



**Spectrum Research & Testing Lab., Inc.**  
No. 101-10, Ling 8,  
Shan-Tong Li, Chung-Li  
City, Taoyuan, Taiwan

## TEST REPORT

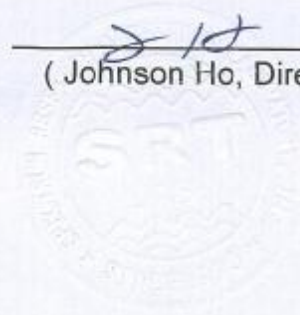
Reference No.: A12040501  
Report No.: FCCA12040501  
FCC ID : FSUGMZJY  
Page: 1 of 54  
Date: May. 08, 2012

Product Name: Traveler 9005BT  
Model No.: GM-110036/T  
Applicant: KYE SYSTEMS CORP.  
No. 492, Sec. 5, Chung Hsin Rd., San Chung,  
New Taipei City, 24160, Taiwan, R.O.C.  
Date of Receipt: Apr. 05, 2012  
Finished date of Test: May. 08, 2012  
Applicable Standards: 47 CFR Part 15, Subpart C  
47 CFR Part 15, Subpart B  
ANSI C63.4: 2003  
FCC Public Notice DA 00-705(March 2000)

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Tested By : Richard Lin , Date: 5/8/2012  
(Richard Lin)

Approved By : J. H. , Date: 5/8/2012  
(Johnson Ho, Director)





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## 1. DOCUMENT POLICY AND TEST STATEMENT

### 1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.

### 1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- DC power source, 3.0 Vdc of AA battery × 2 (TX) was used during the test.

### 1.3 EUT MODIFICATION

- No modification in SRT Lab.



## TEST REPORT

## 2. DESCRIPTION OF EUT AND TEST MODE

### 2.1 GENERAL DESCRIPTION OF EUT

|                             |                                                      |
|-----------------------------|------------------------------------------------------|
| PRODUCT                     | Traveler 9005BT                                      |
| MODEL NO.                   | GM-110036/T                                          |
| POWER SUPPLY                | DC power source from AA battery × 2 : 3.0 Vdc, 50 mA |
| CABLE                       | NA                                                   |
| FREQUENCY BAND              | 2.400 GHz ~ 2.4835 GHz                               |
| CARRIER FREQUENCY           | 2.402 GHz ~ 2.480 GHz                                |
| NUMBER OF CHANNEL           | 79                                                   |
| RATED RF OUTPUT POWER       | -9.73 dBm                                            |
| MODULATION TYPE             | GFSK, DQPSK, 8DPSK                                   |
| MODE OF OPERATION           | Duplex                                               |
| ANTENNA TYPE                | PCB Printed                                          |
| ANTENNA GAIN                | -1 dBi                                               |
| OPERATING TEMPERATURE RANGE | -20 ~ 50 °C                                          |

**NOTE :** For more detailed information, please refer to the EUT's specification or user's manual provided by manufacturer.

### 2.2 DESCRIPTION OF EUT INTERNAL DEVICE

| No | Device | Brand | Model # | FCC ID/DoC | Cable |
|----|--------|-------|---------|------------|-------|
|    | N/A    |       |         |            |       |
|    |        |       |         |            |       |

### 2.3 EUT OPERATING CONDITION

1. Setup the EUT and all peripheral devices .
2. Turn on the power of all equipment and EUT.
3. Set the EUT under continuous transmission condition, standby mode.
4. The EUT was set to the highest available power level.



## 2.4 Used Channel and Frequency Table

| 頻道   | 頻率       | 頻道   | 頻率       | 頻道   | 頻率       | 頻道   | 頻率       |
|------|----------|------|----------|------|----------|------|----------|
| CH00 | 2402 MHz | CH20 | 2422 MHz | CH40 | 2442 MHz | CH60 | 2462 MHz |
| CH01 | 2403 MHz | CH21 | 2423 MHz | CH41 | 2443 MHz | CH61 | 2463 MHz |
| CH02 | 2404 MHz | CH22 | 2424 MHz | CH42 | 2444 MHz | CH62 | 2464 MHz |
| CH03 | 2405 MHz | CH23 | 2425 MHz | CH43 | 2445 MHz | CH63 | 2465 MHz |
| CH04 | 2406 MHz | CH24 | 2426 MHz | CH44 | 2446 MHz | CH64 | 2466 MHz |
| CH05 | 2407 MHz | CH25 | 2427 MHz | CH45 | 2447 MHz | CH65 | 2467 MHz |
| CH06 | 2408 MHz | CH26 | 2428 MHz | CH46 | 2448 MHz | CH66 | 2468 MHz |
| CH07 | 2409 MHz | CH27 | 2429 MHz | CH47 | 2449 MHz | CH67 | 2469 MHz |
| CH08 | 2410 MHz | CH28 | 2430 MHz | CH48 | 2450 MHz | CH68 | 2470 MHz |
| CH09 | 2411 MHz | CH29 | 2431 MHz | CH49 | 2451 MHz | CH69 | 2471 MHz |
| CH10 | 2412 MHz | CH30 | 2432 MHz | CH50 | 2452 MHz | CH70 | 2472 MHz |
| CH11 | 2413 MHz | CH31 | 2433 MHz | CH51 | 2453 MHz | CH71 | 2473 MHz |
| CH12 | 2414 MHz | CH32 | 2434 MHz | CH52 | 2454 MHz | CH72 | 2474 MHz |
| CH13 | 2415 MHz | CH33 | 2435 MHz | CH53 | 2455 MHz | CH73 | 2475 MHz |
| CH14 | 2416 MHz | CH34 | 2436 MHz | CH54 | 2456 MHz | CH74 | 2476 MHz |
| CH15 | 2417 MHz | CH35 | 2437 MHz | CH55 | 2457 MHz | CH75 | 2477 MHz |
| CH16 | 2418 MHz | CH36 | 2438 MHz | CH56 | 2458 MHz | CH76 | 2478 MHz |
| CH17 | 2419 MHz | CH37 | 2439 MHz | CH57 | 2459 MHz | CH77 | 2479 MHz |
| CH18 | 2420 MHz | CH38 | 2440 MHz | CH58 | 2460 MHz | CH78 | 2480 MHz |
| CH19 | 2421 MHz | CH39 | 2441 MHz | CH59 | 2461 MHz |      |          |

|                                                                                                                                                                                                               |                      |                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------|
|  <b>Spectrum Research &amp; Testing Lab., Inc.</b><br>No. 101-10, Ling 8,<br>Shan-Tong Li, Chung-Li<br>City, Taoyuan, Taiwan | <h1>TEST REPORT</h1> | Reference No.: A12040501<br>Report No.: FCCA12040501<br>FCC ID : FSUGMZJY<br>Page: 7 of 54<br>Date: May. 08, 2012 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------|

## 2.5 DESCRIPTION OF TEST MODE

| Mode |         |          |
|------|---------|----------|
| 1    | TX      | 2402 MHz |
| 2    |         | 2441 MHz |
| 3    |         | 2480 MHz |
| 4    | Standby | NA       |

**NOTE :** The axis X,Y and Z we evaluate in chamber, the X axis is worst case.

X axis:



Y axis:



Z axis:



## 2.6 DESCRIPTION OF SUPPORT UNIT

The EUT was configured by the requirement of ANSI C63.4:2003. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

| NO | DEVICE      | BRAND   | MODEL #      | FCC ID/DOC | CABLE                                                                     |
|----|-------------|---------|--------------|------------|---------------------------------------------------------------------------|
| 1  | PC          | ACER    | Aspire SA85  | DoC        | 1.5m unshielded power cable                                               |
| 2  | CRT Monitor | SAMSUNG | PG17IS       | DOC        | 1.8m unshielded power cord<br>1.5m shielded data cable.<br>with one core. |
| 3  | Keyboard    | WinTEK  | WM530        | DoC        | 1.8m unshielded data cable.                                               |
| 4  | Mouse       | WinTEK  | WSS30        | DoC        | 1.5m unshielded data cable.                                               |
| 5  | Modem       | ACEEX   | DM-1414      | DOC        | 1.5m unshielded power cord<br>1.5m shielded data cable.                   |
| 6  | Printer     | EPSON   | STYLUS C20SX | N/A        | 1.5m unshielded power cord<br>1.2m shielded data cable.                   |
| 7  | Dongle      | ASUS    | WL-BTD202    | DoC        | NA                                                                        |

**NOTE :** For the actual test configuration, please refer to the photos of testing.



### 3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a wireless product. According to the specifications provided by the applicant, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C

47 CFR Part 15, Subpart B

ANSI C63.4: 2003

Public Notice DA 00-705 (March 2000)

All tests have been performed and recorded as the above standards.

#### 3.1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications :

| STANDARD SECTION   | TEST TYPE AND LIMIT RESULTS                                                             | RESULTS |
|--------------------|-----------------------------------------------------------------------------------------|---------|
| 15.247(a)          | Channel separation test<br>Limit : minimum of 25 kHz or the 20 dB bandwidth             | PASS    |
| 15.247(a)          | 20dB Bandwidth                                                                          | PASS    |
| 15.247(a)(b)       | Quantity of hopping channel test<br>Limit : 75 non-overlapping hopping channels         | PASS    |
| 15.247(a)          | Time of occupancy (Dwell Time)<br>Limit : greater than 0.4 seconds                      | PASS    |
| 15.247(b)          | Peak power test<br>Limit : 1 watt                                                       | PASS    |
| 15.247(d)          | Band Edge Measurement<br>Limit : 20dB less than the peak value of fundamental frequency | PASS    |
| 15.33(a)<br>15.249 | Transmitter Radiated Emissions<br>Limit : Table 15.209                                  | PASS    |
| 15.203             | Antenna requirement<br>Limit : max. 6 dBi                                               | PASS    |

|                                                                                                                                                                                                               |                      |                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------|
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------|

## 4. TECHNICAL CHARACTERISTICS TEST

### 4.1 CHANNEL SEPARATION TEST

#### 4.1.1 LIMIT

FCC Part15, Subpart C Section 15.247(a)(1). Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

| Frequency Range (MHz) | Limit(kHz) |
|-----------------------|------------|
| 902-928               | >25 kHz    |
| 2400-2483.5           | >25 kHz    |
| 5725-5850             | >25 kHz    |

#### 4.1.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test :

| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS | MANUFACTURER       | MODEL#/<br>SERIAL# | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|----------------|--------------------|--------------------|-----------------------------------|
| SPECTRUM<br>ANALYZER     | 9 kHz – 40 GHz | ROHDE &<br>SCHWARZ | FSP40 /<br>100093  | DEC. 2012<br>ETC                  |
| EMI Test Receiver        | 9 kHz – 6 GHz  | ROHDE &<br>SCHWARZ | ESL/<br>100176     | Mar. 2012<br>R&S                  |

**NOTE:** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.1.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

#### 4.1.4 TEST PROCEDURE

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

#### 4.1.5 EUT OPERATING CONDITION

1. Set the EUT under transmission condition continuously at a specific channel frequency.
2. The EUT was set to the highest available power level.



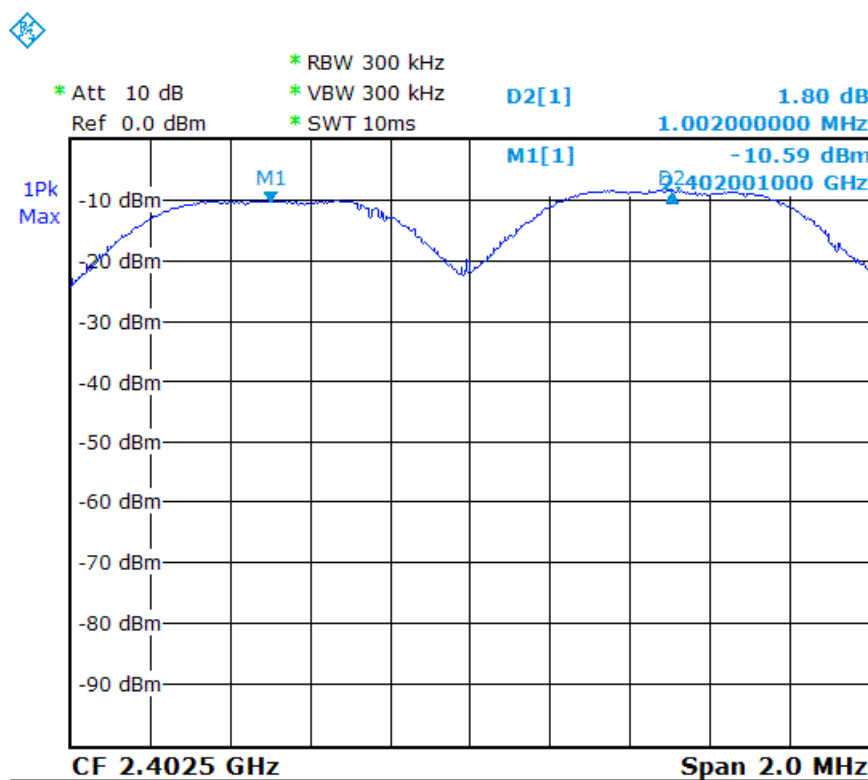
## TEST REPORT

### 4.1.6 TEST RESULT

|                     |      |               |               |
|---------------------|------|---------------|---------------|
| Temperature :       | 22°C | Humidity :    | 61%RH         |
| Spectrum Detector : | PK   | Tested by :   | Richard Lin   |
| Test Result :       | PASS | Tested Date : | Apr. 07, 2012 |

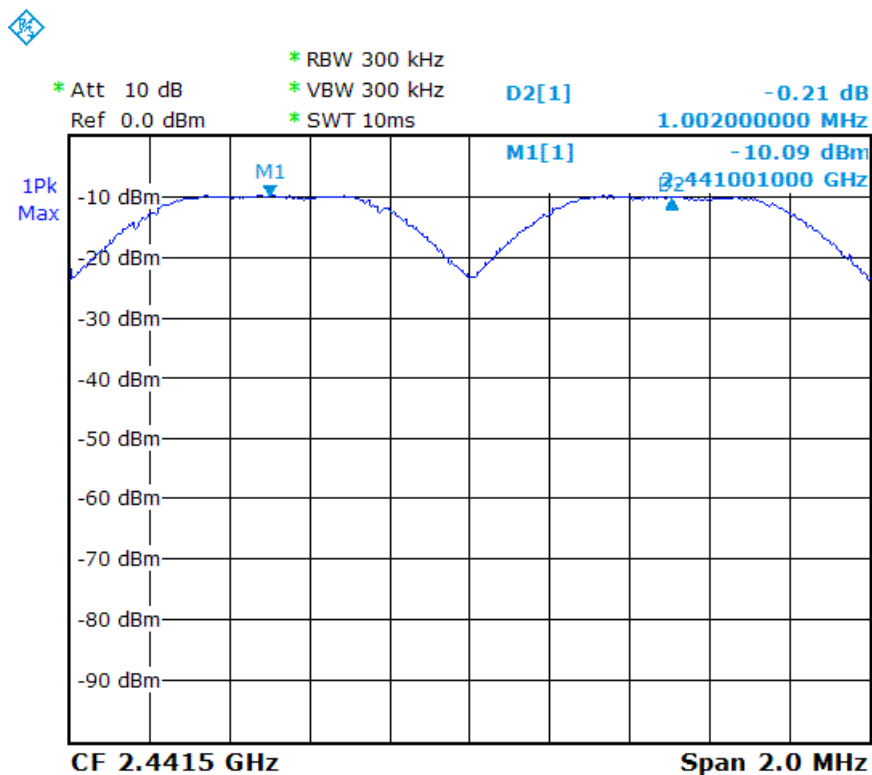
| Channel Number | Channel Frequency (MHz) | Separation Read Value (kHz) | Minimum Limit(20dB Bandwidth) (kHz) |
|----------------|-------------------------|-----------------------------|-------------------------------------|
| 0              | 2402                    | 1002                        | 25                                  |
| 39             | 2441                    | 1002                        | 25                                  |
| 78             | 2480                    | 1006                        | 25                                  |

