

# FCC TEST REPORT

**Product Name:** Computador de Bordo  
**Trade Mark:** solinftec  
**Model No.:** XBee PROS3B  
**Report Number:** 180516002RFC-1  
**Test Standards:** FCC 47 CFR Part 15 Subpart C  
**FCC ID:** 2AQWE-XB900HP  
**Test Result:** PASS  
**Date of Issue:** March 12, 2019

Prepared for:

**TECSOIL AUTOMACAO E SISTEMAS S.A.**  
**RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil**

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Tested by:



Henry Lu

Project Engineer

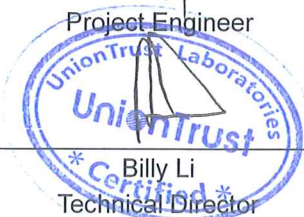
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## Version

| Version No. | Date             | Description                 |
|-------------|------------------|-----------------------------|
| V1.0        | October 16, 2018 | Change FCC ID and model     |
| V1.1        | March 12, 2019   | Class II Permissible Change |



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## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

|                                 |                                                        |
|---------------------------------|--------------------------------------------------------|
| <b>Applicant:</b>               | TECSOIL AUTOMACAO E SISTEMAS S.A.                      |
| <b>Address of Applicant:</b>    | RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil |
| <b>Manufacturer:</b>            | TECSOIL AUTOMACAO E SISTEMAS S.A.                      |
| <b>Address of Manufacturer:</b> | RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil |

### 1.2 EUT INFORMATION

|                               |                                        |             |
|-------------------------------|----------------------------------------|-------------|
| <b>Product Name:</b>          | Computador de Bordo                    |             |
| <b>Model No.:</b>             | XBee PROS3B                            |             |
| <b>Trade Mark:</b>            | solinftec                              |             |
| <b>DUT Stage:</b>             | Identical Prototype                    |             |
| <b>EUT Supports Function:</b> | 902-928MHz Band:                       | IEEE 802.14 |
| <b>Sample Received Date:</b>  | May 13, 2018                           |             |
| <b>Sample Tested Date:</b>    | September 1, 2018 to September 5, 2018 |             |

### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

|                                       |                                            |
|---------------------------------------|--------------------------------------------|
| <b>Frequency Range:</b>               | 902 MHz to 928 MHz                         |
| <b>Modulation Technique:</b>          | Frequency Hopping Spread Spectrum(FHSS)    |
| <b>Type of Modulation:</b>            | FSK (10 kbps and 20 kbps), GMSK (200 kbps) |
| <b>Number of Channels:</b>            | 64/ 84/ 64                                 |
| <b>Channel Separation:</b>            | 400 KHz/ 300 KHz/ 400KHz                   |
| <b>Type of Equipment:</b>             | 915MHz Frequency Hopping                   |
| <b>Antenna Type:</b>                  | External Antenna                           |
| <b>Antenna Gain:</b>                  | 6 dBi                                      |
| <b>Declared Nominal Output Power:</b> | +24 dBm                                    |
| <b>Normal Test Voltage:</b>           | 24 Vdc                                     |

### 1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

#### 1) Support Equipment

| Description | Manufacturer | Model No. | Serial Number | Supplied by |
|-------------|--------------|-----------|---------------|-------------|
| Notebook    | Lenovo       | E450      | SL10G10780    | UnionTrust  |

#### 2) Support Cable

| Cable No. | Description | Connector | Length | Supplied by |
|-----------|-------------|-----------|--------|-------------|
| --        | --          | --        | --     | --          |

## 1.5 TEST LOCATION

---

### **Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109  
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## 1.6 TEST FACILITY

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The test facility is recognized, certified, or accredited by the following organizations:

### **CNAS-Lab Code: L9069**

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

### **IC-Registration No.: 21600-1**

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

### **A2LA-Lab Certificate No.: 4312.01**

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### **FCC Accredited Lab.**

Designation Number: CN1194  
Test Firm Registration Number: 259480

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## 1.7 DEVIATION FROM STANDARDS

None.

## 1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

## 1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

## 1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

| No. | Item                            | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1   | Conducted emission 9KHz-150KHz  | $\pm 3.8$ dB            |
| 2   | Conducted emission 150KHz-30MHz | $\pm 3.4$ dB            |
| 3   | Radiated emission 9KHz-30MHz    | $\pm 4.9$ dB            |
| 4   | Radiated emission 30MHz-1GHz    | $\pm 4.7$ dB            |
| 5   | Radiated emission 1GHz-18GHz    | $\pm 5.1$ dB            |
| 6   | Radiated emission 18GHz-26GHz   | $\pm 5.2$ dB            |
| 7   | Radiated emission 26GHz-40GHz   | $\pm 5.2$ dB            |

## 2. TEST SUMMARY

| FCC 47 CFR Part 15 Subpart C Test Cases                                                                                                                                                                                                                                                                                                                                             |                                                        |                  |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------|---------------------------|
| Test Item                                                                                                                                                                                                                                                                                                                                                                           | Test Requirement                                       | Test Method      | Result                    |
| Antenna Requirement                                                                                                                                                                                                                                                                                                                                                                 | FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (c) | ANSI C63.10-2013 | PASS                      |
| AC Power Line Conducted Emission                                                                                                                                                                                                                                                                                                                                                    | FCC 47 CFR Part 15 Subpart C Section 15.207            | ANSI C63.10-2013 | N/A <sup>(Note1, 2)</sup> |
| Conducted Peak Output Power                                                                                                                                                                                                                                                                                                                                                         | FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(2)     | ANSI C63.10-2013 | PASS                      |
| 20 dB Bandwidth                                                                                                                                                                                                                                                                                                                                                                     | FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)     | ANSI C63.10-2013 | N/A <sup>(Note1, 2)</sup> |
| Carrier Frequencies Separation                                                                                                                                                                                                                                                                                                                                                      | FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)     | ANSI C63.10-2013 | N/A <sup>(Note1, 2)</sup> |
| Number of Hopping Channel                                                                                                                                                                                                                                                                                                                                                           | FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)     | ANSI C63.10-2013 | N/A <sup>(Note1, 2)</sup> |
| Dwell Time                                                                                                                                                                                                                                                                                                                                                                          | FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)     | ANSI C63.10-2013 | N/A <sup>(Note1, 2)</sup> |
| Conducted Out of Band Emission                                                                                                                                                                                                                                                                                                                                                      | FCC 47 CFR Part 15 Subpart C Section 15.247(d)         | ANSI C63.10-2013 | N/A <sup>(Note1, 2)</sup> |
| Radiated Emissions                                                                                                                                                                                                                                                                                                                                                                  | FCC 47 CFR Part 15 Subpart C Section 15.205/15.209     | ANSI C63.10-2013 | PASS                      |
| Band Edge Measurement                                                                                                                                                                                                                                                                                                                                                               | FCC 47 CFR Part 15 Subpart C Section 15.205/15.209     | ANSI C63.10-2013 | PASS                      |
| <b>Note:</b><br>1) N/A: In this whole report not application.<br>2) The module 902-928MHz used in this product is the same as the module of report no.DIGI31-U1 Rev A, only the transmitting antenna was changed. After evaluation, all technical data except radiation emission, Conducted Peak Output Power and Band Edge Measurement are derived from report no.DIGI31-U1 Rev A. |                                                        |                  |                           |

### 3. EQUIPMENT LIST

| Radiated Emission Test Equipment List |                                      |              |           |                            |                         |                             |
|---------------------------------------|--------------------------------------|--------------|-----------|----------------------------|-------------------------|-----------------------------|
| Used                                  | Equipment                            | Manufacturer | Model No. | Serial Number              | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/>   | 3M Chamber & Accessory Equipment     | ETS-LINDGREN | 3M        | N/A                        | Dec. 20, 2015           | Dec. 19, 2018               |
| <input checked="" type="checkbox"/>   | Receiver                             | R&S          | ESIB26    | 100114                     | Dec. 10, 2017           | Dec. 10, 2018               |
| <input checked="" type="checkbox"/>   | Loop Antenna                         | ETS-LINDGREN | 6502      | 00202525                   | Dec. 22, 2017           | Dec. 22, 2018               |
| <input checked="" type="checkbox"/>   | Broadband Antenna                    | ETS-LINDGREN | 3142E     | 00201566                   | Dec. 17, 2017           | Dec. 17, 2018               |
| <input checked="" type="checkbox"/>   | Preamplifier                         | HP           | 8447F     | 2805A02960                 | Dec. 10, 2017           | Dec. 10, 2018               |
| <input checked="" type="checkbox"/>   | Horn Antenna (Pre-amplifier)         | ETS-LINDGREN | 3117-PA   | 00201874                   | May 22, 2018            | May 22, 2019                |
| <input checked="" type="checkbox"/>   | Universal Radio Communication Tester | R&S          | CMU200    | 114713                     | Dec. 10, 2017           | Dec. 10, 2018               |
| <input checked="" type="checkbox"/>   | Multi device Controller              | ETS-LINDGREN | 7006-001  | 00160105                   | N/A                     | N/A                         |
| <input checked="" type="checkbox"/>   | Test Software                        | Audix        | e3        | Software Version: 9.160323 |                         |                             |

| Conducted RF test Equipment List    |                           |              |           |               |                         |                             |
|-------------------------------------|---------------------------|--------------|-----------|---------------|-------------------------|-----------------------------|
| Used                                | Equipment                 | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/> | EXA Spectrum Analyzer     | KEYSIGHT     | N9010A    | MY51440197    | Dec.10, 2017            | Dec. 10, 2018               |
| <input checked="" type="checkbox"/> | USB Wideband Power Sensor | KEYSIGHT     | U2021XA   | MY55430035    | Dec. 10, 2017           | Dec. 10, 2018               |

## 4. TEST CONFIGURATION

### 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

#### 4.1.1 Normal or Extreme Test Conditions

| Environment Parameter                                           | Selected Values During Tests |               |                       |
|-----------------------------------------------------------------|------------------------------|---------------|-----------------------|
| Test Condition                                                  | Ambient                      |               |                       |
|                                                                 | Temperature (°C)             | Voltage (Vdc) | Relative Humidity (%) |
| NT/NV                                                           | +15 to +35                   | 24            | 20 to 75              |
| <b>Remark:</b><br>1) NV: Normal Voltage; NT: Normal Temperature |                              |               |                       |

#### 4.1.2 Record of Normal Environment

| Test Item                   | Temperature (°C) | Relative Humidity (%) | Pressure (Kpa) | Tested by    |
|-----------------------------|------------------|-----------------------|----------------|--------------|
| Conducted Peak Output Power | 25               | 56                    | 99.45          | Terence Chen |
| Radiated Emissions          | 26.1             | 50                    | 99.45          | Tony Kang    |
| Band Edge Measurement       | 25               | 56                    | 99.45          | Terence Chen |

### 4.2 TEST CHANNELS

| Mode | Tx/Rx Frequency    | Test RF Channel Lists |            |            |
|------|--------------------|-----------------------|------------|------------|
|      |                    | Lowest(L)             | Middle(M)  | Highest(H) |
| FSK  | 902 MHz to 928 MHz | Channel 0             | Channel 33 | Channel 63 |
|      |                    | 902.4 MHz             | 915.2 MHz  | 927.6 MHz  |

### 4.3 EUT TEST STATUS

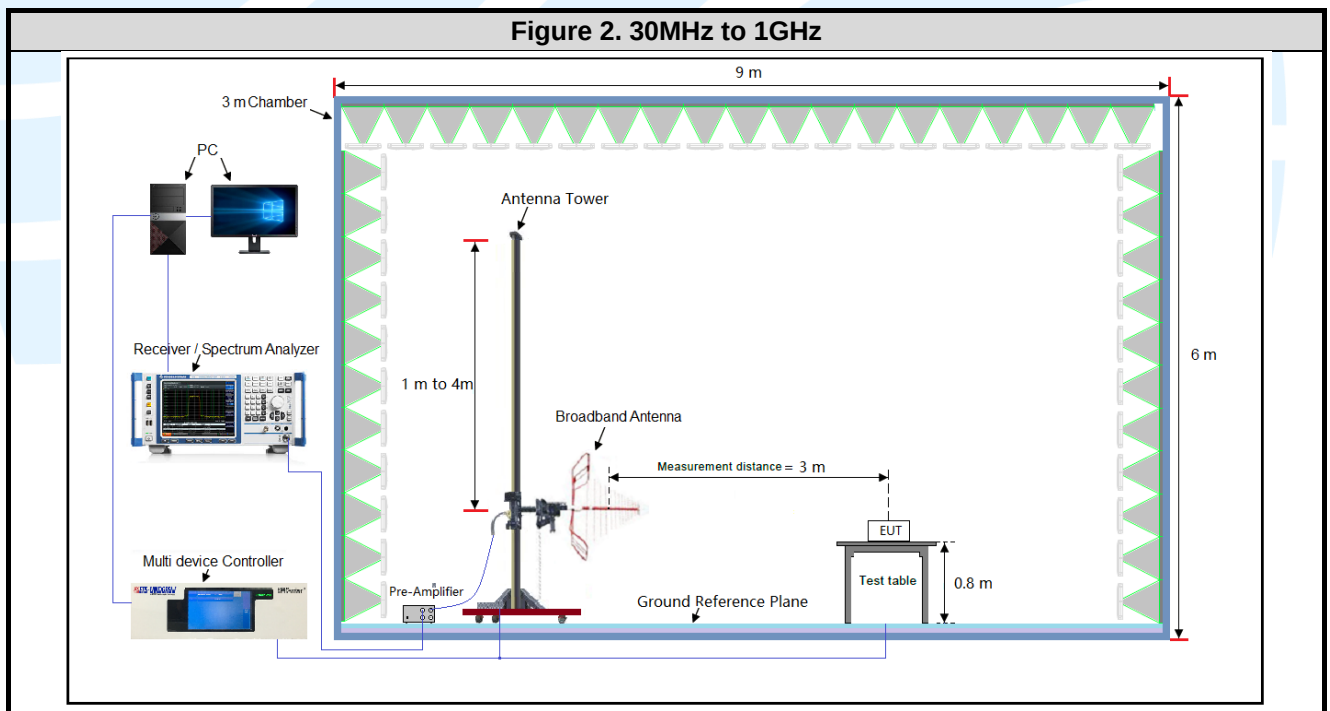
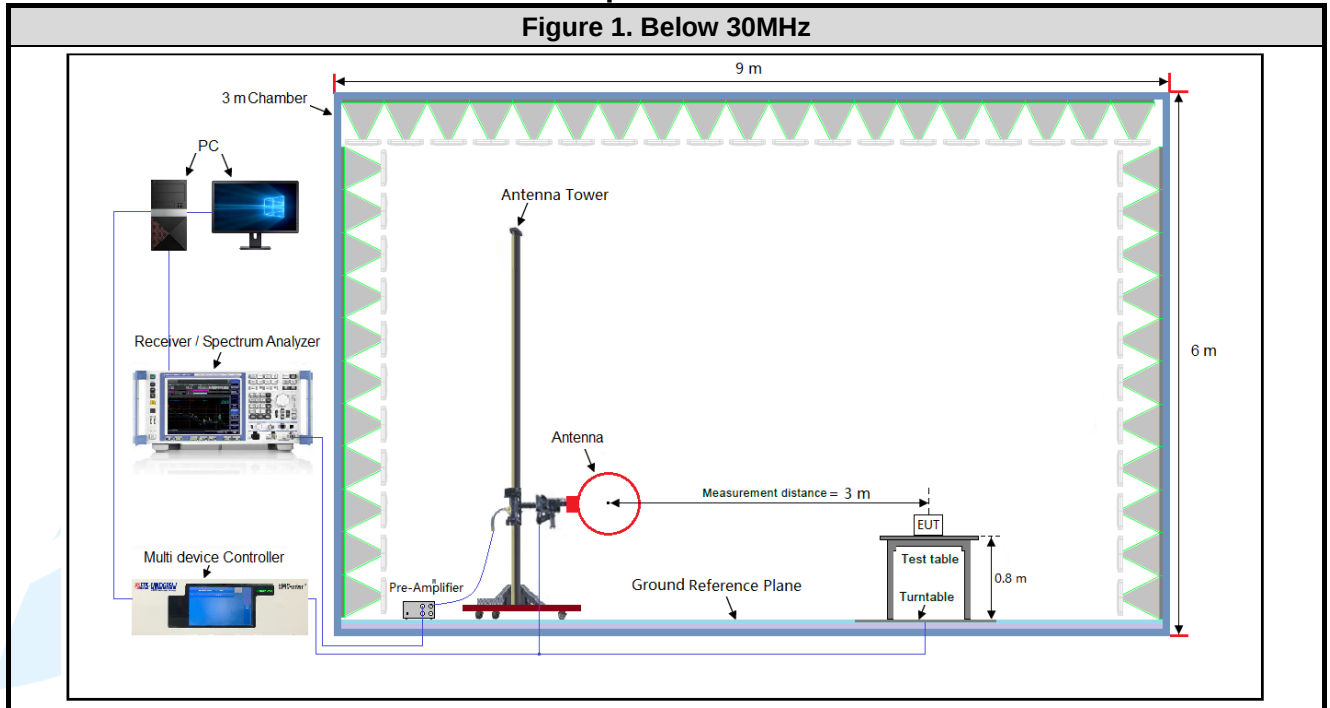
| Type of Modulation | Function | Description                                                           |
|--------------------|----------|-----------------------------------------------------------------------|
| FSK                | 1Tx/1Rx  | Keep the EUT in continuously transmitting with Modulation test single |
| BPSK               | 1Tx/1Rx  | WCDMA Normal Link with CMU200                                         |

