# FCC Test Report (15.247)

| | |
|---|---|
| **Report No.:** | RF131223E02C |
| **FCC ID:** | XU8TEW818DRU |
| **Test Model:** | TEW-818DRU |
| **Received Date:** | Oct. 28, 2015 |
| **Test Date:** | Nov. 03 to 09, 2015 |
| **Issued Date:** | Dec. 24, 2015 |
| **Applicant:** | TRENDnet, Inc. |
| **Address:** | 20675 Manhattan Place, Torrance, CA 90501 |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **Lab Address:** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |
| **Test Location (1):** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |
| **Test Location (2):** | No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C. |

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF131223E02C | Original release. | Dec. 24, 2015 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | AC1900 Dual Band Wireless Router |
| **Brand:** | TRENDnet |
| **Test Model:** | TEW-818DRU |
| **Sample Status:** | ENGINEERING SAMPLE |
| **Applicant:** | TRENDnet, Inc. |
| **Test Date:** | Nov. 03 to 09, 2015 |
| **Standards:** | 47 CFR FCC Part 15, Subpart C (Section 15.247)<br>ANSI C63.10: 2013 |

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

**Prepared by :** _____ , **Date:** Dec. 24, 2015
Lori Chung / Specialist

**Approved by :** _____ , **Date:** Dec. 24, 2015
May Chen / Manager

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (SECTION 15.247) | | | |
|---|---|---|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -0.35dB at 0.17344MHz. |
| 15.205 / 15.209 / 15.247(d) | Radiated Emissions and Band Edge Measurement | PASS | Meet the requirement of limit. Minimum passing margin is -7.6dB at 932.00MHz. |
| 15.203 | Antenna Requirement | PASS | Antenna connector is i-pex(MHF) not a standard connector. |

**NOTE:** 1. The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.25GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

2. This report is prepared for FCC Class II permissive change. (Added one new adapter).

### 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 | Expended Uncertainty (k=2) (±) |
|---|---|---|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 2.86 dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GMHz | 5.37 dB |

### 2.2 Modification Record

There were no modifications required for compliance.

## 3 General Information

### 3.1 General Description of EUT

| | |
|---|---|
| Product | AC1900 Dual Band Wireless Router |
| Brand | TRENDnet |
| Test Model | TEW-818DRU |
| Status of EUT | ENGINEERING SAMPLE |
| Power Supply Rating | DC 12V from power adapter |
| Modulation Type | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz |
| Modulation Technology | DSSS,OFDM |
| Transfer Rate | **2.4GHz:**<br>802.11b: up to 11Mbps<br>802.11g: up to 54Mbps<br>802.11n: up to 600Mbps<br>**5GHz:**<br>802.11a: up to 54Mbps<br>802.11n: up to 450Mbps<br>802.11ac: up to 1300Mbps |
| Operating Frequency | **For 5GHz:** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz |
| | **For 2.4GHz:** 2.412 ~ 2.462GHz |
| Number of Channel | **For 5GHz**<br>9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)<br>4 for 802.11n (HT40), 802.11ac (VHT40)<br>2 for 802.11ac (VHT80) |
| | **For 2.4GHz**<br>11 for 802.11b, 802.11g, 802.11n (HT20)<br>7 for 802.11n (HT40) |
| Output Power | **For 5GHz**<br>802.11a: 450.817 mW<br>802.11ac (VHT20): 350.93mW<br>802.11ac (VHT40): 345.754mW<br>802.11ac (VHT80): 115.388mW<br>**For 2.4GHz**<br>802.11b: 218.273mW<br>802.11g: 412.098mW<br>802.11n (HT20): 705.471mW<br>802.11n (HT40): 263.260mW |
| Antenna Type | Refer to Note |
| Antenna Connector | Refer to Note |
| Accessory Device | Adapter x1 |
| Data Cable Supplied | Ethernet Cable (unshielded, 1.5m) x1 |

Note:

1. This report is prepared for FCC Class II permissive change. This report is used in conjunction with report No: RF131223E02 and adds the following additional information:
   - ◆ Added one new adapter as following table:

| Original | | | | |
|---|---|---|---|---|
| No | Brand | Model No. | Plug | Spec. |
| 1 | HON-KWANG | HK-AX-120A200-US | US | Input: 100-240V, 800mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 2 | HON-KWANG | HK-AX-120A200-EU | EU | Input: 100-240V, 800mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 3 | HON-KWANG | HK-AX-120A200-GB | UK | Input: 100-240V, 800mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 4 | HON-KWANG | HK-AX-120A200-AU | AU | Input: 100-240V, 800mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 5 | KTEC | KSASB0241200200HU | US | Input: 100-240V, 600mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 6 | KTEC | KSASB0241200200HE | EU | Input: 100-240V, 600mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 7 | KTEC | KSASB0241200200HK | UK | Input: 100-240V, 600mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| 8 | KTEC | KSASB0241200200HA | AU | Input: 100-240V, 600mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |
| Newly | | | | |
| No | Brand | Model No. | Plug | Spec. |
| 9 | HON-KWANG | HK-AY-120A200-US | US | Input: 100-240V, 800mA, 47~63Hz<br>Output: 12V, 2000mA<br>DC output cable: 1.5m, unshielded |

2. According to above conditions, only radiated emissions below 1GHz / conducted emissions need to be performed. And all data was verified to meet the requirements.
3. 2.4GHz and 5GHz technology can transmit at same time.
4. The antennas provided to the EUT, please refer to the following table:

| Ant. No. | Transmitter Circuit | Gain (dBi) (Include cable loss) | Antenna Type | Connecter Type | Frequency range (GHz to GHz) | Cable Length (mm) |
|---|---|---|---|---|---|---|
| 1 | Chain (0) | 2.5 | Dipole | i-pex (MHF) | 2.4~2.4835 | 78 |
| | Chain (2) | 4.8 | | | 5.15~5.85 | |
| 2 | Chain (1) | 6 | Dipole | i-pex (MHF) | 2.4~2.4835 | 90 |
| | | | | | 5.15~5.85 | |
| 3 | Chain (2) | 5.5 | Dipole | i-pex (MHF) | 2.4~2.4835 | 185 |
| | Chain (0) | 6 | | | 5.15~5.85 | |
| Note:<br>1. From above antennas, 802.11b mode will fix transmission on Chain (0).<br>2. From above antennas, 802.11g mode the worst case was found in Chain (1).<br>3. From above antennas, 802.11a mode the worst case was found in Chain (0).<br>Therefore only the test data of the mode was recorded in this report. | | | | | | |

5. The EUT incorporates a MIMO function.

| MODULATION MODE | Tx/Rx FUNCTION |
|---|---|
| **802.11a** | 1TX (Diversity) / 3RX |
| **802.11b** | 1TX (Fixed Chain 0) / 3RX |
| **802.11g** | 1TX (Diversity) / 3RX |
| **802.11n (HT20)** | 3TX/3RX |
| **802.11n (HT40)** | 3TX/3RX |
| **802.11ac (VHT20)** | 3TX/3RX |
| **802.11ac (VHT40)** | 3TX/3RX |
| **802.11ac (VHT80)** | 3TX/3RX |

Note: 1. The EUT support 2.4GHz band MIMO without beam forming function and 5GHz band MIMO with beam forming function.

2. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

6. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.
7. When the EUT operating in 802.11ac and support 256QAM of 802.11n (HT40) for 2.4GHz band, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 9.
8. 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

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

| 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 (HT40):

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

### 3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

**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.

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11n (HT20) | 1 to 11 | 6 | OFDM | BPSK | 6.5 |

**Power Line Conducted Emission Test:**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11n (HT20) | 1 to 11 | 6 | OFDM | BPSK | 6.5 |

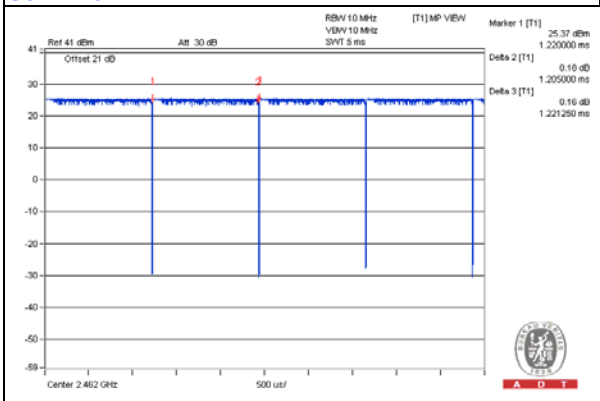
**Test Condition:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| RE<1G | 26deg. C, 70%RH | 120Vac, 60Hz | Weiwei Lo |
| PLC | 24deg. C, 55%RH | 120Vac, 60Hz | Jason Huang |

