

# TEST REPORT

of

## FCC Part 15 Subpart C

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

**Product :** GA6040 Wireless Backup Camera

**Brand:** SUPA / GONAV / MITAC / NAVAIR

**Model:** GA6040

**Model Difference:** N/A

**FCC ID:** UHXGA6040-RX

**FCC Rule Part:** §15.249

**Applicant:** Supa Technology Co., Ltd

**Address:** 7F, no 19-5, Sanchong Rd, Nangang District  
Taipei, 115, Taiwan, R.O.C

### Test Performed by:

#### International Standards Laboratory

<Lung-Tan LAB>

\*Site Registration No.

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

\*Address:

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**Report No.: ISL-11LR041FC**

**Issue Date : 2011/06/10**

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:** Supa Technology Co., Ltd  
**Product Description:** GA6040 Wireless Backup Camera  
**Brand Name:** SUPA / GONAV / MITAC / NAVAIR  
**FCC ID:** UHXGA6040-RX  
**FCC Rule Part:** §15.249  
**Model No.:** GA6040  
**Model Difference:** N/A  
**Date of test:** 2011/05/25 ~ 2011/05/28  
**Date of EUT Received:** 2011/05/25

### 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.

**Test By:**



**Date:**

2011/06/10

*Dion Chang / Engineer*

**Prepared By:**



**Date:**

2011/06/10

*Eva Kao / Asst. Supervisor*

**Approved By:**



**Date:**

2011/06/10

*Jim Chu / Director*

## Version

| Version No. | Date       | Description                  |
|-------------|------------|------------------------------|
| 00          | 2011/06/10 | Initial creation of document |
|             |            |                              |

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## 1 GENERAL INFORMATION

### 1.1 Product Description

|                      |                                               |
|----------------------|-----------------------------------------------|
| Product Name:        | GA6040 Wireless Backup Camera                 |
| Brand Name:          | SUPA / GONAV / MITAC / NAVAIR                 |
| Model Name:          | GA6040                                        |
| Model Difference:    | N/A                                           |
| Operation Frequency: | 2404.125~2478.375MHz                          |
| Channel number:      | 64 channels                                   |
| Rated Power:         | Peak < 114 dBuV/m<br>Av <94 dBuV /m           |
| Modulation Type:     | GFSK, Frequency Hopping Spread Spectrum(FHSS) |
| Power Supply:        | 5V dc from USB port                           |
| Antenna Designation: | Fixed Dipole Antenna                          |

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

This submittal(s) (test report) is intended for FCC ID: **UHXGA6040-RX** 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-LISN50-25-2-01   | 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    | 05/12/2011 | 05/11/2012 |
| 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 |

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 (MHz) | Field strength $\mu\text{V/m}$ | Distance (m) | Field strength at 3m $\text{dB}\mu\text{V/m}$ |
|-----------------|--------------------------------|--------------|-----------------------------------------------|
| 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                                            |

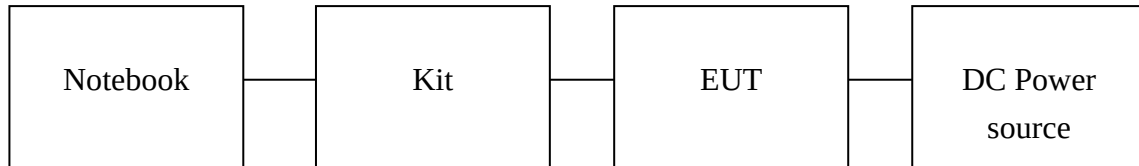
### (4) Radiated Emission 15.249(e)

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  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
  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**

| No | Unit         | Brand | Model | Serial No. | Data Cable | Power Cable |
|----|--------------|-------|-------|------------|------------|-------------|
| 1  | Notebook     | IBM   | X40   | N/A        | Shield     | Non-shield  |
| 2  | Kit          | N/A   | N/A   | N/A        | Shield     | Non-shield  |
| 3  | Power Source | ABM   | 8185D | N/A        | N/A        | Non-shield  |

**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

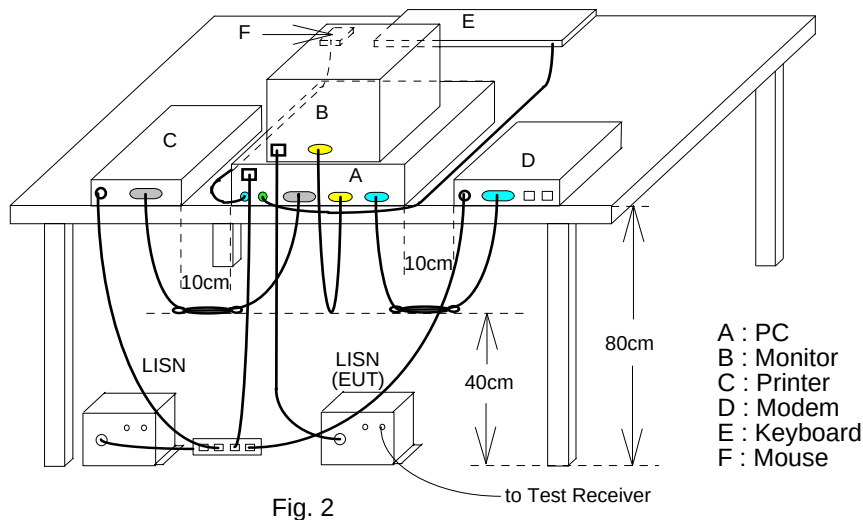
Channel low (2404.125MHz) 、mid (2442.375MHz) and high (2478.375MHz) with highest data rate are chosen for full testing.

