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# FCC TEST REPORT (15.407)

**REPORT NO.:** RF110801C10-1

**MODEL NO.:** S1635-01 (Refer to item 3.1 for the more details)

**FCC ID:** PZWS1635-01

**RECEIVED:** Aug. 01, 2011

**TESTED:** Aug. 11 ~ Nov. 09, 2011

**ISSUED:** Nov. 10, 2011

**APPLICANT:** DENSO WAVE INCORPORATED

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

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,  
New Taipei City, Taiwan (R.O.C)

**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

| ISSUE NO.        | REASON FOR CHANGE | DATE ISSUED   |
|------------------|-------------------|---------------|
| Original release | NA                | Nov. 10, 2011 |

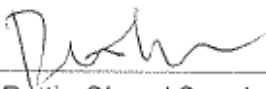


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## 1. CERTIFICATION

**PRODUCT:** Hand Held Terminal  
**MODEL NO.:** S1635-01 (Refer to item 3.1 for the more details)  
**BRAND:** NEC  
**APPLICANT:** DENSO WAVE INCORPORATED  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Aug. 11 ~ Nov. 09, 2011  
**STANDARDS:** **FCC Part 15, Subpart E (Section 15.407)**  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (Model: S1635-01) 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 :  , DATE: Nov. 10, 2011  
Pettie Chen / Specialist

APPROVED BY :  , DATE: Nov. 10, 2011  
Gary Chang / Technical Manager

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407) |                             |        |  |
|---|-----------------------------|--------|--|
| STANDARD SECTION  | TEST TYPE                   | RESULT | REMARK   |
| 15.407(b)(5)  | AC Power Conducted Emission | NA     | Power supply is 3.7Vdc from battery  |
| 15.407(b)(1/2/3)<br>(b)(5)                                | Radiated spurious emission  | PASS   | Meet the requirement of limit. Minimum passing margin is -9.6dB at 10480MHz. |
| 15.407(a)(1/2/3)  | Peak Transmit Power         | PASS   | Meet the requirement of limit.   |
| 15.407(a)(6)  | Peak Power Excursion        | PASS   | Meet the requirement of limit.   |
| 15.407(a)(1/2/3)  | Peak Power Spectral Density | PASS   | Meet the requirement of limit.   |
| 15.407(g)   | Frequency Stability         | 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:

| MEASUREMENT        | FREQUENCY       | UNCERTAINTY |
|--------------------|-----------------|-------------|
| Radiated emissions | 30MHz ~ 200MHz  | 3.34 dB     |
|                    | 200MHz ~1000MHz | 3.35 dB     |
|                    | 1GHz ~ 18GHz    | 2.26 dB     |
|                    | 18GHz ~ 40GHz   | 1.94 dB     |

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



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                              |  |
|------------------------------|--|
| <b>PRODUCT</b>               | Hand Held Terminal   |
| <b>MODEL NO.</b>             | S1635-01 (Refer to NOTE for the more details)  |
| <b>FCC ID</b>                | PZWS1635-01  |
| <b>NOMINAL VOLTAGE</b>       | 3.7Vdc (from battery)  |
| <b>MODULATION TYPE</b>       | 64QAM, 16QAM, QPSK, BPSK   |
| <b>MODULATION TECHNOLOGY</b> | OFDM   |
| <b>TRANSFER RATE</b>         | 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps<br>802.11n (20MHz): up to 72.2Mbps |
| <b>OPERATING FREQUENCY</b>   | 5180.0 ~ 5240.0MHz   |
| <b>NUMBER OF CHANNEL</b>     | 4 for 802.11a, 802.11n (20MHz)   |
| <b>OUTPUT POWER</b>          | 3.2mW  |
| <b>ANTENNA TYPE</b>          | Refer to Note as below   |
| <b>ANTENNA CONNECTER</b>     | Refer to Note as below   |
| <b>DATA CABLE</b>            | NA   |
| <b>I/O PORTS</b>             | Refer to user's manual   |
| <b>ACCESSORY DEVICES</b>     | Battery  |

**NOTE:**

1. The following models are provided to this EUT.

| Brand | Model     | Description   |
|-------|-----------|---|
| NEC   | S1635-01  | All models are electrically identical, different model names are for marketing purpose. |
|       | S1635-01A |   |
|       | S1635-01B |   |

2. The frequency bands used in this EUT are listed as follows:

| FREQUENCY BAND (MHz) | 2412~2462 | 5180~5240 | 5745~5825 |
|----------------------|-----------|-----------|-----------|
| 802.11b              | √         |           |           |
| 802.11g              | √         |           |           |
| 802.11a              |           | √         | √         |
| 802.11n (20MHz)      | √         | √         | √         |

3. The EUT provides one completed transmitter and one receiver.

| MODULATION MODE | TX FUNCTION |
|-----------------|-------------|
| 802.11b         | 1TX         |
| 802.11g         | 1TX         |
| 802.11a         | 1TX         |
| 802.11n (20MHz) | 1TX         |

4. The following antenna used in this EUT is listed as below table:

| TYPE        | GAIN (dBi) |            | ANTENNA CONNECTOR |
|-------------|------------|------------|-------------------|
|             | FOR 2.4GHz | FOR 5.0GHz |                   |
| Printed PCB | 1.86dBi    | 1.20dBi    | NA                |

5. The EUT uses following battery:

|               |                       |
|---------------|-----------------------|
| <b>MODEL</b>  | BT-110LA(BP06-00028C) |
| <b>RATING</b> | 3.7Vdc Capacity 8.5Wh |

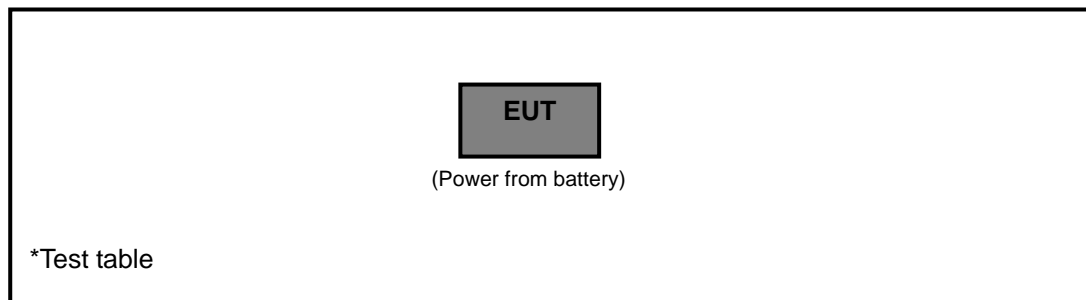
6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 DESCRIPTION OF TEST MODES

4 channels are provided for 802.11a and 802.11n (20MHz):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 36      | 5180MHz   | 44      | 5220MHz   |
| 40      | 5200MHz   | 48      | 5240MHz   |

#### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST







### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO |       |      |      | DESCRIPTION |
|--------------------|---------------|-------|------|------|-------------|
|                    | RE≥1G         | RE<1G | PLC  | APCM |             |
| -                  | √             | √     | NOTE | √    | -           |

Where **RE≥1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement  
**NOTE**: No need to concern of Conducted Emission due to the EUT is powered by battery.

