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# VARIANT FCC TEST REPORT (15.247)

**REPORT NO.:** RF130814C33B-3

**MODEL NO.:** NeverLost® 6 Tablet

**FCC ID:** 2AA4L-HTZNLTABLET

**RECEIVED:** Jun. 09, 2014

**TESTED:** Jun. 21, 2014 ~ Jun. 22, 2014

**ISSUED:** Jul. 01, 2014

**APPLICANT:** MiTAC International Corp.

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
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**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   |
|----------------|-------------------|---------------|
| RF130814C33B-3 | Original release  | Jul. 01, 2014 |



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## 1. CERTIFICATION

**PRODUCT:** Automotive Navigation Device

**MODEL NO.:** NeverLost® 6 Tablet

**BRAND:** Hertz

**APPLICANT:** MiTAC International Corp.

**TESTED:** Jun. 21, 2014 ~ Jun. 22, 2014

**TEST SAMPLE:** Production Unit

**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10-2009

This report is issued as a supplementary report to BV ADT report no.: RF130814C33-3. This report shall be used by combining with its original report.

**PREPARED BY** : Gina Liu , **DATE** : Jul. 01, 2014  
Gina Liu / Specialist

**APPROVED BY** : Sam chen , **DATE** : Jul. 01, 2014  
Sam Chen / Senior Project Engineer

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| <b>APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)</b> |                             |               |                                                                              |
|------------------------------------------------------------------|-----------------------------|---------------|------------------------------------------------------------------------------|
| <b>STANDARD SECTION</b>                                          | <b>TEST TYPE</b>            | <b>RESULT</b> | <b>REMARK</b>                                                                |
| 15.207                                                           | AC Power Conducted Emission | NA            | Refer to Note                                                                |
| 15.247(d)<br>15.209                                              | Radiated Emissions          | PASS          | Meet the requirement of limit. Minimum passing margin is -2.24dB at 2390MHz. |
| 15.247(d)                                                        | Band Edge Measurement       | NA            | Refer to Note                                                                |
| 15.247(a)(2)                                                     | 6dB bandwidth               | NA            | Refer to Note                                                                |
| 15.247(b)                                                        | Conducted power             | NA            | Refer to Note                                                                |
| 15.247(e)                                                        | Power Spectral Density      | NA            | Refer to Note                                                                |
| 15.203                                                           | Antenna Requirement         | NA            | Refer to Note                                                                |

**NOTE:** Only radiated emissions test was performed for this addendum. Refer to original report for other test data.

### 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:

| <b>MEASUREMENT</b>  | <b>FREQUENCY</b> | <b>UNCERTAINTY</b> |
|---------------------|------------------|--------------------|
| Conducted emissions | 9kHz~30MHz       | 2.44 dB            |
| 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>EUT</b>                   | Automotive Navigation Device                                                                                                                                                           |
| <b>MODEL NO.</b>             | NeverLost® 6 Tablet                                                                                                                                                                    |
| <b>POWER SUPPLY</b>          | 12Vdc (battery)                                                                                                                                                                        |
| <b>MODULATION TYPE</b>       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM                                                                                                                        |
| <b>MODULATION TECHNOLOGY</b> | DSSS, OFDM                                                                                                                                                                             |
| <b>TRANSFER RATE</b>         | 802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps<br>802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps<br>802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps<br>802.11n: up to 300.0Mbps |
| <b>OPERATING FREQUENCY</b>   | <b>2.4GHz:</b> 2412 ~ 2462MHz<br><b>5.0GHz:</b> 5745 ~ 5825MHz                                                                                                                         |
| <b>NUMBER OF CHANNEL</b>     | <b>2.4GHz:</b><br>11 for 802.11b, 802.11g, 802.11n (20MHz)<br>7 for 802.11n (40MHz)<br><b>5.0GHz:</b><br>5 for 802.11a, 802.11n (20MHz)<br>2 for 802.11n (40MHz)                       |
| <b>ANTENNA TYPE</b>          | <b>2.4GHz:</b><br>PIFA antenna with 1.5dBi gain<br><b>5.0GHz:</b><br>PIFA antenna with 3.1dBi gain                                                                                     |
| <b>ANTENNA CONNECTOR</b>     | NA                                                                                                                                                                                     |
| <b>DATA CABLE</b>            | Refer to Note as below                                                                                                                                                                 |
| <b>I/O PORTS</b>             | Refer to user's manual                                                                                                                                                                 |
| <b>ACCESSORY DEVICES</b>     | Refer to Note as below                                                                                                                                                                 |

