

# FCC Radio Test Report

## FCC ID: RWO-DGRFG5

This report concerns (check one):  Original Grant  Class II Change

**Project No.** : 1612C191  
**Equipment** : USB Dongle  
**Test Model** : DGRFG5  
**Applicant** : Razer Inc.  
**Address** : 201 3rd Street, Suite 900, San Francisco, CA 94103

**Date of Receipt** : Dec. 16, 2016  
**Date of Test** : Dec. 16, 2016 ~ Dec. 27, 2016  
**Issued Date** : Dec. 28, 2016  
**Tested by** : BTL Inc.

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## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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## REPORT ISSUED HISTORY

| Issued No.          | Description     | Issued Date   |
|---------------------|-----------------|---------------|
| BTL-FCCP-1-1612C191 | Original Issue. | Dec. 28, 2016 |

## 1. CERTIFICATION

Equipment : USB Dongle  
Brand Name : RAZER  
Model Name : DGRFG5  
Applicant : Razer Inc.  
Manufacturer : Razer (Asia-Pacific) Pte.,Ltd.  
Address : 514 Chai Chee Lane #07-01 ~ 06 Singapore 469029  
Factory : RAZER TECHNOLOGY AND DEVELOPMENT (SHENZHEN) CO., LTD  
Address : East Wing, 3rd Floor, Block 2, Phase 1 of Vision Shenzhen Business Park Keji South Road, Hi-Tech Industrial Park, Shenzhen 518057, China  
Date of Test : Dec. 16, 2016 ~ Dec. 27, 2016  
Test Sample : Engineering Sample  
Standard(s) : FCC Part15, Subpart C (15.249) / ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1612C191) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| Applied Standard(s): FCC Part15, Subpart C (15.249) |                              |          |        |
|---|------------------------------|----------|--------|
| Standard(s) Section                                 | Test Item                    | Judgment | Remark |
| 15.207(a)   | Conducted Emission           | PASS     |        |
| 15.205  | Restricted Band of Operation | PASS     |        |
| 15.209<br>15.249(a)                                 | Radiated Emissions           | PASS     |        |
| 15.215(c)   | 20dB Bandwidth Test          | PASS     |        |

NOTE:

(1)" N/A" denotes test is not applicable to this device.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 319330

## 2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95 %**.

### A. Conducted Measurement:

| Test Site | Method | Measurement Frequency Range | U, (dB) |
|-----------|--------|-----------------------------|---------|
| DG-C02    | CISPR  | 150 KHz ~ 30MHz             | 1.94    |

### B. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U, (dB) |
|-----------|--------|-----------------------------|------------|---------|
| DG-CB03   | CISPR  | 9KHz~30MHz                  | V          | 3.79    |
|           |        | 9KHz~30MHz                  | H          | 3.57    |
|           |        | 30MHz ~ 200MHz              | V          | 3.82    |
|           |        | 30MHz ~ 200MHz              | H          | 3.78    |
|           |        | 200MHz ~ 1,000MHz           | V          | 4.10    |
|           |        | 200MHz ~ 1,000MHz           | H          | 4.06    |
|           |        | 1GHz~18GHz                  | V          | 3.12    |
|           |        | 1GHz~18GHz                  | H          | 3.68    |
|           |        | 18GHz~40GHz                 | V          | 4.15    |
|           |        | 18GHz~40GHz                 | H          | 4.14    |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

### 3. GENERAL INFORMATION

#### 3.1 DESCRIPTION OF EUT

|                     |   |   |
|---------------------|---|---|
| Equipment           | USB Dongle  |   |
| Brand Name          | RAZER   |   |
| Model Name          | DGRFG5  |   |
| Model Difference    | The system's model name is RZ01-0212, and the system is contain a Gaming Mouse (Model name: RC30-021203) and USB Dongle (Model name: DGRFG5). |   |
| Product Description | Operation Frequency   | 2402-2480 MHz                                     |
|                     | Modulation Technology   | GFSK  |
|                     | Bit Rate of Transmitter   | 1 Mbps  |
|                     | Field Strength  | 92.54 dBuV/m (Peak Max)<br>75.91 dBuV/m (AVG Max) |
| Power Source        | Supplied from USB port.   |   |
| EUT Power Rating    | DC 5V, 500mA  |   |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

## 2. Channel List:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 01      | 2402            | 28      | 2429            | 55      | 2456            |
| 02      | 2403            | 29      | 2430            | 56      | 2457            |
| 03      | 2404            | 30      | 2431            | 57      | 2458            |
| 04      | 2405            | 31      | 2432            | 58      | 2459            |
| 05      | 2406            | 32      | 2433            | 59      | 2460            |
| 06      | 2407            | 33      | 2434            | 60      | 2461            |
| 07      | 2408            | 34      | 2435            | 61      | 2462            |
| 08      | 2409            | 35      | 2436            | 62      | 2463            |
| 09      | 2410            | 36      | 2437            | 63      | 2464            |
| 10      | 2411            | 37      | 2438            | 64      | 2465            |
| 11      | 2412            | 38      | 2439            | 65      | 2466            |
| 12      | 2413            | 39      | 2440            | 66      | 2467            |
| 13      | 2414            | 40      | 2441            | 67      | 2468            |
| 14      | 2415            | 41      | 2442            | 68      | 2469            |
| 15      | 2416            | 42      | 2443            | 69      | 2470            |
| 16      | 2417            | 43      | 2444            | 70      | 2471            |
| 17      | 2418            | 44      | 2445            | 71      | 2472            |
| 18      | 2419            | 45      | 2446            | 72      | 2473            |
| 19      | 2420            | 46      | 2447            | 73      | 2474            |
| 20      | 2421            | 47      | 2448            | 74      | 2475            |
| 21      | 2422            | 48      | 2449            | 75      | 2476            |
| 22      | 2423            | 49      | 2450            | 76      | 2477            |
| 23      | 2424            | 50      | 2451            | 77      | 2478            |
| 24      | 2425            | 51      | 2452            | 78      | 2479            |
| 25      | 2426            | 52      | 2453            | 79      | 2480            |
| 26      | 2427            | 53      | 2454            |         |                 |
| 27      | 2428            | 54      | 2455            |         |                 |

## 3. Table for Filed Antenna

| Ant. | Brand | P/N | Antenna Type | Connector | Gain (dBi) |
|------|-------|-----|--------------|-----------|------------|
| 1    | N/A   | N/A | Printed      | N/A       | 2.26       |

### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|--------------|-------------|
| Mode 1       | TX Mode     |

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

| For Conducted Test |             |
|--------------------|-------------|
| Final Test Mode    | Description |
| Mode 1             | TX Mode     |

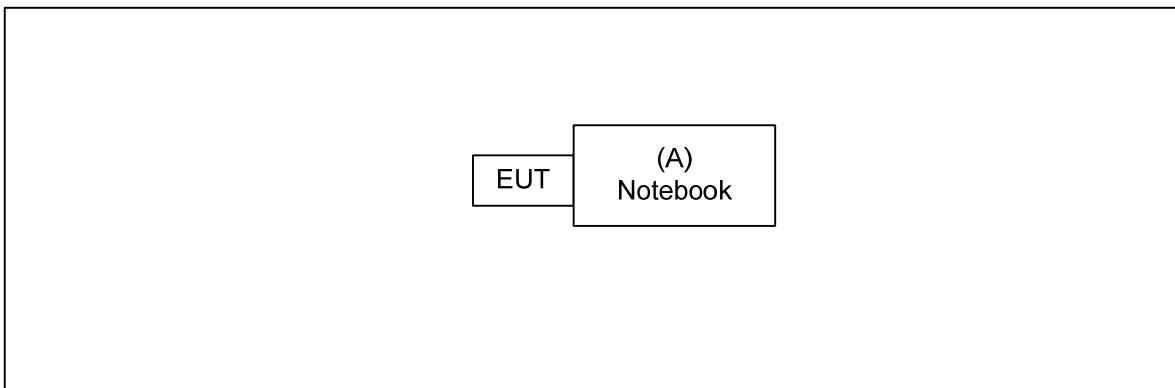
| For Radiated Test |                         |
|-------------------|-------------------------|
| Final Test Mode   | Description             |
| Mode 1            | TX Mode <b>NOTE (1)</b> |

Note:

(1) The measurements are performed at the high, middle, low available channels.

### 3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated TX Mode:



### 3.5 DESCRIPTION OF SUPPORT UNITS

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

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No.   |
|------|-----------|-----------|----------------|--------|--------------|
| A    | Notebook  | Lenovo    | INSPIRON 1420- | DOC    | JX193A01SDC2 |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| -    | -             | -            | -      | -    |

Note:

- (1) The support equipment was authorized by Declaration of Conformity (DOC).

## 4. EMC EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

| Frequency of Emission (MHz) | Conducted Limit (dB $\mu$ V) |           |
|-----------------------------|------------------------------|-----------|
|                             | Quasi-peak                   | Average   |
| 0.15 -0.                    | 66 to 56*                    | 56 to 46* |
| 0.50 -5.0                   | 56                           | 46        |
| 5.0 -30.0                   | 60                           | 50        |

Note:

(1) The limit of " \* " decreases with the logarithm of the frequency

(2) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

| Receiver Parameters | Setting  |
|---------------------|----------|
| Attenuation         | 10 dB    |
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 kHz    |

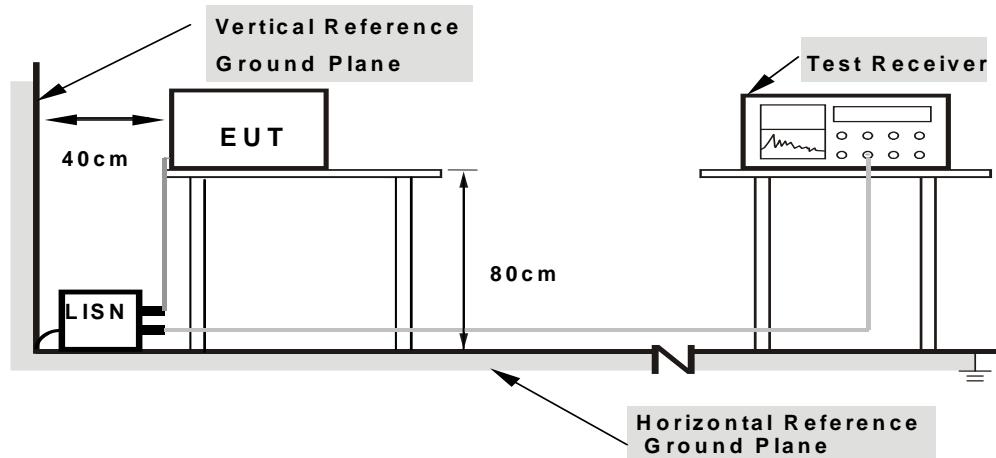
#### 4.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.4 TEST SETUP



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

#### 4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting/receiving data or hopping on mode.

#### 4.1.6 EUT TEST CONDITIONS

Temperature: 23°C

Relative Humidity: 60%

Test Voltage: AC 120V/60Hz

#### 4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “\*” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) “N/A” denotes test is not applicable to this device.

