

# **FCC Test Report**

Report No.: RF140508E03A-1

FCC ID: V7TD1201

Test Model: D1201

Received Date: Mar. 02 2016

Test Date: Mar. 31 to Apr. 07, 2016

**Issued Date:** Apr. 19, 2016

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# **Release Control Record**

| Issue No.      | Description       | Date Issued   |
|----------------|-------------------|---------------|
| RF140508E03A-1 | Original release. | Apr. 19, 2016 |

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# 1 Certificate of Conformity

Product: Wireless AC1200 ADSL2+ Dual Band Modem Router

Brand: Tenda

Test Model: D1201

Sample Status: ENGINEERING SAMPLE

Applicant: SHENZHEN TENDA TECHNOLOGY CO.,LTD.

Test Date: Mar. 31 to Apr. 07, 2016

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)

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: | Apr. 19, 2016 |  |
|---------------|--------------------------|---|-------|---------------|--|
|               | Claire Kuan / Specialist |   |       |               |  |

Approved by:

May Chen/ Manager

Apr. 19, 2016



# 2 Summary of Test Results

|                          | 47 CFR FCC Part 15, Subpart E (SECTION 15.407) |                |  |  |  |  |
|--------------------------|--|----------------|--|--|--|--|
| FCC Test Item            |  | Result Remarks |  |  |  |  |
| 15.407(b)(6)             | AC Power Conducted Emissions                   | PASS           | Meet the requirement of limit. Minimum passing margin is -10.81dB at 0.18800MHz. |  |  |  |
| 15.407(b)<br>(1/2/3/4/6) | Radiated Emissions                             | PASS           | Meet the requirement of limit. Minimum passing margin is -4.3dB at 625.00MHz.    |  |  |  |

Note:

This is a supplementary report of Report No.:RF140508E03-1. Only AC Power Conducted Emission and Radiated Emissions (Below 1GHz) test item of the newly sample needs to be performed.

# 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 ~ 1GHz   | 5.37 dB                        |

# 2.2 Modification Record

There were no modifications required for compliance.



# 3 General Information

# 3.1 General Description of EUT

| Product                                       | Wireless AC1200 ADSL2+ Dual Band Modem Router      |
|---|--|
| Brand   | Tenda  |
| Test Model D1201                              |  |
| Status of EUT ENGINEERING SAMPLE              |  |
| Power Supply Rating DC 12V from Power Adapter |  |
|   | CCK, DQPSK, DBPSK for DSSS                         |
| Modulation Type                               | 64QAM, 16QAM, QPSK, BPSK for OFDM                  |
|   | 256QAM for OFDM in 802.11ac                        |
| Modulation Technology                         | DSSS, OFDM   |
|   | 802.11b: up to 11Mbps                              |
| Transfer Rate                                 | 802.11a / g: up to 54Mbps                          |
| Transier Rate                                 | 802.11n: up to 300Mbps                             |
|   | 802.11ac: up to 900Mbps                            |
| Operating Frequency                           | For 15.247: 2.412GHz ~ 2.462GHz                    |
| Operating Frequency                           | For 15.407: 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz |
|   | 2.4GHz:  |
|   | 11 for 802.11b, 802.11g, 802.11n (HT20)            |
|   | 7 for 802.11n (HT40)                               |
| Number of Channel                             | 5GHz:  |
|   | 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)    |
|   | 4 for 802.11n (HT40), 802.11ac (VHT40)             |
|   | 2 for 802.11ac (VHT80)                             |
| Antenna Type                                  | Refer to Note                                      |
| Antenna Connector Refer to Note               |  |
| Accessory Device                              | Adapter x 1  |
| Data Cable Supplied                           | NA   |