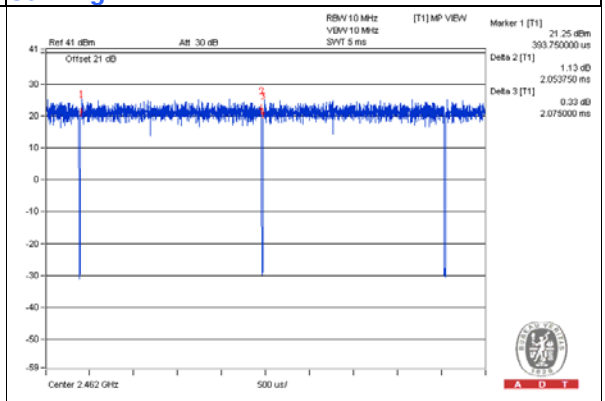
### 3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
**802.11b**: Duty cycle = 1.205 ms/1.221 ms = 0.987
**802.11g**: Duty cycle = 2.054 ms/2.075 ms = 0.99
**802.11n (HT20):** Duty cycle = 1.914 ms/1.935 ms = 0.989
**802.11n (HT40):** Duty cycle = 0.941 ms/0.963 ms = 0.977, Duty factor = 10 * log( 1/0.977) = 0.1

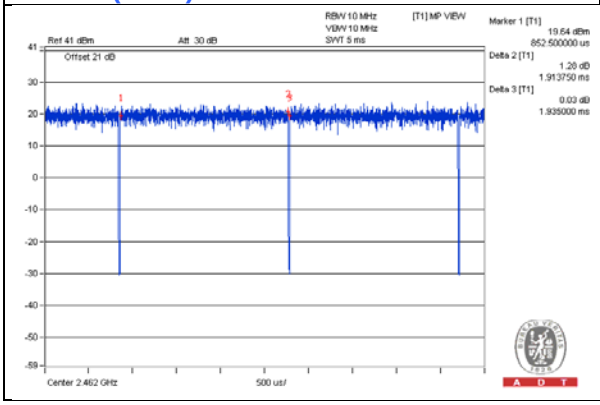
**802.11b**



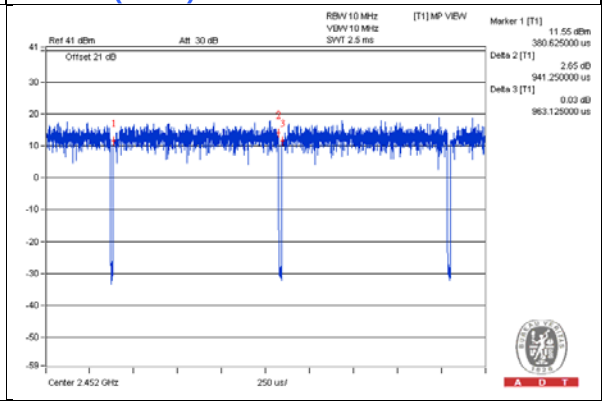

**802.11g**




**802.11n (HT20)**




**802.11n (HT40)**



### 3.4 Description of Support Units

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