## 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

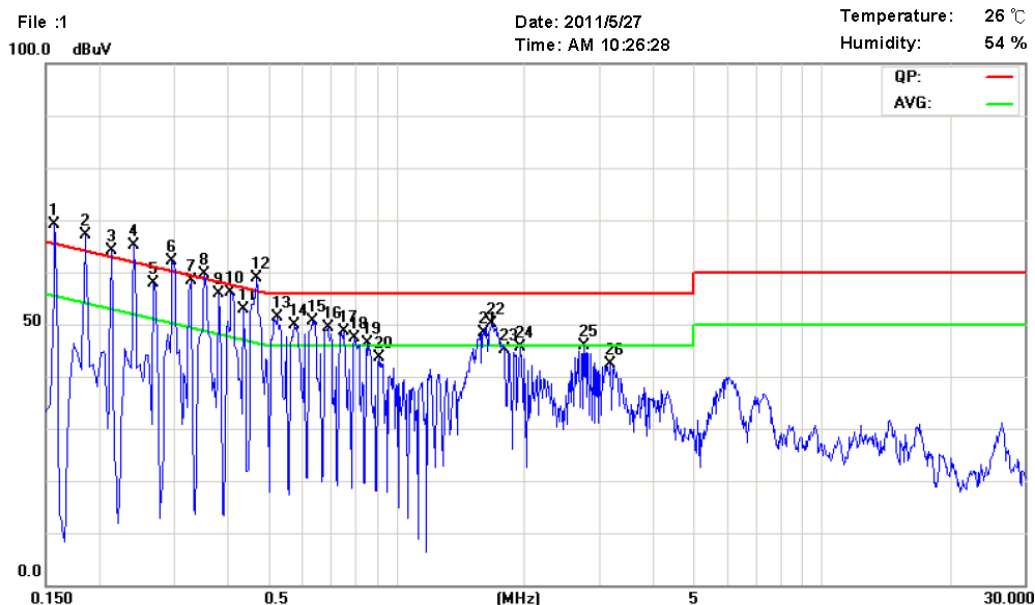
### 5.4 Measurement Result:

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: | 05/27/2011 |
|                 |                | Test By:   | Dino       |



Site: Conduction 03

Phase: L1

Limit: CISPR22 Class B Conduction

Power: AC 120V/60Hz

Company: 正翰

Witness:

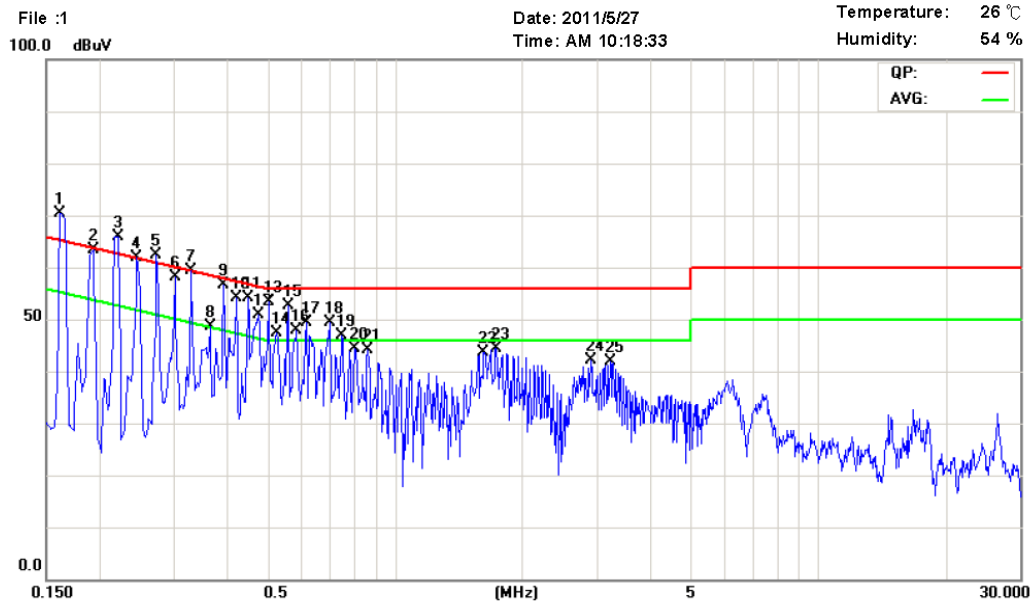
EUT Model:

Execute Program:

