# TEST REPORT

**Report Number:** 13911916-E2V2

| | | |
|---|---|---|
| **Applicant** | : | APPLE, INC.<br>1 APPLE PARK WAY<br>CUPERTINO, CA 95014, U.S.A |
| **Model** | : | A2595 (Parent Model, Full Test)<br>A2782, A2783, A2784, A2785 (Variant Models) |
| **FCC ID** | : | BCG-E4082A (Parent Model)<br>BCG-E8064A, BCG-E4083A, BCG-8076A (Variant Models) |
| **IC** | : | 579C-E4082A (Parent Model)<br>579C-E8064A, 579C-E4083A, 579C-8076A (Variant Models) |
| **EUT Description** | : | SMARTPHONE |
| **Test Standard(s)** | : | FCC 47 CFR PART 15 SUBPART C<br>ISED RSS-247 ISSUE 2<br>ISED RSS-GEN ISSUE 5 + A1 + A2 |

**Date Of Issue:**
February 09, 2022

**Prepared by:**
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

ACCREDITED
CERT #0751.05

# REPORT REVISION HISTORY

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 1/25/2022 | Initial Issue | Chin Pang |
| V2 | 2/9/2022 | Address TCB's questions on cover page and page 9. Add loop antenna in section 8, update ANT 2 iPA power on L/H channels | Chin Pang |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# TABLE OF CONTENTS

**1. ATTESTATION OF TEST RESULTS ..... 5**

**2. TEST SUMMARY ..... 7**

**3. TEST METHODOLOGY ..... 7**

**4. FACILITIES AND ACCREDITATION ..... 7**

**5. DECISION RULES AND MEASUREMENT UNCERTAINTY ..... 8**

*5.1. METROLOGICAL TRACEABILITY ..... 8*

*5.2. DECISION RULES ..... 8*

*5.3. MEASUREMENT UNCERTAINTY ..... 8*

**6. EQUIPMENT UNDER TEST ..... 9**

*6.1. EUT DESCRIPTION ..... 9*

*6.2. MAXIMUM OUTPUT POWER ..... 9*

*6.3. DESCRIPTION OF AVAILABLE ANTENNAS ..... 10*

*6.4. SOFTWARE AND FIRMWARE ..... 10*

*6.5. WORST-CASE CONFIGURATION AND MODE ..... 10*

*6.6. DESCRIPTION OF TEST SETUP ..... 11*

**7. MEASUREMENT METHOD ..... 14**

**8. TEST AND MEASUREMENT EQUIPMENT ..... 15**

**9. ANTENNA PORT TEST RESULTS ..... 16**

*9.1. ON TIME AND DUTY CYCLE ..... 16*

*9.2. 99% BANDWIDTH ..... 18*

9.2.1. HIGH POWER BLE (1Mbps) ..... 19

9.2.2. HIGH POWER BLE TXBF (1Mbps) ..... 20

9.2.3. HIGH POWER BLE (2Mbps) ..... 21

9.2.4. HIGH POWER BLE TXBF (2Mbps) ..... 22

*9.3. 6 dB BANDWIDTH ..... 23*

9.3.1. HIGH POWER BLE (1Mbps) ..... 24

9.3.2. HIGH POWER BLE TXBF (1Mbps) ..... 25

*9.4. OUTPUT POWER ..... 26*

9.4.1. HIGH POWER BLE (1Mbps) ..... 27

9.4.2. HIGH POWER BLE TXBF (1Mbps) ..... 27

9.4.3. HIGH POWER BLE (2Mbps) ..... 28

9.4.4. HIGH POWER BLE TXBF (2Mbps) ..... 28

9.4.5. LOW POWER BLE (1Mbps) ..... 29

9.4.6. LOW POWER BLE TXBF (1Mbps) ..... 29

9.4.7. LOW POWER BLE (2Mbps) ..... 30

9.4.8. LOW POWER BLE TXBF (2Mbps) ..... 30



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

*9.5. AVERAGE POWER ..... 31*
9.5.1. HIGH POWER BLE (1Mbps) ..... 32
9.5.2. HIGH POWER BLE TXBF (1Mbps) ..... 32
9.5.3. HIGH POWER BLE (2Mbps) ..... 33
9.5.4. HIGH POWER BLE TXBF (2Mbps) ..... 33
9.5.5. LOW POWER BLE (1Mbps) ..... 34
9.5.6. LOW POWER BLE TXBF (1Mbps) ..... 34
9.5.7. LOW POWER BLE (2Mbps) ..... 35
9.5.8. LOW POWER BLE TXBF (2Mbps) ..... 35
*9.6. POWER SPECTRAL DENSITY ..... 36*
9.6.1. HIGH POWER BLE (1Mbps) ..... 37
9.6.2. HIGH POWER BLE TXBF (1Mbps) ..... 38
9.6.3. HIGH POWER BLE (2Mbps) ..... 39
9.6.4. HIGH POWER BLE TXBF (2Mbps) ..... 40
*9.7. CONDUCTED SPURIOUS EMISSIONS ..... 41*
9.7.1. HIGH POWER BLE (1Mbps) ..... 42
9.7.2. HIGH POWER BLE TXBF (1Mbps) ..... 44
9.7.3. HIGH POWER BLE (2Mbps) ..... 46
9.7.4. HIGH POWER BLE TXBF (2Mbps) ..... 48
9.7.5. LOW POWER BLE (1Mbps) ..... 50
9.7.6. LOW POWER BLE TXBF (1Mbps) ..... 52
9.7.7. LOW POWER BLE (2Mbps) ..... 54
9.7.8. LOW POWER BLE TXBF (2Mbps) ..... 56
**10. RADIATED TEST RESULTS ..... 58**
*10.1. LIMITS AND PROCEDURE ..... 58*
*10.2. TRANSMITTER ABOVE 1 GHz ..... 60*
10.2.1. HIGH POWER BLE (1Mbps) ..... 60
10.2.2. HIGH POWER BLE TXBF (1Mbps) ..... 68
10.2.3. HIGH POWER BLE (2Mbps) ..... 72
10.2.4. HIGH POWER BLE TXBF (2Mbps) ..... 80
10.2.5. HARMONICS AND SPURIOUS EMISSIONS ..... 84
10.2.6. LOW POWER BLE (1Mbps) ..... 90
10.2.7. LOW POWER BLE TXBF (1Mbps) ..... 98
10.2.8. LOW POWER BLE (2Mbps) ..... 102
10.2.9. LOW POWER BLE TXBF (2Mbps) ..... 110
*10.3. WORST CASE BELOW 1 GHZ ..... 114*
*10.4. WORST CASE 18-26 GHz ..... 116*
**11. AC POWER LINE CONDUCTED EMISSIONS ..... 118**
*11.1. AC POWER LINE WITH AC/DC ADAPTER ..... 119*
*11.2. AC POWER LINE WITH LAPTOP ..... 121*
**12. SETUP PHOTOS ..... 123**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

**EUT DESCRIPTION:** SMARTPHONE

**MODEL:** A2595 (Parent Model)
A2782, A2783, A2784, A2785 (Variant Models)

**BRAND:** APPLE

**FCC ID:** BCG-E4082A (Parent Model)
BCG-E8064A, BCG-E4083A, BCG-E8076A (Variant Models)

**IC:** 579C-E4082A (Parent Model)
579C-E8064A, 579C-E4083A, 579C-E8076A (Variant Models)

**SERIAL NUMBER:** DT23CMFDH2

**SAMPLE RECEIPT DATE:** SEPTEMBER 08, 2021

**DATE TESTED:** SEPTEMBER 08, 2021 – FEBRUARY 9, 2022

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 Part 15 Subpart C | Complies |
| ISED RSS-247 Issue 2 | Complies |
| ISED RSS-GEN Issue 5 + A1 + A2 | Complies |

UL Verification Services Inc. 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.

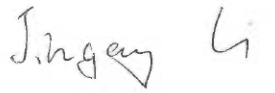
The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Chin Pang
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Jingang Li
Test Engineer
Consumer Technology Division
UL Verification Services Inc.



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 2. TEST SUMMARY

| FCC Clause | ISED Clause | Requirement | Result | Comment |
|---|---|---|---|---|
| See Comment | | Duty Cycle | Reporting purposes only | ANSI C63.10 Section 11.6. |
| - | RSS-GEN 6.7 | 99% OBW | Reporting purposes only | ANSI C63.10 Section 6.9.3. |
| 15.247 (a) (2) | RSS-247 5.2 (a) | 6dB BW | Complies | None. |
| 15.247 (b) (3) | RSS-247 5.4 (d) | Output Power | Complies | None. |
| See Comment | | Average power | Reporting purposes only | Per ANSI C63.10, Section 11.9.2.3.2. |
| 15.247 (e) | RSS-247 5.2 (b) | PSD | Complies | None. |
| 15.247 (d) | RSS-247 5.5 | Conducted Spurious Emissions | Complies | None. |
| 15.209, 15.205 | RSS-GEN 8.9, 8.10 | Radiated Emissions | Complies | None. |
| 15.207 | RSS-Gen 8.8 | AC Mains Conducted Emissions | Complies | None. |

# 3. 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, KDB 414788 D01 Radiated Test Site v01r01, KDB 662911, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 2.

# 4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

| Location | Address | ISED CABID | ISED Company Number | FCC Registration |
|---|---|---|---|---|
| ☐ | Building 1: 47173 Benicia Street, Fremont, CA 94538, USA | US0104 | 2324A | 550739 |
| ☒ | Building 2: 47266 Benicia Street, Fremont, CA 94538, USA | US0104 | 22541 | 550739 |
| ☒ | Building 4: 47658 Kato Rd, Fremont, CA 94538, USA | US0104 | 2324B | 550739 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

## 5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

## 5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

## 5.3. MEASUREMENT UNCERTAINTY

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

| PARAMETER | $U_{Lab}$ |
|---|---|
| Worst Case Conducted Disturbance, 9KHz to 0.15 MHz | 3.78 dB |
| Worst Case Conducted Disturbance, 0.15 to 30 MHz | 3.40 dB |
| Worst Case Radiated Disturbance, 9KHz to 30 MHz | 2.87 dB |
| Worst Case Radiated Disturbance, 30 to 1000 MHz | 6.01 dB |
| Worst Case Radiated Disturbance, 1000 to 18000 MHz | 4.73 dB |
| Worst Case Radiated Disturbance, 18000 to 26000 MHz | 4.51 dB |
| Worst Case Radiated Disturbance, 26000 to 40000 MHz | 5.29 dB |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 6. EQUIPMENT UNDER TEST

## 6.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video),cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G FR1, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, GPS and NFC. All models support at least one UICC based SIM. The second SIM is an UICC based e-SIM (electronic SIM) in some models. China model has 1 p-SIM only. The device supports a built-in inductive charging receiver. The rechargeable battery is not user accessible.

Testing was performed on the parent model and is used to support the application for the parent and variants identified in this report based on the test plan submitted and approved via KDB inquiry by the FCC and by ISED-Canada.

The Model and FCC IDs / ISED covered by this report includes:

Parent Model: A2595, FCC ID: BCG-E4082A, IC: 579C-E4082A

Variant Models: A2782, FCC ID: BCG-E8064A, IC: 579C-E8064A
A2783; FCC ID: BCG-E4083A, IC: 579C-E4083A
A2784 & A2785, FCC ID: BCG-E8076A, IC: 579C-8076A

## 6.2. MAXIMUM OUTPUT POWER

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

| Antenna | Configuration | Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|---|---|---|---|---|---|
| ANT 2 | High Power | 2402 - 2480 | BLE 1M | 17.21 | 52.60 |
| | Low Power | | | 11.71 | 14.83 |
| | High Power | 2404 - 2478 | BLE 2M | 17.33 | 54.08 |
| | Low Power | | | 11.69 | 14.76 |
| ANT 3 | High Power | 2402 - 2480 | BLE 1M | 20.26 | 106.17 |
| | Low Power | | | 11.32 | 13.55 |
| | High Power | 2404 - 2478 | BLE 2M | 20.25 | 105.93 |
| | Low Power | | | 11.28 | 13.43 |
| BF, ANT 2 + ANT 3 | High Power | 2402 - 2480 | BLE 1M | 20.24 | 105.68 |
| | Low Power | | | 14.5 | 28.18 |
| | High Power | 2404 - 2478 | BLE 2M | 20.28 | 106.66 |
| | Low Power | | | 14.52 | 28.31 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

| Frequency Range (GHz) | ANT 2 (dBi) | ANT 3 (dBi) |
|---|---|---|
| 2.4 | 2.6 | -0.3 |

## 6.4. SOFTWARE AND FIRMWARE

The EUT firmware version installed during testing was 19.5.418.4462

## 6.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y and Z on ANT 2, ANT 3 and 2TX beamforming. It was determined that X (Flatbed) orientation was the worst-case orientation for ANT 2, ANT 3 and beamforming 2TX.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT was set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario. There were no emissions found below 30MHz within 20dB of the limit.

For below 1GHz tests were performed with EUT connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

For simultaneous transmission of multiple channels in the 2.4GHz BLE and 5GHz bands. No noticeable emission was found.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 6.6. DESCRIPTION OF TEST SETUP

| SUPPORT TEST EQUIPMENT | | | | | | |
|---|---|---|---|---|---|---|
| **Description** | | **Manufacturer** | **Model** | **Serial Number** | | **FCC ID/ DoC** |
| Laptop | | Apple | Macbook Pro | C02VD7SAHV22 | | BCGA1708 |
| Laptop AC/DC adapter | | Liteon Technology | A1424 | NSW25679 | | DoC |
| EUT AC/DC adapter | | Apple | A1720 | C3D8417A7R93KVPA8 | | DoC |
| **I/O CABLES (RF CONDUCTED TEST)** | | | | | | |
| **Cable No.** | **Port** | **# of Identical Ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | Antenna | 1 | SMA | Un-shielded | 0.2 | To spectrum Analyzer |
| 2 | USB | 1 | USB | Shielded | 1.0 | N/A |
| 3 | AC | 1 | AC | Un-shielded | 2 | N/A |
| **I/O CABLES (RF RADIATED AND AC LINE CONDUCTED TEST)** | | | | | | |
| **Cable No.** | **Port** | **# of Identical Ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | AC | 1 | AC | Un-shielded | 2 | N/A |
| 2 | USB | 1 | USB | Un-shielded | 1 | N/A |

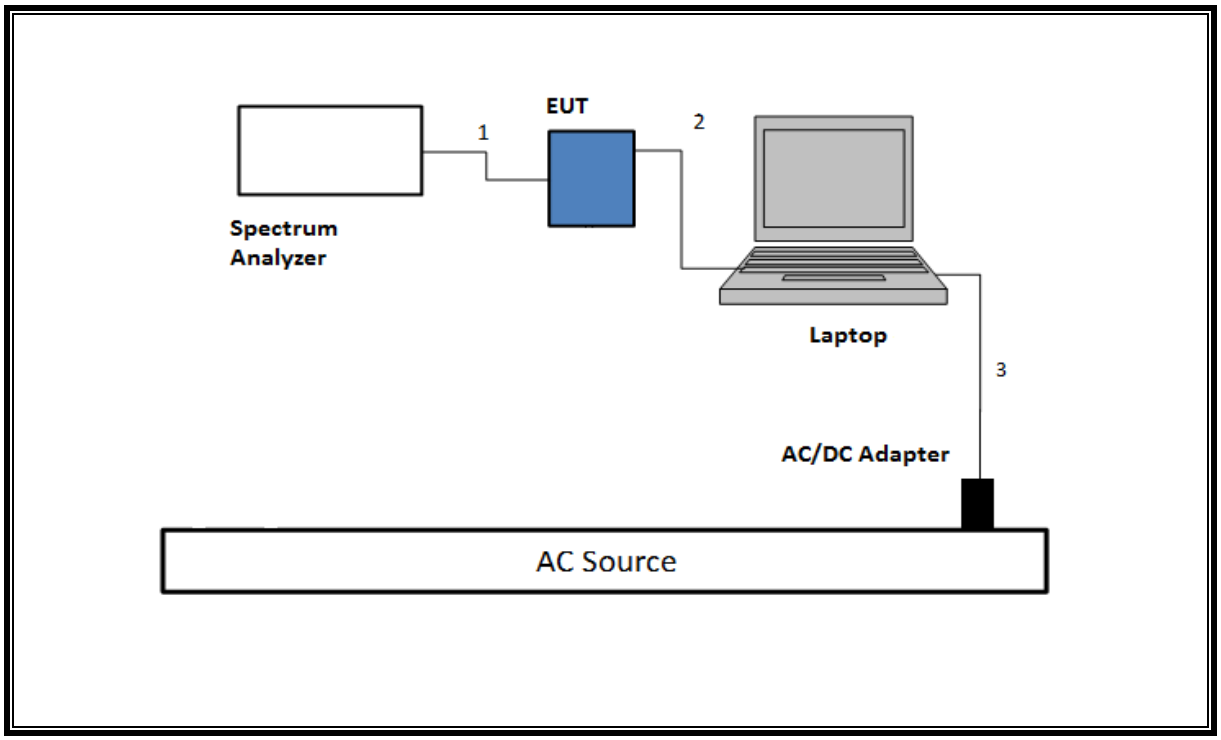
**TEST SETUP**

The EUT setup is shown as below. Test software exercised the radio card.

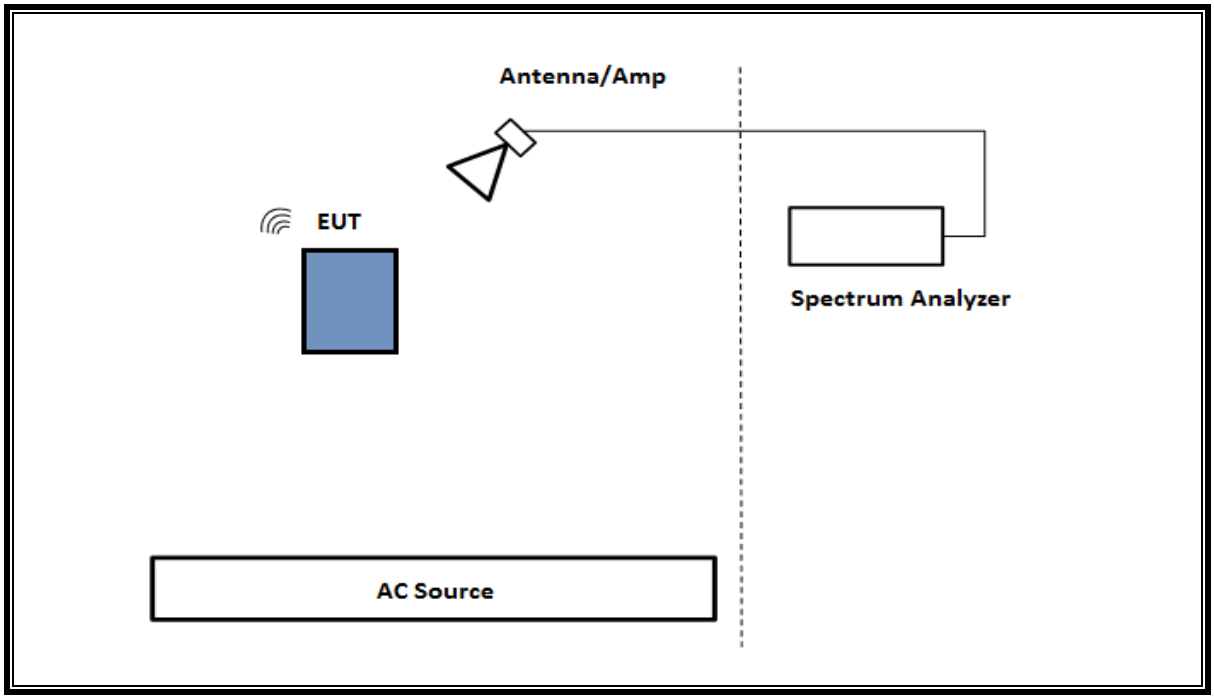


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**SETUP DIAGRAM FOR CONDUCTED TESTS**



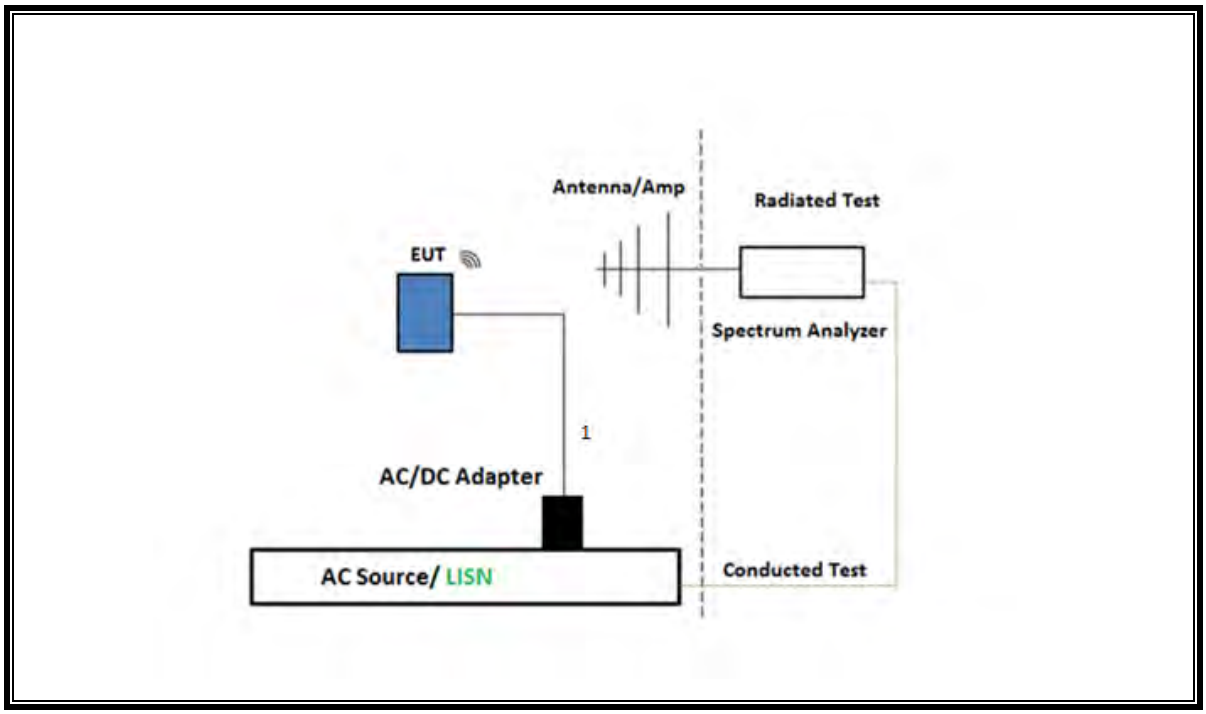

**SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz**



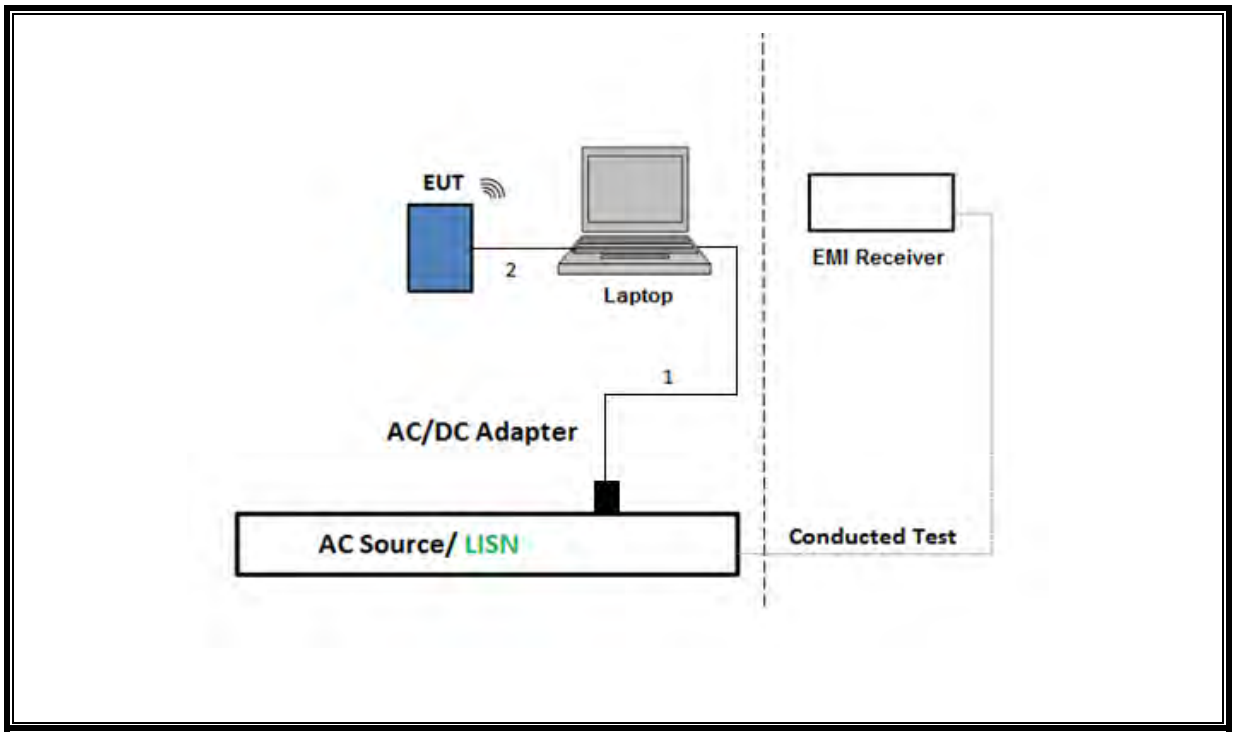



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST**




**TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION**






UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v05r02, Section 6.

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW ≥ DTS BW

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

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Measurement using gated average power meter.

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

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1 & Clause 13

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Subclause -11.13.3.2 & Clause 13: Integration method -Peak detection

Band-edge: ANSI C63.10 Subclause -11.13.3.3 & Clause 13: Integration method -Trace averaging with continuous transmission at full power

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

Radiated emissions non-restricted frequency bands ANSI C63.10 Subclause -11.11 & Clause 13

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4 & 13

**NOTE**: All conducted antenna port tests for Beamforming applied the same test procedures as BLE 1Mbps and BLE 2Mbps normal modes.



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 8. TEST AND MEASUREMENT EQUIPMENT

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

| Description | Manufacturer | Model | ID Num | Cal Due | Last Cal |
|---|---|---|---|---|---|
| *Spectrum Analyzer, PXA 3Hz to 44GHz | Keysight | N9030A | T1466 | 01/25/2022 | 01/25/2021 |
| Amplifier, 1 to 18GHz | Miteq | AFS42-00101800-25-S-42 | T740 | 10/13/2022 | 10/13/2021 |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz | Sunol Sciences | JB3 | 204045 | 03/03/2022 | 03/03/2021 |
| Antenna, Horn 1-18GHz | ETS Lindgren | 3117 | T712 | 03/22/2022 | 03/22/2021 |
| Antenna Horn 18 to 26.5GHz (HFR) | ARA | MWH-1826/B | 81140 | 04/22/2022 | 04/22/2021 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz | Agilent (Keysight) Technologies | N9030A | T1454 | 01/27/2022 | 01/27/2021 |
| Pre-Amp 18-26GHz | Agilent Technology | 8449B | T404 | 04/19/2022 | 04/19/2021 |
| Antenna, Active Loop 9KHz to 30MHz | ETS-Lindgren | 6502 | T757 | 11/12/2021 | 11/12/2020 |
| *Spectrum Analyzer, PXA, 3Hz to 44GHz | Agilent (Keysight) Technologies | N9030A | T342 | 01/25/2022 | 01/25/2021 |
| Power Meter, P-series single channel | Keysight | N1911A | T1268 | 01/27/2022 | 01/27/2021 |
| *Spectrum Analyzer, PXA, 3Hz to 44GHz | Agilent (Keysight) Technologies | N9030A | T342 | 01/25/2022 | 01/25/2021 |
| Power Sensor | Keysight | N1921A | T1225 | 01/28/2022 | 01/28/2021 |

| AC Line Conducted | | | | | |
|---|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **ID Num** | **Cal Due** | **Last Cal** |
| EMI Test Receiver 9kHz-7GHz | Rohde & Schwarz | ESR | T1436 | 02/19/2022 | 02/19/2021 |
| *Power Cable, Line Conducted Emissions | UL | PR1 | T861 | 10/27/2021 | 10/27/2020 |
| *LISN for Conducted Emissions CISPR-16 | FISCHER CUSTOM COMMUNICATIONS | FCC-LISN-50/250-25-2-01 | PRE0186446 | 01/20/2022 | 01/20/2021 |
| **UL AUTOMATION SOFTWARE** | | | | | |
| Radiated Software | UL | UL EMC | Ver 9.5, Mar 6, 2020 | | |
| Conducted Software | UL | UL EMC | 2020.2.26 | | |
| AC Line Conducted Software | UL | UL EMC | Ver 9.5, February 21, 2020 | | |

*Testing was completed before equipment calibration date



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 9. ANTENNA PORT TEST RESULTS

## 9.1. ON TIME AND DUTY CYCLE

**LIMITS**

None; for reporting purposes only.

**PROCEDURE**

KDB 558074 Zero-Span Spectrum Analyzer Method.

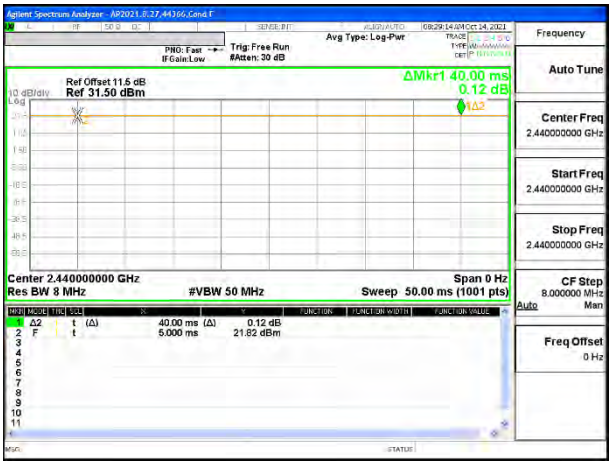
**ON TIME AND DUTY CYCLE RESULTS**

| 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** | | | | | | |
| BLE, 1Mbps | 40.00 | 40.00 | 1.000 | 100.00% | 0.00 | 0.010 |
| BLE, 2Mbps | 40.00 | 40.00 | 1.000 | 100.00% | 0.00 | 0.010 |
| BLE, TXBF, 1Mbps | 40.00 | 40.00 | 1.000 | 100.00% | 0.00 | 0.010 |
| BLE, TXBF, 2Mbps | 40.00 | 40.00 | 1.000 | 100.00% | 0.00 | 0.010 |

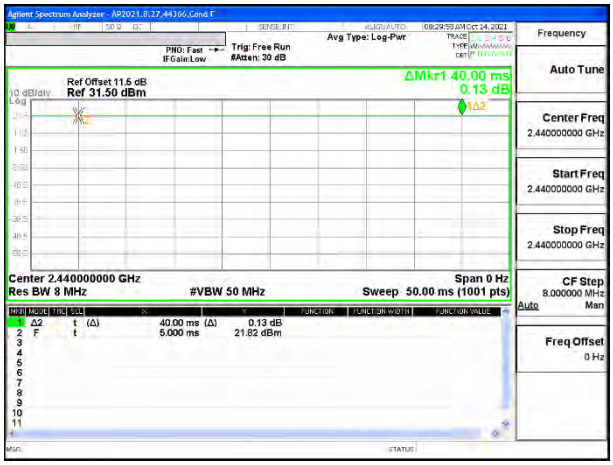


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

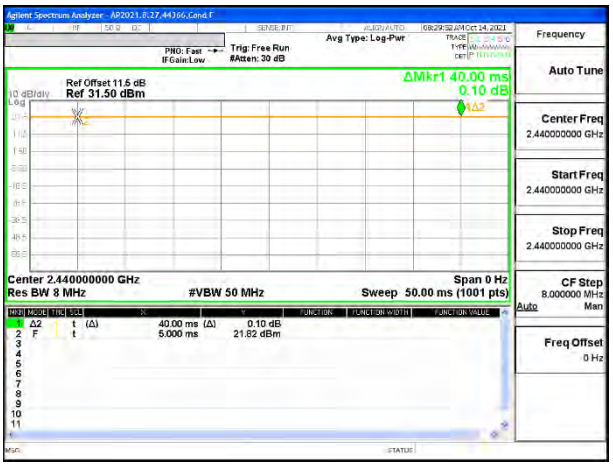
## DUTY CYCLE PLOTS




**BLE 1Mbps**




**BLE 2Mbps**




**BLE TXBF 1Mbps**


**BLE TXBF 2Mbps**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

**RESULTS**

Only High Power modes result is reported, it covers all Low Power modes. Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.2.1. **HIGH POWER BLE (1Mbps)**

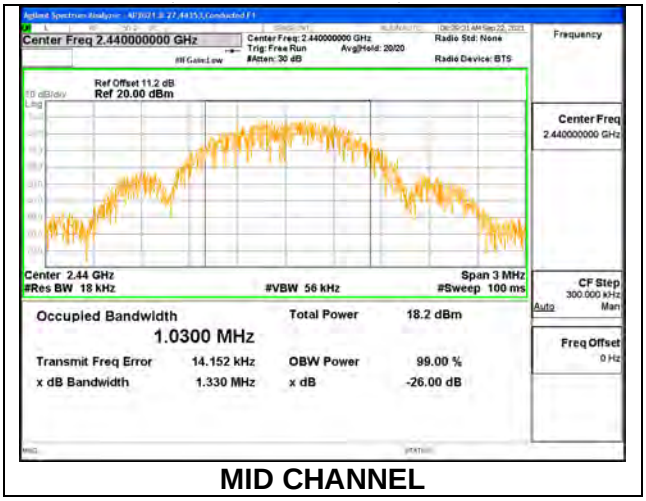
**ANT 2**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2402 | 1.033 |
| Middle | 2440 | 1.044 |
| High | 2480 | 1.054 |


**MID CHANNEL**

**ANT 3**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2402 | 1.056 |
| Middle | 2440 | 1.030 |
| High | 2480 | 1.058 |




**MID CHANNEL**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.2.2. **HIGH POWER BLE TXBF (1Mbps)**

| Channel | Frequency (MHz) | 99% Bandwidth UAT 1 (MHz) | 99% Bandwidth LAT 3 (MHz) |
|---|---|---|---|
| Low | 2402 | 1.056 | 1.039 |
| Mid | 2440 | 1.036 | 1.046 |
| High | 2480 | 1.029 | 1.052 |

Note: Test procedures and setting are same as BLE normal mode.


**MID CHANNEL ANT 2**


**MID CHANNEL ANT 3**

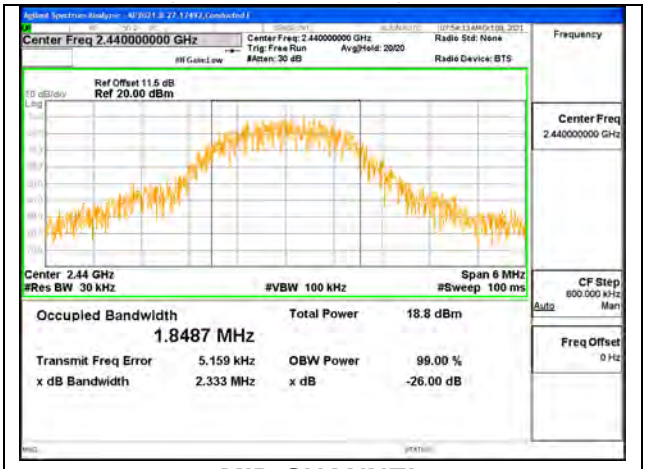


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.2.3. **HIGH POWER BLE (2Mbps)**

**ANT 2**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2404 | 1.871 |
| Middle | 2440 | 1.849 |
| High | 2078 | 1.871 |




**MID CHANNEL**

**ANT 3**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2404 | 1.890 |
| Middle | 2440 | 1.866 |
| High | 2478 | 1.890 |


**MID CHANNEL**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.2.4. **HIGH POWER BLE TXBF (2Mbps)**

| Channel | Frequency (MHz) | 99% Bandwidth ANT 2 (MHz) | 99% Bandwidth ANT 3 (MHz) |
|---|---|---|---|
| Low | 2404 | 1.835 | 1.871 |
| Mid | 2440 | 1.879 | 1.887 |
| High | 2478 | 1.885 | 1.866 |

Note: Test procedures and setting are same as BLE normal mode.


**MID CHANNEL ANT 2**


**MID CHANNEL ANT 3**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.3. 6 dB BANDWIDTH

**LIMITS**

FCC §15.407 (e)

RSS-247 5.2 (a)

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

**RESULTS**

The 6dB bandwidth was measured for the narrowest bandwidth mode, High Power 1Mbps, to demonstrate compliance with the minimum required bandwidth of 500 kHz. Other modes were not tested as their bandwidth is greater than the High Power 1Mbps mode, as demonstrated by the 99% bandwidth measurements performed on all modes.

Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.3.1. **HIGH POWER BLE (1Mbps)**

**ANT 2**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 2402 | 0.720 | 0.5 |
| Middle | 2440 | 0.717 | 0.5 |
| High | 2480 | 0.714 | 0.5 |


**MID CHANNEL**

**ANT 3**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 2402 | 0.729 | 0.5 |
| Middle | 2440 | 0.702 | 0.5 |
| High | 2480 | 0.714 | 0.5 |


**MID CHANNEL**

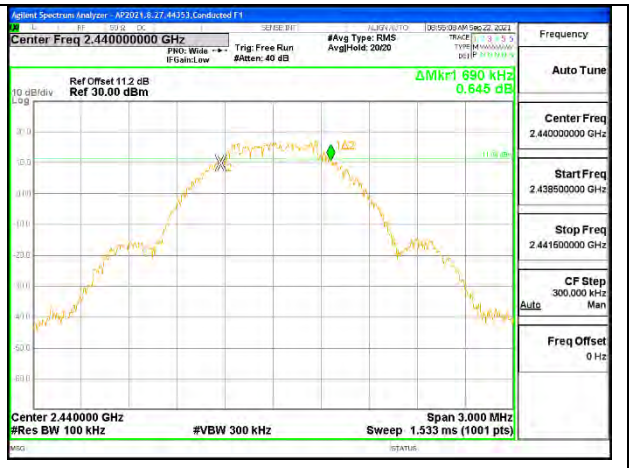


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.3.2. **HIGH POWER BLE TXBF (1Mbps)**

| Channel | Frequency (MHz) | 6 dB Bandwidth ANT 2 (MHz) | 6 dB Bandwidth ANT 3 (MHz) | Minimum Limit (MHz) |
|---|---|---|---|---|
| Low | 2402 | 0.690 | 0.690 | 0.5 |
| Mid | 2440 | 0.690 | 0.690 | 0.5 |
| High | 2480 | 0.705 | 0.717 | 0.5 |


**MID CHANNEL ANT 2**




**MID CHANNEL ANT 3**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.4. OUTPUT POWER

**LIMITS**

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

**TEST PROCEDURE**

Measurements perform using a wideband RF power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband peak power sensor. Peak output power was read directly from the power meter.

**DIRECTIONAL ANTENNA GAIN**

For 1 TX:
There is only one transmitter output therefore the directional gain is equal to the antenna gain.