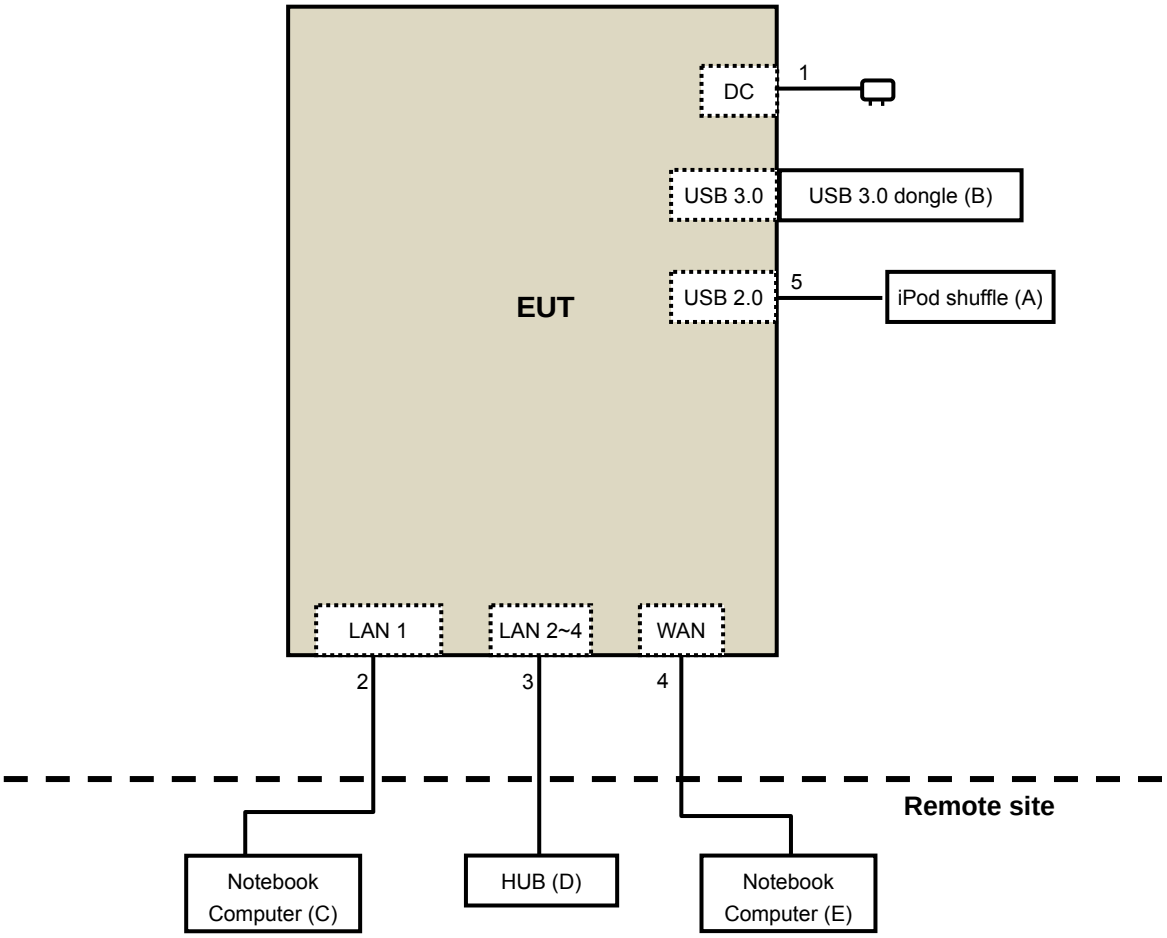
| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | iPod shuffle | Apple | MD778TA/A | CC4JMCMXF4T1 | NA | Provided by Lab |
| B. | USB 3.0 dongle | NA | NA | NA | NA | Provided by Lab |
| C. | Notebook Computer | DELL | E6420 | 482T3R1 | FCC DoC | Provided by Lab |
| D. | HUB | ZyXEL | ES-116P | S060H02000215 | FCC DoC | Provided by Lab |
| E. | Notebook Computer | DELL | PP32LA | GSLB32S | FCC DoC | Provided by Lab |

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items E~F acted as communication partners to transfer data.

