March 29, 2024

CalAmp Wireless Networks, Inc

2200 Faraday Ave, #200
Carlsbad, CA 92008

Dear Imad Rizk,

Enclosed is the Wireless test report for compliance testing of the CalAmp Wireless Networks, Inc., LTE CAT1 Telematics Gateway as tested to the requirements of Title 47 of the CFR, Part 15 Subpart C, RSS 247 for Intentional Radiators.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. If you have any questions regarding these results or if Eurofins Electrical and Electronic Testing NA, Inc. can be of further service to you, please feel free to contact me.

Gary Chou

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIR130984_130989-CalAmp_FCC_ISED-BLE_Rev 1.1

ACCREDITED
CERT #591.02
FCC Test Site(s) Reg #:US1123
IC Test Site(s) Reg. #: 2043C



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# FCC/ ISED Test Report

**Applicant name: CalAmp Wireless Networks, Inc**

**Product: LTE CAT1 Telematics Gateway**

**Report: WIR130984_130989-CalAmp_FCC_ISED-BLE_Rev 1.1**

**Applicant Address:**

**2200 Faraday Ave, #200**
**Carlsbad, CA 92008**

**Manufacturer Address:**

**2200 Faraday Ave, #200**
**Carlsbad, CA 92008**

**Prepared By:**
**Eurofins Electrical and Electronic Testing NA, Inc.**
3162 Belick St.
Santa Clara CA, 95054

# FCC/ ISED Test Report

## Applicant name: CalAmp Wireless Networks, Inc

**Product: CalAmp Wireless Networks, Inc**

**Standard**
**47 CFR FCC Part 15, Subpart C (Section 15.247)**
**558074 D01 15.247 Meas Guidance v05r02**
**RSS 247 Issue2, February 2017**
**RSS Gen Issue5, March 2019**
**ANSI C63.10: 2013**

Richard Dollente
Richard Dollente Test Engineer, Wireless Laboratory

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements FCC Rules under normal use and maintenance.

Gary Chou
Gary Chou
Wireless Engineering Manager, Wireless Laboratory

# Report Status Sheet

| Revision | Report Date | Reason for Revision |
|---|---|---|
| ∅ | March 29, 2024 | Initial Issue. |
| 1.0 | April 22, 2024 | Update Output Power Procedure |
| 1.1 | May 01, 2024 | Add Test Data for Data Rate 2 MHz/ Updated Output Power for 1MHz Data Rate |

# Table of Contents

# I. Executive Summary

## A. Executive Summary

| 47 CFR FCC Part 15, Subpart C (SECTION 15.247)<br>RSS 247 Issue2, RSS Gen Issue5 | | | | |
|---|---|---|---|---|
| FCC/ IC Cluse | ISED | Test Item | Result | Remarks |
| 15.207 | RSS Gen 8.8 | AC Power Conducted Emission | N/A | Powered by DC so test is not required. |
| 15.205 &15.209 & 15.247(d) | RSS Gen 8.8 | Radiated Emissions and Band Edge Measurement | PASS | Meet the requirement of limit. |
| 15.247(a)(2) | RSS 247 5.5C | 6dB bandwidth & 99% bandwidth | PASS | Meet the requirement of limit. |
| 15.247(b) | RSS 247 5.2.1<br>RSS Gen 6.7 | Conducted power | PASS | Meet the requirement of limit. |
| 15.247(e) | RSS 247 5.4.4 | Power Spectral Density | PASS | Meet the requirement of limit. |
| 15.203 | RSS 247 5.2.2 | Antenna Requirement | PASS | Chip antenna (without connector) meet the requirement. |

**Note:**

1.Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

# II. Equipment Information

## A. Overview

**EUT Summary Table**

| | | |
|---|---|---|
| **Product:** | LTE CAT1 Telematics Gateway | |
| **Brand:** | CalAmp | |
| **Model(s) Tested:** | LMU4350LB/ LMU4351LB | |
| **Series Model:** | N/A | |
| **Sample Status:** | Product Sample | |
| **EUT Specifications:** | Primary Power: | 12 Vdc/ 24 Vdc |
| | Voltage Frequency: | N/A |
| | Technology / Type of Modulations: | BLUETOOTH LE: GFSK |
| | Operating Frequency : | 2.402 ~ 2.480GHz |
| | FCC ID: | APV-4350LB |
| | ISED ID: | 5843C-4350LB |
| | Antenna Type/ Manufacturer/ Model: | Dielectric Chip Antenna/ CIROCOMM TECHNOLOGY/ DCAK0012 |
| | Antenna connector: | N/A |
| | Antenna Gain | Antenna Gain: 2 dBi |
| **Analysis:** | The results obtained relate only to the item(s) tested. | |
| **Environmental Test Conditions:** | Temperature: 20.3° C | |
| | Relative Humidity: 47.5% | |
| | Barometric Pressure: 860-1060 mbar | |
| **Evaluated by:** | Richard Dollente | |
| **Issue Date(s):** | May 01, 2024 | |

NOTE: The following modules can be chosen to be configured in the EUT.

| | Model No. | FCC ID | Note |
|---|---|---|---|
| - | - | - | - |
| - | - | - | - |

## FCC/IC RF Testing Units Setting

| Model | Hardware (FW) Rev. | Firmware (FW) Rev. | FW operation verification and Instruction |
|---|---|---|---|
| LMU4350LB/ LMU4351LB | REV A | 3.21.21 | Verify by Spectrum Analyzer & Laptop |

### DESCRIPTION OF TEST MODES

Power Setting :

| Channel | Frequency(MHz) | Power Setting |
|---|---|---|
| 0 | 2402 | Default |
| 19 | 2440 | Default |
| 39 | 2480 | Default |

40 channels are provided for Bluetooth LE:

| Channel | Frequency(MHz) | Channel | Frequency(MHz) | Channel | Frequency(MHz) |
|---|---|---|---|---|---|
| 0 | 2402 | 14 | 2430 | 28 | 2458 |
| 1 | 2404 | 15 | 2432 | 29 | 2460 |
| 2 | 2406 | 16 | 2434 | 30 | 2462 |
| 3 | 2408 | 17 | 2436 | 31 | 2464 |
| 4 | 2410 | 18 | 2438 | 32 | 2466 |
| 5 | 2412 | 19 | 2440 | 33 | 2468 |
| 6 | 2414 | 20 | 2442 | 34 | 2470 |
| 7 | 2416 | 21 | 2444 | 35 | 2472 |
| 8 | 2418 | 22 | 2446 | 36 | 2474 |
| 9 | 2420 | 23 | 2448 | 37 | 2476 |
| 10 | 2422 | 24 | 2450 | 38 | 2478 |
| 11 | 2424 | 25 | 2452 | 39 | 2480 |
| 12 | 2426 | 26 | 2454 | | |
| 13 | 2428 | 27 | 2456 | | |

## B. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| B | wideband radio communication tester | ROHDE& SCHARZ | CMW500 | 1201.0002K50 | - | Bluetooth Tester |

**Note: (Describe the outline of a simulator, if used for the tests, as a note under the table.)**

**Insert Cable Connections to/from EUT provided by test team.**

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| | - | - | - | - | 0 | - |

Note: The core(s) is(are) originally attached to the cable(s).

**General Description of Applied Standards**

## C. References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

- **47 CFR FCC Part 15, Subpart C (Section 15.247)**
- **558074 D01 15.247 Meas Guidance v05r02**
- **ANSI C63.10:2013**
- **RSS 247 Issue2**
- **RSS Gen Issue5**

## D. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 3162 Belick St. Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.02) in accordance with ISO/IEC 17025:2017.

Eurofins Electrical and Electronic Testing NA, Inc. is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

## E. Measurement Uncertainty

| Test Method | Typical Expanded Uncertainty | K | Confidence Level |
|---|---|---|---|
| **RF Frequencies** | ±4.52 Hz | 2 | 95% |
| **RF Power Conducted Emissions** | ±2.32 dB | 2 | 95% |
| **RF Power Conducted Spurious Emissions** | ±2.25 dB | 2 | 95% |
| **RF Power Radiated Emissions** | ±3.01 dB | 2 | 95% |

**Uncertainty Calculations Summary**

## F. Modifications

### a) Modifications to EUT

No modifications were made to the EUT.

### b) Modifications to Test Standard

No modifications were made to the test standard.

## G. Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to CalAmp Wireless Networks, Inc upon completion of testing.

# III. Electromagnetic Compatibility Criteria for Intentional Radiators

**Radiated Emission and Bandage Measurement**

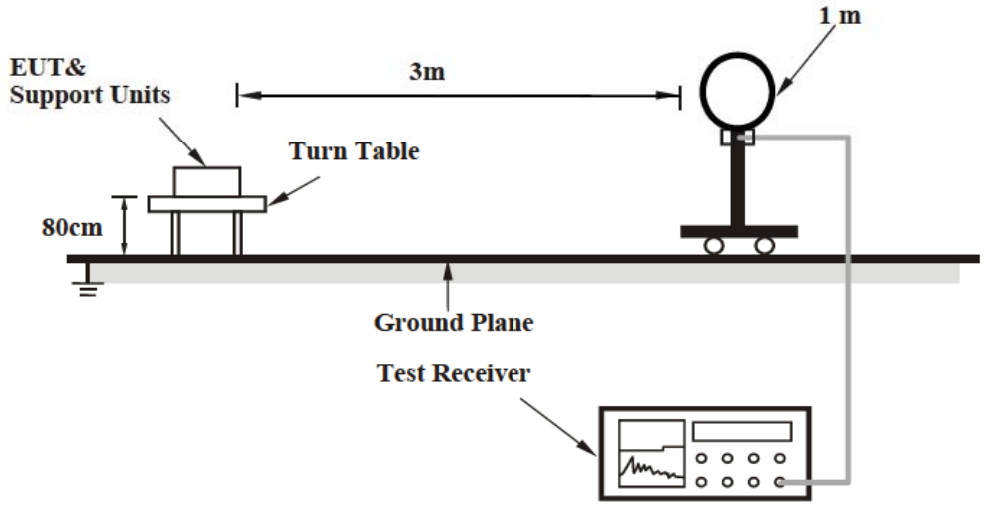
Limits of Radiated Emission and Bandage Measurement:
Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

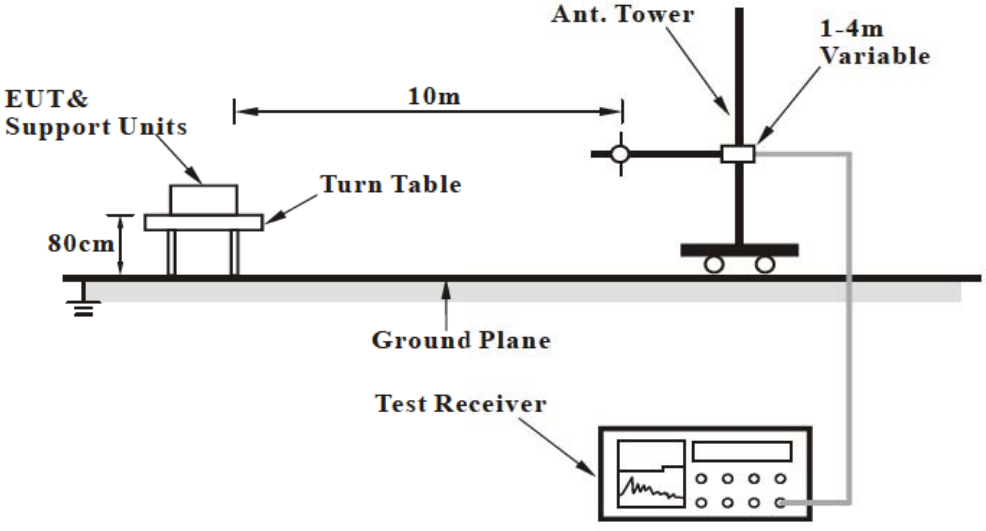
**Test Procedures:** The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Only noise floor was measured above 18 GHz.

