# FCC TEST REPORT

| | |
|---|---|
| **REPORT NO.:** | RF990715E02 |
| **MODEL NO.:** | 2.4G TXMOD- I |
| **FCC ID:** | YPQFT24GTX1 |
| **RECEIVED:** | July 15, 2010 |
| **TESTED:** | July 23 to Aug. 30, 2010 |
| **ISSUED:** | Sep. 01, 2010 |
| **APPLICANT:** | FONTAL TECHNOLOGY INCORPORATION |
| **ADDRESS:** | 2F, No. 12, R&DII Rd., Science-based Ind. Park, Hsin-chu, 30076, Taiwan |
| **ISSUED BY:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **LAB ADDRESS:** | No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan |
| **TEST LOCATION (1):** | No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan |
| **TEST LOCATION (2):** | No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan |

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# 1 CERTIFICATION

| | |
|---|---|
| **PRODUCT :** | 2.4G TXMOD- Ⅰ |
| **BRAND NAME :** | FONTAL |
| **MODEL NO. :** | 2.4G TXMOD- Ⅰ |
| **APPLICANT :** | FONTAL TECHNOLOGY INCORPORATION |
| **TESTED DATE :** | July 23 to Aug. 30, 2010 |
| **TEST SAMPLE :** | MASS-PRODUCTION |
| **STANDARDS :** | 47 CFR Part 15, Subpart C (Section 15.247)<br>ANSI C63.4-2003 |

The above equipment (Model: 2.4G TXMOD- Ⅰ ) 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** : Sunny Wen , **DATE:** *Sep. 01, 2010*
( Sunny Wen, Specialist )

**TECHNICAL ACCEPTANCE** : , **DATE:** *Sep. 01, 2010*
( Hank Chung, Deputy Manager )

**APPROVED BY** : , **DATE:** *Sep. 01, 2010*
( May Chen, Deputy Manager )

# 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: 47 CFR Part 15, Subpart C | | | |
|---|---|---|---|
| **Standard Section** | **Test Type and Limit** | **Result** | **REMARK** |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -38.94dB at 1.737MHz |
| 15.247(a)(1)(I)-(ii) | Number of Hopping Frequency Used Spec.: At least 15 channels | PASS | Meet the requirement of limit |
| 15.247(a)(1)(ii) | Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second | PASS | Meet the requirement of limit |
| 15.247(a)(1)(I)-(ii) | Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, which ever is greater | PASS | Meet the requirement of limit |
| 15.247(a)(2) | Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System | PASS | Report reference |
| 15.247(b) | Maximum Peak Output Power Spec.: max. 125mW | PASS | Meet the requirement of limit |
| 15.247(c) | Transmitter Radiated Emissions Spec.: Table 15.209 | PASS | Meet the requirement of limit Minimum passing margin is -5.6dB at 826.75MHz |
| 15.247(c) | Conducted Out-Band Emissions Measurement | PASS | Meet the requirement of limit |

## 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** | **Value** |
|---|---|
| Conducted emissions | 2.45 dB |
| Radiated emissions (30MHz-1GHz) | 3.30 dB |
| Radiated emissions (1GHz ~18GHz) | 2.19 dB |
| Radiated emissions (18GHz ~20GHz) | 2.56 dB |

# 3 GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | 2.4G TXMOD- Ⅰ |
| **MODEL NO.** | 2.4G TXMOD- Ⅰ |
| **FCC ID** | YPQFT24GTX1 |
| **POWER SUPPLY** | DC 3.3V |
| **MODULATION TYPE** | DSSS |
| **MODULATION TECHNOLOGY** | FHSS |
| **FREQUENCY RANGE** | 2407MHz ~ 2477MHz |
| **NUMBER OF CHANNEL** | 71 |
| **OUTPUT POWER** | 67.6mW |
| **ANTENNA TYPE** | Dipole antenna with IPEX connecter<br>(antenna Gain: 2dBi) |
| **DATA CABLE** | NA |
| **I/O PORT** | NA |
| **ASSOCIATED DEVICES** | NA |

**NOTE:**

1. 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

Seventy-one channels are provided to this EUT.

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|---|---|---|
| 1 | 2407 | 21 | 2427 | 41 | 2447 | 61 | 2467 |
| 2 | 2408 | 22 | 2428 | 42 | 2448 | 62 | 2468 |
| 3 | 2409 | 23 | 2429 | 43 | 2449 | 63 | 2469 |
| 4 | 2410 | 24 | 2430 | 44 | 2450 | 64 | 2470 |
| 5 | 2411 | 25 | 2431 | 45 | 2451 | 65 | 2471 |
| 6 | 2412 | 26 | 2432 | 46 | 2452 | 66 | 2472 |
| 7 | 2413 | 27 | 2433 | 47 | 2453 | 67 | 2473 |
| 8 | 2414 | 28 | 2434 | 48 | 2454 | 68 | 2474 |
| 9 | 2415 | 29 | 2435 | 49 | 2455 | 69 | 2475 |
| 10 | 2416 | 30 | 2436 | 50 | 2456 | 70 | 2476 |
| 11 | 2417 | 31 | 2437 | 51 | 2457 | 71 | 2477 |
| 12 | 2418 | 32 | 2438 | 52 | 2458 | | |
| 13 | 2419 | 33 | 2439 | 53 | 2459 | | |
| 14 | 2420 | 34 | 2440 | 54 | 2460 | | |
| 15 | 2421 | 35 | 2441 | 55 | 2461 | | |
| 16 | 2422 | 36 | 2442 | 56 | 2462 | | |
| 17 | 2423 | 37 | 2443 | 57 | 2463 | | |
| 18 | 2424 | 38 | 2444 | 58 | 2464 | | |
| 19 | 2425 | 39 | 2445 | 59 | 2465 | | |
| 20 | 2426 | 40 | 2446 | 60 | 2466 | | |

## 3.3 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

| EUT configure mode | Applicable to | | | | Description |
|---|---|---|---|---|---|
| | PLC | RE<1G | RE≥1G | APCM | |
| - | √ | √ | √ | √ | - |

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

| Available Channel | Tested Channel | Modulation Technology | Modulation Type |
|---|---|---|---|
| 1 to 71 | 1 | FHSS | DSSS |

**Radiated Emission Test (Below 1 GHz):**

☒ 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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type |
|---|---|---|---|
| 1 to 71 | 1 | FHSS | DSSS |

**Radiated Emission Test (Above 1 GHz):**

☒ 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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type |
|---|---|---|---|
| 1 to 71 | 1, 32, 71 | FHSS | DSSS |

**Conducted Out-Band 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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type |
|---|---|---|---|
| 1 to 71 | 1, 71 | FHSS | DSSS |

**Antenna Port Conducted 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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type |
|---|---|---|---|
| 1 to 71 | 1, 32, 71 | FHSS | DSSS |

**TEST CONDITION:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| RE≥1G | 26deg. C, 69%RH, 1014 hPa | DC 3.3V | Frank Liu |
| RE<1G | 26deg. C, 72%RH, 1014 hPa | DC 3.3V | Frank Liu |
| PLC | 25deg. C, 60%RH, 1014 hPa | 120Vac (system) | Max Tseng |
| APCM | 25deg. C, 60%RH, 1014 hPa | DC 3.3V | Rex Huang |

## 3.4 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**

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

## 3.5 DESCRIPTION OF SUPPORT UNITS

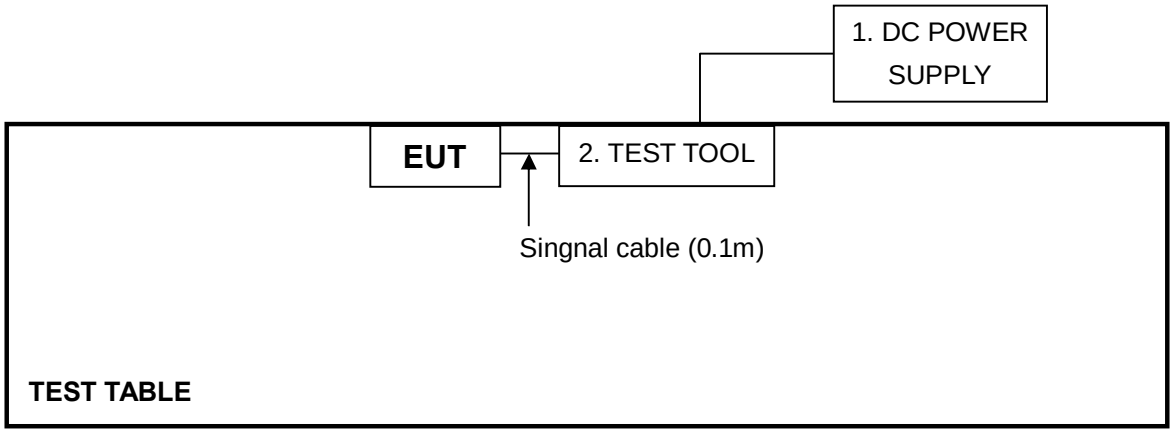
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| No. | Product | Brand | Model No. | Serial No. | FCC ID |
|---|---|---|---|---|---|
| 1 | DC POWER SUPPLY | Topward | 6603D | 795558 | NA |
| 2 | TEST TOOL | FONTAL | NA | NA | NA |

| No. | Signal cable description |
|---|---|
| 1 | 1.8 m DC line. |
| 2 | 0.1 m signal cable. |

Note: 1. All power cords of the above support units are unshielded (1.8m).