#### **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 | MODE            | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) | AXIS |
|--------------------|-----------------|-------------------|----------------|-----------------------|-----------------|------------------|------|
| -                  | 802.11a         | 36 to 48          | 36, 40, 48     | OFDM                  | BPSK            | 6.0              | X    |
| -                  | 802.11n (20MHz) | 36 to 48          | 36, 40, 48     | OFDM                  | BPSK            | 7.2              | 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 | MODE    | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) | AXIS |
|--------------------|---------|-------------------|----------------|-----------------------|-----------------|------------------|------|
| -                  | 802.11a | 36 to 48          | 40             | OFDM                  | BPSK            | 6.0              | 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 | MODE            | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|--------------------|-----------------|-------------------|----------------|-----------------------|-----------------|------------------|
| -                  | 802.11a         | 36 to 48          | 36, 48         | OFDM                  | BPSK            | 6.0              |
| -                  | 802.11n (20MHz) | 36 to 48          | 36, 48         | OFDM                  | BPSK            | 7.2              |



**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 | MODE            | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|--------------------|-----------------|-------------------|----------------|-----------------------|-----------------|------------------|
| -                  | 802.11a         | 36 to 48          | 36, 40, 48     | OFDM                  | BPSK            | 6.0              |
| -                  | 802.11n (20MHz) | 36 to 48          | 36, 40, 48     | OFDM                  | BPSK            | 7.2              |

**TEST CONDITION:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER  | TESTED BY  |
|---------------|--------------------------|--------------|------------|
| RE≥1G         | 25deg. C, 65%RH          | 120Vac, 60Hz | Match Tsui |
| RE<1G         | 25deg. C, 65%RH          | 120Vac, 60Hz | Match Tsui |
| APCM          | 25deg. C, 68%RH          | 120Vac, 60Hz | Match Tsui |

**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 E (15.407)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

**3.4 DESCRIPTION OF SUPPORT UNITS**

The EUT has been tested as an independent unit.



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## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified in Section 15.209(a).

| 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.

#### 4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

| FREQUENCIES (MHz) | EIRP LIMIT (dBm) | EQUIVALENT FIELD STRENGTH AT 3m (dBµV/m) *NOTE 3 |
|-------------------|------------------|--|
|                   | PK               | PK   |
| 5150 ~ 5250       | -27              | 68.3   |

**NOTE:** The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$



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#### 4.1.3 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER                          | MODEL NO.                    | SERIAL NO.           | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|------------------------------|----------------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ                    | ESCI                         | 100744               | Apr. 19, 2011       | Apr. 18, 2012           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ                | FSP40                        | 100269               | Jan. 06, 2011       | Jan. 05, 2012           |
| BILOG Antenna<br>SCHWARZBECK                        | VULB9168                     | 9168-156             | Apr. 12, 2011       | Apr. 11, 2012           |
| HORN Antenna<br>SCHWARZBECK                         | BBHA 9120 D                  | 9120D-563            | Sep. 06, 2011       | Sep. 05, 2012           |
| HORN Antenna<br>SCHWARZBECK                         | BBHA 9170                    | BBHA9170243          | Dec. 27, 2010       | Dec. 26, 2011           |
| Preamplifier<br>Agilent                             | 8449B                        | 3008A01911           | Oct. 29, 2011       | Oct. 28, 2012           |
| Preamplifier<br>Agilent                             | 8447D                        | 2944A10638           | Oct. 29, 2011       | Oct. 28, 2012           |
| RF signal cable<br>HUBER+SUHNNER                    | SUCOFLEX 104                 | 295013/4<br>283403/4 | Aug. 19, 2011       | Aug. 18, 2012           |
| RF signal cable<br>Worken                           | 8D-FB                        | Cable-HYCH9-01       | Aug. 13, 2011       | Aug. 12, 2012           |
| Software  | ADT_Radiated_<br>V7.6.15.9.2 | NA                   | NA                  | NA                      |
| Antenna Tower<br>EMCO                               | 2070/2080                    | 512.835.4684         | NA                  | NA                      |
| Turn Table<br>EMCO                                  | 2087-2.03                    | NA                   | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller EMCO       | 2090                         | NA                   | NA                  | NA                      |
| Turn Table Controller<br>ADT.                       | SC100.                       | SC93021703           | NA                  | NA                      |
| High Speed Peak Power<br>Meter                      | ML2495A                      | 0842014              | Apr. 26, 2011       | Apr. 25, 2012           |
| Power Sensor  | MA2411B                      | 0738404              | Apr. 26, 2011       | Apr. 25, 2012           |
| WIT STANDARD<br>TEMPERATURE AND<br>HUMIDITY CHAMBER | TH-4S-C                      | W981030              | Jun. 15, 2011       | Jun. 14, 2012           |
| 26GHz ~ 40GHz Amplifier                             | EM26400                      | 815221               | Oct. 29, 2011       | Oct. 28, 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 HwaYa Chamber 3.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.