CH0 :

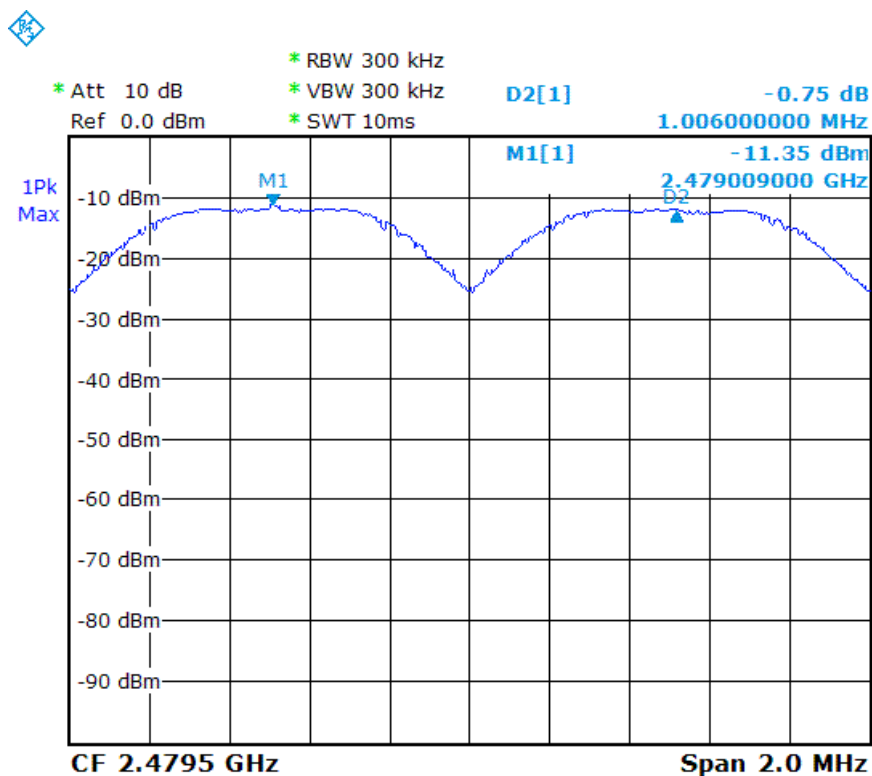




CH39 :



CH78 :



|                                                                                                                                                                                                               |                      |                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|
|  <b>Spectrum Research &amp; Testing Lab., Inc.</b><br>No. 101-10, Ling 8,<br>Shan-Tong Li, Chung-Li<br>City, Taoyuan, Taiwan | <h1>TEST REPORT</h1> | Reference No.: A12040501<br>Report No.: FCCA12040501<br>FCC ID : FSUGMZJY<br>Page: 12 of 54<br>Date: May. 08, 2012 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|

## 4.2 20dB Bandwidth

### 4.2.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

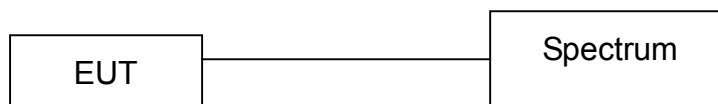
### 4.2.2 TEST EQUIPMENT

The following test equipment was used during the test :

| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS | MANUFACTURER       | MODEL#/<br>SERIAL# | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|----------------|--------------------|--------------------|-----------------------------------|
| SPECTRUM<br>ANALYZER     | 9 kHz – 40 GHz | ROHDE &<br>SCHWARZ | FSP40 /<br>100093  | DEC. 2012<br>ETC                  |
| EMI Test Receiver        | 9 kHz – 6 GHz  | ROHDE &<br>SCHWARZ | ESL/<br>100176     | Mar. 2012<br>R&S                  |

**NOTE:** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.2.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

### 4.2.4 TEST PROCEDURE

The EUT was operated in hopping mode or any specific channel.  
Printed out the test result from the spectrum by hard copy function.



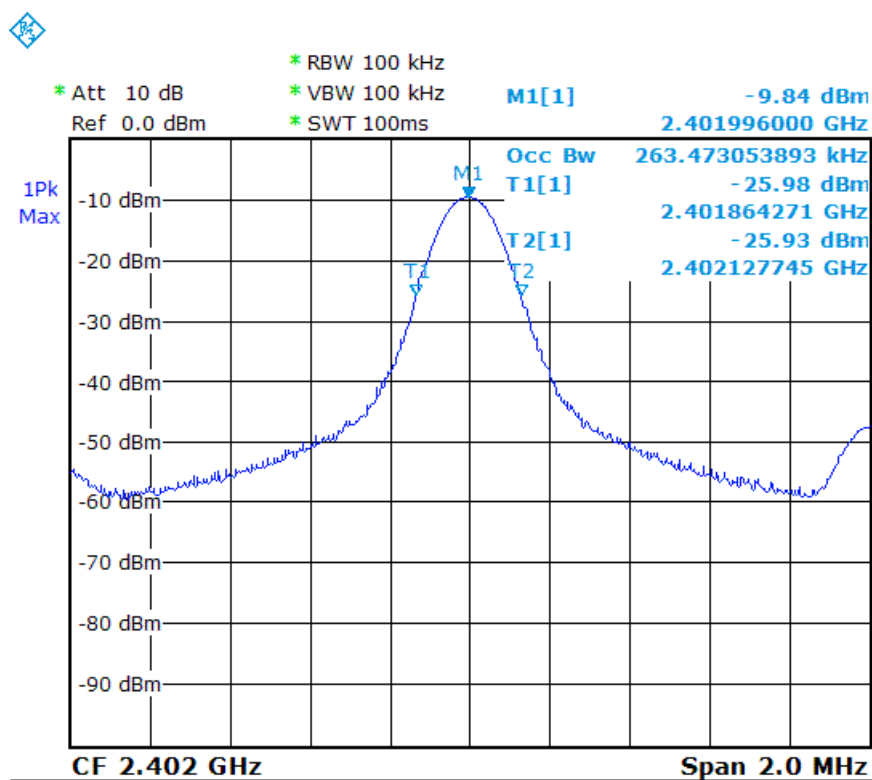
## TEST REPORT

### 4.2.5 TEST RESULT

|                    |      |              |               |
|--------------------|------|--------------|---------------|
| Temperature:       | 22°C | Humidity:    | 61%RH         |
| Spectrum Detector: | PK   | Tested by:   | Richard Lin   |
| Test Result:       | PASS | Tested Date: | Apr. 07, 2012 |

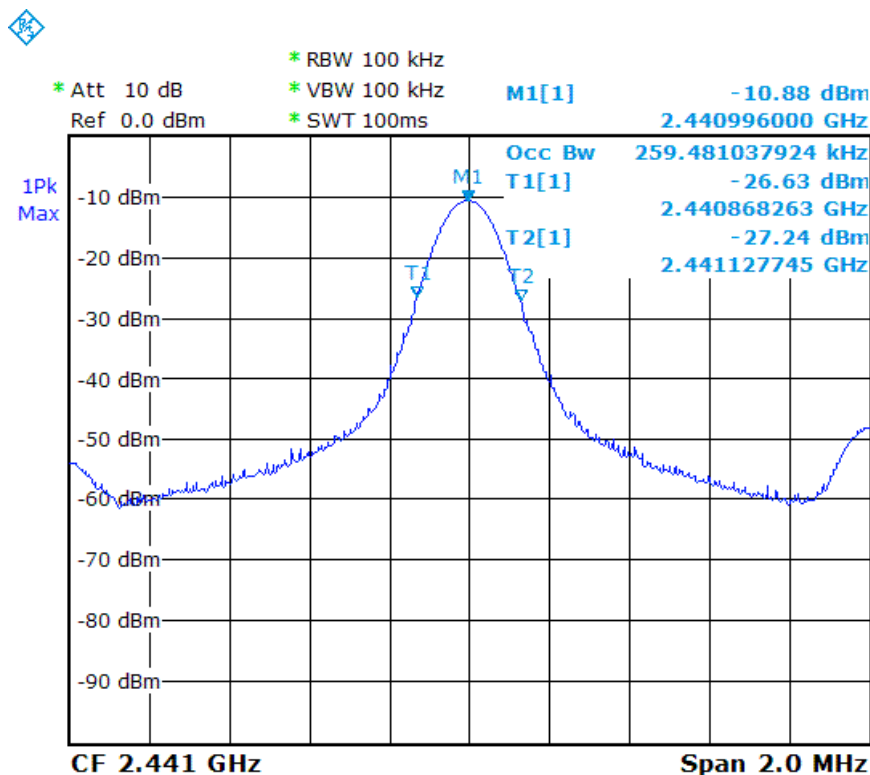
| Channel Number | Channel Frequency (MHz) | 20dB Down Bandwidth (KHz) |
|----------------|-------------------------|---------------------------|
| 0              | 2402                    | 263.5                     |
| 39             | 2441                    | 259.5                     |
| 78             | 2480                    | 255.5                     |

CH0 :

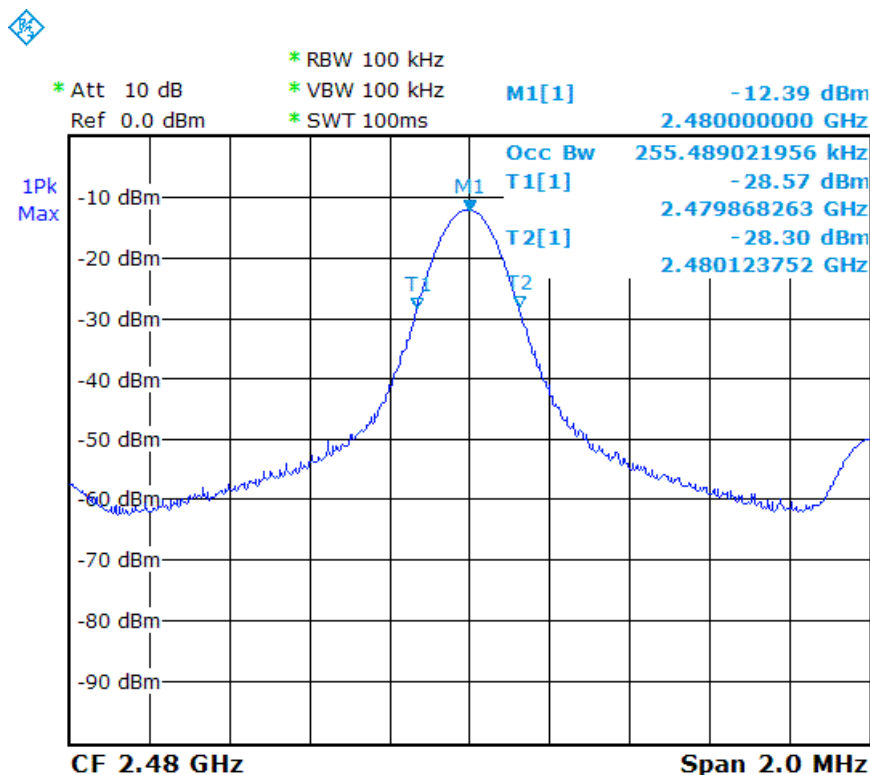




CH39 :



CH78 :





## 4.3 QUANTITY OF HOPPING CHANNEL TEST

### 4.3.1 LIMIT

FCC Part15, Subpart C Section 15.247(a)(b).

Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels.

| Frequency Range (MHz) | Limit (Quantity of Hopping Channel) |                          |                        |                        |
|-----------------------|-------------------------------------|--------------------------|------------------------|------------------------|
|                       | 20dB Bandwidth < 250 kHz            | 20dB Bandwidth > 250 kHz | 20dB Bandwidth < 1 MHz | 20dB Bandwidth > 1 MHz |
| 902-928               | 50                                  | 25                       | N/A                    | N/A                    |
| 2400-2483.5           | N/A                                 | N/A                      | 75                     | 15                     |
| 5725-5850             | N/A                                 | N/A                      | 75                     | N/A                    |

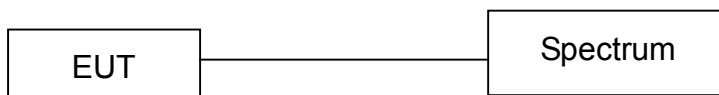
### 4.3.2 TEST EQUIPMENT

The following test equipment was used during the test :

| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS | MANUFACTURER       | MODEL#/<br>SERIAL# | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|----------------|--------------------|--------------------|-----------------------------------|
| SPECTRUM ANALYZER        | 9K TO 40GHz    | ROHDE &<br>SCHWARZ | FSP40 /<br>100093  | DEC. 2012<br>ETC                  |

**NOTE:** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.3.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

### 4.3.4 TEST PROCEDURE

The EUT was operating in hopping mode or could be controlled its channel.  
Printed out the test result from the spectrum by hard copy function.

### 4.3.5 EUT OPERATING CONDITION

1. Set the EUT under frequency hopping transmission condition.
2. The EUT was set to the highest available power level.



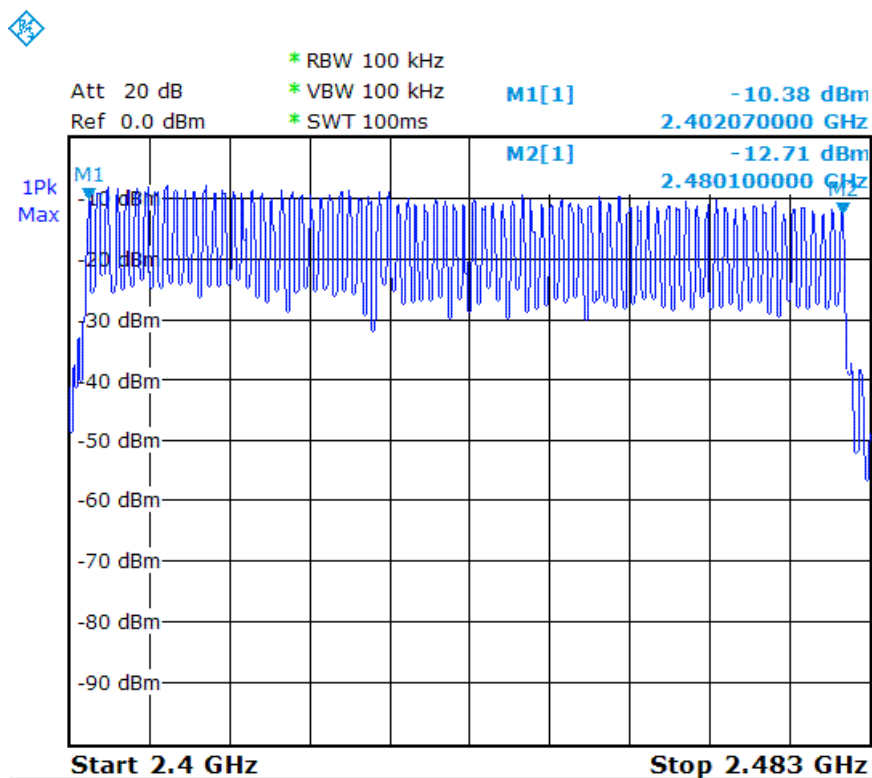
## TEST REPORT

### 4.3.6 TEST RESULT

|                    |      |              |               |
|--------------------|------|--------------|---------------|
| Temperature:       | 22°C | Humidity:    | 61%RH         |
| Spectrum Detector: | PK   | Tested by:   | Richard Lin   |
| Test Result:       | PASS | Tested Date: | Apr. 07, 2012 |

| Hopping Channel Frequency Range(MHz) | Quantity of Hopping Channel Read Value | Quantity of Hopping Channel Limit |
|--------------------------------------|----------------------------------------|-----------------------------------|
| 2402~2480                            | 79                                     | 75                                |

CH0 ~ CH78 :



|                                                                                                                                                                                                               |                      |                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|
|  <b>Spectrum Research &amp; Testing Lab., Inc.</b><br>No. 101-10, Ling 8,<br>Shan-Tong Li, Chung-Li<br>City, Taoyuan, Taiwan | <h1>TEST REPORT</h1> | Reference No.: A12040501<br>Report No.: FCCA12040501<br>FCC ID : FSUGMZJY<br>Page: 17 of 54<br>Date: May. 08, 2012 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|

#### 4.4 TIME OF OCCUPANCY (Dwell Time)

##### 4.4.1 LIMIT

FCC Part15, Subpart C Section 15.247(a).