For 2TX:

Tx chains are correlated for power and PSD due to the device supporting Beamforming mode. The directional gains are as follows:

| Band (GHz) | ANT 2 Gain (dBi) | ANT 3 Gain (dBi) | Correlated Chains Directional Gain (dBi) |
|---|---|---|---|
| 2.4 | 2.60 | -0.30 | 4.28 |

**RESULTS**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.4.1. **HIGH POWER BLE (1Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44252 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 17.18 | 30 | -12.82 |
| Middle | 2440 | 17.21 | 30 | -12.79 |
| High | 2480 | 17.13 | 30 | -12.87 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 20.20 | 30 | -9.80 |
| Middle | 2440 | 20.21 | 30 | -9.79 |
| High | 2480 | 20.26 | 30 | -9.74 |

### 9.4.2. **HIGH POWER BLE TXBF (1Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Peak Power ANT 2 (dBm) | Peak Power ANT 3 (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2402 | 17.21 | 17.22 | 20.23 | 30 | -9.77 |
| Middle | 2440 | 17.21 | 17.24 | 20.24 | 30 | -9.76 |
| High | 2480 | 17.23 | 17.20 | 20.23 | 30 | -9.77 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.4.3. **HIGH POWER BLE (2Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2404 | 17.33 | 30 | -12.67 |
| Middle | 2440 | 17.27 | 30 | -12.73 |
| High | 2478 | 17.29 | 30 | -12.71 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2404 | 20.25 | 30 | -9.75 |
| Middle | 2440 | 20.22 | 30 | -9.78 |
| High | 2478 | 20.20 | 30 | -9.80 |

### 9.4.4. **HIGH POWER BLE TXBF (2Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Peak Power ANT 2 (dBm) | Peak Power ANT 3 (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2404 | 17.20 | 17.22 | 20.22 | 30 | -9.78 |
| Middle | 2440 | 17.23 | 17.20 | 20.23 | 30 | -9.77 |
| High | 2478 | 17.26 | 17.27 | 20.28 | 30 | -9.72 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.4.5. **LOW POWER BLE (1Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 11.62 | 30 | -18.38 |
| Middle | 2440 | 11.71 | 30 | -18.29 |
| High | 2480 | 11.44 | 30 | -18.56 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 11.20 | 30 | -18.80 |
| Middle | 2440 | 11.32 | 30 | -18.68 |
| High | 2480 | 11.25 | 30 | -18.75 |

## 9.4.6. **LOW POWER BLE TXBF (1Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power ANT 2 (dBm) | Peak Power ANT 3 (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2402 | 11.60 | 11.26 | 14.44 | 30 | -15.56 |
| Middle | 2440 | 11.73 | 11.24 | 14.50 | 30 | -15.50 |
| High | 2480 | 11.42 | 11.28 | 14.36 | 30 | -15.64 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.4.7. **LOW POWER BLE (2Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2404 | 11.62 | 30 | -18.38 |
| Middle | 2440 | 11.69 | 30 | -18.31 |
| High | 2478 | 11.60 | 30 | -18.40 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2404 | 11.22 | 30 | -18.78 |
| Middle | 2440 | 11.28 | 30 | -18.72 |
| High | 2478 | 11.20 | 30 | -18.80 |

## 9.4.8. **LOW POWER BLE TXBF (2Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022, 2/9/2022 |

| Channel | Frequency (MHz) | Peak Power ANT 2 (dBm) | Peak Power ANT 3 (dBm) | Total Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2404 | 11.42 | 11.29 | 14.37 | 30 | -15.63 |
| Middle | 2440 | 11.72 | 11.28 | 14.52 | 30 | -15.48 |
| High | 2478 | 11.44 | 11.26 | 14.36 | 30 | -15.64 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.5. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

Measurements perform using a wideband RF power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

**RESULTS**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.5.1. **HIGH POWER BLE (1Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2402 | 16.88 |
| Middle | 2440 | 16.91 |
| High | 2480 | 16.80 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2402 | 19.90 |
| Middle | 2440 | 19.91 |
| High | 2480 | 19.96 |

### 9.5.2. **HIGH POWER BLE TXBF (1Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Average Power ANT 2 (dBm) | Average Power ANT 3 (dBm) | Total Power (dBm) |
|---|---|---|---|---|
| Low | 2402 | 16.93 | 16.94 | 19.95 |
| Middle | 2440 | 16.93 | 16.95 | 19.95 |
| High | 2480 | 16.94 | 16.90 | 19.93 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.5.3. **HIGH POWER BLE (2Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Average power (dBm) |
|---|---|---|
| Low | 2404 | 17.00 |
| Middle | 2440 | 16.95 |
| High | 2478 | 16.97 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Average power (dBm) |
|---|---|---|
| Low | 2404 | 19.93 |
| Middle | 2440 | 19.90 |
| High | 2478 | 19.87 |

### 9.5.4. **HIGH POWER BLE TXBF (2Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44366 |
| **Date:** | 10/26/2021 |

| Channel | Frequency (MHz) | Average Power ANT 2 (dBm) | Average Power ANT 3 (dBm) | Total Power (dBm) |
|---|---|---|---|---|
| Low | 2404 | 16.88 | 16.91 | 19.91 |
| Middle | 2440 | 16.90 | 16.87 | 19.90 |
| High | 2478 | 16.93 | 16.94 | 19.95 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.5.5. **LOW POWER BLE (1Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 2/9/2022 |

| Channel | Frequency (MHz) | Average power (dBm) |
|---|---|---|
| Low | 2402 | 11.21 |
| Middle | 2440 | 11.37 |
| High | 2480 | 11.04 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Average power (dBm) |
|---|---|---|
| Low | 2402 | 10.87 |
| Middle | 2440 | 10.99 |
| High | 2480 | 10.91 |

## 9.5.6. **LOW POWER BLE TXBF (1Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 01/25/2022, 02/09/2022 |

| Channel | Frequency (MHz) | Average Power ANT 2 (dBm) | Average Power ANT 3 (dBm) | Total Power (dBm) |
|---|---|---|---|---|
| Low | 2402 | 11.31 | 10.93 | 14.13 |
| Middle | 2440 | 11.40 | 10.91 | 14.17 |
| High | 2480 | 11.12 | 10.95 | 14.05 |

## 9.5.7. **LOW POWER BLE (2Mbps)**

**ANT 2**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022<br>2/09/2022 |

| Channel | Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2404 | 11.3 |
| Middle | 2440 | 11.38 |
| High | 2478 | 11.33 |

**ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022 |

| Channel | Frequency (MHz) | Average power (dBm) |
|---|---|---|
| Low | 2404 | 10.88 |
| Middle | 2440 | 10.94 |
| High | 2478 | 10.86 |

## 9.5.8. **LOW POWER BLE TXBF (2Mbps)**

**ANT 2 + ANT 3**

| | |
|---|---|
| **Tested By:** | 44353 |
| **Date:** | 1/25/2022<br>2/9/2022 |

| Channel | Frequency (MHz) | Average Power ANT 2 (dBm) | Average Power ANT 3 (dBm) | Total Power (dBm) |
|---|---|---|---|---|
| Low | 2404 | 11.11 | 10.94 | 14.04 |
| Middle | 2440 | 11.41 | 10.93 | 14.19 |
| High | 2478 | 11.18 | 10.91 | 14.06 |



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.6. 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.

**RESULTS**

Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

Only High-Power modes result is reported, it covers all Low Power modes

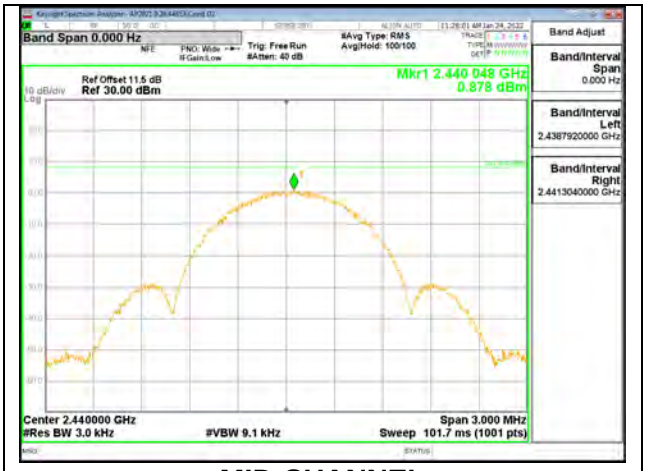


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.6.1. **HIGH POWER BLE (1Mbps)**

**ANT 2**

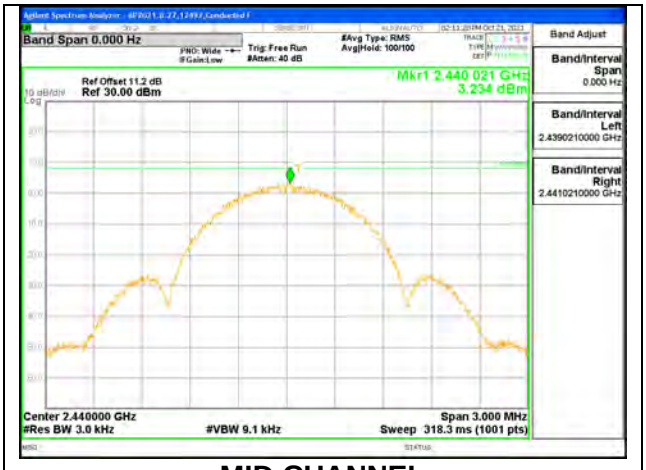
| Channel | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 0.998 | 8 | -7.00 |
| Middle | 2440 | 0.878 | 8 | -7.12 |
| High | 2480 | 0.944 | 8 | -7.06 |




**MID CHANNEL**

**ANT 3**

| Channel | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 3.112 | 8 | -4.89 |
| Middle | 2440 | 3.234 | 8 | -4.77 |
| High | 2480 | 3.419 | 8 | -4.58 |




**MID CHANNEL**

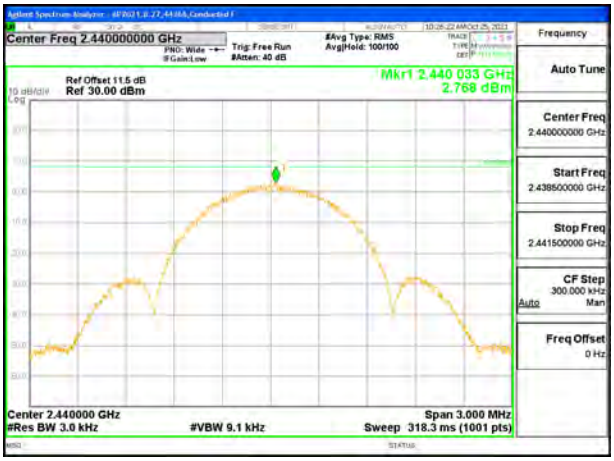
## 9.6.2. **HIGH POWER BLE TXBF (1Mbps)**

| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd PSD |
|---|---|---|

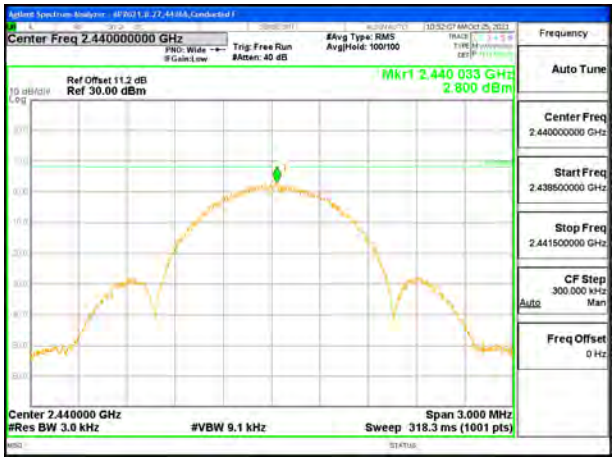
**PSD Results**

| Channel | Frequency (MHz) | ANT 2 Meas (dBm/ 3kHz) | ANT 3 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2402 | 2.741 | 2.760 | 5.76 | 8.0 | -2.2 |
| Mid | 2440 | 2.768 | 2.800 | 5.79 | 8.0 | -2.2 |
| Hjigh | 2480 | 2.780 | 2.726 | 5.76 | 8.0 | -2.2 |

Note: Test procedures and setting are same as BLE normal mode.




**MID CHANNEL ANT 2**




**MID CHANNEL ANT 3**

## 9.6.3. **HIGH POWER BLE (2Mbps)**

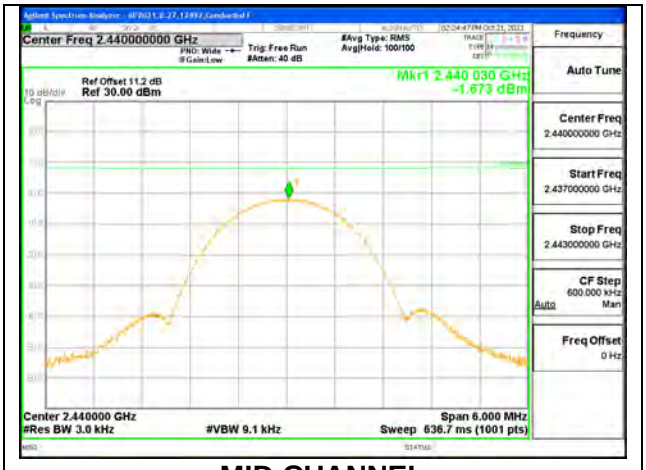
**ANT 2**

| Channel | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Margin (dB) |
|---|---|---|---|---|
| Low | 2404 | -4.592 | 8 | -12.59 |
| Middle | 2440 | -4.673 | 8 | -12.67 |
| High | 2478 | -4.476 | 8 | -12.48 |


**MID CHANNEL**

**ANT 3**

| Channel | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Margin (dB) |
|---|---|---|---|---|
| Low | 2404 | -1.669 | 8 | -9.67 |
| Middle | 2440 | -1.673 | 8 | -9.67 |
| High | 2478 | -1.710 | 8 | -9.71 |




**MID CHANNEL**

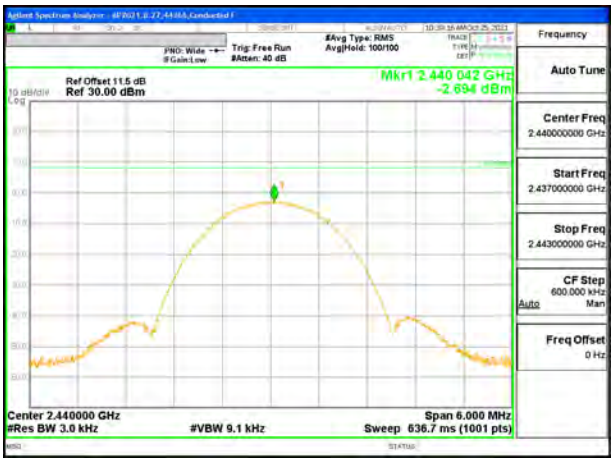
## 9.6.4. **HIGH POWER BLE TXBF (2Mbps)**

| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd PSD |
|---|---|---|

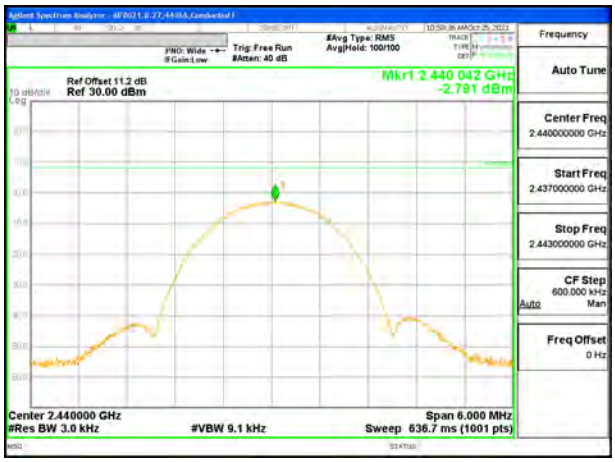
**PSD Results**

| Channel | Frequency (MHz) | ANT 2 Meas (dBm/ 3kHz) | ANT 3 Meas (dBm/ 3kHz) | Total Corr'd PSD (dBm/ 3kHz) | Limit (dBm/ 3kHz) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2404 | -2.749 | -2.699 | 0.29 | 8.0 | -7.7 |
| Mid | 2440 | -2.694 | -2.791 | 0.27 | 8.0 | -7.7 |
| Hjigh | 2478 | -2.569 | -2.685 | 0.38 | 8.0 | -7.6 |

Note: Test procedures and setting are same as BLE normal mode.




**MID CHANNEL ANT 2**




**MID CHANNEL ANT 3**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.7. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

RSS-247 5.5

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

Note: Test procedures and setting are same as BLE normal mode.

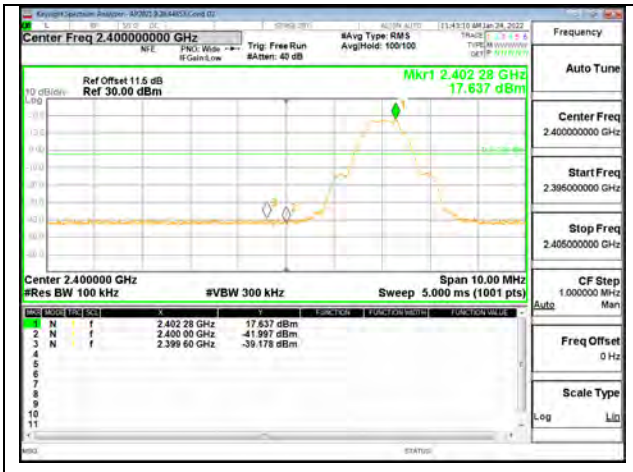
**RESULTS**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

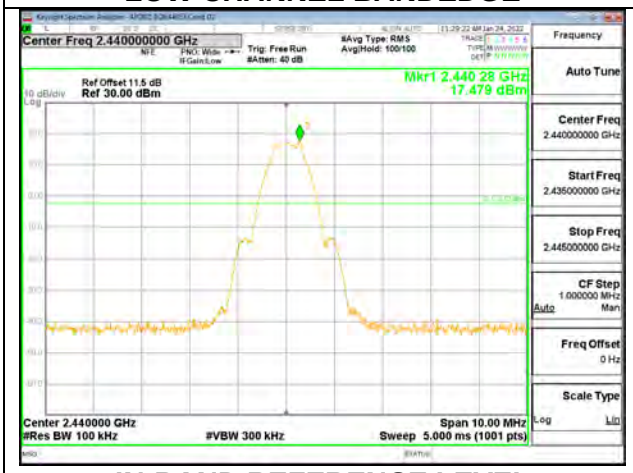
## 9.7.1. **HIGH POWER BLE (1Mbps)**

**ANT 2**



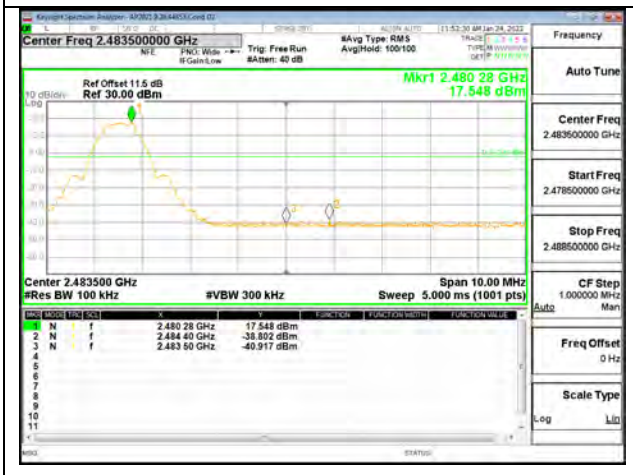

**LOW CHANNEL BANDEDGE**


**OUT-OF-BAND LOW CHANNEL**




**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**



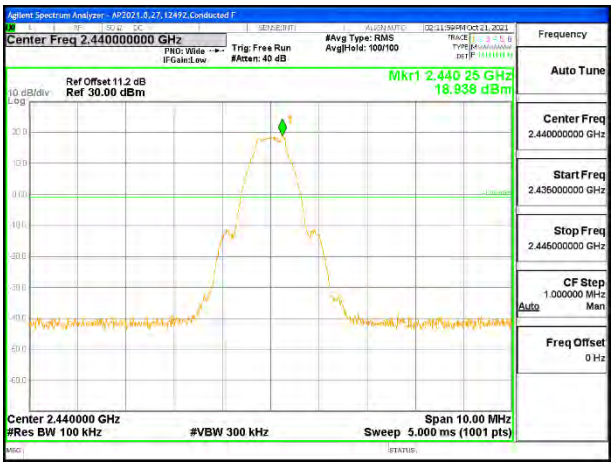

**HIGH CHANNEL BANDEDGE**


**OUT-OF-BAND HIGH CHANNEL**

**ANT 3**


**LOW CHANNEL BANDEDGE**

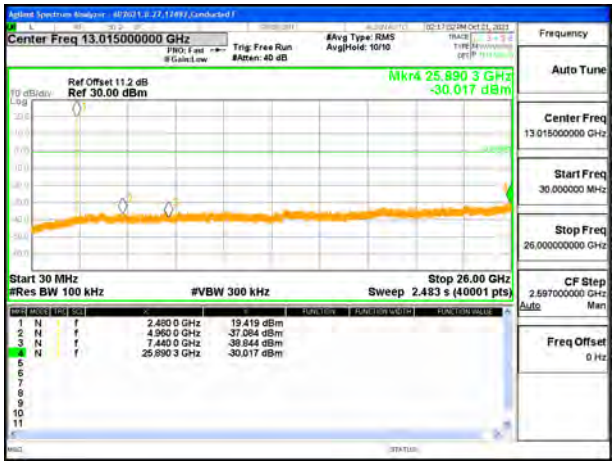

**OUT-OF-BAND LOW CHANNEL**




**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**


**HIGH CHANNEL BANDEDGE**




**OUT-OF-BAND HIGH CHANNEL**

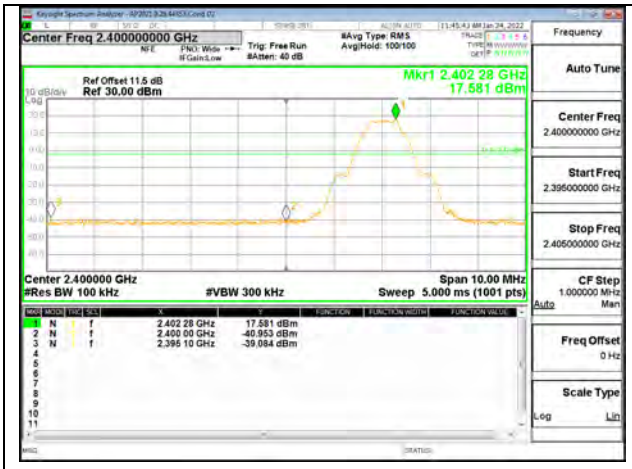


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.7.2. **HIGH POWER BLE TXBF (1Mbps)**

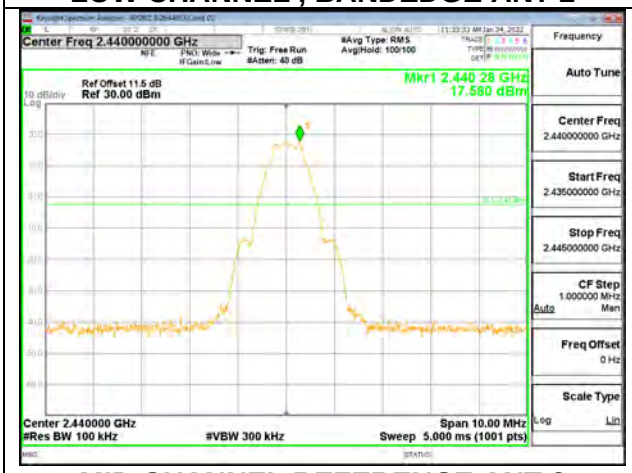
Note: Test procedures and setting are same as BLE normal mode.

**ANT 2**



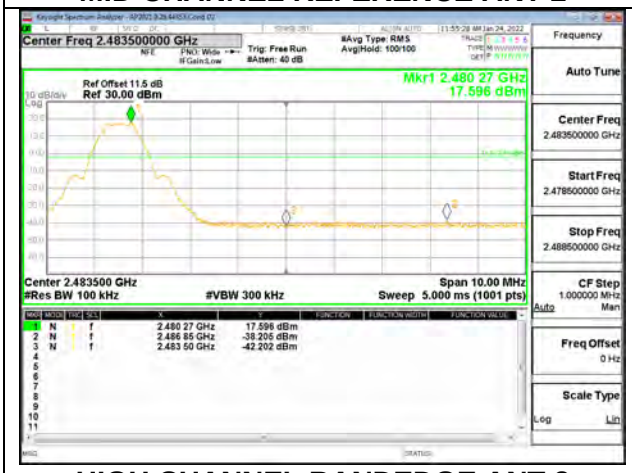

**LOW CHANNEL , BANDEDGE ANT 2**


**LOW CHANNEL OUT-OF-BAND ANT 2**




**MID CHANNEL REFERENCE ANT 2**


**MID CHANNEL OUT-OF-BAND ANT 2**




**HIGH CHANNEL BANDEDGE ANT 2**


**HIGH CHANNEL OUT-OF-BAND ANT 2**

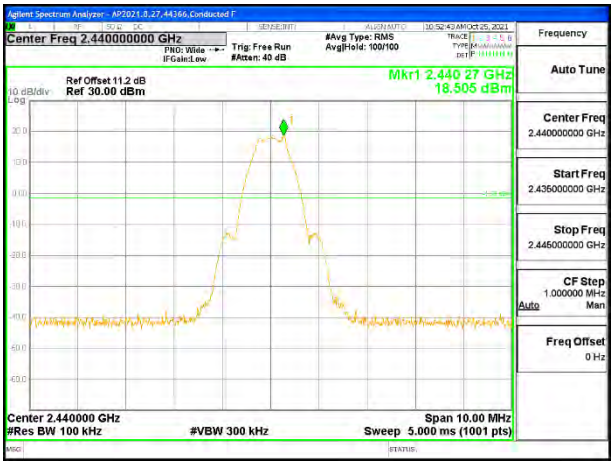


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**

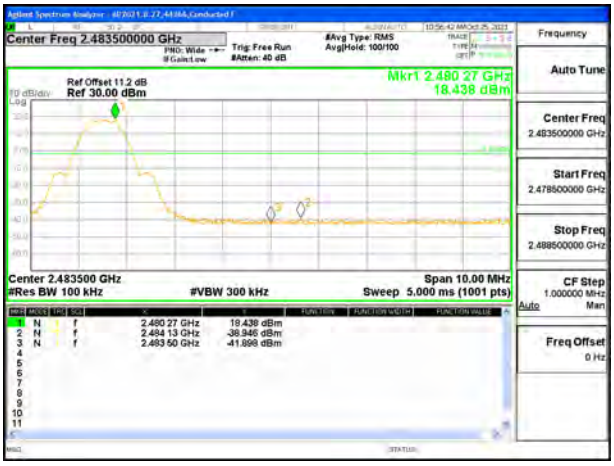

**LOW CHANNEL , BANDEDGE ANT 3**


**LOW CHANNEL OUT-OF-BAND ANT 3**

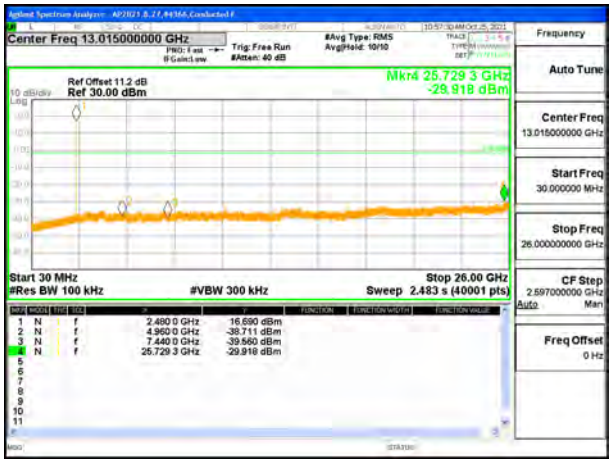



**MID CHANNEL REFERENCE ANT 3**


**MID CHANNEL OUT-OF-BAND ANT 3**




**HIGH CHANNEL REFERENCE ANT 3**



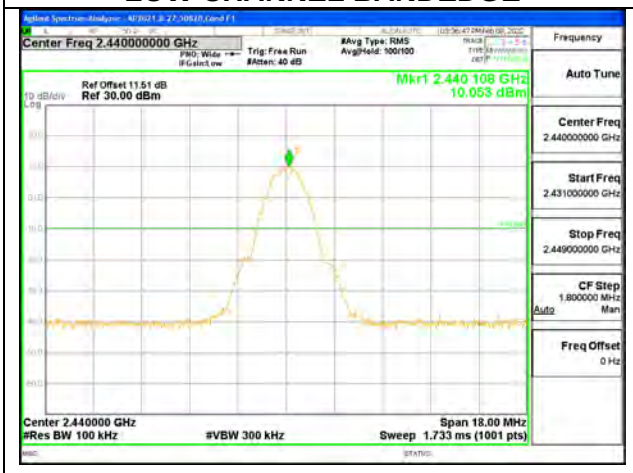

**HIGH CHANNEL OUT-OF-BAND ANT 3**

## 9.7.3. **HIGH POWER BLE (2Mbps)**

**ANT 2**

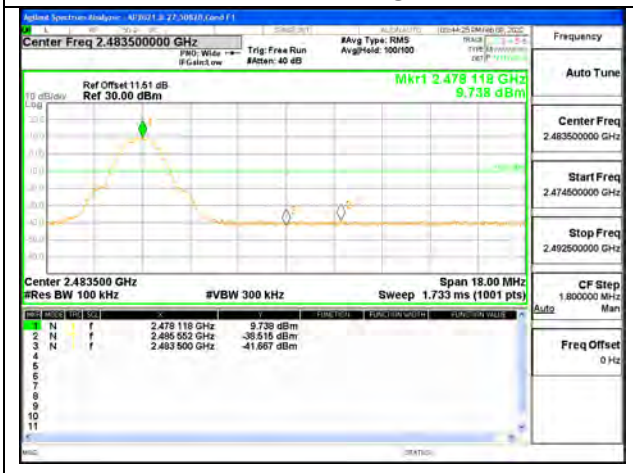

**LOW CHANNEL BANDEDGE**


**OUT-OF-BAND LOW CHANNEL**

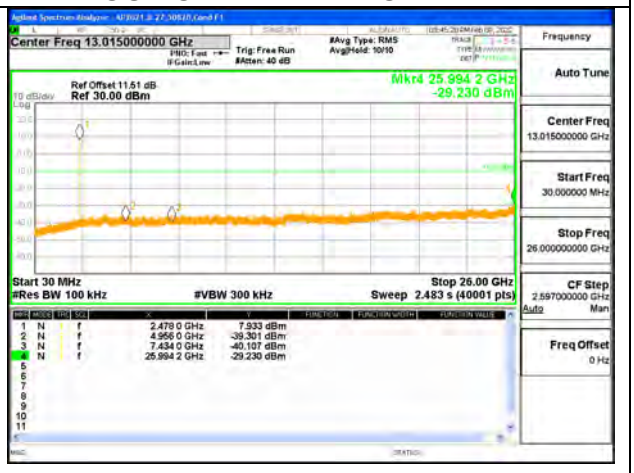



**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**

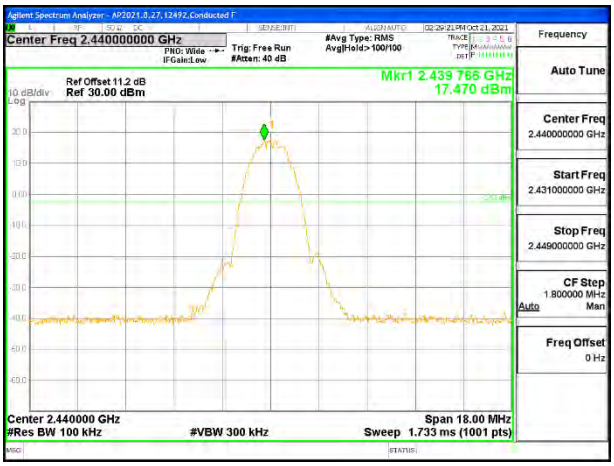



**OUT-OF-BAND HIGH CHANNEL**

**ANT 3**


**LOW CHANNEL BANDEDGE**

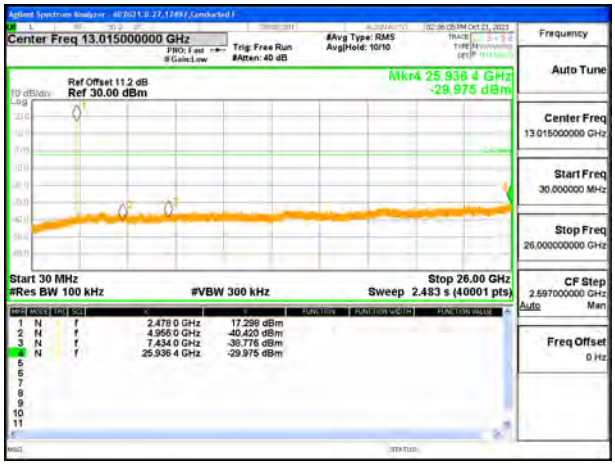

**OUT-OF-BAND LOW CHANNEL**




**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**


**HIGH CHANNEL BANDEDGE**




**OUT-OF-BAND HIGH CHANNEL**

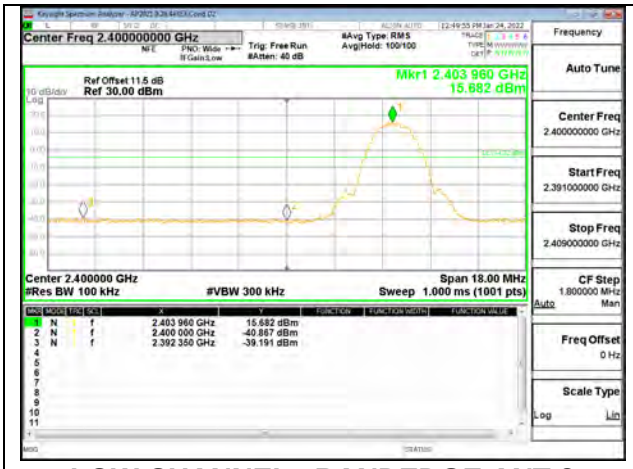


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

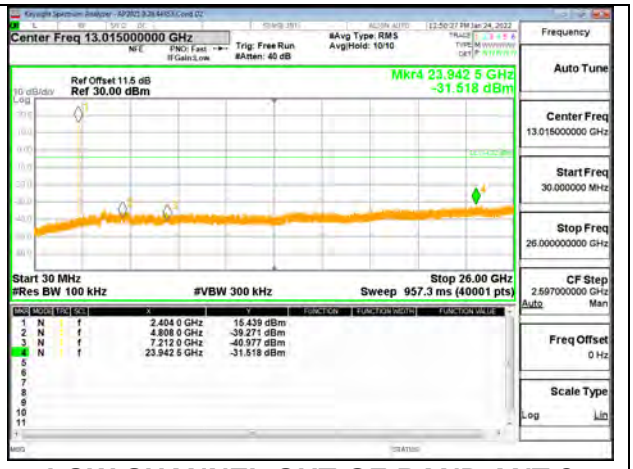
## 9.7.4. **HIGH POWER BLE TXBF (2Mbps)**

Note: Test procedures and setting are same as BLE normal mode.

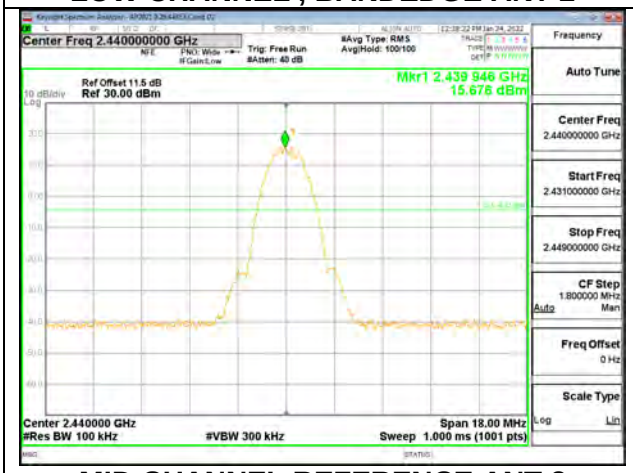
**ANT 2**




**LOW CHANNEL , BANDEDGE ANT 2**

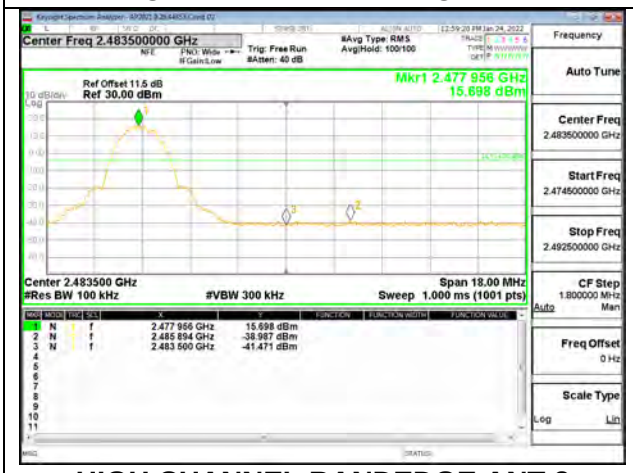



**LOW CHANNEL OUT-OF-BAND ANT 2**

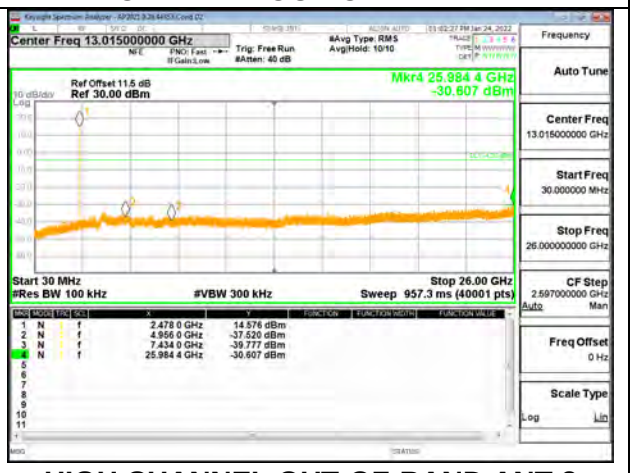



**MID CHANNEL REFERENCE ANT 2**


**MID CHANNEL OUT-OF-BAND ANT 2**




**HIGH CHANNEL BANDEDGE ANT 2**

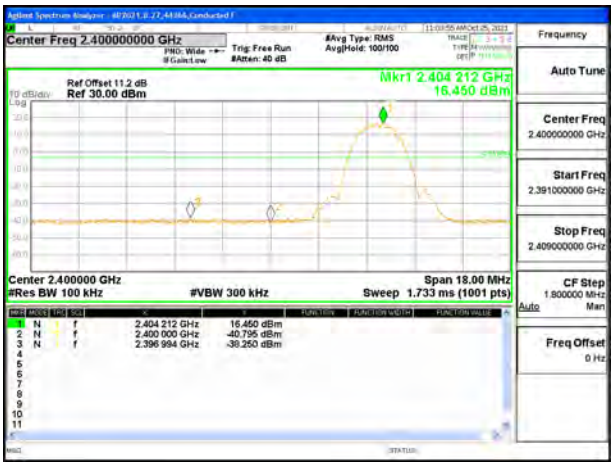



**HIGH CHANNEL OUT-OF-BAND ANT 2**



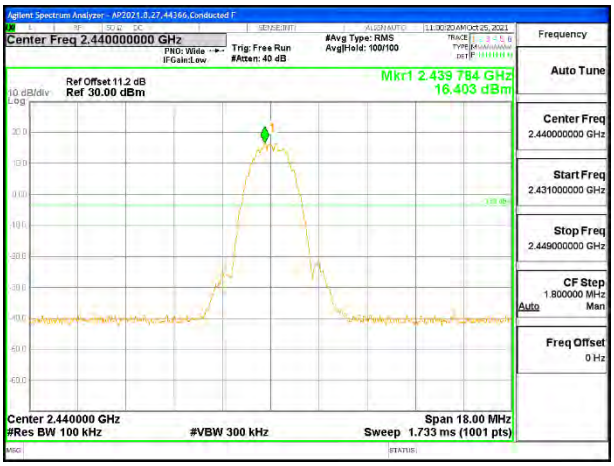
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**



