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# FCC TEST REPORT

**REPORT NO.:** RF110221D05

**MODEL NO.:** W0B5

**FCC ID:** XKIPDPNPEN11-1

**RECEIVED:** Feb. 21, 2011

**TESTED:** Feb. 23 ~ Mar. 8, 2011

**ISSUED:** Mar. 11, 2011

**APPLICANT:** AVerMedia INFORMATION, Inc

**ADDRESS:** 5F., No.135, Jian 1st Rd., Zhonghe Dist., New Taipei City 23585, Taiwan (R.O.C.)

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**LAB LOCATION:** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien, 244 Taiwan

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## RELEASE CONTROL RECORD

| ISSUE NO.        | REASON FOR CHANGE | DATE ISSUED   |
|------------------|-------------------|---------------|
| Original release | N/A               | Mar. 11, 2011 |



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## 1. CERTIFICATION

**PRODUCT:** New AVerPen  
**BRAND NAME:** AVerMedia  
**MODEL NO.:** W0B5  
**TEST ITEM:** ENGINEERING SAMPLE  
**APPLICANT:** AVerMedia INFORMATION, Inc  
**TESTED:** Feb. 23 ~ Mar. 8, 2011  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Jessica Cheng , **DATE:** Mar. 11, 2011  
( Jessica / Specialist )

**APPROVED BY :** Ken Liu , **DATE:** Mar. 11, 2011  
( Ken Liu / Manager )



## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| <b>APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)</b> |  |               |  |
|--|--|---------------|--|
| <b>STANDARD SECTION</b>  | <b>TEST TYPE AND LIMIT</b>   | <b>RESULT</b> | <b>REMARK</b>  |
| 15.207   | AC Power Conducted Emission  | PASS          | Meet the requirement of limit.<br>Minimum passing margin is -12.91dB at 0.416MHz |
| 15.247(a)(2)   | Spectrum Bandwidth of a Direct Sequence Spread Spectrum System<br>Limit: min. 500kHz   | PASS          | Meet the requirement of limit.   |
| 15.247(b)  | Maximum Output Power<br>Limit: max. 30dBm  | PASS          | Meet the requirement of limit.   |
| 15.247(d)  | Radiated Emissions<br>Limit: Table 15.209  | PASS          | Meet the requirement of limit.<br>Minimum passing margin is -0.8dB at 222.17MHz  |
| 15.247(e)  | Power Spectral Density<br>Limit: max. 8dBm   | PASS          | Meet the requirement of limit.   |
| 15.247(d)  | Band Edge Measurement<br>Limit: 20dB less than the peak value of fundamental frequency | PASS          | Meet the requirement of limit.   |
| 15.203   | Antenna Requirement  | PASS          | No antenna connector is used.  |

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

| <b>MEASUREMENT</b>  | <b>FREQUENCY</b> | <b>UNCERTAINTY</b> |
|---------------------|------------------|--------------------|
| Conducted emissions | 150kHz~30MHz     | 2.41 dB            |
| Radiated emissions  | 30MHz~1GHz       | 3.67 dB            |
|                     | Above 1GHz       | 2.89 dB            |



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                     |  |
|---------------------|--|
| PRODUCT             | New AVerPen  |
| MODEL NO.           | W0B5   |
| FCC ID              | XKIPPDNPEN11-1   |
| POWER SUPPLY        | 1.5Vdc from battery<br>5Vdc from host equipment or adapter |
| MODULATION TYPE     | GFSK   |
| OPERATING FREQUENCY | 2405 ~ 2480MHz   |
| NUMBER OF CHANNEL   | 16   |
| OUTPUT POWER        | 0.8mW  |
| ANTENNA TYPE        | PIFA antenna with 2.47dBi                                  |
| ANTENNA CONNECTOR   | NA   |
| DATA CABLE          | Shielded USB cable (1.2m)                                  |
| I/O PORTS           | N/A  |
| ASSOCIATED DEVICES  | N/A  |

**Note:**

1. The EUT is a New AVerPen and it has two samples, which are identical to each other except for following differences:

| Model No. | Sample      | Power source   |
|-----------|-------------|--|
| W0B5      | Teacher pen | ◆ Rechargeable Battery or<br>Non-rechargeable Battery, size AAA*1<br>◆ 5Vdc from PC<br>◆ 5Vdc from Adapter |
|           | Student pen | ◆ Non-rechargeable Battery, size AAA* 1  |

After pre-tested above two samples, the **Teacher pen** was the worst case, therefore, only its test data was recorded in this report.

2. The EUT consumes power from an AC adapter, as follows:

| Brand  | Model No. | Spec.  |
|--------|-----------|--|
| U.love | UAC1      | AC I/P: 100V-240V, 50/60Hz, 0.2A<br>DC O/P: 5V, 1A<br>(AC-2-PIN) |

3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



### 3.2 DESCRIPTION OF TEST MODES

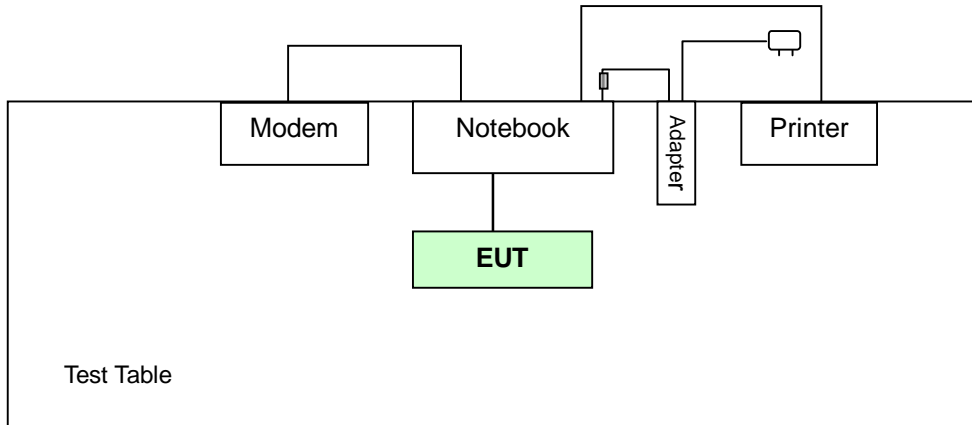
16 channels are provided to this EUT:

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 11      | 2405MHz   | 19      | 2445MHz   |
| 12      | 2410MHz   | 20      | 2450MHz   |
| 13      | 2415MHz   | 21      | 2455MHz   |
| 14      | 2420MHz   | 22      | 2460MHz   |
| 15      | 2425MHz   | 23      | 2465MHz   |
| 16      | 2430MHz   | 24      | 2470MHz   |
| 17      | 2435MHz   | 25      | 2475MHz   |
| 18      | 2440MHz   | 26      | 2480MHz   |

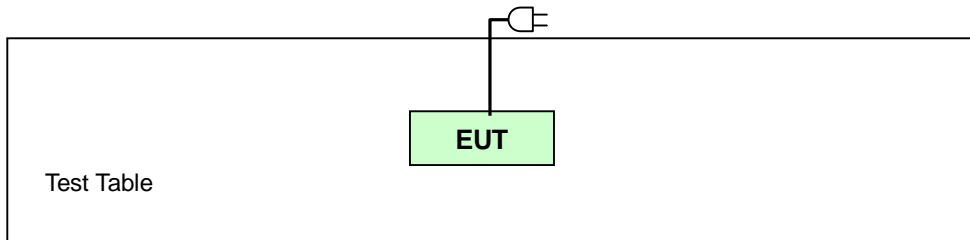


### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

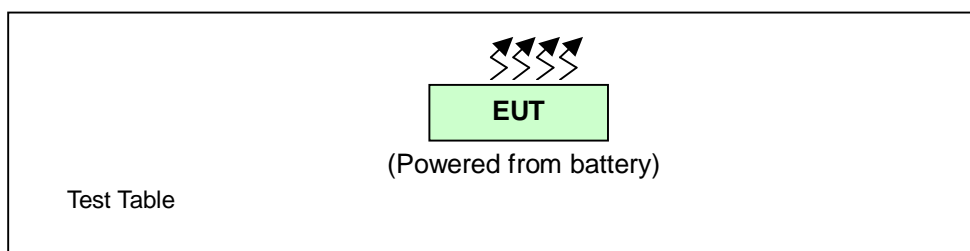
FOR MODE A (Operating+ Charging):



FOR MODE B (Operating+ Charging):



FOR MODE C (Operating):





### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO      |       |     |      | DESCRIPTION                                |
|--------------------|--------------------|-------|-----|------|--|
|                    | RE <sup>3</sup> 1G | RE<1G | PLC | APCM |  |
| A                  | √                  | √     | √   | √    | Operating+ Charging Mode EUT with Notebook |
| B                  | √                  | -     | √   | -    | Operating+ Charging Mode EUT with Adapter  |
| C                  | √                  | -     | -   | -    | Operating Mode EUT only                    |

Where **RE<sup>3</sup>1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

#### **POWER LINE CONDUCTED EMISSION TEST:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|--------------------|-------------------|----------------|-----------------|
| A, B               | 11 to 26          | 26             | GFSK            |

#### **RADIATED EMISSION TEST (ABOVE 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ Axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | AXIS |
|--------------------|-------------------|----------------|-----------------|------|
| A                  | 11 to 26          | 11, 18, 26     | GFSK            | X    |

#### **RADIATED EMISSION TEST (BELOW 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ Axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | AXIS |
|--------------------|-------------------|----------------|-----------------|------|
| A, B, C            | 11 to 26          | 26             | GFSK            | X    |



**BANDEDGE MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|--------------------|-------------------|----------------|-----------------|
| A                  | 11 to 26          | 11, 26         | GFSK            |