**NOTE:**

1. This report is issued as a supplementary report to BV ADT report no.: RF130814C33-3. The difference compared with original report is update Main board. Therefore, only radiated emissions test was performed and presented in the test report.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

| MODULATION MODE | TX FUNCTION |
|-----------------|-------------|
| 802.11b         | 1TX         |
| 802.11g         | 1TX         |
| 802.11a         | 1TX         |
| 802.11n (20MHz) | 2TX         |
| 802.11n (40MHz) | 2TX         |

3. The EUT contains following accessory devices.

| ITEM        | BRAND     | MODEL   | DESCRIPTION            |
|-------------|-----------|---------|------------------------|
| Battery     | Tian Yu   | N425    | Rating: 3.7Vdc, 920mAh |
| WWAN Module | CINTERION | PHS8-P  | --                     |
| WLAN Module | nFore     | NF3301  | --                     |
| NFC Module  | Jogtek    | TM-007A | --                     |
| BT Module   | nFore     | NF3301  | --                     |

4. 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

#### FOR 2.4GHz:

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 1       | 2412MHz   | 7       | 2442MHz   |
| 2       | 2417MHz   | 8       | 2447MHz   |
| 3       | 2422MHz   | 9       | 2452MHz   |
| 4       | 2427MHz   | 10      | 2457MHz   |
| 5       | 2432MHz   | 11      | 2462MHz   |
| 6       | 2437MHz   |         |           |

7 channels are provided for 802.11n (40MHz):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 3       | 2422MHz   | 7       | 2442MHz   |
| 4       | 2427MHz   | 8       | 2447MHz   |
| 5       | 2432MHz   | 9       | 2452MHz   |
| 6       | 2437MHz   |         |           |

#### FOR 5.0GHz (5745 ~ 5825MHz):

5 channels are provided for 802.11a, 802.11n (20MHz):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 149     | 5745MHz   | 161     | 5805MHz   |
| 153     | 5765MHz   | 165     | 5825MHz   |
| 157     | 5785MHz   |         |           |

2 channels are provided for 802.11n (40MHz):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 151     | 5755MHz   | 159     | 5795MHz   |

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

#### FOR 2.4GHz:

| EUT CONFIGURE MODE | APPLICABLE TO |       | DESCRIPTION       |
|--------------------|---------------|-------|-------------------|
|                    | RE $\geq$ 1G  | RE<1G |                   |
| A                  | √             | -     | Chain 0 only      |
| B                  | √             | √     | Chain 0 + Chain 1 |

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz

#### NOTE:

The antenna of the EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

#### 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 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) |
|--------------------|-----------------|-------------------|----------------|-----------------------|-----------------|------------------|
| A                  | 802.11g         | 1 to 11           | 1              | OFDM                  | BPSK            | 6.0              |
| B                  | 802.11n (20MHz) | 1 to 11           | 1              | OFDM                  | BPSK            | MCS8             |

#### 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 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) |
|--------------------|-----------------|-------------------|----------------|-----------------------|-----------------|------------------|
| B                  | 802.11n (20MHz) | 1 to 11           | 1              | OFDM                  | BPSK            | MCS8             |

#### TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY  |
|---------------|--------------------------|----------------------|------------|
| RE $\geq$ 1G  | 25deg. C, 65%RH          | 120Vac, 60Hz         | Peter Weng |
| RE<1G         | 25deg. C, 65%RH          | 120Vac, 60Hz         | Peter Weng |

### FOR 5.0GHz (5745 ~ 5825MHz):

| EUT<br>CONFIGURE<br>MODE | APPLICABLE TO |       | DESCRIPTION       |
|--------------------------|---------------|-------|-------------------|
|                          | RE $\geq$ 1G  | RE<1G |                   |
| A                        | √             | -     | Chain 0 only      |
| B                        | √             | √     | Chain 0 + Chain 1 |

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz

#### NOTE:

The antenna of the EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

### 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 and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | MODE            | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA<br>RATE<br>(Mbps) |
|--------------------------|-----------------|----------------------|-------------------|--------------------------|--------------------|------------------------|
| A                        | 802.11a         | 149 to 165           | 149               | OFDM                     | BPSK               | 6.0                    |
| B                        | 802.11n (40MHz) | 151 to 159           | 159               | OFDM                     | BPSK               | MCS8                   |

