# FCC TEST REPORT(15.407)

| | |
|---|---|
| **REPORT NO.:** | RF120927E07-1 |
| **MODEL NO.:** | X3500 |
| **FCC ID:** | Q87-X3500 |
| **RECEIVED:** | Sep. 27, 2012 |
| **TESTED:** | Oct. 03 to 15, 2012 |
| **ISSUED:** | Oct. 26, 2012 |

| | |
|---|---|
| **APPLICANT:** | Cisco Consumer Products, LLC |
| **ADDRESS:** | 121 Theory, Irvine, CA 92617 |

| | |
|---|---|
| **ISSUED BY:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **LAB ADDRESS :** | No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C. |
| **TEST LOCATION (1):** | No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C. |
| **TEST LOCATION (2):** | No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C. |

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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# RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---|---|---|
| RF120927E07-1 | Original release | Oct. 26, 2012 |

# 1. CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | Linksys X3500 Advanced Wireless-N ADSL2+ Modem Router |
| **BRAND NAME:** | Cisco |
| **MODEL NO.:** | X3500 |
| **TEST SAMPLE:** | ENGINEERING SAMPLE |
| **APPLICANT:** | Cisco Consumer Products, LLC |
| **TESTED:** | Oct. 03 to 15, 2012 |
| **STANDARDS:** | **FCC Part 15, Subpart E (Section 15.407)**<br>ANSI C63.10-2009 |

The above equipment (Model: X3500) 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. 26, 2012*
( Claire Kuan, Specialist )

**APPROVED BY** : _____ , **DATE:** *Oct. 26, 2012*
( May Chen, Deputy Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 5GHz, 5180~5240MHz

| APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407) | | | |
|---|---|---|---|
| **STANDARD SECTION** | **TEST TYPE** | **RESULT** | **REMARK** |
| 15.407(b)(6) | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -12.19dB at 0.15022MHz |
| 15.407(b/1/2/3)(b)(6) | Spurious Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -1.1dB at 5150.00MHz |
| 15.407(a/1/2) | Peak Transmit Power | PASS | Meet the requirement of limit. |
| 15.407(a)(6) | Peak Power Excursion | PASS | Meet the requirement of limit. |
| 15.407(a/1/2) | Peak Power Spectral Density | PASS | Meet the requirement of limit. |
| 15.407(g) | Frequency Stability | PASS | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | PASS | No antenna connector is used. |

**NOTE:** The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2.400 ~ 2.4835GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

## 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:

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

| Measurement | Value |
|---|---|
| Conducted emissions | 2.98 dB |
| Radiated emissions (30MHz-1GHz) | 5.59 dB |
| Radiated emissions (1GHz -6GHz) | 3.78 dB |
| Radiated emissions (6GHz -18GHz) | 3.98 dB |
| Radiated emissions (18GHz -40GHz) | 4.24 dB |

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | Linksys X3500 Advanced Wireless-N ADSL2+ Modem Router |
| **MODEL NO.** | X3500 |
| **POWER SUPPLY** | DC 12V from power adapter |
| **MODULATION TYPE** | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM |
| **MODULATION TECHNOLOGY** | DSSS, OFDM |
| **TRANSFER RATE** | **For 2.4GHz**<br>802.11b: up to 11Mbps<br>802.11g: up to 54Mbps<br>802.11n (HT20, 800ns GI): up to 130Mbps<br>802.11n (HT40, 800ns GI): up to 270Mbps<br>802.11n (HT20, 400ns GI): up to 144.4bps<br>802.11n (HT40, 400ns GI): up to 300Mbps<br>**For 5GHz**<br>802.11 a: up to 54Mbps<br>802.11n (HT20, 800ns GI): up to 195Mbps<br>802.11n (HT20, 400ns GI): up to 216.7Mbps<br>802.11n (HT40, 800ns GI): up to 405Mbps<br>802.11n (HT40, 400ns GI): up to 450Mbps |
| **OPERATING FREQUENCY** | **For 15.407**<br>5.18 ~ 5.24GHz |
| | **For 15.247**<br>2.4GHz: 2.412 ~ 2.462GHz<br>5GHz: 5.745 ~ 5.825GHz |
| **NUMBER OF CHANNEL** | **For 15.407**<br>4 for 802.11a, 802.11n (HT20)<br>2 for 802.11n (HT40) |
| | **For 15.247 (2.4GHz)**<br>11 for 802.11b, 802.11g, 802.11n (HT20)<br>7 for 802.11n (HT40)<br>**For 15.247 (5GHz)**<br>5 for 802.11a, 802.11n (HT20)<br>2 for 802.11n (HT40) |

