -13.57 | 8.0 | -21.6 |
| High 11 | 2462 | -12.268 | -12.27 | 8.0 | -20.3 |




**LOW CHANNEL 1**




**MID CHANNEL 6**



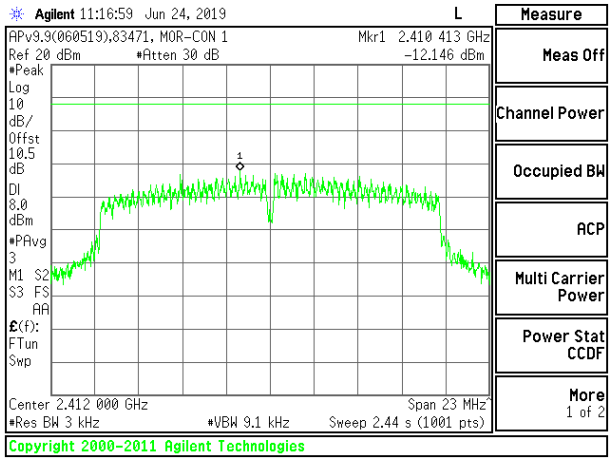

**HIGH CHANNEL 11**

### 8.6.3. 802.11n HT20 MODE

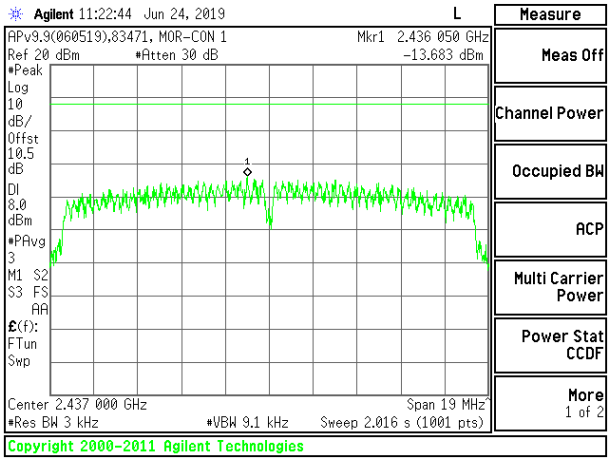
**CHAIN 0**

**PSD Results**

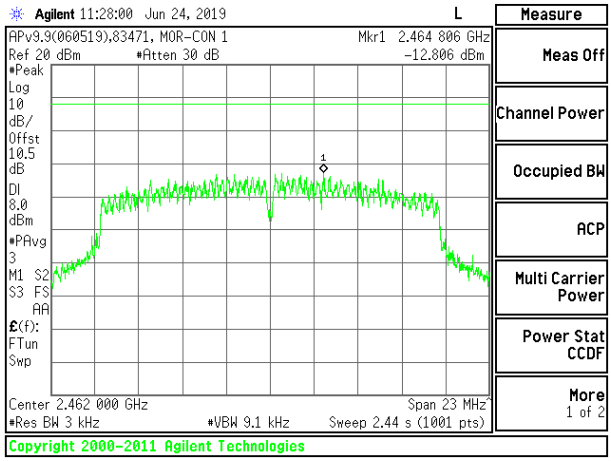
| Channel | Frequency (MHz) | Chain 0 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | -12.146 | -12.15 | 8.0 | -20.1 |
| Mid 6 | 2437 | -13.683 | -13.68 | 8.0 | -21.7 |
| High 11 | 2462 | -12.806 | -12.81 | 8.0 | -20.8 |




**LOW CHANNEL 1**




**MID CHANNEL 6**



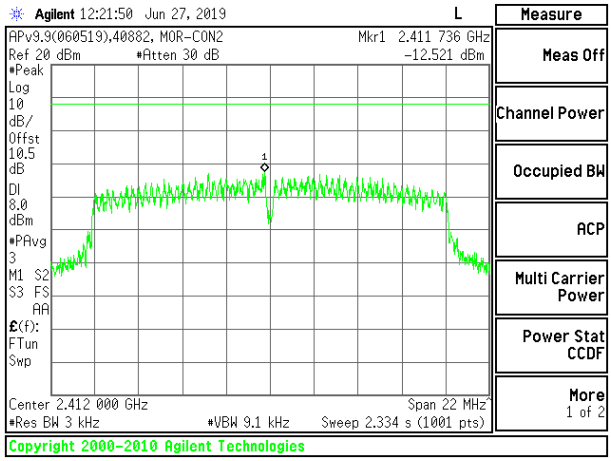

**HIGH CHANNEL 11**

Tested by: 83471/40882

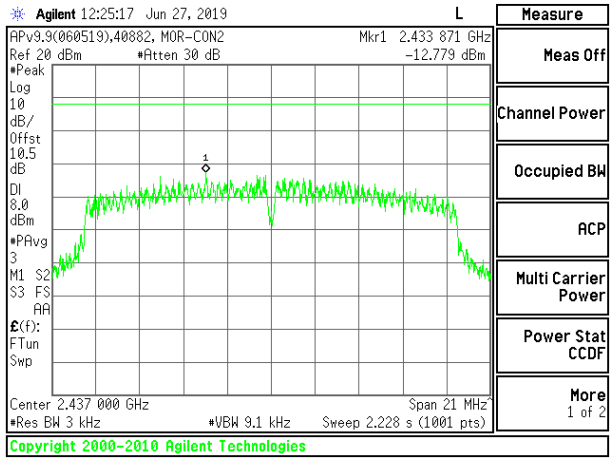
**CHAIN 1**

**PSD Results**

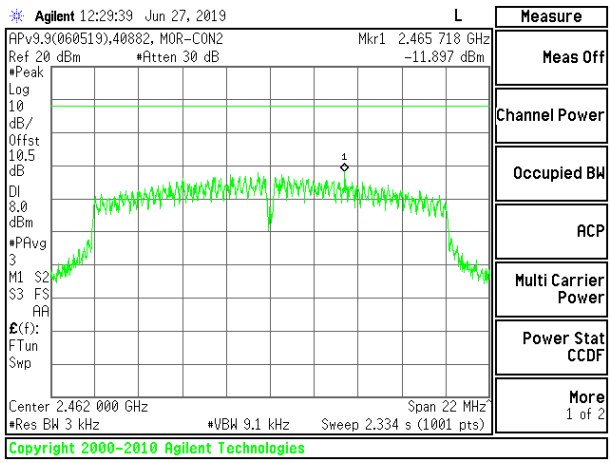
| Channel | Frequency (MHz) | Chain 1 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|
| Low 1 | 2412 | -12.521 | -12.52 | 8.0 | -20.5 |
| Mid 6 | 2437 | -12.779 | -12.78 | 8.0 | -20.8 |
| High 11 | 2462 | -11.897 | -11.90 | 8.0 | -19.9 |




**LOW CHANNEL 1**




**MID CHANNEL 6**




**HIGH CHANNEL 11**

## 8.7. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

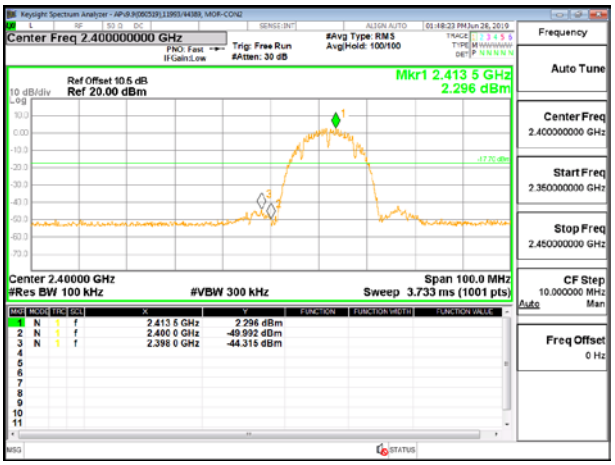
RSS-247 5.5

Output power was measured based on the use of peak measurement, therefore the required attenuation is 20 dB.