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 RADIATED EMISSION LIMITS (FCC 15.209)

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490       | 2400/F(KHz)                       | 300                           |
| 0.490~1.705       | 24000/F(KHz)                      | 30                            |
| 1.705~30.0        | 30                                | 30                            |
| 30~88             | 100                               | 3                             |
| 88~216            | 150                               | 3                             |
| 216~960           | 200                               | 3                             |
| 960~1000          | 500                               | 3                             |

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other 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 comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

### LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.209)

| FREQUENCY (MHz) | (dBuV/m) (at 3m) |         |
|-----------------|------------------|---------|
|                 | PEAK             | AVERAGE |
| Above 1000      | 74               | 54      |

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

### LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)

| FCC Part15 (15.249) , Subpart C  |                      |
|--|----------------------|
| Limit  | Frequency Range(MHz) |
| Field strength of fundamental<br>50000 $\mu$ V/m (94 dB $\mu$ V/m) @ 3 m | 2400-2483.5          |
| Field strength of harmonics<br>500 $\mu$ V/m (54 dB $\mu$ V/m) @ 3 m     | Above 2483.5         |

| Spectrum Parameter | Setting               |
|--------------------|-----------------------|
| Attenuation        | Auto                  |
| Start Frequency    | 1000 MHz              |
| Stop Frequency     | 10th carrier harmonic |

| Receiver Parameter     | Setting                           |
|------------------------|-----------------------------------|
| Attenuation            | Auto                              |
| Start ~ Stop Frequency | 9KHz~90KHz for PK/AVG detector    |
| Start ~ Stop Frequency | 90KHz~110KHz for QP detector      |
| Start ~ Stop Frequency | 110KHz~490KHz for PK/AVG detector |
| Start ~ Stop Frequency | 490KHz~30MHz for QP detector      |
| Start ~ Stop Frequency | 30MHz~1000MHz for QP detector     |

#### 4.2.2 TEST PROCEDURE

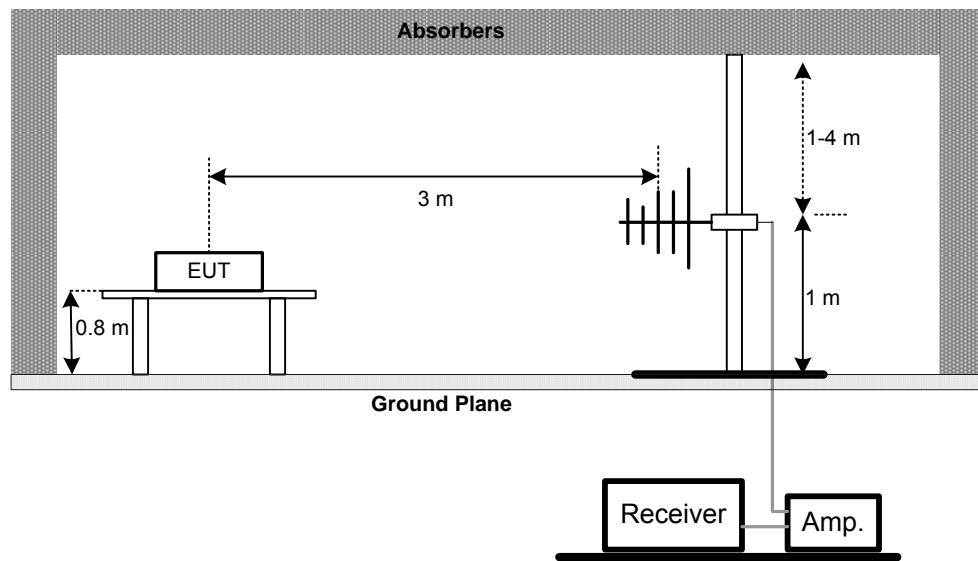
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.3 DEVIATION FROM TEST STANDARD

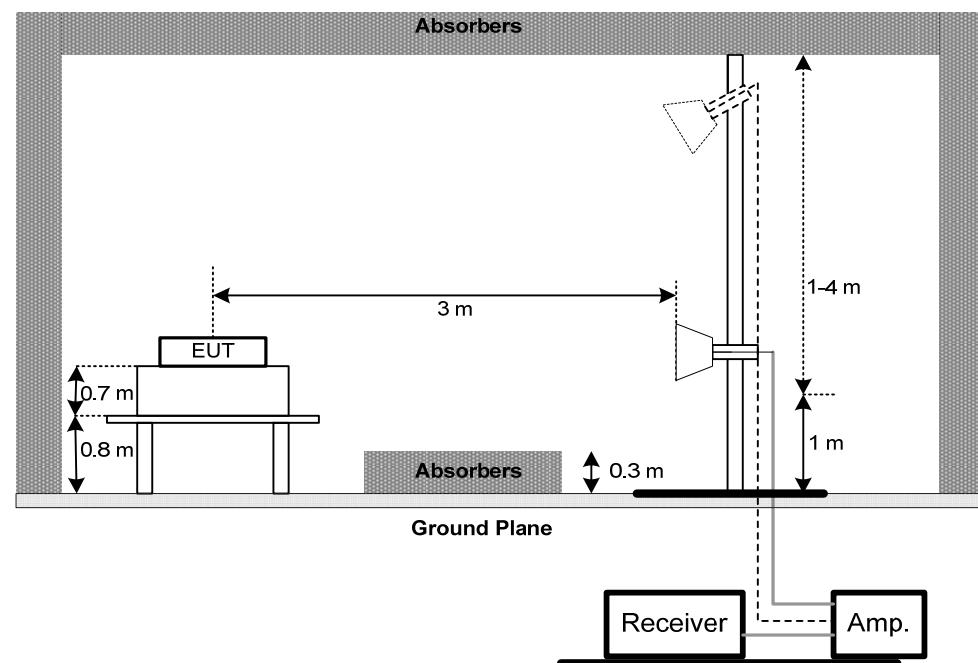
No deviation

#### 4.2.4 TEST SETUP

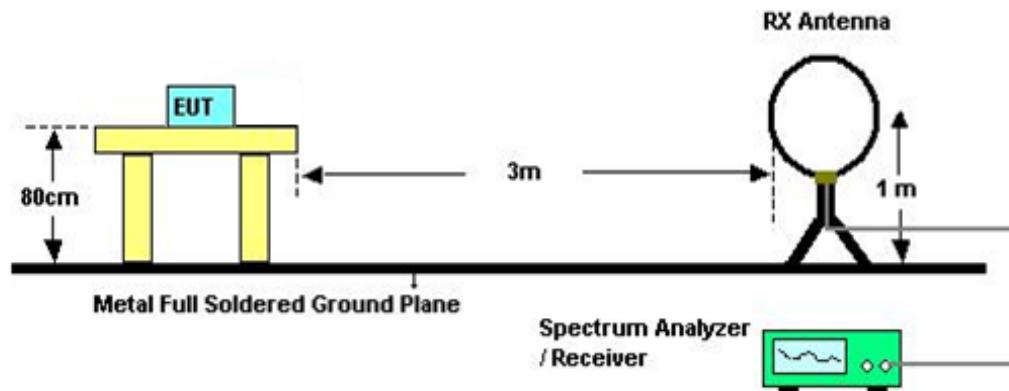
#### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For radiated emissions below 30MHz



#### 4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### 4.2.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 60%

Test Voltage: DC 5V

#### 4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Attachment B

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

#### 4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Attachment C.

Remark:

- (1) Measuring frequency range from 30MHz to 1000MHz.
- (2) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

#### 4.2.9 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

Remark:

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (3) EUT Orthogonal Axis:  
"X" - denotes Laid on Table, "Y" - denotes Vertical Stand, "Z" - denotes Side Stand
- (4) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (5) No limit: This is fundamental signal, the judgment is not applicable.  
For fundamental signal judgment was referred to Peak output test.

## 5. BANDWIDTH TEST

### 5.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

### 5.2 DEVIATION FROM STANDARD

No deviation.

### 5.3 TEST SETUP



### 5.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 5.5 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 60%

Test Voltage: DC 5V

### 5.6 TEST RESULTS

Please refer to the Attachment E.

## 6. MEASUREMENT INSTRUMENTS LIST

| Conducted Emission Measurement |                         |              |                           |            |                  |
|--------------------------------|-------------------------|--------------|---------------------------|------------|------------------|
| Item                           | Kind of Equipment       | Manufacturer | Type No.                  | Serial No. | Calibrated until |
| 1                              | EMI Test Receiver       | R&S          | ESCI                      | 100382     | Mar. 27, 2017    |
| 2                              | LISN                    | EMCO         | 3816/2                    | 52765      | Mar. 27, 2017    |
| 3                              | 50Ω Terminator          | SHX          | TF2-3G-A                  | 8122901    | Mar. 27, 2017    |
| 4                              | TWO-LINE<br>V-NETWORK   | R&S          | ENV216                    | 101447     | Mar. 27, 2017    |
| 5                              | Cable                   | emci         | RG223(9KHz-30<br>MHz)(5m) | N/A        | Mar. 10, 2017    |
| 6                              | Measurement<br>Software | Farad        | EZ-EMC<br>Ver.NB-03A1-01  | N/A        | N/A              |

| Radiated Emission Measurement |   |                   |  |                  |                  |
|-------------------------------|---|-------------------|--|------------------|------------------|
| Item                          | Kind of Equipment                         | Manufacturer      | Type No.                                 | Serial No.       | Calibrated until |
| 1                             | Antenna                                   | Schwarbeck        | VULB9160                                 | 9160-3232        | Mar. 27, 2017    |
| 2                             | Amplifier                                 | HP                | 8447D                                    | 2944A09673       | Oct. 20, 2017    |
| 3                             | Receiver                                  | AGILENT           | N9038A                                   | MY52130039       | Sep. 04, 2017    |
| 4                             | Test Cable                                | emci              | LMR-400(30MH<br>z-1GHz)                  | C-01             | Jun. 26, 2017    |
| 5                             | Controller                                | CT                | SC100                                    | N/A              | N/A              |
| 6                             | Measurement<br>Software                   | Farad             | EZ-EMC<br>Ver.NB-03A1-01                 | N/A              | N/A              |
| 7                             | Antenna                                   | ETS               | 3115                                     | 00075789         | Mar. 27, 2017    |
| 8                             | Amplifier                                 | Agilent           | 8449B                                    | 3008A02274       | Nov. 01, 2017    |
| 9                             | Test Cable                                | emci              | EMC104-SM-S<br>M-10000(1GHz-<br>26.5GHz) | C-68             | Jun. 26, 2017    |
| 10                            | Broad-Band Horn<br>Antenna                | Schwarbeck        | BBHA 9170                                | 9170319          | Mar. 27, 2017    |
| 11                            | Microwave<br>Preamplifier With<br>Adaptor | EMC<br>INSTRUMENT | EMC2654045                               | 980039 &<br>HA01 | Mar. 27, 2017    |
| 12                            | EMI Test Receiver                         | R&S               | ESCI                                     | 100895           | Mar. 27, 2017    |
| 13                            | Active Loop<br>Antenna                    | R&S               | HFH2-Z2                                  | 830749/020       | Sep. 07, 2017    |

| Bandwidth Measurement |                   |              |          |            |                  |
|-----------------------|-------------------|--------------|----------|------------|------------------|
| Item                  | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1                     | Spectrum Analyzer | R&S          | FSP40    | 100185     | Sep. 04, 2017    |

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

**ATTACHMENT A - CONDUCTED EMISSION**

Test Mode: TX MODE

## Line



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dB | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|-------------|--------------|----------|---------|
| 1   |     | 0.154        | 42.99                    | 9.52                    | 52.51                    | 65.78       | -13.27       | peak     |         |
| 2   |     | 0.406        | 29.93                    | 9.55                    | 39.48                    | 57.73       | -18.25       | peak     |         |
| 3   |     | 0.550        | 35.58                    | 9.64                    | 45.22                    | 56.00       | -10.78       | peak     |         |
| 4 * |     | 0.550        | 27.90                    | 9.64                    | 37.54                    | 46.00       | -8.46        | AVG      |         |
| 5   |     | 0.962        | 23.45                    | 9.76                    | 33.21                    | 56.00       | -22.79       | peak     |         |
| 6   |     | 2.598        | 24.52                    | 10.09                   | 34.61                    | 56.00       | -21.39       | peak     |         |
| 7   |     | 13.214       | 18.77                    | 10.30                   | 29.07                    | 60.00       | -30.93       | peak     |         |

