

# TEST REPORT

of

## FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

**Product :** GIGABYTE Nano receiver

**Brand:** GIGABYTE

**Model:** 28713C55RX

**Model Difference:** N/A

**FCC ID:** JCK28713C55RX

**FCC Rule Part:** §15.249

**Applicant:** GIGA-BYTE Technology Co., Ltd.

**Address:** No. 6, Bau Chiang Road, Hsin-Tien, Taipei,  
Taiwan

### Test Performed by:

#### International Standards Laboratory

<Lung-Tan LAB>

\*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

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**Report No.: ISL-11LR024FC**

**Issue Date : 2011/05/09**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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## VERIFICATION OF COMPLIANCE

**Applicant:** GIGA-BYTE Technology Co., Ltd.  
**Product Description:** GIGABYTE Nano receiver  
**Brand Name:** GIGABYTE  
**FCC ID:** JCK28713C55RX  
**FCC Rule Part:** §15.249  
**Model No.:** 28713C55RX  
**Model Difference:** N/A  
**Date of test:** 2011/04/28 ~ 2011/05/06  
**Date of EUT Received:** 2011/04/28

### We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

|                     |                                                                                                                                   |              |                     |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|
| <b>Test By:</b>     | <br>_____<br><b>Dion Chang / Engineer</b>      | <b>Date:</b> | 2011/05/09<br>_____ |
| <b>Prepared By:</b> | <br>_____<br><b>Eva Kao / Asst. Supervisor</b> | <b>Date:</b> | 2011/05/09<br>_____ |
| <b>Approved By:</b> | <br>_____<br><b>Jim Chu / Director</b>         | <b>Date:</b> | 2011/05/09<br>_____ |

## Version

| Version No. | Date       | Description                  |
|-------------|------------|------------------------------|
| 00          | 2011/05/09 | Initial creation of document |
|             |            |                              |

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## 1 GENERAL INFORMATION

### 1.1 Product Description

|                      |                        |
|----------------------|------------------------|
| Product Name:        | GIGABYTE Nano receiver |
| Brand Name:          | GIGABYTE               |
| Model Name:          | 28713C55RX             |
| Model Difference:    | N/A                    |
| Operation Frequency: | 2402~2479MHz           |
| Channel number:      | 16 channels            |
| Rated Power:         | Less than 10mW         |
| Modulation Type:     | GFSK                   |
| Power Supply:        | 5V dc form USB port    |
| Antenna Designation: | Printed Antenna        |

### 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: JCK28713C55RX filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

### 1.5 Special Accessories

Not available for this EUT intended for grant.

### 1.6 Equipment Modifications

Not available for this EUT intended for grant.

## **2 System Test Configuration**

### **2.1 EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 EUT Exercise**

The Transmitter was operated in the engineering operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

### **2.3 Test Procedure**

#### **2.3.1 Conducted Emissions**

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### **2.3.2 Radiated Emissions**

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

## 2.4 Measurement Equipment Used:

| Conducted Emission Test Site |                 |                       |                  |            |            |
|------------------------------|-----------------|-----------------------|------------------|------------|------------|
| EQUIPMENT TYPE               | MFR             | MODEL NUMBER          | SERIAL NUMBER    | LAST CAL.  | CAL DUE.   |
| Conduction 03 -1 Cable       | WOKEN           | CFD 300-NL            | Conduction 03 -1 | 06/21/2010 | 06/21/2011 |
| EMI Receiver 12              | ROHDE & SCHWARZ | ESCI                  | 100804           | 06/25/2010 | 06/25/2011 |
| LISN 07                      | FCC Inc.        | FCC-LISN-50-100-4 -02 | 07040            | 06/02/2010 | 06/02/2011 |
| LISN 08                      | FCC             | FCC-LISN50-25-2-0 1   | 07039            | 06/25/2010 | 06/25/2011 |

| Chamber 14(966)      |              |              |               |            |            |
|----------------------|--------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE       | MFR          | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer 21 | Agilent      | N9010A       | MY49060537    | 07/13/2010 | 07/13/2011 |
| Spectrum Analyzer 19 | R&S          | FSP40        | 100116        | 10/18/2010 | 10/18/2011 |
| Spectrum Analyzer 20 | Agilent      | E4443A       | MY48250315    | 05/11/2010 | 05/11/2011 |
| Loop Antenna         | A.H.SYSTEM   | SAS-564      | 294           | 02/28/2011 | 02/27/2012 |
| Bilog Antenna        | Schaffner    | CBL 6111D    | 22612         | 03/30/2011 | 03/29/2012 |
| Horn antenna(06)     | EMCO         | 3117         | 0006665       | 09/27/2010 | 09/26/2012 |
| Horn antenna(05)     | Com-power    | AH-640       | 100A          | 01/11/2011 | 01/10/2013 |
| Horn antenna(04)     | Com-power    | AH-826       | 081001        | 03/30/2011 | 03/29/2012 |
| Preamplifier         | HP           | 8447F        | N/A           | 01/03/2011 | 02/28/2012 |
| Preamplifier 15      | Agilent      | 8449B        | 3008A2471     | 01/06/2011 | 01/06/2012 |
| Preamplifier 13      | MITEQ        | JS4-2600400  | 1329256       | 06/10/2010 | 06/10/2011 |
| Cable                | Huber Suhner | Sucoflex 106 | N/A           | 02/09/2011 | 02/08/2012 |
| Cable                | Pacific      | 8D-FB        | N/A           | 10/18/2010 | 10/17/2011 |