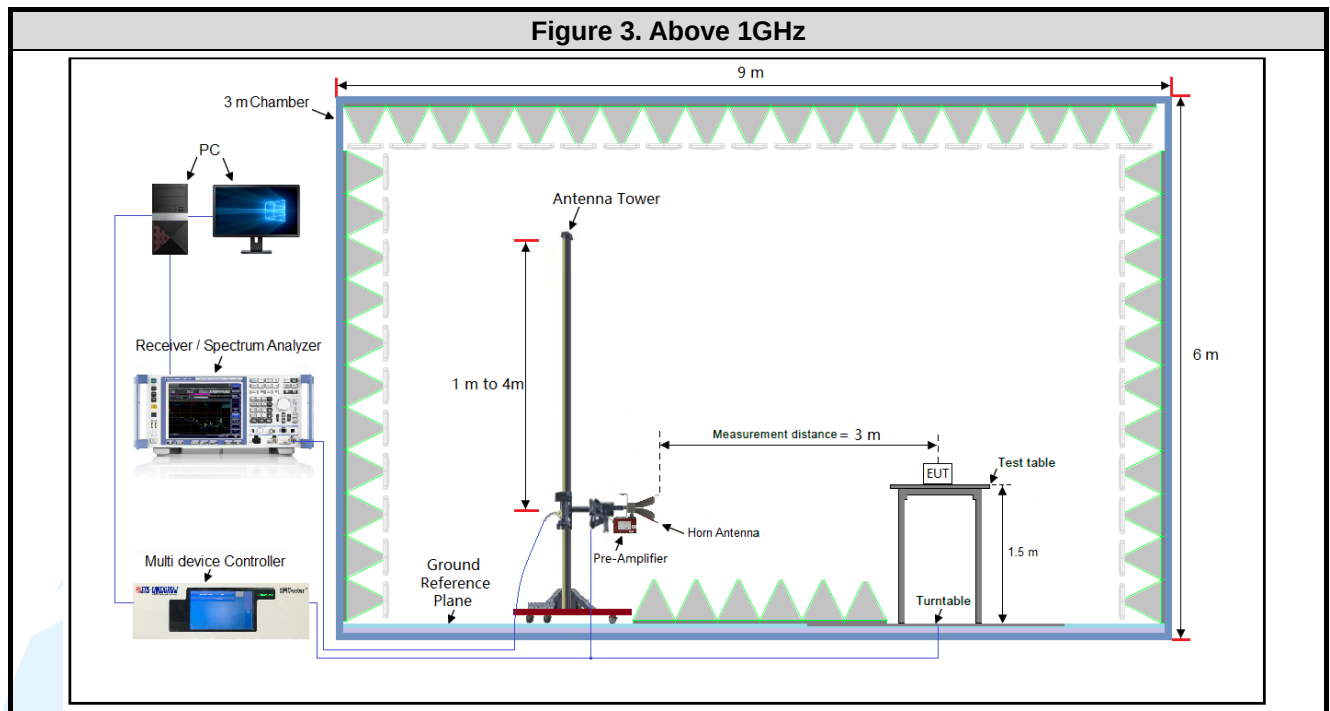
| Power Setting                                                          |
|------------------------------------------------------------------------|
| Power Setting: not applicable, test used software default power level. |

| Test Software               |
|-----------------------------|
| Test software name: xBeeFCC |

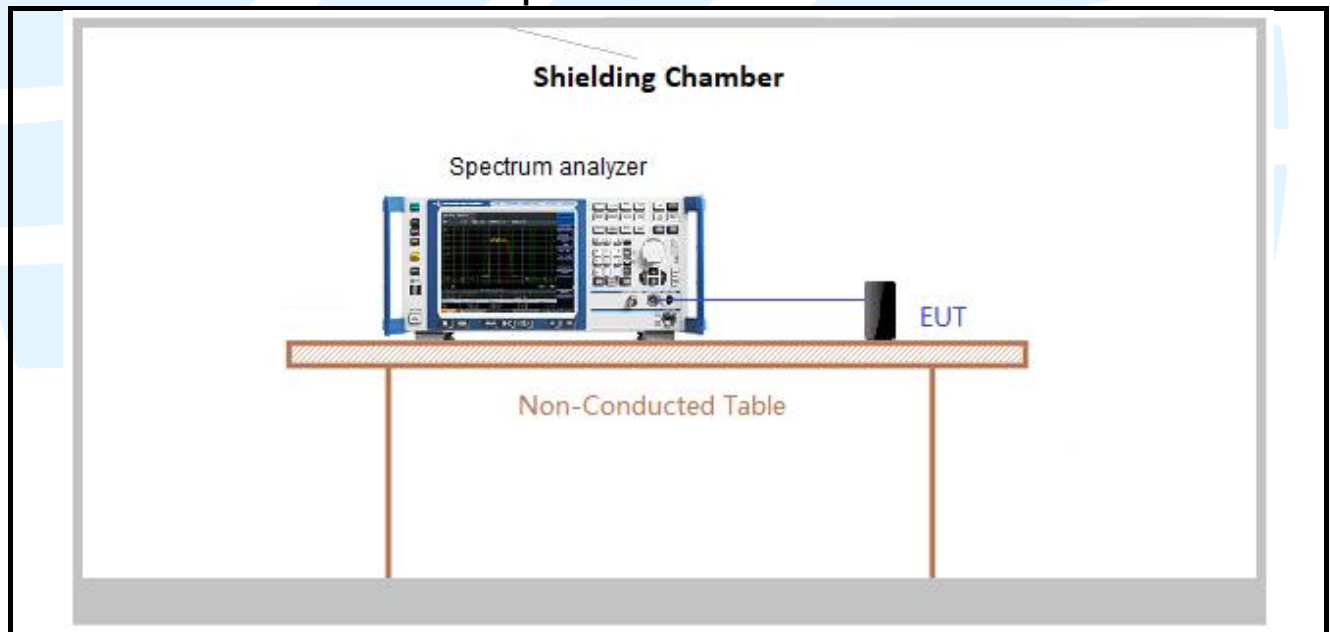
## 4.4 TEST SETUP

### 4.5.1 For Radiated Emissions test setup





#### 4.5.2 For Conducted RF test setup



## 4.5 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 24Vdc only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

| Frequency          | Mode | Antenna Port | Worst-case axis positioning |
|--------------------|------|--------------|-----------------------------|
| ZigBee(902-928MHz) | 1TX  | Chain 0      | Y axis                      |
| WCDMA Band II/IV/V | 1TX  | Chain 0      | Y axis                      |

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## 5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

### 5.1 REFERENCE DOCUMENTS FOR TESTING

| No. | Identity           | Document Title                                                                |
|-----|--------------------|-------------------------------------------------------------------------------|
| 1   | FCC 47 CFR Part 2  | Frequency allocations and radio treaty matters; general rules and regulations |
| 2   | FCC 47 CFR Part 15 | Radio Frequency Devices                                                       |
| 3   | ANSI C63.10-2013   | American National Standard for Testing Unlicensed Wireless Devices            |

### 5.2 ANTENNA REQUIREMENT

| Standard Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>15.203 requirement:</b><br/>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p><b>15.247(b) (4) requirement:</b><br/>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> <p><b>EUT Antenna:</b><br/>Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 6 dBi.</p> |

### 5.3 CONDUCTED PEAK OUTPUT POWER

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(1)

**Test Method:** ANSI C63.10-2013 Section 7.8.5

**Limit:** For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

**Test Procedure:** Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

- a) Use the following spectrum analyzer settings:
  - 1) Span: Approximately 5 x 20 dB bandwidth, centered on a hopping channel.
  - 2) RBW > 20 dB bandwidth of the emission being measured.
  - 3) VBW  $\geq$  RBW.
  - 4) Sweep: Auto.
  - 5) Detector function: Peak.
  - 6) Trace: Max hold.
- b) Allow trace to stabilize.
- c) Use the marker-to-peak function to set the marker to the peak of the emission.
- d) The indicated level is the peak output power, after any corrections for external attenuators and cables.
- e) A plot of the test results and setup description shall be included in the test report.

**Test Setup:** Refer to section 4.5.3 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Transmitter mode

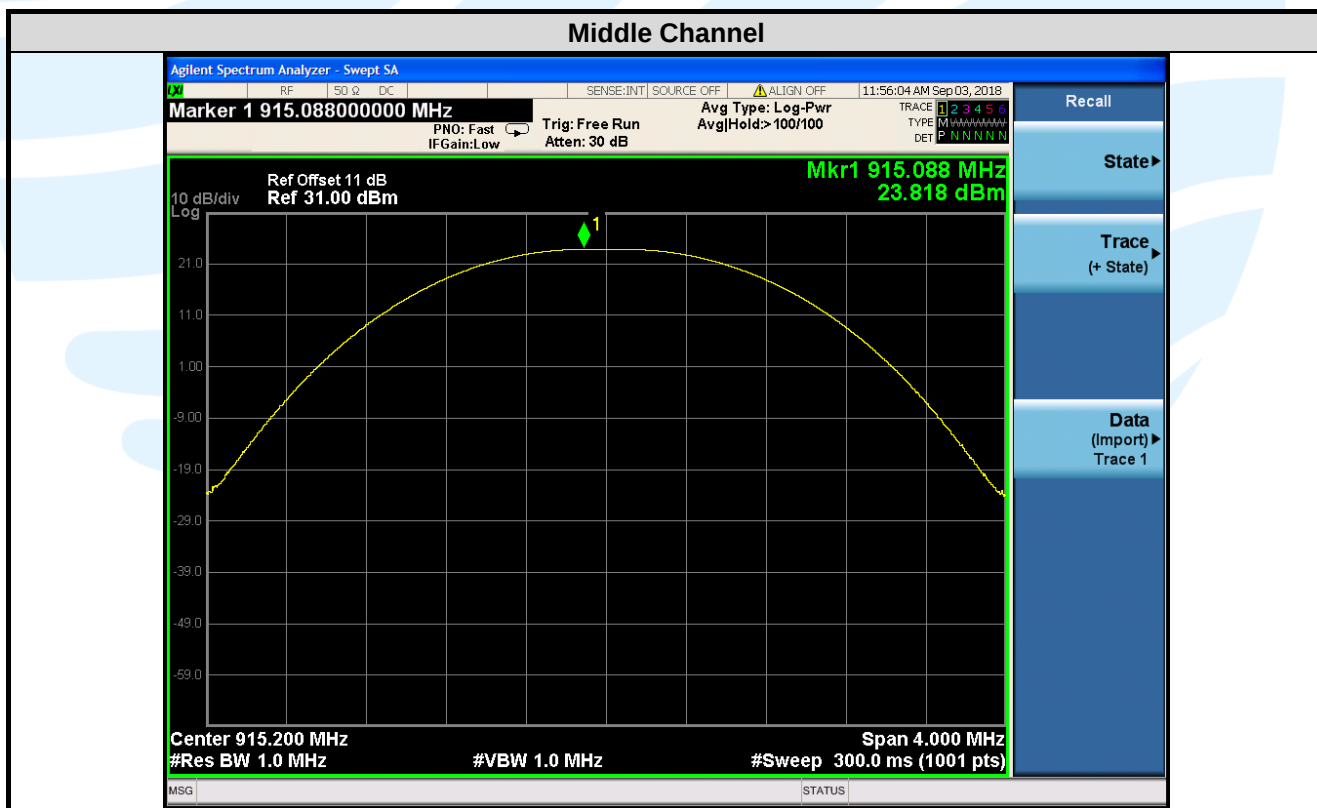
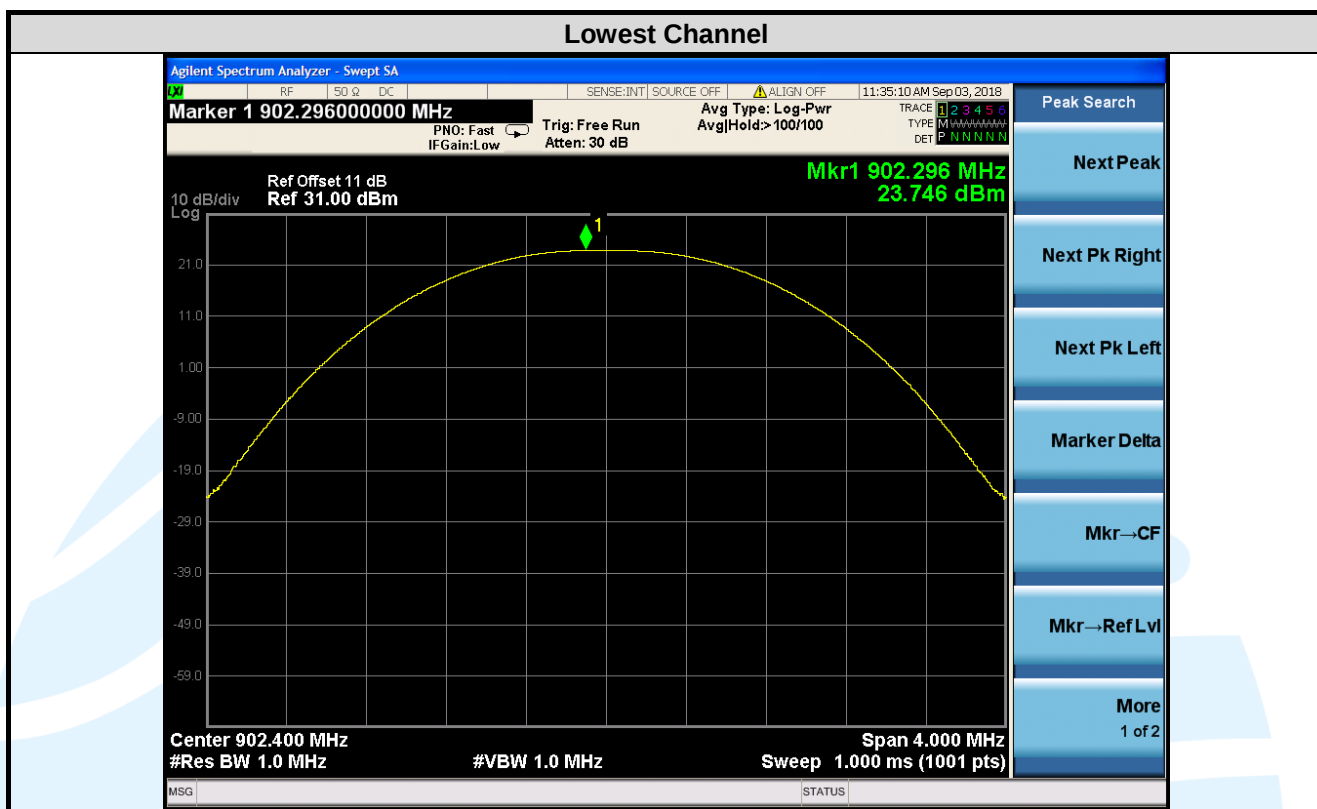
**Test Results:** Pass

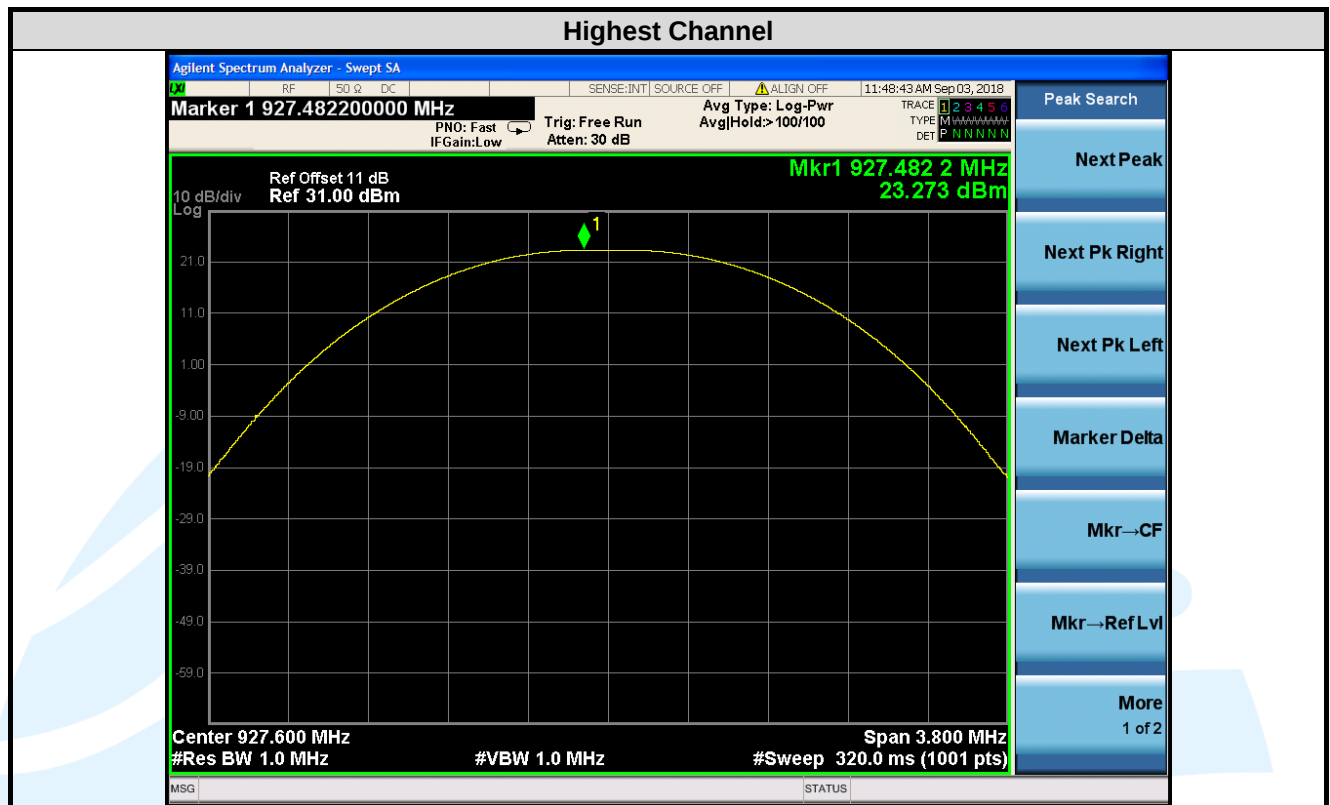
**Test Data:**

| Peak Output Power (dBm) |            |            | Peak Output Power (mW) |            |            |
|-------------------------|------------|------------|------------------------|------------|------------|
| Channel 0               | Channel 33 | Channel 63 | Channel 0              | Channel 33 | Channel 63 |
| 23.746                  | 23.818     | 23.273     | 236.92                 | 240.88     | 212.47     |