#### 4.1.4 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. 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 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

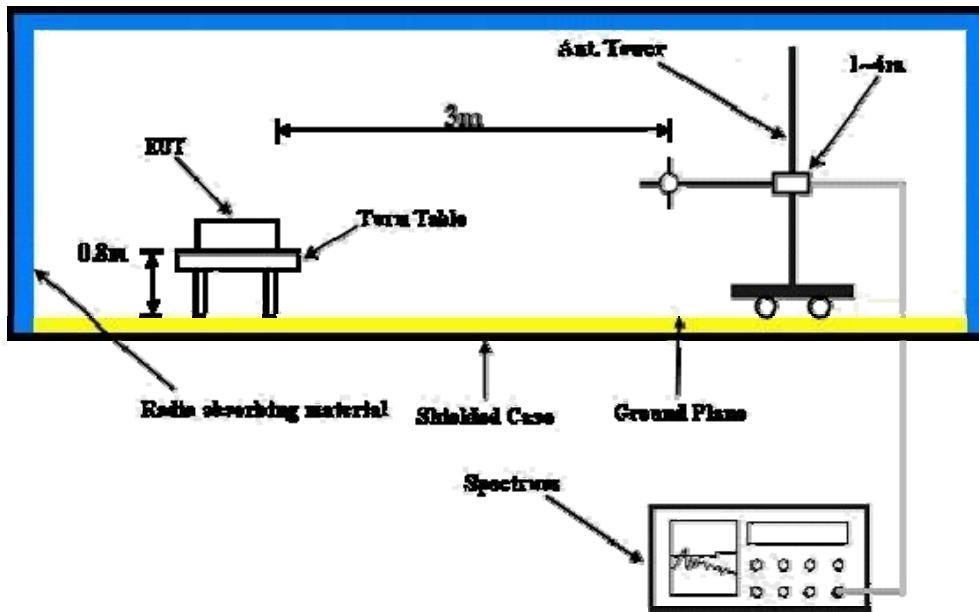
**NOTE:**

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 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.

#### 4.1.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.6 TEST SETUP



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

#### 4.1.7 EUT OPERATING CONDITION

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



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### 4.1.8 TEST RESULTS

#### 802.11a

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 36      | FREQUENCY RANGE    | 1 ~ 40GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 68%RH | TESTED BY          | Match Tsui                |

| 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   | 5150.00     | 47.0 PK                 | 74.0           | -27.0       | 1.07 H             | 150                  | 7.80             | 39.20                    |
| 2   | 5150.00     | 35.4 AV                 | 54.0           | -18.6       | 1.07 H             | 150                  | -3.80            | 39.20                    |
| 3   | *5180.00    | 100.5 PK                |                |             | 1.07 H             | 150                  | 61.20            | 39.30                    |
| 4   | *5180.00    | 89.9 AV                 |                |             | 1.07 H             | 150                  | 50.60            | 39.30                    |
| 5   | #10360.00   | 57.8 PK                 | 68.3           | -10.5       | 1.00 H             | 0                    | 8.10             | 49.70                    |
| 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   | 5150.00     | 47.4 PK                 | 74.0           | -26.6       | 1.08 V             | 13                   | 8.20             | 39.20                    |
| 2   | 5150.00     | 35.5 AV                 | 54.0           | -18.5       | 1.08 V             | 13                   | -3.70            | 39.20                    |
| 3   | *5180.00    | 101.7 PK                |                |             | 1.08 V             | 13                   | 62.40            | 39.30                    |
| 4   | *5180.00    | 92.0 AV                 |                |             | 1.08 V             | 13                   | 52.70            | 39.30                    |
| 5   | #10360.00   | 58.2 PK                 | 68.3           | -10.1       | 1.00 V             | 0                    | 8.50             | 49.70                    |

- 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 radiated frequency is out the restricted band.



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| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 40      | FREQUENCY RANGE    | 1 ~ 40GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 68%RH | TESTED BY          | Match Tsui                |

| 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   | 5150.00     | 45.9 PK                 | 74.0           | -28.1       | 1.32 H             | 120                  | 6.70             | 39.20                    |
| 2   | 5150.00     | 34.8 AV                 | 54.0           | -19.2       | 1.32 H             | 120                  | -4.40            | 39.20                    |
| 3   | *5200.00    | 100.7 PK                |                |             | 1.32 H             | 120                  | 61.40            | 39.30                    |
| 4   | *5200.00    | 90.5 AV                 |                |             | 1.32 H             | 120                  | 51.20            | 39.30                    |
| 5   | #10400.00   | 58.1 PK                 | 68.3           | -10.2       | 1.00 H             | 0                    | 8.30             | 49.80                    |
| 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   | 5150.00     | 46.2 PK                 | 74.0           | -27.8       | 1.10 V             | 11                   | 7.00             | 39.20                    |
| 2   | 5150.00     | 35.0 AV                 | 54.0           | -19.0       | 1.10 V             | 11                   | -4.20            | 39.20                    |
| 3   | *5200.00    | 102.5 PK                |                |             | 1.10 V             | 11                   | 63.20            | 39.30                    |
| 4   | *5200.00    | 91.6 AV                 |                |             | 1.10 V             | 11                   | 52.30            | 39.30                    |
| 5   | #10400.00   | 58.3 PK                 | 68.3           | -10.0       | 1.00 V             | 0                    | 8.50             | 49.80                    |

- 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 radiated frequency is out the restricted band.





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| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 48      | FREQUENCY RANGE    | 1 ~ 40GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 68%RH | TESTED BY          | Match Tsui                |

| 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   | 5150.00     | 44.6 PK                 | 74.0           | -29.4       | 1.31 H             | 121                  | 5.40             | 39.20                    |
| 2   | 5150.00     | 34.6 AV                 | 54.0           | -19.4       | 1.31 H             | 121                  | -4.60            | 39.20                    |
| 3   | *5240.00    | 101.1 PK                |                |             | 1.31 H             | 121                  | 61.70            | 39.40                    |
| 4   | *5240.00    | 91.0 AV                 |                |             | 1.31 H             | 121                  | 51.60            | 39.40                    |
| 5   | #10480.00   | 58.5 PK                 | 68.3           | -9.8        | 1.00 H             | 0                    | 8.50             | 50.00                    |
| 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   | 5150.00     | 46.5 PK                 | 74.0           | -27.5       | 1.00 V             | 9                    | 7.30             | 39.20                    |
| 2   | 5150.00     | 34.3 AV                 | 54.0           | -19.7       | 1.00 V             | 9                    | -4.90            | 39.20                    |
| 3   | *5240.00    | 102.6 PK                |                |             | 1.00 V             | 9                    | 63.20            | 39.40                    |
| 4   | *5240.00    | 92.6 AV                 |                |             | 1.00 V             | 9                    | 53.20            | 39.40                    |
| 5   | #10480.00   | 58.3 PK                 | 68.3           | -10.0       | 1.00 V             | 0                    | 8.30             | 50.00                    |

- 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 radiated frequency is out the restricted band.