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

| Frequency Range (MHz) | Limit (ms)                        |                                   |                                 |
|-----------------------|-----------------------------------|-----------------------------------|---------------------------------|
|                       | 20dB Bandwidth <250kHz(50Channel) | 20dB Bandwidth >250kHz(25Channel) | 20dB Bandwidth <1MHz(75Channel) |
| 902-928               | 400(20 s)                         | 400(10 s)                         | NA                              |
| 2400-2483.5           | NA                                | NA                                | 400(30 s)                       |
| 5725-5850             | NA                                | NA                                | 400(30 s)                       |

**NOTE :** The “()” is all channel’s average time of occupancy.

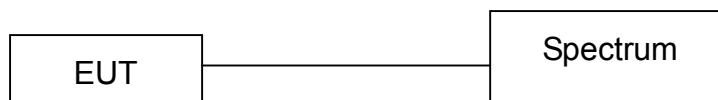
##### 4.4.2 TEST EQUIPMENT

The following test equipment was used during the test :

| EQUIPMENT/ FACILITIES | SPECIFICATIONS  | MANUFACTURER    | MODEL#/ SERIAL# | DUE DATE OF CAL. & CAL. CENTER |
|-----------------------|-----------------|-----------------|-----------------|--------------------------------|
| SPECTRUM ANALYZER     | 9 KHz TO 40 GHz | ROHDE & SCHWARZ | FSP40 / 100093  | DEC. 2012<br>ETC               |

**NOTE :** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

##### 4.4.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

##### 4.4.4 TEST PROCEDURE

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

##### 4.4.5 EUT OPERATING CONDITION

1. Set the EUT under frequency hopping transmission condition.
2. The EUT was set to the highest available power level.



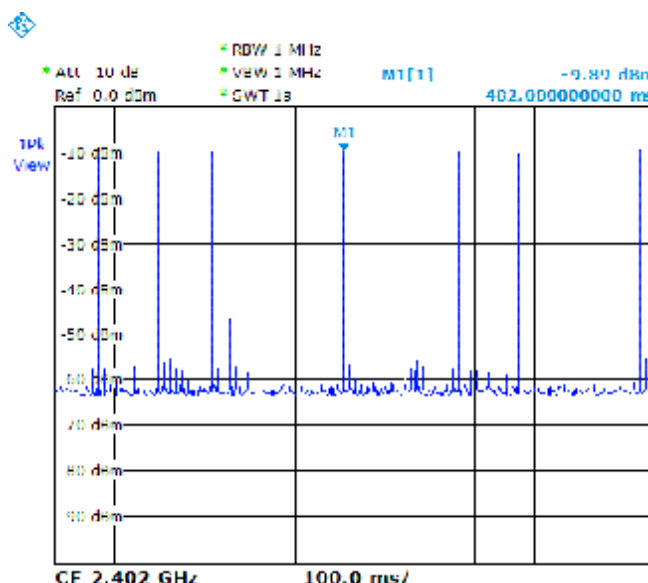
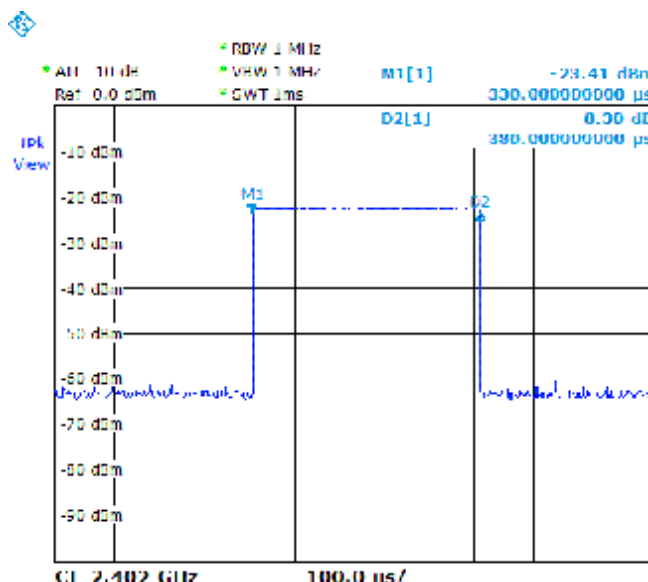
## 4.4.6 TEST RESULT

Temperature: 22°C  
Spectrum Detector: PK  
Test Result: PASS

Humidity: 61%RH  
Tested by: Richard Lin  
Tested Date: Apr. 07, 2012

| Channel Number | Channel Frequency (MHz) | Pulse Time (ms) | Period Time (s) | Time of Occupancy (Dwell Time) (ms) | Average Time of Occupancy Limit (ms) |
|----------------|-------------------------|-----------------|-----------------|-------------------------------------|--------------------------------------|
| 0              | 2402.00                 | 0.380           | 31.6            | 120.080                             | 400                                  |
| 39             | 2441.00                 | 0.376           | 31.6            | 118.816                             | 400                                  |
| 78             | 2480.00                 | 0.378           | 31.6            | 119.448                             | 400                                  |

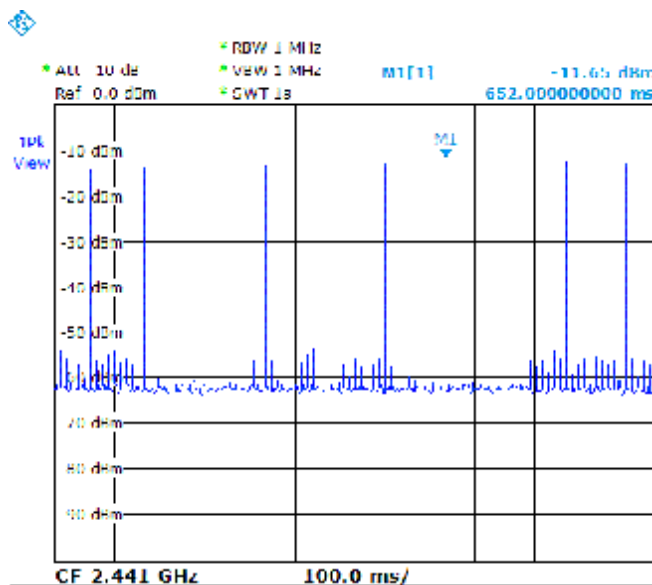
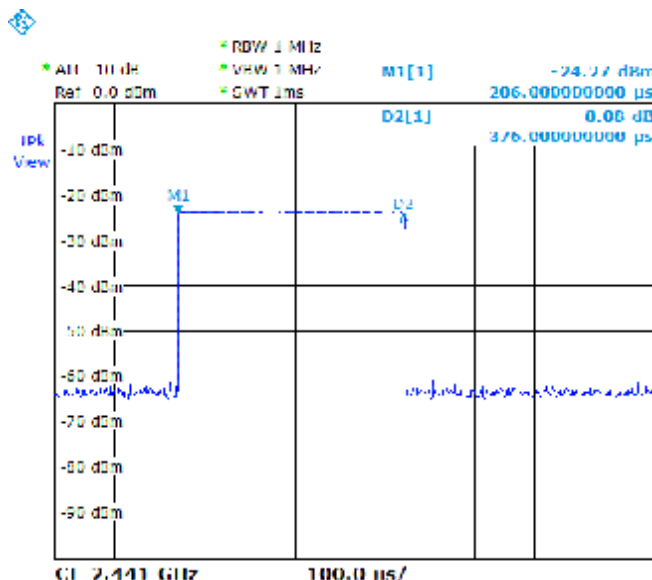
CH0 :





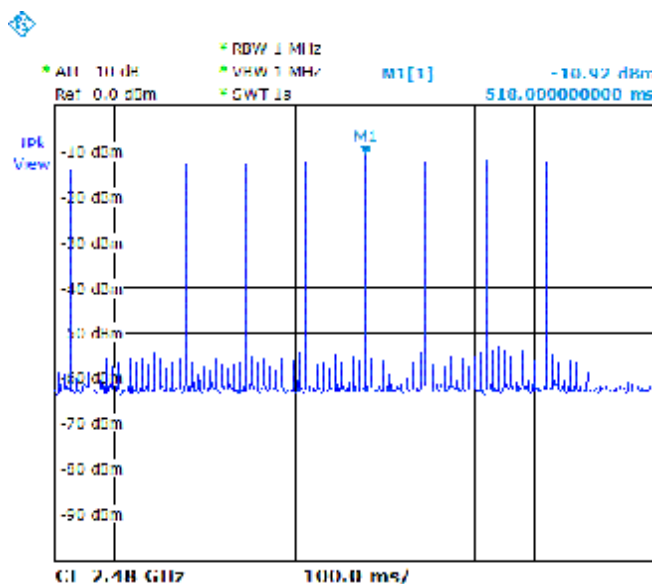
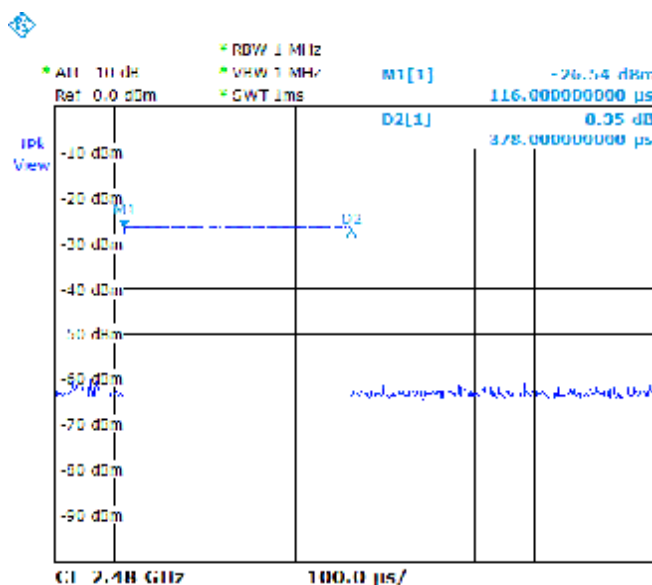
# TEST REPORT

CH39 :





CH78 :



|                                                                                                                                                                                                               |                      |                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|
|  <b>Spectrum Research &amp; Testing Lab., Inc.</b><br>No. 101-10, Ling 8,<br>Shan-Tong Li, Chung-Li<br>City, Taoyuan, Taiwan | <h1>TEST REPORT</h1> | Reference No.: A12040501<br>Report No.: FCCA12040501<br>FCC ID : FSUGMZJY<br>Page: 21 of 54<br>Date: May. 08, 2012 |
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## 4.5 PEAK POWER TEST

### 4.5.1 LIMIT

FCC Part15, Subpart C Section 15.247.

| Frequency Range (MHz) | Limit(W)                    |           |               |               |           |
|-----------------------|-----------------------------|-----------|---------------|---------------|-----------|
|                       | Quantity of Hopping Channel | 50        | 25            | 15            | 75        |
| 902-928               |                             | 1(30 dBm) | 0.125(21 dBm) | NA            | NA        |
| 2400-2483.5           |                             | NA        | NA            | 0.125( 21dBm) | 1(30 dBm) |
| 5725-5850             |                             | NA        | NA            | NA            | 1(30 dBm) |

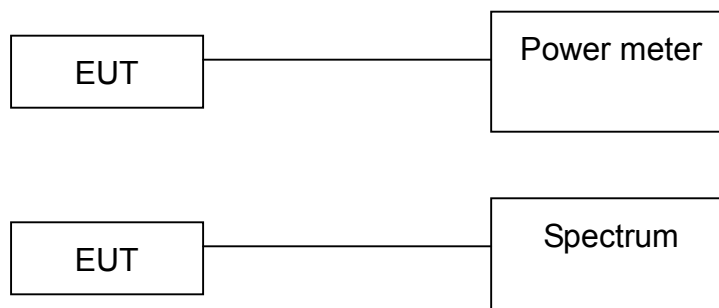
### 4.5.2 TEST EQUIPMENT

The following test equipment was used during the test :

| Equipment/ Facilities | Specifications  | Manufacturer      | Model#/ Serial# | Due Date of Cal. & Cal. Center |
|-----------------------|-----------------|-------------------|-----------------|--------------------------------|
| SPECTRUM ANALYZER     | 9 KHz TO 40 GHz | ROHDE & SCHWARZ   | FSP40 / 100093  | DEC. 2012 ETC                  |
| POWER SENSOR          | BOONTON         | 51015(5E) / 32966 | MAR. 2013 ETC   | POWER SENSOR                   |
| POWER METER           | BOONTON         | 4232A / 115702    | NOV. 2012 ETC   | POWER METER                    |

**NOTE:** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.5.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.



## TEST REPORT

### 4.5.4 TEST PROCEDURE

The EUT was operating in hopping mode or could control its channel.  
Printed out the test result from the spectrum by hard copy function.  
Recorded the read value of the power meter.

