

# FCC Radio Test Report

## FCC ID: Q3N-8231

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

**Project No.** : 1411165A  
**Equipment** : Terminal  
**Model Name** : 8231  
**Applicant** : CIPHERLAB CO., LTD.  
**Address** : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan

**Date of Receipt** : May 26, 2015  
**Date of Test** : May 26, 2015 ~ Jun. 10, 2015  
**Issued Date** : Jun. 15, 2015  
**Tested by** : BTL Inc.

**Testing Engineer** : Rush Kao  
(Rush Kao)

**Technical Manager** : Jeff Yang  
(Jeff Yang)

**Authorized Signatory** : Andy Chiu  
(Andy Chiu)

### **B T L I N C .**

B1, No.37, Lane 365, Yang Guang St.,  
Nei-Hu District, Taipei City 114, Taiwan.  
TEL:+886-2-2657-3299 FAX: +886-2- 2657-3331

### **Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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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-2-1411165A | Original Issue. | Jun. 15, 2015 |

## 1. CERTIFICATION

Equipment : Terminal  
Brand Name : CIPHERLAB  
Model Name : 8231  
Applicant : CIPHERLAB CO., LTD.  
Manufacturer : CIPHERLAB CO., LTD.  
Address : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan  
Factory : CIPHERLAB CO., LTD. 2nd  
Address : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan  
Date of Test : May 26, 2015 ~ Jun. 10, 2015  
Test Sample : ENGINEERING SAMPLE  
Standard(s) : FCC Part15, Subpart C :2014 (15.247) / ANSI C63.4-2009

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-2-1411165A) 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):

| Standard(s)   | Section | Test Item                           | Judgment | Remark |
|---------------|---------|-------------------------------------|----------|--------|
| 15.207        |         | Conducted Emission                  | PASS     |        |
| 15.247(d)     |         | Antenna conducted Spurious Emission | PASS     |        |
| 15.247(a)(2)  |         | 6dB Bandwidth                       | PASS     |        |
| 15.247(b)(3)  |         | Peak Output Power                   | PASS     |        |
| 15.247(e)     |         | Power Spectral Density              | PASS     |        |
| 15.203        |         | Antenna Requirement                 | PASS     |        |
| 15.209/15.205 |         | Transmitter Radiated Emissions      | PASS     |        |

### NOTE:

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

(2) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r02 (Measurement Guidelines of DTS)

## 2.1 TEST FACILITY

### Conducted emission Test:

**C05:** (FCC RN:965108; FCC DN:TW1082)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

### Radiated emission Test (Below 1 GHz):

**CB08:** (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)

1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

### Radiated emission Test (Above 1 GHz):

**CB08:** (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)

1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

## 2.2 MEASUREMENT UNCERTAINTY

**The measurement uncertainty is not specified by FCC rules and Canada Industry for reference only.**

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%**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{\text{CISPR}}$  requirement.

### A. Conducted Measurement :

| Test Site | Measurement Frequency Range | U , (dB) | NOTE |
|-----------|-----------------------------|----------|------|
| C05       | 150 kHz ~ 30 MHz            | 1.94     |      |

### B. Radiated Measurement :

| Test Site | Item                    | Measurement Frequency Range | Uncertainty   | NOTE    |
|-----------|-------------------------|-----------------------------|---------------|---------|
| CB08      | Radiated emission at 3m | Horizontal                  | 30 - 200MHz   | 3.35 dB |
|           |                         |                             | 200 - 1000MHz | 3.11 dB |
|           |                         |                             | 1 - 18GHz     | 3.97 dB |
|           |                         |                             | 18 - 40GHz    | 4.01 dB |
|           | Vertical Polarization   |                             | 30 - 200MHz   | 3.22 dB |
|           |                         |                             | 200 - 1000MHz | 3.24 dB |
|           |                         |                             | 1 - 18GHz     | 4.05 dB |
|           |                         |                             | 18 - 40GHz    | 4.04 dB |

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

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our  $U_{\text{lab}}$  values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called  $U_{\text{CISPR}}$ , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our  $U_{\text{lab}}$  values are smaller than  $U_{\text{CISPR}}$ .

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                     |                                                                                                                                                                                  |                           |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Equipment           | Terminal                                                                                                                                                                         |                           |
| Brand Name          | CIPHERLAB                                                                                                                                                                        |                           |
| Model Name          | 8231                                                                                                                                                                             |                           |
| Model Difference    | The EUT includes three optional readers: 2D, CCD and Laser.                                                                                                                      |                           |
| Product Description | Operation Frequency                                                                                                                                                              | 2402~2480 MHz             |
|                     | Modulation Technology                                                                                                                                                            | GFSK(1Mbps)               |
|                     | Bit Rate of Transmitter                                                                                                                                                          |                           |
|                     | Output Power (Max.)                                                                                                                                                              | 4.98 dBm(0.0031W) (1Mbps) |
| Power Source        | #1 DC Voltage supplied from AC adapter.<br>Brand/Model: ADAPTER TECH./STD-05030V<br>#2 DC Voltage supplied from USB host.<br>#3 Supplied from Li-ion Battery.<br>Model:BA-80S1A2 |                           |
| Power Rating        | #1 I/P:AC 100-240V~47-63Hz 0.48A MAX O/P:5V/3A 15W MAX<br>#2 I/P: DC 5V 500mA<br>#3 DC 3.7V 1200mAh,4.44Wh                                                                       |                           |

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) |
| 00           | 2402            | 20      | 2442            |
| 01           | 2404            | 21      | 2444            |
| 02           | 2406            | 22      | 2446            |
| 03           | 2408            | 23      | 2448            |
| 04           | 2410            | 24      | 2450            |
| 05           | 2412            | 25      | 2452            |
| 06           | 2414            | 26      | 2454            |
| 07           | 2416            | 27      | 2456            |
| 08           | 2418            | 28      | 2458            |
| 09           | 2420            | 29      | 2460            |
| 10           | 2422            | 30      | 2462            |
| 11           | 2424            | 31      | 2464            |
| 12           | 2426            | 32      | 2466            |
| 13           | 2428            | 33      | 2468            |
| 14           | 2430            | 34      | 2470            |
| 15           | 2432            | 35      | 2472            |
| 16           | 2434            | 36      | 2474            |
| 17           | 2436            | 37      | 2476            |
| 18           | 2438            | 38      | 2478            |
| 19           | 2440            | 39      | 2480            |

3. Table for Filed Antenna

| Ant. | Brand     | Model Name      | Antenna Type | Connector | Gain (dBi) |
|------|-----------|-----------------|--------------|-----------|------------|
| 1    | CIPHERLAB | 8231 BT Antenna | PIFA         | N/A       | 1.71       |

### 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 <b>NOTE (1)</b> |
| Mode 2       | 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 2             | TX Mode     |

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

Note:

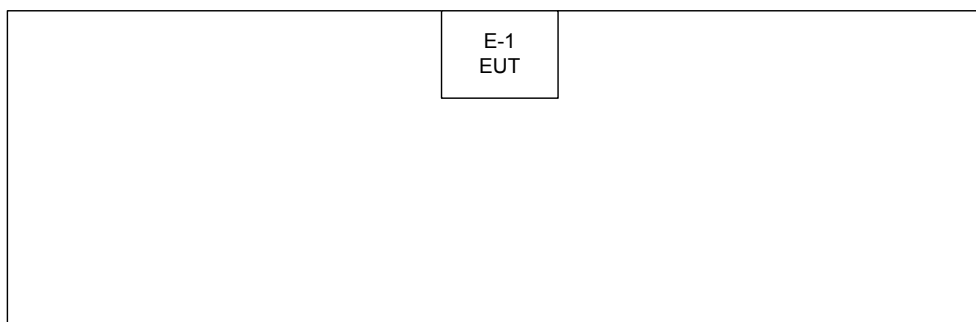
(1) The measurements are performed at the high, middle, low available channels.

### 3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

|                       |      |      |      |
|-----------------------|------|------|------|
| Test Software Version | 0    |      |      |
| Frequency (MHz)       | 2402 | 2440 | 2480 |
| BT LE                 | DEF  | DEF  | DEF  |

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



### 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/IC | Series No. | Note |
|------|-----------|-----------|----------------|-----------|------------|------|
|      | -         | -         | -              | -         | -          | -    |

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

Note:

- (1) For detachable type I/O cable should be specified the length in m in 『Length』 column.

## 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 (dBμV) |           |
|-----------------------------|------------------------|-----------|
|                             | Quasi-peak             | Average   |
| 0.15 -0.5                   | 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

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    |

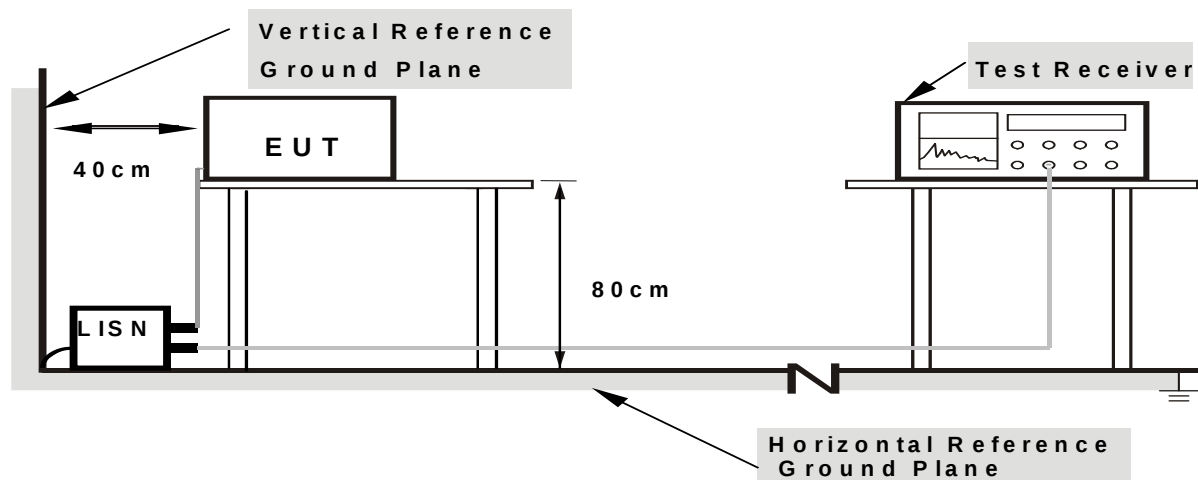
#### 4.1.2 TEST PROCEDURE

- 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: 26°C  
 Relative Humidity: 59%  
 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

20dB in any 100 KHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

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

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| Frequency (MHz) | (dBuV/m) (at 3 meters) |         |
|-----------------|------------------------|---------|
|                 | 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).
- (4) The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)  
 Margin Level = Measurement Value - Limit Value

| Spectrum Parameter                         | Setting                                                                   |
|--------------------------------------------|---------------------------------------------------------------------------|
| Attenuation                                | Auto                                                                      |
| Start Frequency                            | 1000 MHz                                                                  |
| Stop Frequency                             | 10th carrier harmonic                                                     |
| RBW / VBW<br>(Emission in restricted band) | RBW 1MHz VBW 3MHz peak detector for Pk value<br>RMS detector for AV value |

| 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 or PK detector |

#### 4.2.2 TEST PROCEDURE

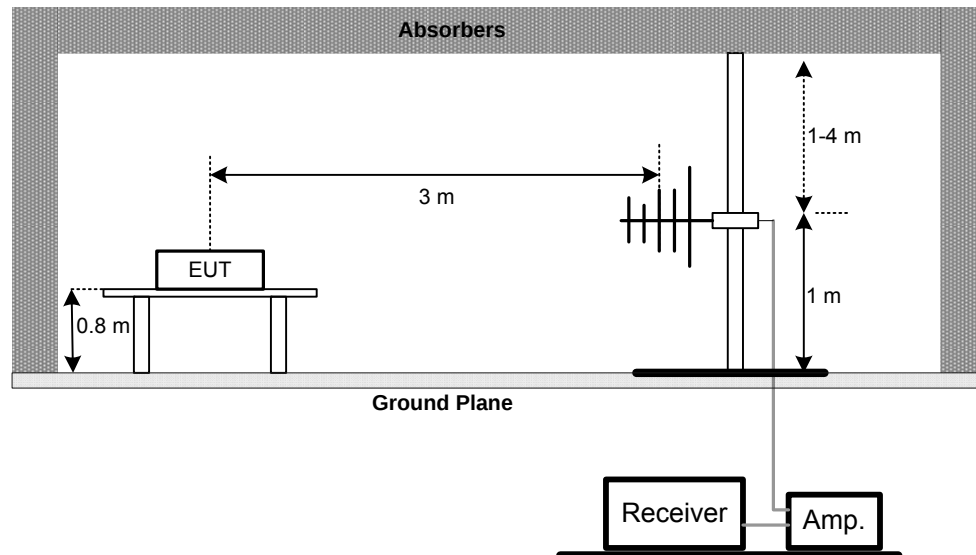
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8 m; 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.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.3 DEVIATION FROM TEST STANDARD

