# Electromagnetic Compatibility
# Test Report

**Test Report No: FRR 110118 Rev.2**
**Issued on:** March 12, 2018

**Product Name**

**BLE Robot Board/RF**
**Module ESB6007D**

**Tested According to**
**FCC Subpart C §15.249, §2.1049, RSS 210 Issue 9**

**Tests Performed for**
**Robomow Ltd.**
POB 1412, Pardesia 4281500 Israel
Tel: +972-926-6262


***QualiTech EMC Laboratory***
30 Hasivim Street,P.O.Box 7500
Petah-Tikva, 4951169, Israel
Tel: +972-3-926-6994
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## Test Personnel

**Tests Performed By:** ----------

**Idan Zehavi Dmitri Babiev**

**Report Prepared By:** ----------

**Bina Talkar**

**Report Approved By**: ----------

**Rami Nataf**
**EMC Lab. Manager**
**QualiTech EMC Laboratory**

## Test Report details:

Test commencement date: 21.12.2017

Test completion date: 11.01.2018

Customer's Representative: Eli Levi

Issued on: 12.03.2018

### Revision details:

| Version | Date | Details/Reasons |
|---|---|---|
| Rev. 1 | 11.01.2018 | - |
| Rev. 2 | 12.03.2018 | Updated per TCB requirements. |

## Assessment Information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was setup and exercised using the configuration, modes of operation and arrangements defined in this report only.

## Modifications:

**Modifications made to the EUT**

None

**Modifications made to the Test Standard**

None

# System Test Configuration

## Justification:

In order to select worst-case host for full testing of limited modular approval certification, investigative fundamental emission from channel 20 (2442MHz) was performed.The results of the investigative fundamental emission appear in the table below.

| *Unit name | 2442MHz level (dBuv/m) @ 3 meter |
|---|---|
| RC306 | 86.957 |
| RS630 | 91.427 |
| RC Base station | 93.771 |

Based on the above results, the Base Unit was selected as the worst case host for full testing.

Refer to customer's declarations below for description of the differences between the models. None of the differences affects the radio performance of the EUT.

*The models above represent all models mentioned in the manufacturer's declaration below.

## Customer's declaration

Robomow®
Your robot. Our expertise.

**Date: January 11, 2018**

# DECLARATION

**I Hereby declare that**
**Model RC304, RC306, RC306p, RC312, RC312p, XR2 1000, XR2 1500, XR2 2000 are identical physically and mechanically. The models differ only by the battery capacity (2.4Ah vs 3Ah), by the DC motor type (brushless vs. brush) and by the shape and the color of the plastic cover.**

**The difference in the above listed hosts do not affect the radio modules in the devices. Please related to them all (from a Radio point of view) as the same product.**

**Thank you,**
**Signature:** _____
**Vadim Pilipenko**
**Product Manager**
**F. Robotics Acquisitions Ltd.**

**F Robotics Acquisitions Ltd.**
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Robomow®
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**Date: January 11, 2018**

# DECLARATION

**I Hereby declare that**
**Model RS612, RS612p, RS622, RS630, XR3 3000, XR3 4000, XR3 5000 are identical physically and mechanically. The models differ only by the battery capacity (4.5Ah vs 6Ah) and by the shape and the color of the plastic cover.**

**The difference in the above listed hosts do not affect the radio modules in the devices. Please related to them all (from a Radio point of view) as the same product.**

**Thank you,**
**Signature:** _____
**Vadim Pilipenko**
**Product Manager**
**F. Robotics Acquisitions Ltd.**

# Summary of Compliance Status:

## FCC Part 15, Subpart C Part 15.249 & RSS 210 issue 9 – Intentional Radiators

| Test Spec. Clause | Test Case/Procedure | Remarks |
|---|---|---|
| FCC Part 15, Subpart C – Intentional Radiators, ANSI C63.10: 2013, RSS 210 Issue 9 | | |
| §2.1049, RSS GEN section 6.6, | Occupied Bandwidth | - |
| §15.249,§15.205 & §15.209& sRSS 210 section B.10 | Field Strength of Fundamental & Harmonics & Restricted Bands& Outside of Frequency Bands | Pass |
| 47 CFR §15.107/207, ICES-003 RSS-GEN section 8.8 | Power Line Emissions measurements- Power Supply Model PWS0018B | Pass |
| 47 CFR §15.203,RSS- Gen Issue 4 | Antenna Connector Requirements | Pass |

# *Table of Contents*

# 1. General Description

## 1.1. Description of the EUT /test Item:

**Product name:**

FCC ID:2ABHE-RB-2
IC:23524-RB2

**EUT Description:**

BLE Robot Board P/N: ESB6007D is a Bluetooth Low Energy transceiver - SCR chip based module intended to enable robotic lawn mower communicating with external devices.

Frequency Range: 2402-2480 MHz

Antenna Details:2400-2500 MHz,Max = 0.5 dBi ,Chip Antenna,Medel:2450AT18B100

## 1.2. Worst Case Results:

In order to determine the worst-case emissions for all modes/data rates/tests and EUT's position(three axis- x,y,z), all modes/data rates and position were investigated for each required test to determine which produces the worst- case data and then full testing was performed in that mode/data rate and position,

# 2. Test Facility & Uncertainty of Measurement

## 2.1. Accreditation/ Registration reference:

- *A2LA Certificate Number: 1633.01*
- *FCC Registration Number: 102724*
- *Industry Canada File Number: IC4808A-1*
- *VCCI Member no.: 1798 (C3775, R-3404, G-620, T1630)*

## 2.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom

**Address:** 30, Hasivim St., Petah Tikva, Israel.
Tel: 972-3-926-6994

**3m Anechoic Chamber:**

Two 3m-screened chambers are used in two configurations: the semi-anechoic chamber for Radiated Emission measurements and the full-anechoic chamber for Radiated Immunity tests.

**Semi Anechoic Configuration:**

| | |
|---|---|
| Measurement distance | 3m |
| Chamber dimensions | 9.5m x 6.5m x 5.2m |
| Antenna height | 1 - 4m |
| Shielding Effectiveness | Magnetic field ≥80dB at 15 kHz<br>≥90dB at 100 kHz<br>Electric field >120dB from 1MHz to 1GHz<br>>110dB from 1GHz to 10GHz |
| Absorbing material | Ferrite tiles on the walls and ceiling<br>Emerson and Cuming absorbing material in selected positions on the walls |
| Normalized Site Attenuation<br>measured at 5 positions | ±3.9dB, 30MHz to 200MHz<br>±3dB, 200MHz to 1000MHz |
| Transmission Loss<br>measured at 5 positions, at 1.5m height | ±3dB, 1GHz to 18GHz |

**Full-Anechoic Configuration:**

| | |
|---|---|
| Measurement distance | 3m |
| Chamber dimensions | 7m x 4m x 3m |
| Antenna height | 1.55m at Horizontal & Vertical polarizations |
| Shielding Effectiveness | Magnetic field ≥80dB at 15 kHz<br>≥90dB at 100 kHz<br>Electric field >120dB from 1MHz to 1GHz<br>>110dB from 1GHz to 10GHz |
| Absorbing material | Ferrite tiles on the walls and ceiling Emerson and Cuming absorbing material in selected positions on the walls and floor |
| Field Uniformity to EN61000-4-3 | ±3dB 80MHz to 18GHz |

# 3. Measurements & Test Results:

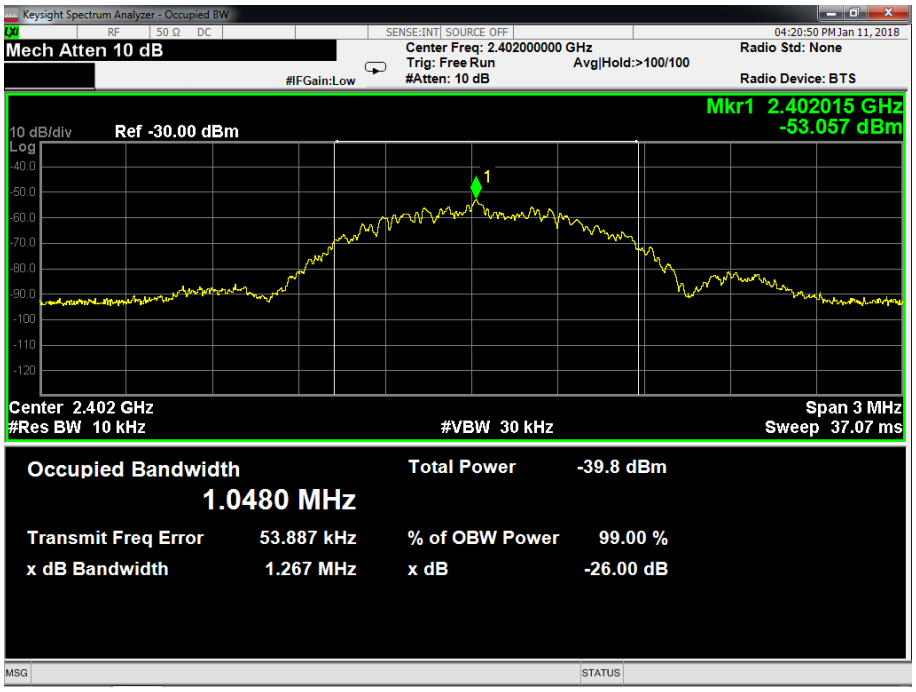
## 3.1. Occupied Bandwidth

| | | | |
|---|---|---|---|
| Reference document: | **§2.1049, RSS GEN sec 6.6** | | |
| Test Requirements: | The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. | | |
| Measurement Standard | ANSI C63.10: 2013 | **Pass** | |
| Method of testing: | Conducted | | |
| Operating conditions: | Under normal test conditions | | |
| S.A. Settings: | RBW: 1% to 3% of the 99% bandwidth | | |
| Mode of operation: | Peak Detector<br>Trace Mode : Max Hold | | |
| Environment conditions: | Ambient Temperature: 23.2°c | Relative Humidity: 59.8% | Atmospheric Pressure: 1018hPa |
| Test Result: | See below | | |

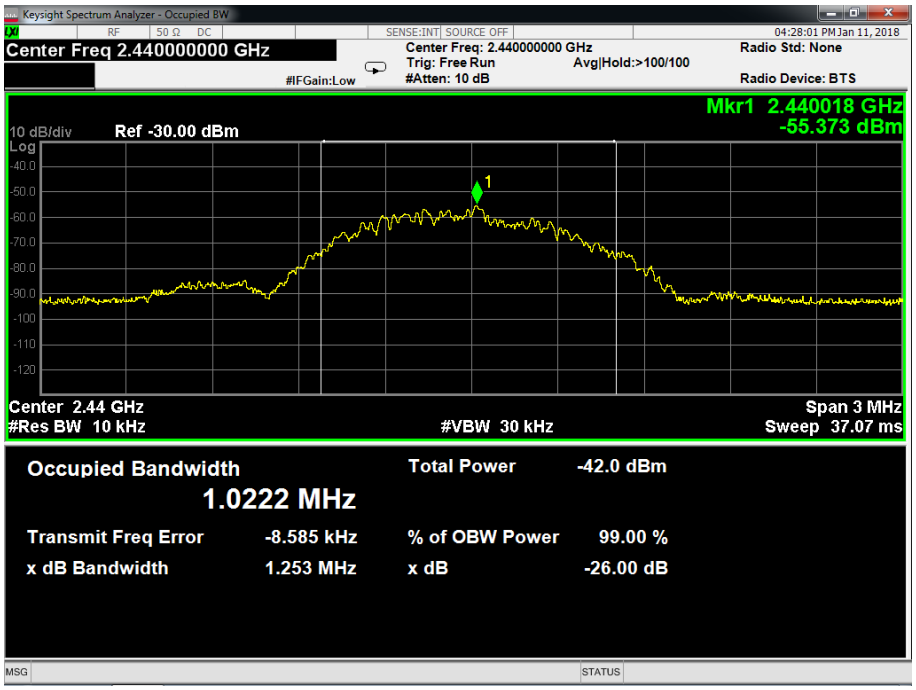
**Test results:**

| Frequency, [MHz] | 99% power BW, [MHz] | Lower Frequency, [MHz] | Middle Frequency, [MHz] | Higher Frequency, [MHz] | Limit |
|---|---|---|---|---|---|
| 2402.00 | 1.048 | 2402.015 | NA | NA | NA |
| 2440.00 | 1.022 | NA | 2440.018 | NA | |
| 2480.00 | 1.074 | NA | N.A | 2480.015 | |

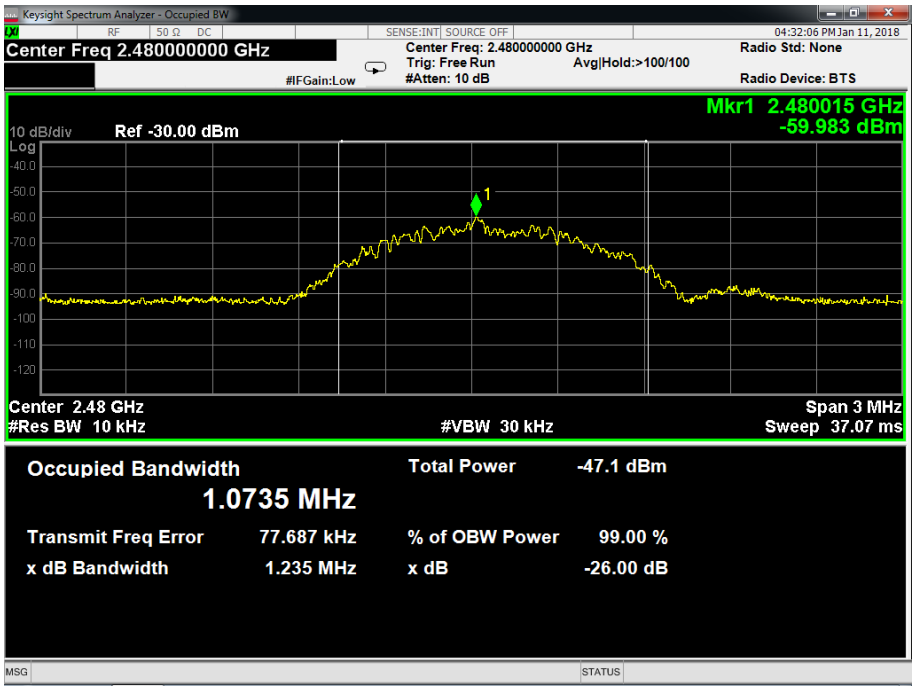
**Plot 3.1.1 Occupied Channel Bandwidth test results, F = 2402 MHz**