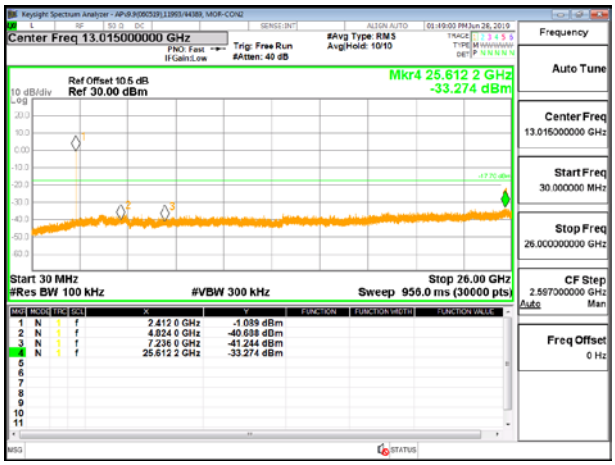
**RESULTS**

### 8.7.1. 802.11b MODE

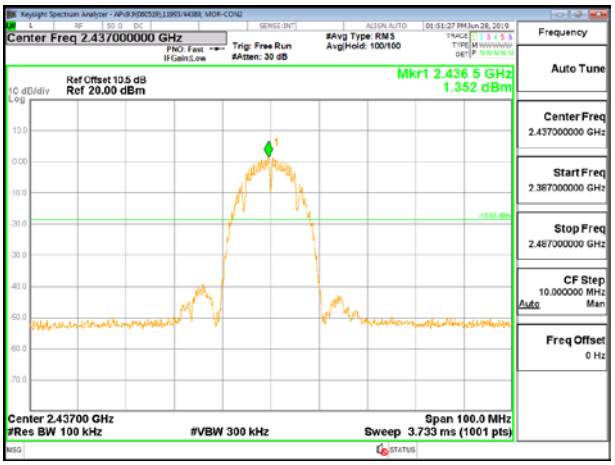
**CHAIN 0**



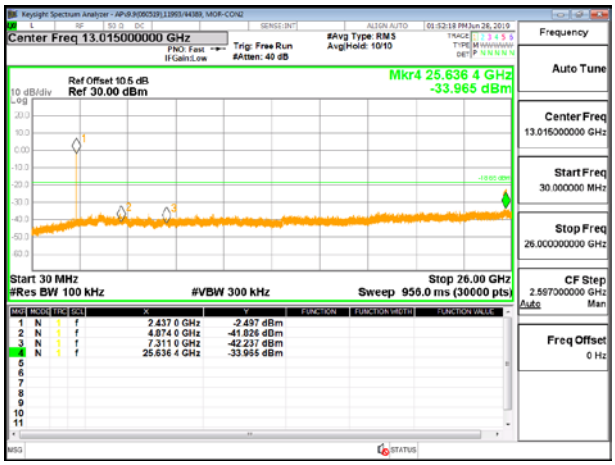

**LOW CHANNEL 1 BANDEDGE**



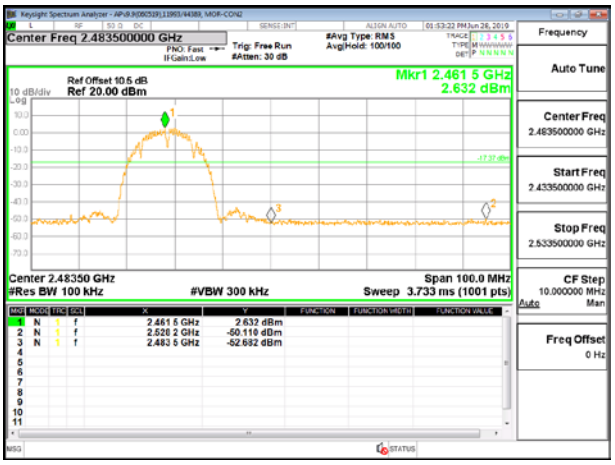

**OUT-OF-BAND LOW CHANNEL 1**



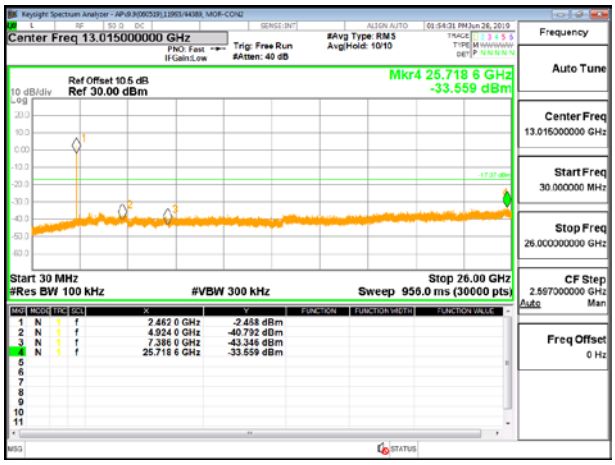

**IN-BAND REFERNCE LEVEL**




**OUT-OF-BAND MID CHANNEL**

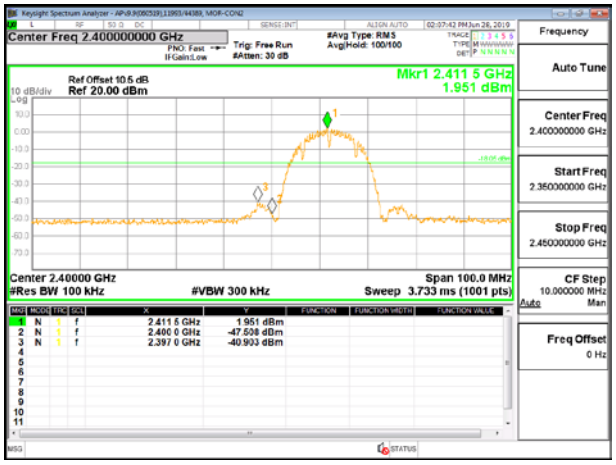



**HIGH CHANNEL 11 BANDEDGE**

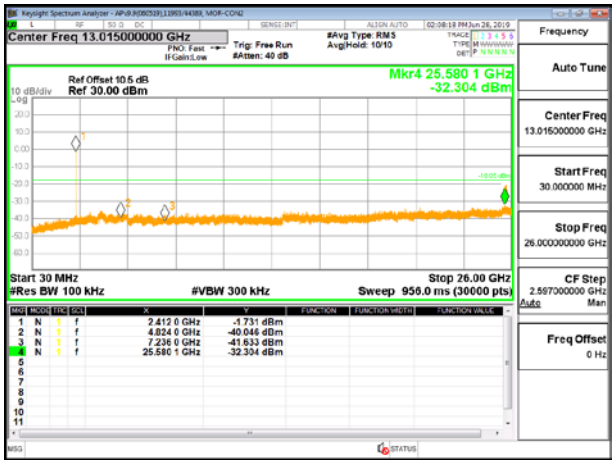



**OUT-OF-BAND HIGH CHANNEL 11**

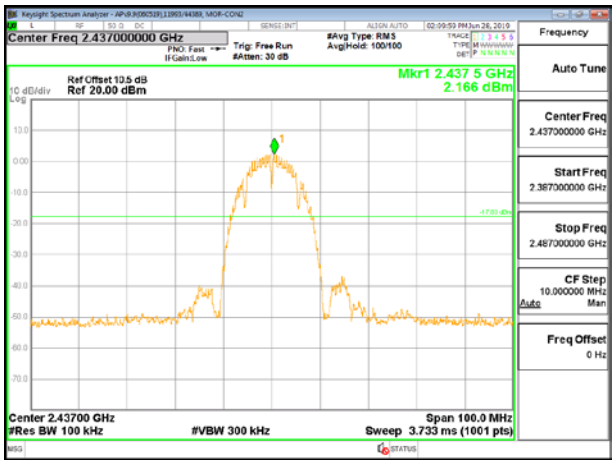
**CHAIN 1**



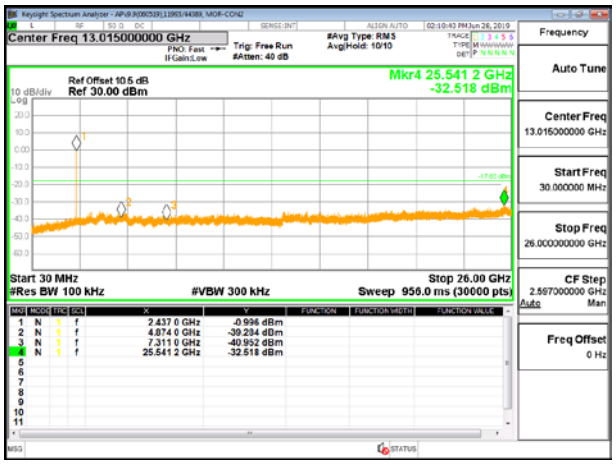

**LOW CHANNEL 1 BANDEDGE**



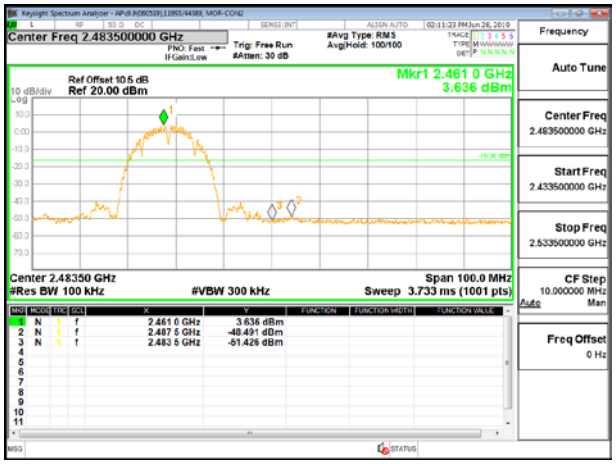

**OUT-OF-BAND LOW CHANNEL 1**



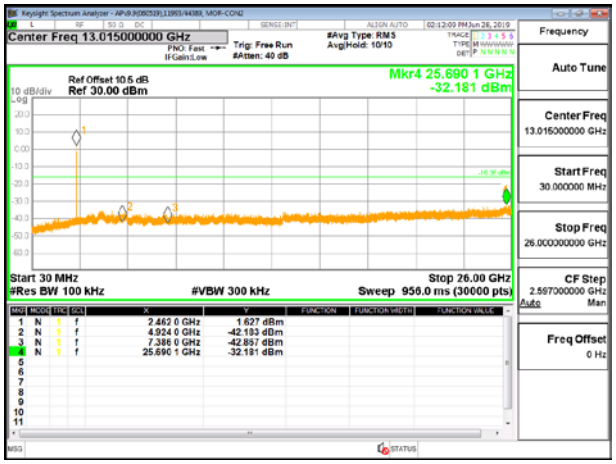

**IN-BAND REFERNCE LEVEL**




**OUT-OF-BAND MID CHANNEL**



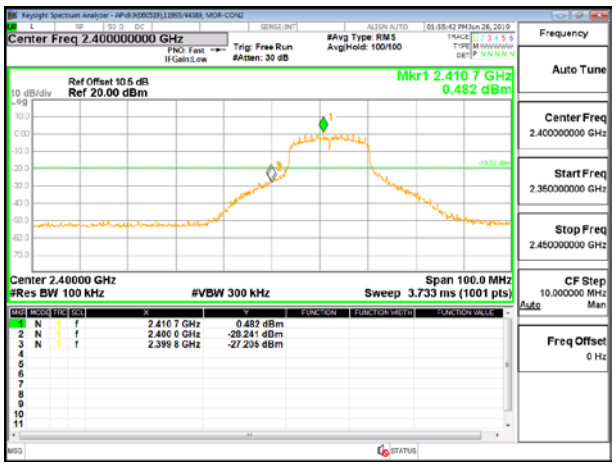

**HIGH CHANNEL 11 BANDEDGE**



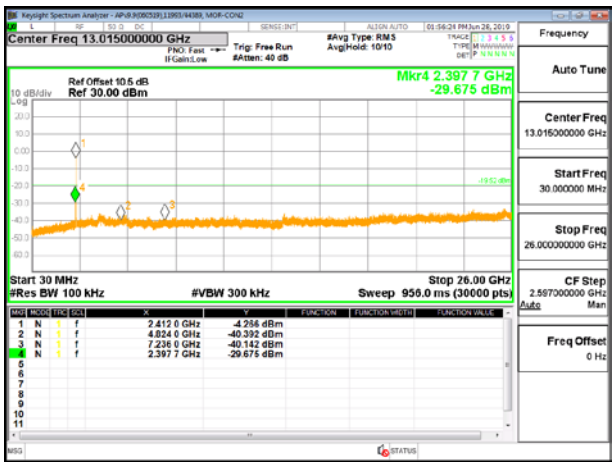

**OUT-OF-BAND HIGH CHANNEL 11**

### 8.7.2. 802.11g MODE

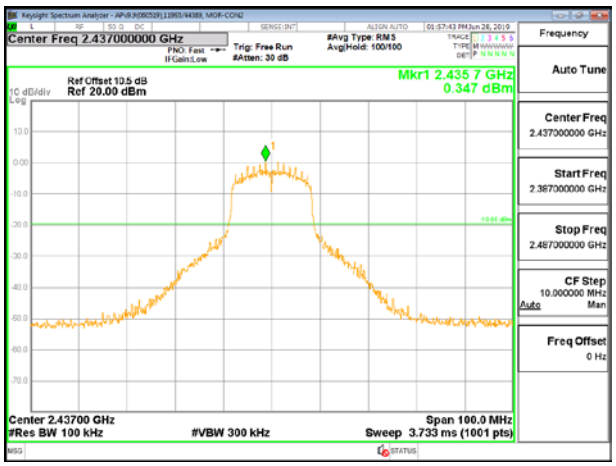
**CHAIN 0**



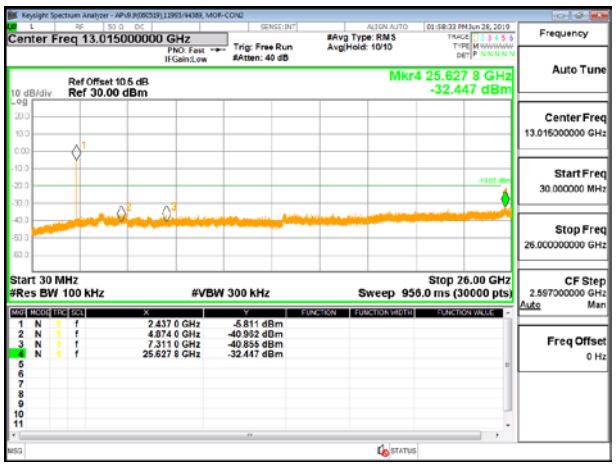