Test Mode: TX MODE

## Neutral

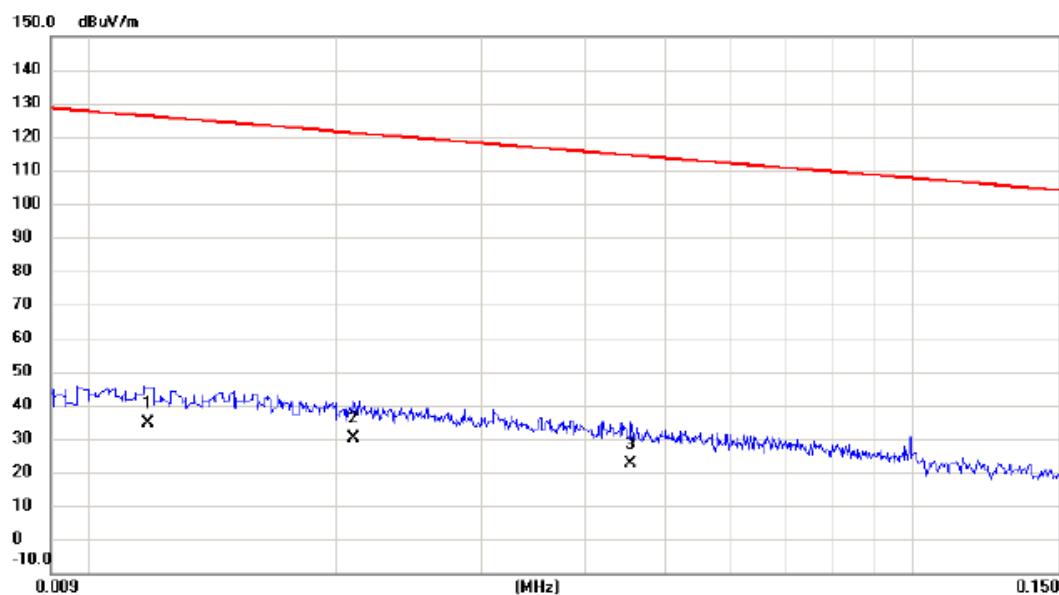


| No. | Mk. | Freq.  | Reading | Correct | Measure- | Limit | Margin | Detector | Comment |
|-----|-----|--------|---------|---------|----------|-------|--------|----------|---------|
|     |     |        | Level   | Factor  | ment     |       |        |          |         |
|     |     | MHz    | dBuV    | dB      | dBuV     | dBuV  | dB     |          |         |
| 1   |     | 0.150  | 43.40   | 9.52    | 52.92    | 66.00 | -13.08 | peak     |         |
| 2   |     | 0.182  | 37.04   | 9.47    | 46.51    | 64.39 | -17.88 | peak     |         |
| 3   |     | 0.322  | 28.75   | 9.53    | 38.28    | 59.66 | -21.38 | peak     |         |
| 4   |     | 0.558  | 35.61   | 9.44    | 45.05    | 56.00 | -10.95 | peak     |         |
| 5 * |     | 0.558  | 26.00   | 9.44    | 35.44    | 46.00 | -10.56 | AVG      |         |
| 6   |     | 2.866  | 25.76   | 9.79    | 35.55    | 56.00 | -20.45 | peak     |         |
| 7   |     | 13.726 | 22.41   | 10.35   | 32.76    | 60.00 | -27.24 | peak     |         |

**ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)**

Test Mode: TX Mode

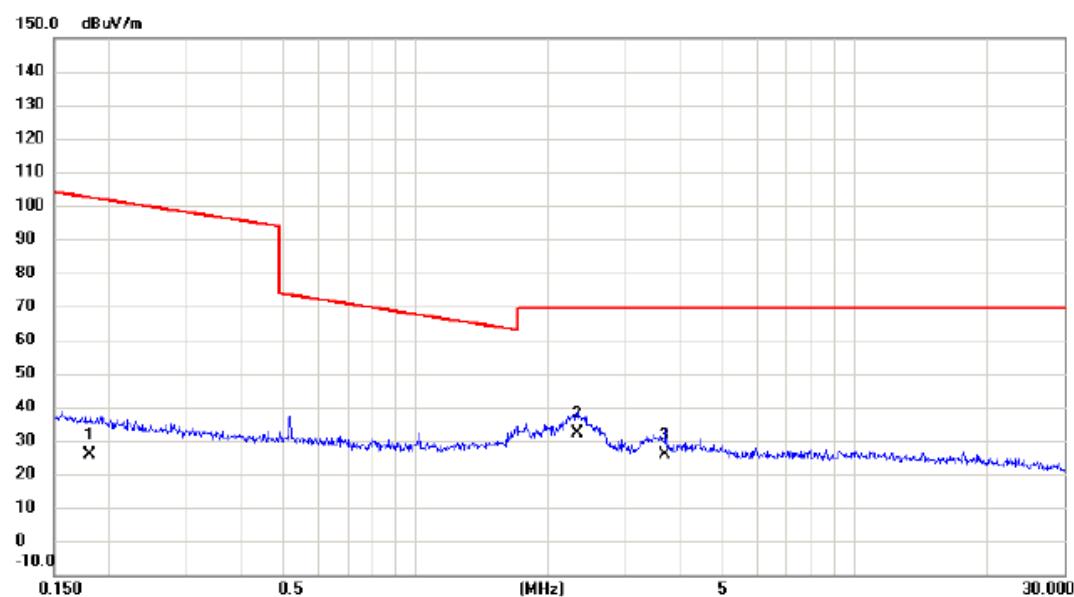
Ant 0°



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB | Margin | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-------------|--------|----------|---------|
| 1   |     | 0.0118       | 34.40                    | 0.02                    | 34.42                      | 126.17      | -91.75 | AVG      |         |
| 2   | *   | 0.0210       | 30.10                    | 0.02                    | 30.12                      | 121.16      | -91.04 | AVG      |         |
| 3   |     | 0.0454       | 22.50                    | 0.02                    | 22.52                      | 114.46      | -91.94 | AVG      |         |

Test Mode: TX Mode

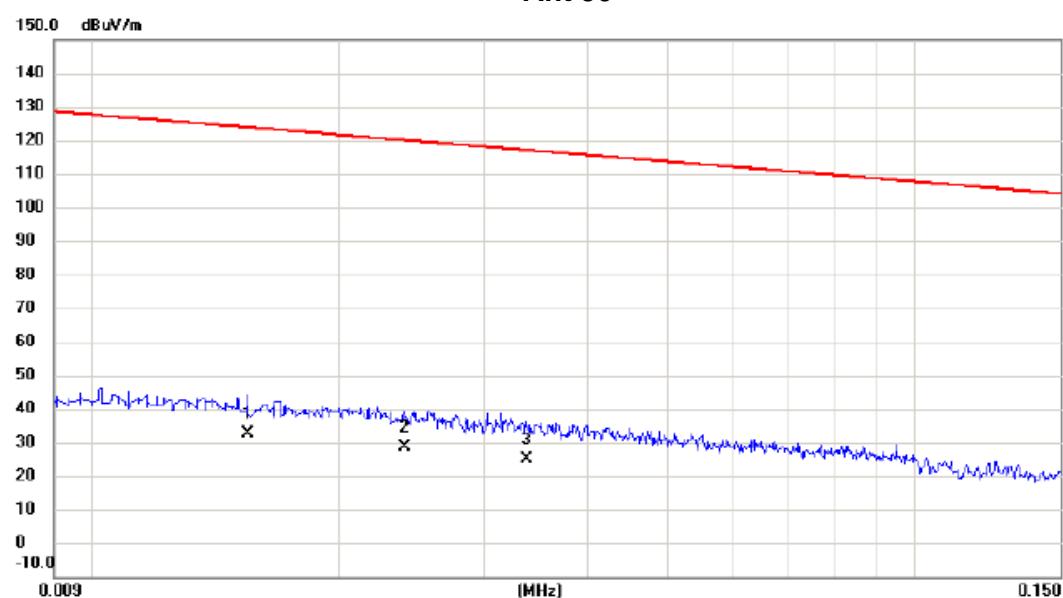
Ant 0°



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB | Margin<br>Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-------------|--------------------|---------|
| 1   |     | 0.1815       | 25.70                    | 0.04                    | 25.74                      | 102.43      | -76.69             | AVG     |
| 2   | *   | 2.3336       | 32.20                    | 0.11                    | 32.31                      | 69.54       | -37.23             | QP      |
| 3   |     | 3.7001       | 25.80                    | 0.15                    | 25.95                      | 69.54       | -43.59             | QP      |

Test Mode: TX Mode

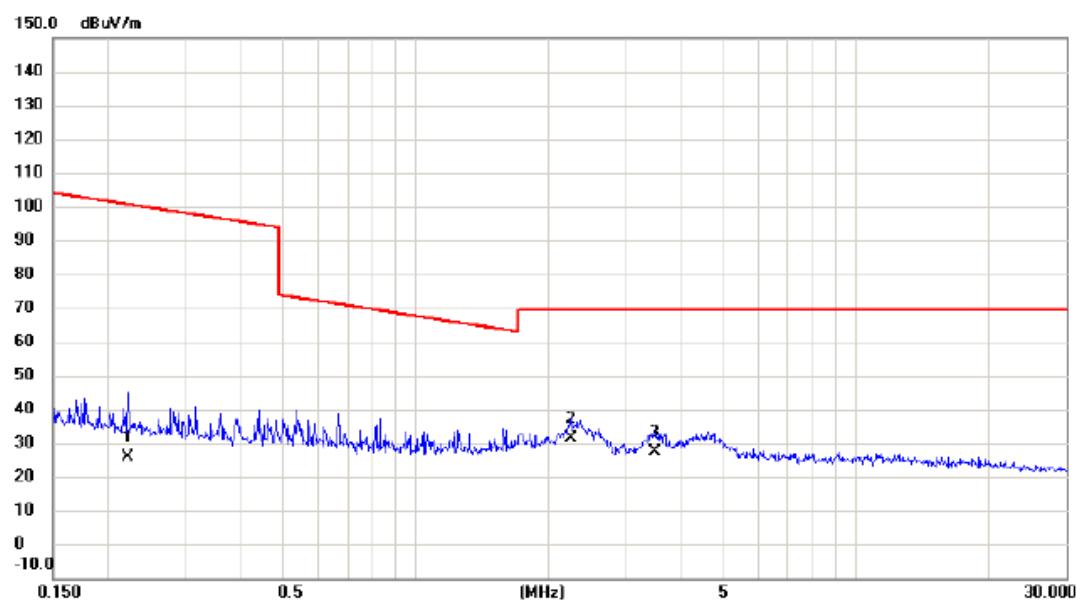
Ant 90°



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measure-<br>ment | Limit  | Margin   |         |
|-----|-----|--------|---------------|----------------|------------------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV/m           | dB     | Detector | Comment |
| 1   | *   | 0.0155 | 32.40         | 0.02           | 32.42            | 123.80 | -91.38   | AVG     |
| 2   |     | 0.0240 | 28.60         | 0.02           | 28.62            | 120.00 | -91.38   | AVG     |
| 3   |     | 0.0338 | 24.90         | 0.02           | 24.92            | 117.03 | -92.11   | AVG     |