**Test Setup**

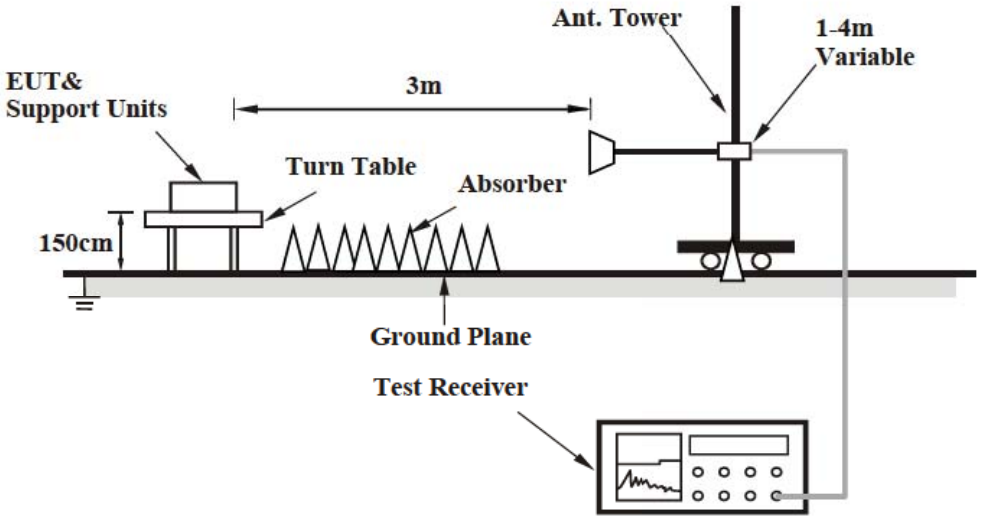
**For Radiated Emission Below 30MHz**




**For Radiated emission 30 MHz to 1GHz**



**For Radiated emission 1GHz to 40GHz**




**Test Results:** The EUT was tested is **compliant** with Radiated Spurious Emissions Requirements.

**Test Equipment List**

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

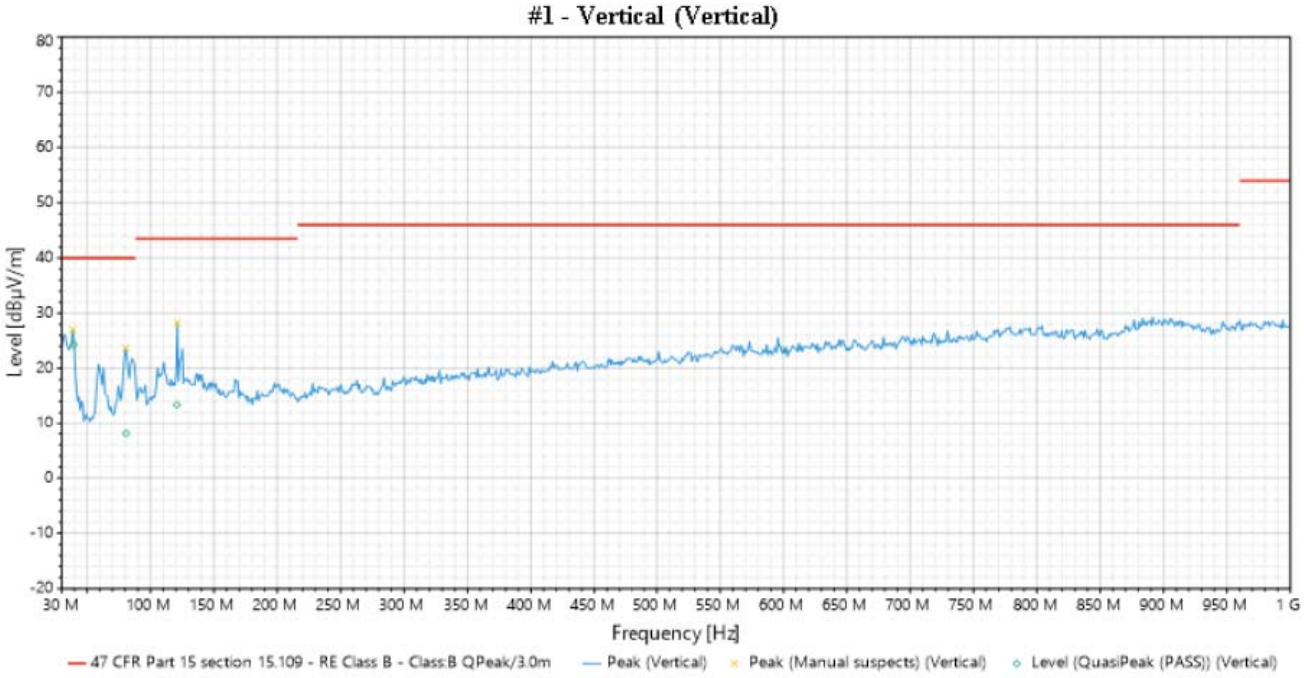
| Asset # | Equipment | Manufacturer | Model | Last Cal Date | Cal Due Date |
|---|---|---|---|---|---|
| 1S2003 | EMI Test Receiver | Keysight | N9030B | 11/06/2023 | 11/06/2024 |
| 1S2399 | Turntable Controller | SUNOL SCIENCE | SC99V | Not Required | Not Required |
| 1S2486 | 5 Meter Chamber Control Room | Panashield | 5 Meter Control Room | Not Required | Not Required |
| 1S3826 | Horn Antenna | ETS-LINDGREN | 3117 | 04/06/2023 | 04/06/2025 |
| 1S4802 | Preamplifier | EMC Instrument | EMC118A45SE | Note 1 | Note 1 |
| 1S2668 | Preamplifier | Sonoma Instrument | 310N | Note 1 | Note 1 |
| 1S2600 | Antenna | Sunol Sciences Corp | JB3 | 04/ 11/ 2023 | 04/ 11/ 2025 |
| Note 1: Verified by calibrated instrumentation at the time of testing | | | | | |

**Test Engineer:** Richard Dollente

**Test Date(s):** 03/29/2024

## Test Data
## Radiated Emissions (30 MHz~1000 MHz)

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 30MHz-1GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 1Mbps Data Rate | | |



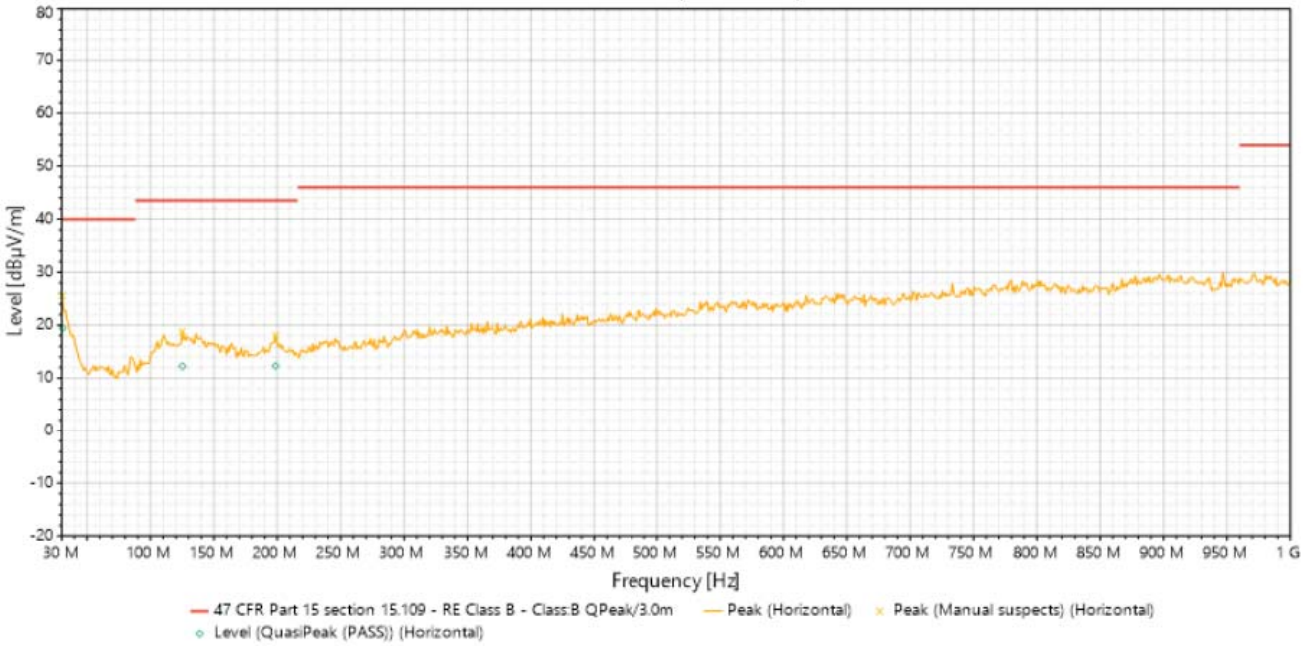

| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Pass/ Fail |
| 1 | 39.48 | Vertical | 24.321 | 40 | -15.679 | 1.2 | 0 | -9.541 | Pass |
| 2 | 80.81 | Vertical | 8.091 | 40 | -31.909 | 1.972 | 197 | -15.144 | Pass |
| 3 | 120.82 | Vertical | 13.422 | 43.5 | -30.078 | 1.497 | 328 | -7.68 | Pass |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 30MHz-1GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 1Mbps Data Rate | | |

**#2 - Horizontal (Horizontal)**



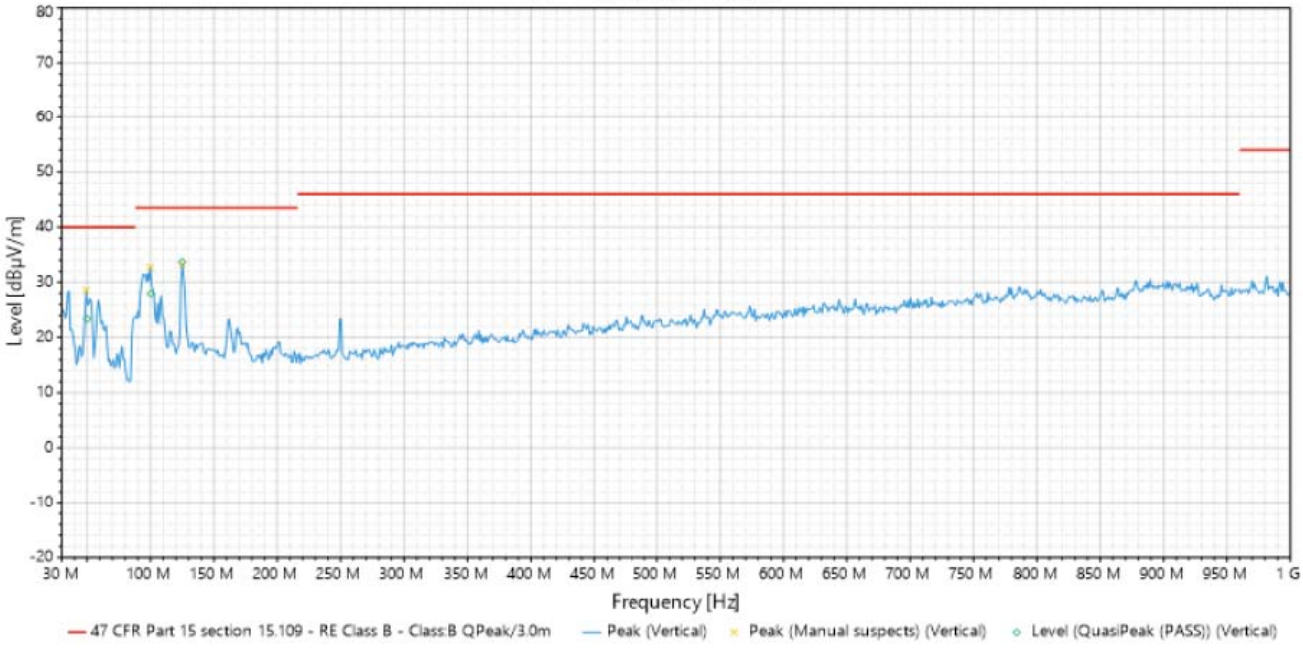

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Pass/ Fail |
| 1 | 30.67 | Horizontal | 19.477 | 40 | -20.523 | 2.919 | 24 | -1.161 | Pass |
| 2 | 125.2 | Horizontal | 12.226 | 43.5 | -31.274 | 2.088 | 215 | -7.771 | Pass |
| 3 | 198.66 | Horizontal | 12.286 | 43.5 | -31.214 | 3.273 | 201 | -7.717 | Pass |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 30MHz-1GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 2Mbps Data Rate | | |

#1 - Vertical (Vertical)



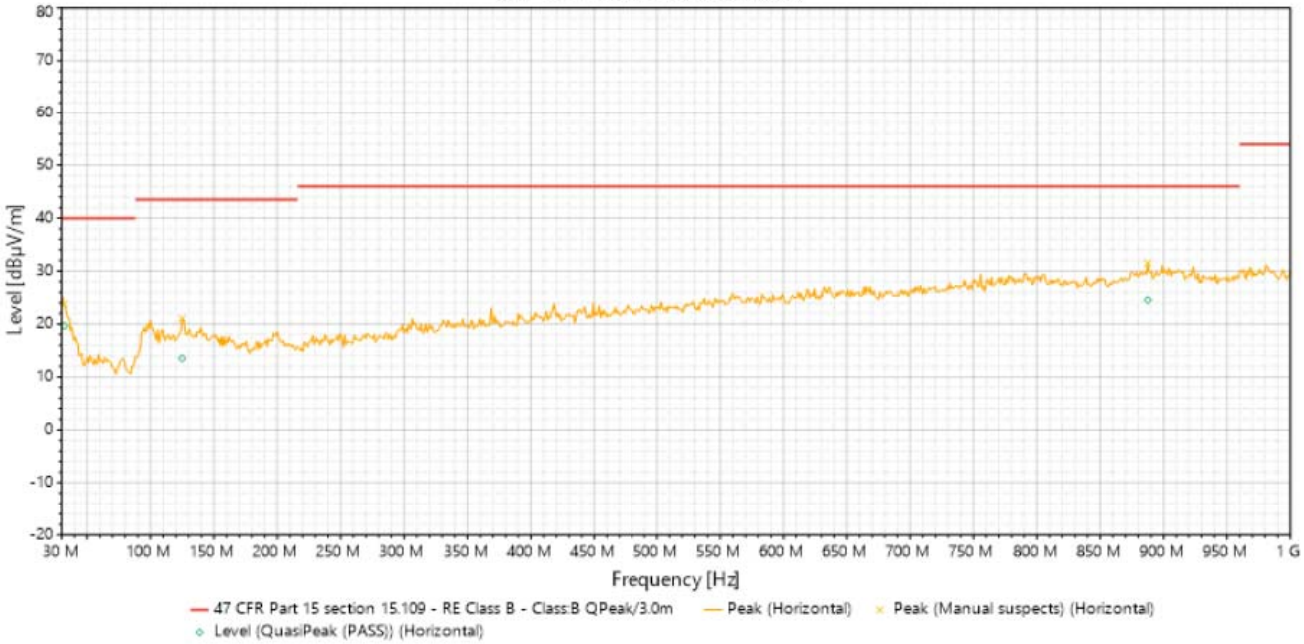

| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Pass/ Fail |
| 1 | 50.14 | Vertical | 23.392 | 40 | -16.608 | 1.168 | 266 | -14.42 | Pass |
| 2 | 100.27 | Vertical | 27.926 | 43.5 | -15.574 | 1.866 | 32 | -10.353 | Pass |
| 3 | 125 | Vertical | 33.681 | 43.5 | -9.819 | 1.027 | 121 | -7.513 | Pass |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 30MHz-1GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 2Mbps Data Rate | | |

