# FCC Test Report

| | |
|---|---|
| **Report No.:** | RF150731D07 |
| **FCC ID:** | PY312400216 |
| **Test Model:** | D6200xxxxx<br>(The “x” in the model name can be 0 to 9, A to Z or blank, for marketing purpose) |
| **Series Model:** | D6400 |
| **Received Date:** | Jul. 31, 2015 |
| **Test Date:** | Aug. 4 ~ Oct. 15, 2015 |
| **Issued Date:** | Oct. 15, 2015 |
| **Applicant:** | NETGEAR INC. |
| **Address:** | 350 East Plumeria Drive, San Jose, CA 95134, USA |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **Lab Address:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.) |

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF150731D07 | Original release. | Oct. 15, 2015 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | D6200 WiFi Modem Router |
| **Brand:** | NETGEAR |
| **Test Model:** | D6200xxxxx<br>(The “x” in the model name can be 0 to 9, A to Z or blank, for marketing purpose) |
| **Series Model:** | D6400 |
| **Sample Status:** | Engineering sample |
| **Applicant:** | NETGEAR INC. |
| **Test Date:** | Aug. 4 ~ Oct. 15, 2015 |
| **Standard:** | 47 CFR FCC Part 15, Subpart E (Section 15.407)<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:** Oct. 15, 2015

( Celia Chen / Supervisor )

**Approved by :**  **, Date:** Oct. 15, 2015

( Rex Lai / Assistant Manager )

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart E (SECTION 15.407) | | | |
|---|---|---|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.407(b)(6) | AC Power Conducted Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -11.14dB at 0.29462MHz. |
| 15.407(b) (1/2/3/4/6) | Radiated Emissions & Band Edge Measurement | PASS | Meet the requirement of limit. Minimum passing margin is -0.2dB at 5714.99MHz, 5725.00MHz, 5860.01MHz. |
| 15.407(a)(1/2/3) | Max Average Transmit Power | PASS | Meet the requirement of limit. |
| 15.407(a)(1/2/3) | Peak Power Spectral Density | PASS | Meet the requirement of limit. |
| 15.407(e) | 6dB bandwidth | PASS | Meet the requirement of limit. (U-NII-3 Band only) |
| 15.407(g) | Frequency Stability | PASS | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | PASS | Antenna connector is I-PEX not a standard connector. |

### 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 | 3.43 dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 1000MHz | 4.00 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 40GHz | 3.36 dB |

### 2.2 Modification Record

There were no modifications required for compliance.

## 3 General Information

### 3.1 General Description of EUT

| | |
|---|---|
| Product | D6200 WiFi Modem Router |
| Brand | NETGEAR |
| Test Model | D6200xxxxx (The “x” in the model name can be 0 to 9, A to Z or blank, for marketing purpose) |
| Series Model | D6400 |
| Model Difference | For marketing purpose |
| Status of EUT | Engineering sample |
| Power Supply Rating | 12Vdc from Adapter |
| Modulation Type | 64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in 11ac mode only. |
| Modulation Technology | OFDM |
| Transfer Rate | 802.11a: 54/48/36/24/18/12/9/6Mbps<br>802.11n: up to 300Mbps<br>802.11ac: up to 866.7Mbps |
| Operating Frequency | 5745 ~ 5825MHz |
| Number of Channel | 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)<br>2 for 802.11n (HT40), 802.11ac (VHT40)<br>1 for 802.11ac (VHT80) |
| Output Power | **CDD Mode:** 414.099mW<br>**Beamforming_NSS1 Mode:** 414.099mW |
| Antenna Type | Refer to note 2 as below |
| Antenna Connector | Refer to note 2 as below |
| Accessory Device | Adapter |
| Data Cable Supplied | Non-shielded DC cable (1.8m)<br>Non-shielded DS RJ11 cable (1.5m)<br>Non-shielded HL RJ11 cable (1.5m)<br>Shielded RJ45 cable (1.5m)<br>Non-shielded RJ45 cable (1.5m) |

Note:

1. This supplementary report is issued for upgrading the standard version to new rules for U-NII-3 Band only, therefore the EUT is re-tested in this report.
2. The EUT support the following antenna:

| 5G_Antenna | Brand | Model | Antenna Type | Antenna Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | WNC | D6200 | PCB | I-PEX | 4.70 |
| 2 | WNC | D6200 | PCB | I-PEX | 3.94 |

3. The EUT provides 2 completed transmitters and 2 receivers.

| Modulation Mode | TX Function | |
|---|---|---|
| | 5.0GHz (Non-Beamforming) | 5.0GHz (Beamforming) |
| 802.11a | 1TX | - |
| 802.11n (HT20) | 2TX | - |
| 802.11n (HT40) | 2TX | - |
| 802.11ac (VHT20) | 2TX | 2TX |
| 802.11ac (VHT40) | 2TX | 2TX |
| 802.11ac (VHT80) | 2TX | 2TX |

Note: The modulation and bandwidth are similar for 802.11n mode for HT20 (HT40) and 802.11ac mode for VHT20 (VHT40), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

4. The EUT uses following adapter.

| Adapter | 1 | 2 |
|---|---|---|
| Brand | NETGEAR | NETGEAR |
| Model | 2ABL030F NA | ADS-40FPA-12 12030GPCU |
| P/N | 332-10756-01 | 332-10757-01 |
| AC Input Power | 100-240V, 50/60Hz, 1.0A | 100-240V, 50/60Hz, 1.0A |
| DC Output Power | 12V, 2.5A | 12V, 2.5A |

After pre-tested above adapters, **adapter 2** was selected as a representative one and therefore only its test data was recorded in this report.

5. 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

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

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
**PLC:** Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

**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.

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.0 |
| **Beamforming_NSS1 MODE** | | | | | | |
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11ac (VHT20) | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.5 |
| - | 802.11ac (VHT40) | 151 to 159 | 151, 159 | OFDM | BPSK | 13.5 |
| - | 802.11ac (VHT80) | 155 | 155 | OFDM | BPSK | 29.3 |

**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.

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 157 | OFDM | BPSK | 6.0 |

**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.

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 157 | OFDM | BPSK | 6.0 |

**Antenna Port Conducted Measurement:**

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.0 |
| - | 802.11ac (VHT20) | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.5 |
| - | 802.11ac (VHT40) | 151 to 159 | 151, 159 | OFDM | BPSK | 13.5 |
| - | 802.11ac (VHT80) | 155 | 155 | OFDM | BPSK | 29.3 |
| **Beamforming_NSS1 MODE** | | | | | | |
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11ac (VHT20) | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.5 |
| - | 802.11ac (VHT40) | 151 to 159 | 151, 159 | OFDM | BPSK | 13.5 |
| - | 802.11ac (VHT80) | 155 | 155 | OFDM | BPSK | 29.3 |

**Test Condition:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| RE≥1G | 27deg. C, 73%RH | 120Vac, 60Hz | Aaron You |
| RE<1G | 27deg. C, 73%RH | 120Vac, 60Hz | Aaron You |
| PLC | 25deg. C, 66%RH | 120Vac, 60Hz | Dalen Dai |
| APCM | 25deg. C, 60%RH | 120Vac, 60Hz | Saxon Lee |

### 3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %, duty factor is required

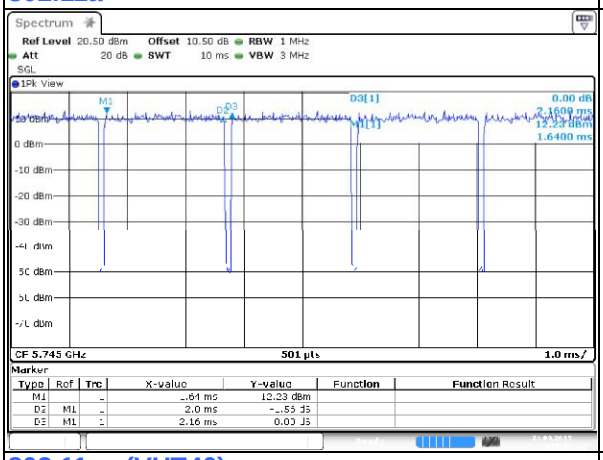
**802.11a**: Duty cycle = 2.0/2.16 = 0.926, Duty factor = 10 * log( 1/0.926) = 0.33

**802.11ac (VHT20):** Duty cycle = 1.88/2.06 = 0.913, Duty factor = 10 * log( 1/0.913) = 0.40

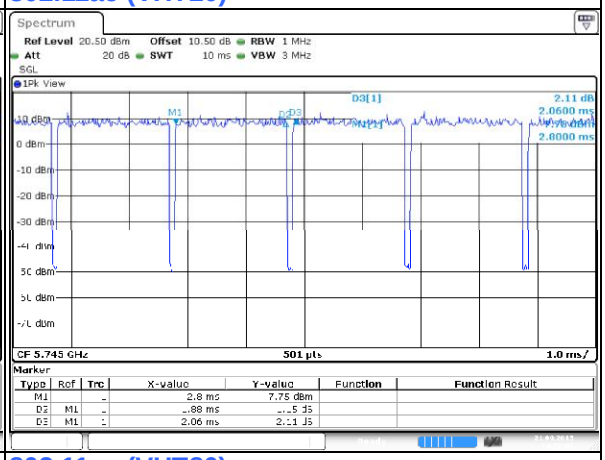
**802.11ac (VHT40):** Duty cycle = 0.91/1.06 = 0.858, Duty factor = 10 * log( 1/0.858) = 0.66

