



FCC/IC Test Report

FOR:

Harman International

Model Number: CMC VP4

Product Description: Automotive Infotainment Unit

FCC ID: QNG-BE2804

IC ID: 6434C-BE2804

47 CFR Part 15.247 for FHSS Systems

IC RSS-210 Issue 8

TEST REPORT #: EMC_HARMA-027-12001_DSS

DATE: 2013-02-08



**FCC :
Accredited**

**IC recognized #
3462B**

CETECOM Inc.

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

Phone: + 1 (408) 586 6200 • Fax: + 1 (408) 586 6299 • E-mail: info@cetecomusa.com • <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following equipment (and as identified in Ch.3 of this test report) was evaluated against the applicable criteria specified in FCC CFR47 Part 15.247, 15.207, 15.209 and Industry Canada Standards RSS 210 Issue 8.

No deviations were ascertained during the course of the tests performed.

| Company | Description | Model # |
|----------------------|------------------------------|---------|
| Harman International | Automotive Infotainment Unit | CMC VP4 |

Responsible for Testing Laboratory:

| 2013-02-08 | Compliance | Sajay Jose (EMC Lab Manager) | |
|------------|------------|---------------------------------|-----------|
| Date | Section | Name | Signature |

Responsible for the Report:

| 2013-02-08 | Compliance | Calvin Lee (EMC Project Engineer) | |
|------------|------------|--------------------------------------|-----------|
| Date | Section | Name | Signature |

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

| | |
|--------------------------|--|
| Company Name: | CETECOM Inc. |
| Department: | Compliance |
| Address: | 411 Dixon Landing Road Milpitas, CA 95035 U.S.A. |
| Telephone: | +1 (408) 586 6200 |
| Fax: | +1 (408) 586 6299 |
| Test Lab Manager: | Sajay Jose |
| Test Engineer: | Calvin Lee |

2.2 Identification of the Client

| | |
|------------------------|----------------------------|
| Client: | Harman International |
| Street Address: | 26500 Haggerty Road |
| City/Zip Code | Farmington Hills, MI 48331 |
| Country | USA |
| Contact Person: | Shain E. Chmura |
| Phone No. | +1 (248) 592-3157 |
| e-mail: | schmura@harman.com |

2.3 Identification of the Manufacturer

| | |
|-------------------------------|----------------|
| Manufacturer's Name: | Same as above. |
| Manufacturers Address: | |
| City/Zip Code | |
| Country | |

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

| | |
|---|--|
| Model Number: | CMC VP4 |
| FCC-ID / IC-ID: | QNG-BE2804 / 6434C-BE2804 |
| HW Version: | PV |
| Product Description: | Automotive Infotainment Unit |
| Frequency Band of Operation: | ISM: 2400 – 2483.5 MHz |
| Frequency Range of Test: | 2402-2480 MHz |
| No. of Channels: | 79 |
| Type(s) of Modulation: | Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK |
| Antenna Info: | Fakra style external antenna Manufacturer stated Max. Antenna Gain: 2 dBi |
| Max Output Powers: | Conducted (Measured): GFSK: 3.2 dBm (0.0021 W) Radiated EIRP (Calculated): GFSK: 5.2 dBm (0.0033 W) |
| Other Radios in the device: | WLAN: 2412-2462 MHz: 802.11b/g radio, |
| Rated Operating Voltage Range: | 9-16 VDC |
| Rated Operating Temperature Range: | -40°C to 85°C |
| Test Sample Status: | Pre-Production |

3.2 Identification of the Equipment under Test (EUT)

| EUT # | Serial Number | HW Version | Notes |
|-------|-------------------|------------|--|
| 1 | BE6150J0023040035 | PV | Radiated Sample |
| 2 | BE6150J0023040011 | PV | Radiated Sample |
| 3 | BE6150J0023040037 | PV | Conducted Sample for verifying output power. |

3.3 Identification of Support equipment

| STE # | Type | Manufacturer | Model | Serial Number |
|-------|----------------------|--------------|---------------|---------------|
| 1 | Ethernet-USB Adapter | Cisco | USB200M | CU906M729067 |
| 2 | Laptop #1 | Dell | Latitude D510 | DT7570 |

3.4 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:

Ambient Temperature: 20-25°C

Relative humidity: 40-60%

3.5 Dates of Testing:

Nov. 27-28, & Dec. 13, 2012.

3.6 Other Testing Notes:

The device was configured with a manufacturer provided test SW, capable of setting the unit in BT Test mode. In this mode, the unit can be connected to a Bluetooth Tester to control different modulation schemes, channels etc., as required for testing.

The EUT was tested on low, mid and high channels in GFSK, $\pi/4$ DQPSK and 8DPSK modes.

4 Subject of Investigation

The objective of the measurements applied by CETECOM Inc. was to establish compliance of the EUT as described under Ch. 3 of this Test Report, with the applicable criteria specified in

- FCC CFR47 Parts 15.247, 15.207, 15.209
- IC RSS-210 Issue 8

This test report is to support a request for new equipment authorization under the FCC ID **QNG-BE2804** and IC ID **6434C-BE2804**.

CMC VP4 integrates the pre-certified Bluetooth/WLAN module, model: CWN-01/ UWM-WBT from Wistron NeWeb Corporation.

Based on verification that the module's conducted output power is within limits and following guidance from FCC KDB 996369, this test report covers the radiated test portion of the above listed FCC rule parts.

For conducted test results, reference is made to the results from the module's pre-certification and as documented in test report # FR1D0821AA issued by SPORTON International Inc., on Dec. 22, 2011, with FCC ID: NKRUWMWBT-CWM01

5 Summary of Measurement Results

| Test Specification | Test Case | Temperature and Voltage Conditions | Mode | Pass | Fail | NA | NP | Result |
|--|--------------------------------------|------------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------|
| §15.247(e) RSS210 A8.2(b) | Power Spectral Density | Nominal | GFSK $\pi/4$ DQPSK 8DPSK | <input type="checkbox"/> | <input type="checkbox"/> | ■ | <input type="checkbox"/> | See Note 1 |
| §15.247(a)(1) RSS210 A8.1(b) | Carrier Frequency Separation | Nominal | Hopping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 2 |
| §15.247(a)(1) RSS210 A8.1(d) | Number of Hopping Channels | Nominal | Hopping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 2 |
| §15.247(a)(1)(iii) RSS210 A8.3(1) | Time of occupancy | Nominal | Hopping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 2 |
| §15.247(a)(1) RSS210 A8.2(a) | Spectrum Bandwidth | Nominal | GFSK $\pi/4$ DQPSK 8DPSK | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 2 |
| §15.247(b)(1) RSS210 A8.4(2) | Maximum Peak Conducted Output Power | Nominal | GFSK $\pi/4$ DQPSK 8DPSK | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| §15.247(d) RSS210 A8.5 | Band edge compliance-Conducted | Nominal | GFSK $\pi/4$ DQPSK 8DPSK | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 3 |
| §15.247(d) RSS210 A8.5 | Band edge compliance-Radiated | Nominal | GFSK $\pi/4$ DQPSK 8DPSK | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| §15.247(d) RSS210 A8.5 | TX Spurious emissions-Conducted | Nominal | GFSK $\pi/4$ DQPSK 8DPSK | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 2 |
| §15.247(d) RSS210 A8.5 | TX Spurious emissions-Radiated | Nominal | GFSK | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| §15.209(a) RSS Gen | TX Spurious Emissions Radiated<30MHz | Nominal | GFSK | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |

Note: NA= Not Applicable; NP= Not Performed.

- Power Spectral Density is NOT APPLICABLE for devices with hopping functionality.
- Conducted measurements leveraged from the module's certification data.
 - Module FCC ID: NKRUWMWBT-CWM01.
 - Test report number FR1D0821AB issued by SPORTON International Inc., on Dec. 22, 2011.
- Band Edge compliance-conducted is NOT PERFORMED as the device passes radiated measurement.

6 Measurements

6.1 Measurement Method:

Ref: FCC Public Notice DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems|

6.2 Radiated Measurement Procedure

ANSI C63.4 (2009) Section 8.3.1.1: Exploratory radiated emission measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. A shielded room may be used for exploratory testing, but may have anomalies that can lead to significant errors in amplitude measurements.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of testing. It is recommended that either a headset or loudspeaker be connected as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT when the exploratory and final testing is performed in an OATS with strong ambient signals. Caution should be taken if either antenna height between 1 and 4 meters or EUT azimuth is not fully explored. Not fully exploring these parameters during exploratory testing may require complete testing at the OATS or semi-anechoic chamber when the final full spectrum testing is conducted.

The EUT should be set up in its typical configuration and arrangement, and operated in its various modes. For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit. A step-by-step technique for determining this emission can be found in Annex C.

When measuring emissions above 1 GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1 GHz. If the EUT is a device with dimensions approximately equal to that of the measurement antenna beamwidth, the measurement antenna shall be aligned with the EUT.

ANSI C63.4 (2009) Section 8.3.1.2: Final radiated emission measurements

Based on the measurement results in 8.3.1.1, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement. The final measurement is then performed on a site meeting the requirements of 5.3, 5.4, or 5.5 as appropriate without variation of the EUT arrangement or EUT mode of operation. If the EUT is relocated from an exploratory test site to a final test site, the highest emission shall be remaximized at the final test location before final radiated emissions measurements are performed. However, antenna height and polarity and EUT azimuth are to be varied. In addition, the full frequency spectrum (for the range to be checked for meeting compliance) shall be investigated.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. During the full frequency spectrum investigation, particular focus should be made on those frequencies found in exploratory testing that were used to find the final test configuration, mode of operation, and arrangement (associated with achieving the least margin with respect to the limit). This full spectrum test constitutes the compliance measurement.

For measurements above 1 GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of measurements. Data collected shall satisfy the report requirements of Clause 10.

NOTES

- 1— Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- 2—Use of waveguide and flexible waveguide may be necessary at frequencies above 10 GHz to achieve usable signal-to noise ratios at required measurement distances. If so, it may be necessary to restrict the height search of the antenna, and special care should be taken to ensure that maximum emissions are correctly measured.
- 3—All presently known devices causing emissions above 10 GHz are physically small compared with the beam-widths of typical horn antennas used for EMC measurements. For such EUTs and frequencies, it may be preferable to vary the height and polarization of the EUT instead of the receiving antenna to maximize the measured emissions.

