

FCC PART 15.249  
EMI MEASUREMENT AND TEST REPORT  
For

Dongguan Jiuyue Electro-acoustic Co. Ltd  
South of Da wei No.2,JingLian old road, Qiaotou Town,Dongguan, China

**FCC ID:2ACY6JY-033**

Trade: JOYING

|                                          |                                                                                                                                  |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| This Report Concerns:<br>Original Report | Equipment Type:<br>Bluetooth headset                                                                                             |
| Test Engineer:                           | Lisa Chen <i>Lisa Chen</i>                                                                                                       |
| Report No.:                              | BSL20151014-1                                                                                                                    |
| Receive EUT<br>Date/Test Date:           | October 08, 2015/<br>October 08- October 14, 2015                                                                                |
| Reviewed By:                             | Mike moo <i>Mike moo</i>                                                                                                         |
| Prepared By:                             | <b>BSL Testing Co.,LTD.</b><br>NO. 24, ZH Park, Nantou, Shenzhen, 518000 China<br>Tel: 86- 755-26508703<br>Fax: 86- 755-26508703 |

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## 1. GENERAL INFORMATION

### 1.1. Report information

- 1.1.1.This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BSL approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BSL in any way guarantees the later performance of the product/equipment.
- 1.1.2.The sample/s mentioned in this report is/are supplied by Applicant, BSL therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 1.1.3.Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BSL, unless the applicant has authorized BSL in writing to do so.

Test Facility -

The test site used to collect the radiated data is located on the address of BSL Testing Co.,LTD.

(FCC Registered Test Site Number: 191509) on

NO. 24, ZH Park, Nantou, Shenzhen, 518000 China

The Test Site is constructed and calibrated to meet the FCC requirements.

### 1.2. Measurement Uncertainty

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

| No. | Item                          | Uncertainty |
|-----|-------------------------------|-------------|
| 1   | Conducted Emission Test       | +/-1.25dB   |
| 2   | RF Power, Conducted           | +/-0.20dB   |
| 3   | Spurious emissions, conducted | +/-0.33dB   |
| 4   | All emissions, radiated (<1G) | +/-3.47dB   |
| 5   | All emissions, radiated (>1G) | +/-3.82dB   |
| 6   | Temperature                   | +/-0.5°CdB  |
| 7   | Humidity                      | +/-2%       |

## 2. PRODUCT DESCRIPTION

### 2.1. EUT Description

|                    |                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Description        | : Bluetooth headset                                                                                                |
| Applicant          | : Dongguan Jiuyue Electro-acoustic Co. Ltd<br>South of Da wei No.2,JingLian old road, Qiaotou Town,Dongguan, China |
| Manufacturer       | : Dongguan Jiuyue Electro-acoustic Co. Ltd<br>South of Da wei No.2,JingLian old road, Qiaotou Town,Dongguan, China |
| Model Number       | : JY-033,EL67                                                                                                      |
| Modulation type    | : GFSK                                                                                                             |
| Antenna gain       | : 0dBi                                                                                                             |
| BT version         | : V4.0 (no Support EDR and BLE Because of the firmware limitation)                                                 |
| Antenna type       | : PCB Antenna                                                                                                      |
| Frequency          | : 2402-2480MHz                                                                                                     |
| Number of Channels | : 79 Channels                                                                                                      |
| Power Supply       | : DC 3.7V Battery                                                                                                  |
| Hardware version   | : V1                                                                                                               |
| Software version   | : V1                                                                                                               |
| Serial Number      | : 20151014                                                                                                         |

| Channel List |                 |         |                 |         |                 |
|--------------|-----------------|---------|-----------------|---------|-----------------|
| Channel      | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00           | 2402            | 27      | 2429            | 54      | 2456            |
| 01           | 2403            | 28      | 2430            | 55      | 2457            |
| 02           | 2404            | 29      | 2431            | 56      | 2458            |
| 03           | 2405            | 30      | 2432            | 57      | 2459            |
| 04           | 2406            | 31      | 2433            | 58      | 2460            |
| 05           | 2407            | 32      | 2434            | 59      | 2461            |
| 06           | 2408            | 33      | 2435            | 60      | 2462            |
| 07           | 2409            | 34      | 2436            | 61      | 2463            |
| 08           | 2410            | 35      | 2437            | 62      | 2464            |
| 09           | 2411            | 36      | 2438            | 63      | 2465            |
| 10           | 2412            | 37      | 2439            | 64      | 2466            |
| 11           | 2413            | 38      | 2440            | 65      | 2467            |
| 12           | 2414            | 39      | 2441            | 66      | 2468            |
| 13           | 2415            | 40      | 2442            | 67      | 2469            |
| 14           | 2416            | 41      | 2443            | 68      | 2470            |
| 15           | 2417            | 42      | 2444            | 69      | 2471            |
| 16           | 2418            | 43      | 2445            | 70      | 2472            |
| 17           | 2419            | 44      | 2446            | 71      | 2473            |
| 18           | 2420            | 45      | 2447            | 72      | 2474            |
| 19           | 2421            | 46      | 2448            | 73      | 2475            |
| 20           | 2422            | 47      | 2449            | 74      | 2476            |
| 21           | 2423            | 48      | 2450            | 75      | 2477            |
| 22           | 2424            | 49      | 2451            | 76      | 2478            |
| 23           | 2425            | 50      | 2452            | 77      | 2479            |
| 24           | 2426            | 51      | 2453            | 78      | 2480            |
| 25           | 2427            | 52      | 2454            |         |                 |
| 26           | 2428            | 53      | 2455            |         |                 |

The series products, model name: JY-033,EL67 have the same circuit diagram,PCB layout, software, RF Module, Features and functionality. The differences are the model name, so, we select JY-033 to test.

## 2.2. Block Diagram of EUT Configuration

Radiated test :



Conducted test:

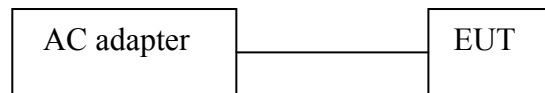


Figure 1 EUT Setup

## 2.3. Support Equipment List

| Name       | Model No        | S/N | Manufacturer | Used (Y/N) |
|------------|-----------------|-----|--------------|------------|
| AC adapter | GEO101U-050100W | -   | I.T.E        | Y          |
| -          | -               | -   | -            | -          |

## 2.4. Test Conditions

It must provide an operational voltage (3.7V DC by Battery) to turn on the Bluetooth headset and on one certain channel in service mode by means of company proprietary software.

the test software name: CSR8635 test Software.

After the preliminary test, we found to emit the worst emissions and therefore had been tested under operating condition.

during the test the eut use the fully-charged battery

The EUT Themselves can enter the test mode.

