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# FCC TEST REPORT

**REPORT NO.:** RF990914D03

**MODEL NO.:** RMTP-S1H1, HWMP1

**FCC ID:** YSXRMTTP-S1H1-01

**RECEIVED:** Sep. 14, 2010

**TESTED:** Sep. 15 ~ 20, 2010

**ISSUED:** Oct. 1, 2010

**APPLICANT:** SUYIN OPTRONICS CORP

**ADDRESS:** No.377, Fude 1st RD., Xizhi City, Taipei County  
221, Taiwan

**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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## 1. CERTIFICATION

**PRODUCT:** RMTP  
**MODEL NO.:** RMTP-S1H1 (**BRAND NAME:** SUYIN)  
HWMP1 (**BRAND NAME:** HAWKING)  
**APPLICANT:** SUYIN OPTRONICS CORP  
**TESTED:** Sep. 15 ~ 20, 2010  
**TEST ITEM:** ENGINEERING SAMPLE  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.249)  
ANSI C63.4-2003

The above equipment (Model: RMTP-S1H1) 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 :** Annie Chang, **DATE:** Oct. 1, 2010  
(Annie Chang / Senior Specialist)

**TECHNICAL ACCEPTANCE :** Jamison Chan, **DATE:** Oct. 1, 2010  
Responsible for RF (Jamison Chan / Supervisor)

**APPROVED BY :** Ken Liu, **DATE:** Oct. 1, 2010  
(Ken Liu / Manager)

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.249) |  |        |  |
|---|--|--------|--|
| STANDARD SECTION  | TEST TYPE AND LIMIT  | RESULT | REMARK   |
| 15.207  | Conducted Emission Test  | N/A    | Power supply is 4.2Vdc from battery            |
| 15.209<br>15.249<br>15.249 (d)                            | Radiated Emission Test<br>Band Edge Measurement<br>Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 12.209 | PASS   | Minimum passing margin is -9.5dB at 2390.00MHz |

### 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.

| Measurement        | Frequency    | Uncertainty |
|--------------------|--------------|-------------|
| Radiated emissions | 30MHz ~ 1GHz | 3.67 dB     |
|                    | Above 1GHz   | 2.89 dB     |

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                            |                                    |
|----------------------------|------------------------------------|
| <b>EUT</b>                 | RMTP                               |
| <b>MODEL NO.</b>           | RMTP-S1H1, HWMP1                   |
| <b>FCC ID</b>              | YSXRMTP-S1H1-01                    |
| <b>POWER SUPPLY</b>        | 4.2Vdc from battery                |
| <b>MODULATION TYPE</b>     | GFSK                               |
| <b>OPERATING FREQUENCY</b> | 2402.5MHz ~ 2475MHz                |
| <b>NUMBER OF CHANNEL</b>   | 30                                 |
| <b>ANTENNA TYPE</b>        | Printed antenna with -7.77dBi gain |
| <b>ANTENNA CONNECTOR</b>   | N/A                                |
| <b>DATA CABLE</b>          | N/A                                |
| <b>I/O PORTS</b>           | N/A                                |
| <b>ASSOCIATED DEVICES</b>  | N/A                                |

#### NOTE:

1. The EUT is a transceiver.
2. The EUT has several models, which are identical to each other except for their brand name differences only, as the following:

| <b>Brand Name</b> | <b>Model No.</b> | <b>Differentiation</b>    |
|-------------------|------------------|---------------------------|
| SUYIN             | RMTP-S1H1        | Marketing differentiation |
| HAWKING           | HWMP1            |                           |

During the test, model: **RMTP-S1H1** was selected as the representative one and therefore only its test data was recorded in this report.

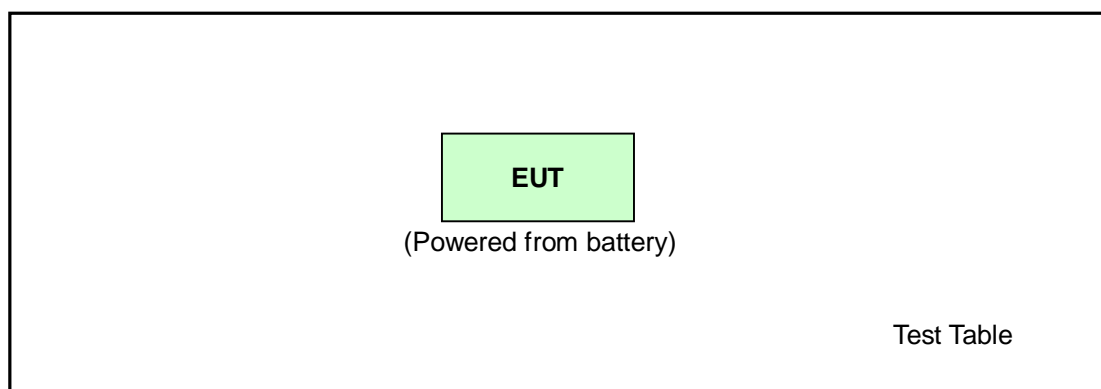
3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