### 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 and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | MODE            | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA<br>RATE<br>(Mbps) |
|--------------------------|-----------------|----------------------|-------------------|--------------------------|--------------------|------------------------|
| B                        | 802.11n (40MHz) | 151 to 159           | 159               | OFDM                     | BPSK               | MCS8                   |

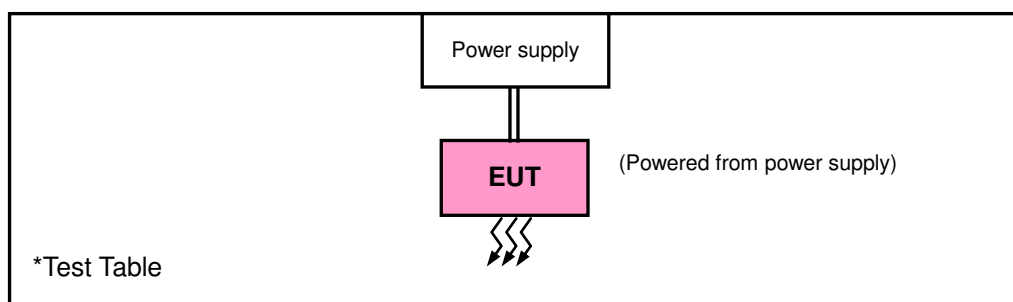
### TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER<br>(SYSTEM) | TESTED BY  |
|---------------|--------------------------|-------------------------|------------|
| RE $\geq$ 1G  | 25deg. C, 65%RH          | 120Vac, 60Hz            | Peter Weng |
| RE<1G         | 25deg. C, 65%RH          | 120Vac, 60Hz            | Peter Weng |

### 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units.

#### 3.3.1 CONFIGURATION OF SYSTEM UNDER TEST



### 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)**

**558074 D01 DTS Meas Guidance v03r01**

**662911 D01 Multiple Transmitter Output v02**

**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.

## 4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

### 4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

| FREQUENCIES<br>(MHz) | FIELD STRENGTH<br>(microvolts/meter) | MEASUREMENT DISTANCE<br>(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. 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 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER                     | MODEL NO.      | SERIAL NO.          | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|------------------------------------------------|----------------|---------------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ               | ESCI           | 100424              | Sep. 09, 2013       | Sep. 08, 2014           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ           | FSU 43         | 100115              | Dec. 18, 2013       | Dec. 17, 2014           |
| BILOG Antenna<br>SCHWARZBECK                   | VULB9168       | 9168-155            | Feb. 26, 2014       | Feb. 25, 2015           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9120D     | 9120D-404           | Jan. 05, 2014       | Jan. 04, 2015           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9170      | 148                 | Jul. 15, 2013       | Jul. 14, 2014           |
| Loop Antenna                                   | HFH2-Z2        | 100070              | Mar. 06, 2014       | Mar. 05, 2016           |
| Preamplifier<br>EMCI                           | EMC 012645     | 980115              | Dec. 26, 2013       | Dec. 25, 2014           |
| Preamplifier<br>EMCI                           | EMC 184045     | 980116              | Jan. 13, 2014       | Jan. 12, 2015           |
| Preamplifier<br>EMCI                           | EMC 330H       | 980112              | Dec. 27, 2013       | Dec. 26, 2014           |
| RF signal cable<br>HUBER+SUHNNER               | SUCOFLEX 104   | 309219/4<br>2950114 | Oct. 18, 2013       | Oct. 17, 2014           |
| RF signal cable<br>HUBER+SUHNNER               | SUCOFLEX 104   | 250130/4            | Oct. 18, 2013       | Oct. 17, 2014           |
| RF signal cable<br>Worken                      | RG-213         | NA                  | Nov. 07, 2013       | Nov. 06, 2014           |
| Software<br>BV ADT                             | E3<br>6.120103 | NA                  | NA                  | NA                      |
| Antenna Tower<br>MF                            | MFA-440H       | NA                  | NA                  | NA                      |
| Turn Table<br>MF                               | MFT-201SS      | NA                  | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller<br>MF | MF-7802        | NA                  | NA                  | NA                      |
| Power Meter                                    | ML2495A        | 1012010             | Jul. 31, 2013       | Jul. 30, 2014           |
| Power Sensor                                   | MA2411B        | 1315050             | Jul. 31, 2013       | Jul. 30, 2014           |

- 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. The test was performed in HwaYa Chamber 10.
  4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  5. The FCC Site Registration No. is 690701.
  6. The IC Site Registration No. is IC 7450F-10.