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| 1. | DC | 1 | 1.5 | No | 0 | Supplied by Client |
| 2. | RJ45 | 1 | 10 | No | 0 | Provided by Lab |
| 3. | RJ45 | 3 | 10 | No | 0 | Provided by Lab |
| 4. | RJ45 | 1 | 10 | No | 0 | Provided by Lab |
| 5. | USB | 1 | 0.1 | Yes | 0 | Provided by Lab |

### 3.4.1 Configuration of System under Test



## 3.5 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)**
**KDB 558074 D01 DTS Meas Guidance v03r03**
**KDB 662911 D01 Multiple Transmitter Output v02r01**
ANSI C63.10-2013

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

**NOTE:** The EUT 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

### 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 (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. 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. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Test Receiver<br>Agilent | N9038A | MY51210105 | July 24, 2015 | July 23, 2016 |
| Pre-Amplifier(*)<br>EMCI | EMC001340 | 980142 | Jan. 13, 2014 | Jan. 12, 2016 |
| Loop Antenna(*)<br>Electro-Metrics | EM-6879 | 264 | Dec. 16, 2014 | Dec. 15, 2016 |
| RF Cable | NA | LOOPCAB-001<br>LOOPCAB-002 | Jan. 18, 2015 | Jan. 17, 2016 |
| Pre-Amplifier<br>Mini-Circuits | ZFL-1000VH2B | AMP-ZFL-03 | Nov. 12, 2014 | Nov. 11, 2015 |
| Trilog Broadband Antenna<br>SCHWARZBECK | VULB 9168 | 9168-360 | Feb. 06, 2015 | Feb. 05, 2016 |
| RF Cable | 8D-FB | CHGCAB-001-1<br>CHGCAB-001-2 | Oct. 03, 2015 | Oct. 02, 2016 |
| | RF-141 | CHGCAB-004 | Oct. 03, 2015 | Oct. 02, 2016 |
| Software | ADT_Radiated_V8.7.07 | NA | NA | NA |
| Antenna Tower & Turn Table<br>CT | NA | NA | NA | NA |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Loop antenna was used for all emissions below 30 MHz.
4. The test was performed in 966 Chamber No. G.
5. The FCC Site Registration No. is 966073.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: Nov. 09, 2015

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

**Note:**

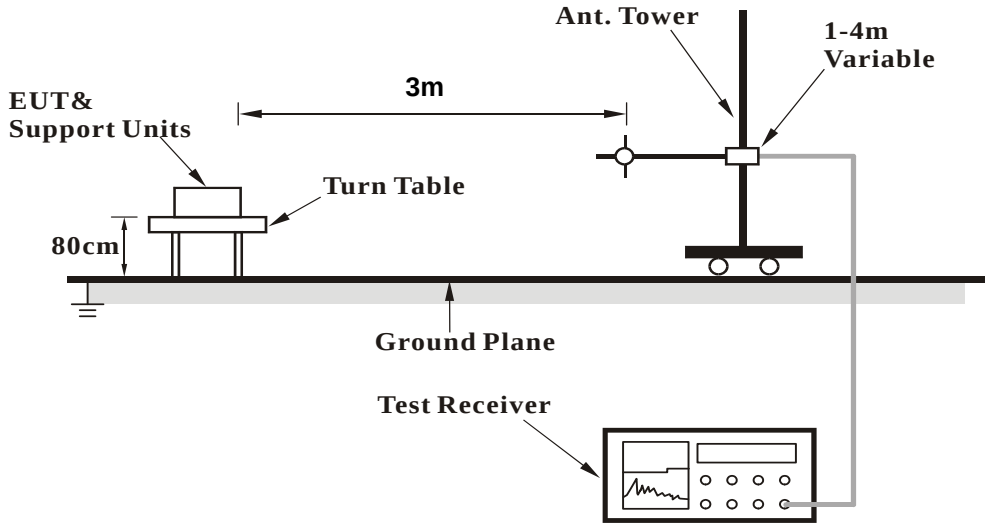
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

No deviation.

4.1.5 Test Setup

**<Frequency Range below 1GHz>**




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

4.1.6 EUT Operating Conditions

1. Place the EUT on testing table.
2. Prepare computer system (support unit C) to act as communication partner.
3. The communication partner runs test program “Mtool_2.0.1.0.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