## 3.6 CONFIGURATION OF SYSTEM UNDER TEST



# 4 TEST PROCEDURES AND RESULTS

## 4.1 CONDUCTED EMISSION MEASUREMENT

### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5<br>0.5-5<br>5-30 | 66 to 56<br>56<br>60 | 56 to 46<br>46<br>50 |

**NOTE**:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Test Receiver | ESCS 30 | 100375 | Mar. 09, 2010 | Mar. 08, 2011 |
| Line-Impedance Stabilization Network (for EUT) | NSLK 8127 | 8127-522 | Sep. 23, 2009 | Sep. 22, 2010 |
| Line-Impedance Stabilization Network (for Peripheral) | ESH3-Z5 | 848773/004 | Oct. 26, 2009 | Oct. 25, 2010 |
| RF Cable (JYEBAO) | 5DFB | COBCAB-001 | Nov. 24, 2009 | Nov. 23, 2010 |
| 50 ohms Terminator | 50 | 3 | Oct. 28, 2009 | Oct. 27, 2010 |
| Software | BV ADT_Cond_V7.3.7 | NA | NA | NA |

**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. C.
3 The VCCI Con C Registration No. is C-3611.

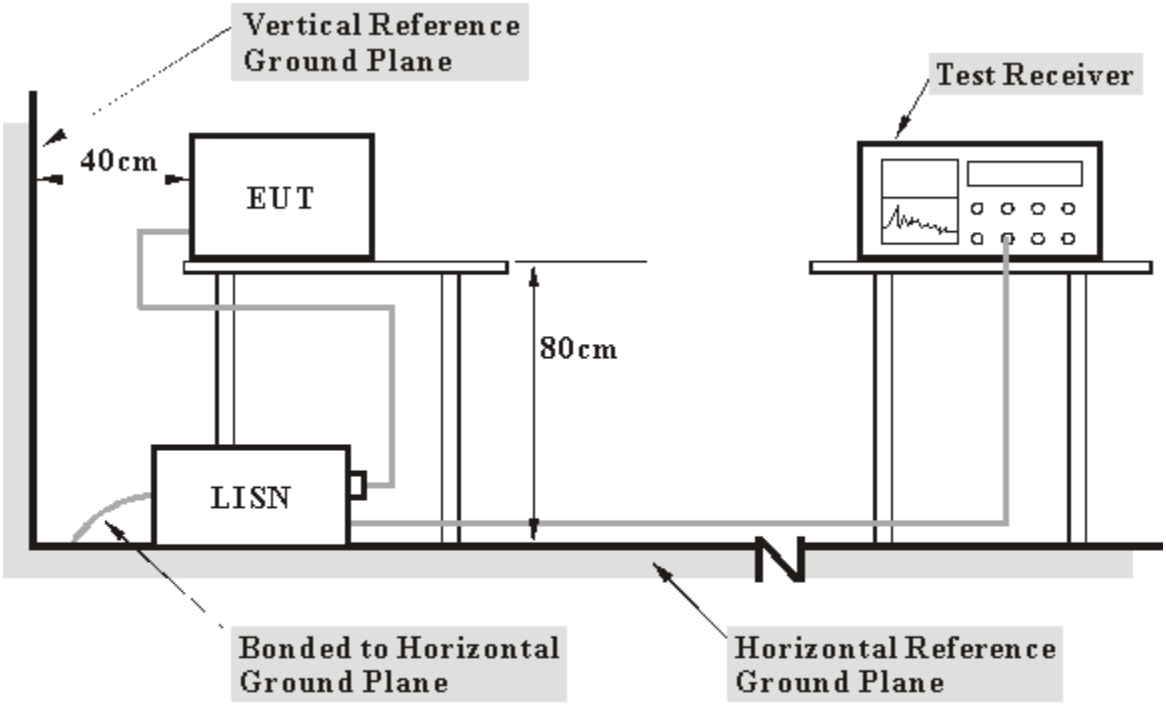
4.1.3 TEST PROCEDURES

a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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/HOST were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP




Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the 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.

### 4.1.5 EUT OPERATING CONDITIONS

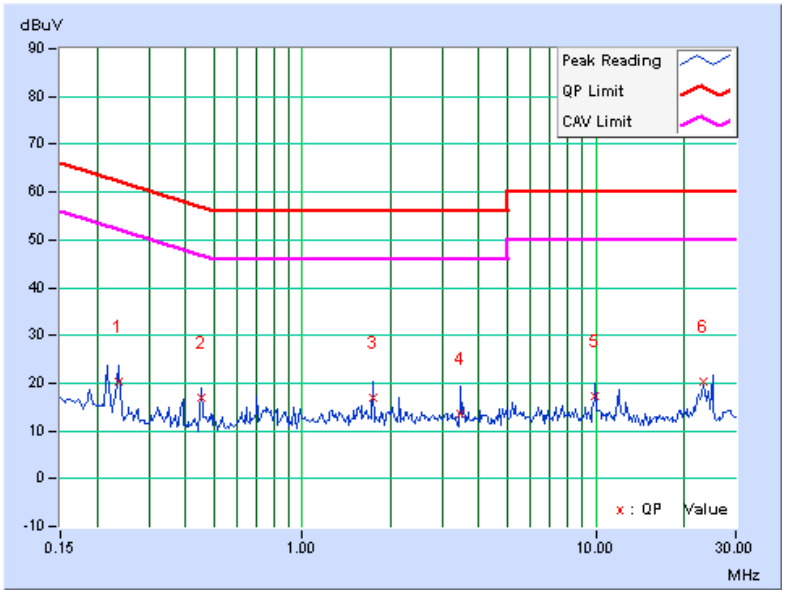
a. The EUT ran a test program “RF Sample Button function” under transmission condition continuously.

## 4.1.6 TEST RESULTS

| 6DB BANDWIDTH | 9 kHz | PHASE | Line (L) |
|---|---|---|---|

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.236 | 0.05 | 20.32 | - | 20.37 | - | 62.24 | 52.24 | -41.86 | - |
| 2 | 0.451 | 0.06 | 16.72 | - | 16.78 | - | 56.86 | 46.86 | -40.07 | - |
| **3** | **1.737** | **0.12** | **16.94** | **-** | **17.06** | **-** | **56.00** | **46.00** | **-38.94** | **-** |
| 4 | 3.474 | 0.17 | 13.27 | - | 13.44 | - | 56.00 | 46.00 | -42.56 | - |
| 5 | 9.898 | 0.35 | 16.96 | - | 17.31 | - | 60.00 | 50.00 | -42.69 | - |
| 6 | 23.129 | 0.58 | 19.63 | - | 20.21 | - | 60.00 | 50.00 | -39.79 | - |

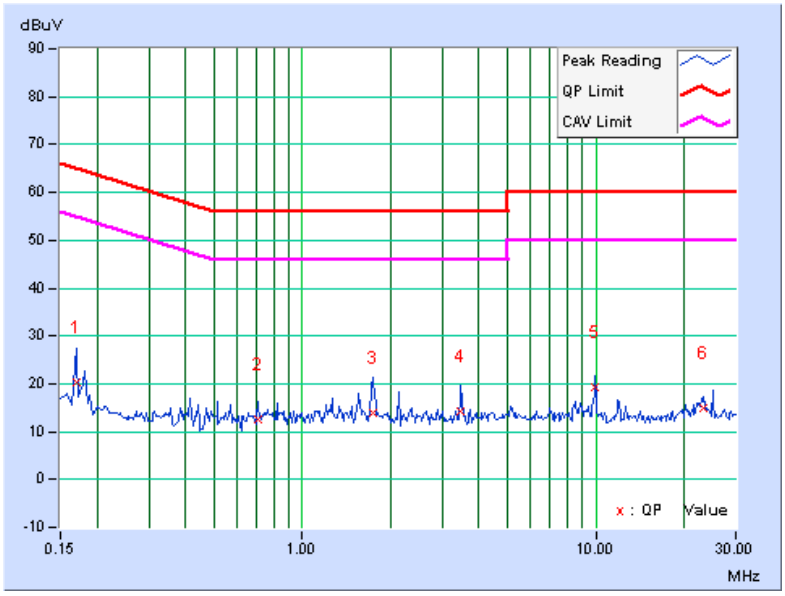
**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



| 6dB BANDWIDTH | 9 kHz | PHASE | Neutral (N) |
|---|---|---|---|

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.170 | 0.06 | 20.34 | - | 20.40 | - | 64.98 | 54.98 | -44.58 | - |
| 2 | 0.709 | 0.09 | 12.57 | - | 12.66 | - | 56.00 | 46.00 | -43.34 | - |
| 3 | 1.734 | 0.13 | 13.94 | - | 14.07 | - | 56.00 | 46.00 | -41.93 | - |
| 4 | 3.477 | 0.18 | 14.18 | - | 14.36 | - | 56.00 | 46.00 | -41.64 | - |
| 5 | 9.898 | 0.36 | 19.03 | - | 19.39 | - | 60.00 | 50.00 | -40.61 | - |
| 6 | 23.125 | 0.59 | 14.38 | - | 14.97 | - | 60.00 | 50.00 | -45.03 | - |

**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 NUMBER OF HOPPING FREQUENCY USED

### 4.2.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 hopping frequencies, and should be equally spaced.

### 4.2.2 TEST INSTRUMENTS

**Tested Data: Aug. 16**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | E4446A | MY48250253 | Aug. 03, 2010 | Aug. 02, 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.