| Conducted Emission Test Site |         |                 |                  |              |            |
|------------------------------|---------|-----------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE            | MFR     | MODEL<br>NUMBER | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| Power Meter 03               | Agilent | E4418B          | GB41299009       | 06/05/2010   | 06/04/2011 |
| Power Sensor RF 01           | Agilent | 8481H           | MY41091048       | 06/05/2010   | 06/04/2011 |
| Spectrum Analyzer 19         | R&S     | FSP40           | 100116           | 10/18/2010   | 10/18/2011 |
| Spectrum Analyzer 20         | Agilent | E4443A          | MY48250315       | 05/11/2010   | 05/10/2011 |
| Temperature Chamber          | KSON    | THS-B4H100      | 2287             | 03/03/2011   | 03/03/2012 |
| DC Power supply              | ABM     | 51850           | N/A              | N/A          | N/A        |

Note: Calibration is traceable to NIST or national or international standards.

## 2.5 Limitation

### (1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-Peak             | Average |
| 0.15 – 0.5      | 66 - 56                | 56 - 46 |
| 0.5 – 5         | 56                     | 46      |
| 5 - 30          | 60                     | 50      |

### (2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

| Frequency (MHz)  | Field strength of Fundamental | Field strength of Harmonics | Distance (m) |
|------------------|-------------------------------|-----------------------------|--------------|
| 902 - 928        | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 2400 – 2483.5    | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 5725 – 5875      | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 24.0 – 24.25 GHz | 250 mV/m<br>(107.95dBuV/m)    | 2500 uV/m<br>(67.95dBuV/m)  | 3            |

### (3) Radiated Emission 15.249 (d)

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

| Frequency<br>(MHz) | Field strength<br>$\mu\text{V/m}$ | Distance (m) | Field strength at<br>3m dB $\mu\text{V/m}$ |
|--------------------|-----------------------------------|--------------|--------------------------------------------|
| 1.705-30           | 30                                | 30           | 69.54                                      |
| 30-88              | 100                               | 3            | 40                                         |
| 88-216             | 150                               | 3            | 43.5                                       |
| 216-960            | 200                               | 3            | 46                                         |
| Above 960          | 500                               | 3            | 54                                         |

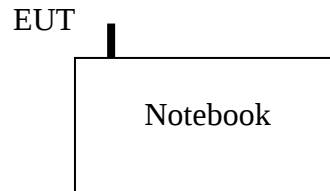
### (4) Radiated Emission 15.249(e)

For frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

- Remark:
1. Emission level in dB $\mu\text{V/m}$  = 20 log ( $\mu\text{V/m}$ )
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
  4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of § 15.205, then the general radiated emission limits in § 15.209 apply.

## 2.6 Configuration of Tested System

**Fig. 2-1 Configuration of Radiated Emission Test**



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord                 |
|------|-----------|-----------|--------------------|------------|------------|----------------------------|
| 1.   | Notebook  | DELL      | Latitude D620      | N/A        | shielded   | Non-shielded<br>Detachable |

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

### 3 Summary of Test Results

| FCC Rules        | Description Of Test         | Result    |
|------------------|-----------------------------|-----------|
| §15.207          | Conducted Emission          | Compliant |
| §15.249(a)(d)(e) | Radiated Emission           | Compliant |
| §15.215 (c )     | 20dB band width Measurement | Compliant |

### 4 Description of test modes

The EUT has been tested under operating condition.

The EUT is staying in continuous transmitting mode

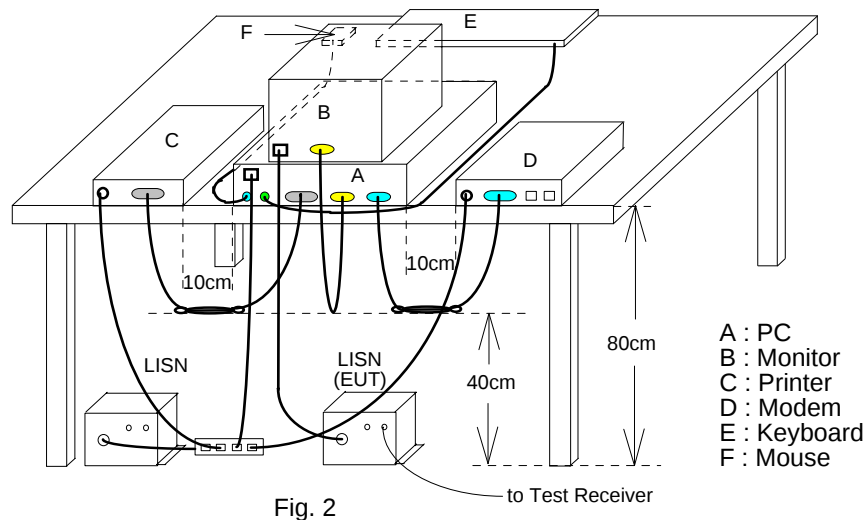
Channel low (2402MHz) 、mid (2439MHz) and high (2479MHz) with highest data rate are chosen for full testing.