**LOW CHANNEL 1 BANDEDGE**



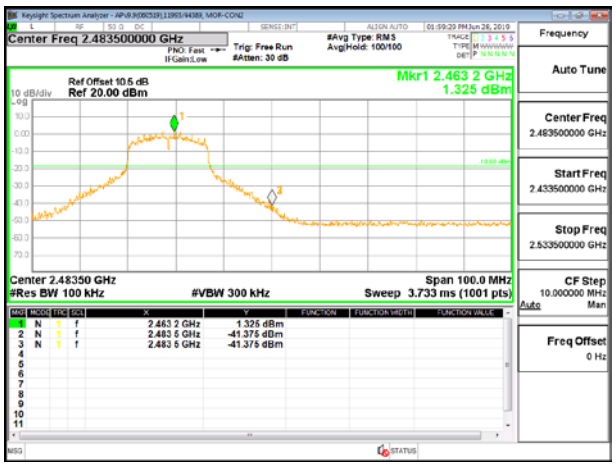

**OUT-OF-BAND LOW CHANNEL 1**



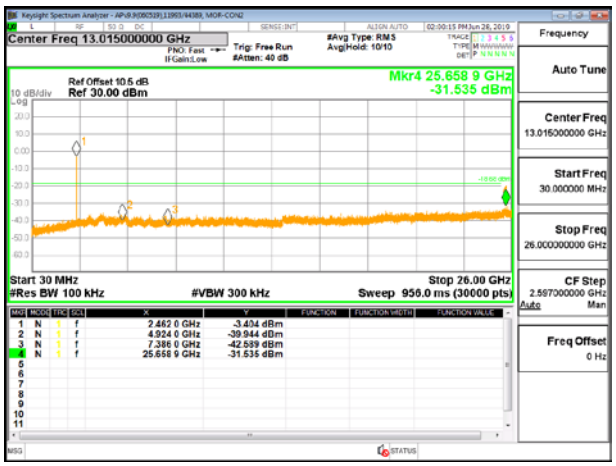

**IN-BAND REFERNCE LEVEL**




**OUT-OF-BAND MID CHANNEL**

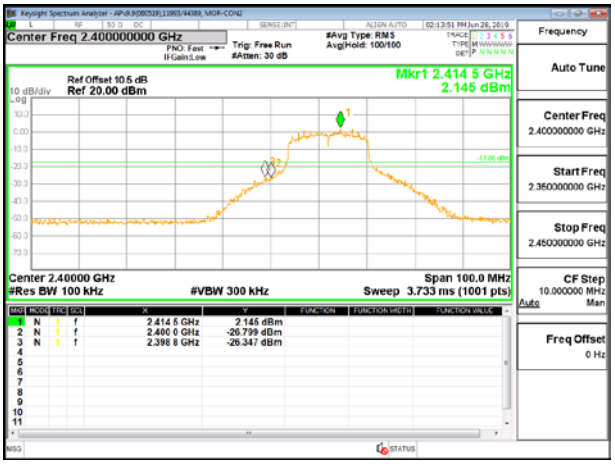



**HIGH CHANNEL 11 BANDEDGE**

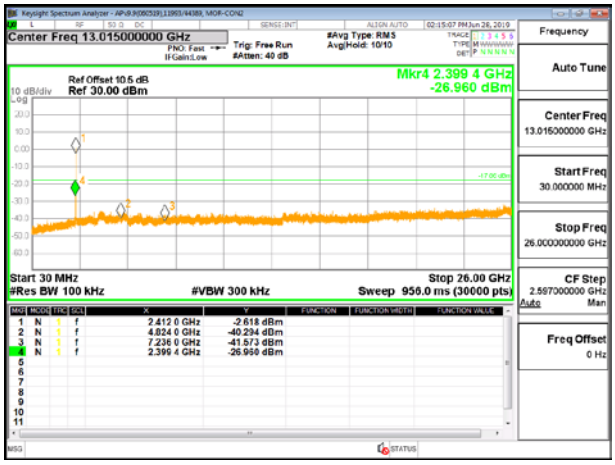



**OUT-OF-BAND HIGH CHANNEL 11**

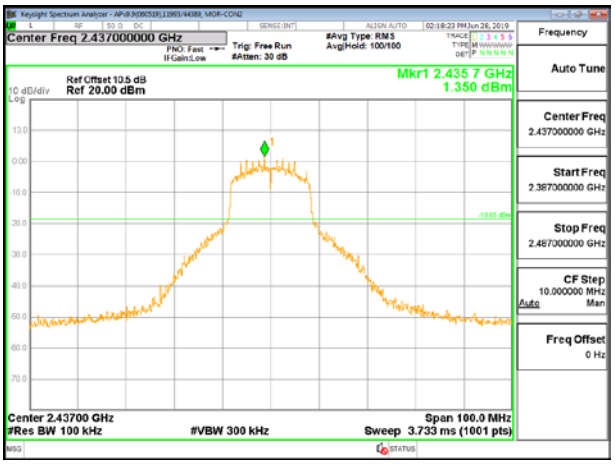
**CHAIN 1**



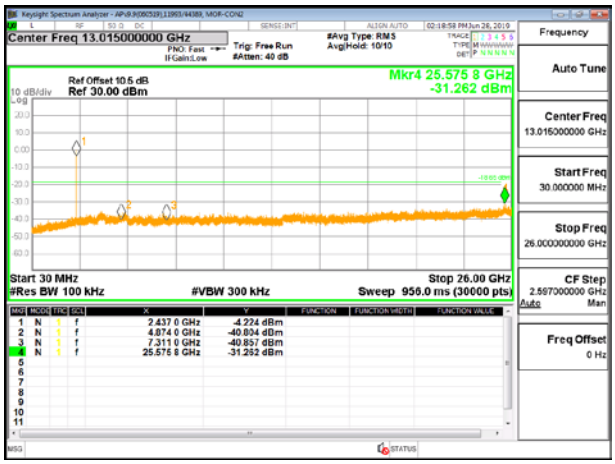

**LOW CHANNEL 1 BANDEDGE**



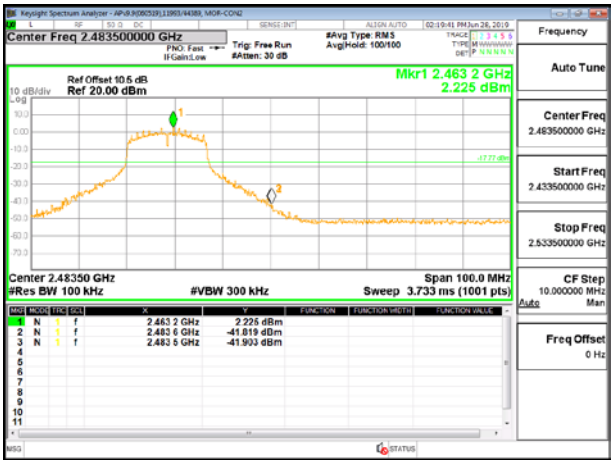

**OUT-OF-BAND LOW CHANNEL 1**



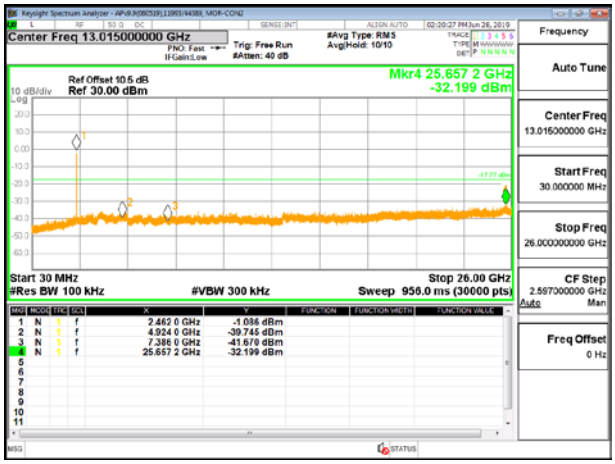

**IN-BAND REFERNCE LEVEL**




**OUT-OF-BAND MID CHANNEL**



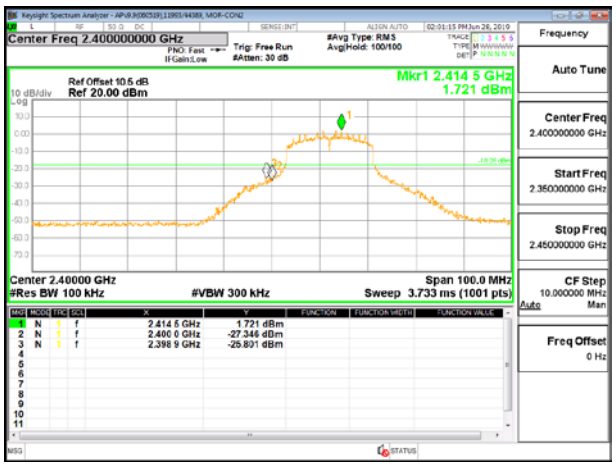

**HIGH CHANNEL 11 BANDEDGE**



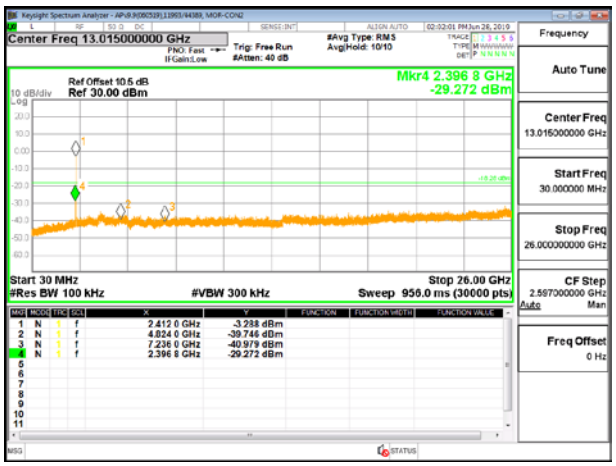

**OUT-OF-BAND HIGH CHANNEL 11**

### 8.7.3. 802.11n HT20 MODE

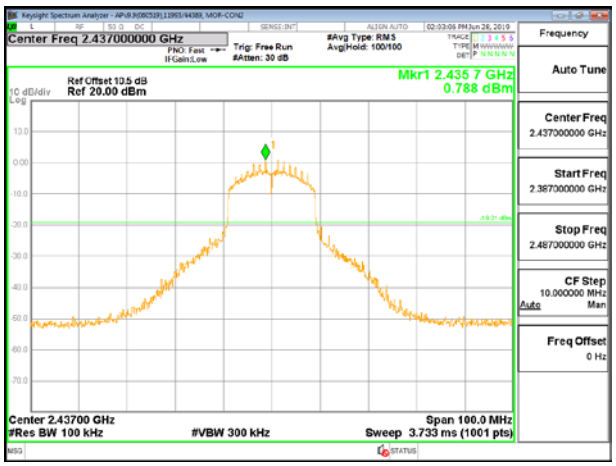
**CHAIN 0**



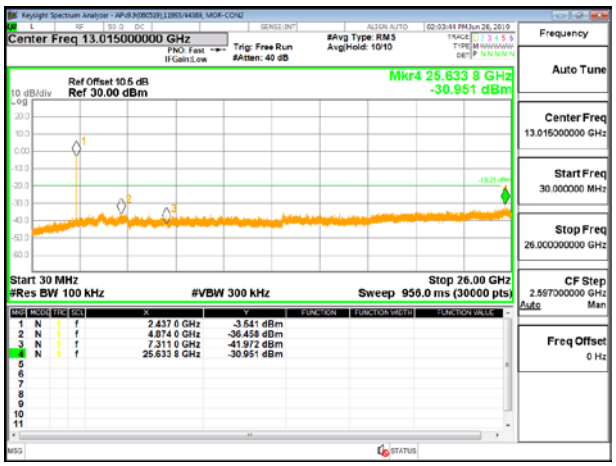

**LOW CHANNEL 1 BANDEDGE**



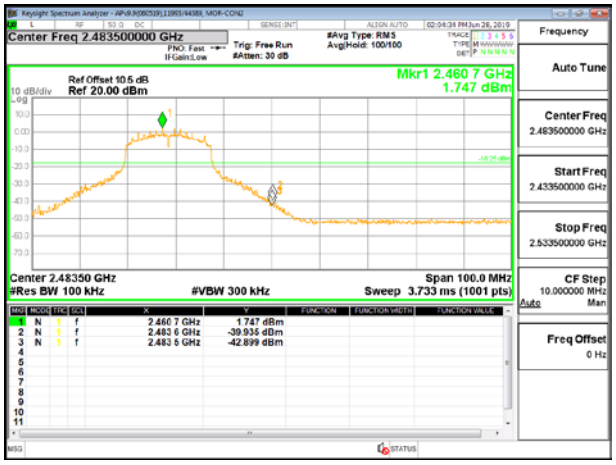

**OUT-OF-BAND LOW CHANNEL 1**



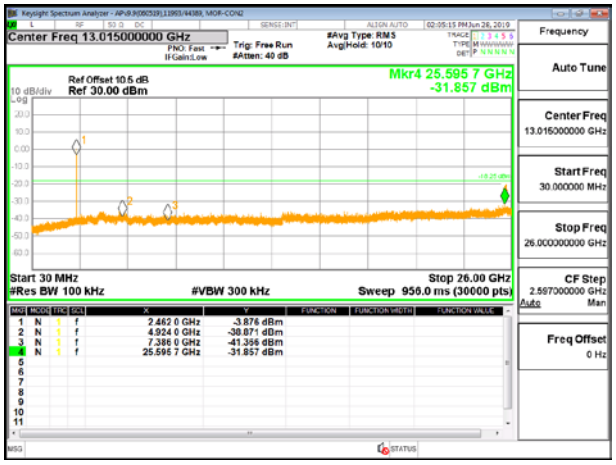

**IN-BAND REFERNCE LEVEL**




**OUT-OF-BAND MID CHANNEL**

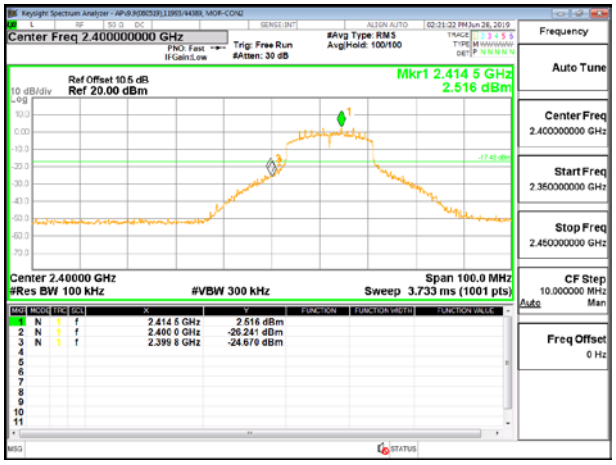