Power setting parameters For mode:

**GFSK (PK Power:-2dbm).**

For the EUT was tested with Channel Frequency 2402MHz, 2440MHz and 2480MHz.

### 3. TEST RESULTS SUMMARY

#### FCC 15 Subpart C, Paragraph 15.249:2013

| FCC Rules                           | Description of Test                              | Result    |
|-------------------------------------|--------------------------------------------------|-----------|
| Section 15.207                      | Conducted Emission                               | Compliant |
| Section 15.249(a)                   | The fundamental field strength and the harmonics | Compliant |
| Section 15.209<br>Section 15.249(d) | Radiated Emission                                | Compliant |
| Section 15.249(d)                   | Band Edge                                        | Compliant |
| Section 15.203                      | Antenna Requirement                              | Compliant |
| Section 15.249                      | 20dB Bandwidth                                   | Compliant |

Remark: "N/A" means "Not applicable".

Statement: All testing was performed using the test procedures found in ANSI C63.4-2003.

#### Modifications

No modification was made.

#### 4. TEST EQUIPMENT USED

| EQUIPMENT/FACILITIES            | MANUFACTURER     | MODEL                        | SERIAL NO. | DATE OF CAL. | CAL. INTERVAL |
|---------------------------------|------------------|------------------------------|------------|--------------|---------------|
| 3m Semi-Anechoic Chamber        | Chengyu Electron | 9 (L)*6 (W)* 6 (H)           | BSL086     | Aug. 23 2015 | 1 Year        |
| EMI Test Receiver               | Rohde & Schwarz  | ESCI3                        | BSL001     | Sep. 28 2015 | 1 Year        |
| BiConiLog Antenna               | Rohde & Schwarz  | HL562<br>(30MHz—3GHz)        | BSL009     | Sep. 28 2015 | 1 Year        |
| Double -ridged waveguide horn   | Rohde & Schwarz  | BBHA9120D<br>(1—18GHz)       | BSL008     | Aug. 27 2015 | 1 Year        |
| Horn Antenna                    | AHS              | SAS-574<br>(18GHz—40GHz)     | BSL072     | Dec. 28 2014 | 1 Year        |
| Cable                           | PUTIANLE         | BSL045<br>(9 kHz-40GHz)      | BSL045     | Aug. 27 2015 | 1 Year        |
| Cable                           | PUTIANLE         | BSL046<br>(9 kHz-40GHz)      | BSL046     | Aug. 27 2015 | 1 Year        |
| Cable                           | PUTIANLE         | BSL047<br>(9 kHz-40GHz)      | BSL047     | Aug. 27 2015 | 1 Year        |
| Amplifier(100kHz-40GHz)         | R&S              | SMR40                        | BSL007     | Sep. 28 2015 | 1 Year        |
| Band filter                     | Amindeon         | 82346                        | BSL049     | Aug. 27 2015 | 1 Year        |
| Active Loop Antenna             | Schwarzbeck      | FMZB1519<br>(9 kHz - 30 MHz) | BSL011     | Sep. 28 2015 | 1 Year        |
| Coaxial Switch                  | YUANFANG         | TA218B                       | BSL004     | Aug. 27 2015 | 1 Year        |
| Spectrum analyzer               | Rohde & Schwarz  | FSP40                        | BSL049     | Sep. 28 2015 | 1 Year        |
| Shielding Room                  | zhongyu Electron | 7.0(L)x3.0(W)x3.0(H)         | BSL085     | Sep. 28 2015 | 1 Year        |
| EMI Test Receiver               | R&S              | ESPI                         | BSL002     | Sep. 28 2015 | 1 Year        |
| 10dB Pulse Limita               | R&S              | BSL003                       | BSL003     | Sep. 28 2015 | 1 Year        |
| Coaxial Switch                  | PUTIANLE         | TA218B                       | BSL004     | Aug. 27 2015 | 1 Year        |
| LISN                            | Rohde & Schwarz  | ESH3-Y5                      | BSL005     | Sep. 28 2015 | 1 Year        |
| Coaxial Cable                   | PUTIANLE         | BSL048<br>(9 kHz-40GHz)      | BSL048     | Aug. 27 2015 | 1 Year        |
| the temporary antenna connector | BSL              | BSL1005                      | BSL1005    | Aug. 27 2015 | 1 Year        |
| EMI TEST SOFTWARE               | AUDIX            | E3                           | N/A        | N/A          | N/A           |

the temporary antenna connector model number BSL1005, impedance 50Ω, cable loss 0.5 dB.

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

## **5. ANTENNA REQUIREMENT**

### **5.1. Standard Applicable**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### **5.2. Antenna Connected Construction**

According to § 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The antenna used for this product is a PCB ANT .The antenna is permanently attached. Refer to the product photo.

### **5.3. Result**

Compliance

## 6. CONDUCTED POWER LINE TEST

### 6.1. Test Equipment

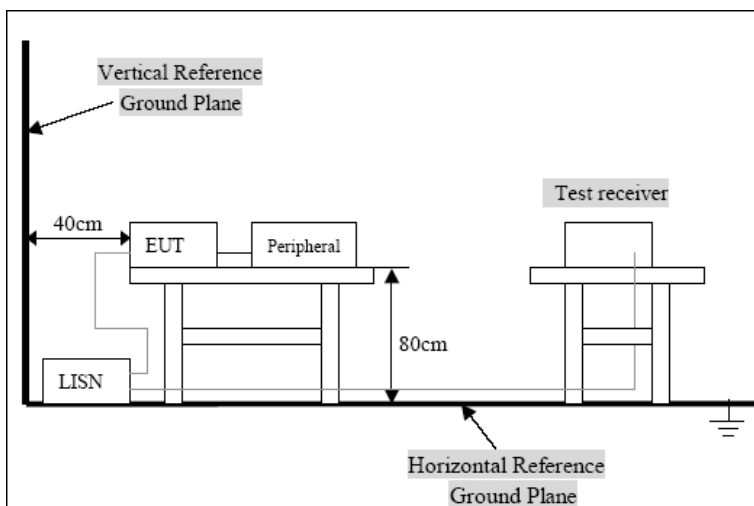
Please refer to section 4 this report.

### 6.2. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uh coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uh coupling impedance with 50ohm termination.