A D T

802.11n (20MHz)

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 36      | FREQUENCY RANGE    | 1 ~ 40GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 68%RH | TESTED BY          | Match Tsui                |

| 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   | 5150.00     | 46.8 PK                 | 74.0           | -27.2       | 1.05 H             | 150                  | 7.60             | 39.20                    |
| 2   | 5150.00     | 35.2 AV                 | 54.0           | -18.8       | 1.05 H             | 150                  | -4.00            | 39.20                    |
| 3   | *5180.00    | 100.1 PK                |                |             | 1.05 H             | 150                  | 60.80            | 39.30                    |
| 4   | *5180.00    | 89.6 AV                 |                |             | 1.05 H             | 150                  | 50.30            | 39.30                    |
| 5   | #10360.00   | 57.5 PK                 | 68.3           | -10.8       | 1.00 H             | 0                    | 7.80             | 49.70                    |
| 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   | 5150.00     | 47.9 PK                 | 74.0           | -26.1       | 1.09 V             | 11                   | 8.70             | 39.20                    |
| 2   | 5150.00     | 35.5 AV                 | 54.0           | -18.5       | 1.09 V             | 11                   | -3.70            | 39.20                    |
| 3   | *5180.00    | 102.0 PK                |                |             | 1.09 V             | 11                   | 62.70            | 39.30                    |
| 4   | *5180.00    | 92.1 AV                 |                |             | 1.09 V             | 11                   | 52.80            | 39.30                    |
| 5   | #10360.00   | 57.6 PK                 | 68.3           | -10.7       | 1.00 V             | 0                    | 7.90             | 49.70                    |

- 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 radiated frequency is out the restricted band.



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| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 40      | FREQUENCY RANGE    | 1 ~ 40GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 68%RH | TESTED BY          | Match Tsui                |

| 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   | 5150.00     | 45.9 PK                 | 74.0           | -28.1       | 1.30 H             | 120                  | 6.70             | 39.20                    |
| 2   | 5150.00     | 34.9 AV                 | 54.0           | -19.1       | 1.30 H             | 120                  | -4.30            | 39.20                    |
| 3   | *5200.00    | 101.0 PK                |                |             | 1.30 H             | 120                  | 61.70            | 39.30                    |
| 4   | *5200.00    | 90.7 AV                 |                |             | 1.30 H             | 120                  | 51.40            | 39.30                    |
| 5   | #10400.00   | 58.4 PK                 | 68.3           | -9.9        | 1.00 H             | 0                    | 8.60             | 49.80                    |
| 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   | 5150.00     | 47.1 PK                 | 74.0           | -26.9       | 1.02 V             | 9                    | 7.90             | 39.20                    |
| 2   | 5150.00     | 34.7 AV                 | 54.0           | -19.3       | 1.02 V             | 9                    | -4.50            | 39.20                    |
| 3   | *5200.00    | 102.1 PK                |                |             | 1.02 V             | 9                    | 62.80            | 39.30                    |
| 4   | *5200.00    | 91.9 AV                 |                |             | 1.02 V             | 9                    | 52.60            | 39.30                    |
| 5   | #10400.00   | 58.5 PK                 | 68.3           | -9.8        | 1.00 V             | 0                    | 8.70             | 49.80                    |

- 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 radiated frequency is out the restricted band.



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| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 48      | FREQUENCY RANGE    | 1 ~ 40GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 68%RH | TESTED BY          | Match Tsui                |

| 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   | 5150.00     | 44.5 PK                 | 74.0           | -29.5       | 1.31 H             | 119                  | 5.30             | 39.20                    |
| 2   | 5150.00     | 34.2 AV                 | 54.0           | -19.8       | 1.31 H             | 119                  | -5.00            | 39.20                    |
| 3   | *5240.00    | 101.6 PK                |                |             | 1.31 H             | 119                  | 62.20            | 39.40                    |
| 4   | *5240.00    | 91.8 AV                 |                |             | 1.31 H             | 119                  | 52.40            | 39.40                    |
| 5   | #10480.00   | 58.7 PK                 | 68.3           | -9.6        | 1.00 H             | 0                    | 8.70             | 50.00                    |
| 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   | 5150.00     | 45.8 PK                 | 74.0           | -28.2       | 1.00 V             | 11                   | 6.60             | 39.20                    |
| 2   | 5150.00     | 34.7 AV                 | 54.0           | -19.3       | 1.00 V             | 11                   | -4.50            | 39.20                    |
| 3   | *5240.00    | 102.7 PK                |                |             | 1.00 V             | 11                   | 63.30            | 39.40                    |
| 4   | *5240.00    | 93.0 AV                 |                |             | 1.00 V             | 11                   | 53.60            | 39.40                    |
| 5   | #10480.00   | 58.5 PK                 | 68.3           | -9.8        | 1.00 V             | 0                    | 8.50             | 50.00                    |

- 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 radiated frequency is out the restricted band.



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**BELOW 1GHz WORST-CASE DATA : 802.11a**

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |               |
|--------------------------|-----------------|--------------------|---------------|
| CHANNEL                  | Channel 40      | FREQUENCY RANGE    | Below 1000MHz |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Quasi-Peak    |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Match Tsui    |

| 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   | 76.56       | 17.7 QP                 | 40.0           | -22.3       | 1.00 H             | 235                  | 7.70             | 10.00                    |
| 2   | 101.84      | 20.6 QP                 | 43.5           | -22.9       | 1.25 H             | 346                  | 11.90            | 8.70                     |
| 3   | 523.75      | 25.1 QP                 | 46.0           | -20.9       | 1.00 H             | 43                   | 4.80             | 20.30                    |
| 4   | 543.19      | 25.7 QP                 | 46.0           | -20.3       | 1.00 H             | 88                   | 4.90             | 20.80                    |
| 5   | 729.84      | 23.8 QP                 | 46.0           | -22.2       | 1.25 H             | 7                    | 0.30             | 23.50                    |
| 6   | 795.95      | 23.5 QP                 | 46.0           | -22.5       | 1.50 H             | 106                  | -0.90            | 24.40                    |
| 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   | 76.56       | 25.5 QP                 | 40.0           | -14.5       | 1.00 V             | 139                  | 15.50            | 10.00                    |
| 2   | 134.89      | 22.0 QP                 | 43.5           | -21.5       | 1.00 V             | 349                  | 8.70             | 13.30                    |
| 3   | 216.00      | 17.5 QP                 | 43.5           | -26.0       | 1.50 V             | 244                  | 6.50             | 11.00                    |
| 4   | 241.83      | 27.5 QP                 | 46.0           | -18.5       | 1.00 V             | 214                  | 15.30            | 12.20                    |
| 5   | 729.84      | 23.1 QP                 | 46.0           | -22.9       | 1.00 V             | 43                   | -0.40            | 23.50                    |
| 6   | 795.95      | 25.5 QP                 | 46.0           | -20.5       | 1.00 V             | 160                  | 1.10             | 24.40                    |

- 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.