Note: The antenna gain of 6 dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

The test plot as follows:





## 5.4 RADIATED SPURIOUS EMISSIONS

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

**Test Method:** ANSI C63.10-2013 Section 6.6.4.3

**Receiver Setup:**

| Frequency           | RBW         |
|---------------------|-------------|
| 0.009 MHz-0.150 MHz | 200/300 kHz |
| 0.150 MHz -30 MHz   | 9/10 kHz    |
| 30 MHz-1 GHz        | 100/120 kHz |
| Above 1 GHz         | 1 MHz       |

**Limits:**

**Spurious Emissions**

| Frequency           | Field strength (microvolt/meter) | Limit (dBμV/m ) | Remark     | Measurement distance (m) |
|---------------------|----------------------------------|-----------------|------------|--------------------------|
| 0.009 MHz-0.490 MHz | 2400/F(kHz)                      | --              | --         | 300                      |
| 0.490 MHz-1.705 MHz | 24000/F(kHz)                     | --              | --         | 30                       |
| 1.705 MHz-30 MHz    | 30                               | --              | --         | 30                       |
| 30 MHz-88 MHz       | 100                              | 40.0            | Quasi-peak | 3                        |
| 88 MHz-216 MHz      | 150                              | 43.5            | Quasi-peak | 3                        |
| 216 MHz-960 MHz     | 200                              | 46.0            | Quasi-peak | 3                        |
| 960MHz-1GHz         | 500                              | 54.0            | Quasi-peak | 3                        |
| Above 1 GHz         | 500                              | 54.0            | Average    | 3                        |

**Remark:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

**Test Setup:** Refer to section 4.5.1 for details.

**Test Procedures:**

1. From 30 MHz to 1GHz test procedure as below:
  - 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
  - 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
  - 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
  - 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
  - 5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
  - 6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
2. From 1GHz to 20GHz test procedure as below:
  - 1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).
  - 2) Test the EUT in the lowest channel ,middle channel, the Highest channel
  - 3) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found

### Shenzhen UnionTrust Quality and Technology Co., Ltd.

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the Y axis positioning which it is worse case.

4) Repeat above procedures until all frequencies measured was complete.

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

**The measurement data as follows:**

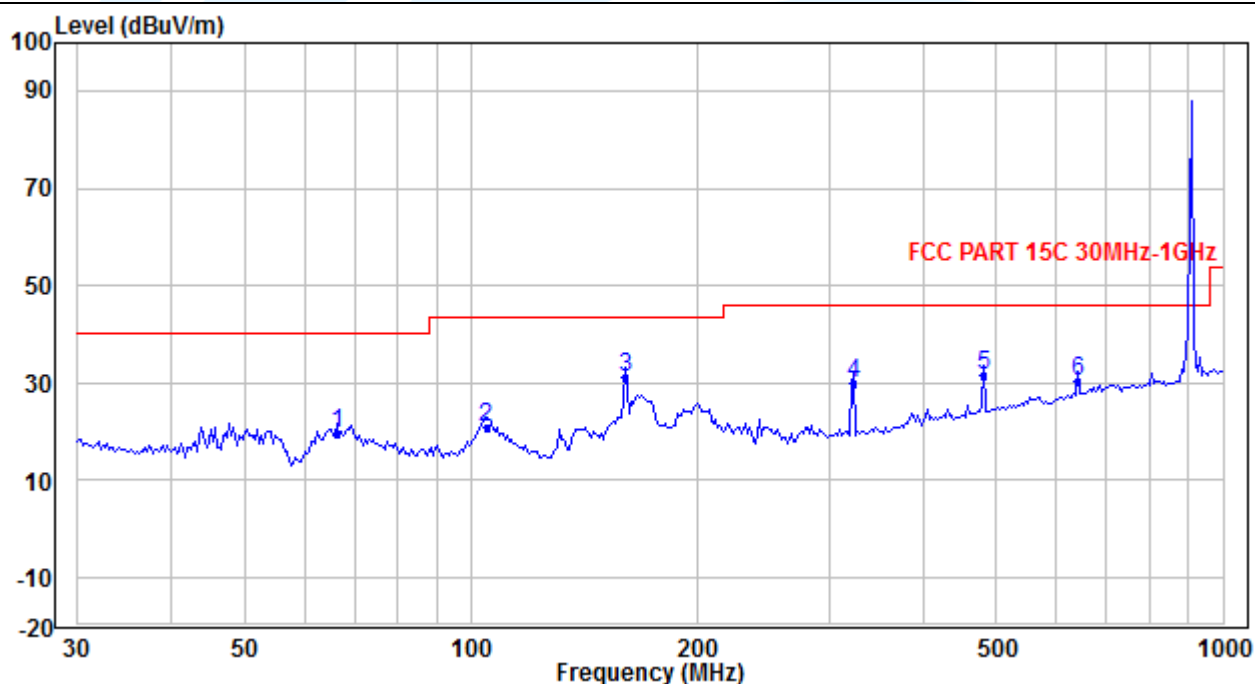
#### Radiated Emission Test Data (9 KHz ~ 30 MHz):

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

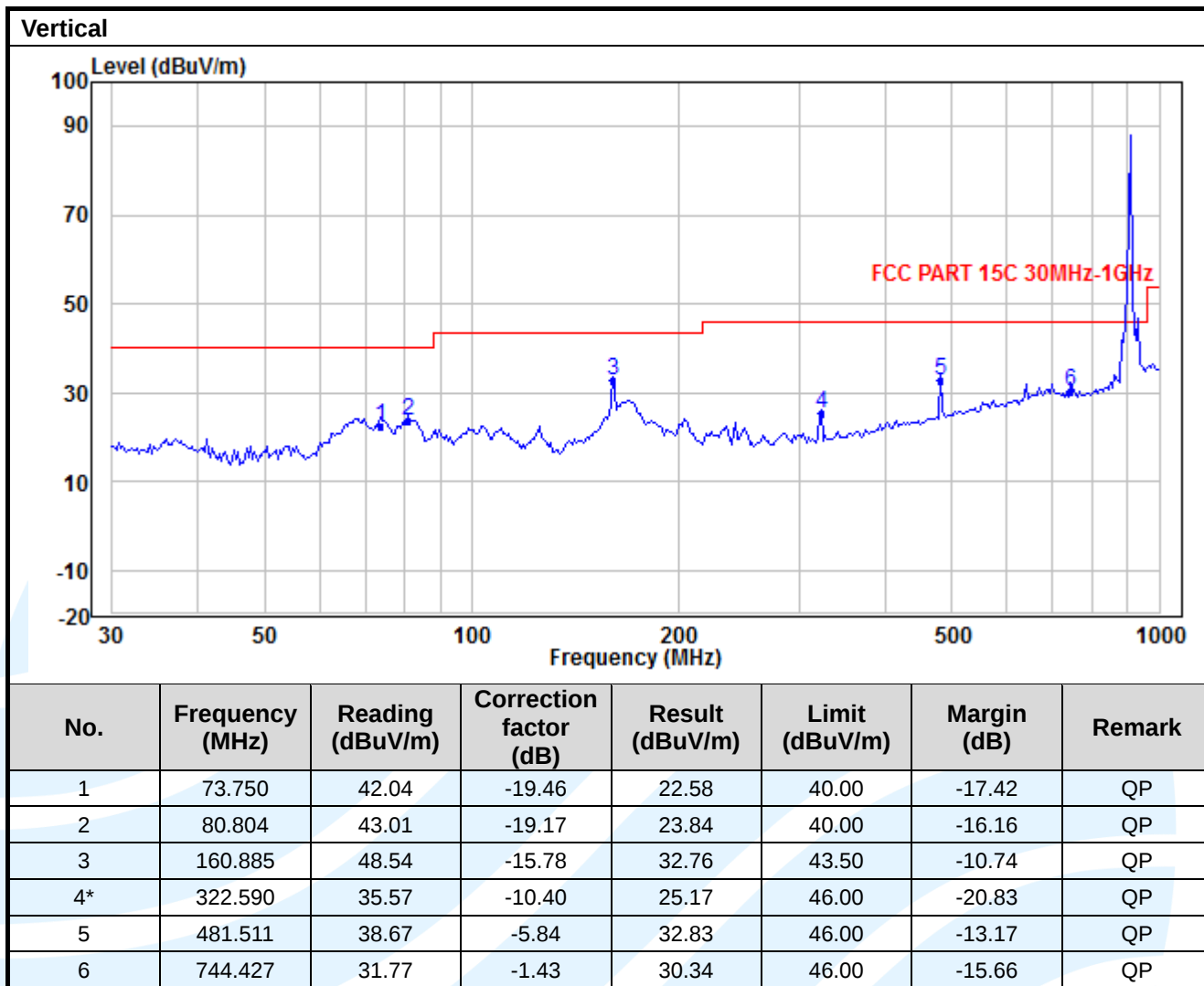
#### Transmitter Radiated Emission Test Data (30 MHz ~ 1 GHz):

##### Lowest Channel

##### Horizontal

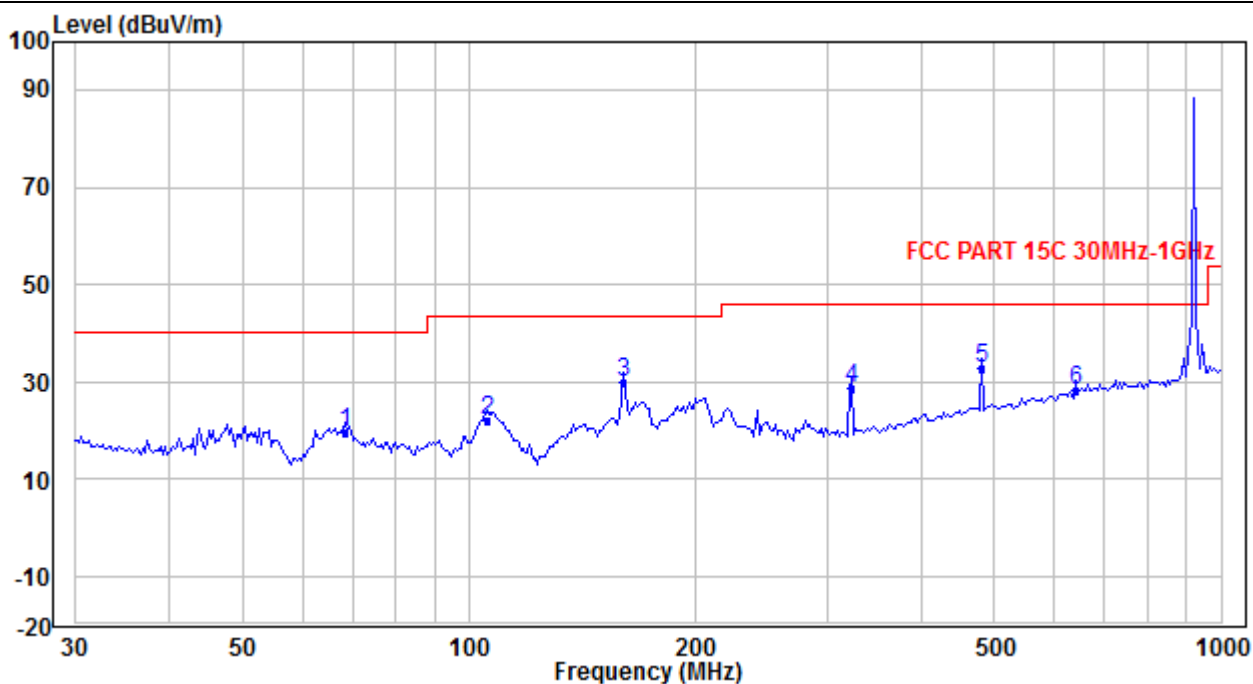


| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 66.371          | 39.33            | -19.88                 | 19.45           | 40.00          | -20.55      | QP     |
| 2*  | 104.798         | 38.13            | -17.41                 | 20.72           | 43.50          | -22.78      | QP     |
| 3   | 160.885         | 46.97            | -15.78                 | 31.19           | 43.50          | -12.31      | QP     |
| 4   | 322.590         | 40.38            | -10.40                 | 29.98           | 46.00          | -16.02      | QP     |
| 5   | 481.511         | 37.59            | -5.84                  | 31.75           | 46.00          | -14.25      | QP     |
| 6   | 642.292         | 33.18            | -2.87                  | 30.31           | 46.00          | -15.69      | QP     |