Measurement Uncertainty: $\pm 3\text{dB}$

6.3 Sample Calculations for Radiated Measurements

6.3.1.1 Field Strength Measurements:

Measurements from the Spectrum Analyzer/ Receiver is used to calculate the Field Strength, taking into account the following parameters:

1. Measured reading in dB μ V
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

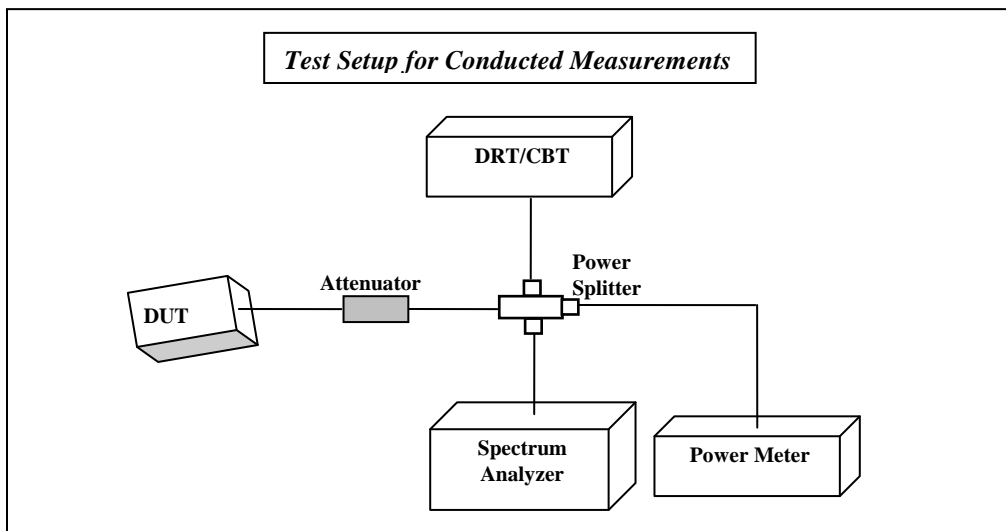
FS (dB μ V/m)= Measured Value on SA (dB μ V)+ Cable Loss (dB)+ Antenna Factor (dB/m)

Eg:

| Frequency (MHz) | Measured SA (dB μ V) | Cable Loss (dB) | Antenna Factor Correction (dB) | Field Strength Result (dB μ V/m) |
|--------------------|-----------------------------|--------------------|--------------------------------------|--|
| 1000 | 80.5 | 3.5 | 14 | 98.0 |

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the above equation.

6.4 Conducted Measurement Procedure



1. Connect the equipment as shown in the above diagram.
 2. Adjust the settings of the CBT (Rohde-Schwarz Bluetooth Tester) to connect the EUT at the required channel.
 3. Measurements are to be performed with the EUT set to the low, middle and high channels and for GFSK, $\pi/4$ DQPSK and 8DPSK modulation schemes.
- Measurement Uncertainty: $\pm 0.5\text{dB}$

6.5 Peak Output Power

6.5.1 Limits:

6.5.1.1 §15.247 (b)(1)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:
For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt.
For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

6.5.1.2 RSS 210- A8.4(2)

Nominal Peak Output Power < 30 dBm (1W)

6.5.2 Test Conditions:

Tnom: 25°C; Vnom: 12 V

Hopping OFF

6.5.3 Test Procedure:

Measurement according to DA 00-705

Measurement Settings:

Conducted output power measured using a CBT (Bluetooth Tester).

Radiated EIRP calculated using the formula= Conducted Power+ Antenna Gain.

Max. Antenna Gain (dBi): 2 dBi

6.5.4 Test Result:

| Measured Peak Output Power - Conducted (dBm) | | | |
|--|-----------------|------|------|
| Modulation | Frequency (MHz) | | |
| | 2402 | 2441 | 2480 |
| GFSK | 1.6 | 2.8 | 3.2 |
| $\pi/4$ DQPSK | -0.2 | 1.0 | 1.4 |
| 8-DPSK | -0.2 | 1.0 | 1.3 |

| Calculated Peak Output Power- Radiated (dBm) | | | |
|--|-----------------|------|------|
| Modulation | Frequency (MHz) | | |
| | 2402 | 2441 | 2480 |
| GFSK | 3.6 | 4.8 | 5.2 |
| $\pi/4$ DQPSK | 1.8 | 3.0 | 3.4 |
| 8-DPSK | 1.8 | 3.0 | 3.3 |

6.5.4.1 Measurement Verdict: Pass.

6.6 Band Edge Compliance of Radiated Emissions

6.6.1 References:

FCC CFR §2.1053

RSS-210 A8.5

6.6.2 Limits: §15.247/15.205

15.247 (d) Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

15.205 (a) Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| ¹ 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | (²) |
| 13.36 - 13.41 | | | |

15.209 (a) Emission Limits:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (m) |
|-----------------|-----------------------------------|--------------------------|
| 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 |

6.6.3 Test Conditions:

Tnom: 25°C; Vnom: 12 V
Hopping OFF

6.6.4 Measurement Procedure:

Peak measurements are made using a peak detector and RBW=1MHz.

*PEAK LIMIT= 74dB μ V/m

Average measurements performed using a peak detector and according to video averaging procedure with RBW=1MHz and VBW=10Hz.

*AVG. LIMIT= 54dB μ V/m

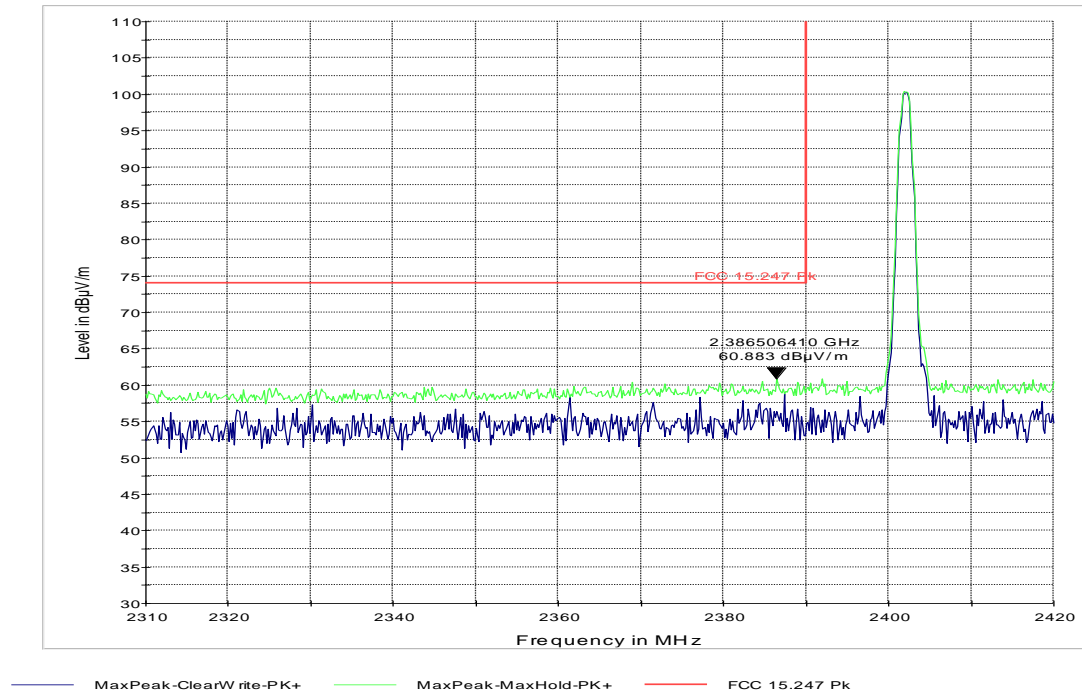
Measurement Uncertainty: ± 3.0 dB

6.6.4.1 Test Verdict

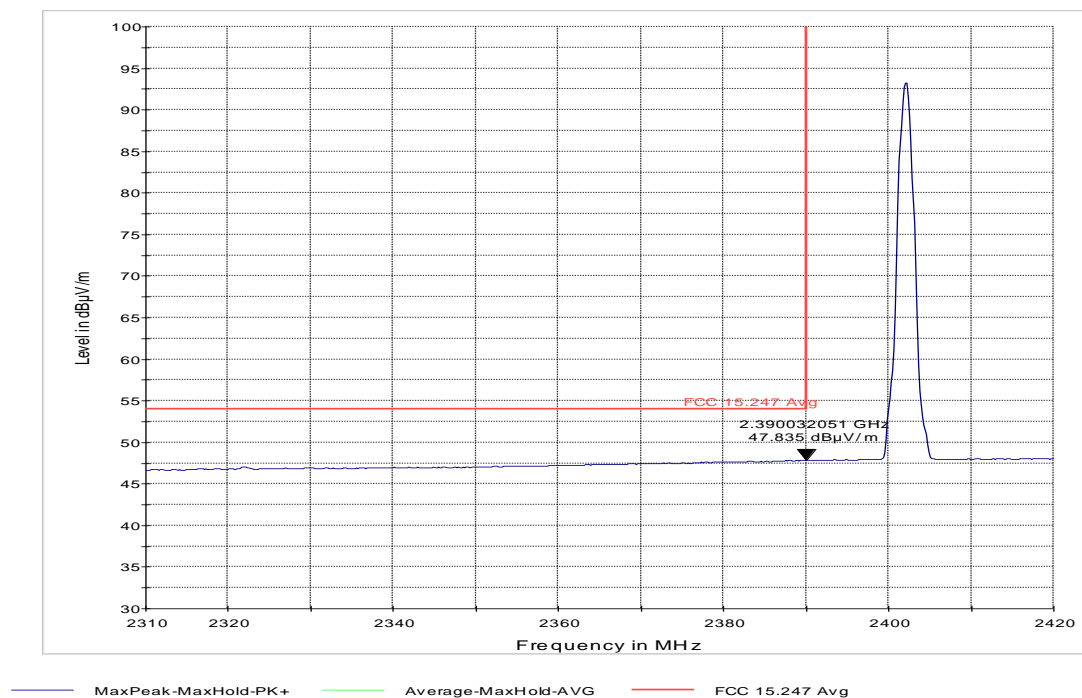
Pass.