**HIGH CHANNEL 11 BANDEDGE**

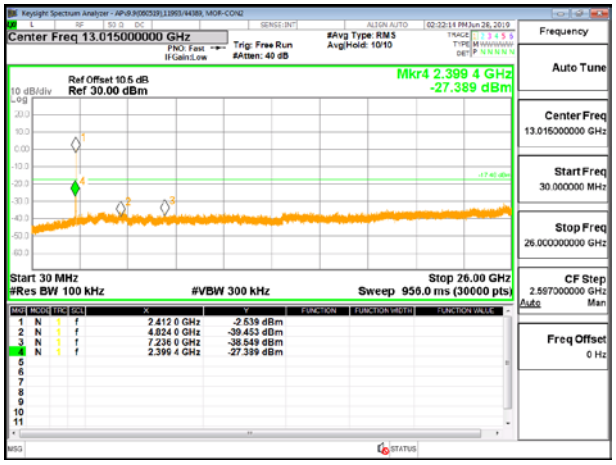



**OUT-OF-BAND HIGH CHANNEL 11**

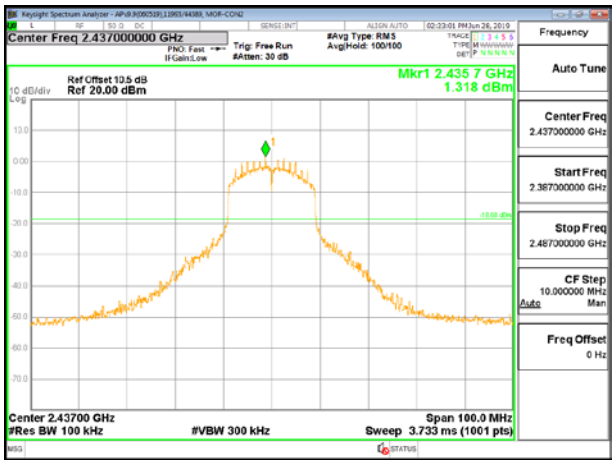
**CHAIN 1**



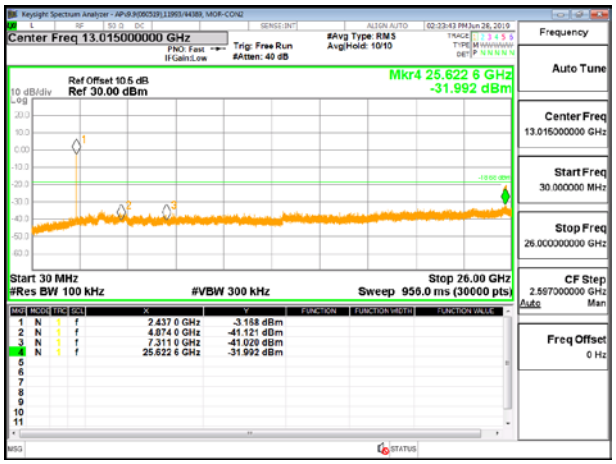

**LOW CHANNEL 1 BANDEDGE**



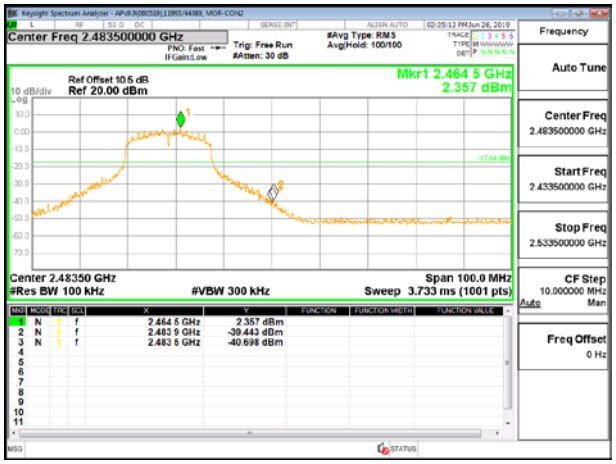

**OUT-OF-BAND LOW CHANNEL 1**



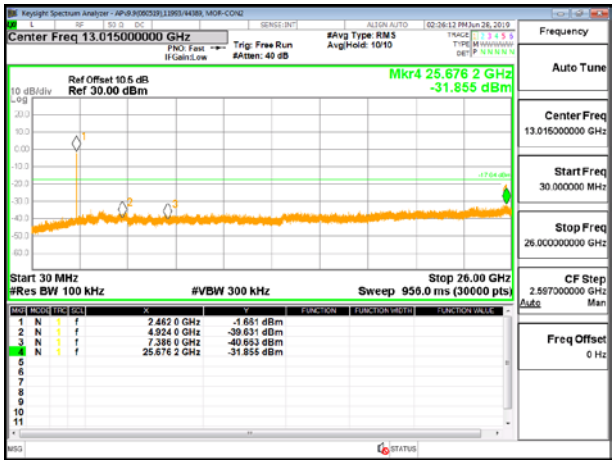

**IN-BAND REFERNCE LEVEL**




**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL 11 BANDEDGE**




**OUT-OF-BAND HIGH CHANNEL 11**

# 9. RADIATED TEST RESULTS

**LIMITS**

FCC §15.205 and §15.209
RSS-GEN, Section 8.9 and 8.10

| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) @ 300 m | - |
| 0.490-1.705 | 24000/F(kHz) @ 30 m | - |
| 1.705 - 30 | 30 @ 30m | - |
| 30 - 88 | 100 | 40 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46 |
| Above 960 | 500 | 54 |

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements. RMS detection used.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

**KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification**

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.