30 channels are provided to this EUT:

| CHANNEL | FREQ.<br>(MHZ) | CHANNEL | FREQ.<br>(MHz) | CHANNEL | FREQ.<br>(MHz) | CHANNEL | FREQ.<br>(MHz) |
|---------|----------------|---------|----------------|---------|----------------|---------|----------------|
| 1       | 2402.5         | 9       | 2422.5         | 17      | 2442.5         | 25      | 2462.5         |
| 2       | 2405.0         | 10      | 2425.0         | 18      | 2445.0         | 26      | 2465.0         |
| 3       | 2407.5         | 11      | 2427.5         | 19      | 2447.5         | 27      | 2467.5         |
| 4       | 2410.0         | 12      | 2430.0         | 20      | 2450.0         | 28      | 2470.0         |
| 5       | 2412.5         | 13      | 2432.5         | 21      | 2452.5         | 29      | 2472.5         |
| 6       | 2415.0         | 14      | 2435.0         | 22      | 2455.0         | 30      | 2475.0         |
| 7       | 2417.5         | 15      | 2437.5         | 23      | 2457.5         |         |                |
| 8       | 2420.0         | 16      | 2440.0         | 24      | 2460.0         |         |                |

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT<br>configure<br>mode | Applicable to |       |                    |    | Description |
|--------------------------|---------------|-------|--------------------|----|-------------|
|                          | PLC           | RE<1G | RE <sup>≥</sup> 1G | BM |             |
| -                        | Note          | √     | √                  | √  | -           |

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz BM: Bandedge Measurement

**Note:** No need to concern of Conducted Emission due to the EUT is powered by battery.

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

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

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 30           | 1              | GFSK            |

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

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

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 30           | 1, 16, 30      | GFSK            |

#### BANDEDGE MEASUREMENT:

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

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 30           | 1, 30          | GFSK            |

#### TEST CONDITION:

| APPLICABLE TO      | ENVIRONMENTAL CONDITIONS  | INPUT POWER | TESTED BY |
|--------------------|---------------------------|-------------|-----------|
| RE<1G              | 28deg. C, 67% RH, 1011hPa | 4.2Vdc      | Chad Lee  |
| RE <sup>≥</sup> 1G | 28deg. C, 67% RH, 1008hPa | 4.2Vdc      | Chad Lee  |
| BM                 | 26deg. C, 72% RH, 1008hPa | 4.2Vdc      | Nick Chen |

### **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 (Section 15.249)**

**ANSI C63.4-2003**

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 without any necessary accessory or support unit.



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

N/A

### 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, 15.249 as following:

| 15.209 Limit          |  |  |
|-----------------------|--|--|
| 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  |
| 15.249 Limit          |  |  |
| Fundamental Frequency | Field Strength of Fundamental (millivolts/meter) | Field Strength of Harmonics (microvolts/meter) |
| 902 ~ 928 MHz         | 50   | 500  |
| 2400 ~ 2483.5 MHz     | 50   | 500  |
| 5725 ~ 5875 MHz       | 50   | 500  |
| 24 ~ 24.25 GHz        | 250  | 2500   |

**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                   | SF104-26.5                   | CABLE-CH6-17m<br>-01 | Aug. 20, 2010   | Aug. 19, 2011    |
| ROHDE & SCHWARZ Spectrum Analyzer | FSP 40                       | 100036               | Apr. 06, 2010   | Apr. 05, 2011    |
| EMCO Horn Antenna                 | 3115                         | 6714                 | Oct. 26, 2009   | Oct. 25, 2010    |
| EMCO Horn Antenna                 | 3115                         | 9312-4192            | Apr. 23, 2010   | Apr. 22, 2011    |

- 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 meter semi-anechoic chamber room. 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- 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 method or average method as specified and then reported in data sheet.