Test Mode: TX Mode

Ant 90°

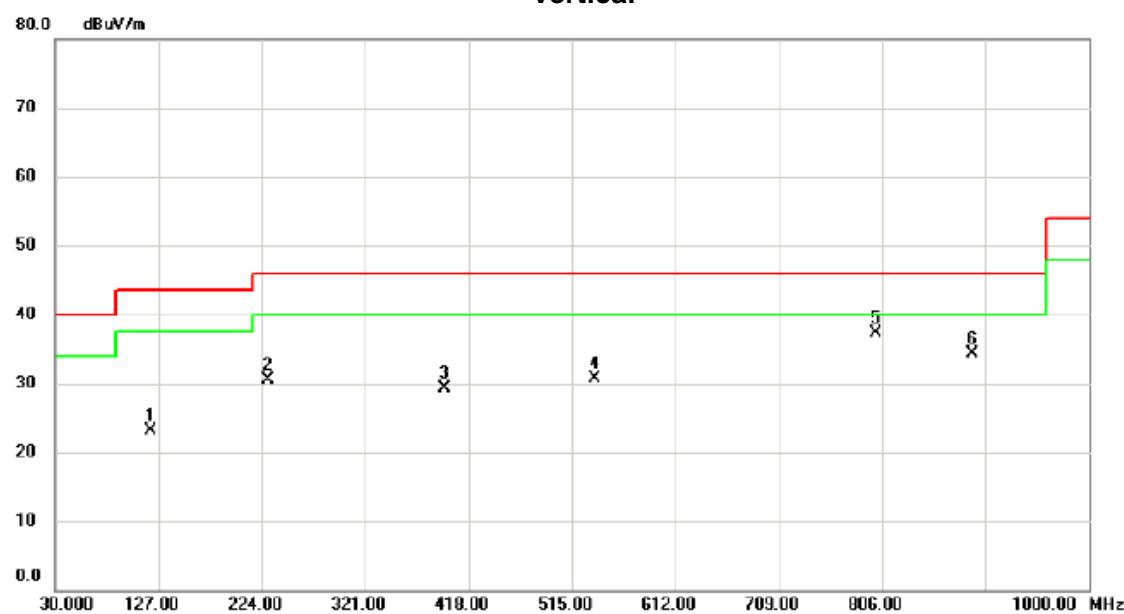


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor | Measure-<br>ment<br>dBuV/m | Limit<br>dB | Margin<br>Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------|----------------------------|-------------|--------------------|---------|
| 1   |     | 0.2220       | 25.70                    | 0.05              | 25.75                      | 100.68      | -74.93             | AVG     |
| 2   | *   | 2.2486       | 31.30                    | 0.11              | 31.41                      | 69.54       | -38.13             | QP      |
| 3   |     | 3.4906       | 27.30                    | 0.14              | 27.44                      | 69.54       | -42.10             | QP      |

**ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)**

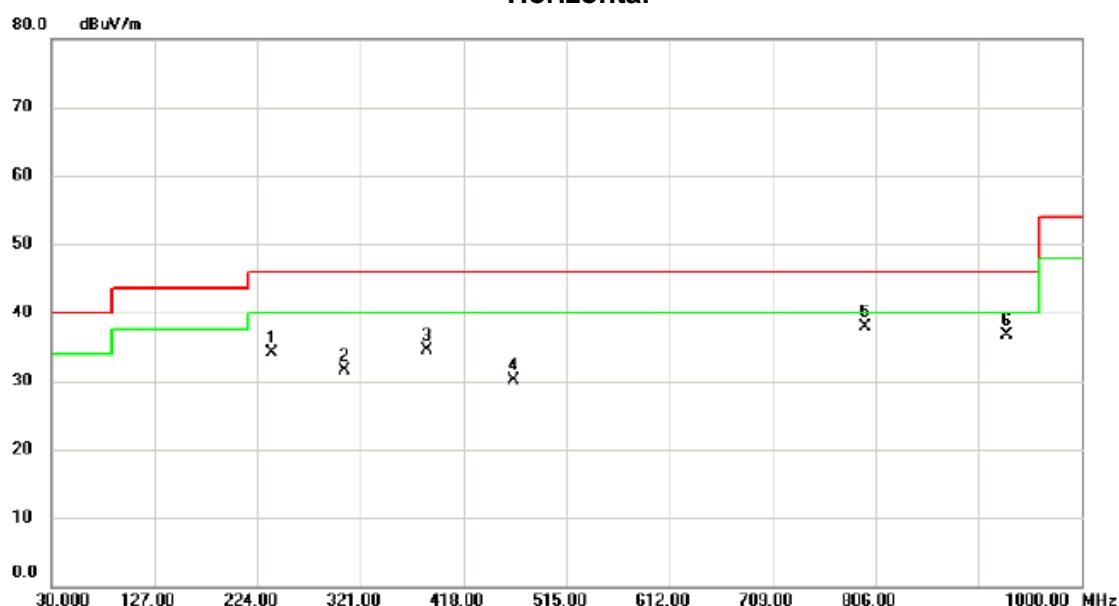
Test Mode: TX 2402MHz

## Vertical



| No. | Mk.     | Reading Level | Correct Factor | Measure-ment | Limit  | Margin |          |
|-----|---------|---------------|----------------|--------------|--------|--------|----------|
|     | MHz     | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | Detector |
| 1   | 120.210 | 36.59         | -13.43         | 23.16        | 43.50  | -20.34 | peak     |
| 2   | 229.820 | 43.90         | -13.38         | 30.52        | 46.00  | -15.48 | peak     |
| 3   | 395.690 | 37.33         | -8.08          | 29.25        | 46.00  | -16.75 | peak     |
| 4   | 535.855 | 36.77         | -6.01          | 30.76        | 46.00  | -15.24 | peak     |
| 5 * | 799.695 | 37.08         | 0.25           | 37.33        | 46.00  | -8.67  | peak     |
| 6   | 890.390 | 32.43         | 1.90           | 34.33        | 46.00  | -11.67 | peak     |

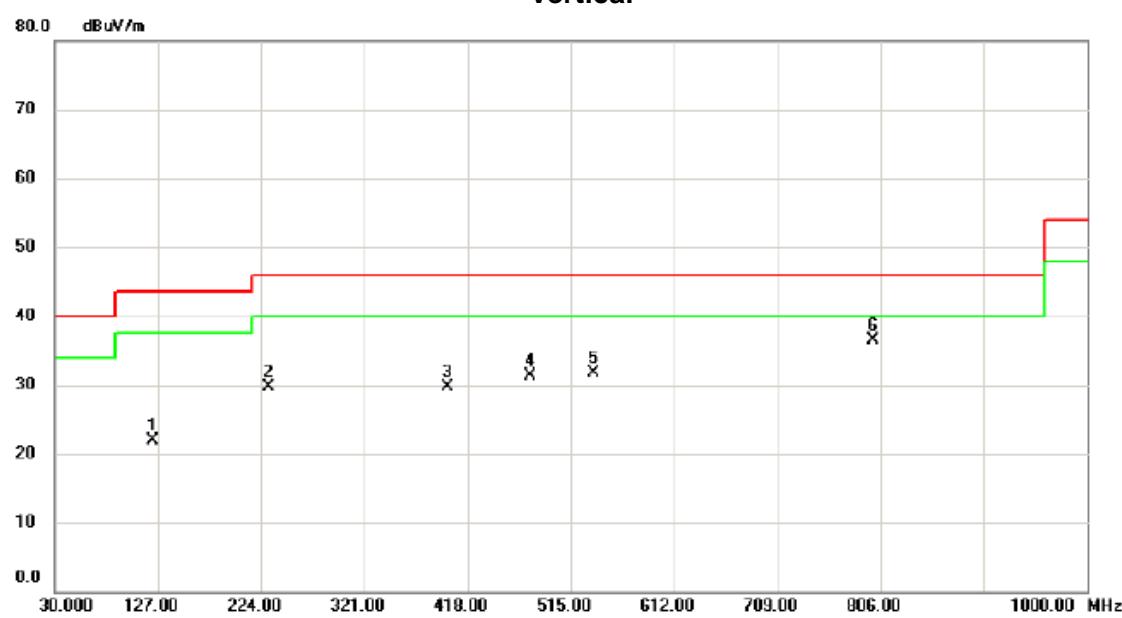
Test Mode: TX 2402MHz

**Horizontal**

| No. | Mk. | Freq.   | Reading | Correct | Measure- | Limit | Margin   |         |
|-----|-----|---------|---------|---------|----------|-------|----------|---------|
|     |     |         | Level   | Factor  | ment     |       |          |         |
|     |     | MHz     | dBuV    | dB      | dBuV/m   | dB    | Detector | Comment |
| 1   |     | 237.095 | 47.81   | -13.66  | 34.15    | 46.00 | -11.85   | peak    |
| 2   |     | 306.450 | 41.79   | -10.30  | 31.49    | 46.00 | -14.51   | peak    |
| 3   |     | 383.080 | 43.46   | -8.94   | 34.52    | 46.00 | -11.48   | peak    |
| 4   |     | 465.530 | 38.60   | -8.53   | 30.07    | 46.00 | -15.93   | peak    |
| 5 * |     | 796.785 | 37.69   | 0.12    | 37.81    | 46.00 | -8.19    | peak    |
| 6   |     | 929.190 | 34.16   | 2.52    | 36.68    | 46.00 | -9.32    | peak    |

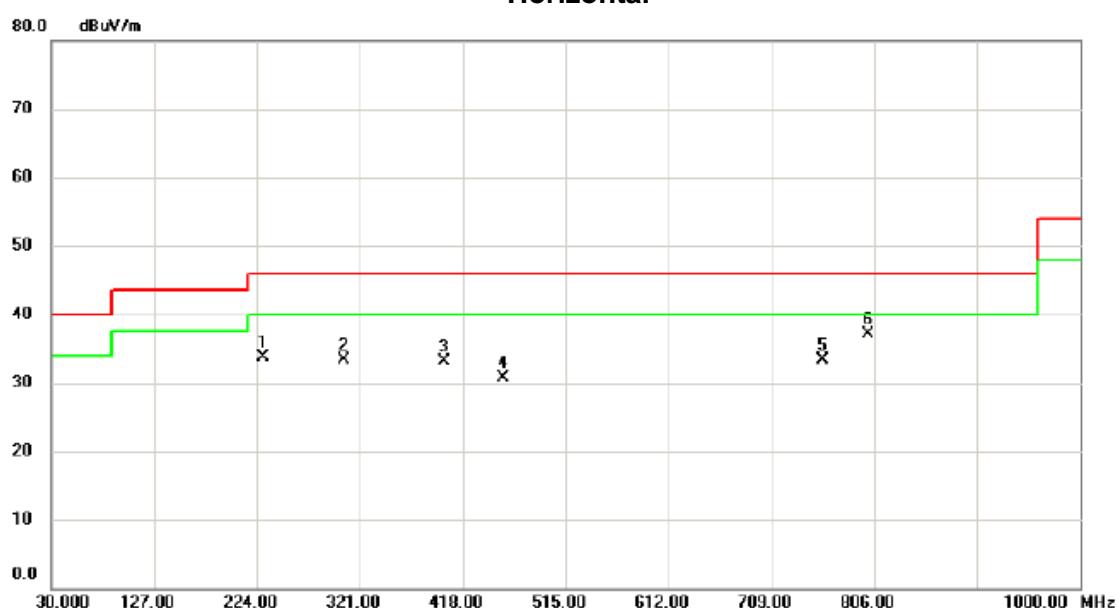
Test Mode: TX 2440MHz

## Vertical



| No. | Mk. | Reading |       | Correct Factor | Measure-<br>ment | Limit | Margin   | Comment |
|-----|-----|---------|-------|----------------|------------------|-------|----------|---------|
|     |     | MHz     | dBuV  | dB             | dBuV/m           | dB    | Detector |         |
| 1   |     | 122.635 | 34.98 | -13.17         | 21.81            | 43.50 | -21.69   | peak    |
| 2   |     | 230.790 | 43.08 | -13.40         | 29.68            | 46.00 | -16.32   | peak    |
| 3   |     | 398.600 | 37.67 | -7.88          | 29.79            | 46.00 | -16.21   | peak    |
| 4   |     | 476.200 | 40.24 | -8.90          | 31.34            | 46.00 | -14.66   | peak    |
| 5   |     | 536.340 | 37.73 | -5.96          | 31.77            | 46.00 | -14.23   | peak    |
| 6 * |     | 799.210 | 36.32 | 0.23           | 36.55            | 46.00 | -9.45    | peak    |