## 4.2 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

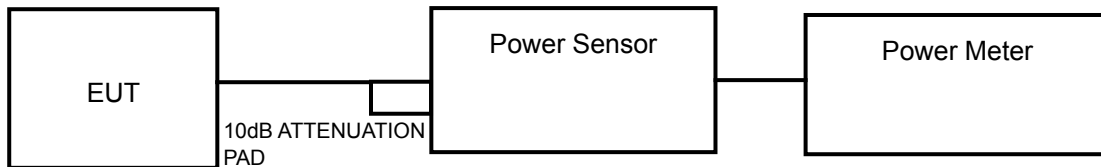
### 4.2.1 LIMITS OF MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

| FREQUENCY BAND | LIMIT                                       |
|----------------|---|
| 5.15 ~ 5.25GHz | The lesser of 50mW (17dBm) or 4dBm + 10logB |

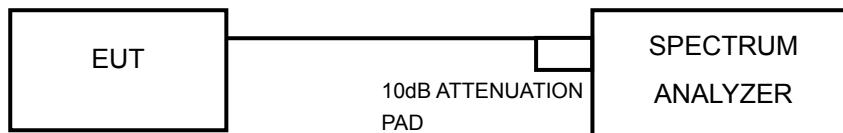
**NOTE:** Where B is the 26dB emission bandwidth in MHz.

### 4.2.2 TEST SETUP

#### FOR POWER OUTPUT MEASUREMENT



#### FOR 26dB OCCUPIED BANDWIDTH



### 4.2.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.



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#### 4.2.4 TEST PROCEDURE

##### FOR AVERAGE POWER MEASUREMENT

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.

##### FOR 26dB OCCUPIED BANDWIDTH

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

#### 4.2.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



#### 4.2.7 TEST RESULTS

##### POWER OUTPUT: 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|--------------------|-------------------|-------------------|-----------|
| 36      | 5180                    | 4.7                | 3.0               | 17                | PASS      |
| 40      | 5200                    | 5.0                | 3.2               | 17                | PASS      |
| 48      | 5240                    | 4.5                | 2.8               | 17                | PASS      |

##### 802.11n (20MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|--------------------|-------------------|-------------------|-----------|
| 36      | 5180                    | 4.6                | 2.9               | 17                | PASS      |
| 40      | 5200                    | 4.8                | 3.0               | 17                | PASS      |
| 48      | 5240                    | 4.5                | 2.8               | 17                | PASS      |

##### 26dB OCCUPIED BANDWIDTH: 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc OCCUPIED BANDWIDTH (MHz) | PASS / FAIL |
|---------|-------------------------|--------------------------------|-------------|
| 36      | 5180                    | 23.61                          | PASS        |
| 40      | 5200                    | 23.27                          | PASS        |
| 48      | 5240                    | 22.93                          | PASS        |

##### 802.11n (20MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc OCCUPIED BANDWIDTH (MHz) | PASS / FAIL |
|---------|-------------------------|--------------------------------|-------------|
| 36      | 5180                    | 24.33                          | PASS        |
| 40      | 5200                    | 24.85                          | PASS        |
| 48      | 5240                    | 24.71                          | PASS        |

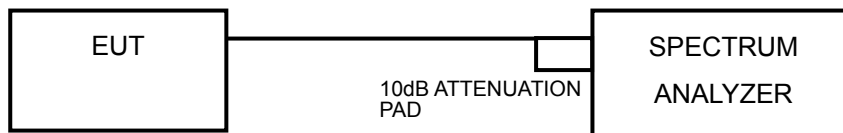


### 4.3 PEAK POWER EXCURSION MEASUREMENT

#### 4.3.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

#### 4.3.2 TEST SETUP



#### 4.3.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

#### 4.3.4 TEST PROCEDURE

- 1) Set RBW = 1 MHz, VBW  $\leq$  3 MHz, Detector = peak.
- 2) Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
- 3) Use the peak search function to find the peak of the spectrum.
- 4) Measure the PPSD.
- 5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