**ANTENNA PORT CONDUCTED MEASUREMENT:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|--------------------|-------------------|----------------|-----------------|
| A                  | 11 to 26          | 11, 18, 26     | GFSK            |

**TEST CONDITION:**

| APPLICABLE TO      | EUT CONFIGURE MODE | ENVIRONMENTAL CONDITIONS  | INPUT POWER           | TESTED BY |
|--------------------|--------------------|---------------------------|-----------------------|-----------|
| RE <sup>3</sup> 1G | A                  | 16deg. C, 63% RH, 1017hPa | 120Vac, 60Hz (SYSTEM) | Nick Chen |
| RE <1G             | A                  | 16deg. C, 63% RH, 1018hPa | 120Vac, 60Hz (SYSTEM) | Nick Chen |
|                    | B                  | 13deg. C, 76% RH, 1023hPa | 120Vac, 60Hz          | Chad Lee  |
|                    | C                  | 16deg. C, 63% RH, 1017hPa | 1.5Vdc                | Nick Chen |
| PLC                | A                  | 20deg. C, 78% RH, 1018hPa | 120Vac, 60Hz (SYSTEM) | Jun Wu    |
|                    | B                  | 17deg. C, 66% RH, 1018hPa | 120Vac, 60Hz          | Nick Chen |
| APCM               | A                  | 14deg. C, 68% RH, 1015hPa | 120Vac, 60Hz (SYSTEM) | Jun Wu    |



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### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.247)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT           | BRAND | MODEL NO. | SERIAL NO.  | FCC ID           |
|-----|-------------------|-------|-----------|-------------|------------------|
| 1   | NOTEBOOK COMPUTER | DELL  | PP05L     | 24729091408 | FCC DoC Approved |
| 2   | MODEM             | ACEEX | 1414      | 980020520   | IFAXDM1414       |
| 3   | PRINTER           | EPSON | LQ-300+   | DCGY017054  | FCC DoC Approved |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS  |
|-----|--|
| 1   | N/A  |
| 2   | 1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.      |
| 3   | 1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core |

**NOTE:** All power cords of the above support units are non-shielded (1.8m).



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB $\mu$ V) |          |
|-----------------------------|------------------------------|----------|
|                             | Quasi-peak                   | Average  |
| 0.15 ~ 0.5                  | 66 to 56                     | 56 to 46 |
| 0.5 ~ 5                     | 56                           | 46       |
| 5 ~ 30                      | 60                           | 50       |

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



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## 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER                                 | MODEL NO.       | SERIAL NO.   | CALIBRATED DATE | CALIBRATED UNTIL |
|--|-----------------|--------------|-----------------|------------------|
| ROHDE & SCHWARZ Test Receiver                              | ESCS 30         | 100276       | Dec. 31, 2010   | Dec. 30, 2011    |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT)         | ESH3-Z5         | 100219       | Nov. 24, 2010   | Nov. 23, 2011    |
| LISN With Adapter (for EUT)                                | AD10            | C10Ada-001   | Nov. 24, 2010   | Nov. 23, 2011    |
| ROHDE & SCHWARZ Artificial Mains Network (for peripherals) | ESH3-Z5         | 100218       | Nov. 24, 2010   | Nov. 23, 2011    |
| Software   | ADT_Cond_V7.3.7 | NA           | NA              | NA               |
| Software   | ADT_ISN_V7.3.7  | NA           | NA              | NA               |
| RF cable (JYEBAO)  | 5D-FB           | Cable-C10.01 | Feb. 22, 2011   | Feb. 21, 2012    |
| SUHNER Terminator (For ROHDE & SCHWARZ LISN)               | 65BNC-5001      | E1-010773    | Feb. 23, 2011   | Feb. 22, 2012    |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in Shielded Room No. 10.
  3. The VCCI Site Registration No. C-1852.

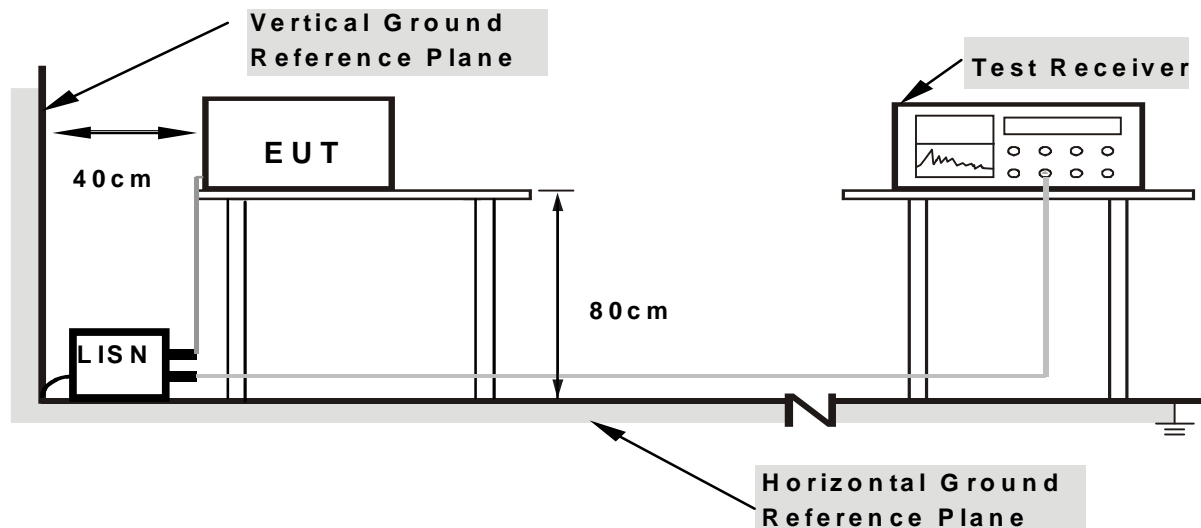
### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.1.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



#### 4.1.6 EUT OPERATING CONDITIONS

##### For Mode A

- a. Connected the EUT to a notebook (via USB cable) placed on a testing table.
- b. Notebook ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. Notebook read and wrote messages to/ from HDD.
- d. Notebook sent "H" messages to its screen.
- e. Notebook sent messages to printer, and the printer printed them out.
- f. Notebook sent messages to modem.
- g. Repeated c ~ g.

##### For Mode B

- a. Connected the EUT with AC adapter placed on testing table.
- b. The EUT under transmission/receiving condition continuously at specific channel frequency.
- c. Set the EUT under charging condition.
- d. Steps c-d were repeated.

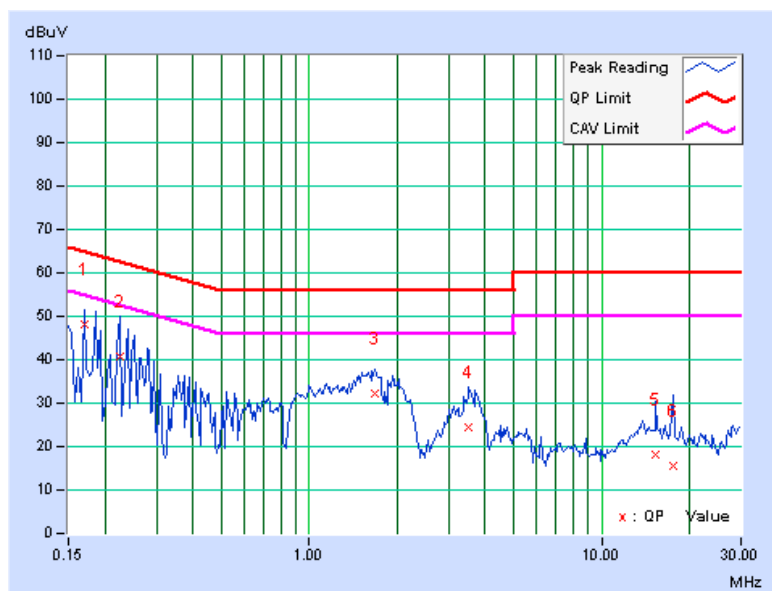


### 4.1.7 TEST RESULTS

|           |        |               |            |
|-----------|--------|---------------|------------|
| PHASE     | Line 1 | 6dB BANDWIDTH | 9kHz       |
| TEST MODE | A      | CHANNEL       | Channel 26 |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value [dB (uV)] |     | Emission Level [dB (uV)] |     | Limit [dB (uV)] |       | Margin (dB) |     |
|----|-------------|-------------------|-------------------------|-----|--------------------------|-----|-----------------|-------|-------------|-----|
|    |             |                   | Q.P.                    | AV. | Q.P.                     | AV. | Q.P.            | AV.   | Q.P.        | AV. |
| 1  | 0.170       | 0.17              | 47.90                   | -   | 48.07                    | -   | 64.98           | 54.98 | -16.92      | -   |
| 2  | 0.224       | 0.18              | 40.48                   | -   | 40.66                    | -   | 62.66           | 52.66 | -22.00      | -   |
| 3  | 1.684       | 0.31              | 31.78                   | -   | 32.09                    | -   | 56.00           | 46.00 | -23.91      | -   |
| 4  | 3.512       | 0.45              | 23.84                   | -   | 24.29                    | -   | 56.00           | 46.00 | -31.71      | -   |
| 5  | 15.387      | 1.11              | 17.03                   | -   | 18.14                    | -   | 60.00           | 50.00 | -41.86      | -   |
| 6  | 17.508      | 1.22              | 14.18                   | -   | 15.40                    | -   | 60.00           | 50.00 | -44.60      | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