## Note:

- 1. This is a supplementary report of Report No.:RF140508E03-1. The differences between them are as below information:
  - ◆ Added one new power adapter as following table:

| Origir | Original                            |               |                                    |  |  |
|--------|-------------------------------------|---------------|------------------------------------|--|--|
| No.    | Brand                               | Model         | Spec.                              |  |  |
|        |                                     |               | Input power: 100-240V~50/60Hz 0.6A |  |  |
| 1      | Dongguan Ponon Technology Co., Ltd. | TEA12U-12150  | Output power: 12V, 1.5A            |  |  |
|        |                                     |               | DC output cable(unshielded, 1.5m)  |  |  |
| Newly  | /                                   |               |                                    |  |  |
| No.    | Brand                               | Model         |                                    |  |  |
|        | SHENZHEN HEWEISHUN NETWORK          |               | Input power: 100-240V~50/60Hz 0.6A |  |  |
| 2      |                                     | BN050-A18012U | Output power: 12V, 1.5A            |  |  |
|        | TECHNOLOGY CO.,LTD.                 |               | DC output cable(unshielded, 1.5m)  |  |  |

2. According to above condition, only AC Power Conducted Emission and Radiated Emissions (Below 1GHz) test item of the newly adapter needs to be performed. And all data were verified to meet the requirements.



3. The antennas provided to the EUT, please refer to the following table:

|                        | For 2.4GHz                   |                         |                 |                      |                                 |              |
|------------------------|------------------------------|-------------------------|-----------------|----------------------|---------------------------------|--------------|
| Transmitter            | Gain(dBi)                    | Cable Loss(dB)          | Antenna         | Connecter            | Frequency range                 | Cable Length |
| Circuit                | Exclude cable loss           | (External only, if any) | Type            | Туре                 | (MHz to MHz)                    | Cable Length |
| Chain (0)              | 5                            | 0.4                     | dipole          | SMA Straight<br>Plug | 2400-2500                       | 272mm        |
| Chain (1)              | 5                            | 0.4                     | dipole          | SMA Straight<br>Plug | 2400-2500                       | 90mm         |
|                        |                              |                         | For 5GHz        |                      |                                 |              |
| Transmitter<br>Circuit | Gain(dBi) Exclude cable loss | Cable Loss(dB)          | Antenna<br>Type | Connecter<br>Type    | Frequency range<br>(MHz to MHz) | Cable Length |
| Chain (0)              | 2.5                          | 0.4                     | PCB             | NA                   | 5150-5850                       | 60mm         |
| Chain (1)              | 2.5                          | 0.4                     | PCB             | NA                   | 5150-5850                       | 145mm        |

4. The EUT incorporates a MIMO function.

|                  | 2.40                      |            |             |
|------------------|---------------------------|------------|-------------|
| IODULATION MODE  | DATA RATE (MCS)           | TX & RX CO | NFIGURATION |
| 802.11b          | 1 ~ 11Mbps                | 1TX        | 1RX         |
| 802.11g          | 6 ~ 54Mbps                | 1TX        | 1RX         |
| 802.11n (HT20)   | MCS 0~7                   | 1TX        | 1RX         |
| 002:1111 (11120) | MCS 8~15                  | 2TX        | 2RX         |
| 802 11n (HT40)   | MCS 0~7                   | 1TX        | 1RX         |
| 802.11n (HT40)   | MCS 8~15                  | 2TX        | 2RX         |
|                  | 5Gi                       |            |             |
| IODULATION MODE  | DATA RATE (MCS)           | TX & RX CO | NFIGURATION |
| 802.11a          | 6 ~ 54Mbps                | 1TX        | 1RX         |
| 802.11n (HT20)   | MCS 0~7                   | 1TX        | 1RX         |
|                  | MCS 8~15                  | 2TX        | 2RX         |
| 000 44 (UT40)    | MCS 0~7                   | 1TX        | 1RX         |
| 802.11n (HT40)   | MCS 8~15                  | 2TX        | 2RX         |
| 802.11ac (VHT20) | MCS0~8 (256QAM)<br>Nss= 1 | 1TX        | 1RX         |
| (5GHz)           | MCS0~8 (256QAM)<br>Nss= 2 | 2TX        | 2RX         |
| 802.11ac (VHT40) | MCS0~9 (256QAM)<br>Nss= 1 | 1TX        | 1RX         |
| (5GHz)           | MCS0~9 (256QAM)<br>Nss= 2 | 2TX        | 2RX         |
| 802.11ac (VHT80) | MCS0~9 (256QAM)<br>Nss= 1 | 1TX        | 1RX         |
| (5GHz)           | MCS0~9 (256QAM)<br>Nss= 2 | 2TX        | 2RX         |