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12 Laboratory Dr., RTP, NC 27709; USA TEL: (919) 549-1400

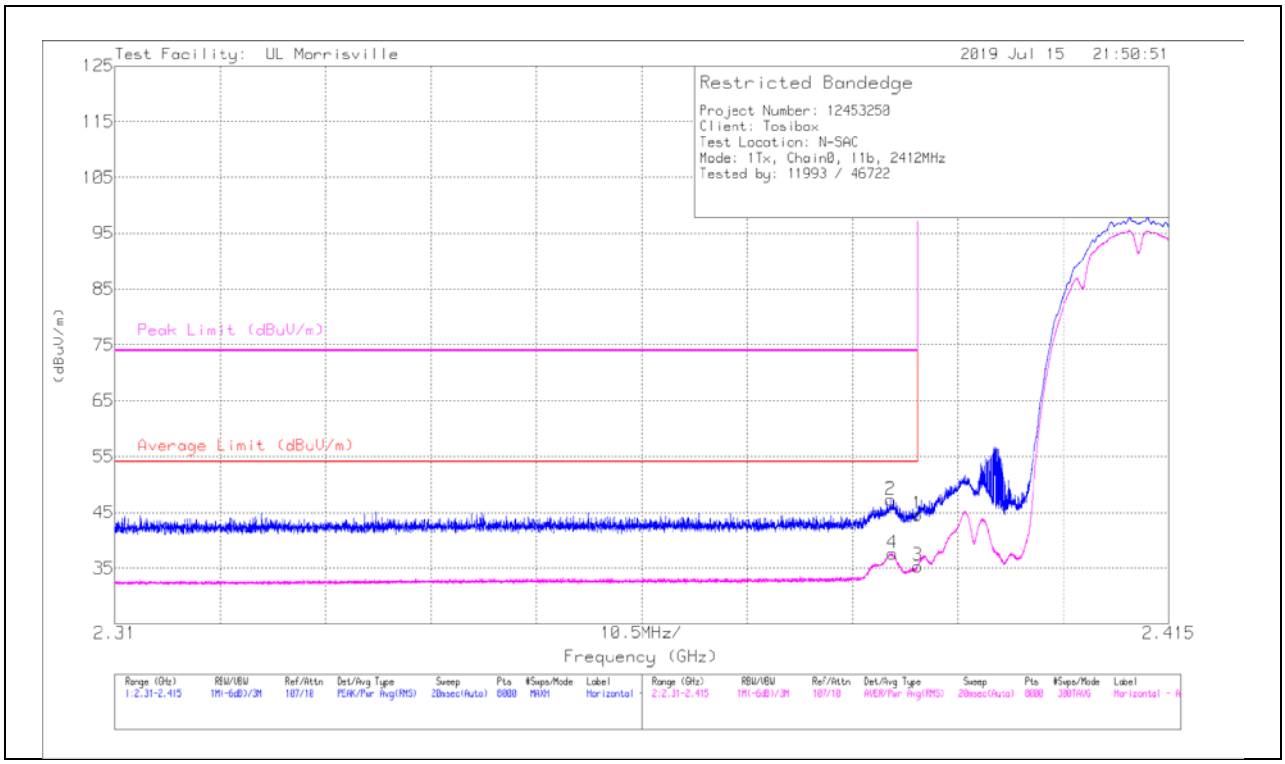
## 9.1. TRANSMITTER 1 – 18 GHz

### 9.1.1. TX 1-18 GHz 802.11b MODE IN THE 2.4 GHz BAND

**1TX Antenna 1 MODE**

**BANDEDGE (LOW CHANNEL, CH 1)**

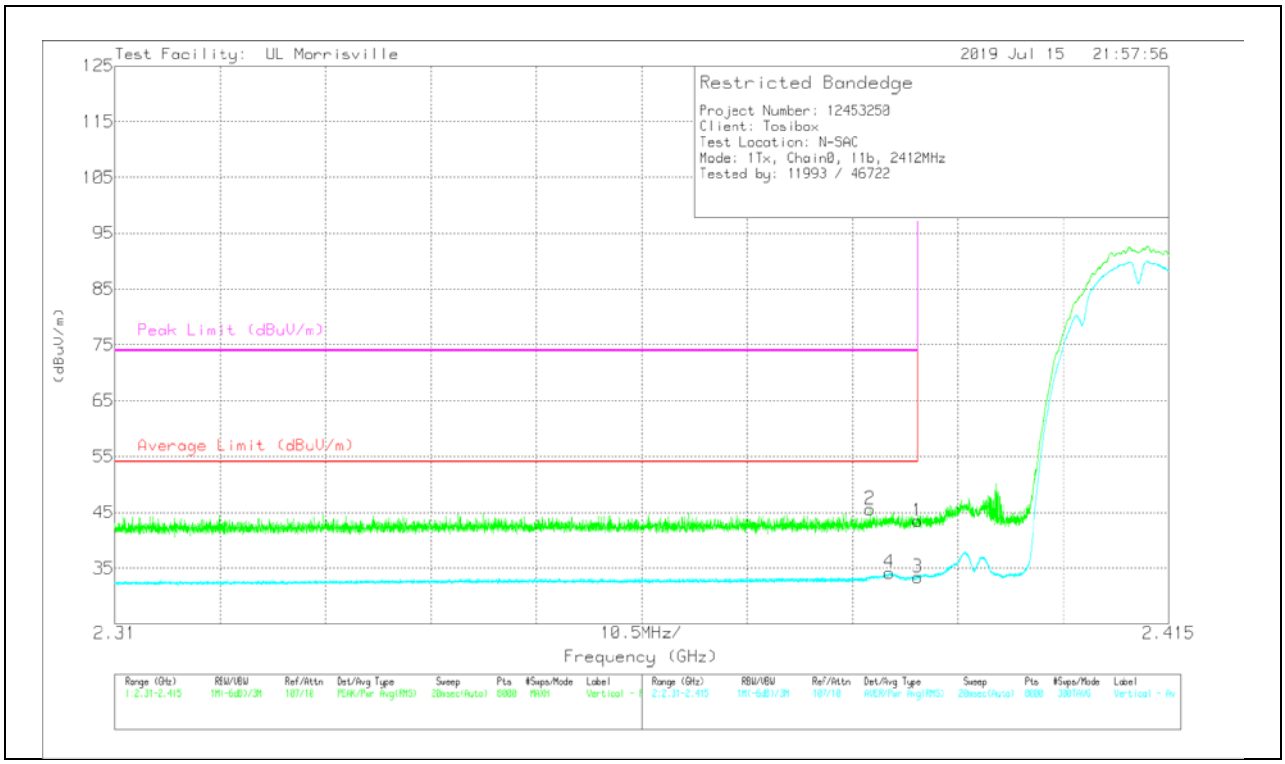
**HORIZONTAL RESULT**




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 2.39 | 37.04 | Pk | 32 | -24.4 | 0 | 44.64 | - | - | 74 | -29.36 | 295 | 131 | H |
| 2 | * ** 2.38731 | 39.7 | Pk | 32 | -24.4 | 0 | 47.3 | - | - | 74 | -26.7 | 295 | 131 | H |
| 3 | * ** 2.39 | 27.61 | RMS | 32 | -24.4 | .2 | 35.41 | 54 | -18.59 | - | - | 295 | 131 | H |
| 4 | * ** 2.3875 | 29.83 | RMS | 32 | -24.4 | .2 | 37.63 | 54 | -16.37 | - | - | 295 | 131 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
RMS - RMS detection

## VERTICAL RESULT

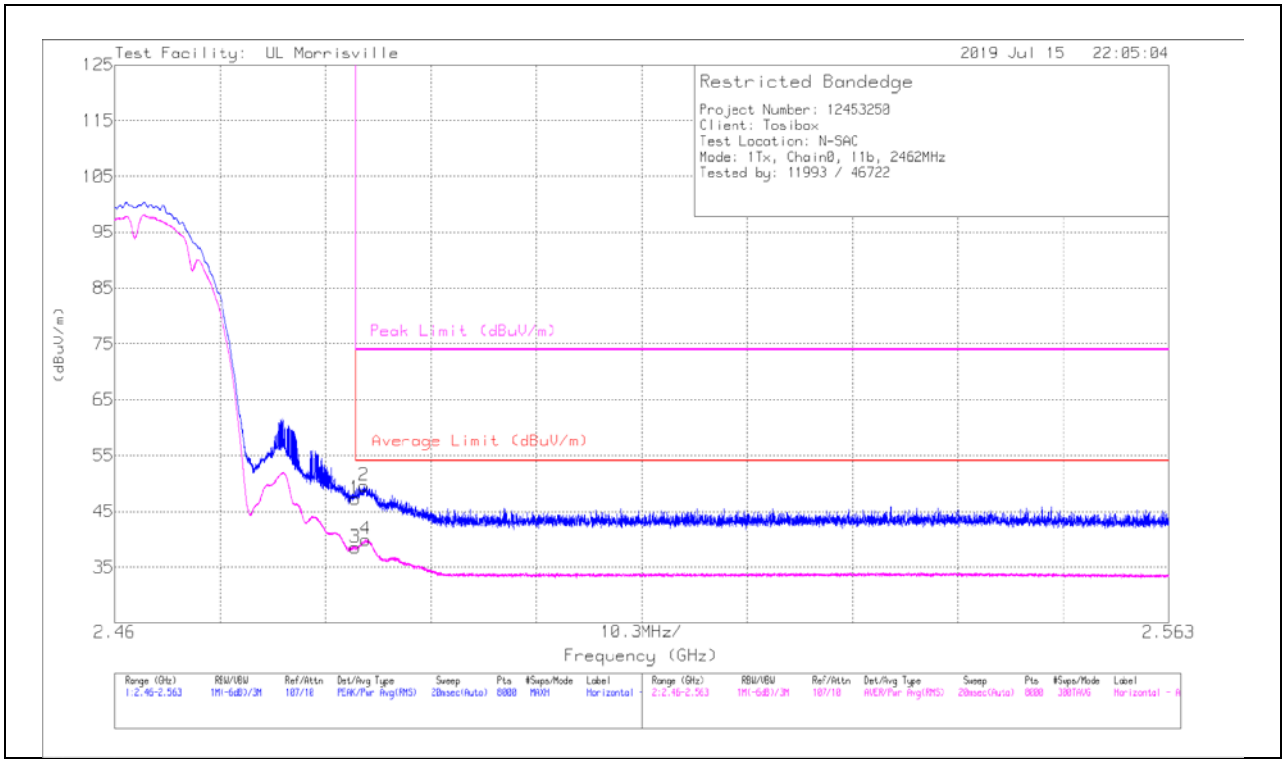



| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 2.39 | 35.87 | Pk | 32 | -24.4 | 0 | 43.47 | - | - | 74 | -30.53 | 21 | 284 | V |
| 2 | * ** 2.38524 | 37.93 | Pk | 32 | -24.4 | 0 | 45.53 | - | - | 74 | -28.47 | 21 | 284 | V |
| 3 | * ** 2.39 | 25.59 | RMS | 32 | -24.4 | .2 | 33.39 | 54 | -20.61 | - | - | 21 | 284 | V |
| 4 | * ** 2.38717 | 26.39 | RMS | 32 | -24.4 | .2 | 34.19 | 54 | -19.81 | - | - | 21 | 284 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
RMS - RMS detection