**802.11ac (VHT80):** Duty cycle = 0.416/0.480 = 0.867, Duty factor = 10 * log( 1/0.867) = 0.62

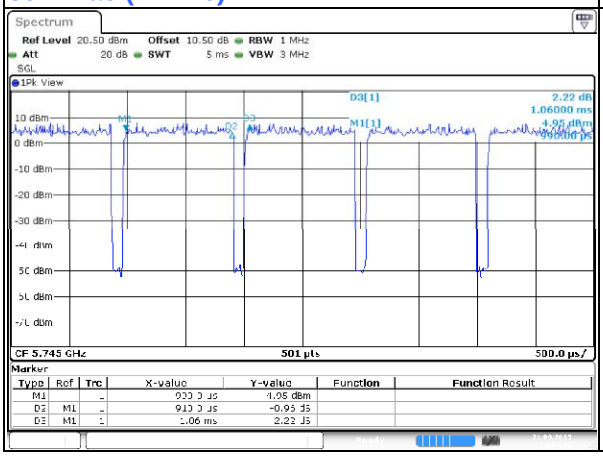
**802.11a**



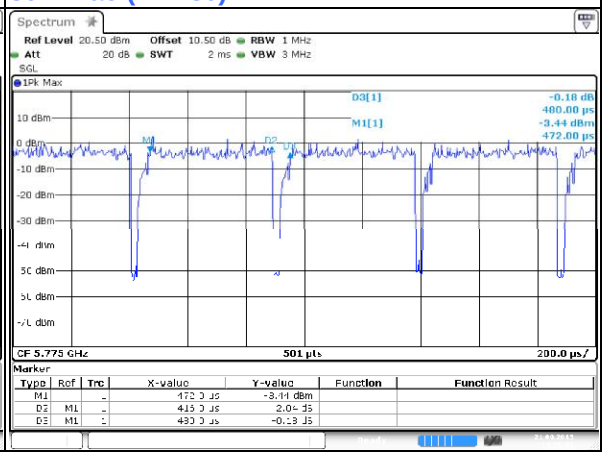

**802.11ac (VHT20)**




**802.11ac (VHT40)**




**802.11ac (VHT80)**



### 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. | AC ADAPTER | NETGEAR | ADS-40FPA-12 12030GPCU | N/A | FCC DoC Approved | Supplied by client |
| B. | USB 3.0 Flash Drive | HP | v250w | N/A | FCC DoC Approved | Provided by Lab |
| C. | LAN Load*4 | N/A | N/A | N/A | N/A | Provided by Lab |
| D. | RJ11 Load | N/A | N/A | N/A | N/A | Provided by Lab |
| E. | Notebook PC | DELL | PP27L | 8SNZ12S | FCC DoC Approved | Provided by Lab |
| F. | Notebook PC | DELL | E6530 | 9331GV1 | FCC DoC Approved | Provided by Lab |

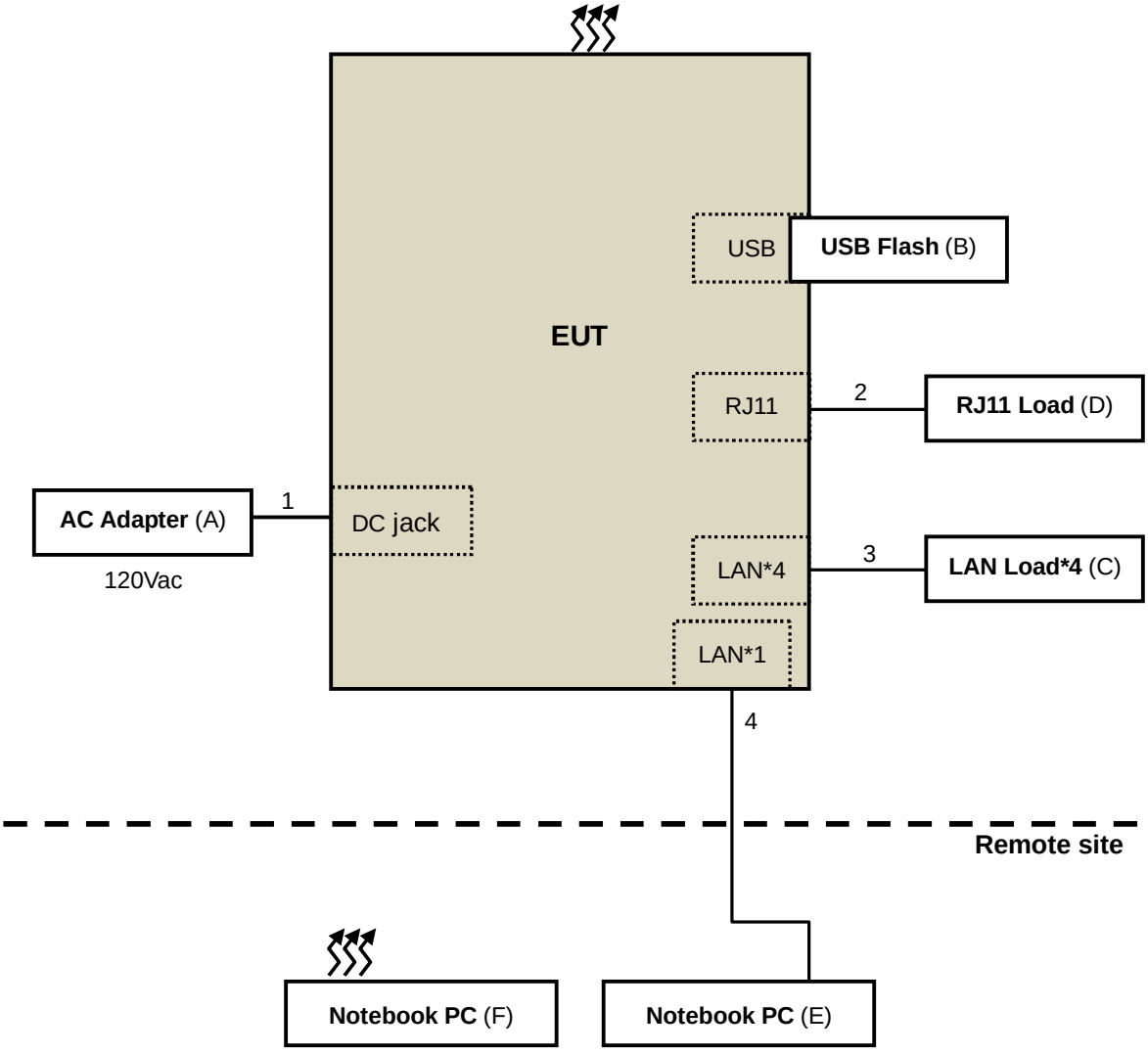
Note:

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 cable | 1 | 1.8 | N | 0 | Supplied by client |
| 2. | RJ11 cable | 1 | 1.5 | N | 0 | Supplied by client |
| 3. | RJ45 cable | 4 | 1.8 | N | 0 | Provided by Lab |
| 4. | RJ45 cable | 1 | 10 | N | 0 | Provided by Lab |

Note: The core(s) is(are) originally attached to the cable(s).

### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied Standard

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)**
**789033 D02 General UNII Test Procedure New Rules v01**
**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.

| 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.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

| **APPLICABLE TO** | **LIMIT** | |
|---|---|---|
| 789033 D02 General UNII Test Procedure New Rules v01 | FIELD STRENGTH AT 3m | |
| | PK:74 (dBμV/m) | AV:54 (dBμV/m) |
| **APPLICABLE TO** | **EIRP LIMIT** | **EQUIVALENT FIELD STRENGTH AT 3m** |
| 15.407(b)(1) | PK:-27 (dBm/MHz) | PK:68.2(dBμV/m) |
| 15.407(b)(2) | | |
| 15.407(b)(3) | | |
| 15.407(b)(4) | PK:-27 (dBm/MHz) *1<br>PK:-17 (dBm/MHz) *2 | PK: 68.2(dBμV/m) *1<br>PK:78.2 (dBμV/m) *2 |

**NOTE:** *1 beyond 10MHz of the band edge *2 within 10 MHz of band edge

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

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

4.1.2 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| HP Preamplifier | 8447D | 2432A03504 | Feb. 26, 2015 | Feb. 25, 2016 |
| HP Preamplifier | 8449B | 3008A01201 | Feb. 26, 2015 | Feb. 25, 2016 |
| MITEQ Preamplifier | AMF-6F-260400-33-8P | 892164 | Mar. 01, 2015 | Feb. 28, 2016 |
| Agilent Spectrum | E4446A | MY51100050 | Oct. 24, 2014 | Oct. 23, 2015 |
| Agilent TEST RECEIVER | N9038A | MY51210129 | Jan. 20, 2015 | Jan. 19, 2016 |
| Schwarzbeck Antenna | VULB 9168 | 139 | Feb. 04, 2015 | Feb. 03, 2016 |
| Schwarzbeck Antenna | VHBA 9123 | 480 | May 29, 2015 | May 28, 2017 |
| Schwarzbeck Horn Antenna | BBHA-9170 | 212 | Feb. 09, 2015 | Feb. 08, 2016 |
| Schwarzbeck Horn Antenna | BBHA 9120-D1 | D130 | Feb. 10, 2015 | Feb. 09, 2016 |
| ADT. Turn Table | TT100 | 0306 | NA | NA |
| ADT. Tower | AT100 | 0306 | NA | NA |
| Software | Radiated_V7.6.15.9.4 | NA | NA | NA |
| SUHNER RF cable With 4dB PAD | SF104 | CABLE-CH6 | Aug. 15, 2015 | Aug. 14, 2016 |
| SUHNER RF cable With 3dB PAD | SF102 | Cable-CH8-3.6m | Aug. 15, 2015 | Aug. 14, 2016 |
| EMCO Horn Antenna | 3115 | 00028257 | Feb. 05, 2015 | Feb. 04, 2016 |
| Highpass filter Wainwright Instruments | WHK 3.1/18G-10SS | SN 8 | NA | NA |
| ROHDE & SCHWARZ Spectrum Analyzer | FSV40 | 101042 | Sep. 23, 2015 | Sep. 22, 2016 |
| Anritsu Power Sensor | MA2411B | 0738404 | Apr. 21, 2015 | Apr. 20, 2016 |
| Anritsu Power Meter | ML2495A | 0842014 | Apr. 21, 2015 | Apr. 20, 2016 |

**NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

4.1.3 Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 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.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**Note:**

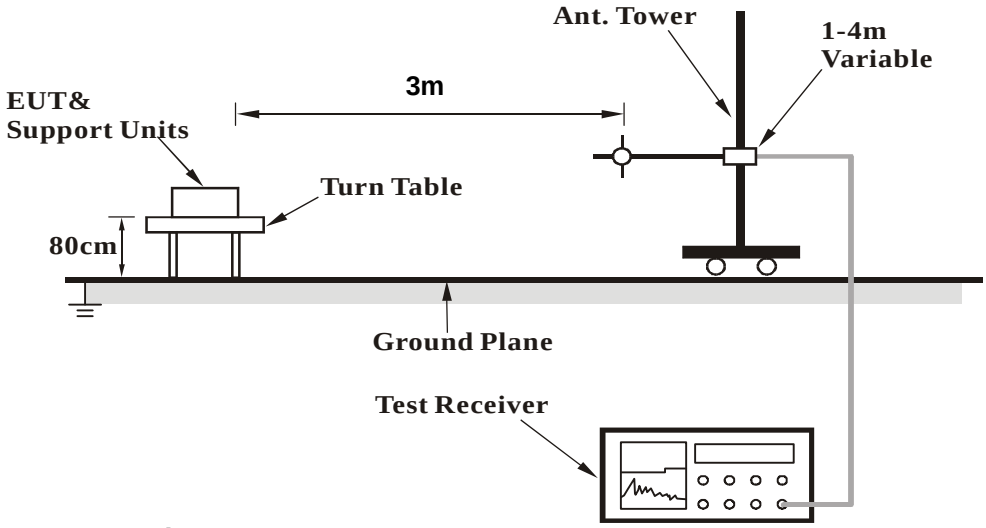
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