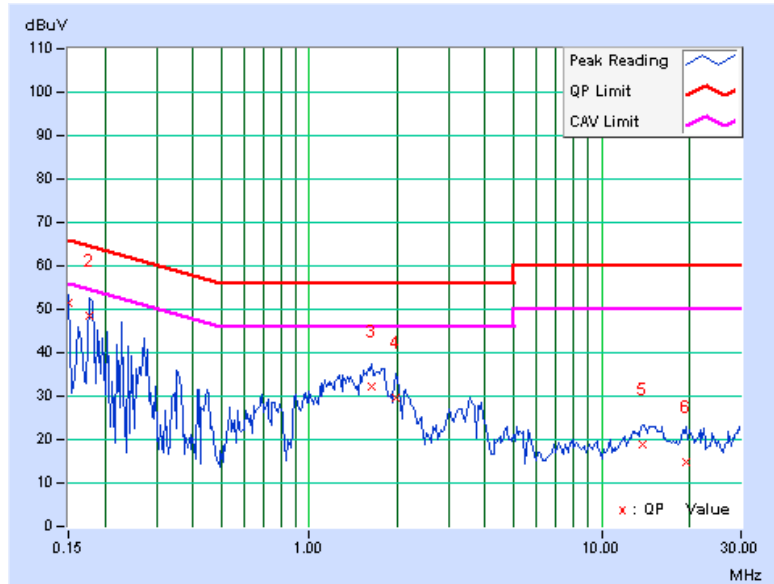


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|           |        |               |            |
|-----------|--------|---------------|------------|
| PHASE     | Line 2 | 6dB BANDWIDTH | 9kHz       |
| TEST MODE | A      | CHANNEL       | Channel 26 |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |     | Emission Level |     | Limit     |       | Margin |     |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
|    |                |                         | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)] |       | (dB)   |     |
|    |                |                         | Q.P.          | AV. | Q.P.           | AV. | Q.P.      | AV.   | Q.P.   | AV. |
| 1  | 0.150          | 0.18                    | 51.47         | -   | 51.65          | -   | 66.00     | 56.00 | -14.35 | -   |
| 2  | 0.177          | 0.18                    | 48.47         | -   | 48.65          | -   | 64.61     | 54.61 | -15.96 | -   |
| 3  | 1.629          | 0.31                    | 31.87         | -   | 32.18          | -   | 56.00     | 46.00 | -23.82 | -   |
| 4  | 1.973          | 0.33                    | 29.21         | -   | 29.54          | -   | 56.00     | 46.00 | -26.46 | -   |
| 5  | 13.770         | 0.81                    | 18.14         | -   | 18.95          | -   | 60.00     | 50.00 | -41.05 | -   |
| 6  | 19.453         | 0.98                    | 14.01         | -   | 14.99          | -   | 60.00     | 50.00 | -45.01 | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



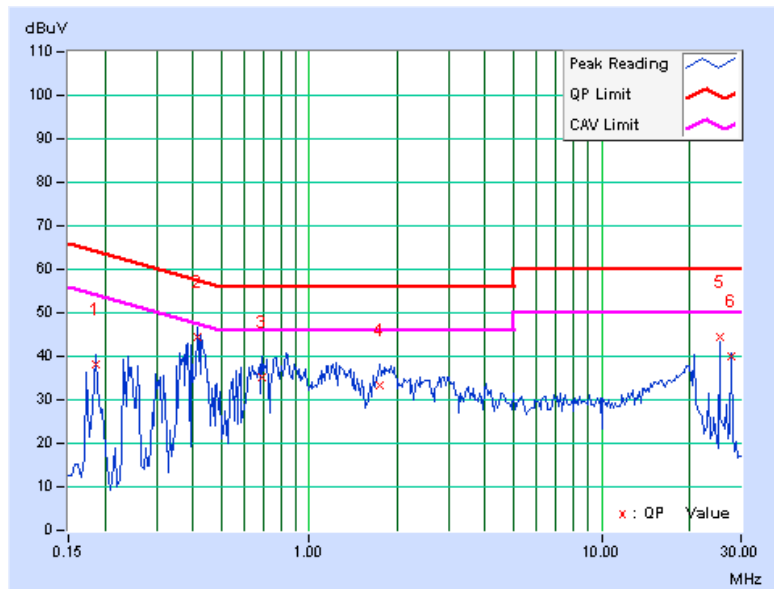


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|           |        |               |            |
|-----------|--------|---------------|------------|
| PHASE     | Line 1 | 6dB BANDWIDTH | 9kHz       |
| TEST MODE | B      | CHANNEL       | Channel 26 |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |     | Emission Level |     | Limit        |              | Margin        |     |
|----|----------------|-------------------------|---------------|-----|----------------|-----|--------------|--------------|---------------|-----|
|    |                |                         | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)]    |              | (dB)          |     |
|    |                |                         | Q.P.          | AV. | Q.P.           | AV. | Q.P.         | AV.          | Q.P.          | AV. |
| 1  | 0.185          | 0.17                    | 38.04         | -   | 38.21          | -   | 64.25        | 54.25        | -26.04        | -   |
| 2  | <b>0.416</b>   | <b>0.24</b>             | <b>44.38</b>  | -   | <b>44.62</b>   | -   | <b>57.54</b> | <b>47.54</b> | <b>-12.91</b> | -   |
| 3  | 0.693          | 0.25                    | 34.83         | -   | 35.08          | -   | 56.00        | 46.00        | -20.92        | -   |
| 4  | 1.746          | 0.31                    | 33.04         | -   | 33.35          | -   | 56.00        | 46.00        | -22.65        | -   |
| 5  | 25.457         | 1.50                    | 42.76         | -   | 44.26          | -   | 60.00        | 50.00        | -15.74        | -   |
| 6  | 27.771         | 1.59                    | 38.42         | -   | 40.01          | -   | 60.00        | 50.00        | -19.99        | -   |

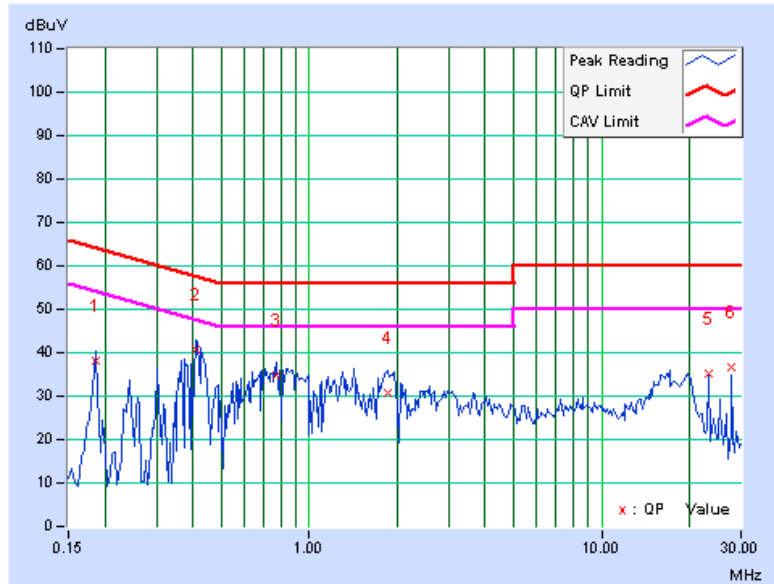
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



|           |        |               |            |
|-----------|--------|---------------|------------|
| PHASE     | Line 2 | 6dB BANDWIDTH | 9kHz       |
| TEST MODE | B      | CHANNEL       | Channel 26 |

| No | Freq.  | Corr.  | Reading Value |     | Emission Level |     | Limit     |       | Margin |     |
|----|--------|--------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
|    | [MHz]  | Factor | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)] |       | (dB)   |     |
|    |        | (dB)   | Q.P.          | AV. | Q.P.           | AV. | Q.P.      | AV.   | Q.P.   | AV. |
| 1  | 0.185  | 0.18   | 37.80         | -   | 37.98          | -   | 64.25     | 54.25 | -26.27 | -   |
| 2  | 0.409  | 0.25   | 40.52         | -   | 40.77          | -   | 57.67     | 47.67 | -16.90 | -   |
| 3  | 0.771  | 0.27   | 34.63         | -   | 34.90          | -   | 56.00     | 46.00 | -21.10 | -   |
| 4  | 1.855  | 0.32   | 30.42         | -   | 30.74          | -   | 56.00     | 46.00 | -25.26 | -   |
| 5  | 23.147 | 1.05   | 34.11         | -   | 35.16          | -   | 60.00     | 50.00 | -24.84 | -   |
| 6  | 27.779 | 1.15   | 35.34         | -   | 36.49          | -   | 60.00     | 50.00 | -23.51 | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| FREQUENCIES (MHz) | FIELD STRENGTH (microvolts/meter) | MEASUREMENT DISTANCE (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490     | 2400/F(kHz)                       | 300                           |
| 0.490 ~ 1.705     | 24000/F(kHz)                      | 30                            |
| 1.705 ~ 30.0      | 30                                | 30                            |
| 30 ~ 88           | 100                               | 3                             |
| 88 ~ 216          | 150                               | 3                             |
| 216 ~ 960         | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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## 4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER                   | MODEL NO.                    | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--|------------------------------|------------|-----------------|------------------|
| HP Preamplifier                              | 8447D                        | 2432A03504 | May 06, 2010    | May 05, 2011     |
| HP Preamplifier                              | 8449B                        | 3008A01924 | Jul. 14, 2010   | Jul. 13, 2011    |
| HP Preamplifier                              | 8449B                        | 3008A01292 | Jul. 14, 2010   | Jul. 13, 2011    |
| ROHDE & SCHWARZ TEST RECEIVER                | ESU26                        | 100005     | Jun. 10, 2010   | Jun. 09, 2011    |
| Schwarzbeck Antenna                          | VULB 9168                    | 137        | Apr. 29, 2010   | Apr. 28, 2011    |
| Schwarzbeck Antenna                          | VHBA 9123                    | 480        | Apr. 29, 2010   | Apr. 28, 2011    |
| ADT. Turn Table                              | TT100                        | 0306       | NA              | NA               |
| ADT. Tower                                   | AT100                        | 0306       | NA              | NA               |
| Software                                     | ADT_Radiated_V<br>7.6.15.9.2 | NA         | NA              | NA               |
| SUHNER RF cable                              | SF102                        | CABLE-CH6  | Aug. 20, 2010   | Aug. 19, 2011    |
| EMCO Horn Antenna                            | 3115                         | 6714       | Oct. 26, 2010   | Oct. 25, 2011    |
| EMCO Horn Antenna                            | 3115                         | 9312-4192  | Apr. 23, 2010   | Apr. 22, 2011    |
| Highpass filter<br>Wainwright<br>Instruments | WHK<br>3.1/18G-10SS          | SN 8       | NA              | NA               |

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.



### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

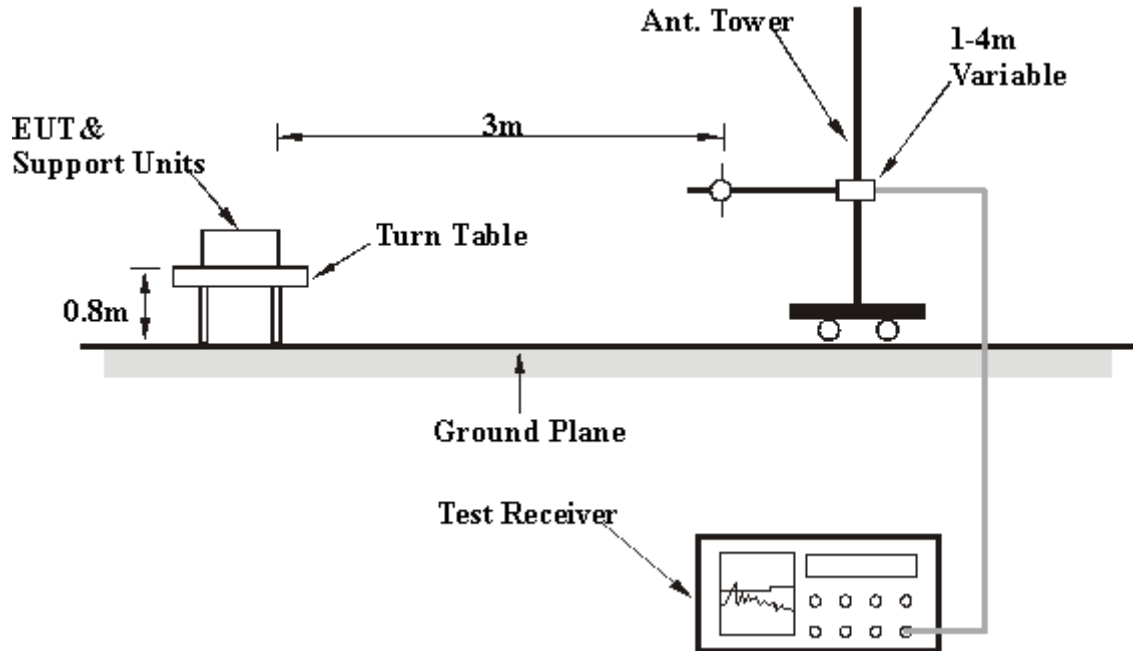
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.2.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).





## 4.2.6 EUT OPERATING CONDITIONS

### For Mode A

- a. Connected the EUT to a notebook (via USB cable) placed on a testing table.
- b. Notebook ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. Set EUT under charging condition.
- d. Notebook read and wrote messages to/ from HDD.
- e. Notebook sent "H" messages to its screen.
- f. Notebook sent messages to printer, and the printer printed them out.
- g. Notebook sent messages to modem.
- h. Repeated c ~ h.

### For Mode B

- a. Connected the EUT with AC adapter placed on testing table.
- b. The EUT under transmission/receiving condition continuously at specific channel frequency.
- c. Set the EUT under charging condition.
- d. Steps c-d were repeated.

### For Mode C

Set the EUT under transmission/receiving condition continuously at specific channel frequency.



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## 4.2.7 TEST RESULTS

### ABOVE 1GHz DATA

| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------------------|--------------------|---------------------------|
| CHANNEL                  | Channel 11                  | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz                | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 16deg. C, 63%RH<br>1017 hPa | TESTED BY          | Nick Chen                 |
| TEST MODE                | A                           |                    |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 2390.00     | 58.2 PK                 | 74.0           | -15.8       | 1.00 H             | 51                   | 25.71            | 32.47                    |
| 2   | 2390.00     | 46.9 AV                 | 54.0           | -7.2        | 1.00 H             | 51                   | 14.38            | 32.47                    |
| 3   | 2400.00     | 36.6 PK                 | 74.0           | -37.4       | 1.00 H             | 51                   | 4.13             | 32.51                    |
| 4   | 2400.00     | 34.2 AV                 | 54.0           | -19.8       | 1.00 H             | 51                   | 1.68             | 32.51                    |
| 5   | *2405.00    | 92.4 PK                 |                |             | 1.00 H             | 51                   | 59.91            | 32.53                    |
| 6   | *2405.00    | 90.0 AV                 |                |             | 1.00 H             | 51                   | 57.46            | 32.53                    |
| 7   | 4810.00     | 51.7 PK                 | 74.0           | -22.4       | 1.00 H             | 41                   | 11.77            | 39.87                    |
| 8   | 4810.00     | 41.4 AV                 | 54.0           | -12.6       | 1.00 H             | 41                   | 1.52             | 39.87                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 2390.00     | 58.7 PK                 | 74.0           | -15.3       | 1.03 V             | 3                    | 26.21            | 32.47                    |
| 2   | 2390.00     | 46.8 AV                 | 54.0           | -7.2        | 1.03 V             | 3                    | 14.31            | 32.47                    |
| 3   | 2400.00     | 33.1 PK                 | 74.0           | -40.9       | 1.03 V             | 3                    | 0.63             | 32.51                    |
| 4   | 2400.00     | 30.6 AV                 | 54.0           | -23.4       | 1.03 V             | 3                    | -1.92            | 32.51                    |
| 5   | *2405.00    | 88.9 PK                 |                |             | 1.03 V             | 3                    | 56.41            | 32.53                    |
| 6   | *2405.00    | 86.4 AV                 |                |             | 1.03 V             | 3                    | 53.86            | 32.53                    |
| 7   | 4810.00     | 54.6 PK                 | 74.0           | -19.4       | 1.01 V             | 190                  | 14.68            | 39.87                    |
| 8   | 4810.00     | 49.4 AV                 | 54.0           | -4.6        | 1.01 V             | 190                  | 9.49             | 39.87                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* ” : Fundamental frequency



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| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------------------|--------------------|---------------------------|
| CHANNEL                  | Channel 18                  | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz                | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 16deg. C, 63%RH<br>1017 hPa | TESTED BY          | Nick Chen                 |
| TEST MODE                | A                           |                    |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | *2440.00    | 92.8 PK                 |                |             | 1.14 H             | 27                   | 60.10            | 32.65                    |
| 2   | *2440.00    | 90.2 AV                 |                |             | 1.14 H             | 27                   | 57.57            | 32.65                    |
| 3   | 4880.00     | 51.5 PK                 | 74.0           | -22.6       | 1.03 H             | 297                  | 11.34            | 40.10                    |
| 4   | 4880.00     | 42.4 AV                 | 54.0           | -11.6       | 1.03 H             | 297                  | 2.27             | 40.10                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | *2440.00    | 88.9 PK                 |                |             | 1.02 V             | 359                  | 56.25            | 32.65                    |
| 2   | *2440.00    | 86.3 AV                 |                |             | 1.02 V             | 359                  | 53.67            | 32.65                    |
| 3   | 4880.00     | 56.5 PK                 | 74.0           | -17.5       | 1.02 V             | 11                   | 16.36            | 40.10                    |
| 4   | 4880.00     | 51.9 AV                 | 54.0           | -2.1        | 1.02 V             | 11                   | 11.78            | 40.10                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* “ : Fundamental frequency



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| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------------------|--------------------|---------------------------|
| CHANNEL                  | Channel 26                  | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz                | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 16deg. C, 63%RH<br>1017 hPa | TESTED BY          | Nick Chen                 |
| TEST MODE                | A                           |                    |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | *2480.00    | 92.2 PK                 |                |             | 1.00 H             | 51                   | 59.37            | 32.80                    |
| 2   | *2480.00    | 89.6 AV                 |                |             | 1.00 H             | 51                   | 56.84            | 32.80                    |
| 3   | 2483.50     | 44.7 PK                 | 74.0           | -29.3       | 1.00 H             | 51                   | 11.86            | 32.81                    |
| 4   | 2483.50     | 42.1 AV                 | 54.0           | -11.9       | 1.00 H             | 51                   | 9.33             | 32.81                    |
| 5   | 4960.00     | 53.5 PK                 | 74.0           | -20.5       | 1.08 H             | 32                   | 13.12            | 40.34                    |
| 6   | 4960.00     | 42.2 AV                 | 54.0           | -11.8       | 1.08 H             | 32                   | 1.82             | 40.34                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | *2480.00    | 90.0 PK                 |                |             | 1.00 V             | 356                  | 57.19            | 32.80                    |
| 2   | *2480.00    | 87.5 AV                 |                |             | 1.00 V             | 356                  | 54.74            | 32.80                    |
| 3   | 2483.50     | 42.5 PK                 | 74.0           | -31.5       | 1.00 V             | 356                  | 9.68             | 32.81                    |
| 4   | 2483.50     | 40.0 AV                 | 54.0           | -14.0       | 1.00 V             | 356                  | 7.23             | 32.81                    |
| 5   | 4960.00     | 55.2 PK                 | 74.0           | -18.8       | 1.00 V             | 3                    | 14.89            | 40.34                    |
| 6   | 4960.00     | 50.5 AV                 | 54.0           | -3.5        | 1.00 V             | 3                    | 10.11            | 40.34                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* ” : Fundamental frequency