6.6.5 Test Data/plots:

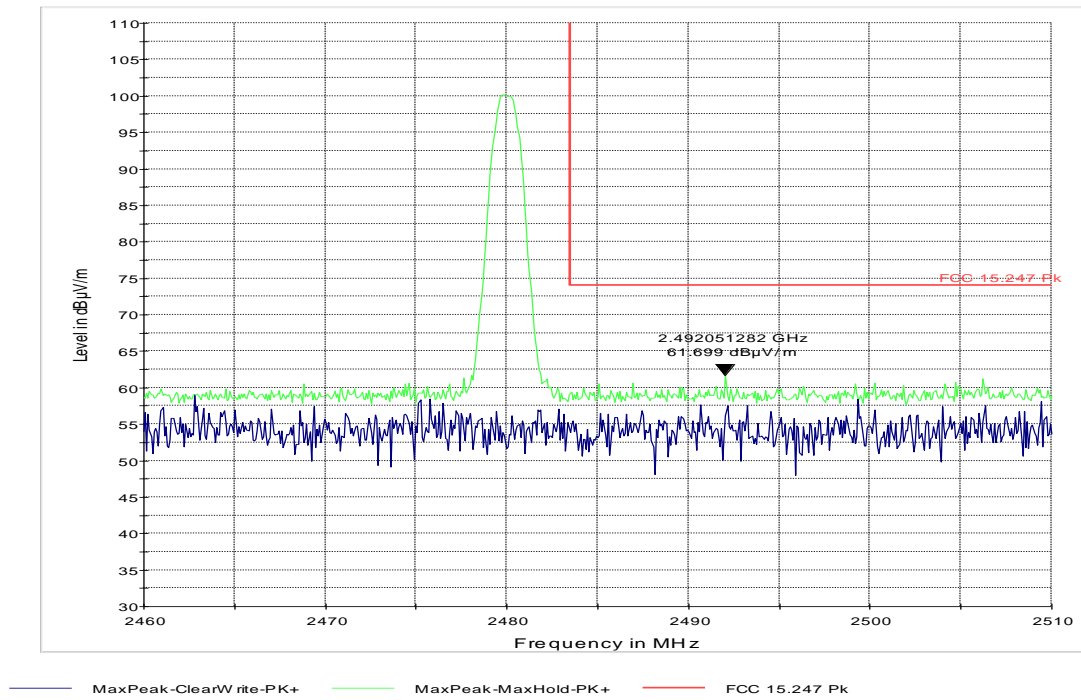
Lower band edge peak -GFSK modulation



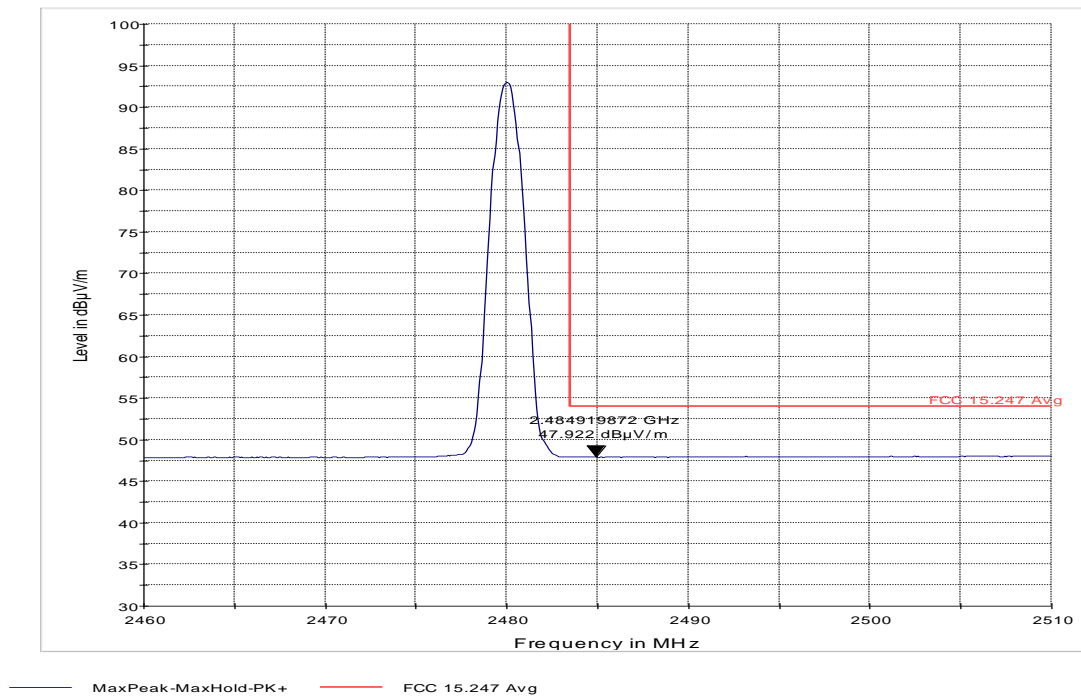
Lower band edge average -GFSK modulation



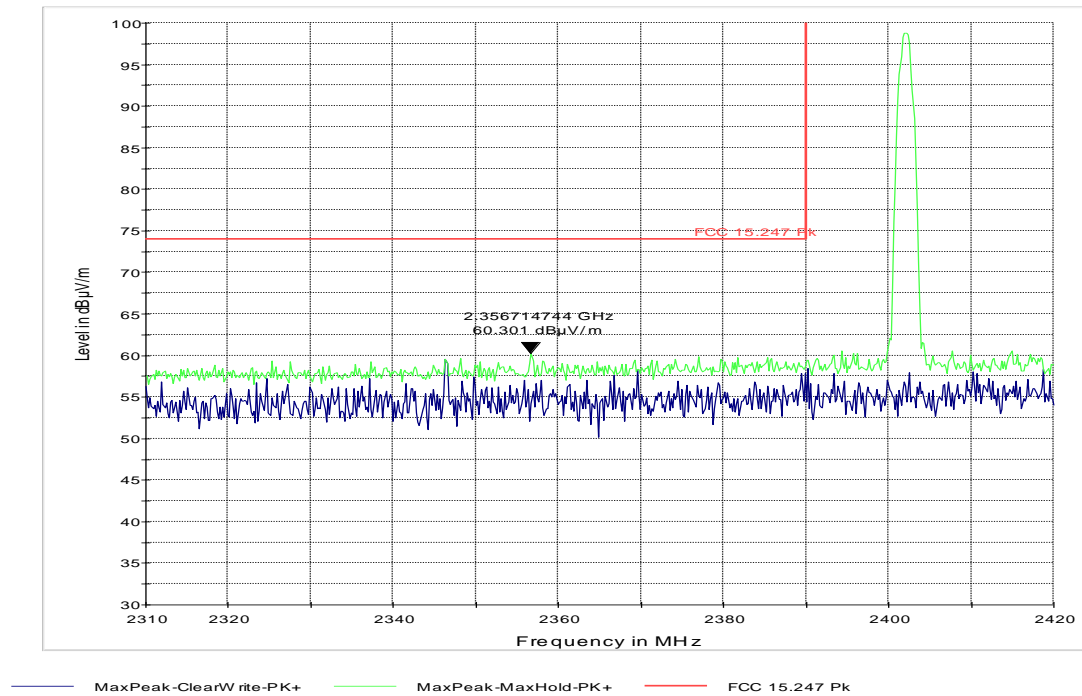
Higher band edge peak -GFSK modulation



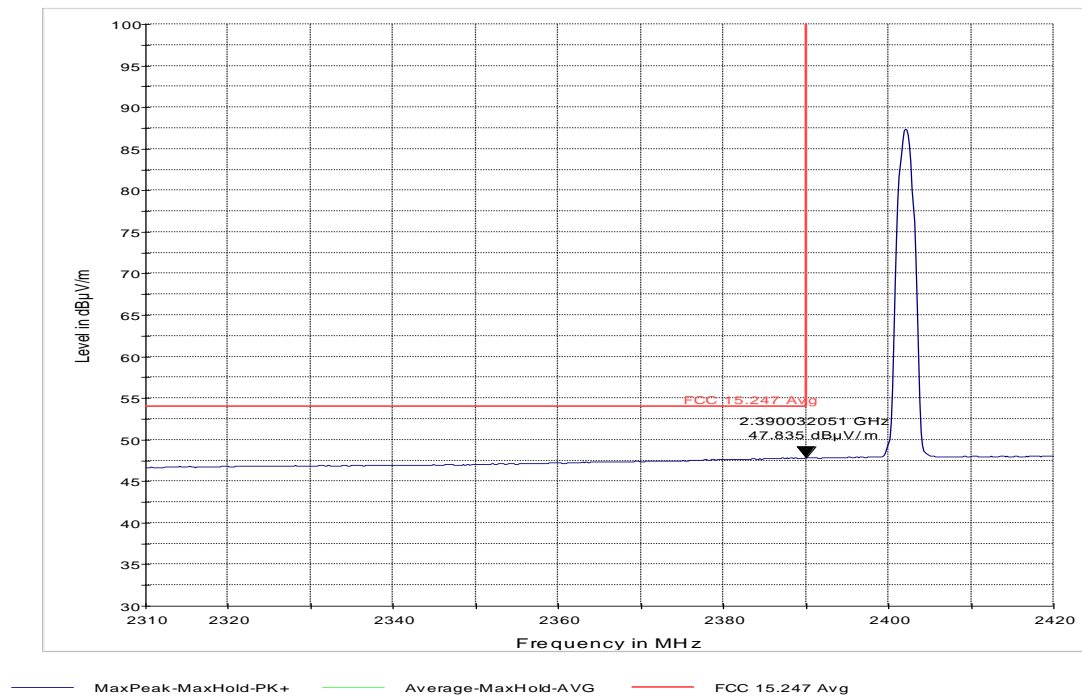
Higher band edge average-GFSK modulation



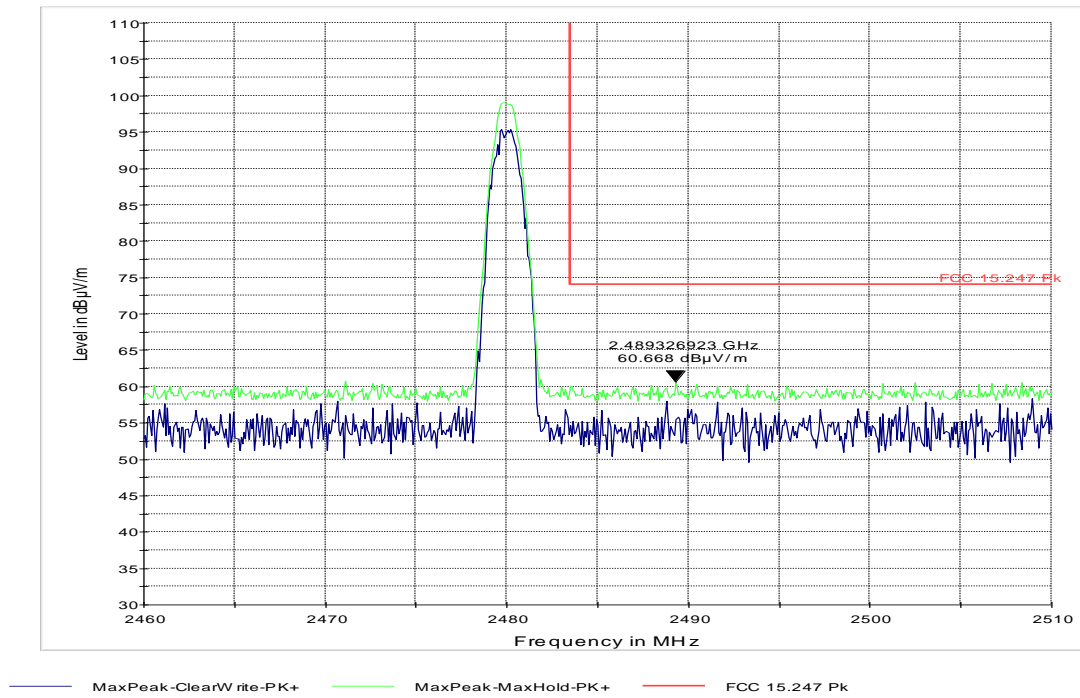
Lower band edge peak - $\pi/4$ DQPSK modulation