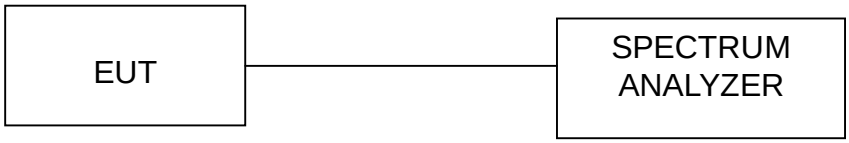
### 4.2.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

### 4.2.4 DEVIATION FROM TEST STANDARD

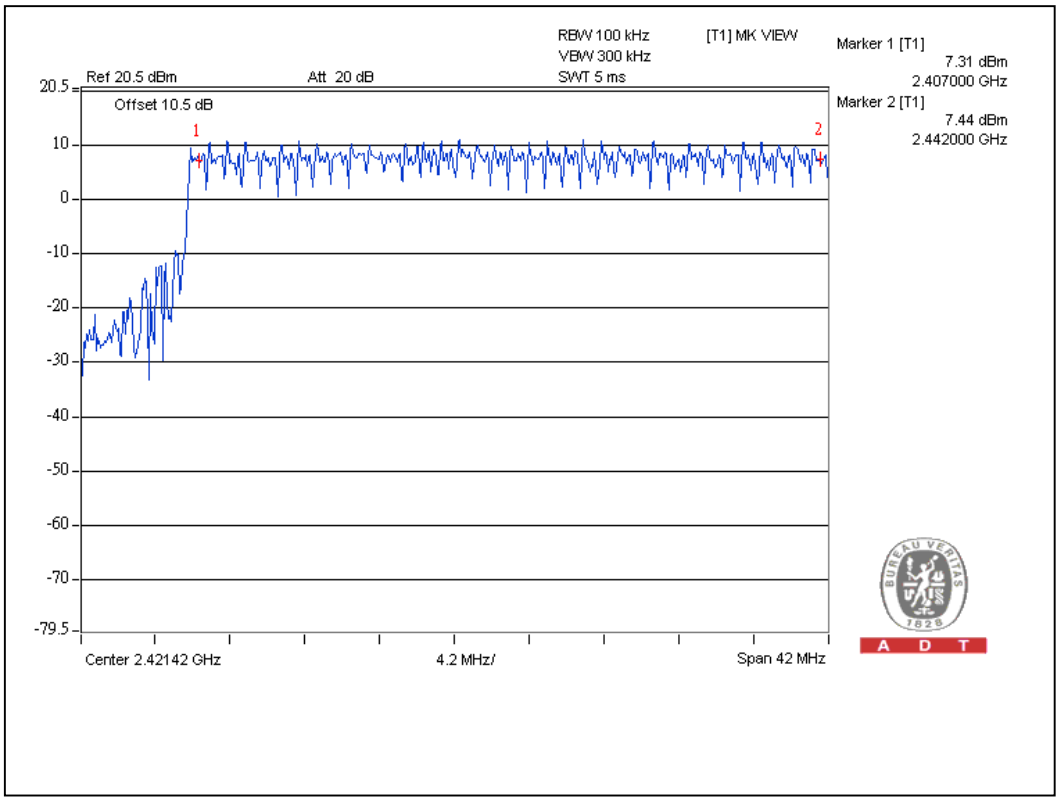
No deviation

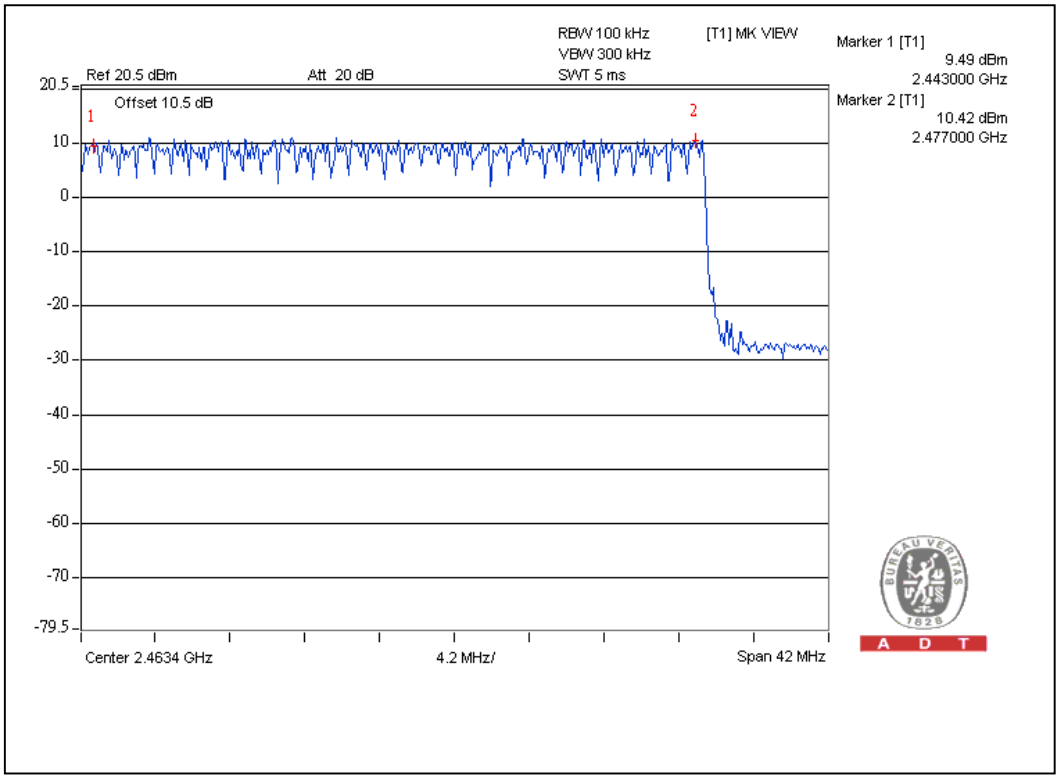
### 4.2.5 TEST SETUP




### 4.2.6 TEST RESULTS

There are 71 hopping frequencies in the hopping mode. Please refer to next pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
7.31 dBm
2.407000 GHz
Marker 2 [T1]
7.44 dBm
2.442000 GHz
Ref 20.5 dBm
Att 20 dB
Offset 10.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
9.49 dBm
2.443000 GHz
Marker 2 [T1]
10.42 dBm
2.477000 GHz
Ref 20.5 dBm
Att 20 dB
Offset 10.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

## 4.3 DWELL TIME ON EACH CHANNEL

### 4.3.1 LIMIT OF DWELL TIME USED

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period. For hybrid systems, the average time of occupancy on any frequency should not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

### 4.3.2 TEST INSTRUMENTS

**Tested Data: Aug. 16**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | E4446A | MY48250253 | Aug. 03, 2010 | Aug. 02, 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.

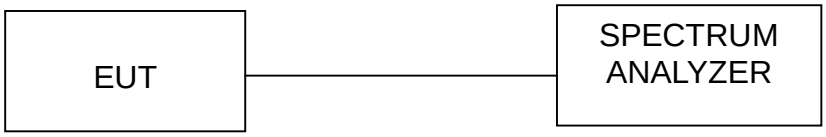
### 4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.3.5 TEST SETUP