Note: 11LR041 Operation

| 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   | 0.1580           | 0.09               | 0.04                | 62.63                  | 65.5                | -2.94              | 35.84                   | 55.5                 | -19.7               |      |
| 2   | 0.1860           | 0.08               | 0.04                | 60.54                  | 64.2                | -3.67              | 35.62                   | 54.2                 | -18.5               |      |
| 3   | 0.2140           | 0.07               | 0.04                | 59.02                  | 63.0                | -4.03              | 35.05                   | 53.0                 | -18.0               |      |
| 4   | 0.2420           | 0.07               | 0.05                | 57.70                  | 62.0                | -4.33              | 34.57                   | 52.0                 | -17.4               |      |
| 5   | 0.2700           | 0.07               | 0.05                | 55.31                  | 61.1                | -5.81              | 33.93                   | 51.1                 | -17.1               |      |
| 6   | 0.2980           | 0.07               | 0.05                | 52.96                  | 60.3                | -7.34              | 34.44                   | 50.3                 | -15.8               |      |
| 7   | 0.3300           | 0.06               | 0.05                | 51.54                  | 59.4                | -7.91              | 35.97                   | 49.4                 | -13.4               |      |
| 8   | 0.3540           | 0.06               | 0.05                | 49.87                  | 58.8                | -9.00              | 37.46                   | 48.8                 | -11.4               |      |
| 9   | 0.3820           | 0.06               | 0.05                | 49.50                  | 58.2                | -8.74              | 37.22                   | 48.2                 | -11.0               |      |
| 10  | 0.4100           | 0.06               | 0.06                | 48.66                  | 57.6                | -8.99              | 35.49                   | 47.6                 | -12.1               |      |
| 11  | 0.4380           | 0.06               | 0.06                | 47.52                  | 57.1                | -9.58              | 30.90                   | 47.1                 | -16.2               |      |
| 12  | 0.4700           | 0.06               | 0.06                | 51.94                  | 56.5                | -4.57              | 42.18                   | 46.5                 | -4.33               |      |
| 13  | 0.5260           | 0.06               | 0.06                | 47.69                  | 56.0                | -8.31              | 36.75                   | 46.0                 | -9.25               |      |
| 14  | 0.5780           | 0.06               | 0.06                | 46.34                  | 56.0                | -9.66              | 36.99                   | 46.0                 | -9.01               |      |
| 15  | 0.6340           | 0.06               | 0.06                | 48.30                  | 56.0                | -7.70              | 36.68                   | 46.0                 | -9.32               |      |

| 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 |
|-----|------------------|--------------------|---------------------|------------------------|---------------------|--------------------|-------------------------|----------------------|---------------------|------|
| 16  | 0.6900           | 0.06               | 0.06                | 46.91                  | 56.0                | -9.09              | 37.36                   | 46.0                 | -8.64               |      |
| 17  | 0.7540           | 0.06               | 0.06                | 46.48                  | 56.0                | -9.52              | 35.49                   | 46.0                 | -10.5               |      |
| 18  | 0.7980           | 0.06               | 0.06                | 43.88                  | 56.0                | -12.1              | 34.74                   | 46.0                 | -11.2               |      |
| 19  | 0.8540           | 0.06               | 0.06                | 44.06                  | 56.0                | -11.9              | 33.39                   | 46.0                 | -12.6               |      |
| 20  | 0.9140           | 0.06               | 0.06                | 40.60                  | 56.0                | -15.4              | 30.92                   | 46.0                 | -15.0               |      |
| 21  | 1.5820           | 0.06               | 0.08                | 46.47                  | 56.0                | -9.53              | 36.07                   | 46.0                 | -9.93               |      |
| 22  | 1.6740           | 0.06               | 0.08                | 45.95                  | 56.0                | -10.0              | 35.89                   | 46.0                 | -10.1               |      |
| 23  | 1.8020           | 0.06               | 0.08                | 42.79                  | 56.0                | -13.2              | 33.05                   | 46.0                 | -12.9               |      |
| 24  | 1.9660           | 0.06               | 0.09                | 41.74                  | 56.0                | -14.2              | 31.45                   | 46.0                 | -14.5               |      |
| 25  | 2.7740           | 0.06               | 0.11                | 42.81                  | 56.0                | -13.1              | 33.43                   | 46.0                 | -12.5               |      |
| 26  | 3.1980           | 0.07               | 0.12                | 40.06                  | 56.0                | -15.9              | 30.56                   | 46.0                 | -15.4               |      |



Site: Conduction 03

Phase: N

Limit: CISPR22 Class B Conduction

Power: AC 120V/60Hz

Company: 正翰

Witness:

EUT Model:

Execute Program:

Note: 11LR041 Operation

| 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   | 0.1620           | 0.11               | 0.04                | 62.64                  | 65.3                | -2.72              | 34.70                   | 55.3                 | -20.6               |      |
| 2   | 0.1940           | 0.1                | 0.04                | 60.66                  | 63.8                | -3.20              | 33.75                   | 53.8                 | -20.1               |      |
| 3   | 0.2220           | 0.1                | 0.04                | 58.15                  | 62.7                | -4.59              | 32.22                   | 52.7                 | -20.5               |      |
| 4   | 0.2460           | 0.1                | 0.05                | 57.27                  | 61.8                | -4.62              | 32.51                   | 51.8                 | -19.3               |      |
| 5   | 0.2740           | 0.09               | 0.05                | 54.48                  | 61.0                | -6.52              | 31.46                   | 51.0                 | -19.5               |      |
| 6   | 0.3020           | 0.09               | 0.05                | 53.11                  | 60.1                | -7.08              | 31.60                   | 50.1                 | -18.5               |      |
| 7   | 0.3300           | 0.09               | 0.05                | 51.42                  | 59.4                | -8.03              | 32.86                   | 49.4                 | -16.5               |      |
| 8   | 0.3660           | 0.08               | 0.05                | 50.32                  | 58.5                | -8.27              | 33.87                   | 48.5                 | -14.7               |      |
| 9   | 0.3940           | 0.08               | 0.05                | 48.93                  | 57.9                | -9.05              | 34.46                   | 47.9                 | -13.5               |      |
| 10  | 0.4220           | 0.08               | 0.06                | 47.72                  | 57.4                | -9.69              | 32.37                   | 47.4                 | -15.0               |      |
| 11  | 0.4500           | 0.08               | 0.06                | 47.10                  | 56.8                | -9.78              | 33.80                   | 46.8                 | -13.0               |      |
| 12  | 0.4780           | 0.08               | 0.06                | 46.30                  | 56.3                | -10.0              | 36.53                   | 46.3                 | -9.84               |      |
| 13  | 0.5020           | 0.08               | 0.06                | 45.72                  | 56.0                | -10.2              | 35.16                   | 46.0                 | -10.8               |      |
| 14  | 0.5260           | 0.08               | 0.06                | 44.98                  | 56.0                | -11.0              | 33.98                   | 46.0                 | -12.0               |      |
| 15  | 0.5620           | 0.08               | 0.06                | 43.95                  | 56.0                | -12.0              | 32.45                   | 46.0                 | -13.5               |      |