## BANDEDGE (HIGH CHANNEL, CH 11)

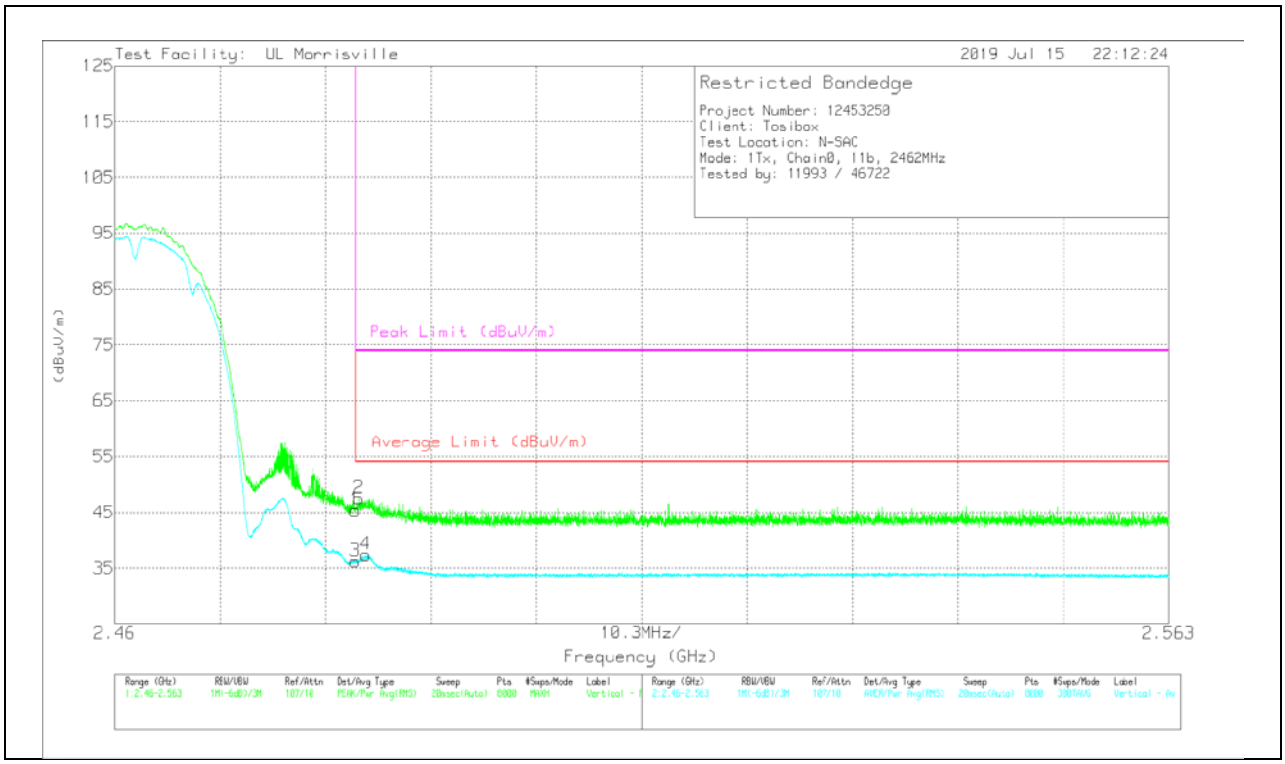
### HORIZONTAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 2.4835 | 39.2 | Pk | 32.4 | -24.3 | 0 | 47.3 | - | - | 74 | -26.7 | 206 | 280 | H |
| 2 | * ** 2.48434 | 41.53 | Pk | 32.4 | -24.3 | 0 | 49.63 | - | - | 74 | -24.37 | 206 | 280 | H |
| 3 | * ** 2.4835 | 30.22 | RMS | 32.4 | -24.3 | .2 | 38.52 | 54 | -15.48 | - | - | 206 | 280 | H |
| 4 | * ** 2.48452 | 31.66 | RMS | 32.4 | -24.3 | .2 | 39.96 | 54 | -14.04 | - | - | 206 | 280 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
RMS - RMS detection

## VERTICAL RESULT

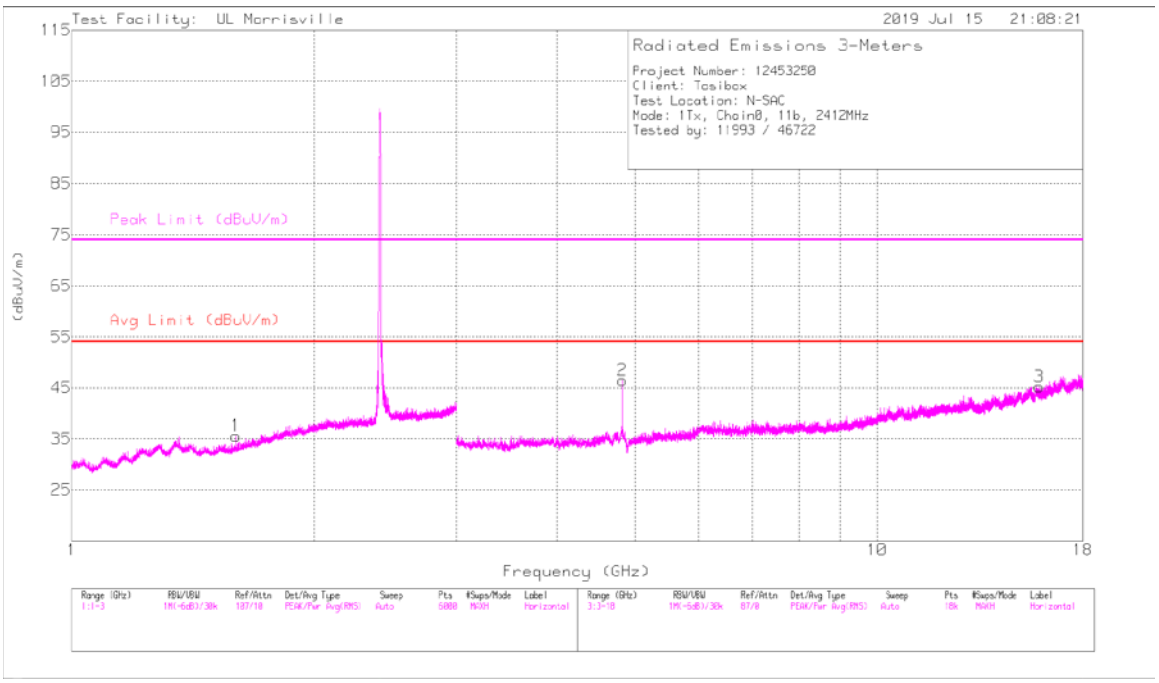



| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 2.4835 | 37.28 | Pk | 32.4 | -24.3 | 0 | 45.38 | - | - | 74 | -28.62 | 237 | 348 | V |
| 2 | * ** 2.48382 | 39.42 | Pk | 32.4 | -24.3 | 0 | 47.52 | - | - | 74 | -26.48 | 237 | 348 | V |
| 3 | * ** 2.4835 | 27.95 | RMS | 32.4 | -24.3 | .2 | 36.25 | 54 | -17.75 | - | - | 237 | 348 | V |
| 4 | * ** 2.48451 | 29.09 | RMS | 32.4 | -24.3 | .2 | 37.39 | 54 | -16.61 | - | - | 237 | 348 | V |

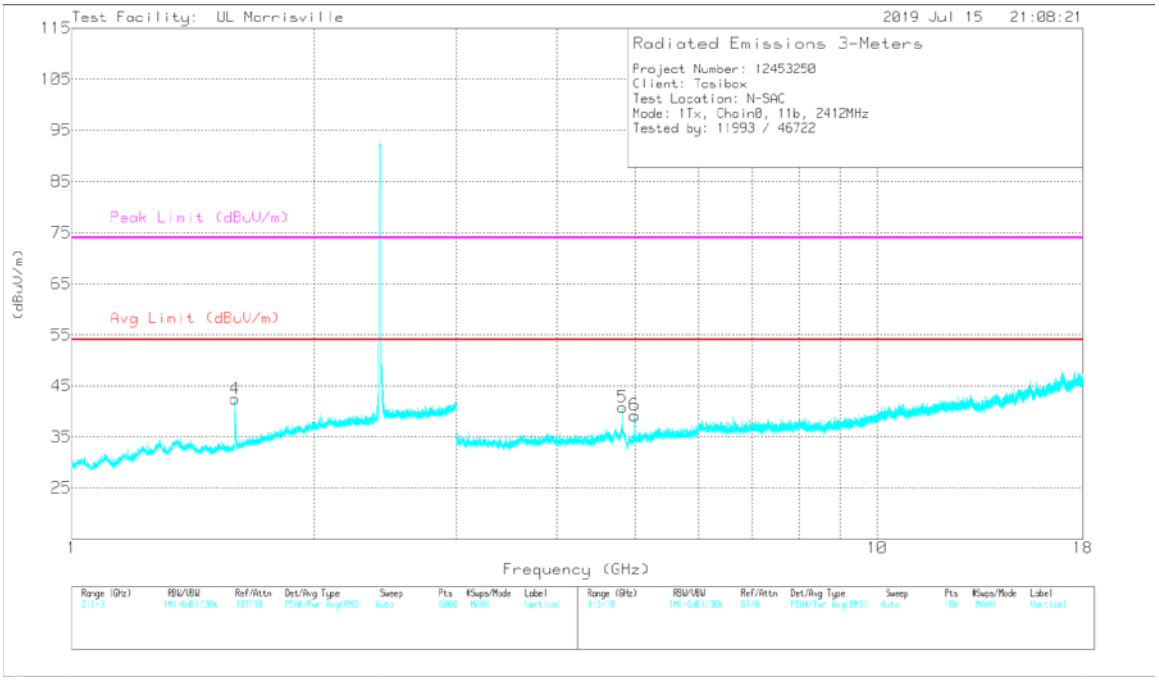
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
RMS - RMS detection