#2 - Horizontal (Horizontal)



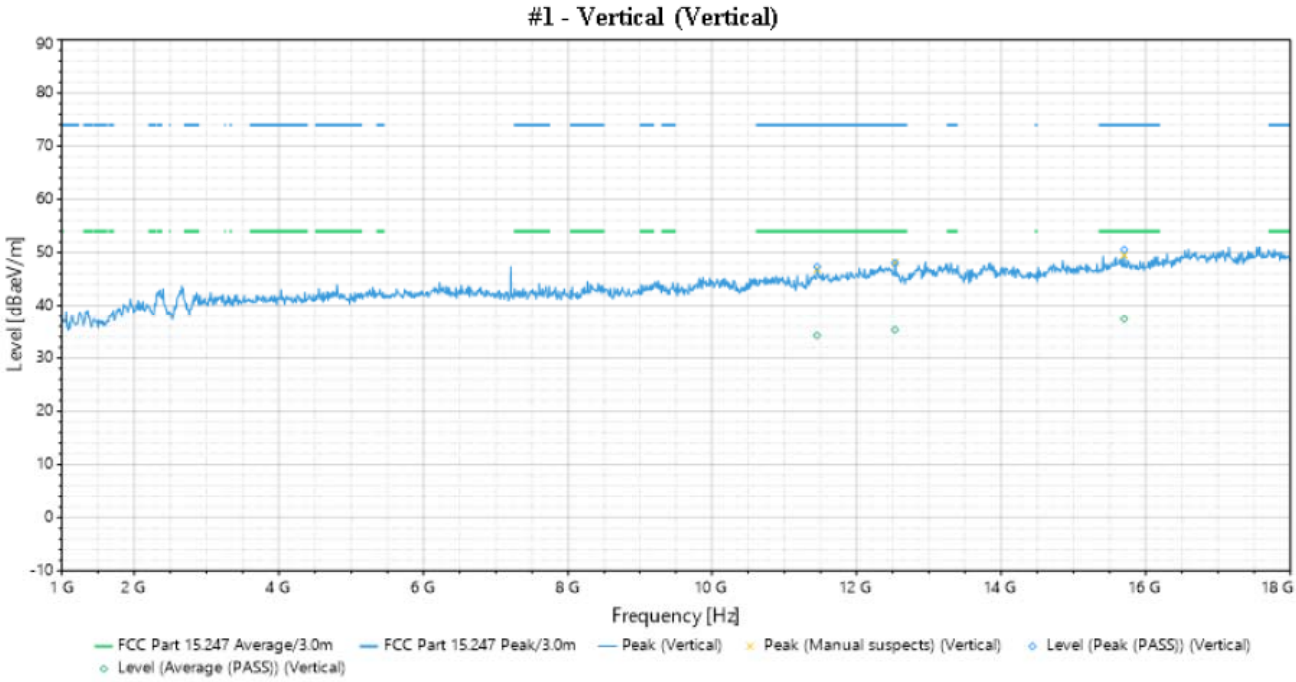

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Pass/ Fail |
| 1 | 32.12 | Horizontal | 19.667 | 40 | -20.333 | 1.801 | 17 | -2.393 | Pass |
| 2 | 125.02 | Horizontal | 13.528 | 43.5 | -29.972 | 1.328 | 333 | -7.782 | Pass |
| 3 | 887.59 | Horizontal | 24.546 | 46 | -21.454 | 2.644 | 243 | 4.78 | Pass |

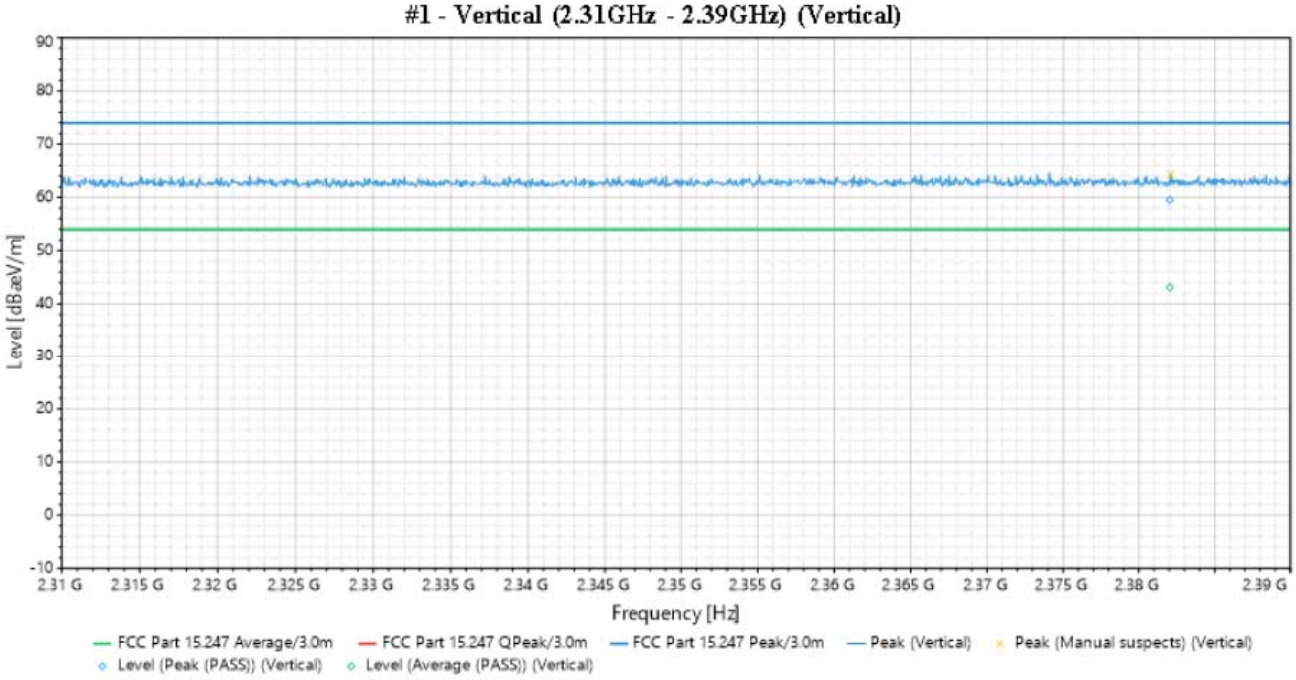
**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

## Radiated Emissions (Above 1GHz)

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2402 MHz, 1Mbps Data Rate | | |





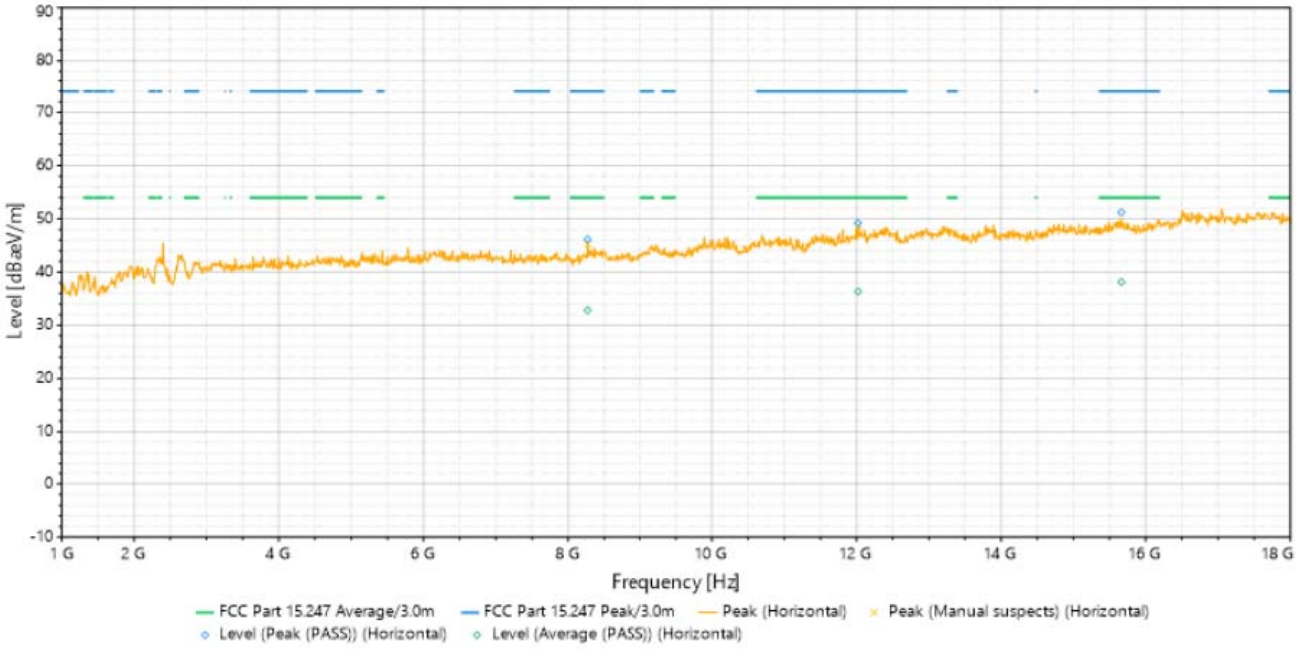

| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 11454.1 | Vertical | 47.35 | 74 | -26.65 | 3.1 | 263 | 8.006 | Peak (PASS) |
| 2 | 11454.1 | Vertical | 34.257 | 54 | -19.743 | 3.1 | 263 | 8.006 | Average (PASS) |
| 3 | 12532.1 | Vertical | 48.06 | 74 | -25.94 | 3.1 | 290 | 9.001 | Peak (PASS) |
| 4 | 12532.1 | Vertical | 35.307 | 54 | -18.693 | 3.1 | 290 | 9.001 | Average (PASS) |
| 5 | 15702 | Vertical | 50.549 | 74 | -23.451 | 3.1 | 265 | 10.027 | Peak (PASS) |
| 6 | 15702 | Vertical | 37.377 | 54 | -16.623 | 3.1 | 265 | 10.027 | Average (PASS) |
| 7 | 2382.038 | Vertical | 59.551 | 74 | -14.449 | 2.638 | 106 | 38.188 | Peak (PASS) |
| 8 | 2382.038 | Vertical | 43.149 | 54 | -10.851 | 2.638 | 106 | 38.188 | Average (PASS) |

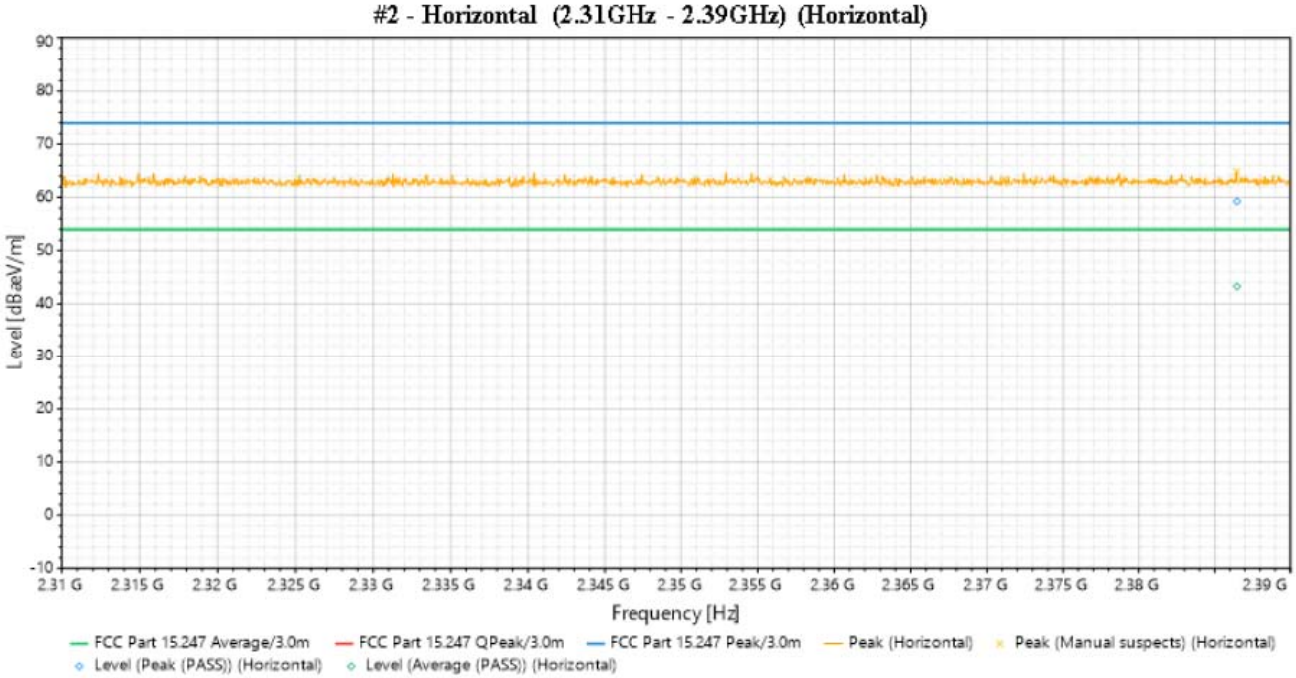
**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2402 MHz, 1Mbps Data Rate | | |