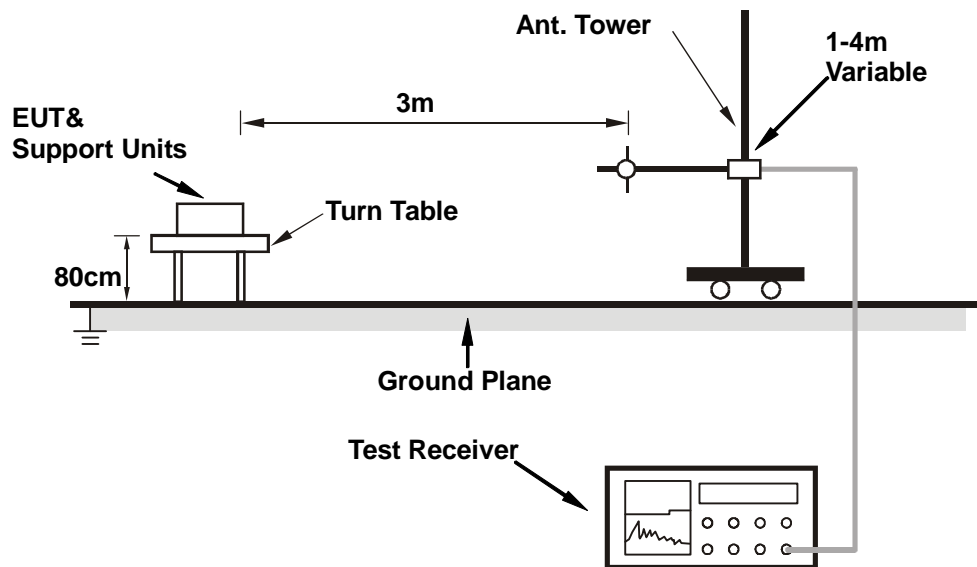
#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz 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 related item – Photographs of the Test Configuration.

## 4.2.6 EUT OPERATING CONDITIONS

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

## 4.2.7 TEST RESULTS

### ABOVE 1GHz DATA

| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------------------|--------------------|---------------------------|
| CHANNEL                  | Channel 1                   | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER              | 4.2Vdc                      | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 28deg. C, 67%RH<br>1008 hPa | TESTED BY          | Chad Lee                  |

| 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     | 59.1 PK                 | 74.0           | -14.9       | 1.16 H             | 148                  | 27.16            | 31.89                    |
| 2   | 2390.00     | 44.5 AV                 | 54.0           | -9.5        | 1.16 H             | 148                  | 12.59            | 31.89                    |
| 3   | 2400.00     | 45.0 PK                 | 74.0           | -29.0       | 1.16 H             | 148                  | 13.06            | 31.93                    |
| 4   | 2400.00     | 19.0 AV                 | 54.0           | -35.0       | 1.16 H             | 148                  | -12.94           | 31.93                    |
| 5   | *2402.50    | 94.5 PK                 | 114.0          | -19.5       | 1.16 H             | 148                  | 62.57            | 31.94                    |
| 6   | *2402.50    | 68.5 AV                 | 94.0           | -25.5       | 1.16 H             | 148                  | 36.57            | 31.94                    |
| 7   | 4805.00     | 58.6 PK                 | 74.0           | -15.4       | 1.09 H             | 318                  | 19.51            | 39.07                    |
| 8   | 4805.00     | 32.6 AV                 | 54.0           | -21.4       | 1.09 H             | 318                  | -6.49            | 39.07                    |
| 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     | 58.4 PK                 | 74.0           | -15.6       | 1.29 V             | 198                  | 26.52            | 31.89                    |
| 2   | 2390.00     | 44.0 AV                 | 54.0           | -10.0       | 1.29 V             | 198                  | 12.12            | 31.89                    |
| 3   | 2400.00     | 36.9 PK                 | 74.0           | -37.1       | 1.29 V             | 198                  | 4.93             | 31.93                    |
| 4   | 2400.00     | 10.9 AV                 | 54.0           | -43.1       | 1.29 V             | 198                  | -21.07           | 31.93                    |
| 5   | *2402.50    | 86.4 PK                 | 114.0          | -27.6       | 1.29 V             | 198                  | 54.44            | 31.94                    |
| 6   | *2402.50    | 60.4 AV                 | 94.0           | -33.6       | 1.29 V             | 198                  | 28.44            | 31.94                    |
| 7   | 4805.00     | 60.4 PK                 | 74.0           | -13.6       | 1.00 V             | 100                  | 21.29            | 39.07                    |
| 8   | 4805.00     | 34.4 AV                 | 54.0           | -19.6       | 1.00 V             | 100                  | -4.71            | 39.07                    |

**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
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  

$$20 \log (\text{Duty cycle}) = 20 \log (0.4 \text{ ms} / 7.996 \text{ ms}) = -26.0 \text{ dB}$$
Please see page 16 for plotted duty.