Note: 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 3.3)

- 5. 2.4GHz and 5GHz technology can transmit at same time.
- 6. Spurious emission of the simultaneous operation (2.4GHz and 5GHz) has been evaluated and no non-compliance was found.
- 7. 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 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 36      | 5180 MHz  | 44      | 5220 MHz  |
| 40      | 5200 MHz  | 48      | 5240 MHz  |

# 2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

|         | <u> </u>  | · '     |           |
|---------|-----------|---------|-----------|
| Channel | Frequency | Channel | Frequency |
| 38      | 5190 MHz  | 46      | 5230 MHz  |

# 1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 42      | 5210MHz   |

# FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 149     | 5745MHz   | 161     | 5805MHz   |
| 153     | 5765MHz   | 165     | 5825MHz   |
| 157     | 5785MHz   |         |           |

# 2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 151     | 5755MHz   | 159     | 5795MHz   |

# 1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 155     | 5775MHz   |



# 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT<br>CONFIGURE | APPLICABLE 10 |              | DESCRIPTION    |
|------------------|---------------|--------------|----------------|
| MODE             | RE<1G         | PLC          | DESCRIPTION    |
| 1                | $\sqrt{}$     | $\checkmark$ | With adapter 2 |

Where

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

Note: The test mode was reference to the worst case in the original test report.

# 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              | FREQ. BAND<br>(MHz) | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA<br>RATE<br>(Mbps) |
|-------------------|---------------------|----------------------|-------------------|--------------------------|--------------------|------------------------|
| 000 44 () (LITOO) | 5180-5240           | 36 to 48             | 440               | OFDM                     | DDOK               | 0                      |
| 802.11ac (VHT20)  | 5745-5825           | 149 to 165           | 149               | OFDM                     | BPSK               | 6                      |

# **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             | FREQ. BAND<br>(MHz) | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA<br>RATE<br>(Mbps) |
|------------------|---------------------|----------------------|-------------------|--------------------------|--------------------|------------------------|
| 000 44 (1/1/20)  | 5180-5240           | 36 to 48             | 110               | OFDM                     | DDOK               | 0                      |
| 802.11ac (VHT20) | 5745-5825           | 149 to 165           | 149               | OFDM                     | BPSK               | 6                      |

# **Test Condition:**

| APPLICABLE TO ENVIRONMENTAL CONDITIONS |                 | INPUT POWER  | TESTED BY    |  |
|--|-----------------|--------------|--------------|--|
| RE<1G                                  | 22deg. C, 60%RH | 120Vac, 60Hz | JyunChun Lin |  |
| PLC                                    | 20deg. C, 70%RH | 120Vac, 60Hz | Wythe Lin    |  |



# 3.3 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         |
|----|----------------------|-------|-----------|---------------|---------|-----------------|
| Α. | IPOD                 | Apple | MC749TA/A | CC4DN25WDFDM  | NA      | Provided by Lab |
| В. | NOTEBOOK<br>COMPUTER | DELL  | E5430     | 4YV4VY1       | FCC DoC | Provided by Lab |
| C. | HUB                  | ZyXEL | ES-116P   | S060H02000215 | FCC DoC | Provided by Lab |
| D. | CO-ROUTER            | ZyXEL | IES-1000  | S4Z3112558    | NA      | Provided by Lab |

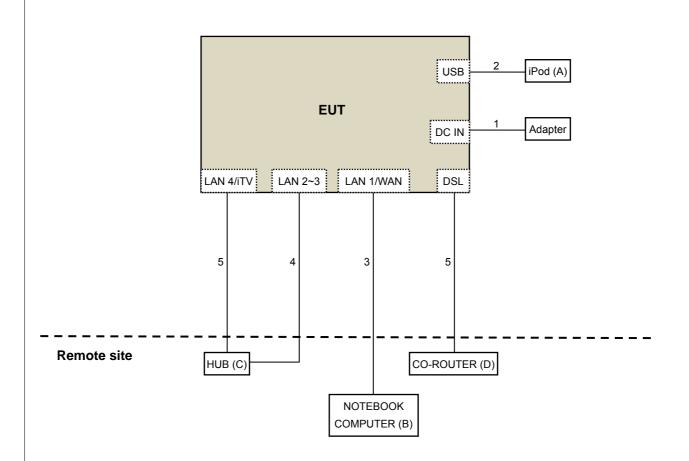
#### Note:

<sup>1.</sup> All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding<br>(Yes/No) | Cores (Qty.) | Remarks            |
|----|--------------|------|------------|-----------------------|--------------|--------------------|
| 1. | DC           | 1    | 1.5        | No                    | 0            | Supplied by client |
| 2. | USB          | 1    | 0.1        | Yes                   | 0            | Provided by Lab    |
| 3. | RJ-45        | 1    | 10         | No                    | 0            | Provided by Lab    |
| 4. | RJ-45        | 2    | 10         | No                    | 0            | Provided by Lab    |
| 5. | RJ-45        | 1    | 10         | No                    | 0            | Provided by Lab    |
| 6. | RJ-11        | 1    | 10         | No                    | 0            | Provided by Lab    |



# 3.3.1 Configuration of System under Test





# **General Description of Applied Standard** 3.4 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 C63.10-2013 All test items have been performed and recorded as per the above standards.



# 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.

| 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.

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# 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 <sup>(*)</sup> EMCI           | EMC001340             | 980142                               | Jan. 20, 2016   | Jan. 19, 2018    |
| Loop Antenna <sup>(*)</sup> Electro-Metrics | EM-6879               | 264                                  | Dec. 16, 2014   | Dec. 15, 2016    |
| RF Cable                                    | NA                    | LOOPCAB-001<br>LOOPCAB-002           | Jan. 18, 2016   | Jan. 17, 2017    |
| Pre-Amplifier Mini-Circuits                 | ZFL-1000VH2<br>B      | AMP-ZFL-03                           | Nov. 11, 2015   | Nov. 10, 2016    |
| Trilog Broadband Antenna SCHWARZBECK        | VULB 9168             | 9168-360                             | Jan. 04, 2016   | Jan. 03, 2017    |
| RF Cable                                    | 8D-FB                 | CHGCAB-001<br>-1<br>CHGCAB-001<br>-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 CT               | NA                    | NA                                   | NA              | NA               |
| Boresight Antenna Fixture                   | 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 test was performed in 966 Chamber No. G.
- 3. The FCC Site Registration No. is 966073.
- 4. The CANADA Site Registration No. is IC 7450H-2.
- 5. Tested Date: Apr. 07, 2016



#### 4.1.3 Test Procedure

- 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.
- The height of antenna is varied from one meter to four meters above the ground to determine the C. 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.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum e. hold mode when the test frequency is below 1 GHz.

### Note:

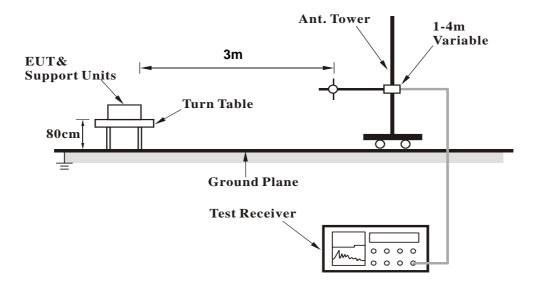
- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for 1. Quasi-peak detection (QP) at frequency below 1GHz.
- All modes of operation were investigated and the worst-case emissions are reported. 2.

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# 4.1.5 Test Setup



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

# 4.1.6 EUT Operating Condition

- a. Placed the EUT on the testing table.
- b. Connect the EUT with the support unit B (Notebook Computer) which is kept in a remote area
- c. The communication partner run test program "MP Tool 2.0.1.0.exe" to enable EUT under transmission/receiving condition continuously at specific channel frequency.