**Plot 3.1.2 Occupied Channel Bandwidth test results, F = 2440 MHz**




**Plot 3.1.3 Occupied Channel Bandwidth test results, F = 2480 MHz**



## 3.2. Field Strength of Fundamental & Harmonics & Restricted Bands& Outside of Frequency Bands

<table>
<tr><td>Reference document:</td><td colspan="3">47 CFR §15.249 (a)(c)(d), 47 CFR §15.205(a), RSS 210 section B.10</td></tr>
<tr><td>Test Requirements:</td><td colspan="3">the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following,in addition emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation
<table>
<tr><th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/meter)</th><th>Field strength of harmonics & (microvolts/meter)</th></tr>
<tr><td>902-928 MHz</td><td>50</td><td>500</td></tr>
<tr><td>2400-2483.5 MHz</td><td>50</td><td>500</td></tr>
<tr><td>5725-5875 MHz</td><td>50</td><td>500</td></tr>
<tr><td>24.0-24.25 GHz</td><td>250</td><td>2500</td></tr>
<tr><td colspan="3">-All other emission limits per § 15.209</td></tr>
</table></td></tr>
<tr><td>Measurement Standard</td><td>ANSI C63.10: 2013</td><td colspan="2" rowspan="4">Pass</td></tr>
<tr><td>Operating conditions:</td><td>Under normal test conditions</td></tr>
<tr><td>Method of testing:</td><td>Radiated</td></tr>
<tr><td>S.A. Settings:</td><td>RBW:1GHz <120kHz, VBW: 300kHz<br>1GHz >1MHz, VBW: 3MHz</td></tr>
<tr><td>Environment conditions:</td><td>Ambient Temperature: 23.3°c</td><td>Relative Humidity: 41%</td><td>Atmospheric Pressure: 1011.4 hPa</td></tr>
<tr><td>Test Result:</td><td>See below</td><td colspan="2">-</td></tr>
</table>

**Limit:**

| Frequency Range, MHz | Limit | |
|---|---|---|
| | **Field strength of fundamental , ,Strength@3m, dBµV/m** | **Field strength of harmonics Strength@3m, dBµV/m** |
| 902-928 MHz | 93.98 | 53.98 |
| 2400-2483.5 MHz | 93.98 | 53.98 |
| 5725-5875 MHz | 93.98 | 53.98 |
| 24.0-24.25 GHz | 107.96 | 67.96 |
| -All other emission limits per § 15.209 | | |

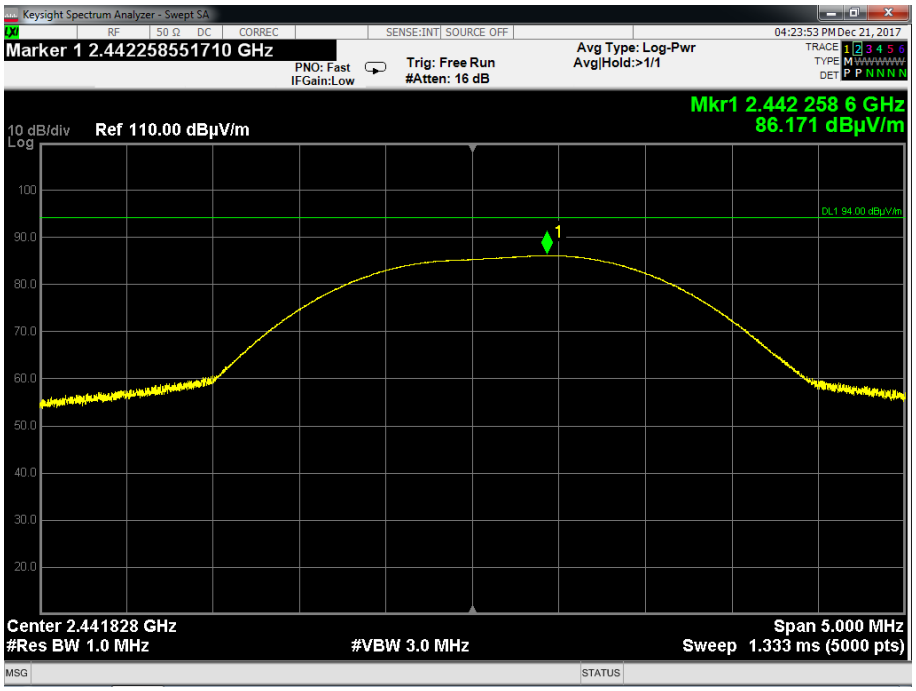
**Test Result: RC Base Station, CBS01 – worst case - 120Vac**

| Frequency [MHz] | Antenna POL | Emission Type | Pk Detector dBµV/m | AV Detector dBµV/m | Pk Limit Detector dBµV/m | AV Limit dBµV/m | *Pk Marge | **AV Marge | Antenna Position [cm] | Turn-table Azimuth [°] | Pass/ Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fc - 2402** | | | | | | | | | | | |
| 2402 | V | fundamental | 91.86 | - | - | 93.98 | - | -2.12 | 180 | 176 | Pass |
| 197.280 | H | Harmonics | 52.230 | 46.230 | 74.000 | 54.000 | -21.770 | -7.770 | 150 | 50 | Pass |
| 189.800 | H | Harmonics | 51.340 | 46.150 | 74.000 | 54.000 | -22.660 | -7.850 | 155 | 56 | Pass |
| 2389.71 | H | Restricted Bands | 46.054 | 33.810 | 74.000 | 54.000 | -27.946 | -20.190 | 152 | 53 | Pass |
| **Fc - 2442** | | | | | | | | | | | |
| 2442 | H | fundamental | 93.77 | - | - | 93.98 | - | -0.21 | 245 | 10 | Pass |
| 196.040 | V | Harmonics | 49.340 | 44.230 | 74.000 | 54.000 | -24.660 | -9.770 | 160 | 40 | Pass |
| 197.730 | H | Harmonics | 52.540 | 46.450 | 74.000 | 54.000 | -21.460 | -7.550 | 172 | 37 | Pass |
| 189.590 | H | Harmonics | 51.110 | 46.240 | 74.000 | 54.000 | -22.890 | -7.760 | 130 | 45 | Pass |
| **Fc - 2480** | | | | | | | | | | | |
| 2480 | V | fundamental | 93.67 | - | - | 93.98 | - | -0.31 | 127 | 28 | Pass |
| 197.690 | H | Harmonics | 52.230 | 46.410 | 74.000 | 54.000 | -21.770 | -7.590 | 160 | 49 | Pass |
| 189.580 | H | Harmonics | 50.940 | 40.970 | 74.000 | 54.000 | -23.060 | -13.030 | 162 | 0 | Pass |
| 2483.530 | V | Restricted Bands | 62.365 | 44.190 | 74.000 | 54.000 | -11.635 | -9.810 | 161 | 51 | Pass |

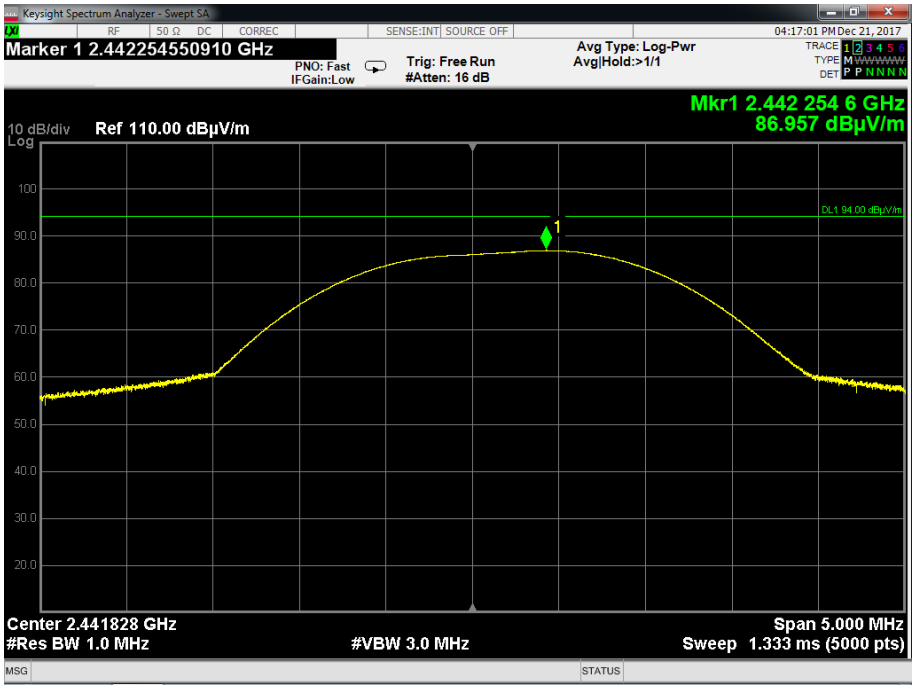
** Compared to AV Limit which is the worst case scenario

**Worst case finding process**

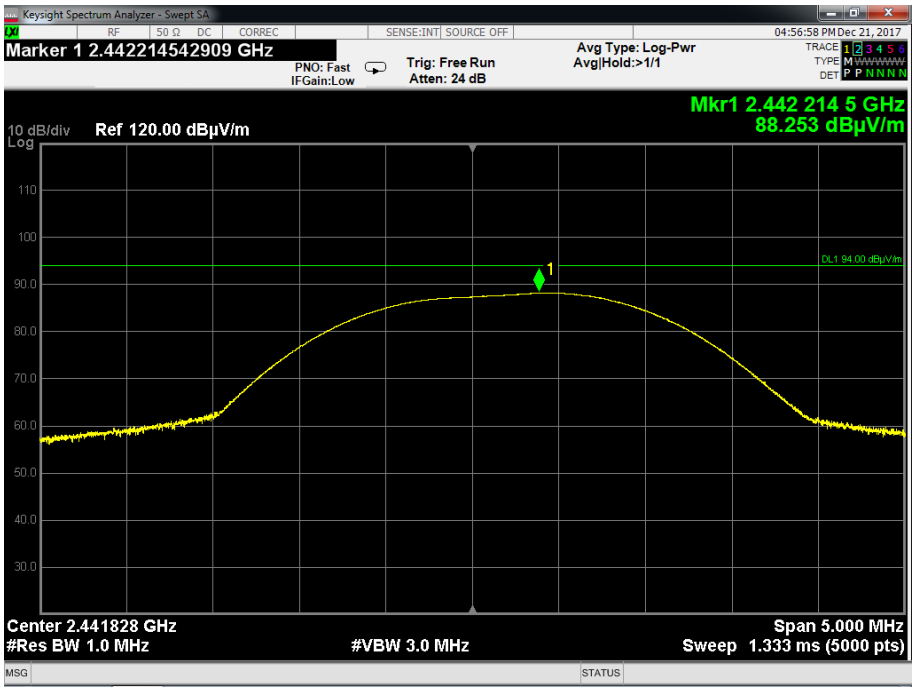
**Plot 3.2.1: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of fundamental, Fc -2442- RC306**