## 5 Conducted Emissions Test

### 5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Equipment Used:

Refer to section 2.4 in this report

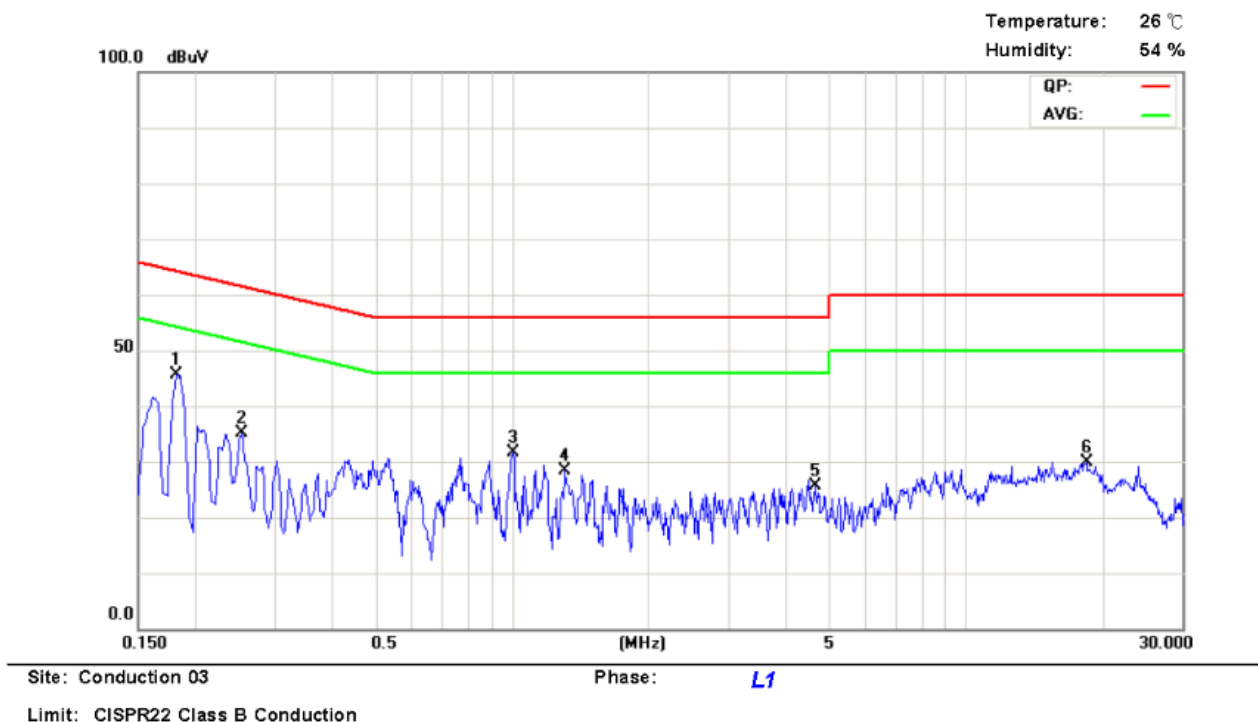
### 5.4 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

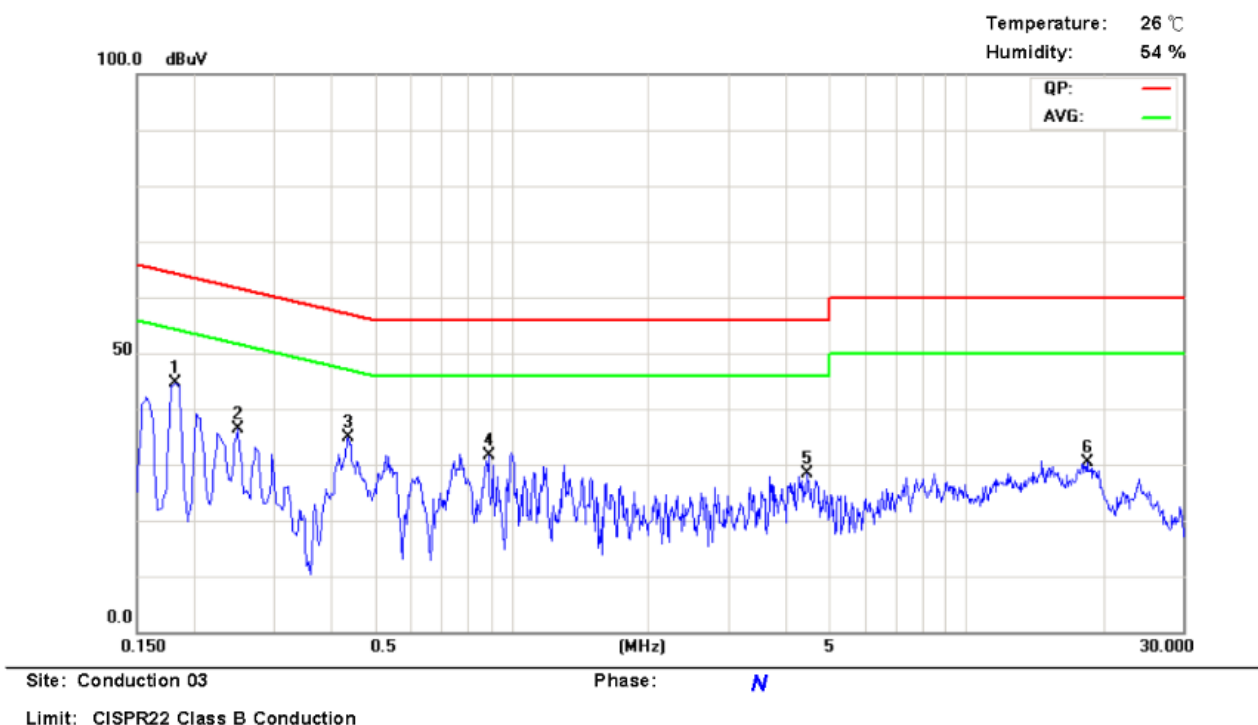
Note: Refer to next page for measurement data and plots.