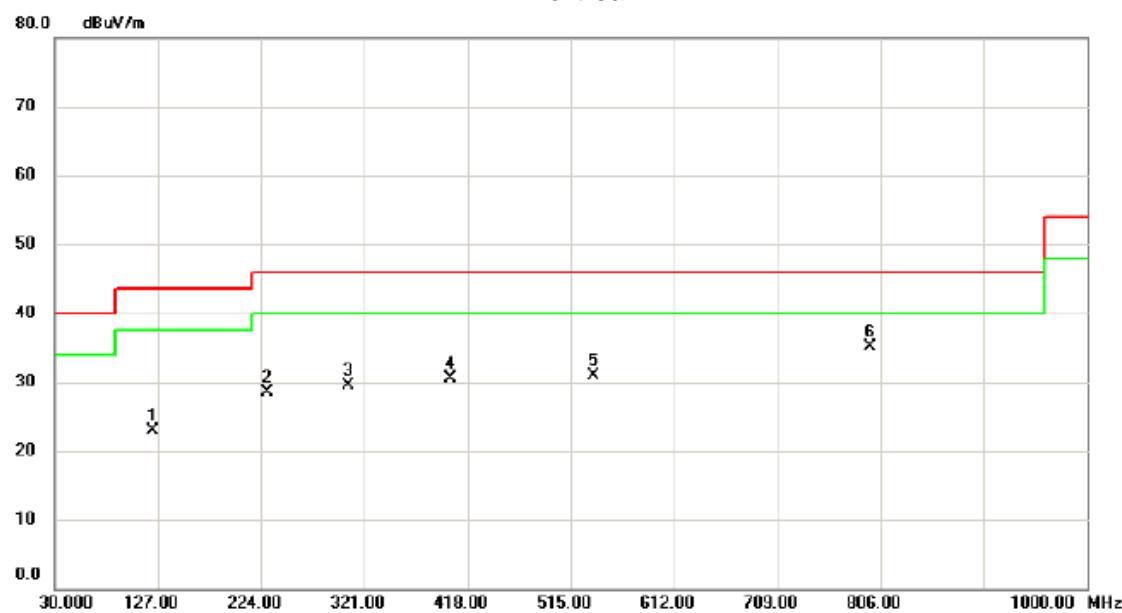
Test Mode: TX 2440MHz

**Horizontal**

| No. | Mk. | Reading<br>Freq.<br>MHz | Correct<br>Level<br>dBuV | Measure-<br>ment<br>dB | Limit<br>dBuV/m | Margin<br>dB | Detector | Comment |
|-----|-----|-------------------------|--------------------------|------------------------|-----------------|--------------|----------|---------|
| 1   |     | 229.820                 | 47.09                    | -13.38                 | 33.71           | 46.00        | -12.29   | peak    |
| 2   |     | 306.450                 | 43.59                    | -10.30                 | 33.29           | 46.00        | -12.71   | peak    |
| 3   |     | 400.055                 | 40.88                    | -7.78                  | 33.10           | 46.00        | -12.90   | peak    |
| 4   |     | 455.830                 | 38.86                    | -8.20                  | 30.66           | 46.00        | -15.34   | peak    |
| 5   |     | 757.985                 | 34.92                    | -1.62                  | 33.30           | 46.00        | -12.70   | peak    |
| 6 * |     | 799.695                 | 36.90                    | 0.25                   | 37.15           | 46.00        | -8.85    | peak    |

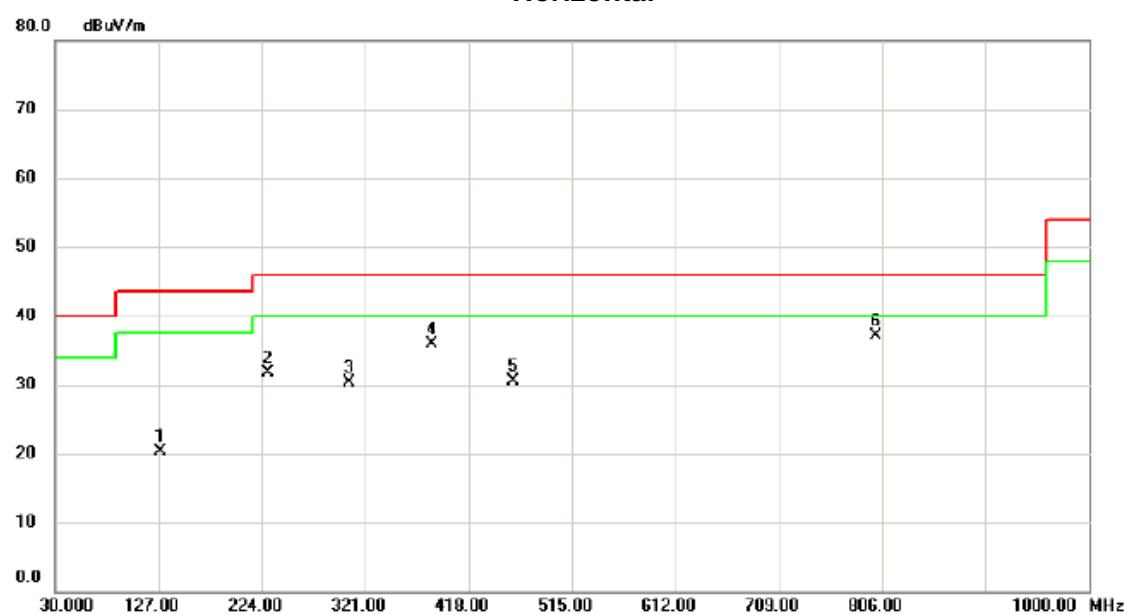
Test Mode: TX 2480MHz

## Vertical



| No. | Mk.     | Reading      |               | Correct Factor | Measure-<br>ment | Limit  | Margin | Comment |
|-----|---------|--------------|---------------|----------------|------------------|--------|--------|---------|
|     |         | Freq.<br>MHz | Level<br>dBuV |                |                  |        |        |         |
| 1   | 122.635 | 36.00        | -13.17        | 22.83          | 43.50            | -20.67 | peak   |         |
| 2   | 229.820 | 41.85        | -13.38        | 28.47          | 46.00            | -17.53 | peak   |         |
| 3   | 306.450 | 39.88        | -10.30        | 29.58          | 46.00            | -16.42 | peak   |         |
| 4   | 401.510 | 38.21        | -7.79         | 30.42          | 46.00            | -15.58 | peak   |         |
| 5   | 536.340 | 36.88        | -5.96         | 30.92          | 46.00            | -15.08 | peak   |         |
| 6 * | 796.300 | 35.09        | 0.09          | 35.18          | 46.00            | -10.82 | peak   |         |

Test Mode: TX 2480MHz

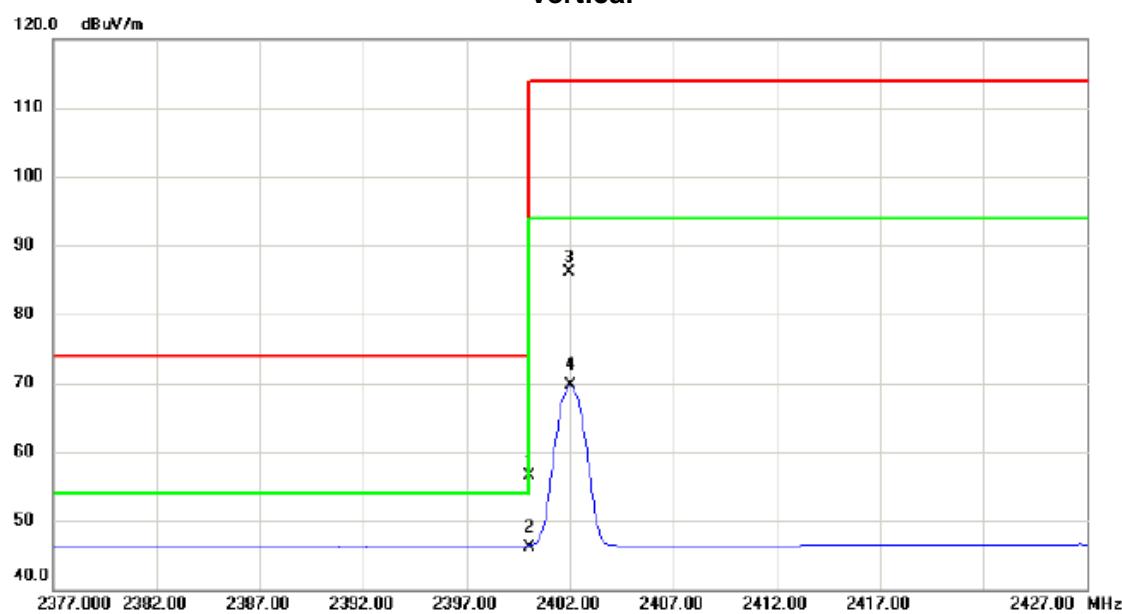
**Horizontal**

| No. | Mk. | Freq.   | Reading | Correct | Measure- | Limit | Margin   | Comment |
|-----|-----|---------|---------|---------|----------|-------|----------|---------|
|     |     |         | Level   | Factor  | ment     |       |          |         |
|     |     | MHz     | dBuV    | dB      | dBuV/m   | dB    | Detector |         |
| 1   |     | 128.455 | 32.83   | -12.52  | 20.31    | 43.50 | -23.19   | peak    |
| 2   |     | 229.820 | 45.09   | -13.38  | 31.71    | 46.00 | -14.29   | peak    |
| 3   |     | 306.450 | 40.59   | -10.30  | 30.29    | 46.00 | -15.71   | peak    |
| 4   |     | 383.080 | 44.80   | -8.94   | 35.86    | 46.00 | -10.14   | peak    |
| 5   |     | 460.195 | 38.81   | -8.35   | 30.46    | 46.00 | -15.54   | peak    |
| 6 * |     | 799.695 | 36.90   | 0.25    | 37.15    | 46.00 | -8.85    | peak    |

**ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)**

Test Mode TX Mode\_2402 MHz

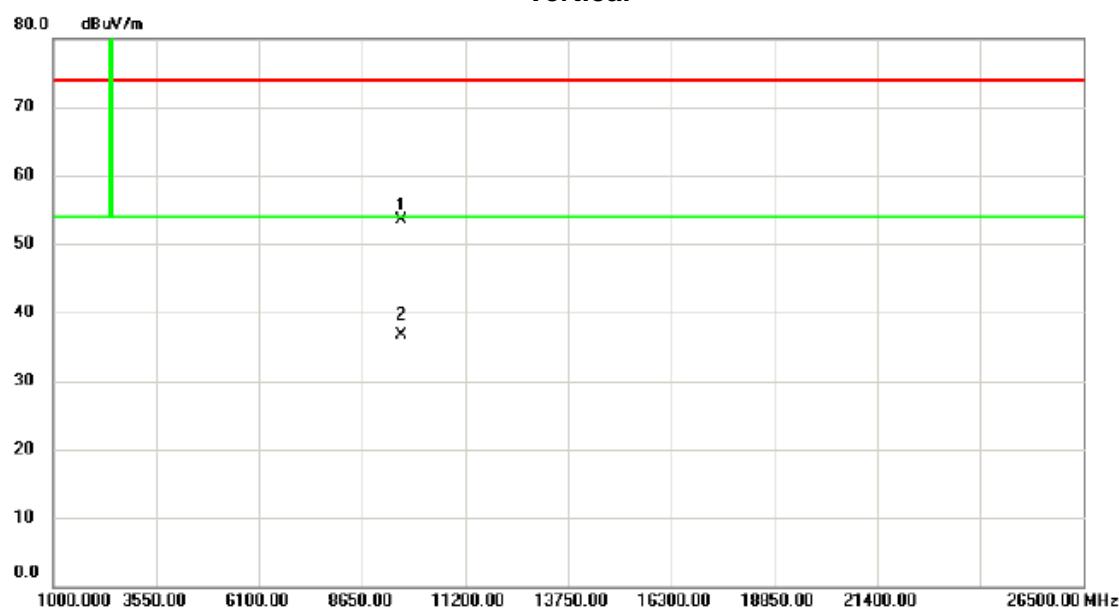
## Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB | Margin | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-------------|--------|----------|---------|
| 1   |     | 2400.000     | 23.37                    | 33.05                   | 56.42                      | 74.00       | -17.58 | peak     |         |
| 2 * |     | 2400.000     | 13.13                    | 33.05                   | 46.18                      | 54.00       | -7.82  | AVG      |         |
| 3   |     | 2401.950     | 53.07                    | 33.06                   | 86.13                      | 114.00      | -27.87 | peak     |         |
| 4   |     | 2402.000     | 36.56                    | 33.06                   | 69.62                      | 94.00       | -24.38 | AVG      |         |