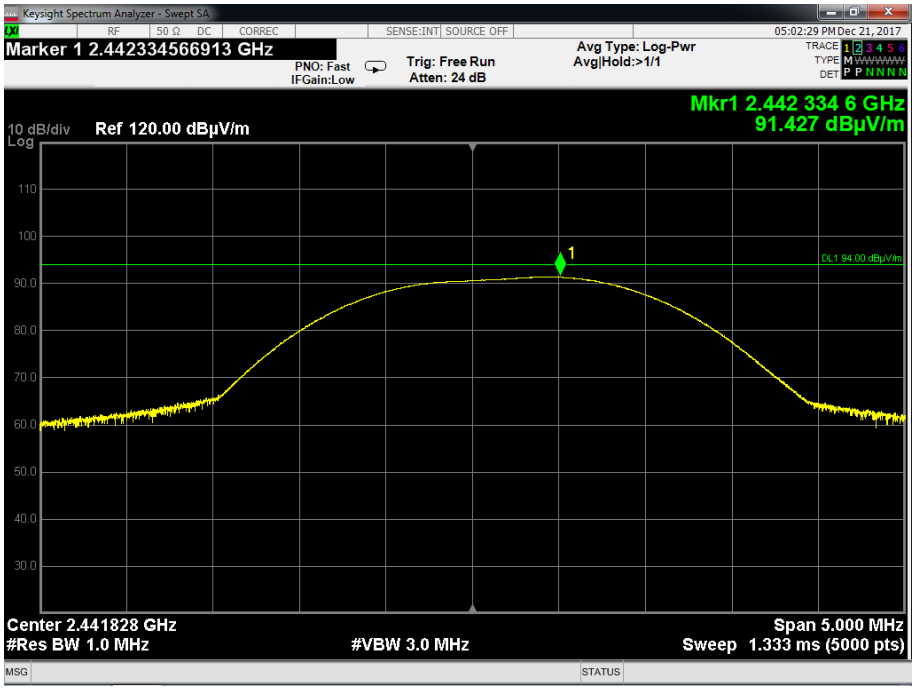

**Plot 3.2.2: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of fundamental, Fc -2442- RC306**



**Plot 3.2.3: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of fundamental, Fc -2442- RS630**

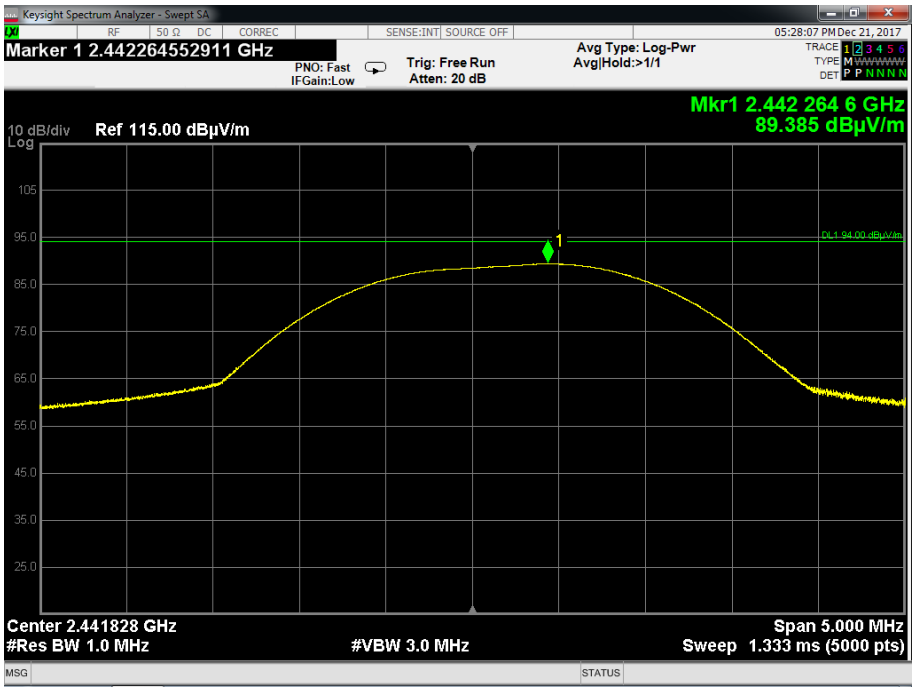



**Plot 3.2.4: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of fundamental, Fc -2442- RS630**

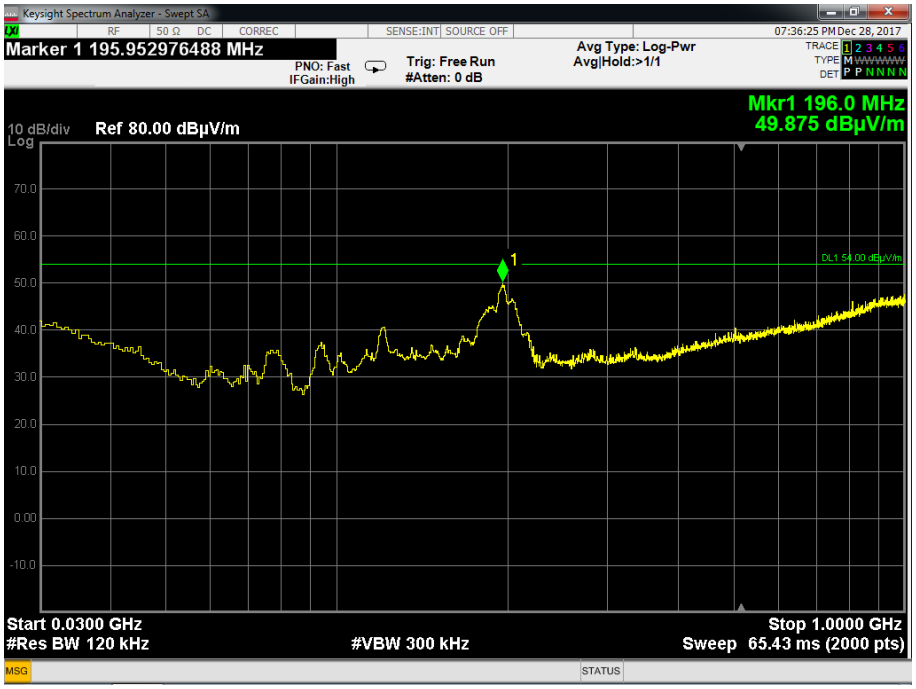


**Plot 3.2.5: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of fundamental, Cannel 20- Fc -2442, RC Base Station, CBS01 – worst case**

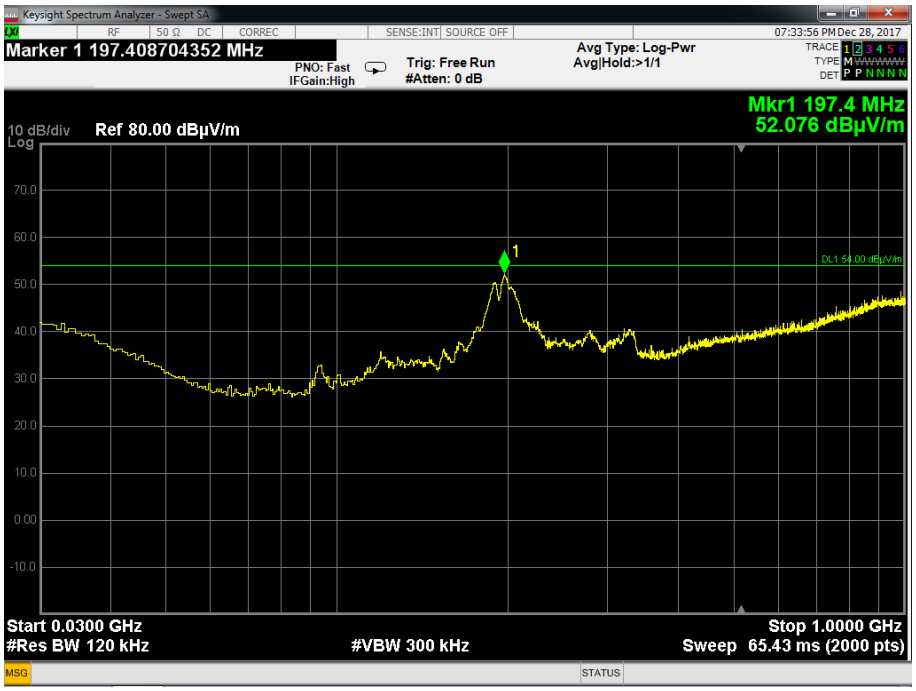

**Plot 3.2.6: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of fundamental, Cannel 20 - Fc -2442, RC Base Station, CBS01 – worst case,**



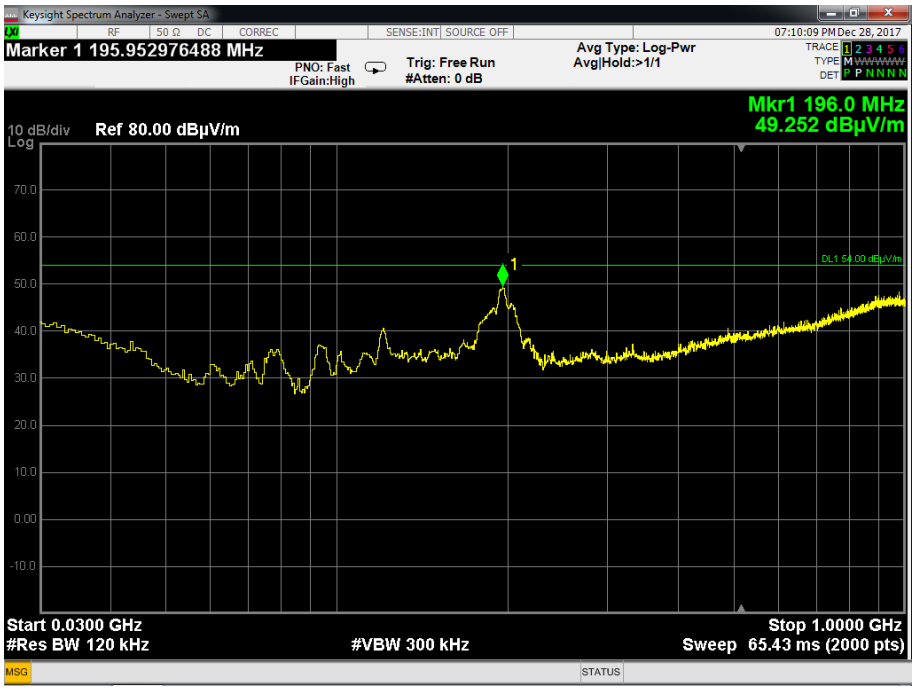
**Full testing on worst case unit**
**Plot 3.2.7: Radiated Emissions test, Vertical Polarization, Tx Modulated, 30MHz-1GHz**
**Cannel 0- Fc -2402, RC Base Station, CBS01- input power 120vac**



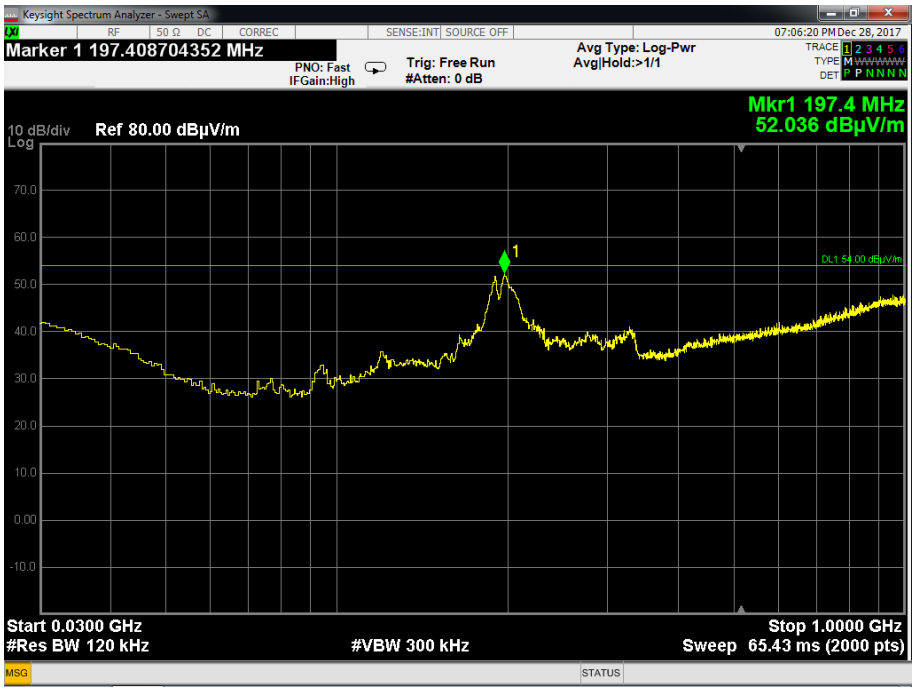

**Plot 3.2.8: Radiated Emissions test, Horizontal Polarization, Tx Modulated, 30MHz-1GHz**
**, Cannel 0- Fc -2402, RC Base Station, CBS01**



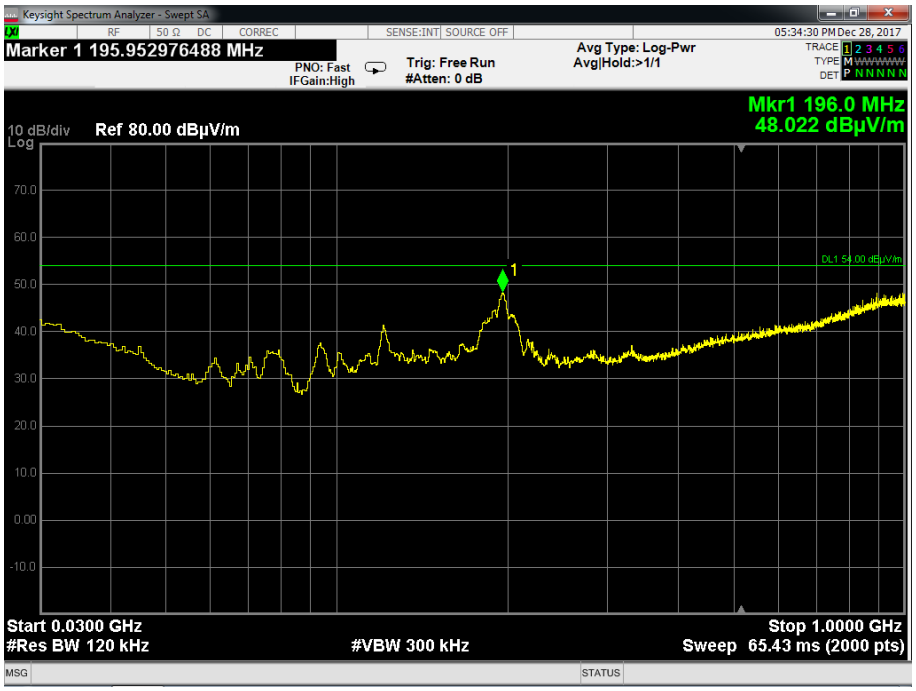
**Plot 3.2.9: Radiated Emissions test, Vertical Polarization, Tx Modulated, 30MHz-1GHz Cannel 20- Fc -2442, RC Base Station, CBS01**