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| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------------------|--------------------|---------------------------|
| CHANNEL                  | Channel 16                  | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER              | 4.2Vdc                      | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 28deg. C, 67%RH<br>1008 hPa | TESTED BY          | Chad Lee                  |

| 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    | 91.6 PK                 | 114.0          | -22.4       | 1.18 H             | 207                  | 59.54            | 32.07                    |
| 2   | *2440.00    | 65.6 AV                 | 94.0           | -28.4       | 1.18 H             | 207                  | 33.54            | 32.07                    |
| 3   | 4880.00     | 57.5 PK                 | 74.0           | -16.5       | 1.00 H             | 10                   | 18.09            | 39.41                    |
| 4   | 4880.00     | 31.5 AV                 | 54.0           | -22.5       | 1.00 H             | 10                   | -7.91            | 39.41                    |
| 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    | 88.3 PK                 | 114.0          | -25.7       | 1.01 V             | 273                  | 56.21            | 32.07                    |
| 2   | *2440.00    | 62.3 AV                 | 94.0           | -31.7       | 1.01 V             | 273                  | 30.21            | 32.07                    |
| 3   | 4880.00     | 59.7 PK                 | 74.0           | -14.3       | 1.15 V             | 101                  | 20.29            | 39.41                    |
| 4   | 4880.00     | 33.7 AV                 | 54.0           | -20.3       | 1.15 V             | 101                  | -5.71            | 39.41                    |

**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  
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.4 \text{ ms} / 7.996 \text{ ms}) = -26.0 \text{ dB}$   
Please see page 16 for plotted duty.



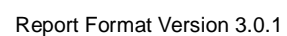
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| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------------------|--------------------|---------------------------|
| CHANNEL                  | Channel 30                  | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER              | 4.2Vdc                      | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 28deg. C, 67%RH<br>1008 hPa | TESTED BY          | Chad Lee                  |

| 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   | *2475.00    | 90.8 PK                 | 114.0          | -23.2       | 1.00 H             | 110                  | 58.65            | 32.19                    |
| 2   | *2475.00    | 64.8 AV                 | 94.0           | -29.2       | 1.00 H             | 110                  | 32.65            | 32.19                    |
| 3   | 2483.50     | 40.7 PK                 | 74.0           | -33.3       | 1.00 H             | 110                  | 8.52             | 32.21                    |
| 4   | 2483.50     | 14.7 AV                 | 54.0           | -39.3       | 1.00 H             | 110                  | -17.48           | 32.21                    |
| 5   | 4950.00     | 52.8 PK                 | 74.0           | -21.2       | 1.00 H             | 344                  | 13.16            | 39.63                    |
| 6   | 4950.00     | 26.8 AV                 | 54.0           | -27.2       | 1.00 H             | 344                  | -12.84           | 39.63                    |
| 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   | *2475.00    | 83.0 PK                 | 114.0          | -31.0       | 1.26 V             | 204                  | 50.79            | 32.19                    |
| 2   | *2475.00    | 57.0 AV                 | 94.0           | -37.0       | 1.26 V             | 204                  | 24.78            | 32.19                    |
| 3   | 2483.50     | 32.9 PK                 | 74.0           | -41.1       | 1.26 V             | 204                  | 0.65             | 32.21                    |
| 4   | 2483.50     | 6.9 AV                  | 54.0           | -47.1       | 1.26 V             | 204                  | -25.35           | 32.21                    |
| 5   | 4950.00     | 55.9 PK                 | 74.0           | -18.1       | 1.00 V             | 103                  | 16.30            | 39.63                    |
| 6   | 4950.00     | 29.9 AV                 | 54.0           | -24.1       | 1.00 V             | 103                  | -9.70            | 39.63                    |

**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
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.4 \text{ ms} / 7.996 \text{ ms}) = -26.0 \text{ dB}$   
 Please see page 16 for plotted duty.