#2 - Horizontal (Horizontal)



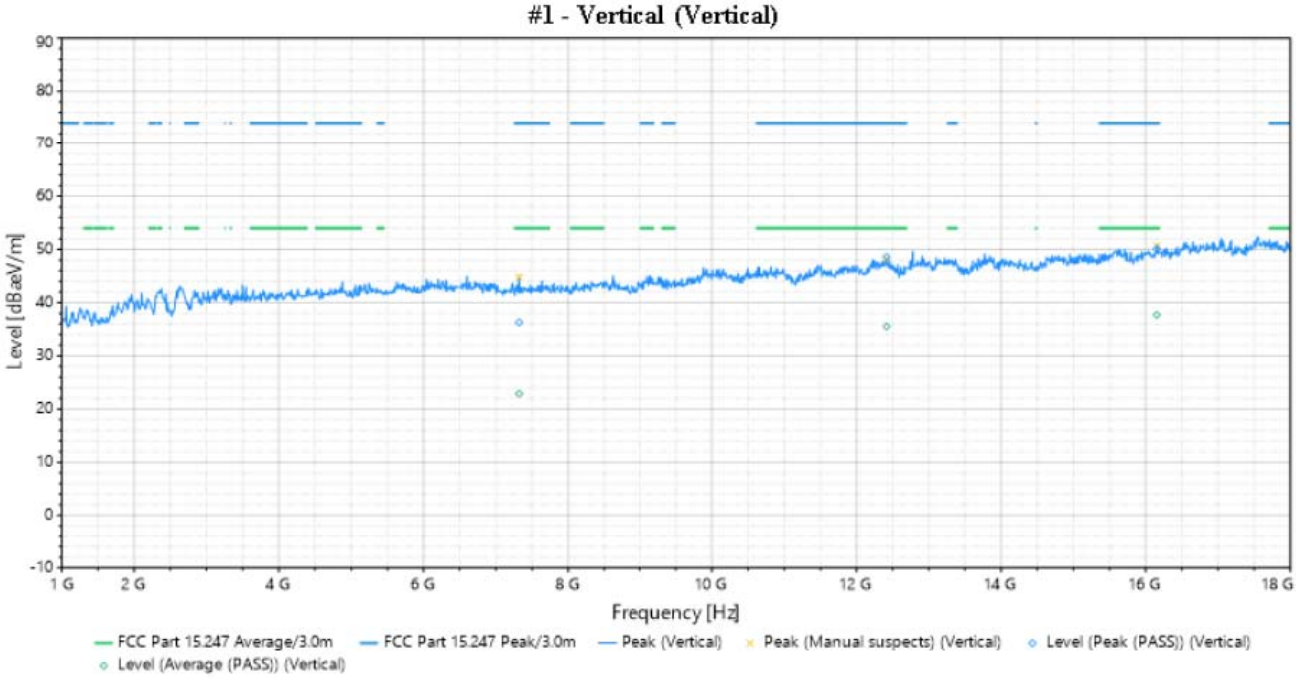



| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 8265.4 | Horizontal | 46.186 | 74 | -27.814 | 3.5 | 191 | 6.674 | Peak (PASS) |
| 2 | 8265.4 | Horizontal | 32.869 | 54 | -21.131 | 3.5 | 191 | 6.674 | Average (PASS) |
| 3 | 12022.3 | Horizontal | 49.182 | 74 | -24.818 | 3.5 | 145 | 8.882 | Peak (PASS) |
| 4 | 12022.3 | Horizontal | 36.346 | 54 | -17.654 | 3.5 | 145 | 8.882 | Average (PASS) |
| 5 | 15664.2 | Horizontal | 51.238 | 74 | -22.762 | 3.5 | 360 | 9.947 | Peak (PASS) |
| 6 | 15664.2 | Horizontal | 38.151 | 54 | -15.849 | 3.5 | 360 | 9.947 | Average (PASS) |
| 7 | 2386.467 | Horizontal | 59.262 | 74 | -14.738 | 2.435 | 15 | 38.311 | Peak (PASS) |
| 8 | 2386.467 | Horizontal | 43.289 | 54 | -10.711 | 2.435 | 15 | 38.311 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 1Mbps Data Rate | | |

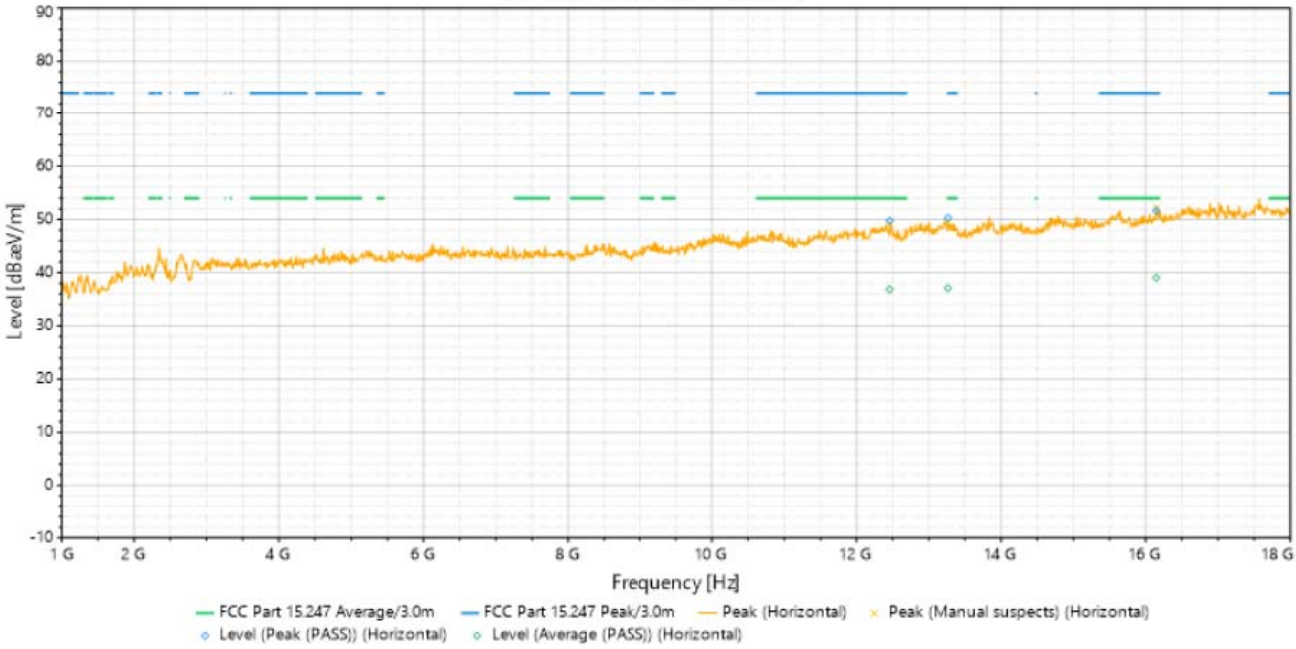



| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 7320.9 | Vertical | 36.286 | 74 | -37.714 | 2.1 | 232 | 6.55 | Peak (PASS) |
| 2 | 7320.9 | Vertical | 22.891 | 54 | -31.109 | 2.1 | 232 | 6.55 | Average (PASS) |
| 3 | 12415.2 | Vertical | 48.574 | 74 | -25.426 | 3.1 | 219 | 8.86 | Peak (PASS) |
| 4 | 12415.2 | Vertical | 35.525 | 54 | -18.475 | 3.1 | 219 | 8.86 | Average (PASS) |
| 5 | 16154.2 | Vertical | 50.13 | 74 | -23.87 | 3.1 | 298 | 10.316 | Peak (PASS) |
| 6 | 16154.2 | Vertical | 37.696 | 54 | -16.304 | 3.1 | 298 | 10.316 | Average (PASS) |

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 1Mbps Data Rate | | |

#2 - Horizontal (Horizontal)