| 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 |
|-----|------------------|--------------------|---------------------|------------------------|---------------------|--------------------|-------------------------|----------------------|---------------------|------|
| 16  | 0.5860           | 0.08               | 0.06                | 43.39                  | 56.0                | -12.6              | 33.29                   | 46.0                 | -12.7               |      |
| 17  | 0.6180           | 0.08               | 0.06                | 43.29                  | 56.0                | -12.7              | 33.46                   | 46.0                 | -12.5               |      |
| 18  | 0.7020           | 0.07               | 0.06                | 43.20                  | 56.0                | -12.8              | 33.99                   | 46.0                 | -12.0               |      |
| 19  | 0.7500           | 0.07               | 0.06                | 42.95                  | 56.0                | -13.0              | 32.56                   | 46.0                 | -13.4               |      |
| 20  | 0.8060           | 0.07               | 0.06                | 41.69                  | 56.0                | -14.3              | 32.40                   | 46.0                 | -13.6               |      |
| 21  | 0.8660           | 0.07               | 0.06                | 41.23                  | 56.0                | -14.7              | 30.60                   | 46.0                 | -15.4               |      |
| 22  | 1.6260           | 0.08               | 0.08                | 41.04                  | 56.0                | -14.9              | 32.55                   | 46.0                 | -13.4               |      |
| 23  | 1.7420           | 0.08               | 0.08                | 40.52                  | 56.0                | -15.4              | 32.48                   | 46.0                 | -13.5               |      |
| 24  | 2.9140           | 0.08               | 0.11                | 37.16                  | 56.0                | -18.8              | 28.09                   | 46.0                 | -17.9               |      |
| 25  | 3.2380           | 0.09               | 0.12                | 38.75                  | 56.0                | -17.2              | 28.32                   | 46.0                 | -17.6               |      |