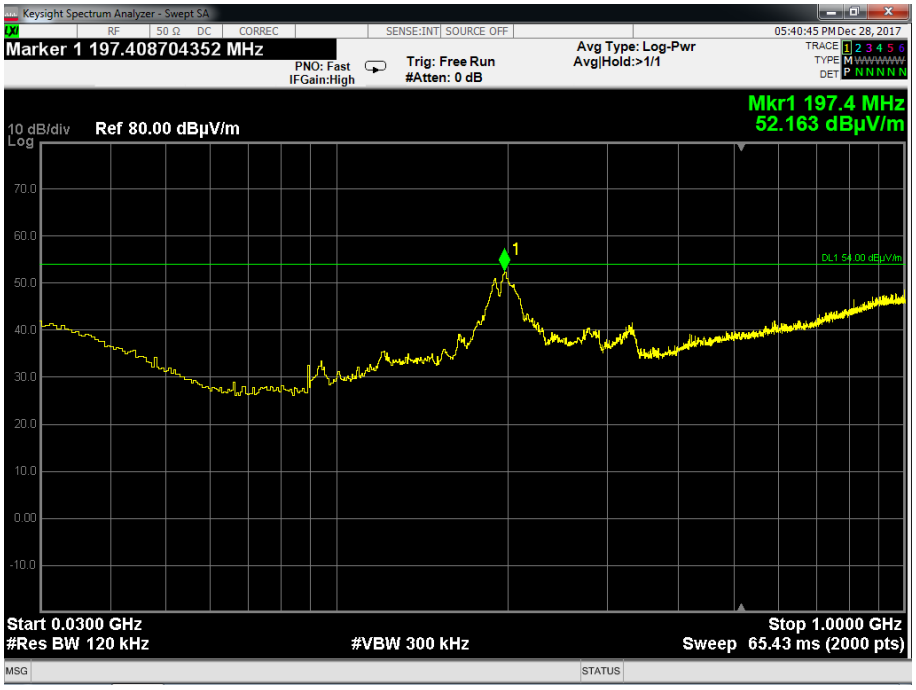

**Plot 3.2.10: Radiated Emissions test, Horizontal Polarization, Tx Modulated, 30MHz-1GHz Cannel 20- Fc -2442, RC Base Station, CBS01**



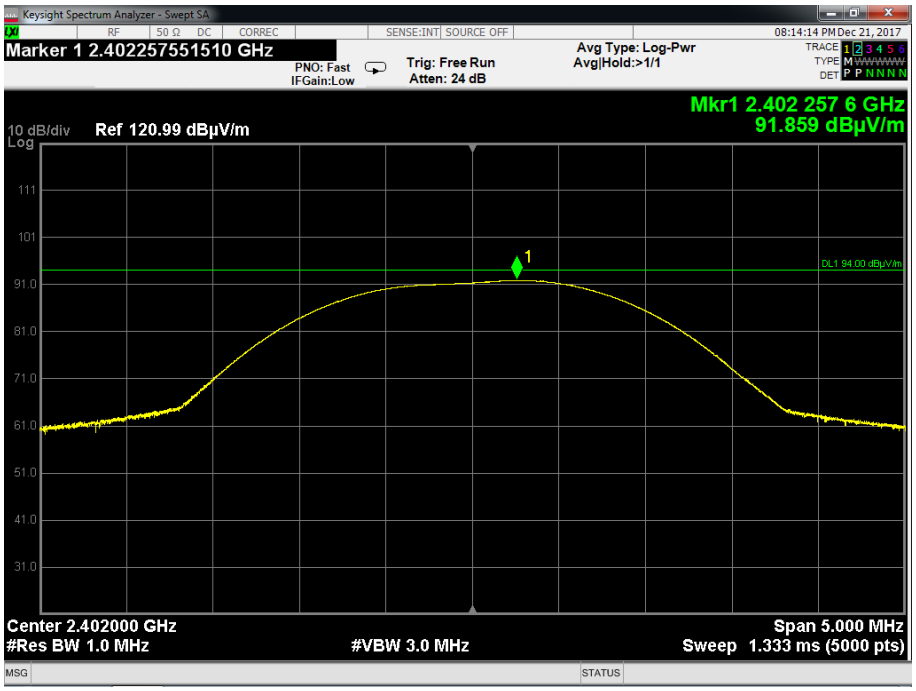
**Plot 3.2.11: Radiated Emissions test, Vertical Polarization, Tx Modulated, 30MHz-1GHz , Cannel 39- Fc -2480, RC Base Station, CBS01**



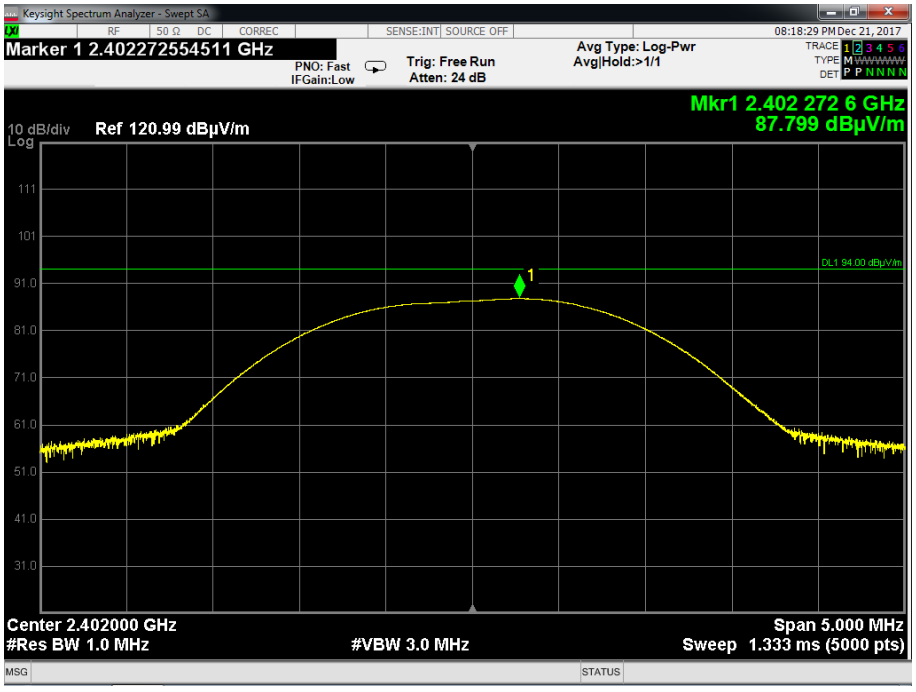

**Plot 3.2.12: Radiated Emissions test, Horizontal Polarization, Tx Modulated, 30MHz-1GHz , Cannel 39- Fc -2480, RC Base Station, CBS01**



**Plot 3.2.13: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of fundamental, Cannel 0- Fc -2402, RC Base Station, CBS01 – worst case**

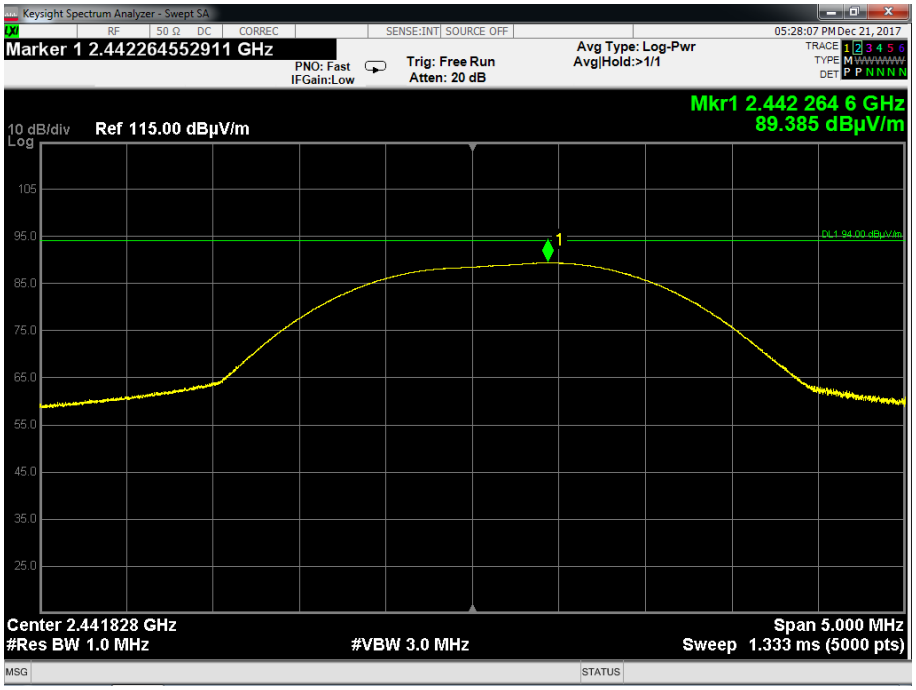



**Plot 3.2.14: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of fundamental, Cannel 0- Fc -2402, RC Base Station, CBS01 – worst case**

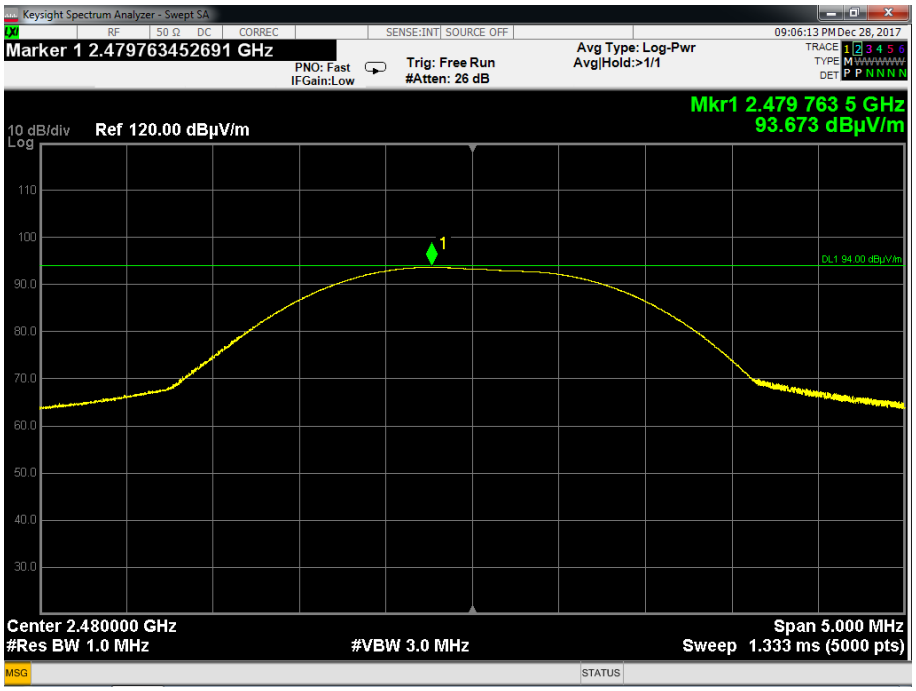


**Plot 3.2.15: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of fundamental, Cannel 20- Fc -2442, RC Base Station, CBS01 – worst case**

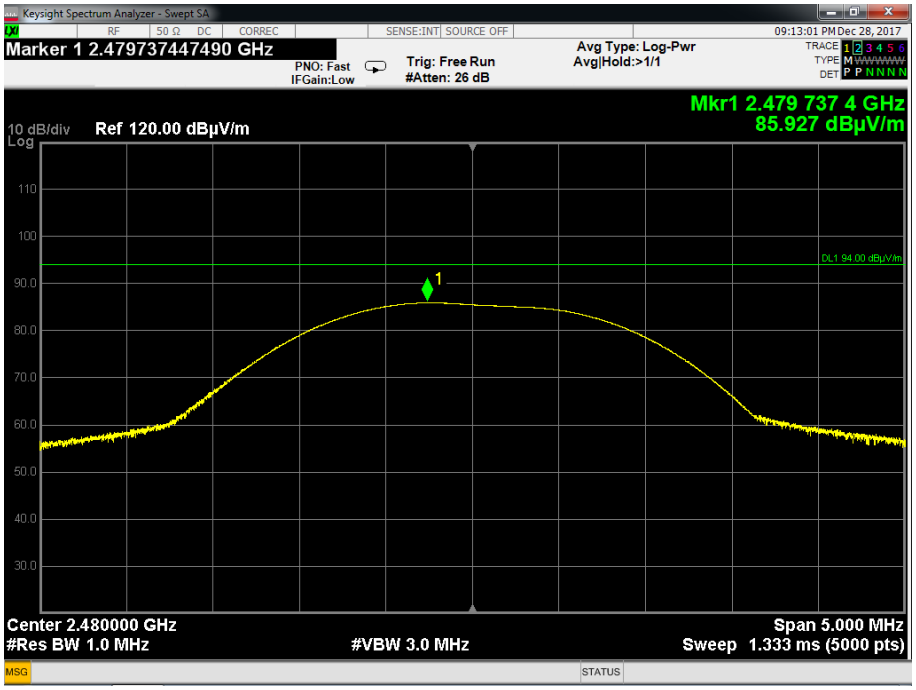

**Plot 3.2.16: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of fundamental, Cannel 20 - Fc -2442, RC Base Station, CBS01 – worst case,**



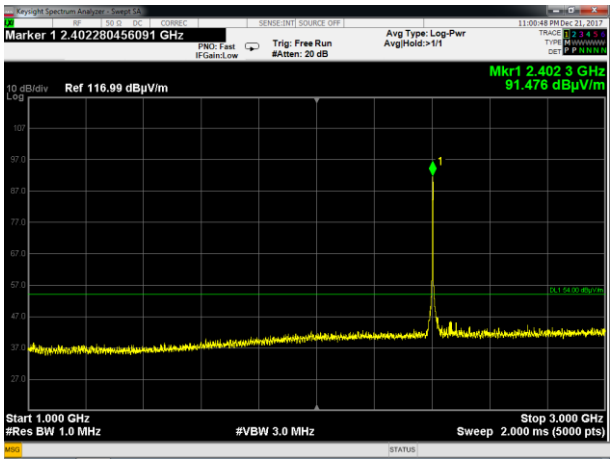
**Plot 3.2.17: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of fundamental, Cannel 39- Fc -2480, RC Base Station, CBS01 – worst case**