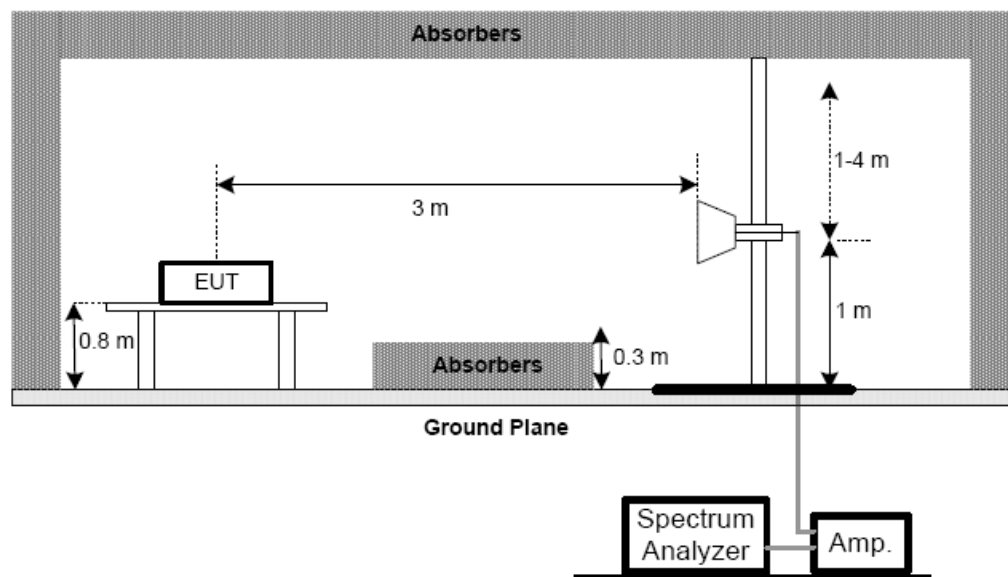
No deviation

#### 4.2.4 TEST SETUP

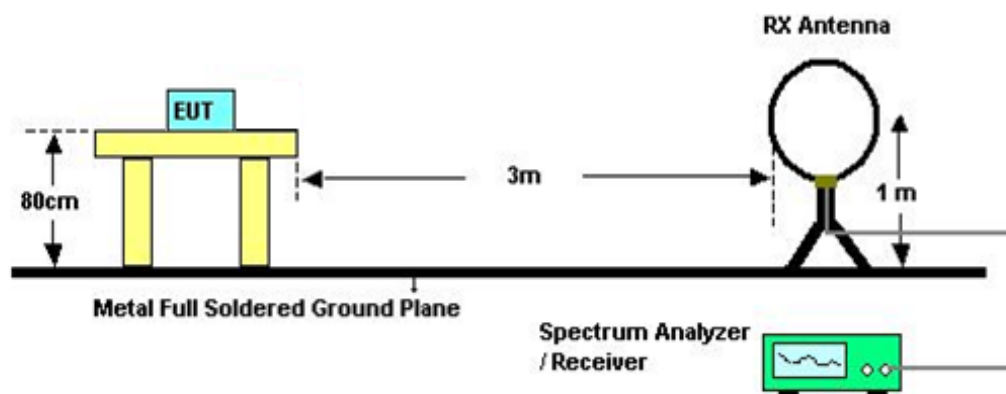
##### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



##### (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: 24°C

Relative Humidity: 60%

Test Voltage: AC 120V/60Hz

#### 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 (BETWEEN 30MHZ TO 1000 MHZ)**

**Please refer to the Attachment C.**

Remark:

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz.
- (2) 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.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) 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) 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.
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (3) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (4) EUT Orthogonal Axis:  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (5) 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
- (6) 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 Applied procedures / limit

| FCC Part15 (15.247) , Subpart C |           |                                         |                       |        |
|---------------------------------|-----------|-----------------------------------------|-----------------------|--------|
| Section                         | Test Item | Limit                                   | Frequency Range (MHz) | Result |
| 15.247(a)(2)                    | Bandwidth | $\geq 500\text{KHz}$<br>(6dB bandwidth) | 2400-2483.5           | PASS   |

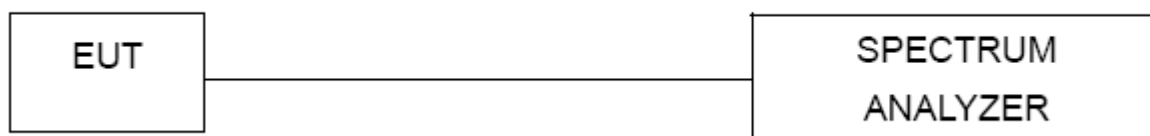
#### 5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP



#### 5.1.4 EUT OPERATION 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.

#### 5.1.5 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: AC 120V/60Hz

#### 5.1.6 TEST RESULTS

Please refer to the Attachment E.

## 6. MAXIMUM OUTPUT POWER TEST

### 6.1 Applied procedures / limit

| FCC Part15 (15.247) , Subpart C |                      |                 |                       |        |
|---------------------------------|----------------------|-----------------|-----------------------|--------|
| Section                         | Test Item            | Limit           | Frequency Range (MHz) | Result |
| 15.247(b)(3)                    | Maximum Output Power | 1 watt or 30dBm | 2400-2483.5           | PASS   |

#### 6.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance v03r02.

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



#### 6.1.4 EUT OPERATION 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. Transmit output power was measured while the host equipment supply voltage was varied from 85 % to 115 % of the nominal rated supply voltage. No change in transmit output power was observed.

#### 6.1.5 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: AC 120V/60Hz

#### 6.1.6 TEST RESULTS

Please refer to the Attachment F.

## 7. ANTENNA CONDUCTED SPURIOUS EMISSION

### 7.1 Applied procedures / limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that transmitter demonstrates compliance with the peak conducted power limits.

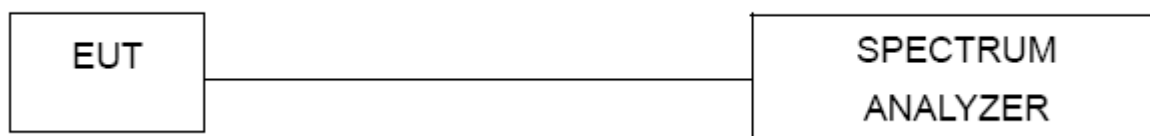
#### 7.1.1 TEST PROCEDURE

- 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=300KHz, Sweep time = 10 ms.

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



#### 7.1.4 EUT OPERATION 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.

#### 7.1.5 EUT OPERATION CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: AC 120V/60Hz

#### 7.1.6 TEST RESULTS

Please refer to the Attachment G.

## 8. POWER SPECTRAL DENSITY TEST

### 8.1 Applied procedures / limit

| FCC Part15 (15.247) , Subpart C |                        |                        |                       |        |
|---------------------------------|------------------------|------------------------|-----------------------|--------|
| Section                         | Test Item              | Limit                  | Frequency Range (MHz) | Result |
| 15.247(e)                       | Power Spectral Density | 8 dBm<br>(in any 3KHz) | 2400-2483.5           | PASS   |

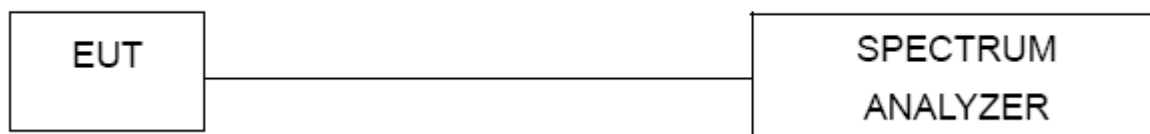
#### 8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW=3KHz, VBW=10 KHz, Sweep time = auto.

#### 8.1.2 DEVIATION FROM STANDARD

No deviation.

#### 8.1.3 TEST SETUP



#### 8.1.4 EUT OPERATION 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.

#### 8.1.5 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: AC 120V/60Hz

#### 8.1.6 TEST RESULTS

Please refer to the Attachment H.

## 9. MEASUREMENT INSTRUMENTS LIST

| Conducted Emission Measurement |                    |              |           |            |                  |
|--------------------------------|--------------------|--------------|-----------|------------|------------------|
| Item                           | Kind of Equipment  | Manufacturer | Type No.  | Serial No. | Calibrated until |
| 1                              | TWO-LINE V-NETWORK | R&S          | ENV216    | 101050     | Feb. 01, 2016    |
| 2                              | Test Cable         | TIMES        | CFD300-NL | C05        | Jun. 10, 2016    |
| 3                              | EMI Test Receiver  | R&S          | ESR3      | 101854     | Dec. 09, 2015    |

| Radiated Emission Measurement |                         |                    |                  |            |                  |
|-------------------------------|-------------------------|--------------------|------------------|------------|------------------|
| Item                          | Kind of Equipment       | Manufacturer       | Type No.         | Serial No. | Calibrated until |
| 1                             | Spectrum Analyzer       | R&S                | FSP-40           | 100129     | Jan.07, 2016     |
| 2                             | Horn Antenna            | Schwarzbeck        | BBHA 9120        | D-325      | Jun. 15, 2016    |
| 3                             | Microwave Pre_amplifier | Agilent            | 8449B            | 3008A01714 | Apr. 16, 2016    |
| 4                             | Microflex Cable         | Harbour industries | 27478LL142       | 1m         | May. 13, 2016    |
| 5                             | Microflex Cable         | EMC                | S104-SMA         | 8m         | May. 15, 2016    |
| 6                             | Microflex Cable         | Harbour industries | 27478LL142       | 3m         | May. 13, 2016    |
| 7                             | Test Cable              | LMR                | LMR-400          | 12m        | May. 14, 2016    |
| 8                             | Test Cable              | LMR                | LMR-400          | 3m         | May. 14, 2016    |
| 9                             | Pre-Amplifier           | Anritsu            | MH648A           | M92649     | Jun. 20, 2015    |
| 10                            | Log-Bicon Antenna       | Schwarzbeck        | VULB9168-35<br>2 | 9168-352   | Jun. 20, 2015    |
| 11                            | Loop Antenna            | EMCO               | 6502             | 00042960   | Nov. 08, 2015    |

| 6dB Bandwidth Measurement |                   |              |          |            |                  |
|---------------------------|-------------------|--------------|----------|------------|------------------|
| Item                      | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1                         | Spectrum Analyzer | R&S          | FSP-40   | 100129     | Jan. 07, 2016    |

| Peak Output Power Measurement |                    |              |          |            |                  |
|-------------------------------|--------------------|--------------|----------|------------|------------------|
| Item                          | Kind of Equipment  | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1                             | Power Meter        | Anritsu      | ML2495A  | 1128008    | Aug. 08, 2015    |
| 2                             | Power Meter Sensor | Anritsu      | MA2411B  | 1126001    | Aug. 08, 2015    |

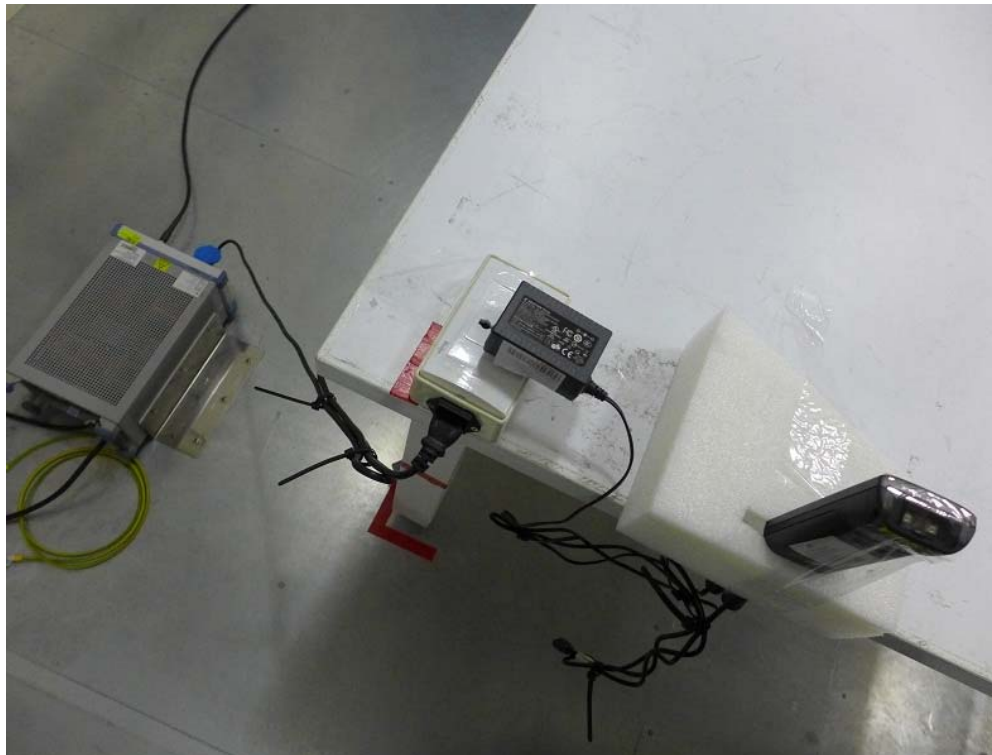
| Antenna Conducted Spurious Emission Measurement |                   |              |          |            |                  |
|-------------------------------------------------|-------------------|--------------|----------|------------|------------------|
| Item                                            | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1                                               | Spectrum Analyzer | R&S          | FSP-40   | 100129     | Jan. 07, 2016    |

| Power Spectral Density Measurement |                   |              |          |            |                  |
|------------------------------------|-------------------|--------------|----------|------------|------------------|
| Item                               | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1                                  | Spectrum Analyzer | R&S          | FSP-40   | 100129     | Jan. 07, 2016    |

Remark: "N/A" denotes no model name, serial no. or calibration specified.  
All calibration period of equipment list is one year.