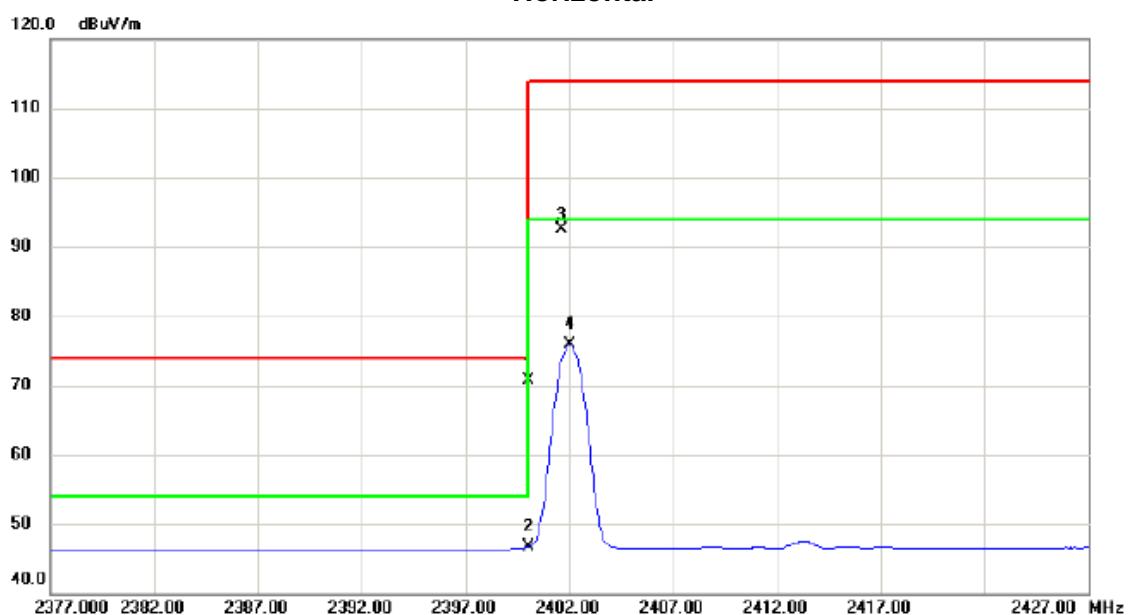
Test Mode TX Mode\_2402 MHz

## Vertical



| No. | Mk. | Reading  |       | Correct Factor | Measure-<br>ment | Limit  | Margin | Detector | Comment |
|-----|-----|----------|-------|----------------|------------------|--------|--------|----------|---------|
|     |     | Freq.    | Level |                |                  |        |        |          |         |
|     |     | MHz      | dBuV  | dB             | dBuV/m           | dBuV/m | dB     |          |         |
| 1   |     | 9607.160 | 40.16 | 13.41          | 53.57            | 74.00  | -20.43 | peak     |         |
| 2 * |     | 9607.870 | 23.21 | 13.41          | 36.62            | 54.00  | -17.38 | AVG      |         |

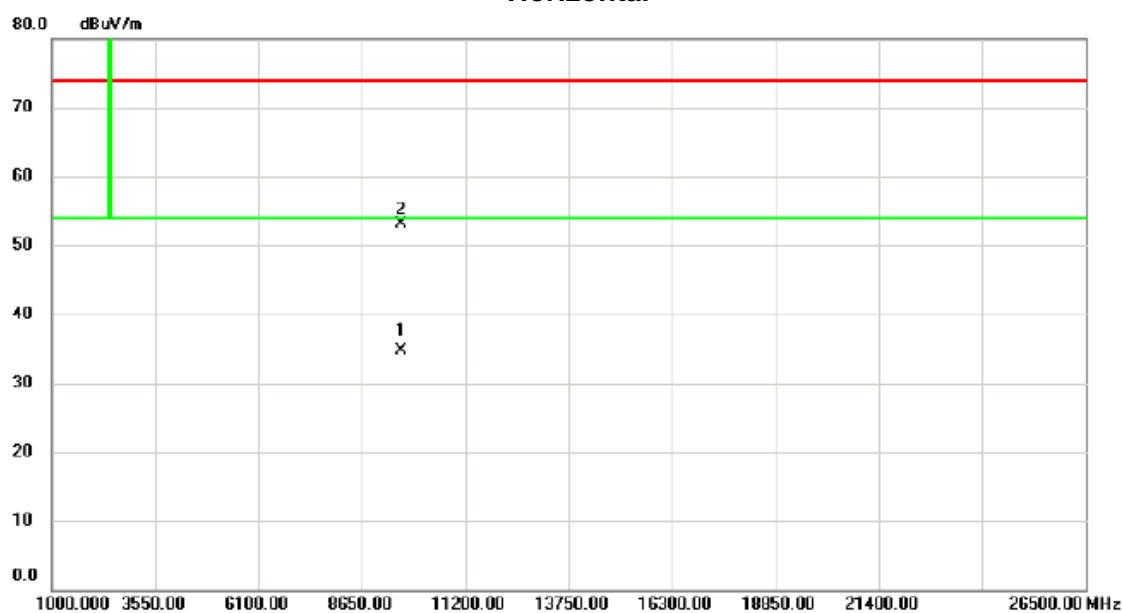
Test Mode | TX Mode\_2402 MHz

**Horizontal**

| No. | Mk. | Reading<br>Freq.<br>MHz | Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuW/m | Limit<br>dBuW/m | Margin<br>dB | Detector | Comment |
|-----|-----|-------------------------|---------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1   | *   | 2400.000                | 37.58         | 33.05                   | 70.63                      | 74.00           | -3.37        | peak     |         |
| 2   |     | 2400.000                | 13.70         | 33.05                   | 46.75                      | 54.00           | -7.25        | AVG      |         |
| 3   |     | 2401.650                | 59.48         | 33.06                   | 92.54                      | 114.00          | -21.46       | peak     |         |
| 4   |     | 2402.050                | 42.85         | 33.06                   | 75.91                      | 94.00           | -18.09       | AVG      |         |

Test Mode TX Mode\_2402 MHz

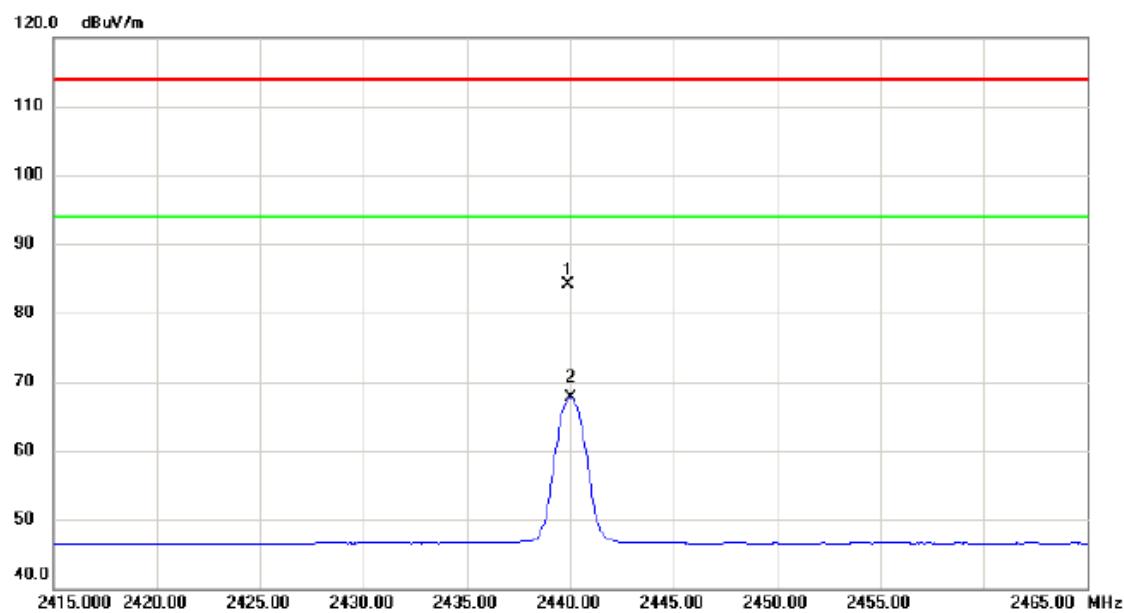
## Horizontal



| No. | Mk.      | Reading      |               | Correct Factor | Measure-<br>ment | Limit  | Margin |
|-----|----------|--------------|---------------|----------------|------------------|--------|--------|
|     |          | Freq.<br>MHz | Level<br>dBuV |                |                  |        |        |
| 1 * | 9607.880 | 21.24        | 13.41         | 34.65          | 54.00            | -19.35 | AVG    |
| 2   | 9609.185 | 39.73        | 13.41         | 53.14          | 74.00            | -20.86 | peak   |

Test Mode TX Mode\_2440 MHz

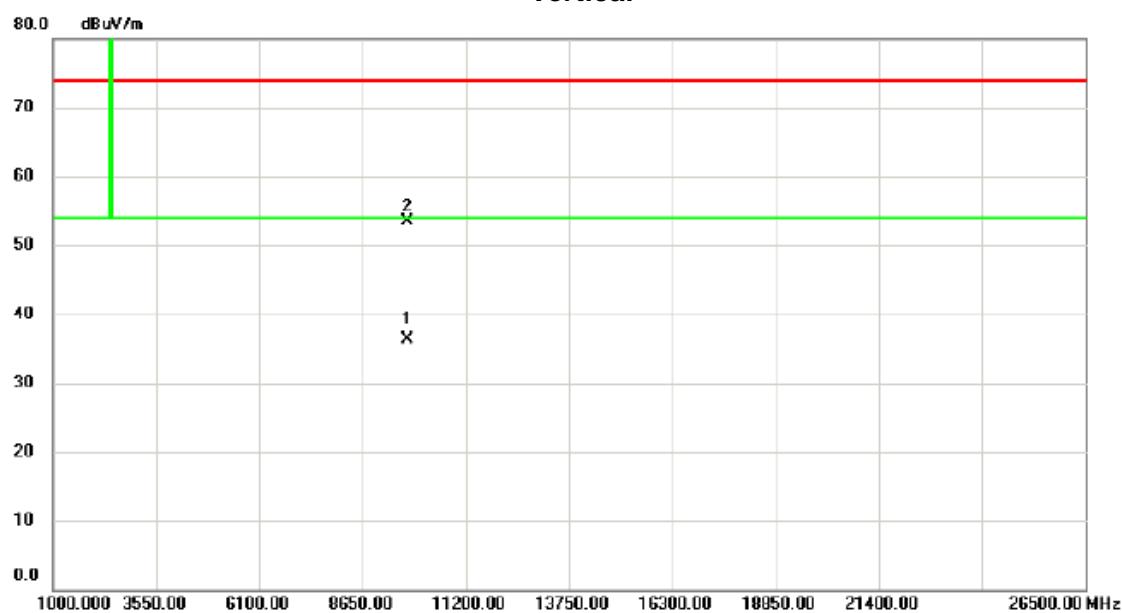
## Vertical



| No. | Mk. | Reading<br>Freq.<br>MHz | Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Detector | Comment |
|-----|-----|-------------------------|---------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1   |     | 2439.900                | 50.98         | 33.22                   | 84.20                      | 114.00          | -29.80       | peak     |         |
| 2 * |     | 2440.050                | 34.58         | 33.22                   | 67.80                      | 94.00           | -26.20       | AVG      |         |