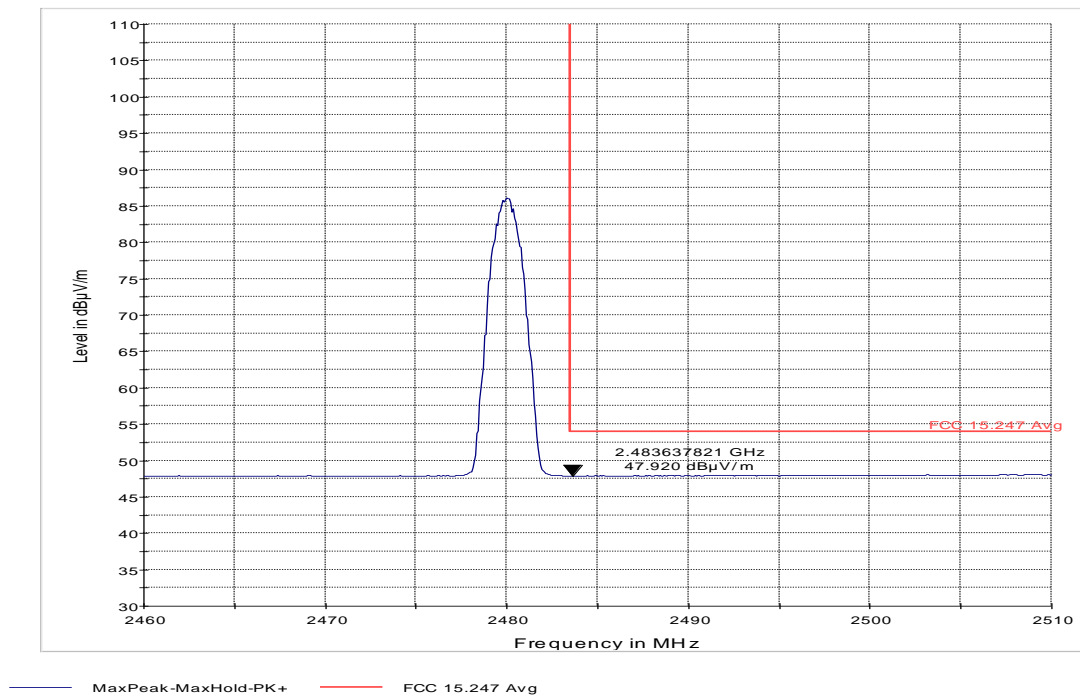
Lower band edge average - $\pi/4$ DQPSK modulation



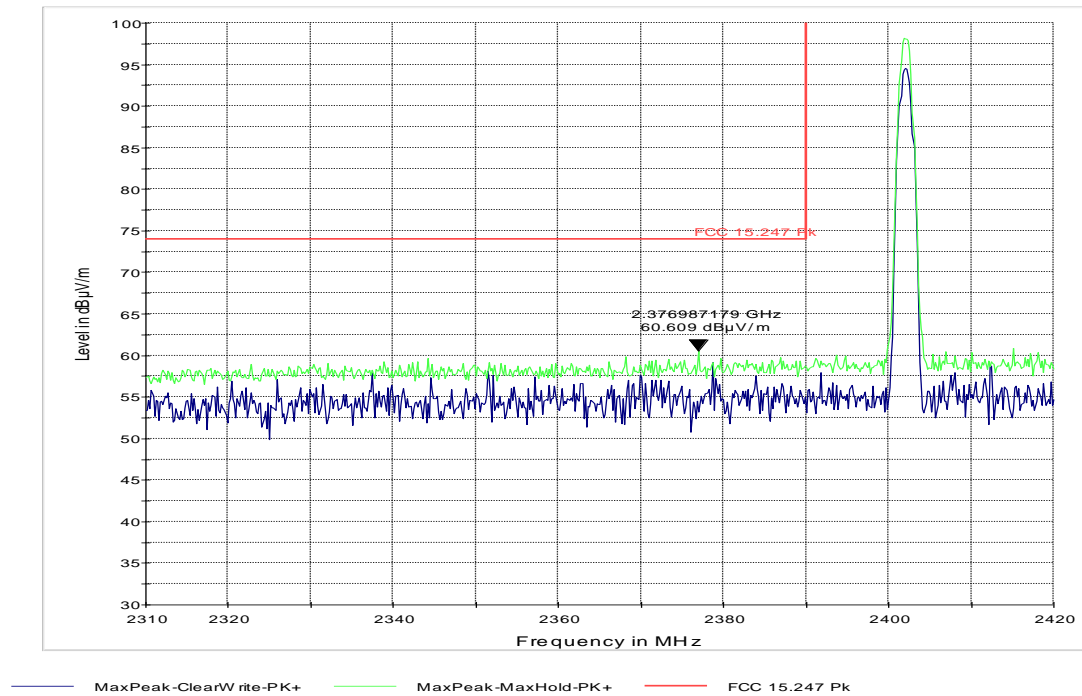
Higher band edge peak $-\pi/4$ DQPSK modulation



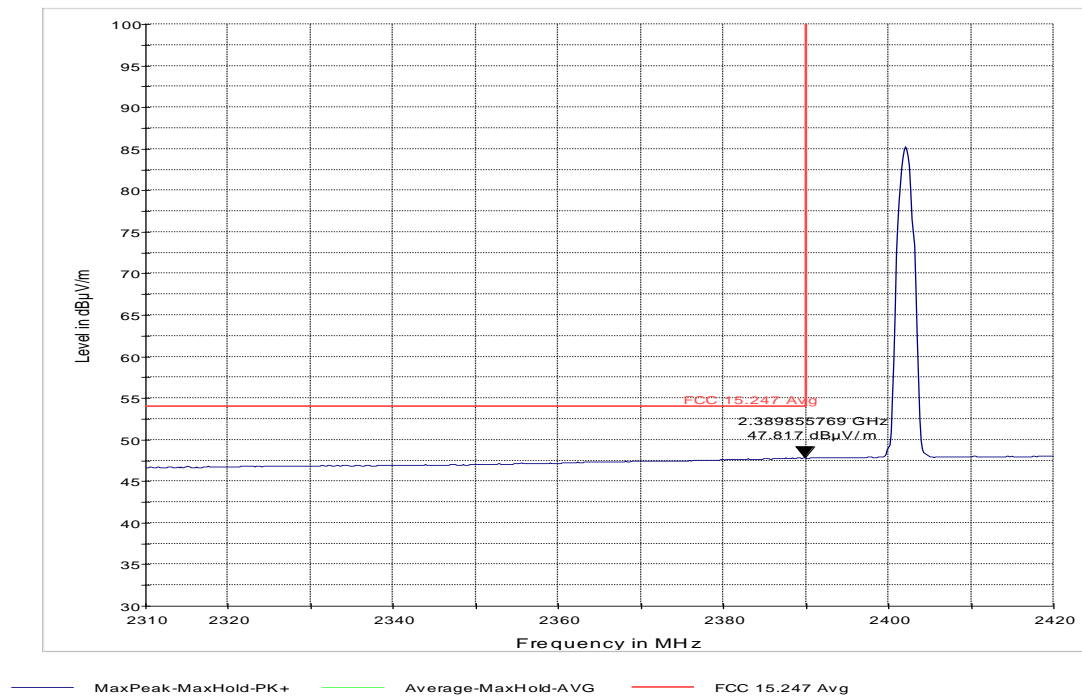
Higher band edge average $-\pi/4$ DQPSK modulation