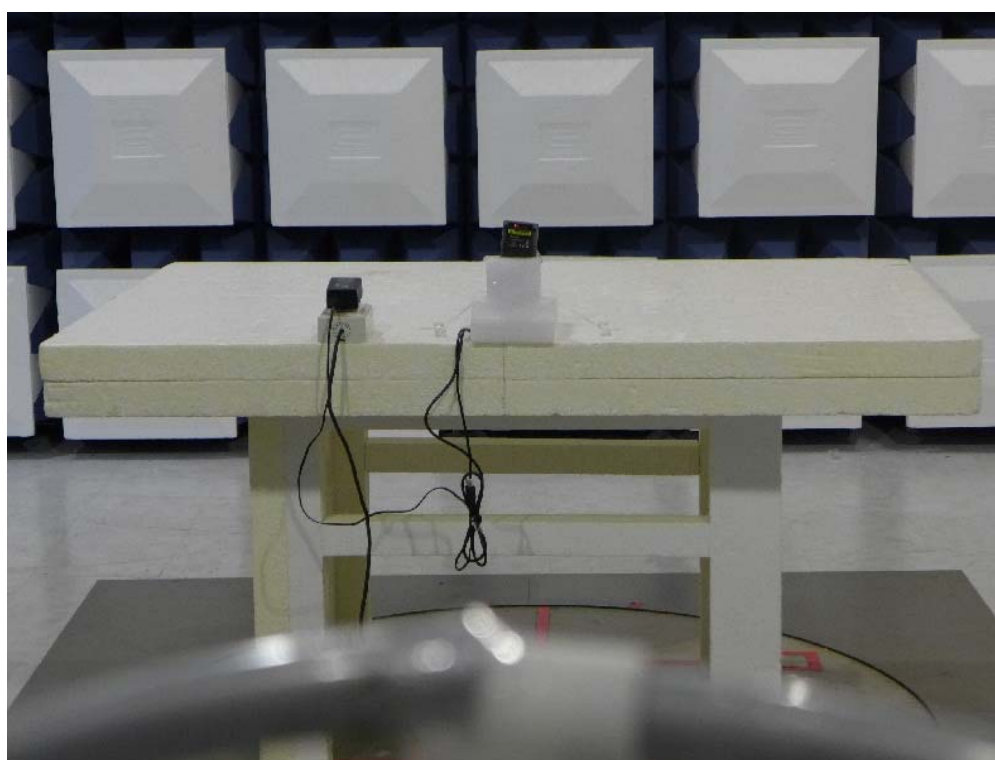
## 10. EUT TEST PHOTO

### Conducted Measurement Photos



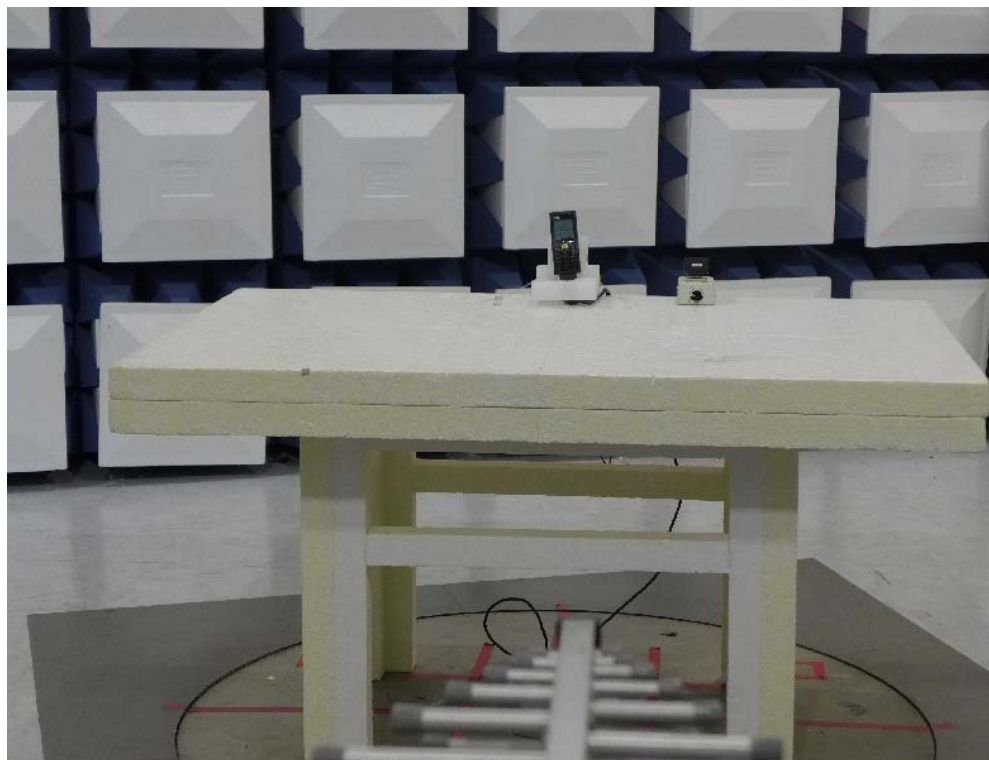
## Radiated Measurement Photos

9K-30MHz



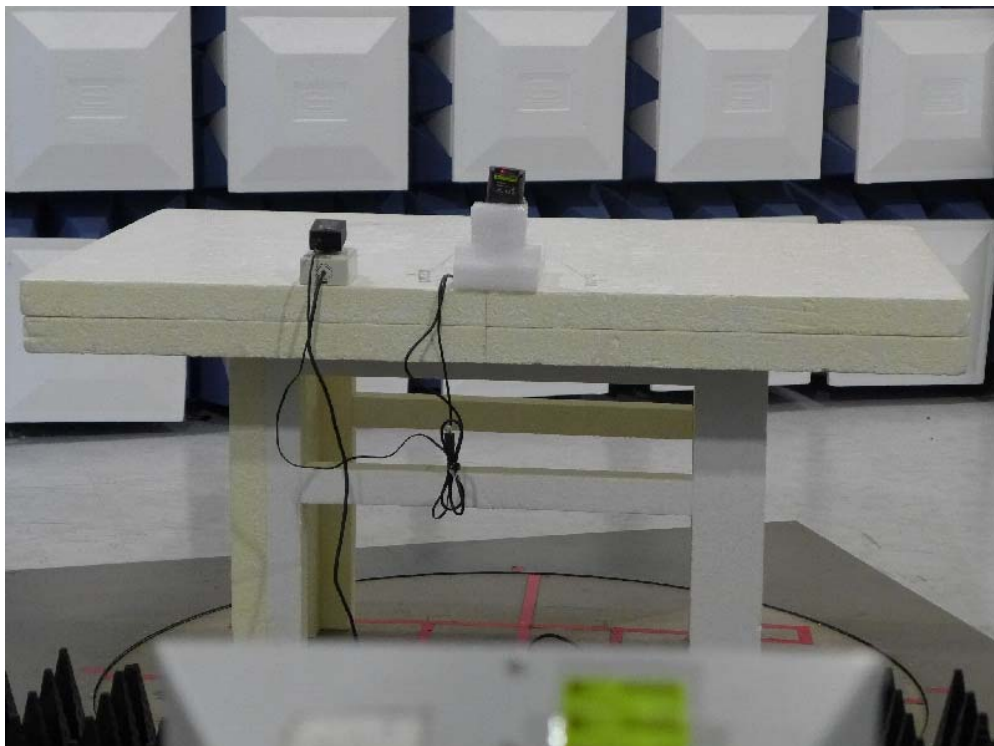
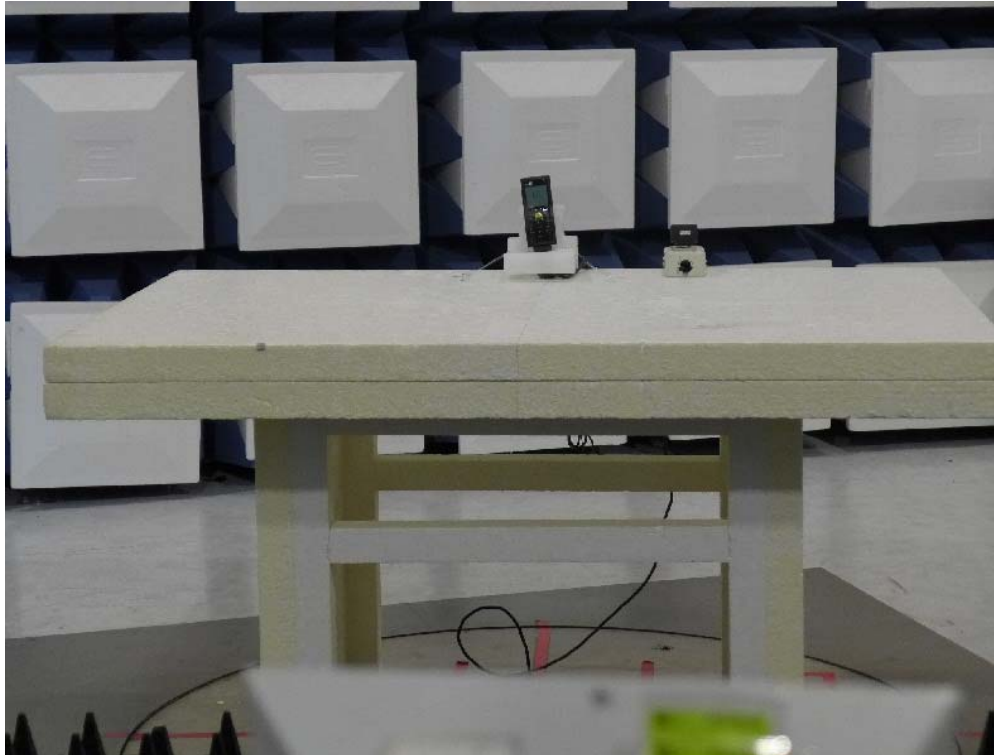
## Radiated Measurement Photos

30MHz-1G



## Radiated Measurement Photos

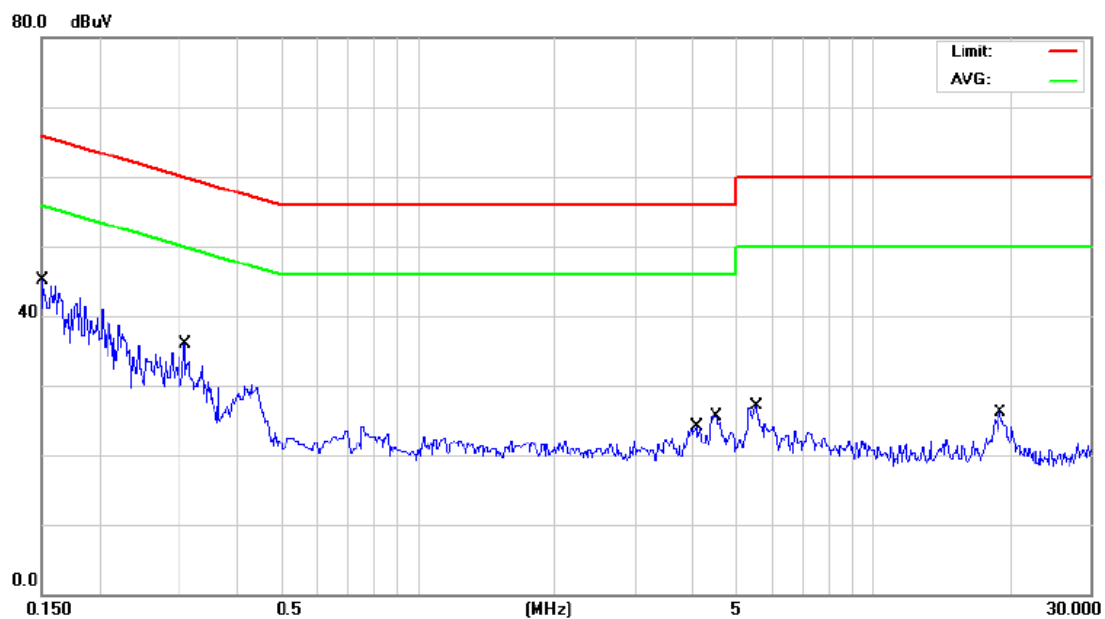
### Above 1G



## **ATTACHMENT A - CONDUCTED EMISSION**

Test Mode: TX Mode

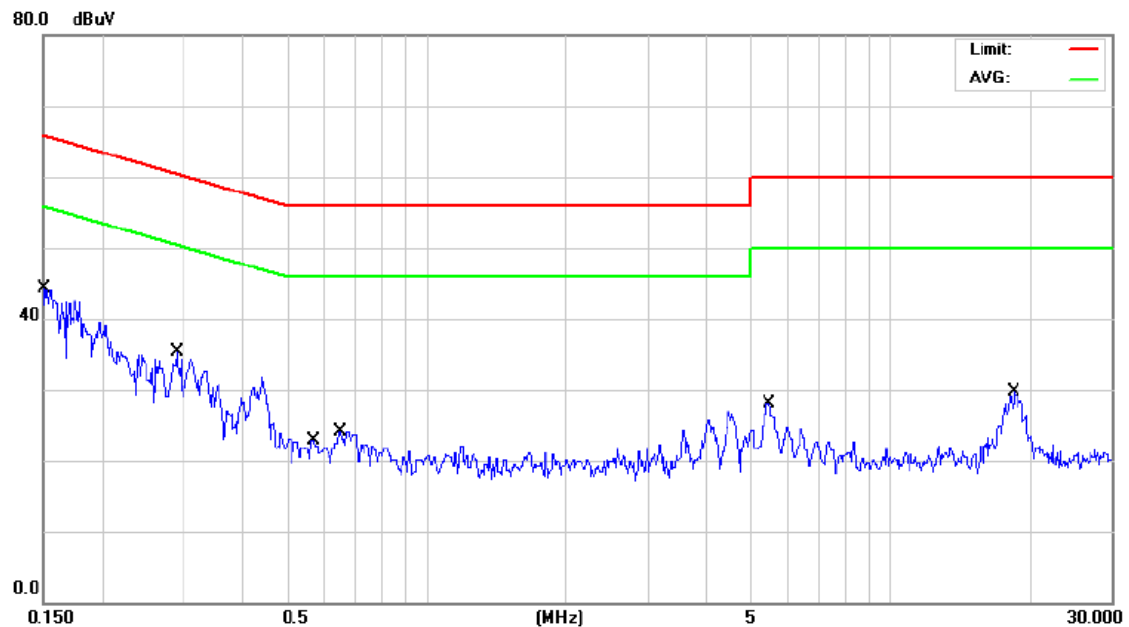
### Line



| No. | Mk. | Freq.   | Reading | Correct | Measure- | Limit | Over   |          |         |
|-----|-----|---------|---------|---------|----------|-------|--------|----------|---------|
|     |     | MHz     | Level   | Factor  | ment     |       |        |          |         |
|     |     |         | dBuV    | dB      | dBuV     | dBuV  | dB     | Detector | Comment |
| 1   | *   | 0.1507  | 25.70   | 9.64    | 35.34    | 65.96 | -30.62 | QP       |         |
| 2   |     | 0.1507  | 12.60   | 9.64    | 22.24    | 55.96 | -33.72 | AVG      |         |
| 3   |     | 0.3068  | 13.60   | 9.63    | 23.23    | 60.05 | -36.82 | QP       |         |
| 4   |     | 0.3068  | 6.90    | 9.63    | 16.53    | 50.05 | -33.52 | AVG      |         |
| 5   |     | 4.0820  | 5.00    | 9.82    | 14.82    | 56.00 | -41.18 | QP       |         |
| 6   |     | 4.0820  | 1.00    | 9.82    | 10.82    | 46.00 | -35.18 | AVG      |         |
| 7   |     | 4.5050  | 6.60    | 9.83    | 16.43    | 56.00 | -39.57 | QP       |         |
| 8   |     | 4.5050  | 1.10    | 9.83    | 10.93    | 46.00 | -35.07 | AVG      |         |
| 9   |     | 5.5500  | 11.30   | 9.86    | 21.16    | 60.00 | -38.84 | QP       |         |
| 10  |     | 5.5500  | 7.40    | 9.86    | 17.26    | 50.00 | -32.74 | AVG      |         |
| 11  |     | 18.9500 | 8.50    | 9.84    | 18.34    | 60.00 | -41.66 | QP       |         |
| 12  |     | 18.9500 | 4.40    | 9.84    | 14.24    | 50.00 | -35.76 | AVG      |         |