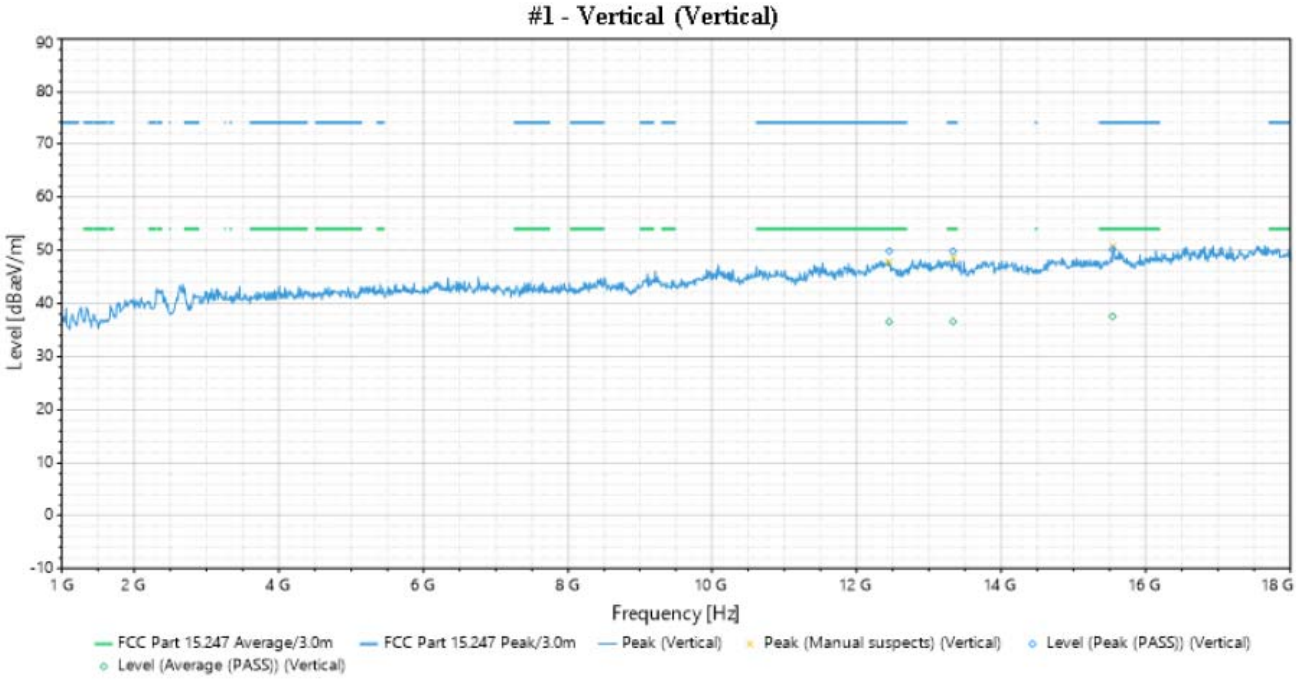


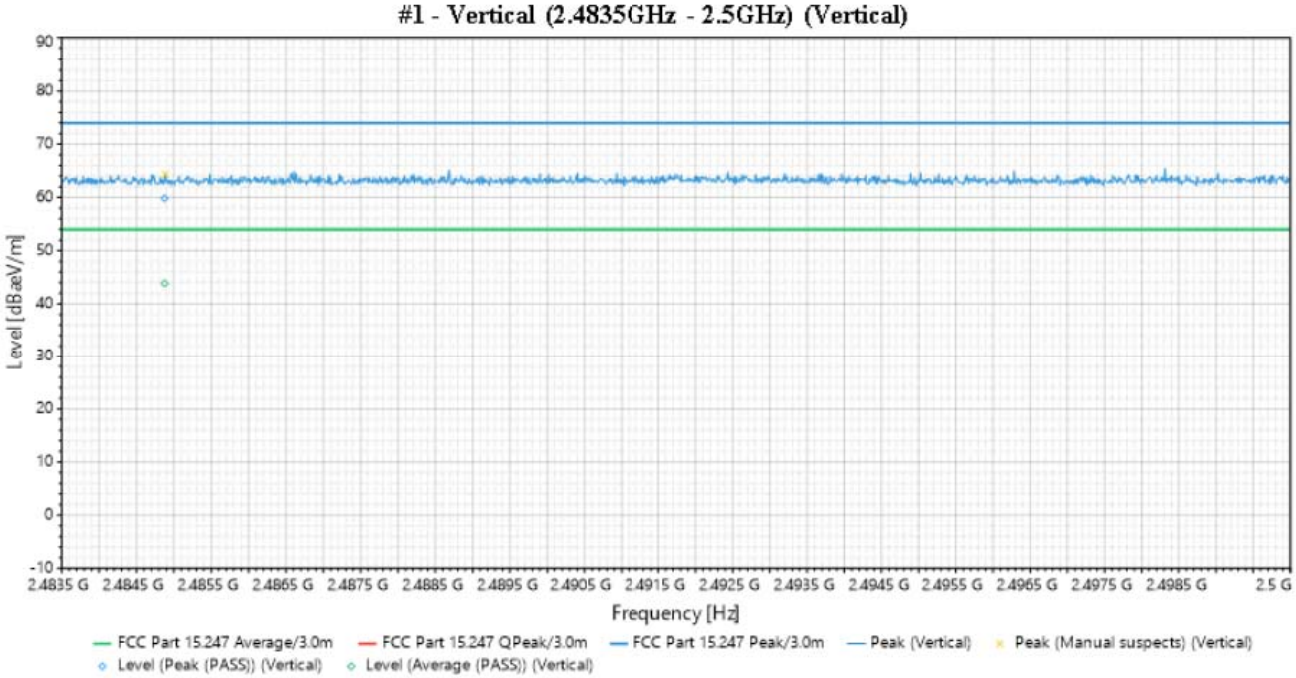

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 12458.1 | Horizontal | 49.748 | 74 | -24.252 | 3.5 | 334 | 8.942 | Peak (PASS) |
| 2 | 12458.1 | Horizontal | 36.868 | 54 | -17.132 | 3.5 | 334 | 8.942 | Average (PASS) |
| 3 | 13264.7 | Horizontal | 50.318 | 74 | -23.682 | 3.5 | 228 | 8.719 | Peak (PASS) |
| 4 | 13264.7 | Horizontal | 37.076 | 54 | -16.924 | 3.5 | 228 | 8.719 | Average (PASS) |
| 5 | 16145.8 | Horizontal | 51.654 | 74 | -22.346 | 3.5 | 79 | 10.327 | Peak (PASS) |
| 6 | 16145.8 | Horizontal | 39.037 | 54 | -14.963 | 3.5 | 79 | 10.327 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2480 MHz, 1Mbps Data Rate | | |



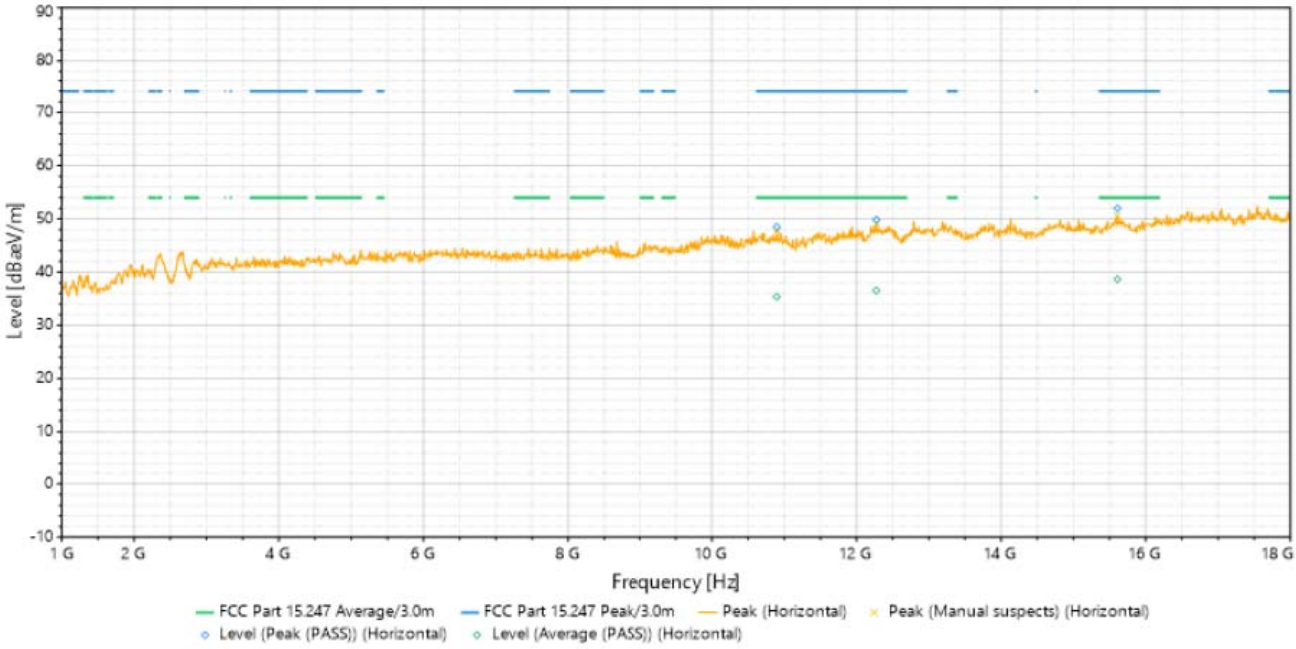


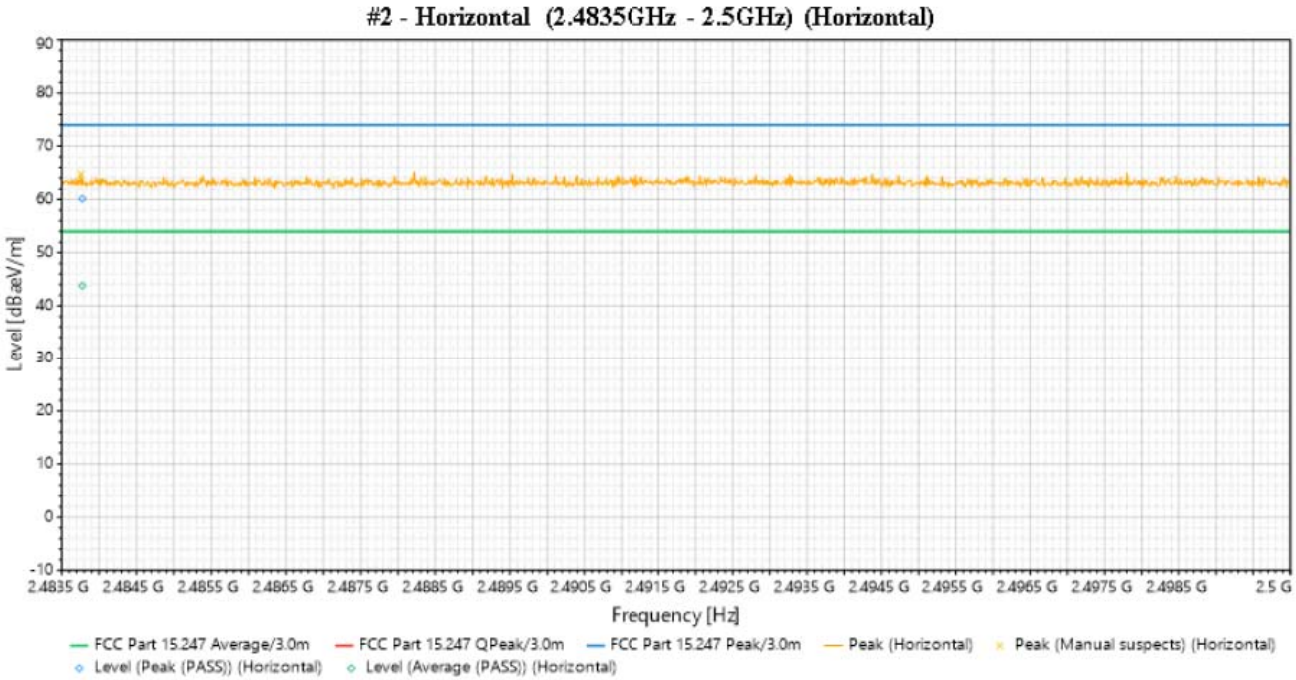

| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 12452.6 | Vertical | 49.82 | 74 | -24.18 | 3.1 | 298 | 8.92 | Peak (PASS) |
| 2 | 12452.6 | Vertical | 36.573 | 54 | -17.427 | 3.1 | 298 | 8.92 | Average (PASS) |
| 3 | 13335.3 | Vertical | 49.818 | 74 | -24.182 | 3.1 | 61 | 8.779 | Peak (PASS) |
| 4 | 13335.3 | Vertical | 36.601 | 54 | -17.399 | 3.1 | 61 | 8.779 | Average (PASS) |
| 5 | 15543.3 | Vertical | 50.15 | 74 | -23.85 | 3.1 | 360 | 9.825 | Peak (PASS) |
| 6 | 15543.3 | Vertical | 37.558 | 54 | -16.442 | 3.1 | 360 | 9.825 | Average (PASS) |
| 7 | 2484.876 | Vertical | 59.849 | 74 | -14.151 | 3.185 | 59.849 | 38.635 | Peak (PASS) |
| 8 | 2484.876 | Vertical | 43.838 | 54 | -10.162 | 3.185 | 43.838 | 38.635 | Average (PASS) |

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2480 MHz, 1Mbps Data Rate | | |

#2 - Horizontal (Horizontal)