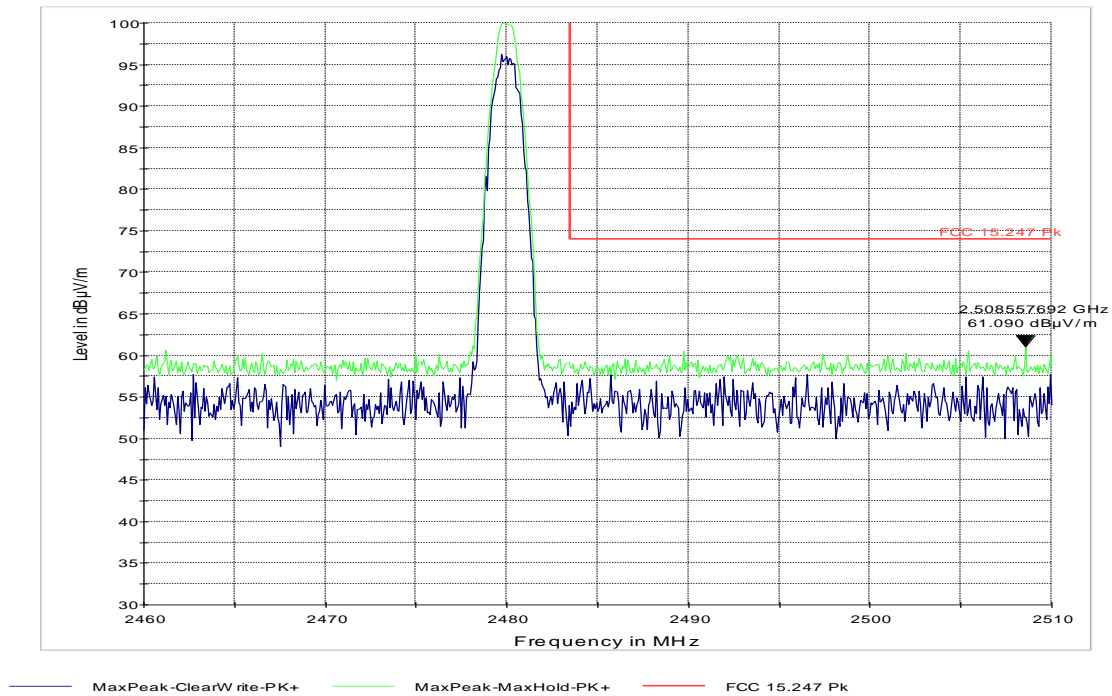
Lower band edge peak - 8DPSK modulation



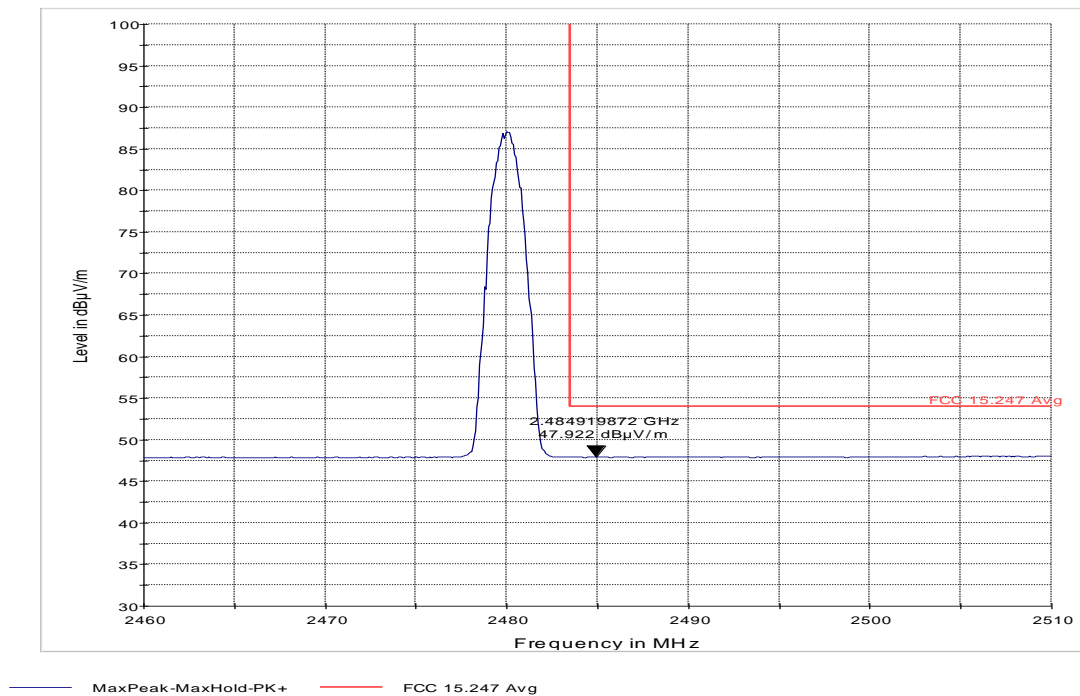
Lower band edge average -8DPSK modulation



Higher band edge peak - 8DPSK modulation



Higher band edge average-8DPSK modulation



6.7 Transmitter Spurious Emissions- Radiated

6.7.1 Limits:

§15.247/15.205

RSS-Gen Section 4.9; RSS 210-A8.5

| Frequency of emission (MHz) | Field strength (μV/m) | Measurement Distance (m) |
|-----------------------------|-----------------------|--------------------------|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |

| Frequency of emission (MHz) | Field strength (μV/m) |
|-----------------------------|-----------------------|
| 30–88 | 100 (40dBμV/m) |
| 88–216 | 150 (43.5 dBμV/m) |
| 216–960 | 200 (46 dBμV/m) |
| Above 960 | 500 (54 dBμV/m) |

6.7.2 Test Result:

The device was set to operate in GFSK test mode (highest conducted output power) and measurement results as reported here, represents the worst case radiated spurious emissions.

Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

For radiated measurements, all data in this report shows the worst case emissions data between H/V antenna polarizations and for all 3 orthogonal orientations of the EUT.

6.7.3 Test Conditions:

Tnom: 25°C; Vnom: 12 V

Hopping OFF

6.7.4 Measurement Procedure:

Peak measurements are made using a peak detector and RBW=120kHz (<1GHz) and RBW= 1MHz (>1GHz)

Measurement Uncertainty: ±3.0dB

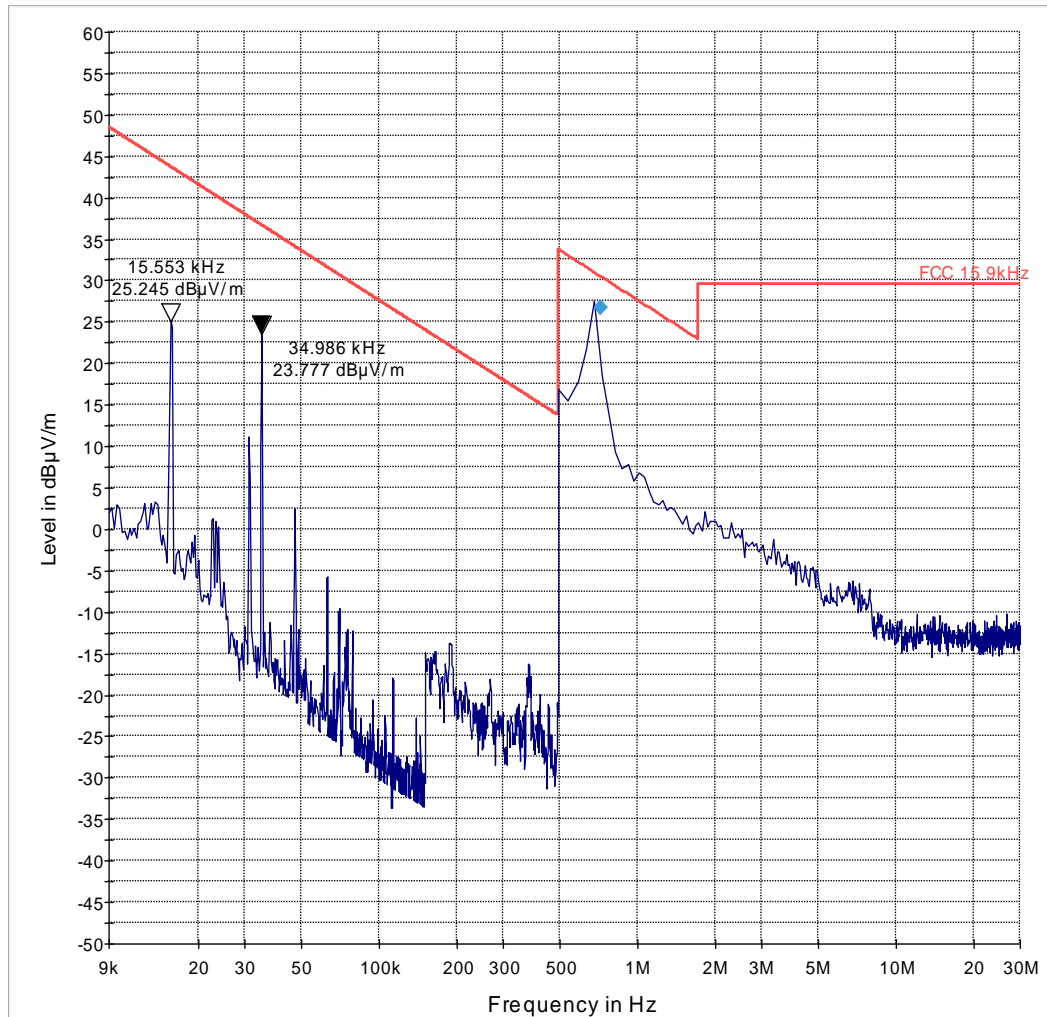
6.7.4.1 Test Verdict

Pass.

6.7.5 Test data/ plots:

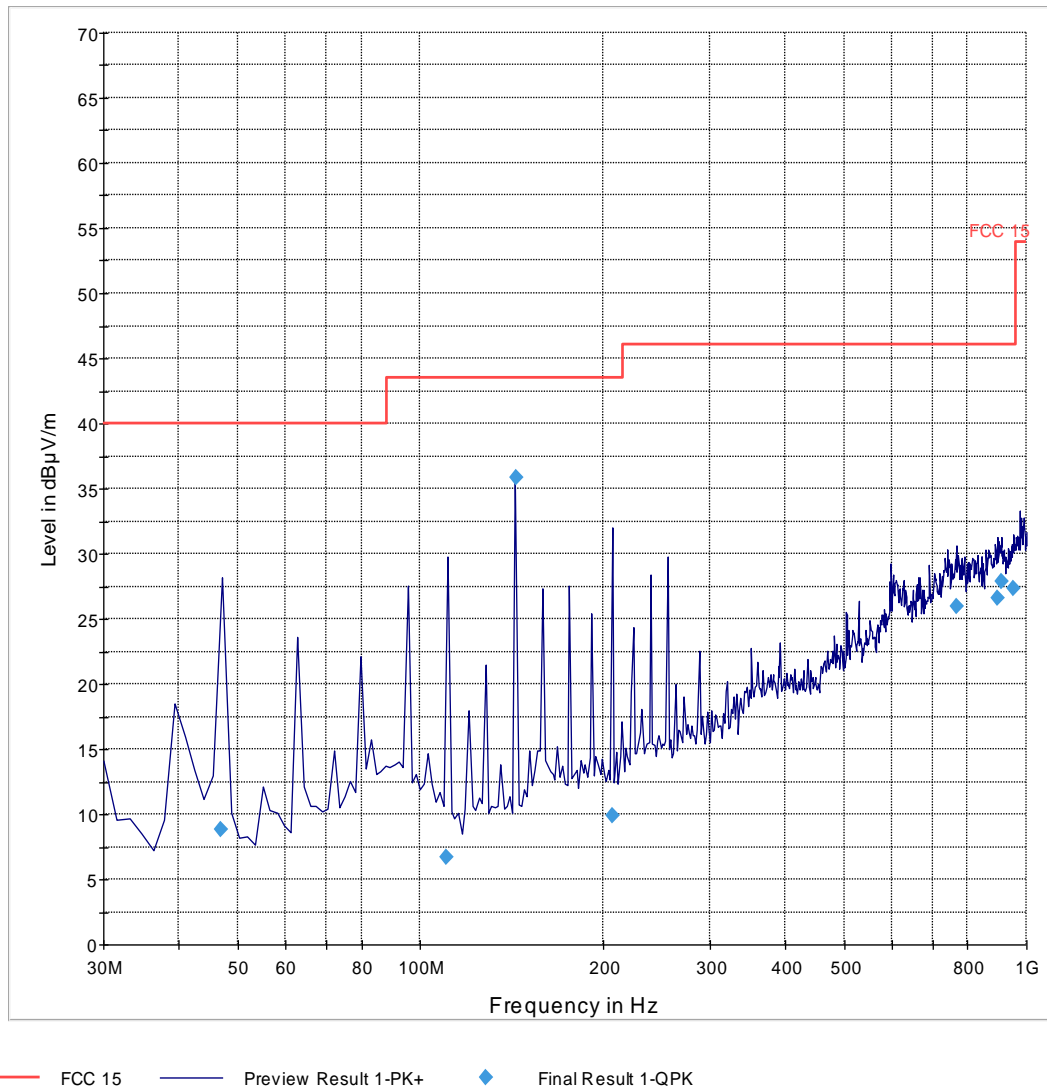
Transmitter Radiated Spurious Emission: Ch39: <30MHz

Note: Worst case representation for all channels and modes of operation in this frequency range-
Limits adjusted for 3m measurement.