Test Mode: TX Mode

### Neutral



| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit | Over   |          |         |
|-----|-----|---------|---------------|----------------|-------------|-------|--------|----------|---------|
|     |     | MHz     | dBuV          | dB             | dBuV        | dBuV  | dB     | Detector | Comment |
| 1   |     | 0.1500  | 27.90         | 9.63           | 37.53       | 65.99 | -28.46 | QP       |         |
| 2   |     | 0.1500  | 16.20         | 9.63           | 25.83       | 55.99 | -30.16 | AVG      |         |
| 3   |     | 0.2884  | 20.90         | 9.64           | 30.54       | 60.57 | -30.03 | QP       |         |
| 4   | *   | 0.2884  | 17.60         | 9.64           | 27.24       | 50.57 | -23.33 | AVG      |         |
| 5   |     | 0.5720  | 5.70          | 9.65           | 15.35       | 56.00 | -40.65 | QP       |         |
| 6   |     | 0.5720  | 4.80          | 9.65           | 14.45       | 46.00 | -31.55 | AVG      |         |
| 7   |     | 0.6530  | 8.90          | 9.66           | 18.56       | 56.00 | -37.44 | QP       |         |
| 8   |     | 0.6530  | 7.50          | 9.66           | 17.16       | 46.00 | -28.84 | AVG      |         |
| 9   |     | 5.4499  | 11.60         | 9.85           | 21.45       | 60.00 | -38.55 | QP       |         |
| 10  |     | 5.4499  | 7.90          | 9.85           | 17.75       | 50.00 | -32.25 | AVG      |         |
| 11  |     | 18.5000 | 15.20         | 9.85           | 25.05       | 60.00 | -34.95 | QP       |         |
| 12  |     | 18.5000 | 10.40         | 9.85           | 20.25       | 50.00 | -29.75 | AVG      |         |

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

|            |         |
|------------|---------|
| Test Mode: | TX Mode |
|------------|---------|

| Frequency (MHz) | Ant 0°/90° | Read level dBuV/m | Factor (dB) | Measured(FS) (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Note |
|-----------------|------------|-------------------|-------------|-----------------------|----------------|-------------|------|
| 0.0150          | 0°         | 33.36             | 22.28       | 55.64                 | 104.08         | -48.45      | AVG  |
| 0.0150          | 0°         | 44.32             | 22.28       | 66.60                 | 124.08         | -57.49      | PK   |
| 0.0255          | 0°         | 28.52             | 22.01       | 50.53                 | 99.47          | -48.94      | AVG  |
| 0.0255          | 0°         | 33.63             | 22.01       | 55.64                 | 119.47         | -63.83      | PK   |
| 0.0366          | 0°         | 24.92             | 21.74       | 46.66                 | 96.33          | -49.68      | AVG  |
| 0.0366          | 0°         | 32.63             | 21.74       | 54.37                 | 116.33         | -61.97      | PK   |
| 0.0600          | 0°         | 24.78             | 21.24       | 46.02                 | 92.04          | -46.02      | AVG  |
| 0.0600          | 0°         | 34.69             | 21.24       | 55.93                 | 112.04         | -56.11      | PK   |
| 1.2650          | 0°         | 34.87             | 20.34       | 55.21                 | 65.56          | -10.36      | QP   |
| 1.1353          | 0°         | 37.65             | 20.46       | 58.11                 | 66.50          | -8.39       | QP   |

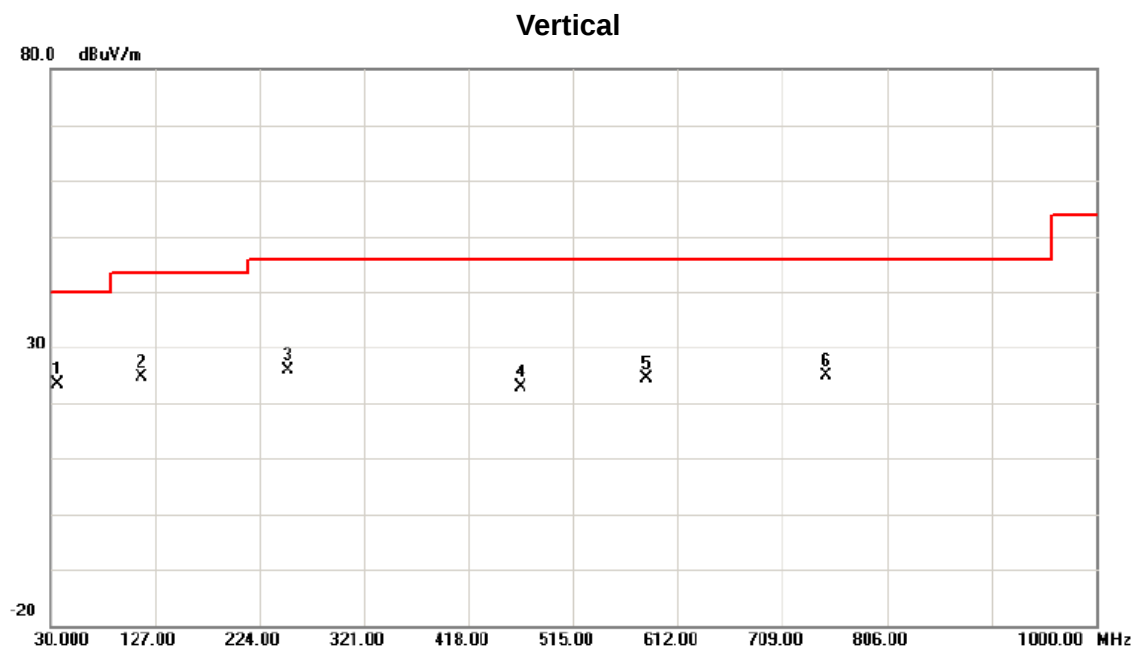
| Frequency (MHz) | Ant 0°/90° | Read level dBuV/m | Factor (dB) | Measured(FS) (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Note |
|-----------------|------------|-------------------|-------------|-----------------------|----------------|-------------|------|
| 0.0132          | 90°        | 34.11             | 22.32       | 56.43                 | 105.19         | -48.76      | AVG  |
| 0.0132          | 90°        | 48.32             | 22.32       | 70.64                 | 125.19         | -54.55      | PK   |
| 0.0257          | 90°        | 27.33             | 22.01       | 49.34                 | 99.41          | -50.07      | AVG  |
| 0.0257          | 90°        | 42.82             | 22.01       | 64.83                 | 119.41         | -54.58      | PK   |
| 0.0345          | 90°        | 26.39             | 21.79       | 48.18                 | 96.85          | -48.67      | AVG  |
| 0.0345          | 90°        | 35.41             | 21.79       | 57.20                 | 116.85         | -59.65      | PK   |
| 0.0632          | 90°        | 22.36             | 21.19       | 43.55                 | 91.59          | -48.04      | AVG  |
| 0.0632          | 90°        | 38.62             | 21.19       | 59.81                 | 111.59         | -51.78      | PK   |
| 1.2510          | 90°        | 34.33             | 20.35       | 54.68                 | 65.66          | -10.98      | QP   |
| 1.6500          | 90°        | 36.31             | 19.95       | 56.26                 | 63.25          | -6.99       | QP   |

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 (specific distance / test distance) (dB);
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

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

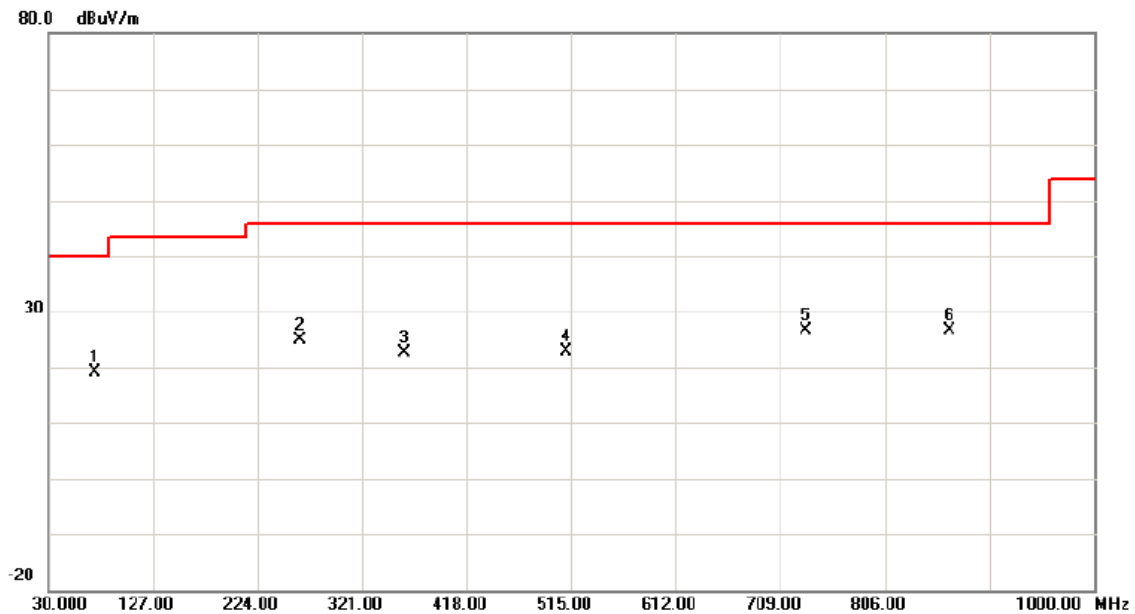
|            |                         |
|------------|-------------------------|
| Test Mode: | TX 2440MHz -CH19 -1Mbps |
|------------|-------------------------|



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   | *   | 37.2750      | 38.27                    | -14.78                  | 23.49                      | 40.00           | -16.51     | peak                    |                           |         |
| 2   |     | 114.8750     | 41.55                    | -16.98                  | 24.57                      | 43.50           | -18.93     | peak                    |                           |         |
| 3   |     | 250.6750     | 40.76                    | -14.98                  | 25.78                      | 46.00           | -20.22     | peak                    |                           |         |
| 4   |     | 466.5000     | 32.59                    | -9.77                   | 22.82                      | 46.00           | -23.18     | peak                    |                           |         |
| 5   |     | 582.9000     | 32.28                    | -7.78                   | 24.50                      | 46.00           | -21.50     | peak                    |                           |         |
| 6   |     | 750.2250     | 30.21                    | -5.23                   | 24.98                      | 46.00           | -21.02     | peak                    |                           |         |

Test Mode: TX 2440MHz -CH19 -1Mbps

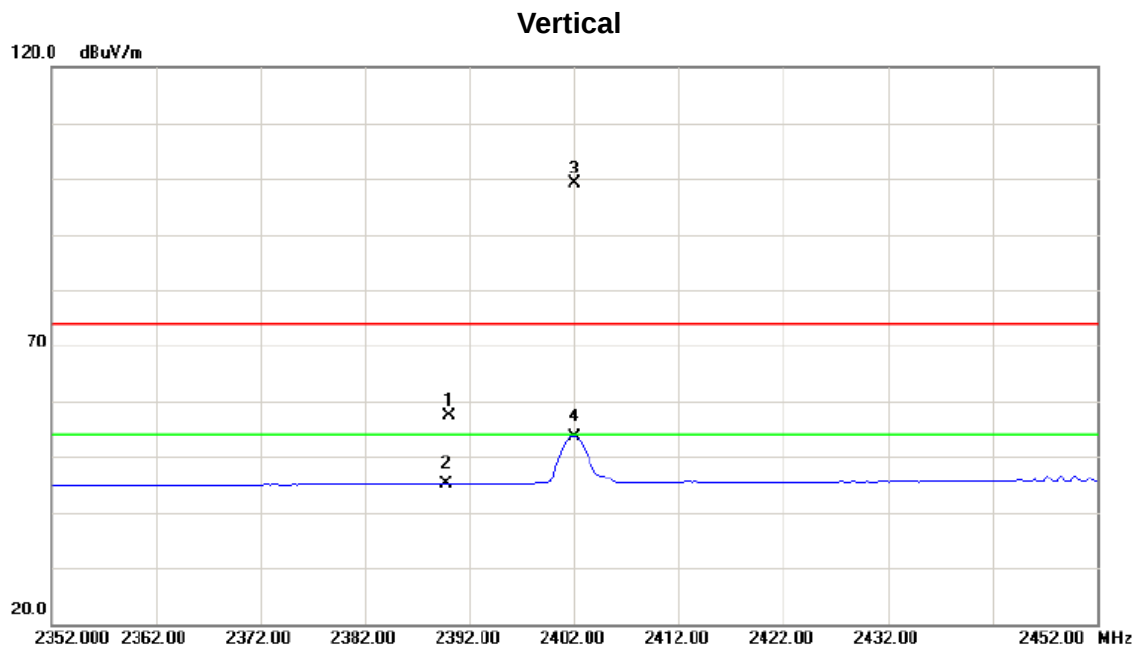
### Horizontal



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 73.6500  | 36.31         | -17.14         | 19.17       | 40.00  | -20.83 | peak           |              |         |
| 2   |     | 262.8000 | 39.49         | -14.60         | 24.89       | 46.00  | -21.11 | peak           |              |         |
| 3   |     | 359.8000 | 35.09         | -12.35         | 22.74       | 46.00  | -23.26 | peak           |              |         |
| 4   |     | 510.1500 | 32.03         | -9.25          | 22.78       | 46.00  | -23.22 | peak           |              |         |
| 5   |     | 733.2500 | 31.95         | -5.43          | 26.52       | 46.00  | -19.48 | peak           |              |         |
| 6   | *   | 866.6250 | 30.53         | -3.86          | 26.67       | 46.00  | -19.33 | peak           |              |         |