# 4.1.7 Test Results

# **BELOW 1GHz WORST-CASE DATA:**

802.11ac (VHT20)

| CHANNEL         | TX Channel 149 | DETECTOR | Overi Beek (OB) |
|-----------------|----------------|----------|-----------------|
| FREQUENCY RANGE | 30MHz ~ 1GHz   | FUNCTION | Quasi-Peak (QP) |

|     |   | ANTENNA                       | POLARITY          | & TEST DIS     | TANCE: HO                | RIZONTAL                   | AT 3 M                 |                                |
|-----|---|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO. | FREQ.<br>(MHz)                          | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 92.78                                   | 32.1 QP                       | 43.5              | -11.4          | 2.00 H                   | 88                         | 45.64                  | -13.56                         |
| 2   | 149.99                                  | 32.7 QP                       | 43.5              | -10.8          | 2.00 H                   | 88                         | 40.36                  | -7.64                          |
| 3   | 200.02                                  | 33.7 QP                       | 43.5              | -9.8           | 1.00 H                   | 102                        | 44.74                  | -11.00                         |
| 4   | 375.01                                  | 38.6 QP                       | 46.0              | -7.4           | 2.50 H                   | 292                        | 43.22                  | -4.59                          |
| 5   | 625.00                                  | 41.0 QP                       | 46.0              | -5.0           | 1.00 H                   | 58                         | 39.38                  | 1.61                           |
| 6   | 750.01                                  | 37.4 QP                       | 46.0              | -8.6           | 1.00 H                   | 332                        | 33.52                  | 3.87                           |
|     |   | ANTENNA                       | POLARITY          | / & TEST DI    | STANCE: V                | ERTICAL A                  | T 3 M                  |                                |
| NO. | NO. FREQ. (MHz) EMISSION LEVEL (dBuV/m) |                               |                   | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 38.23                                   | 34.7 QP                       | 40.0              | -5.3           | 1.00 V                   | 360                        | 43.28                  | -8.60                          |
| 2   | 207.78                                  | 35.2 QP                       | 43.5              | -8.3           | 1.00 V                   | 170                        | 46.14                  | -10.98                         |
| 3   | 375.01                                  | 39.5 QP                       | 46.0              | -6.5           | 1.50 V                   | 360                        | 44.05                  | -4.59                          |
| 4   | 625.00                                  | 41.8 QP                       | 46.0              | -4.3           | 1.50 V                   | 329                        | 40.14                  | 1.61                           |
| 5   | 750.01                                  | 37.2 QP                       | 46.0              | -8.8           | 1.00 V                   | 360                        | 33.29                  | 3.87                           |
| 6   | 875.02                                  | 38.5 QP                       | 46.0              | -7.6           | 1.00 V                   | 344                        | 32.98                  | 5.47                           |

# **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



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# 4.2 Conducted Emission Measurement

# 4.2.1 Limits of Conducted Emission Measurement

|   | Frequency (MHz)     | Conducted Limit (dBuV) |         |  |  |  |  |
|---|---------------------|------------------------|---------|--|--|--|--|
|   | Frequency (IVII IZ) | Quasi-peak             | Average |  |  |  |  |
| Ī | 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<br>DATE | CALIBRATED<br>UNTIL |
|---|-------------------------|------------|--------------------|---------------------|
| Test Receiver<br>R&S  | ESCS 30                 | 100375     | May 06, 2015       | May 05, 2016        |
| Line-Impedance<br>Stabilization Network<br>(for EUT)<br>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. 08, 2016      | Mar. 07, 2017       |
| 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       |
| 50 ohms Terminator  | E1-011315               | 13         | Dec. 11 2015       | Dec. 10 2016        |
| Software<br>BVADT   | BVADT_Cond_<br>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: Mar. 31, 2016



# 4.2.3 Test Procedure

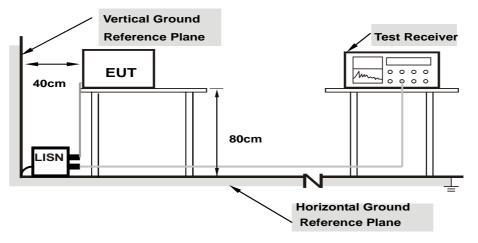
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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: All modes of operation were investigated and the worst-case emissions are reported.

### 4.2.4 Deviation from Test Standard

No deviation.

# 4.2.5 Test Setup



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 Condition

Same as 4.1.6.