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**BELOW 1GHz WORST-CASE DATA**

| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |               |
|--------------------------|-----------------------------|--------------------|---------------|
| CHANNEL                  | Channel 26                  | FREQUENCY RANGE    | Below 1000MHz |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz                | DETECTOR FUNCTION  | Quasi-Peak    |
| ENVIRONMENTAL CONDITIONS | 16deg. C, 63%RH<br>1017 hPa | TESTED BY          | Nick Chen     |
| TEST MODE                | A                           |                    |               |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 34.66       | 21.9 QP                 | 40.0           | -18.1       | 1.12 H             | 10                   | 9.07             | 12.81                    |
| 2   | 843.00      | 24.8 QP                 | 46.0           | -21.2       | 1.69 H             | 85                   | -2.18            | 27.02                    |
| 3   | 852.32      | 27.7 QP                 | 46.0           | -18.3       | 1.82 H             | 10                   | 0.50             | 27.18                    |
| 4   | 886.52      | 25.5 QP                 | 46.0           | -20.5       | 1.41 H             | 10                   | -2.16            | 27.70                    |
| 5   | 928.49      | 26.9 QP                 | 46.0           | -19.1       | 1.00 H             | 10                   | -1.42            | 28.29                    |
| 6   | 947.15      | 28.4 QP                 | 46.0           | -17.6       | 1.52 H             | 214                  | -0.10            | 28.54                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 65.75       | 19.7 QP                 | 40.0           | -20.3       | 1.52 V             | 85                   | 6.89             | 12.81                    |
| 2   | 780.82      | 24.3 QP                 | 46.0           | -21.7       | 1.69 V             | 283                  | -1.68            | 25.96                    |
| 3   | 839.89      | 25.2 QP                 | 46.0           | -20.8       | 1.88 V             | 10                   | -1.74            | 26.96                    |
| 4   | 875.64      | 25.7 QP                 | 46.0           | -20.3       | 1.44 V             | 355                  | -1.83            | 27.54                    |
| 5   | 898.96      | 26.0 QP                 | 46.0           | -20.0       | 1.20 V             | 301                  | -1.90            | 27.89                    |
| 6   | 936.27      | 26.6 QP                 | 46.0           | -19.4       | 1.59 V             | 325                  | -1.84            | 28.40                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |               |
|--------------------------|-----------------------------|--------------------|---------------|
| CHANNEL                  | Channel 26                  | FREQUENCY RANGE    | Below 1000MHz |
| INPUT POWER              | 120Vac, 60Hz                | DETECTOR FUNCTION  | Quasi-Peak    |
| ENVIRONMENTAL CONDITIONS | 13deg. C, 76%RH<br>1023 hPa | TESTED BY          | Chad Lee      |
| TEST MODE                | B                           |                    |               |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 31.55       | 36.1 QP                 | 40.0           | -3.9        | 1.08 H             | 166                  | 23.82            | 12.24                    |
| 2   | 75.08       | 37.7 QP                 | 40.0           | -2.3        | 1.63 H             | 295                  | 26.77            | 10.89                    |
| 3   | 188.56      | 34.0 QP                 | 43.5           | -9.5        | 1.14 H             | 211                  | 22.50            | 11.53                    |
| 4   | 219.65      | 40.1 QP                 | 46.0           | -5.9        | 1.84 H             | 226                  | 28.08            | 12.02                    |
| 5   | 225.87      | 39.1 QP                 | 46.0           | -6.9        | 1.17 H             | 217                  | 26.71            | 12.37                    |
| 6   | 270.95      | 35.2 QP                 | 46.0           | -10.8       | 1.29 H             | 181                  | 20.61            | 14.57                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 75.08       | 36.3 QP                 | 40.0           | -3.8        | 1.74 V             | 244                  | 25.36            | 10.89                    |
| 2   | 188.56      | 38.9 QP                 | 43.5           | -4.6        | 1.03 V             | 304                  | 27.34            | 11.53                    |
| 3   | 222.17      | 45.2 QP                 | 46.0           | -0.8        | 1.51 V             | 277                  | 33.06            | 12.16                    |
| 4   | 270.95      | 44.3 QP                 | 46.0           | -1.7        | 1.12 V             | 277                  | 29.74            | 14.57                    |
| 5   | 308.25      | 43.4 QP                 | 46.0           | -2.6        | 1.00 V             | 262                  | 27.42            | 16.00                    |
| 6   | 373.54      | 41.0 QP                 | 46.0           | -5.0        | 1.00 V             | 244                  | 23.26            | 17.71                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |               |
|--------------------------|-----------------------------|--------------------|---------------|
| CHANNEL                  | Channel 26                  | FREQUENCY RANGE    | Below 1000MHz |
| INPUT POWER              | 1.5Vdc                      | DETECTOR FUNCTION  | Quasi-Peak    |
| ENVIRONMENTAL CONDITIONS | 16deg. C, 63%RH<br>1017 hPa | TESTED BY          | Nick Chen     |
| TEST MODE                | C                           |                    |               |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 40.88       | 24.11 QP                | 40.00          | -15.89      | 1.07 H             | 10                   | 10.42            | 13.69                    |
| 2   | 766.83      | 26.11 QP                | 46.00          | -19.89      | 1.11 H             | 10                   | 0.34             | 25.77                    |
| 3   | 835.22      | 26.80 QP                | 46.00          | -19.20      | 1.08 H             | 217                  | -0.07            | 26.87                    |
| 4   | 856.99      | 26.86 QP                | 46.00          | -19.14      | 1.24 H             | 46                   | -0.39            | 27.25                    |
| 5   | 892.74      | 27.24 QP                | 46.00          | -18.76      | 1.29 H             | 319                  | -0.56            | 27.80                    |
| 6   | 928.49      | 28.19 QP                | 46.00          | -17.81      | 1.08 H             | 61                   | -0.10            | 28.29                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 39.33       | 25.10 QP                | 40.00          | -14.90      | 1.07 V             | 310                  | 11.68            | 13.42                    |
| 2   | 76.63       | 23.48 QP                | 40.00          | -16.52      | 1.11 V             | 223                  | 13.01            | 10.47                    |
| 3   | 107.72      | 27.48 QP                | 43.50          | -16.02      | 1.03 V             | 325                  | 17.14            | 10.34                    |
| 4   | 137.26      | 24.84 QP                | 43.50          | -18.66      | 1.18 V             | 340                  | 10.66            | 14.18                    |
| 5   | 849.21      | 26.98 QP                | 46.00          | -19.02      | 1.02 V             | 250                  | -0.15            | 27.13                    |
| 6   | 891.19      | 27.35 QP                | 46.00          | -18.65      | 1.19 V             | 214                  | -0.43            | 27.78                    |
| 7   | 959.58      | 27.78 QP                | 46.00          | -18.22      | 1.50 V             | 97                   | -0.91            | 28.69                    |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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## 4.3 6dB BANDWIDTH MEASUREMENT

### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|----------------------------|-----------|------------|---------------------|-------------------------|
| R&S SPECTRUM ANALYZER      | FSP 40    | 100036     | Apr. 27, 2010       | Apr. 26, 2011           |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.3.3 TEST PROCEDURE

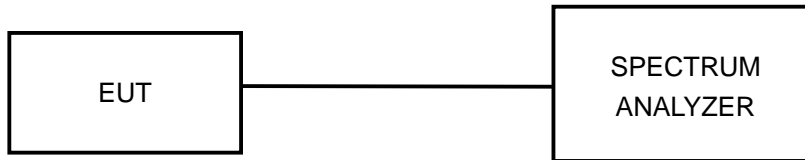
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation



### 4.3.5 TEST SETUP



### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



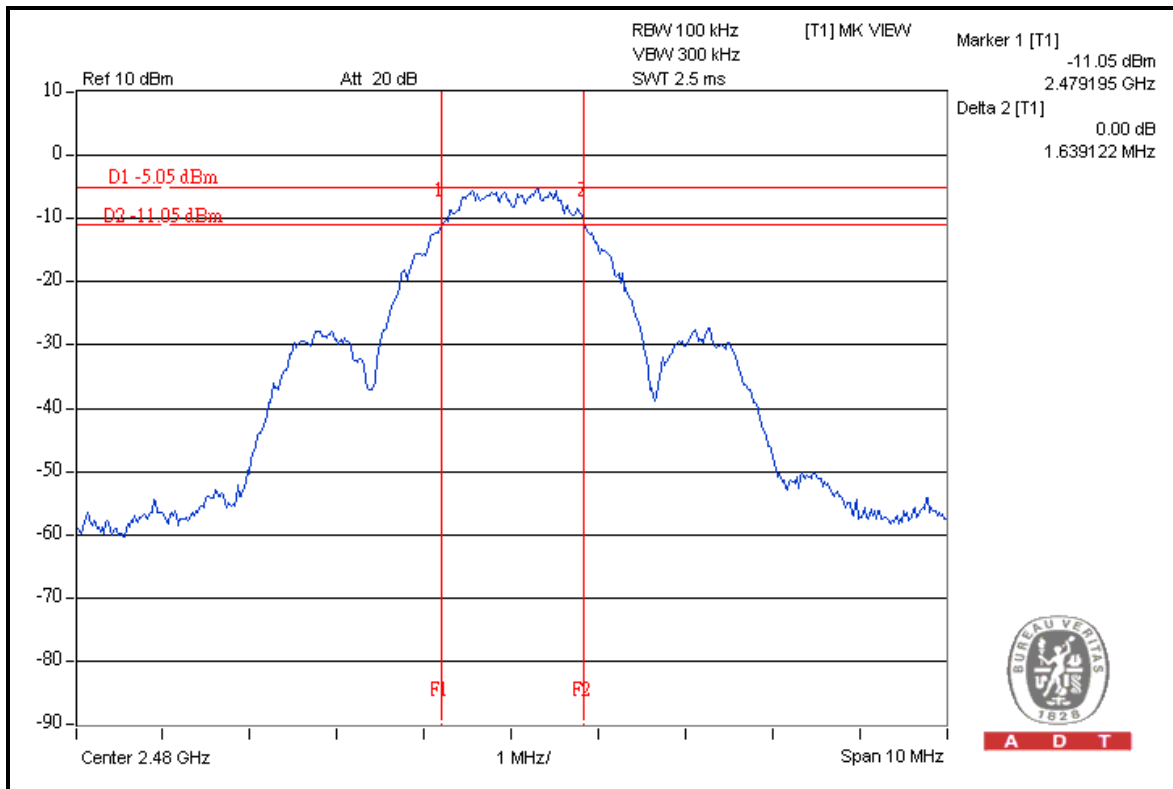
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### 4.3.7 TEST RESULTS