## AC POWER LINE CONDUCTED EMISSION TEST DATA

|                 |                |            |            |
|-----------------|----------------|------------|------------|
| Operation Mode: | Operation Mode | Test Date: | 05/05/2011 |
|                 |                | Test By:   | Dino       |



| No. | Frequency<br>MHz | LISN<br>Loss<br>dB | Cable<br>Loss<br>dB | QP<br>Correct.<br>dBuV | QP<br>Limit<br>dBuV | QP<br>Margin<br>dB | AVG<br>Correct.<br>dBuV | AVG<br>Limit<br>dBuV | AVG<br>Margin<br>dB | Note |
|-----|------------------|--------------------|---------------------|------------------------|---------------------|--------------------|-------------------------|----------------------|---------------------|------|
| 1   | 0.1820           | 0.11               | 0.01                | 43.19                  | 64.3                | -21.2              | 30.12                   | 54.3                 | -24.2               |      |
| 2   | 0.2540           | 0.11               | 0.02                | 30.13                  | 61.6                | -31.5              | 19.28                   | 51.6                 | -32.3               |      |
| 3   | 1.0060           | 0.13               | 0.04                | 29.34                  | 56.0                | -26.6              | 24.88                   | 46.0                 | -21.1               |      |
| 4   | 1.3140           | 0.14               | 0.05                | 25.04                  | 56.0                | -30.9              | 18.51                   | 46.0                 | -27.4               |      |
| 5   | 4.6900           | 0.25               | 0.14                | 21.23                  | 56.0                | -34.7              | 12.87                   | 46.0                 | -33.1               |      |
| 6   | 18.4740          | 0.94               | 0.2                 | 24.99                  | 60.0                | -35.0              | 19.36                   | 50.0                 | -30.6               |      |



| No. | Frequency<br>MHz | LISN<br>Loss<br>dB | Cable<br>Loss<br>dB | QP<br>Correct.<br>dBuV | QP<br>Limit<br>dBuV | QP<br>Margin<br>dB | AVG<br>Correct.<br>dBuV | AVG<br>Limit<br>dBuV | AVG<br>Margin<br>dB | Note |
|-----|------------------|--------------------|---------------------|------------------------|---------------------|--------------------|-------------------------|----------------------|---------------------|------|
| 1   | 0.1820           | 0.13               | 0.01                | 43.01                  | 64.3                | -21.3              | 30.92                   | 54.3                 | -23.4               |      |
| 2   | 0.2500           | 0.13               | 0.02                | 33.69                  | 61.7                | -28.0              | 23.19                   | 51.7                 | -28.5               |      |
| 3   | 0.4380           | 0.13               | 0.03                | 30.93                  | 57.1                | -26.1              | 25.31                   | 47.1                 | -21.7               |      |
| 4   | 0.8940           | 0.14               | 0.04                | 27.18                  | 56.0                | -28.8              | 21.17                   | 46.0                 | -24.8               |      |
| 5   | 4.4860           | 0.22               | 0.13                | 22.30                  | 56.0                | -33.7              | 14.12                   | 46.0                 | -31.8               |      |
| 6   | 18.4260          | 0.64               | 0.2                 | 25.12                  | 60.0                | -34.8              | 19.62                   | 50.0                 | -30.3               |      |