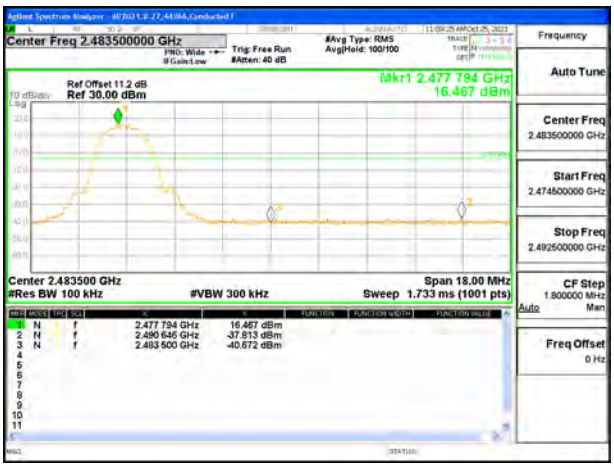

**LOW CHANNEL , BANDEDGE ANT 3**


**LOW CHANNEL OUT-OF-BAND ANT 3**

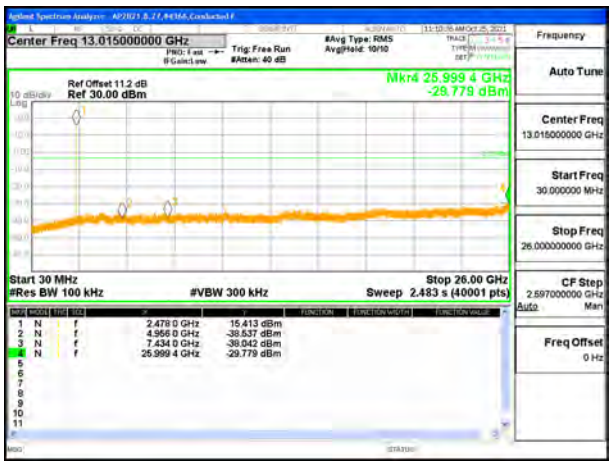



**MID CHANNEL REFERENCE ANT 3**


**MID CHANNEL OUT-OF-BAND ANT 3**




**HIGH CHANNEL REFERENCE ANT 3**




**HIGH CHANNEL OUT-OF-BAND ANT 3**

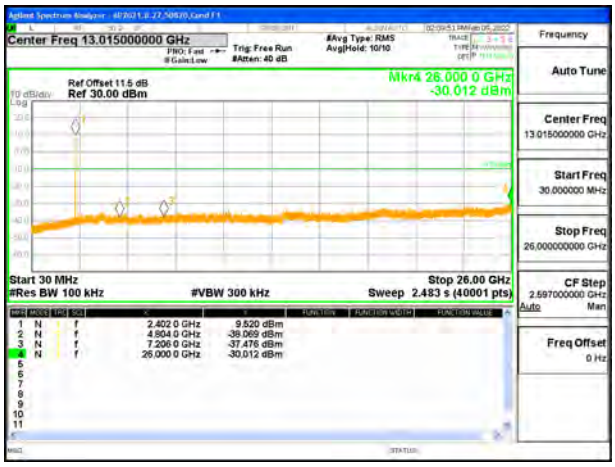


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

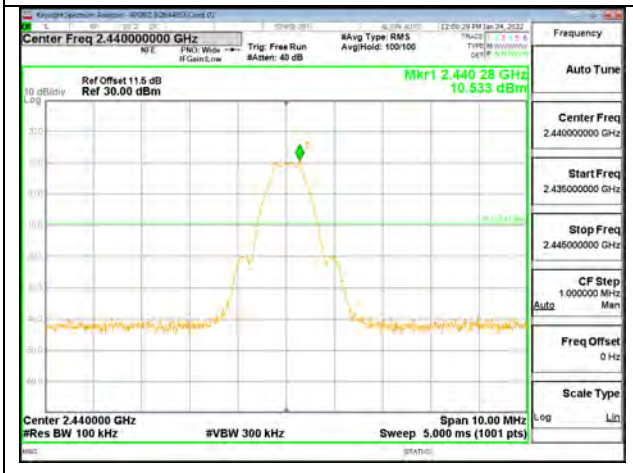
## 9.7.5. **LOW POWER BLE (1Mbps)**

**ANT 2**


**LOW CHANNEL BANDEDGE**




**OUT-OF-BAND LOW CHANNEL**



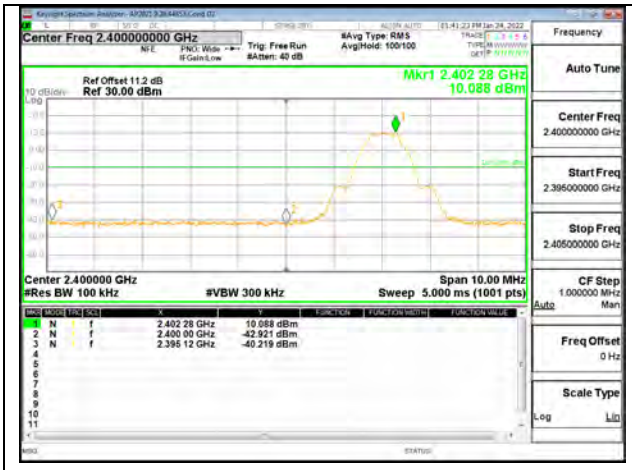

**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**


**HIGH CHANNEL BANDEDGE**

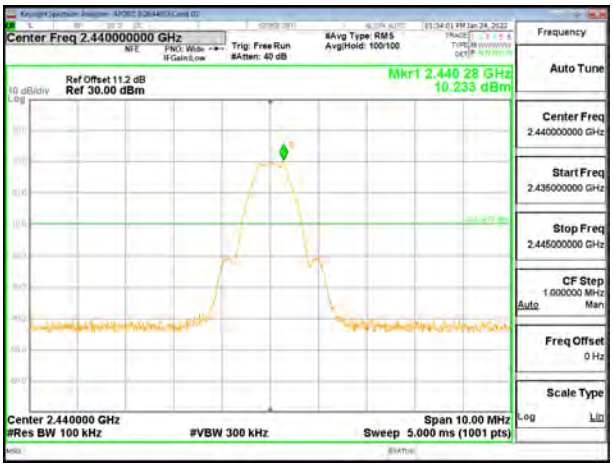

**OUT-OF-BAND HIGH CHANNEL**

**ANT 3**



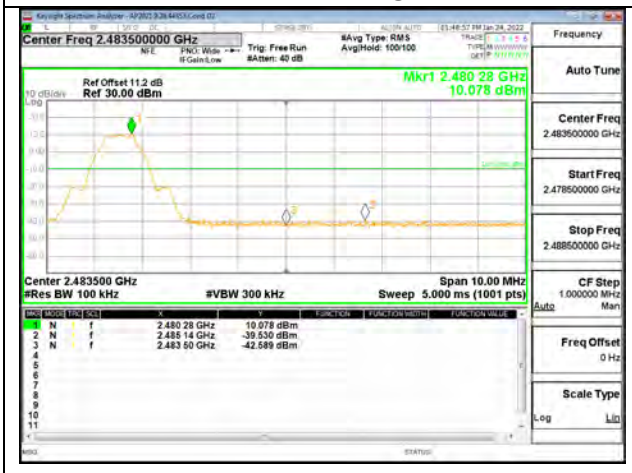

**LOW CHANNEL BANDEDGE**


**OUT-OF-BAND LOW CHANNEL**




**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**


**OUT-OF-BAND HIGH CHANNEL**

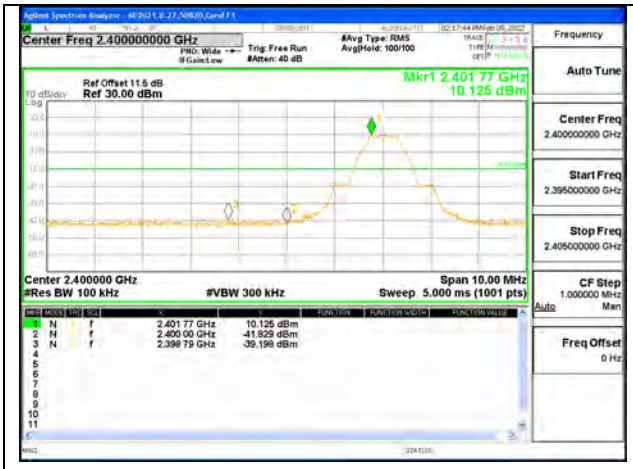


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 9.7.6. **LOW POWER BLE TXBF (1Mbps)**

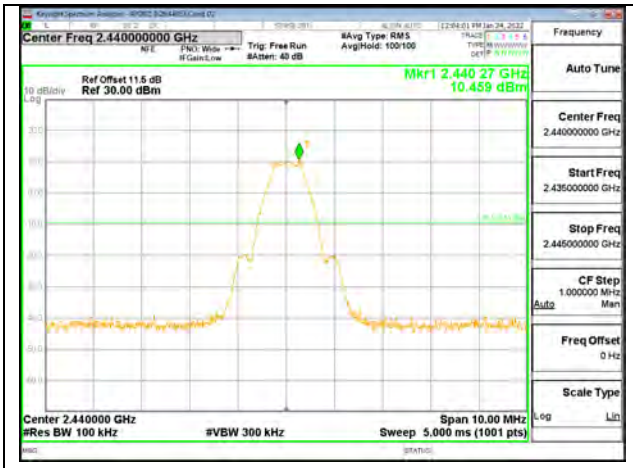
Note: Test procedures and setting are same as BLE normal mode.

**ANT 2**



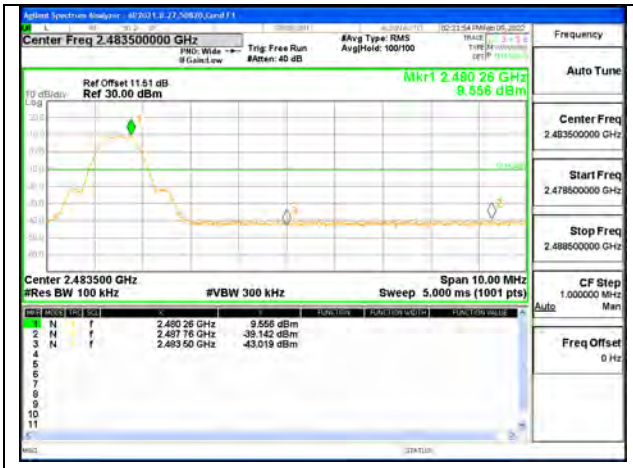

**LOW CHANNEL , BANDEDGE ANT 2**


**LOW CHANNEL OUT-OF-BAND ANT 2**




**MID CHANNEL REFERENCE ANT 2**


**MID CHANNEL OUT-OF-BAND ANT 2**



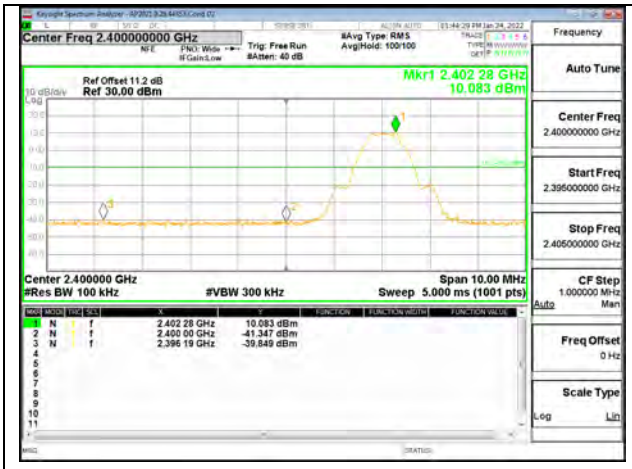

**HIGH CHANNEL BANDEDGE ANT 2**


**HIGH CHANNEL OUT-OF-BAND ANT 2**



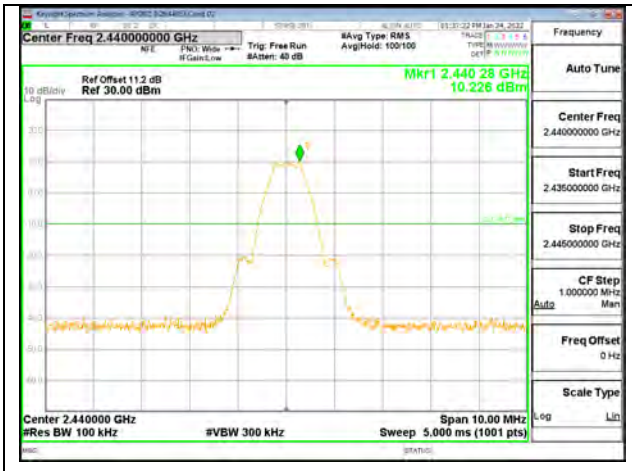
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**



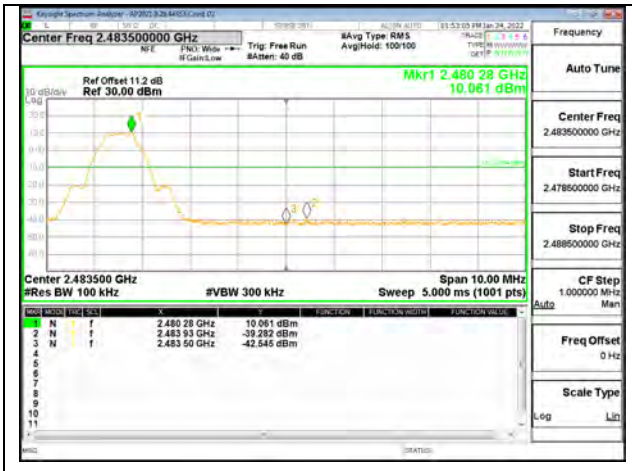

**LOW CHANNEL , BANDEDGE ANT 3**


**LOW CHANNEL OUT-OF-BAND ANT 3**




**MID CHANNEL REFERENCE ANT 3**


**MID CHANNEL OUT-OF-BAND ANT 3**




**HIGH CHANNEL REFERENCE ANT 3**


**HIGH CHANNEL OUT-OF-BAND ANT 3**



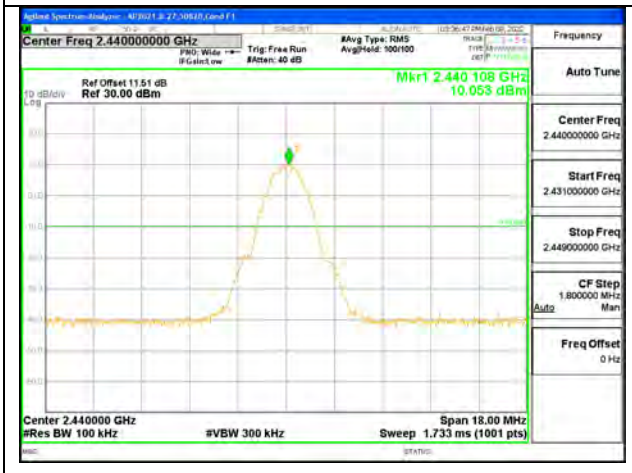
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 9.7.7. **LOW POWER BLE (2Mbps)**

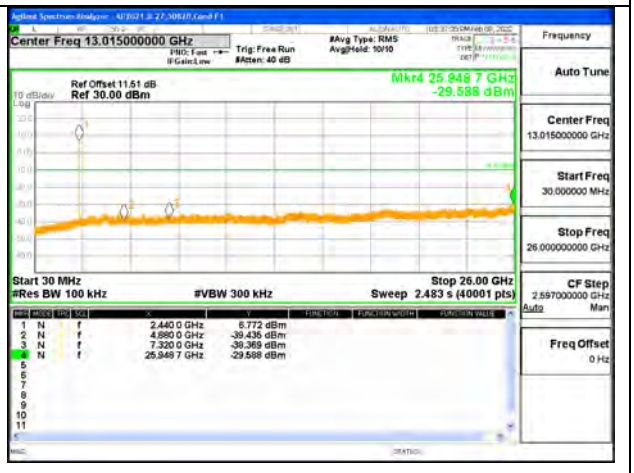
**ANT 2**


**LOW CHANNEL BANDEDGE**

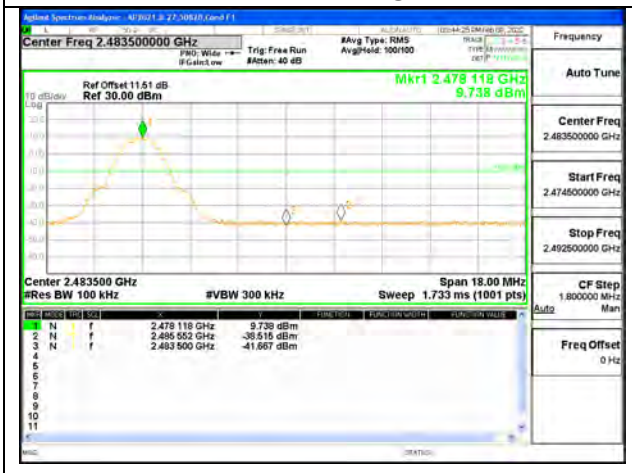

**OUT-OF-BAND LOW CHANNEL**



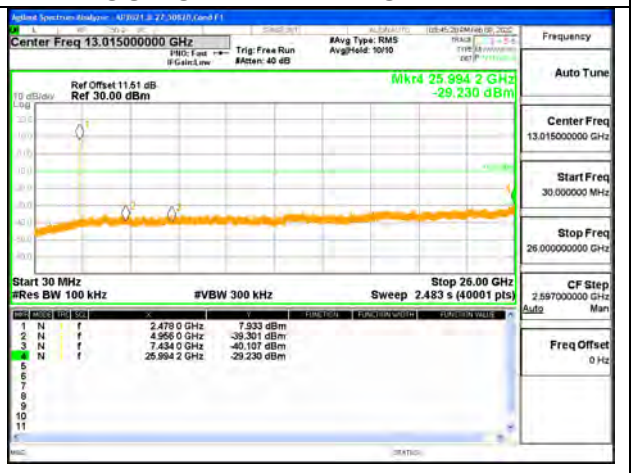

**IN-BAND REFERENCE LEVEL**




**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**

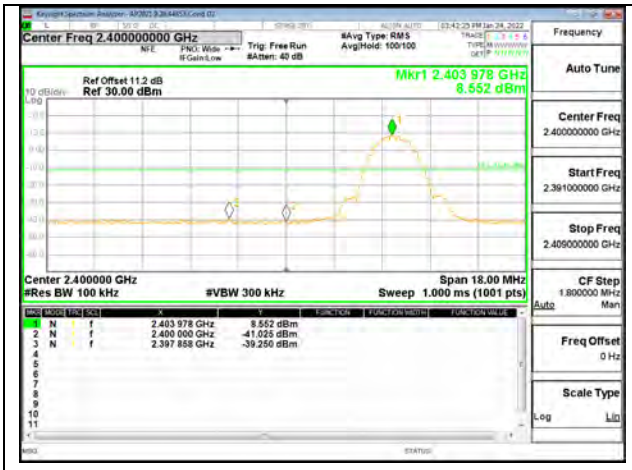



**OUT-OF-BAND HIGH CHANNEL**



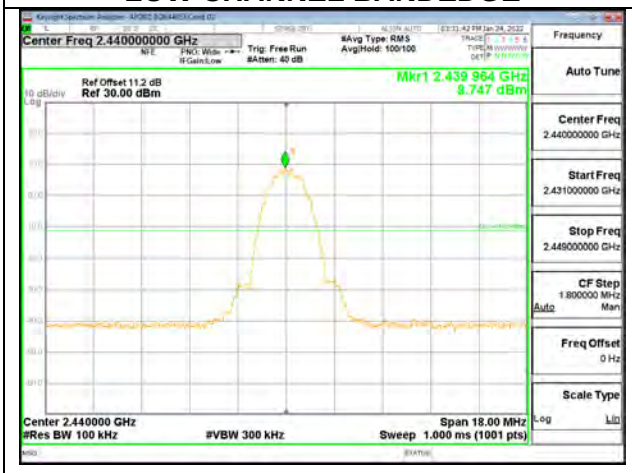
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**



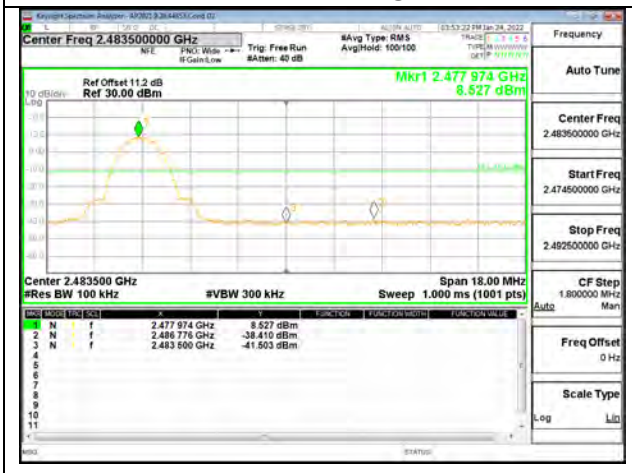

**LOW CHANNEL BANDEDGE**


**OUT-OF-BAND LOW CHANNEL**




**IN-BAND REFERENCE LEVEL**


**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**


**OUT-OF-BAND HIGH CHANNEL**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

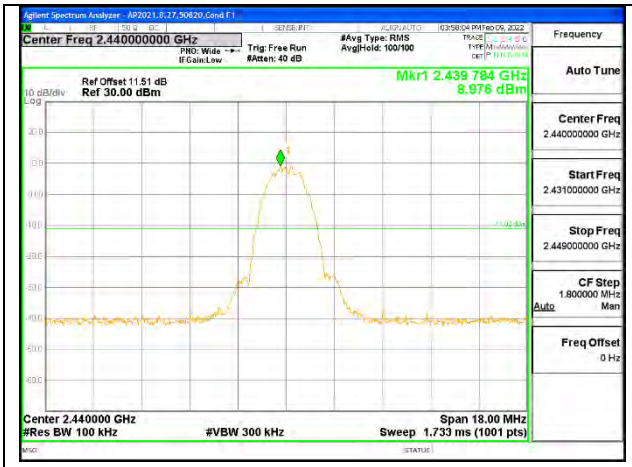
## 9.7.8. **LOW POWER BLE TXBF (2Mbps)**

Note: Test procedures and setting are same as BLE normal mode.

**ANT 2**


**LOW CHANNEL , BANDEDGE ANT 2**

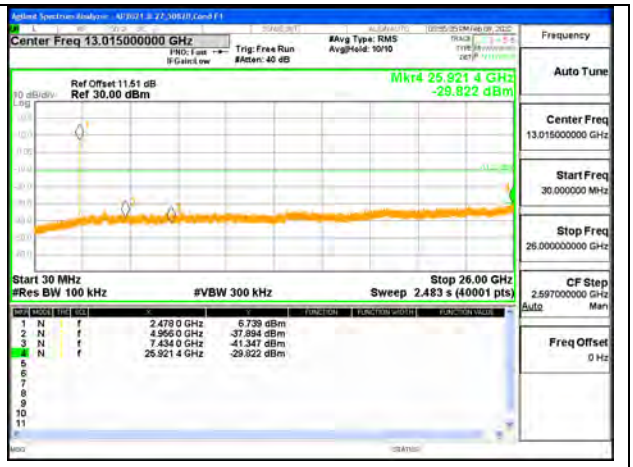

**LOW CHANNEL OUT-OF-BAND ANT 2**




**MID CHANNEL REFERENCE ANT 2**


**MID CHANNEL OUT-OF-BAND ANT 2**


**HIGH CHANNEL BANDEDGE ANT 2**

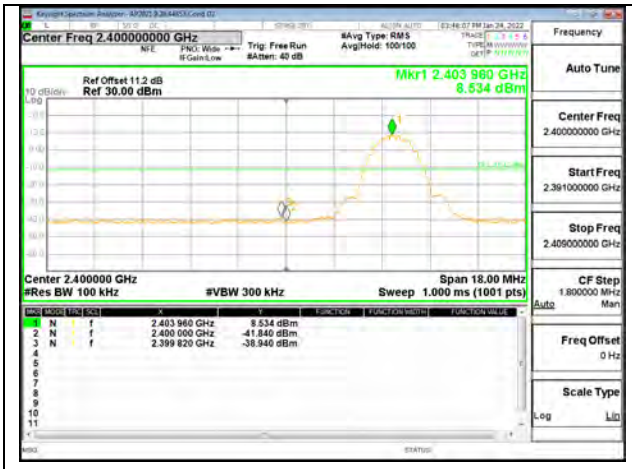



**HIGH CHANNEL OUT-OF-BAND ANT 2**



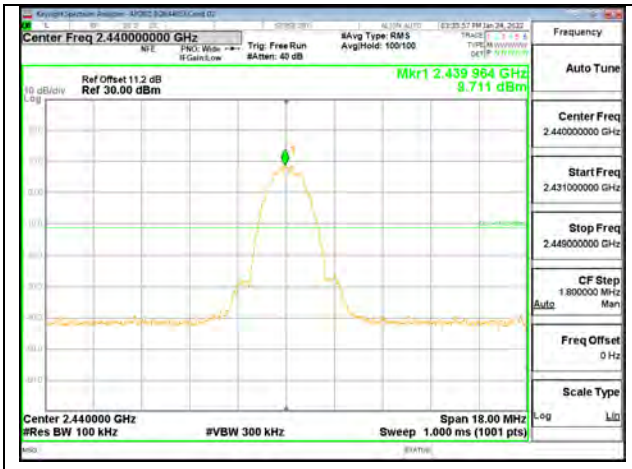
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**



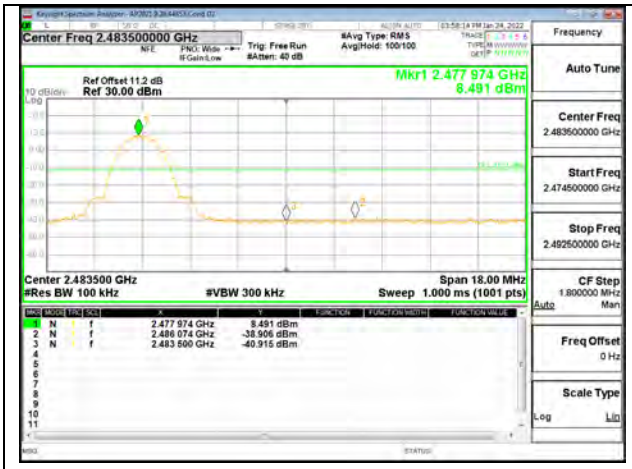

**LOW CHANNEL , BANDEDGE ANT 3**


**LOW CHANNEL OUT-OF-BAND ANT 3**




**MID CHANNEL REFERENCE ANT 3**


**MID CHANNEL OUT-OF-BAND ANT 3**




**HIGH CHANNEL REFERENCE ANT 3**


**HIGH CHANNEL OUT-OF-BAND ANT 3**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 10. RADIATED TEST RESULTS

## 10.1. LIMITS AND PROCEDURE

**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.

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.



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**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.

**RESULTS**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

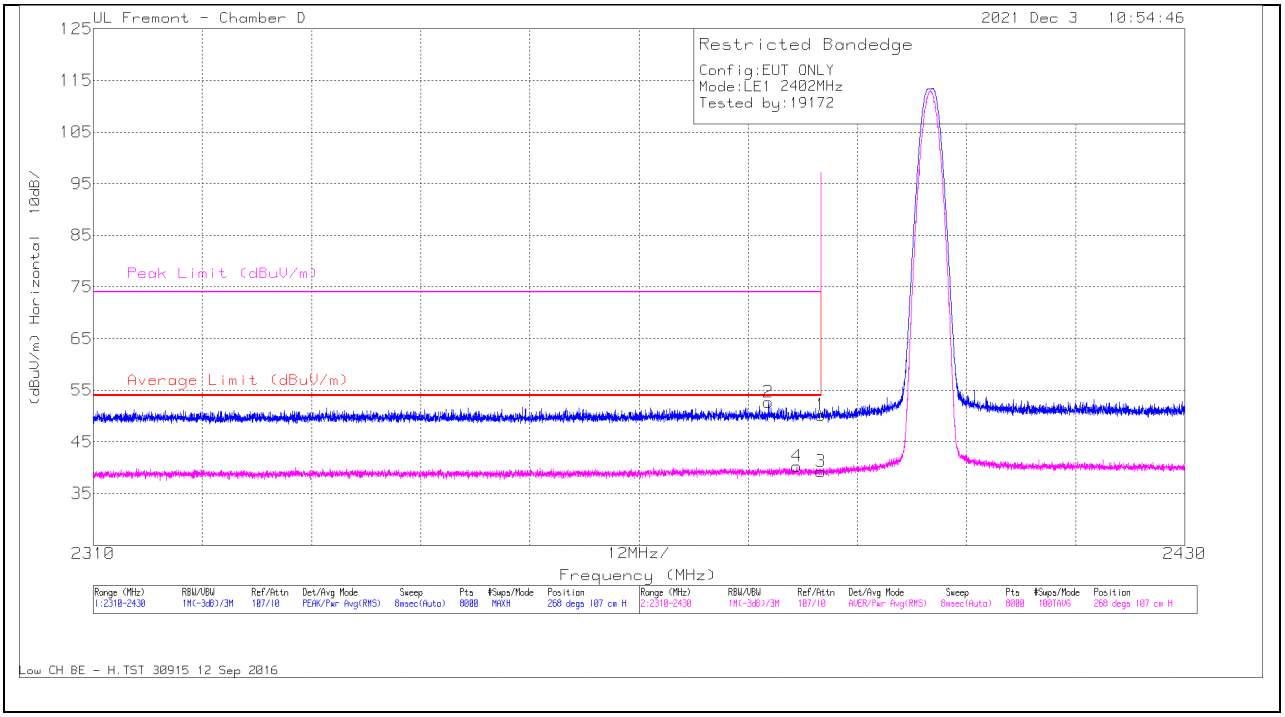
## 10.2. TRANSMITTER ABOVE 1 GHz

### 10.2.1. HIGH POWER BLE (1Mbps)

**ANT 2**

## BANDEDGE (LOW CHANNEL)

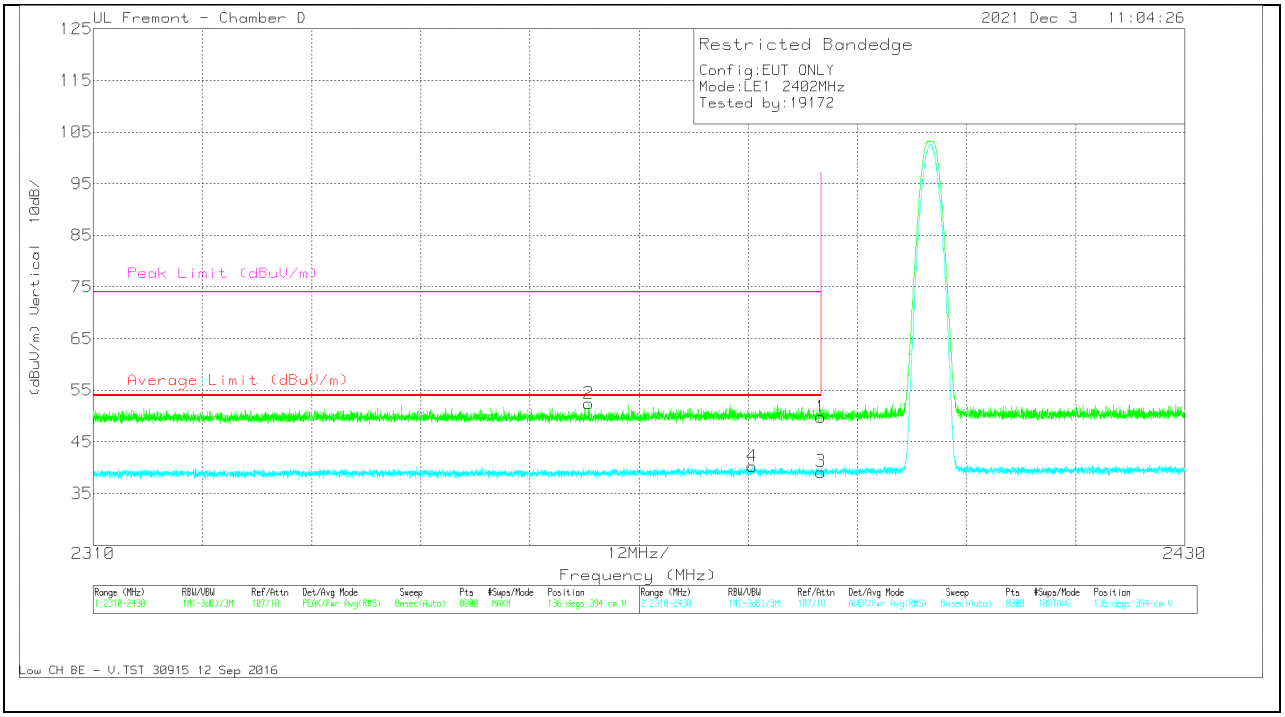
### HORIZONTAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.76 | Pk | 32.1 | -20.7 | 50.16 | - | - | 74 | -23.84 | 268 | 107 | H |
| 2 | * 2384.2 | 41.41 | Pk | 32.1 | -20.8 | 52.71 | - | - | 74 | -21.29 | 268 | 107 | H |
| 3 | * 2390 | 27.88 | RMS | 32.1 | -20.7 | 39.28 | 54 | -14.72 | - | - | 268 | 107 | H |
| 4 | * 2387.3 | 29.01 | RMS | 32.1 | -20.8 | 40.31 | 54 | -13.69 | - | - | 268 | 107 | H |

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

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.44 | Pk | 32.1 | -20.7 | 49.84 | - | - | 74 | -24.16 | 136 | 394 | V |
| 2 | * 2364.5 | 41.4 | Pk | 31.9 | -20.8 | 52.5 | - | - | 74 | -21.5 | 136 | 394 | V |
| 3 | * 2390 | 27.8 | RMS | 32.1 | -20.7 | 39.2 | 54 | -14.8 | - | - | 136 | 394 | V |
| 4 | * 2382.4 | 28.91 | RMS | 32.1 | -20.8 | 40.21 | 54 | -13.79 | - | - | 136 | 394 | V |

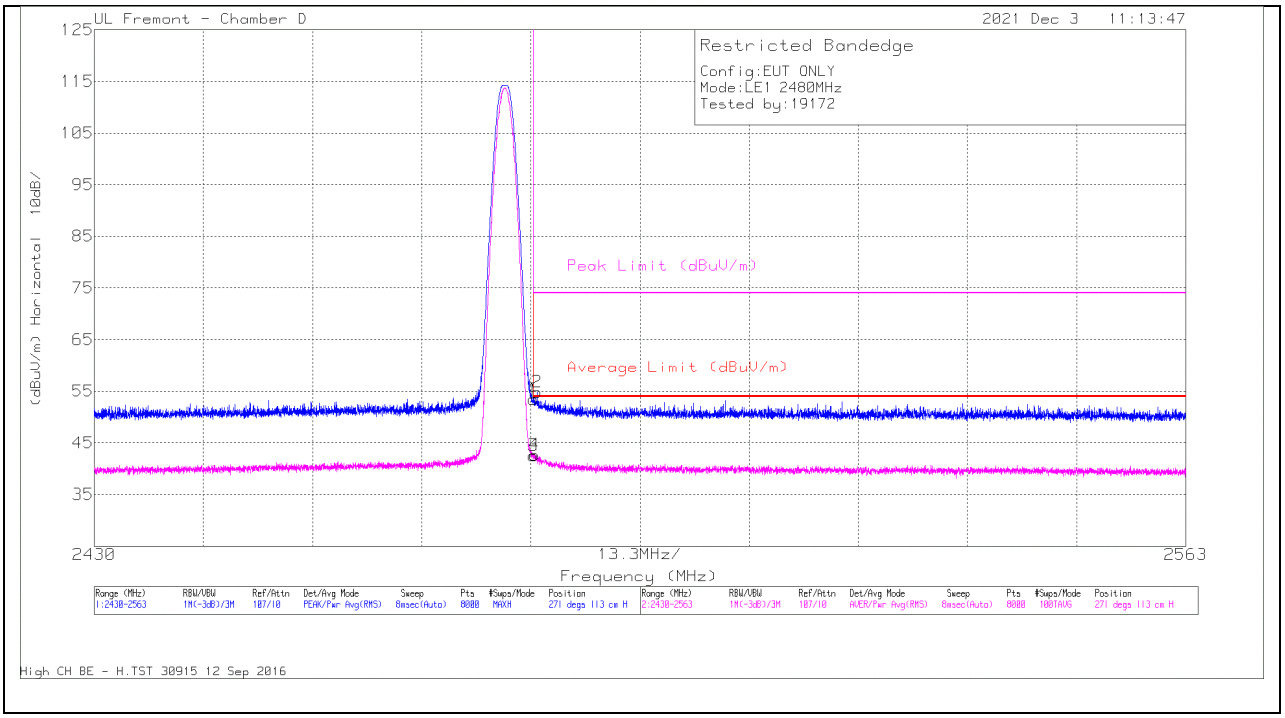
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



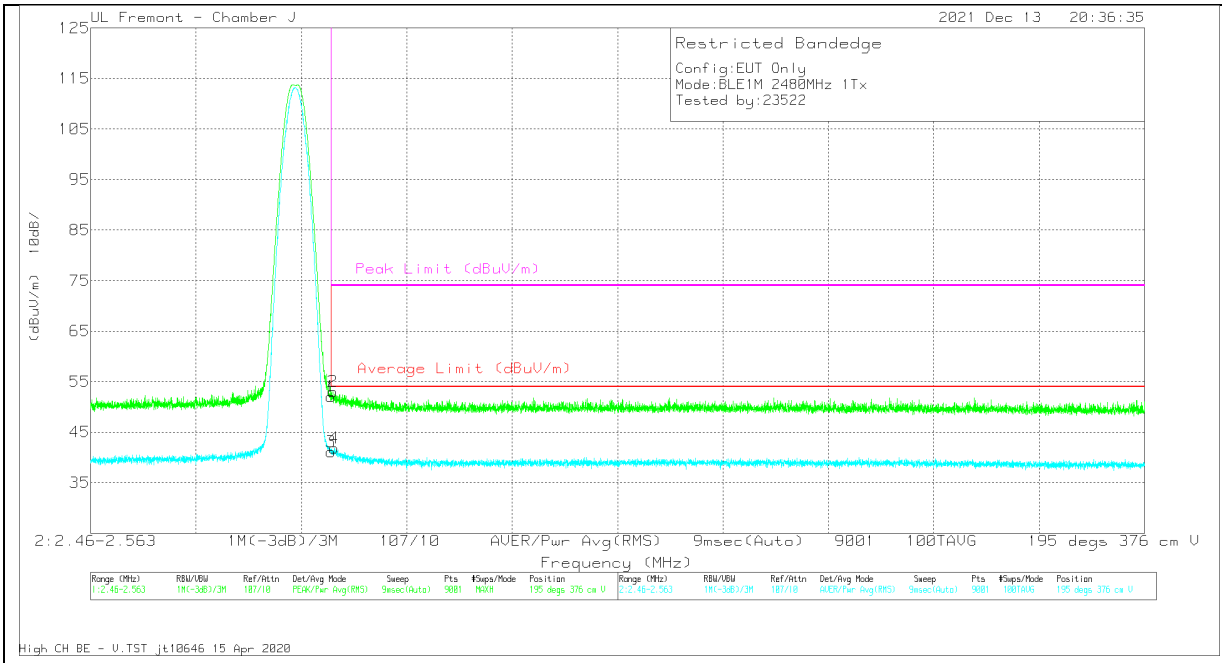

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 41.41 | Pk | 32.7 | -20.7 | 53.41 | - | - | 74 | -20.59 | 271 | 113 | H |
| 2 | * 2483.91 | 42.79 | Pk | 32.7 | -20.7 | 54.79 | - | - | 74 | -19.21 | 271 | 113 | H |
| 3 | * 2483.5 | 30.52 | RMS | 32.7 | -20.7 | 42.52 | 54 | -11.48 | - | - | 271 | 113 | H |
| 4 | * 2483.6 | 30.68 | RMS | 32.7 | -20.7 | 42.68 | 54 | -11.32 | - | - | 271 | 113 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF 206806 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 46.76 | Pk | 32.4 | -27.1 | 52.06 | - | - | 74 | -21.94 | 195 | 376 | V |
| 2 | * 2483.655 | 47.71 | Pk | 32.4 | -27.1 | 53.01 | - | - | 74 | -20.99 | 195 | 376 | V |
| 3 | * 2483.5 | 35.8 | RMS | 32.4 | -27.1 | 41.1 | 54 | -12.9 | - | - | 195 | 376 | V |
| 4 | * 2483.792 | 36.53 | RMS | 32.4 | -27.1 | 41.83 | 54 | -12.17 | - | - | 195 | 376 | V |