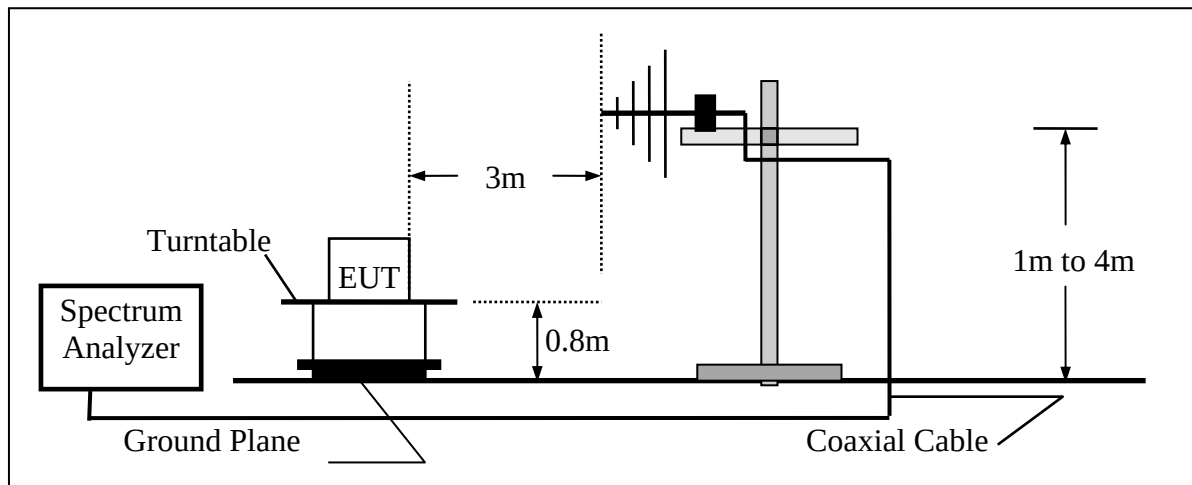
## 6 Radiated Emission Test

### 6.1 Measurement Procedure

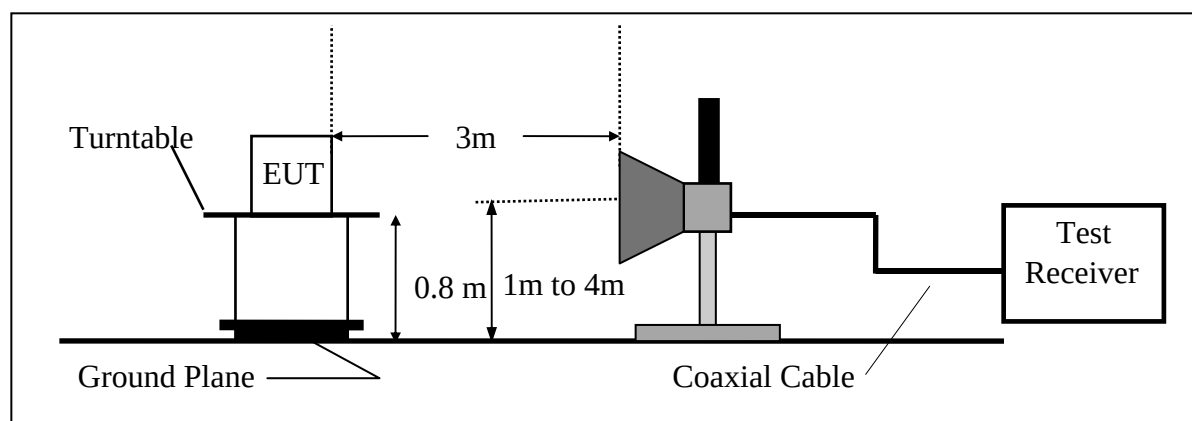
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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

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

$$AV \text{ Factor} = 20\log(6\text{ms}/100\text{ms}) = -24.44\text{dB}$$

|       |                        |                                            |
|-------|------------------------|--------------------------------------------|
| 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 27, 2011  
Fundamental Frequency : 2404.125 MHz Test By : Dino  
Temp : 25 °C Hum. : 60%

| No | 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  | 191.99      | 49.65           | -18.11       | 31.54           | 43.50           | -11.96              | Peak   | VERTICAL   |
| 2  | 317.12      | 43.44           | -14.52       | 28.92           | 46.00           | -17.08              | Peak   | VERTICAL   |
| 3  | 377.26      | 42.95           | -13.43       | 29.52           | 46.00           | -16.48              | Peak   | VERTICAL   |
| 4  | 490.75      | 38.08           | -13.00       | 25.08           | 46.00           | -20.92              | Peak   | VERTICAL   |
| 5  | 599.39      | 38.35           | -12.14       | 26.21           | 46.00           | -19.79              | Peak   | VERTICAL   |
| 6  | 824.43      | 39.06           | -10.83       | 28.23           | 46.00           | -17.77              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 191.99      | 56.86           | -18.11       | 38.75           | 43.50           | -4.75               | Peak   | HORIZONTAL |
| 2  | 288.02      | 48.34           | -15.11       | 33.23           | 46.00           | -12.77              | Peak   | HORIZONTAL |
| 3  | 480.08      | 46.54           | -13.07       | 33.47           | 46.00           | -12.53              | Peak   | HORIZONTAL |
| 4  | 576.11      | 43.80           | -12.17       | 31.63           | 46.00           | -14.37              | Peak   | HORIZONTAL |
| 5  | 672.14      | 37.32           | -11.86       | 25.46           | 46.00           | -20.54              | Peak   | HORIZONTAL |
| 6  | 911.73      | 34.36           | -10.05       | 24.31           | 46.00           | -21.69              | 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 27, 2011  
Fundamental Frequency : 2442.375 MHz Test By : Dino  
Temp : 25 °C Hum. : 60%

| No | 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  | 191.99      | 48.22           | -18.11       | 30.11           | 43.50           | -13.39              | Peak   | VERTICAL   |
| 2  | 335.55      | 43.89           | -14.10       | 29.79           | 46.00           | -16.21              | Peak   | VERTICAL   |
| 3  | 480.08      | 39.55           | -13.07       | 26.48           | 46.00           | -19.52              | Peak   | VERTICAL   |
| 4  | 575.14      | 37.18           | -12.17       | 25.01           | 46.00           | -20.99              | Peak   | VERTICAL   |
| 5  | 695.42      | 31.66           | -11.89       | 19.77           | 46.00           | -26.23              | Peak   | VERTICAL   |
| 6  | 838.98      | 36.67           | -10.73       | 25.94           | 46.00           | -20.06              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 191.99      | 57.08           | -18.11       | 38.97           | 43.50           | -4.53               | Peak   | HORIZONTAL |
| 2  | 288.02      | 48.34           | -15.11       | 33.23           | 46.00           | -12.77              | Peak   | HORIZONTAL |
| 3  | 480.08      | 46.07           | -13.07       | 33.00           | 46.00           | -13.00              | Peak   | HORIZONTAL |
| 4  | 576.11      | 43.92           | -12.17       | 31.75           | 46.00           | -14.25              | Peak   | HORIZONTAL |
| 5  | 671.17      | 36.58           | -11.87       | 24.71           | 46.00           | -21.29              | Peak   | HORIZONTAL |
| 6  | 911.73      | 33.06           | -10.05       | 23.01           | 46.00           | -22.99              | 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 27, 2011 |
| Fundamental Frequency | : 2478.375 MHz | Test By   | : Dino         |
| Temp                  | : 25 °C        | Hum.      | : 60%          |