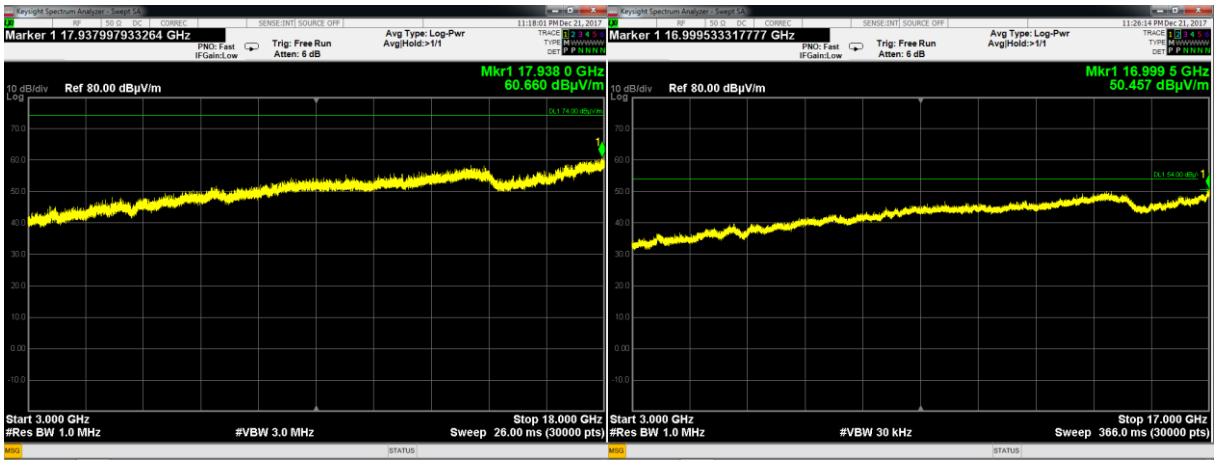



**Plot 3.2.18: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of fundamental, Cannel 39- Fc -2480, RC Base Station, CBS01 – worst case**



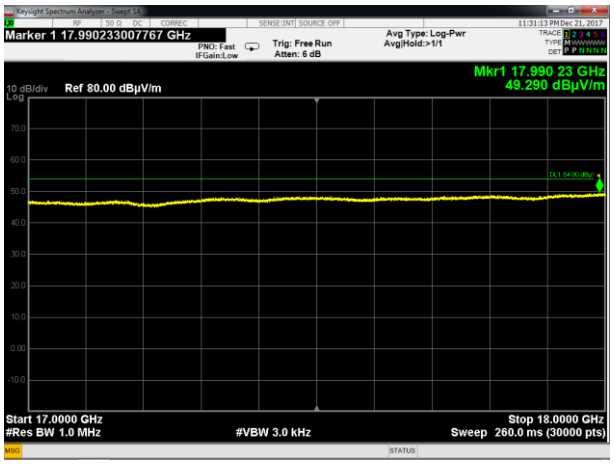
**Plot 3.2.19: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of harmonics, Cannel 0 - Fc -2402, RC Base Station, CBS01 – worst case, 1GHz -18GHz**



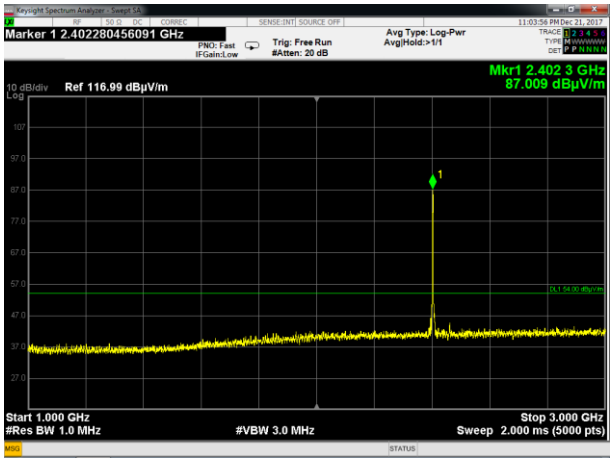

PE AV

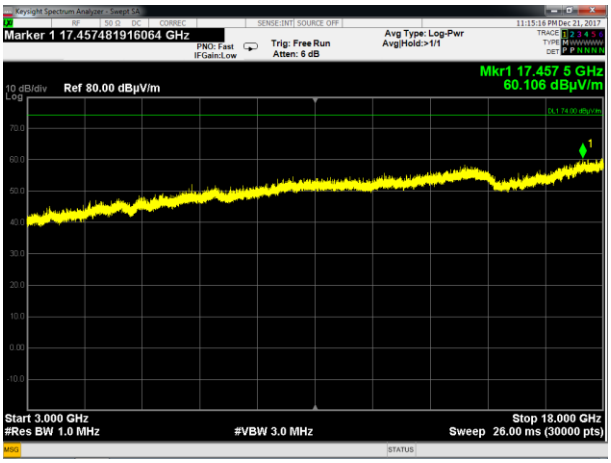
With Notch Filter 50702

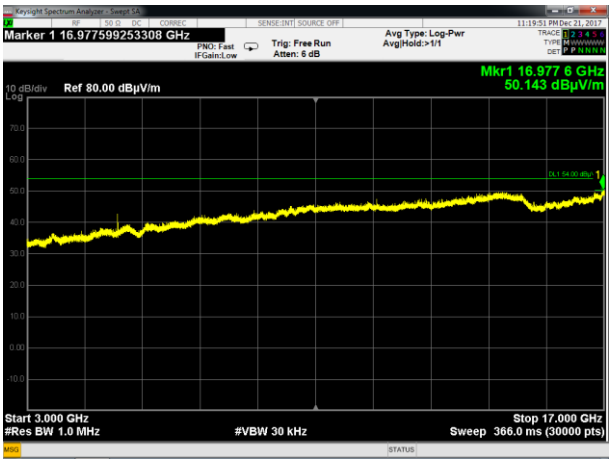



With Notch Filter 50702

**Plot 3.2.20: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of harmonics, Cannel 0 - Fc -2402, RC Base Station, CBS01 – worst case, 1GHz -18GHz**

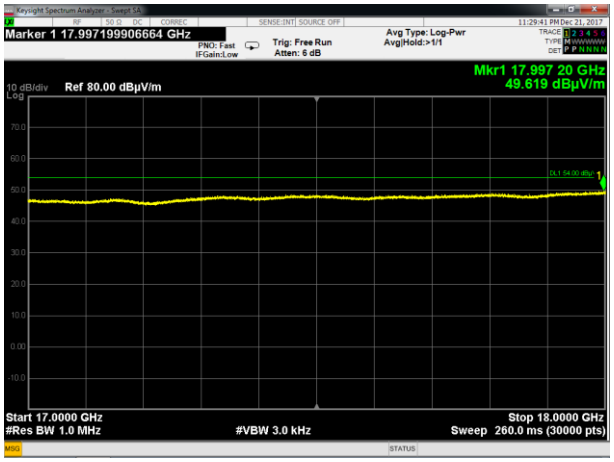


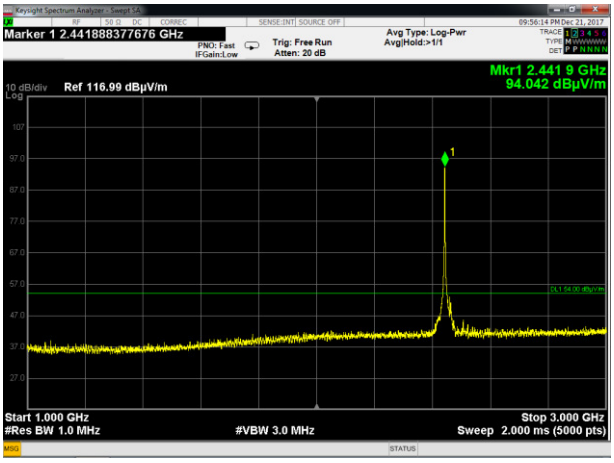

PE AV

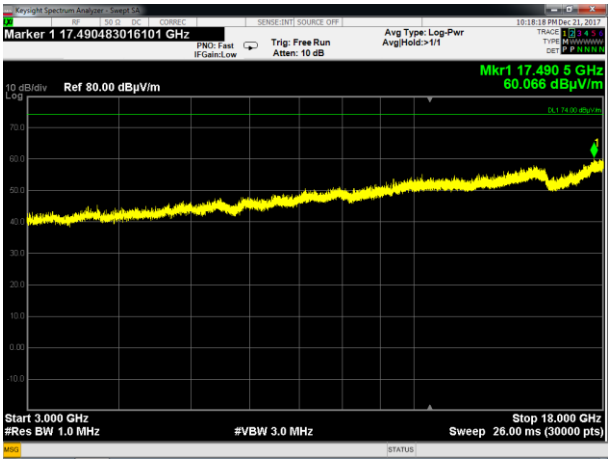
With Notch Filter 50702

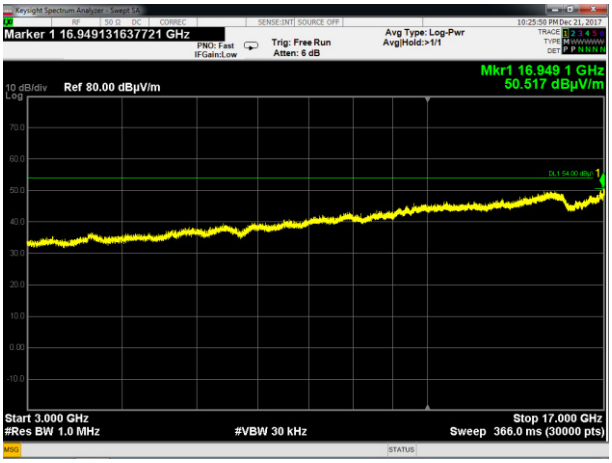



With Notch Filter 50702

**Plot 3.2.21: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of harmonics, Cannel 20 - Fc -2442, RC Base Station, CBS01 – worst case, 1GHz -18GHz**

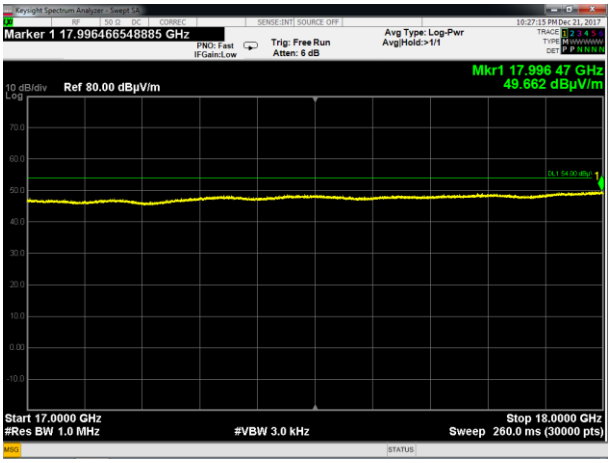


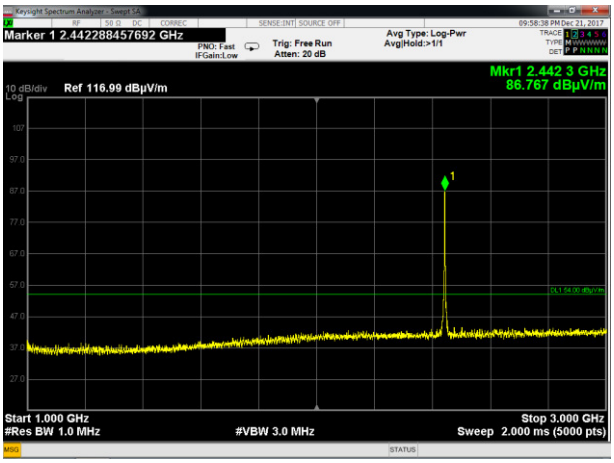

PE AV

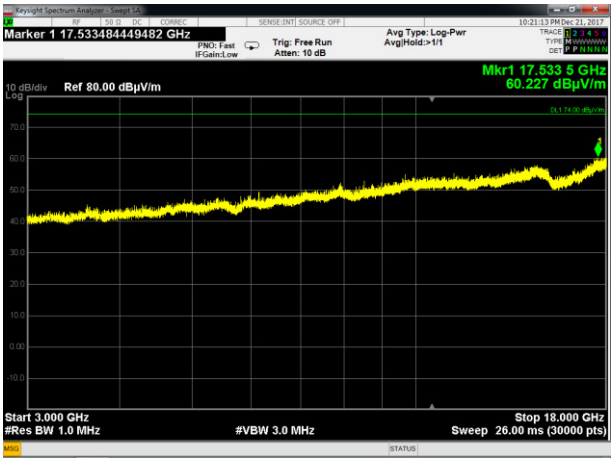
With Notch Filter 50702

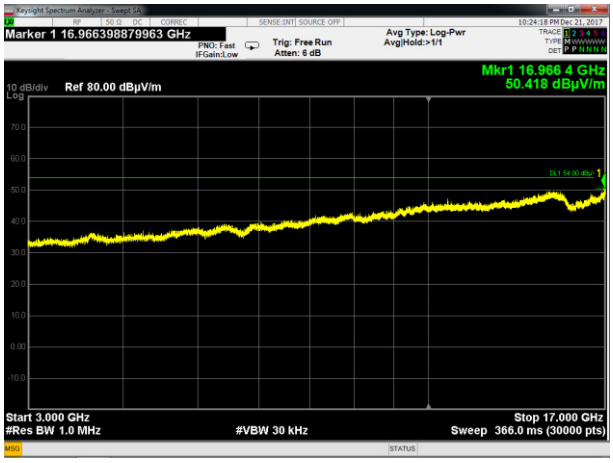



With Notch Filter 50702

**Plot 3.2.22: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of harmonics, Cannel 20 - Fc -2442, RC Base Station, CBS01 – worst case, 1GHz -18GHz**