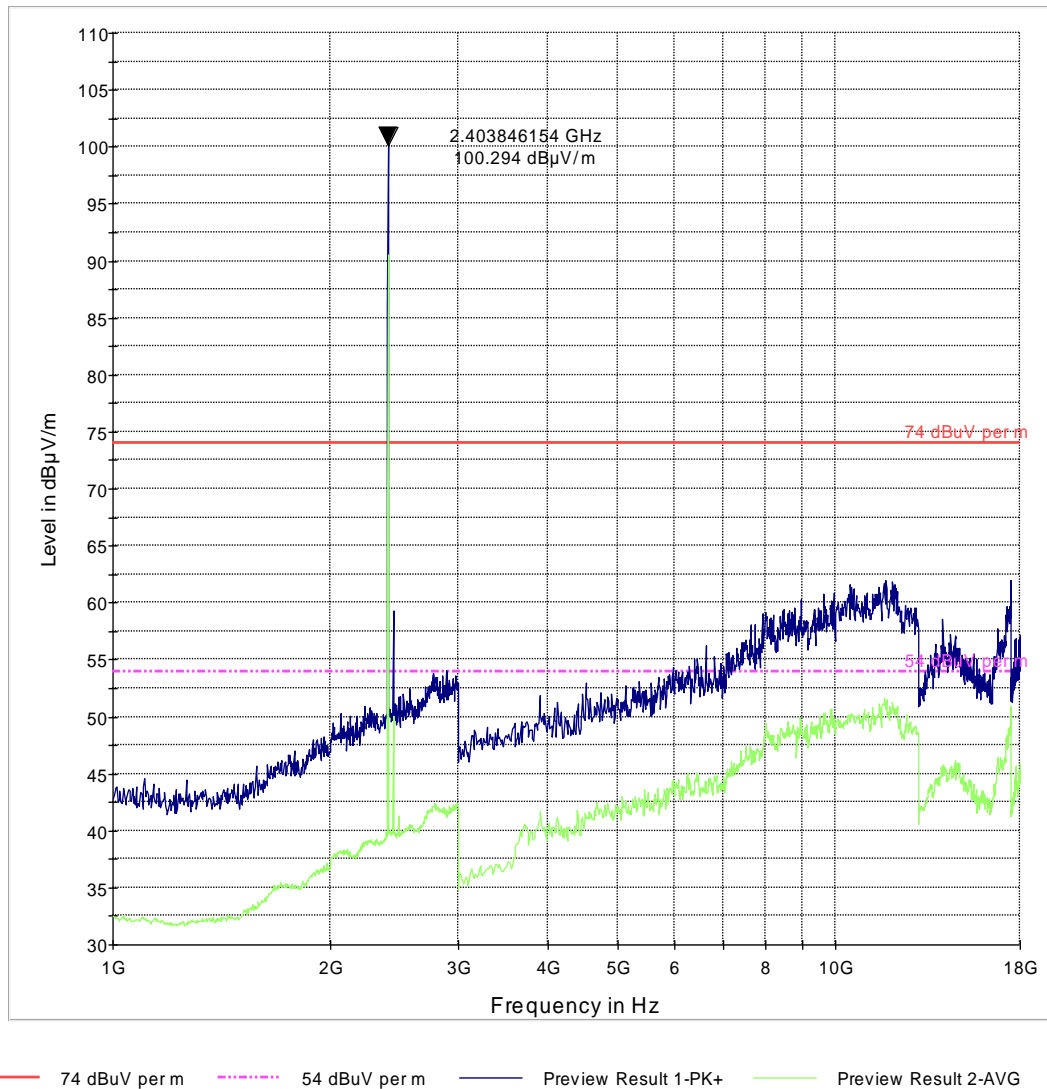


— FCC 15.9kHz — Preview Result 1-PK+ ◆ Final Result 1-QPK

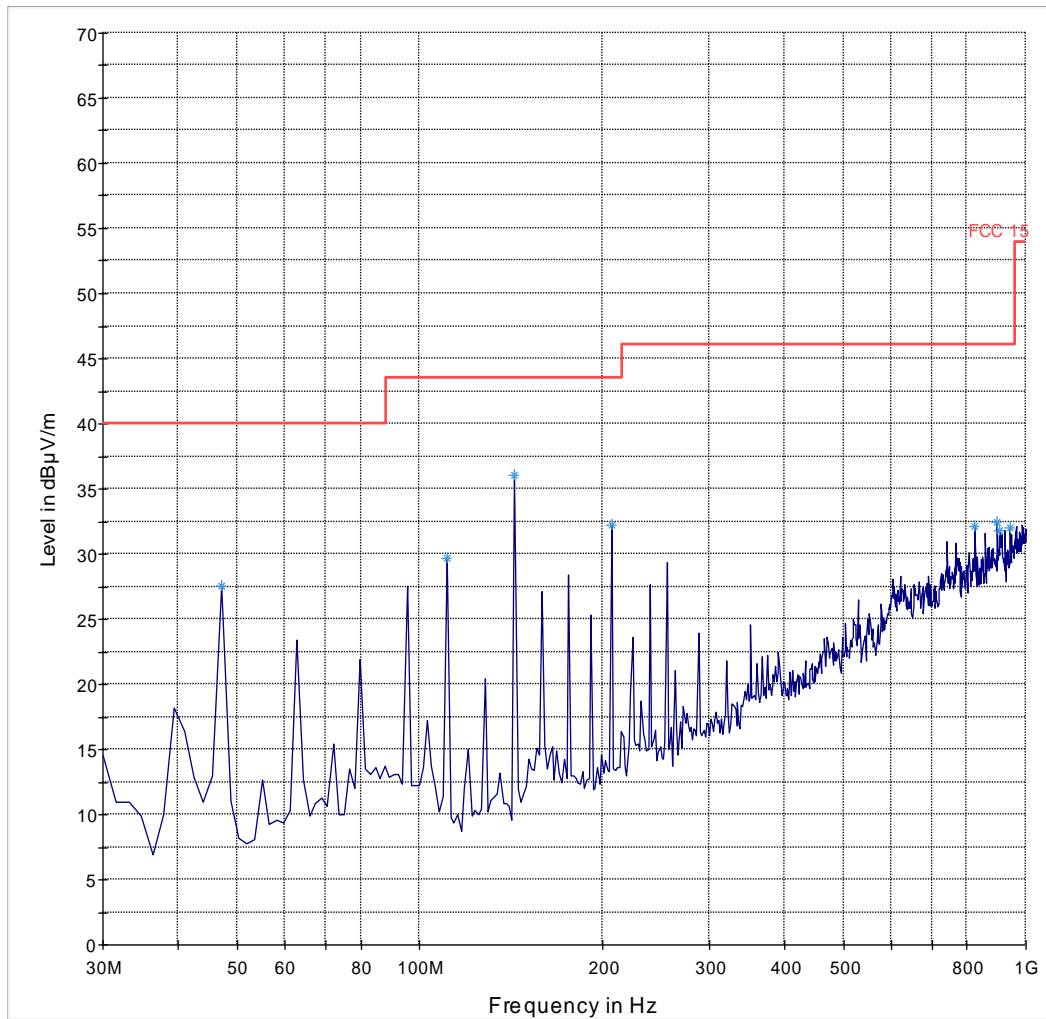
Transmitter Radiated Spurious Emission- Ch0- 30M-1GHz