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

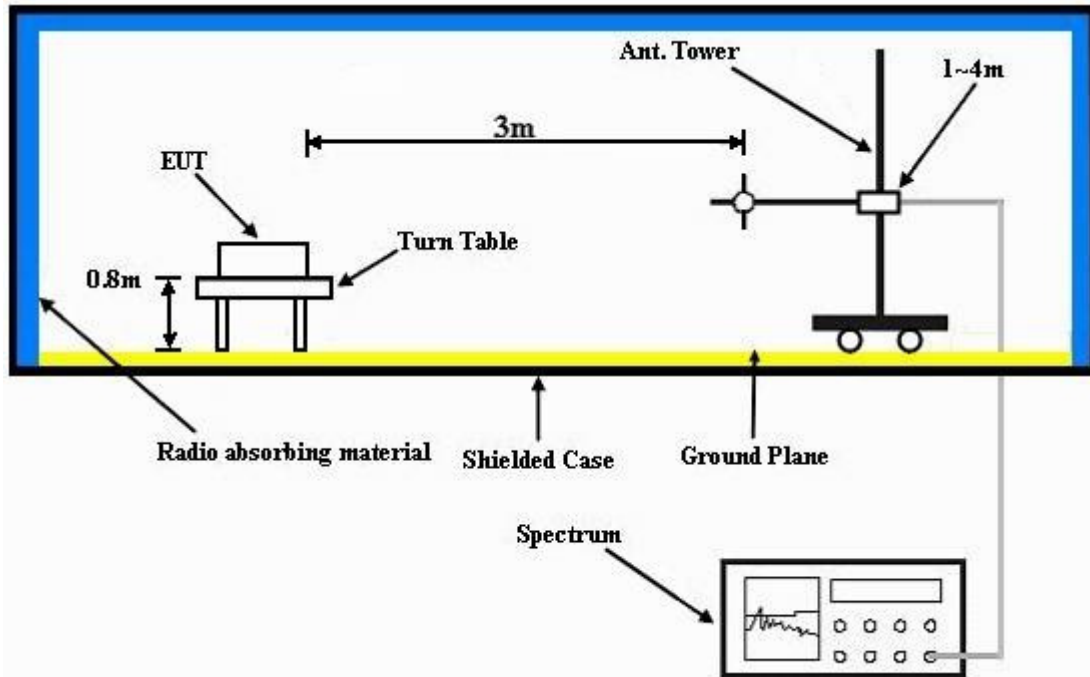
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 1kHz(Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



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

#### 4.1.6 EUT OPERATING CONDITIONS

- Plugged the EUT into a notebook through a convertible board and placed on a test table.
- The notebook ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.



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## 4.1.7 TEST RESULTS

## ABOVE 1GHz WORST-CASE DATA

## MODE A

802.11g

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 1       | FREQUENCY RANGE    | 1GHz ~ 25GHz              |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Peter Weng                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 2390                                                | 50.46                   | 57.53             | 54             | -3.54       | 26.91                 | 3.54            | 37.52              | 118                 | 259                  | Average |
| 2390                                                | 69.12                   | 76.19             | 74             | -4.88       | 26.91                 | 3.54            | 37.52              | 118                 | 259                  | Peak    |
| 2412                                                | 97.59                   | 104.61            |                |             | 26.96                 | 3.54            | 37.52              | 118                 | 259                  | Average |
| 2412                                                | 107.47                  | 114.49            |                |             | 26.96                 | 3.54            | 37.52              | 118                 | 259                  | Peak    |
| 2484                                                | 36.26                   | 42.83             | 54             | -17.74      | 27.15                 | 3.6             | 37.32              | 118                 | 259                  | Average |
| 2484                                                | 56.37                   | 62.94             | 74             | -17.63      | 27.15                 | 3.6             | 37.32              | 118                 | 259                  | Peak    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 2390                                                | 46.83                   | 53.9              | 54             | -7.17       | 26.91                 | 3.54            | 37.52              | 103                 | 276                  | Average |
| 2390                                                | 64.74                   | 71.81             | 74             | -9.26       | 26.91                 | 3.54            | 37.52              | 103                 | 276                  | Peak    |
| 2412                                                | 93.65                   | 100.67            |                |             | 26.96                 | 3.54            | 37.52              | 103                 | 276                  | Average |
| 2412                                                | 103.28                  | 110.3             |                |             | 26.96                 | 3.54            | 37.52              | 103                 | 276                  | Peak    |
| 2484                                                | 35.47                   | 42.04             | 54             | -18.53      | 27.15                 | 3.6             | 37.32              | 103                 | 276                  | Average |
| 2484                                                | 56.11                   | 62.68             | 74             | -17.89      | 27.15                 | 3.6             | 37.32              | 103                 | 276                  | Peak    |