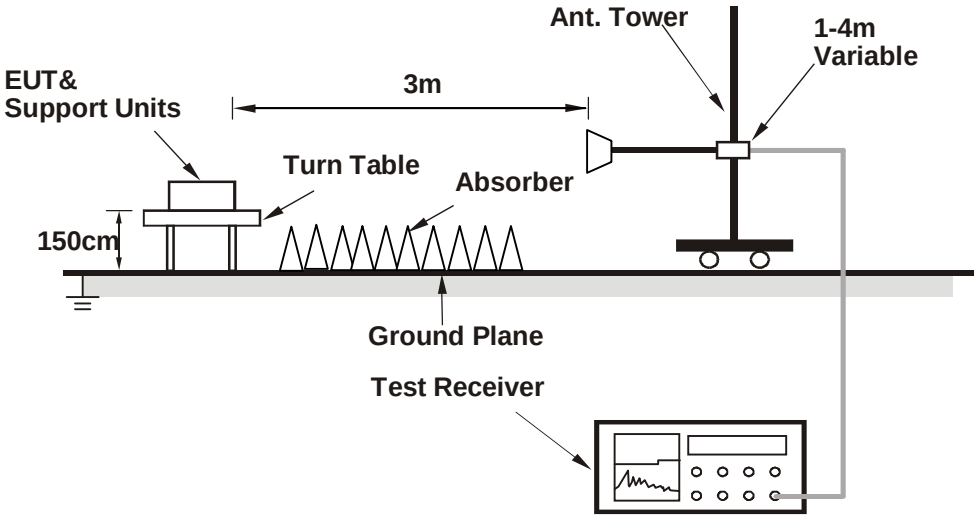
No deviation.

4.1.5 Test Setup

**<Frequency Range below 1GHz>**




**<Frequency Range above 1GHz>**




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. Prepared notebooks to act as communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".
e. The necessary accessories enable the system in full functions.

4.1.7 Test Results

**Above 1GHz Data：**

**CDD MODE**

**802.11a**

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 149 | **DETECTOR FUNCTION** | Peak (PK)<br>Average (AV) |
| **FREQUENCY RANGE** | 1GHz ~ 40GHz | | |

| 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 | #5714.99 | 63.3 PK | 68.2 | -4.9 | 1.58 H | 332 | 58.67 | 4.61 |
| 2 | #5725.00 | 74.4 PK | 78.2 | -3.8 | 1.58 H | 332 | 69.77 | 4.61 |
| 3 | *5745.00 | 104.4 PK | | | 1.58 H | 332 | 99.74 | 4.66 |
| 4 | *5745.00 | 94.3 AV | | | 1.58 H | 332 | 89.59 | 4.66 |
| 5 | 11490.00 | 57.8 PK | 74.0 | -16.2 | 1.02 H | 231 | 44.12 | 13.66 |
| 6 | 11490.00 | 44.2 AV | 54.0 | -9.8 | 1.02 H | 231 | 30.53 | 13.66 |
| **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 | #5714.99 | 67.4 PK | 68.2 | -0.8 | 1.96 V | 277 | 62.78 | 4.61 |
| **2** | **#5725.00** | **78.0 PK** | **78.2** | **-0.2** | **1.96 V** | **277** | **73.34** | **4.61** |
| 3 | *5745.00 | 108.4 PK | | | 1.96 V | 277 | 103.78 | 4.66 |
| 4 | *5745.00 | 99.0 AV | | | 1.96 V | 277 | 94.32 | 4.66 |
| 5 | 11490.00 | 60.9 PK | 74.0 | -13.1 | 1.39 V | 137 | 47.25 | 13.66 |
| 6 | 11490.00 | 48.2 AV | 54.0 | -5.8 | 1.39 V | 137 | 34.54 | 13.66 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 157 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | *5785.00 | 108.8 PK | | | 1.30 H | 333 | 104.04 | 4.72 |
| 2 | *5785.00 | 98.6 AV | | | 1.30 H | 333 | 93.83 | 4.72 |
| 3 | 11570.00 | 63.9 PK | 74.0 | -10.1 | 1.18 H | 229 | 50.02 | 13.90 |
| 4 | 11570.00 | 50.5 AV | 54.0 | -3.5 | 1.18 H | 229 | 36.64 | 13.90 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5785.00 | 113.5 PK | | | 1.78 V | 270 | 108.74 | 4.72 |
| 2 | *5785.00 | 102.9 AV | | | 1.78 V | 270 | 98.20 | 4.72 |
| 3 | 11570.00 | 64.9 PK | 74.0 | -9.1 | 1.00 V | 137 | 51.01 | 13.90 |
| 4 | 11570.00 | 52.8 AV | 54.0 | -1.2 | 1.00 V | 137 | 38.89 | 13.90 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

| CHANNEL | TX Channel 165 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | *5825.00 | 108.3 PK | | | 1.50 H | 334 | 103.53 | 4.79 |
| 2 | *5825.00 | 98.7 AV | | | 1.50 H | 334 | 93.90 | 4.79 |
| 3 | #5850.00 | 77.7 PK | 78.2 | -0.5 | 1.50 H | 334 | 72.89 | 4.80 |
| 4 | #5860.01 | 65.1 PK | 68.2 | -3.1 | 1.50 H | 334 | 60.27 | 4.82 |
| 5 | 11650.00 | 61.8 PK | 74.0 | -12.2 | 1.17 H | 228 | 48.24 | 13.56 |
| 6 | 11650.00 | 48.8 AV | 54.0 | -5.2 | 1.17 H | 228 | 35.21 | 13.56 |
| 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 | *5825.00 | 109.1 PK | | | 1.81 V | 282 | 104.31 | 4.79 |
| 2 | *5825.00 | 99.5 AV | | | 1.81 V | 282 | 94.71 | 4.79 |
| 3 | #5850.00 | 77.9 PK | 78.2 | -0.3 | 1.81 V | 282 | 73.09 | 4.80 |
| 4 | #5860.01 | 66.6 PK | 68.2 | -1.6 | 1.81 V | 282 | 61.80 | 4.82 |
| 5 | 11650.00 | 62.9 PK | 74.0 | -11.1 | 1.30 V | 142 | 49.38 | 13.56 |
| 6 | 11650.00 | 51.1 AV | 54.0 | -2.9 | 1.30 V | 142 | 37.55 | 13.56 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

**Beamforming_NSS1 MODE**

**802.11ac (VHT20)**

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 149 | **DETECTOR FUNCTION** | Peak (PK)<br>Average (AV) |
| **FREQUENCY RANGE** | 1GHz ~ 40GHz | | |

| 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 | #5714.99 | 64.1 PK | 68.2 | -4.1 | 1.85 H | 38 | 58.65 | 5.48 |
| 2 | #5725.00 | 75.8 PK | 78.2 | -2.4 | 1.85 H | 38 | 70.26 | 5.49 |
| 3 | *5745.00 | 105.4 PK | | | 1.85 H | 28 | 99.81 | 5.54 |
| 4 | *5745.00 | 94.9 AV | | | 1.85 H | 28 | 89.33 | 5.54 |
| 5 | 11490.00 | 59.1 PK | 74.0 | -14.9 | 1.27 H | 263 | 42.04 | 17.04 |
| 6 | 11490.00 | 45.2 AV | 54.0 | -8.8 | 1.27 H | 263 | 28.18 | 17.04 |
| **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 | #5714.99 | 66.6 PK | 68.2 | -1.6 | 1.77 V | 261 | 61.12 | 5.48 |
| 2 | #5725.00 | 77.9 PK | 78.2 | -0.3 | 1.77 V | 261 | 72.38 | 5.49 |
| 3 | *5745.00 | 109.4 PK | | | 1.77 V | 261 | 103.81 | 5.54 |
| 4 | *5745.00 | 97.8 AV | | | 1.77 V | 261 | 92.21 | 5.54 |
| 5 | 11490.00 | 64.8 PK | 74.0 | -9.3 | 1.14 V | 202 | 47.71 | 17.04 |
| 6 | 11490.00 | 51.7 AV | 54.0 | -2.3 | 1.14 V | 202 | 34.63 | 17.04 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 157 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | *5785.00 | 110.5 PK | | | 1.65 H | 313 | 104.85 | 5.62 |
| 2 | *5785.00 | 100.4 AV | | | 1.65 H | 313 | 94.74 | 5.62 |
| 3 | 11570.00 | 65.9 PK | 74.0 | -8.1 | 1.25 H | 225 | 48.83 | 17.11 |
| 4 | 11570.00 | 51.7 AV | 54.0 | -2.3 | 1.25 H | 225 | 34.58 | 17.11 |
| 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 | *5785.00 | 115.8 PK | | | 1.89 V | 307 | 110.20 | 5.62 |
| 2 | *5785.00 | 104.4 AV | | | 1.89 V | 307 | 98.73 | 5.62 |
| 3 | 11570.00 | 69.7 PK | 74.0 | -4.3 | 1.58 V | 179 | 52.57 | 17.11 |
| 4 | 11570.00 | 53.6 AV | 54.0 | -0.4 | 1.58 V | 179 | 36.52 | 17.11 |