#### Mode A

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---------|-------------------------|---------------------|---------------------|-------------|
| 11      | 2405                    | 1.62                | 0.5                 | PASS        |
| 18      | 2440                    | 1.62                | 0.5                 | PASS        |
| 26      | 2480                    | 1.64                | 0.5                 | PASS        |

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## 4.4 MAXIMUM OUTPUT POWER

### 4.4.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 30dBm.

### 4.4.2 INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|----------------------------|-----------|------------|---------------------|-------------------------|
| Anritsu<br>Power Sensor    | MA2411B   | 0738404    | Apr. 21, 2010       | Apr. 20, 2011           |
| Anritsu<br>Power Meter     | ML2495A   | 0842014    | Apr. 21, 2010       | Apr. 20, 2011           |

- Note:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. Measurement Bandwidth of ML2495A is 65MHz greater than 6dB bandwidth of emission.

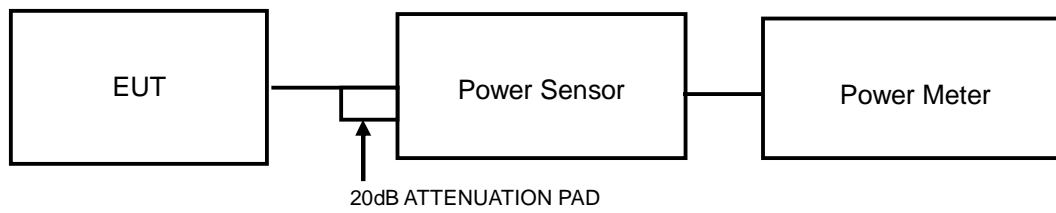
### 4.4.3 TEST PROCEDURES

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



### 4.4.7 TEST RESULTS

Mode A

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER OUTPUT (dBm) | PASS / FAIL |
|---------|-------------------------|--------------------|-------------------|--------------------|-------------|
| 11      | 2405                    | -1.1               | 0.8               | 30                 | PASS        |
| 18      | 2440                    | -1.2               | 0.8               | 30                 | PASS        |
| 26      | 2480                    | -1.6               | 0.7               | 30                 | PASS        |



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## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|----------------------------|-----------|------------|---------------------|-------------------------|
| R&S SPECTRUM ANALYZER      | FSP 40    | 100036     | Apr. 27, 2010       | Apr. 26, 2011           |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

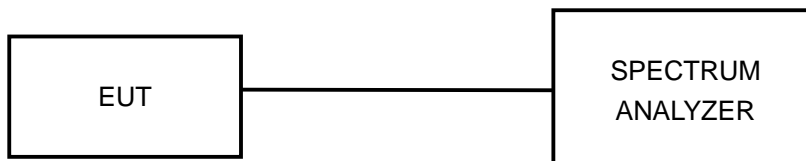


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#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



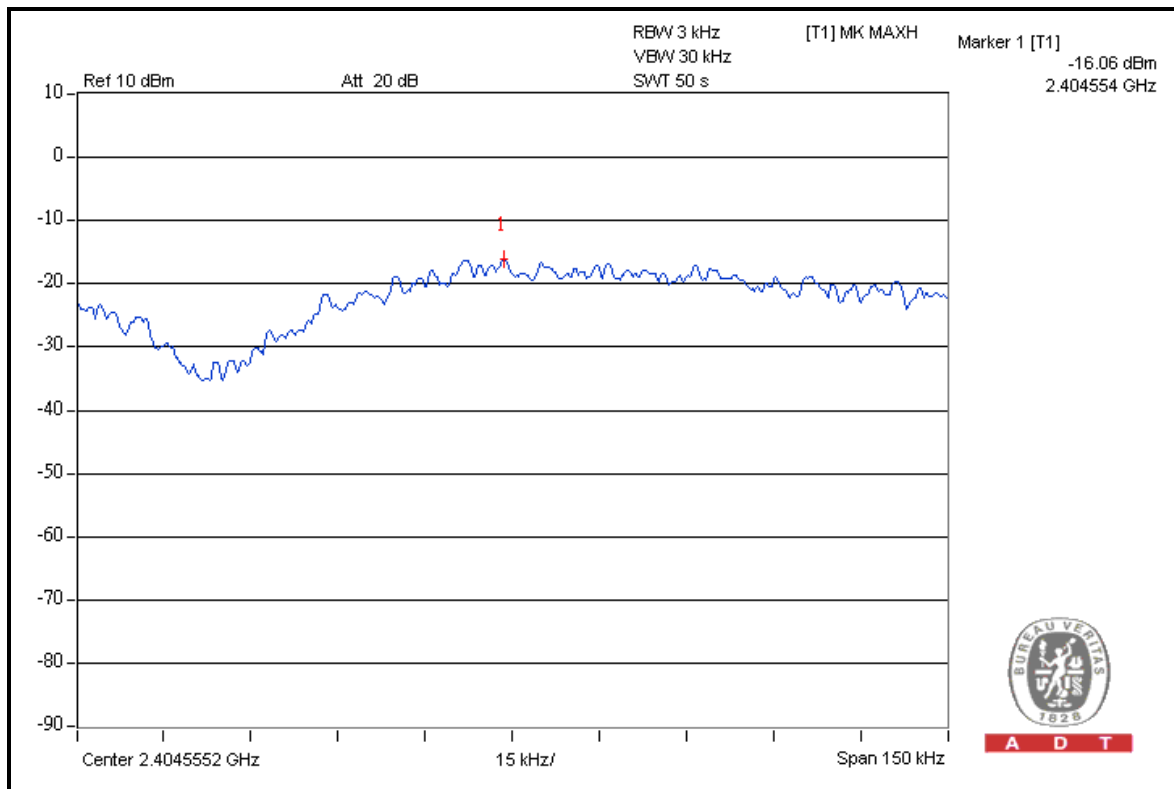
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## 4.5.7 TEST RESULTS

### Mode A

| CHANNEL | CHANNEL FREQUENCY (MHz) | RF POWER LEVEL IN 3kHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS / FAIL |
|---------|-------------------------|---------------------------------|---------------------|-------------|
| 11      | 2405                    | -16.06                          | 8                   | PASS        |
| 18      | 2440                    | -16.46                          | 8                   | PASS        |
| 26      | 2480                    | -17.20                          | 8                   | PASS        |

### CH 1







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## 4.6 BAND EDGES MEASUREMENT

### 4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER             | MODEL NO.                | SERIAL NO. | DATE OF CALIBRATION | CALIBRATED UNTIL |
|--|--------------------------|------------|---------------------|------------------|
| <b>FOR CONDUCTED MEASUREMENT:</b>      |                          |            |                     |                  |
| R&S SPECTRUM ANALYZER                  | FSP 40                   | 100036     | Apr. 27, 2010       | Apr. 26, 2011    |
| <b>FOR RADIATED MEASUREMENT:</b>       |                          |            |                     |                  |
| HP Preamplifier                        | 8447D                    | 2432A03504 | May 06, 2010        | May 05, 2011     |
| HP Preamplifier                        | 8449B                    | 3008A01924 | Jul. 14, 2010       | Jul. 13, 2011    |
| HP Preamplifier                        | 8449B                    | 3008A01292 | Jul. 14, 2010       | Jul. 13, 2011    |
| ROHDE & SCHWARZ TEST RECEIVER          | ESU26                    | 100005     | Jun. 10, 2010       | Jun. 09, 2011    |
| Schwarzbeck Antenna                    | VULB 9168                | 137        | Apr. 29, 2010       | Apr. 28, 2011    |
| Schwarzbeck Antenna                    | VHBA 9123                | 480        | Apr. 29, 2010       | Apr. 28, 2011    |
| ADT. Turn Table                        | TT100                    | 0306       | NA                  | NA               |
| ADT. Tower                             | AT100                    | 0306       | NA                  | NA               |
| Software                               | ADT_Radiated_V7.6.15.9.2 | NA         | NA                  | NA               |
| SUHNER RF cable                        | SF102                    | CABLE-CH6  | Aug. 20, 2010       | Aug. 19, 2011    |
| EMCO Horn Antenna                      | 3115                     | 6714       | Oct. 26, 2010       | Oct. 25, 2011    |
| EMCO Horn Antenna                      | 3115                     | 9312-4192  | Apr. 23, 2010       | Apr. 22, 2011    |
| Highpass filter Wainwright Instruments | WHK 3.1/18G-10SS         | SN 8       | NA                  | NA               |

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
  2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  3. The test was performed in Chamber No. 6.
  4. The Industry Canada Reference No. IC 7450E-6.
  5. The FCC Site Registration No. is 447212.