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## BELOW 1GHz WORST-CASE DATA

| EUT TEST CONDITION       |                             | MEASUREMENT DETAIL |               |
|--------------------------|-----------------------------|--------------------|---------------|
| CHANNEL                  | Channel 1                   | FREQUENCY RANGE    | Below 1000MHz |
| INPUT POWER              | 4.2Vdc                      | DETECTOR FUNCTION  | Quasi-Peak    |
| ENVIRONMENTAL CONDITIONS | 28deg. C, 67%RH<br>1011 hPa | TESTED BY          | Chad Lee      |

| 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   | 752.84      | 25.0 QP                 | 46.0           | -21.0       | 1.51 H             | 295                  | -0.54            | 25.57                    |
| 2   | 810.35      | 25.3 QP                 | 46.0           | -20.7       | 1.23 H             | 358                  | -1.12            | 26.42                    |
| 3   | 844.55      | 26.0 QP                 | 46.0           | -20.0       | 2.02 H             | 208                  | -1.03            | 27.05                    |
| 4   | 852.32      | 26.2 QP                 | 46.0           | -19.8       | 1.55 H             | 340                  | -0.98            | 27.18                    |
| 5   | 894.29      | 27.9 QP                 | 46.0           | -18.2       | 1.98 H             | 91                   | 0.03             | 27.82                    |
| 6   | 956.47      | 28.0 QP                 | 46.0           | -18.0       | 1.52 H             | 127                  | -0.63            | 28.65                    |
| 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   | 774.60      | 25.2 QP                 | 46.0           | -20.8       | 2.02 V             | 301                  | -0.70            | 25.87                    |
| 2   | 791.70      | 25.4 QP                 | 46.0           | -20.6       | 1.41 V             | 223                  | -0.68            | 26.11                    |
| 3   | 844.55      | 26.5 QP                 | 46.0           | -19.5       | 1.50 V             | 76                   | -0.52            | 27.05                    |
| 4   | 860.10      | 27.3 QP                 | 46.0           | -18.7       | 1.59 V             | 10                   | -0.03            | 27.30                    |
| 5   | 895.85      | 27.3 QP                 | 46.0           | -18.7       | 1.63 V             | 157                  | -0.55            | 27.85                    |
| 6   | 917.61      | 27.6 QP                 | 46.0           | -18.4       | 1.24 V             | 76                   | -0.57            | 28.15                    |

**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.

## 4.3 BAND EDGES MEASUREMENT

### 4.3.1 LIMITS OF BAND EDGES MEASUREMENT

Below –50dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER          | FSP 40    | 100036     | Apr. 06, 2010   | Apr. 05, 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 via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots are attached on the following pages.

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.3.5 EUT OPERATING CONDITION