**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
5. " * ": Fundamental frequency.

| CHANNEL | TX Channel 165 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | *5825.00 | 107.6 PK | | | 1.75 H | 312 | 101.92 | 5.71 |
| 2 | *5825.00 | 98.3 AV | | | 1.75 H | 312 | 92.56 | 5.71 |
| 3 | #5850.00 | 77.6 PK | 78.2 | -0.6 | 1.75 H | 312 | 71.83 | 5.74 |
| 4 | #5860.01 | 66.4 PK | 68.2 | -1.8 | 1.75 H | 312 | 60.61 | 5.77 |
| 5 | 11650.00 | 62.7 PK | 74.0 | -11.3 | 1.30 H | 144 | 46.11 | 16.59 |
| 6 | 11650.00 | 48.6 AV | 54.0 | -5.4 | 1.30 H | 144 | 32.05 | 16.59 |
| 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 | *5825.00 | 110.0 PK | | | 1.85 V | 288 | 104.28 | 5.71 |
| 2 | *5825.00 | 99.2 AV | | | 1.85 V | 288 | 93.52 | 5.71 |
| 3 | #5850.00 | 77.9 PK | 78.2 | -0.3 | 1.85 V | 288 | 72.17 | 5.74 |
| 4 | #5860.01 | 67.7 PK | 68.2 | -0.5 | 1.85 V | 288 | 61.90 | 5.77 |
| 5 | 11650.00 | 66.0 PK | 74.0 | -8.0 | 1.29 V | 194 | 49.45 | 16.59 |
| 6 | 11650.00 | 52.4 AV | 54.0 | -1.6 | 1.29 V | 194 | 35.77 | 16.59 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## 802.11ac (VHT40)

| CHANNEL | TX Channel 151 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | #5714.99 | 67.6 PK | 68.2 | -0.6 | 2.01 H | 212 | 62.13 | 5.48 |
| 2 | #5725.00 | 73.6 PK | 78.2 | -4.6 | 2.01 H | 212 | 68.07 | 5.49 |
| 3 | *5755.00 | 104.0 PK | | | 2.01 H | 212 | 98.41 | 5.56 |
| 4 | *5755.00 | 92.7 AV | | | 2.01 H | 212 | 87.14 | 5.56 |
| 5 | 11510.00 | 64.1 PK | 74.0 | -10.0 | 1.17 H | 246 | 46.97 | 17.08 |
| 6 | 11510.00 | 50.1 AV | 54.0 | -4.0 | 1.17 H | 246 | 32.97 | 17.08 |
| 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 | #5714.99 | 67.9 PK | 68.2 | -0.3 | 1.80 V | 284 | 62.45 | 5.48 |
| 2 | #5725.00 | 76.7 PK | 78.2 | -1.5 | 1.80 V | 284 | 71.21 | 5.49 |
| 3 | *5755.00 | 105.7 PK | | | 1.80 V | 284 | 100.09 | 5.56 |
| 4 | *5755.00 | 94.5 AV | | | 1.80 V | 284 | 88.93 | 5.56 |
| 5 | 11510.00 | 64.3 PK | 74.0 | -9.7 | 1.03 V | 347 | 47.18 | 17.08 |
| 6 | 11510.00 | 50.6 AV | 54.0 | -3.4 | 1.03 V | 347 | 33.51 | 17.08 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 159 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | *5795.00 | 105.1 PK | | | 1.90 H | 225 | 99.46 | 5.64 |
| 2 | *5795.00 | 95.3 AV | | | 1.90 H | 225 | 89.67 | 5.64 |
| 3 | #5850.00 | 67.1 PK | 78.2 | -11.1 | 1.90 H | 225 | 61.37 | 5.74 |
| 4 | #5860.01 | 64.7 PK | 68.2 | -3.5 | 1.90 H | 225 | 58.94 | 5.77 |
| 5 | 11590.00 | 60.8 PK | 74.0 | -13.2 | 1.64 H | 142 | 43.63 | 17.13 |
| 6 | 11590.00 | 45.7 AV | 54.0 | -8.3 | 1.64 H | 142 | 28.57 | 17.13 |
| 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 | *5795.00 | 108.3 PK | | | 1.73 V | 289 | 102.63 | 5.64 |
| 2 | *5795.00 | 96.7 AV | | | 1.73 V | 289 | 91.09 | 5.64 |
| 3 | #5850.00 | 69.3 PK | 78.2 | -8.9 | 1.73 V | 289 | 63.56 | 5.74 |
| 4 | #5860.01 | 67.9 PK | 68.2 | -0.3 | 1.73 V | 289 | 62.14 | 5.77 |
| 5 | 11590.00 | 67.1 PK | 74.0 | -6.9 | 1.04 V | 198 | 49.93 | 17.13 |
| 6 | 11590.00 | 49.8 AV | 54.0 | -4.2 | 1.04 V | 198 | 32.67 | 17.13 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## 802.11ac (VHT80)

| CHANNEL | TX Channel 155 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | |

| 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 | #5714.99 | 66.9 PK | 68.2 | -1.3 | 1.75 H | 39 | 61.46 | 5.48 |
| 2 | #5725.00 | 71.2 PK | 78.2 | -7.0 | 1.75 H | 39 | 65.71 | 5.49 |
| 3 | *5775.00 | 103.0 PK | | | 1.75 H | 39 | 97.38 | 5.61 |
| 4 | *5775.00 | 89.2 AV | | | 1.75 H | 39 | 83.58 | 5.61 |
| 5 | #5850.00 | 68.7 PK | 78.2 | -9.5 | 1.75 H | 39 | 62.99 | 5.74 |
| 6 | #5860.01 | 65.2 PK | 68.2 | -3.0 | 1.75 H | 39 | 59.42 | 5.77 |
| 7 | 11550.00 | 56.7 PK | 74.0 | -17.3 | 1.06 H | 217 | 39.56 | 17.10 |
| 8 | 11550.00 | 44.3 AV | 54.0 | -9.8 | 1.06 H | 217 | 27.15 | 17.10 |
| **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** | **#5714.99** | **68.0 PK** | **68.2** | **-0.2** | **1.79 V** | **247** | **62.49** | **5.48** |
| 2 | #5725.00 | 73.8 PK | 78.2 | -4.4 | 1.79 V | 247 | 68.29 | 5.49 |
| 3 | *5775.00 | 104.5 PK | | | 1.79 V | 247 | 98.93 | 5.61 |
| 4 | *5775.00 | 95.2 AV | | | 1.79 V | 247 | 89.55 | 5.61 |
| 5 | #5850.00 | 70.5 PK | 78.2 | -7.7 | 1.79 V | 247 | 64.73 | 5.74 |
| **6** | **#5860.01** | **68.0 PK** | **68.2** | **-0.2** | **1.79 V** | **247** | **62.18** | **5.77** |
| 7 | 11550.00 | 60.3 PK | 74.0 | -13.7 | 1.24 V | 256 | 43.17 | 17.10 |
| 8 | 11550.00 | 45.5 AV | 54.0 | -8.5 | 1.24 V | 256 | 28.39 | 17.10 |

**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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

**Below 1GHz Data:**

**CDD MODE**

**802.11a**

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 157 | **DETECTOR FUNCTION** | Quasi-Peak (QP) |
| **FREQUENCY RANGE** | 30MHz ~ 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 | 70.45 | 30.6 QP | 40.0 | -9.4 | 4.00 H | 255 | 46.09 | -15.47 |
| 2 | 142.91 | 33.1 QP | 43.5 | -10.4 | 4.00 H | 93 | 47.06 | -13.96 |
| 3 | 291.32 | 29.9 QP | 46.0 | -16.1 | 3.44 H | 64 | 42.04 | -12.18 |
| 4 | 374.98 | 31.6 QP | 46.0 | -14.4 | 2.86 H | 251 | 41.98 | -10.35 |
| 5 | 500.01 | 36.0 QP | 46.0 | -10.0 | 1.77 H | 0 | 43.73 | -7.69 |
| 6 | 875.02 | 33.0 QP | 46.0 | -13.0 | 1.00 H | 139 | 34.41 | -1.38 |
| **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 | 43.47 | 32.7 QP | 40.0 | -7.3 | 1.18 V | 86 | 46.70 | -14.03 |
| 2 | 146.88 | 33.4 QP | 43.5 | -10.1 | 1.00 V | 114 | 47.06 | -13.64 |
| 3 | 333.37 | 34.3 QP | 46.0 | -11.7 | 1.62 V | 279 | 45.47 | -11.16 |
| 4 | 447.92 | 34.2 QP | 46.0 | -11.8 | 1.88 V | 241 | 42.95 | -8.73 |
| 5 | 625.04 | 35.2 QP | 46.0 | -10.8 | 2.11 V | 246 | 40.15 | -4.99 |
| 6 | 999.99 | 39.8 QP | 54.0 | -14.2 | 2.20 V | 354 | 39.01 | 0.80 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| ROHDE & SCHWARZ TEST RECEIVER | ESCS 30 | 838251/021 | Oct. 27, 2014 | Oct. 26, 2015 |
| ROHDE & SCHWARZ Artificial Mains Network (For EUT) | ENV216 | 101195 | Apr. 27, 2015 | Apr. 26, 2016 |
| LISN With Adapter (for EUT) | AD10 | C03Ada-002 | Apr. 27, 2015 | Apr. 26, 2016 |
| EMCO L.I.S.N. (For peripherals) | 3825/2 | 9504-2359 | Jul. 27, 2015 | Jul. 26, 2016 |
| SCHWARZBECK Artificial Mains Network (For EUT) | NNLK8129 | 8129229 | May 06, 2015 | May 05, 2016 |
| Software | Cond_V7.3.7 | NA | NA | NA |
| RF cable (JYEBAO) With10dB PAD | 5D-FB | Cable-C03.01 | Sep. 23, 2015 | Sep. 22, 2016 |
| LYNICS Terminator (For EMCO LISN) | 0900510 | E1-01-300 | Jan. 19, 2015 | Jan. 18, 2016 |
| LYNICS Terminator (For EMCO LISN) | 0900510 | E1-01-301 | Jan. 29, 2015 | Jan. 28, 2016 |
| ROHDE & SCHWARZ Artificial Mains Network (For TV EUT) | ESH3-Z5 | 100220 | Nov. 20, 2014 | Nov. 19, 2015 |
| LISN With Adapter (for TV EUT) | 100220 | N/A | Nov. 20, 2014 | Nov. 19, 2015 |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 3.
3. The VCCI Site Registration No. C-274.

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.