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### 4.6.3 TEST PROCEDURE

#### FOR CONDUCTED MEASUREMENT:

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW =100kHz, VBW = 300kHz; Average RBW = 1MHz, VBW = 1kHz) are attached on the following pages.

#### FOR RADIATED MEASUREMENT:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW =100kHz, VBW = 300kHz; Average RBW = 1MHz, VBW = kHz) are attached on the following pages.

**NOTE:** The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 1Hz for Average detection (AV) at frequency above 1GHz.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6



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## 4.6.6 TEST RESULTS

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

### Mode A

#### RESTRICT BAND (2310 ~ 2390 MHz)

| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|-----------------|-------------------------------|------------|--|----------------|
| 2405.00 (PK)    | 92.4                          | 52.0       | 40.4   | 74.00          |
| 2405.00 (AV)    | 90.0                          | 67.0       | 23.0   | 54.00          |

#### RESTRICT BAND (2483.5 ~ 2500 MHz)

| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|-----------------|-------------------------------|------------|--|----------------|
| 2480.00 (PK)    | 92.2                          | 46.5       | 45.7   | 74.00          |
| 2480.00 (AV)    | 89.6                          | 35.8       | 53.8   | 54.00          |

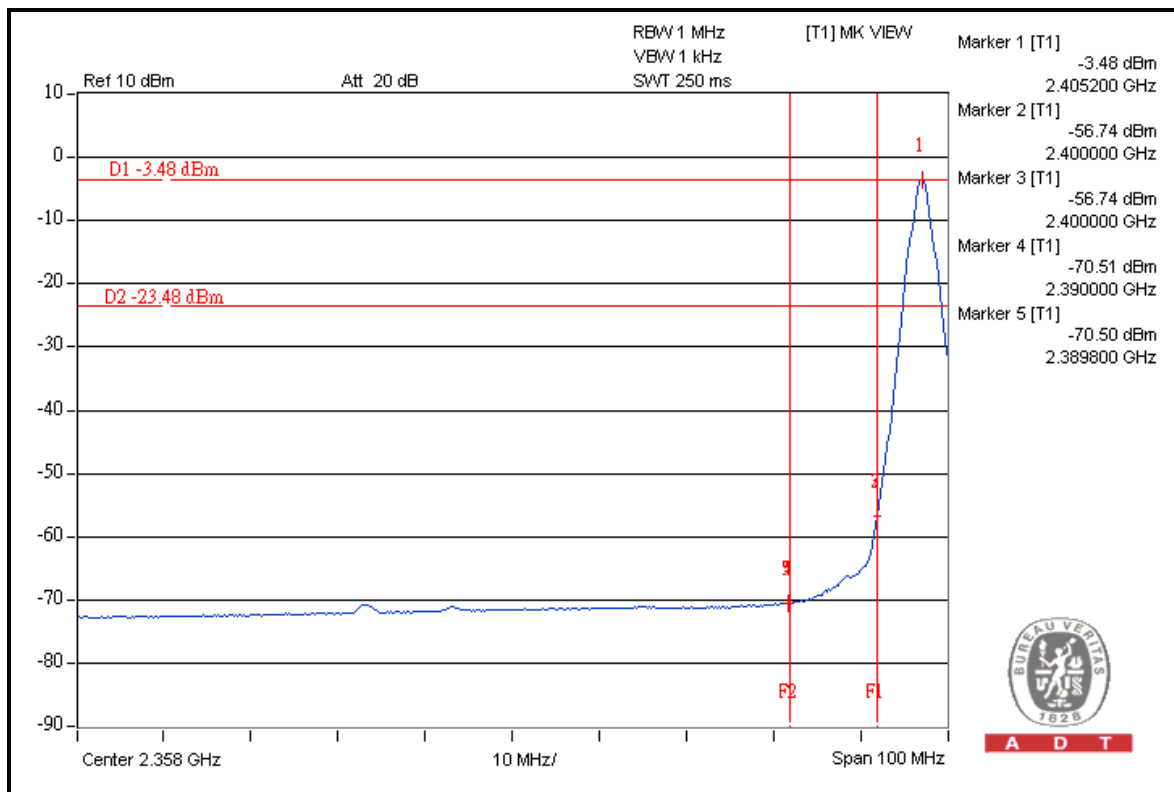
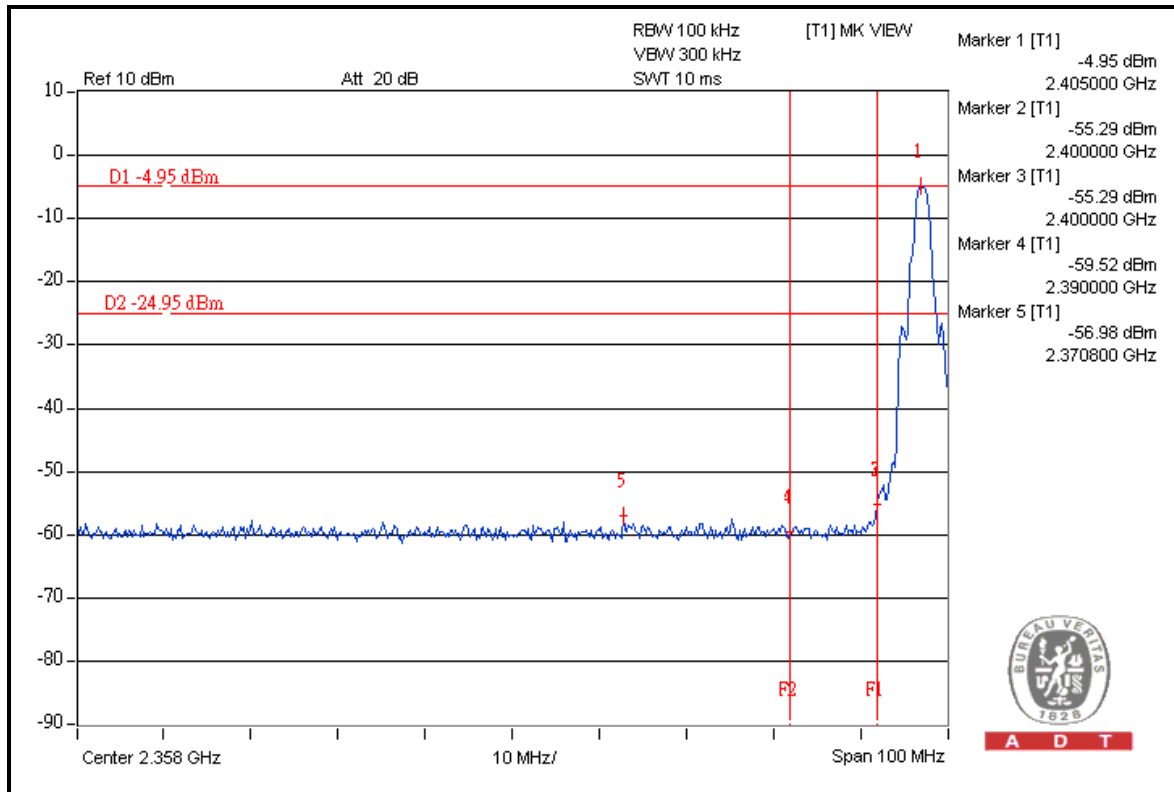
#### NOTE:

1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 3 pages.
2. Maximum field strength in restrict band = Fundamental emission – Delta.



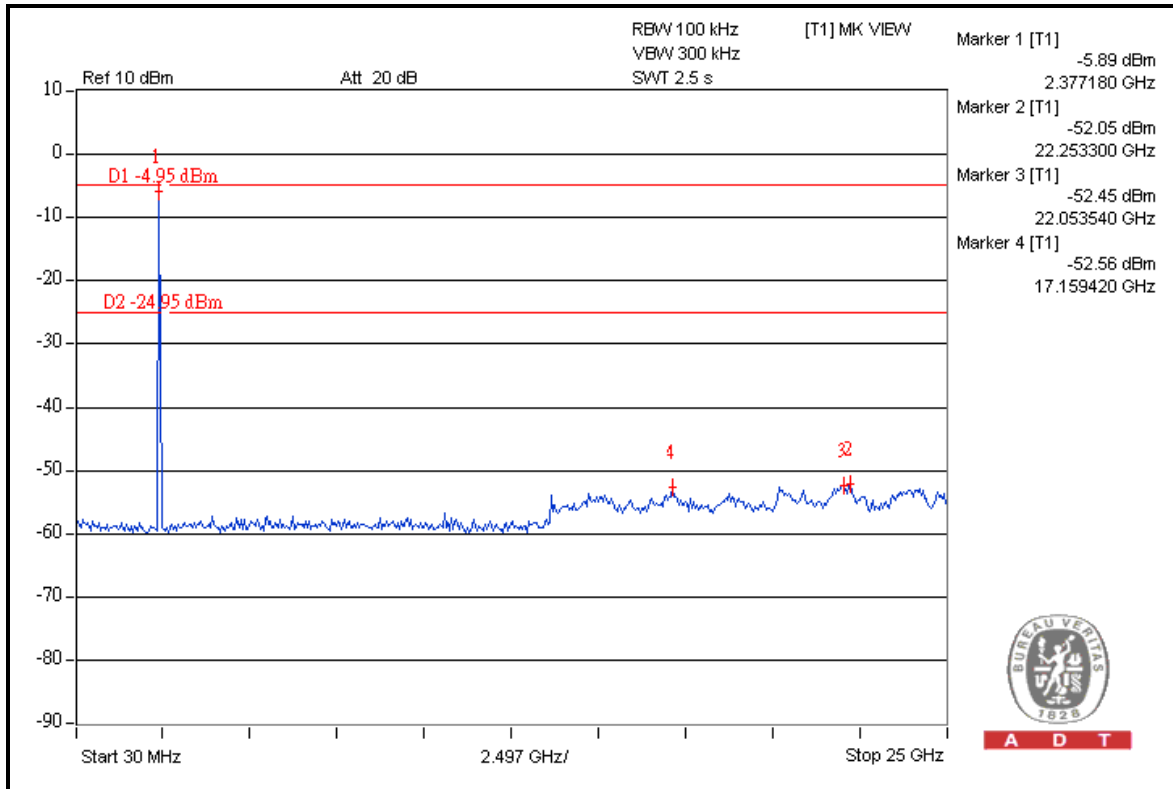
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### Mode A