Both sides of A.C. Line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ASIN C63.4:2003 on conducted measurement. Conducted emissions were measured over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

### 6.3. Test Setup



For the actual test configuration, Please refer to the related items-Photos of testing

### 6.4. Conducted Power line Emission Limits

| FCC Part 15 Paragraph 15.207 (dBuV) |               |               |
|-------------------------------------|---------------|---------------|
| Frequency Range (MHZ)               | Class A QP/AV | Class B QP/AV |
| 0.15-0.5                            | 79/66         | 65-56/56-46   |
| 0.5-5.0                             | 73/60         | 56-46         |
| 5.0-3.0                             | 73/60         | 60-50         |

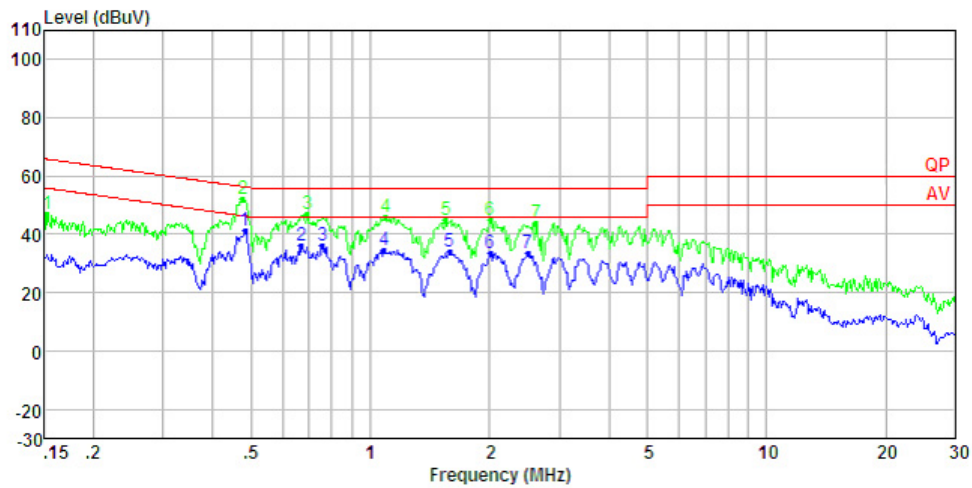
**Note:** In the above table, the tighter limit applies at the band edges.

## 6.5. Conducted Power Line Test Result

Pass

2402MHz Transmitting(Worst case mode)

power test voltage:AC 120V/60Hz



Condition:

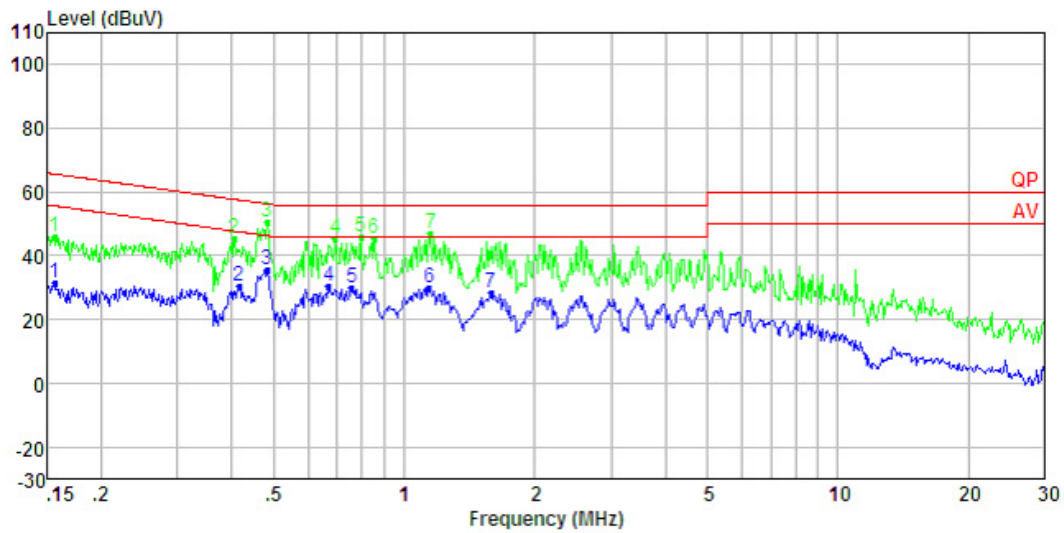
: RBW:9.000KHz VBW:30.000KHz

|       | Freq  | Level | Limit | Over  | Remark  | Pol/Phase |
|-------|-------|-------|-------|-------|---------|-----------|
|       | MHz   | dBuV  | Line  | Limit | dB      |           |
| 1     | 0.484 | 41.1  | 46.3  | -5.2  | Average | LINE      |
| 2 Max | 0.672 | 35.9  | 46.0  | -10.1 | Average | LINE      |
| 3     | 0.759 | 35.9  | 46.0  | -10.1 | Average | LINE      |
| 4     | 1.082 | 34.6  | 46.0  | -11.4 | Average | LINE      |
| 5     | 1.585 | 33.8  | 46.0  | -12.2 | Average | LINE      |
| 6     | 2.012 | 33.4  | 46.0  | -12.6 | Average | LINE      |
| 7     | 2.500 | 33.7  | 46.0  | -12.3 | Average | LINE      |

Condition:

: RBW:9.000KHz VBW:30.000KHz

|       | Freq  | Level | Limit | Over  | Remark | Pol/Phase |
|-------|-------|-------|-------|-------|--------|-----------|
|       | MHz   | dBuV  | Line  | Limit | dB     |           |
| 1     | 0.153 | 46.9  | 65.8  | -18.9 | QP     | LINE      |
| 2 Max | 0.476 | 52.1  | 56.4  | -4.3  | QP     | LINE      |
| 3     | 0.694 | 46.9  | 56.0  | -9.1  | QP     | LINE      |
| 4     | 1.094 | 45.8  | 56.0  | -10.2 | QP     | LINE      |
| 5     | 1.552 | 45.0  | 56.0  | -11.0 | QP     | LINE      |
| 6     | 2.012 | 44.7  | 56.0  | -11.3 | QP     | LINE      |
| 7     | 2.622 | 44.1  | 56.0  | -11.9 | QP     | LINE      |



Condition:

: RBW:9.000KHz VBW:30.000KHz

|       | Freq  | Level | Limit | Over  |         | Pol/Phase |
|-------|-------|-------|-------|-------|---------|-----------|
|       | MHz   | dBuV  | dBuV  | dB    | Remark  |           |
| 1     | 0.156 | 31.5  | 55.6  | -24.1 | Average | NEUTRAL   |
| 2     | 0.417 | 30.3  | 47.5  | -17.2 | Average | NEUTRAL   |
| 3 Max | 0.484 | 35.6  | 46.3  | -10.7 | Average | NEUTRAL   |
| 4     | 0.672 | 30.3  | 46.0  | -15.7 | Average | NEUTRAL   |
| 5     | 0.759 | 30.0  | 46.0  | -16.0 | Average | NEUTRAL   |
| 6     | 1.141 | 30.1  | 46.0  | -15.9 | Average | NEUTRAL   |
| 7     | 1.585 | 28.3  | 46.0  | -17.7 | Average | NEUTRAL   |

Condition:

: RBW:9.000KHz VBW:30.000KHz

|       | Freq  | Level | Limit | Over  |        | Pol/Phase |
|-------|-------|-------|-------|-------|--------|-----------|
|       | MHz   | dBuV  | dBuV  | dB    | Remark |           |
| 1     | 0.156 | 46.2  | 65.6  | -19.4 | QP     | NEUTRAL   |
| 2     | 0.406 | 45.6  | 57.7  | -12.1 | QP     | NEUTRAL   |
| 3 Max | 0.484 | 50.4  | 56.3  | -5.9  | QP     | NEUTRAL   |
| 4     | 0.694 | 45.5  | 56.0  | -10.5 | QP     | NEUTRAL   |
| 5     | 0.796 | 45.7  | 56.0  | -10.3 | QP     | NEUTRAL   |
| 6     | 0.853 | 45.5  | 56.0  | -10.5 | QP     | NEUTRAL   |
| 7     | 1.153 | 46.9  | 56.0  | -9.1  | QP     | NEUTRAL   |

## 7. RADIATED EMISSION TEST

### 7.1. Test Equipment

Please refer to section 4 this report.

### 7.2. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level.

Calibrated Loop antenna is used as receiving antenna for frequencies below 30MHz, Calibrated Bilog antenna is used as receiving antenna for frequencies between 30 MHz and 1 GHz, Calibrated Horn antenna is used as receiving antenna for frequencies above 1000MHz. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

The bandwidth of test receiver is set at 9kHz in below 30MHz. and set at 120kHz in 30-1000MHz, and 1MHz in above 1000MHz.

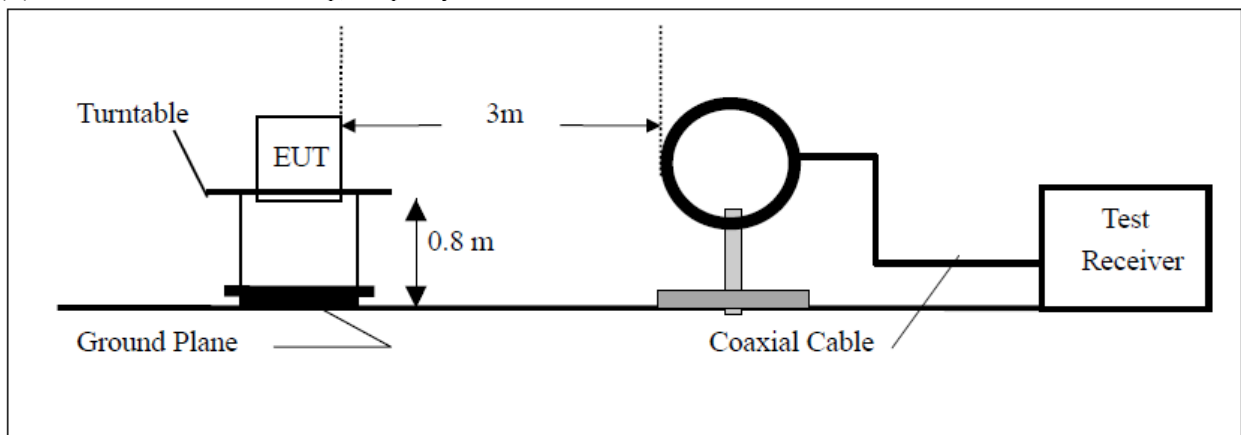
The frequency range from 9kHz to 25GHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Peak detector and Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

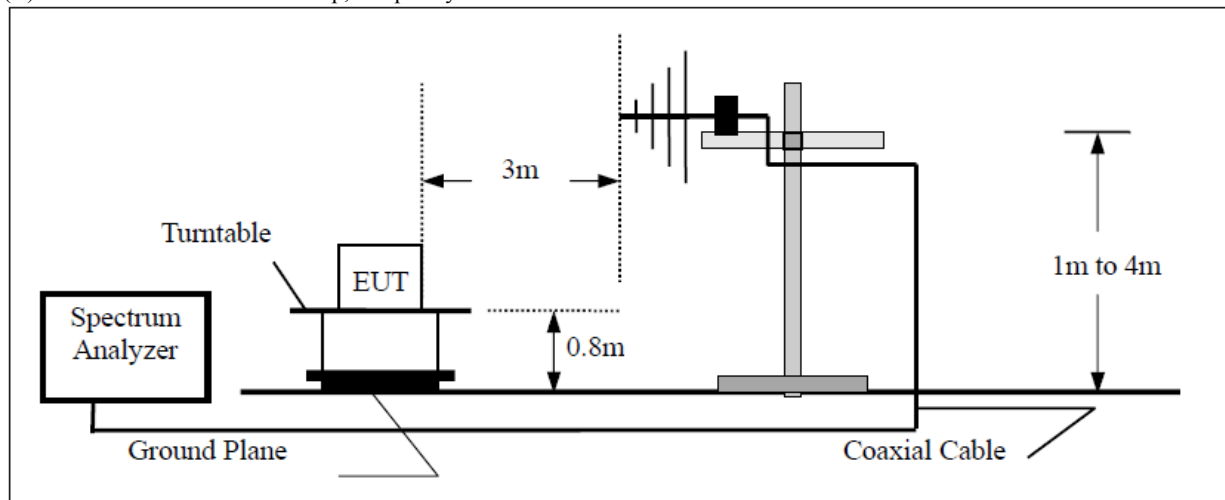
Through three orthogonal axes to determine which attitude and equipment arrangement produces the highest emission relative to the limit. And X direction is worst mode.

### 7.3. Radiated Test Setup

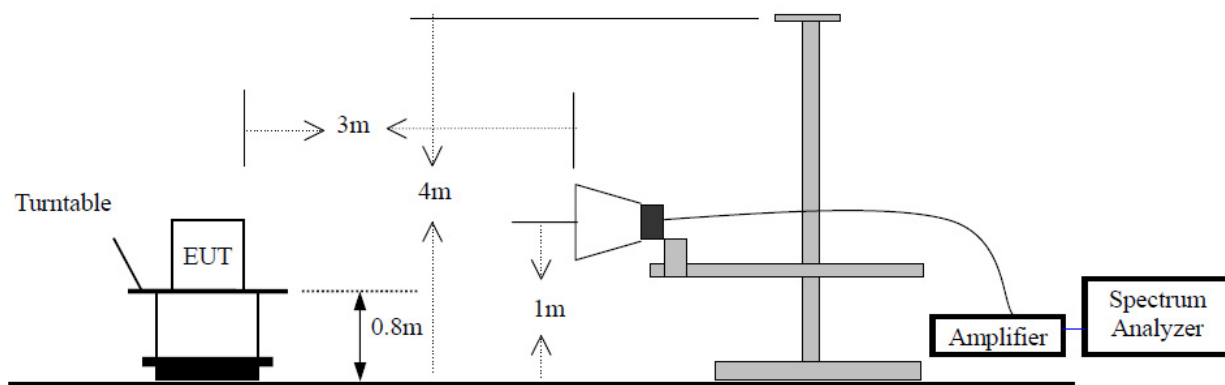
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