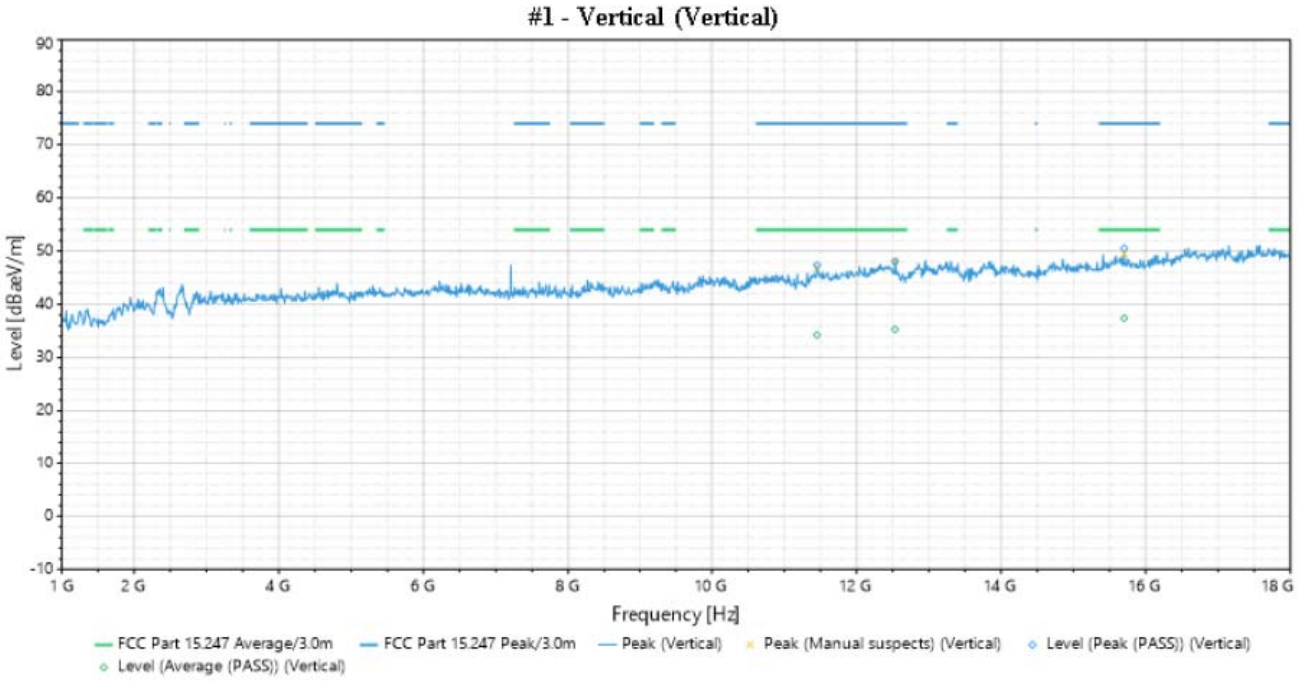


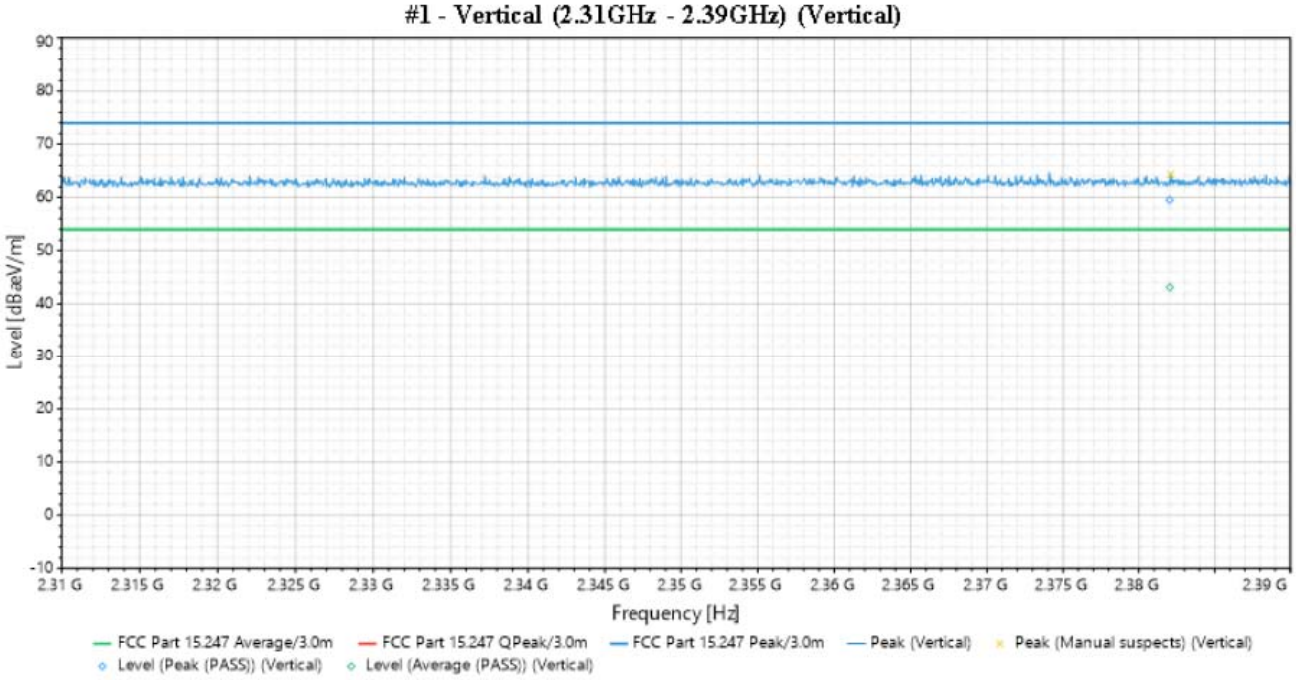

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level [dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 10896.3 | Horizontal | 48.459 | 74 | -25.541 | 3.5 | 272 | 7.822 | Peak (PASS) |
| 2 | 10896.3 | Horizontal | 35.369 | 54 | -18.631 | 3.5 | 272 | 7.822 | Average (PASS) |
| 3 | 12273.9 | Horizontal | 49.876 | 74 | -24.124 | 3.5 | 140 | 8.874 | Peak (PASS) |
| 4 | 12273.9 | Horizontal | 36.541 | 54 | -17.459 | 3.5 | 140 | 8.874 | Average (PASS) |
| 5 | 15609.7 | Horizontal | 51.986 | 74 | -22.014 | 3.5 | 155 | 9.893 | Peak (PASS) |
| 6 | 15609.7 | Horizontal | 38.664 | 54 | -15.336 | 3.5 | 155 | 9.893 | Average (PASS) |
| 7 | 2483.775 | Horizontal | 60.161 | 74 | -13.839 | 3.112 | 228 | 38.633 | Peak (PASS) |
| 8 | 2483.775 | Horizontal | 43.793 | 54 | -10.207 | 3.112 | 228 | 38.633 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2402 MHz, 1Mbps Data Rate | | |





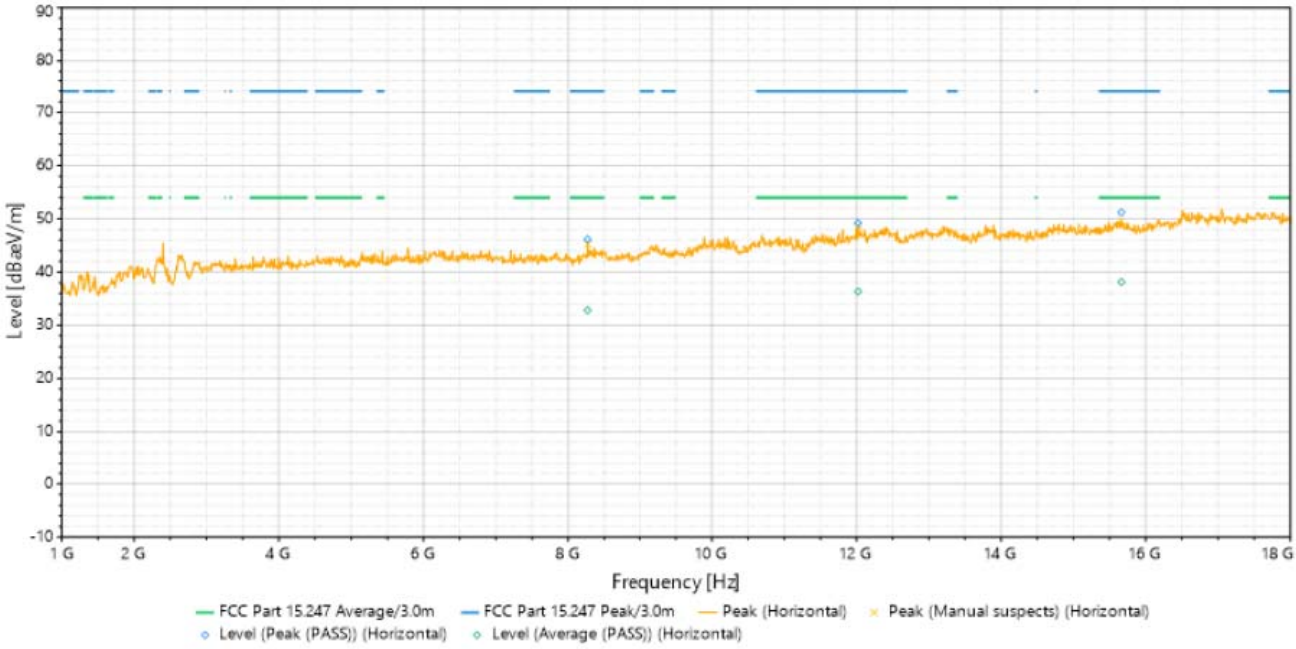

| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 11454.1 | Vertical | 47.35 | 74 | -26.65 | 3.1 | 263 | 8.006 | Peak (PASS) |
| 2 | 11454.1 | Vertical | 34.257 | 54 | -19.743 | 3.1 | 263 | 8.006 | Average (PASS) |
| 3 | 12532.1 | Vertical | 48.06 | 74 | -25.94 | 3.1 | 290 | 9.001 | Peak (PASS) |
| 4 | 12532.1 | Vertical | 35.307 | 54 | -18.693 | 3.1 | 290 | 9.001 | Average (PASS) |
| 5 | 15702 | Vertical | 50.549 | 74 | -23.451 | 3.1 | 265 | 10.027 | Peak (PASS) |
| 6 | 15702 | Vertical | 37.377 | 54 | -16.623 | 3.1 | 265 | 10.027 | Average (PASS) |
| 7 | 2382.038 | Vertical | 59.551 | 74 | -14.449 | 2.638 | 106 | 38.188 | Peak (PASS) |
| 8 | 2382.038 | Vertical | 43.149 | 54 | -10.851 | 2.638 | 106 | 38.188 | Average (PASS) |

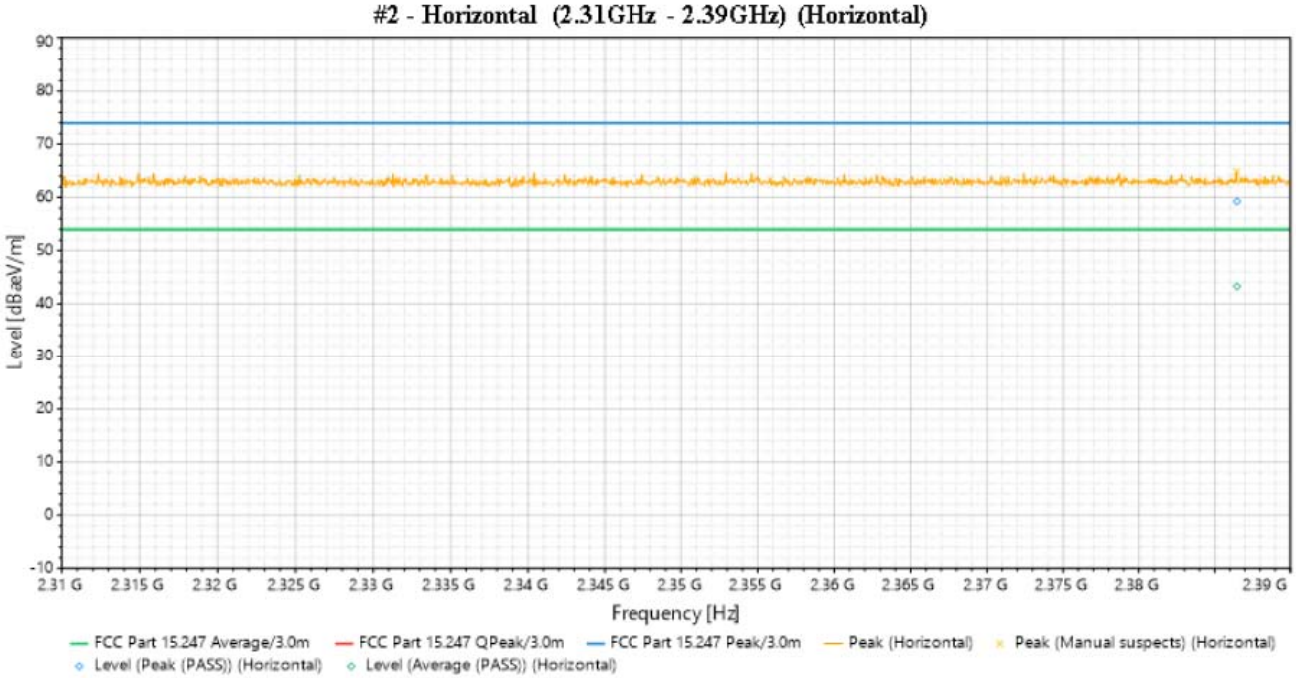
**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2402 MHz, 1Mbps Data Rate | | |

#2 - Horizontal (Horizontal)





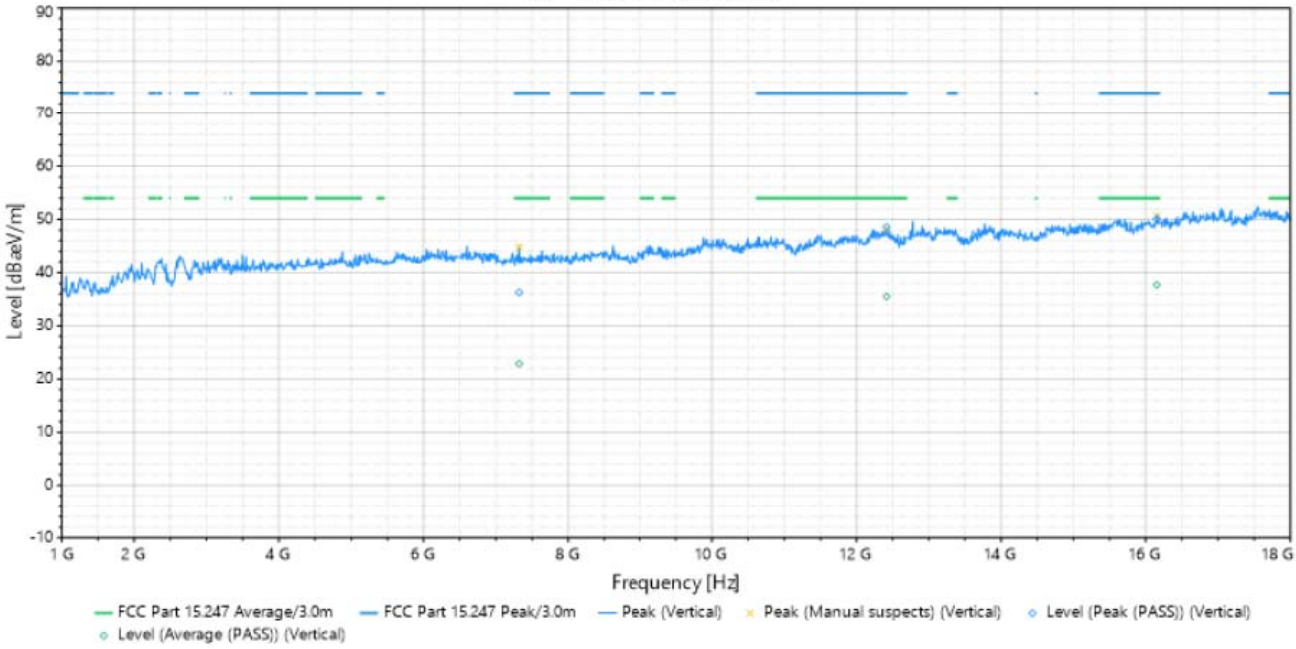

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 8265.4 | Horizontal | 46.186 | 74 | -27.814 | 3.5 | 191 | 6.674 | Peak (PASS) |
| 2 | 8265.4 | Horizontal | 32.869 | 54 | -21.131 | 3.5 | 191 | 6.674 | Average (PASS) |
| 3 | 12022.3 | Horizontal | 49.182 | 74 | -24.818 | 3.5 | 145 | 8.882 | Peak (PASS) |
| 4 | 12022.3 | Horizontal | 36.346 | 54 | -17.654 | 3.5 | 145 | 8.882 | Average (PASS) |
| 5 | 15664.2 | Horizontal | 51.238 | 74 | -22.762 | 3.5 | 360 | 9.947 | Peak (PASS) |
| 6 | 15664.2 | Horizontal | 38.151 | 54 | -15.849 | 3.5 | 360 | 9.947 | Average (PASS) |
| 7 | 2386.467 | Horizontal | 59.262 | 74 | -14.738 | 2.435 | 15 | 38.311 | Peak (PASS) |
| 8 | 2386.467 | Horizontal | 43.289 | 54 | -10.711 | 2.435 | 15 | 38.311 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 1Mbps Data Rate | | |