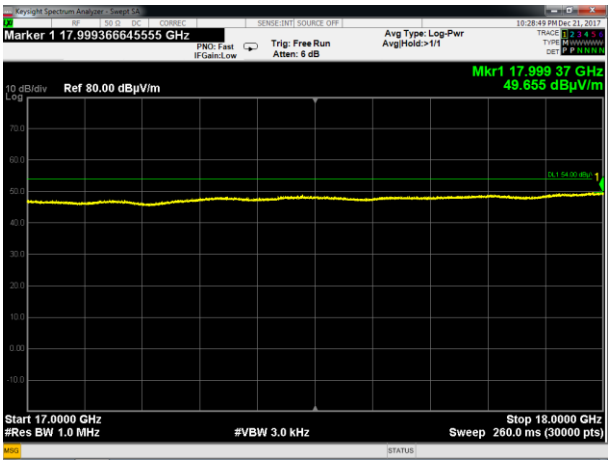


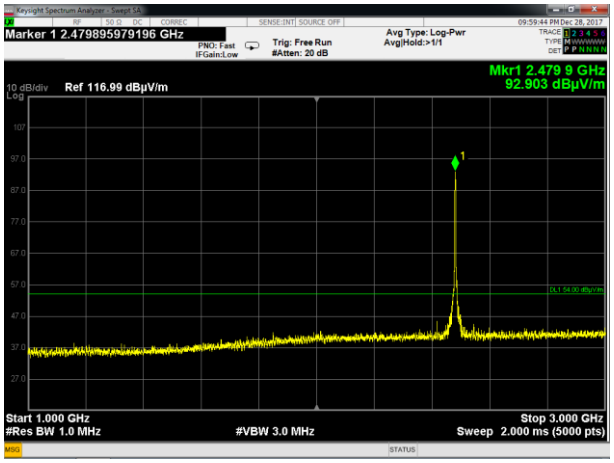

PE AV

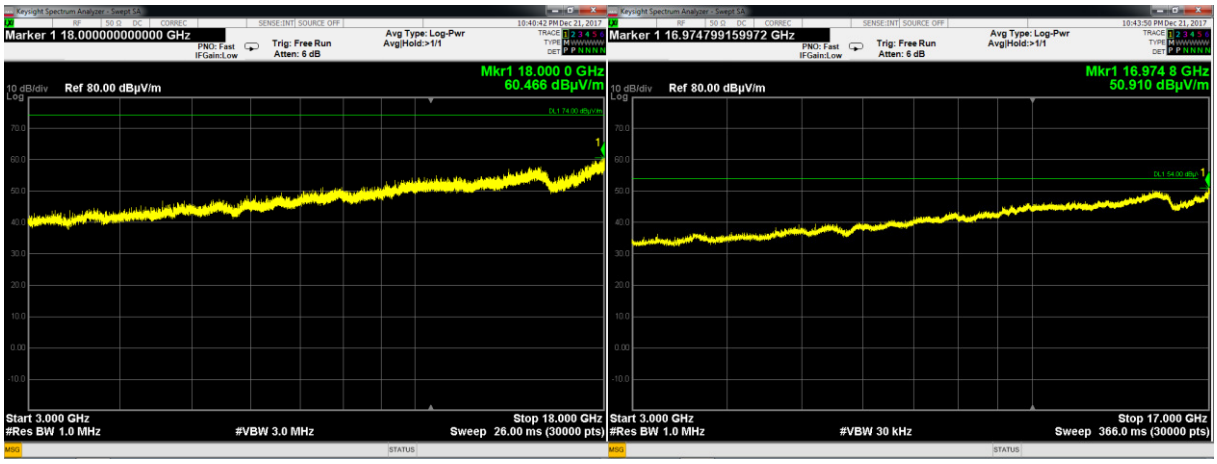
With Notch Filter 50702




With Notch Filter 50702

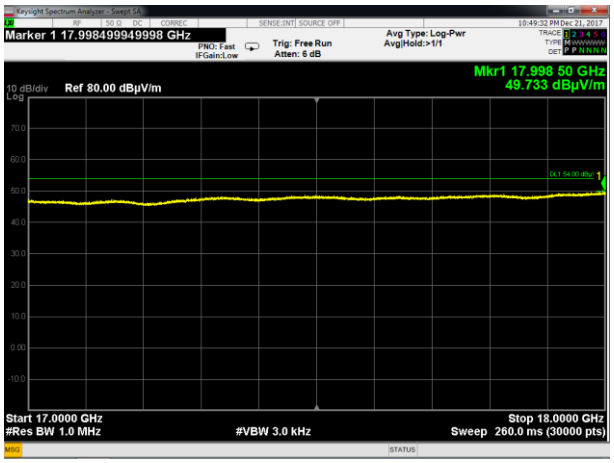
**Plot 3.2.23: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of harmonics, Cannel 39- Fc -2480, RC Base Station, CBS01 – worst case, 1GHz -18GHz**




PE AV

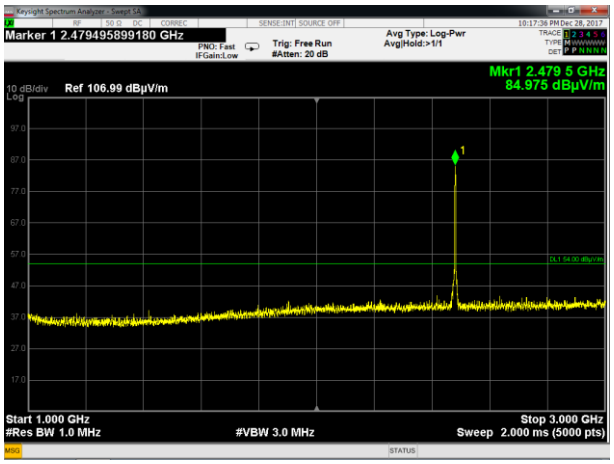
With Notch Filter 50702

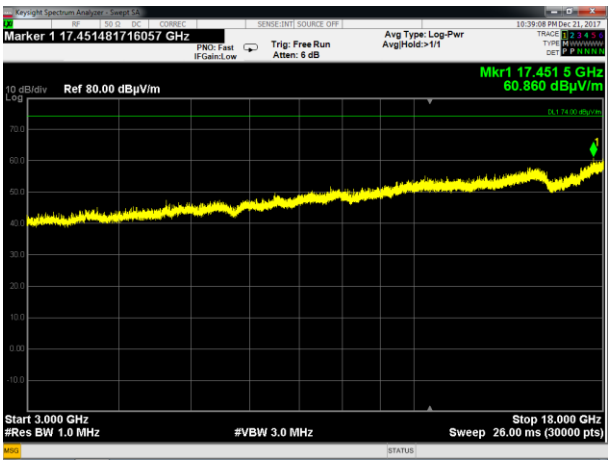


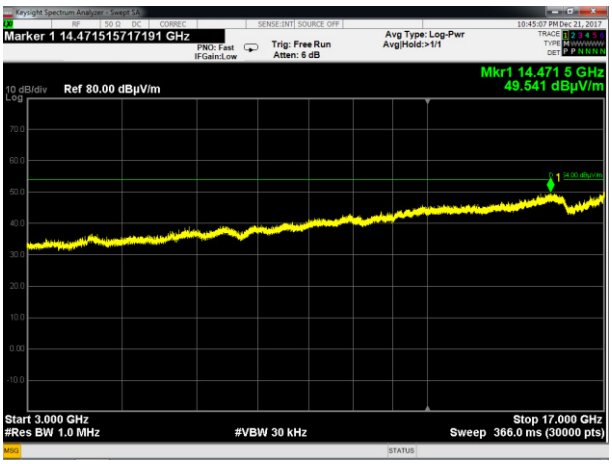

PE AV

With notch filter 50702

**Plot 3.2.24: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of harmonics, Cannel 39- Fc -2480, RC Base Station, CBS01 – worst case, 1GHz -18GHz**

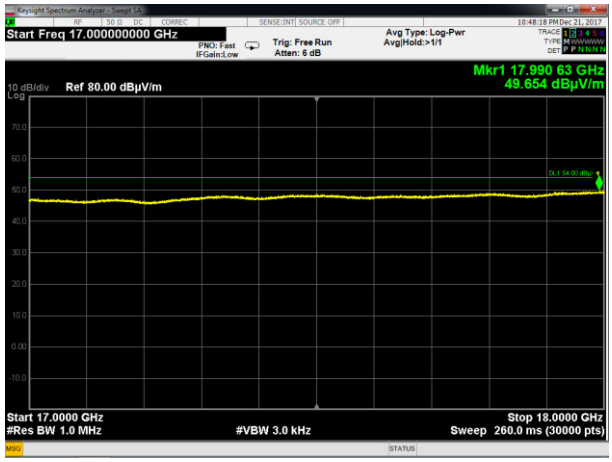


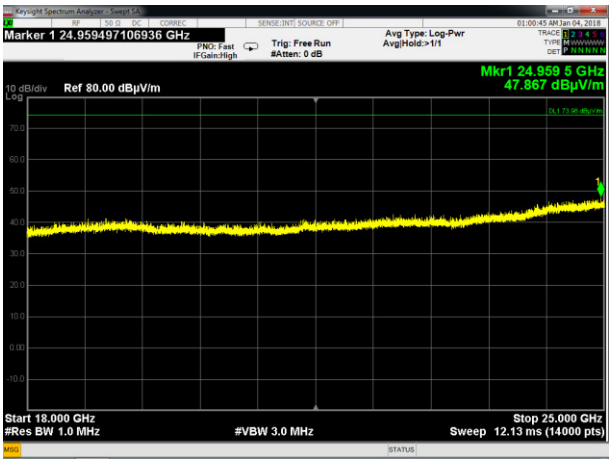

PE AV

With Notch Filter 50702

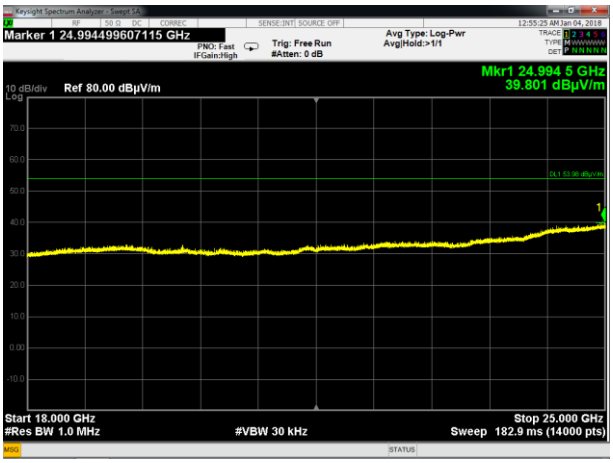



With Notch Filter 50702

**Plot 3.2.25: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of harmonics, Cannel 0 - Fc -2402, RC Base Station, CBS01, 18GHz -25GHz**

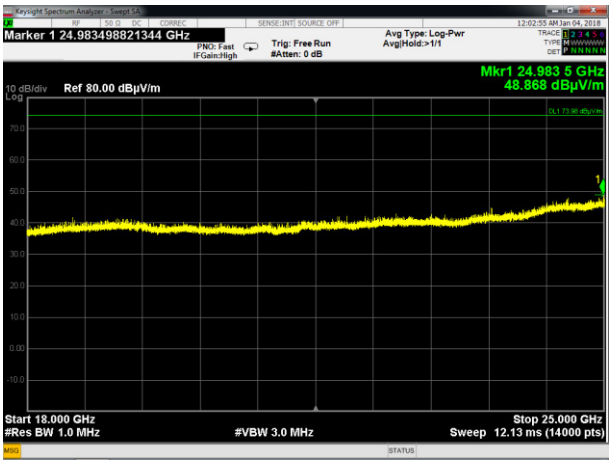



**PE**

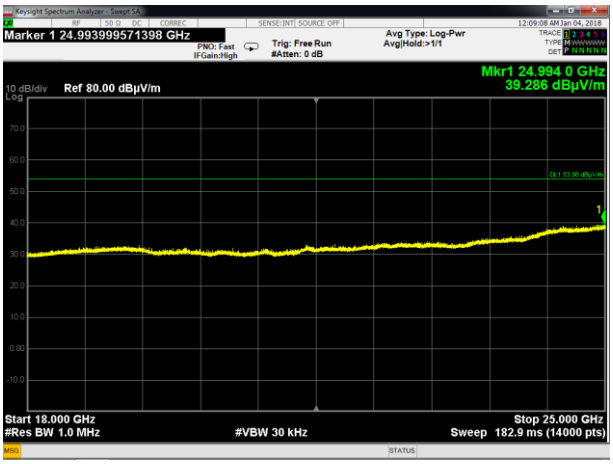



**AV**

**Plot 3.2.26: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of harmonics, Cannel 0 - Fc -2402, RC Base Station, CBS01, 18GHz -25GHz**