## 7.4. Radiated Emission Limit

All emission from a digital device,including any network of conductors and apparatus connected thereto,shall not exceed the level of field strength specified below :

### A. Fundamental and Harmonics Radiated Emissions 15.249(a) Limit

| Fundamental Frequency (MHZ) | Field as trength of Fundamental(3m) |        |           | Field as trength of Harmonics(3m) |        |          |
|-----------------------------|-------------------------------------|--------|-----------|-----------------------------------|--------|----------|
|                             | mV/m                                | dBuV/m |           | uV/m                              | dBuV/m |          |
| 902-928                     | 50                                  | 94(QP) | 114(Peak) | 500                               | 54(AV) | 74(Peak) |
| 2400-2483.5                 | 50                                  | 94(AV) | 114(Peak) | 500                               | 54(AV) | 74(Peak) |

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(3) The emission limit in this paragraph os based on measurement instrumentation employing an average detector.Measurement using instrumentation with a peak detector function,corresponding to 20dB above the maximum permitted average limit.

### B. Spurious Radiated Emissions.

| Frequency (MHz) | Limit                                             |                                             |                          |                                                                                                                                                                                                                                                |
|-----------------|---------------------------------------------------|---------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Field Strength of Quasi-peak Value (microvolts/m) | Field Strength of Quasi-peak Value (dBμV/m) | Measurement distance (m) | The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector. |
| 0.009 - 0.490   | 2400/F(kHz)                                       | /                                           | 300                      |                                                                                                                                                                                                                                                |
| 0.490 - 1.705   | 24000/F(kHz)                                      | /                                           | 30                       |                                                                                                                                                                                                                                                |
| 1.705-30        | 30                                                | 29.5                                        | 30                       |                                                                                                                                                                                                                                                |
| 30 - 88         | 100                                               | 40                                          | 3                        |                                                                                                                                                                                                                                                |
| 88 - 216        | 150                                               | 43.5                                        | 3                        |                                                                                                                                                                                                                                                |
| 216 - 960       | 200                                               | 46                                          | 3                        |                                                                                                                                                                                                                                                |
| Above 960       | 500                                               | 54                                          | 3                        |                                                                                                                                                                                                                                                |

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

(2) In the Above Table,the tighter limit applies at the band edges.

(3) Distaqnce refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

## 7.5. Radiated Emission Test Result

Pass

### A. Fundamental Radiated Emissions Data

#### CH Low

| Freq.<br>(MHz) | Read<br>Level<br>(dBuV)<br>AV/PK | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Emission<br>(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits<br>(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|----------------------------------|-----------------------------|-----------------------|--------------------------|-------------------------------|----------------|-----------------------------|----------------|
| 2402           | 78.68/88.75                      | 27.47                       | 5.42                  | 30.17                    | 81.4/91.47                    | VERT           | 94/114                      | -12.6/-22.53   |
| 2402           | 80.79/90.64                      | 27.47                       | 5.42                  | 30.17                    | 83.51/93.36                   | HORIZ          | 94/114                      | -10.49/-20.64  |

#### CH Middle

| Freq.<br>(MHz) | Read<br>Level<br>(dBuV)<br>AV/PK | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Emission<br>(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits<br>(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|----------------------------------|-----------------------------|-----------------------|--------------------------|-------------------------------|----------------|-----------------------------|----------------|
| 2440           | 79.84/89.25                      | 27.40                       | 5.40                  | 30.15                    | 82.49/91.9                    | VERT           | 94/114                      | -11.51/-22.1   |
| 2440           | 81.02/90.86                      | 27.40                       | 5.40                  | 30.15                    | 83.67/93.51                   | HORIZ          | 94/114                      | -10.33/-20.49  |

#### CH High

| Freq.<br>(MHz) | Read<br>Level<br>(dBuV)<br>AV/PK | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Factor<br>(dB) | Emission<br>(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits<br>(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|----------------------------------|-----------------------------|-----------------------|--------------------------|-------------------------------|----------------|-----------------------------|----------------|
| 2480           | 78.54/87.98                      | 27.50                       | 5.46                  | 29.98                    | 81.52/89.85                   | VERT           | 94/114                      | -12.48/-23.04  |
| 2480           | 80.48/89.93                      | 27.50                       | 5.46                  | 29.98                    | 83.46/92.91                   | HORIZ          | 94/114                      | -10.54/-21.09  |

Remark:

Final Emission = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

## B. General Radiated Emissions Data

**For below 9kHz-30MHz Spurious**

| Freq.<br>(MHz) | Emission(dBuV/m)<br>PK / AV | Limits(dBuV/m)<br>PK / AV | Margin<br>(dB) |
|----------------|-----------------------------|---------------------------|----------------|
| -              | -                           | -                         | -              |
| -              | -                           | -                         | -              |