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

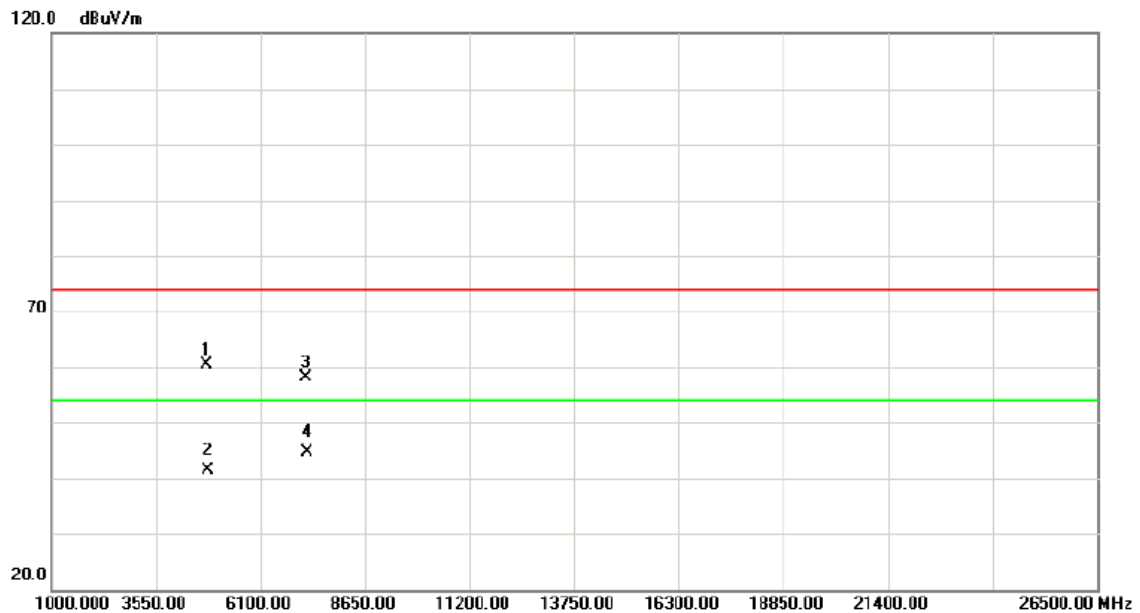
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2402MHz _CH00_1Mbps |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment  |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|----------|
| 1   |     | 2390.000     | 26.05                    | 31.29                   | 57.34                      | 74.00           | -16.66     | peak                    |                           |          |
| 2   |     | 2390.000     | 13.83                    | 31.29                   | 45.12                      | 54.00           | -8.88      | AVG                     |                           |          |
| 3   | *   | 2402.000     | 67.83                    | 31.34                   | 99.17                      | 74.00           | 25.17      | peak                    |                           | NO LIMIT |
| 4   |     | 2402.000     | 22.31                    | 31.34                   | 53.65                      | 54.00           | -0.35      | AVG                     |                           | NO LIMIT |

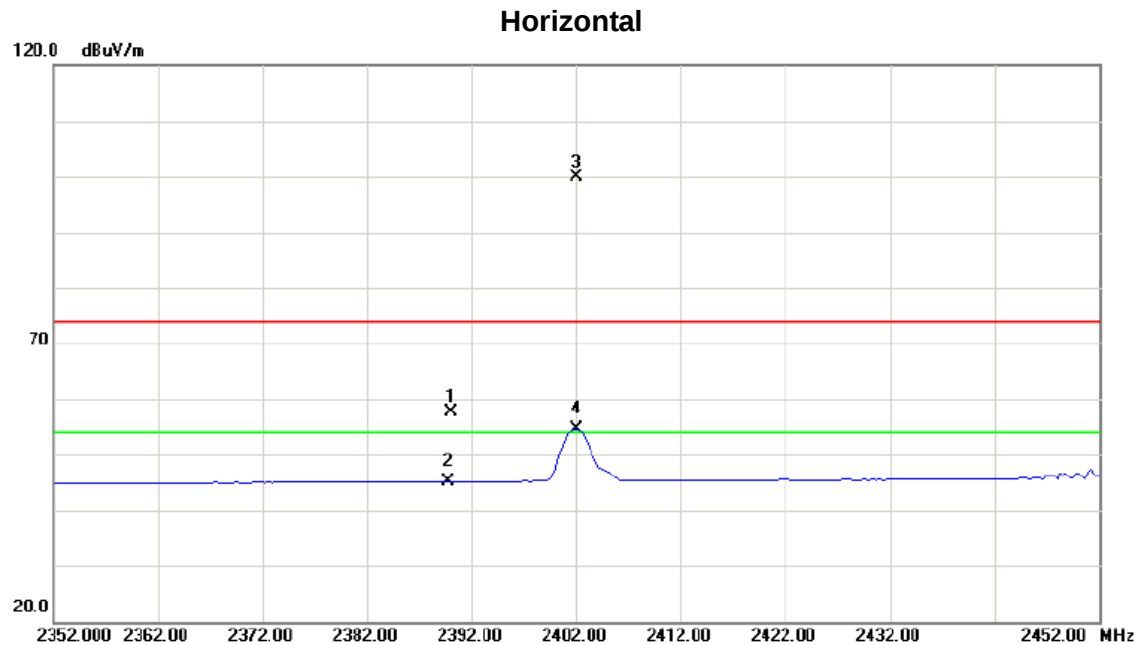
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2402MHz _CH00_1Mbps |

### Vertical



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 4804.025 | 52.93         | 7.57           | 60.50       | 74.00  | -13.50 | peak           |              |         |
| 2   |     | 4804.025 | 33.78         | 7.57           | 41.35       | 54.00  | -12.65 | AVG            |              |         |
| 3   |     | 7208.675 | 44.16         | 13.86          | 58.02       | 74.00  | -15.98 | peak           |              |         |
| 4   | *   | 7208.675 | 30.66         | 13.86          | 44.52       | 54.00  | -9.48  | AVG            |              |         |

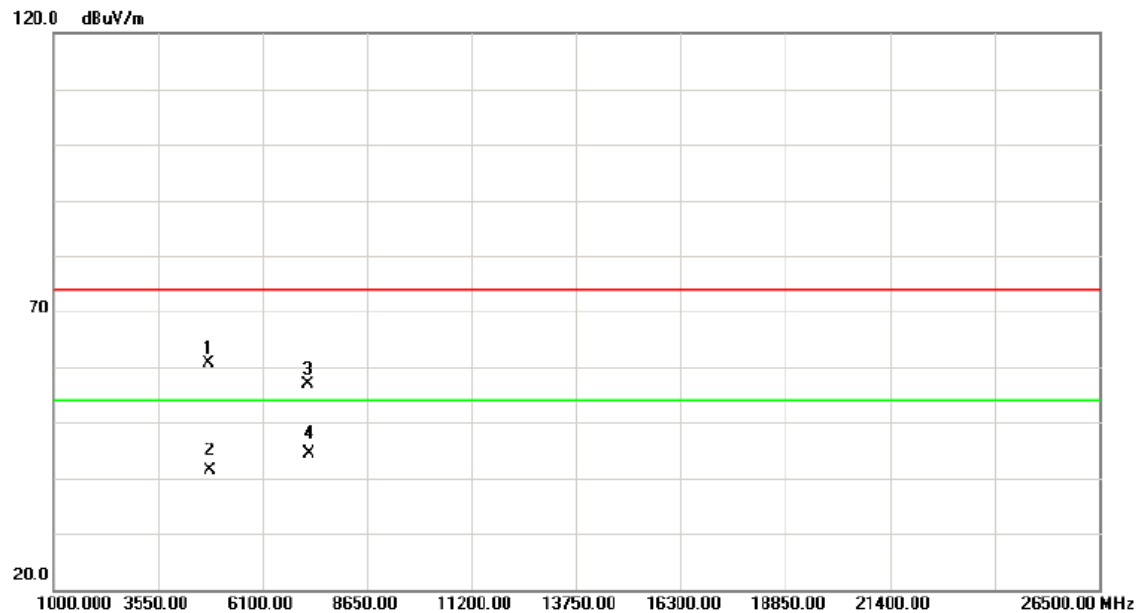
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2402MHz _CH00_1Mbps |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree | Comment  |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|----------|
| 1   |     | 2390.000     | 26.35                    | 31.29                   | 57.64                      | 74.00           | -16.36     | peak                    |                 |          |
| 2   |     | 2390.000     | 13.85                    | 31.29                   | 45.14                      | 54.00           | -8.86      | AVG                     |                 |          |
| 3   | *   | 2402.000     | 68.66                    | 31.34                   | 100.00                     | 74.00           | 26.00      | peak                    |                 | NO LIMIT |
| 4   | X   | 2402.000     | 23.33                    | 31.34                   | 54.67                      | 54.00           | 0.67       | AVG                     |                 | NO LIMIT |

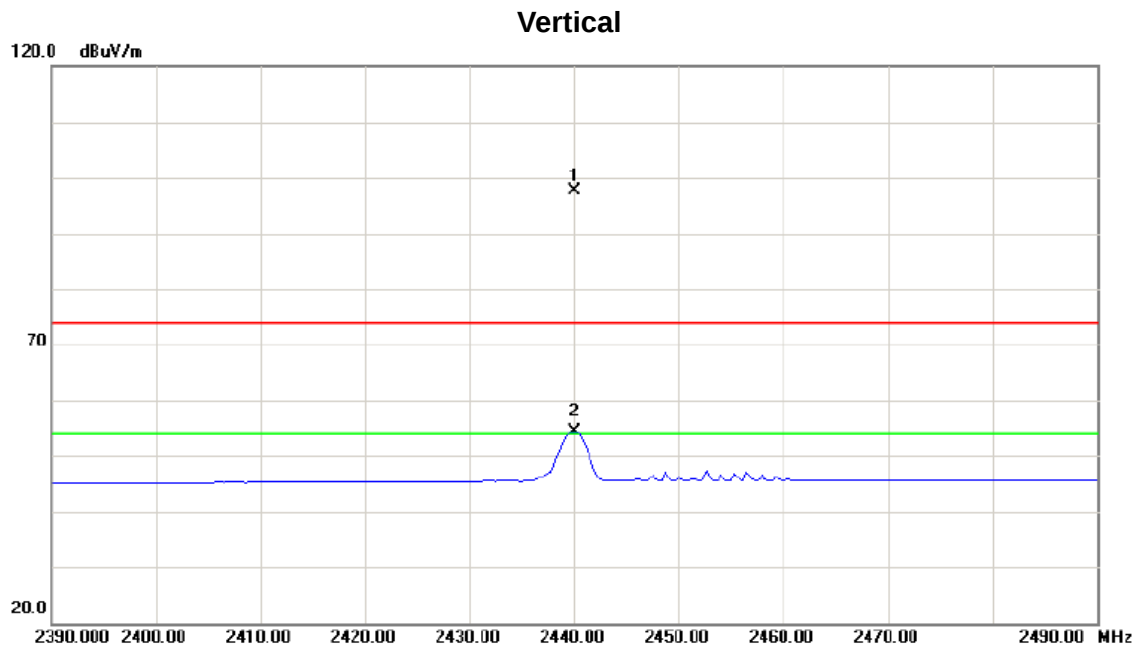
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2402MHz _CH00_1Mbps |

### Horizontal



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 4803.800 | 52.96         | 7.57           | 60.53       | 74.00  | -13.47 | peak           |              |         |
| 2   |     | 4803.800 | 33.69         | 7.57           | 41.26       | 54.00  | -12.74 | AVG            |              |         |
| 3   |     | 7205.400 | 42.90         | 13.86          | 56.76       | 74.00  | -17.24 | peak           |              |         |
| 4   | *   | 7205.400 | 30.63         | 13.86          | 44.49       | 54.00  | -9.51  | AVG            |              |         |