Same as 4.2.6



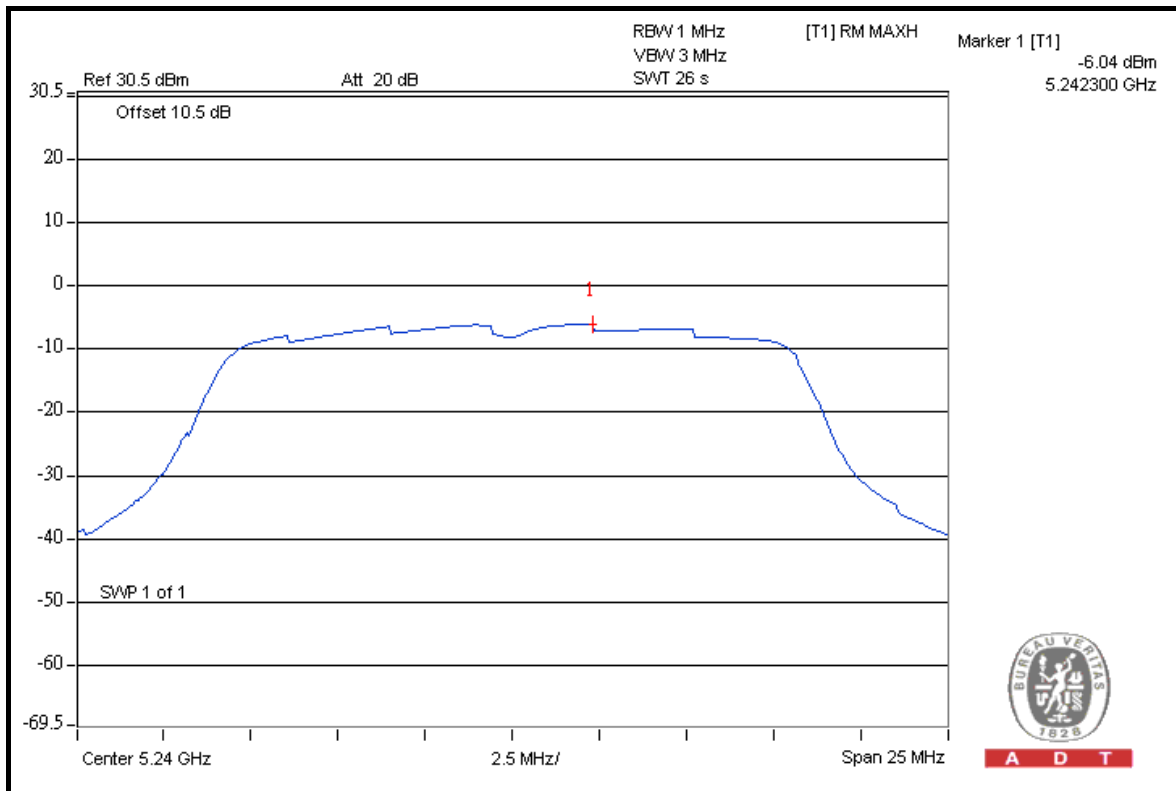
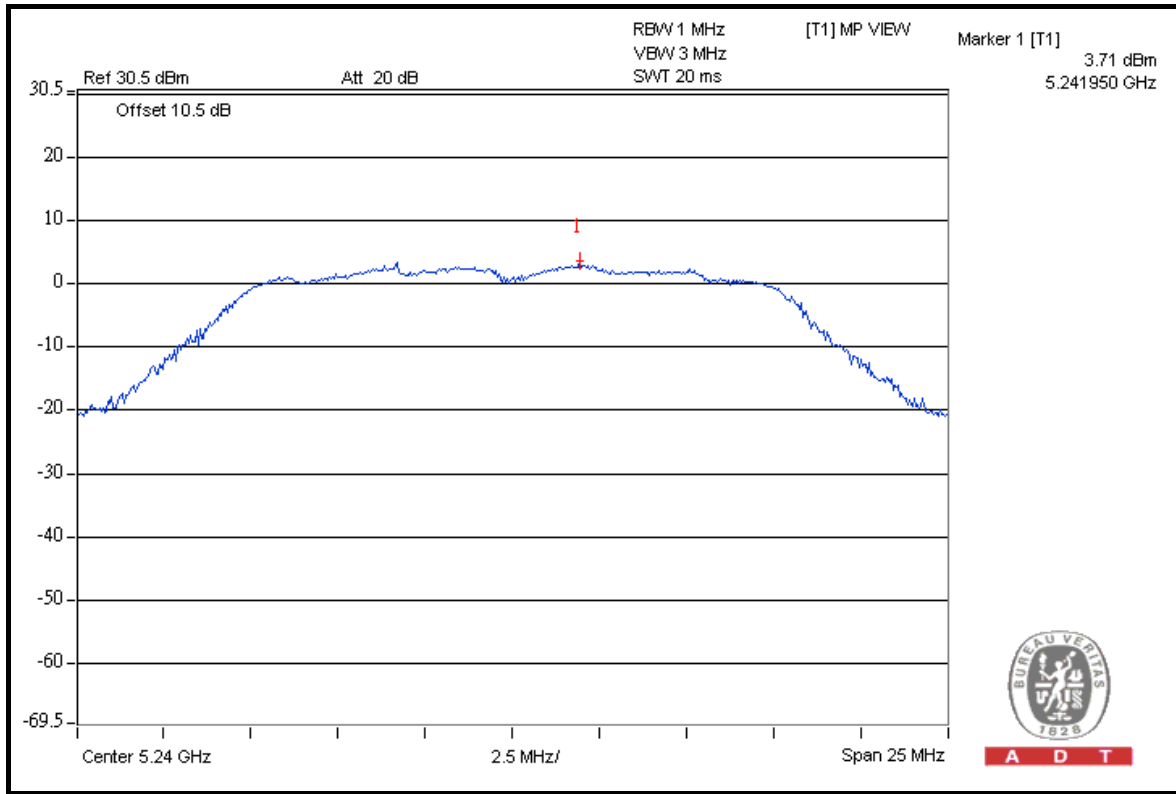
### 4.3.7 TEST RESULTS

#### 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK VALUE (dBm) | PPSD (dBm) | PEAK POWER EXCURSION (dB) | PEAK to AVERAGE EXCURSION LIMIT (dB) | PASS/FAIL |
|---------|-------------------------|------------------|------------|---------------------------|--------------------------------------|-----------|
| 36      | 5180                    | 3.55             | -5.67      | 9.22                      | 13                                   | PASS      |
| 40      | 5200                    | 3.70             | -5.38      | 9.08                      | 13                                   | PASS      |
| 48      | 5240                    | 3.71             | -6.04      | 9.75                      | 13                                   | PASS      |