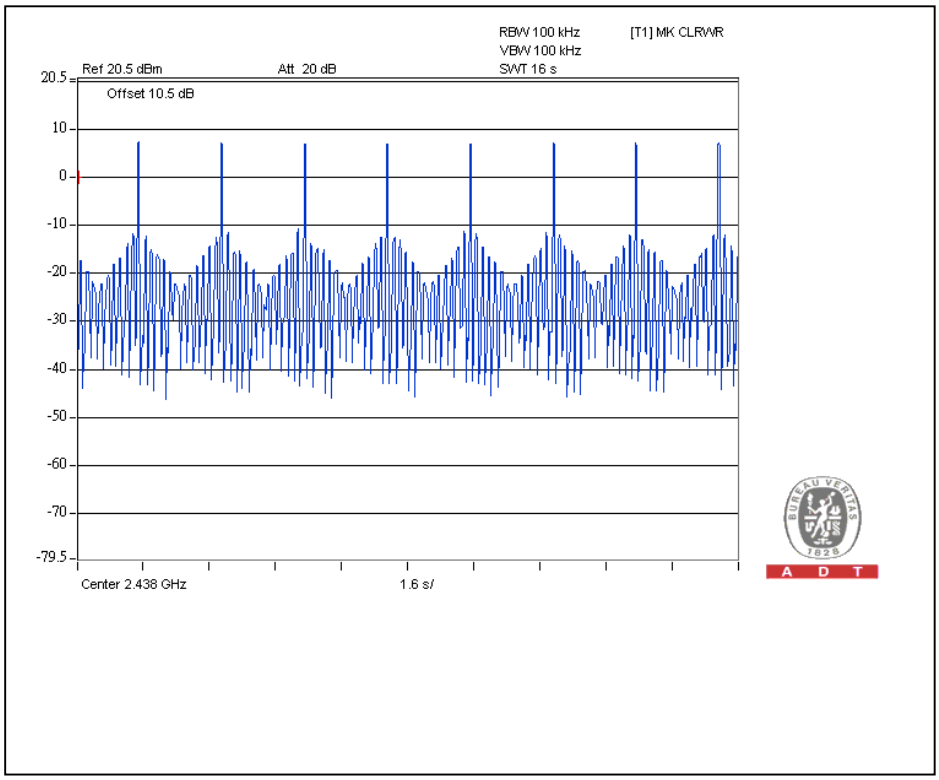


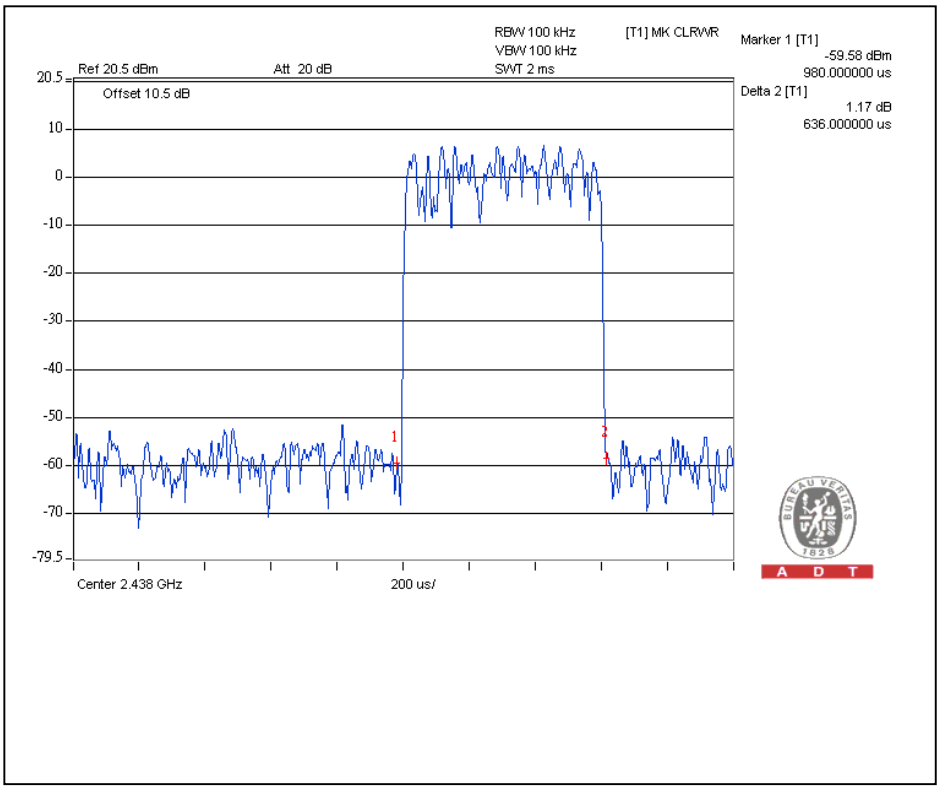

### 4.3.6 TEST RESULTS

| Number of transmission in a 16 (40 Hopping*0.4) | Length of transmission time (msec) | Result (msec) | Limit (msec) |
|---|---|---|---|
| 8 (times / 16 sec) *1=8 times | 0.636 | 5.088 | 400 |

There are seventy-one channels in this device totally. But it always hops in forty channels by random within forty channels.

Test plot of the transmitting time slot is shown on next page.


RBW 100 kHz
VBW 100 kHz
SWT 16 s
[T1] MK CLRWR
Ref 20.5 dBm
Att 20 dB
Offset 10.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.438 GHz
1.6 s/


RBW 100 kHz
VBW 100 kHz
SWT 2 ms
[T1] MK CLRWR
Marker 1 [T1]
-59.58 dBm
980.000000 us
Delta 2 [T1]
1.17 dB
636.000000 us
Ref 20.5 dBm
Att 20 dB
Offset 10.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.438 GHz
200 us/

## 4.4 CHANNEL BANDWIDTH

### 4.4.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, 20dB bandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

### 4.4.2 TEST INSTRUMENTS

**Tested Data: Aug. 16**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | E4446A | MY48250253 | Aug. 03, 2010 | Aug. 02, 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.

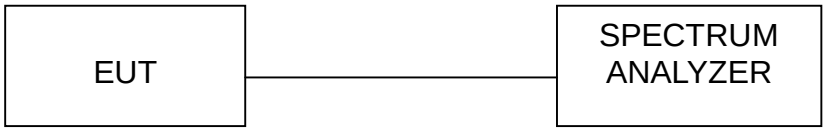
### 4.4.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.4.5 TEST SETUP



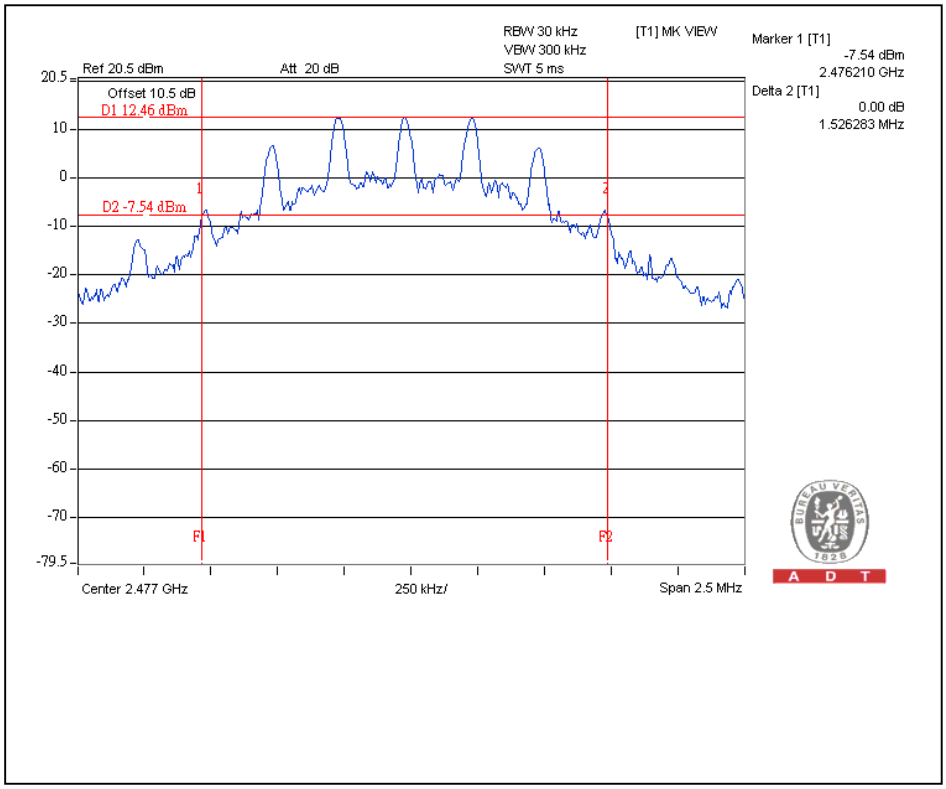

### 4.4.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

## 4.4.7 TEST RESULTS

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---|---|---|
| 1 | 2407 | 1.52 |
| 32 | 2438 | 1.11 |
| 71 | 2477 | 1.52 |

**Channel 71**



## 4.5 HOPPING CHANNEL SEPARATION

### 4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25 kHz or 20dB hopping channel bandwidth (whichever is greater).

### 4.5.2 TEST INSTRUMENTS

**Tested Data: Aug. 16**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | E4446A | MY48250253 | Aug. 03, 2010 | Aug. 02, 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.

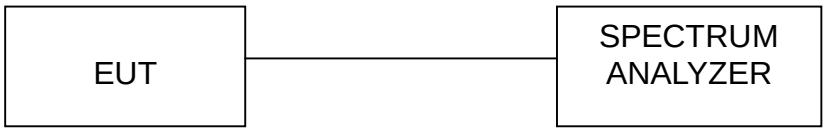
### 4.5.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