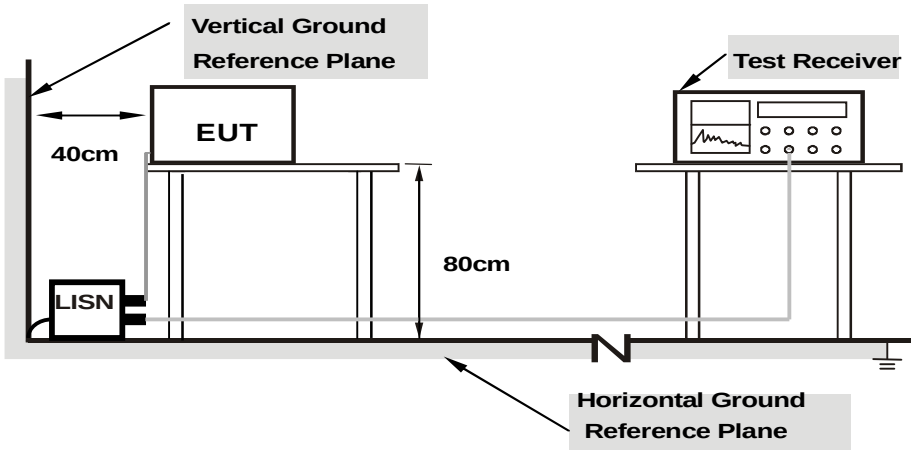
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**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.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

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

4.2.6 EUT Operating Condition

Same as item 4.1.6.

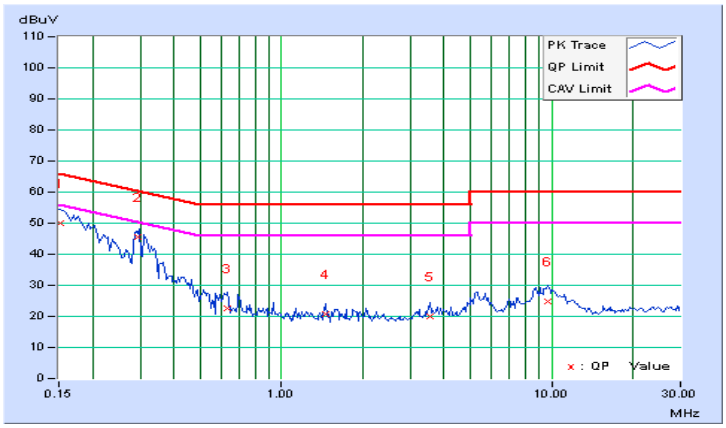
4.2.7 Test Results

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

| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15255 | 9.71 | 40.47 | 31.84 | 50.18 | 41.55 | 65.86 | 55.86 | -15.68 | -14.31 |
| **2** | **0.29462** | **9.73** | **35.66** | **29.52** | **45.39** | **39.25** | **60.39** | **50.39** | **-15.00** | **-11.14** |
| 3 | 0.63438 | 9.76 | 12.83 | 3.20 | 22.59 | 12.96 | 56.00 | 46.00 | -33.41 | -33.04 |
| 4 | 1.45703 | 9.82 | 11.07 | 4.26 | 20.89 | 14.08 | 56.00 | 46.00 | -35.11 | -31.92 |
| 5 | 3.53906 | 9.89 | 10.03 | 3.51 | 19.92 | 13.40 | 56.00 | 46.00 | -36.08 | -32.60 |
| 6 | 9.69141 | 10.05 | 14.82 | 10.20 | 24.87 | 20.25 | 60.00 | 50.00 | -35.13 | -29.75 |

**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

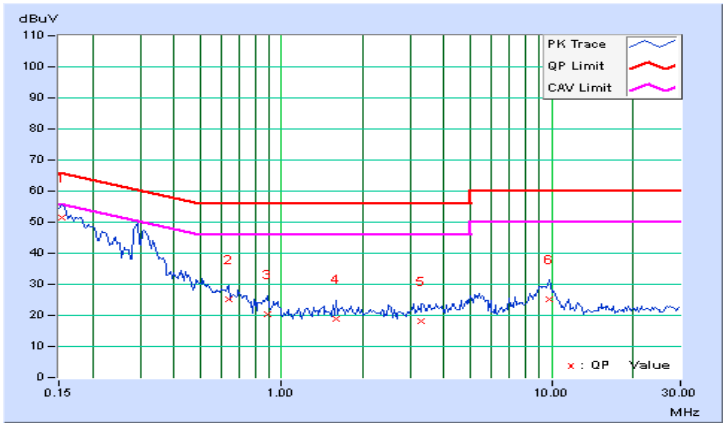


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15391 | 9.66 | 41.81 | 31.99 | 51.47 | 41.65 | 65.79 | 55.79 | -14.32 | -14.14 |
| 2 | 0.63573 | 9.68 | 15.68 | 5.70 | 25.36 | 15.38 | 56.00 | 46.00 | -30.64 | -30.62 |
| 3 | 0.88828 | 9.69 | 10.78 | 2.36 | 20.47 | 12.05 | 56.00 | 46.00 | -35.53 | -33.95 |
| 4 | 1.60156 | 9.72 | 9.29 | 3.01 | 19.01 | 12.73 | 56.00 | 46.00 | -36.99 | -33.27 |
| 5 | 3.30859 | 9.77 | 8.49 | 2.89 | 18.26 | 12.66 | 56.00 | 46.00 | -37.74 | -33.34 |
| 6 | 9.75781 | 9.90 | 15.46 | 11.06 | 25.36 | 20.96 | 60.00 | 50.00 | -34.64 | -29.04 |

**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



## 4.3 Transmit Power Measurment

### 4.3.1 Limits of Transmit Power Measurement

| Operation Band | EUT Category | | LIMIT |
|---|---|---|---|
| U-NII-1 | | Outdoor Access Point | 1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon) |
| | | Fixed point-to-point Access Point | 1 Watt (30 dBm) |
| | | Indoor Access Point | 1 Watt (30 dBm) |
| | | Mobile and Portable client device | 250mW (24 dBm) |
| U-NII-2A | --- | | 250mW (24 dBm) or 11 dBm+10 log B* |
| U-NII-2C | --- | | 250mW (24 dBm) or 11 dBm+10 log B* |
| U-NII-3 | √ | | 1 Watt (30 dBm) |

*B is the 26 dB emission bandwidth in megahertz

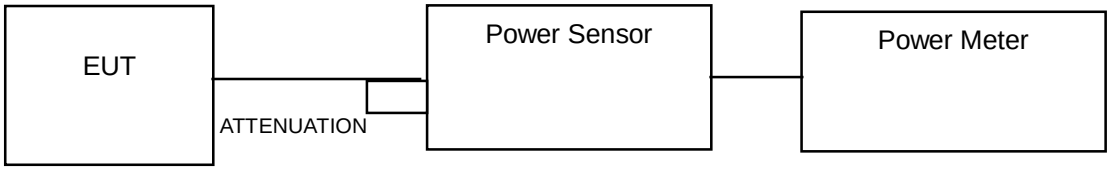
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any $N_{ANT}$;
Array Gain = 5 log($N_{ANT}/N_{SS}$) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log($N_{ANT}/N_{SS}$) dB.

### 4.3.2 Test Setup

**FOR POWER OUTPUT MEASUREMENT**




**FOR OCCUPIED BANDWIDTH**


### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

**FOR AVERAGE POWER MEASUREMENT**

**For 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11n (HT40), 802.11ac (VHT40)**

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

**For 802.11ac (VHT80)**

1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2) Set sweep trigger to “free run”.
3) Set RBW = 1 MHz.
4) Set VBW ≥ 3 MHz
5) Number of points in sweep ≥ 2 Span / RBW.
6) Sweep time ≤ (number of points in sweep) * T
7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
8) Detector = RMS.
9) Trace mode = max hold.
10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

**FOR OCCUPIED BANDWIDTH**

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to AVERAGE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

**POWER OUTPUT:**

**CDD MODE**

**802.11a**

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 149 | 5745 | 17.15 | 17.77 | 111.721 | 20.48 | 30 | PASS |
| 157 | 5785 | 22.87 | 23.04 | 395.014 | 25.97 | 30 | PASS |
| 165 | 5825 | 19.16 | 19.71 | 175.955 | 22.45 | 30 | PASS |

**802.11ac (VHT20)**

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 149 | 5745 | 15.37 | 15.53 | 70.162 | 18.46 | 30 | PASS |
| 157 | 5785 | 23.08 | 23.24 | **414.099** | 26.17 | 30 | PASS |
| 165 | 5825 | 17.79 | 17.96 | 122.634 | 20.89 | 30 | PASS |

**802.11ac (VHT40)**

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 151 | 5755 | 15.03 | 15.17 | 64.727 | 18.11 | 30 | PASS |
| 159 | 5795 | 17.21 | 17.36 | 107.052 | 20.30 | 30 | PASS |

**802.11ac (VHT80)**

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 155 | 5775 | 14.58 | 14.78 | 58.769 | 17.69 | 30 | PASS |

## Beamforming_NSS1 MODE

### 802.11ac (VHT20)

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 149 | 5745 | 15.44 | 15.65 | 71.723 | 18.56 | 28.66 | PASS |
| 157 | 5785 | 23.08 | 23.24 | **414.099** | 26.17 | 28.66 | PASS |
| 165 | 5825 | 18.07 | 18.55 | 135.735 | 21.33 | 28.66 | PASS |

**NOTE:** Directional gain = 10 log[($10^{4.70/20}$ + $10^{3.94/20}$)$^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.

### 802.11ac (VHT40)

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 151 | 5755 | 15.15 | 15.29 | 66.54 | 18.23 | 28.66 | PASS |
| 159 | 5795 | 17.49 | 17.78 | 116.084 | 20.65 | 28.66 | PASS |

**NOTE:** Directional gain = 10 log[($10^{4.70/20}$ + $10^{3.94/20}$)$^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.

### 802.11ac (VHT80)

| CHAN. | CHAN. FREQ. (MHz) | MAXIMUM CONDUCTED POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | | | |
| 155 | 5775 | 14.68 | 14.89 | 60.208 | 17.80 | 28.66 | PASS |

**NOTE:** Directional gain = 10 log[($10^{4.70/20}$ + $10^{3.94/20}$)$^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.