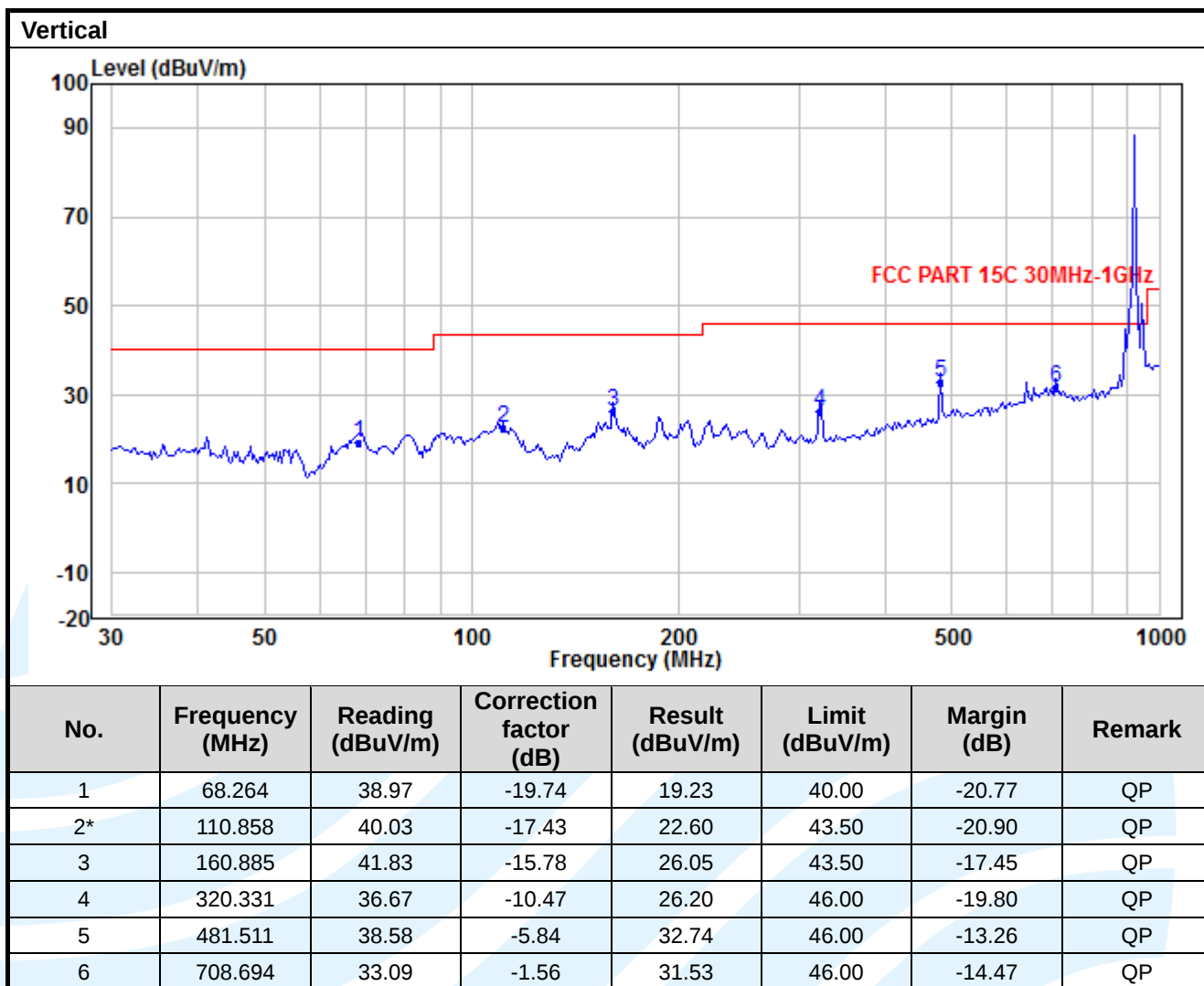


### Middle Channel

#### Horizontal

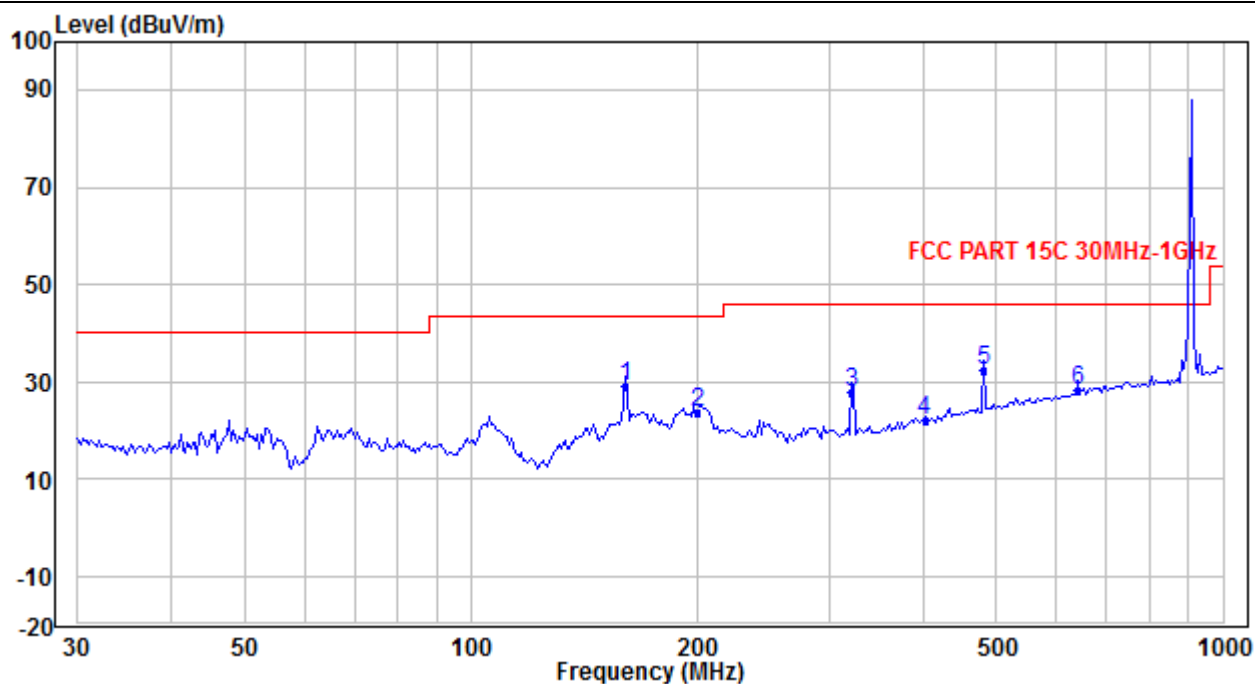


| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 68.264          | 39.29            | -19.74                 | 19.55           | 40.00          | -20.45      | QP     |
| 2*  | 105.537         | 39.50            | -17.42                 | 22.08           | 43.50          | -21.42      | QP     |
| 3   | 160.885         | 45.65            | -15.78                 | 29.87           | 43.50          | -13.63      | QP     |
| 4   | 322.590         | 39.10            | -10.40                 | 28.70           | 46.00          | -17.30      | QP     |
| 5   | 481.511         | 38.50            | -5.84                  | 32.66           | 46.00          | -13.34      | QP     |
| 6   | 642.292         | 30.98            | -2.87                  | 28.11           | 46.00          | -17.89      | QP     |

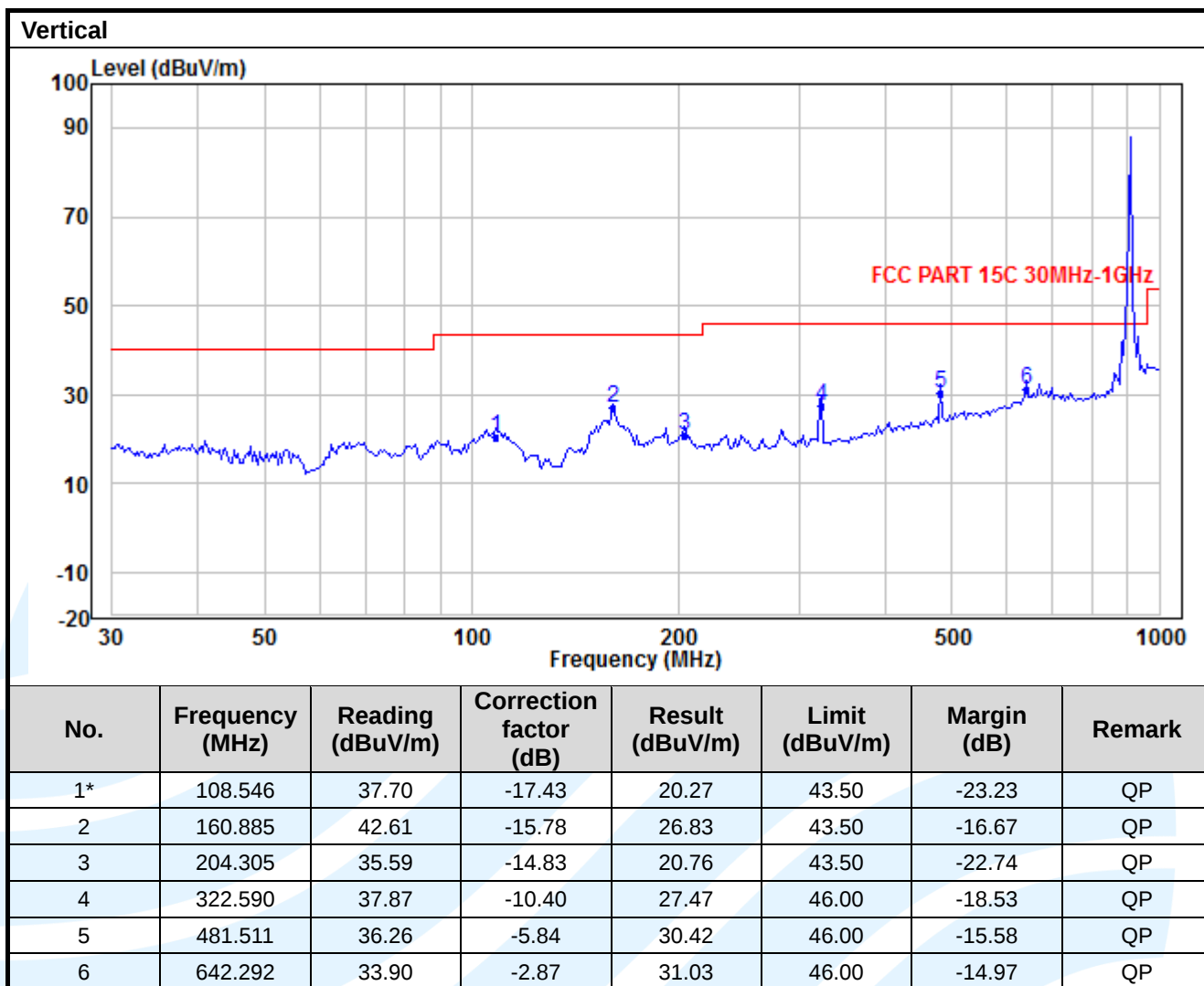


### Highest Channel

#### Horizontal



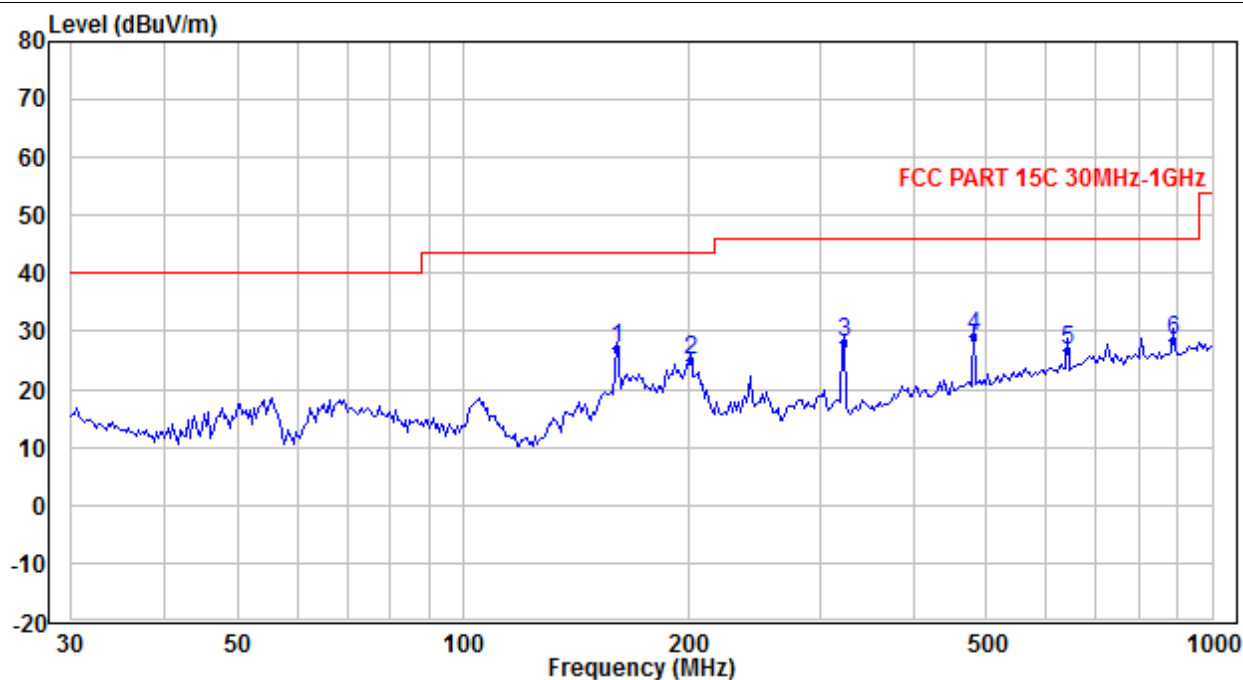
| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 160.885         | 45.04            | -15.78                 | 29.26           | 43.50          | -14.24      | QP     |
| 2   | 200.043         | 38.58            | -15.05                 | 23.53           | 43.50          | -19.97      | QP     |
| 3   | 320.331         | 38.35            | -10.47                 | 27.88           | 46.00          | -18.12      | QP     |
| 4*  | 401.105         | 29.90            | -7.91                  | 21.99           | 46.00          | -24.01      | QP     |
| 5   | 481.511         | 38.15            | -5.84                  | 32.31           | 46.00          | -13.69      | QP     |
| 6   | 642.292         | 31.14            | -2.87                  | 28.27           | 46.00          | -17.73      | QP     |



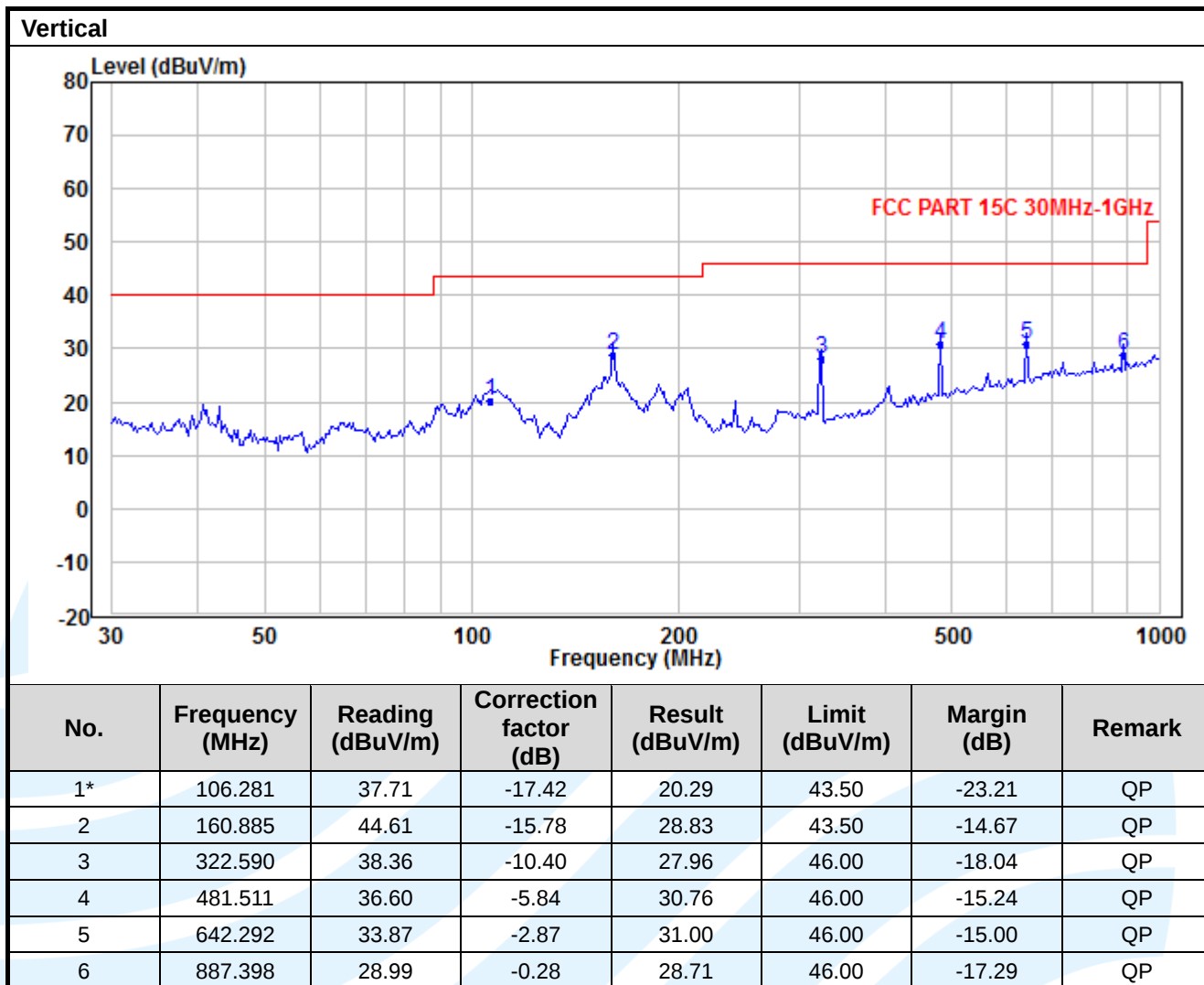
# Receiver Radiated Emission Test Data (30 MHz ~ 1 GHz):

Lowest Channel

Horizontal

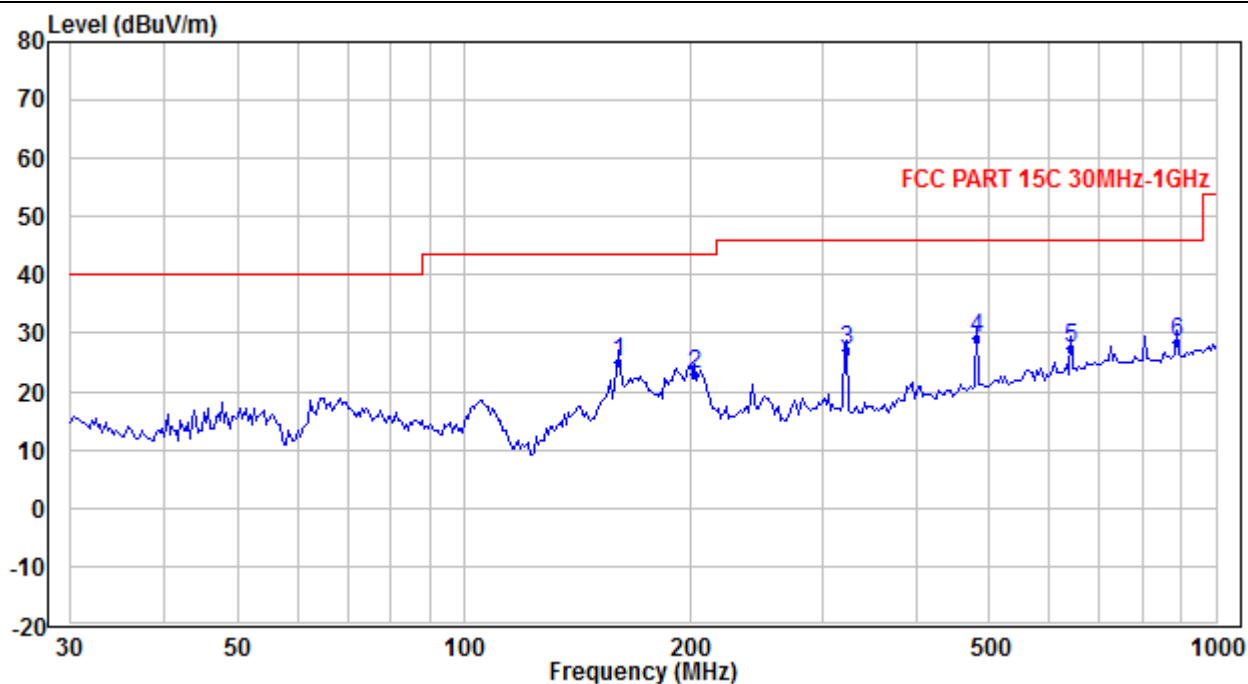


| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 160.885         | 42.92            | -15.78                 | 27.14           | 43.50          | -16.36      | QP     |
| 2   | 201.454         | 40.04            | -14.96                 | 25.08           | 43.50          | -18.42      | QP     |
| 3   | 322.590         | 38.65            | -10.40                 | 28.25           | 46.00          | -17.75      | QP     |
| 4   | 481.511         | 34.81            | -5.84                  | 28.97           | 46.00          | -17.03      | QP     |
| 5*  | 642.292         | 29.58            | -2.87                  | 26.71           | 46.00          | -19.29      | QP     |
| 6   | 887.398         | 28.85            | -0.28                  | 28.57           | 46.00          | -17.43      | QP     |