| No | 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  | 191.99      | 50.30           | -18.11       | 32.19           | 43.50           | -11.31              | Peak   | VERTICAL   |
| 2  | 315.18      | 44.29           | -14.55       | 29.74           | 46.00           | -16.26              | Peak   | VERTICAL   |
| 3  | 500.45      | 40.39           | -12.93       | 27.46           | 46.00           | -18.54              | Peak   | VERTICAL   |
| 4  | 649.83      | 34.83           | -11.84       | 22.99           | 46.00           | -23.01              | Peak   | VERTICAL   |
| 5  | 829.28      | 40.31           | -10.80       | 29.51           | 46.00           | -16.49              | Peak   | VERTICAL   |
| 6  | 897.18      | 35.65           | -10.21       | 25.44           | 46.00           | -20.56              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 191.99      | 56.62           | -18.11       | 38.51           | 43.50           | -4.99               | Peak   | HORIZONTAL |
| 2  | 288.02      | 48.77           | -15.11       | 33.66           | 46.00           | -12.34              | Peak   | HORIZONTAL |
| 3  | 480.08      | 45.72           | -13.07       | 32.65           | 46.00           | -13.35              | Peak   | HORIZONTAL |
| 4  | 576.11      | 43.55           | -12.17       | 31.38           | 46.00           | -14.62              | Peak   | HORIZONTAL |
| 5  | 659.53      | 37.69           | -11.85       | 25.84           | 46.00           | -20.16              | Peak   | HORIZONTAL |
| 6  | 911.73      | 33.20           | -10.05       | 23.15           | 46.00           | -22.85              | 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 27, 2011  
Fundamental Frequency : 2404.125 MHz Test By : Dino  
Temp : 25 °C Hum. : 60%

| No | 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  | 2404.125    | 103.69          | -24.44       | 79.25           | 94.00           | -14.75              | Average | VERTICAL   |
| 2  | 2404.125    | 110.66          | -6.97        | 103.69          | 114.00          | -10.31              | Peak    | VERTICAL   |
| 3  | 2404.125    | 104.28          | -24.44       | 79.84           | 94.00           | -14.16              | Average | HORIZONTAL |
| 4  | 2404.125    | 111.25          | -6.97        | 104.28          | 114.00          | -9.72               | Peak    | HORIZONTAL |

| No | 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  | 4808.25     | 49.18           | -1.85        | 47.33           | 74.00           | -26.67              | Peak   | VERTICAL   |
| 2  | 7212.38     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 3  | 9616.50     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 4  | 12020.63    | ---             |              |                 |                 |                     |        | VERTICAL   |
| 1  | 4808.25     | 44.58           | -1.85        | 42.73           | 74.00           | -31.27              | Peak   | HORIZONTAL |
| 2  | 7212.38     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 3  | 9616.50     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 4  | 12020.63    | ---             |              |                 |                 |                     |        | 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 AV level = Peak level + Duty Cycle Correction factor..

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

Operation Mode : TX CH Mid Test Date : May 27, 2011  
Fundamental Frequency : 2442.375 MHz Test By : Dino  
Temp : 25 °C Hum. : 60%

| No | 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  | 2442.375    | 102.59          | -24.44       | 78.15           | 94.00           | -15.85              | Average | VERTICAL   |
| 2  | 2442.375    | 109.54          | -6.95        | 102.59          | 114.00          | -11.41              | Peak    | VERTICAL   |
| 3  | 2442.375    | 102.61          | -24.44       | 78.17           | 94.00           | -15.83              | Average | HORIZONTAL |
| 4  | 2442.375    | 109.56          | -6.95        | 102.61          | 114.00          | -11.39              | Peak    | HORIZONTAL |

| No | 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  | 4884.75     | 44.23           | -1.71        | 42.52           | 74.00           | -31.48              | Peak   | VERTICAL   |
| 2  | 7327.13     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 3  | 9769.50     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 4  | 12211.88    | ---             |              |                 |                 |                     |        | VERTICAL   |
| 1  | 4884.75     | 44.21           | -1.66        | 42.55           | 74.00           | -31.45              | Peak   | HORIZONTAL |
| 2  | 7327.13     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 3  | 9769.50     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 4  | 12211.88    | ---             |              |                 |                 |                     |        | 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 AV level = Peak level + Duty Cycle Correction factor..

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

Operation Mode : TX CH High Test Date : May 27, 2011  
Fundamental Frequency : 2478.375 MHz Test By : Dino  
Temp./Hum. : 25 °C / : 60%

| No | 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  | 2478.375    | 103.20          | -24.44       | 78.76           | 94.00           | -15.24              | Average | VERTICAL   |
| 2  | 2478.375    | 110.14          | -6.94        | 103.20          | 114.00          | -10.80              | Peak    | VERTICAL   |
| 3  | 2478.375    | 104.08          | -24.44       | 79.64           | 94.00           | -14.36              | Average | HORIZONTAL |
| 4  | 2478.375    | 111.02          | -6.94        | 104.08          | 114.00          | -9.92               | Peak    | HORIZONTAL |

| No | 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  | 4956.75     | 43.20           | -1.50        | 41.70           | 74.00           | -32.30              | Peak   | VERTICAL   |
| 2  | 7435.13     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 3  | 9913.50     | ---             |              |                 |                 |                     |        | VERTICAL   |
| 4  | 12391.88    | ---             |              |                 |                 |                     |        | VERTICAL   |
| 1  | 4956.75     | 45.76           | -1.47        | 44.29           | 74.00           | -29.71              | Peak   | HORIZONTAL |
| 2  | 7435.13     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 3  | 9913.50     | ---             |              |                 |                 |                     |        | HORIZONTAL |
| 4  | 12391.88    | ---             |              |                 |                 |                     |        | 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 AV level = Peak level + Duty Cycle Correction factor..