## OCCUPIED BANDWIDTH:

### CDD MODE

#### 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 149 | 5745 | 17.13 | 17.20 | Pass |
| 157 | 5785 | 23.40 | 23.10 | Pass |
| 165 | 5825 | 18.00 | 18.30 | Pass |

#### 802.11ac (VHT20)

| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 149 | 5745 | 17.91 | 18.00 | Pass |
| 157 | 5785 | 21.40 | 21.50 | Pass |
| 165 | 5825 | 18.20 | 18.10 | Pass |

#### 802.11ac (VHT40)

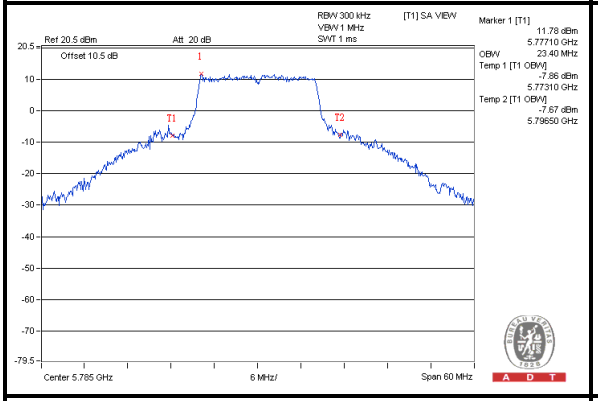
| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 151 | 5755 | 36.96 | 36.83 | Pass |
| 159 | 5795 | 37.50 | 37.50 | Pass |

#### 802.11ac (VHT80)

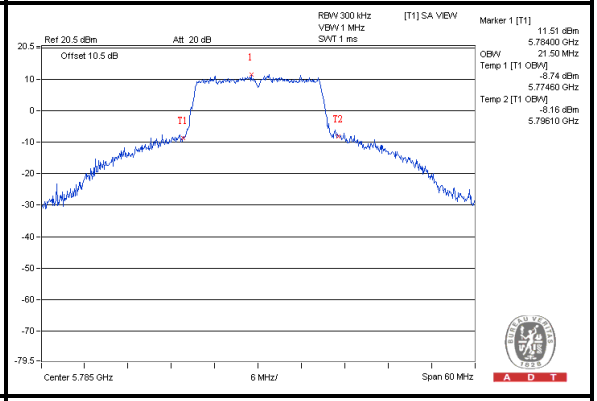
| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 155 | 5775 | 75.88 | 75.88 | Pass |

## SPECTRUM PLOT OF WORST VALUE

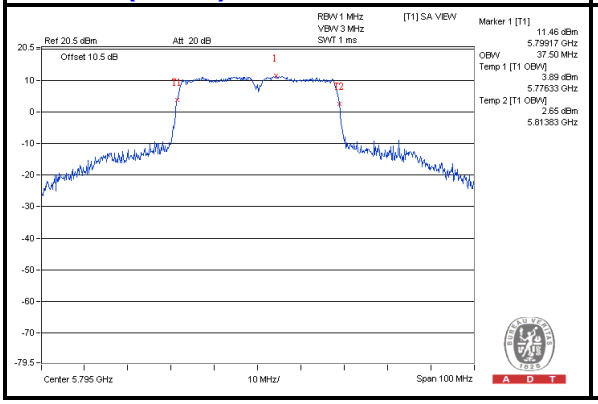
### 802.11a



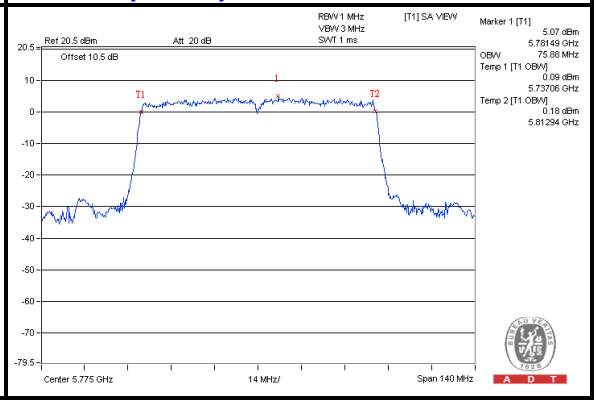

### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)



## Beamforming_NSS1 MODE

### 802.11ac (VHT20)

| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 149 | 5745 | 18.00 | 18.00 | Pass |
| 157 | 5785 | 21.40 | 21.50 | Pass |
| 165 | 5825 | 18.20 | 18.20 | Pass |

### 802.11ac (VHT40)

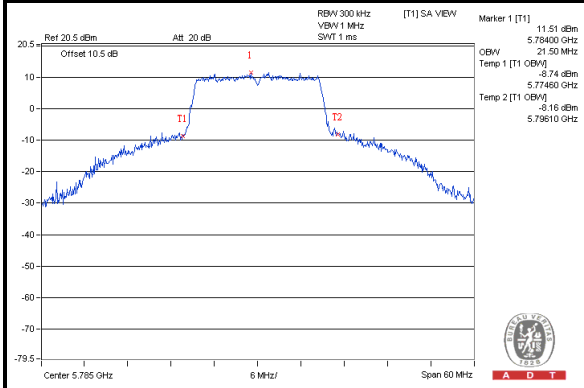
| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 151 | 5755 | 36.81 | 36.67 | Pass |
| 159 | 5795 | 37.17 | 37.17 | Pass |

### 802.11ac (VHT80)

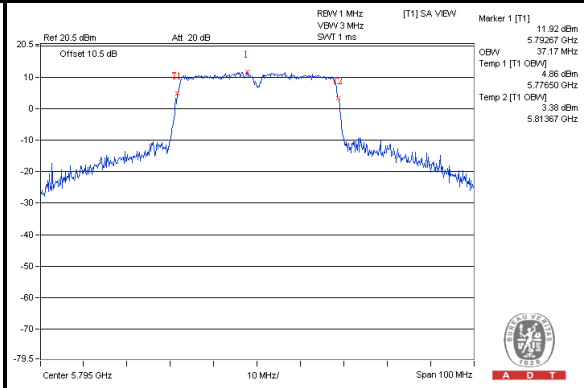
| CHANNEL | CHANNEL FREQUENCY (MHz) | OCCUPIED BANDWIDTH (MHz) | | PASS / FAIL |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | |
| 155 | 5775 | 75.88 | 75.88 | Pass |

## SPECTRUM PLOT OF WORST VALUE

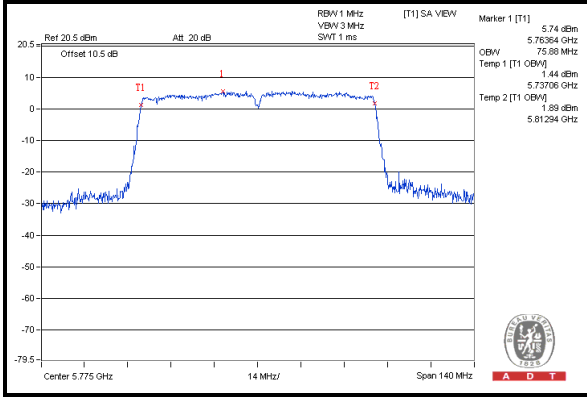
### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)

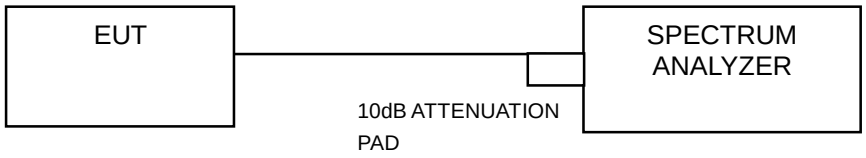


## 4.4 Peak Power Spectral Density Measurement

### 4.4.1 Limits of Peak Power Spectral Density Measurement

| Operation Band | EUT Category | | LIMIT |
|---|---|---|---|
| U-NII-1 | | Outdoor Access Point | 17dBm/ MHz |
| | | Fixed point-to-point Access Point | |
| | | Indoor Access Point | |
| | | Mobile and Portable client device | 11dBm/ MHz |
| U-NII-2A | --- | | 11dBm/ MHz |
| U-NII-2C | --- | | 11dBm/ MHz |
| U-NII-3 | √ | | 30dBm/ 500kHz |

### 4.4.2 Test Setup




### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.4 Test Procedure

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
3) Sweep time = auto, trigger set to “free run”.
4) Trace average at least 100 traces in power averaging mode.
5) Record the max value and add 10 log (1/duty cycle)
6) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)

### 4.4.5 Deviation from Test Standard

No deviation.

### 4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

## CDD MODE

### 802.11a

| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 149 | 5745 | 10.89 | 3.01 | 13.90 | 0.33 | 14.23 | 28.66 | PASS |
| | 157 | 5785 | 14.33 | 3.01 | 17.34 | 0.33 | 17.67 | 28.66 | PASS |
| | 165 | 5825 | 13.09 | 3.01 | 16.10 | 0.33 | 16.43 | 28.66 | PASS |
| 1 | 149 | 5745 | 10.97 | 3.01 | 13.98 | 0.33 | 14.31 | 28.66 | PASS |
| | 157 | 5785 | 14.23 | 3.01 | 17.24 | 0.33 | 17.57 | 28.66 | PASS |
| | 165 | 5825 | 13.09 | 3.01 | 16.10 | 0.33 | 16.43 | 28.66 | PASS |

**NOTE:**

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{4.70/20} + 10^{3.94/20})^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ac (VHT20)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 149 | 5745 | 9.10 | 3.01 | 12.11 | 0.40 | 12.51 | 28.66 | PASS |
| | 157 | 5785 | 14.12 | 3.01 | 17.13 | 0.40 | 17.53 | 28.66 | PASS |
| | 165 | 5825 | 11.41 | 3.01 | 14.42 | 0.40 | 14.82 | 28.66 | PASS |
| 1 | 149 | 5745 | 9.09 | 3.01 | 12.10 | 0.40 | 12.50 | 28.66 | PASS |
| | 157 | 5785 | 14.28 | 3.01 | 17.29 | 0.40 | 17.69 | 28.66 | PASS |
| | 165 | 5825 | 11.73 | 3.01 | 14.74 | 0.40 | 15.14 | 28.66 | PASS |

**NOTE:**

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{4.70/20} + 10^{3.94/20})^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

## 802.11ac (VHT40)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 151 | 5755 | 6.25 | 3.01 | 9.26 | 0.66 | 9.92 | 28.66 | PASS |
| | 159 | 5795 | 8.98 | 3.01 | 11.99 | 0.66 | 12.65 | 28.66 | PASS |
| 1 | 151 | 5755 | 6.25 | 3.01 | 9.26 | 0.66 | 9.92 | 28.66 | PASS |
| | 159 | 5795 | 9.47 | 3.01 | 12.48 | 0.66 | 13.14 | 28.66 | PASS |

**NOTE:**

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[($10^{4.70/20}$ + $10^{3.94/20}$)$^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