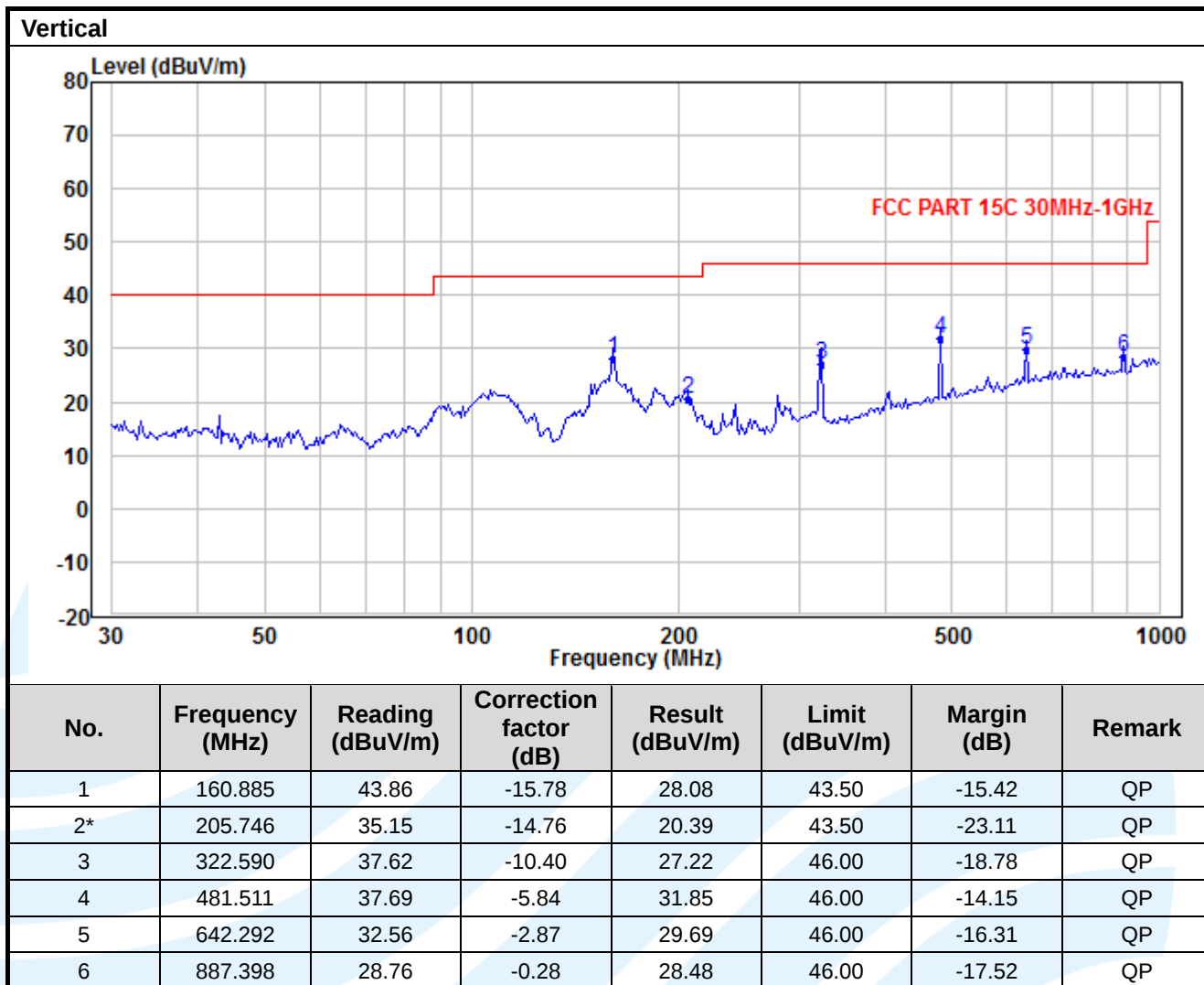


### Middle Channel

#### Horizontal

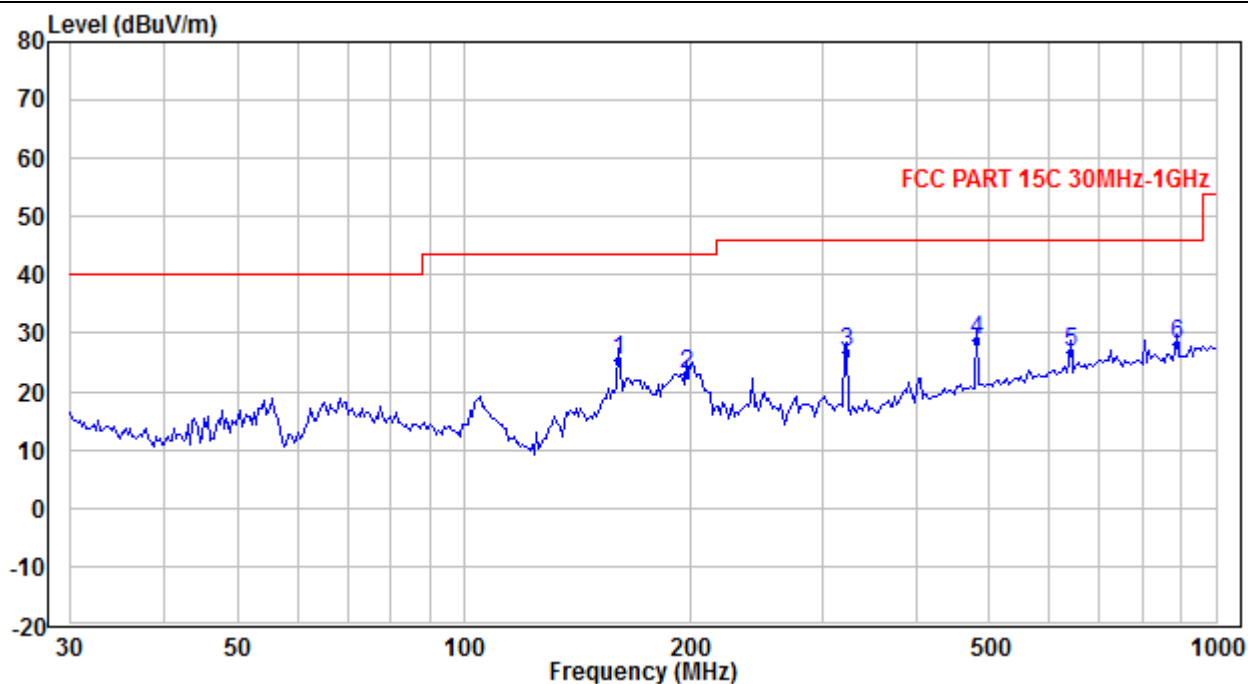


| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 160.885         | 40.78            | -15.78                 | 25.00           | 43.50          | -18.50      | QP     |
| 2*  | 202.875         | 37.73            | -14.90                 | 22.83           | 43.50          | -20.67      | QP     |
| 3   | 322.590         | 37.36            | -10.40                 | 26.96           | 46.00          | -19.04      | QP     |
| 4   | 481.511         | 35.06            | -5.84                  | 29.22           | 46.00          | -16.78      | QP     |
| 5   | 642.292         | 30.26            | -2.87                  | 27.39           | 46.00          | -18.61      | QP     |
| 6   | 887.398         | 28.68            | -0.28                  | 28.40           | 46.00          | -17.60      | QP     |

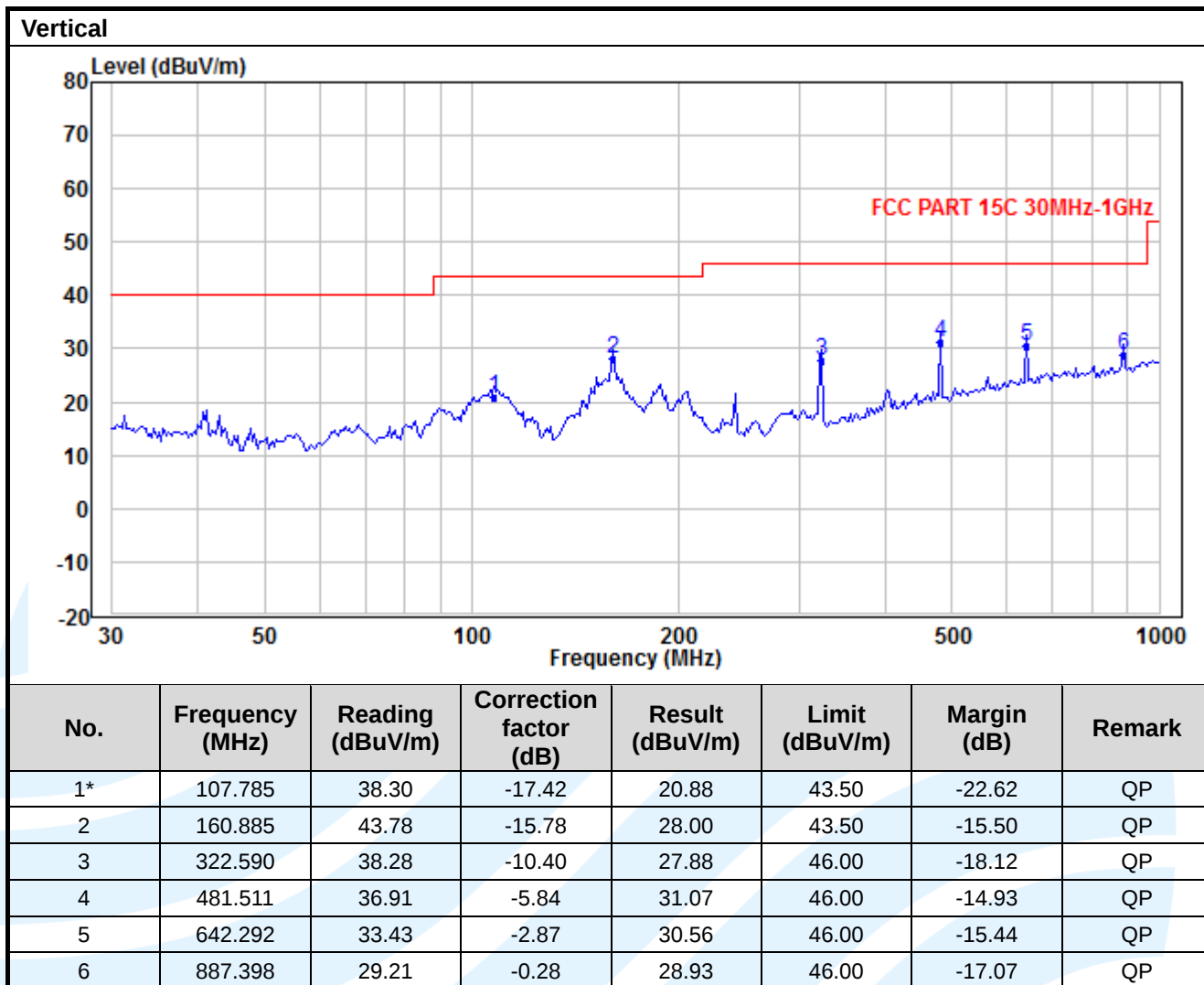


### Highest Channel

#### Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 160.885         | 41.12            | -15.78                 | 25.34           | 43.50          | -18.16      | QP     |
| 2*  | 197.251         | 38.25            | -15.18                 | 23.07           | 43.50          | -20.43      | QP     |
| 3   | 322.590         | 36.98            | -10.40                 | 26.58           | 46.00          | -19.42      | QP     |
| 4   | 481.511         | 34.74            | -5.84                  | 28.90           | 46.00          | -17.10      | QP     |
| 5   | 642.292         | 29.77            | -2.87                  | 26.90           | 46.00          | -19.10      | QP     |
| 6   | 887.398         | 28.26            | -0.28                  | 27.98           | 46.00          | -18.02      | QP     |

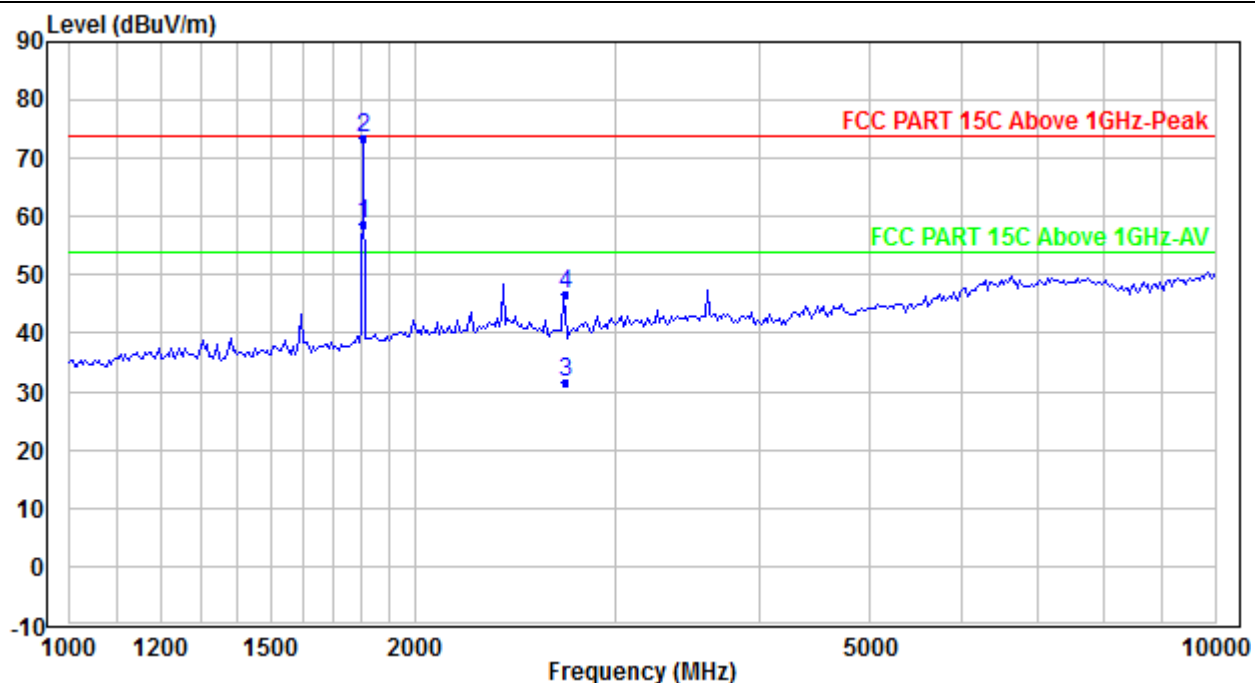


For emissions above 1GHz, only the worst case from 1GHz to 10GHz reported.

### Transmitter Radiated Emission Test Data (above 1 GHz):

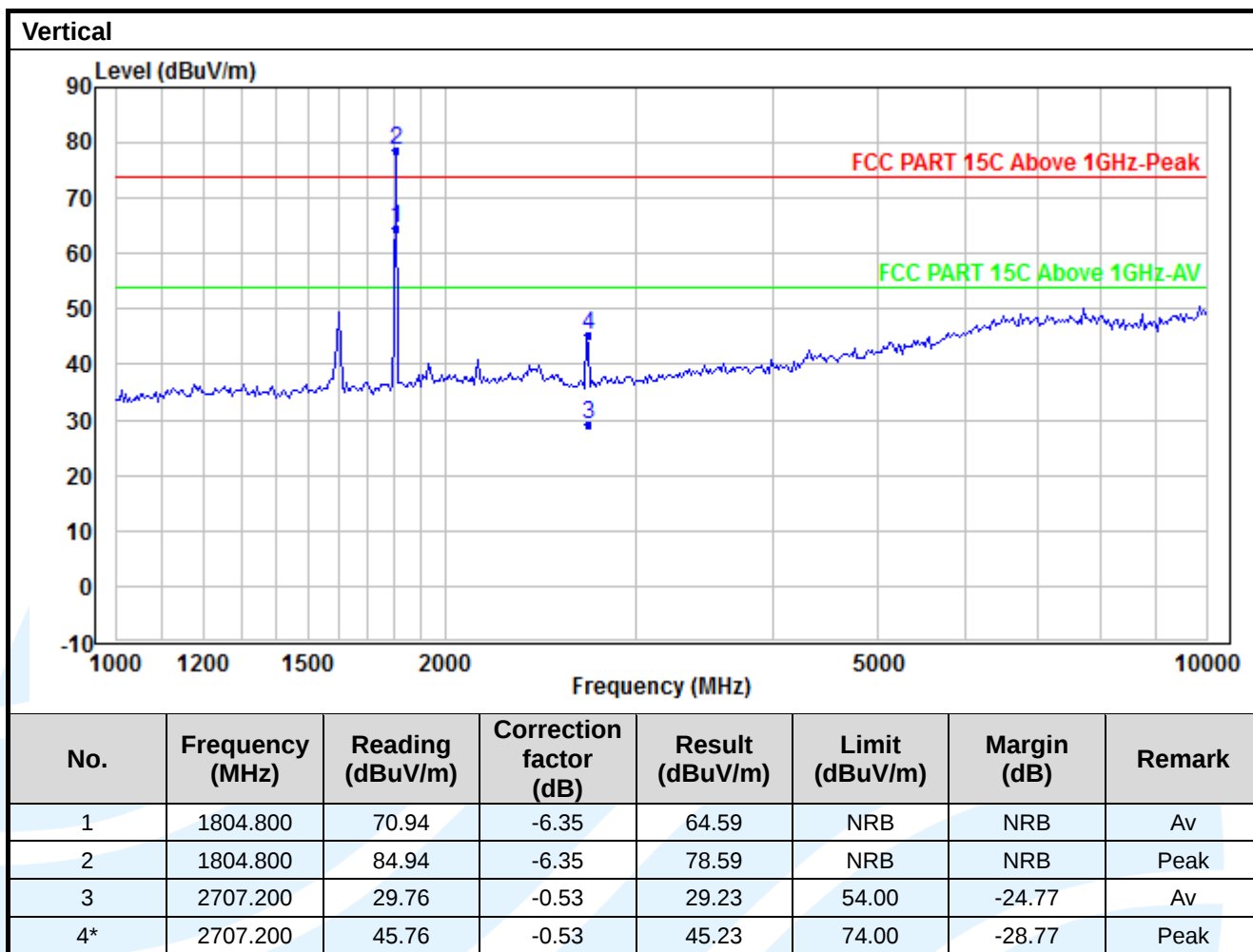
#### Lowest Channel

#### Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 1804.800        | 65.02            | -6.35                  | 58.67           | NRB            | NRB         | Avg    |
| 2   | 1804.800        | 80.02            | -6.35                  | 73.67           | NRB            | NRB         | Peak   |
| 3   | 2707.200        | 32.14            | -0.53                  | 31.61           | 54.00          | -22.39      | Avg    |
| 4*  | 2707.200        | 47.14            | -0.53                  | 46.61           | 74.00          | -27.39      | Peak   |