### 4.5.5 EUT OPERATING CONDITION

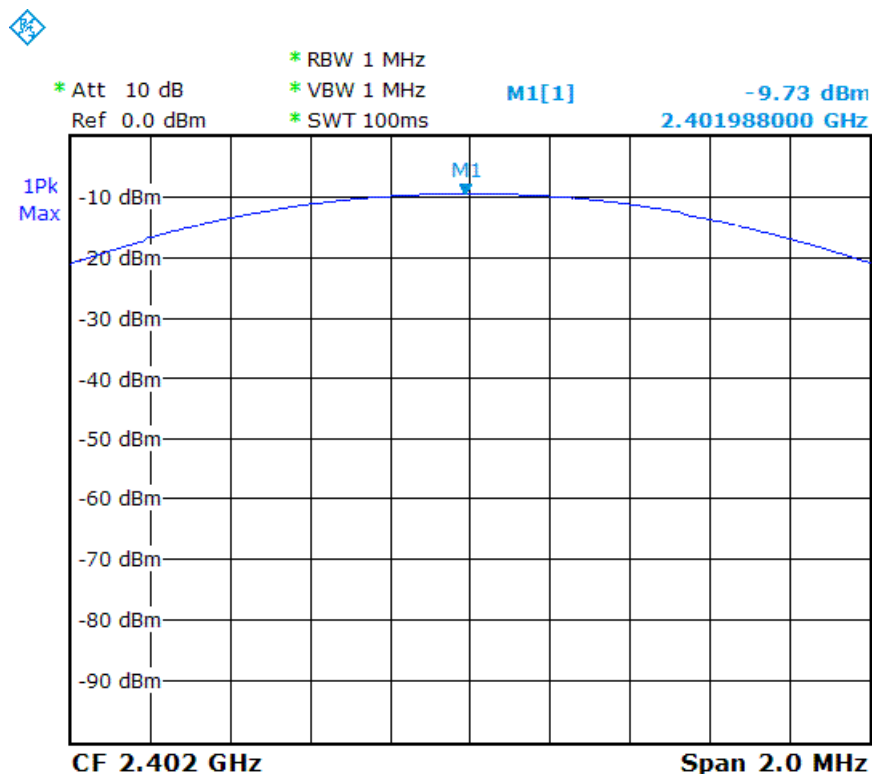
1. Set the EUT under frequency hopping transmission condition.
2. The EUT was set to the highest available power level.

### 4.5.6 TEST RESULT

|                    |      |              |               |
|--------------------|------|--------------|---------------|
| Temperature:       | 22°C | Humidity:    | 61%RH         |
| Spectrum Detector: | PK   | Tested by:   | Richard Lin   |
| Test Result:       | PASS | Tested Date: | Apr. 07, 2012 |

| Channel Number | Channel Frequency (MHz) | Peak Output Power (dBm) | Peak Power Limit (dBm) |
|----------------|-------------------------|-------------------------|------------------------|
| 0              | 2401.9880               | -9.73                   | 30                     |
| 39             | 2441.0319               | -10.86                  | 30                     |
| 78             | 2480.0160               | -12.03                  | 30                     |

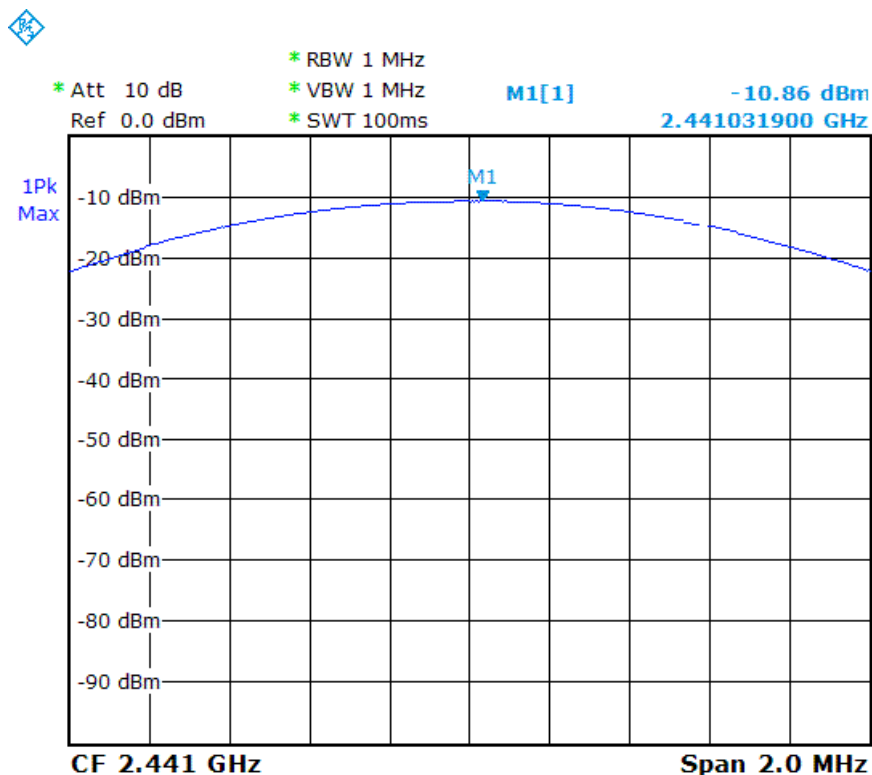
CH0 :



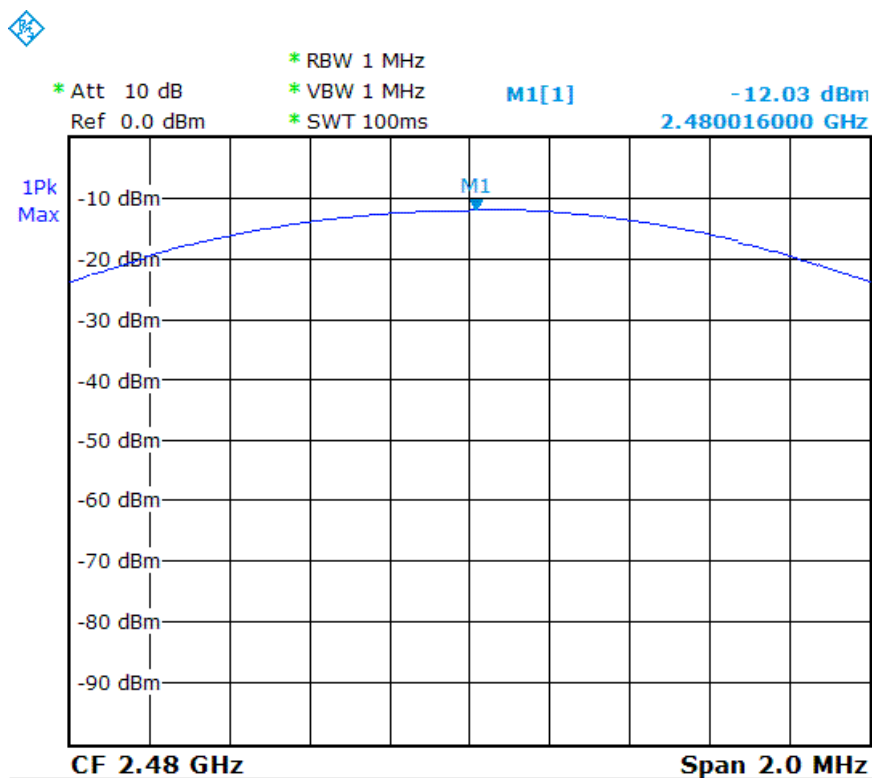


# TEST REPORT

CH39 :



CH78 :





## 4.6 BAND EDGE TEST

### 4.6.1 LIMIT

FCC Part15, Subpart C Section 15.247. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

| OPERATING<br>FREQUENCY RANGE<br>(MHz) | SPURIOUS EMISSION<br>FREQUENCY<br>(MHz) | LIMIT                                 |                        |
|---------------------------------------|-----------------------------------------|---------------------------------------|------------------------|
|                                       |                                         | Peak power ration to<br>emission(dBc) | Emission level(dBuV/m) |
| 902 - 928                             | < 902                                   | > 20                                  | NA                     |
|                                       | > 928                                   | > 20                                  | NA                     |
|                                       | 960 - 1240                              | NA                                    | 54                     |
| 2400 - 2483.5                         | < 2400                                  | > 20                                  | NA                     |
|                                       | > 2483.5 - 2500                         | NA                                    | 54                     |
| 5725 - 5850                           | < 5350 - 5460                           | NA                                    | 54                     |
|                                       | < 5725                                  | > 20                                  | NA                     |
|                                       | > 5850                                  | > 20                                  | NA                     |

|                                                                                                                                                                                                               |                      |                                                                                                                    |
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|  <b>Spectrum Research &amp; Testing Lab., Inc.</b><br>No. 101-10, Ling 8,<br>Shan-Tong Li, Chung-Li<br>City, Taoyuan, Taiwan | <h1>TEST REPORT</h1> | Reference No.: A12040501<br>Report No.: FCCA12040501<br>FCC ID : FSUGMZJY<br>Page: 25 of 54<br>Date: May. 08, 2012 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|

## 4.6.2 TEST EQUIPMENT

The following test equipment was used during the test:

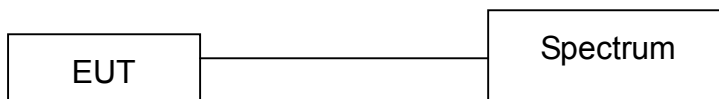
| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS                | MANUFACTURER       | MODEL#/<br>SERIAL#                        | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|-------------------------------|--------------------|-------------------------------------------|-----------------------------------|
| SPECTRUM                 | 9 kHz – 40 GHz                | ROHDE &<br>SCHWARZ | FSP40/<br>100093                          | Dec. 2012<br>ETC                  |
| EMI Test Receiver        | 9 kHz – 6 GHz                 | ROHDE &<br>SCHWARZ | ESL/<br>100176                            | Mar. 2013<br>R&S                  |
| SPECTRUM                 | 9 kHz – 26.5 GHz              | HP                 | 8953E/<br>3710A03220                      | Nov. 2012<br>ETC                  |
| PRE-AMPLIFIER            | 1 GHz – 26.5 GHz<br>Gain:30dB | HP                 | 8449B/<br>3008A01019                      | Nov. 2012<br>ETC                  |
| HORN ANTENNA             | 1 GHz – 18GHz                 | EMCO               | 3115/<br>6881                             | Nov. 2012<br>ETC                  |
| K-TYPE CABLE             | 1 M                           | HUBER SUHNER       | SF102-40/2*11 /<br>28934/2                | May. 2012<br>ETC                  |
| RF CABLE                 | 1.5 M                         | JYEBAO             | A30A30-L 142 /<br>EQF-0035                | Dec. 2012<br>ETC                  |
| RF CABLE                 | 3.5 M                         | JYEBAO             | A30A30-L 142<br>(G3.5M)/<br>EQF-0036(002) | Dec. 2012<br>ETC                  |

**NOTE:** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.



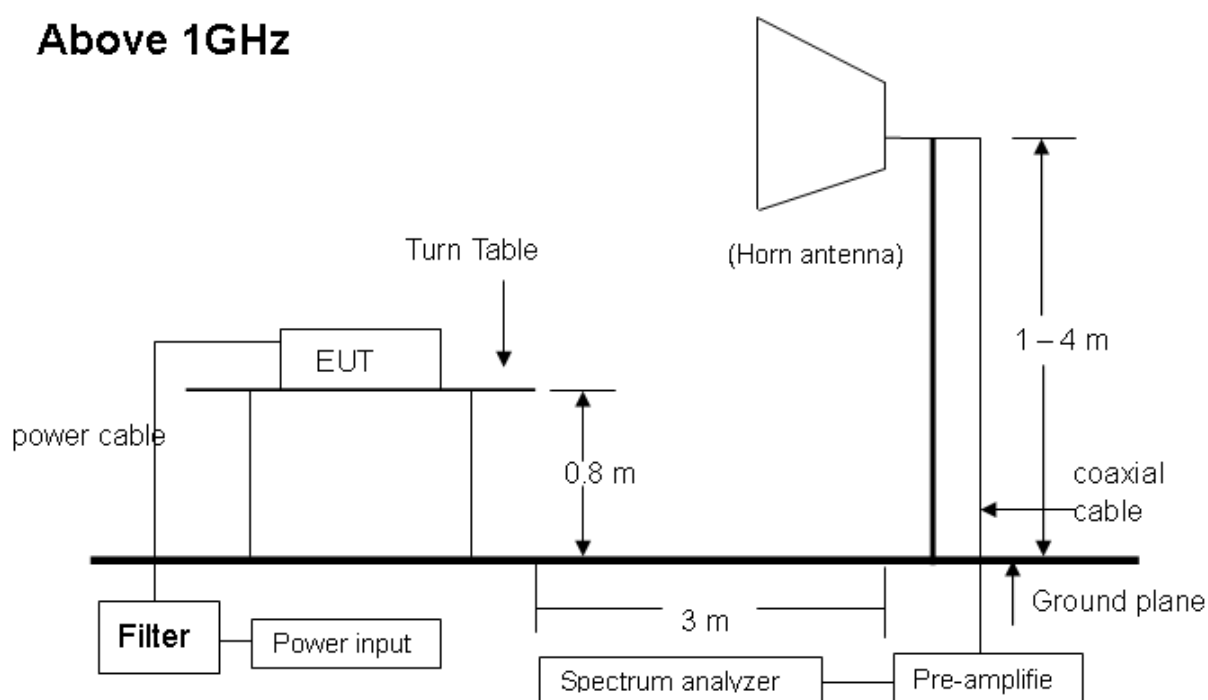
## 4.6.3 TEST SETUP

FOR RF Conducted test (dBc)



The EUT was connected to a spectrum through a 50 $\Omega$  RF cable.

### Above 1GHz



**NOTE :** The EUT system was put on a wooden table with 0.8m heights above a ground plane.  
For the actual test configuration, please refer to the photos of testing.



## 4.6.4 TEST PROCEDURE

1. The EUT was operating in continuous transmission mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.
2. The EUT was tested according to the requirement of ANSI C63.4 and CISPR 22. The measurements were made at an open area test site with 3 meter measurement distance under 1 GHz and with 3m distance above 1GHz. The frequency spectrum measured started from 30 MHz. Under 1 GHz. All readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak and average values with 1 MHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

## 4.6.5 EUT OPERATING CONDITION

1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.