## 802.11ac (VHT80)

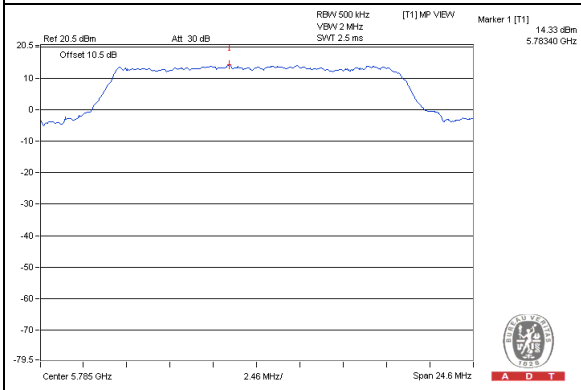
| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 155 | 5775 | 2.59 | 3.01 | 5.60 | 0.62 | 6.22 | 28.66 | PASS |
| 1 | 155 | 5775 | 2.70 | 3.01 | 5.71 | 0.62 | 6.33 | 28.66 | PASS |

**NOTE:**

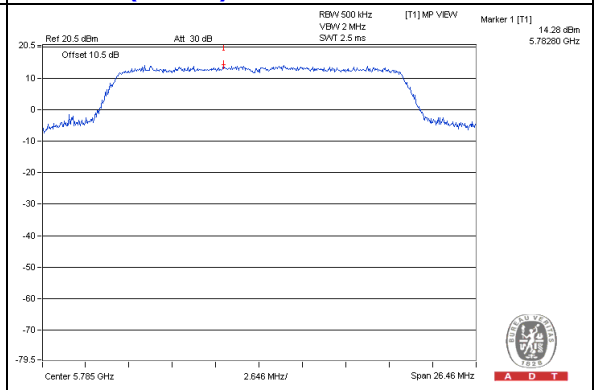
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[($10^{4.70/20}$ + $10^{3.94/20}$)$^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

## SPECTRUM PLOT OF WORST VALUE

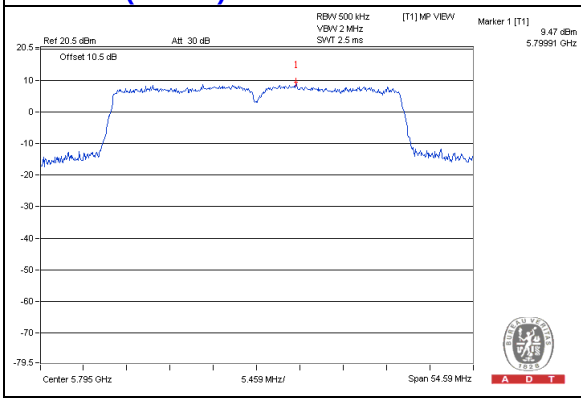
### 802.11a



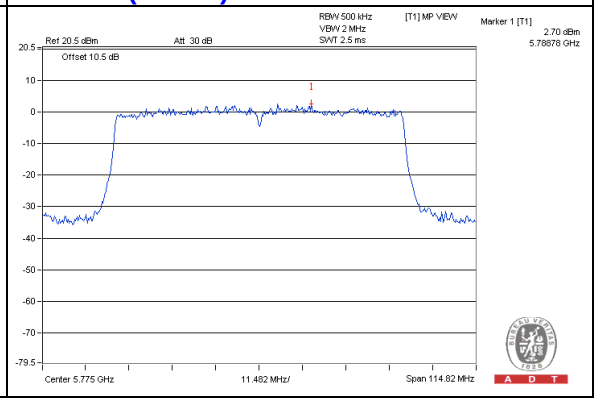

### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)



## Beamforming_NSS1 MODE

### 802.11ac (VHT20)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 149 | 5745 | 9.94 | 3.01 | 12.95 | 0.40 | 13.35 | 28.66 | PASS |
| | 157 | 5785 | 14.12 | 3.01 | 17.13 | 0.40 | 17.53 | 28.66 | PASS |
| | 165 | 5825 | 12.22 | 3.01 | 15.23 | 0.40 | 15.63 | 28.66 | PASS |
| 1 | 149 | 5745 | 9.81 | 3.01 | 12.82 | 0.40 | 13.22 | 28.66 | PASS |
| | 157 | 5785 | 14.28 | 3.01 | 17.29 | 0.40 | 17.69 | 28.66 | PASS |
| | 165 | 5825 | 11.90 | 3.01 | 14.91 | 0.40 | 15.31 | 28.66 | PASS |

**NOTE:**

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{4.70/20} + 10^{3.94/20})^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ac (VHT40)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 151 | 5755 | 6.65 | 3.01 | 9.66 | 0.66 | 10.32 | 28.66 | PASS |
| | 159 | 5795 | 9.38 | 3.01 | 12.39 | 0.66 | 13.05 | 28.66 | PASS |
| 1 | 151 | 5755 | 6.51 | 3.01 | 9.52 | 0.66 | 10.18 | 28.66 | PASS |
| | 159 | 5795 | 9.09 | 3.01 | 12.10 | 0.66 | 12.76 | 28.66 | PASS |

**NOTE:**

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{4.70/20} + 10^{3.94/20})^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

## 802.11ac (VHT80)

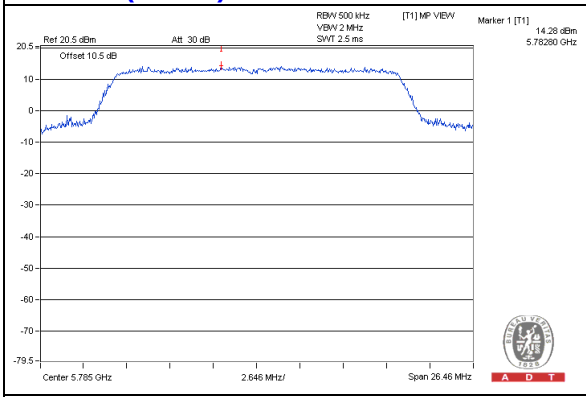
| TX chain | Channel | Freq. (MHz) | PSD (dBm/500kHz) | 10 log (N=2) dB | Total PSD W/O Duty Factor (dBm/500kHz) | Duty Factor | Total PSD with Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 155 | 5775 | 3.74 | 3.01 | 6.75 | 0.62 | 7.37 | 28.66 | PASS |
| 1 | 155 | 5775 | 3.07 | 3.01 | 6.08 | 0.62 | 6.70 | 28.66 | PASS |

**NOTE:**

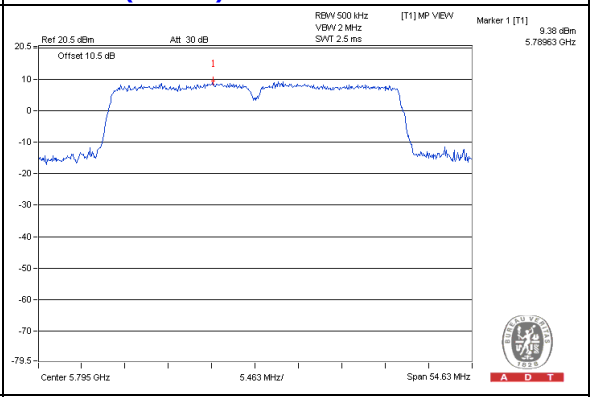
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[($10^{4.70/20}$ + $10^{3.94/20}$)$^2$ / 2] + 10log(2) = 7.34dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7.34-6) = 28.66dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

**SPECTRUM PLOT OF WORST VALUE**

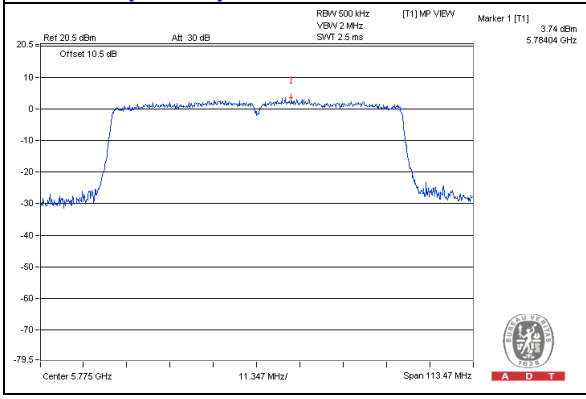
**802.11ac (VHT20)**




**802.11ac (VHT40)**




**802.11ac (VHT80)**

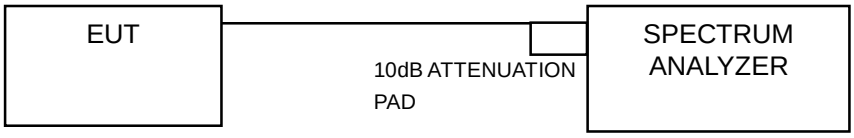


## 4.5 6dB Bandwidth Measurment

### 4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

### 4.5.2 Test Setup




### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

**MEASUREMENT PROCEDURE REF**

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

## CDD MODE

### 802.11a

| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 149 | 5745 | 16.37 | 16.40 | 0.5 | PASS |
| 157 | 5785 | 16.41 | 16.40 | 0.5 | PASS |
| 165 | 5825 | 16.39 | 16.38 | 0.5 | PASS |

### 802.11ac (VHT20)

| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 149 | 5745 | 17.62 | 17.62 | 0.5 | PASS |
| 157 | 5785 | 17.62 | 17.64 | 0.5 | PASS |
| 165 | 5825 | 17.60 | 17.62 | 0.5 | PASS |

### 802.11ac (VHT40)

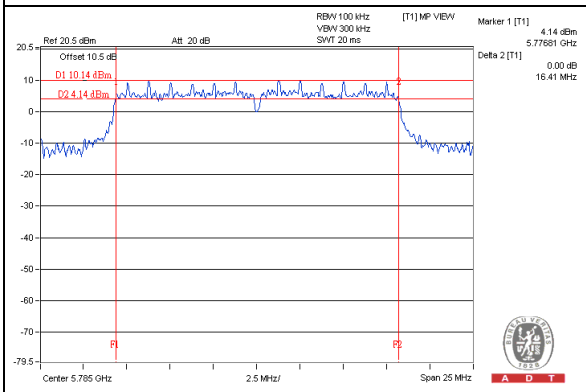
| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 151 | 5755 | 36.43 | 36.40 | 0.5 | PASS |
| 159 | 5795 | 36.40 | 36.39 | 0.5 | PASS |