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value
- 2412MHz: Fundamental frequency.



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**MODE B****802.11n (20MHz)**

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 1       | FREQUENCY RANGE    | 1GHz ~ 25GHz              |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Peter Weng                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 2390                                                | 50.68                   | 57.75             | 54             | -3.32       | 26.91                 | 3.54            | 37.52              | 117                 | 260                  | Average |
| 2390                                                | 68.79                   | 75.86             | 74             | -5.21       | 26.91                 | 3.54            | 37.52              | 117                 | 260                  | Peak    |
| 2412                                                | 96.33                   | 103.35            |                |             | 26.96                 | 3.54            | 37.52              | 117                 | 260                  | Average |
| 2412                                                | 106.43                  | 113.45            |                |             | 26.96                 | 3.54            | 37.52              | 117                 | 260                  | Peak    |
| 2484                                                | 36.29                   | 42.86             | 54             | -17.71      | 27.15                 | 3.6             | 37.32              | 117                 | 260                  | Average |
| 2484                                                | 55.81                   | 62.38             | 74             | -18.19      | 27.15                 | 3.6             | 37.32              | 117                 | 260                  | Peak    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 2390                                                | 51.76                   | 58.83             | 54             | -2.24       | 26.91                 | 3.54            | 37.52              | 100                 | 91                   | Average |
| 2390                                                | 71.49                   | 78.56             | 74             | -2.51       | 26.91                 | 3.54            | 37.52              | 100                 | 91                   | Peak    |
| 2412                                                | 96.55                   | 103.57            |                |             | 26.96                 | 3.54            | 37.52              | 100                 | 91                   | Average |
| 2412                                                | 107.25                  | 114.27            |                |             | 26.96                 | 3.54            | 37.52              | 100                 | 91                   | Peak    |
| 2484                                                | 35.37                   | 41.94             | 54             | -18.63      | 27.15                 | 3.6             | 37.32              | 100                 | 91                   | Average |
| 2484                                                | 55.83                   | 62.4              | 74             | -18.17      | 27.15                 | 3.6             | 37.32              | 100                 | 91                   | Peak    |

**REMARKS:**

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value
- 2412MHz: Fundamental frequency.



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## BELOW 1GHz WORST-CASE DATA:

## MODE B

## 802.11n (20MHz)

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                 |
|--------------------------|-----------------|--------------------|-----------------|
| CHANNEL                  | Channel 1       | FREQUENCY RANGE    | 30MHz ~ 1GHz    |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>QP |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Peter Weng      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK |
| 32.7                                                | 17.06                   | 35.1              | 40             | -22.94      | 12.47                 | 0.58            | 31.09              | 140                 | 177                  | Peak   |
| 143.13                                              | 18.78                   | 36.63             | 43.5           | -24.72      | 12.47                 | 1.31            | 31.63              | 100                 | 343                  | Peak   |
| 275.16                                              | 24.07                   | 41.83             | 46             | -21.93      | 12.22                 | 1.94            | 31.92              | 126                 | 93                   | Peak   |
| 330.1                                               | 30.72                   | 46.71             | 46             | -15.28      | 13.66                 | 2.16            | 31.81              | 109                 | 358                  | Peak   |
| 418.3                                               | 27.02                   | 40.87             | 46             | -18.98      | 15.7                  | 2.49            | 32.04              | 100                 | 299                  | Peak   |
| 750.1                                               | 26.33                   | 32.54             | 46             | -19.67      | 21.52                 | 3.57            | 31.3               | 124                 | 76                   | Peak   |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK |
| 30.81                                               | 28.03                   | 46.44             | 40             | -11.97      | 12.14                 | 0.57            | 31.12              | 121                 | 77                   | Peak   |
| 165                                                 | 18.37                   | 36.51             | 43.5           | -25.13      | 12.25                 | 1.42            | 31.81              | 100                 | 30                   | Peak   |
| 241.95                                              | 23.26                   | 42.13             | 46             | -22.74      | 11.15                 | 1.8             | 31.82              | 109                 | 329                  | Peak   |
| 461.7                                               | 29.43                   | 42.19             | 46             | -16.57      | 16.56                 | 2.65            | 31.97              | 100                 | 311                  | Peak   |
| 572.3                                               | 27.18                   | 37.29             | 46             | -18.82      | 18.97                 | 3.01            | 32.09              | 116                 | 78                   | Peak   |
| 784.4                                               | 27.15                   | 32.9              | 46             | -18.85      | 22.01                 | 3.66            | 31.42              | 120                 | 35                   | Peak   |