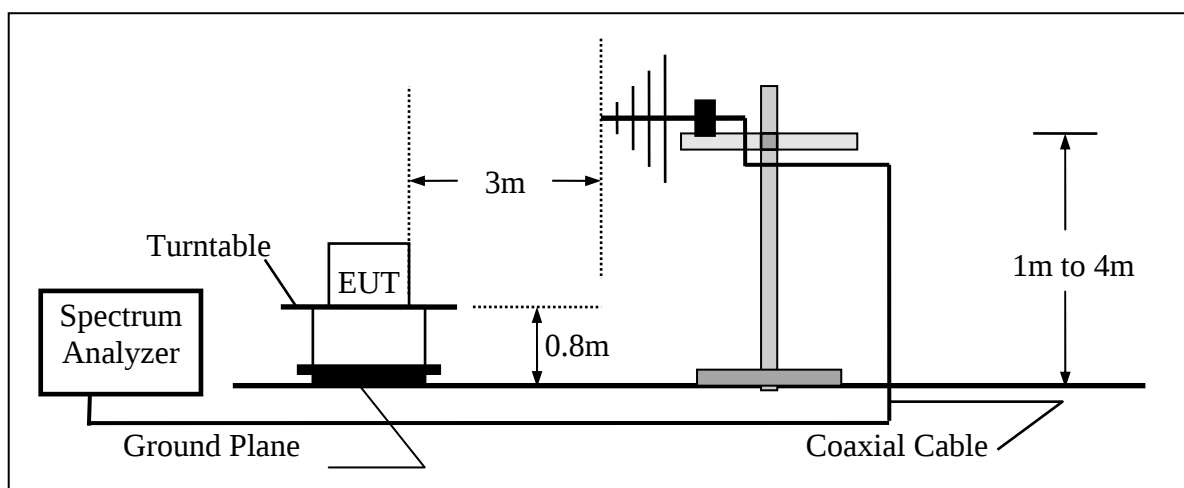
## 6 Radiated Emission Test

### 6.1 Measurement Procedure

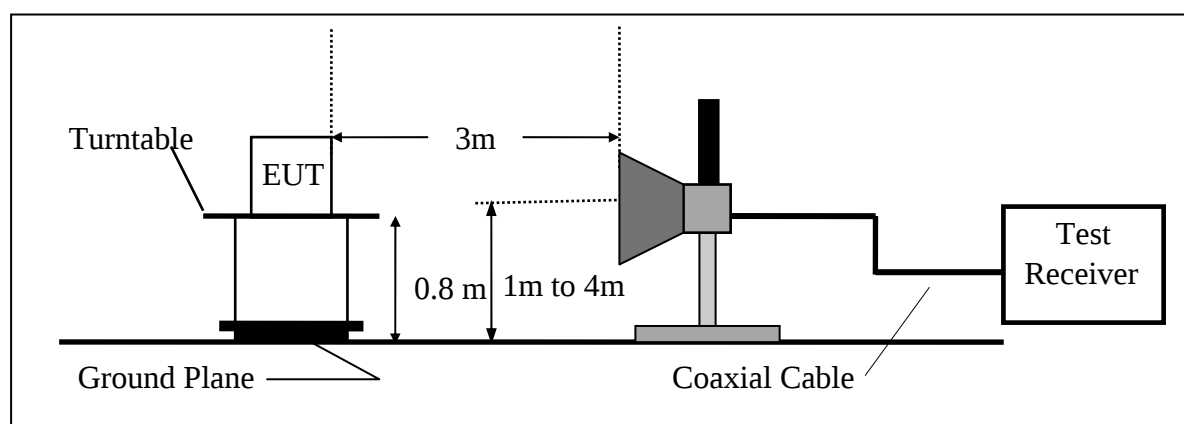
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 6.2 Test SET-UP (Block Diagram of Configuration)

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



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



### 6.3 Measurement Equipment Used:

Refer to section 2.4 in this report

#### 6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|       |                        |                                            |
|-------|------------------------|--------------------------------------------|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |                                            |

## 6.5 Measurement Result

### Radiated Spurious Emission Measurement Result (below 1GHz)

|                       |             |           |                |
|-----------------------|-------------|-----------|----------------|
| Operation Mode        | : TX CH Low | Test Date | : May 06, 2011 |
| Fundamental Frequency | : 2402 MHz  | Test By   | : Dino         |
| Temp                  | : 25 °C     | Hum.      | : 60%          |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 126.03      | 46.12           | -17.36       | 28.76           | 43.50           | -14.74              | Peak   | VERTICAL   |
| 2   | 298.69      | 44.06           | -14.92       | 29.14           | 46.00           | -16.86              | Peak   | VERTICAL   |
| 3   | 388.90      | 40.74           | -13.28       | 27.46           | 46.00           | -18.54              | Peak   | VERTICAL   |
| 4   | 515.97      | 36.41           | -12.71       | 23.70           | 46.00           | -22.30              | Peak   | VERTICAL   |
| 5   | 798.24      | 34.19           | -11.04       | 23.15           | 46.00           | -22.85              | Peak   | VERTICAL   |
| 6   | 906.88      | 32.10           | -10.11       | 21.99           | 46.00           | -24.01              | Peak   | VERTICAL   |
|     |             |                 |              |                 |                 |                     |        |            |
| 1   | 167.74      | 52.23           | -17.79       | 34.44           | 43.50           | -9.06               | Peak   | HORIZONTAL |
| 2   | 298.69      | 43.85           | -14.92       | 28.93           | 46.00           | -17.07              | Peak   | HORIZONTAL |
| 3   | 386.96      | 42.39           | -13.30       | 29.09           | 46.00           | -16.91              | Peak   | HORIZONTAL |
| 4   | 662.44      | 34.69           | -11.85       | 22.84           | 46.00           | -23.16              | Peak   | HORIZONTAL |
| 5   | 798.24      | 36.79           | -11.04       | 25.75           | 46.00           | -20.25              | Peak   | HORIZONTAL |
| 6   | 903.00      | 33.05           | -10.15       | 22.90           | 46.00           | -23.10              | Peak   | HORIZONTAL |

#### Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

### Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode : TX CH Mid Test Date : May 06, 2011  
Fundamental Frequency : 2439 MHz Test By : Dino  
Temp : 25 °C Hum. : 60%