**Below 1GHz Data:**

**802.11n (HT20)**

| CHANNEL | TX Channel 6 | DETECTOR FUNCTION | Quasi-Peak (QP) |
|---|---|---|---|
| FREQUENCY RANGE | Below 1GHz | | |

| 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 | 151.25 | 35.5 QP | 43.5 | -8.0 | 2.00 H | 280 | 43.13 | -7.65 |
| 2 | 282.90 | 37.9 QP | 46.0 | -8.1 | 1.00 H | 309 | 45.10 | -7.20 |
| 3 | 400.00 | 32.7 QP | 46.0 | -13.3 | 2.00 H | 329 | 36.73 | -4.05 |
| 4 | 500.00 | 31.6 QP | 46.0 | -14.4 | 1.50 H | 48 | 33.16 | -1.55 |
| 5 | 800.00 | 38.1 QP | 46.0 | -7.9 | 1.00 H | 89 | 33.60 | 4.51 |
| **6** | **932.00** | **38.5 QP** | **46.0** | **-7.6** | **1.50 H** | **85** | **31.67** | **6.78** |
| **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 | 114.80 | 31.4 QP | 43.5 | -12.1 | 1.50 V | 320 | 48.83 | -17.42 |
| 2 | 153.50 | 33.2 QP | 43.5 | -10.3 | 1.50 V | 45 | 48.13 | -14.95 |
| 3 | 283.50 | 36.2 QP | 46.0 | -9.9 | 1.50 V | 190 | 50.74 | -14.59 |
| 4 | 400.00 | 35.2 QP | 46.0 | -10.9 | 1.50 V | 66 | 46.89 | -11.74 |
| 5 | 500.00 | 33.2 QP | 46.0 | -12.8 | 1.00 V | 91 | 42.37 | -9.18 |
| 6 | 800.00 | 38.3 QP | 46.0 | -7.7 | 1.00 V | 288 | 41.85 | -3.56 |

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

| Frequency (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Test Receiver R&S | ESCS 30 | 100375 | May 06, 2015 | May 05, 2016 |
| Line-Impedance Stabilization Network (for EUT) SCHWARZBECK | NSLK-8127 | 8127-522 | Sep. 01, 2015 | Aug. 31, 2016 |
| Line-Impedance Stabilization Network (for Peripheral ) R&S | ENV216 | 100072 | June 11, 2015 | June 10, 2016 |
| RF Cable | 5D-FB | COCCAB-001 | Mar. 09, 2015 | Mar. 08, 2016 |
| 50 ohms Terminator | N/A | EMC-03 | Sep. 23, 2015 | Sep. 22, 2016 |
| 50 ohms Terminator | N/A | EMC-02 | Oct. 01, 2015 | Sep. 30, 2016 |
| Software BVADT | BVADT_Cond_ V7.3.7.3 | NA | NA | NA |

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Nov. 03, 2015

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

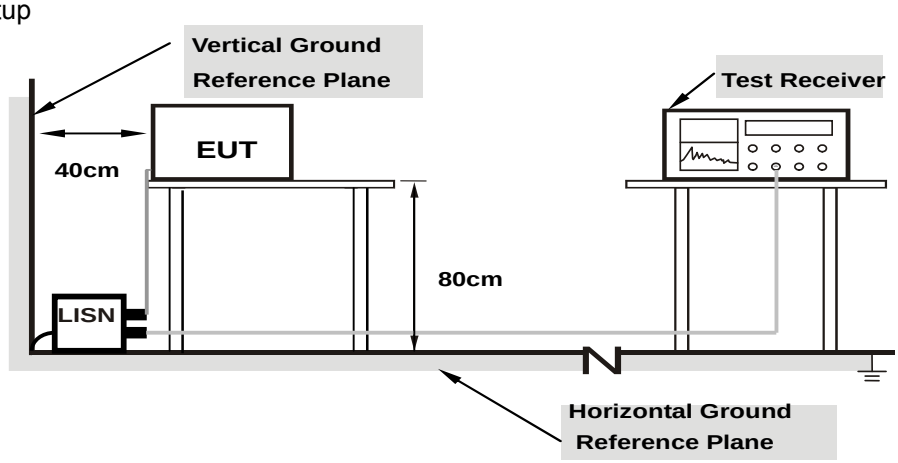
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup




**Note: 1.Support units were connected to second LISN.**

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

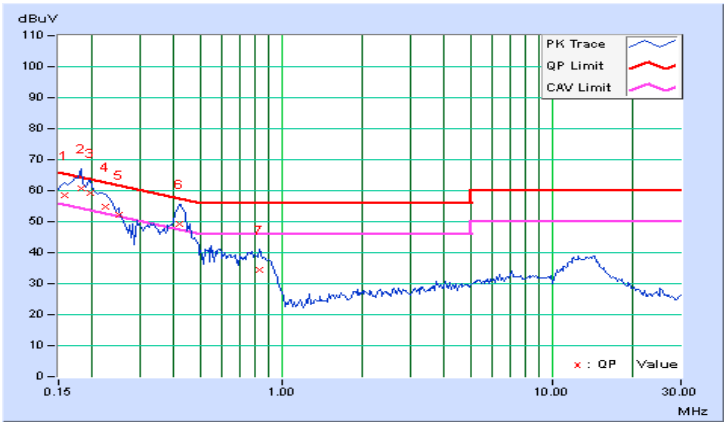
4.2.7 Test Results

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15781 | 10.37 | 48.27 | 40.25 | 58.64 | 50.62 | 65.58 | 55.58 | -6.93 | -4.95 |
| 2 | 0.18125 | 10.36 | 50.43 | 41.02 | 60.79 | 51.38 | 64.43 | 54.43 | -3.64 | -3.05 |
| 3 | 0.19775 | 10.34 | 48.96 | 40.31 | 59.30 | 50.65 | 63.70 | 53.70 | -4.40 | -3.05 |
| 4 | 0.22422 | 10.34 | 44.46 | 35.55 | 54.80 | 45.89 | 62.66 | 52.66 | -7.86 | -6.77 |
| 5 | 0.25156 | 10.35 | 41.80 | 33.20 | 52.15 | 43.55 | 61.71 | 51.71 | -9.56 | -8.16 |
| 6 | 0.41953 | 10.37 | 38.74 | 32.21 | 49.11 | 42.58 | 57.46 | 47.46 | -8.35 | -4.88 |
| 7 | 0.82578 | 10.33 | 24.16 | 11.95 | 34.49 | 22.28 | 56.00 | 46.00 | -21.51 | -23.72 |

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

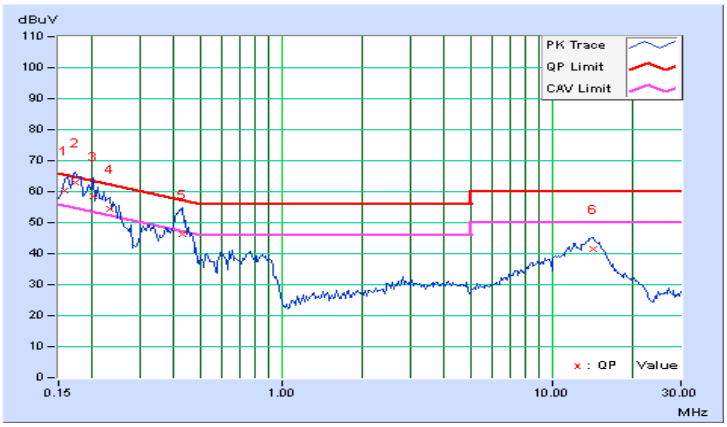


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15781 | 10.38 | 50.17 | 41.32 | 60.55 | 51.70 | 65.58 | 55.58 | -5.03 | -3.88 |
| **2** | **0.17344** | **10.38** | **52.50** | **44.06** | **62.88** | **54.44** | **64.79** | **54.79** | **-1.91** | **-0.35** |
| 3 | 0.20078 | 10.39 | 48.11 | 38.69 | 58.50 | 49.08 | 63.58 | 53.58 | -5.08 | -4.50 |
| 4 | 0.23203 | 10.39 | 44.07 | 34.34 | 54.46 | 44.73 | 62.38 | 52.38 | -7.91 | -7.64 |
| 5 | 0.43125 | 10.42 | 36.00 | 29.61 | 46.42 | 40.03 | 57.23 | 47.23 | -10.81 | -7.20 |
| 6 | 14.25000 | 11.19 | 30.46 | 26.99 | 41.65 | 38.18 | 60.00 | 50.00 | -18.35 | -11.82 |

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



## 5 Pictures of Test Arrangements

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

**Appendix – 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.

**--- END ---**