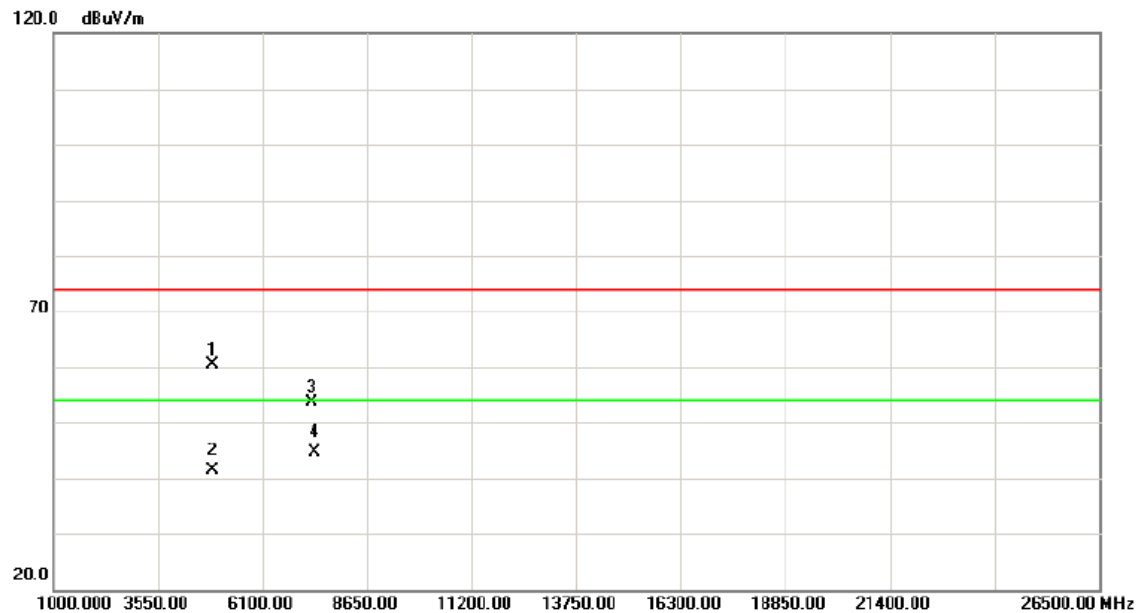
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2440MHz _CH19_1Mbps |



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over  | Antenna Height | Table Degree |          |
|-----|-----|----------|---------------|----------------|-------------|--------|-------|----------------|--------------|----------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB    | Detector       | cm           | degree   |
| 1   | *   | 2440.000 | 66.29         | 31.44          | 97.73       | 74.00  | 23.73 | peak           |              | NO LIMIT |
| 2   | X   | 2440.000 | 22.97         | 31.44          | 54.41       | 54.00  | 0.41  | AVG            |              | NO LIMIT |

|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2440MHz _CH19_1Mbps |

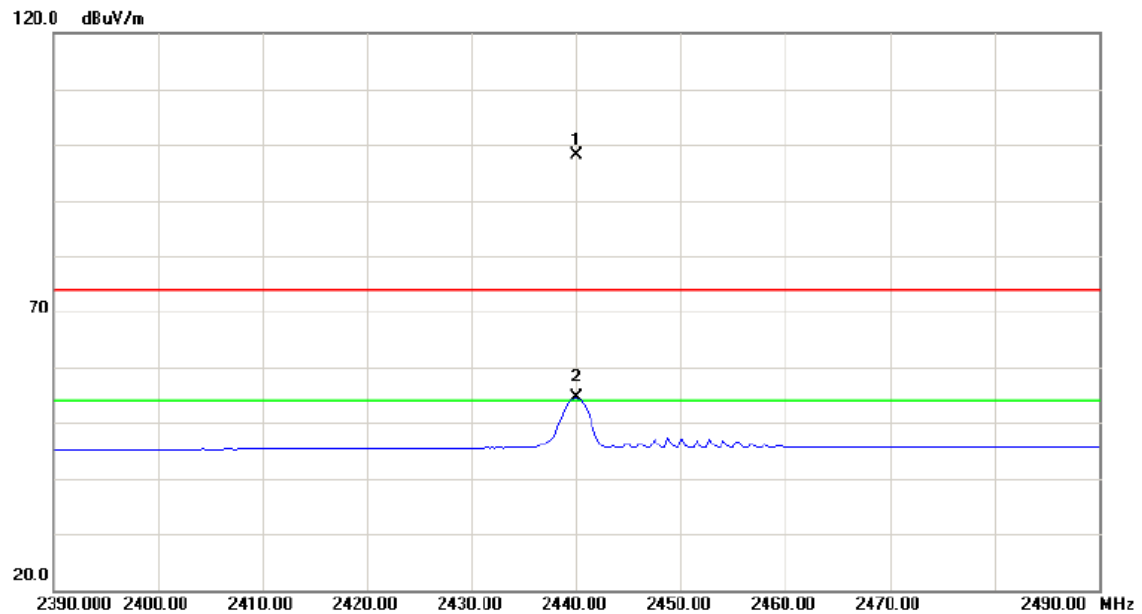
### Vertical



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 4879.275 | 52.60         | 7.87           | 60.47       | 74.00  | -13.53 | peak           |              |         |
| 2   |     | 4879.275 | 33.40         | 7.87           | 41.27       | 54.00  | -12.73 | AVG            |              |         |
| 3   |     | 7315.025 | 39.53         | 14.18          | 53.71       | 74.00  | -20.29 | peak           |              |         |
| 4   | *   | 7315.025 | 30.48         | 14.18          | 44.66       | 54.00  | -9.34  | AVG            |              |         |

|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2440MHz _CH19_1Mbps |

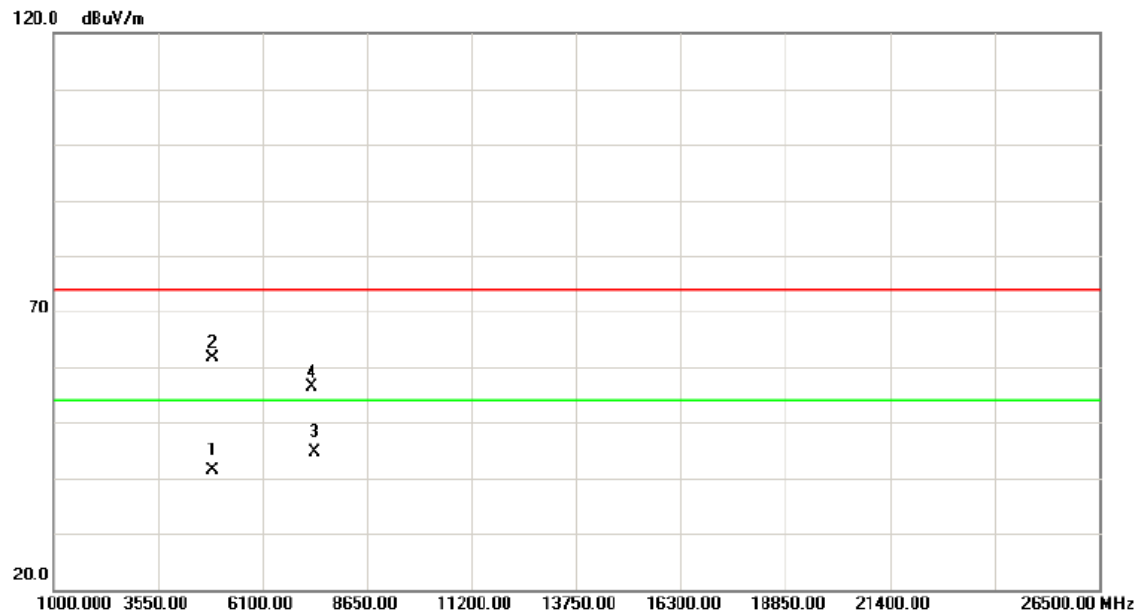
### Horizontal



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over  | Antenna Height | Table Degree |          |
|-----|-----|----------|---------------|----------------|-------------|--------|-------|----------------|--------------|----------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB    | cm             | degree       | Comment  |
| 1   | *   | 2440.000 | 66.67         | 31.44          | 98.11       | 74.00  | 24.11 | peak           |              | NO LIMIT |
| 2   | X   | 2440.000 | 23.10         | 31.44          | 54.54       | 54.00  | 0.54  | AVG            |              | NO LIMIT |

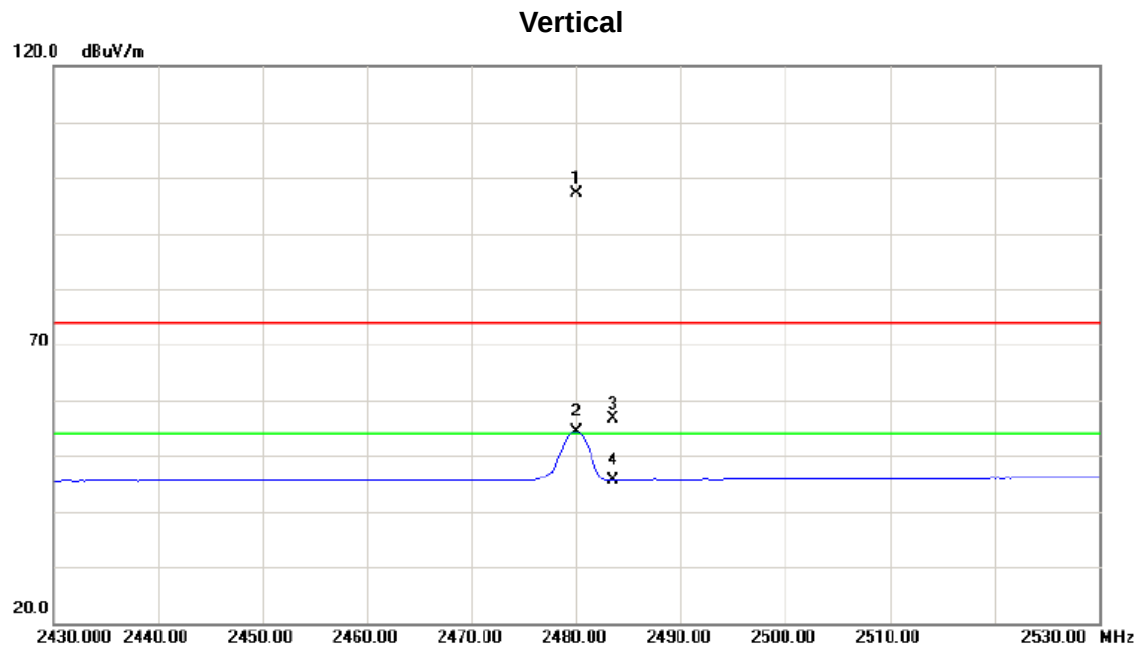
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2440MHz _CH19_1Mbps |

### Horizontal



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 4879.325 | 33.47         | 7.87           | 41.34       | 54.00  | -12.66 | AVG            |              |         |
| 2   |     | 4879.325 | 53.71         | 7.87           | 61.58       | 74.00  | -12.42 | peak           |              |         |
| 3   | *   | 7317.000 | 30.52         | 14.19          | 44.71       | 54.00  | -9.29  | AVG            |              |         |
| 4   |     | 7317.000 | 42.25         | 14.19          | 56.44       | 74.00  | -17.56 | peak           |              |         |

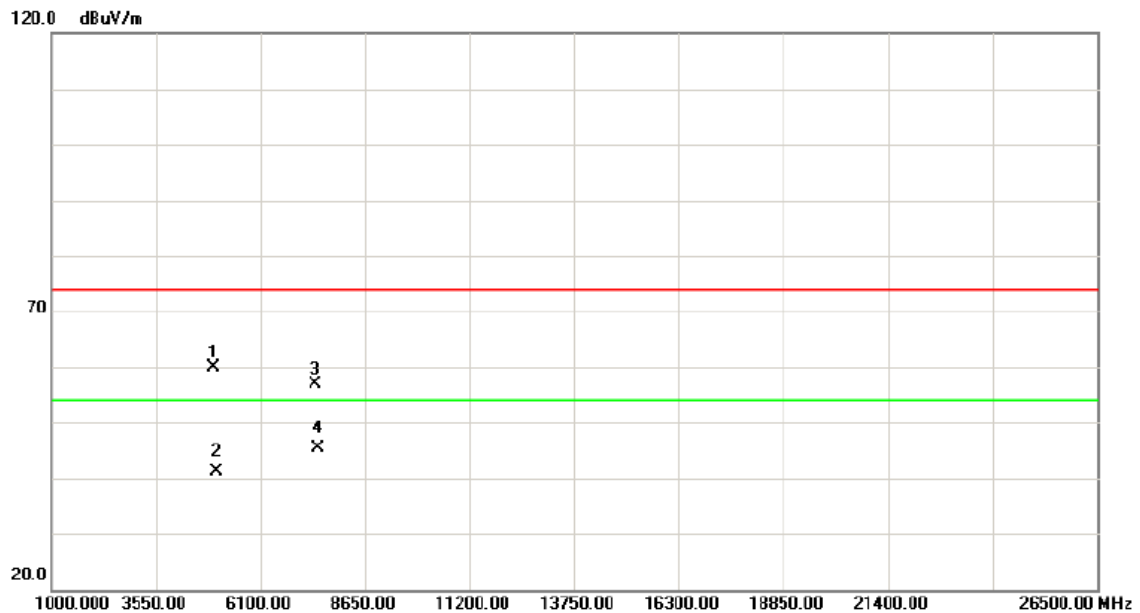
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2480MHz _CH39_1Mbps |



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |          |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|----------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment  |
| 1   | *   | 2480.000 | 65.52         | 31.56          | 97.08       | 74.00  | 23.08  | peak           |              | NO LIMIT |
| 2   | X   | 2480.000 | 22.85         | 31.56          | 54.41       | 54.00  | 0.41   | AVG            |              | NO LIMIT |
| 3   |     | 2483.500 | 25.11         | 31.57          | 56.68       | 74.00  | -17.32 | peak           |              |          |
| 4   |     | 2483.500 | 14.17         | 31.57          | 45.74       | 54.00  | -8.26  | AVG            |              |          |