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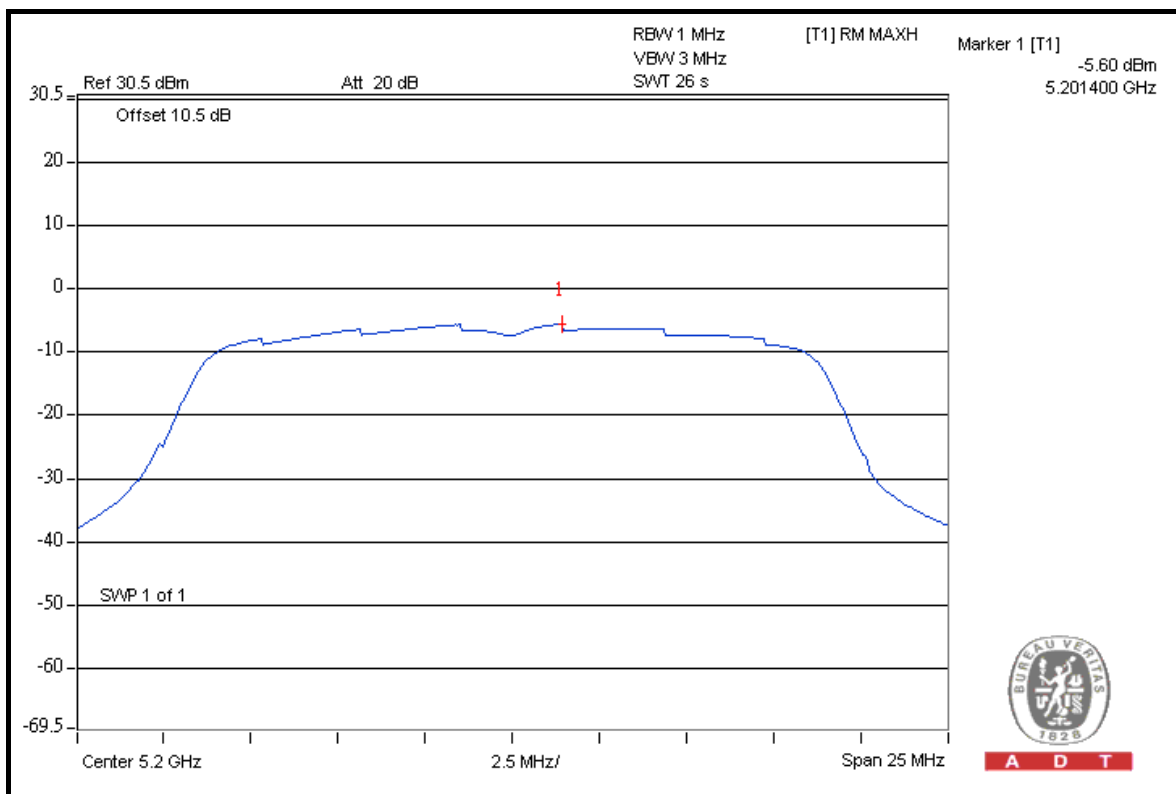
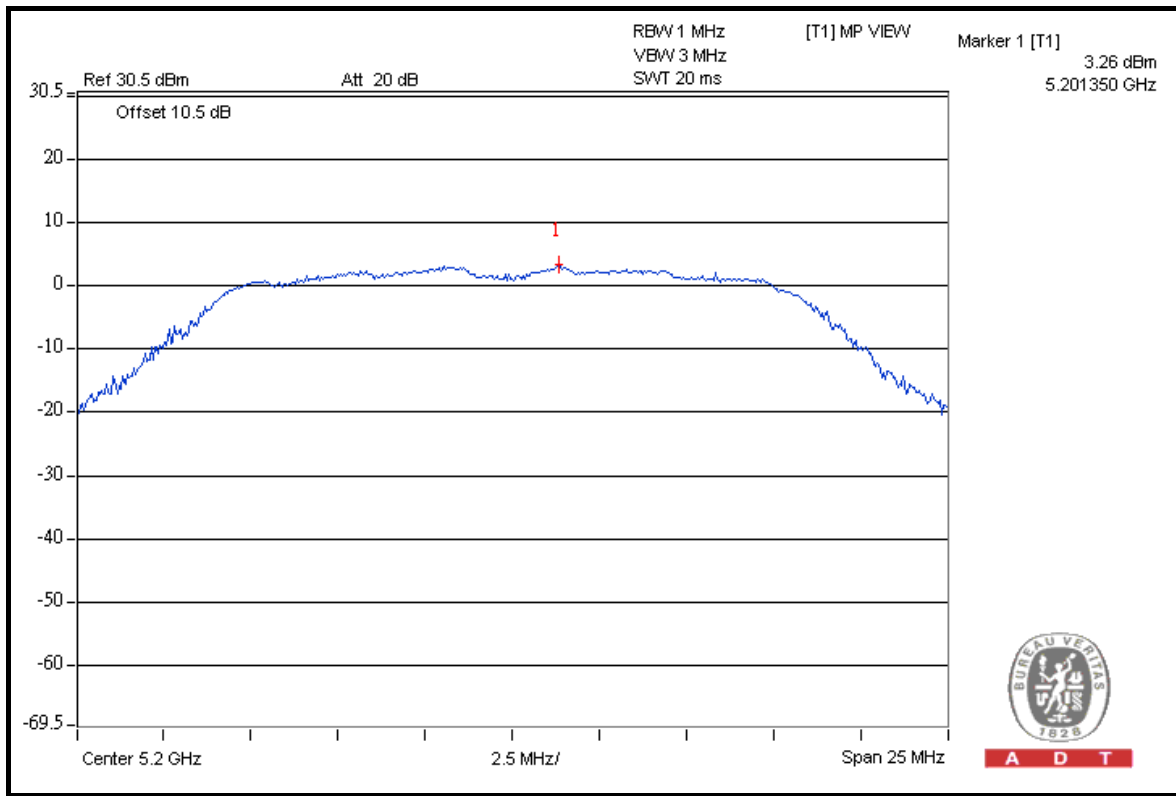
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802.11n (20MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK VALUE (dBm) | PPSD (dBm) | PEAK POWER EXCURSION (dB) | PEAK to AVERAGE EXCURSION LIMIT (dB) | PASS/FAIL |
|---------|-------------------------|------------------|------------|---------------------------|--------------------------------------|-----------|
| 36      | 5180                    | 2.50             | -6.14      | 8.64                      | 13                                   | PASS      |
| 40      | 5200                    | 3.26             | -5.60      | 8.86                      | 13                                   | PASS      |
| 48      | 5240                    | 2.51             | -6.29      | 8.80                      | 13                                   | PASS      |



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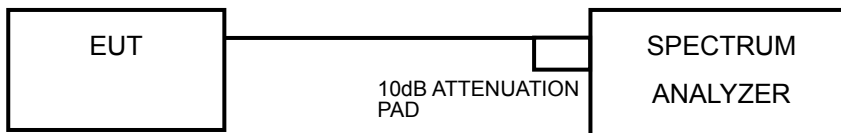


## 4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

| FREQUENCY BAND                      | LIMIT(dBm) |
|-------------------------------------|------------|
| 5.15 ~ 5.25GHz                      | 4          |
| 5.25 ~ 5.35GHz and 5.470 ~ 5.725GHz | 11         |
| 5.725~5825GHz                       | 17         |

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

### 4.4.4 TEST PROCEDURES

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1 MHz, Set VBW  $\geq$  3 MHz, Detector = RMS
- 3) Sweep time = auto, trigger set to "free run".
- 4) Trace average at least 100 traces in power averaging mode.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6.