Transmitter Radiated Spurious Emission- Ch0- 1G-18GHz

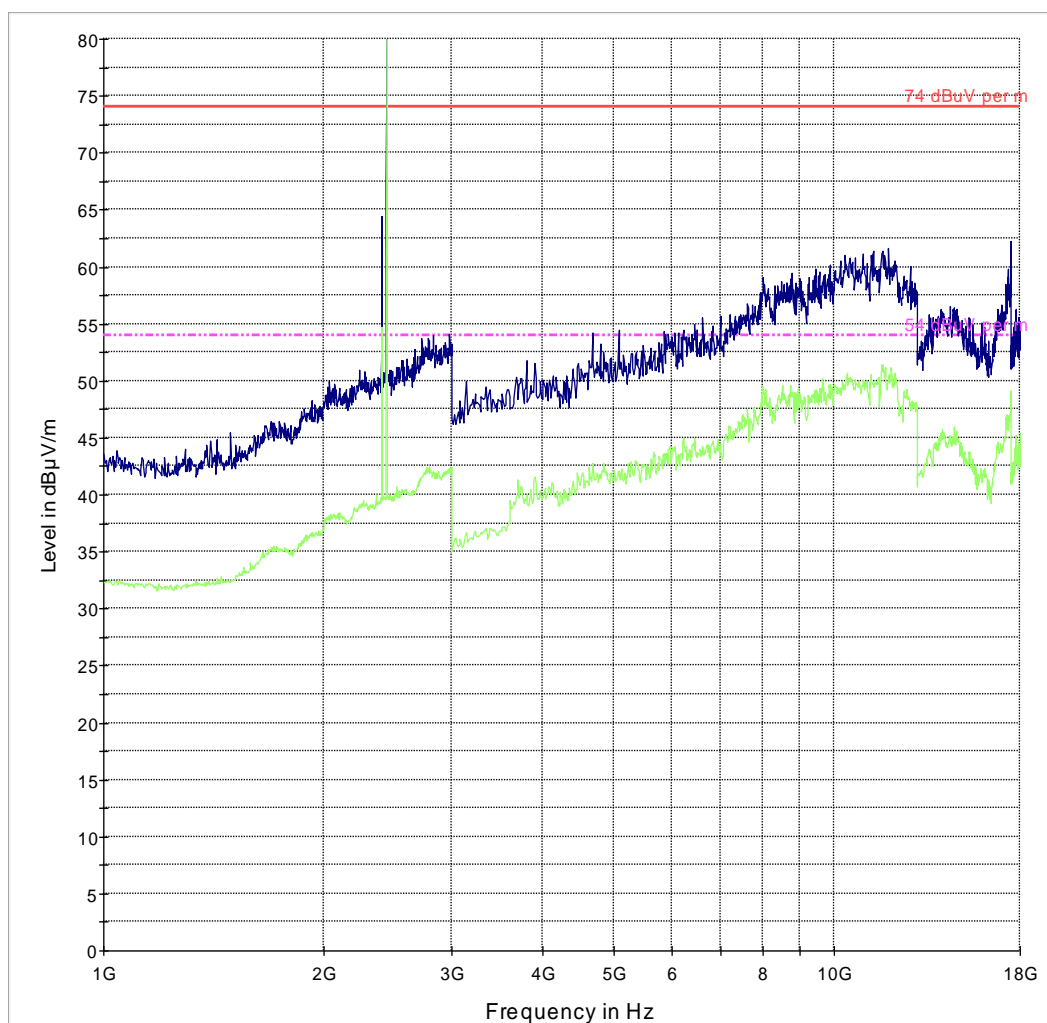


Transmitter Radiated Spurious Emission- Ch39- 30M-1GHz



— FCC 15 — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

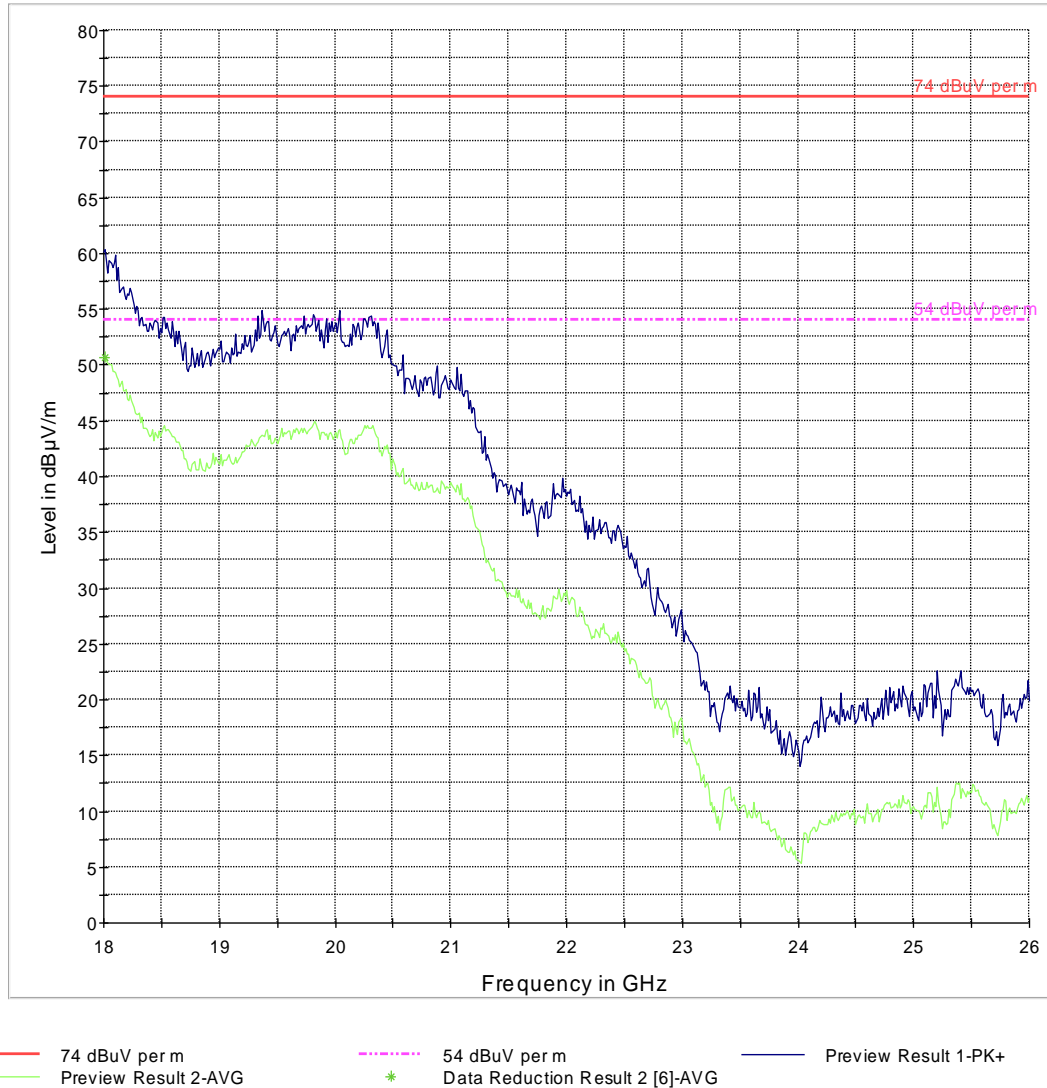
Transmitter Radiated Spurious Emission- Ch39- 1G-18GHz



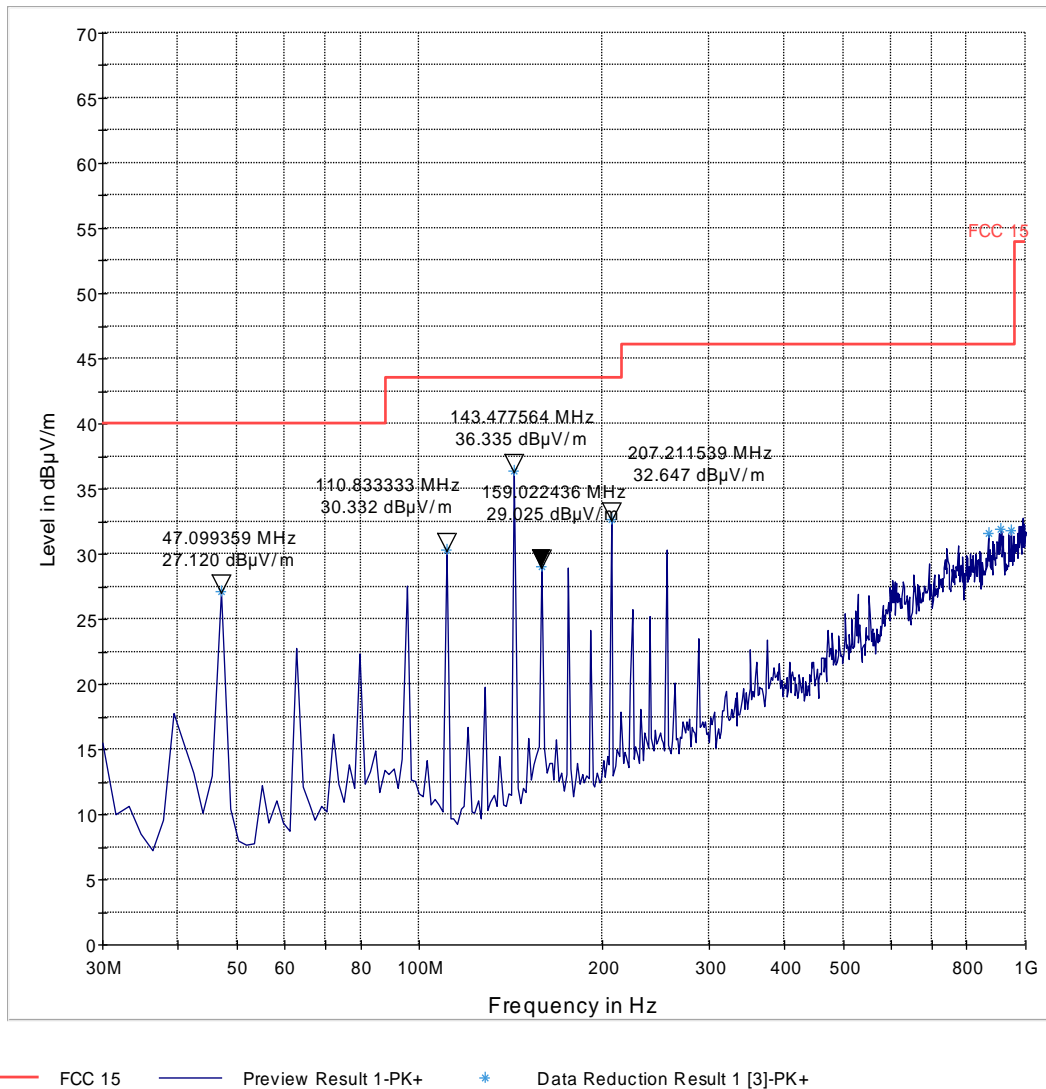
— 74 dBuV per m - - - 54 dBuV per m — Preview Result 1-PK+ — Preview Result 2-AVG

Transmitter Radiated Spurious Emission- Ch39- 18G-26GHz

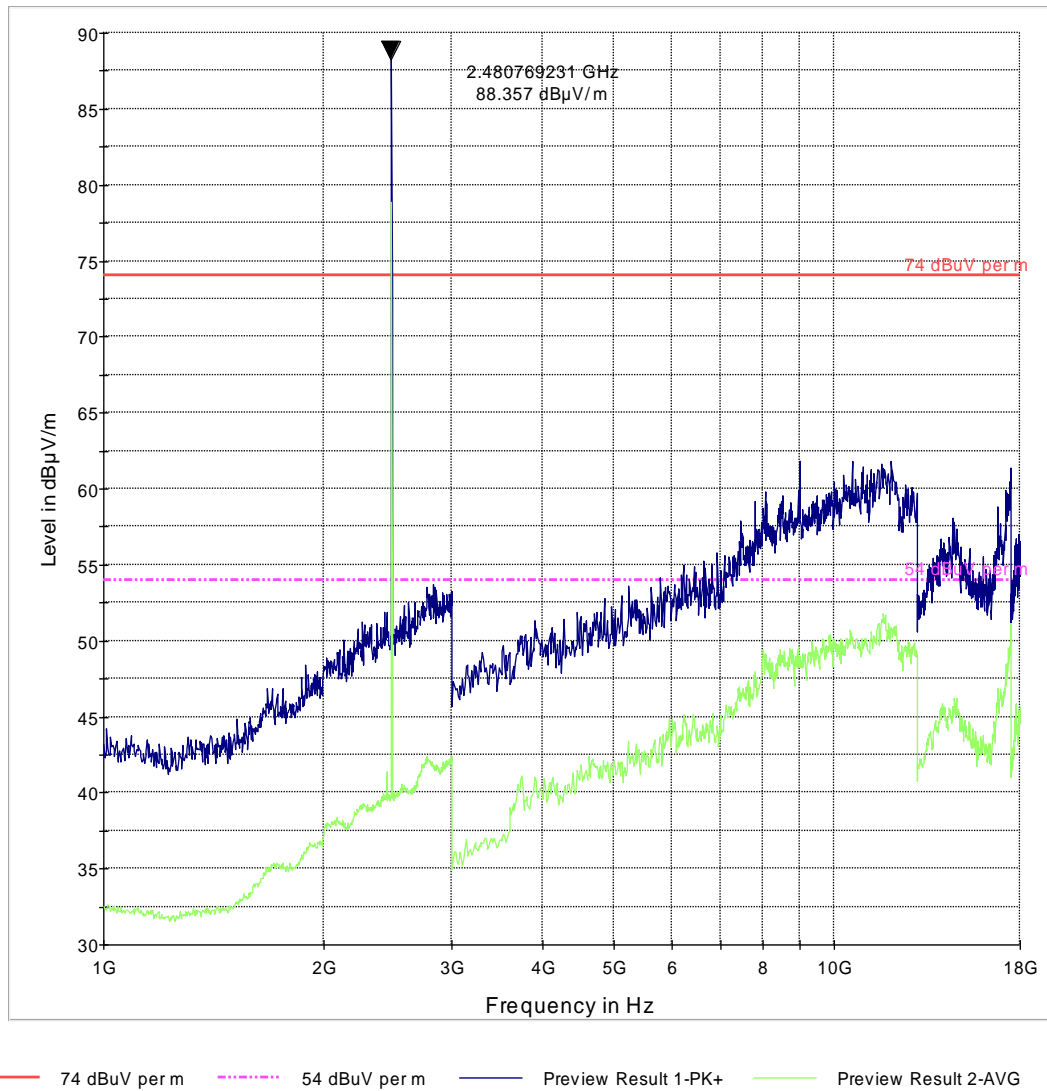
Note: Worst case representation for all channels and modes of operation in this frequency range-