Same as Item 4.2.6

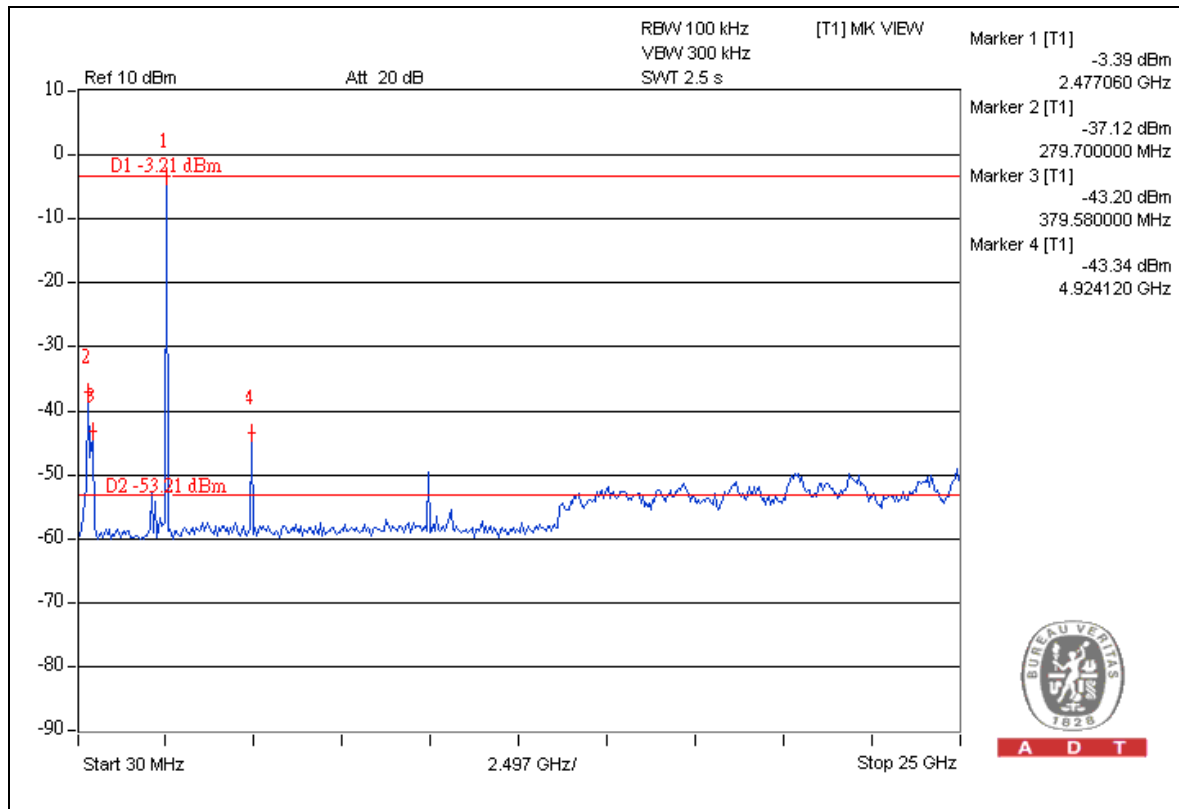
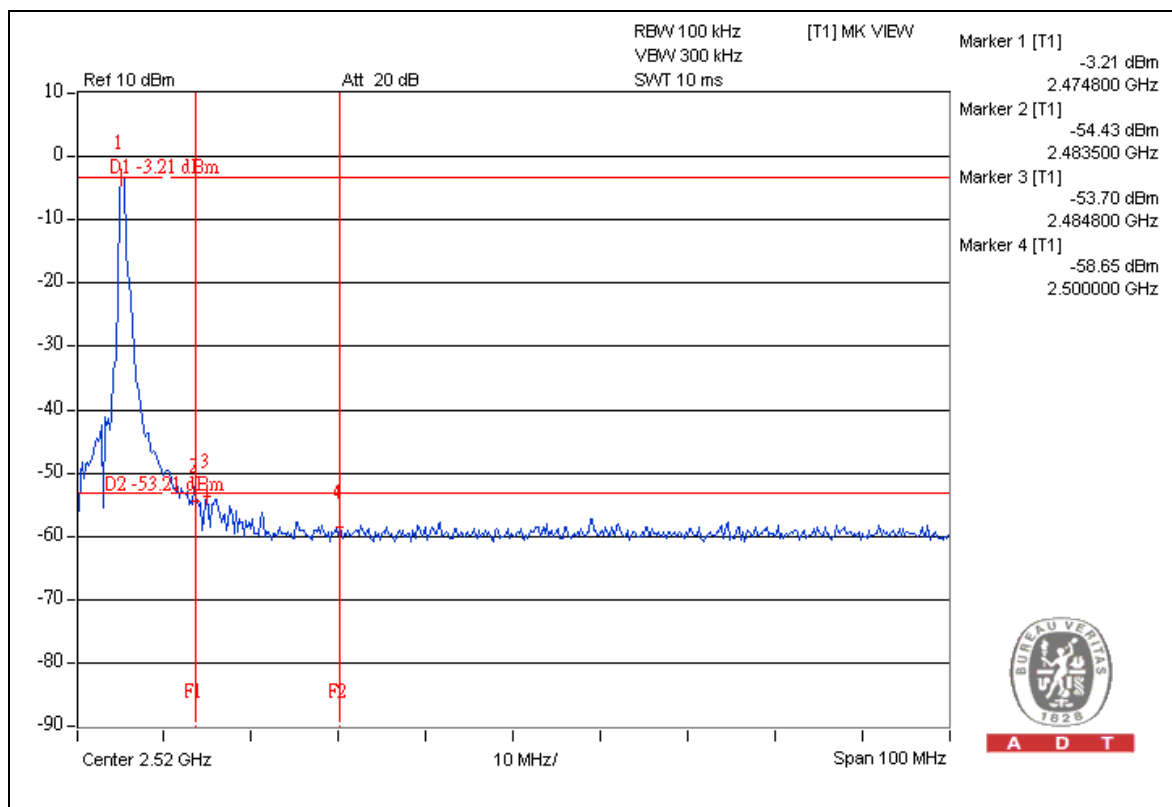
### 4.3.6 TEST RESULTS

The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, and D2 line indicates the 50dB offset below D1. It shows compliance with the requirement in part 15.249(d).





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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

## 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---**