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 298.69      | 43.93           | -14.92       | 29.01           | 46.00           | -16.99              | Peak   | VERTICAL   |
| 2   | 388.90      | 40.71           | -13.28       | 27.43           | 46.00           | -18.57              | Peak   | VERTICAL   |
| 3   | 515.97      | 36.86           | -12.71       | 24.15           | 46.00           | -21.85              | Peak   | VERTICAL   |
| 4   | 661.47      | 33.78           | -11.85       | 21.93           | 46.00           | -24.07              | Peak   | VERTICAL   |
| 5   | 798.24      | 34.88           | -11.04       | 23.84           | 46.00           | -22.16              | Peak   | VERTICAL   |
| 6   | 907.85      | 31.64           | -10.10       | 21.54           | 46.00           | -24.46              | Peak   | VERTICAL   |
|     |             |                 |              |                 |                 |                     |        |            |
| 1   | 167.74      | 51.09           | -17.79       | 33.30           | 43.50           | -10.20              | Peak   | HORIZONTAL |
| 2   | 257.95      | 41.61           | -15.65       | 25.96           | 46.00           | -20.04              | Peak   | HORIZONTAL |
| 3   | 388.90      | 41.77           | -13.28       | 28.49           | 46.00           | -17.51              | Peak   | HORIZONTAL |
| 4   | 663.41      | 36.74           | -11.86       | 24.88           | 46.00           | -21.12              | Peak   | HORIZONTAL |
| 5   | 797.27      | 36.11           | -11.05       | 25.06           | 46.00           | -20.94              | Peak   | HORIZONTAL |
| 6   | 906.88      | 33.30           | -10.11       | 23.19           | 46.00           | -22.81              | Peak   | HORIZONTAL |

#### Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

|                       |              |           |                |
|-----------------------|--------------|-----------|----------------|
| Operation Mode        | : TX CH High | Test Date | : May 06, 2011 |
| Fundamental Frequency | : 2479 MHz   | Test By   | : Dino         |
| Temp                  | : 25 °C      | Hum.      | : 60%          |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 127.97      | 45.69           | -17.37       | 28.32           | 43.50           | -15.18              | Peak   | VERTICAL   |
| 2   | 298.69      | 43.46           | -14.92       | 28.54           | 46.00           | -17.46              | Peak   | VERTICAL   |
| 3   | 388.90      | 40.56           | -13.28       | 27.28           | 46.00           | -18.72              | Peak   | VERTICAL   |
| 4   | 515.97      | 37.39           | -12.71       | 24.68           | 46.00           | -21.32              | Peak   | VERTICAL   |
| 5   | 797.27      | 40.21           | -11.05       | 29.16           | 46.00           | -16.84              | Peak   | VERTICAL   |
| 6   | 905.91      | 31.45           | -10.12       | 21.33           | 46.00           | -24.67              | Peak   | VERTICAL   |
|     |             |                 |              |                 |                 |                     |        |            |
| 1   | 167.74      | 52.09           | -17.79       | 34.30           | 43.50           | -9.20               | Peak   | HORIZONTAL |
| 2   | 298.69      | 43.52           | -14.92       | 28.60           | 46.00           | -17.40              | Peak   | HORIZONTAL |
| 3   | 386.96      | 42.50           | -13.30       | 29.20           | 46.00           | -16.80              | Peak   | HORIZONTAL |
| 4   | 666.32      | 35.55           | -11.85       | 23.70           | 46.00           | -22.30              | Peak   | HORIZONTAL |
| 5   | 798.24      | 35.49           | -11.04       | 24.45           | 46.00           | -21.55              | Peak   | HORIZONTAL |
| 6   | 906.88      | 31.84           | -10.11       | 21.73           | 46.00           | -24.27              | Peak   | HORIZONTAL |

**Remark:**

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

## Radiated Spurious Emission Measurement Result (above 1GHz)

|                       |             |           |                |
|-----------------------|-------------|-----------|----------------|
| Operation Mode        | : TX CH Low | Test Date | : May 06, 2011 |
| Fundamental Frequency | : 2402 MHz  | Test By   | : Dino         |
| Temp                  | : 25 °C     | Hum.      | : 60%          |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 2402.00     | 80.64           | -1.25        | 79.39           | 114.00          | -34.61              | Peak   | VERTICAL   |
| 2   | 2402.00     | 84.61           | -1.25        | 83.36           | 114.00          | -30.64              | Peak   | HORIZONTAL |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark  | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1   | 2720.00     | 45.68           | -0.45        | 45.23           | 74.00           | -28.77              | Peak    | VERTICAL   |
| 2   | 4804.00     | 39.15           | 9.38         | 48.53           | 74.00           | -25.47              | Peak    | VERTICAL   |
| 3   | 7206.00     | ---             |              |                 |                 |                     |         | VERTICAL   |
| 4   | 9608.00     | ---             |              |                 |                 |                     |         | VERTICAL   |
| 5   | 12010.00    | ---             |              |                 |                 |                     |         | VERTICAL   |
| 1   | 4804.00     | 32.48           | 9.39         | 41.87           | 54              | -12.13              | Average | HORIZONTAL |
| 2   | 4804.00     | 45.94           | 9.39         | 55.33           | 74              | -18.67              | Peak    | HORIZONTAL |
| 3   | 7206.00     | ---             |              |                 |                 |                     |         | HORIZONTAL |
| 4   | 9608.00     | ---             |              |                 |                 |                     |         | HORIZONTAL |
| 5   | 12010.00    | ---             |              |                 |                 |                     |         | HORIZONTAL |

### Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

## Radiated Spurious Emission Measurement Result (above 1GHz)

|                       |             |           |                |
|-----------------------|-------------|-----------|----------------|
| Operation Mode        | : TX CH Mid | Test Date | : May 06, 2011 |
| Fundamental Frequency | : 2439 MHz  | Test By   | : Dino         |
| Temp                  | : 25 °C     | Hum.      | : 60%          |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 2439.00     | 81.94           | -1.20        | 80.74           | 114.00          | -33.26              | Peak   | VERTICAL   |
| 2   | 2439.00     | 84.18           | -1.20        | 82.98           | 114.00          | -31.02              | Peak   | HORIZONTAL |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 4878.00     | 40.80           | 9.66         | 50.46           | 74.00           | -23.54              | Peak   | VERTICAL   |
| 2   | 7317.00     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 3   | 9756.00     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 4   | 12195.00    | ---             |              |                 |                 |                     |        | VERTICAL   |
| 1   | 2662.00     | 45.23           | -0.63        | 44.60           | 74.00           | -29.40              | Peak   | HORIZONTAL |
| 2   | 4878.00     | 42.08           | 9.66         | 51.74           | 74.00           | -22.26              | Peak   | HORIZONTAL |
| 3   | 7317.00     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 4   | 9756.00     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 5   | 12195.00    | ---             |              |                 |                 |                     |        | HORIZONTAL |

### Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

## Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode : TX CH High

Test Date : May 06, 2011

Fundamental Frequency : 2479 MHz

Test By : Dino

Temp./Hum. : 25 °C / : 60%

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 2479.00     | 82.13           | -1.17        | 80.96           | 114.00          | -33.04              | Peak   | VERTICAL   |
| 2   | 2479.00     | 84.70           | -1.17        | 83.53           | 114.00          | -30.47              | Peak   | HORIZONTAL |

| N.o | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1   | 4958.00     | 34.85           | 9.96         | 44.81           | 74.00           | -29.19              | Peak   | VERTICAL   |
| 2   | 7437.00     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 3   | 9916.00     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 4   | 12395.00    | ---             |              |                 |                 |                     |        | VERTICAL   |
| 1   | 4958.00     | 41.33           | 9.96         | 51.29           | 74.00           | -22.71              | Peak   | HORIZONTAL |
| 2   | 7437.00     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 3   | 9916.00     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 4   | 12395.00    | ---             |              |                 |                 |                     |        | HORIZONTAL |

### Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

## Radiated Spurious Emission Measurement Result (Band Edge)

Operation Mode : Band Edge Test Date : May 06, 2011  
 Temp./Hum. : 25 °C / : 60% Test By : Dino

### CH Low

| Freq    | Reading | Factor | Level  | Limit  | Over Limit | Remark | Pol        |
|---------|---------|--------|--------|--------|------------|--------|------------|
| MHz     | dBuV    | dB     | dBuV/m | dBuV/m | dB         |        | V/H        |
| 2390.00 | 45.19   | -1.26  | 43.93  | 74.00  | -30.07     | Peak   | VERTICAL   |
|         |         |        |        |        |            |        |            |
| 2390.00 | 44.13   | -1.26  | 42.87  | 74.00  | -31.13     | Peak   | HORIZONTAL |

### CH High

| Freq    | Reading | Factor | Level  | Limit  | Over Limit | Remark | Pol        |
|---------|---------|--------|--------|--------|------------|--------|------------|
| MHz     | dBuV    | dB     | dBuV/m | dBuV/m | dB         |        | V/H        |
| 2483.50 | 52.60   | -1.16  | 51.44  | 74.00  | -22.56     | Peak   | VERTICAL   |
|         |         |        |        |        |            |        |            |
| 2483.50 | 40.02   | -1.16  | 38.86  | 74.00  | -35.14     | Peak   | HORIZONTAL |
| 2483.50 | 56.35   | -1.16  | 55.19  | 74.00  | -18.81     | Peak   | HORIZONTAL |

### Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

## **7 20 dB Band Width Measurement**

### **7.1 Measurement Procedure**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 10MHz.
4. Set SPA Max hold. Mark peak, -20dB.

### **7.2 Test SET-UP (Block Diagram of Configuration)**

Same as 4.2 Radiated Emission Measurement.

### **7.3 Measurement Equipment Used:**

Same as 4.2 Radiated Emission Measurement.