Transmitter Radiated Spurious Emission- Ch78- 30M-1GHz



Transmitter Radiated Spurious Emission- Ch78- 1G-18GHz



7 Test Equipment and Ancillaries used for tests

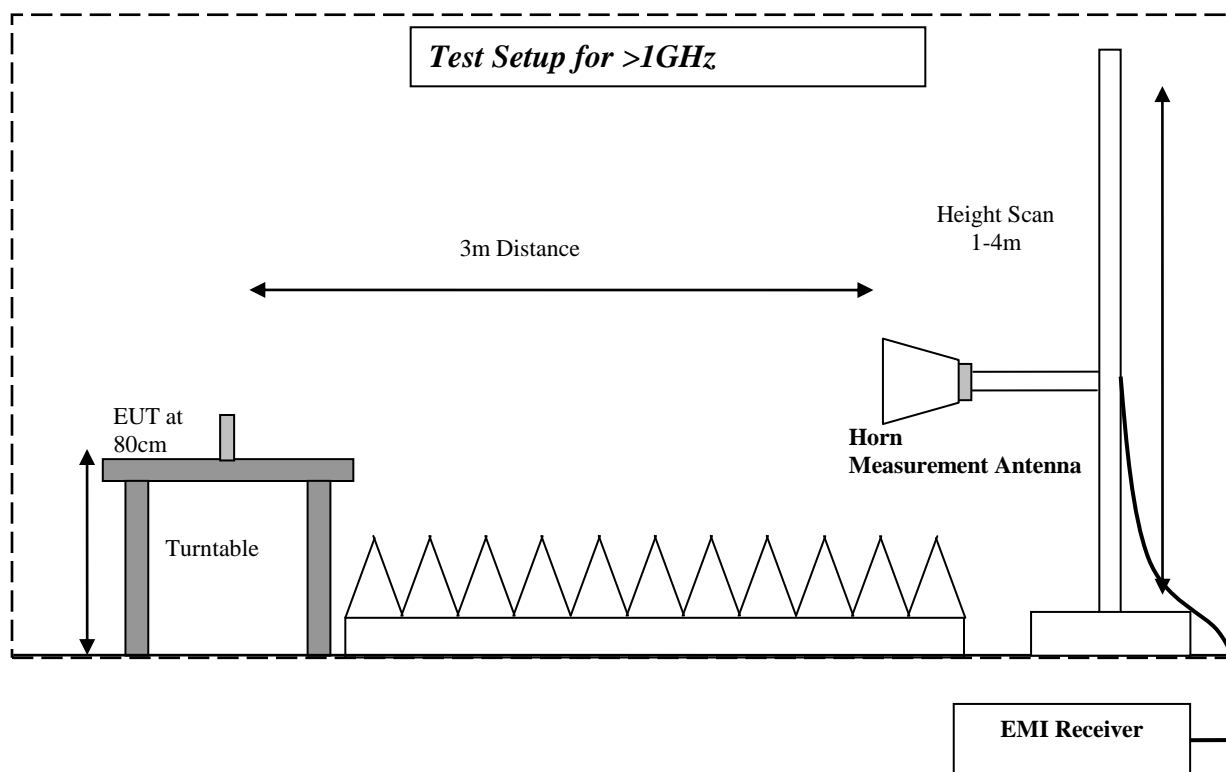
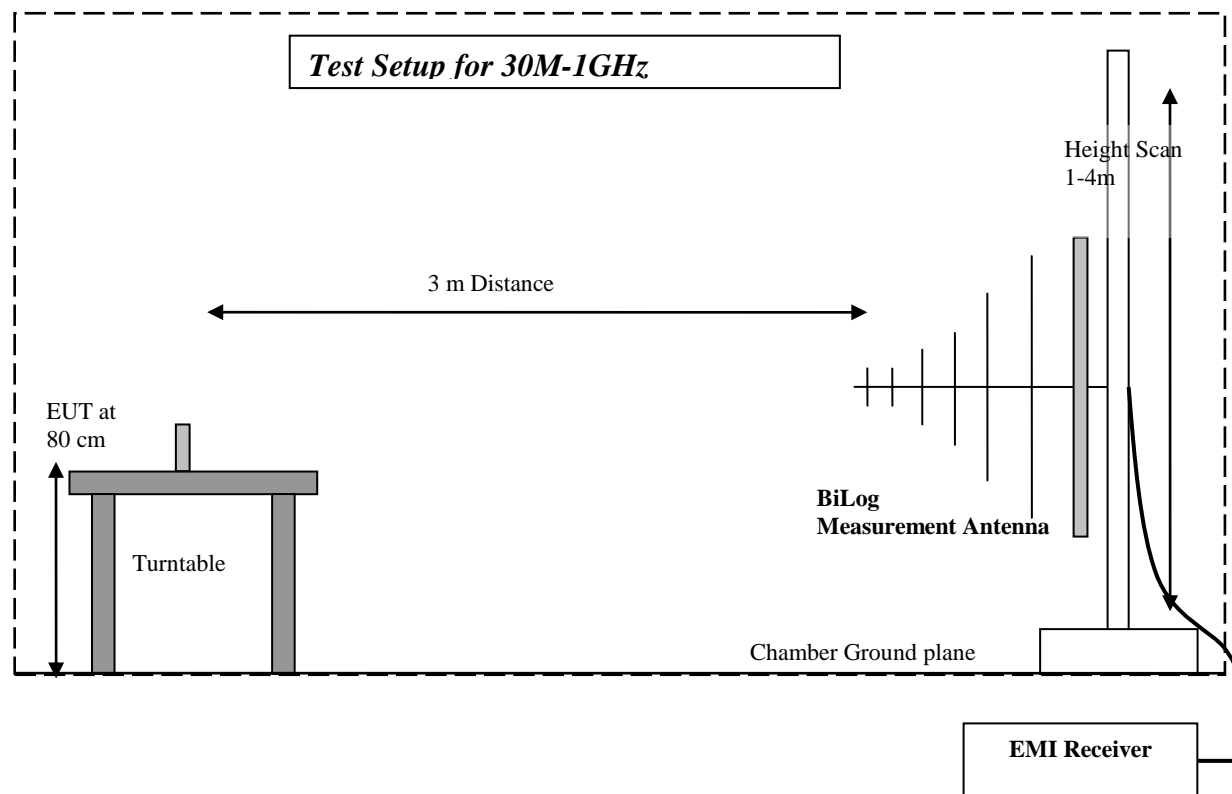
| No. | Equipment Name | Manufacturer | Type/model | Serial No. | Cal Date | Cal Interval |
|----------------------------|-----------------------------|---------------|------------|------------|----------|--------------|
| 3m Semi- Anechoic Chamber: | | | | | | |
| | Turntable | EMCO | 2075 | N/A | N/A | N/A |
| | MAPS Position Controller | ETS Lindgren | 2092 | 0004-1510 | N/A | N/A |
| | Antenna Mast | EMCO | 2075 | N/A | N/A | N/A |
| | Relay Switch Unit | Rohde&Schwarz | RSU | 338964/001 | N/A | N/A |
| | EMI Receiver/Analyzer | Rohde&Schwarz | ESU 40 | 100251 | Jul 2012 | 1 Year |
| | Spectrum Analyzer | Rohde&Schwarz | FSU | 200302 | May 2011 | 2 Years |
| | 1500MHz HP Filter | Filtek | HP12/1700 | 14c48 | N/A | N/A |
| | 2800 MHZ HP Filter | Filtek | HP12/2800 | 14C47 | N/A | N/A |
| | Pre-Amplifier | Miteq | JS40010260 | 340125 | N/A | N/A |
| | Binconilog Antenna | EMCO | 3141 | 0005-1186 | Apr 2012 | 3 Years |
| | Binconilog Antenna | ETS | 3149 | J000123908 | Feb 2012 | 3 years |
| | Horn Antenna | EMCO | 3115 | 35114 | Mar 2012 | 3 Years |
| Ancillary equipment | | | | | | |
| | Multimeter | Klein Tools | MM200 | 001 | Apr 2011 | 2 Years |
| | Humidity Temperature Logger | Dickson | TM320 | 03280063 | Mar 2012 | 1 Year |
| | Digital Barometer | VWR | 35519-055 | 91119547 | Nov 2011 | 2 Years |
| | Climatic Chamber | Votsch | VT4004 | G1115 | N/A | N/A |
| | DC Power Supply | HP | E3610A | KR83023316 | N/A | N/A |
| | DC Power Supply | Protek | 3003B | H012771 | N/A | N/A |
| | Communication Antenna | IBP5-900/1940 | Kathrein | N/A | N/A | N/A |

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month.

Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

8 Test Setup Diagram:



Test Report #: EMC_HARMA-027-12001_DSS

FCC ID: QNG-BE2804

Date of Report : 2013-02-08

IC ID: 6434C-BE2804



9 Revision History

| Date | Report Name | Changes to report | Report prepared by |
|------------|-------------------------|-------------------|--------------------|
| 2013-02-08 | EMC_HARMA-027-12001_DSS | First Version | C. Lee |
| | | | |