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value

## 5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

### 5.1 RADIATED EMISSION MEASUREMENT

#### 5.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

| FREQUENCIES<br>(MHz) | FIELD STRENGTH<br>(microvolts/meter) | MEASUREMENT DISTANCE<br>(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. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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#### 5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

#### 5.1.3 TEST PROCEDURES

Same as item 4.1.3.

#### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 5.1.5 TEST SETUP

Same as item 4.1.5.

#### 5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



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## 5.1.7 TEST RESULTS

## ABOVE 1GHz WORST-CASE DATA :

## MODE A

## 802.11a

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 149     | FREQUENCY RANGE    | 1GHz ~ 40GHz              |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Peter Weng                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 5725                                                | 62.76                   | 62.64             | 75.31          | -12.55      | 31.96                 | 5.59            | 37.43              | 107                 | 175                  | Average |
| 5725                                                | 76.7                    | 76.58             | 83.68          | -6.98       | 31.96                 | 5.59            | 37.43              | 107                 | 175                  | Peak    |
| 5745                                                | 95.31                   | 95.19             |                |             | 31.99                 | 5.6             | 37.47              | 107                 | 175                  | Average |
| 5745                                                | 103.68                  | 103.56            |                |             | 31.99                 | 5.6             | 37.47              | 107                 | 175                  | Peak    |
| 5850                                                | 38.86                   | 38.56             | 75.31          | -36.45      | 32.15                 | 5.66            | 37.51              | 107                 | 175                  | Average |
| 5850                                                | 57.69                   | 57.39             | 83.68          | -25.99      | 32.15                 | 5.66            | 37.51              | 107                 | 175                  | Peak    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 5725                                                | 62.76                   | 62.64             | 75.31          | -12.55      | 31.96                 | 5.59            | 37.43              | 107                 | 175                  | Average |
| 5725                                                | 76.7                    | 76.58             | 83.68          | -6.98       | 31.96                 | 5.59            | 37.43              | 107                 | 175                  | Peak    |
| 5745                                                | 95.31                   | 95.19             |                |             | 31.99                 | 5.6             | 37.47              | 107                 | 175                  | Average |
| 5745                                                | 103.68                  | 103.56            |                |             | 31.99                 | 5.6             | 37.47              | 107                 | 175                  | Peak    |
| 5850                                                | 38.86                   | 38.56             | 75.31          | -36.45      | 32.15                 | 5.66            | 37.51              | 107                 | 175                  | Average |
| 5850                                                | 57.69                   | 57.39             | 83.68          | -25.99      | 32.15                 | 5.66            | 37.51              | 107                 | 175                  | Peak    |

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value
- 5745MHz: Fundamental frequency.
- 5725MHz & 5850MHz: Out of restricted band



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**MODE B****802.11n (40MHz)**