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

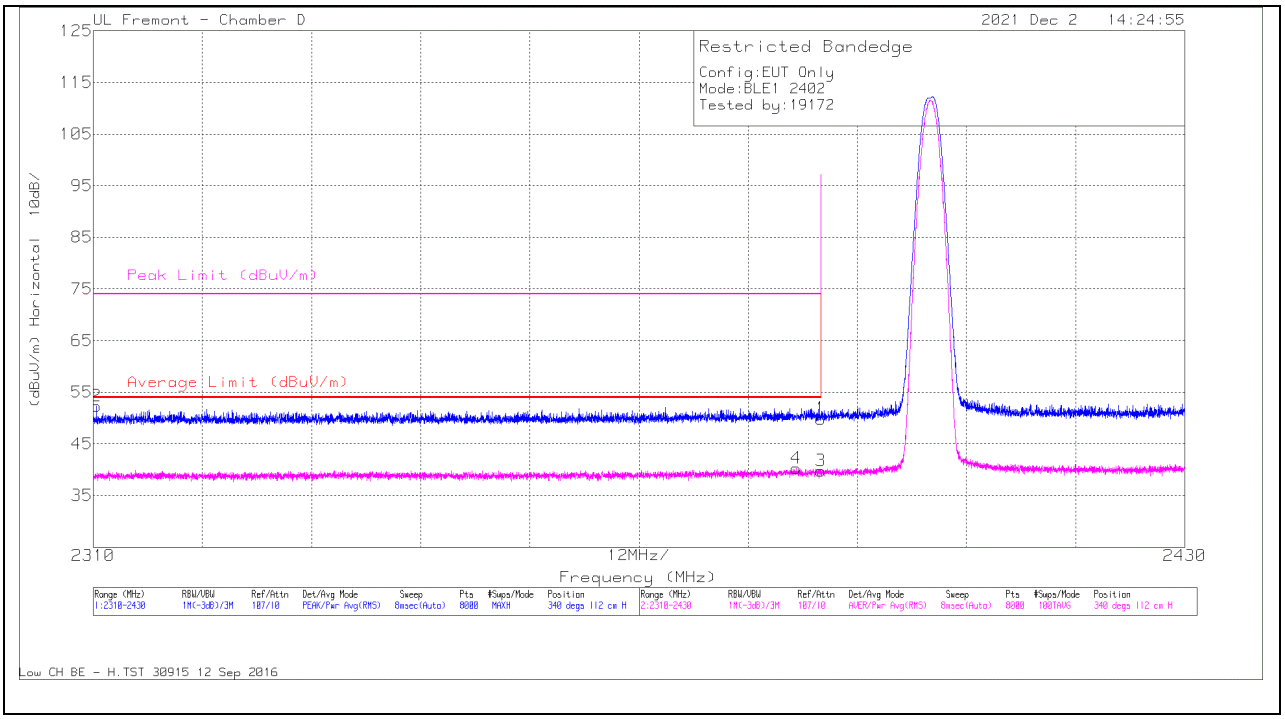


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



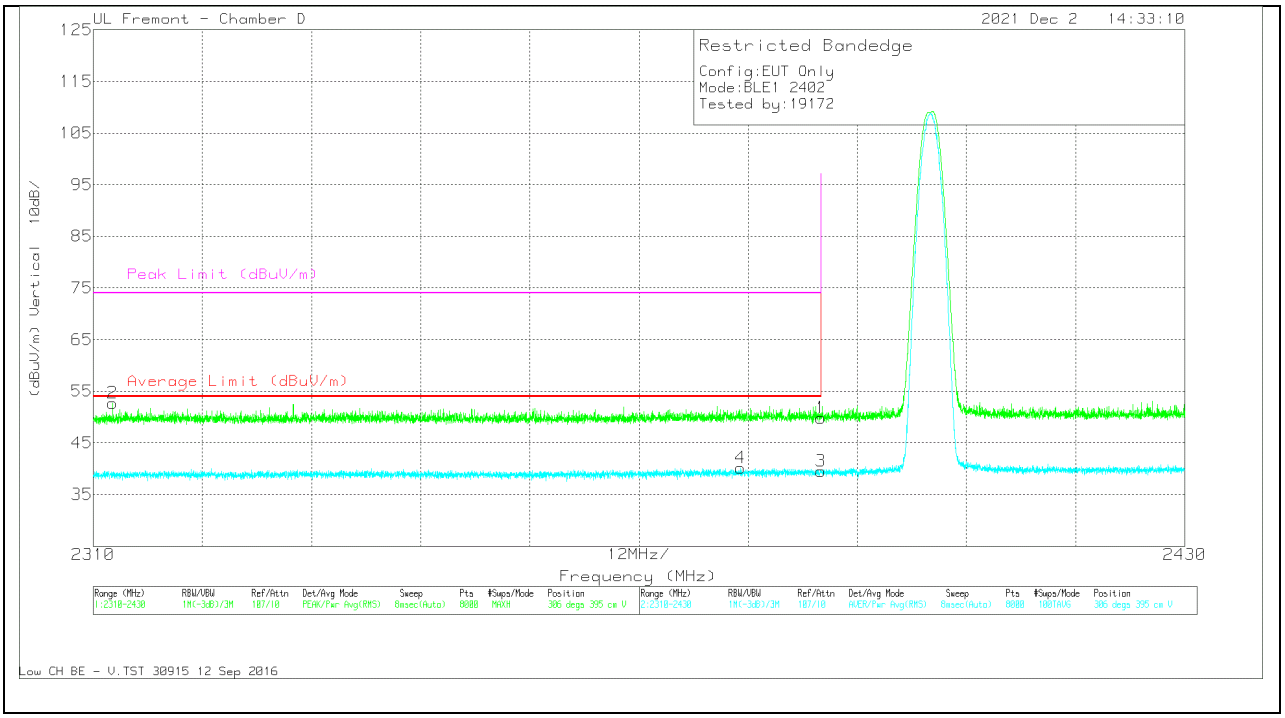

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.47 | Pk | 32.1 | -20.7 | 49.87 | - | - | 74 | -24.13 | 340 | 112 | H |
| 2 | * 2310.4 | 41.37 | Pk | 31.8 | -20.8 | 52.37 | - | - | 74 | -21.63 | 340 | 112 | H |
| 3 | * 2390 | 28.33 | RMS | 32.1 | -20.7 | 39.73 | 54 | -14.27 | - | - | 340 | 112 | H |
| 4 | * 2387.3 | 28.99 | RMS | 32.1 | -20.8 | 40.29 | 54 | -13.71 | - | - | 340 | 112 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.44 | Pk | 32.1 | -20.7 | 49.84 | - | - | 74 | -24.16 | 306 | 395 | V |
| 2 | * 2312.1 | 41.83 | Pk | 31.8 | -20.9 | 52.73 | - | - | 74 | -21.27 | 306 | 395 | V |
| 3 | * 2390 | 28.09 | RMS | 32.1 | -20.7 | 39.49 | 54 | -14.51 | - | - | 306 | 395 | V |
| 4 | * 2381.1 | 28.79 | RMS | 32.1 | -20.8 | 40.09 | 54 | -13.91 | - | - | 306 | 395 | V |

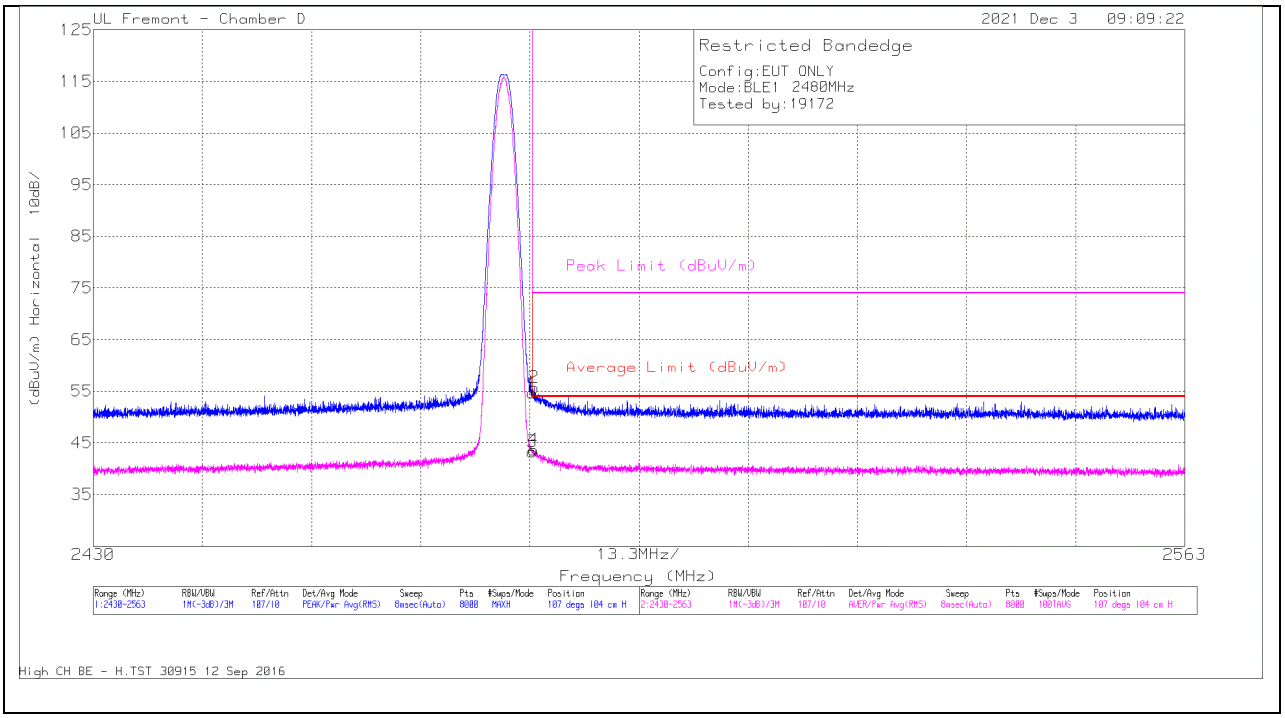
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



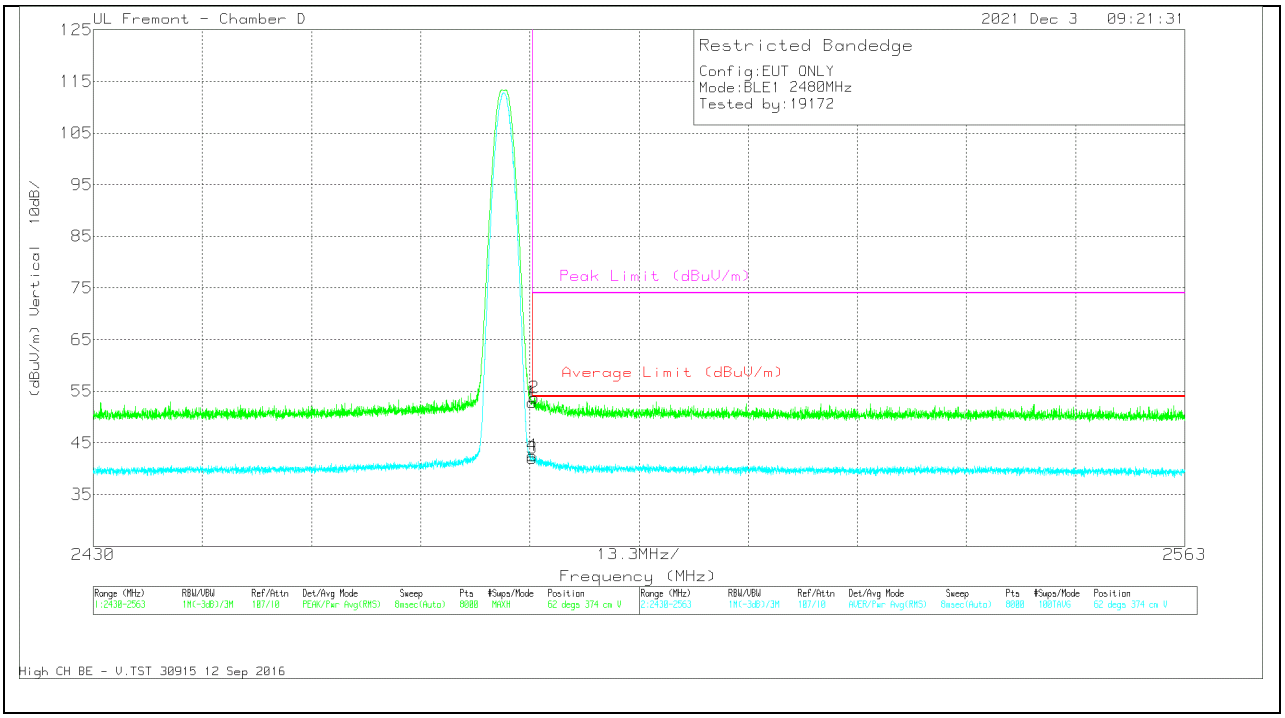

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 42.75 | Pk | 32.7 | -20.7 | 54.75 | - | - | 74 | -19.25 | 107 | 104 | H |
| 2 | * 2483.7 | 43.73 | Pk | 32.7 | -20.7 | 55.73 | - | - | 74 | -18.27 | 107 | 104 | H |
| 3 | * 2483.5 | 31.31 | RMS | 32.7 | -20.7 | 43.31 | 54 | -10.69 | - | - | 107 | 104 | H |
| 4 | * 2483.7 | 31.66 | RMS | 32.7 | -20.7 | 43.66 | 54 | -10.34 | - | - | 107 | 104 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 40.85 | Pk | 32.7 | -20.7 | 52.85 | - | - | 74 | -21.15 | 62 | 374 | V |
| 2 | * 2483.76 | 41.73 | Pk | 32.7 | -20.7 | 53.73 | - | - | 74 | -20.27 | 62 | 374 | V |
| 3 | * 2483.5 | 30.05 | RMS | 32.7 | -20.7 | 42.05 | 54 | -11.95 | - | - | 62 | 374 | V |
| 4 | * 2483.52 | 30.57 | RMS | 32.7 | -20.7 | 42.57 | 54 | -11.43 | - | - | 62 | 374 | V |

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

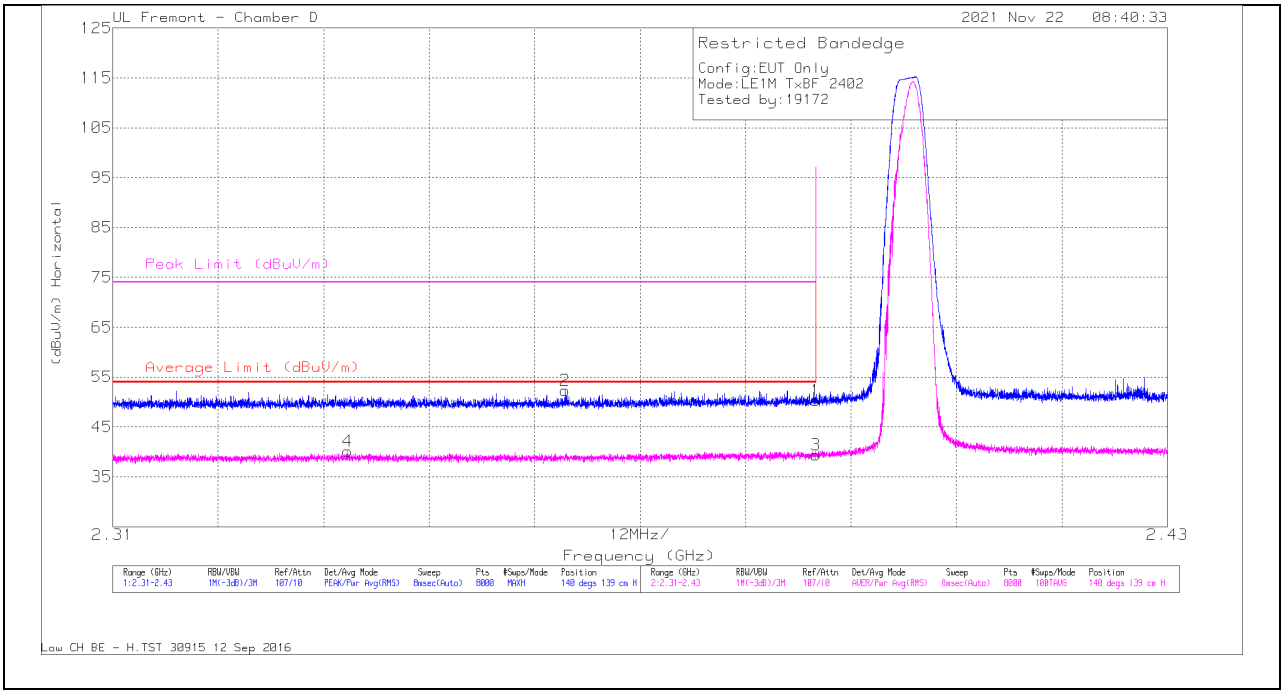


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.2. HIGH POWER BLE TXBF (1Mbps)

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



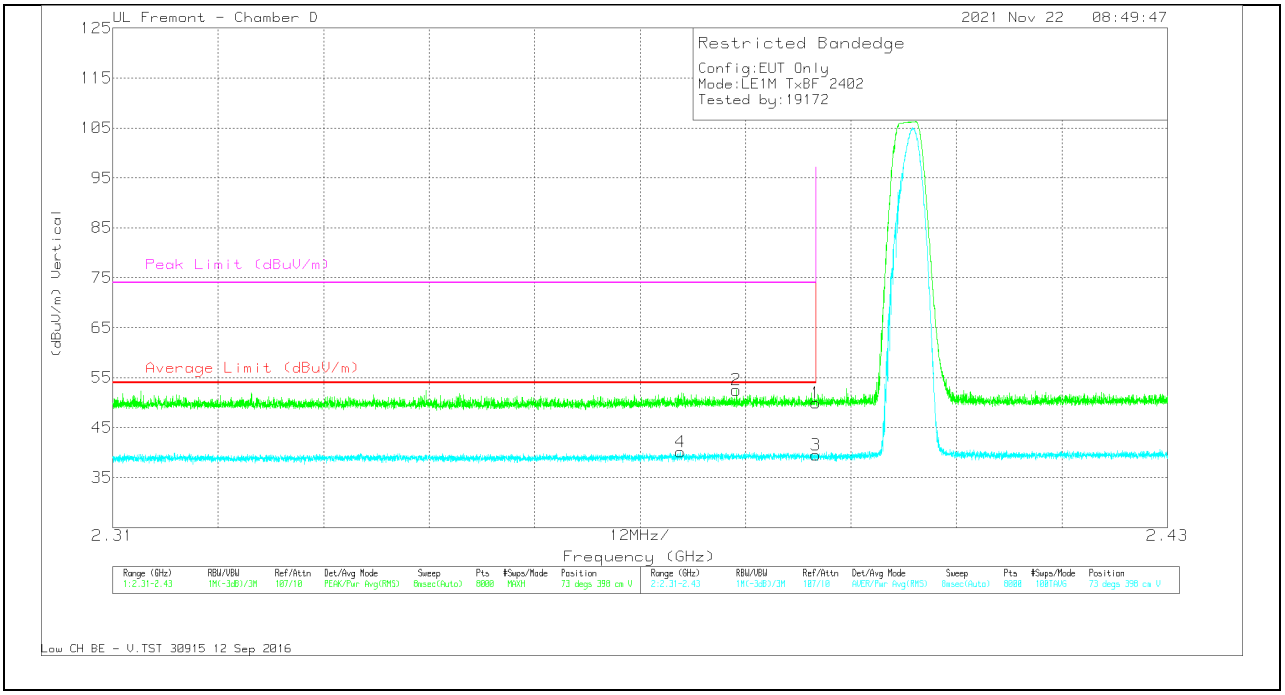

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.39 | 38.94 | Pk | 32.1 | -20.7 | 50.34 | - | - | 74 | -23.66 | 140 | 139 | H |
| 2 | * 2.36144 | 41.27 | Pk | 31.9 | -20.8 | 52.37 | - | - | 74 | -21.63 | 140 | 139 | H |
| 3 | * 2.39 | 28.01 | RMS | 32.1 | -20.7 | 39.41 | 54 | -14.59 | - | - | 140 | 139 | H |
| 4 | * 2.3367 | 29.16 | RMS | 31.9 | -20.9 | 40.16 | 54 | -13.84 | - | - | 140 | 139 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (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 | 38.56 | Pk | 32.1 | -20.7 | 49.96 | - | - | 74 | -24.04 | 73 | 398 | V |
| 2 | * 2.38094 | 41.21 | Pk | 32.1 | -20.8 | 52.51 | - | - | 74 | -21.49 | 73 | 398 | V |
| 3 | * 2.39 | 28.09 | RMS | 32.1 | -20.7 | 39.49 | 54 | -14.51 | - | - | 73 | 398 | V |
| 4 | * 2.37457 | 28.86 | RMS | 32 | -20.7 | 40.16 | 54 | -13.84 | - | - | 73 | 398 | V |

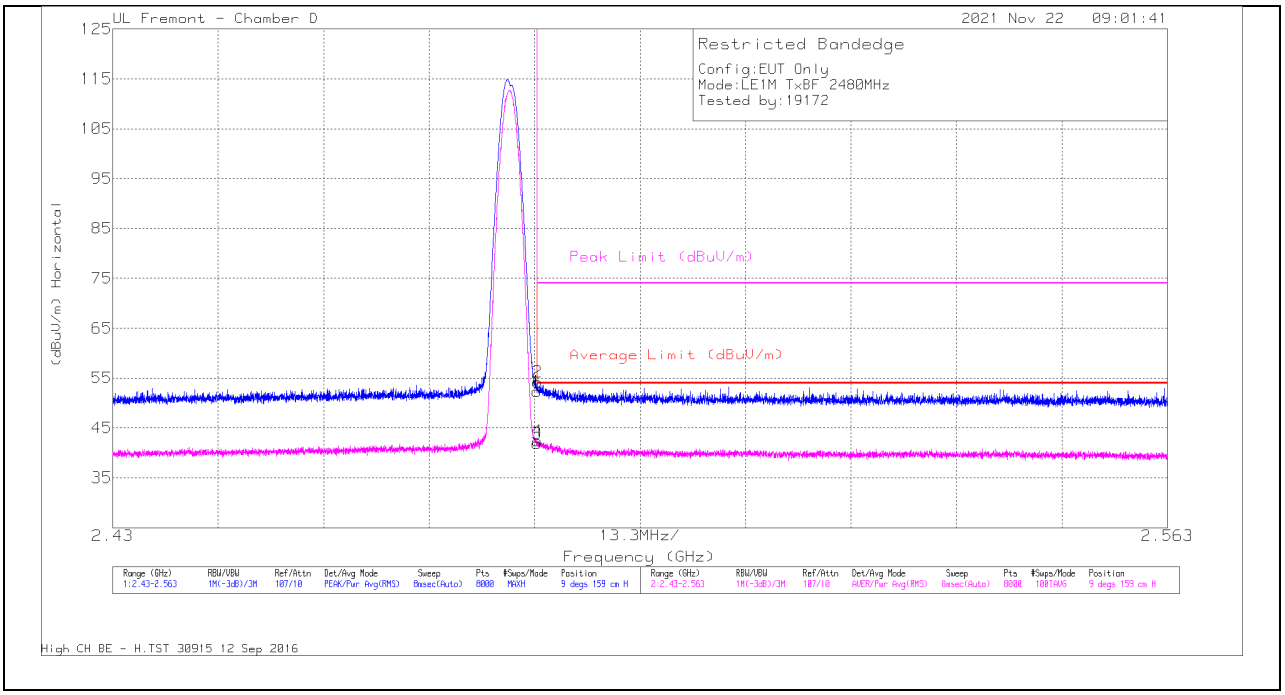
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



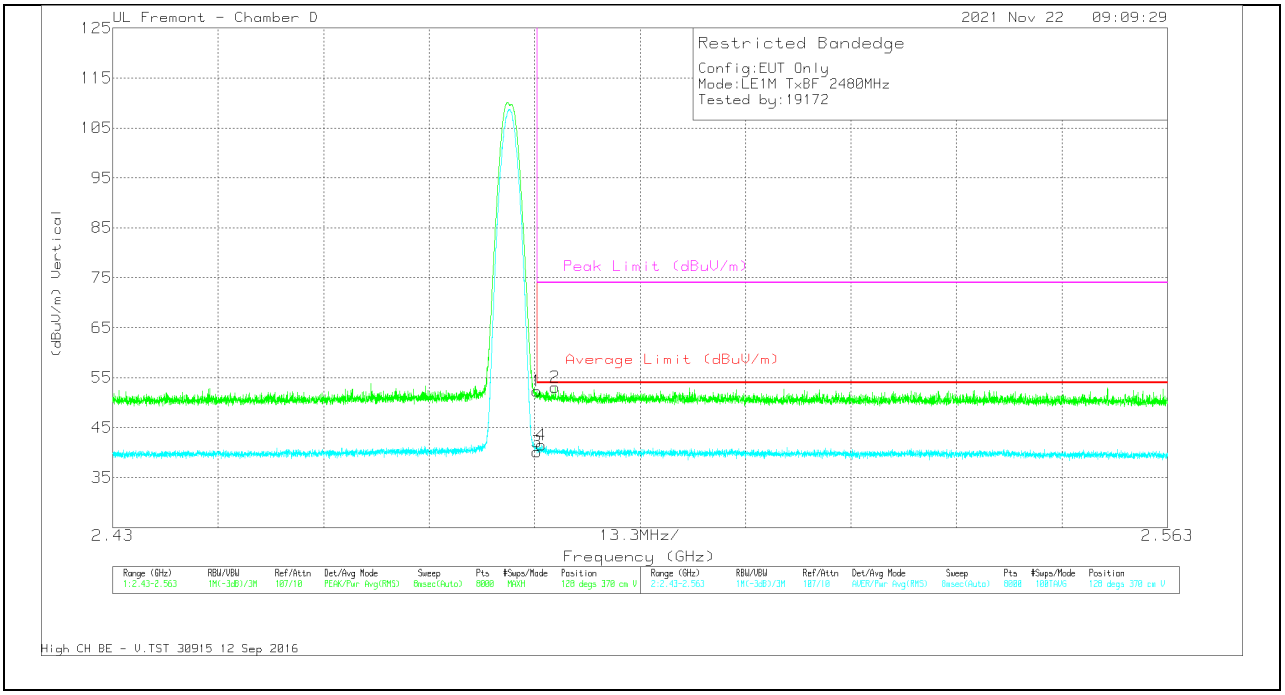

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 40.27 | Pk | 32.7 | -20.7 | 52.27 | - | - | 74 | -21.73 | 9 | 159 | H |
| 2 | * 2.48359 | 42.21 | Pk | 32.7 | -20.7 | 54.21 | - | - | 74 | -19.79 | 9 | 159 | H |
| 3 | * 2.4835 | 29.85 | RMS | 32.7 | -20.7 | 41.85 | 54 | -12.15 | - | - | 9 | 159 | H |
| 4 | * 2.48356 | 30.34 | RMS | 32.7 | -20.7 | 42.34 | 54 | -11.66 | - | - | 9 | 159 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (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 | 40.31 | Pk | 32.7 | -20.7 | 52.31 | - | - | 74 | -21.69 | 128 | 370 | V |
| 2 | * 2.48578 | 41.04 | Pk | 32.7 | -20.7 | 53.04 | - | - | 74 | -20.96 | 128 | 370 | V |
| 3 | * 2.4835 | 28.16 | RMS | 32.7 | -20.7 | 40.16 | 54 | -13.84 | - | - | 128 | 370 | V |
| 4 | * 2.48402 | 29.53 | RMS | 32.7 | -20.7 | 41.53 | 54 | -12.47 | - | - | 128 | 370 | V |

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



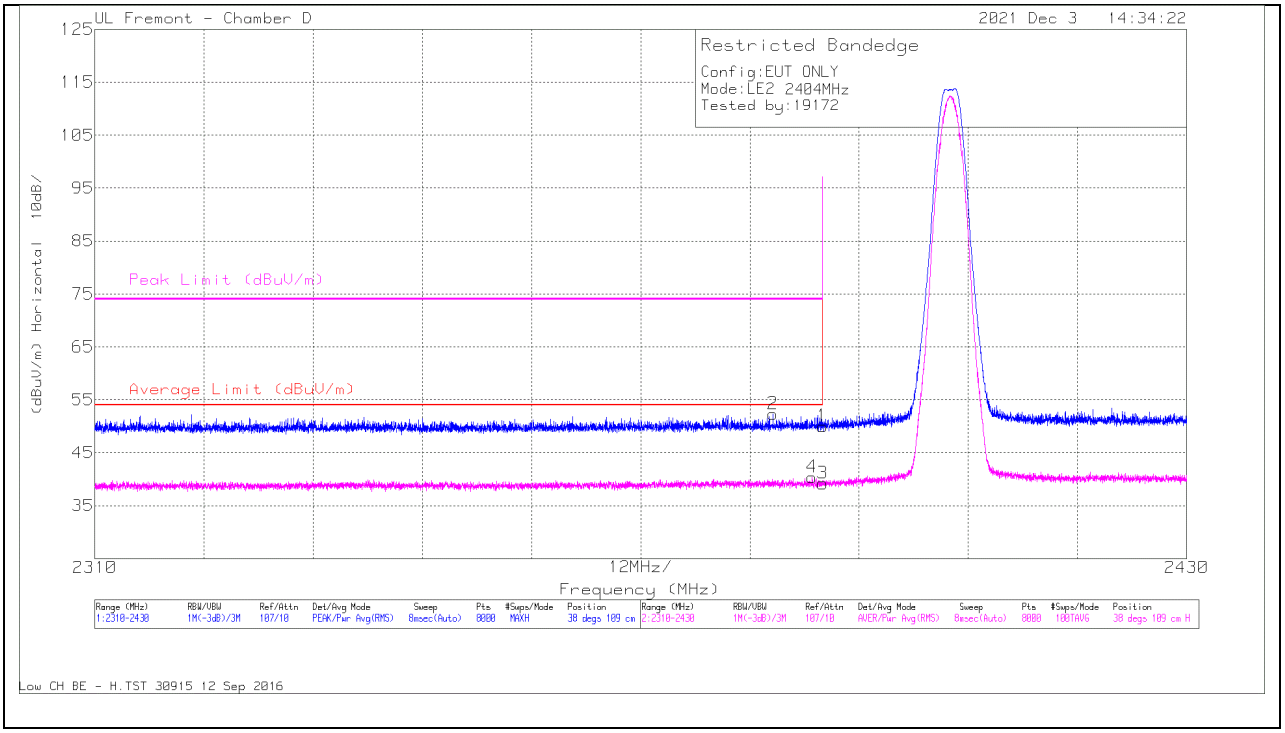
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

### 10.2.3. HIGH POWER BLE (2Mbps)

**ANT 2**

## BANDEDGE (LOW CHANNEL)

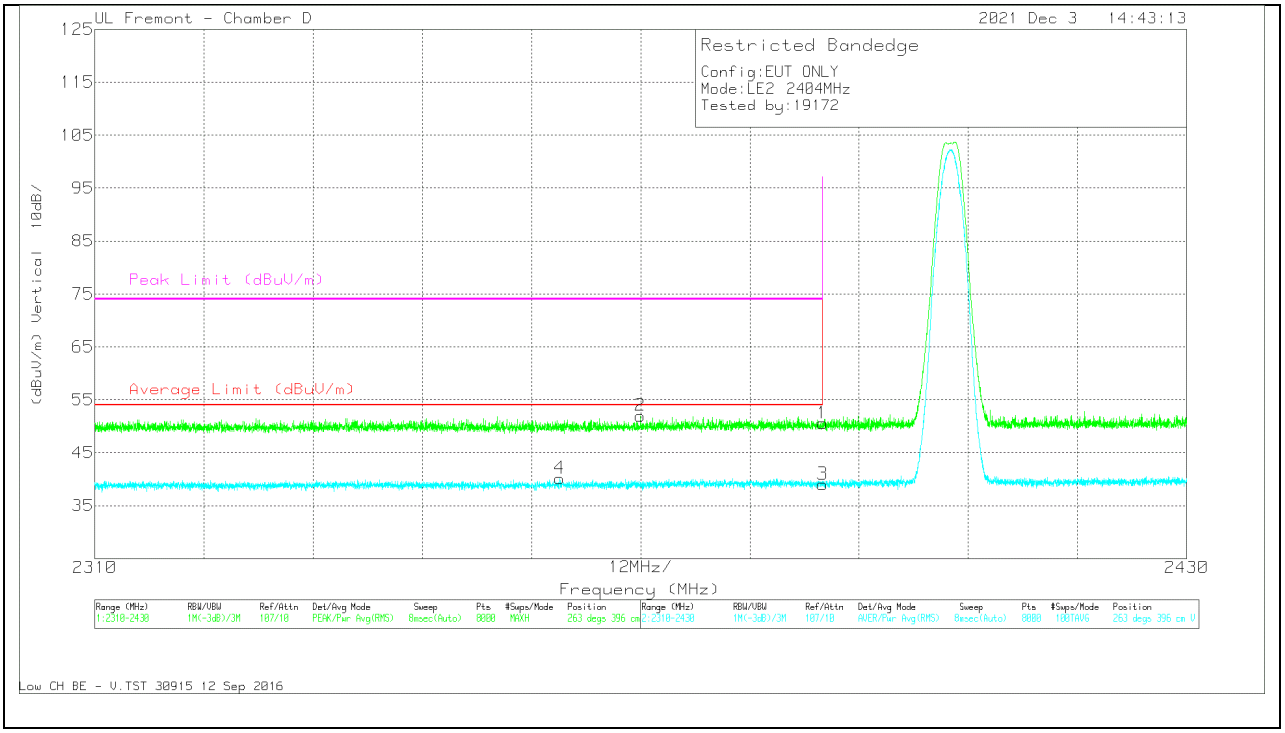
### HORIZONTAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.6 | Pk | 32.1 | -20.7 | 50 | - | - | 74 | -24 | 38 | 109 | H |
| 2 | * 2384.53 | 41.03 | Pk | 32.1 | -20.8 | 52.33 | - | - | 74 | -21.67 | 38 | 109 | H |
| 3 | * 2390 | 27.8 | RMS | 32.1 | -20.7 | 39.2 | 54 | -14.8 | - | - | 38 | 109 | H |
| 4 | * 2388.8 | 28.98 | RMS | 32.1 | -20.7 | 40.38 | 54 | -13.62 | - | - | 38 | 109 | H |

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

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 39.16 | Pk | 32.1 | -20.7 | 50.56 | - | - | 74 | -23.44 | 263 | 396 | V |
| 2 | * 2369.9 | 40.89 | Pk | 31.9 | -20.8 | 51.99 | - | - | 74 | -22.01 | 263 | 396 | V |
| 3 | * 2390 | 27.64 | RMS | 32.1 | -20.7 | 39.04 | 54 | -14.96 | - | - | 263 | 396 | V |
| 4 | * 2361.1 | 29.06 | RMS | 31.9 | -20.8 | 40.16 | 54 | -13.84 | - | - | 263 | 396 | V |

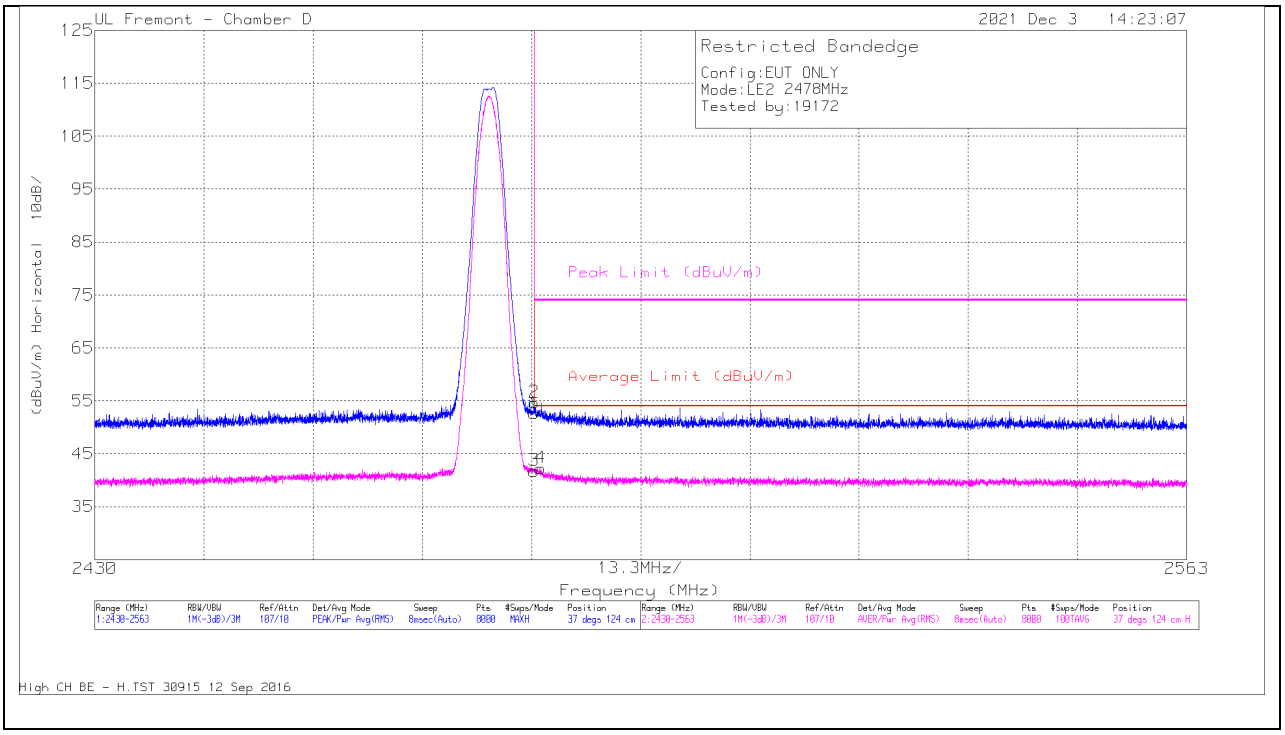
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



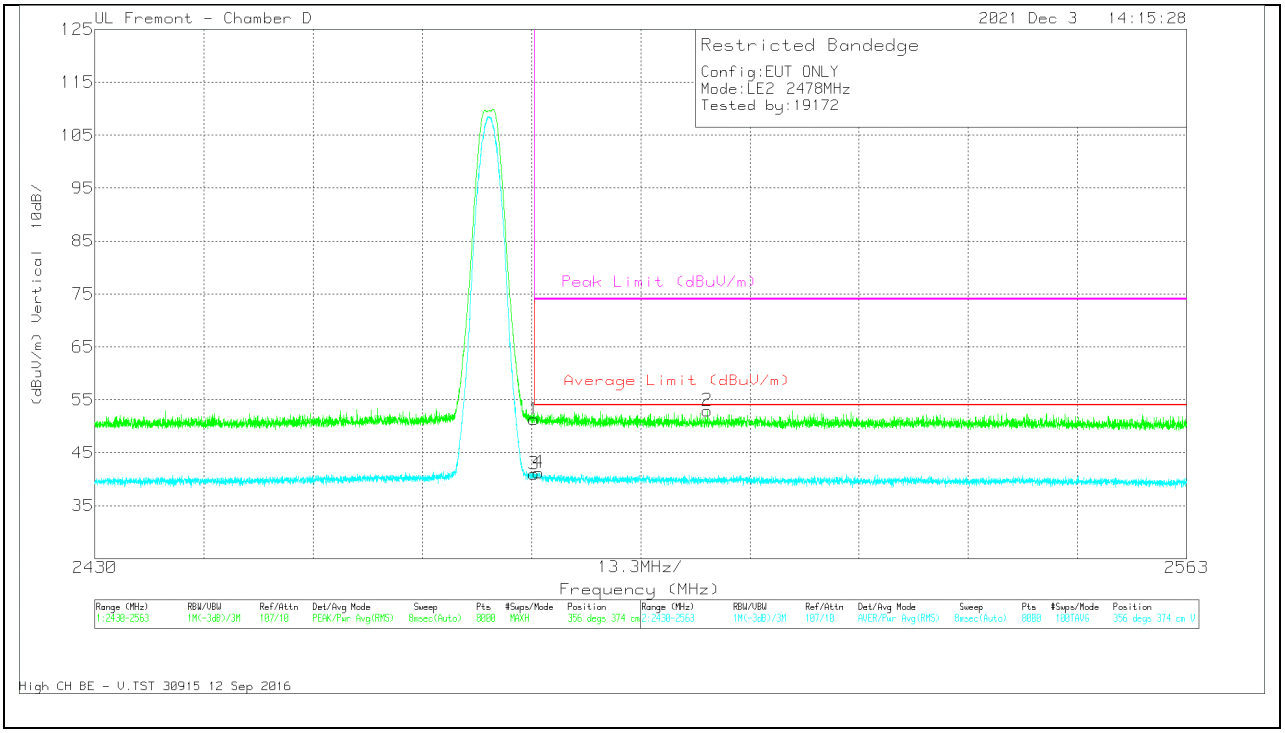

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 40.65 | Pk | 32.7 | -20.7 | 52.65 | - | - | 74 | -21.35 | 37 | 124 | H |
| 2 | * 2483.54 | 42.68 | Pk | 32.7 | -20.7 | 54.68 | - | - | 74 | -19.32 | 37 | 124 | H |
| 3 | * 2483.5 | 29.77 | RMS | 32.7 | -20.7 | 41.77 | 54 | -12.23 | - | - | 37 | 124 | H |
| 4 | * 2484.3 | 30.26 | RMS | 32.7 | -20.7 | 42.26 | 54 | -11.74 | - | - | 37 | 124 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 39.3 | Pk | 32.7 | -20.7 | 51.3 | - | - | 74 | -22.7 | 356 | 374 | V |
| 3 | * 2483.5 | 28.98 | RMS | 32.7 | -20.7 | 40.98 | 54 | -13.02 | - | - | 356 | 374 | V |
| 4 | * 2484.1 | 29.26 | RMS | 32.7 | -20.7 | 41.26 | 54 | -12.74 | - | - | 356 | 374 | V |
| 2 | 2504.64 | 40.96 | Pk | 32.7 | -20.7 | 52.96 | - | - | 74 | -21.04 | 356 | 374 | V |