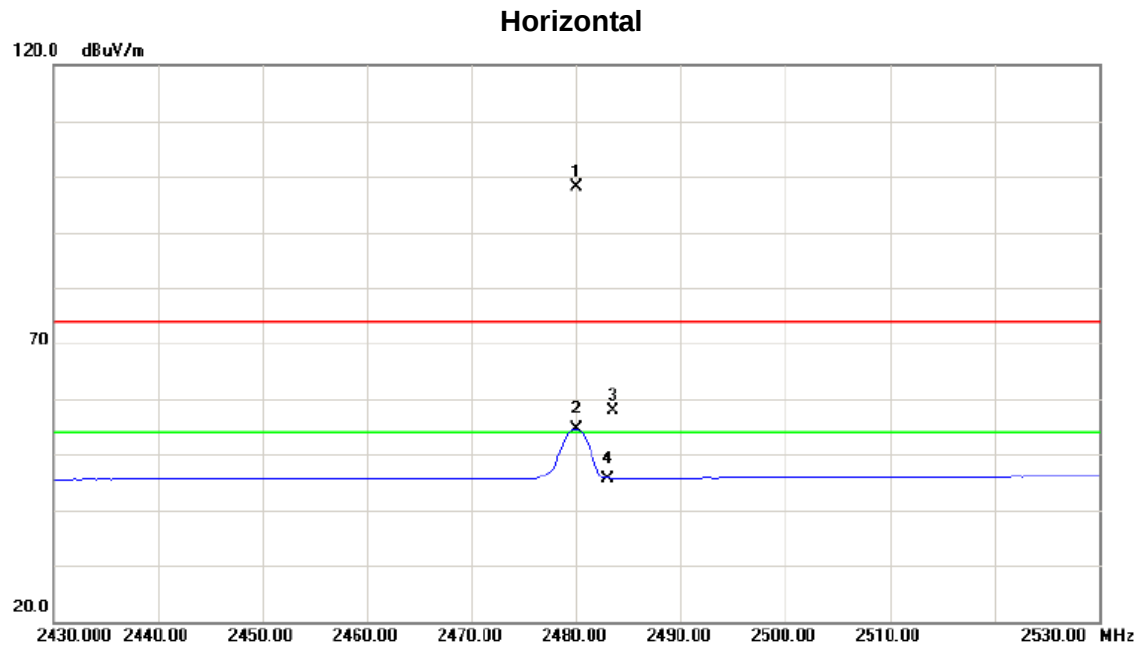
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2480MHz _CH39_1Mbps |

### Vertical



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 4959.413 | 51.62         | 8.17           | 59.79       | 74.00  | -14.21 | peak           |              |         |
| 2   |     | 4959.413 | 32.99         | 8.17           | 41.16       | 54.00  | -12.84 | AVG            |              |         |
| 3   |     | 7442.450 | 42.42         | 14.57          | 56.99       | 74.00  | -17.01 | peak           |              |         |
| 4   | *   | 7442.450 | 30.93         | 14.57          | 45.50       | 54.00  | -8.50  | AVG            |              |         |

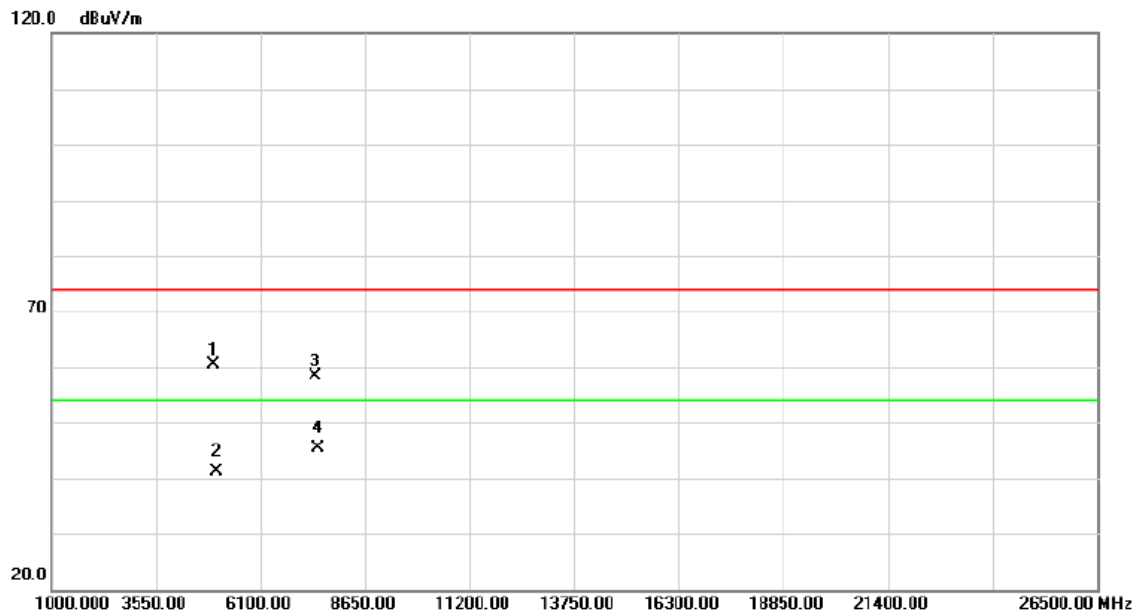
|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2480MHz _CH39_1Mbps |



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |          |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|----------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment  |
| 1   | *   | 2480.000 | 66.47         | 31.56          | 98.03       | 74.00  | 24.03  | peak           |              | NO LIMIT |
| 2   | X   | 2480.000 | 23.03         | 31.56          | 54.59       | 54.00  | 0.59   | AVG            |              | NO LIMIT |
| 3   |     | 2483.500 | 26.33         | 31.57          | 57.90       | 74.00  | -16.10 | peak           |              |          |
| 4   |     | 2483.500 | 14.12         | 31.57          | 45.69       | 54.00  | -8.31  | AVG            |              |          |

|                   |                        |
|-------------------|------------------------|
| Orthogonal Axis : | X                      |
| Test Mode :       | TX 2480MHz _CH39_1Mbps |

### Horizontal

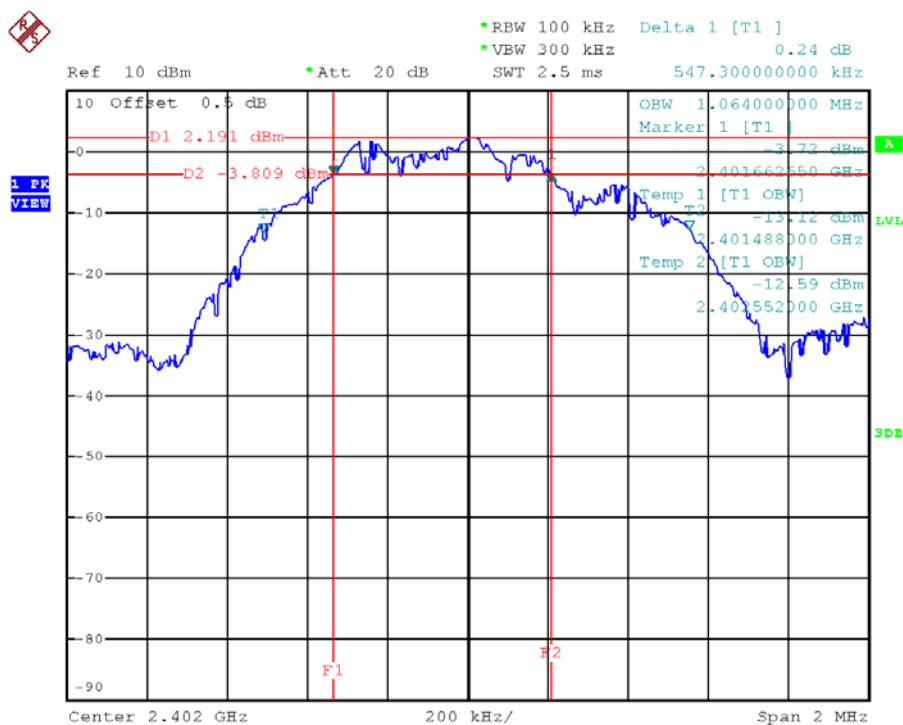


| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 4959.688 | 52.31         | 8.18           | 60.49       | 74.00  | -13.51 | peak           |              |         |
| 2   |     | 4959.688 | 33.00         | 8.18           | 41.18       | 54.00  | -12.82 | AVG            |              |         |
| 3   |     | 7441.225 | 43.85         | 14.57          | 58.42       | 74.00  | -15.58 | peak           |              |         |
| 4   | *   | 7441.225 | 30.93         | 14.57          | 45.50       | 54.00  | -8.50  | AVG            |              |         |

## **ATTACHMENT E - BANDWIDTH**

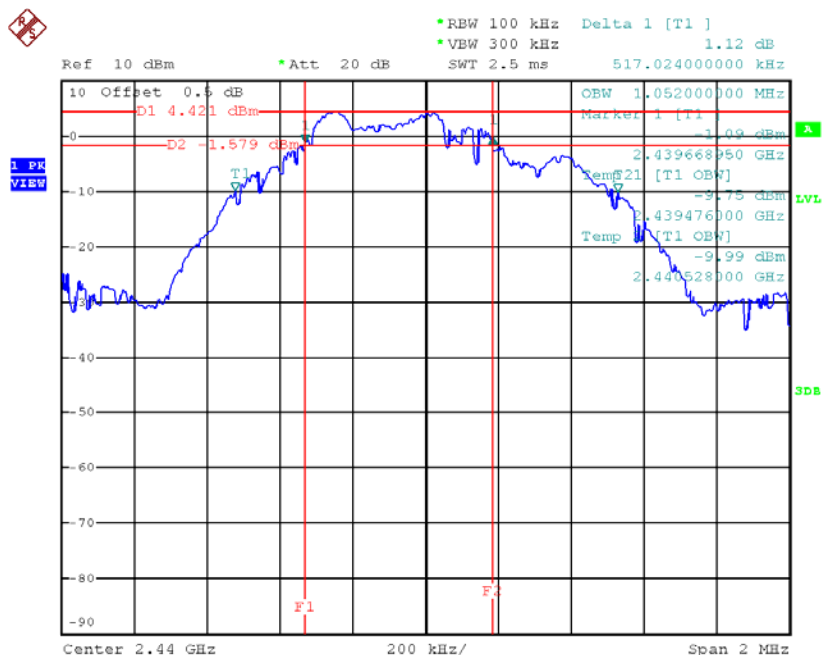
| Frequency (MHz) | 6dB Bandwidth (MHz) | 99% Occupied BW (MHz) | Min. Limit (kHz) | Test Result |
|-----------------|---------------------|-----------------------|------------------|-------------|
| 2402            | 0.547               | 1.064                 | 500              | Complies    |
| 2440            | 0.517               | 1.052                 | 500              | Complies    |
| 2480            | 0.537               | 1.056                 | 500              | Complies    |

### TX CH00



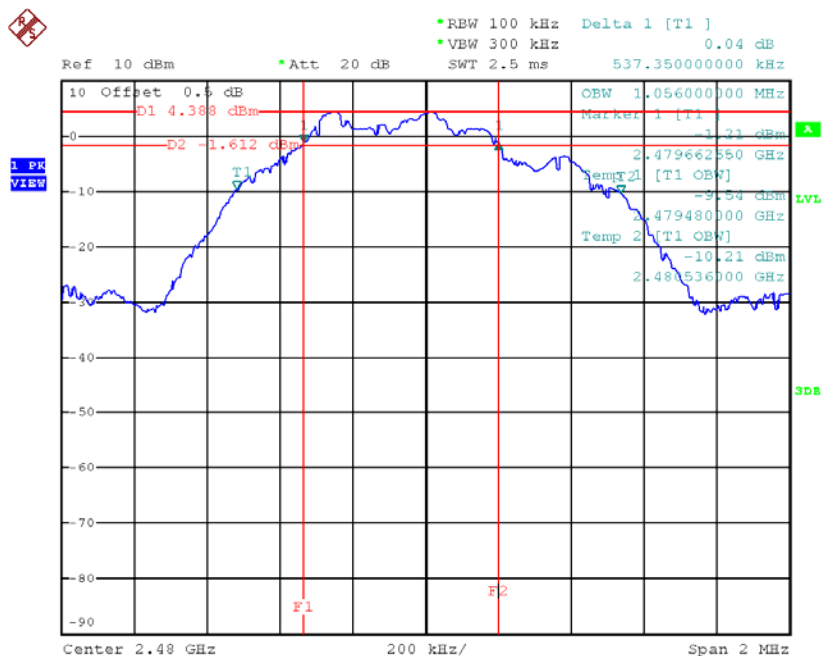
Date: 11.JUN.2015 12:49:20

# TX CH19



Date: 8.JUN.2015 15:44:58

# TX CH39



Date: 8.JUN.2015 15:45:54

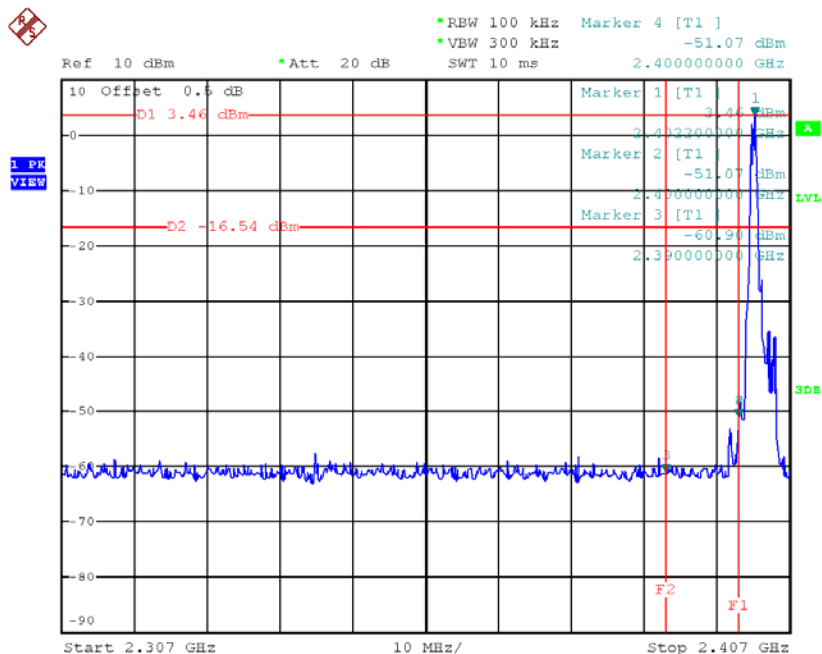
## ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

| Frequency (MHz) | Conducted Power (dBm) | Conducted Power (Watt) | Max. Limit (dBm) | Max. Limit (Watt) | Test Result | Point to Point Max. Limit(dBm) | Max. Limit(W) |
|-----------------|-----------------------|------------------------|------------------|-------------------|-------------|--------------------------------|---------------|
| 2402            | 3.87                  | 0.0024                 | 30.00            | 1.00              | Complies    | 30.00                          | 1.0000        |
| 2440            | 4.98                  | 0.0031                 | 30.00            | 1.00              | Complies    | 30.00                          | 1.0000        |
| 2480            | 4.92                  | 0.0031                 | 30.00            | 1.00              | Complies    | 30.00                          | 1.0000        |