#1 - Vertical (Vertical)

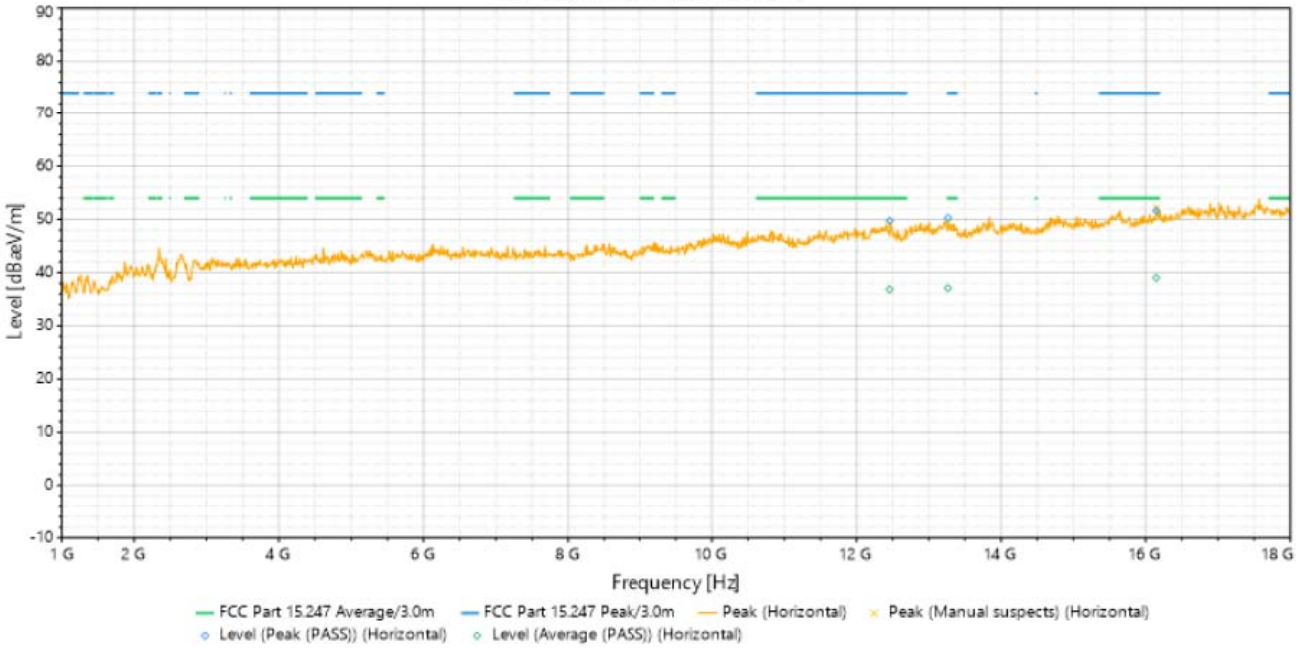



| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 7320.9 | Vertical | 36.286 | 74 | -37.714 | 2.1 | 232 | 6.55 | Peak (PASS) |
| 2 | 7320.9 | Vertical | 22.891 | 54 | -31.109 | 2.1 | 232 | 6.55 | Average (PASS) |
| 3 | 12415.2 | Vertical | 48.574 | 74 | -25.426 | 3.1 | 219 | 8.86 | Peak (PASS) |
| 4 | 12415.2 | Vertical | 35.525 | 54 | -18.475 | 3.1 | 219 | 8.86 | Average (PASS) |
| 5 | 16154.2 | Vertical | 50.13 | 74 | -23.87 | 3.1 | 298 | 10.316 | Peak (PASS) |
| 6 | 16154.2 | Vertical | 37.696 | 54 | -16.304 | 3.1 | 298 | 10.316 | Average (PASS) |

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2440 MHz, 1Mbps Data Rate | | |

#2 - Horizontal (Horizontal)

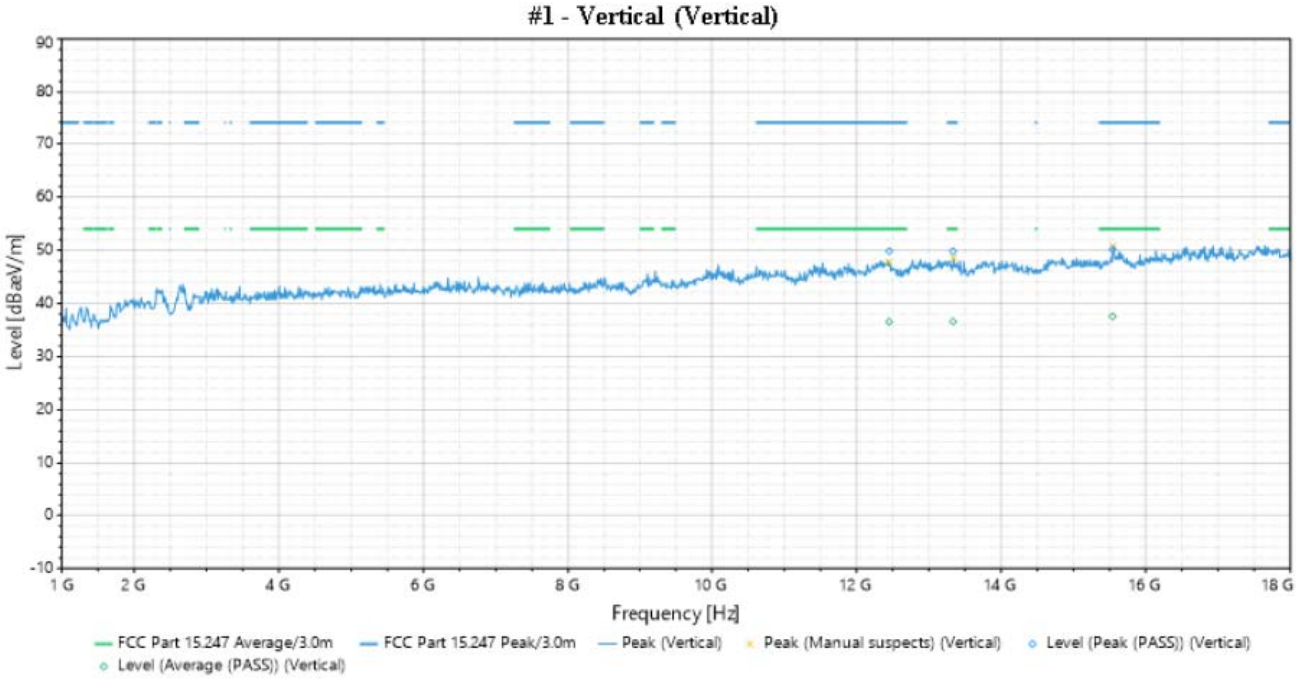


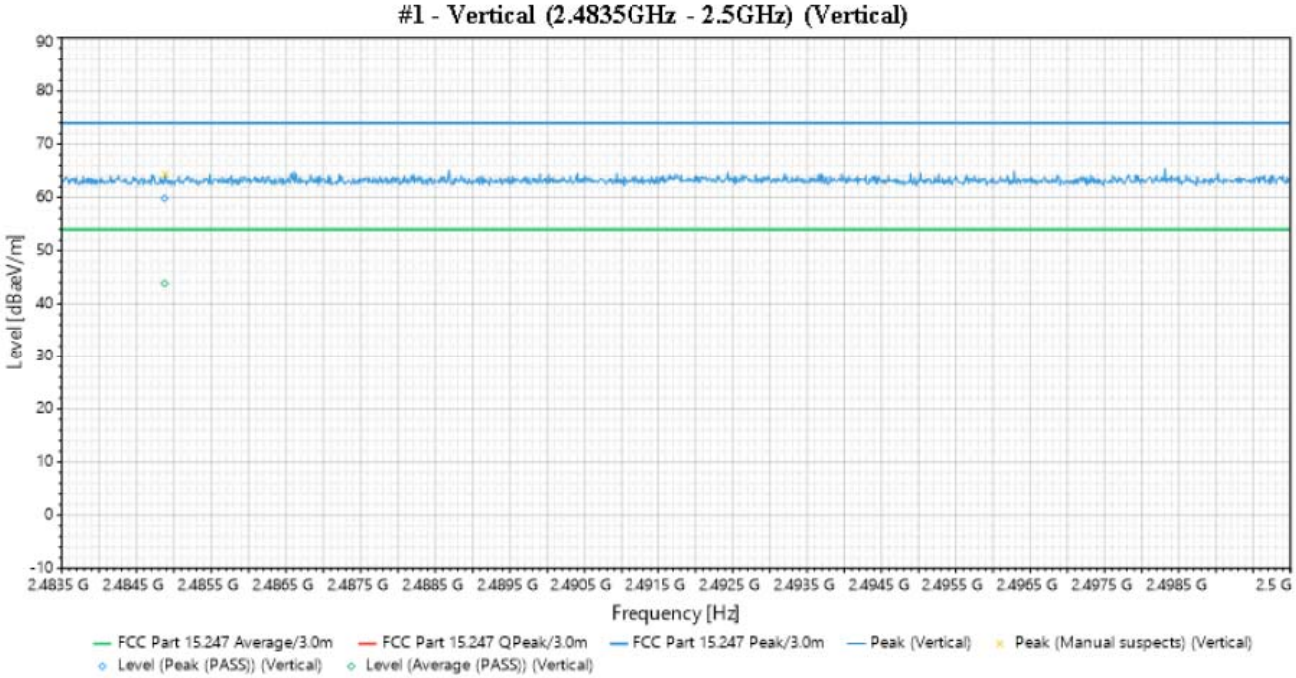

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 12458.1 | Horizontal | 49.748 | 74 | -24.252 | 3.5 | 334 | 8.942 | Peak (PASS) |
| 2 | 12458.1 | Horizontal | 36.868 | 54 | -17.132 | 3.5 | 334 | 8.942 | Average (PASS) |
| 3 | 13264.7 | Horizontal | 50.318 | 74 | -23.682 | 3.5 | 228 | 8.719 | Peak (PASS) |
| 4 | 13264.7 | Horizontal | 37.076 | 54 | -16.924 | 3.5 | 228 | 8.719 | Average (PASS) |
| 5 | 16145.8 | Horizontal | 51.654 | 74 | -22.346 | 3.5 | 79 | 10.327 | Peak (PASS) |
| 6 | 16145.8 | Horizontal | 39.037 | 54 | -14.963 | 3.5 | 79 | 10.327 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2480 MHz, 1Mbps Data Rate | | |