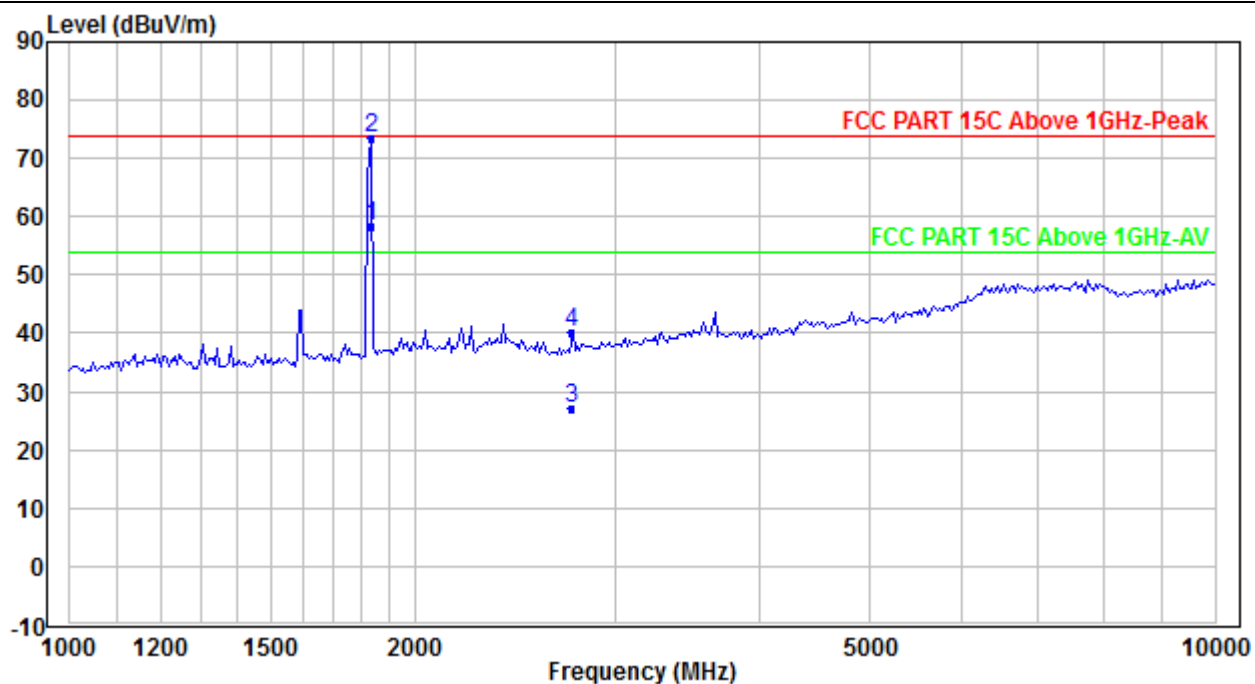
Legend: NRB = Non Restricted Band, Limit is 20dB below fundamental peak



Legend: NRB = Non Restricted Band, Limit is 20dB below fundamental peak

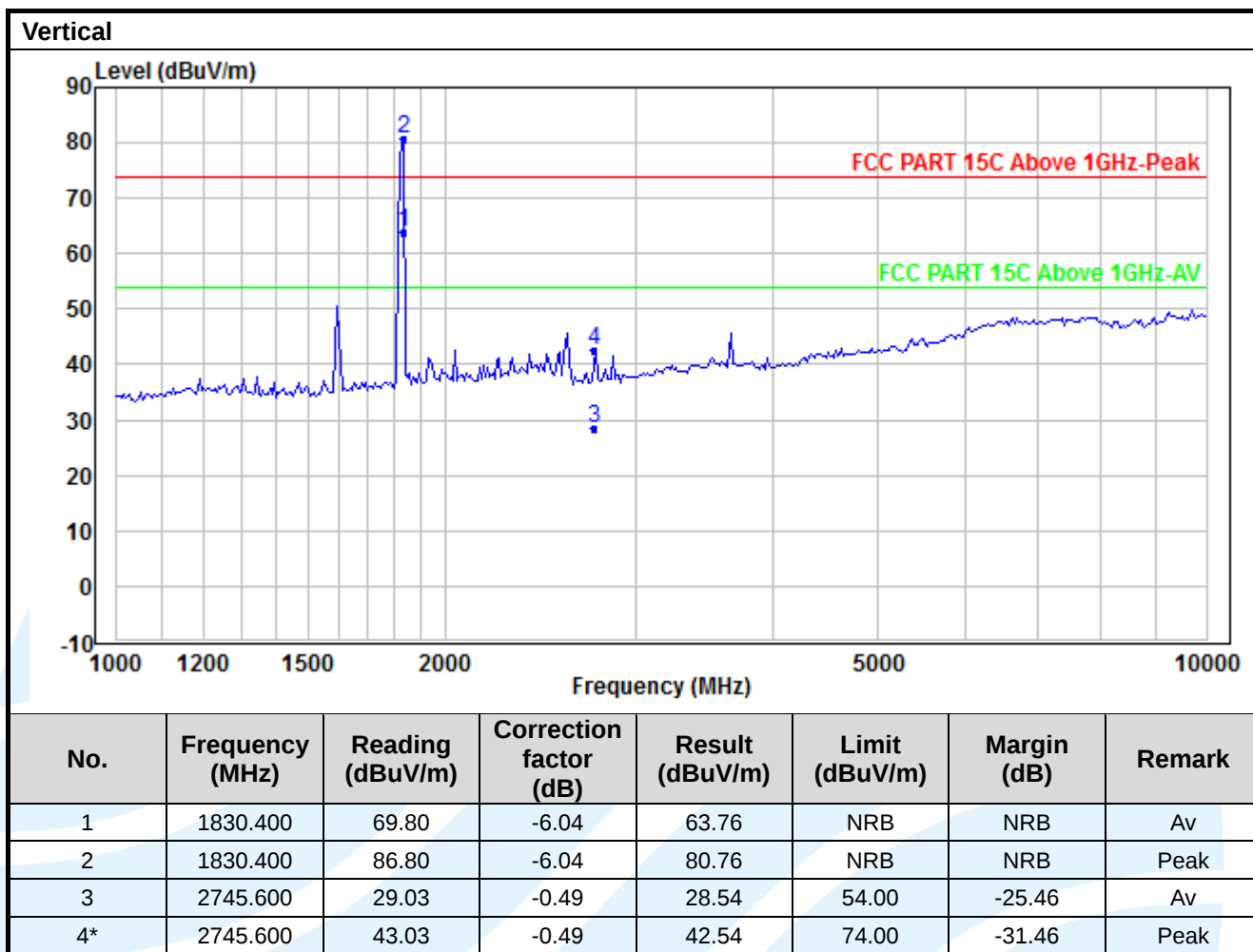
# Middle Channel

## Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 1830.400        | 64.54            | -6.04                  | 58.50           | NRB            | NRB         | Av     |
| 2   | 1830.400        | 79.54            | -6.04                  | 73.50           | NRB            | NRB         | Peak   |
| 3   | 2745.600        | 27.67            | -0.49                  | 27.18           | 54.00          | -26.82      | Av     |
| 4*  | 2745.600        | 40.67            | -0.49                  | 40.18           | 74.00          | -33.82      | Peak   |

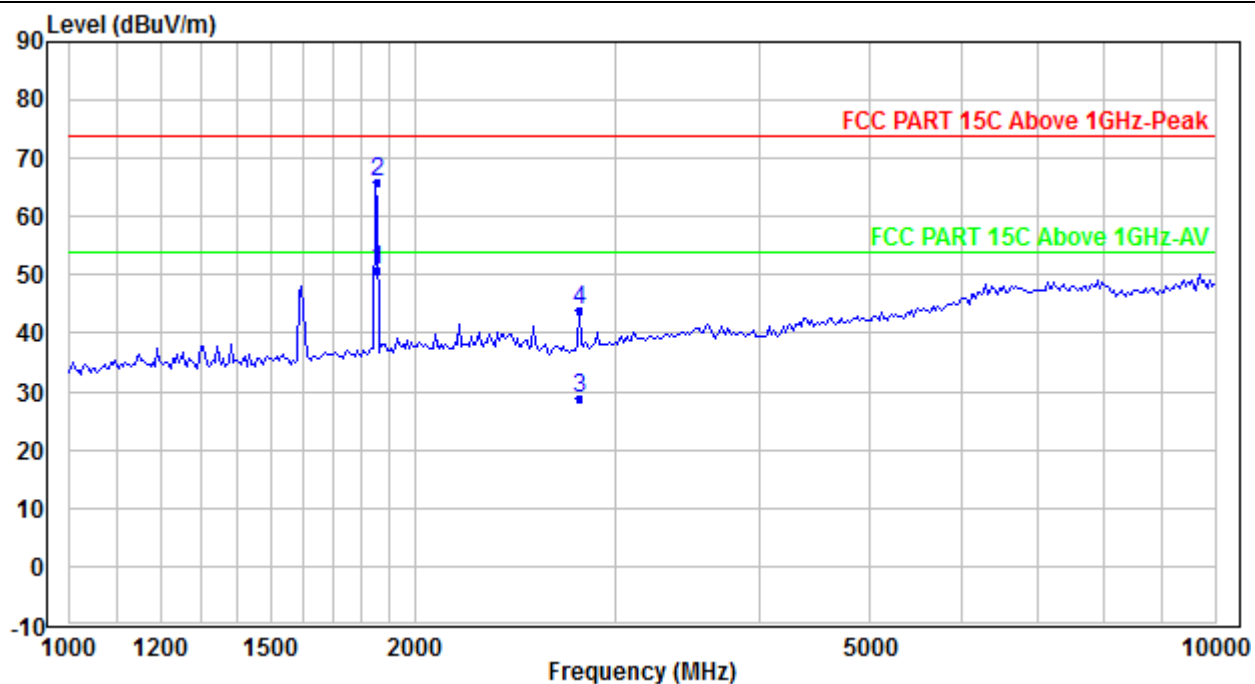
Legend: NRB = Non Restricted Band, Limit is 20dB below fundamental peak



Legend: NRB = Non Restricted Band, Limit is 20dB below fundamental peak

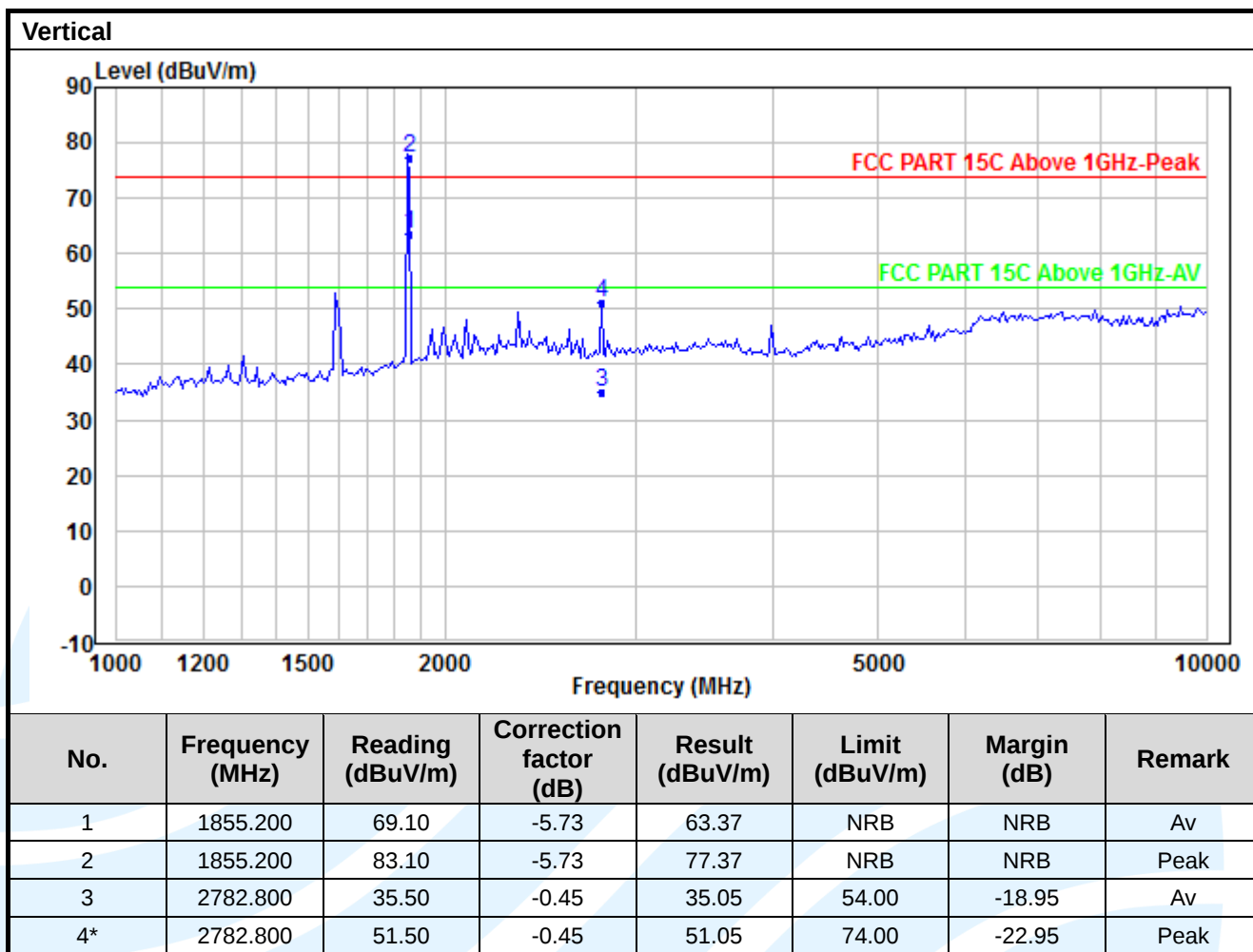
### Highest Channel

#### Horizontal



| No. | Frequency (MHz) | Reading (dBUV/m) | Correction factor (dB) | Result (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 1855.200        | 56.71            | -5.73                  | 50.98           | NRB            | NRB         | Av     |
| 2   | 1855.200        | 71.71            | -5.73                  | 65.98           | NRB            | NRB         | Peak   |
| 3   | 2782.800        | 29.26            | -0.45                  | 28.81           | 54.00          | -25.19      | Av     |
| 4*  | 2782.800        | 44.26            | -0.45                  | 43.81           | 74.00          | -30.19      | Peak   |