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 159     | FREQUENCY RANGE    | 1GHz ~ 40GHz              |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Peter Weng                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 5725                                                | 55.72                   | 55.6              | 68.28          | -12.56      | 31.96                 | 5.59            | 37.43              | 100                 | 68                   | Average |
| 5725                                                | 67.14                   | 67.02             | 77.5           | -10.36      | 31.96                 | 5.59            | 37.43              | 100                 | 68                   | Peak    |
| 5795                                                | 88.28                   | 88.12             |                |             | 32.07                 | 5.63            | 37.54              | 100                 | 68                   | Average |
| 5795                                                | 97.5                    | 97.34             |                |             | 32.07                 | 5.63            | 37.54              | 100                 | 68                   | Peak    |
| 5850                                                | 53                      | 52.7              | 68.28          | -15.28      | 32.15                 | 5.66            | 37.51              | 100                 | 68                   | Average |
| 5850                                                | 67.11                   | 66.81             | 77.5           | -10.39      | 32.15                 | 5.66            | 37.51              | 100                 | 68                   | Peak    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK  |
| 5725                                                | 60.04                   | 59.92             | 73.36          | -13.32      | 31.96                 | 5.59            | 37.43              | 120                 | 41                   | Average |
| 5725                                                | 72.45                   | 72.33             | 83.22          | -10.77      | 31.96                 | 5.59            | 37.43              | 120                 | 41                   | Peak    |
| 5795                                                | 93.36                   | 93.2              |                |             | 32.07                 | 5.63            | 37.54              | 120                 | 41                   | Average |
| 5795                                                | 103.22                  | 103.06            |                |             | 32.07                 | 5.63            | 37.54              | 120                 | 41                   | Peak    |
| 5850                                                | 58.91                   | 58.61             | 73.36          | -14.45      | 32.15                 | 5.66            | 37.51              | 120                 | 41                   | Average |
| 5850                                                | 71.43                   | 71.13             | 83.22          | -11.79      | 32.15                 | 5.66            | 37.51              | 120                 | 41                   | Peak    |

**REMARKS:**

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value
- 5795MHz: Fundamental frequency.
- 5725MHz & 5850MHz: Out of restricted band



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## BELOW 1GHz WORST-CASE DATA :

## MODE B

## 802.11n (40MHz)

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                 |
|--------------------------|-----------------|--------------------|-----------------|
| CHANNEL                  | Channel 159     | FREQUENCY RANGE    | 30MHz ~ 1GHz    |
| INPUT POWER (SYSTEM)     | 120Vac, 60 Hz   | DETECTOR FUNCTION  | Peak (PK)<br>QP |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 65%RH | TESTED BY          | Peter Weng      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK |
| 55.92                                               | 16.94                   | 35.13             | 40             | -23.06      | 12.35                 | 0.8             | 31.34              | 104                 | 21                   | Peak   |
| 153.93                                              | 19.13                   | 36.77             | 43.5           | -24.37      | 12.72                 | 1.36            | 31.72              | 106                 | 64                   | Peak   |
| 264.09                                              | 25.76                   | 43.92             | 46             | -20.24      | 11.88                 | 1.88            | 31.92              | 100                 | 111                  | Peak   |
| 330.1                                               | 30.53                   | 46.52             | 46             | -15.47      | 13.66                 | 2.16            | 31.81              | 109                 | 263                  | Peak   |
| 505.8                                               | 24.62                   | 35.96             | 46             | -21.38      | 17.46                 | 2.8             | 31.6               | 105                 | 340                  | Peak   |
| 759.2                                               | 27.42                   | 33.6              | 46             | -18.58      | 21.66                 | 3.6             | 31.44              | 101                 | 292                  | Peak   |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| FREQ. (MHz)                                         | EMISSION LEVEL (dBuV/m) | READ LEVEL (dBuV) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | PREAMP FACTOR (dB) | ANTENNA HEIGHT (cm) | TABLE ANGLE (Degree) | REMARK |
| 30.81                                               | 27.69                   | 46.1              | 40             | -12.31      | 12.14                 | 0.57            | 31.12              | 127                 | 80                   | Peak   |
| 153.93                                              | 18.67                   | 36.31             | 43.5           | -24.83      | 12.72                 | 1.36            | 31.72              | 100                 | 289                  | Peak   |
| 285.96                                              | 25.18                   | 42.38             | 46             | -20.82      | 12.54                 | 1.99            | 31.73              | 110                 | 115                  | Peak   |
| 330.1                                               | 22.56                   | 38.55             | 46             | -23.44      | 13.66                 | 2.16            | 31.81              | 100                 | 217                  | Peak   |
| 461.7                                               | 28.95                   | 41.71             | 46             | -17.05      | 16.56                 | 2.65            | 31.97              | 124                 | 264                  | Peak   |
| 659.8                                               | 26.07                   | 34.41             | 46             | -19.93      | 20.33                 | 3.28            | 31.95              | 108                 | 319                  | Peak   |

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value



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## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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## 7. 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.

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

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



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## **8. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No modifications were made to the EUT by the lab during the test.

**---END---**