Test Mode | TX Mode\_2440 MHz

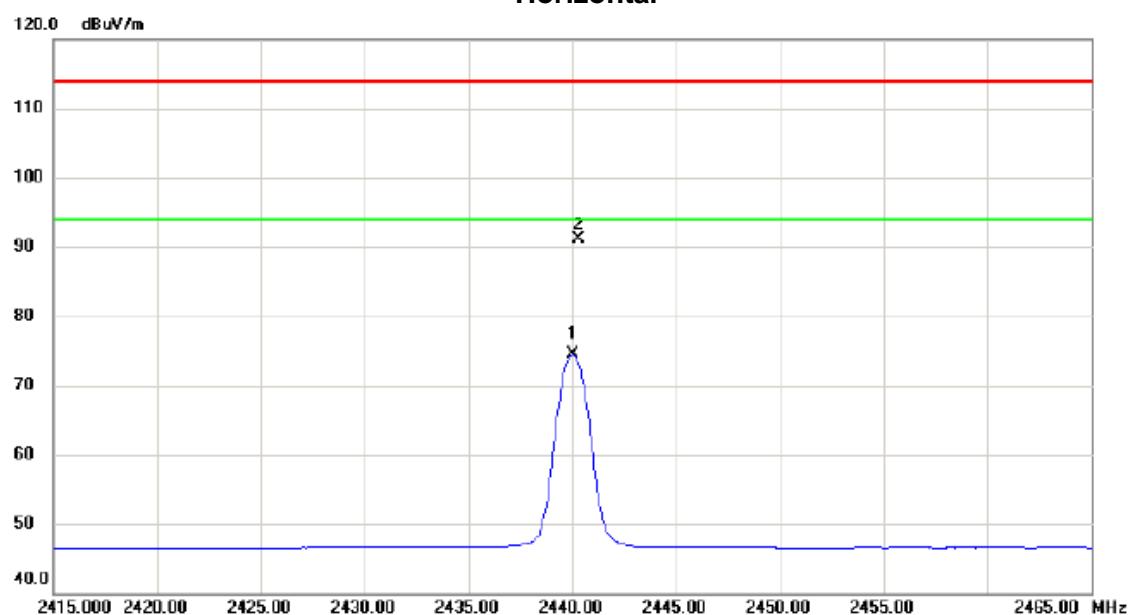
## Vertical



| No. | Mk. | Reading      |               | Correct Factor | Measure-<br>ment | Limit | Margin      |
|-----|-----|--------------|---------------|----------------|------------------|-------|-------------|
|     |     | Freq.<br>MHz | Level<br>dBuV |                |                  |       |             |
| 1   | *   | 9760.125     | 22.57         | 13.68          | 36.25            | 54.00 | -17.75 AVG  |
| 2   |     | 9760.255     | 39.78         | 13.68          | 53.46            | 74.00 | -20.54 peak |

Test Mode | TX Mode\_2440 MHz

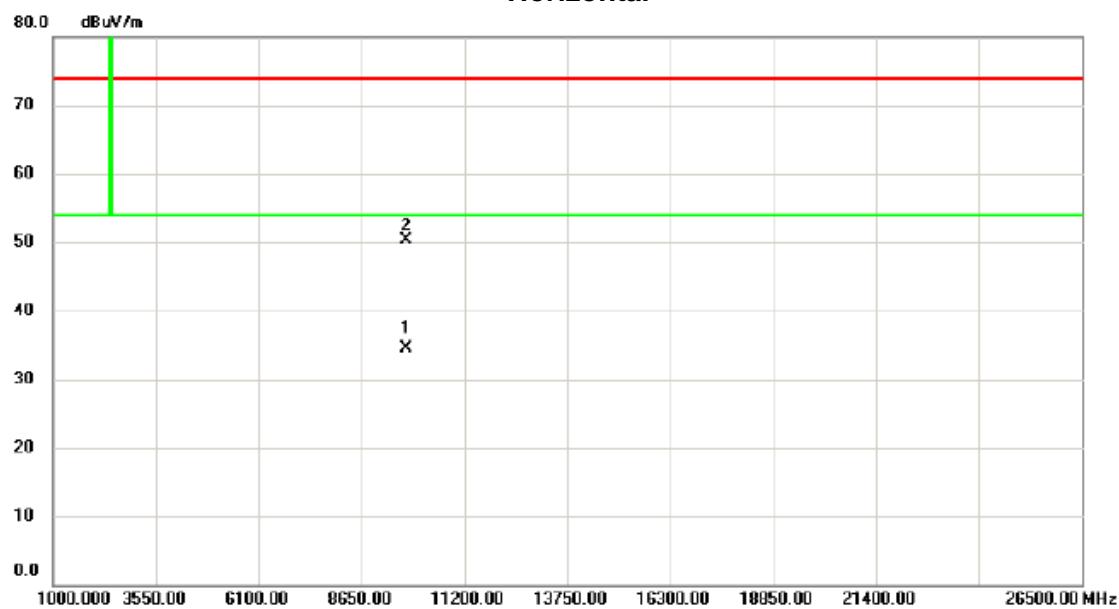
## Horizontal



| No. | Mk. | Freq.    | Reading | Correct | Measure- | Limit  | Margin |          |         |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|---------|
|     |     |          | Level   | Factor  | ment     |        |        |          |         |
|     |     | MHz      | dBuV    | dB      | dBuV/m   | dBuV/m | dB     | Detector | Comment |
| 1   | *   | 2440.000 | 41.24   | 33.22   | 74.46    | 94.00  | -19.54 | AVG      |         |
| 2   |     | 2440.300 | 57.91   | 33.22   | 91.13    | 114.00 | -22.87 | peak     |         |

Test Mode TX Mode\_2440 MHz

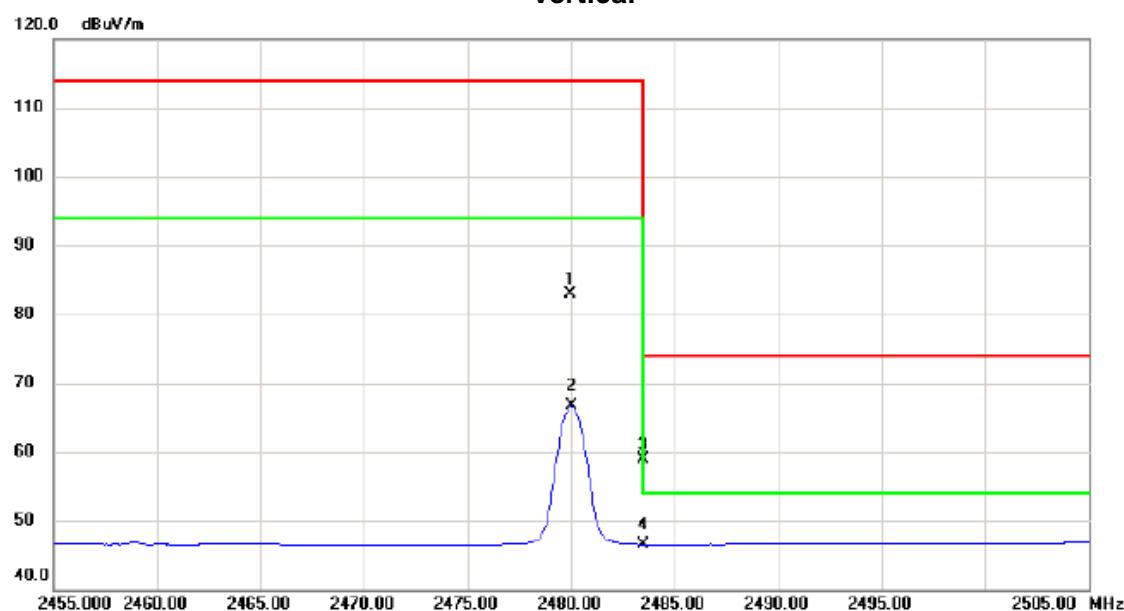
## Horizontal



| No. | Mk. | Reading<br>Freq.<br>MHz | Correct<br>Level<br>dBuV | Measure-<br>ment Factor<br>dB | Limit<br>dBuV/m | Margin<br>dB | Detector | Comment |
|-----|-----|-------------------------|--------------------------|-------------------------------|-----------------|--------------|----------|---------|
| 1   | *   | 9760.140                | 20.76                    | 13.68                         | 34.44           | 54.00        | -19.56   | AVG     |
| 2   |     | 9760.450                | 36.55                    | 13.68                         | 50.23           | 74.00        | -23.77   | peak    |

Test Mode TX Mode\_2480 MHz

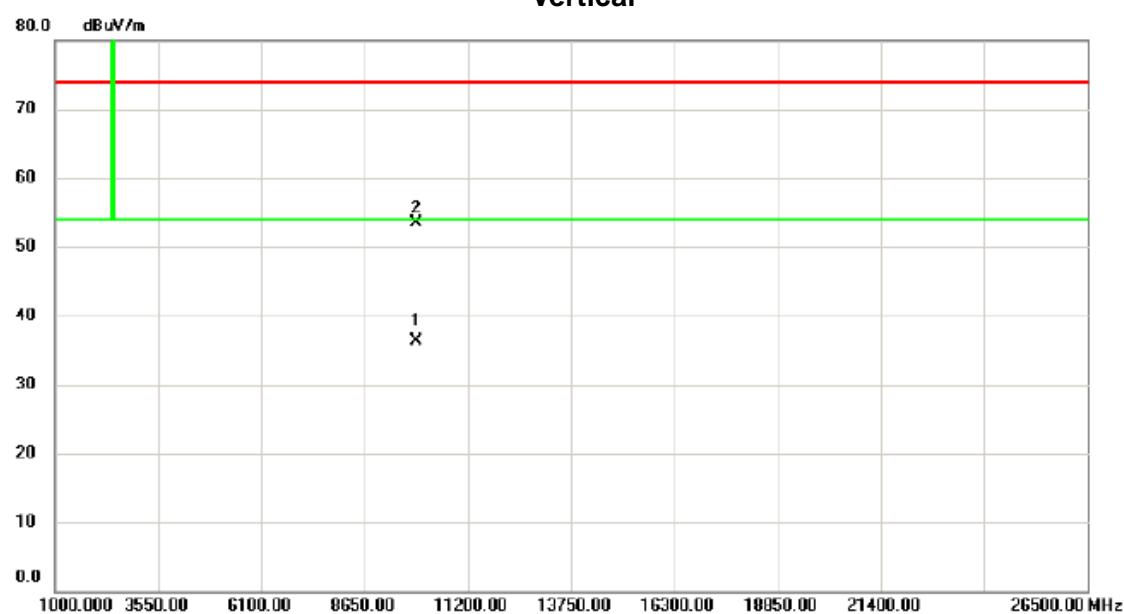
## Vertical



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Margin   |         |
|-----|-----|----------|---------------|----------------|--------------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dB     | Detector | Comment |
| 1   |     | 2479.950 | 49.60         | 33.39          | 82.99        | 114.00 | -31.01   | peak    |
| 2   |     | 2480.000 | 33.22         | 33.39          | 66.61        | 94.00  | -27.39   | AVG     |
| 3   |     | 2483.500 | 25.58         | 33.40          | 58.98        | 74.00  | -15.02   | peak    |
| 4 * |     | 2483.500 | 13.18         | 33.40          | 46.58        | 54.00  | -7.42    | AVG     |