### 802.11ac (VHT80)

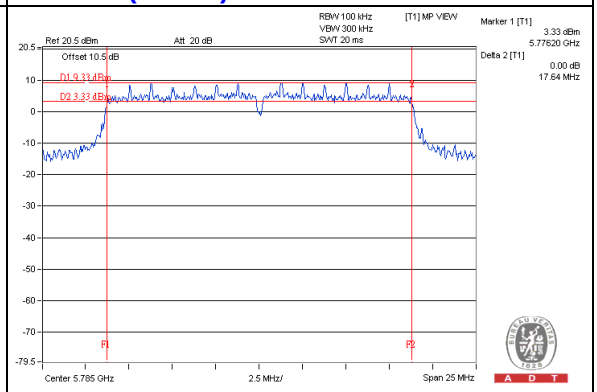
| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 155 | 5775 | 76.45 | 76.55 | 0.5 | PASS |

## SPECTRUM PLOT OF WORST VALUE

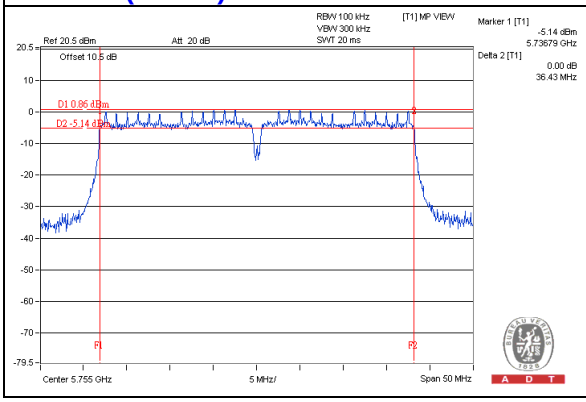
### 802.11a



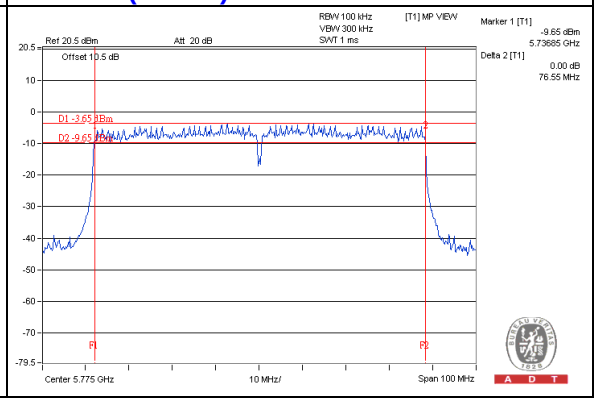

### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)



## Beamforming_NSS1 MODE

### 802.11ac (VHT20)

| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 149 | 5745 | 17.61 | 17.64 | 0.5 | PASS |
| 157 | 5785 | 17.62 | 17.64 | 0.5 | PASS |
| 165 | 5825 | 17.63 | 17.63 | 0.5 | PASS |

### 802.11ac (VHT40)

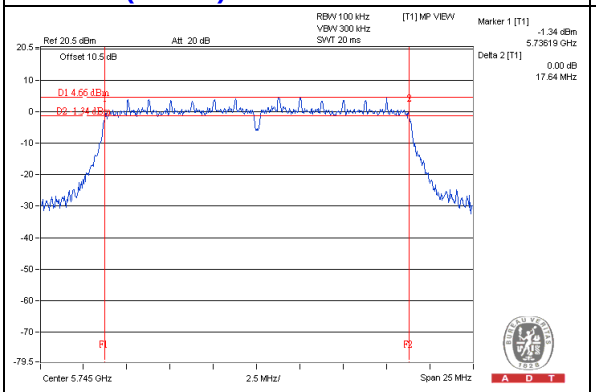
| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 151 | 5755 | 36.36 | 36.42 | 0.5 | PASS |
| 159 | 5795 | 36.42 | 36.40 | 0.5 | PASS |

### 802.11ac (VHT80)

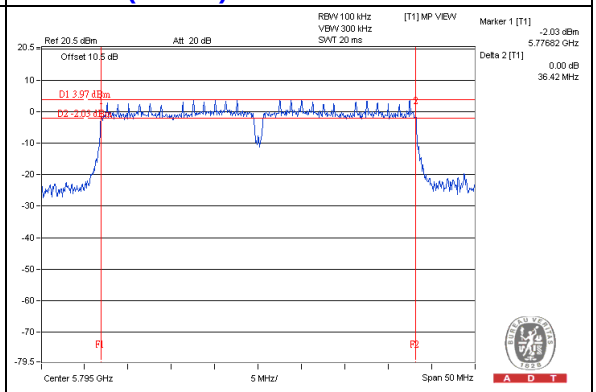
| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 155 | 5775 | 75.65 | 75.80 | 0.5 | PASS |

## SPECTRUM PLOT OF WORST VALUE

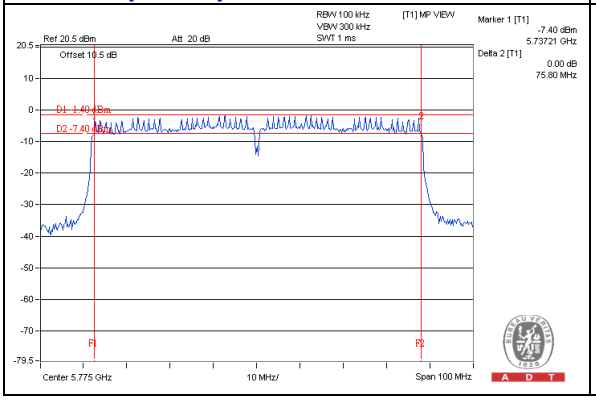
### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)

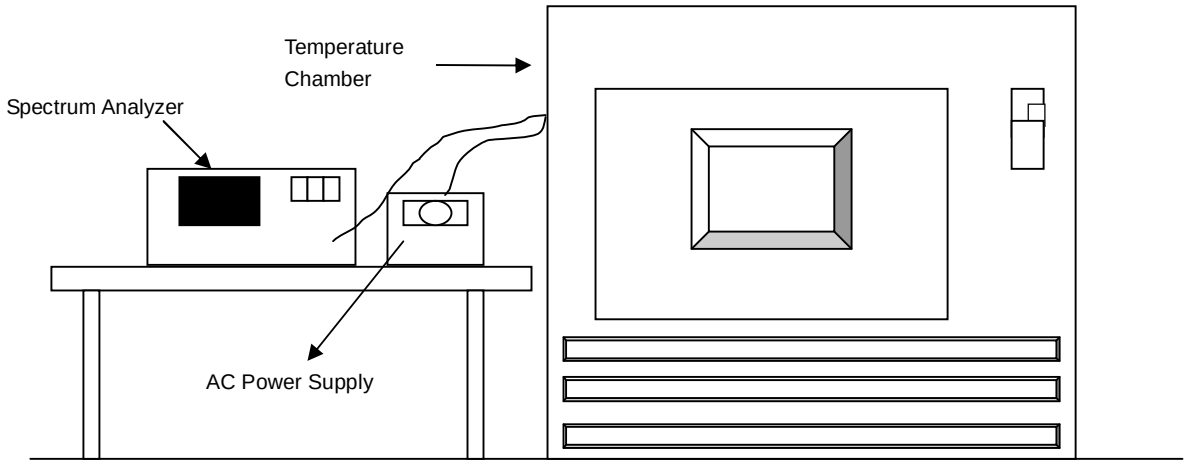


## 4.6 Frequency S tability

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup




4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

| FREQUEMCY STABILITY VERSUS TEMP. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OPERATING FREQUENCY: 5745MHz | | | | | | | | | |
| TEMP. (℃) | POWER SUPPLY (Vac) | 0 MINUTE | | 2 MINUTE | | 5 MINUTE | | 10 MINUTE | |
| | | Measured Frequency (MHz) | Frequency Drift (ppm) | Measured Frequency (MHz) | Frequency Drift (ppm) | Measured Frequency (MHz) | Frequency Drift (ppm) | Measured Frequency (MHz) | Frequency Drift (ppm) |
| 50 | 120 | 5745.042955 | 7.4769365 | 5745.043293 | 7.5357702 | 5745.043060 | 7.4952132 | 5745.042842 | 7.4572672 |
| 40 | 120 | 5745.042361 | 7.3735422 | 5745.042721 | 7.4362054 | 5745.042929 | 7.4724108 | 5745.042435 | 7.3864230 |
| 30 | 120 | 5745.043475 | 7.5674500 | 5745.043546 | 7.5798085 | 5745.043506 | 7.5728460 | 5745.043576 | 7.5850305 |
| 20 | 120 | 5745.042527 | 7.4024369 | 5745.042532 | 7.4033072 | 5745.042528 | 7.4026110 | 5745.042583 | 7.4121845 |
| 10 | 120 | 5745.042949 | 7.4758921 | 5745.04274 | 7.4395126 | 5745.042884 | 7.4645779 | 5745.042808 | 7.4513490 |
| 0 | 120 | 5745.043498 | 7.5714534 | 5745.043391 | 7.5528285 | 5745.043658 | 7.5993037 | 5745.043393 | 7.5531767 |
| -10 | 120 | 5745.043241 | 7.5267189 | 5745.042984 | 7.4819843 | 5745.043167 | 7.5138381 | 5745.043094 | 7.5011314 |
| -20 | 120 | 5745.042823 | 7.4539600 | 5745.04293 | 7.4725849 | 5745.042747 | 7.4407311 | 5745.042847 | 7.4581375 |

| FREQUEMCY STABILITY VERSUS VOLTAGE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OPERATING FREQUENCY: 5745MHz | | | | | | | | | |
| TEMP. (℃) | POWER SUPPLY (Vac) | 0 MINUTE | | 2 MINUTE | | 5 MINUTE | | 10 MINUTE | |
| | | Measured Frequency (MHz) | Frequency Drift (ppm) | Measured Frequency (MHz) | Frequency Drift (ppm) | Measured Frequency (MHz) | Frequency Drift (ppm) | Measured Frequency (MHz) | Frequency Drift (ppm) |
| 20 | 138 | 5745.043446 | 7.5624021 | 5745.043694 | 7.6055701 | 5745.043563 | 7.5827676 | 5745.043588 | 7.5871192 |
| | 120 | 5745.042527 | 7.4024369 | 5745.042532 | 7.4033072 | 5745.042528 | 7.4026110 | 5745.042583 | 7.4121845 |
| | 102 | 5745.042464 | 7.3914708 | 5745.042225 | 7.3498695 | 5745.042313 | 7.3651871 | 5745.042193 | 7.3442994 |

## 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:


**Linko EMC/RF Lab**
Tel: 886-2-26052180
Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab/Telecom Lab**
Tel: 886-3-5935343
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety**
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.

**--- END ---**