#### 4.4.7 TEST RESULTS

##### 802.11a

| CHANNEL | FREQUENCY (MHz) | PSD (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---------|-----------------|-----------|---------------------|-----------|
| 36      | 5180            | -5.67     | 4                   | PASS      |
| 40      | 5220            | -5.38     | 4                   | PASS      |
| 48      | 5240            | -6.04     | 4                   | PASS      |

##### 802.11n (20MHz)

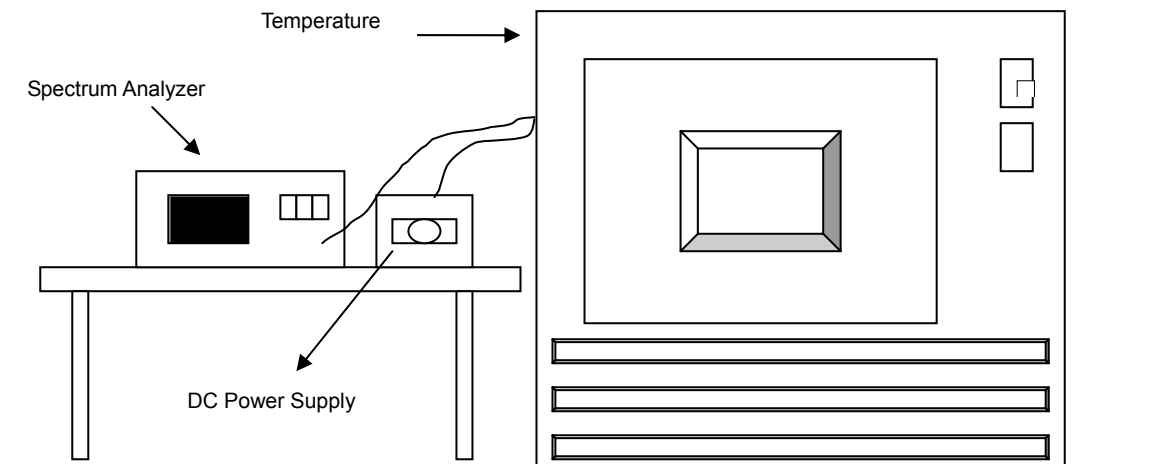
| CHANNEL | CHANNEL FREQUENCY (MHz) | PSD (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-----------|---------------------|-----------|
| 36      | 5180                    | -6.14     | 4                   | PASS      |
| 40      | 5200                    | -5.60     | 4                   | PASS      |
| 48      | 5240                    | -6.29     | 4                   | PASS      |

## 4.5 FREQUENCY STABILITY

### 4.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.





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#### 4.5.4 TEST PROCEDURE

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.5.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.



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#### 4.5.7 TEST RESULTS

| FREQUENCY STABILITY VERSUS TEMP. |                          |                       |                    |                       |                    |                       |                    |                       |                    |
|----------------------------------|--------------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|
| OPERATING FREQUENCY: 5200MHz     |                          |                       |                    |                       |                    |                       |                    |                       |                    |
| TEMP.<br>(°C)                    | POWER<br>SUPPLY<br>(Vac) | 0 MINUTE              |                    | 2 MINUTE              |                    | 5 MINUTE              |                    | 10 MINUTE             |                    |
|                                  |                          | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift |
|                                  |                          | (MHz)                 | ppm                | (MHz)                 | ppm                | (MHz)                 | ppm                | (MHz)                 | ppm                |
| 50                               | 110.0                    | 5199.988774           | -2.159             | 5199.989195           | -2.078             | 5199.989053           | -2.105             | 5199.988981           | -2.119             |
| 40                               | 110.0                    | 5199.988586           | -2.195             | 5199.988355           | -2.239             | 5199.988658           | -2.181             | 5199.988622           | -2.188             |
| 30                               | 110.0                    | 5199.989940           | -1.935             | 5199.989988           | -1.925             | 5199.989594           | -2.001             | 5199.990278           | -1.870             |
| 20                               | 110.0                    | 5199.991855           | -1.566             | 5199.991969           | -1.544             | 5199.991673           | -1.601             | 5199.991791           | -1.579             |
| 10                               | 110.0                    | 5199.992580           | -1.427             | 5199.992320           | -1.477             | 5199.992905           | -1.364             | 5199.992496           | -1.443             |
| 0                                | 110.0                    | 5199.991669           | -1.602             | 5199.991157           | -1.701             | 5199.991995           | -1.539             | 5199.992252           | -1.490             |
| -10                              | 110.0                    | 5199.990562           | -1.815             | 5199.990127           | -1.899             | 5199.990373           | -1.851             | 5199.990591           | -1.809             |
| -20                              | 110.0                    | 5199.988763           | -2.161             | 5199.989038           | -2.108             | 5199.989580           | -2.004             | 5199.989034           | -2.109             |

| FREQUENCY STABILITY VERSUS VOLTAGE |                          |                       |                    |                       |                    |                       |                    |                       |                    |
|------------------------------------|--------------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|
| OPERATING FREQUENCY: 5200MHz       |                          |                       |                    |                       |                    |                       |                    |                       |                    |
| TEMP.<br>(°C)                      | POWER<br>SUPPLY<br>(Vac) | 0 MINUTE              |                    | 2 MINUTE              |                    | 5 MINUTE              |                    | 10 MINUTE             |                    |
|                                    |                          | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift |
|                                    |                          | (MHz)                 | ppm                | (MHz)                 | ppm                | (MHz)                 | ppm                | (MHz)                 | ppm                |
| 20                                 | 93.5                     | 5199.990449           | -1.837             | 5199.990191           | -1.886             | 5199.990445           | -1.837             | 5199.990100           | -1.904             |
|                                    | 110.0                    | 5199.991855           | -1.566             | 5199.991969           | -1.544             | 5199.991673           | -1.601             | 5199.991791           | -1.579             |
|                                    | 126.5                    | 5199.993711           | -1.209             | 5199.993861           | -1.181             | 5199.993424           | -1.265             | 5199.993658           | -1.220             |



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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 and authorization 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:

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**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---**