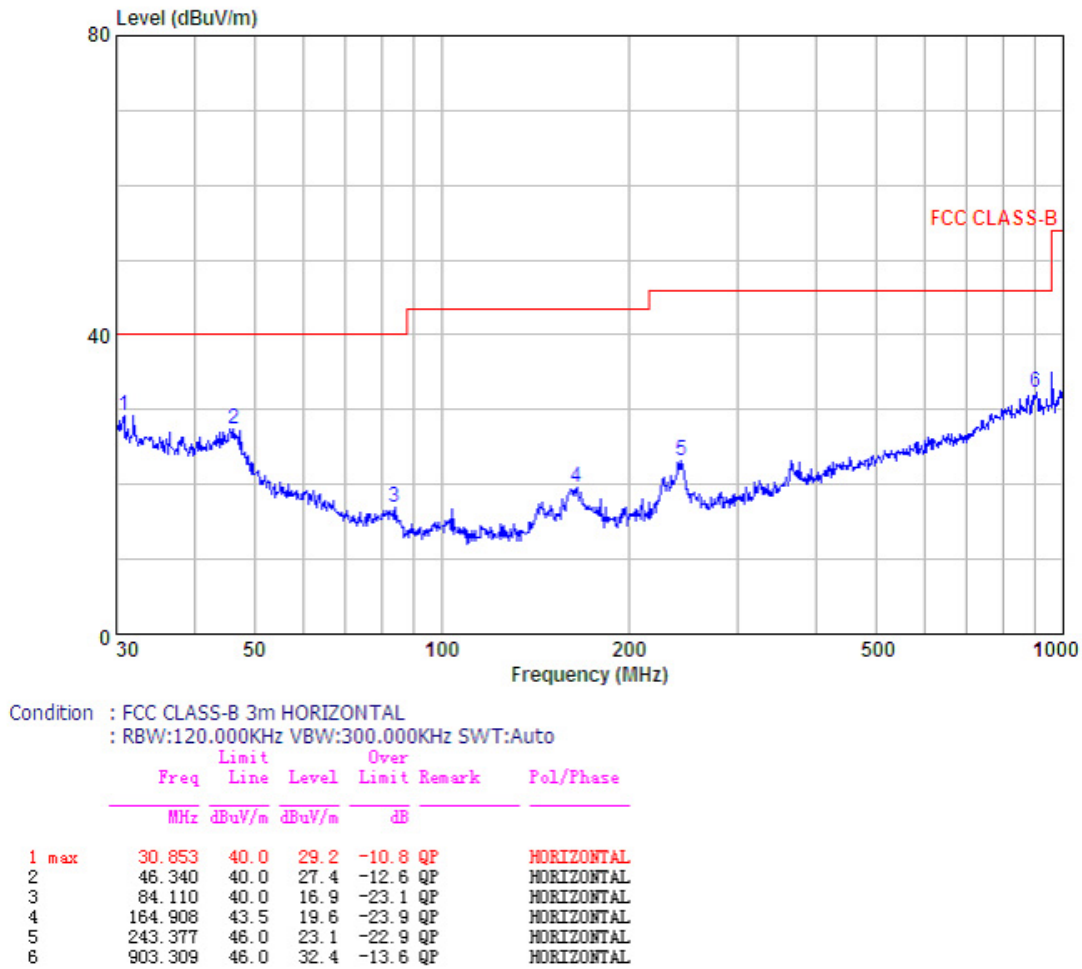
Note:

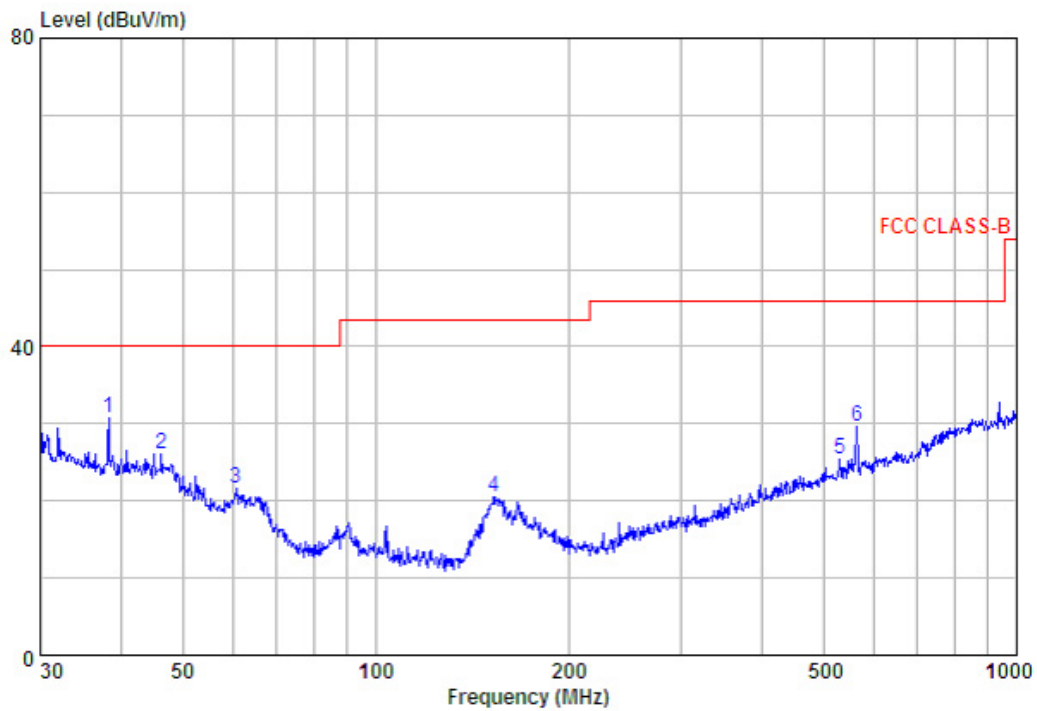
1. Emissions attenuated more than 20 dB below the permissible value are not reported.

For 30M-1000MHz Spurious

$$\text{Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

**2402MHz Transmitting(Worst case mode)**





Condition : FCC CLASS-B 3m VERTICAL  
 : RBW:120.000KHz VBW:300.000KHz SWT:Auto  
 : 9V 650

|       | Freq    | Limit  | Level  | Over  | Remark | Pol/Phase |
|-------|---------|--------|--------|-------|--------|-----------|
|       | MHz     | dBuV/m | dBuV/m | dB    |        |           |
| 1 max | 38.346  | 40.0   | 30.8   | -9.2  | QP     | VERTICAL  |
| 2     | 46.340  | 40.0   | 26.0   | -14.0 | QP     | VERTICAL  |
| 3     | 60.704  | 40.0   | 21.5   | -18.5 | QP     | VERTICAL  |
| 4     | 152.664 | 43.5   | 20.6   | -22.9 | QP     | VERTICAL  |
| 5     | 530.101 | 46.0   | 25.5   | -20.5 | QP     | VERTICAL  |
| 6     | 562.662 | 46.0   | 29.7   | -16.3 | QP     | VERTICAL  |

**For 1000MHz-25000MHz Spurious****CH Low**

| Freq.<br>(MHz) | Emission(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|---------------------------|----------------|-------------------------|----------------|
| 4804           | 39.17/49.1                | VERT           | 54.0/74.0               | -14.83/-24.9   |
| 7206           | 43.13/53.1                |                | 54.0/74.0               | -10.87/-20.9   |
| 9608           | 41.12/51.12               |                | 54.0/74.0               | -12.88/-22.88  |
| 4804           | 38.04/49.71               | HORIZ          | 54.0/74.0               | -15.96/-24.29  |
| 7206           | 45.58/55.58               |                | 54.0/74.0               | -8.42/-18.42   |
| 9608           | 47.07/57.07               |                | 54.0/74.0               | -6.93/-16.93   |

**CH Middle**

| Freq.<br>(MHz) | Emission(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|---------------------------|----------------|-------------------------|----------------|
| 4880           | 34.37/44.45               | VERT           | 54.0/74.0               | -19.63/-29.55  |
| 7320           | 40.26/50.21               |                | 54.0/74.0               | -13.74/-23.79  |
| 9760           | 39.19/49.22               |                | 54.0/74.0               | -14.81/-24.78  |
| 4880           | 34.45/44.48               | HORIZ          | 54.0/74.0               | -19.55/-29.52  |
| 7320           | 42.52/52.52               |                | 54.0/74.0               | -11.48/-21.48  |
| 9760           | 47.26/57.25               |                | 54.0/74.0               | -6.74/-16.75   |