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL, CH 1 RESULTS




**HORIZONTAL**




**VERTICAL**

## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 1.59979 | 42.77 | PK2 | 28.1 | -24.6 | 0 | 46.27 | - | - | 74 | -27.73 | 76 | 342 | H |
| | * ** 1.59862 | 24.72 | MAv1 | 28.1 | -24.6 | .2 | 28.42 | 54 | -25.58 | - | - | 76 | 342 | H |
| 4 | * ** 1.59419 | 49.91 | PK2 | 28.1 | -24.6 | 0 | 53.41 | - | - | 74 | -20.59 | 142 | 136 | V |
| | * ** 1.59303 | 25.87 | MAv1 | 28.1 | -24.6 | .2 | 29.57 | 54 | -24.43 | - | - | 142 | 136 | V |
| 2 | * ** 4.82397 | 48.05 | PK2 | 34.1 | -31.4 | 0 | 50.75 | - | - | 74 | -23.25 | 259 | 198 | H |
| | * ** 4.82395 | 43.66 | MAv1 | 34.1 | -31.4 | .2 | 46.56 | 54 | -7.44 | - | - | 259 | 198 | H |
| 3 | * ** 15.88473 | 36.56 | PK2 | 40.3 | -25.6 | 0 | 51.26 | - | - | 74 | -22.74 | 44 | 391 | H |
| | * ** 15.88449 | 24.59 | MAv1 | 40.3 | -25.6 | .2 | 39.49 | 54 | -14.51 | - | - | 44 | 391 | H |
| 5 | * ** 4.82387 | 44.06 | PK2 | 34.1 | -31.4 | 0 | 46.76 | - | - | 74 | -27.24 | 161 | 107 | V |
| | * ** 4.82395 | 34.96 | MAv1 | 34.1 | -31.4 | .2 | 37.86 | 54 | -16.14 | - | - | 161 | 107 | V |
| 6 | * ** 4.99732 | 45.7 | PK2 | 34 | -32.6 | 0 | 47.1 | - | - | 74 | -26.9 | 90 | 102 | V |
| | * ** 4.99738 | 28.3 | MAv1 | 34 | -32.6 | .2 | 29.9 | 54 | -24.1 | - | - | 90 | 102 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK2 - Maximum Peak
MAv1 - Maximum RMS Average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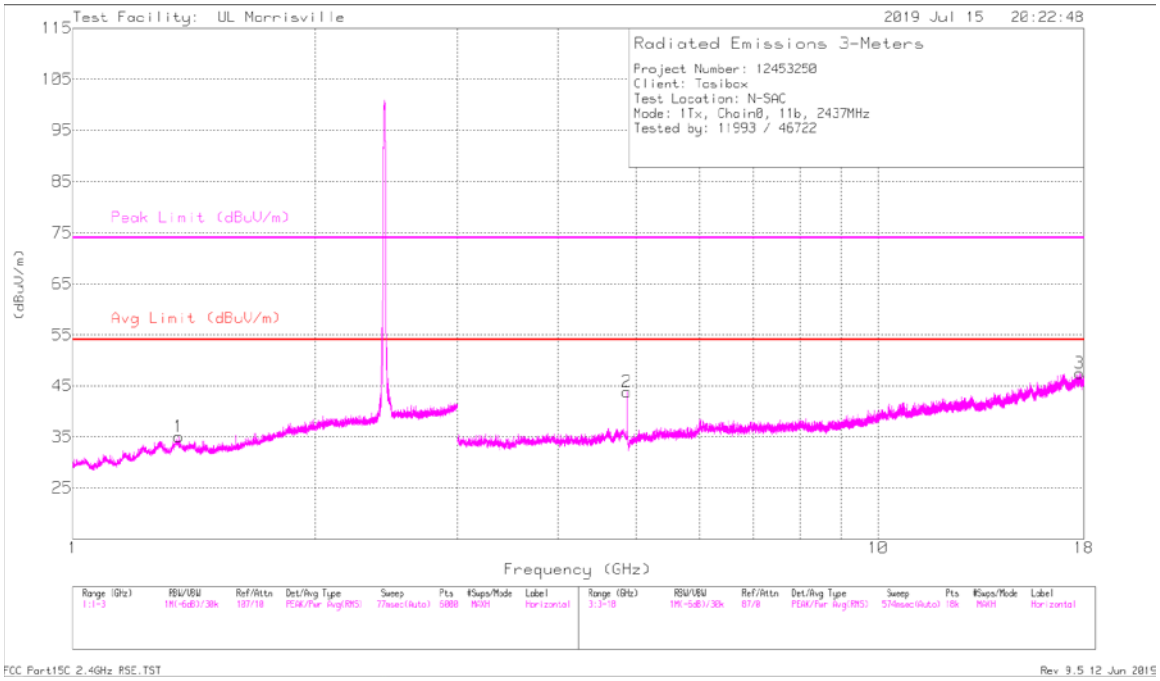
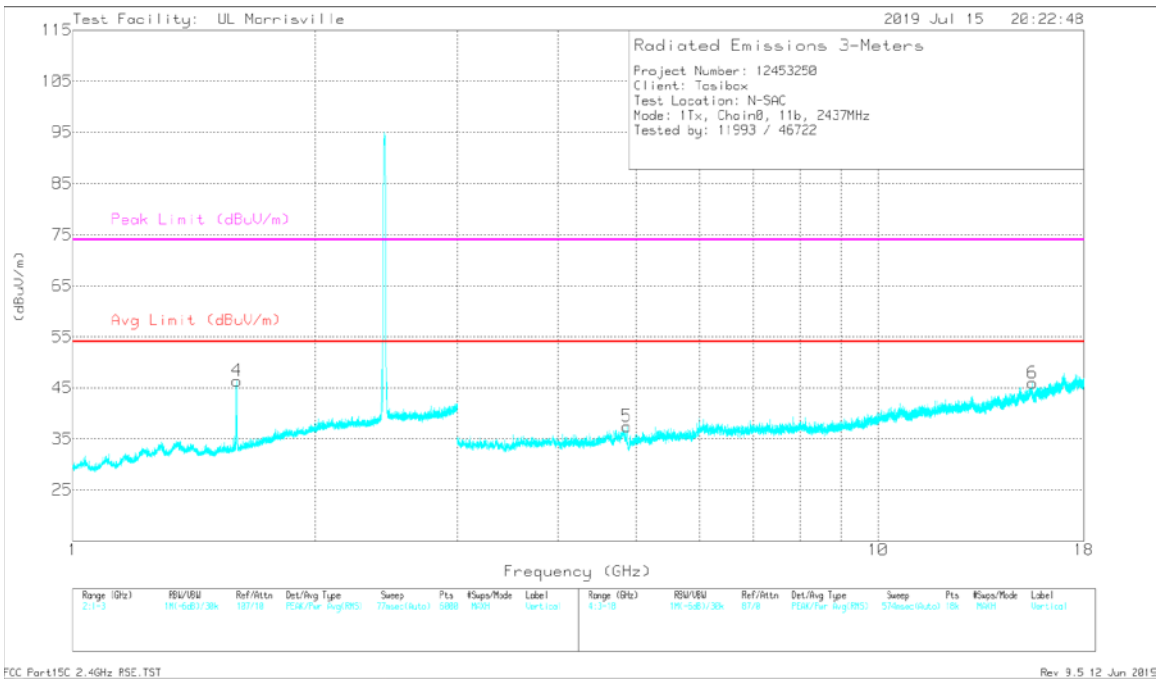
## MID CHANNEL, CH 6 RESULTS