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

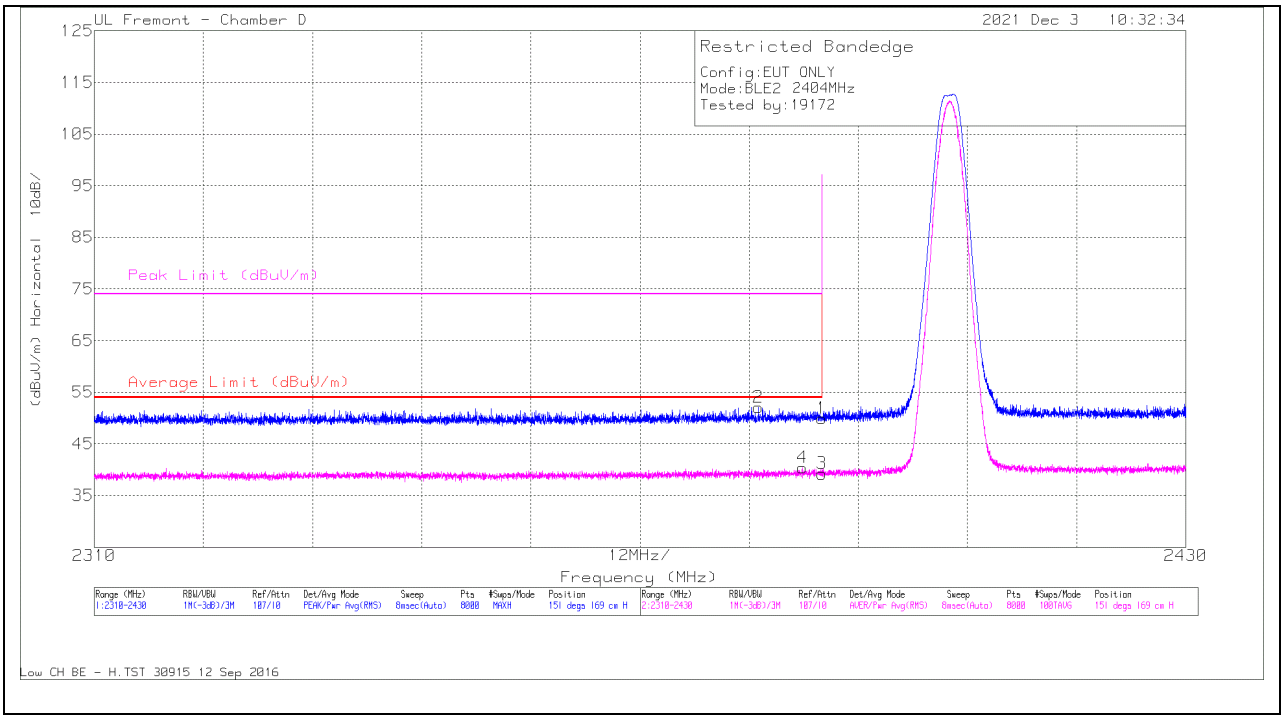


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**

## BANDEDGE (LOW CHANNEL)

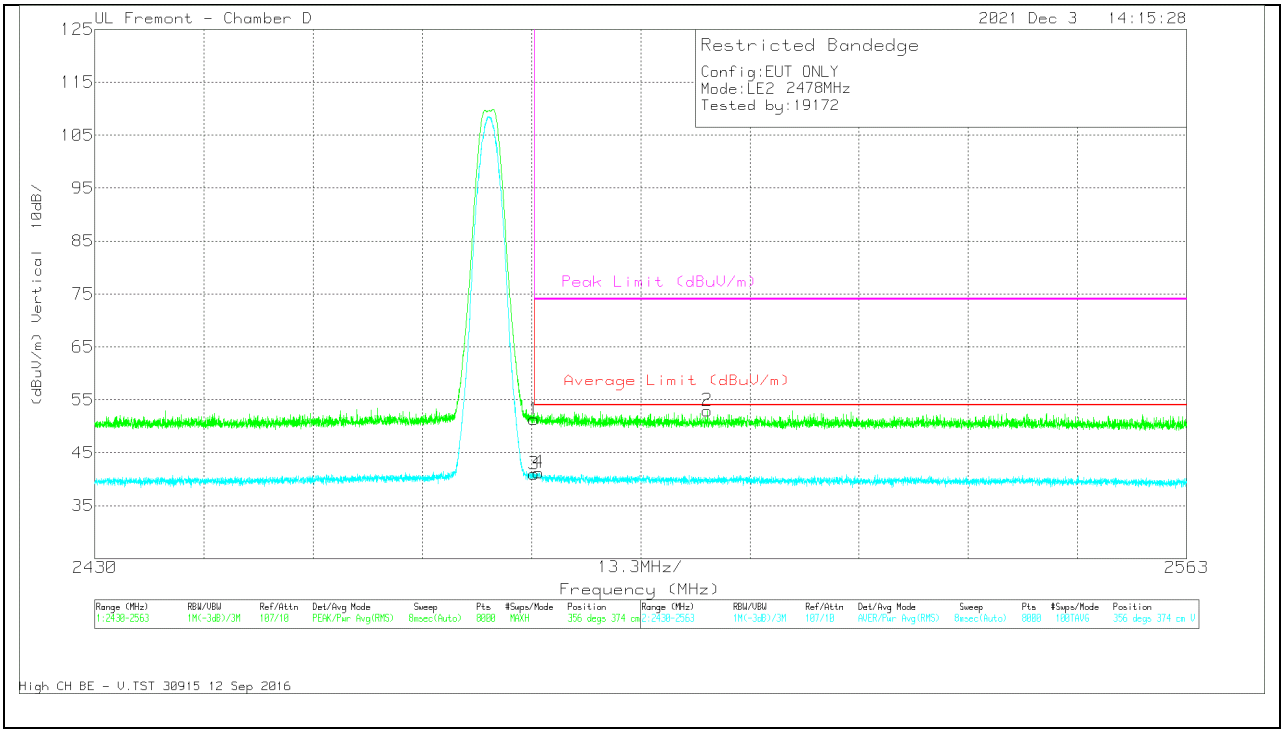
### HORIZONTAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.54 | Pk | 32.1 | -20.7 | 49.94 | - | - | 74 | -24.06 | 151 | 169 | H |
| 2 | * 2383.03 | 40.7 | Pk | 32.2 | -20.8 | 52.1 | - | - | 74 | -21.9 | 151 | 169 | H |
| 3 | * 2390 | 27.8 | RMS | 32.1 | -20.7 | 39.2 | 54 | -14.8 | - | - | 151 | 169 | H |
| 4 | * 2387.83 | 28.96 | RMS | 32.1 | -20.7 | 40.36 | 54 | -13.64 | - | - | 151 | 169 | H |

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

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.58 | Pk | 32.1 | -20.7 | 49.98 | - | - | 74 | -24.02 | 63 | 401 | V |
| 2 | * 2344.93 | 41.62 | Pk | 31.9 | -20.8 | 52.72 | - | - | 74 | -21.28 | 63 | 401 | V |
| 3 | * 2390 | 27.9 | RMS | 32.1 | -20.7 | 39.3 | 54 | -14.7 | - | - | 63 | 401 | V |
| 4 | * 2388.66 | 29.01 | RMS | 32.1 | -20.7 | 40.41 | 54 | -13.59 | - | - | 63 | 401 | V |

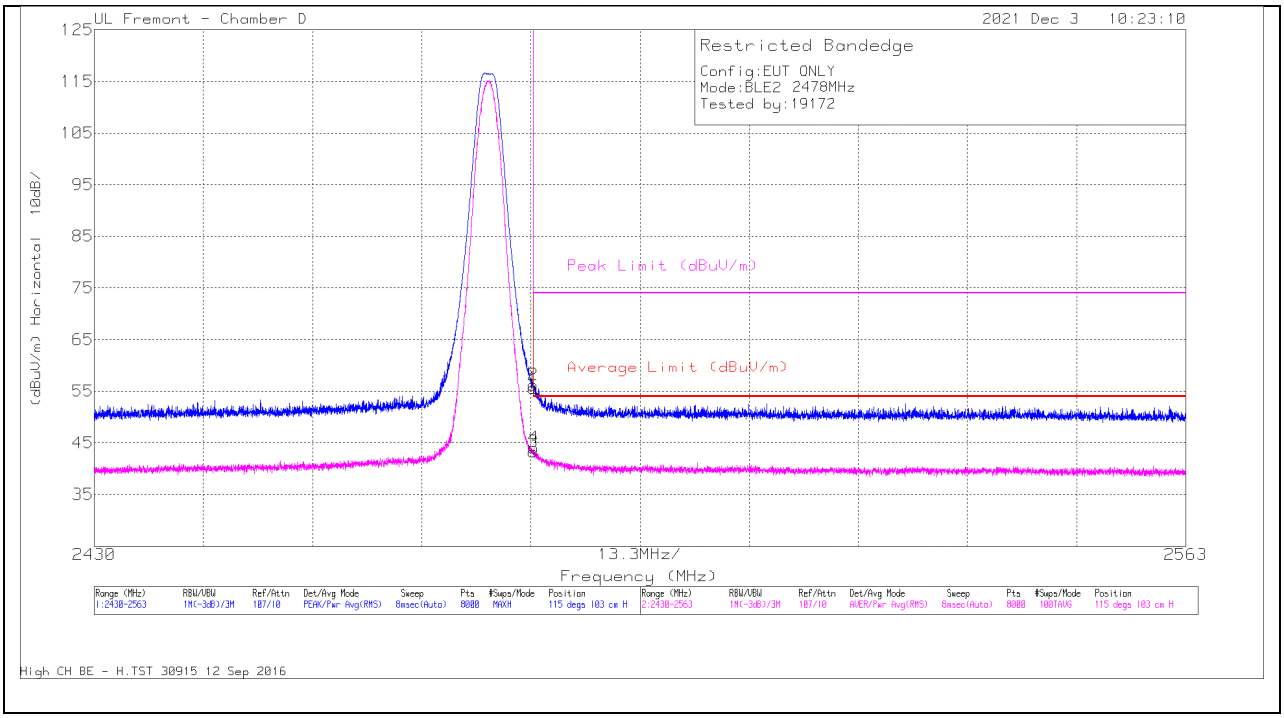
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



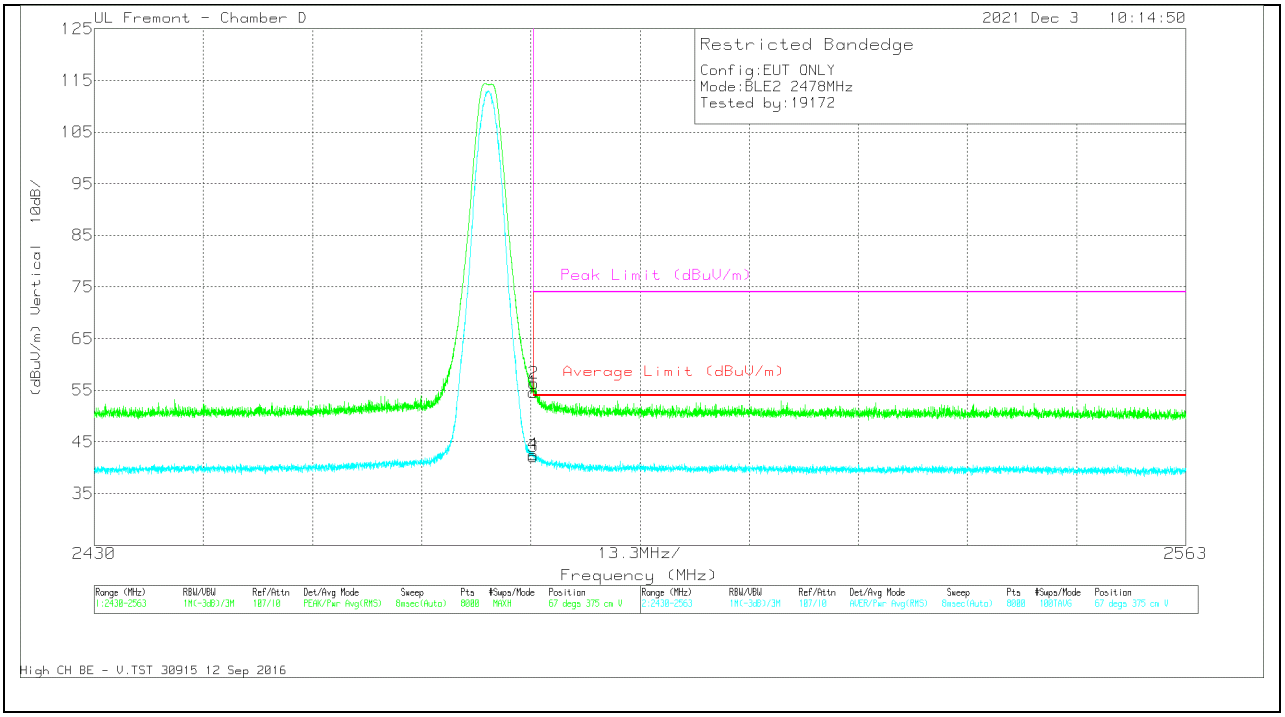

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 43.55 | Pk | 32.7 | -20.7 | 55.55 | - | - | 74 | -18.45 | 115 | 103 | H |
| 2 | * 2483.52 | 44.18 | Pk | 32.7 | -20.7 | 56.18 | - | - | 74 | -17.82 | 115 | 103 | H |
| 3 | * 2483.5 | 31.23 | RMS | 32.7 | -20.7 | 43.23 | 54 | -10.77 | - | - | 115 | 103 | H |
| 4 | * 2483.54 | 31.99 | RMS | 32.7 | -20.7 | 43.99 | 54 | -10.01 | - | - | 115 | 103 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 42.62 | Pk | 32.7 | -20.7 | 54.62 | - | - | 74 | -19.38 | 67 | 375 | V |
| 2 | * 2483.59 | 44.3 | Pk | 32.7 | -20.7 | 56.3 | - | - | 74 | -17.7 | 67 | 375 | V |
| 3 | * 2483.5 | 30.12 | RMS | 32.7 | -20.7 | 42.12 | 54 | -11.88 | - | - | 67 | 375 | V |
| 4 | * 2483.52 | 30.54 | RMS | 32.7 | -20.7 | 42.54 | 54 | -11.46 | - | - | 67 | 375 | V |

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

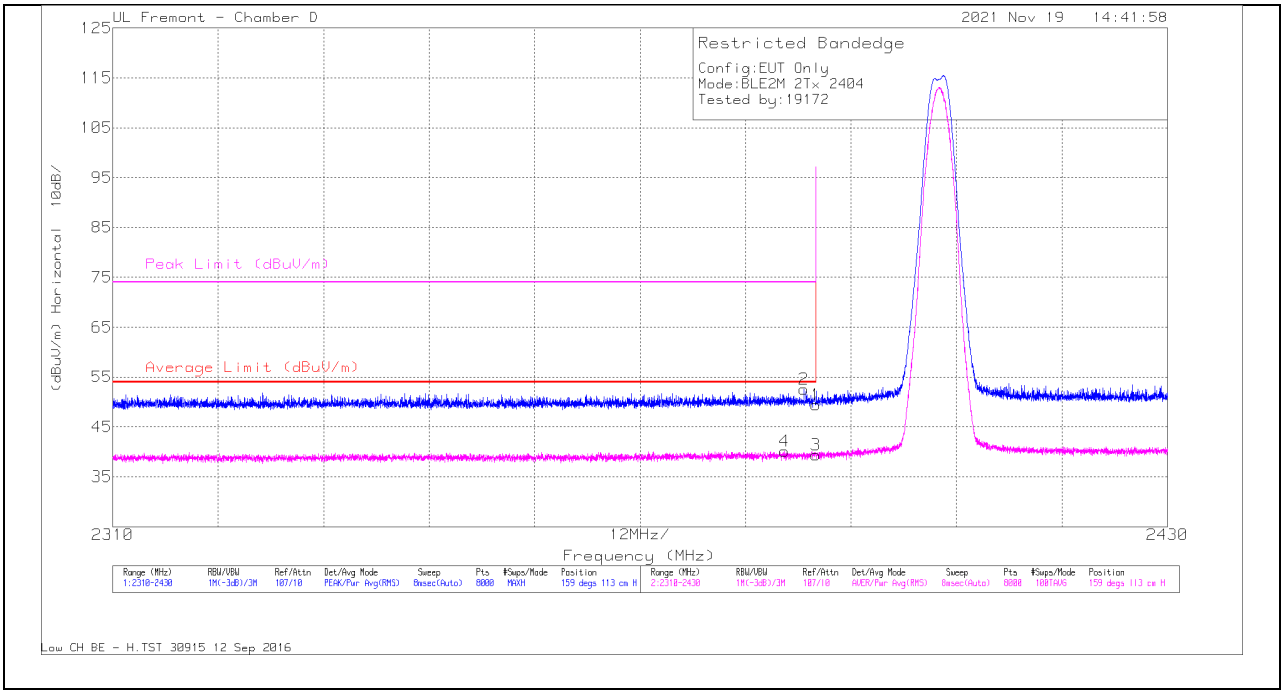


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.4. HIGH POWER BLE TXBF (2Mbps)

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



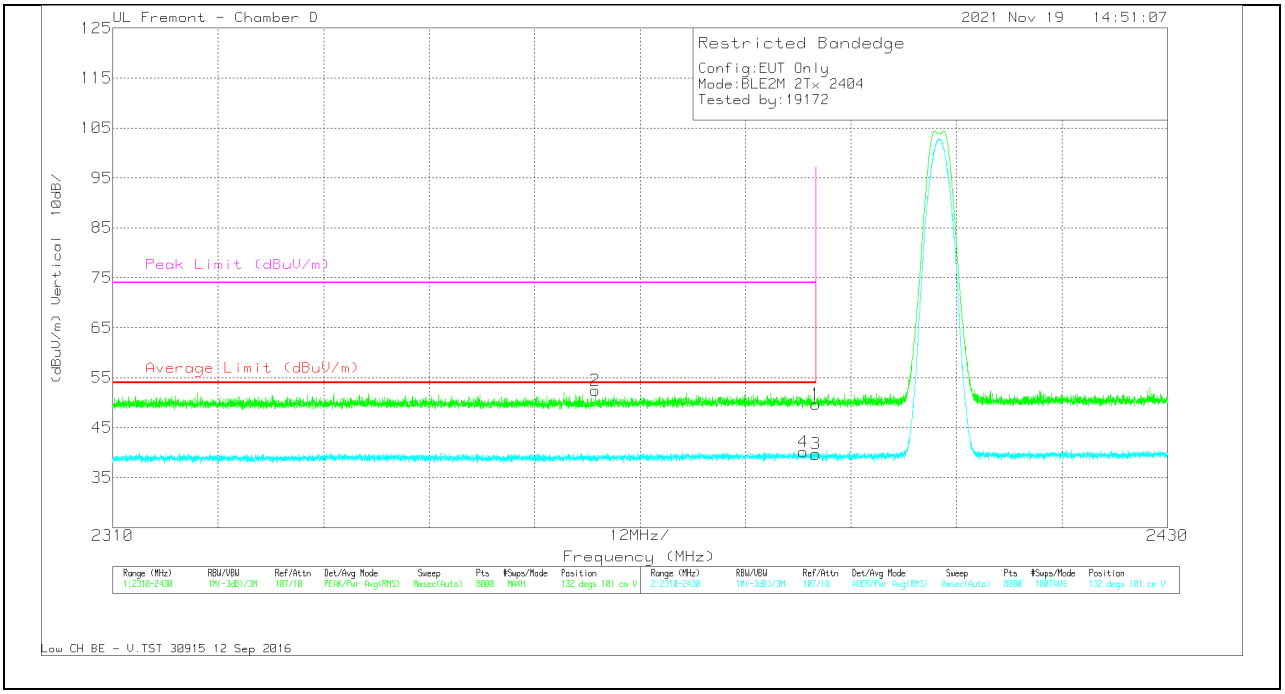

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.03 | Pk | 32.1 | -20.7 | 49.43 | - | - | 74 | -24.57 | 159 | 113 | H |
| 2 | * 2388.66 | 41.18 | Pk | 32.1 | -20.7 | 52.58 | - | - | 74 | -21.42 | 159 | 113 | H |
| 3 | * 2390 | 27.93 | RMS | 32.1 | -20.7 | 39.33 | 54 | -14.67 | - | - | 159 | 113 | H |
| 4 | * 2386.44 | 28.89 | RMS | 32.1 | -20.8 | 40.19 | 54 | -13.81 | - | - | 159 | 113 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.28 | Pk | 32.1 | -20.7 | 49.68 | - | - | 74 | -24.32 | 132 | 101 | V |
| 2 | * 2364.88 | 41.31 | Pk | 31.9 | -20.8 | 52.41 | - | - | 74 | -21.59 | 132 | 101 | V |
| 3 | * 2390 | 28.3 | RMS | 32.1 | -20.7 | 39.7 | 54 | -14.3 | - | - | 132 | 101 | V |
| 4 | * 2388.58 | 28.74 | RMS | 32.1 | -20.7 | 40.14 | 54 | -13.86 | - | - | 132 | 101 | V |

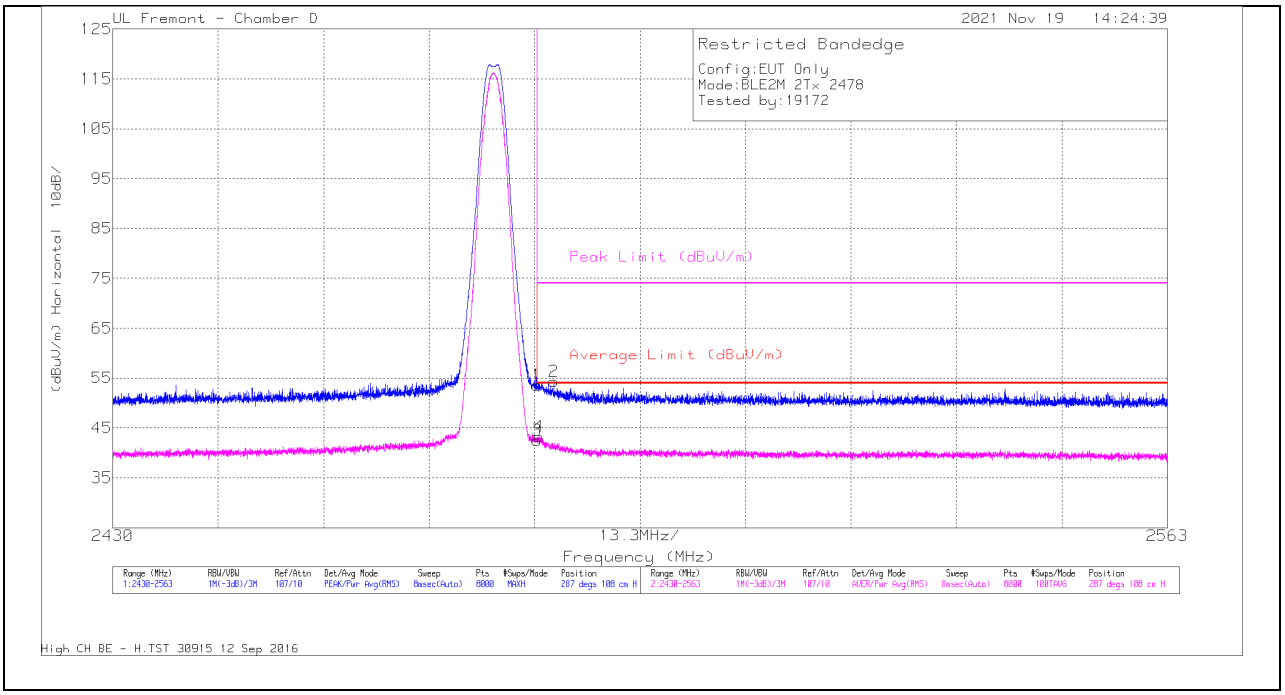
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



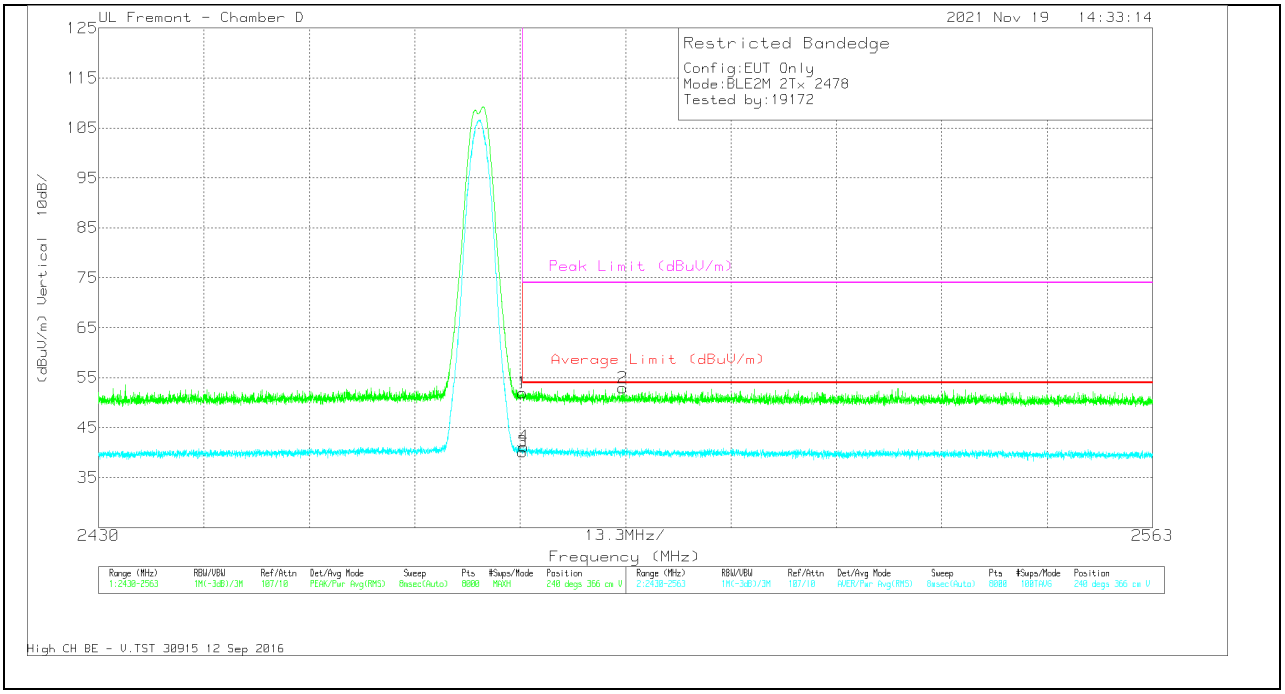

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 41.54 | Pk | 32.7 | -20.7 | 53.54 | - | - | 74 | -20.46 | 287 | 108 | H |
| 2 | * 2485.61 | 42.29 | Pk | 32.7 | -20.7 | 54.29 | - | - | 74 | -19.71 | 287 | 108 | H |
| 3 | * 2483.5 | 30.56 | RMS | 32.7 | -20.7 | 42.56 | 54 | -11.44 | - | - | 287 | 108 | H |
| 4 | * 2483.70 | 31.3 | RMS | 32.7 | -20.7 | 43.3 | 54 | -10.7 | - | - | 287 | 108 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 39.99 | Pk | 32.7 | -20.7 | 51.99 | - | - | 74 | -22.01 | 240 | 366 | V |
| 2 | * 2496.142 | 40.76 | Pk | 32.8 | -20.6 | 52.96 | - | - | 74 | -21.04 | 240 | 366 | V |
| 3 | * 2483.5 | 28.15 | RMS | 32.7 | -20.7 | 40.15 | 54 | -13.85 | - | - | 240 | 366 | V |
| 4 | * 2483.655 | 29.2 | RMS | 32.7 | -20.7 | 41.2 | 54 | -12.8 | - | - | 240 | 366 | V |

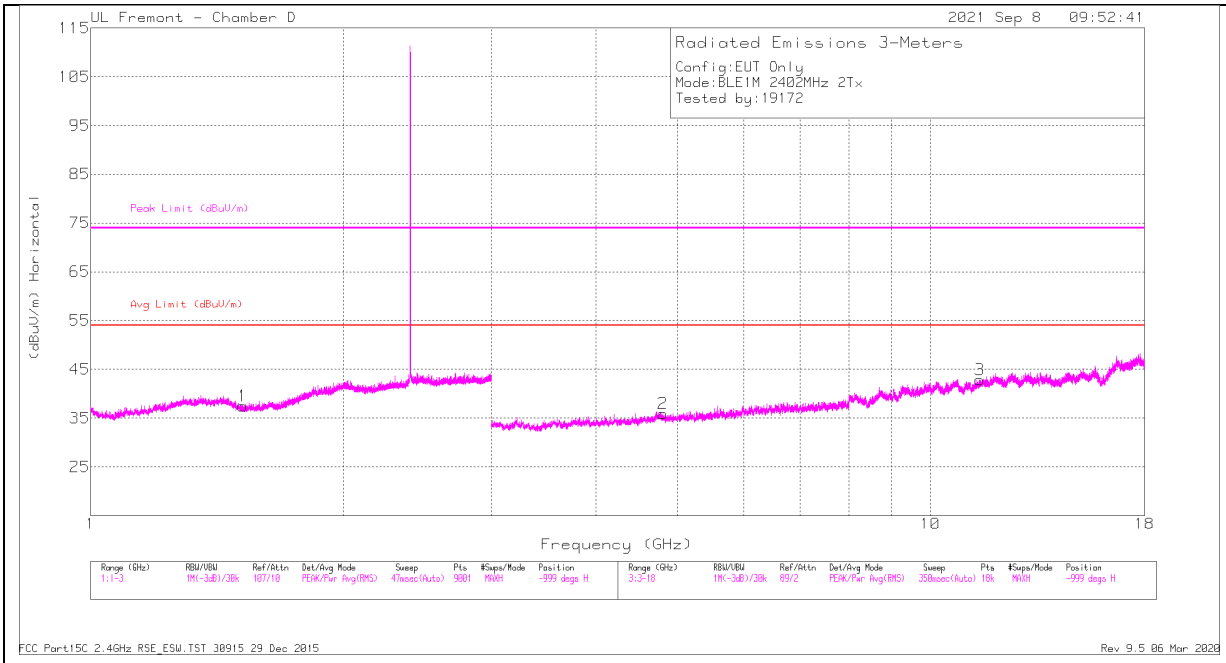
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



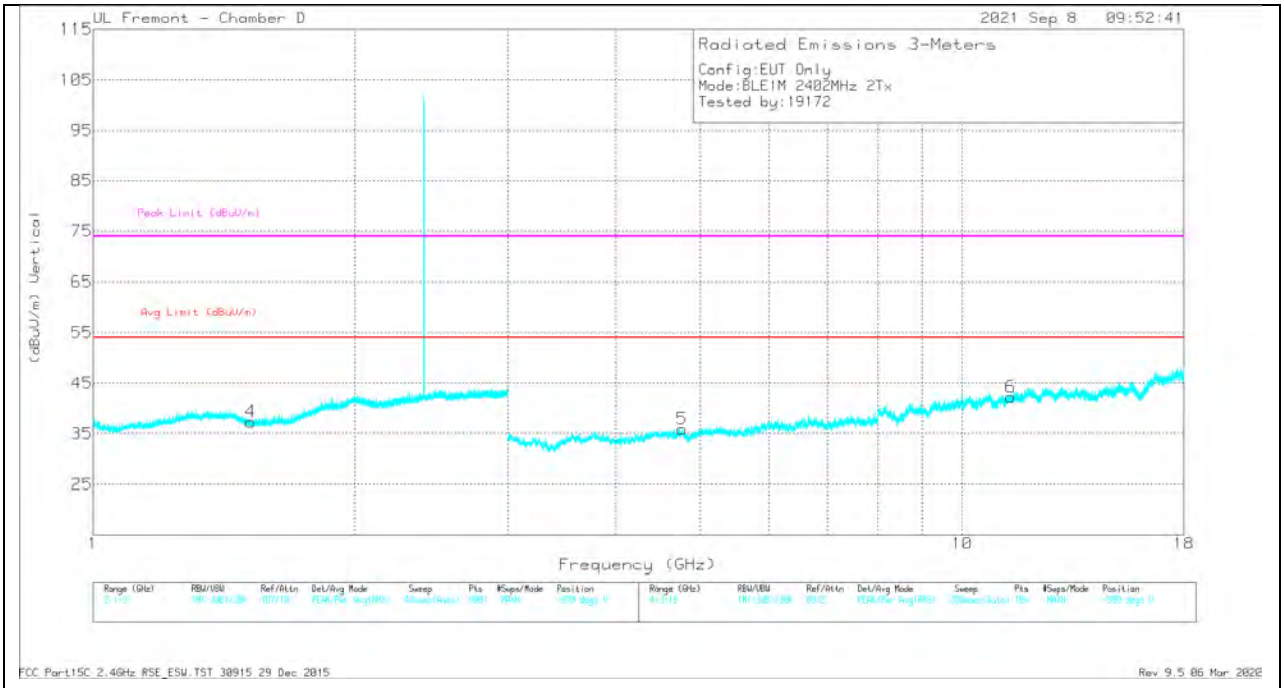
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.5. HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**

## RADIATED EMISSIONS

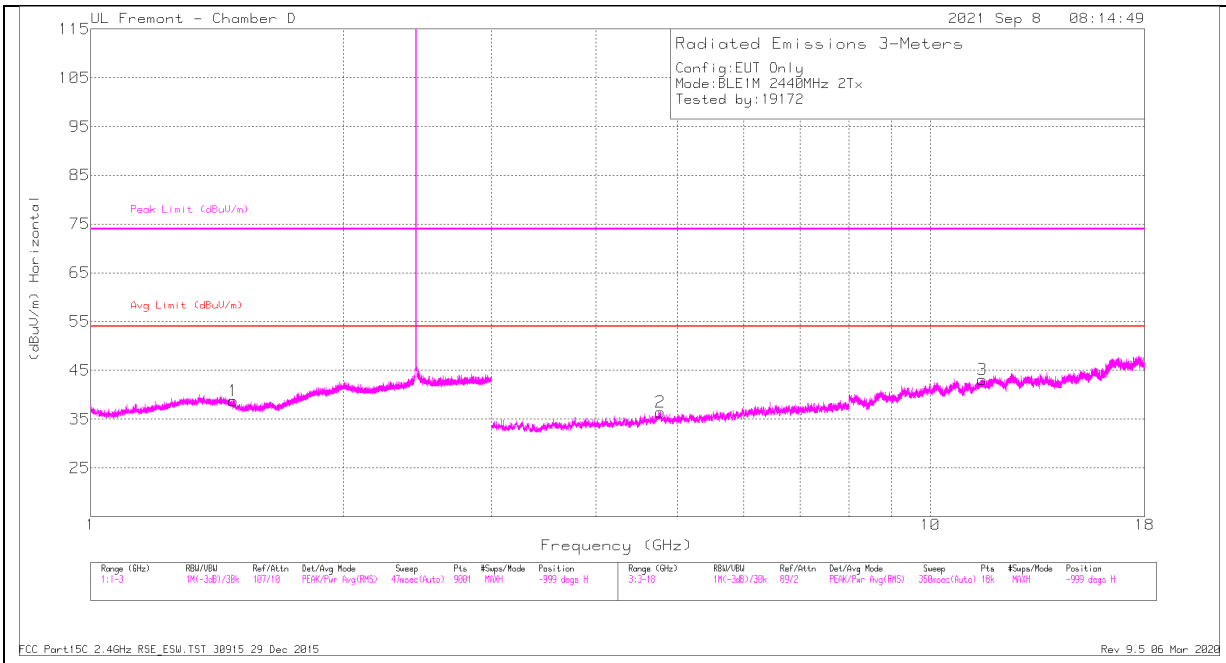
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.51866 | 39.01 | PK2 | 27.8 | -21.5 | 45.31 | - | - | 74 | -28.69 | 147 | 199 | H |
| | * 1.51801 | 29.04 | MAv1 | 27.8 | -21.5 | 35.34 | 54 | -18.66 | - | - | 147 | 199 | H |
| 4 | * 1.51828 | 38.58 | PK2 | 27.8 | -21.5 | 44.88 | - | - | 74 | -29.12 | 51 | 114 | V |
| | * 1.51677 | 29.35 | MAv1 | 27.9 | -21.5 | 35.75 | 54 | -18.25 | - | - | 51 | 114 | V |
| 2 | * 4.80228 | 35.81 | PK2 | 34.2 | -26.6 | 43.41 | - | - | 74 | -30.59 | 218 | 178 | H |
| | * 4.80144 | 26.05 | MAv1 | 34.2 | -26.6 | 33.65 | 54 | -20.35 | - | - | 218 | 178 | H |
| 3 | * 11.44608 | 31.9 | PK2 | 38 | -20.9 | 49 | - | - | 74 | -25 | 149 | 263 | H |
| | * 11.44965 | 22.91 | MAv1 | 38.1 | -20.9 | 40.11 | 54 | -13.89 | - | - | 149 | 263 | H |
| 5 | * 4.76497 | 36.04 | PK2 | 34.2 | -26.2 | 44.04 | - | - | 74 | -29.96 | 356 | 106 | V |
| | * 4.76679 | 25.91 | MAv1 | 34.2 | -26.2 | 33.91 | 54 | -20.09 | - | - | 356 | 106 | V |
| 6 | * 11.37913 | 32.19 | PK2 | 38 | -21 | 49.19 | - | - | 74 | -24.81 | 22 | 295 | V |
| | * 11.37855 | 22.74 | MAv1 | 38 | -21 | 39.74 | 54 | -14.26 | - | - | 22 | 295 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

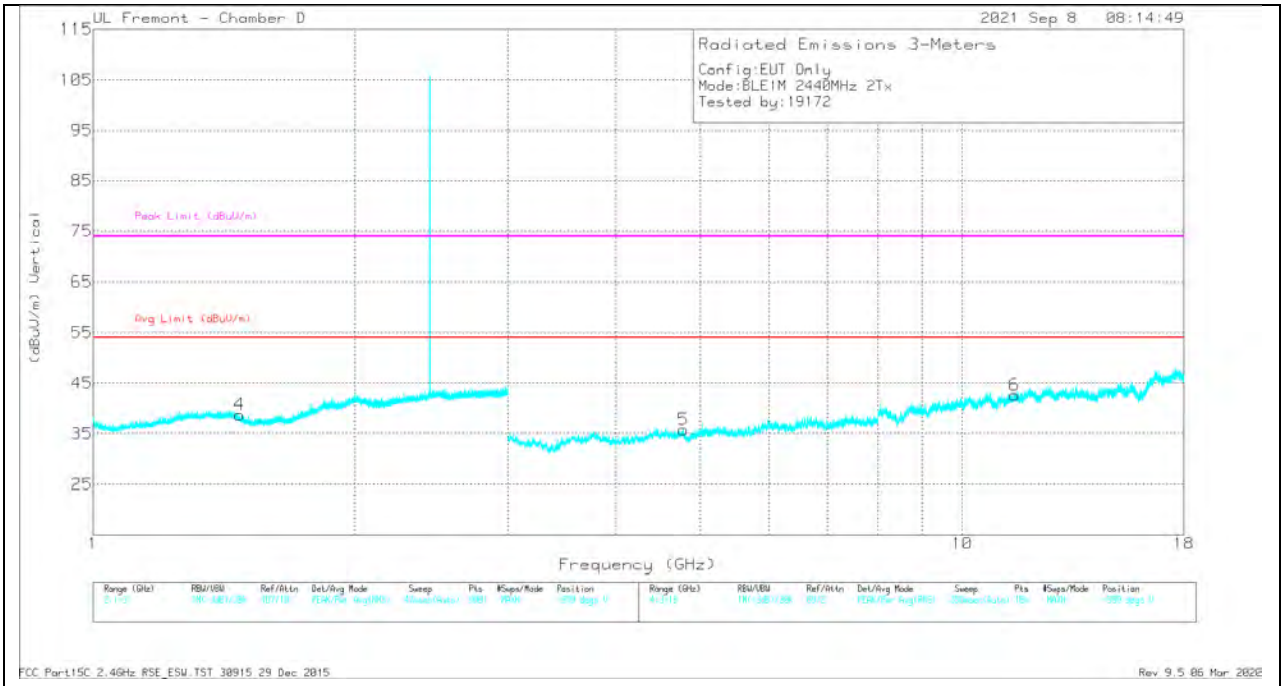


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## MID CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## RADIATED EMISSIONS