## Radiated Spurious Emission Measurement Result (Band Edge)

Operation Mode : Band Edge                      Test Date : May 27, 2011  
 Temp./Hum. : 25 °C / : 60%                      Test By : Dino

### CH Low

| 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 |
|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 2390.00     | 47.84           | -6.97        | 40.87           | 74.00           | -33.13              | Peak   | VERTICAL   |
|             |                 |              |                 |                 |                     |        |            |
| 2390.00     | 48.45           | -6.97        | 41.48           | 74.00           | -32.52              | Peak   | HORIZONTAL |

### CH High

| 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 |
|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 2483.50     | 50.07           | -6.94        | 43.13           | 74.00           | -30.87              | Peak   | VERTICAL   |
|             |                 |              |                 |                 |                     |        |            |
| 2483.50     | 51.68           | -6.94        | 44.74           | 74.00           | -29.26              | 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 AV level = Peak level + Duty Cycle Correction factor..

## **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 = 1MHz.
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:**

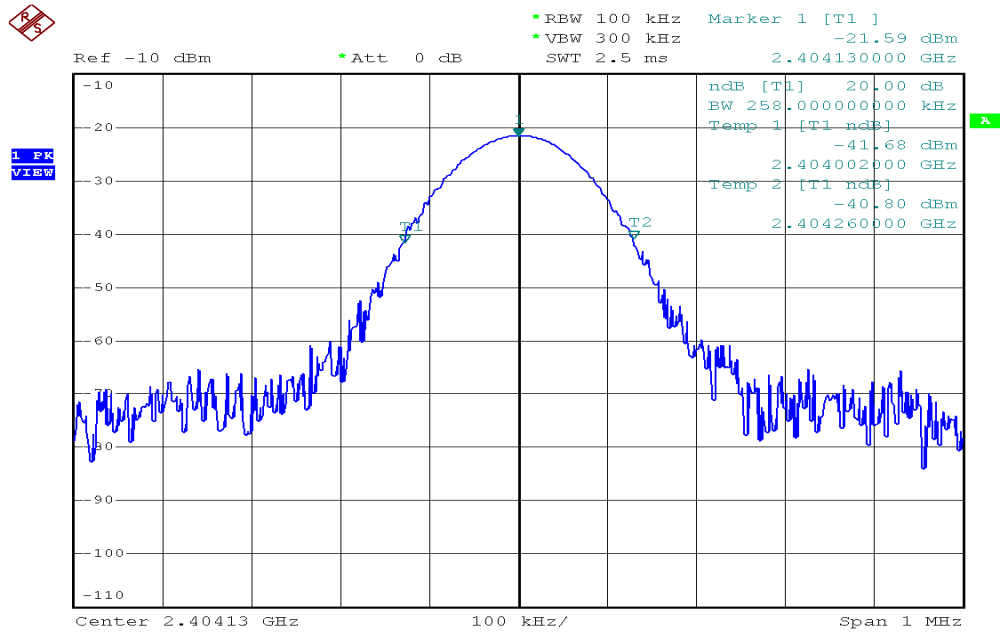
Lowest Channel = 0.258MHz

Mid Channel = 0.262MHz

Highest Channel = 0.260MHz

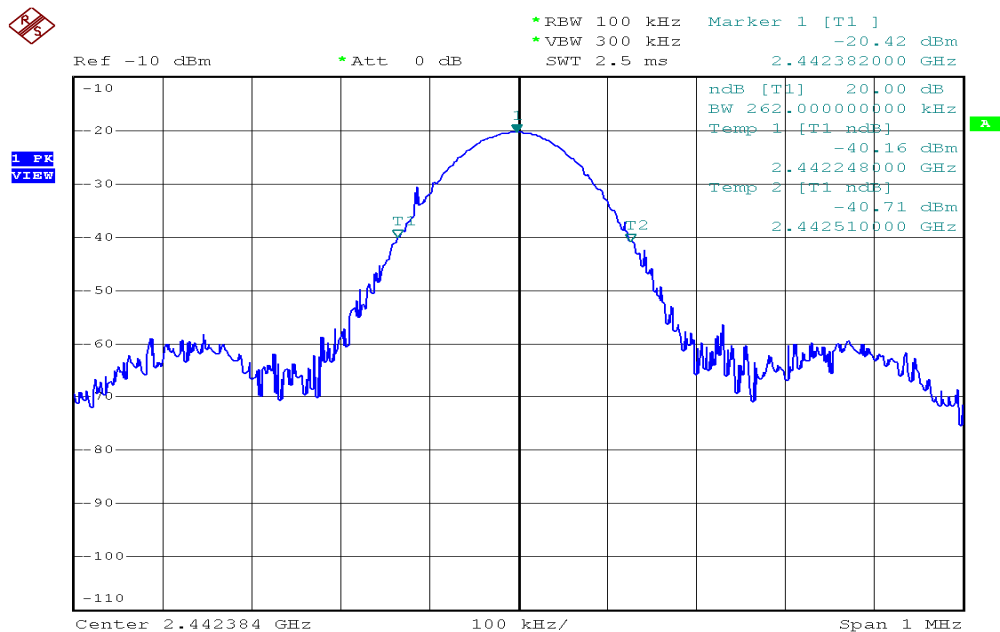
Refer to attached data chart.