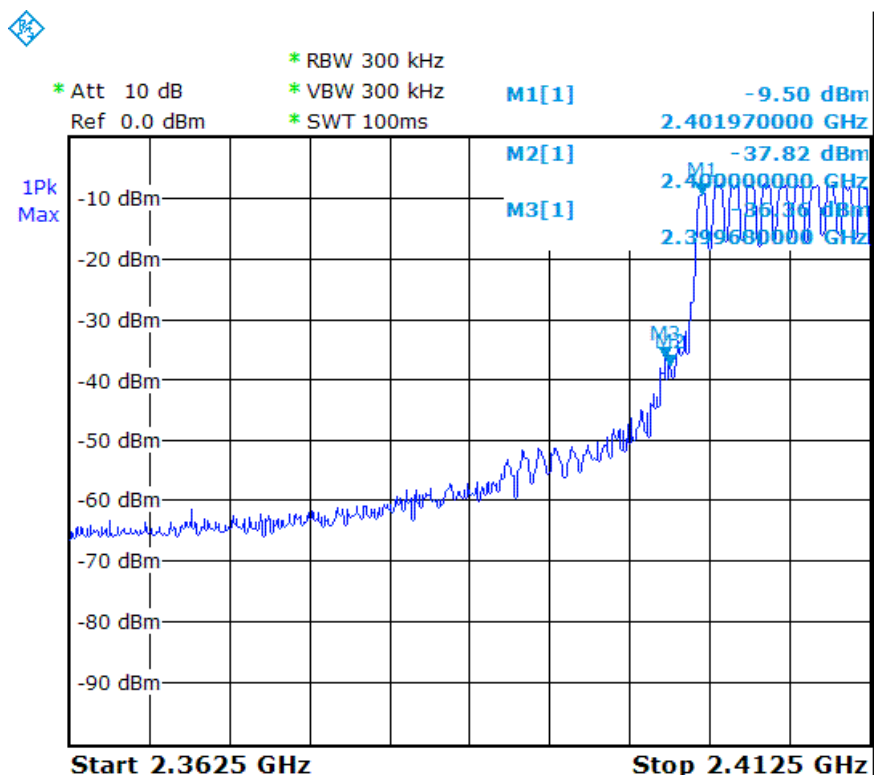
## 4.6.6 TEST RESULT

|                         |             |              |               |
|-------------------------|-------------|--------------|---------------|
| Temperature:            | 22°C        | Humidity:    | 61%RH         |
| Spectrum Detector:      | PK. and AV. | Tested Mode: | TX            |
| Modulation Type:        | GFSK        | Tested By:   | Richard Lin   |
| Radiated emission test: |             | Tested Date: | Apr. 07, 2012 |

### 1. Conducted test

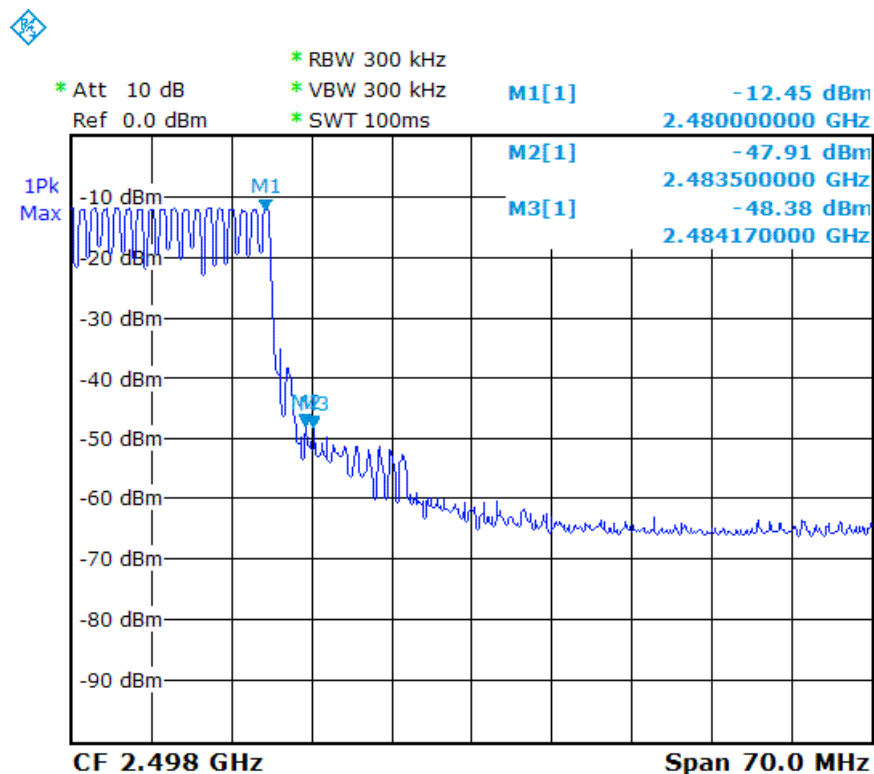
| Frequency<br>(MHz) | PEAK POWER<br>OUTPUT<br>(dBm) | Emission read<br>Value(dBm) | Result of<br>Band edge<br>(dBc) | Band edge<br>LIMIT<br>(dBc) |
|--------------------|-------------------------------|-----------------------------|---------------------------------|-----------------------------|
| < 2400             | -9.50                         | -35.36                      | 25.86                           | > 20 dBc                    |
| > 2483.5           | -12.45                        | -48.37                      | 35.92                           | > 20 dBc                    |

Below 2400MHz :





Above 2483.5 MHz :





## TEST REPORT

2. Radiated emission test :  
Below 2400MHz (mode 1 of 2402MHz emission)

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant. Fac.<br>(dB) | Ant. Pol.<br>(H/V) | Reading<br>(dBuV) |      | Emission<br>(dBuV/m) |      | Limit Line<br>(dBuV/m) |      | Over Limit<br>(dBuV/m) |       |
|--------------------|---------------------------|-------------------|--------------------|-------------------|------|----------------------|------|------------------------|------|------------------------|-------|
|                    |                           |                   |                    | PK                | AV   | PK                   | AV   | PK                     | AV   | PK                     | AV    |
| 2402.00            | -33.88                    | 28.08             | H                  | 93.9              | 81.6 | 88.1                 | 75.8 | 114.0                  | 94.0 | -25.9                  | -18.2 |
| 2402.00            | -33.88                    | 28.08             | V                  | 93.8              | 81.4 | 88.0                 | 75.6 | 114.0                  | 94.0 | -26.0                  | -18.4 |
| 2400.00            | -33.88                    | 28.08             | H                  | 61.3              | 50.5 | 55.5                 | 44.7 | 74.0                   | 54.0 | -18.5                  | -9.3  |
| 2400.00            | -33.88                    | 28.08             | V                  | 60.8              | 49.6 | 55.0                 | 43.8 | 74.0                   | 54.0 | -19.0                  | -10.2 |
| 2390.00            | -33.89                    | 28.06             | H                  | 52.4              | 41.3 | 46.6                 | 35.5 | 74.0                   | 54.0 | -27.4                  | -18.5 |
| 2390.00            | -33.89                    | 28.06             | V                  | 52.1              | 40.8 | 46.3                 | 35.0 | 74.0                   | 54.0 | -27.7                  | -19.0 |

About 2483.5MHz (mode 3 of 2480MHz emission)

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant. Fac.<br>(dB) | Ant. Pol.<br>(H/V) | Reading<br>(dBuV) |      | Emission<br>(dBuV/m) |      | Limit Line<br>(dBuV/m) |      | Over Limit<br>(dBuV/m) |       |
|--------------------|---------------------------|-------------------|--------------------|-------------------|------|----------------------|------|------------------------|------|------------------------|-------|
|                    |                           |                   |                    | PK                | AV   | PK                   | AV   | PK                     | AV   | PK                     | AV    |
| 2480.00            | -33.86                    | 28.26             | H                  | 93.9              | 81.6 | 88.3                 | 76.0 | 114.0                  | 94.0 | -25.7                  | -18.0 |
| 2480.00            | -33.86                    | 28.26             | V                  | 94.5              | 82.2 | 88.9                 | 76.6 | 114.0                  | 94.0 | -25.1                  | -17.4 |
| 2483.00            | -33.86                    | 28.26             | H                  | 55.5              | 44.3 | 49.9                 | 38.7 | 74.0                   | 54.0 | -24.1                  | -15.3 |
| 2483.00            | -33.86                    | 28.26             | V                  | 56.1              | 44.7 | 50.5                 | 39.1 | 74.0                   | 54.0 | -23.5                  | -14.9 |
| 2483.50            | -33.86                    | 28.26             | H                  | 53.1              | 41.9 | 47.5                 | 36.3 | 74.0                   | 54.0 | -26.5                  | -17.7 |
| 2483.50            | -33.86                    | 28.26             | V                  | 53.3              | 42.2 | 47.7                 | 36.6 | 74.0                   | 54.0 | -26.3                  | -17.4 |



## 4.7 RADIATED EMISSION TEST

### 4.7.1 LIMIT

FCC Part15, Subpart C Section 15.209 limit of radiated emission for frequency below1000MHz. The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

| FREQUENCY (MHz) | DISTANCE (m) | FIELD STRENGTH (dB $\mu$ V/m) |
|-----------------|--------------|-------------------------------|
| 0.009 - 0.490   | 300          | 2400/F(KHz)                   |
| 0.490 - 1.705   | 30           | 24000/F(KHz)                  |
| 1.705 - 30      | 30           | 30                            |
| 30 - 88         | 3            | 40.0                          |
| 88 - 216        | 3            | 43.5                          |
| 216 - 960       | 3            | 46.0                          |
| Above 960       | 3            | 54.0                          |

**Note :** 1. 30 dBuV (in 30m) = 70 dBuV (in 3m).

2. Transmitters that require Crystal Controlled Oscillators with values below 30 MHz requires the Test Report to show "Spurious Radiated Emissions" results below 30 MHz per FCC Part 15.33(a).

FCC Part15, Subpart C Section 15.249 limit of radiated emission for frequency below1000MHz (Average).

| FREQUENCY (MHz) | FIELD STRENGTH OF FUNDAMENTAL (millivolts/meter) | FIELD STRENGTH OF HARMONICS (millivolts/meter) |
|-----------------|--------------------------------------------------|------------------------------------------------|
| 902 - 928       | 50                                               | 500                                            |
| 2400 - 2483.5   | 50                                               | 500                                            |
| 5725 - 5875     | 50                                               | 500                                            |
| 24000 - 24250   | 250                                              | 2500                                           |

**NOTE :**

- In the emission tables above , the tighter limit applies at the band edges.
- Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.
- 50mV = 94dBuV

FCC Part 15, Section15.35(b) limit of radiated emission for frequency above 1000 MHz

| FREQUENCY (MHz) | Class A (dBuV/m) (at 3m) |         | Class B (dBuV/m) (at 3m) |         |
|-----------------|--------------------------|---------|--------------------------|---------|
|                 | PEAK                     | AVERAGE | PEAK                     | AVERAGE |
| Above 1000      | 80.0                     | 60.0    | 74.0                     | 54.0    |

|                                                                                                                                                                                                               |                      |                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------|
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#### 4.7.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test :

| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS          | MANUFACTURER       | MODEL#/<br>SERIAL#         | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|-------------------------|--------------------|----------------------------|-----------------------------------|
| EMI TEST<br>RECEIVER     | 20 MHz – 1000<br>MHz    | ROHDE &<br>SCHWARZ | ESVS30 /<br>841977/003     | Dec. 2012<br>ETC                  |
| BI-LOG<br>ANTENNA        | 30 MHz – 2 GHz          | SCHFFNER           | CBL6141A /<br>4128         | May. 2012<br>ETC                  |
| COAXIAL CABLE            | 30 M                    | TIMES              | LMR-400 /<br>#30M          | Nov. 2012<br>SRT                  |
| FILTER                   | 2 LINE, 30 A            | FIL.COIL           | FC-943 /<br>869            | May. 2012<br>ETC                  |
| OATS                     | 3 – 10 M<br>MEASUREMENT | SRT                | SRT-1                      | Jun. 2012<br>SRT                  |
| SPECTRUM<br>ANALYZER     | 9 kHz – 40 GHz          | ROHDE &<br>SCHWARZ | FSP40 /<br>100093          | Dec. 2012<br>ETC                  |
| PRE-AMPLIFIER            | 1 GHz – 26.5 GHz        | AGILENT            | 8449B/<br>3008A01019       | Jan. 2013<br>ETC                  |
| HORN ANTENNA             | 1 GHz TO 18 GHz         | EMCO               | 3115/<br>9602-4681         | Nov. 2012<br>ETC                  |
| K-TYPE CABLE             | 15 M                    | HUBER SUHNER       | SF102-40/2*11 /<br>23932/2 | Feb. 2013<br>ETC                  |
| K-TYPE CABLE             | 1 M                     | HUBER SUHNER       | SF102-40/2*11 /<br>28934/2 | May. 2012<br>ETC                  |
| Loop Antenna             | 9 KHz TO 30 MHz         | ETS.LINDGREN       | 6512/<br>00063889          | JUN. 2012<br>ETC                  |

**NOTE:** The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.



**Spectrum Research &  
Testing Lab., Inc.**

No. 101-10, Ling 8,  
Shan-Tong Li, Chung-Li  
City, Taoyuan, Taiwan

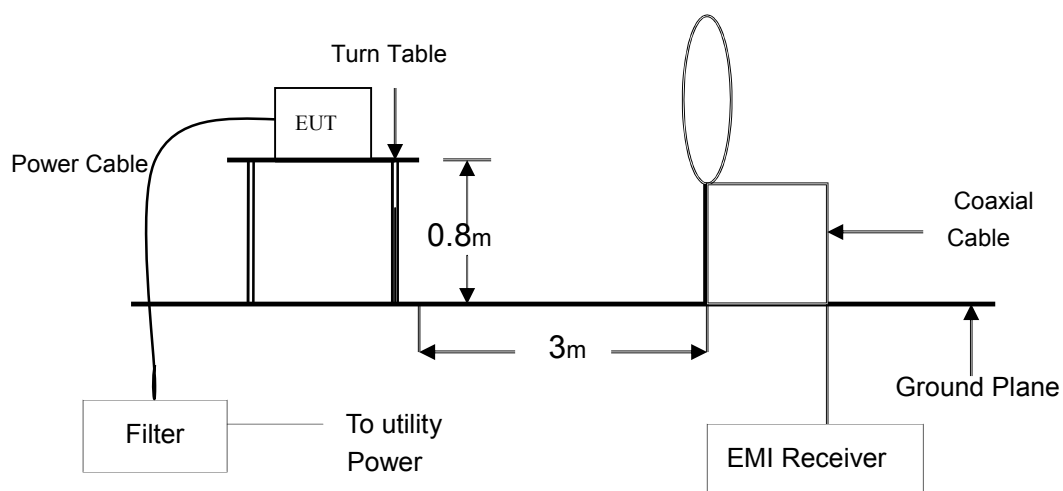
## TEST REPORT

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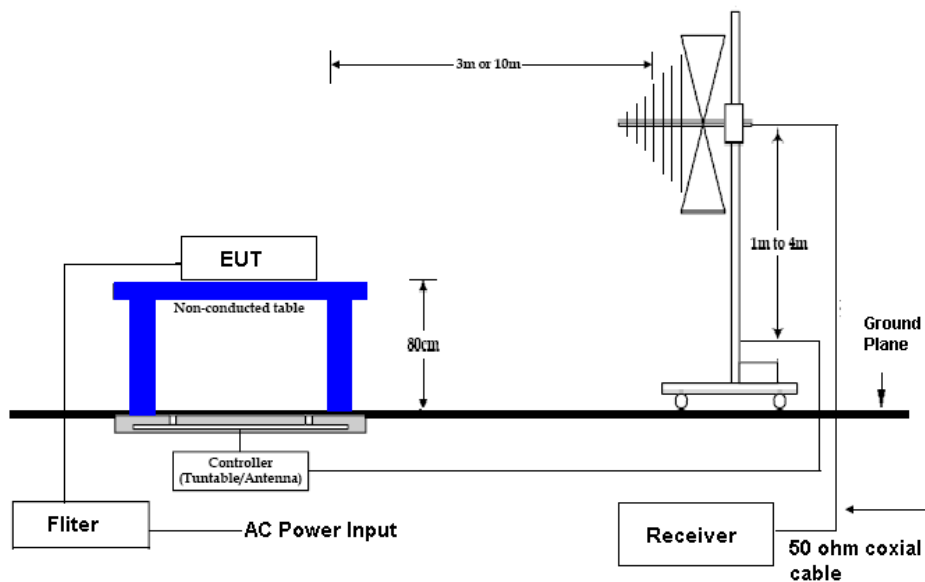