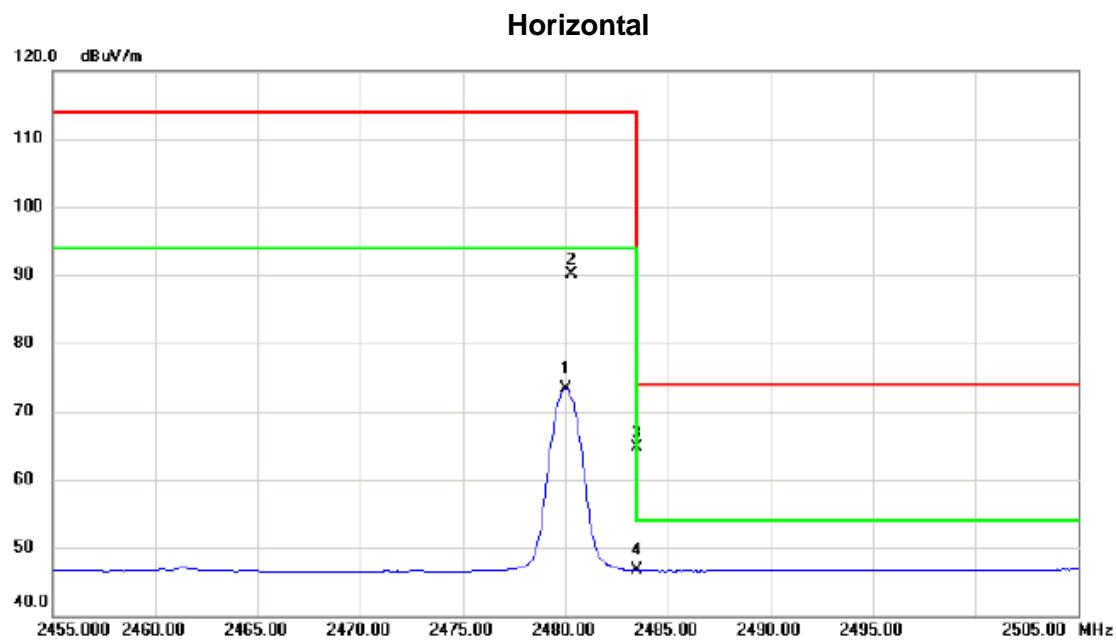
Test Mode | TX Mode\_2480 MHz

## Vertical



| No. | Mk. | Reading      |               | Correct Factor | Measure-<br>ment | Limit | Margin |
|-----|-----|--------------|---------------|----------------|------------------|-------|--------|
|     |     | Freq.<br>MHz | Level<br>dBuV |                |                  |       |        |
| 1   | *   | 9920.110     | 22.32         | 13.98          | 36.30            | 54.00 | -17.70 |
|     | 2   | 9920.250     | 39.44         | 13.98          | 53.42            | 74.00 | -20.58 |

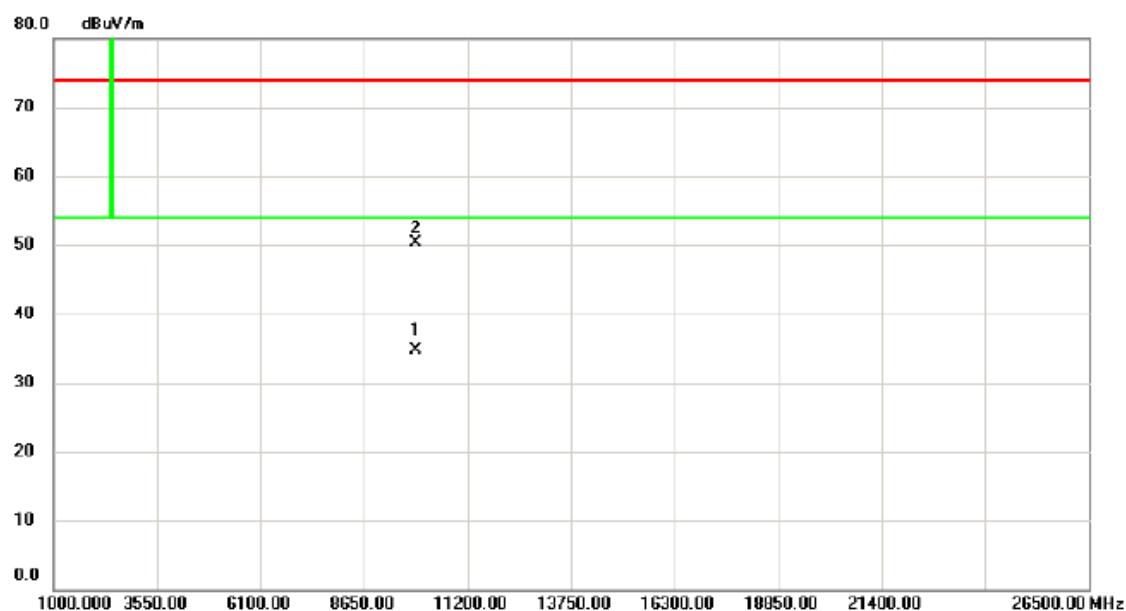
Test Mode TX Mode\_2480 MHz



| No. | Mk. | Reading<br>Freq.<br>MHz | Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Detector | Comment |
|-----|-----|-------------------------|---------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1   |     | 2480.050                | 39.99         | 33.39                   | 73.38                      | 94.00           | -20.62       | AVG      |         |
| 2   |     | 2480.300                | 56.62         | 33.39                   | 90.01                      | 114.00          | -23.99       | peak     |         |
| 3   |     | 2483.500                | 31.27         | 33.40                   | 64.67                      | 74.00           | -9.33        | peak     |         |
| 4   | *   | 2483.500                | 13.26         | 33.40                   | 46.66                      | 54.00           | -7.34        | AVG      |         |

Test Mode TX Mode\_2480 MHz

## Horizontal



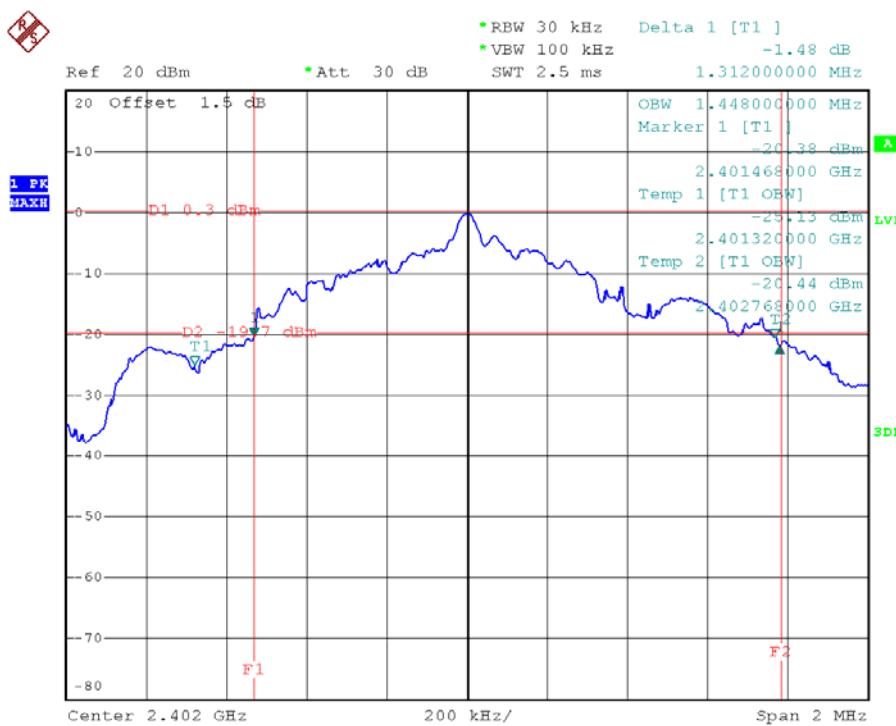
| No. | Mk. | Reading  |       | Correct Factor | Measure-ment |        | Limit    | Margin  |
|-----|-----|----------|-------|----------------|--------------|--------|----------|---------|
|     |     | Freq.    | Level |                | dB           | dBuV/m |          |         |
|     |     | MHz      | dBuV  |                | dB           |        | Detector | Comment |
| 1   | *   | 9920.450 | 20.77 | 13.98          | 34.75        | 54.00  | -19.25   | AVG     |
| 2   |     | 9920.875 | 36.35 | 13.98          | 50.33        | 74.00  | -23.67   | peak    |

## ATTACHMENT E - BANDWIDTH

Test Mode: TX Mode\_2402 MHz/2440 MHz/2480 MHz

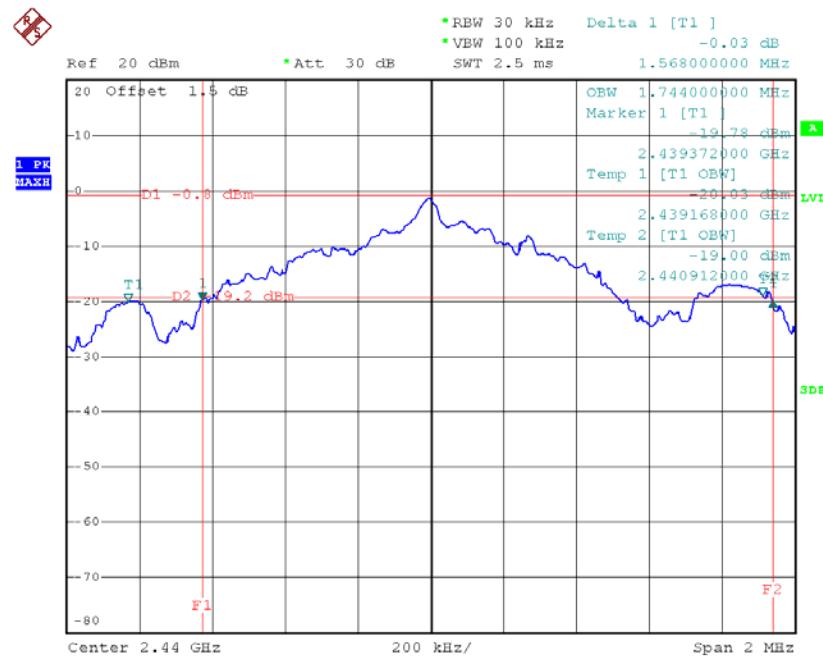
| Frequency (MHz) | 20dB Bandwidth (MHz) | 99% Occupied BW (MHz) |
|-----------------|----------------------|-----------------------|
| 2402            | 1.312                | 1.448                 |
| 2440            | 1.568                | 1.744                 |
| 2480            | 1.052                | 1.796                 |

### TX Mode\_2402 MHz



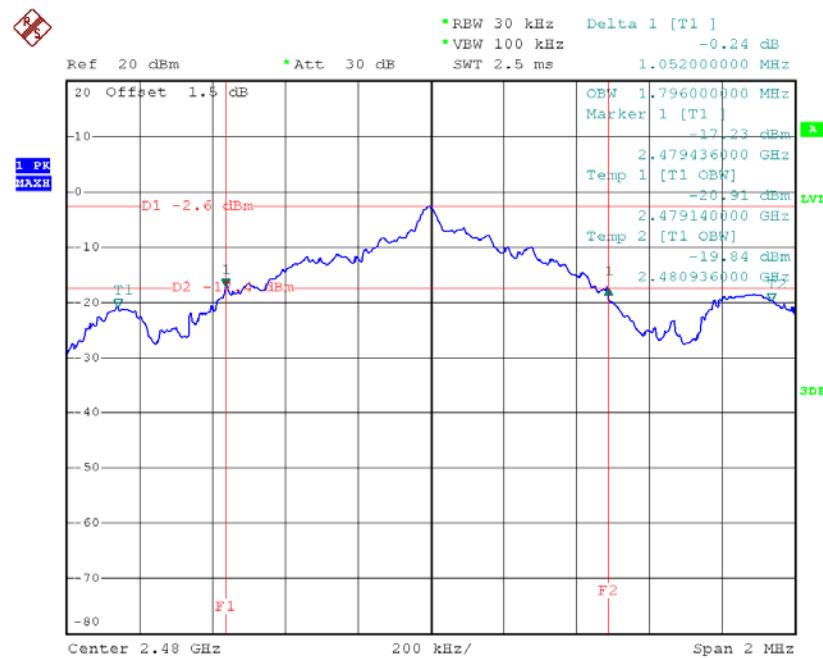
Date: 22.DEC.2016 11:25:33

## TX Mode\_2440 MHz



Date: 22.DEC.2016 11:27:44

## TX Mode\_2480 MHz



Date: 22.DEC.2016 11:30:57