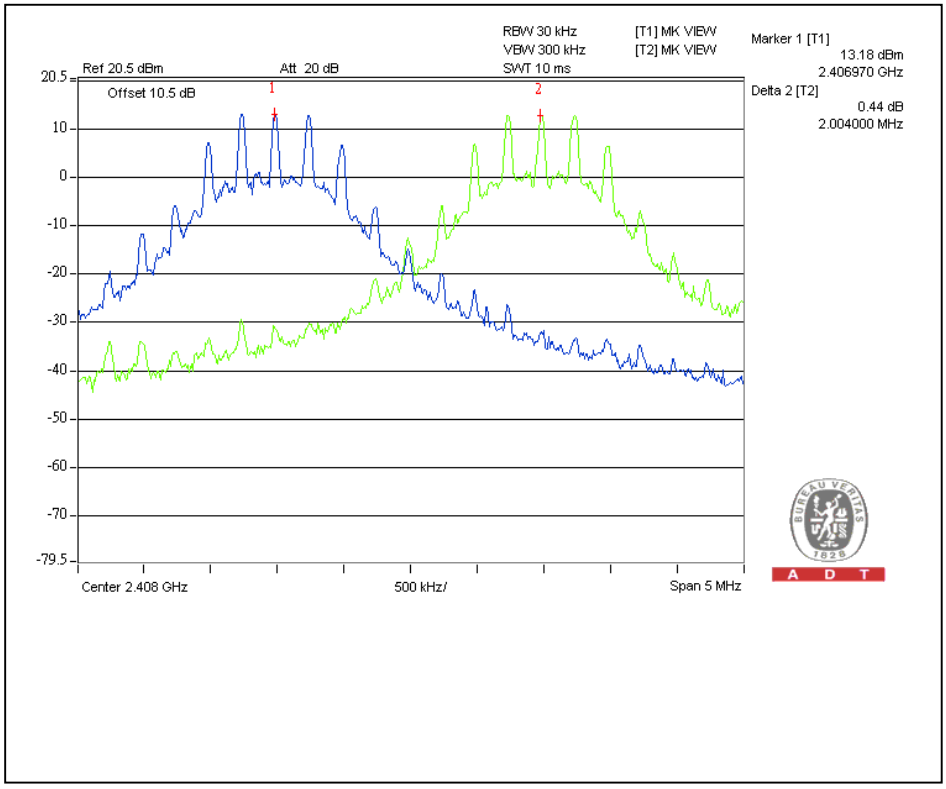
### 4.5.5 TEST SETUP



## 4.5.6 TEST RESULTS

| Channel | Frequency (MHz) | Adjacent Channel Separation (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---|---|---|---|---|
| 1 | 2407 | 2.00 | 1.52 | PASS |
| 32 | 2438 | 2.00 | 1.11 | PASS |
| 71 | 2477 | 2.00 | 1.52 | PASS |

**Channel 1**



## 4.6 MAXIMUM PEAK OUTPUT POWER

### 4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

### 4.6.2 INSTRUMENTS

**Tested Data: Aug. 16**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | E4446A | MY48250253 | Aug. 03, 2010 | Aug. 02, 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.

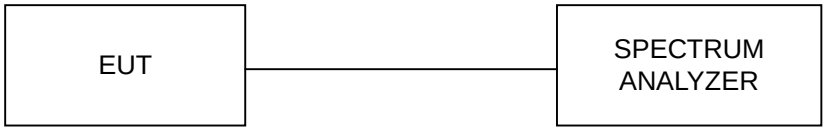
### 4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies measured were complete.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 TEST SETUP




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

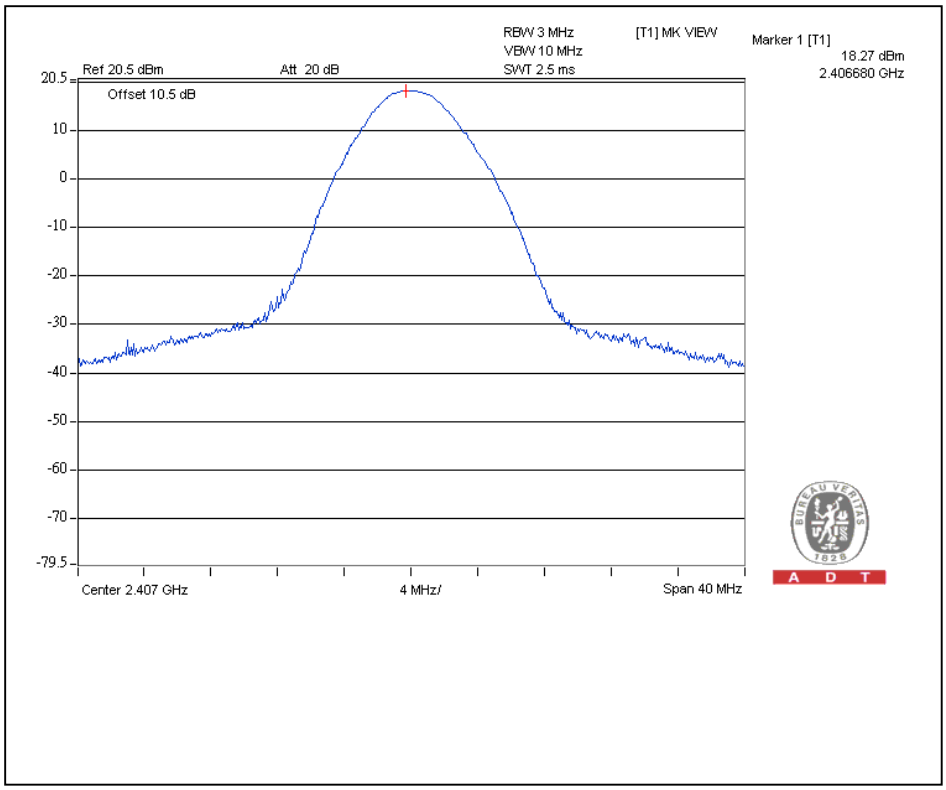
### 4.6.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

## 4.6.7 TEST RESULTS

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (mW) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (mW) | PASS/FAIL |
|---|---|---|---|---|---|
| 1 | 2407 | 67.6 | 18.3 | 125 | PASS |
| 32 | 2438 | 63.1 | 18.0 | 125 | PASS |
| 71 | 2477 | 58.9 | 17.7 | 125 | PASS |

**Channel 1**



## 4.7 RADIATED EMISSION MEASUREMENT

### 4.7.1 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 |

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.

## 4.7.2 TEST INSTRUMENTS

**Tested Date: July 23**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Agilent Spectrum Analyzer | E4446A | MY48250253 | Aug. 03, 2009 | Aug. 02, 2010 |
| Agilent Pre-Selector | N9039A | MY46520311 | Aug. 17, 2009 | Aug. 16, 2010 |
| Agilent Signal Generator | N5181A | MY49060517 | July 14, 2010 | July 13, 2011 |
| Mini-Circuits Pre-Amplifier | ZFL-1000VH2B | AMP-ZFL-03 | Nov. 18, 2009 | Nov. 17, 2010 |
| Agilent Pre-Amplifier | 8449B | 3008A02578 | July 05, 2010 | July 04, 2011 |
| Miteq Pre-Amplifier | AFS33-18002650-30-8P-44 | 881786 | NA | NA |
| SCHWARZBECK Trilog Broadband Antenna | VULB 9168 | 9168-360 | Sep. 30, 2009 | Sep. 29, 2010 |
| AISI Horn_Antenna | AIH.8018 | 0000320091110 | Nov. 16, 2009 | Nov. 15, 2010 |
| SCHWARZBECK Horn_Antenna | BBHA 9170 | 9170-424 | Sep. 30, 2009 | Sep. 29, 2010 |
| RF CABLE | NA | RF104-201<br>RF104-203<br>RF104-204 | Dec. 24, 2009 | Dec. 23, 2010 |
| RF Cable | NA | CHGCAB_001 | NA | NA |
| Software | ADT_Radiated_V8.7.05 | NA | NA | NA |
| CT Antenna Tower & Turn Table | NA | NA | NA | NA |

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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.

### 4.7.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters 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 antenna is a broadband antenna, and its height 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 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

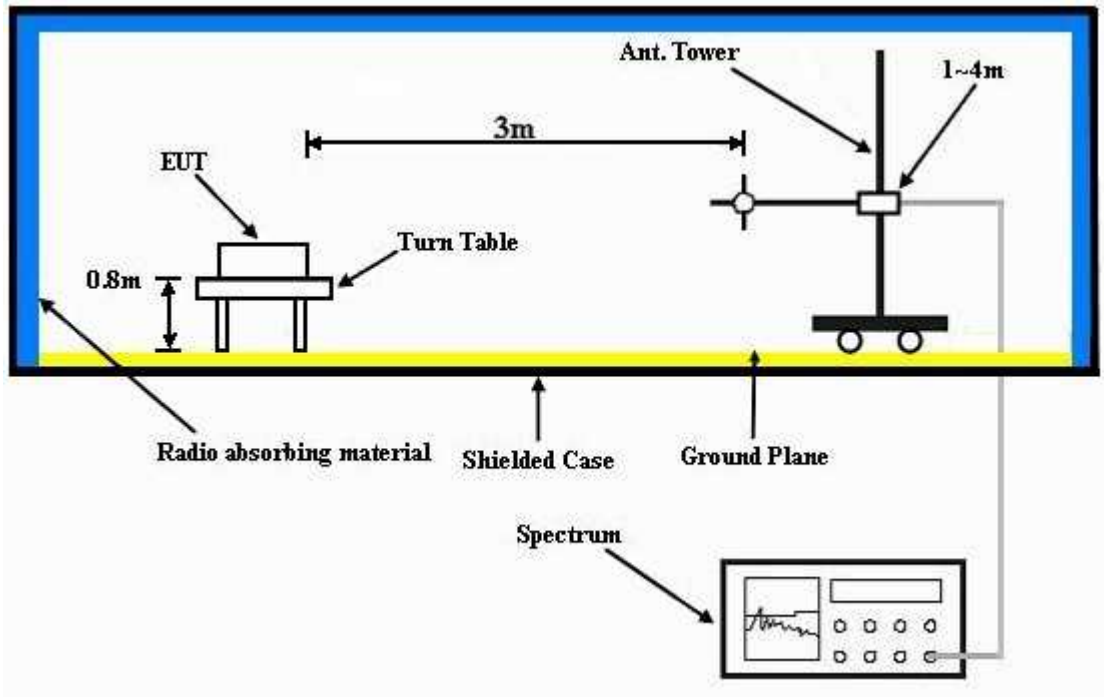
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.

### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.7.5 TEST SETUP




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

## 4.7.6 TEST RESULTS

**BELOW 1GHz WORST-CASE DATA**

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| **CHANNEL** | Channel 1 | **FREQUENCY RANGE** | Below 1000MHz |
| **INPUT POWER** | DC 3.3V | **DETECTOR FUNCTION** | Quasi-Peak |
| **ENVIRONMENTAL CONDITIONS** | 26deg. C, 72%RH 1014 hPa | **TESTED BY** | Frank Liu |

| 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 | 136.23 | 21.2 QP | 43.5 | -22.3 | 1.25 H | 201 | 7.68 | 13.55 |
| 2 | 181.70 | 21.7 QP | 43.5 | -21.8 | 2.00 H | 203 | 10.06 | 11.64 |
| 3 | 272.65 | 24.3 QP | 46.0 | -21.7 | 2.00 H | 264 | 10.24 | 14.10 |
| 4 | 544.07 | 27.3 QP | 46.0 | -18.7 | 2.00 H | 360 | 6.57 | 20.69 |
| 5 | 636.68 | 34.4 QP | 46.0 | -11.6 | 2.00 H | 175 | 12.06 | 22.38 |
| **6** | **826.75** | **40.4 QP** | **46.0** | **-5.6** | **1.00 H** | **58** | **15.45** | **24.96** |
| **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 | 136.23 | 34.2 QP | 43.5 | -9.3 | 1.00 V | 353 | 20.66 | 13.55 |
| 2 | 272.17 | 30.3 QP | 46.0 | -15.7 | 1.00 V | 211 | 16.22 | 14.09 |
| 3 | 454.78 | 31.0 QP | 46.0 | -15.0 | 1.50 V | 91 | 12.39 | 18.62 |
| 4 | 545.73 | 32.8 QP | 46.0 | -13.2 | 1.00 V | 243 | 12.04 | 20.73 |
| 5 | 636.21 | 29.3 QP | 46.0 | -16.7 | 1.00 V | 235 | 6.97 | 22.37 |
| 6 | 826.75 | 38.1 QP | 46.0 | -7.9 | 1.25 V | 296 | 13.12 | 24.96 |

**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.

## ABOVE 1GHz DATA

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 1 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER | DC 3.3V | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 69%RH 1014 hPa | TESTED BY | Frank Liu |

| 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 | 2357.20 | 57.6 PK | 74.0 | -16.4 | 1.00 H | 119 | 26.10 | 31.50 |
| 2 | 2357.20 | 31.7 AV | 54.0 | -22.3 | 1.00 H | 119 | 0.20 | 31.50 |
| 3 | *2407.00 | 107.1 PK | | | 1.00 H | 116 | 75.40 | 31.70 |
| 4 | *2407.00 | 81.2 AV | | | 1.00 H | 116 | 49.50 | 31.70 |
| 5 | 4813.40 | 62.9 PK | 74.0 | -11.1 | 1.08 H | 305 | 24.00 | 38.90 |
| 6 | 4813.40 | 37.0 AV | 54.0 | -17.0 | 1.08 H | 305 | -1.90 | 38.90 |
| **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 | 2357.40 | 63.5 PK | 74.0 | -10.5 | 1.21 V | 326 | 32.00 | 31.50 |
| 2 | 2357.40 | 37.6 AV | 54.0 | -16.4 | 1.21 V | 326 | 6.10 | 31.50 |
| 3 | *2407.00 | 114.6 PK | | | 1.20 V | 337 | 82.90 | 31.70 |
| 4 | *2407.00 | 88.7 AV | | | 1.20 V | 337 | 57.00 | 31.70 |
| 5 | 4813.20 | 63.0 PK | 74.0 | -11.0 | 1.00 V | 290 | 24.10 | 38.90 |
| 6 | 4813.20 | 37.1 AV | 54.0 | -16.9 | 1.00 V | 290 | -1.80 | 38.90 |

**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. Dwell Time = 5.09ms
7. Average value = peak reading + 20log(Dwell Time / 100ms).

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 32 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER | DC 3.3V | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 69%RH 1014 hPa | TESTED BY | Frank Liu |

| 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 | *2438.00 | 107.4 PK | | | 1.00 H | 109 | 75.60 | 31.80 |
| 2 | *2438.00 | 81.5 AV | | | 1.00 H | 109 | 49.70 | 31.80 |
| 3 | 4875.60 | 63.8 PK | 74.0 | -10.2 | 1.00 H | 283 | 24.70 | 39.10 |
| 4 | 4875.60 | 37.9 AV | 54.0 | -16.1 | 1.00 H | 283 | -1.20 | 39.10 |
| 5 | 7313.70 | 59.2 PK | 74.0 | -14.8 | 1.72 H | 209 | 12.60 | 46.60 |
| 6 | 7313.70 | 33.3 AV | 54.0 | -20.7 | 1.72 H | 209 | -13.30 | 46.60 |
| **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 | *2438.00 | 114.7 PK | | | 1.13 V | 329 | 82.90 | 31.80 |
| 2 | *2438.00 | 88.8 AV | | | 1.13 V | 329 | 57.00 | 31.80 |
| 3 | 4875.50 | 64.2 PK | 74.0 | -9.8 | 1.04 V | 253 | 25.10 | 39.10 |
| 4 | 4875.50 | 38.3 AV | 54.0 | -15.7 | 1.04 V | 253 | -0.80 | 39.10 |
| 5 | 7313.50 | 58.4 PK | 74.0 | -15.6 | 1.21 V | 320 | 11.80 | 46.60 |
| 6 | 7313.50 | 32.5 AV | 54.0 | -21.5 | 1.21 V | 320 | -14.10 | 46.60 |

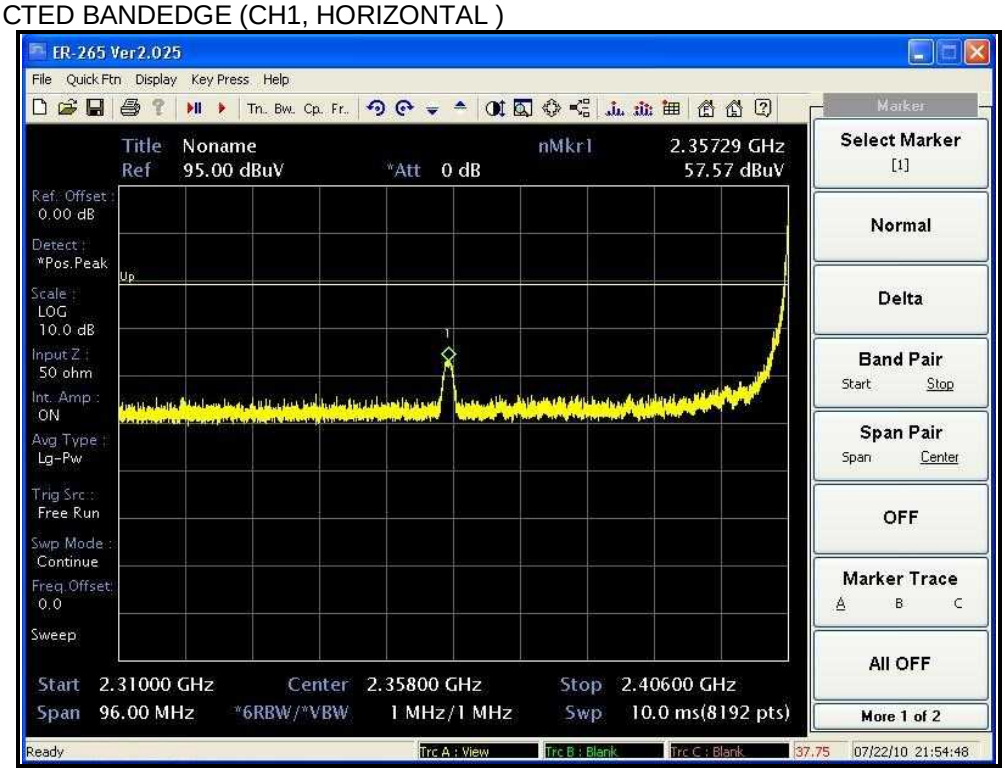
**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. Dwell Time = 5.09ms
7. Average value = peak reading + 20log(Dwell Time / 100ms).