### **7.4 Measurement Results:**

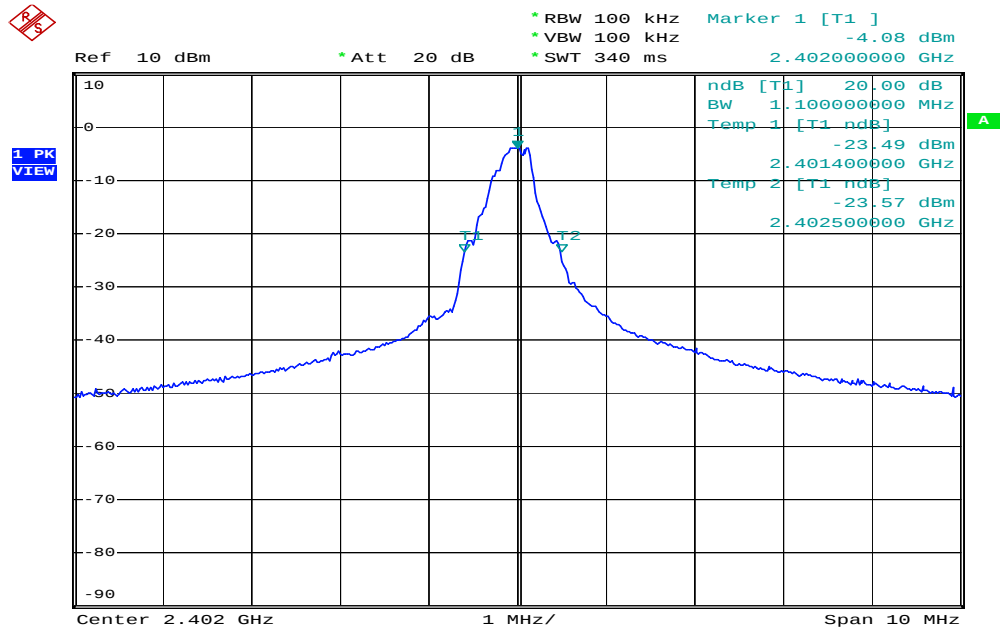
2402 Channel = 1.10MHz

2439 Channel = 1.16MHz

2479 Channel = 1.78MHz

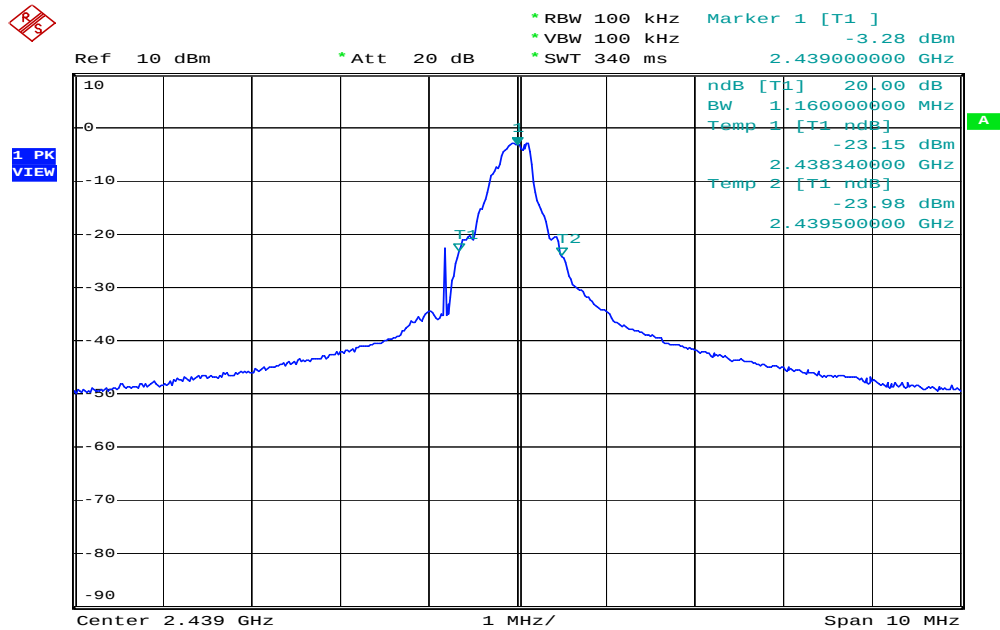
Refer to attached data chart.

## 20dB Bandwidth Test Data CH-Low



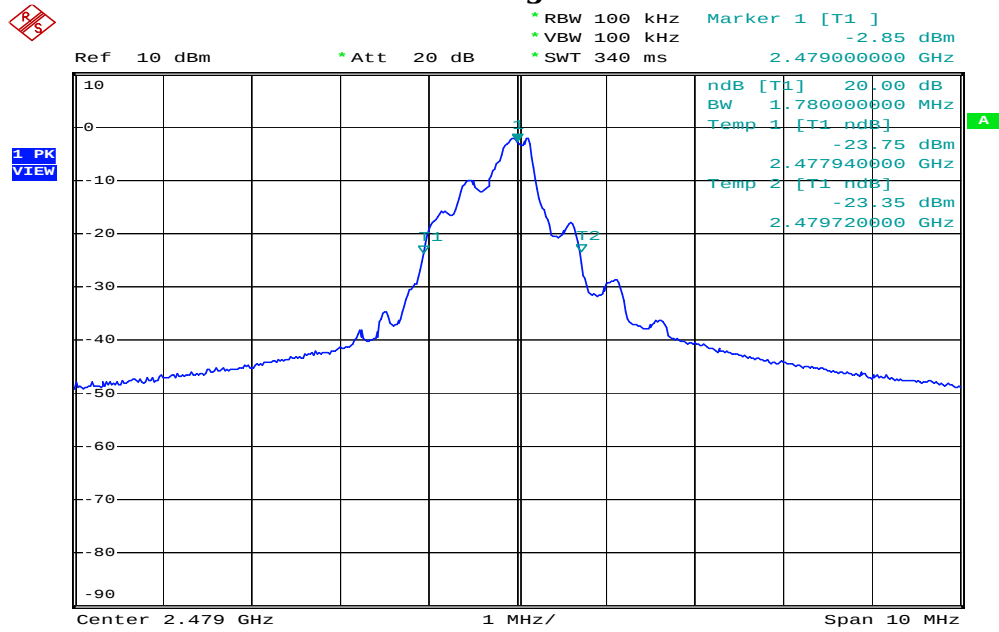
Date: 3.MAY.2011 12:08:23

## 20dB Bandwidth Test Data CH-Mid



Date: 3.MAY.2011 12:06:39

## 20dB Bandwidth Test Data CH-High



Date: 3.MAY.2011 12:09:30