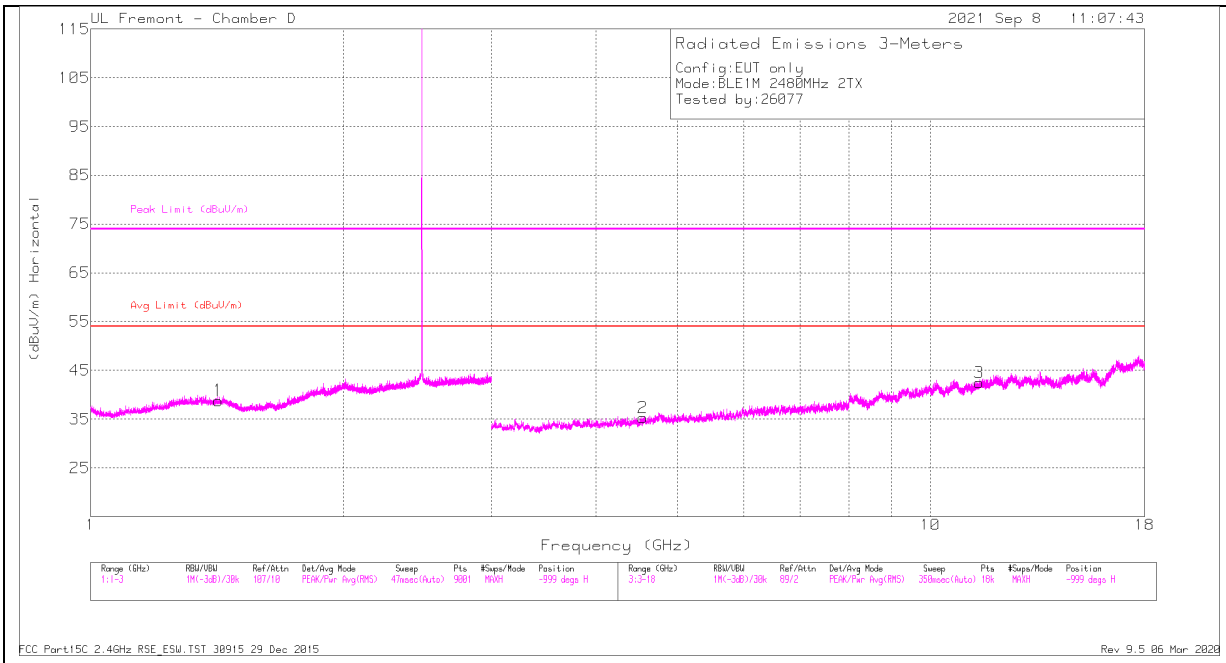
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.47801 | 38.93 | PK2 | 28.6 | -21.6 | 45.93 | - | - | 74 | -28.07 | 183 | 193 | H |
| | * 1.47857 | 28.97 | MAv1 | 28.5 | -21.6 | 35.87 | 54 | -18.13 | - | - | 183 | 193 | H |
| 4 | * 1.47375 | 38.92 | PK2 | 28.6 | -21.6 | 45.92 | - | - | 74 | -28.08 | 329 | 190 | V |
| | * 1.47361 | 29.43 | MAv1 | 28.6 | -21.5 | 36.53 | 54 | -17.47 | - | - | 329 | 190 | V |
| 2 | * 4.76889 | 35.74 | PK2 | 34.2 | -26.2 | 43.74 | - | - | 74 | -30.26 | 16 | 262 | H |
| | * 4.76819 | 26.8 | MAv1 | 34.2 | -26.2 | 34.8 | 54 | -19.2 | - | - | 16 | 262 | H |
| 3 | * 11.54607 | 31.87 | PK2 | 38.2 | -20 | 50.07 | - | - | 74 | -23.93 | 43 | 342 | H |
| | * 11.54664 | 21.73 | MAv1 | 38.2 | -20 | 39.93 | 54 | -14.07 | - | - | 43 | 342 | H |
| 5 | * 4.77583 | 35.36 | PK2 | 34.2 | -26.3 | 43.26 | - | - | 74 | -30.74 | 188 | 237 | V |
| | * 4.7756 | 25.22 | MAv1 | 34.2 | -26.3 | 33.12 | 54 | -20.88 | - | - | 188 | 237 | V |
| 6 | * 11.49372 | 33.04 | PK2 | 38.1 | -20.5 | 50.64 | - | - | 74 | -23.36 | 176 | 175 | V |
| | * 11.49051 | 22.66 | MAv1 | 38.1 | -20.7 | 40.06 | 54 | -13.94 | - | - | 176 | 175 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

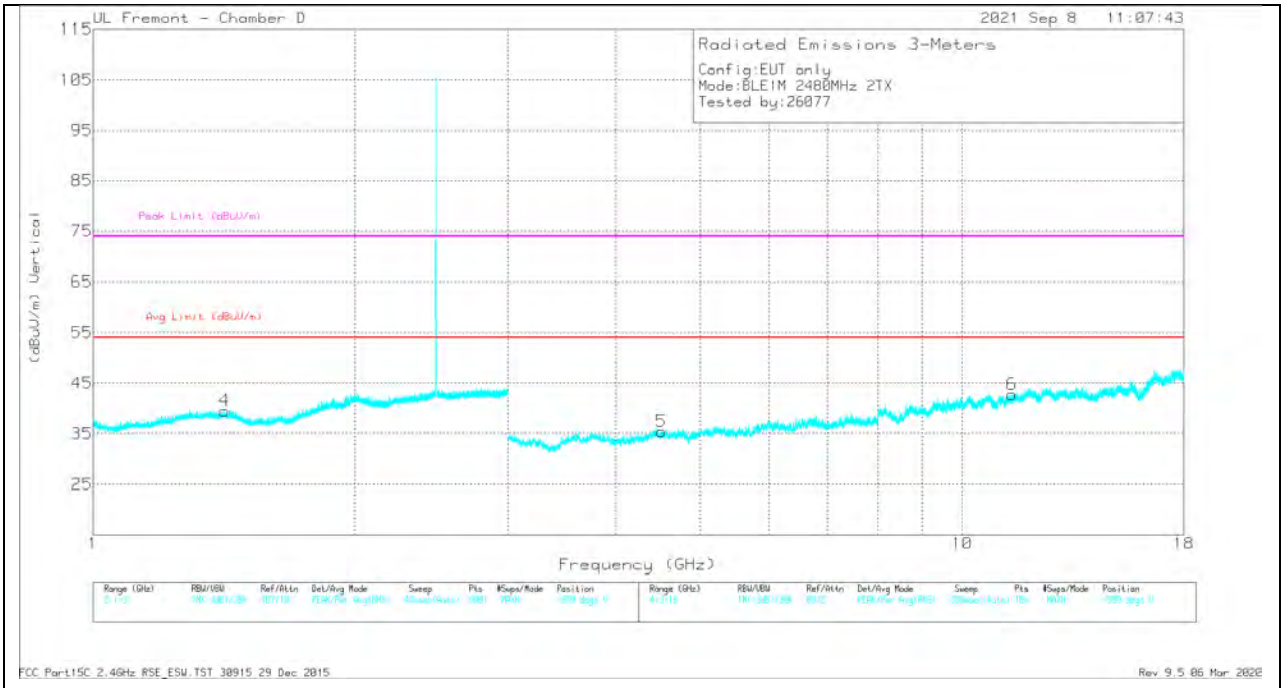


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## HIGH CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.41646 | 39.35 | PK2 | 29.3 | -21.7 | 46.95 | - | - | 74 | -27.05 | 298 | 113 | H |
| | * 1.41718 | 29.46 | MAv1 | 29.3 | -21.6 | 37.16 | 54 | -16.84 | - | - | 298 | 113 | H |
| 4 | * 1.41981 | 39.34 | PK2 | 29.4 | -21.6 | 47.14 | - | - | 74 | -26.86 | 136 | 258 | V |
| | * 1.41725 | 29.22 | MAv1 | 29.3 | -21.6 | 36.92 | 54 | -17.08 | - | - | 136 | 258 | V |
| 2 | * 4.54579 | 36.45 | PK2 | 33.8 | -27.4 | 42.85 | - | - | 74 | -31.15 | 238 | 303 | H |
| | * 4.54817 | 26.59 | MAv1 | 33.8 | -27.4 | 32.99 | 54 | -21.01 | - | - | 238 | 303 | H |
| 3 | * 11.44443 | 32.82 | PK2 | 38 | -20.9 | 49.92 | - | - | 74 | -24.08 | 307 | 107 | H |
| | * 11.44417 | 23.08 | MAv1 | 38 | -20.9 | 40.18 | 54 | -13.82 | - | - | 307 | 107 | H |
| 5 | * 4.50952 | 36.24 | PK2 | 33.7 | -27.1 | 42.84 | - | - | 74 | -31.16 | 11 | 296 | V |
| | * 4.50751 | 26.85 | MAv1 | 33.6 | -27.1 | 33.35 | 54 | -20.65 | - | - | 11 | 296 | V |
| 6 | * 11.42564 | 33.17 | PK2 | 38 | -20.7 | 50.47 | - | - | 74 | -23.53 | 357 | 306 | V |
| | * 11.42747 | 22.36 | MAv1 | 38 | -20.8 | 39.56 | 54 | -14.44 | - | - | 357 | 306 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average



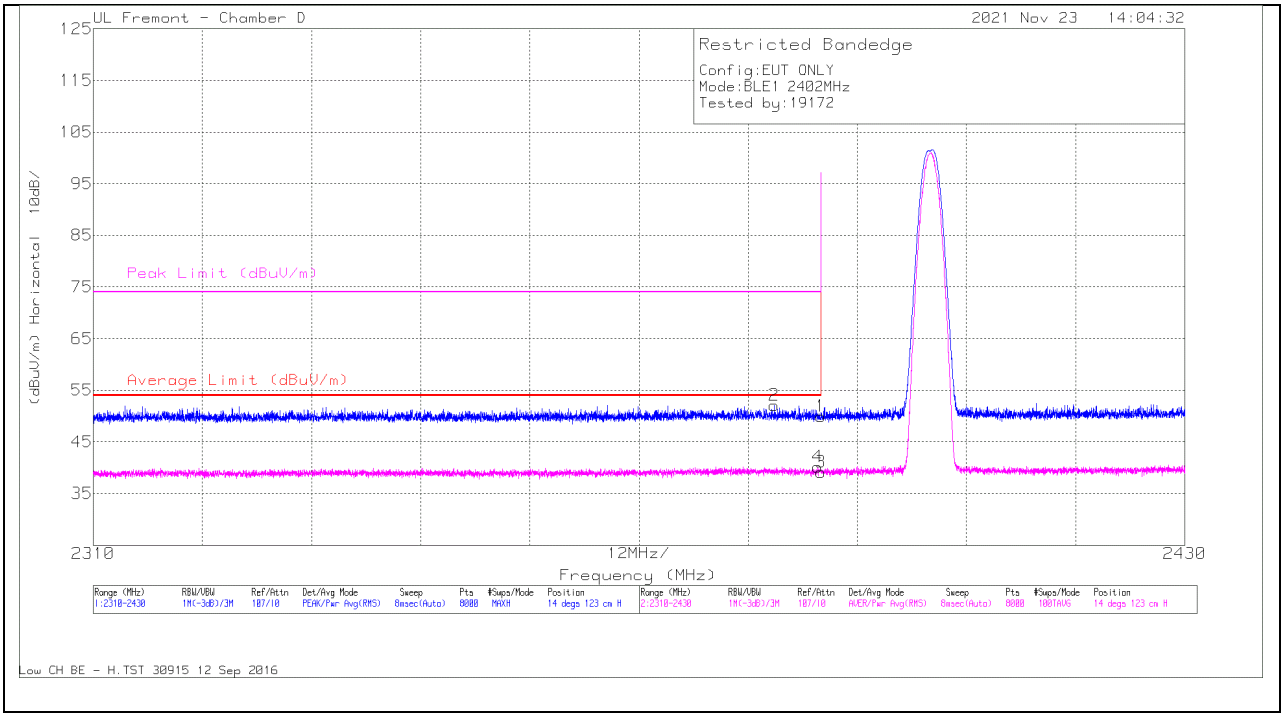
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.6. LOW POWER BLE (1Mbps)

**ANT 2**

## BANDEDGE (LOW CHANNEL)

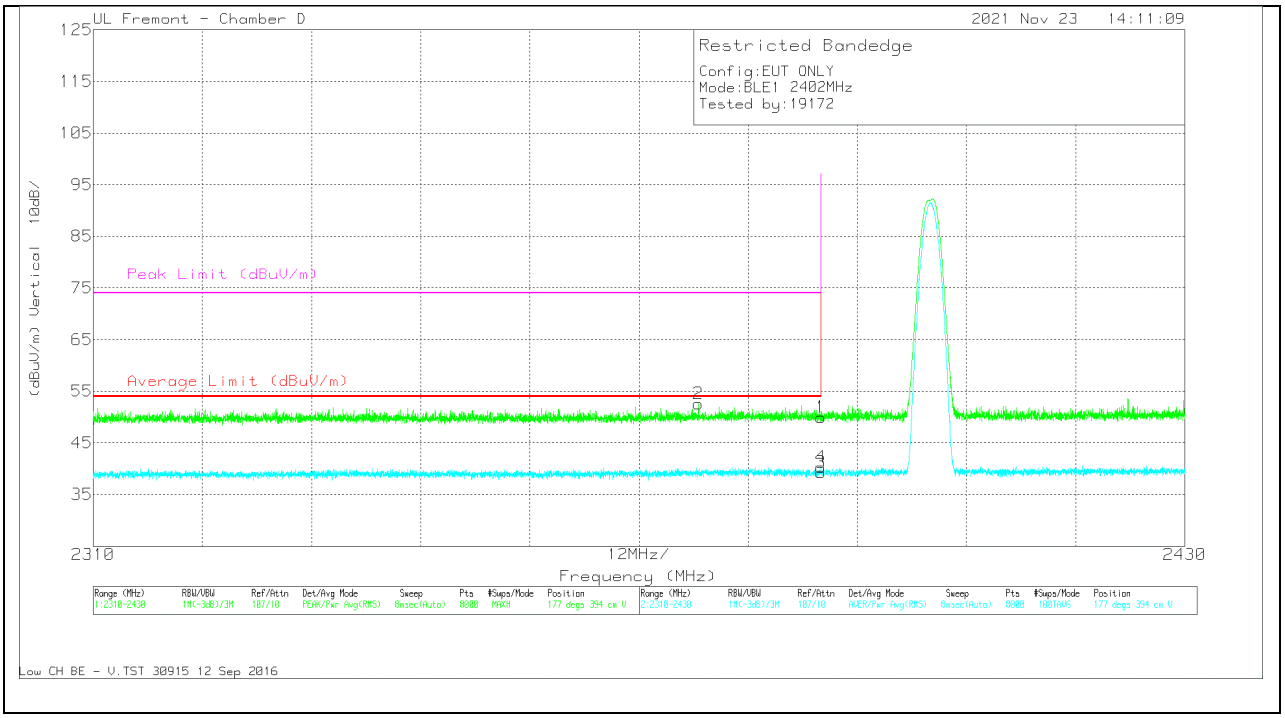
### HORIZONTAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/ Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.53 | Pk | 32.1 | -20.7 | 49.93 | - | - | 74 | -24.07 | 14 | 123 | H |
| 2 | * 2384.89 | 40.77 | Pk | 32.1 | -20.8 | 52.07 | - | - | 74 | -21.93 | 14 | 123 | H |
| 3 | * 2390 | 27.72 | RMS | 32.1 | -20.7 | 39.12 | 54 | -14.88 | - | - | 14 | 123 | H |
| 4 | * 2389.631 | 28.76 | RMS | 32.1 | -20.7 | 40.16 | 54 | -13.84 | - | - | 14 | 123 | H |

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

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.51 | Pk | 32.1 | -20.7 | 49.91 | - | - | 74 | -24.09 | 177 | 394 | V |
| 2 | * 2376.549 | 41.12 | Pk | 32.1 | -20.7 | 52.52 | - | - | 74 | -21.48 | 177 | 394 | V |
| 3 | * 2390 | 27.84 | RMS | 32.1 | -20.7 | 39.24 | 54 | -14.76 | - | - | 177 | 394 | V |
| 4 | * 2389.976 | 28.83 | RMS | 32.1 | -20.7 | 40.23 | 54 | -13.77 | - | - | 177 | 394 | V |

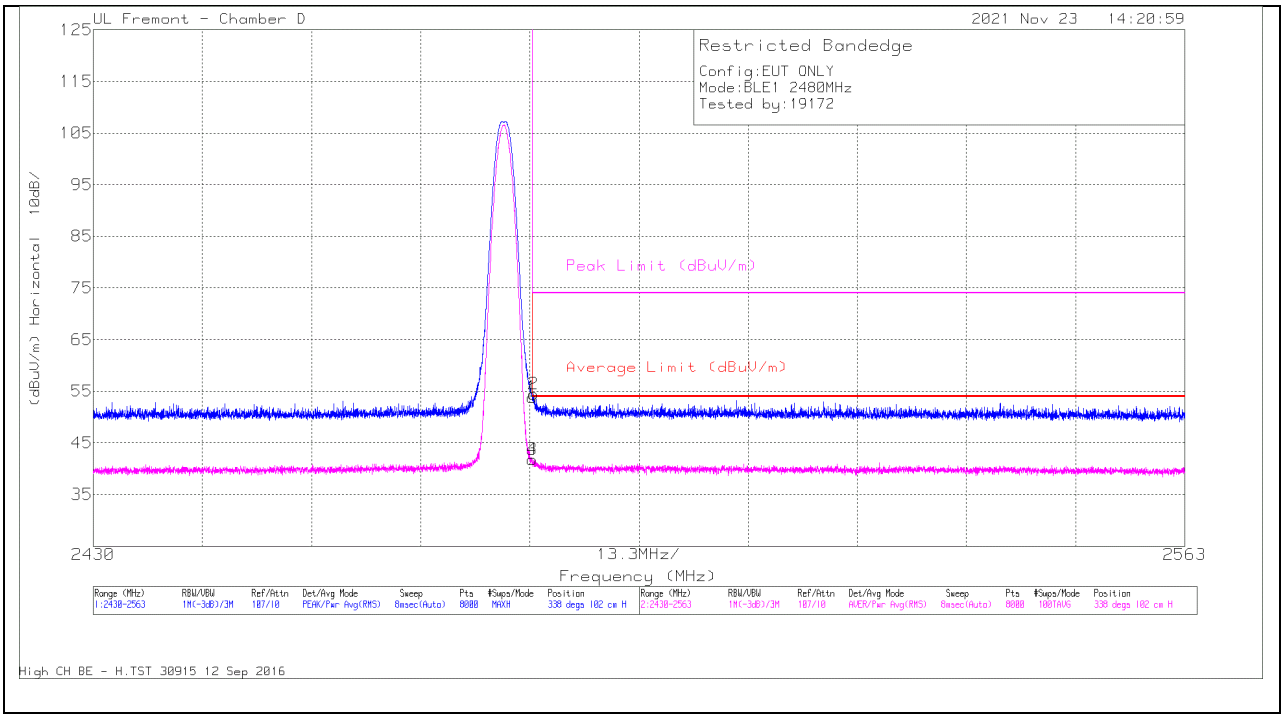
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



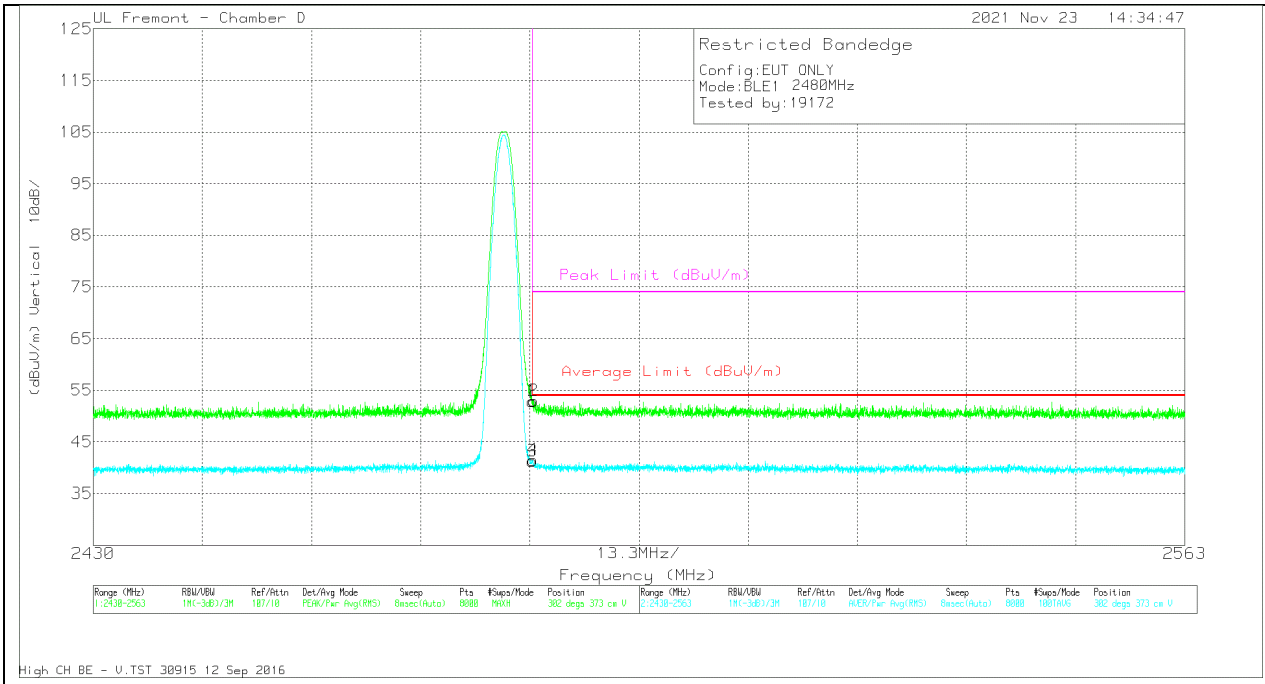

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 41.81 | Pk | 32.7 | -20.7 | 53.81 | - | - | 74 | -20.19 | 338 | 102 | H |
| 2 | * 2483.655 | 42.49 | Pk | 32.7 | -20.7 | 54.49 | - | - | 74 | -19.51 | 338 | 102 | H |
| 3 | * 2483.5 | 29.72 | RMS | 32.7 | -20.7 | 41.72 | 54 | -12.28 | - | - | 338 | 102 | H |
| 4 | * 2483.506 | 29.72 | RMS | 32.7 | -20.7 | 41.72 | 54 | -12.28 | - | - | 338 | 102 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 40.83 | Pk | 32.7 | -20.7 | 52.83 | - | - | 74 | -21.17 | 302 | 373 | V |
| 2 | * 2483.672 | 40.95 | Pk | 32.7 | -20.7 | 52.95 | - | - | 74 | -21.05 | 302 | 373 | V |
| 3 | * 2483.5 | 29.23 | RMS | 32.7 | -20.7 | 41.23 | 54 | -12.77 | - | - | 302 | 373 | V |
| 4 | * 2483.539 | 29.46 | RMS | 32.7 | -20.7 | 41.46 | 54 | -12.54 | - | - | 302 | 373 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

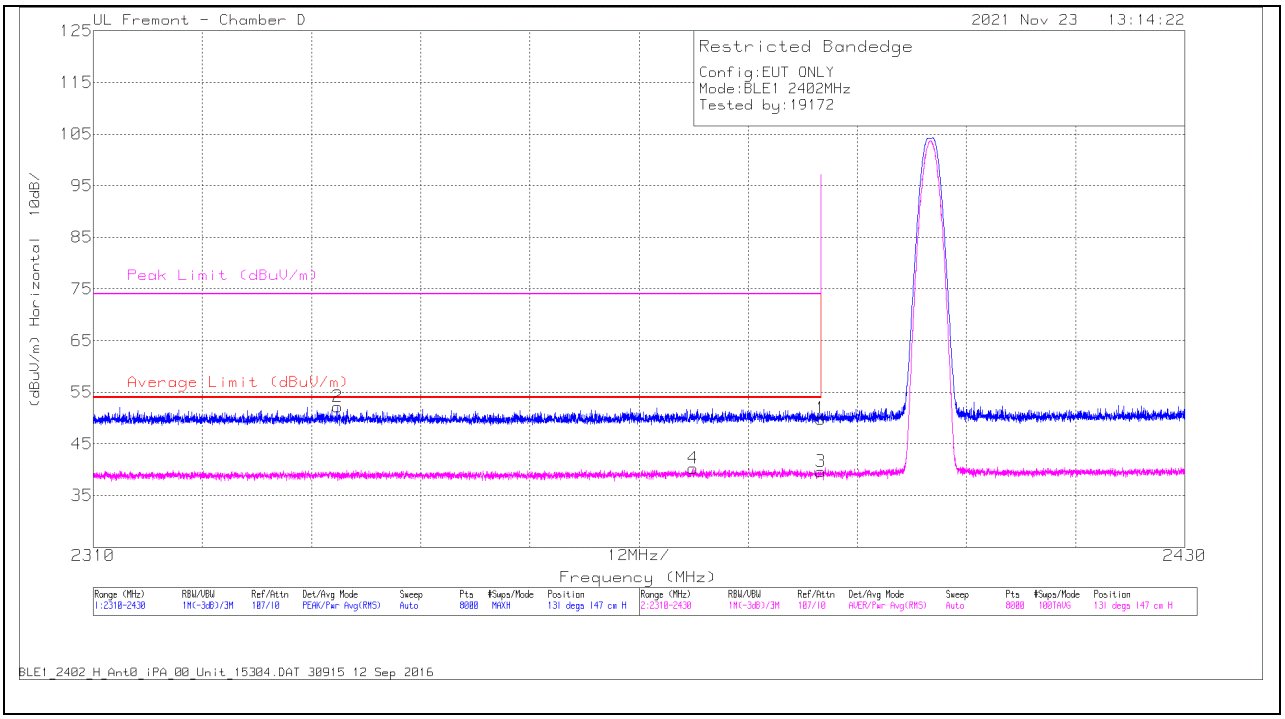


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



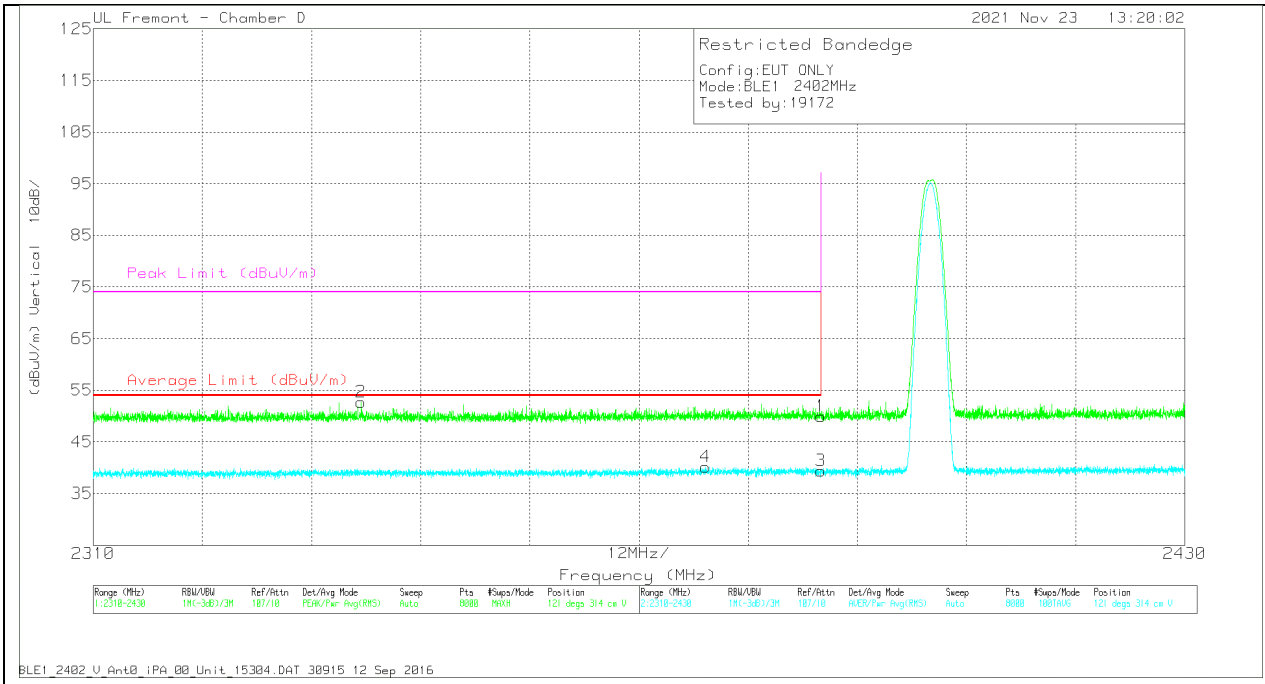

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.47 | Pk | 32.1 | -20.7 | 49.87 | - | - | 74 | -24.13 | 131 | 147 | H |
| 2 | * 2336.854 | 41.23 | Pk | 31.9 | -20.9 | 52.23 | - | - | 74 | -21.77 | 131 | 147 | H |
| 3 | * 2390 | 28.28 | RMS | 32.1 | -20.7 | 39.68 | 54 | -14.32 | - | - | 131 | 147 | H |
| 4 | * 2375.934 | 28.87 | RMS | 32.1 | -20.7 | 40.27 | 54 | -13.73 | - | - | 131 | 147 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.58 | Pk | 32.1 | -20.7 | 49.98 | - | - | 74 | -24.02 | 121 | 314 | V |
| 2 | * 2339.464 | 41.69 | Pk | 31.9 | -20.9 | 52.69 | - | - | 74 | -21.31 | 121 | 314 | V |
| 3 | * 2390 | 27.95 | RMS | 32.1 | -20.7 | 39.35 | 54 | -14.65 | - | - | 121 | 314 | V |
| 4 | * 2377.329 | 28.78 | RMS | 32.1 | -20.7 | 40.18 | 54 | -13.82 | - | - | 121 | 314 | V |

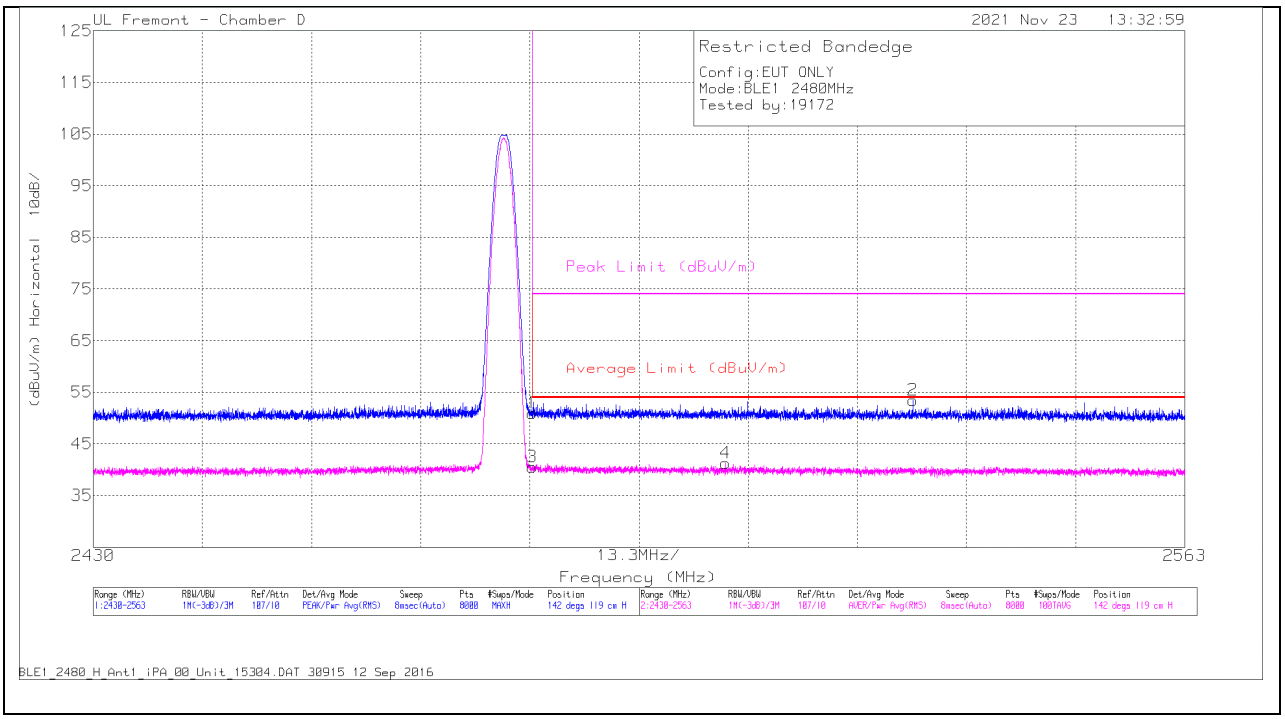
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



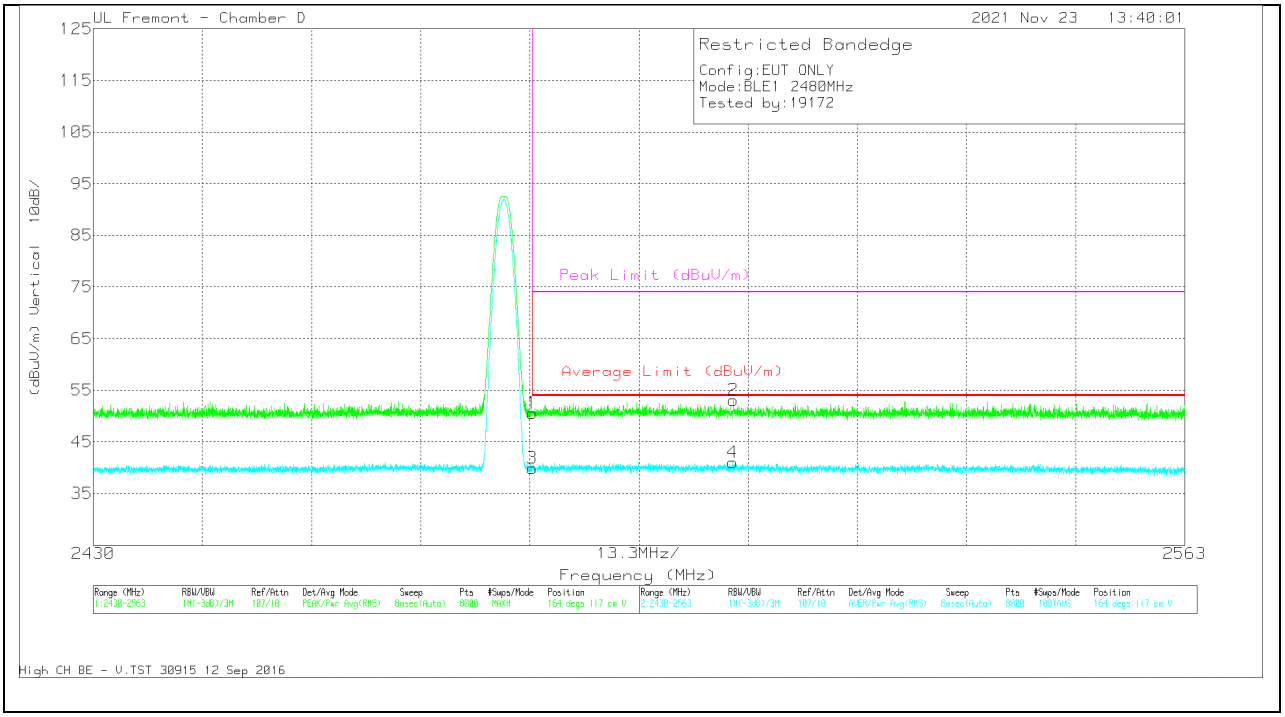

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.98 | Pk | 32.7 | -20.7 | 50.98 | - | - | 74 | -23.02 | 142 | 119 | H |
| 3 | * 2483.5 | 28.56 | RMS | 32.7 | -20.7 | 40.56 | 54 | -13.44 | - | - | 142 | 119 | H |
| 4 | 2507.033 | 29.17 | RMS | 32.7 | -20.6 | 41.27 | 54 | -12.73 | - | - | 142 | 119 | H |
| 2 | 2529.895 | 41.44 | Pk | 32.6 | -20.6 | 53.44 | - | - | 74 | -20.56 | 142 | 119 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.53 | Pk | 32.7 | -20.7 | 50.53 | - | - | 74 | -23.47 | 164 | 117 | V |
| 3 | * 2483.5 | 27.92 | RMS | 32.7 | -20.7 | 39.92 | 54 | -14.08 | - | - | 164 | 117 | V |
| 4 | 2507.881 | 28.93 | RMS | 32.7 | -20.6 | 41.03 | 54 | -12.97 | - | - | 164 | 117 | V |
| 2 | 2507.997 | 40.88 | Pk | 32.7 | -20.5 | 53.08 | - | - | 74 | -20.92 | 164 | 117 | V |

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

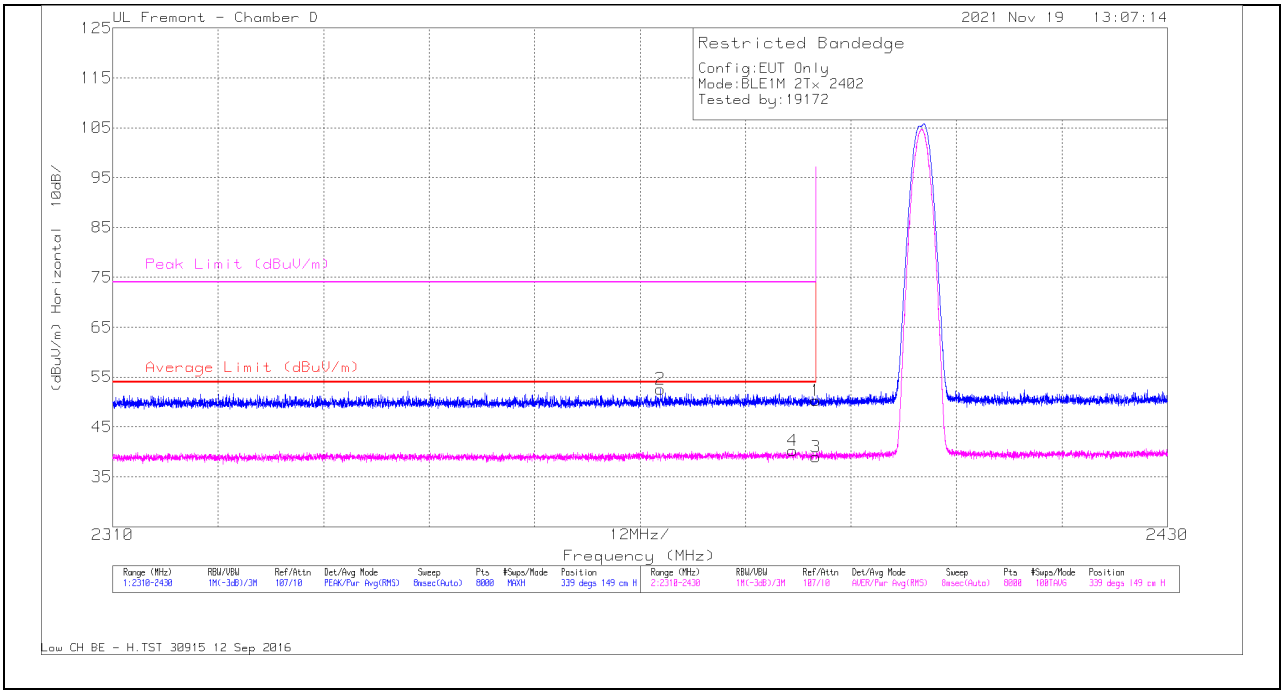


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.7. LOW POWER BLE TXBF (1Mbps)

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



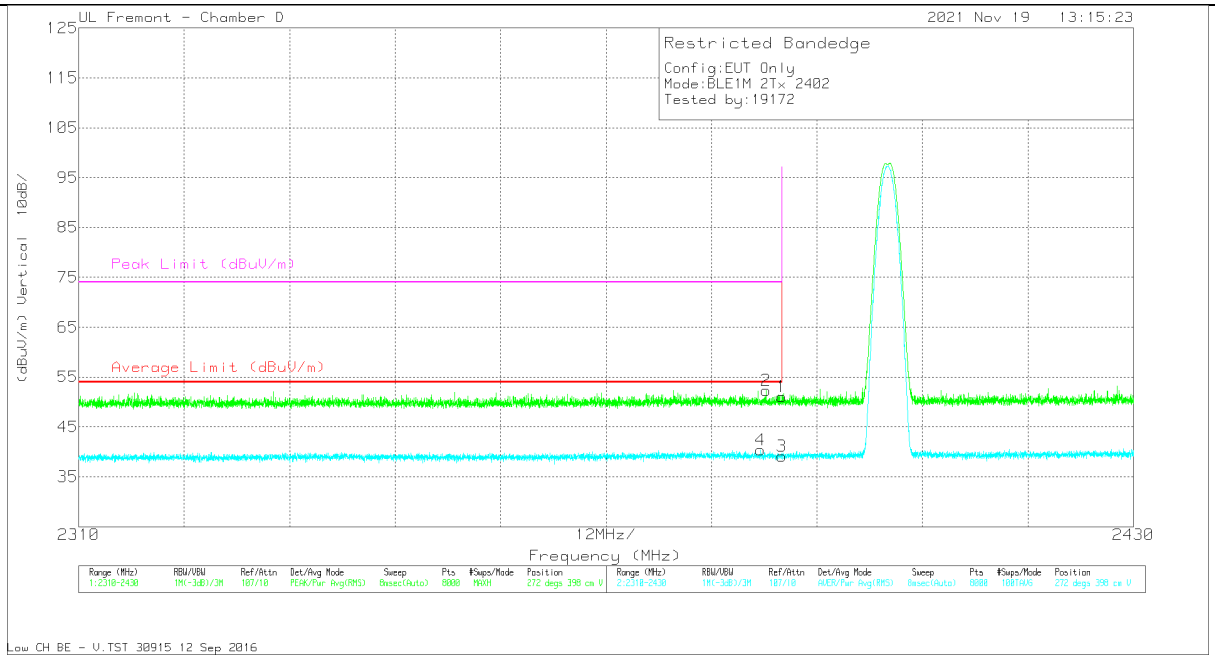

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.91 | Pk | 32.1 | -20.7 | 50.31 | - | - | 74 | -23.69 | 339 | 149 | H |
| 2 | * 2372.3183 | 41.43 | Pk | 32 | -20.8 | 52.63 | - | - | 74 | -21.37 | 339 | 149 | H |
| 3 | * 2390 | 27.59 | RMS | 32.1 | -20.7 | 38.99 | 54 | -15.01 | - | - | 339 | 149 | H |
| 4 | * 2387.3353 | 28.99 | RMS | 32.1 | -20.8 | 40.29 | 54 | -13.71 | - | - | 339 | 149 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 39.62 | Pk | 32.1 | -20.7 | 51.02 | - | - | 74 | -22.98 | 272 | 398 | V |
| 2 | * 2388.1904 | 40.93 | Pk | 32.1 | -20.7 | 52.33 | - | - | 74 | -21.67 | 272 | 398 | V |
| 3 | * 2390 | 27.78 | RMS | 32.1 | -20.7 | 39.18 | 54 | -14.82 | - | - | 272 | 398 | V |
| 4 | * 2387.6054 | 29.04 | RMS | 32.1 | -20.8 | 40.34 | 54 | -13.66 | - | - | 272 | 398 | V |