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 71 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER | DC 3.3V | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 69%RH 1014 hPa | TESTED BY | Frank Liu |

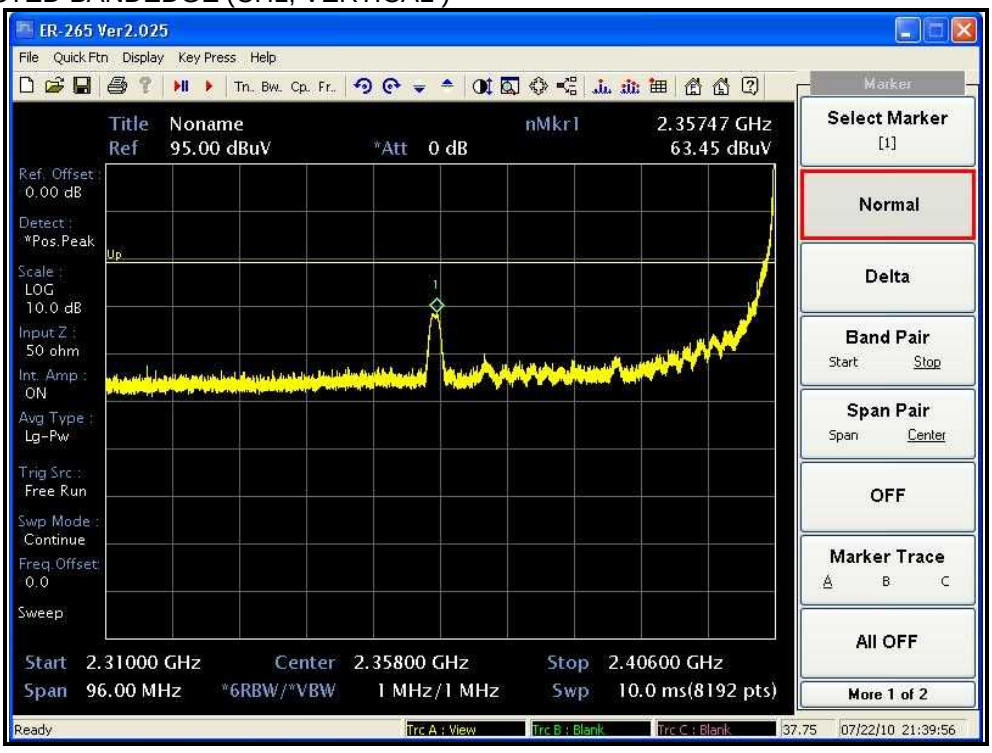
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2477.00 | 107.9 PK | | | 1.00 H | 105 | 76.00 | 31.90 |
| 2 | *2477.00 | 82.0 AV | | | 1.00 H | 105 | 50.10 | 31.90 |
| 3 | 2483.50 | 55.1 PK | 74.0 | -18.9 | 1.00 H | 104 | 23.10 | 32.00 |
| 4 | 2483.50 | 29.2 AV | 54.0 | -24.8 | 1.00 H | 104 | -2.80 | 32.00 |
| 5 | 4951.30 | 64.9 PK | 74.0 | -9.1 | 1.03 H | 305 | 25.50 | 39.40 |
| 6 | 4951.30 | 39.0 AV | 54.0 | -15.0 | 1.03 H | 305 | -0.40 | 39.40 |
| 7 | 7431.60 | 59.5 PK | 74.0 | -14.5 | 1.76 H | 205 | 12.90 | 46.60 |
| 8 | 7431.60 | 33.6 AV | 54.0 | -20.4 | 1.76 H | 205 | -13.00 | 46.60 |
| 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 | *2477.00 | 115.1 PK | | | 1.15 V | 336 | 83.20 | 31.90 |
| 2 | *2477.00 | 89.2 AV | | | 1.15 V | 336 | 57.30 | 31.90 |
| 3 | 2483.50 | 61.8 PK | 74.0 | -12.2 | 1.15 V | 340 | 29.80 | 32.00 |
| 4 | 2483.50 | 35.9 AV | 54.0 | -18.1 | 1.15 V | 340 | 3.90 | 32.00 |
| 5 | 4954.60 | 65.4 PK | 74.0 | -8.6 | 1.01 V | 352 | 26.00 | 39.40 |
| 6 | 4954.60 | 39.5 AV | 54.0 | -14.5 | 1.01 V | 352 | 0.10 | 39.40 |
| 7 | 7431.80 | 58.0 PK | 74.0 | -16.0 | 1.20 V | 314 | 11.40 | 46.60 |
| 8 | 7431.80 | 32.1 AV | 54.0 | -21.9 | 1.20 V | 314 | -14.50 | 46.60 |

**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. Dwell Time = 5.09ms
7. Average value = peak reading + 20log(Dwell Time / 100ms).

RESTRICTED BANDEDGE (CH1, HORIZONTAL )

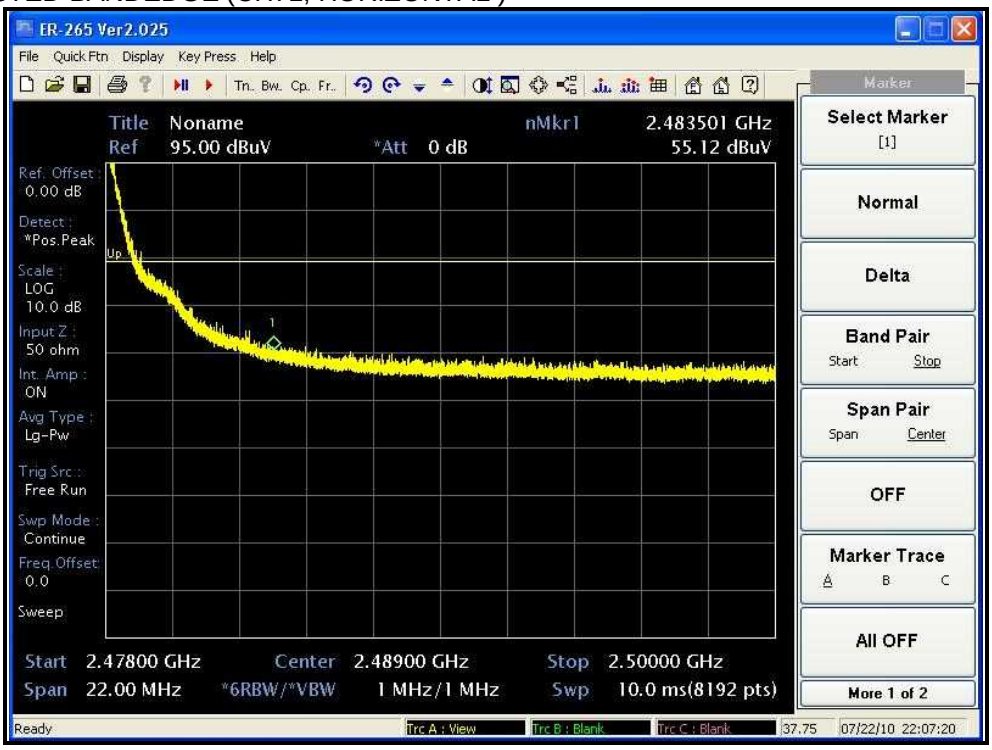



RESTRICTED BANDEDGE (CH1, VERTICAL )

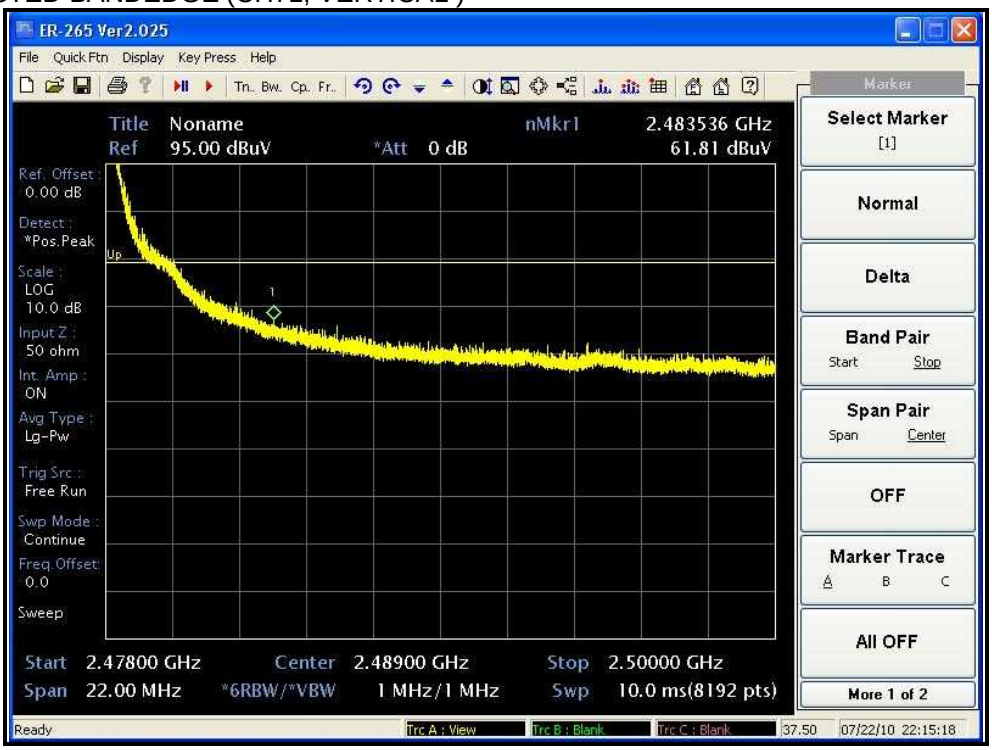



* The average value of fundamental frequency is: Average value = peak reading + 20log(Dwell Time / 100ms). And it meets the requirement of limit.

RESTRICTED BANDEDGE (CH71, HORIZONTAL )




RESTRICTED BANDEDGE (CH71, VERTICAL )




* The average value of fundamental frequency is: Average value = peak reading + 20log(Dwell Time / 100ms). And it meets the requirement of limit.

## 4.8 CONDUCTED OUT-BAND EMISSION MEASUREMENT

### 4.8.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz RBW).

### 4.8.2 TEST INSTRUMENTS

**Tested Data: Aug. 16**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | E4446A | MY48250253 | Aug. 03, 2010 | Aug. 02, 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.