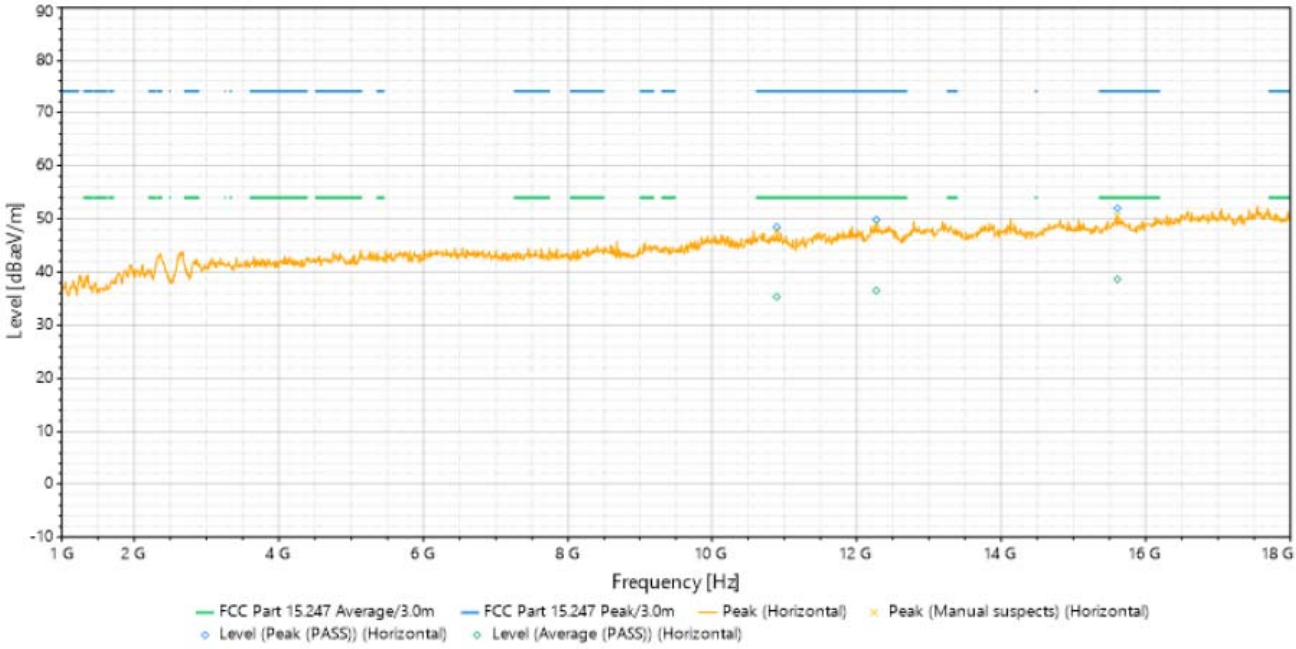


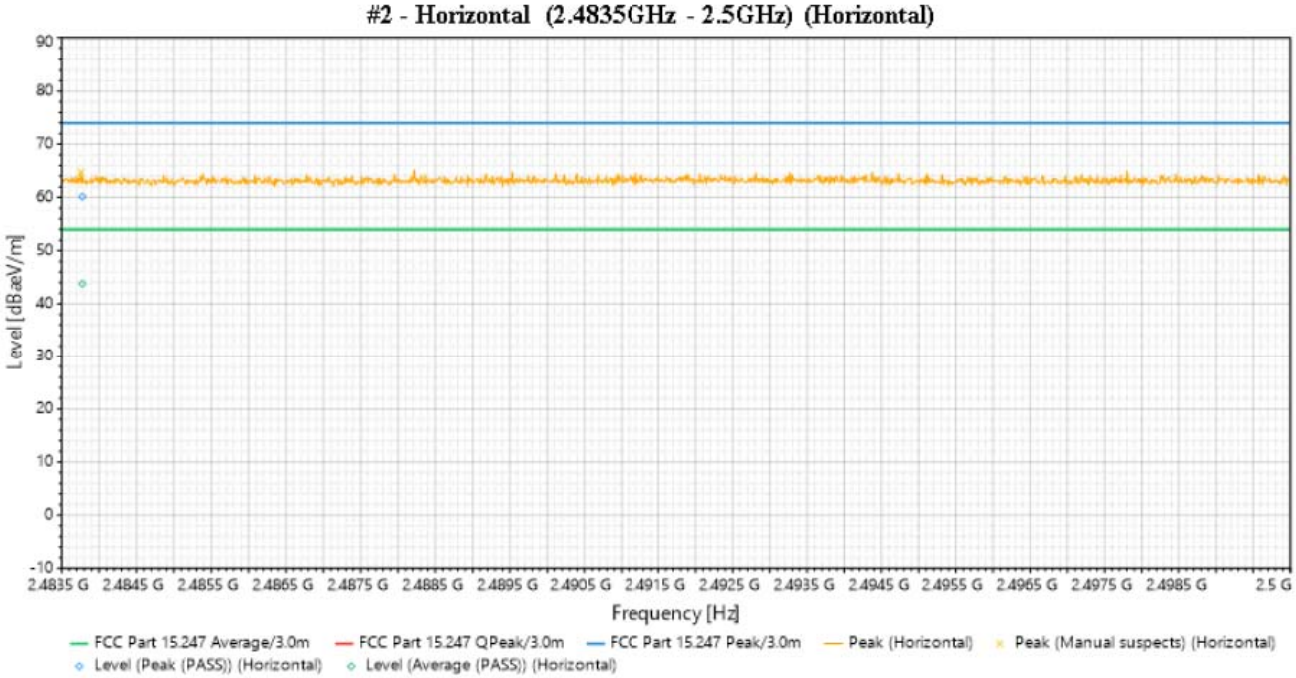

| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 12452.6 | Vertical | 49.82 | 74 | -24.18 | 3.1 | 298 | 8.92 | Peak (PASS) |
| 2 | 12452.6 | Vertical | 36.573 | 54 | -17.427 | 3.1 | 298 | 8.92 | Average (PASS) |
| 3 | 13335.3 | Vertical | 49.818 | 74 | -24.182 | 3.1 | 61 | 8.779 | Peak (PASS) |
| 4 | 13335.3 | Vertical | 36.601 | 54 | -17.399 | 3.1 | 61 | 8.779 | Average (PASS) |
| 5 | 15543.3 | Vertical | 50.15 | 74 | -23.85 | 3.1 | 360 | 9.825 | Peak (PASS) |
| 6 | 15543.3 | Vertical | 37.558 | 54 | -16.442 | 3.1 | 360 | 9.825 | Average (PASS) |
| 7 | 2484.876 | Vertical | 59.849 | 74 | -14.151 | 3.185 | 59.849 | 38.635 | Peak (PASS) |
| 8 | 2484.876 | Vertical | 43.838 | 54 | -10.162 | 3.185 | 43.838 | 38.635 | Average (PASS) |

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2480 MHz, 1Mbps Data Rate | | |

#2 - Horizontal (Horizontal)



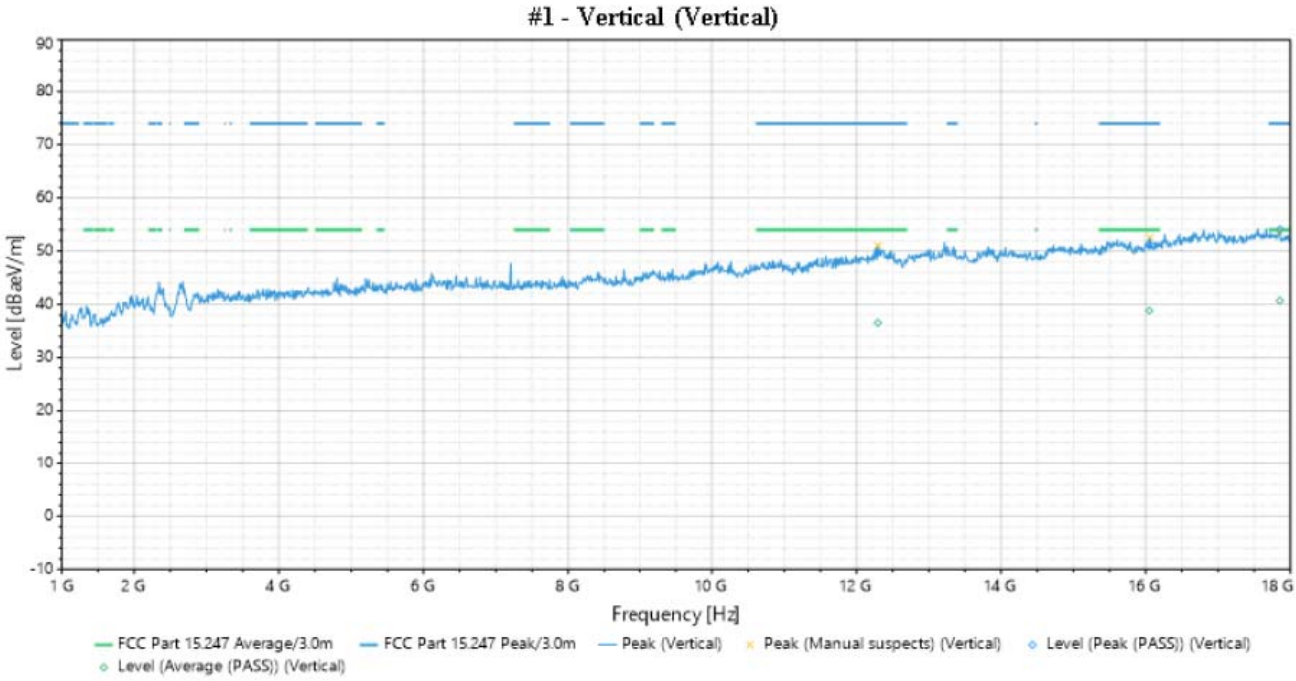


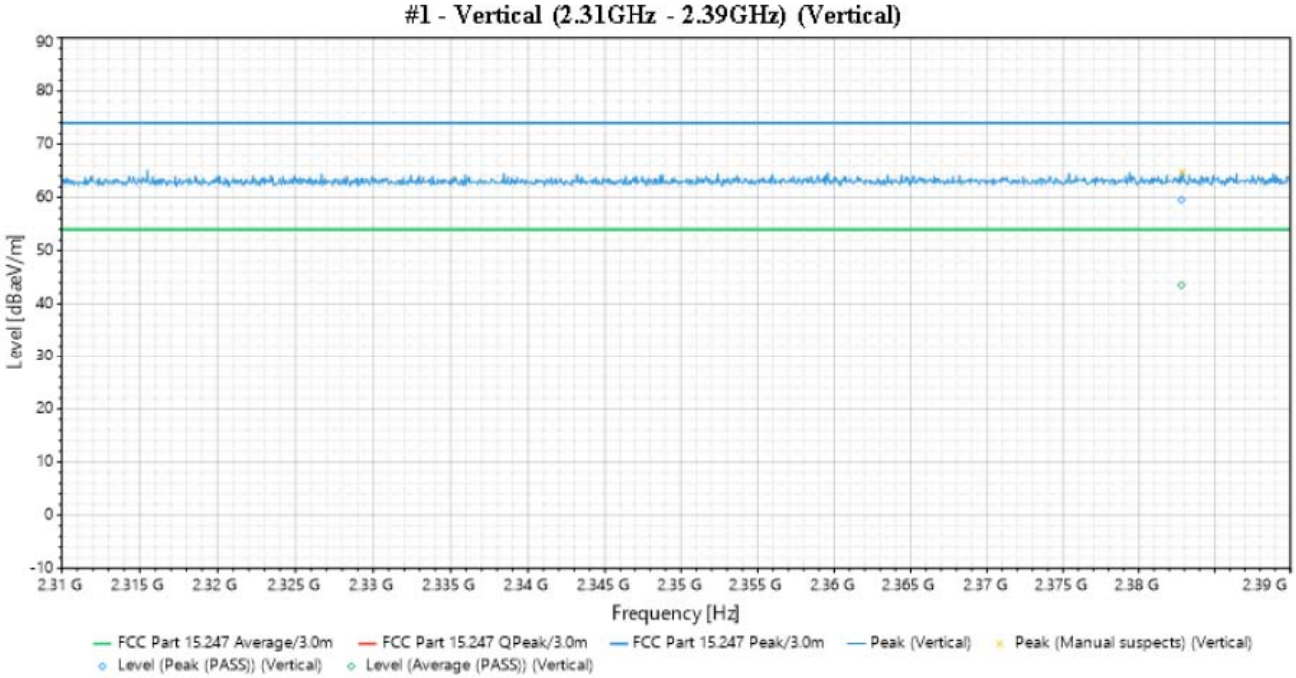

| Antenna Polarity & Test Distance: Horizontal at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level [dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (cm) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 10896.3 | Horizontal | 48.459 | 74 | -25.541 | 3.5 | 272 | 7.822 | Peak (PASS) |
| 2 | 10896.3 | Horizontal | 35.369 | 54 | -18.631 | 3.5 | 272 | 7.822 | Average (PASS) |
| 3 | 12273.9 | Horizontal | 49.876 | 74 | -24.124 | 3.5 | 140 | 8.874 | Peak (PASS) |
| 4 | 12273.9 | Horizontal | 36.541 | 54 | -17.459 | 3.5 | 140 | 8.874 | Average (PASS) |
| 5 | 15609.7 | Horizontal | 51.986 | 74 | -22.014 | 3.5 | 155 | 9.893 | Peak (PASS) |
| 6 | 15609.7 | Horizontal | 38.664 | 54 | -15.336 | 3.5 | 155 | 9.893 | Average (PASS) |
| 7 | 2483.775 | Horizontal | 60.161 | 74 | -13.839 | 3.112 | 228 | 38.633 | Peak (PASS) |
| 8 | 2483.775 | Horizontal | 43.793 | 54 | -10.207 | 3.112 | 228 | 38.633 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2402 MHz, 2Mbps Data Rate | | |






| Antenna Polarity & Test Distance: Vertical at 3m | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. | Frequency (MHz) | Polarization | Level Peak[dB(uV/m)] | Limit Peak dB(uV/m) | Margin Peak [dB] | Height (m) | Angle (Deg) | Factor [dB(1/m)] | Measure Type/ Result |
| 1 | 12297 | Vertical | 49.689 | 74 | -24.311 | 3.1 | 342 | 8.897 | Peak (PASS) |
| 2 | 12297 | Vertical | 36.537 | 54 | -17.463 | 3.1 | 342 | 8.897 | Average (PASS) |
| 3 | 16051 | Vertical | 51.408 | 74 | -22.592 | 3.1 | 198 | 10.334 | Peak (PASS) |
| 4 | 16051 | Vertical | 38.788 | 54 | -15.212 | 3.1 | 198 | 10.334 | Average (PASS) |
| 5 | 17856.4 | Vertical | 54.093 | 74 | -19.907 | 3.4 | 378 | 8.872 | Peak (PASS) |
| 6 | 17856.4 | Vertical | 40.702 | 54 | -13.298 | 3.4 | 378 | 8.872 | Average (PASS) |
| 7 | 2382.809 | Vertical | 59.561 | 74 | -14.439 | 2.457 | 234 | 38.19 | Peak (PASS) |
| 8 | 2382.809 | Vertical | 43.534 | 54 | -10.466 | 2.457 | 234 | 38.19 | Average (PASS) |

**REMARKS:**

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

| EUT Test Condition | | Measurement Detail | |
|---|---|---|---|
| Input Power | 3Vdcdc | Frequency Range | 1GHz-26GHz |
| Environmental Conditions | 25 deg. C, 70% RH | Tested By | Richard Dollente |
| Test Mode | TX MODE BLE 2402 MHz, 2Mbps Data Rate | | |

#2 - Horizontal (Horizontal)