## 4.7.3 TEST SET-UP

### 9KHz ~ 30MHz

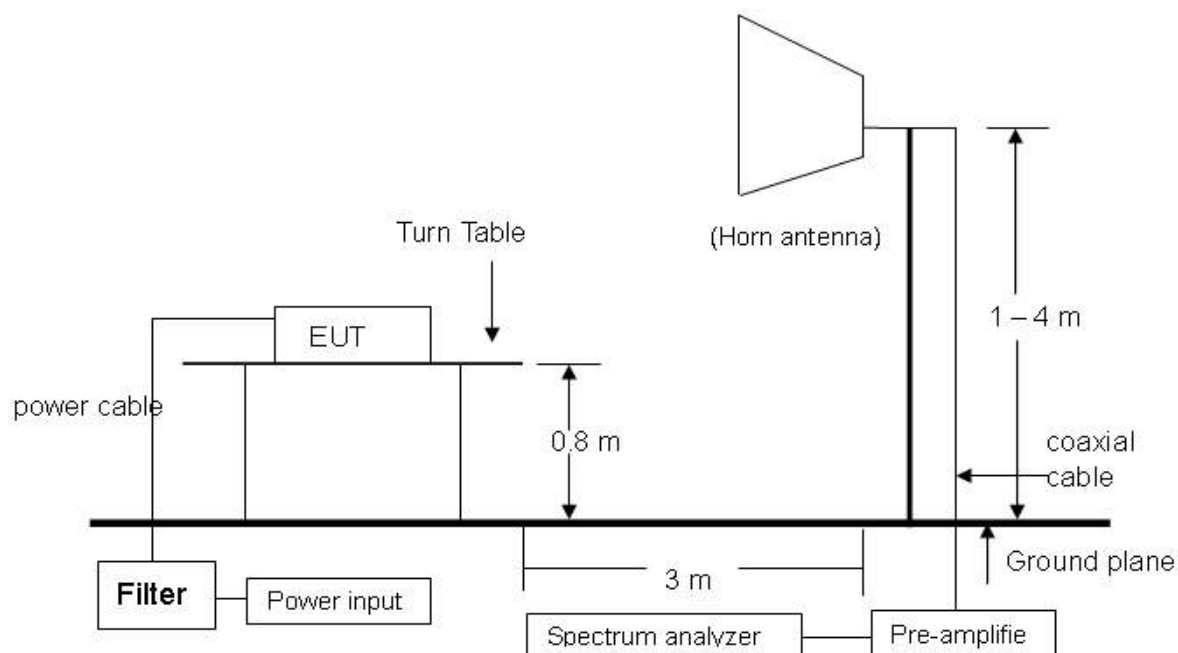


### 30MHz ~ 1GHz





## Above 1GHz



**NOTE :** The EUT system was put on a wooden table with 0.8m heights above a ground plane.  
For the actual test configuration, please refer to the photos of testing.

|                                                                                                                                                                                                               |                      |                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|
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#### 4.7.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2003 and CISPR 22:2003.

The measurements were made at an open area test site with 3 meter measurement distance under 1 GHz and with 3m distance above 1GHz.

The frequency spectrum measured started from 9kHz to 30MHz and 30 MHz to 1 GHz, all readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver.

Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak or average values with 1 MHz resolution bandwidth of the test receiver.

The EUT system was operated in all typical methods by users.

The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

First, find the margin or higher points at least 6 points by software, then use manual to find the maximum data.

The procedure is referred on the test procedure of SRT LAB.



## TEST REPORT

### 4.2.5 TEST RESULT

|                    |               |                    |               |
|--------------------|---------------|--------------------|---------------|
| Temperature:       | 21 °C         | Humidity:          | 58 %RH        |
| Frequency Range:   | 9KHz – 30 MHz | Measured Distance: | 3 m           |
| Receiver Detector: | Q.P.          | Tested Mode:       | 1             |
| Tested By:         | Richard Lin   | Tested Date:       | May. 08, 2012 |

| Frequency<br>(KHz) | Cable<br>Loss (dB) | Ant. Fac.<br>(dB) | Reading<br>(dBμV) | Emission<br>(dBμV/m) | Limit Line<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|--------------------|-------------------|-------------------|----------------------|------------------------|----------------|
| 8.5093             | 0.685              | 7.29              | 31.41             | 38.70                | 70.00                  | -31.30         |
| 20.0716            | 0.801              | 6.24              | 29.72             | 35.96                | 70.00                  | -34.04         |
| 23.5477            | 0.835              | 6.08              | 29.08             | 35.16                | 70.00                  | -34.84         |
| 25.1248            | 0.851              | 6.00              | 30.86             | 36.86                | 70.00                  | -33.14         |
| 25.7391            | 0.858              | 5.97              | 31.19             | 37.16                | 70.00                  | -32.84         |
| 28.3502            | 0.884              | 5.85              | 31.85             | 37.70                | 70.00                  | -32.30         |

|                    |               |                    |               |
|--------------------|---------------|--------------------|---------------|
| Temperature:       | 21 °C         | Humidity:          | 58 %RH        |
| Frequency Range:   | 9KHz – 30 MHz | Measured Distance: | 3 m           |
| Receiver Detector: | Q.P.          | Tested Mode:       | 2             |
| Tested By:         | Richard Lin   | Tested Date:       | May. 08, 2012 |

| Frequency<br>(KHz) | Cable<br>Loss (dB) | Ant. Fac.<br>(dB) | Reading<br>(dBμV) | Emission<br>(dBμV/m) | Limit Line<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|--------------------|-------------------|-------------------|----------------------|------------------------|----------------|
| 7.7129             | 0.677              | 7.63              | 32.25             | 39.88                | 70.00                  | -30.12         |
| 10.0356            | 0.700              | 6.73              | 31.30             | 38.03                | 70.00                  | -31.97         |
| 11.2634            | 0.713              | 6.67              | 32.88             | 39.55                | 70.00                  | -30.45         |
| 20.7516            | 0.808              | 6.21              | 33.74             | 39.95                | 70.00                  | -30.05         |
| 25.2483            | 0.852              | 6.00              | 32.93             | 38.93                | 70.00                  | -31.07         |
| 27.5215            | 0.875              | 5.89              | 32.12             | 38.01                | 70.00                  | -31.99         |



## TEST REPORT

|                    |               |                    |               |
|--------------------|---------------|--------------------|---------------|
| Temperature:       | 21 °C         | Humidity:          | 58 %RH        |
| Frequency Range:   | 9KHz – 30 MHz | Measured Distance: | 3 m           |
| Receiver Detector: | Q.P.          | Tested Mode:       | 3             |
| Tested By:         | Richard Lin   | Tested Date:       | May. 08, 2012 |

| Frequency<br>(KHz) | Cable<br>Loss (dB) | Ant. Fac.<br>(dB) | Reading<br>(dBμV) | Emission<br>(dBμV/m) | Limit Line<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|--------------------|-------------------|-------------------|----------------------|------------------------|----------------|
| 6.3315             | 0.663              | 8.18              | 31.33             | 39.51                | 70.00                  | -30.49         |
| 10.2294            | 0.702              | 6.72              | 32.26             | 38.98                | 70.00                  | -31.02         |
| 12.7436            | 0.727              | 6.60              | 31.96             | 38.56                | 70.00                  | -31.44         |
| 14.3829            | 0.744              | 6.52              | 32.30             | 38.82                | 70.00                  | -31.18         |
| 17.9158            | 0.779              | 6.35              | 33.05             | 39.40                | 70.00                  | -30.60         |
| 24.2631            | 0.843              | 6.05              | 33.90             | 39.95                | 70.00                  | -30.05         |

|                    |               |                    |               |
|--------------------|---------------|--------------------|---------------|
| Temperature:       | 21 °C         | Humidity:          | 58 %RH        |
| Frequency Range:   | 9KHz – 30 MHz | Measured Distance: | 3 m           |
| Receiver Detector: | Q.P.          | Tested Mode:       | 4             |
| Tested By:         | Richard Lin   | Tested Date:       | May. 08, 2012 |

| Frequency<br>(KHz) | Cable<br>Loss (dB) | Ant. Fac.<br>(dB) | Reading<br>(dBμV) | Emission<br>(dBμV/m) | Limit Line<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|--------------------|-------------------|-------------------|----------------------|------------------------|----------------|
| 10.7152            | 0.707              | 6.69              | 33.71             | 40.40                | 70.00                  | -29.60         |
| 14.2637            | 0.743              | 6.53              | 32.44             | 38.97                | 70.00                  | -31.03         |
| 17.5381            | 0.775              | 6.37              | 32.73             | 39.10                | 70.00                  | -30.90         |
| 21.9835            | 0.820              | 6.16              | 32.85             | 39.01                | 70.00                  | -30.99         |
| 23.2416            | 0.832              | 6.10              | 34.00             | 40.10                | 70.00                  | -29.90         |
| 28.9587            | 0.890              | 5.82              | 33.12             | 38.94                | 70.00                  | -31.06         |



## TEST REPORT

|                    |              |                  |               |
|--------------------|--------------|------------------|---------------|
| Temperature:       | 23 °C        | Humidity:        | 57 %RH        |
| Tested By:         | Richard Lin  | Tested Mode:     | 1             |
| Receiver Detector: | Q.P. or AV.  | Modulation Type: | GFSK          |
| Frequency Range:   | 30 M – 1 GHz | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 52.1730            | 1.12                  | 13.02                       | 6.6                       | 20.7                          | 40.0              | -19.3          | 169   | 3.52  |
| 621.4820           | 3.58                  | 19.89                       | 4.8                       | 28.3                          | 46.0              | -17.7          | 184   | 2.97  |
| 646.5140           | 3.68                  | 20.24                       | 3.7                       | 27.6                          | 46.0              | -18.4          | 263   | 2.75  |
| 699.0570           | 3.80                  | 20.69                       | 3.2                       | 27.7                          | 46.0              | -18.3          | 201   | 2.39  |
| 847.6610           | 4.29                  | 22.85                       | 4.6                       | 31.7                          | 46.0              | -14.3          | 95    | 2.11  |
| 938.1450           | 4.58                  | 23.94                       | 3.2                       | 31.7                          | 46.0              | -14.3          | 73    | 1.95  |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 42.1330            | 1.02                  | 17.98                       | 3.7                       | 22.7                          | 40.0              | -17.3          | 125   | 1.74  |
| 53.6740            | 1.13                  | 12.58                       | 7.7                       | 21.4                          | 40.0              | -18.6          | 293   | 1.96  |
| 202.4850           | 1.92                  | 11.88                       | 8.0                       | 21.8                          | 43.5              | -21.7          | 112   | 2.38  |
| 763.7950           | 3.95                  | 21.95                       | 3.6                       | 29.5                          | 46.0              | -16.5          | 87    | 2.57  |
| 803.2670           | 4.11                  | 22.15                       | 3.8                       | 30.1                          | 46.0              | -15.9          | 275   | 2.74  |
| 959.3290           | 4.62                  | 24.27                       | 4.1                       | 33.0                          | 46.0              | -13.0          | 323   | 3.26  |

### NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "\*\*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



## TEST REPORT

|                    |              |                  |               |
|--------------------|--------------|------------------|---------------|
| Temperature:       | 23 °C        | Humidity:        | 57 %RH        |
| Tested By:         | Richard Lin  | Tested Mode:     | 2             |
| Receiver Detector: | Q.P. or AV.  | Modulation Type: | GFSK          |
| Frequency Range:   | 30 M – 1 GHz | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 52.9050            | 1.12                  | 13.02                       | 6.2                       | 20.3                          | 40.0              | -19.7          | 193   | 3.52  |
| 595.2830           | 3.49                  | 19.50                       | 6.3                       | 29.3                          | 46.0              | -16.7          | 115   | 3.24  |
| 647.4640           | 3.69                  | 20.26                       | 3.4                       | 27.3                          | 46.0              | -18.7          | 224   | 2.93  |
| 769.5190           | 3.98                  | 21.98                       | 4.7                       | 30.7                          | 46.0              | -15.3          | 285   | 2.51  |
| 837.2670           | 4.25                  | 22.69                       | 4.8                       | 31.7                          | 46.0              | -14.3          | 319   | 2.25  |
| 932.0650           | 4.56                  | 23.80                       | 3.6                       | 32.0                          | 46.0              | -14.0          | 105   | 1.83  |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 54.0080            | 1.14                  | 12.14                       | 6.7                       | 20.0                          | 40.0              | -20.0          | 126   | 1.84  |
| 63.1540            | 1.20                  | 9.05                        | 8.9                       | 19.2                          | 40.0              | -20.9          | 157   | 1.93  |
| 220.3670           | 2.00                  | 13.20                       | 7.0                       | 22.2                          | 46.0              | -23.8          | 88    | 2.25  |
| 489.5940           | 3.16                  | 17.85                       | 4.3                       | 25.3                          | 46.0              | -20.7          | 64    | 2.64  |
| 762.2740           | 3.95                  | 21.95                       | 4.4                       | 30.3                          | 46.0              | -15.7          | 267   | 2.87  |
| 872.1530           | 4.39                  | 22.99                       | 4.2                       | 31.6                          | 46.0              | -14.4          | 169   | 3.29  |

### NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "\*\*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



## TEST REPORT

|                    |              |                  |               |
|--------------------|--------------|------------------|---------------|
| Temperature:       | 23 °C        | Humidity:        | 57 %RH        |
| Tested By:         | Richard Lin  | Tested Mode:     | 3             |
| Receiver Detector: | Q.P. or AV.  | Modulation Type: | GFSK          |
| Frequency Range:   | 30 M – 1 GHz | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 52.3940            | 1.12                  | 13.02                       | 6.8                       | 20.9                          | 40.0              | -19.1          | 56    | 3.57  |
| 595.1690           | 3.49                  | 19.50                       | 3.7                       | 26.7                          | 46.0              | -19.3          | 138   | 3.18  |
| 621.7950           | 3.58                  | 19.89                       | 3.6                       | 27.1                          | 46.0              | -18.9          | 264   | 2.96  |
| 647.2830           | 3.69                  | 20.26                       | 3.7                       | 27.6                          | 46.0              | -18.4          | 93    | 2.54  |
| 855.4270           | 4.32                  | 22.92                       | 4.8                       | 32.0                          | 46.0              | -14.0          | 182   | 2.23  |
| 955.1340           | 4.61                  | 24.24                       | 3.3                       | 32.2                          | 46.0              | -13.9          | 227   | 2.08  |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 53.2930            | 1.13                  | 12.58                       | 7.4                       | 21.1                          | 40.0              | -18.9          | 309   | 2.14  |
| 220.6240           | 2.00                  | 13.20                       | 7.3                       | 22.5                          | 46.0              | -23.5          | 333   | 2.37  |
| 693.8470           | 3.79                  | 20.64                       | 4.2                       | 28.6                          | 46.0              | -17.4          | 71    | 2.59  |
| 862.9030           | 4.35                  | 22.95                       | 3.8                       | 31.1                          | 46.0              | -14.9          | 196   | 2.73  |
| 911.3350           | 4.52                  | 23.34                       | 3.3                       | 31.2                          | 46.0              | -14.8          | 112   | 2.96  |
| 981.4850           | 4.66                  | 24.45                       | 5.1                       | 34.2                          | 54.0              | -19.8          | 235   | 3.24  |

### NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "\*\*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



## TEST REPORT

|                    |              |                  |               |
|--------------------|--------------|------------------|---------------|
| Temperature:       | 23 °C        | Humidity:        | 57 %RH        |
| Tested By:         | Richard Lin  | Tested Mode:     | 4             |
| Receiver Detector: | Q.P. or AV.  | Modulation Type: | GFSK          |
| Frequency Range:   | 30 M – 1 GHz | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 49.0960            | 1.09                  | 14.41                       | 3.9                       | 19.4                          | 40.0              | -20.6          | 145   | 3.46  |
| 708.2420           | 3.82                  | 20.89                       | 3.7                       | 28.4                          | 46.0              | -17.6          | 37    | 3.11  |
| 736.8530           | 3.87                  | 21.56                       | 4.9                       | 30.3                          | 46.0              | -15.7          | 96    | 2.86  |
| 806.3890           | 4.12                  | 22.20                       | 4.3                       | 30.6                          | 46.0              | -15.4          | 248   | 2.54  |
| 828.7710           | 4.21                  | 22.55                       | 3.6                       | 30.3                          | 46.0              | -15.7          | 171   | 2.17  |
| 910.9260           | 4.52                  | 23.32                       | 3.3                       | 31.1                          | 46.0              | -14.9          | 74    | 1.95  |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | AZ(°) | EL(m) |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|-------------------|----------------|-------|-------|
| 54.5590            | 1.14                  | 12.14                       | 7.7                       | 21.0                          | 40.0              | -19.0          | 193   | 1.99  |
| 220.9330           | 2.00                  | 13.20                       | 6.7                       | 21.9                          | 46.0              | -24.1          | 215   | 2.23  |
| 746.0120           | 3.89                  | 21.80                       | 3.3                       | 29.0                          | 46.0              | -17.0          | 61    | 2.37  |
| 796.5090           | 4.08                  | 22.08                       | 3.4                       | 29.6                          | 46.0              | -16.4          | 203   | 2.59  |
| 911.8830           | 4.52                  | 23.34                       | 3.4                       | 31.3                          | 46.0              | -14.7          | 314   | 2.77  |
| 932.2670           | 4.56                  | 23.80                       | 4.0                       | 32.3                          | 46.0              | -13.7          | 272   | 3.15  |

### NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "\*\*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



## TEST REPORT

|                    |             |                  |               |
|--------------------|-------------|------------------|---------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH        |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 1             |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK          |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) |      | Emission<br>Level<br>(dBμV/m) |      | Limit<br>(dBμV/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------|------|-------------------------------|------|-------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                       | AV.  | PK.                           | AV.  | PK.               | AV.  | PK.            | AV.   |           |           |
| 3772.06            | -33.24                    | 31.81                    | 53.9                      | 42.8 | 52.5                          | 41.4 | 74.0              | 54.0 | -21.5          | -12.6 | 248       | 1.97      |
| 4082.52            | -33.12                    | 32.42                    | 53.8                      | 42.6 | 53.1                          | 41.9 | 74.0              | 54.0 | -20.9          | -12.1 | 125       | 1.75      |
| 4362.75            | -32.98                    | 32.47                    | 54.1                      | 43.5 | 53.6                          | 43.0 | 74.0              | 54.0 | -20.4          | -11.0 | 192       | 1.58      |
| 5107.62            | -32.75                    | 33.49                    | 56.2                      | 45.3 | 56.9                          | 46.0 | 74.0              | 54.0 | -17.1          | -8.0  | 304       | 1.46      |
| 5317.91            | -32.68                    | 33.65                    | 55.8                      | 44.9 | 56.8                          | 45.9 | 74.0              | 54.0 | -17.2          | -8.1  | 167       | 1.27      |
| 5827.44            | -32.63                    | 33.93                    | 55.9                      | 44.7 | 57.2                          | 46.0 | 74.0              | 54.0 | -16.8          | -8.0  | 203       | 1.19      |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) |      | Emission<br>Level<br>(dBμV/m) |      | Limit<br>(dBμV/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------|------|-------------------------------|------|-------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                       | AV.  | PK.                           | AV.  | PK.               | AV.  | PK.            | AV.   |           |           |
| 3262.87            | -33.53                    | 30.62                    | 53.7                      | 42.6 | 50.8                          | 39.7 | 74.0              | 54.0 | -23.2          | -14.3 | 317       | 1.25      |
| 3892.41            | -33.20                    | 32.12                    | 53.7                      | 42.7 | 52.6                          | 41.6 | 74.0              | 54.0 | -21.4          | -12.4 | 158       | 1.42      |
| 4577.67            | -32.89                    | 32.64                    | 55.0                      | 44.4 | 54.7                          | 44.1 | 74.0              | 54.0 | -19.3          | -9.9  | 322       | 1.53      |
| 4892.38            | -32.82                    | 33.21                    | 55.6                      | 44.8 | 56.0                          | 45.2 | 74.0              | 54.0 | -18.0          | -8.8  | 74        | 1.67      |
| 5142.85            | -32.74                    | 33.51                    | 56.2                      | 45.1 | 57.0                          | 45.9 | 74.0              | 54.0 | -17.0          | -8.1  | 93        | 1.78      |
| 5797.16            | -32.63                    | 33.92                    | 55.8                      | 44.9 | 57.1                          | 46.2 | 74.0              | 54.0 | -16.9          | -7.8  | 195       | 1.83      |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



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## TEST REPORT

Reference No.: A12040501  
Report No.: FCCA12040501  
FCC ID : FSUGMZJY  
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Date: May. 08, 2012

|                    |             |                  |                 |
|--------------------|-------------|------------------|-----------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH          |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 1 (Fundamental) |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK            |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012   |

Antenna Polarization : Horizontal

| Frequency (MHz) | Correct Factor (dB) | Ant. Factor (dB/m) | Reading Data (dB $\mu$ V) |      | Emission Level (dB $\mu$ V/m) |      | Limit (dB $\mu$ V/m) |      | Margin (dB) |       | AZ (°) | EL (m) |
|-----------------|---------------------|--------------------|---------------------------|------|-------------------------------|------|----------------------|------|-------------|-------|--------|--------|
|                 |                     |                    | PK.                       | AV.  | PK.                           | AV.  | PK.                  | AV.  | PK.         | AV.   |        |        |
| 2402.00         | -33.88              | 28.08              | 93.9                      | 81.6 | 88.1                          | 75.8 | 114                  | 94.0 | -25.9       | -18.2 | 59     | 1.66   |
| 4804.00         | -32.84              | 33.05              | 54.0                      | 43.2 | 54.2                          | 43.4 | 74.0                 | 54.0 | -19.8       | -10.6 | 241    | 1.48   |
| 7206.00         | -32.69              | 35.74              | 45.7                      | 44.6 | 48.7                          | 47.6 | 74.0                 | 54.0 | -25.3       | -6.4  | 183    | 1.38   |
| 9608.00         | -33.18              | 38.06              | 46.7                      | 35.5 | 51.6                          | 40.4 | 74.0                 | 54.0 | -22.4       | -13.6 | 264    | 1.47   |
| 12010.00        | -32.40              | 39.59              | 47.0                      | 36.4 | 54.2                          | 43.6 | 74.0                 | 54.0 | -19.8       | -10.4 | 91     | 1.68   |
| 14412.00        | -30.92              | 42.41              | 50.9                      | 38.5 | 62.4                          | 50.0 | 74.0                 | 54.0 | -11.6       | -4.0  | 305    | 1.75   |

Antenna Polarization : Vertical

| Frequency (MHz) | Correct Factor (dB) | Ant. Factor (dB/m) | Reading Data (dB $\mu$ V) |      | Emission Level (dB $\mu$ V/m) |      | Limit (dB $\mu$ V/m) |      | Margin (dB) |       | AZ (°) | EL (m) |
|-----------------|---------------------|--------------------|---------------------------|------|-------------------------------|------|----------------------|------|-------------|-------|--------|--------|
|                 |                     |                    | PK.                       | AV.  | PK.                           | AV.  | PK.                  | AV.  | PK.         | AV.   |        |        |
| 2402.00         | -33.88              | 28.08              | 93.8                      | 81.4 | 88.0                          | 75.6 | 114                  | 94.0 | -26.0       | -18.4 | 88     | 1.34   |
| 4804.00         | -32.84              | 33.05              | 53.2                      | 42.7 | 53.4                          | 42.9 | 74.0                 | 54.0 | -20.6       | -11.1 | 67     | 1.54   |
| 7206.00         | -32.69              | 35.74              | 45.4                      | 34.7 | 48.4                          | 37.7 | 74.0                 | 54.0 | -25.6       | -16.3 | 137    | 1.69   |
| 9608.00         | -33.18              | 38.06              | 46.3                      | 35.8 | 51.2                          | 40.7 | 74.0                 | 54.0 | -22.8       | -13.3 | 206    | 1.33   |
| 12010.00        | -32.40              | 39.59              | 47.2                      | 36.5 | 54.4                          | 43.7 | 74.0                 | 54.0 | -19.6       | -10.3 | 159    | 1.52   |
| 14412.00        | -30.92              | 42.41              | 49.6                      | 38.4 | 61.1                          | 49.9 | 74.0                 | 54.0 | -12.9       | -4.1  | 103    | 1.61   |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field strength of fundamental frequency.



## TEST REPORT

|                    |             |                  |               |
|--------------------|-------------|------------------|---------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH        |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 2             |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK          |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) |      | Emission<br>Level<br>(dBμV/m) |      | Limit<br>(dBμV/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------|------|-------------------------------|------|-------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                       | AV.  | PK.                           | AV.  | PK.               | AV.  | PK.            | AV.   |           |           |
| 3322.62            | -33.48                    | 30.74                    | 53.9                      | 42.8 | 51.2                          | 40.1 | 74.0              | 54.0 | -22.8          | -13.9 | 304       | 2.04      |
| 3797.24            | -33.23                    | 31.87                    | 54.3                      | 43.2 | 52.9                          | 41.8 | 74.0              | 54.0 | -21.1          | -12.2 | 127       | 1.86      |
| 4247.14            | -33.04                    | 32.45                    | 53.7                      | 42.9 | 53.1                          | 42.3 | 74.0              | 54.0 | -20.9          | -11.7 | 225       | 1.77      |
| 5187.43            | -32.73                    | 33.55                    | 56.3                      | 45.3 | 57.1                          | 46.1 | 74.0              | 54.0 | -16.9          | -7.9  | 213       | 1.52      |
| 5382.75            | -32.66                    | 33.71                    | 58.0                      | 47.2 | 59.0                          | 48.2 | 74.0              | 54.0 | -15.0          | -5.8  | 158       | 1.37      |
| 5697.34            | -32.63                    | 33.88                    | 55.8                      | 44.9 | 57.1                          | 46.2 | 74.0              | 54.0 | -16.9          | -7.8  | 92        | 1.25      |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBμV) |      | Emission<br>Level<br>(dBμV/m) |      | Limit<br>(dBμV/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------|------|-------------------------------|------|-------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                       | AV.  | PK.                           | AV.  | PK.               | AV.  | PK.            | AV.   |           |           |
| 3772.88            | -33.24                    | 31.81                    | 54.2                      | 43.8 | 52.8                          | 42.4 | 74.0              | 54.0 | -21.2          | -11.6 | 74        | 1.36      |
| 3857.73            | -33.21                    | 32.03                    | 53.7                      | 42.5 | 52.5                          | 41.3 | 74.0              | 54.0 | -21.5          | -12.7 | 186       | 1.49      |
| 4402.66            | -32.96                    | 32.48                    | 54.1                      | 43.1 | 53.6                          | 42.6 | 74.0              | 54.0 | -20.4          | -11.4 | 312       | 1.55      |
| 5092.42            | -32.76                    | 33.47                    | 56.5                      | 45.5 | 57.2                          | 46.2 | 74.0              | 54.0 | -16.8          | -7.8  | 275       | 1.78      |
| 5367.88            | -32.67                    | 33.69                    | 56.7                      | 45.6 | 57.7                          | 46.6 | 74.0              | 54.0 | -16.3          | -7.4  | 103       | 1.92      |
| 5752.37            | -32.63                    | 33.90                    | 56.1                      | 45.3 | 57.4                          | 46.6 | 74.0              | 54.0 | -16.6          | -7.4  | 294       | 2.11      |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "\*\*\*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



**Spectrum Research & Testing Lab., Inc.**  
No. 101-10, Ling 8,  
Shan-Tong Li, Chung-Li  
City, Taoyuan, Taiwan

## TEST REPORT

Reference No.: A12040501  
Report No.: FCCA12040501  
FCC ID : FSUGMZJY  
Page: 46 of 54  
Date: May. 08, 2012

|                    |             |                  |                 |
|--------------------|-------------|------------------|-----------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH          |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 2 (Fundamental) |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK            |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012   |

Antenna Polarization : Horizontal

| Frequency (MHz) | Correct Factor (dB) | Ant. Factor (dB/m) | Reading Data (dB $\mu$ V) |      | Emission Level (dB $\mu$ V/m) |      | Limit (dB $\mu$ V/m) |      | Margin (dB) |       | AZ (°) | EL (m) |
|-----------------|---------------------|--------------------|---------------------------|------|-------------------------------|------|----------------------|------|-------------|-------|--------|--------|
|                 |                     |                    | PK.                       | AV.  | PK.                           | AV.  | PK.                  | AV.  | PK.         | AV.   |        |        |
| 2441.00         | -33.87              | 28.17              | 95.0                      | 83.2 | 89.3                          | 77.5 | 114                  | 94.0 | -24.7       | -16.5 | 161    | 1.84   |
| 4882.00         | -32.82              | 33.19              | 54.9                      | 43.6 | 55.3                          | 44.0 | 74.0                 | 54.0 | -18.7       | -10.0 | 293    | 1.52   |
| 7323.00         | -32.72              | 36.04              | 45.3                      | 34.2 | 48.6                          | 37.5 | 74.0                 | 54.0 | -25.4       | -16.5 | 175    | 1.49   |
| 9764.00         | -33.19              | 38.16              | 48.5                      | 37.6 | 53.5                          | 42.6 | 74.0                 | 54.0 | -20.5       | -11.4 | 208    | 1.58   |
| 12205.00        | -32.18              | 39.48              | 46.1                      | 34.8 | 53.4                          | 42.1 | 74.0                 | 54.0 | -20.6       | -11.9 | 194    | 1.77   |
| 14646.00        | -31.07              | 41.86              | 49.0                      | 37.5 | 59.8                          | 48.3 | 74.0                 | 54.0 | -14.2       | -5.7  | 254    | 1.64   |