## **ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION**

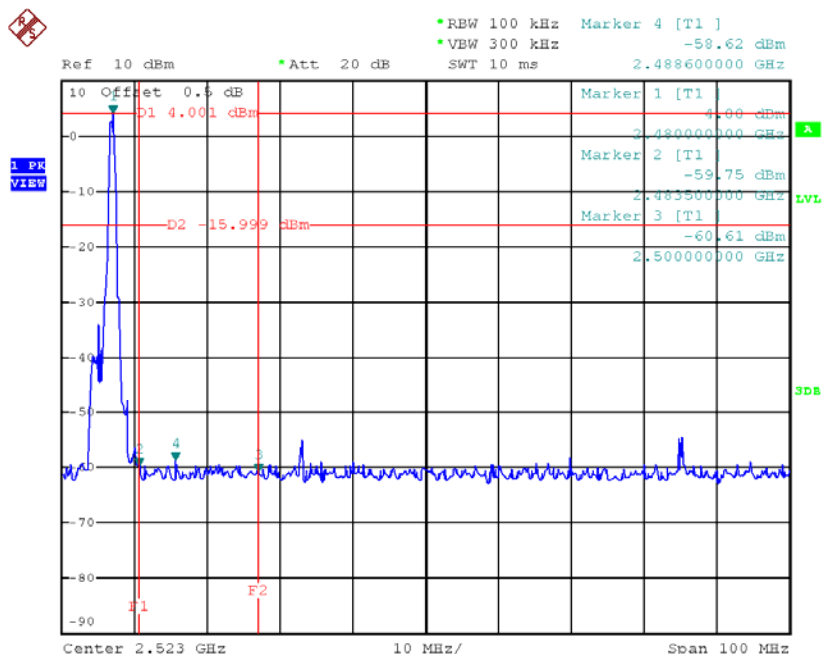
Test Mode : CH00, CH19 , CH39 - 1Mbps

### CH00 (Lower) - 1Mbps



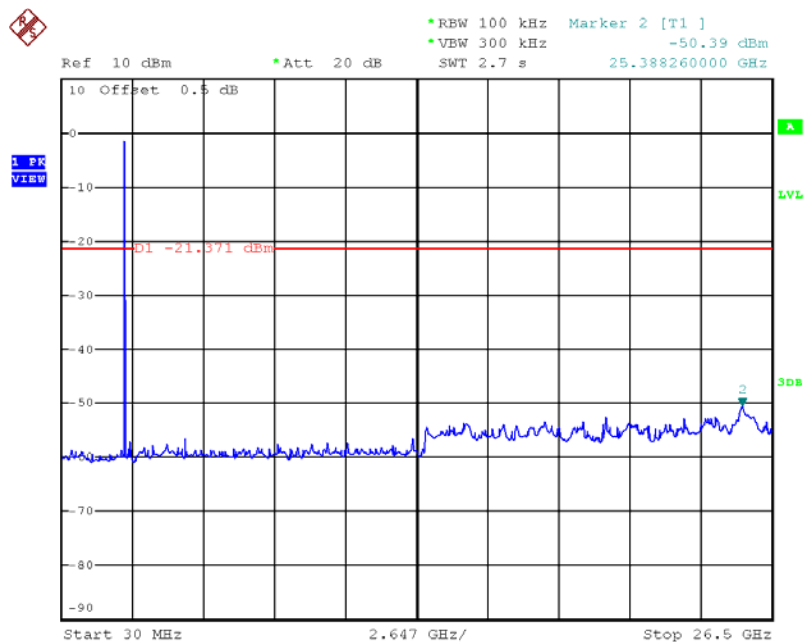
Date: 8.JUN.2015 15:54:22

### CH39 (upper) - 1Mbps



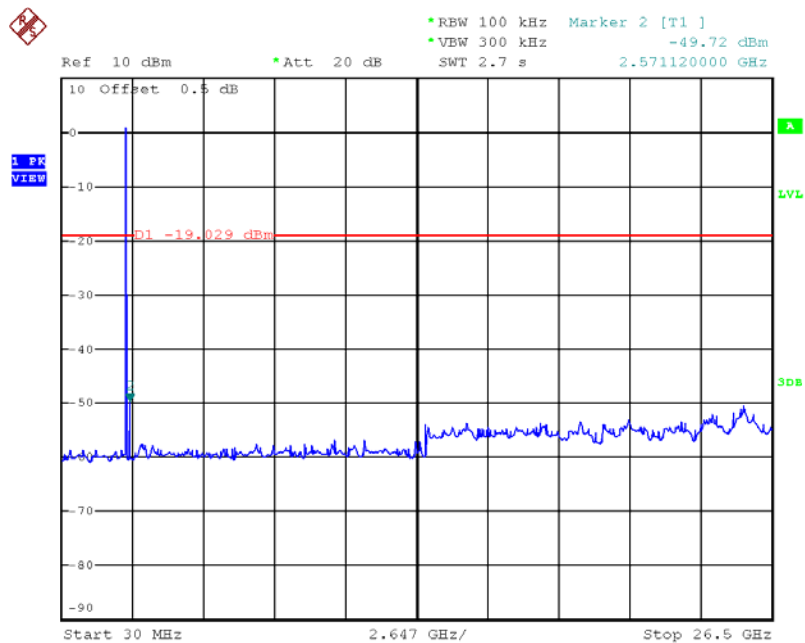
Date: 8.JUN.2015 15:49:32

### CH00 (10 Harmonic of the frequency)



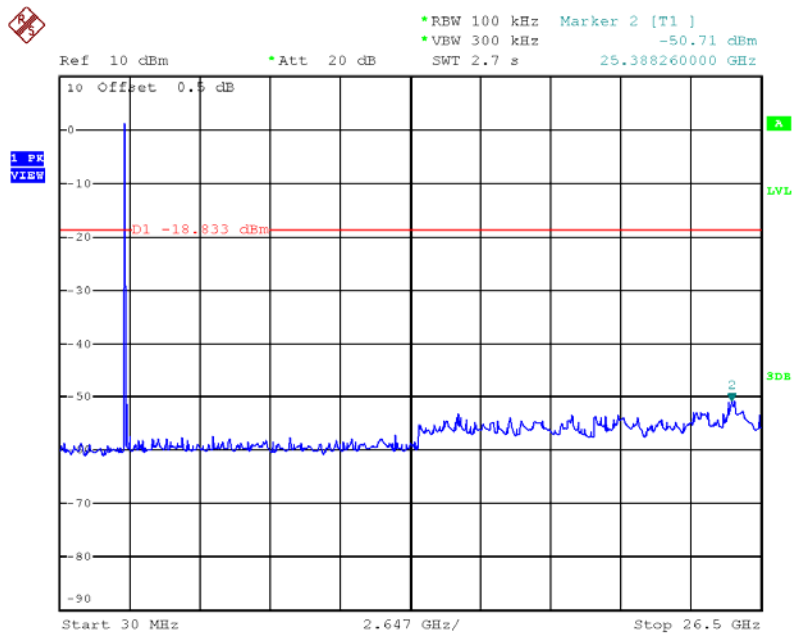
Date: 8.JUN.2015 15:54:15

### CH19 (10 Harmonic of the frequency)



Date: 8.JUN.2015 16:01:32

### CH39 (10 Harmonic of the frequency)

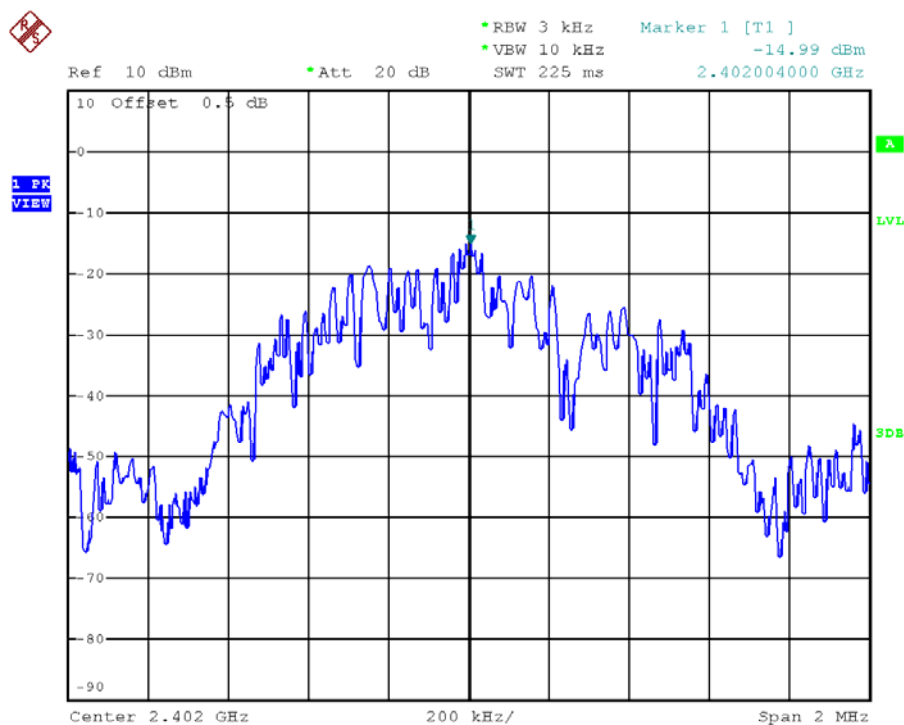


Date: 8.JUN.2015 15:57:49

## **ATTACHMENT H - POWER SPECTRAL DENSITY TEST**

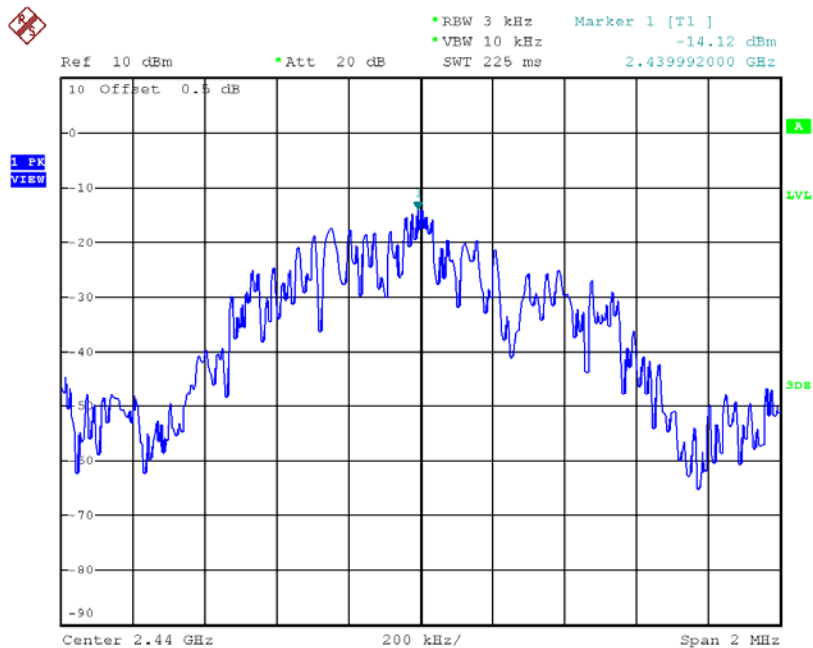
| Frequency (MHz) | Power Density (dBm) | Max. Limit (dBm) | Result   |
|-----------------|---------------------|------------------|----------|
| 2402            | -14.99              | 8                | Complies |
| 2440            | -14.12              | 8                | Complies |
| 2480            | -14.12              | 8                | Complies |

### TX CH00



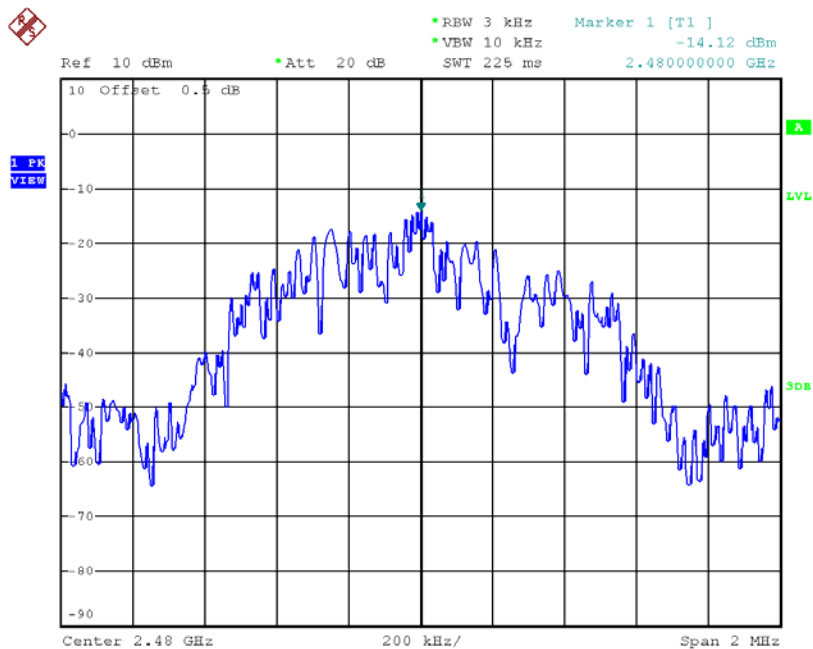
Date: 8.JUN.2015 15:44:18

### TX CH19



Date: 8.JUN.2015 15:45:19

### TX CH39



Date: 8.JUN.2015 15:47:05