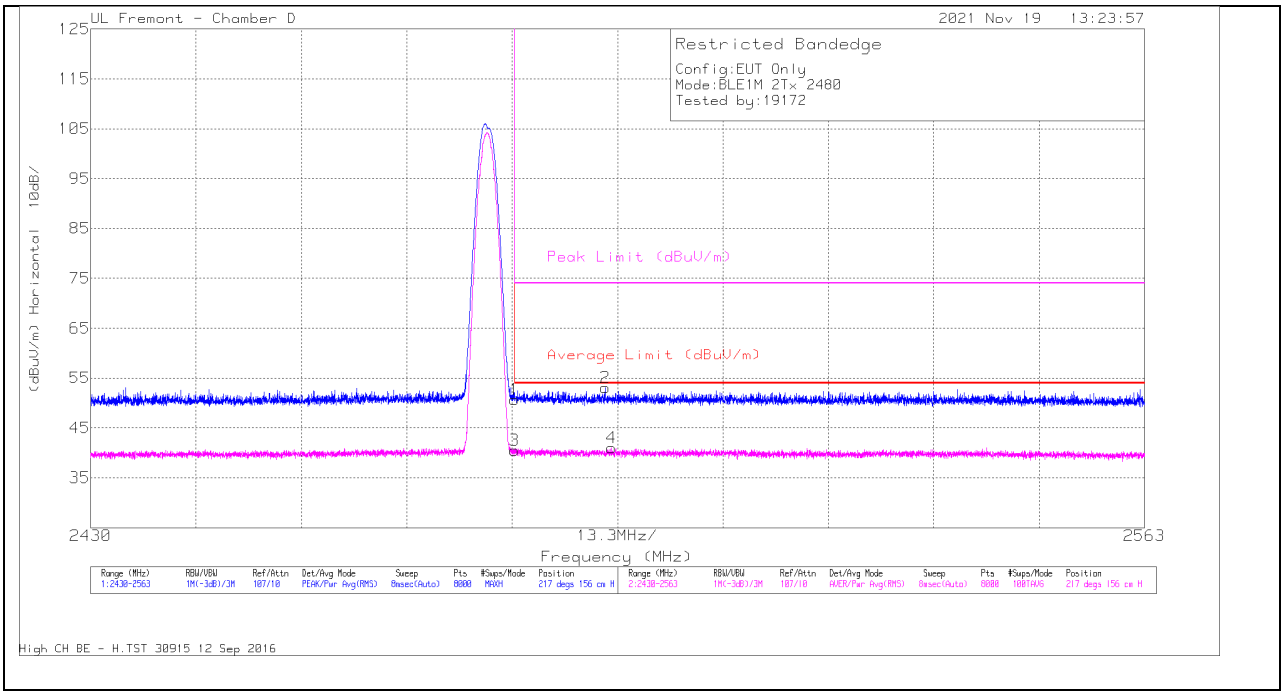
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



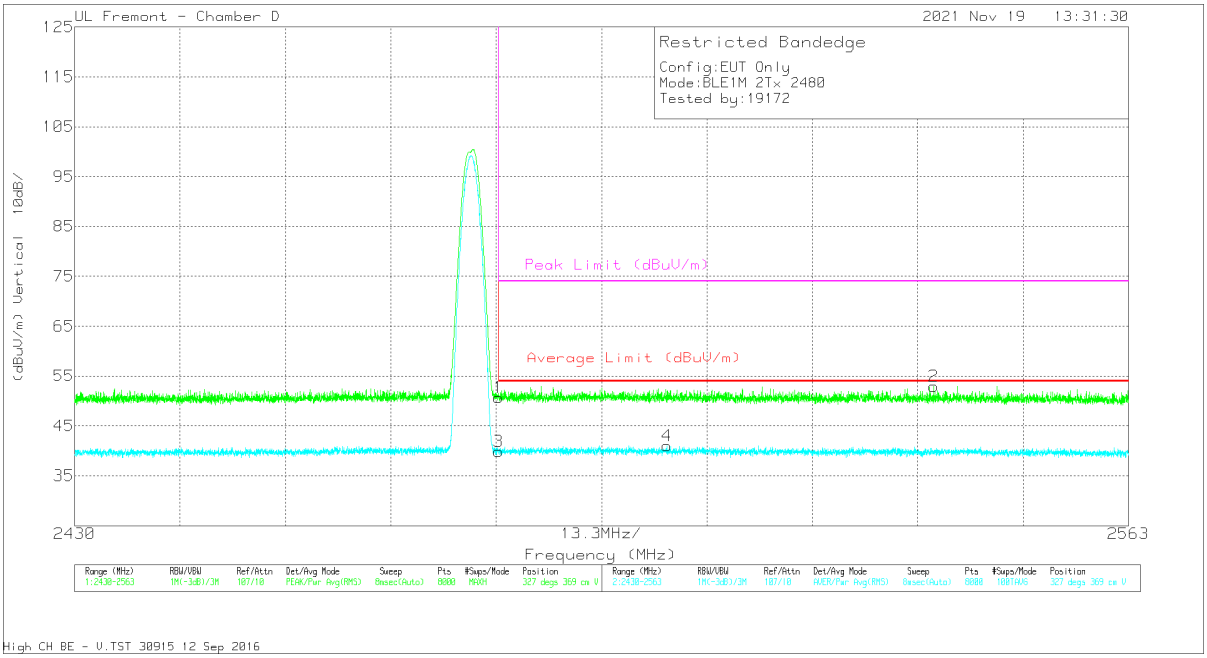

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.69 | Pk | 32.7 | -20.7 | 50.69 | - | - | 74 | -23.31 | 217 | 156 | H |
| 2 | * 2494.9284 | 41.02 | Pk | 32.8 | -20.7 | 53.12 | - | - | 74 | -20.88 | 217 | 156 | H |
| 3 | * 2483.5 | 28.46 | RMS | 32.7 | -20.7 | 40.46 | 54 | -13.54 | - | - | 217 | 156 | H |
| 4 | * 2495.7265 | 28.86 | RMS | 32.8 | -20.6 | 41.06 | 54 | -12.94 | - | - | 217 | 156 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.7 | Pk | 32.7 | -20.7 | 50.7 | - | - | 74 | -23.3 | 327 | 369 | V |
| 3 | * 2483.5 | 27.93 | RMS | 32.7 | -20.7 | 39.93 | 54 | -14.07 | - | - | 327 | 369 | V |
| 4 | 2504.7716 | 29.06 | RMS | 32.7 | -20.7 | 41.06 | 54 | -12.94 | - | - | 327 | 369 | V |
| 2 | 2538.408 | 41.09 | Pk | 32.4 | -20.5 | 52.99 | - | - | 74 | -21.01 | 327 | 369 | V |

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



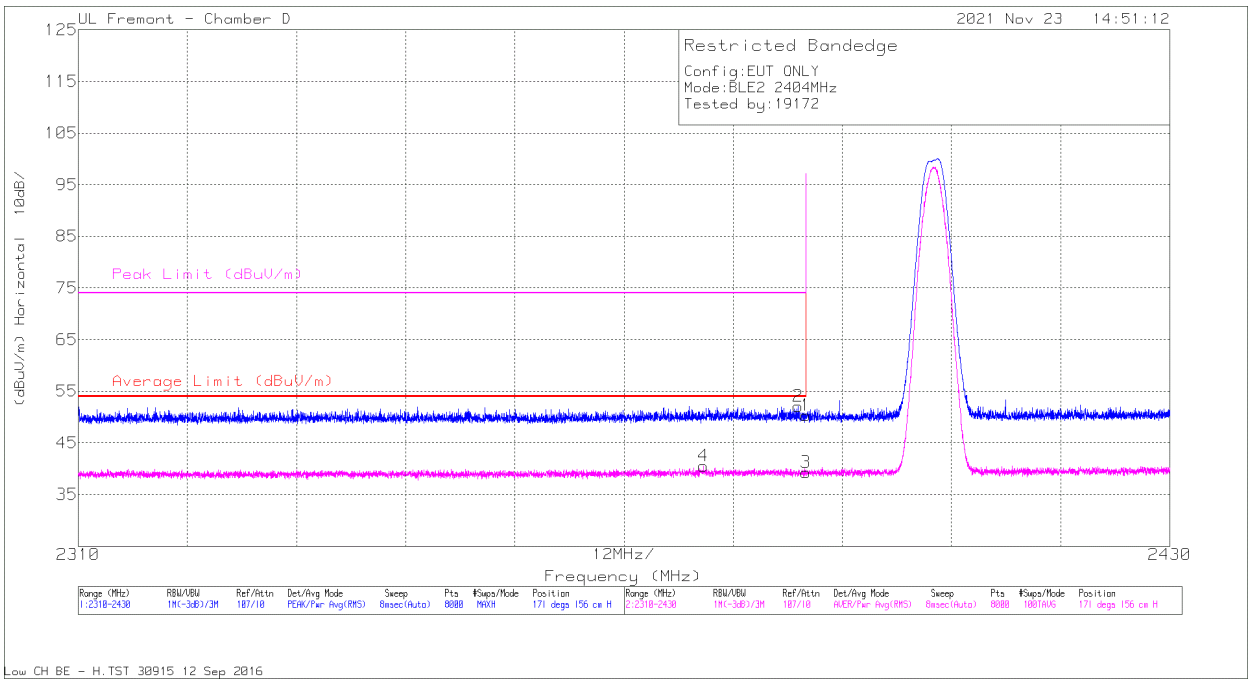
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.8. LOW POWER BLE (2Mbps)

**ANT 2**

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



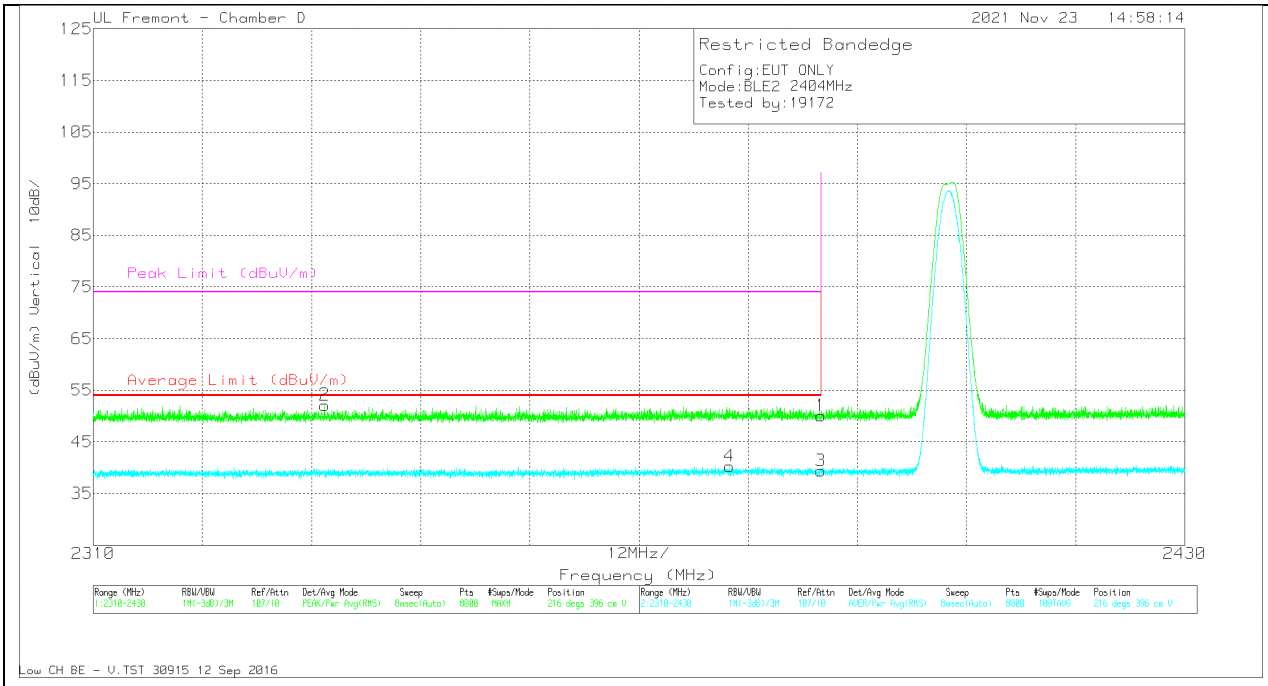

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.87 | Pk | 32.1 | -20.7 | 50.27 | - | - | 74 | -23.73 | 171 | 156 | H |
| 2 | * 2389.151 | 40.7 | Pk | 32.1 | -20.7 | 52.1 | - | - | 74 | -21.9 | 171 | 156 | H |
| 3 | * 2390 | 27.81 | RMS | 32.1 | -20.7 | 39.21 | 54 | -14.79 | - | - | 171 | 156 | H |
| 4 | * 2378.739 | 29.16 | RMS | 32.1 | -20.8 | 40.46 | 54 | -13.54 | - | - | 171 | 156 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.71 | Pk | 32.1 | -20.7 | 50.11 | - | - | 74 | -23.89 | 216 | 396 | V |
| 2 | * 2335.413 | 41.13 | Pk | 31.9 | -20.9 | 52.13 | - | - | 74 | -21.87 | 216 | 396 | V |
| 3 | * 2390 | 28.02 | RMS | 32.1 | -20.7 | 39.42 | 54 | -14.58 | - | - | 216 | 396 | V |
| 4 | * 2379.954 | 28.99 | RMS | 32.1 | -20.8 | 40.29 | 54 | -13.71 | - | - | 216 | 396 | V |

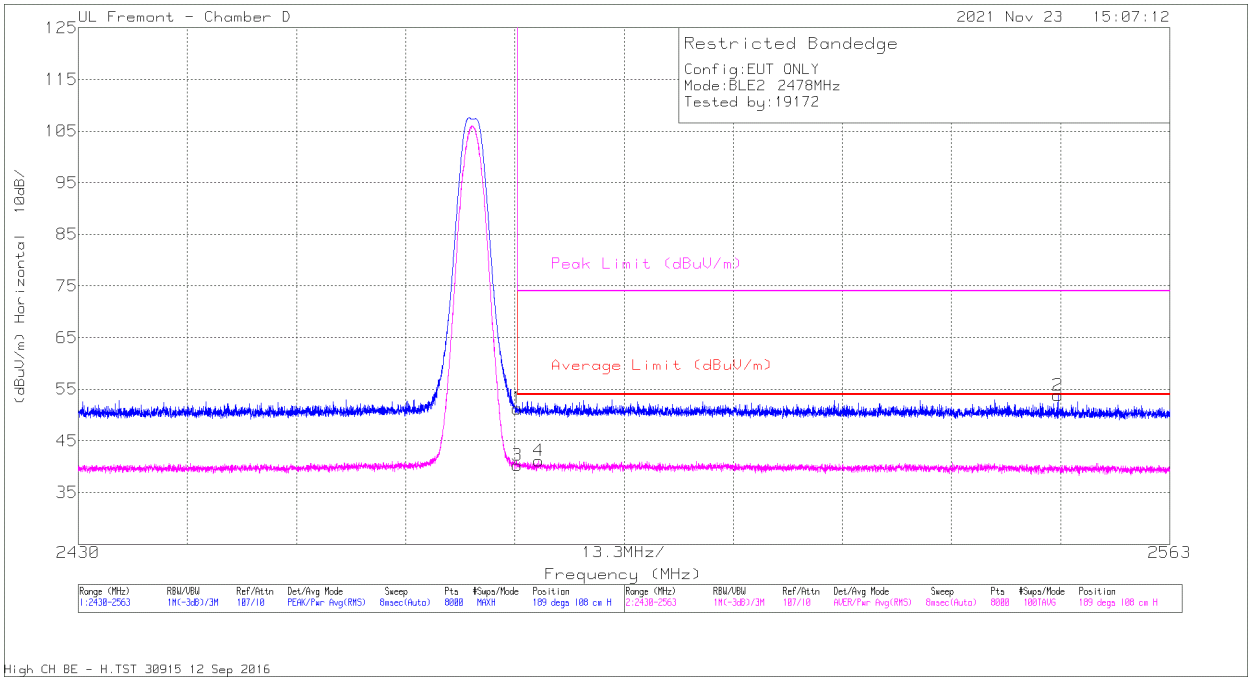
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



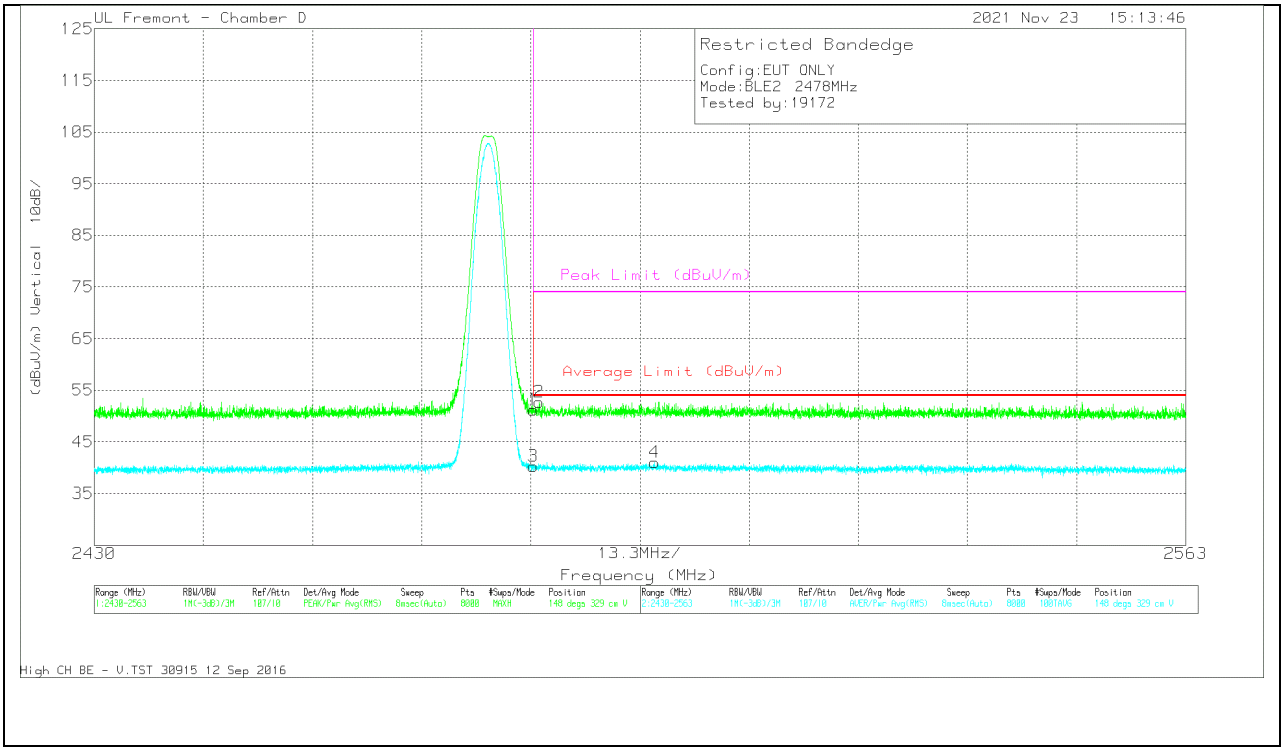

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 39.25 | Pk | 32.7 | -20.7 | 51.25 | - | - | 74 | -22.75 | 189 | 108 | H |
| 3 | * 2483.5 | 28.28 | RMS | 32.7 | -20.7 | 40.28 | 54 | -13.72 | - | - | 189 | 108 | H |
| 4 | * 2486.083 | 29.15 | RMS | 32.7 | -20.7 | 41.15 | 54 | -12.85 | - | - | 189 | 108 | H |
| 2 | 2549.365 | 41.98 | Pk | 32.3 | -20.5 | 53.78 | - | - | 74 | -20.22 | 189 | 108 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 39.14 | Pk | 32.7 | -20.7 | 51.14 | - | - | 74 | -22.86 | 148 | 329 | V |
| 2 | * 2484.221 | 40.75 | Pk | 32.7 | -20.7 | 52.75 | - | - | 74 | -21.25 | 148 | 329 | V |
| 3 | * 2483.5 | 28.31 | RMS | 32.7 | -20.7 | 40.31 | 54 | -13.69 | - | - | 148 | 329 | V |
| 4 | * 2498.237 | 28.78 | RMS | 32.8 | -20.6 | 40.98 | 54 | -13.02 | - | - | 148 | 329 | V |

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

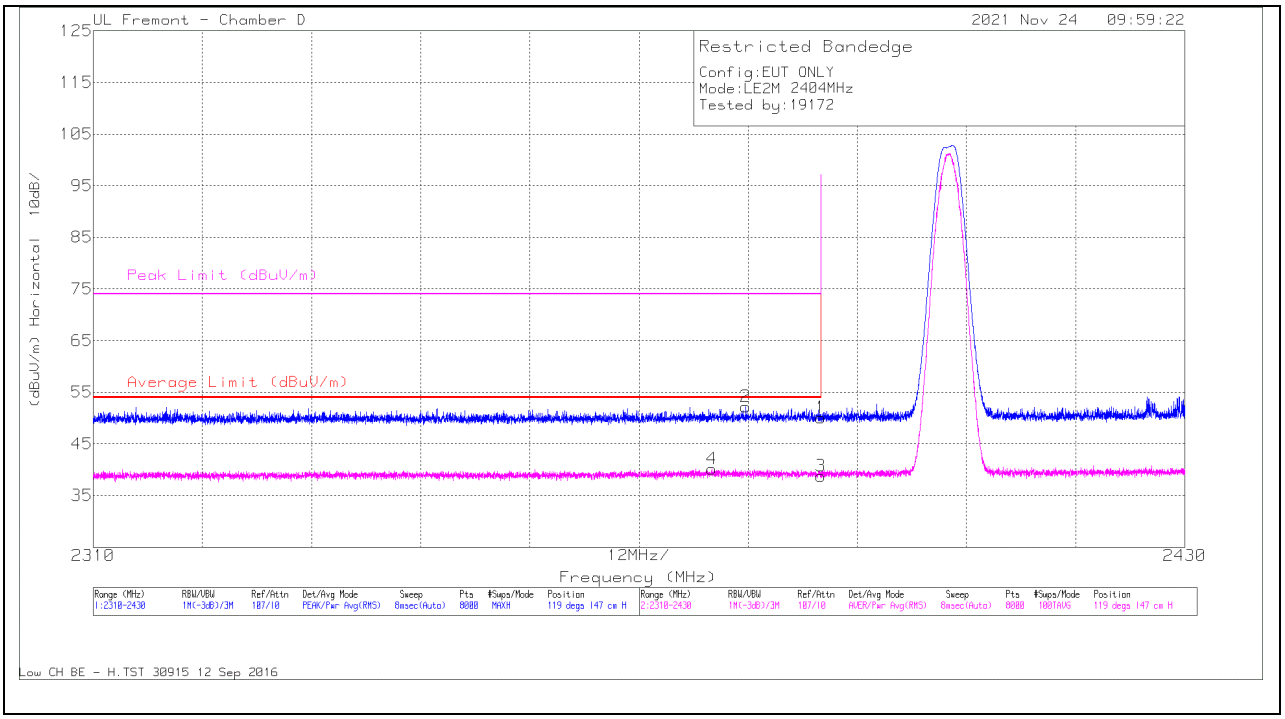


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

**ANT 3**

## BANDEDGE (LOW CHANNEL)

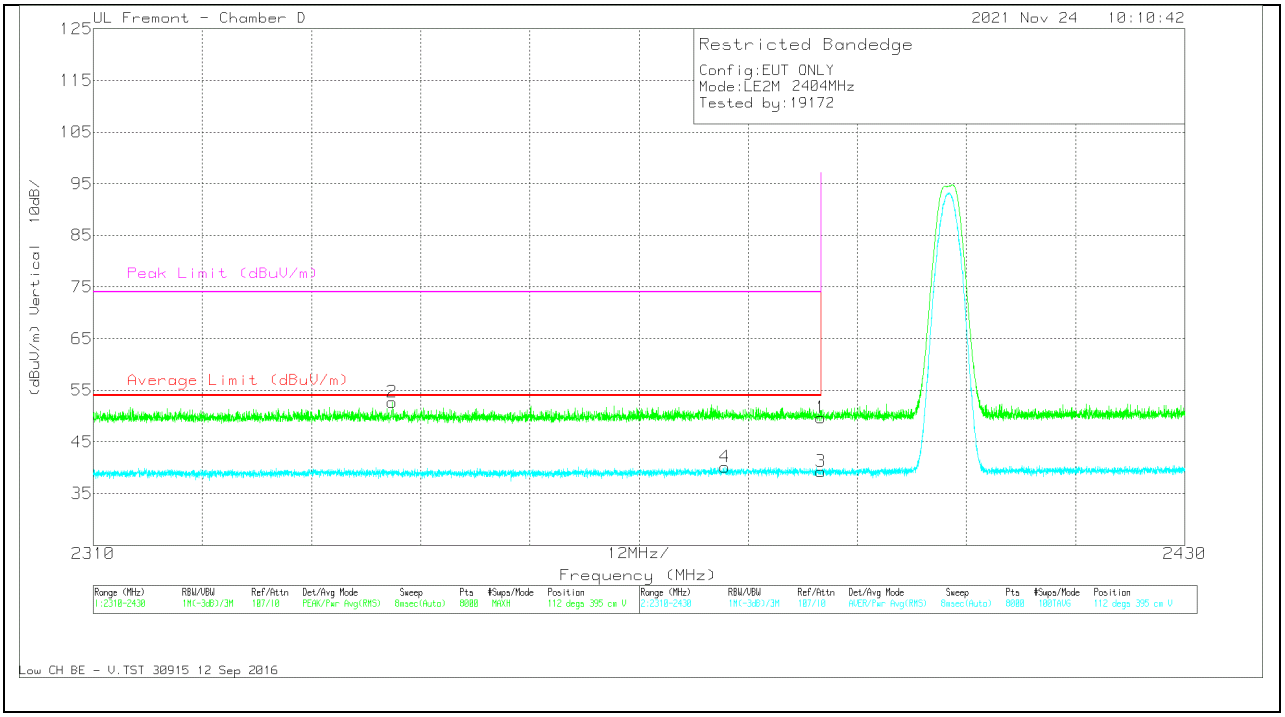
### HORIZONTAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.67 | Pk | 32.1 | -20.7 | 50.07 | - | - | 74 | -23.93 | 119 | 147 | H |
| 2 | * 2381.74 | 40.86 | Pk | 32.1 | -20.8 | 52.16 | - | - | 74 | -21.84 | 119 | 147 | H |
| 3 | * 2390 | 27.35 | RMS | 32.1 | -20.7 | 38.75 | 54 | -15.25 | - | - | 119 | 147 | H |
| 4 | * 2377.989 | 28.87 | RMS | 32.1 | -20.8 | 40.17 | 54 | -13.83 | - | - | 119 | 147 | H |

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

# VERTICAL RESULT

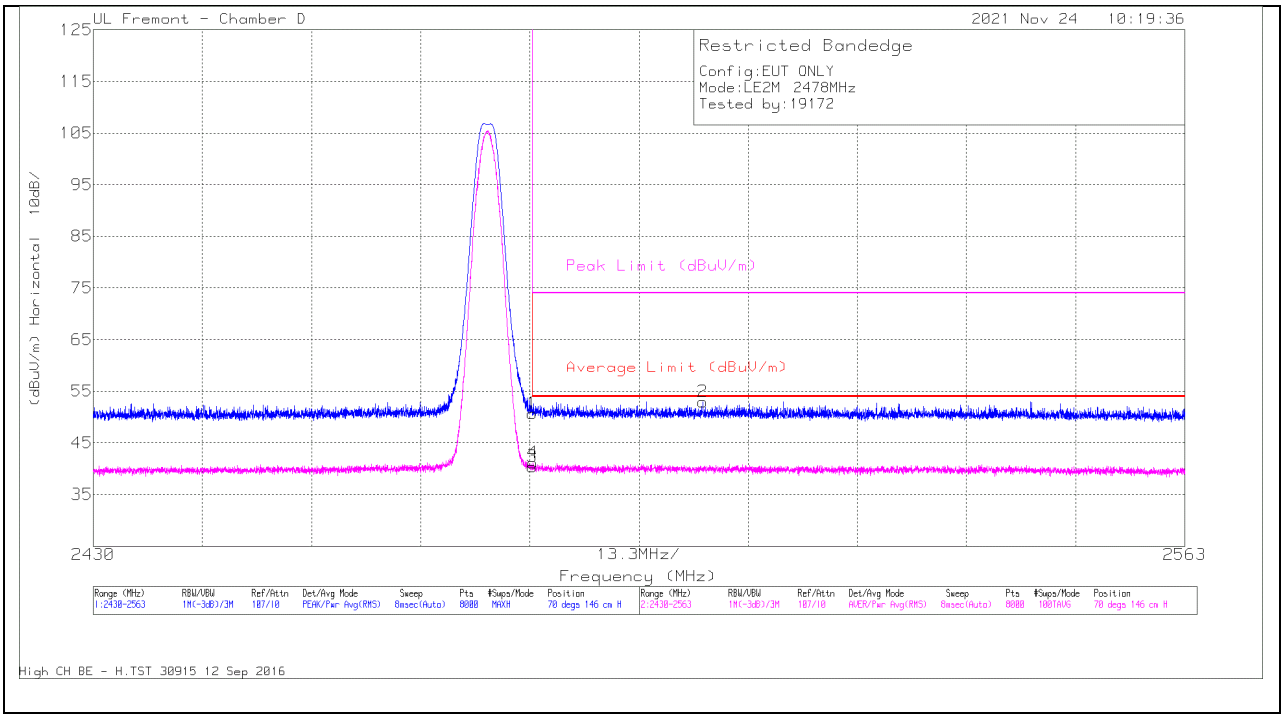



| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.27 | Pk | 32.1 | -20.7 | 49.67 | - | - | 74 | -24.33 | 112 | 395 | V |
| 2 | * 2342.854 | 41.61 | Pk | 31.9 | -20.8 | 52.71 | - | - | 74 | -21.29 | 112 | 395 | V |
| 3 | * 2390 | 27.86 | RMS | 32.1 | -20.7 | 39.26 | 54 | -14.74 | - | - | 112 | 395 | V |
| 4 | * 2379.444 | 28.8 | RMS | 32.1 | -20.8 | 40.1 | 54 | -13.9 | - | - | 112 | 395 | V |

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

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



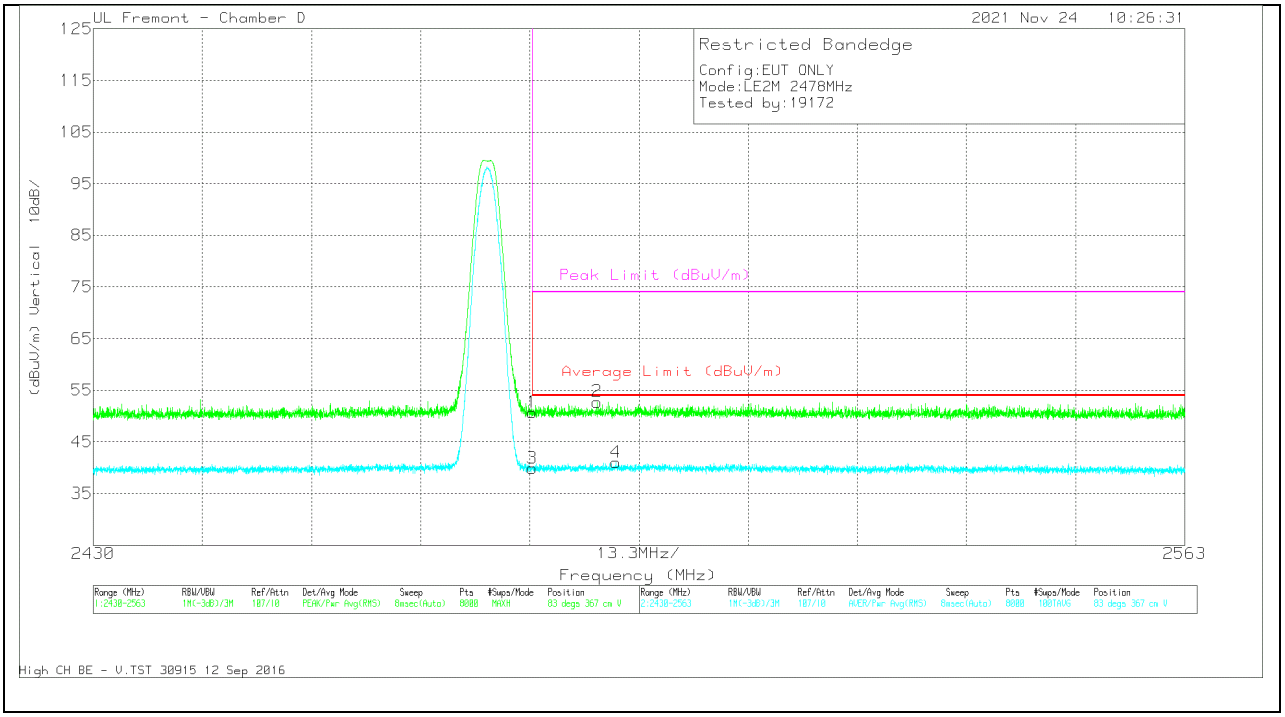

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.73 | Pk | 32.7 | -20.7 | 50.73 | - | - | 74 | -23.27 | 70 | 146 | H |
| 3 | * 2483.5 | 28.34 | RMS | 32.7 | -20.7 | 40.34 | 54 | -13.66 | - | - | 70 | 146 | H |
| 4 | * 2483.589 | 29.09 | RMS | 32.7 | -20.7 | 41.09 | 54 | -12.91 | - | - | 70 | 146 | H |
| 2 | 2504.273 | 40.98 | Pk | 32.7 | -20.7 | 52.98 | - | - | 74 | -21.02 | 70 | 146 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.72 | Pk | 32.7 | -20.7 | 50.72 | - | - | 74 | -23.28 | 83 | 367 | V |
| 2 | * 2491.387 | 40.66 | Pk | 32.8 | -20.7 | 52.76 | - | - | 74 | -21.24 | 83 | 367 | V |
| 3 | * 2483.5 | 27.87 | RMS | 32.7 | -20.7 | 39.87 | 54 | -14.13 | - | - | 83 | 367 | V |
| 4 | * 2493.698 | 28.94 | RMS | 32.8 | -20.7 | 41.04 | 54 | -12.96 | - | - | 83 | 367 | V |

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

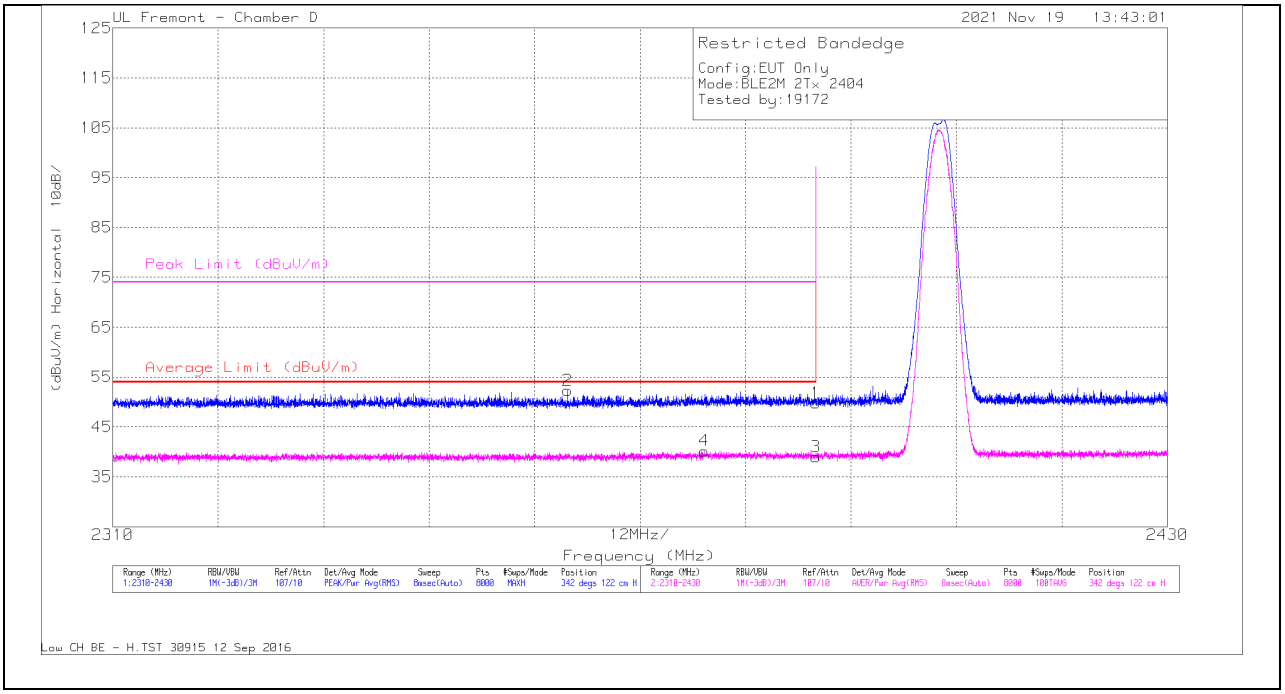


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.2.9. LOW POWER BLE TXBF (2Mbps)

## BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



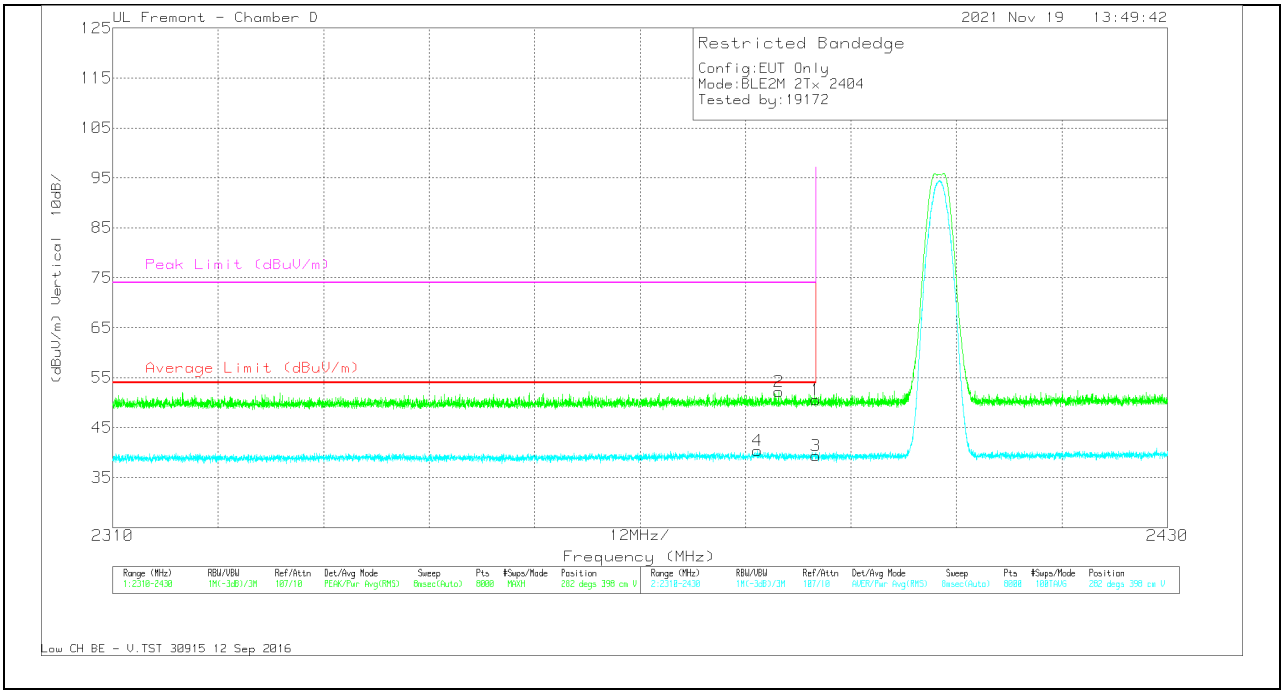

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 38.36 | Pk | 32.1 | -20.7 | 49.76 | - | - | 74 | -24.24 | 342 | 122 | H |
| 2 | * 2361.7419 | 41.21 | Pk | 31.9 | -20.8 | 52.31 | - | - | 74 | -21.69 | 342 | 122 | H |
| 3 | * 2390 | 27.66 | RMS | 32.1 | -20.7 | 39.06 | 54 | -14.94 | - | - | 342 | 122 | H |
| 4 | * 2377.314 | 28.8 | RMS | 32.1 | -20.7 | 40.2 | 54 | -13.8 | - | - | 342 | 122 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2390 | 39.13 | Pk | 32.1 | -20.7 | 50.53 | - | - | 74 | -23.47 | 282 | 398 | V |
| 2 | * 2385.7601 | 40.92 | Pk | 32.1 | -20.8 | 52.22 | - | - | 74 | -21.78 | 282 | 398 | V |
| 3 | * 2390 | 28 | RMS | 32.1 | -20.7 | 39.4 | 54 | -14.6 | - | - | 282 | 398 | V |
| 4 | * 2383.3898 | 29.1 | RMS | 32.1 | -20.8 | 40.4 | 54 | -13.6 | - | - | 282 | 398 | V |

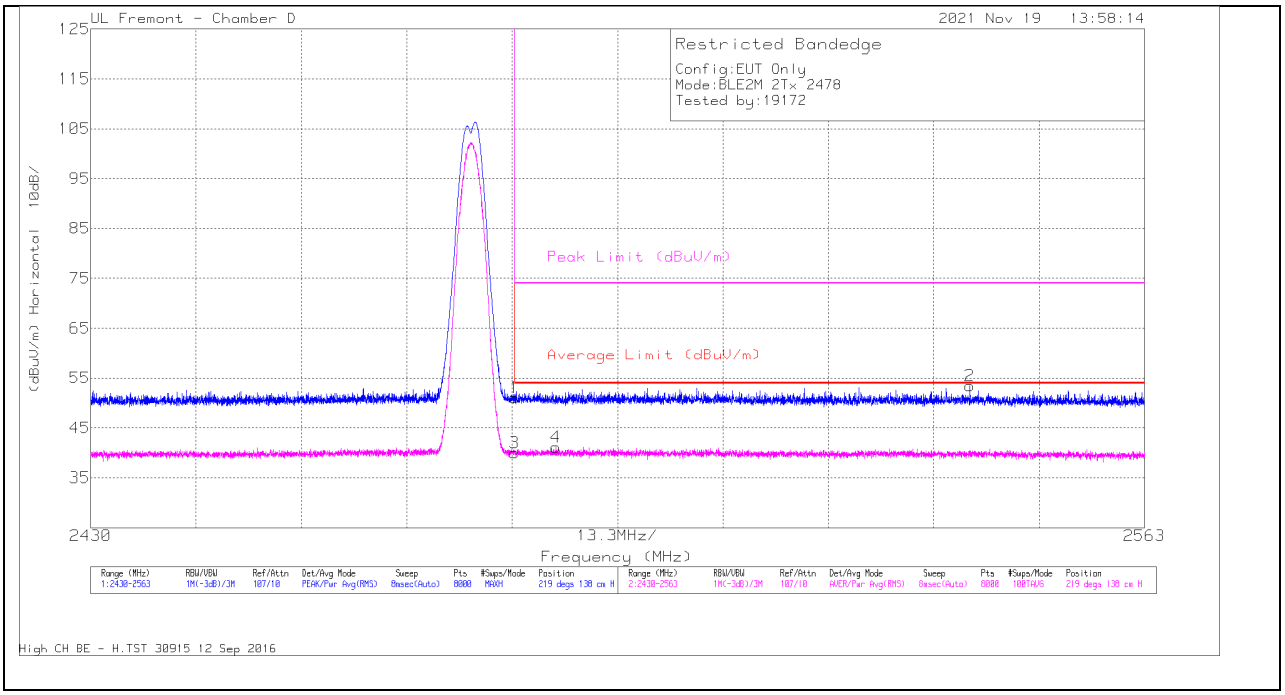
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



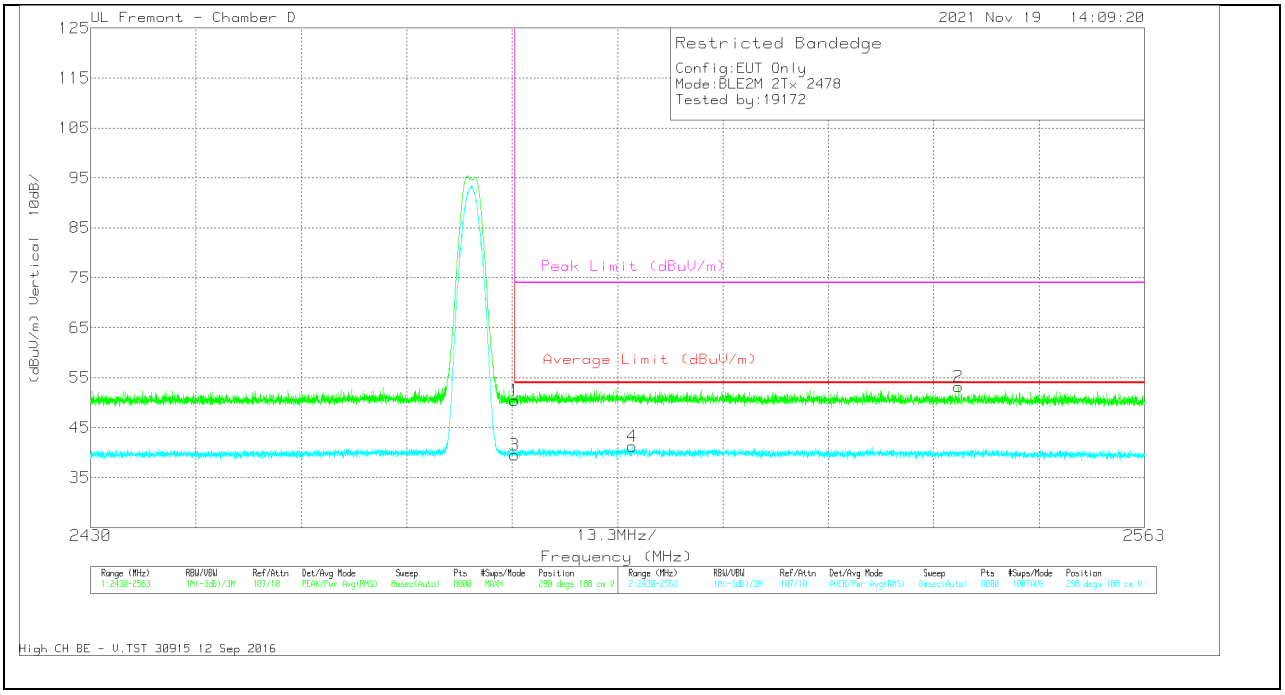

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 39.02 | Pk | 32.7 | -20.7 | 51.02 | - | - | 74 | -22.98 | 219 | 138 | H |
| 3 | * 2483.5 | 28.03 | RMS | 32.7 | -20.7 | 40.03 | 54 | -13.97 | - | - | 219 | 138 | H |
| 4 | * 2488.7099 | 29.07 | RMS | 32.8 | -20.7 | 41.17 | 54 | -12.83 | - | - | 219 | 138 | H |
| 2 | 2540.952 | 41.42 | Pk | 32.4 | -20.4 | 53.42 | - | - | 74 | -20.58 | 219 | 138 | H |

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



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T712 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2483.5 | 38.4 | Pk | 32.7 | -20.7 | 50.4 | - | - | 74 | -23.6 | 298 | 188 | V |
| 3 | * 2483.5 | 27.55 | RMS | 32.7 | -20.7 | 39.55 | 54 | -14.45 | - | - | 298 | 188 | V |
| 4 | * 2498.3536 | 29.11 | RMS | 32.8 | -20.6 | 41.31 | 54 | -12.69 | - | - | 298 | 188 | V |
| 2 | 2539.5221 | 41.16 | Pk | 32.4 | -20.4 | 53.16 | - | - | 74 | -20.84 | 298 | 188 | V |

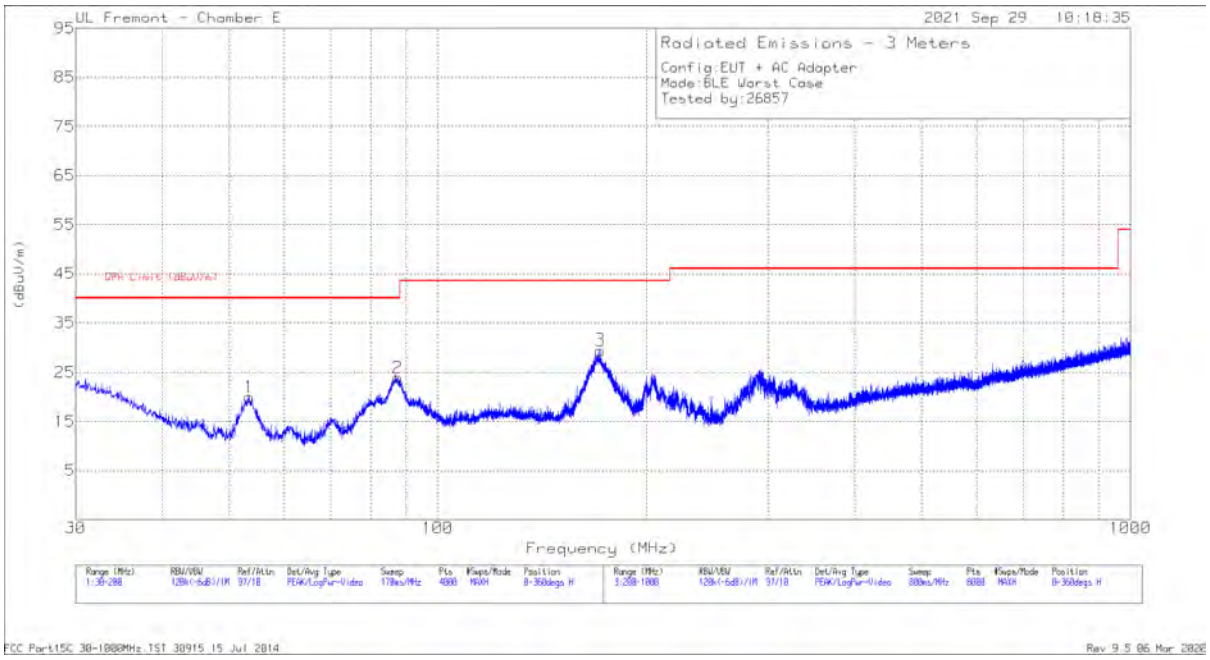
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



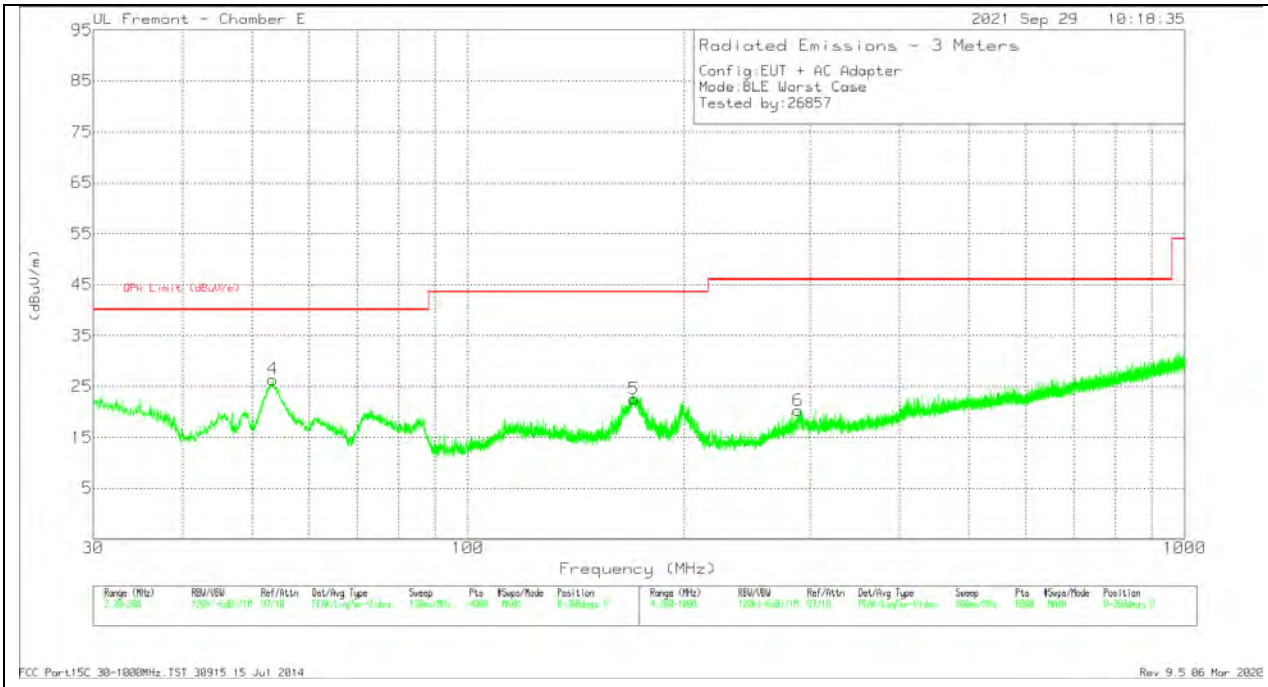
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 10.3. WORST CASE BELOW 1 GHZ

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)**




**HORIZONTAL**




**VERTICAL**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## DATA

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF 204045 (dB/m) | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | * 171.5191 | 42.17 | Pk | 17.4 | -30.1 | 29.47 | 43.52 | -14.05 | 0-360 | 98 | H |
| 5 | * 170.5414 | 35.17 | Pk | 17.5 | -30.1 | 22.57 | 43.52 | -20.95 | 0-360 | 100 | V |
| 1 | 53.4236 | 37.92 | Pk | 13.2 | -31.2 | 19.92 | 40 | -20.08 | 0-360 | 401 | H |
| 4 | 53.4661 | 44.32 | Pk | 13.2 | -31.2 | 26.32 | 40 | -13.68 | 0-360 | 100 | V |
| 2 | 87.4749 | 41.52 | Pk | 13.3 | -30.9 | 23.92 | 40 | -16.08 | 0-360 | 301 | H |
| 6 | 289.0116 | 30.31 | Pk | 19.1 | -29.2 | 20.21 | 46.02 | -25.81 | 0-360 | 99 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

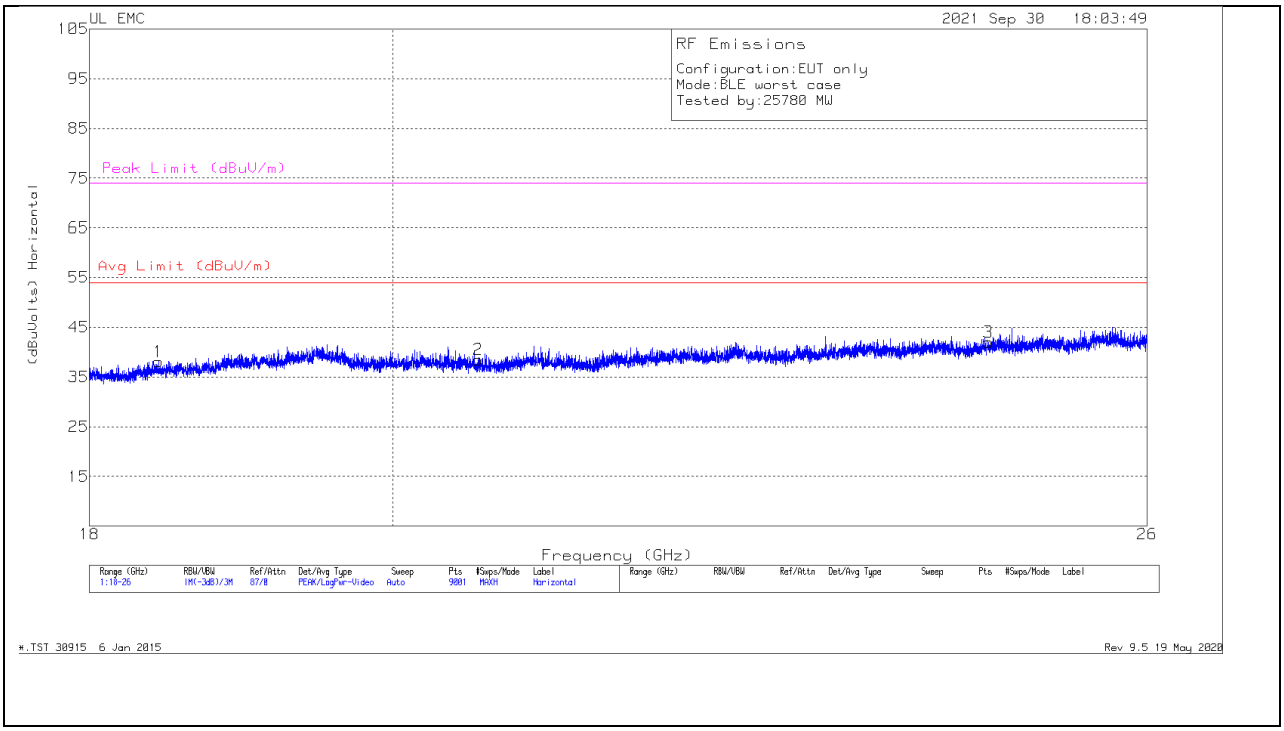


UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

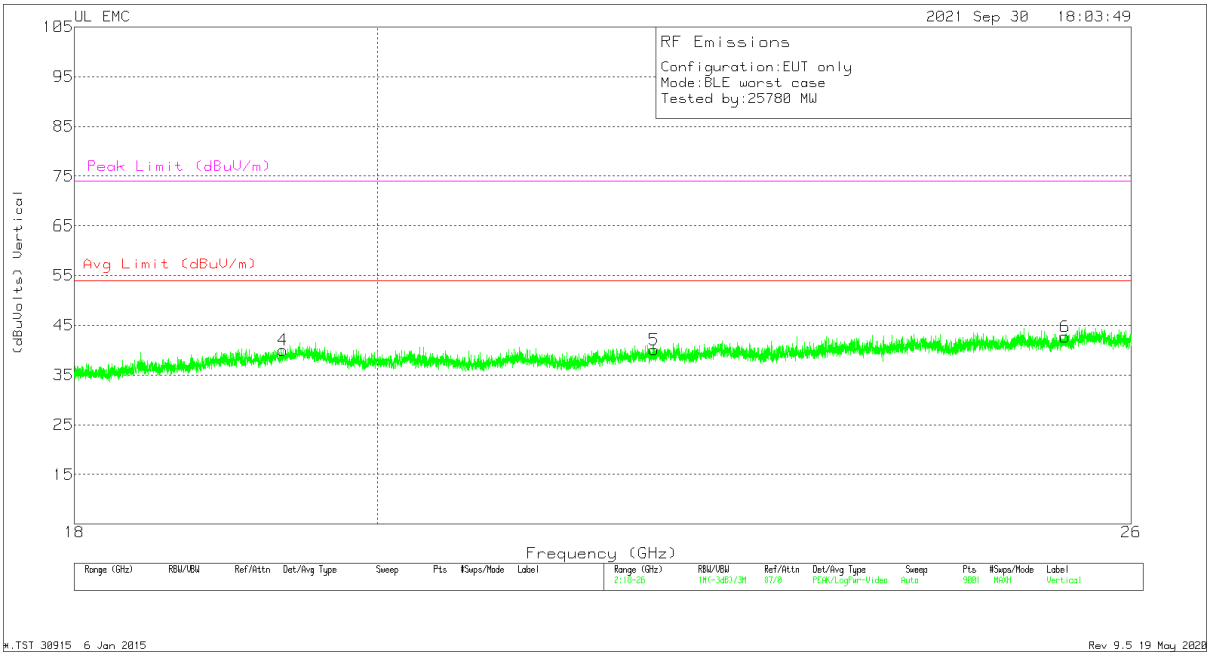
## 10.4. WORST CASE 18-26 GHz

**SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)**

HORIZONTAL




VERTICAL






UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF 81140 | Amp/Cbl (dB) | Dist Corr (dB) | Corrected Reading (dBuVolts) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 18.43733 | 35.7 | Pk | 32.4 | -20.5 | -9.5 | 38.1 | 54 | -15.9 | 74 | -35.9 |
| 2 | 20.60444 | 34.87 | Pk | 32.9 | -19.8 | -9.5 | 38.47 | 54 | -15.53 | 74 | -35.53 |
| 3 | 24.60267 | 35.15 | Pk | 33.8 | -17.5 | -9.5 | 41.95 | 54 | -12.05 | 74 | -32.05 |
| 4 | 19.35467 | 34.99 | Pk | 32.7 | -18.2 | -9.5 | 39.99 | 54 | -14.01 | 74 | -34.01 |
| 5 | 22.02133 | 35.37 | Pk | 33.3 | -19.1 | -9.5 | 40.07 | 54 | -13.93 | 74 | -33.93 |
| 6 | 25.40711 | 36.09 | Pk | 34.2 | -18.1 | -9.5 | 42.69 | 54 | -11.31 | 74 | -31.31 |

Pk - Peak detector



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# 11. AC POWER LINE CONDUCTED EMISSIONS

**LIMITS**

FCC §15.207 (a)

RSS-Gen 8.8

| Frequency of Emission (MHz) | Conducted Limit (dBµV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

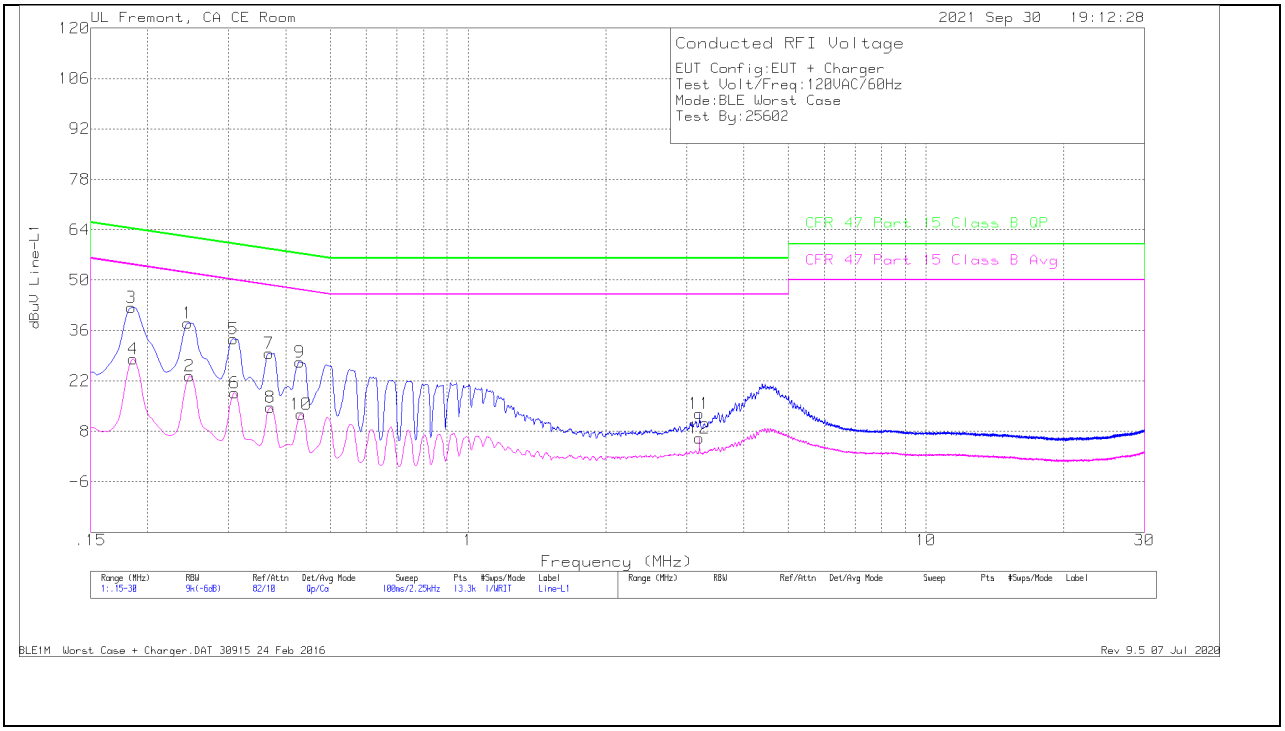
**RESULTS**



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 11.1. AC POWER LINE WITH AC/DC ADAPTER

### LINE 1 RESULTS




Range 1: Line-L1 .15 - 30MHz

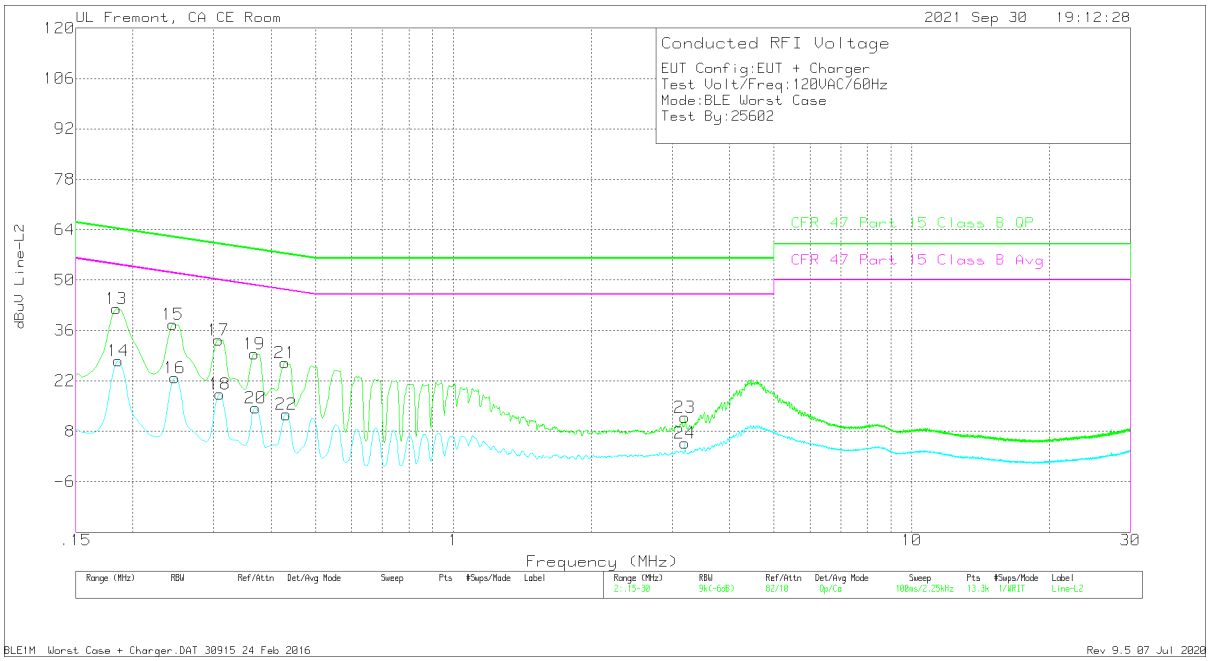
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | PRE018644 6 L1 | LC Cables C1&C3 dB | TekBox Limiter TBFL1 Model 207 | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR)Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | .24675 | 14.1 | Ca | 0 | 0 | 9.3 | 23.4 | - | - | 51.87 | -28.47 |
| 4 | .186 | 18.74 | Ca | 0 | 0 | 9.4 | 28.14 | - | - | 54.21 | -26.07 |
| 6 | .30975 | 9.31 | Ca | 0 | 0 | 9.3 | 18.61 | - | - | 49.98 | -31.37 |
| 8 | .3705 | 5.37 | Ca | 0 | 0 | 9.3 | 14.67 | - | - | 48.49 | -33.82 |
| 10 | .43125 | 3.48 | Ca | 0 | 0 | 9.3 | 12.78 | - | - | 47.23 | -34.45 |
| 12 | 3.19875 | -3.3 | Ca | 0 | .1 | 9.3 | 6.1 | - | - | 46 | -39.9 |
| 1 | .2445 | 28.8 | Qp | 0 | 0 | 9.3 | 38.1 | 61.94 | -23.84 | - | - |
| 3 | .18375 | 33.07 | Qp | 0 | 0 | 9.4 | 42.47 | 64.31 | -21.84 | - | - |
| 5 | .3075 | 24.34 | Qp | 0 | 0 | 9.3 | 33.64 | 60.04 | -26.4 | - | - |
| 7 | .36825 | 20.39 | Qp | 0 | 0 | 9.3 | 29.69 | 58.54 | -28.85 | - | - |
| 9 | .429 | 18 | Qp | 0 | 0 | 9.3 | 27.3 | 57.27 | -29.97 | - | - |
| 11 | 3.19875 | 3.57 | Qp | 0 | .1 | 9.3 | 12.97 | 56 | -43.03 | - | - |

Qp - Quasi-Peak detector
Ca - CISPR average detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

# LINE 2 RESULTS




Range 2: Line-L2 .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | PRE018644 6 L2 | LC Cables C2&C3 dB | TekBox Limiter TBFL1 Model 207 | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR)Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | .186 | 18.22 | Ca | 0 | 0 | 9.4 | 27.62 | - | - | 54.21 | -26.59 |
| 16 | .24675 | 13.63 | Ca | 0 | 0 | 9.3 | 22.93 | - | - | 51.87 | -28.94 |
| 18 | .30975 | 8.95 | Ca | 0 | 0 | 9.3 | 18.25 | - | - | 49.98 | -31.73 |
| 20 | .3705 | 5.23 | Ca | 0 | 0 | 9.3 | 14.53 | - | - | 48.49 | -33.96 |
| 22 | .43125 | 3.36 | Ca | 0 | 0 | 9.3 | 12.66 | - | - | 47.23 | -34.57 |
| 24 | 3.19875 | -4.73 | Ca | 0 | .1 | 9.3 | 4.67 | - | - | 46 | -41.33 |
| 13 | .18375 | 32.67 | Qp | 0 | 0 | 9.4 | 42.07 | 64.31 | -22.24 | - | - |
| 15 | .2445 | 28.45 | Qp | 0 | 0 | 9.3 | 37.75 | 61.94 | -24.19 | - | - |
| 17 | .3075 | 24.08 | Qp | 0 | 0 | 9.3 | 33.38 | 60.04 | -26.66 | - | - |
| 19 | .36825 | 20.21 | Qp | 0 | 0 | 9.3 | 29.51 | 58.54 | -29.03 | - | - |
| 21 | .429 | 17.79 | Qp | 0 | 0 | 9.3 | 27.09 | 57.27 | -30.18 | - | - |
| 23 | 3.19875 | 2.42 | Qp | 0 | .1 | 9.3 | 11.82 | 56 | -44.18 | - | - |

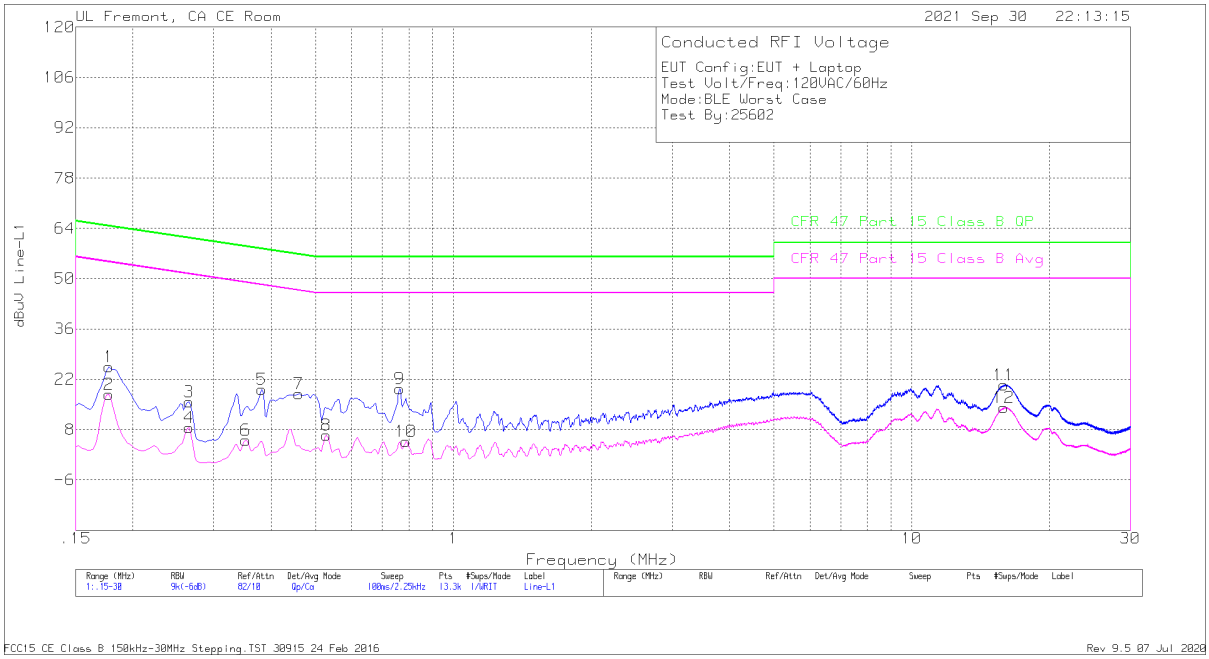
Qp - Quasi-Peak detector
Ca - CISPR average detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 11.2. AC POWER LINE WITH LAPTOP

### LINE 1 RESULTS

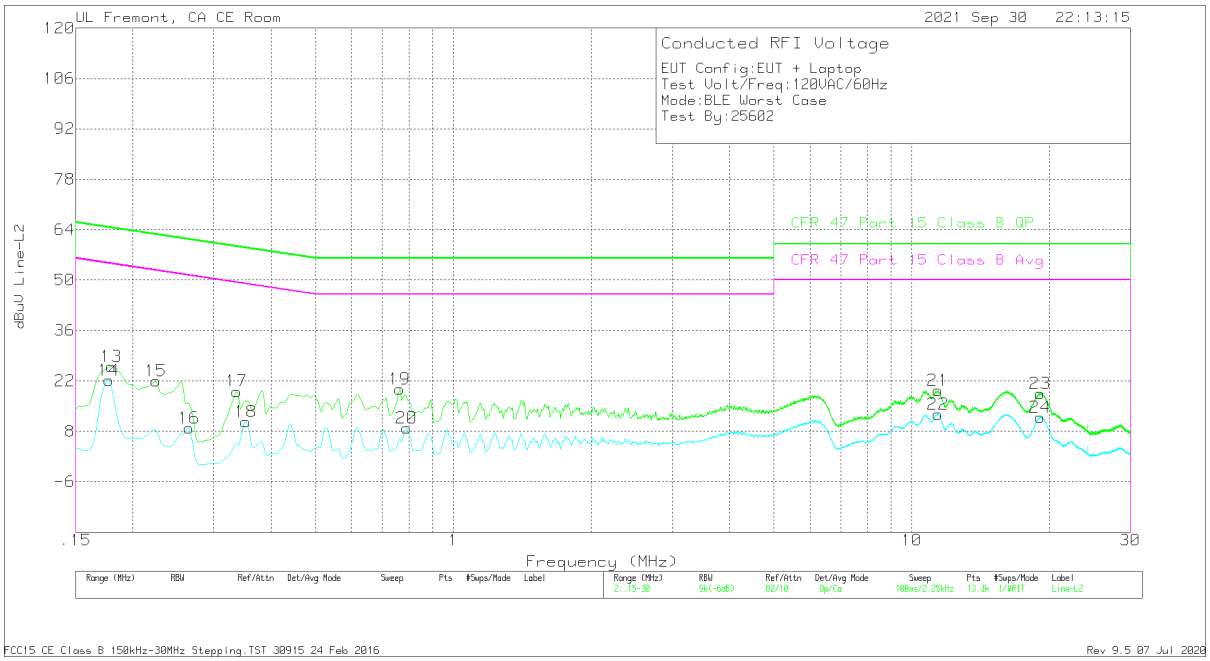



Range 1: Line-L1 .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | PRE018644 6 L1 | LC Cables C1&C3 dB | TekBox Limiter TBFL1 Model 207 | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR)Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | .177 | 8.33 | Ca | 0 | 0 | 9.4 | 17.73 | - | - | 54.63 | -36.9 |
| 4 | .26475 | -.69 | Ca | 0 | 0 | 9.3 | 8.61 | - | - | 51.28 | -42.67 |
| 6 | .3525 | -4.25 | Ca | 0 | 0 | 9.3 | 5.05 | - | - | 48.9 | -43.85 |
| 8 | .528 | -2.91 | Ca | 0 | 0 | 9.3 | 6.39 | - | - | 46 | -39.61 |
| 10 | .789 | -4.7 | Ca | 0 | .1 | 9.3 | 4.7 | - | - | 46 | -41.3 |
| 12 | 15.90225 | 4.6 | Ca | 0 | .2 | 9.3 | 14.1 | - | - | 50 | -35.9 |
| 1 | .177 | 16.13 | Qp | 0 | 0 | 9.4 | 25.53 | 64.63 | -39.1 | - | - |
| 3 | .26475 | 6.45 | Qp | 0 | 0 | 9.3 | 15.75 | 61.28 | -45.53 | - | - |
| 5 | .38175 | 9.84 | Qp | 0 | 0 | 9.3 | 19.14 | 58.24 | -39.1 | - | - |
| 7 | .4605 | 8.61 | Qp | 0 | 0 | 9.3 | 17.91 | 56.68 | -38.77 | - | - |
| 9 | .76425 | 9.98 | Qp | 0 | .1 | 9.3 | 19.38 | 56 | -36.62 | - | - |
| 11 | 15.89663 | 10.97 | Qp | 0 | .2 | 9.3 | 20.47 | 60 | -39.53 | - | - |

Qp - Quasi-Peak detector
Ca - CISPR average detection

# LINE 2 RESULTS




Range 2: Line-L2 .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | PRE018644 6 L2 | LC Cables C2&C3 dB | TekBox Limiter TBFL1 Model 207 | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR)Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | .177 | 12.7 | Ca | 0 | 0 | 9.4 | 22.1 | - | - | 54.63 | -32.53 |
| 16 | .26475 | -.47 | Ca | 0 | 0 | 9.3 | 8.83 | - | - | 51.28 | -42.45 |
| 18 | .3525 | 1.32 | Ca | 0 | 0 | 9.3 | 10.62 | - | - | 48.9 | -38.28 |
| 20 | .79125 | -.4 | Ca | 0 | 0 | 9.3 | 8.9 | - | - | 46 | -37.1 |
| 22 | 11.4045 | 3.27 | Ca | 0 | .2 | 9.3 | 12.77 | - | - | 50 | -37.23 |
| 24 | 19.04775 | 2.33 | Ca | 0 | .2 | 9.3 | 11.83 | - | - | 50 | -38.17 |
| 13 | .17925 | 16.59 | Qp | 0 | 0 | 9.4 | 25.99 | 64.52 | -38.53 | - | - |
| 15 | .22425 | 12.72 | Qp | 0 | 0 | 9.3 | 22.02 | 62.66 | -40.64 | - | - |
| 17 | .33675 | 9.81 | Qp | 0 | 0 | 9.3 | 19.11 | 59.28 | -40.17 | - | - |
| 19 | .76425 | 10.39 | Qp | 0 | 0 | 9.3 | 19.69 | 56 | -36.31 | - | - |
| 21 | 11.40675 | 9.85 | Qp | 0 | .2 | 9.3 | 19.35 | 60 | -40.65 | - | - |
| 23 | 19.04775 | 8.94 | Qp | 0 | .2 | 9.3 | 18.44 | 60 | -41.56 | - | - |

Qp - Quasi-Peak detector
Ca - CISPR average detection



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

## 12. SETUP PHOTOS

Please refer to 13911916-EP1V1 for setup photos

# END OF TEST REPORT



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888