**CH High**

| Freq.<br>(MHz) | Emission(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|---------------------------|----------------|-------------------------|----------------|
| 4960           | 37.3/47.34                | VERT           | 54.0/74.0               | -16.7/-26.66   |
| 7440           | 41.17/51.17               |                | 54.0/74.0               | -12.83/-22.83  |
| 9920           | 42.21/52.3                |                | 54.0/74.0               | -11.79/-21.7   |
| 4960           | 36.57/46.57               | HORIZ          | 54.0/74.0               | -17.43/-27.43  |
| 7440           | 41.26/50.11               |                | 54.0/74.0               | -12.74/-23.89  |
| 9920           | 43.26/52.19               |                | 54.0/74.0               | -10.74/-21.81  |

**Note:**

1. The average measurement was not performed when the peak measured data under the limit of average detection.
2. Emissions attenuated more than 20 dB below the permissible value are not reported.

## **8. BAND EDGE**

### **8.1. Test Equipment**

Please refer to Section 4 this report.

### **8.2. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement. The bandwidth of test receiver is set at 9kHz in below 30MHz. and set at 120kHz in 30-1000MHz, and non-restricted band:RBW=100kHz, restricted band:RBW=1MHz in above 1000MHz. The frequency range from 9kHz to 25GHz is checked.

### **8.3. Band Edge FCC 15.249(d) Limit**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

## 8.4. Band Edge Test Result

### Pass

ALL of the restriction bands were tested, and only the data of worst case was exhibited.

#### CH Low

| Freq.<br>(MHz) | Emission(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|---------------------------|----------------|-------------------------|----------------|
| 2390           | 44.45/52.24               | VERT           | 54.0/74.0               | -9.55/-21.76   |
| 2400           | 49.72/59.14               |                | 54.0/74.0               | -4.28/-14.86   |
| 2390           | 45.18/54.25               | HORIZ          | 54.0/74.0               | -8.82/-19.75   |
| 2400           | 47.41/60.36               |                | 54.0/74.0               | -6.59/-13.64   |

#### CH High

| Freq.<br>(MHz) | Emission(dBuV/m)<br>AV/PK | HORIZ/<br>VERT | Limits(dBuV/m)<br>AV/PK | Margin<br>(dB) |
|----------------|---------------------------|----------------|-------------------------|----------------|
| 2483.5         | 45.81/57.14               | VERT           | 54.0/74.0               | -8.19/-16.86   |
| 2500.00        | 42.84/52.73               |                | 54.0/74.0               | -11.16/-21.27  |
| 2483.5         | 47.17/57.73               | HORIZ          | 54.0/74.0               | -6.83/-16.27   |
| 2500.00        | 43.73/51.88               |                | 54.0/74.0               | -10.27/-22.12  |

#### Remark:

- Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## 9. 20-DB BANDWIDTH

### 9.1. Test Equipment

Please refer to Section 4 this report.

### 9.2. Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=100 KHz, VBW=300 KHz, Sweep=2.5ms.
4. Mark the peak frequency and -20dB (upper and lower) frequency.

### 9.3. Limit

Please refer section15.249

### 9.4. Test Result /Plots

| Limit | Channel Frequency (MHz) | 20dB Bandwidth (MHz) |
|-------|-------------------------|----------------------|
| /     | 2402                    | 0.820                |
| /     | 2441                    | 0.824                |
| /     | 2480                    | 0.816                |

**DELTA MARKER 1**

820 kHz

Ref 10.5 dBm

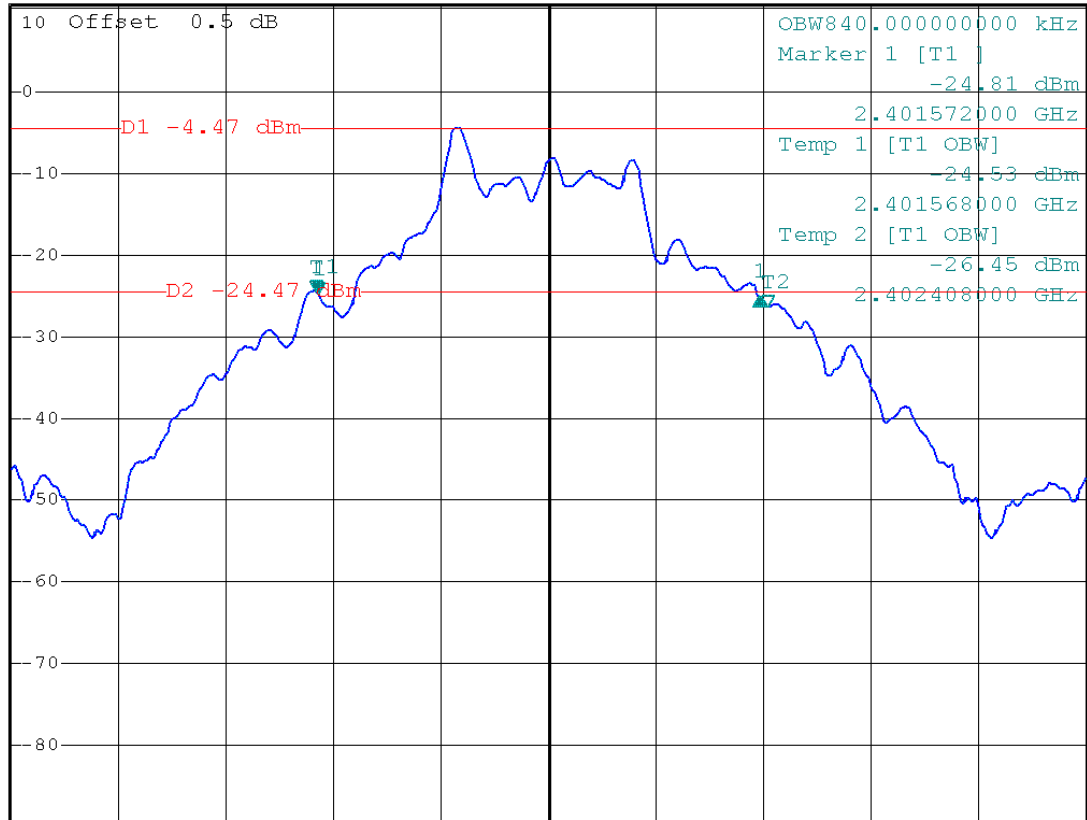
\*Att 30 dB

\*RBW 100 kHz Delta 1 [T1 ]