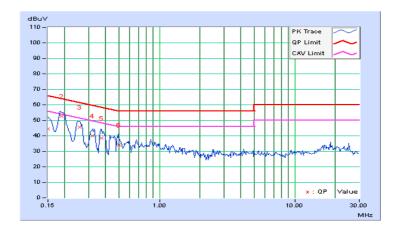
# 4.2.7 Test Results

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

|    | Eroa                     | Corr. | Readin | g Value       | Emissio | ssion Level |       | Limit |        | Margin |  |
|----|--------------------------|-------|--------|---------------|---------|-------------|-------|-------|--------|--------|--|
| No | No Freq. Factor [dB (uV) |       | (uV)]  | /)] [dB (uV)] |         | [dB (uV)]   |       | (dB)  |        |        |  |
|    | [MHz]                    | (dB)  | Q.P.   | AV.           | Q.P.    | AV.         | Q.P.  | AV.   | Q.P.   | AV.    |  |
| 1  | 0.15000                  | 10.44 | 33.84  | 16.33         | 44.28   | 26.77       | 66.00 | 56.00 | -21.72 | -29.23 |  |
| 2  | 0.18906                  | 10.41 | 42.19  | 31.77         | 52.60   | 42.18       | 64.08 | 54.08 | -11.48 | -11.90 |  |
| 3  | 0.25766                  | 10.41 | 34.98  | 26.16         | 45.39   | 36.57       | 61.51 | 51.51 | -16.12 | -14.94 |  |
| 4  | 0.32188                  | 10.42 | 29.75  | 23.95         | 40.17   | 34.37       | 59.66 | 49.66 | -19.49 | -15.29 |  |
| 5  | 0.37600                  | 10.43 | 28.18  | 20.68         | 38.61   | 31.11       | 58.37 | 48.37 | -19.76 | -17.26 |  |
| 6  | 0.50231                  | 10.42 | 23.81  | 18.10         | 34.23   | 28.52       | 56.00 | 46.00 | -21.77 | -17.48 |  |

# **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.



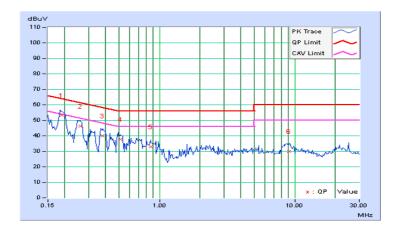


| Phase | Neutral (N) | i Delecior Elinciion | Quasi-Peak (QP) /<br>Average (AV) |
|-------|-------------|----------------------|-----------------------------------|

|    | Eroa    | Corr.  | Readin | Reading Value Emission |       | n Level Limit |       | Margin |        |        |
|----|---------|--------|--------|------------------------|-------|---------------|-------|--------|--------|--------|
| No | Freq.   | Factor | [dB    | (uV)]                  | [dB   | (uV)]         | [dB ( | (uV)]  | (dl    | 3)     |
|    | [MHz]   | (dB)   | Q.P.   | AV.                    | Q.P.  | AV.           | Q.P.  | AV.    | Q.P.   | AV.    |
| 1  | 0.18800 | 10.45  | 42.87  | 31.48                  | 53.32 | 41.93         | 64.12 | 54.12  | -10.81 | -12.20 |
| 2  | 0.25938 | 10.46  | 35.85  | 28.90                  | 46.31 | 39.36         | 61.45 | 51.45  | -15.14 | -12.09 |
| 3  | 0.37656 | 10.48  | 29.49  | 23.54                  | 39.97 | 34.02         | 58.35 | 48.35  | -18.39 | -14.34 |
| 4  | 0.51328 | 10.47  | 27.43  | 22.74                  | 37.90 | 33.21         | 56.00 | 46.00  | -18.10 | -12.79 |
| 5  | 0.86094 | 10.44  | 22.64  | 16.58                  | 33.08 | 27.02         | 56.00 | 46.00  | -22.92 | -18.98 |
| 6  | 9.08594 | 10.91  | 19.23  | 14.36                  | 30.14 | 25.27         | 60.00 | 50.00  | -29.86 | -24.73 |

# **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).  |  |  |  |  |  |  |  |  |
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# 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:

Linko EMC/RF Lab Tel: 886-2-26052180

Tel: 886-3-6668565 Fax: 886-3-6668323

Hsin Chu EMC/RF/Telecom Lab

Fax: 886-2-26051924

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Tel: 886-3-3183232 Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com Web Site: www.bureauveritas-adt.com

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

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