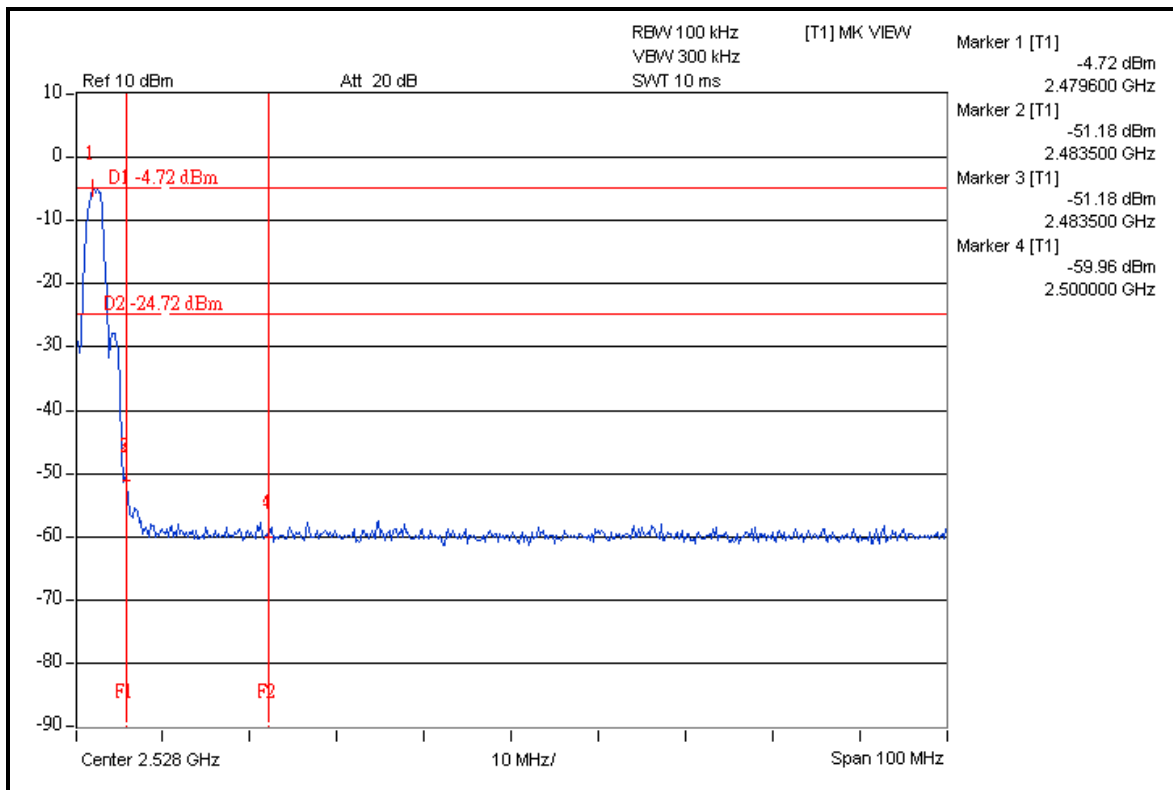




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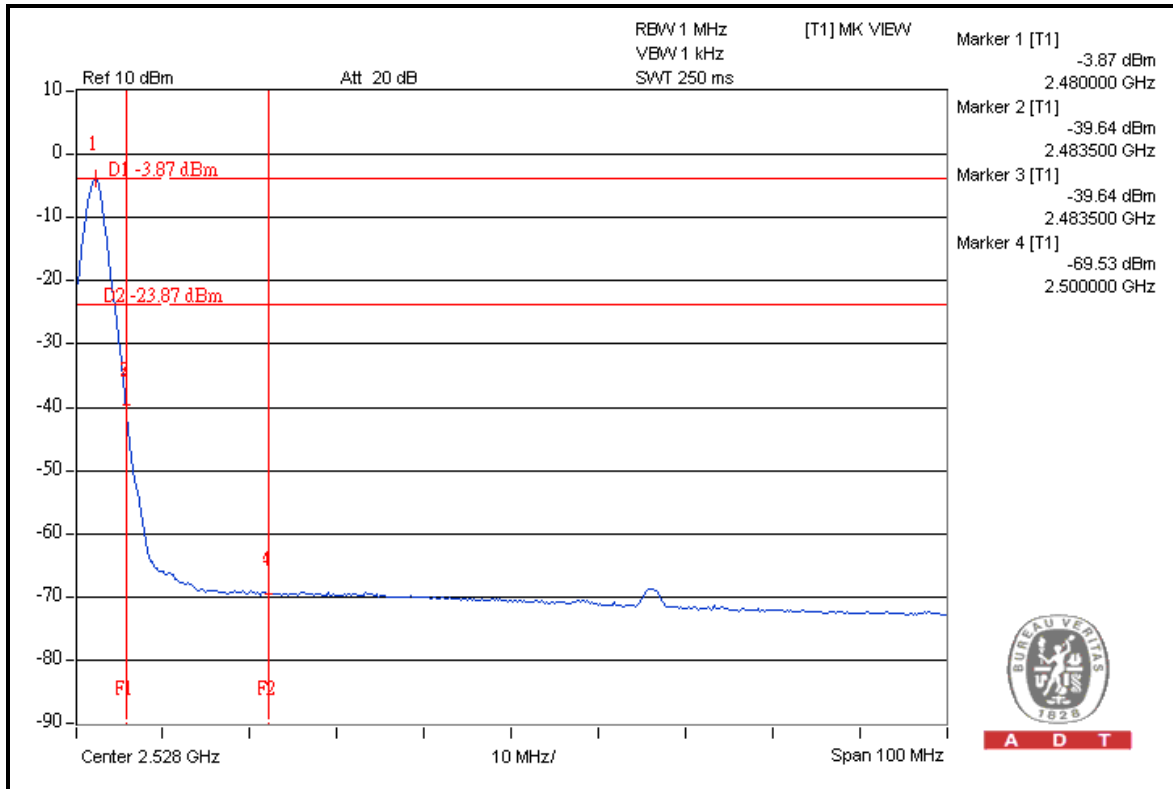


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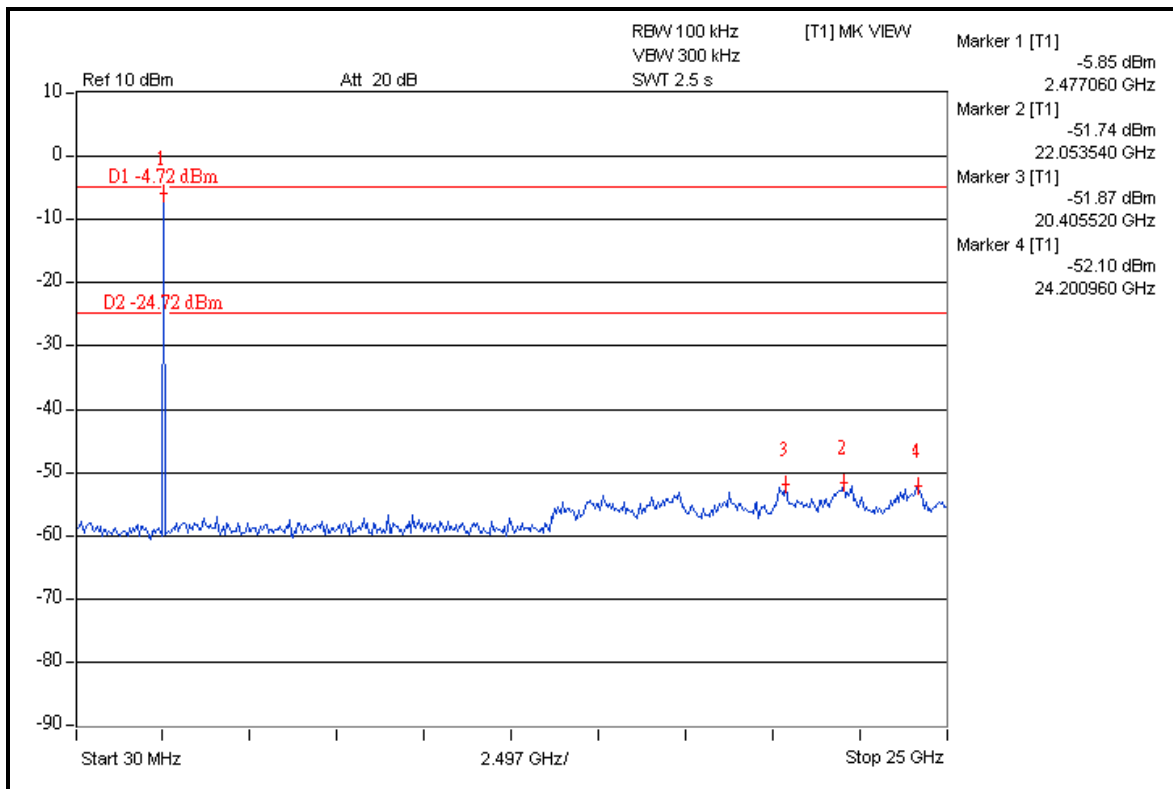




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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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## 6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml).  
If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety / Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.





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## **7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**