\*VBW 300 kHz -0.26 dB

SWT 2.5 ms

820.000000000 kHz

1 PK  
MAXH

A

LVL

3DB

Center 2.402 GHz

200 kHz/

Span 2 MHz

**DELTA MARKER 1**

824 kHz

Ref 10.5 dBm

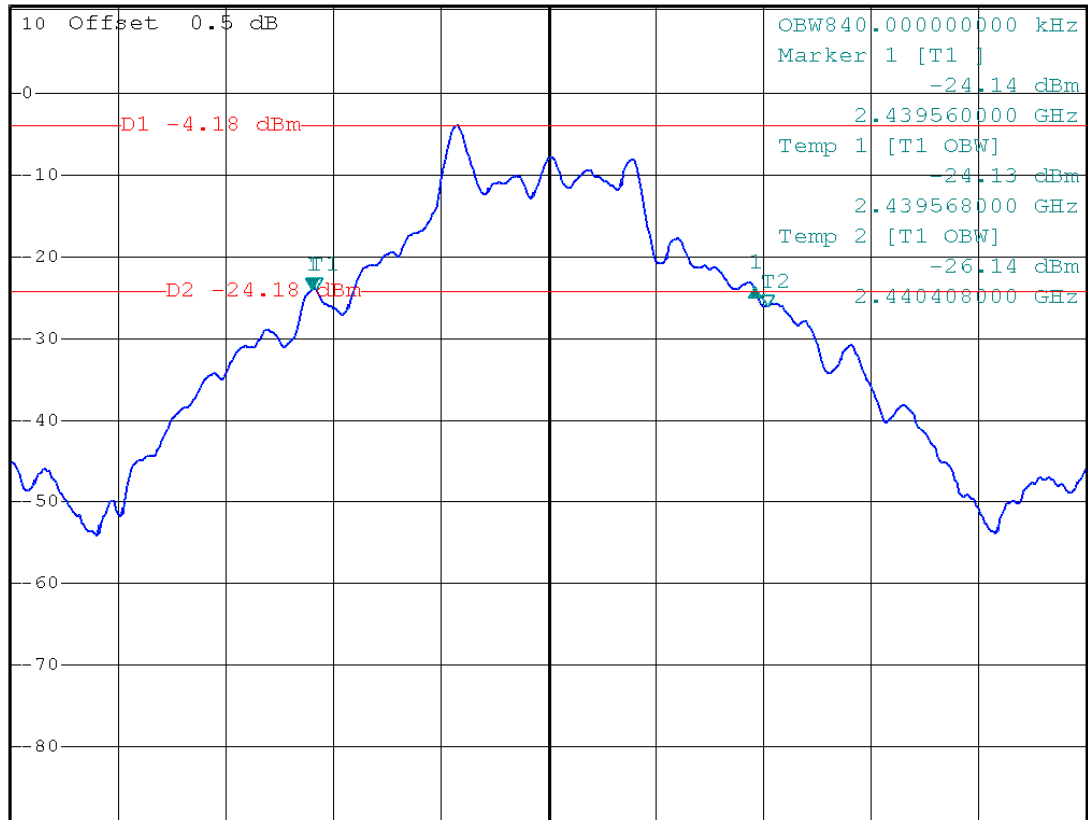
\*Att 30 dB

\*RBW 100 kHz Delta 1 [T1 ]

\*VBW 300 kHz 0.40 dB

SWT 2.5 ms

824.000000000 kHz

1 PK  
MAXH

Center 2.44 GHz

200 kHz/

Span 2 MHz

A

LVL

3DB

**DELTA MARKER 1**

816 kHz

Ref 10.5 dBm

\*Att 30 dB

\*RBW 100 kHz

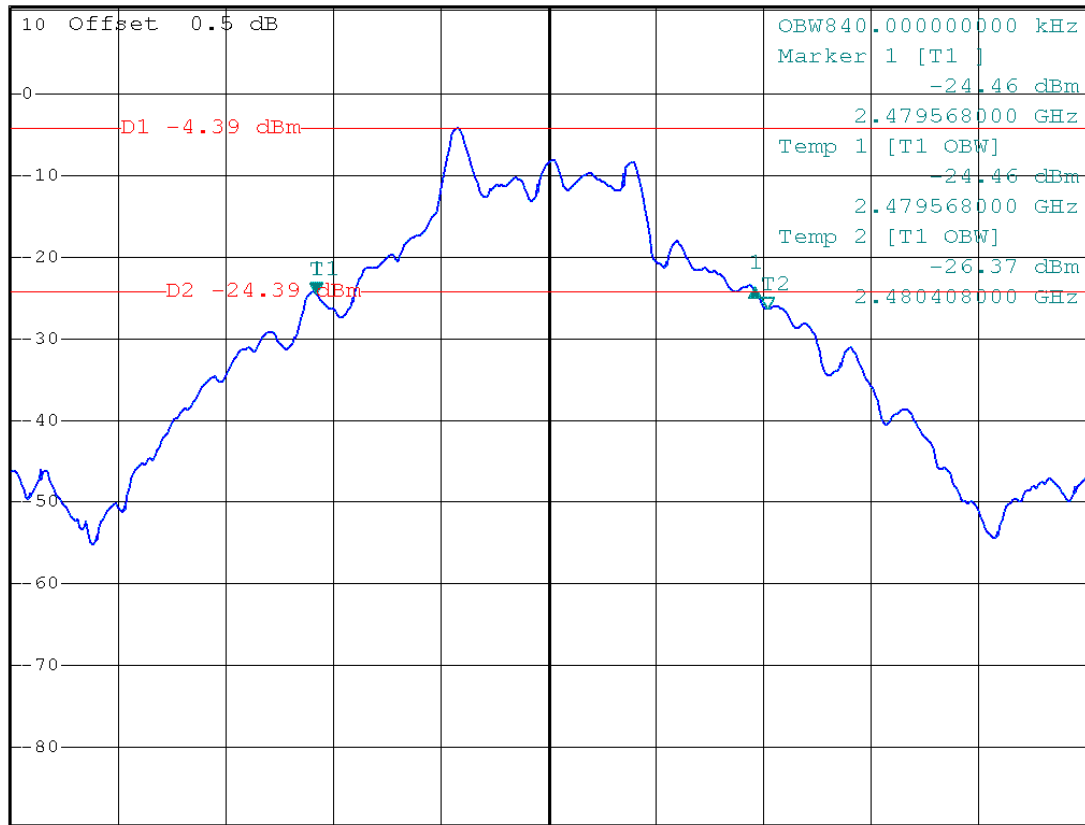
Delta 1 [T1 ]

\*VBW 300 kHz

0.75 dB

SWT 2.5 ms

816.000000000 kHz

**1 PK  
MAXH**

Center 2.48 GHz

200 kHz/

Span 2 MHz

**End Of The Report**