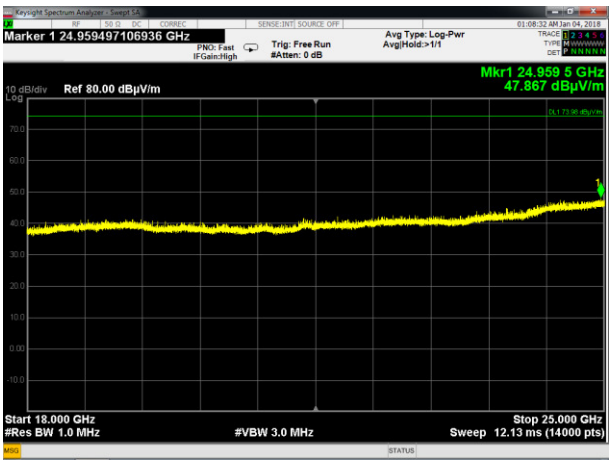



**PE**

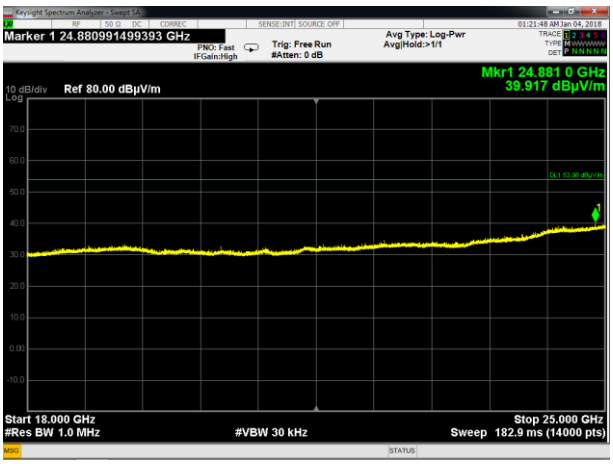



**AV**

**Plot 3.2.27: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of harmonics, Cannel 20 - Fc -2440, RC Base Station, CBS01, 18GHz -25GHz**

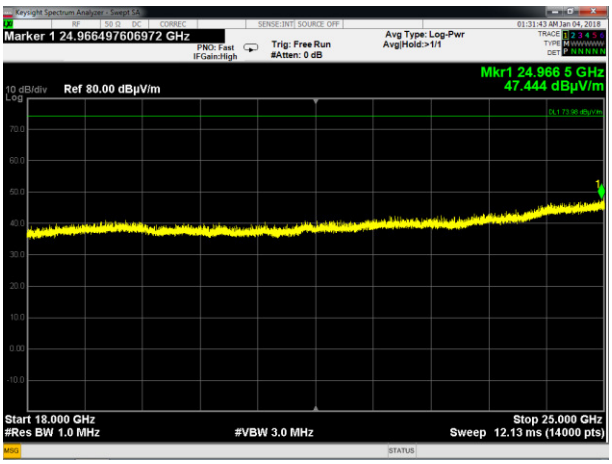



**PE**

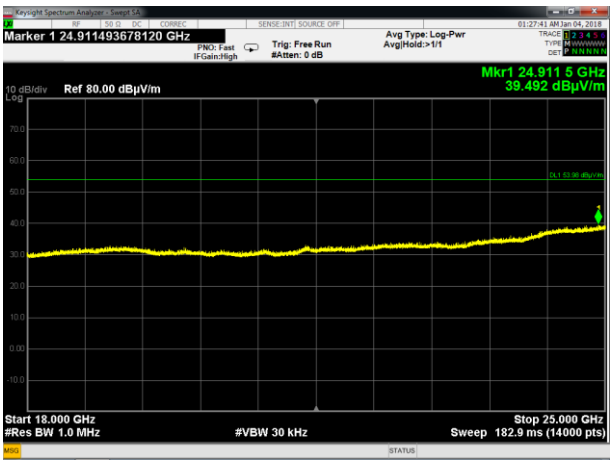



**AV**

**Plot 3.2.28: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of harmonics, Cannel 20 - Fc -2440, RC Base Station, CBS01, 18GHz -25GHz**

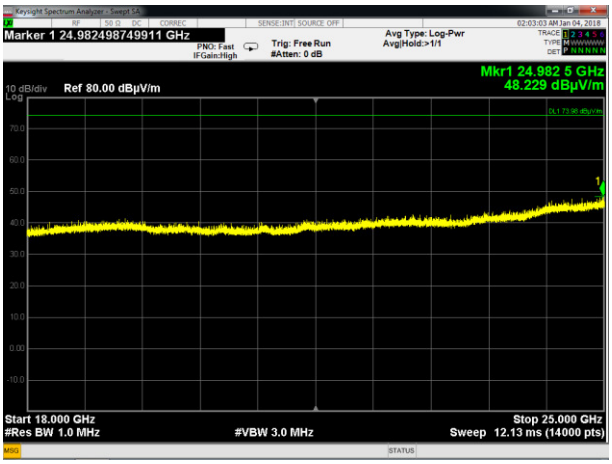



**PE**

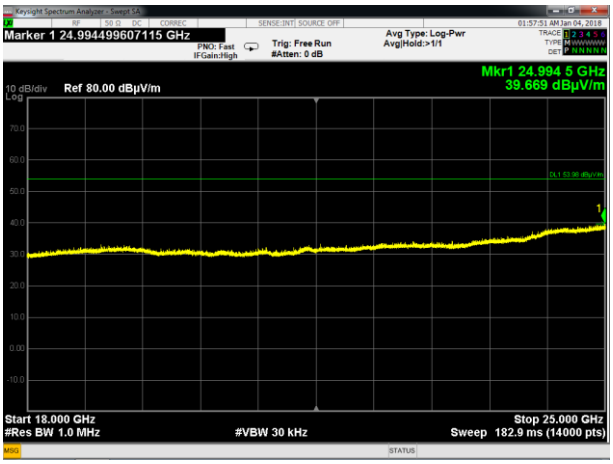



**AV**

**Plot 3.2.29: Radiated Emissions test, Vertical Polarization, Tx Modulated, Field strength of harmonics, Cannel 39- Fc -2480, RC Base Station, CBS01, 18GHz -25GHz**

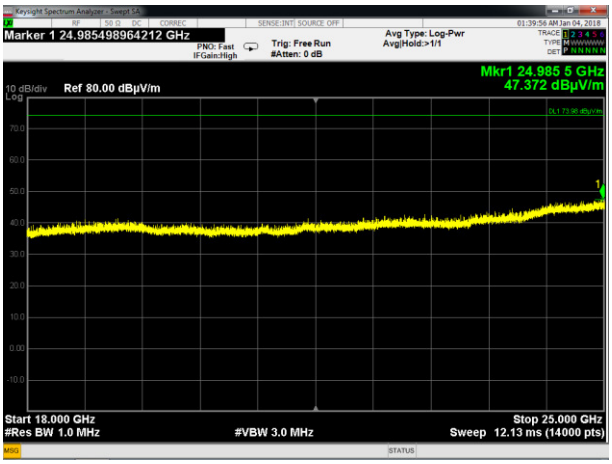



**PE**

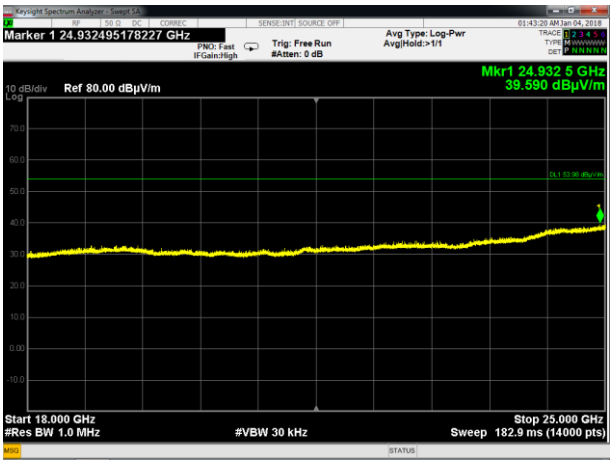



**AV**

**Plot 3.2.30: Radiated Emissions test, Horizontal Polarization, Tx Modulated, Field strength of harmonics, Cannel 39- Fc -2480, RC Base Station, CBS01, 18GHz -25GHz**

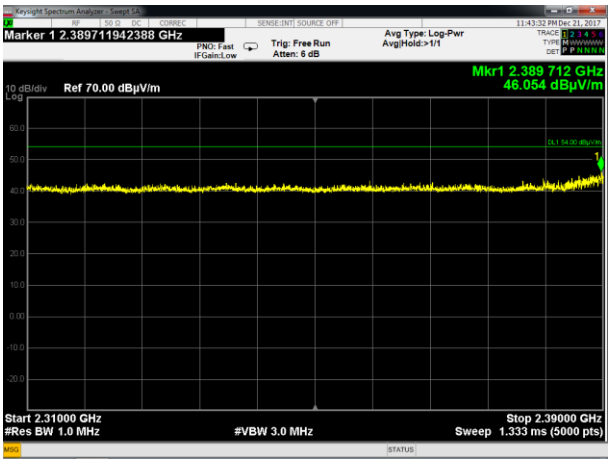



**PE**

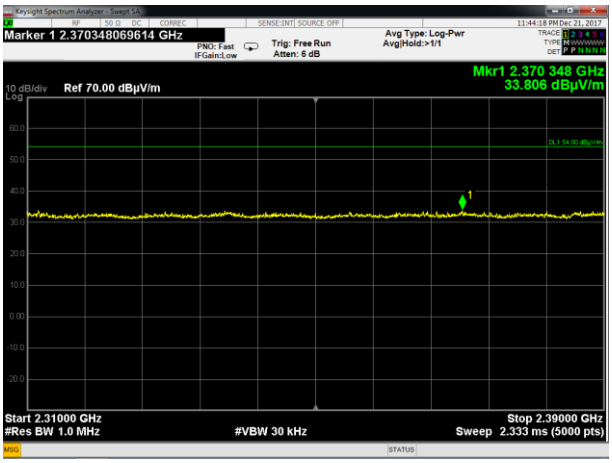



**AV**

**Restricted Bands according to §15.205(a) and § 15.209.**
**Plot 3.2.31: Radiated Emissions test, Vertical Polarization, Tx Modulated, 2310MHz-2390MHz, Cannel 0- Fc -2402, RC Base Station, CBS01 – worst case**