Antenna Polarization : Vertical

| Frequency (MHz) | Correct Factor (dB) | Ant. Factor (dB/m) | Reading Data (dB $\mu$ V) |      | Emission Level (dB $\mu$ V/m) |      | Limit (dB $\mu$ V/m) |      | Margin (dB) |       | AZ (°) | EL (m) |
|-----------------|---------------------|--------------------|---------------------------|------|-------------------------------|------|----------------------|------|-------------|-------|--------|--------|
|                 |                     |                    | PK.                       | AV.  | PK.                           | AV.  | PK.                  | AV.  | PK.         | AV.   |        |        |
| 2441.00         | -33.87              | 28.17              | 94.1                      | 82.6 | 88.4                          | 76.9 | 114                  | 94.0 | -25.6       | -17.1 | 87     | 1.37   |
| 4882.00         | -32.82              | 33.19              | 56.2                      | 45.3 | 56.6                          | 45.7 | 74.0                 | 54.0 | -17.4       | -8.3  | 92     | 1.59   |
| 7323.00         | -32.72              | 36.04              | 46.0                      | 34.7 | 49.3                          | 38.0 | 74.0                 | 54.0 | -24.7       | -16.0 | 105    | 1.62   |
| 9764.00         | -33.19              | 38.16              | 46.4                      | 35.6 | 51.4                          | 40.6 | 74.0                 | 54.0 | -22.6       | -13.4 | 114    | 1.55   |
| 12205.00        | -32.18              | 39.48              | 46.4                      | 35.4 | 53.7                          | 42.7 | 74.0                 | 54.0 | -20.3       | -11.3 | 217    | 1.47   |
| 14646.00        | -31.07              | 41.86              | 48.4                      | 37.8 | 59.2                          | 48.6 | 74.0                 | 54.0 | -14.8       | -5.4  | 95     | 1.63   |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "\*\*\*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



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## TEST REPORT

Reference No.: A12040501  
Report No.: FCCA12040501  
FCC ID : FSUGMZJY  
Page: 47 of 54  
Date: May. 08, 2012

|                    |             |                  |               |
|--------------------|-------------|------------------|---------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH        |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 3             |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK          |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency (MHz) | Correct Factor (dB) | Ant. Factor (dB/m) | Reading Data (dBμV) |      | Emission Level (dBμV/m) |      | Limit (dBμV/m) |      | Margin (dB) |       | AZ (°) | EL (m) |
|-----------------|---------------------|--------------------|---------------------|------|-------------------------|------|----------------|------|-------------|-------|--------|--------|
|                 |                     |                    | PK.                 | AV.  | PK.                     | AV.  | PK.            | AV.  | PK.         | AV.   |        |        |
| 3802.17         | -33.23              | 31.89              | 54.0                | 43.2 | 52.7                    | 41.9 | 74.0           | 54.0 | -21.3       | -12.1 | 192    | 1.95   |
| 4162.47         | -33.08              | 32.43              | 54.0                | 43.3 | 53.4                    | 42.7 | 74.0           | 54.0 | -20.6       | -11.3 | 113    | 1.77   |
| 4557.83         | -32.90              | 32.60              | 53.6                | 42.9 | 53.3                    | 42.6 | 74.0           | 54.0 | -20.7       | -11.4 | 267    | 1.53   |
| 4712.70         | -32.86              | 32.88              | 54.9                | 43.6 | 54.9                    | 43.6 | 74.0           | 54.0 | -19.1       | -10.4 | 245    | 1.46   |
| 5292.07         | -32.69              | 33.63              | 56.4                | 45.8 | 57.3                    | 46.7 | 74.0           | 54.0 | -16.7       | -7.3  | 302    | 1.38   |
| 5637.22         | -32.63              | 33.85              | 55.7                | 44.5 | 56.9                    | 45.7 | 74.0           | 54.0 | -17.1       | -8.3  | 91     | 1.25   |

Antenna Polarization : Vertical

| Frequency (MHz) | Correct Factor (dB) | Ant. Factor (dB/m) | Reading Data (dBμV) |      | Emission Level (dBμV/m) |      | Limit (dBμV/m) |      | Margin (dB) |       | AZ (°) | EL (m) |
|-----------------|---------------------|--------------------|---------------------|------|-------------------------|------|----------------|------|-------------|-------|--------|--------|
|                 |                     |                    | PK.                 | AV.  | PK.                     | AV.  | PK.            | AV.  | PK.         | AV.   |        |        |
| 3767.23         | -33.24              | 31.79              | 53.6                | 42.8 | 52.2                    | 41.4 | 74.0           | 54.0 | -21.8       | -12.6 | 77     | 1.31   |
| 4057.83         | -33.13              | 32.41              | 53.9                | 42.9 | 53.2                    | 42.2 | 74.0           | 54.0 | -20.8       | -11.8 | 154    | 1.46   |
| 4697.52         | -32.86              | 32.85              | 54.4                | 43.4 | 54.4                    | 43.4 | 74.0           | 54.0 | -19.6       | -10.6 | 239    | 1.69   |
| 5237.47         | -32.71              | 33.59              | 55.9                | 44.7 | 56.8                    | 45.6 | 74.0           | 54.0 | -17.2       | -8.4  | 221    | 1.73   |
| 5387.24         | -32.66              | 33.71              | 55.8                | 44.6 | 56.9                    | 45.7 | 74.0           | 54.0 | -17.1       | -8.3  | 178    | 1.91   |
| 5682.75         | -32.63              | 33.87              | 56.1                | 45.1 | 57.3                    | 46.3 | 74.0           | 54.0 | -16.7       | -7.7  | 86     | 2.04   |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field strength of fundamental frequency.



## TEST REPORT

|                    |             |                  |                 |
|--------------------|-------------|------------------|-----------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH          |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 3 (Fundamental) |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK            |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012   |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dB $\mu$ V) |      | Emission<br>Level<br>(dB $\mu$ V/m) |      | Limit<br>(dB $\mu$ V/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------------|------|-------------------------------------|------|-------------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                             | AV.  | PK.                                 | AV.  | PK.                     | AV.  | PK.            | AV.   |           |           |
| 2480.00            | -33.86                    | 28.26                    | 93.9                            | 81.6 | 88.3                                | 76.0 | 114                     | 94.0 | -25.7          | -18.0 | 99        | 1.58      |
| 4960.00            | -32.80                    | 33.33                    | 55.0                            | 44.3 | 55.5                                | 44.8 | 74.0                    | 54.0 | -18.5          | -9.2  | 315       | 1.43      |
| 7440.00            | -32.75                    | 36.34                    | 45.0                            | 33.4 | 48.6                                | 37.0 | 74.0                    | 54.0 | -25.4          | -17.0 | 172       | 1.69      |
| 9920.00            | -33.20                    | 38.25                    | 45.8                            | 34.8 | 50.9                                | 39.9 | 74.0                    | 54.0 | -23.1          | -14.1 | 254       | 1.52      |
| 12400.00           | -31.97                    | 39.36                    | 47.0                            | 36.3 | 54.4                                | 43.7 | 74.0                    | 54.0 | -19.6          | -10.3 | 58        | 1.66      |
| 14880.00           | -31.15                    | 40.83                    | 50.9                            | 39.1 | 60.6                                | 48.8 | 74.0                    | 54.0 | -13.4          | -5.2  | 127       | 1.54      |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dB $\mu$ V) |      | Emission<br>Level<br>(dB $\mu$ V/m) |      | Limit<br>(dB $\mu$ V/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------------|------|-------------------------------------|------|-------------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                             | AV.  | PK.                                 | AV.  | PK.                     | AV.  | PK.            | AV.   |           |           |
| 2480.00            | -33.86                    | 28.26                    | 94.5                            | 82.2 | 88.9                                | 76.6 | 114                     | 94.0 | -25.1          | -17.4 | 226       | 1.38      |
| 4960.00            | -32.80                    | 33.33                    | 54.1                            | 43.5 | 54.6                                | 44.0 | 74.0                    | 54.0 | -19.4          | -10.0 | 167       | 1.75      |
| 7440.00            | -32.75                    | 36.34                    | 44.8                            | 33.7 | 48.4                                | 37.3 | 74.0                    | 54.0 | -25.6          | -16.7 | 83        | 1.62      |
| 9920.00            | -33.20                    | 38.25                    | 47.0                            | 36.5 | 52.1                                | 41.6 | 74.0                    | 54.0 | -21.9          | -12.4 | 195       | 1.59      |
| 12400.00           | -31.97                    | 39.36                    | 47.1                            | 36.4 | 54.5                                | 43.8 | 74.0                    | 54.0 | -19.5          | -10.2 | 243       | 1.44      |
| 14880.00           | -31.15                    | 40.83                    | 48.4                            | 37.6 | 58.1                                | 47.3 | 74.0                    | 54.0 | -15.9          | -6.7  | 68        | 1.36      |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "\*\*\*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



## TEST REPORT

|                    |             |                  |               |
|--------------------|-------------|------------------|---------------|
| Temperature:       | 23 °C       | Humidity:        | 57 %RH        |
| Receiver Detector: | PK. or AV.  | Tested Mode:     | 4             |
| Frequency Range:   | 1 – 25 GHz  | Modulation Type: | GFSK          |
| Tested By:         | Richard Lin | Tested Date:     | Apr. 11, 2012 |

Antenna Polarization : Horizontal

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dB $\mu$ V) |      | Emission<br>Level<br>(dB $\mu$ V/m) |      | Limit<br>(dB $\mu$ V/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------------|------|-------------------------------------|------|-------------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                             | AV.  | PK.                                 | AV.  | PK.                     | AV.  | PK.            | AV.   |           |           |
| 4642.11            | -32.88                    | 32.76                    | 54.5                            | 43.6 | 54.4                                | 43.5 | 74.0                    | 54.0 | -19.6          | -10.5 | 129       | 1.98      |
| 5007.24            | -32.79                    | 33.41                    | 55.6                            | 44.8 | 56.2                                | 45.4 | 74.0                    | 54.0 | -17.8          | -8.6  | 322       | 1.74      |
| 5082.47            | -32.76                    | 33.47                    | 55.9                            | 44.5 | 56.6                                | 45.2 | 74.0                    | 54.0 | -17.4          | -8.8  | 193       | 1.57      |
| 5157.79            | -32.74                    | 33.53                    | 57.1                            | 46.2 | 57.9                                | 47.0 | 74.0                    | 54.0 | -16.1          | -7.0  | 88        | 1.45      |
| 5737.17            | -32.63                    | 33.89                    | 56.1                            | 45.3 | 57.4                                | 46.6 | 74.0                    | 54.0 | -16.6          | -7.4  | 56        | 1.28      |
| 5932.82            | -32.64                    | 33.97                    | 55.5                            | 44.7 | 56.8                                | 46.0 | 74.0                    | 54.0 | -17.2          | -8.0  | 107       | 1.21      |

Antenna Polarization : Vertical

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Ant.<br>Factor<br>(dB/m) | Reading<br>Data<br>(dB $\mu$ V) |      | Emission<br>Level<br>(dB $\mu$ V/m) |      | Limit<br>(dB $\mu$ V/m) |      | Margin<br>(dB) |       | AZ<br>(°) | EL<br>(m) |
|--------------------|---------------------------|--------------------------|---------------------------------|------|-------------------------------------|------|-------------------------|------|----------------|-------|-----------|-----------|
|                    |                           |                          | PK.                             | AV.  | PK.                                 | AV.  | PK.                     | AV.  | PK.            | AV.   |           |           |
| 3762.41            | -33.25                    | 31.78                    | 54.3                            | 43.7 | 52.8                                | 42.2 | 74.0                    | 54.0 | -21.2          | -11.8 | 94        | 1.22      |
| 4412.67            | -32.95                    | 32.48                    | 54.3                            | 43.1 | 53.8                                | 42.6 | 74.0                    | 54.0 | -20.2          | -11.4 | 238       | 1.38      |
| 5027.83            | -32.78                    | 33.42                    | 56.0                            | 45.6 | 56.6                                | 46.2 | 74.0                    | 54.0 | -17.4          | -7.8  | 261       | 1.52      |
| 5087.92            | -32.76                    | 33.47                    | 56.1                            | 45.7 | 56.8                                | 46.4 | 74.0                    | 54.0 | -17.2          | -7.6  | 185       | 1.69      |
| 5552.17            | -32.62                    | 33.82                    | 55.9                            | 44.8 | 57.1                                | 46.0 | 74.0                    | 54.0 | -16.9          | -8.0  | 314       | 1.74      |
| 5727.37            | -32.63                    | 33.89                    | 55.9                            | 44.9 | 57.2                                | 46.2 | 74.0                    | 54.0 | -16.8          | -7.8  | 227       | 1.85      |

### NOTE :

1. Measurement uncertainty is +/- 3.7dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field strength of fundamental frequency.



**Spectrum Research &  
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## TEST REPORT

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### 5. Antenna application

#### 5.1 Antenna requirement

The EUT's antenna is met the requirement of FCC part15C section15.203 and 15.204.

#### 5.2 Result

The EUT's antenna used a PCB Printed. Gain of antenna types is -1 dBi that meet the requirement.



## 6. PHOTOS OF TESTING

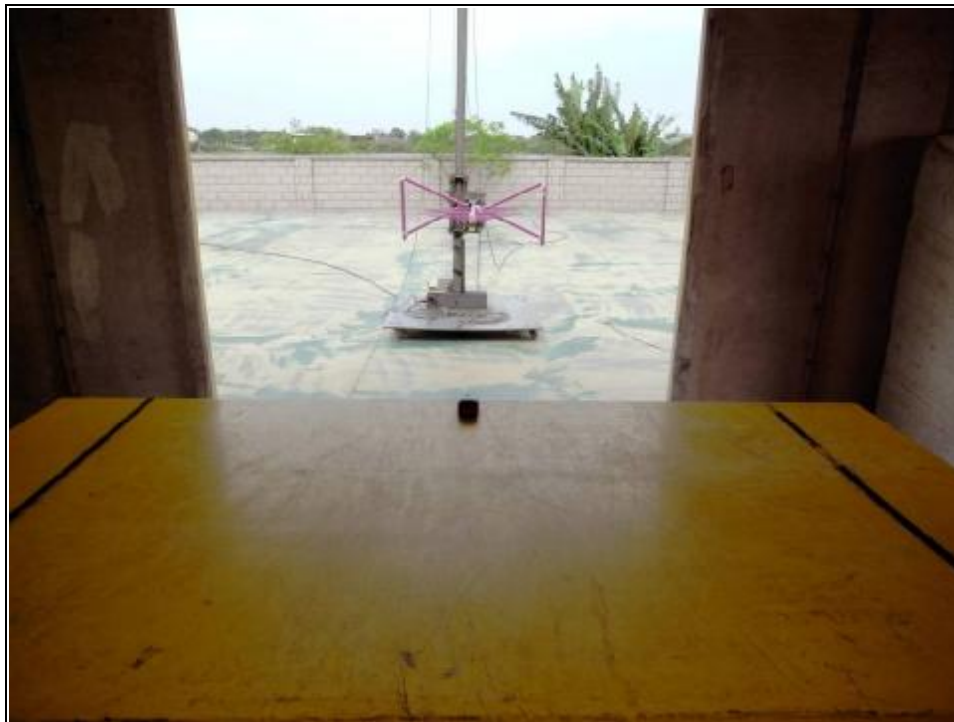
- Radiated test (below 30M , TX & Standby)





## TEST REPORT

- Radiated test (below 1G , TX & Standby)





- Radiated test (above 1G , TX & Standby)





## 7. TERMS OF ABBREVIATION

|          |                                              |
|----------|----------------------------------------------|
| AV.      | Average detection                            |
| AZ(°)    | Turn table azimuth                           |
| Correct. | Correction                                   |
| EL(m)    | Antenna height (meter)                       |
| EUT      | Equipment Under Test                         |
| Horiz.   | Horizontal direction                         |
| LISN     | Line Impedance Stabilization Network         |
| NSA      | Normalized Site Attenuation                  |
| Q.P.     | Quasi-peak detection                         |
| SRT Lab  | Spectrum Research & Testing Laboratory, Inc. |
| Vert.    | Vertical direction                           |