### 4.8.3 TEST PROCEDURE

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

### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation

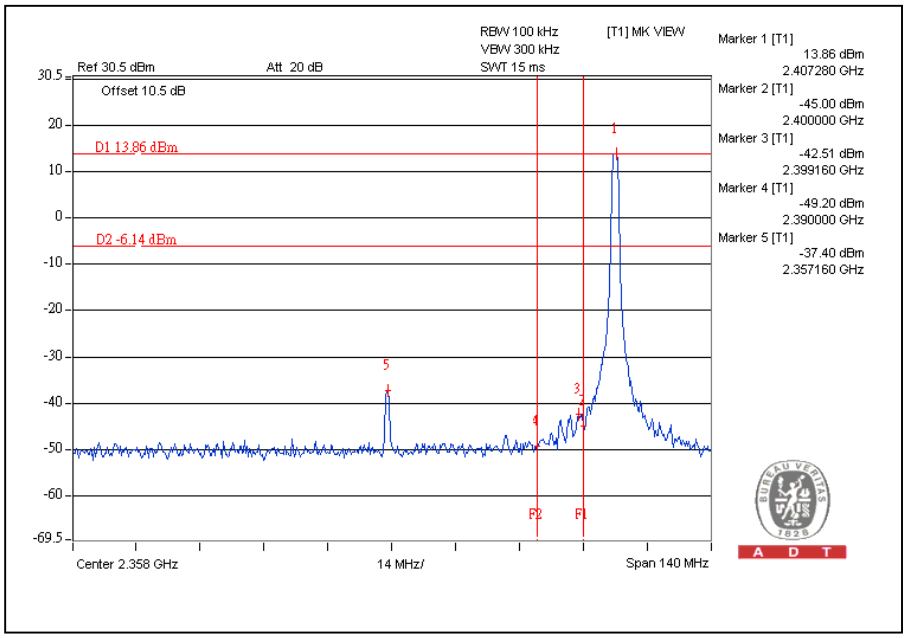
### 4.8.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

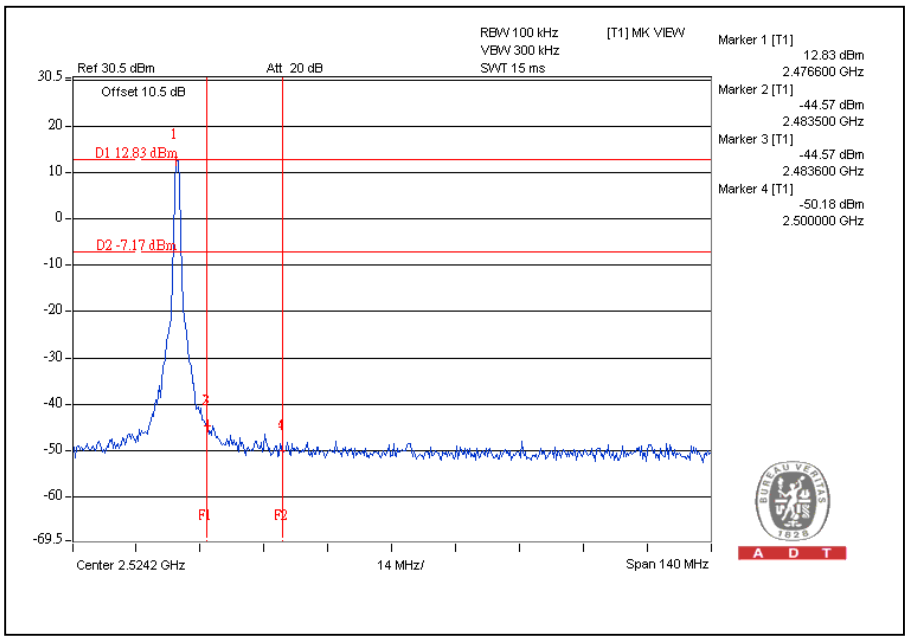
## 4.8.6 TEST RESULTS

Emissions radiated outside of the specified frequency bands, please refer following pages for met the requirement of the general radiated emission limits in § 15.209.

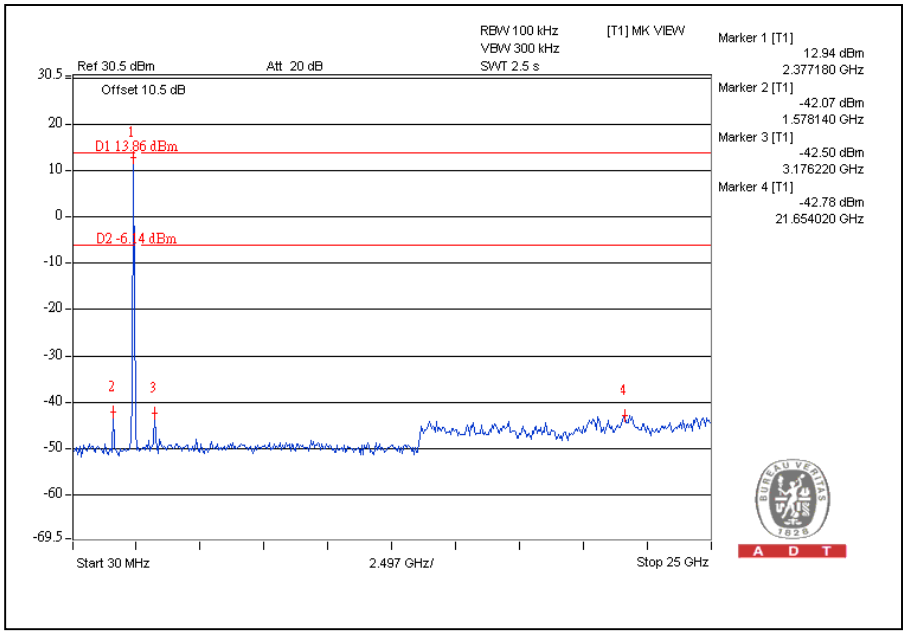
CH1



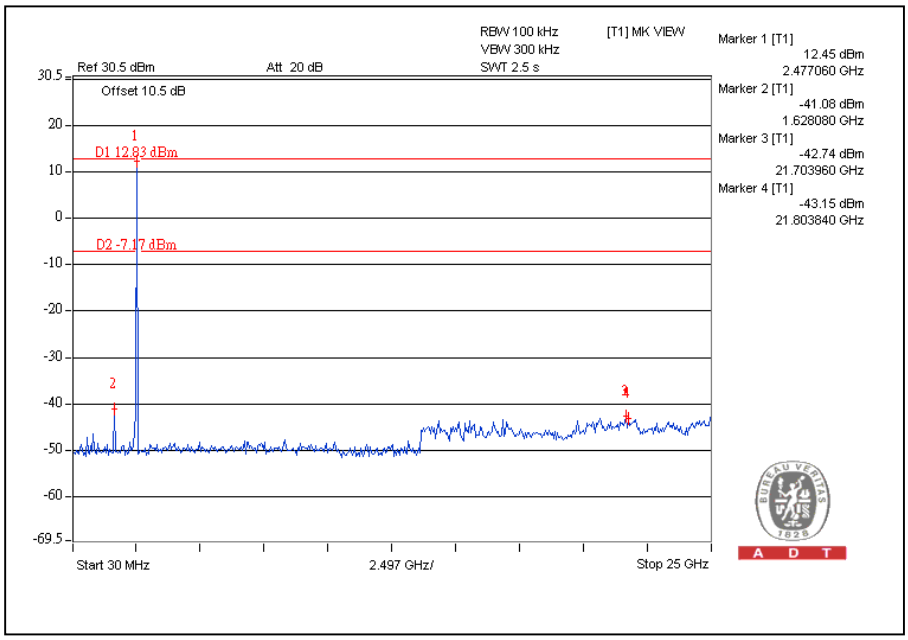

CH71



CH1


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 30.5 dBm
Att 20 dB
Offset 10.5 dB
D1 13.86 dBm
D2 -6.14 dBm
Marker 1 [T1]
12.94 dBm
2.377180 GHz
Marker 2 [T1]
-42.07 dBm
1.578140 GHz
Marker 3 [T1]
-42.50 dBm
3.176220 GHz
Marker 4 [T1]
-42.78 dBm
21.654020 GHz
30.5
20
10
0
-10
-20
-30
-40
-50
-60
-69.5
Start 30 MHz
2.497 GHz/
Stop 25 GHz

CH71


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 30.5 dBm
Att 20 dB
Offset 10.5 dB
D1 12.83 dBm
D2 -7.17 dBm
Marker 1 [T1]
12.45 dBm
2.477060 GHz
Marker 2 [T1]
-41.08 dBm
1.628080 GHz
Marker 3 [T1]
-42.74 dBm
21.703960 GHz
Marker 4 [T1]
-43.15 dBm
21.803840 GHz
30.5
20
10
0
-10
-20
-30
-40
-50
-60
-69.5
Start 30 MHz
2.497 GHz/
Stop 25 GHz

# 5 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.
If you have any comments, please feel free to contact us at the following:


**Linko EMC/RF Lab**:
Tel: 886-2-26052180
Fax: 886-2-26052943

**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

**Email**: service@adt.com.tw
**Web Site**: www.adt.com.tw


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

# 6 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 ---**