| | |
|---|---|
| **MAXIMUM OUTPUT POWER** | **For 15.407**<br>802.11a: 26.303mW<br>802.11n (HT20): 40.856mW<br>802.11n (HT40): 46.595mW<br>**For 15.247 (2.4GHz)**<br>802.11b: 64.565mW<br>802.11g: 194.984mW<br>802.11n (HT20): 333.022mW<br>802.11n (HT40): 270.938mW<br>**For 15.247 (5GHz)**<br>802.11a: 123.027mW<br>802.11n (HT20): 379.345mW<br>802.11n (HT40): 366.859mW |
| **ANTENNA TYPE** | Please see NOTE |
| **DATA CABLE** | NA |
| **I/O PORTS** | Refer to user's manual |
| **ASSOCIATED DEVICES** | NA |

**NOTE:**

1. There are 2.4GHz and 5GHz WLAN technology used for the EUT. The test report of EUT listed as below table:

| Function | Report No. |
|---|---|
| WLAN | RF120927E07 (15.247)<br>RF120927E07-1(15.407) |

2. The EUT must be supplied with power adapter as following table:

| No | Brand | Model No. | Spec. |
|---|---|---|---|
| 1 | Solytech | CAD2412 | Input: 100-240V, 1A, 50-60Hz<br>Output: 12V, 2A<br>DC power cable: 1.5m, unshielded |
| 2 | DVE | DSA-24PFD-15 FUS | Input: 100-240V, 0.8A, 50-60Hz<br>Output: 12V, 2A<br>DC power cable: 1.5m, unshielded |
| Note:<br>1. For radiated test, the EUT was pre-tested with above adapters, the worse case was found in adapter 1. Therefore only the test data of the adapter was recorded in the test report. | | | |

3. There are five antennas provided to this EUT, please refer to the following table:

| 2.4GHz | | | | |
|---|---|---|---|---|
| Transmitter Circuit | Antenna Type | Antenna Gain (dBi) | Connector | Frequency range (MHz to MHz) |
| Chain (0) | PIFA | 2.3 | NA | 2400~2500 |
| Chain (1) | PIFA | 4.6 | | |
| 5GHz | | | | |
| Transmitter Circuit | Antenna Type | Antenna Gain (dBi) | Connector | Frequency range (MHz to MHz) |
| Chain (0) | PIFA | 5.5 | I-PEX | 5180~5825 |
| Chain (1) | PIFA | 5 | | |
| Chain (2) | PIFA | 4.9 | | |

4. The EUT incorporates a MIMO function without beam forming.

| MODULATION MODE | Tx/Rx FUNCTION |
|---|---|
| **802.11b** | 1Tx/2Rx |
| **802.11g** | 1Tx/2Rx |
| **For 2.4 GHz 802.11n (HT20)** | 2Tx/2Rx |
| **For 2.4 GHz 802.11n (HT40)** | 2Tx/2Rx |
| **802.11a** | 1Tx/3Rx |
| **For 5 GHz 802.11n (HT20)** | 3Tx/3Rx |
| **For 5 GHz 802.11n (HT40)** | 3Tx/3Rx |

5. Radiated and Conducted emission of the simultaneous operation (2.4GHz and 5GHz WLAN technology) has been evaluated and no non-compliance was found.

6. For 2.4GHz: When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.

7. For 5GHz: When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.

8. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

**Operated in 5180 ~ 5240MHz band:**

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

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

2 channels are provided for 802.11n (HT40):

| CHANNEL | FREQUENCY |
|---|---|
| 38 | 5190 MHz |
| 46 | 5230 MHz |

## 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|---|---|---|---|---|---|
| | PLC | RE < 1G | RE ≥ 1G | APCM | |
| 1 | √ | √ | √ | √ | Adapter 1 |
| 2 | √ | - | - | - | Adapter 3 |

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

**RE ≥ 1G:** Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

NOTE: 1."-"means no effect.