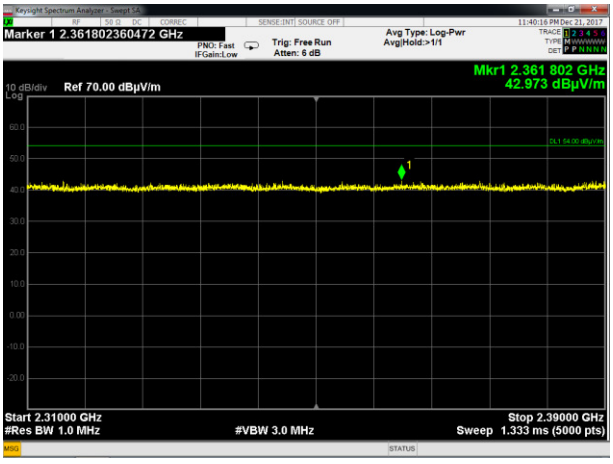



**PE**

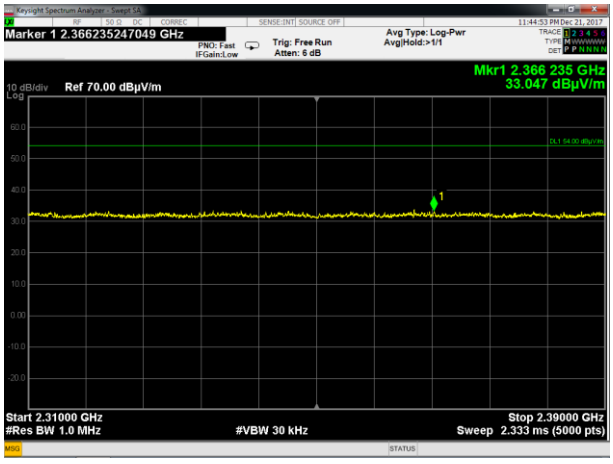



**AV**

**Plot 3.2.32: Radiated Emissions test, Horizontal Polarization, Tx Modulated, 2310MHz-2390MHz, Fc -2402**

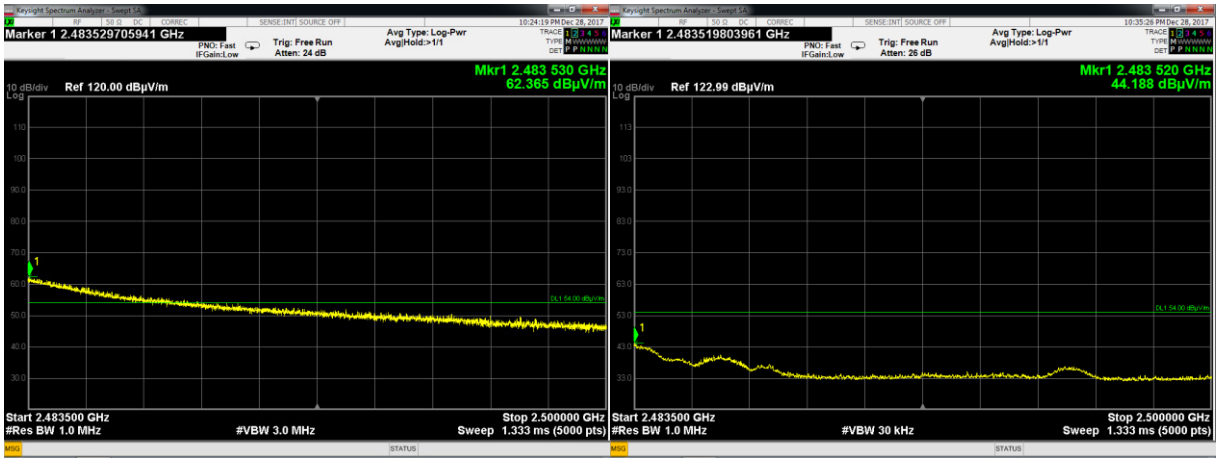



**PE**



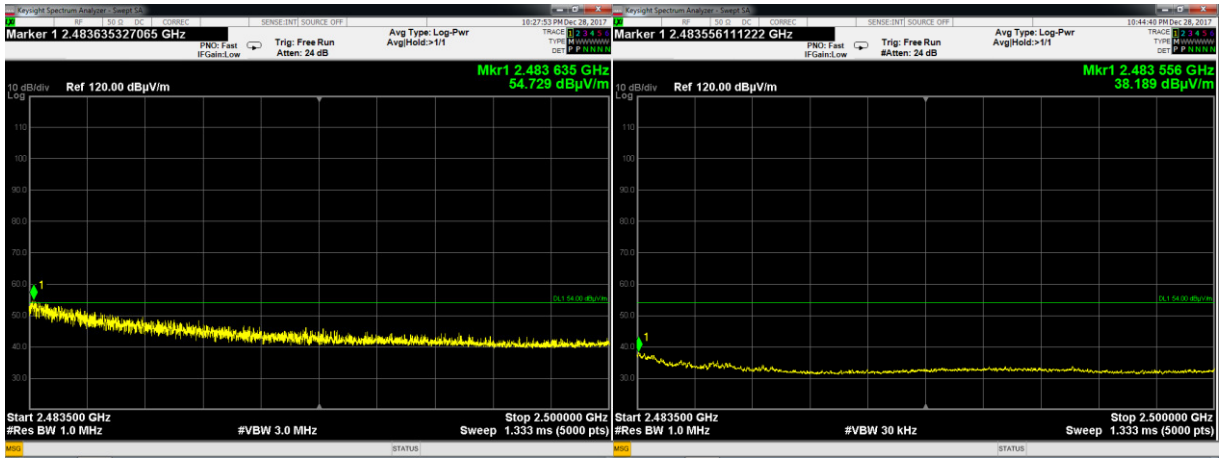

**AV**

**Plot 3.2.33: Radiated Emissions test, Vertical Polarization, Tx Modulated, 2483.50MHz-2500MHz, Cannel 39- Fc -2480, RC Base Station, CBS01 – worst case**




PE AV

**Plot 3.2.34: Radiated Emissions test, Horizontal Polarization, Tx Modulated, 2483.5MHz-2500MHz, Fc -2480**




PE AV

### 3.3. Power Line Emissions measurements

| | | | |
|---|---|---|---|
| Reference document: | **47 CFR §15.207, RSS-GEN section 8.8** | | |
| Test Requirements: | The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in §15.107.<br>The emissions from an intentional radiator shall not exceed the field strength levels specified in §15.207.<br>Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Sec.15.207. | | |
| Measurement Standard | ANSI C63.10: 2013 | **Pass** | |
| Operating conditions: | Under normal test conditions | | |
| Method of testing: | Conducted Emissions | | |
| S.A. Settings: | f <30MHz: RBW: 9kHz, VBW:30kHz | | |
| Radio device: | Idle | | |
| Environment conditions: | Ambient Temperature: 23.2°c | Relative Humidity: 48.1% | Atmospheric Pressure: 1011.4 hPa |
| Test Result: | See below | | |

**Test Results: 110 VAC- Power Supply Model sPWS0018B**

**"Phase" Lead**

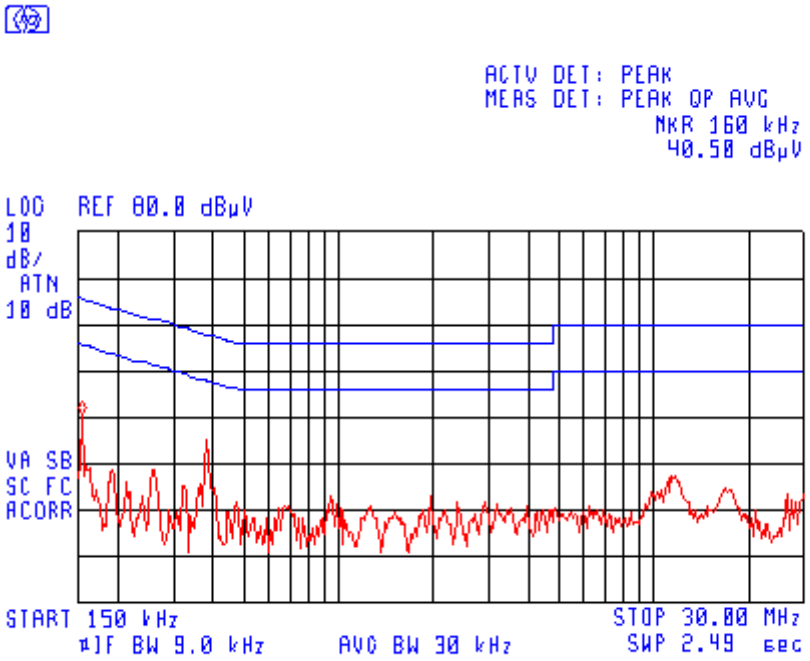
| Frequency [MHz] | Measured Result [dBµV] | | Limit [dBµV] | | Margin [dB] | | Pass/Fail |
|---|---|---|---|---|---|---|---|
| | QP | AVR | QP | AVR | QP | AVR | |
| 0.4071 | 35.3 | 28.6 | 57.71 | 47.71 | -22.41 | -19.11 | **Pass** |
| 0.15 | 31.1 | 19.5 | 66.00 | 56.00 | -34.90 | -36.50 | **Pass** |

**"Neutral" Lead**

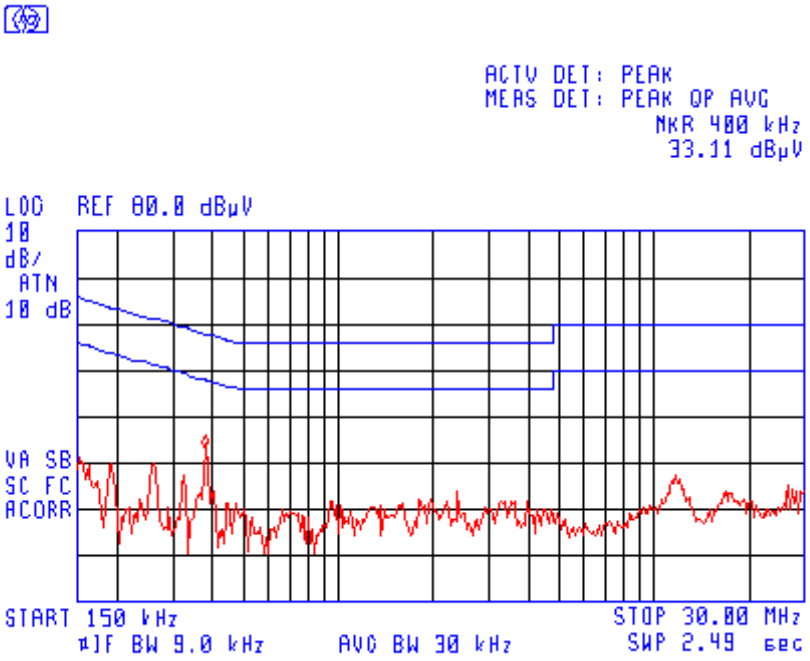
| Frequency [MHz] | Measured Result [dBµV] | | Limit [dBµV] | | Margin [dB] | | Pass/Fail |
|---|---|---|---|---|---|---|---|
| | QP | AVR | QP | AVR | QP | AVR | |
| 0.407115 | 33.9 | 26.9 | 57.71 | 47.71 | -23.81 | -20.81 | Pass |

**Measured at the Power supply 110VAC port**

**Plot 3.3.1: Phase Lead**




**Plot 3.3.2: Neutral Lead**



## 3.4. Antenna Connector Requirements

| | | |
|---|---|---|
| Reference document: | **47 CFR §15.203,RSS- Gen Issue 4** | |
| Test Requirements: | An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with provisions of this section. | |
| Measurement Standard | ANSI C63.10: 2013 | |
| Test Result: | The EUT had integral antenna. | **Pass** |

# 4. Appendix

## Appendix A: List of Measuring Equipment used:

| Description | Manufacturer | Model | Serial No. | Last Cal | Cal Due |
|---|---|---|---|---|---|
| Dipole Antenna | AH. Systems Inc. | FCC-1 | 519 | 2/2/2015 | 2/2/2018 |
| Dipole Antenna | AH. Systems Inc. | FCC-2 | 519 | 2/2/2015 | 2/2/2018 |
| Dipole Antenna | AH. Systems Inc. | FCC-3 | 519 | 2/2/2015 | 2/2/2018 |
| Dipole Antenna | AH. Systems Inc. | FCC-4 | 519 | 2/2/2015 | 2/2/2018 |
| Oscilloscope | Keysight Technologies | DSOX1102G | CN57096496 | 3/6/2017 | 3/6/2018 |
| Oscilloscope | Keysight Technologies | DSOX1102G | CN57126605 | 3/14/2017 | 3/14/2018 |
| Oscilloscope | Keysight Technologies | DSOX1102G | 126530 | 3/15/2017 | 3/15/2018 |
| RF Filter Section (6.5GHz) | HP | 85460A | 3704A00366 | 4/9/2017 | 4/9/2018 |
| EMI Receiver (6.5GHz) | HP | 8546A | 3710A00392 | 4/9/2017 | 4/9/2018 |
| Low-Noise Amplifier 18GHz - 26.5 GHz | Spacek Labs | SL1018-56-5 | 17J29 | 9/29/2017 | 9/29/2018 |
| Environmental Test Chamber | TENNEY ENGINEERING | TTRS | 10.158-5 | 8/6/2017 | 8/6/2018 |
| RF Filter Section (2.9GHz) | HP | 85460A | 3448A00282 | 6/15/2017 | 6/15/2018 |
| EMI Receiver (2.9GHz) | HP | 8546A | 3617A00318 | 6/15/2017 | 6/15/2018 |
| Spectrum Analyzer 9KHz-22GHz | Agilent/HP | 8593EM | 3536A00131 | 9/27/2017 | 9/27/2019 |
| Signal Generator | Agilent | 83732B | US37101834 | 10/17/2017 | 10/17/2018 |
| Spectrum Analyzer (9KHz-3.6GHz) | Agilent | N9010A | MY50060093 | 9/27/2017 | 9/27/2018 |
| EMC Analyzer | Agilent | E7405A | US41160436 | 9/27/2017 | 9/27/2018 |
| Horn Antenna 15-40 GHz | Schwarzbeck | BBHA 9170 | BBHA9170214 | 3/6/2015 | 3/6/2018 |
| Isotropic Probe (10MHz-40GHz) | ETS-Lindgren | HI-6153 | 168752 | 11/19/2017 | 11/19/2018 |
| E-Field Monitor | Amplifier Research | FM5004 | 22107 | 4/18/2017 | 4/18/2018 |
| E-Field Probe (10KHz-1000MHz) | Amplifier Research | FP5000 | 22121 | 4/18/2017 | 4/18/2018 |
| Biconical Antenna 20 –200 MHz | Seibersdorf | PBA320 | 301 | 1/30/2017 | 1/30/2020 |
| Biconical Antenna | Seibersdorf | PBA320 | 302 | 1/30/2017 | 1/30/2020 |
| Log periodic Antenna 180MHz to 4GHz | Schwarzbeck | VUL9118-A | 348 | 5/19/2016 | 5/19/2019 |
| Log periodic Antenna 180MHz to 4GHz | Schwarzbeck | VUL9118-A | 349 | 5/19/2016 | 5/19/2019 |
| Log periodic Antenna 200MHz – 2GHz | Schwarzbeck | VUSLP 9111 | 9111184 | 5/19/2016 | 5/19/2019 |
| Horn Antenna (for IMM) 1-18GHz | EMCO | 3115 | 9602-4677 | 7/6/2016 | 7/6/2019 |
| Horn Antenna (EMM) 1-18GHz | A.R.A | DRG-118/A | 17188 | 8/15/2017 | 8/15/2018 |
| PSG analog signal generator 250KHz-40GHz | Agilent | E8257D | MY49280547 | 3/20/2016 | 3/20/2018 |
| Spectrum Analyzer 3Hz-44GHz | Agilent | E4446A | MY46180602 | 12/16/2016 | 12/16/2018 |
| Low-Noise Amplifier 18GHz - 26.5GHz | MITEQ | | 45372 | 11/10/2016 | 11/10/2017 |
| Highpass Filter, 1.2 ¸ 15 GHz | WAINWRIGHT | WHK1.2/15G-10EF | 3 | 1/14/2017 | 1/14/2018 |
| Highpass Filter, 2.4 ¸ 18 GHz | WAINWRIGHT | WHK2.4/18G-10EF | 1 | 1/14/2017 | 1/14/2018 |
| Highpass Filter, 7 ¸ 18 GHz | WAINWRIGHT | WHKX7.0/18G-8SS | 12 | 1/14/2015 | 1/14/2016 |

## Appendix B: Accreditation Certificate

ilac-MRA A2LA

# Accredited Laboratory

A2LA has accredited

**QUALITECH**

*Petah-Tikva, Israel*

for technical competence in the field of

## Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION CORPORATE SEAL 1978 DISTRICT OF COLUMBIA A2LA

Presented this 28th day of June 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 1633.01
Valid to June 30, 2018

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

***End of the Test Report***