**HORIZONTAL**




**VERTICAL**

## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 1.35029 | 36.59 | PK2 | 29.5 | -25.4 | 0 | 40.69 | - | - | 74 | -33.31 | 189 | 333 | H |
| | * ** 1.34978 | 24.8 | MAv1 | 29.5 | -25.4 | .2 | 29.1 | 54 | -24.9 | - | - | 189 | 333 | H |
| 4 | * ** 1.59848 | 50.36 | PK2 | 28.1 | -24.6 | 0 | 53.86 | - | - | 74 | -20.14 | 132 | 105 | V |
| | * ** 1.59758 | 26.52 | MAv1 | 28.1 | -24.6 | .2 | 30.22 | 54 | -23.78 | - | - | 132 | 105 | V |
| 2 | * ** 4.8741 | 45.78 | PK2 | 34 | -31.3 | 0 | 48.48 | - | - | 74 | -25.52 | 156 | 202 | H |
| | * ** 4.87395 | 41.22 | MAv1 | 34 | -31.3 | .2 | 44.12 | 54 | -9.88 | - | - | 156 | 202 | H |
| 3 | * ** 17.76778 | 35.54 | PK2 | 41.1 | -22.6 | 0 | 54.04 | - | - | 74 | -19.96 | 300 | 285 | H |
| | * ** 17.76794 | 23.36 | MAv1 | 41.1 | -22.6 | .2 | 42.06 | 54 | -11.94 | - | - | 300 | 285 | H |
| 5 | * ** 4.87395 | 42.97 | PK2 | 34 | -31.3 | 0 | 45.67 | - | - | 74 | -28.33 | 89 | 339 | V |
| | * ** 4.8739 | 35.78 | MAv1 | 34 | -31.3 | .2 | 38.68 | 54 | -15.32 | - | - | 89 | 339 | V |
| 6 | * ** 15.54135 | 35.63 | PK2 | 40.2 | -24.5 | 0 | 51.33 | - | - | 74 | -22.67 | 231 | 172 | V |
| | * ** 15.54153 | 23.34 | MAv1 | 40.2 | -24.5 | .2 | 39.24 | 54 | -14.76 | - | - | 231 | 172 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK2 - Maximum Peak
MAv1 - Maximum RMS Average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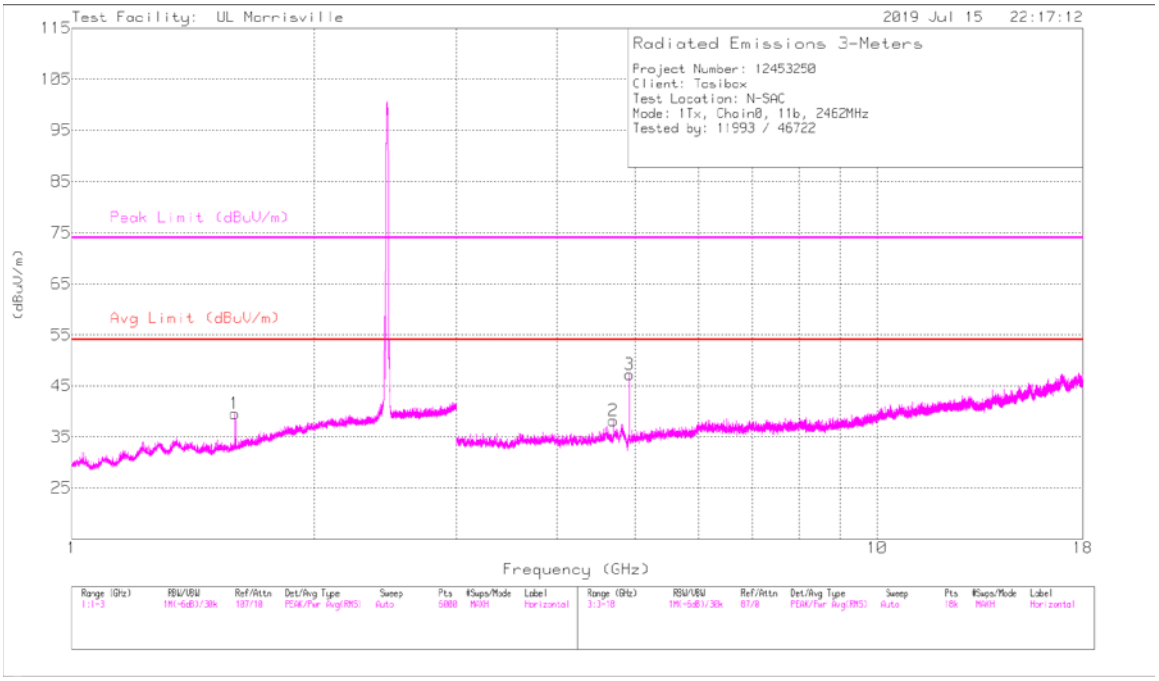
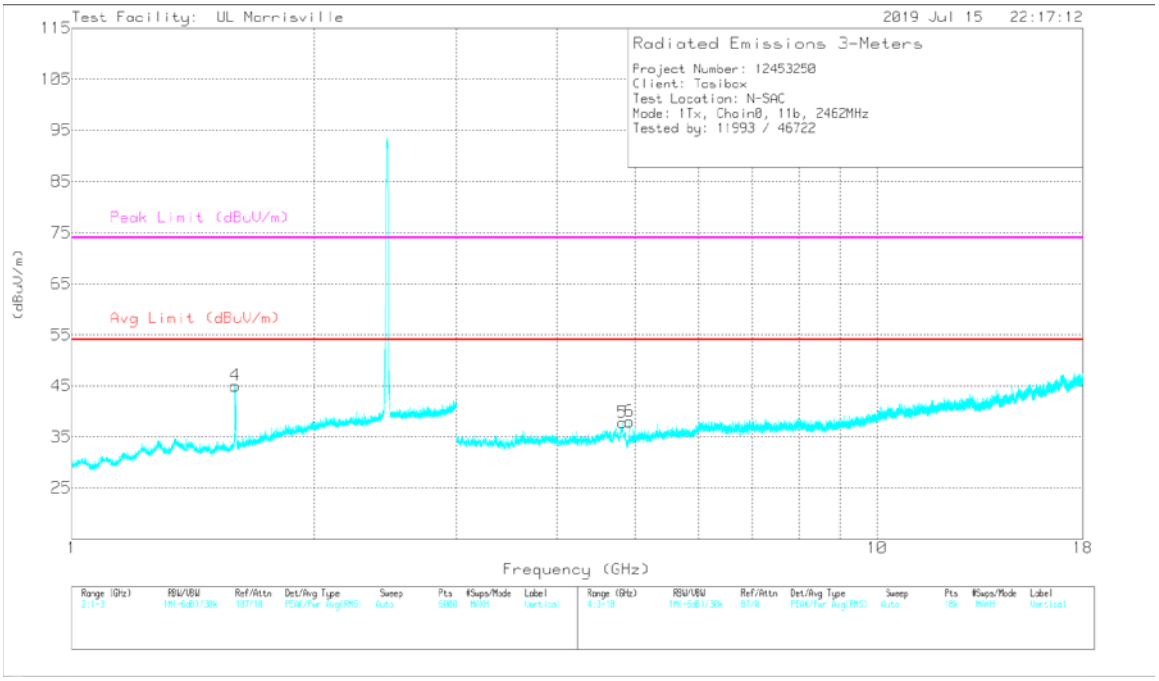
## HIGH CHANNEL, CH 11 RESULTS




**HORIZONTAL**




**VERTICAL**

## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 AF (dBuV/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 1.59392 | 43.15 | PK2 | 28.1 | -24.6 | 0 | 46.65 | - | - | 74 | -27.35 | 206 | 400 | H |
| | * ** 1.59381 | 25.54 | MAv1 | 28.1 | -24.6 | .2 | 29.24 | 54 | -24.76 | - | - | 206 | 400 | H |
| 4 | * ** 1.59495 | 50.97 | PK2 | 28.1 | -24.6 | 0 | 54.47 | - | - | 74 | -19.53 | 134 | 103 | V |
| | * ** 1.59488 | 29.46 | MAv1 | 28.1 | -24.6 | .2 | 33.16 | 54 | -20.84 | - | - | 134 | 103 | V |
| 2 | * ** 4.70574 | 40.39 | PK2 | 34 | -32.4 | 0 | 41.99 | - | - | 74 | -32.01 | 89 | 177 | H |
| | * ** 4.70818 | 29.17 | MAv1 | 33.9 | -32.4 | .2 | 30.87 | 54 | -23.13 | - | - | 89 | 177 | H |
| 3 | * ** 4.92404 | 46.86 | PK2 | 33.9 | -31.8 | 0 | 48.96 | - | - | 74 | -25.04 | 259 | 224 | H |
| | * ** 4.92398 | 42.71 | MAv1 | 33.9 | -31.8 | .2 | 45.01 | 54 | -8.99 | - | - | 259 | 224 | H |
| 5 | * ** 4.82716 | 40.75 | PK2 | 34.1 | -31.4 | 0 | 43.45 | - | - | 74 | -30.55 | 76 | 334 | V |
| | * ** 4.82674 | 28.41 | MAv1 | 34.1 | -31.4 | .2 | 31.31 | 54 | -22.69 | - | - | 76 | 334 | V |
| 6 | * ** 4.9241 | 41.58 | PK2 | 33.9 | -31.8 | 0 | 43.68 | - | - | 74 | -30.32 | 159 | 122 | V |
| | * ** 4.92397 | 33.38 | MAv1 | 33.9 | -31.8 | .2 | 35.68 | 54 | -18.32 | - | - | 159 | 122 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK2 - Maximum Peak
MAv1 - Maximum RMS Average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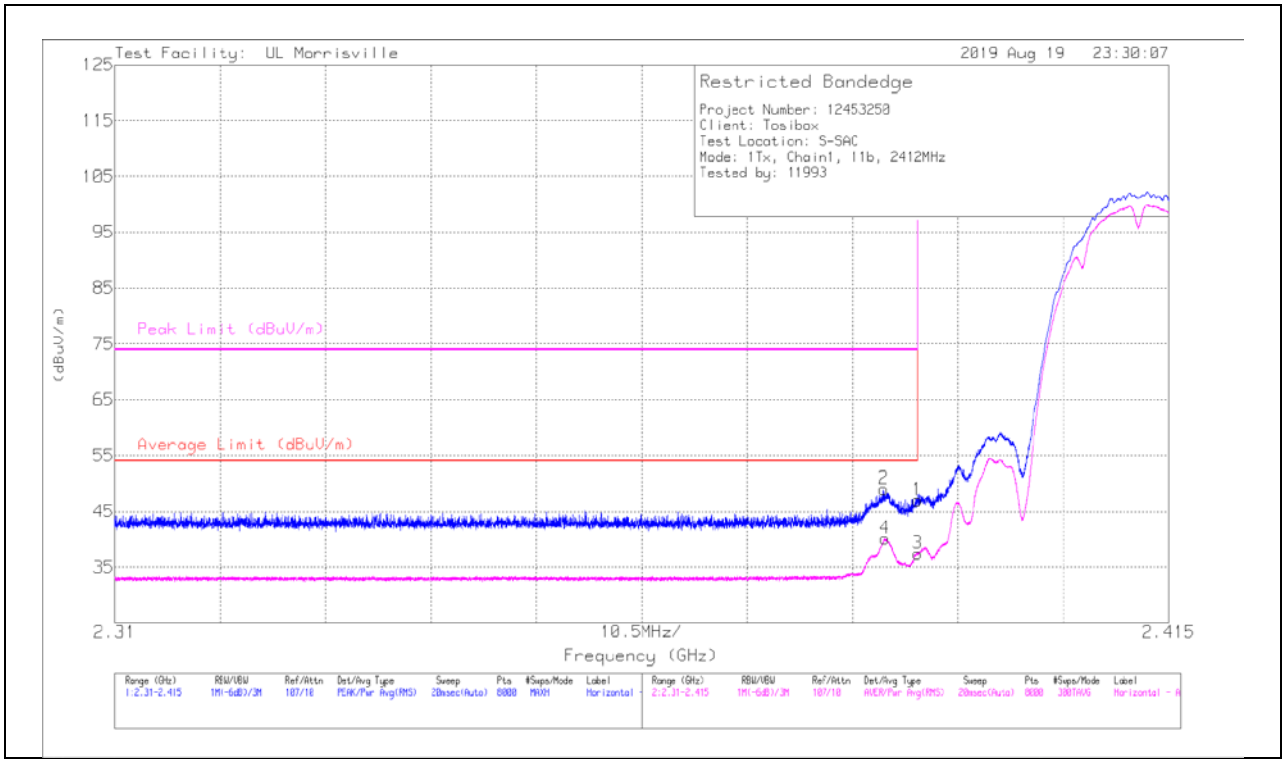
**1TX Antenna 2 MODE**

## BANDEDGE (LOW CHANNEL, CH 1)

### HORIZONTAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0072 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * ** 2.39 | 39.08 | Pk | 31.9 | -24 | 0 | 46.98 | - | - | 74 | -27.02 | 179 | 111 | H |
| 2 | * ** 2.38664 | 41.13 | Pk | 31.9 | -24 | 0 | 49.03 | - | - | 74 | -24.97 | 179 | 111 | H |
| 3 | * ** 2.39 | 29.33 | RMS | 31.9 | -24 | .2 | 37.43 | 54 | -16.57 | - | - | 179 | 111 | H |
| 4 | * ** 2.38674 | 32 | RMS | 31.9 | -24 | .2 | 40.1 | 54 | -13.9 | - | - | 179 | 111 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
RMS - RMS detection