Legend: NRB = Non Restricted Band, Limit is 20dB below fundamental peak

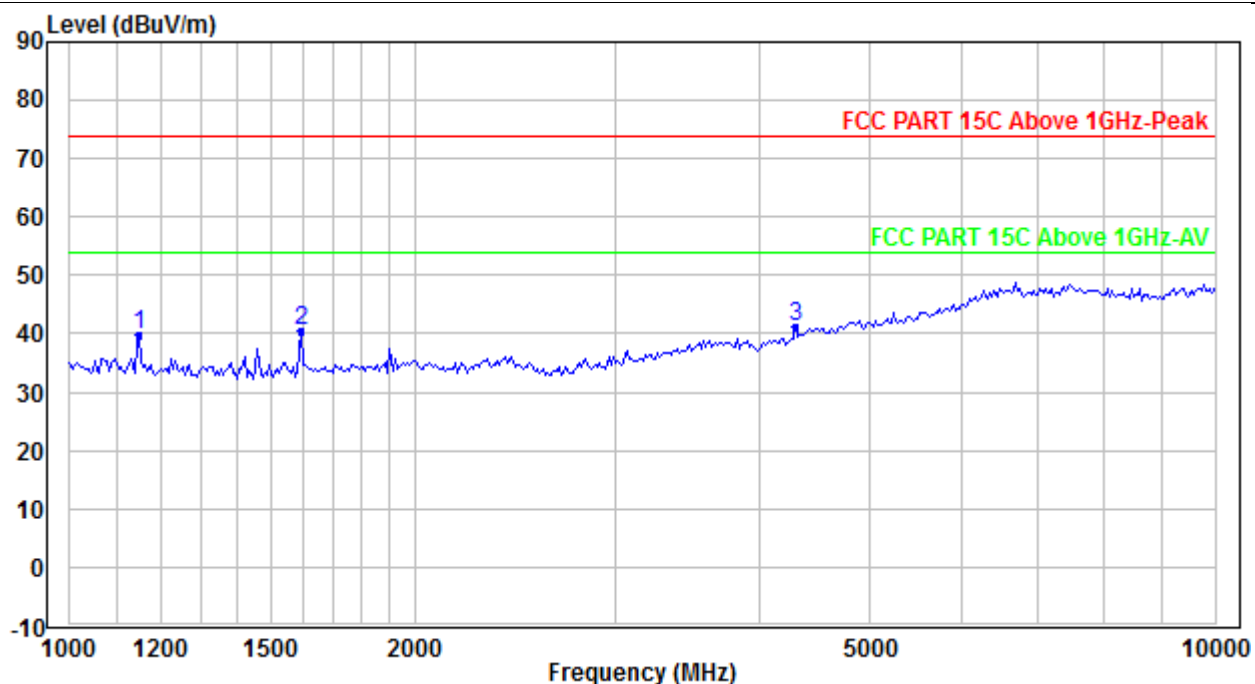


Legend: NRB = Non Restricted Band, Limit is 20dB below fundamental peak

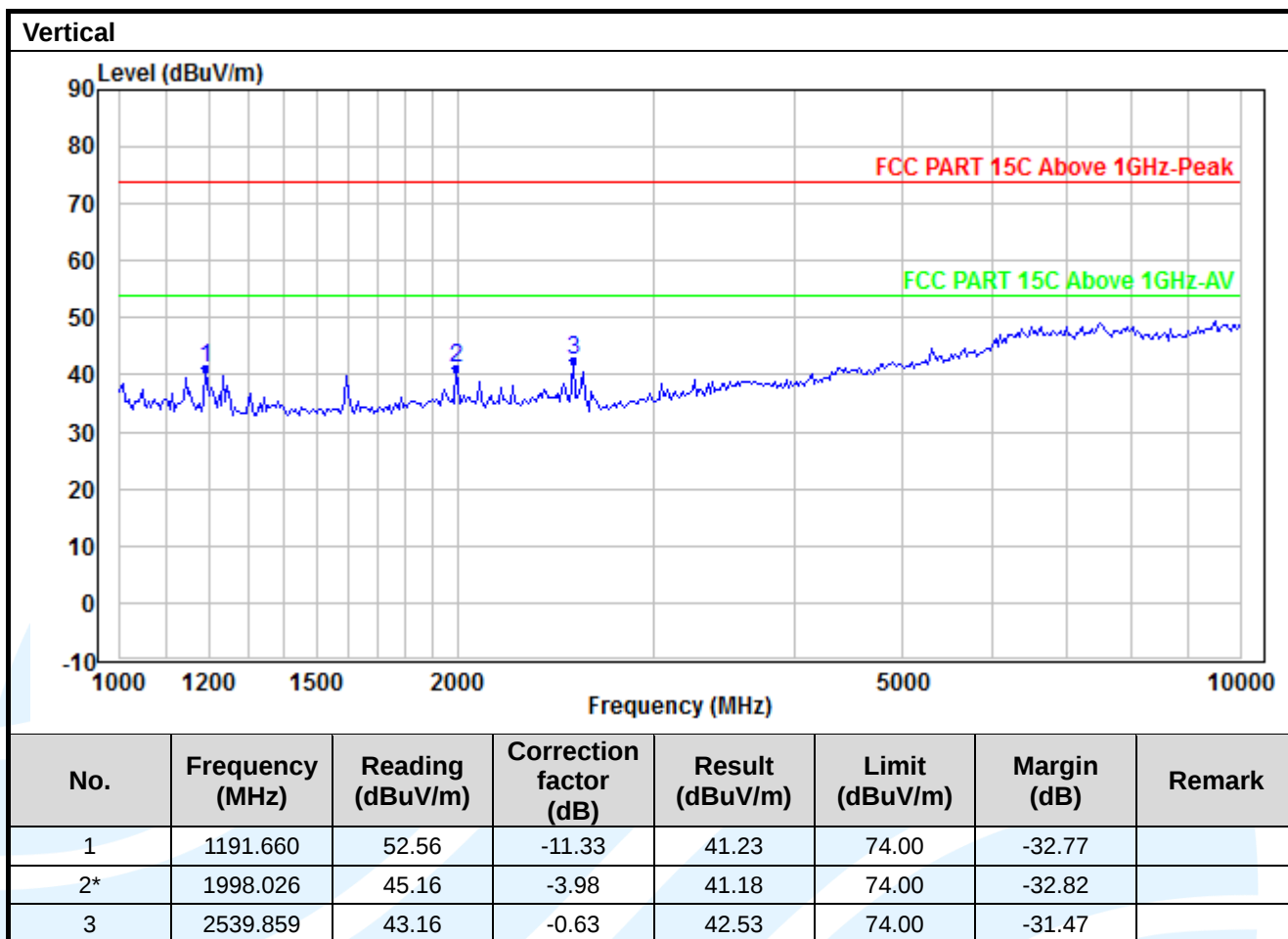
**Receiver Radiated Emission Test Data (above 1 GHz):**

Lowest Channel

Horizontal

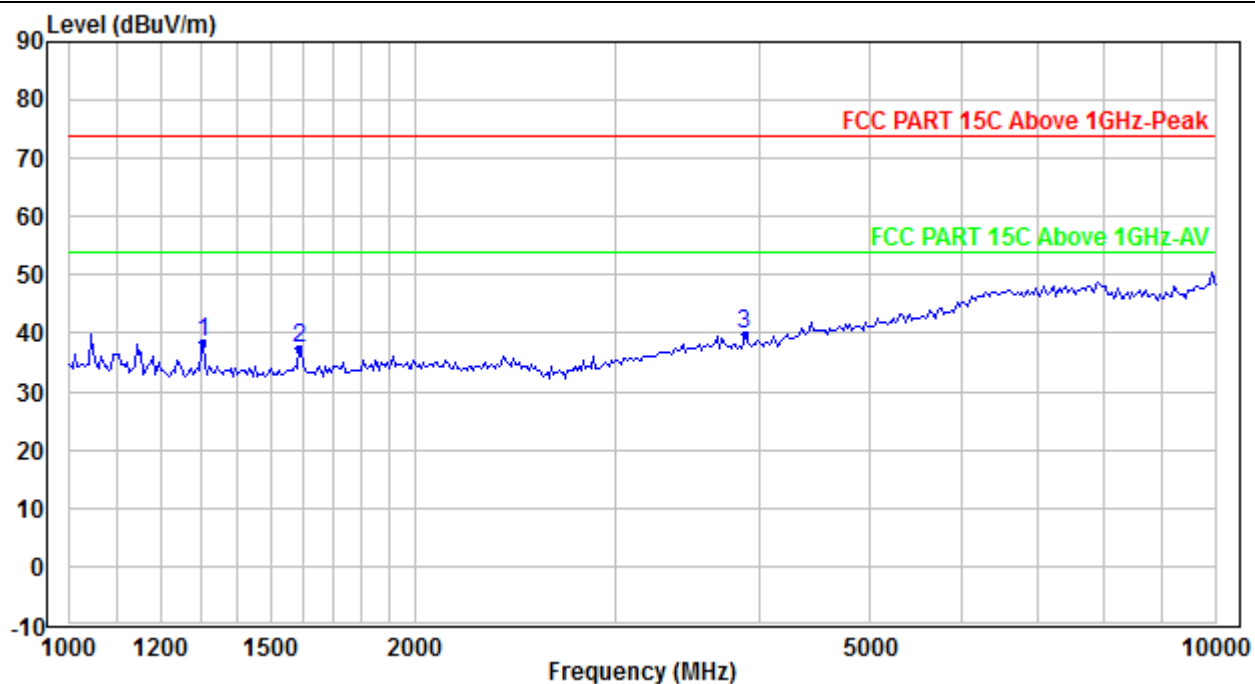


| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1*  | 1148.472        | 51.50            | -11.51                 | 39.99           | 74.00          | -34.01      | Peak   |
| 2   | 1593.693        | 49.23            | -8.83                  | 40.40           | 74.00          | -33.60      | Peak   |
| 3   | 4298.001        | 38.83            | 2.30                   | 41.13           | 74.00          | -32.87      | Peak   |

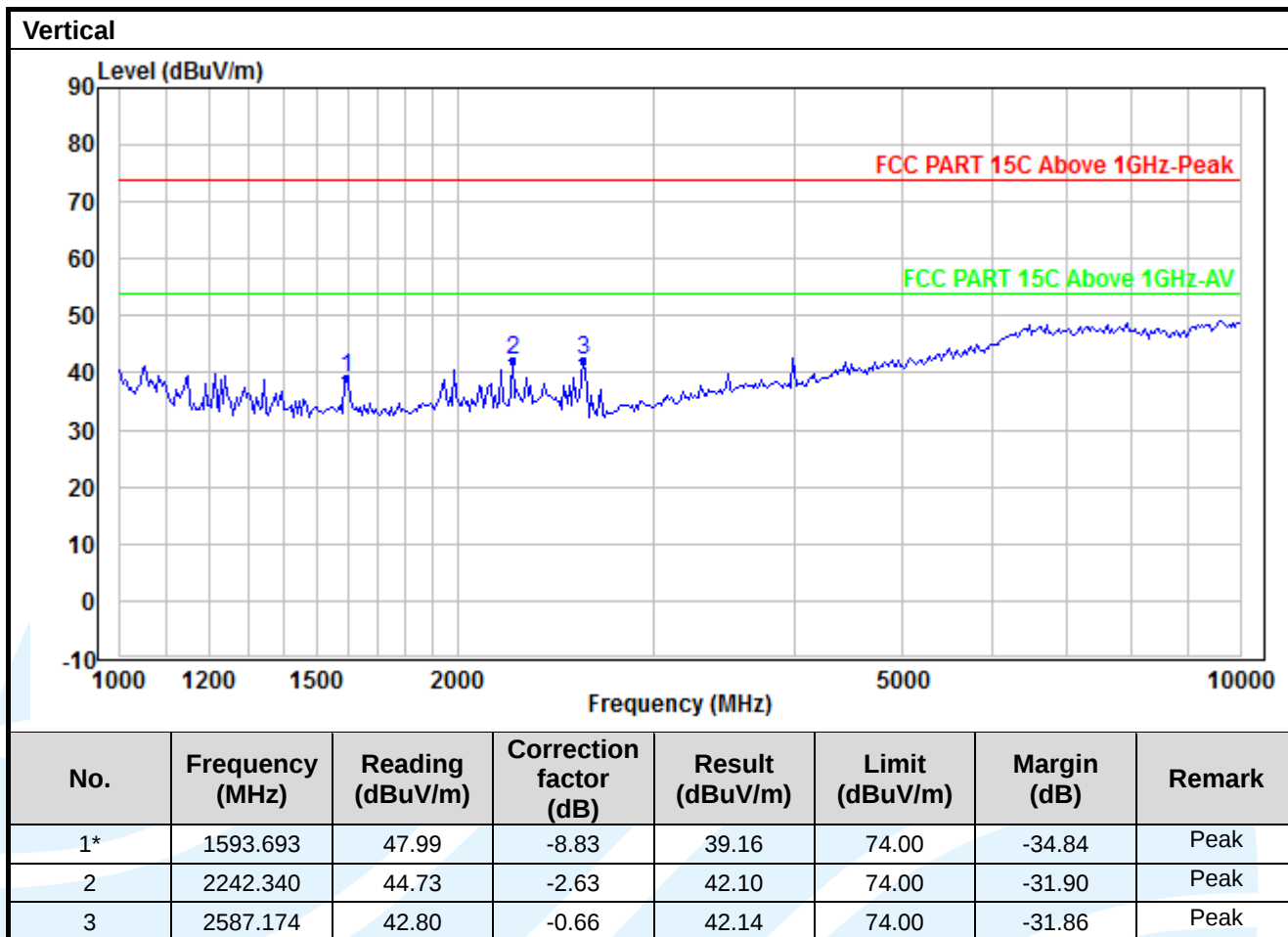


### Middle Channel

#### Horizontal

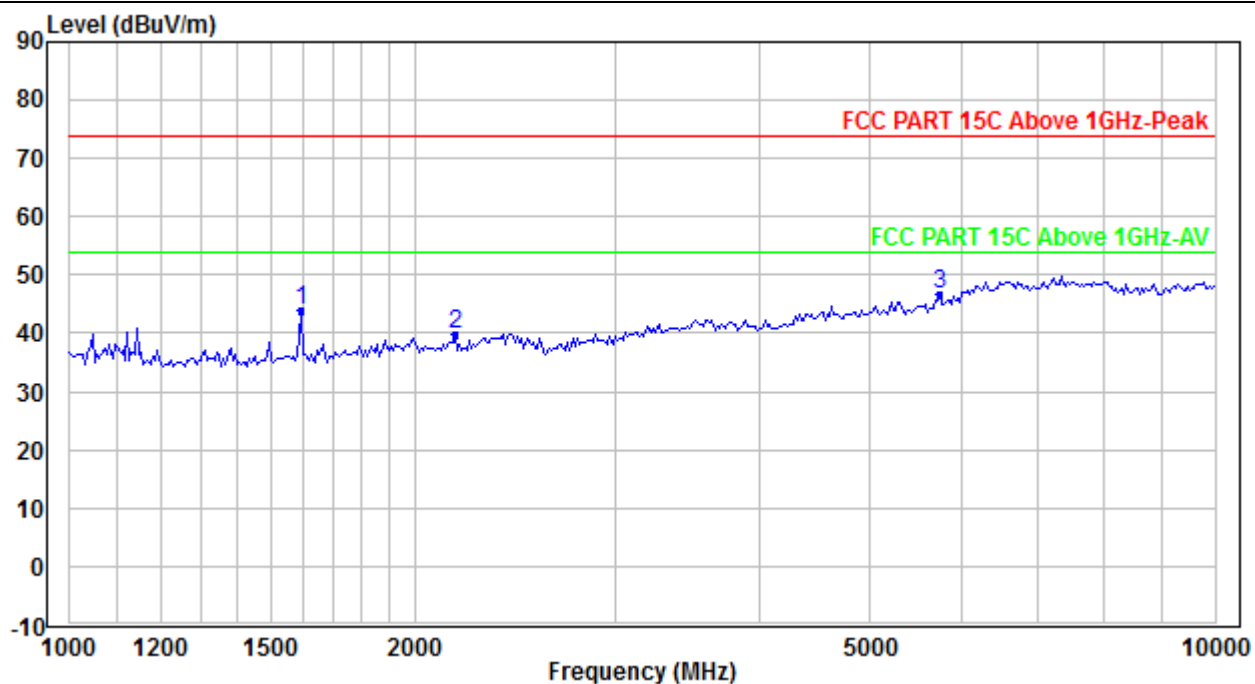


| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 1306.870        | 49.25            | -10.81                 | 38.44           | 74.00          | -35.56      | Peak   |
| 2*  | 1586.357        | 46.42            | -8.92                  | 37.50           | 74.00          | -36.50      | Peak   |
| 3   | 3883.098        | 38.25            | 1.50                   | 39.75           | 74.00          | -34.25      | Peak   |



### Highest Channel

#### Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|------------------------|-----------------|----------------|-------------|--------|
| 1   | 1593.693        | 52.77            | -8.83                  | 43.94           | 74.00          | -30.06      | Peak   |
| 2*  | 2171.068        | 43.12            | -3.30                  | 39.82           | 74.00          | -34.18      | Peak   |
| 3   | 5748.030        | 41.78            | 4.96                   | 46.74           | 74.00          | -27.26      | Peak   |

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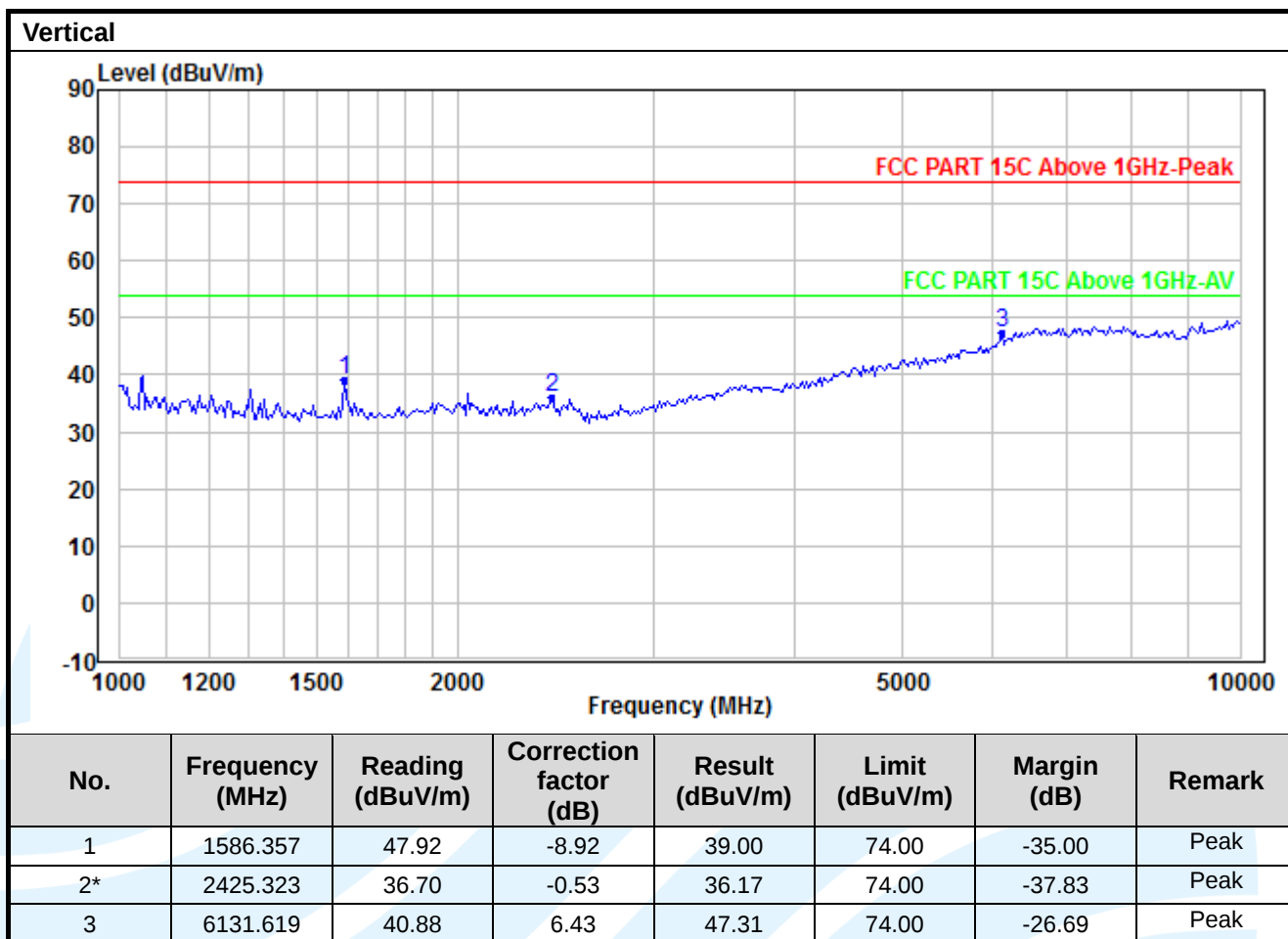
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Remark:

1. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

## 5.1 BAND EDGE MEASUREMENTS (RADIATED)

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

**Test Method:** ANSI C63.10-2013 Section 6.6.4.3

**Limits:**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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) (see §15.205(c)).