## 20dB Bandwidth Test Data CH-Low



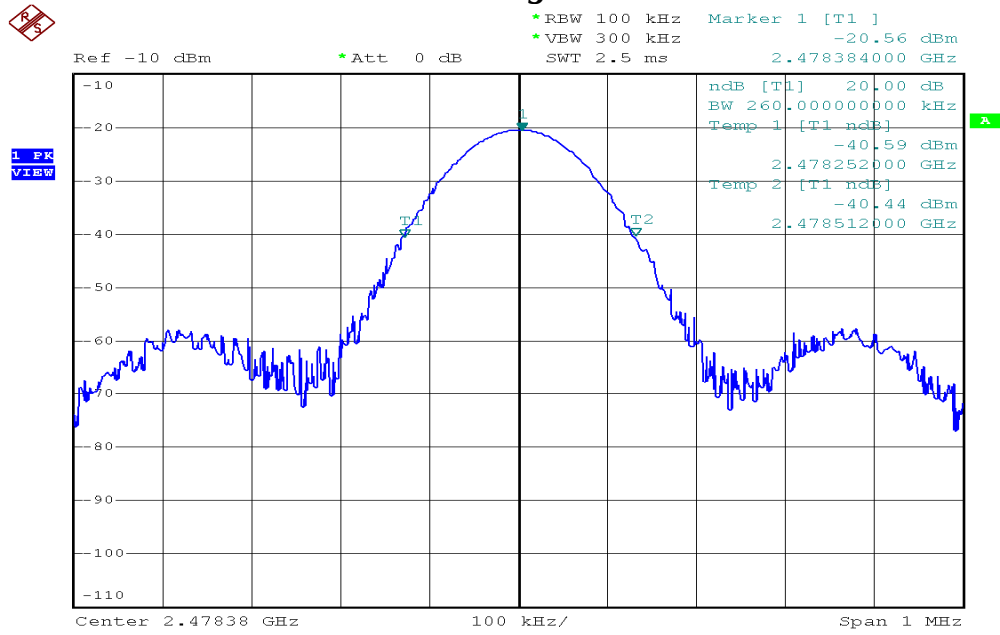
Date: 27.MAY.2011 18:23:56

## 20dB Bandwidth Test Data CH-Mid



Date: 27.MAY.2011 18:26:02

## 20dB Bandwidth Test Data CH-High



Date: 27.MAY.2011 18:27:03

## 8 Duty Cycle Measurement

### 8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW / VBW= 1MHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

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

Same as 6.3 Radiated Emission Measurement.

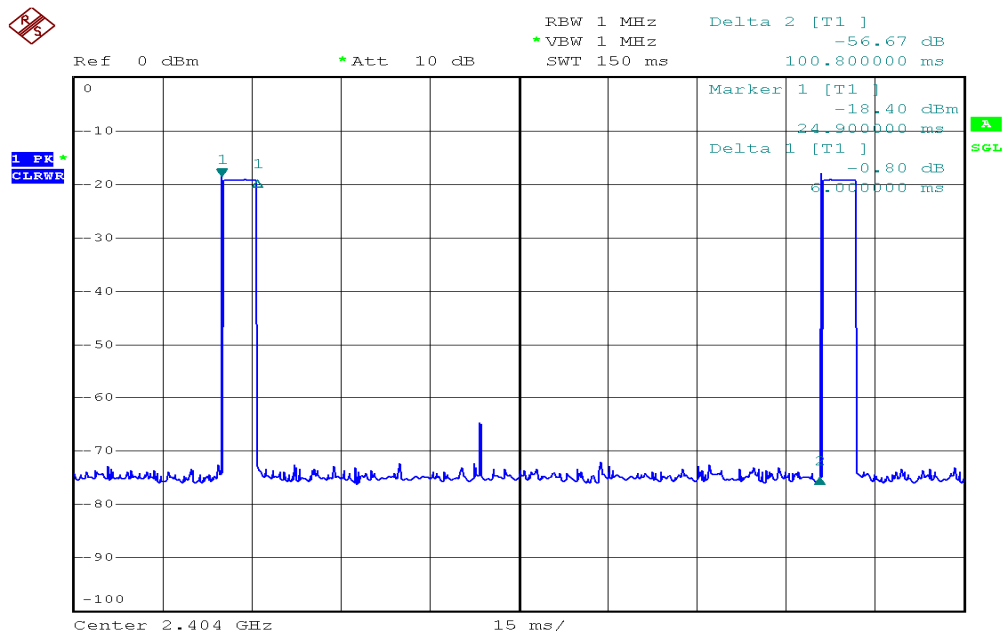
### 8.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

### 8.4 Measurement Results:

$T_p > 100$  (ms),

$$\begin{aligned} \text{Average Correction Factory} &= 20\log(T_{on}/T_p) = 20\log(6/100) \\ &= -24.44\text{dB} \end{aligned}$$



Date: 27.MAY.2011 18:19:28