**Test Setup:** Refer to section 4.5.1 for details.

**Test Procedures:**

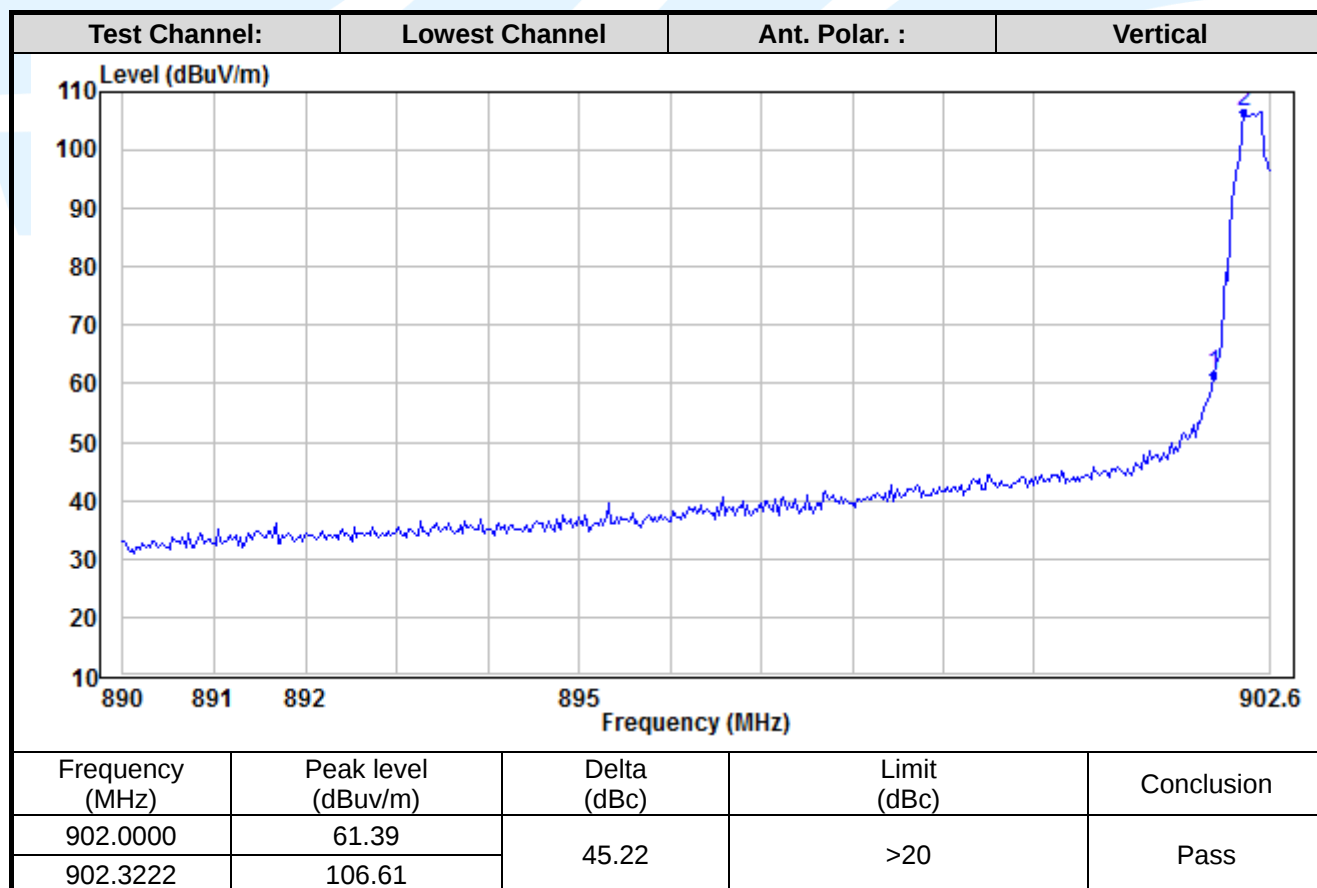
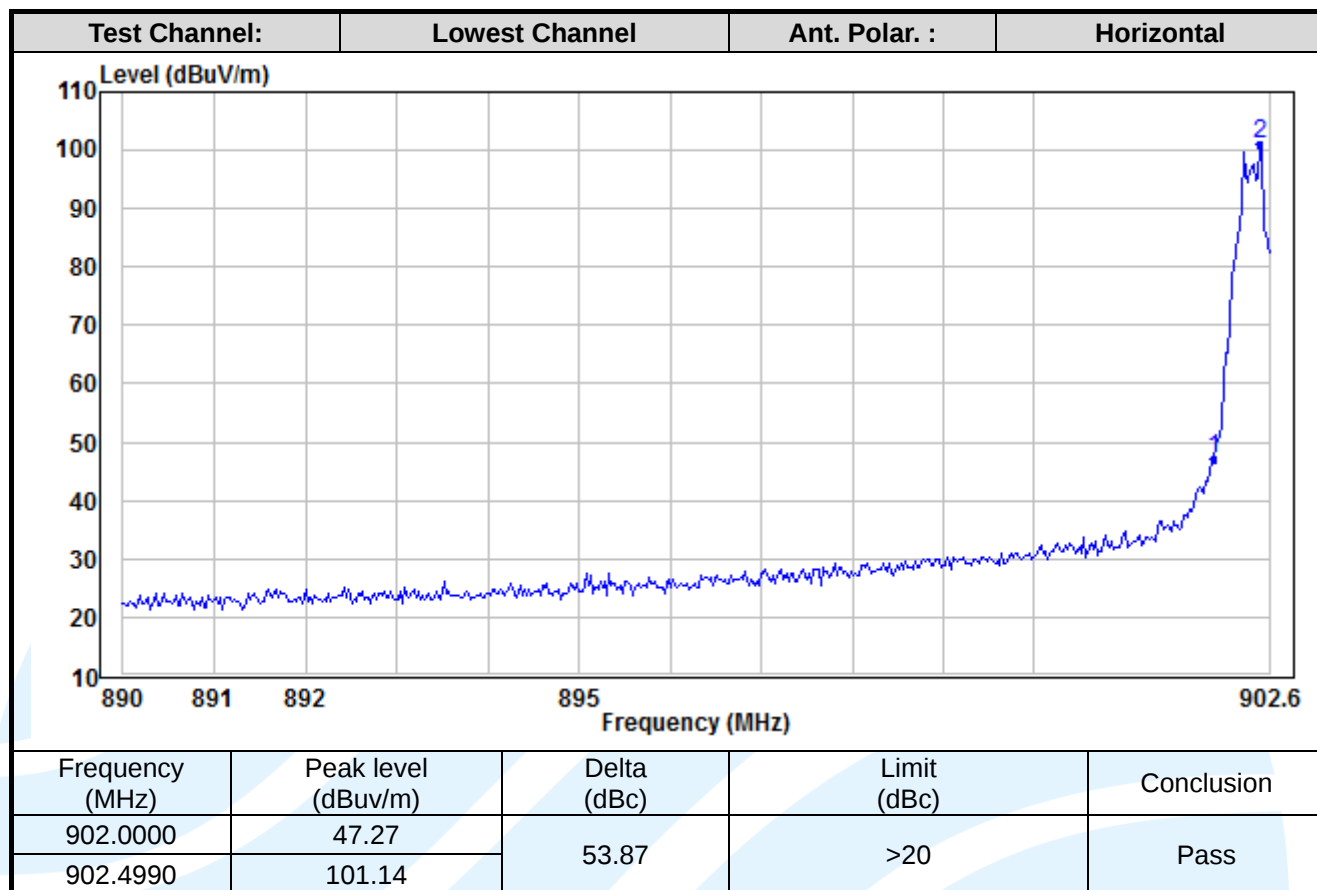
Radiated band edge measurements at 902 MHz and 928 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 0.1 MHz, video bandwidth (VBW) = 0.3 MHz for peak levels.

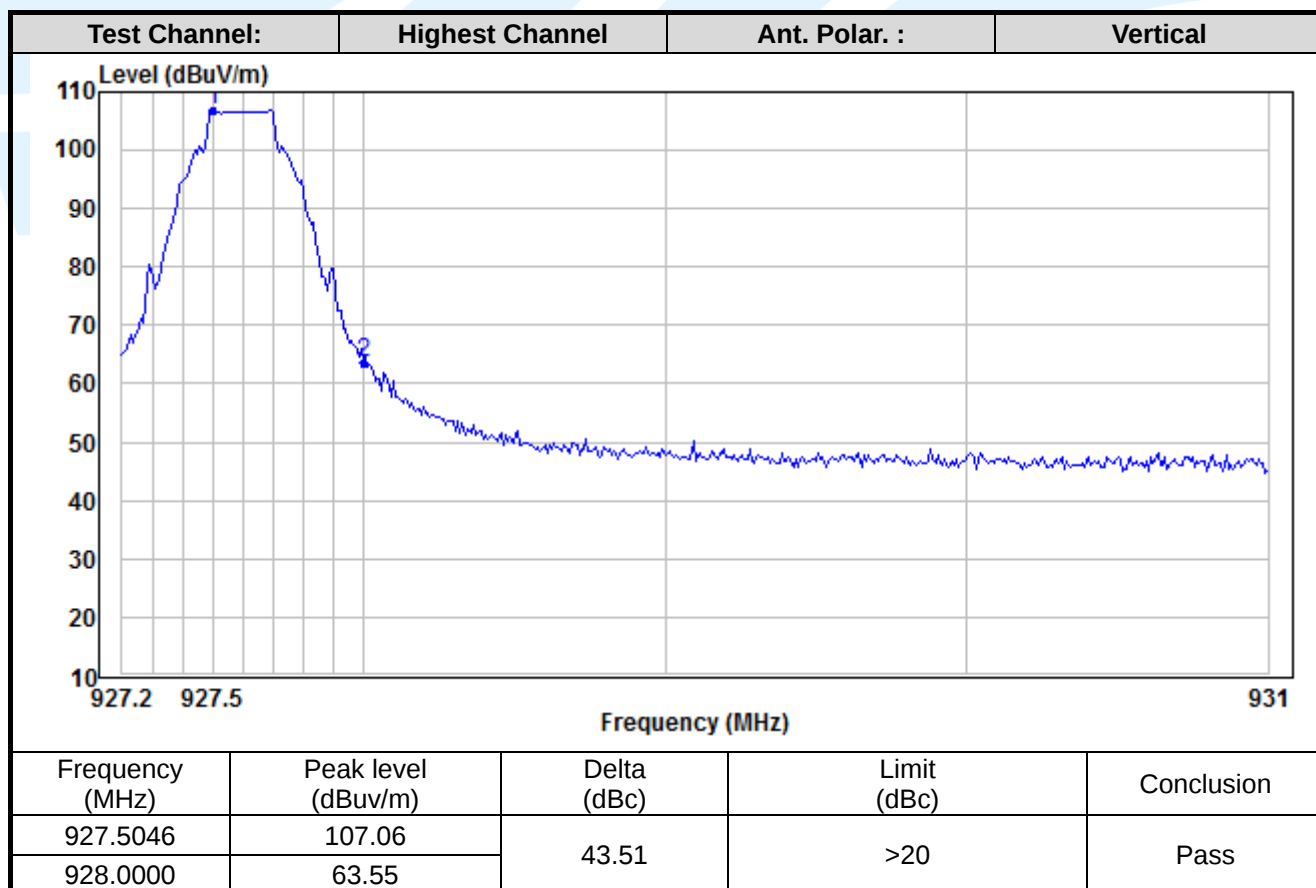
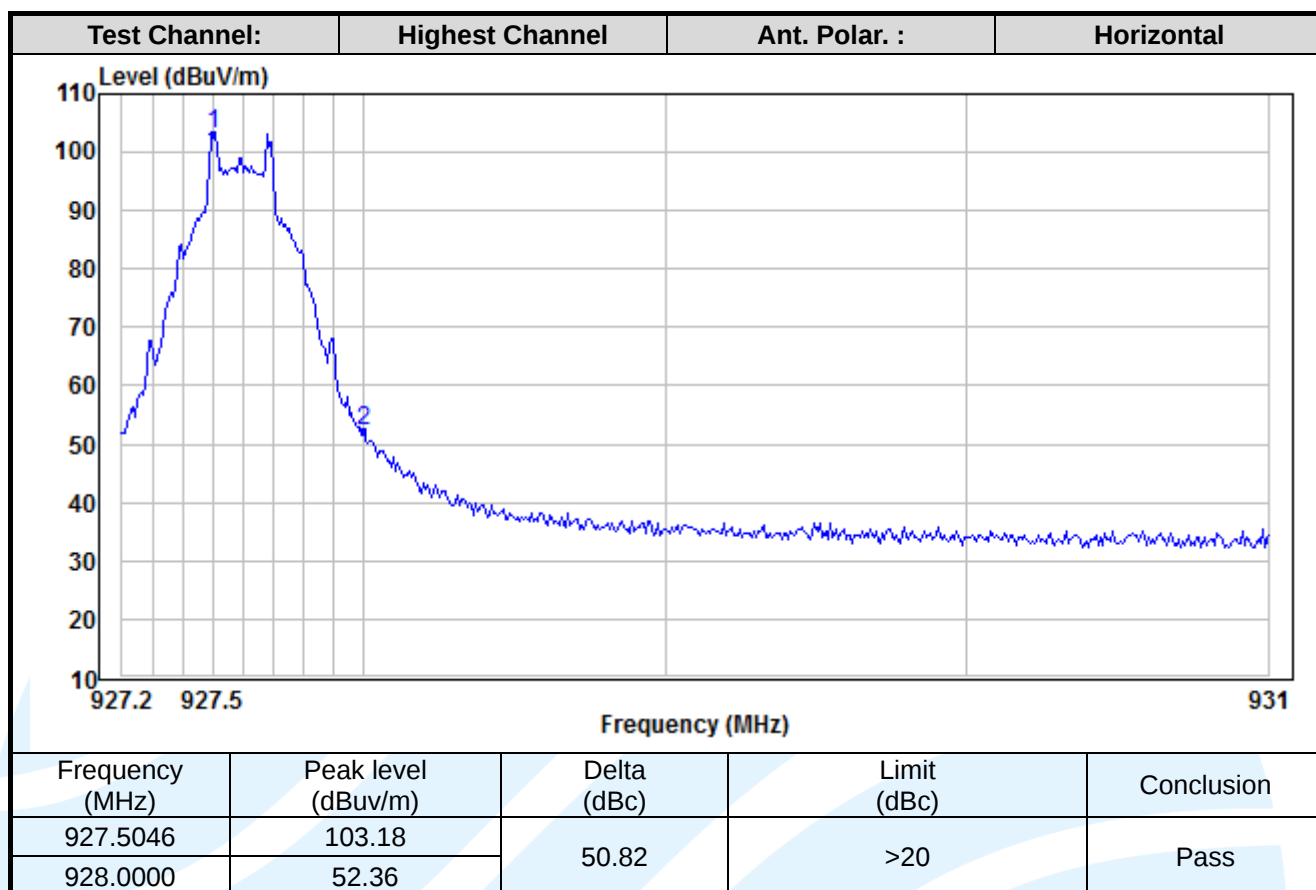
1. Use radiated spurious emission test procedure described in clause 4.3. The transmitter output (antenna port) was connected to the test receiver.
2. Set the PK limit line.
3. Record the fundamental emission and emissions out of the band-edge.
4. Determine band-edge compliance as required.

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

**The measurement data as follows:**





## APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

## APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

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The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.

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