2. The EUT had been pre-tested on the positioned of each 2 axis. The radiated emission worst case was found when positioned on Y-plane for 5GHz

**POWER LINE CONDUCTED EMISSION TEST:**

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

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

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (MBPS) |
|---|---|---|---|---|---|
| 802.11n (HT20) | 36 to 48 | 48 | OFDM | BPSK | 6.5 |

**RADIATED EMISSION TEST (BELOW 1 GHz):**

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

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

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11n (HT20) | 36 to 48 | 48 | OFDM | BPSK | 6.5 |

## RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11a | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6 |
| 802.11n (HT20) | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.5 |
| 802.11n (HT40) | 36 to 48 | 38, 46 | OFDM | BPSK | 13.5 |

## ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11a | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6 |
| 802.11n (HT20) | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.5 |
| 802.11n (HT40) | 36 to 48 | 38, 46 | OFDM | BPSK | 13.5 |

## TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| PLC | 25deg. C, 65%RH | 120Vac, 60Hz | Kyle Huang |
| RE<1G | 25deg. C, 71%RH | 120Vac, 60Hz | Frank Liu |
| RE≥1G | 25deg. C, 66%RH | 120Vac, 60Hz | Robert Cheng |
| APCM | 25deg. C, 60%RH | 120Vac, 60Hz | Frank Liu |

## 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart E (15.407)**
**789033 D01 General UNII Test Procedures v01r01**
ANSI C63.10-2009

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.

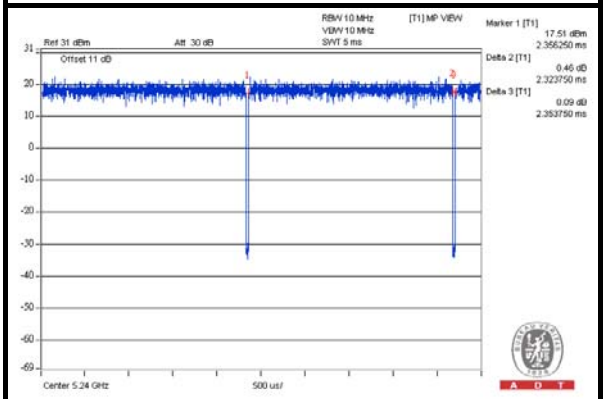
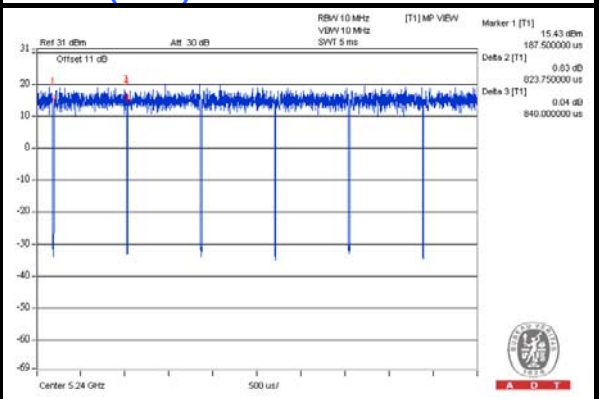
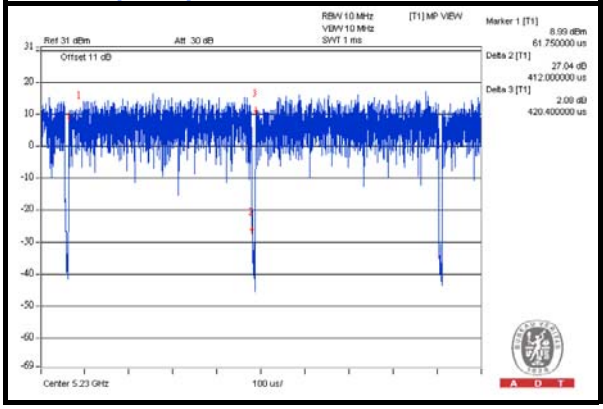
## 3.4 Duty cycle of test signal

Duty cycle of test signal is > 98 %, duty factor is not required.

**802.11a**: Duty cycle = 2.323750 ms/2.353750 ms = 0.987

**802.11n (HT20):** Duty cycle = 823.75 us/840.00 us = 0.980

**802.11n (HT40):** Duty cycle = 412.00 us/420.40 us = 0.980

| 802.11a | 802.11n (HT20) |
|---|---|
|  |  |
| **802.11n (HT40)** | |
|  | |

## 3.5 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.

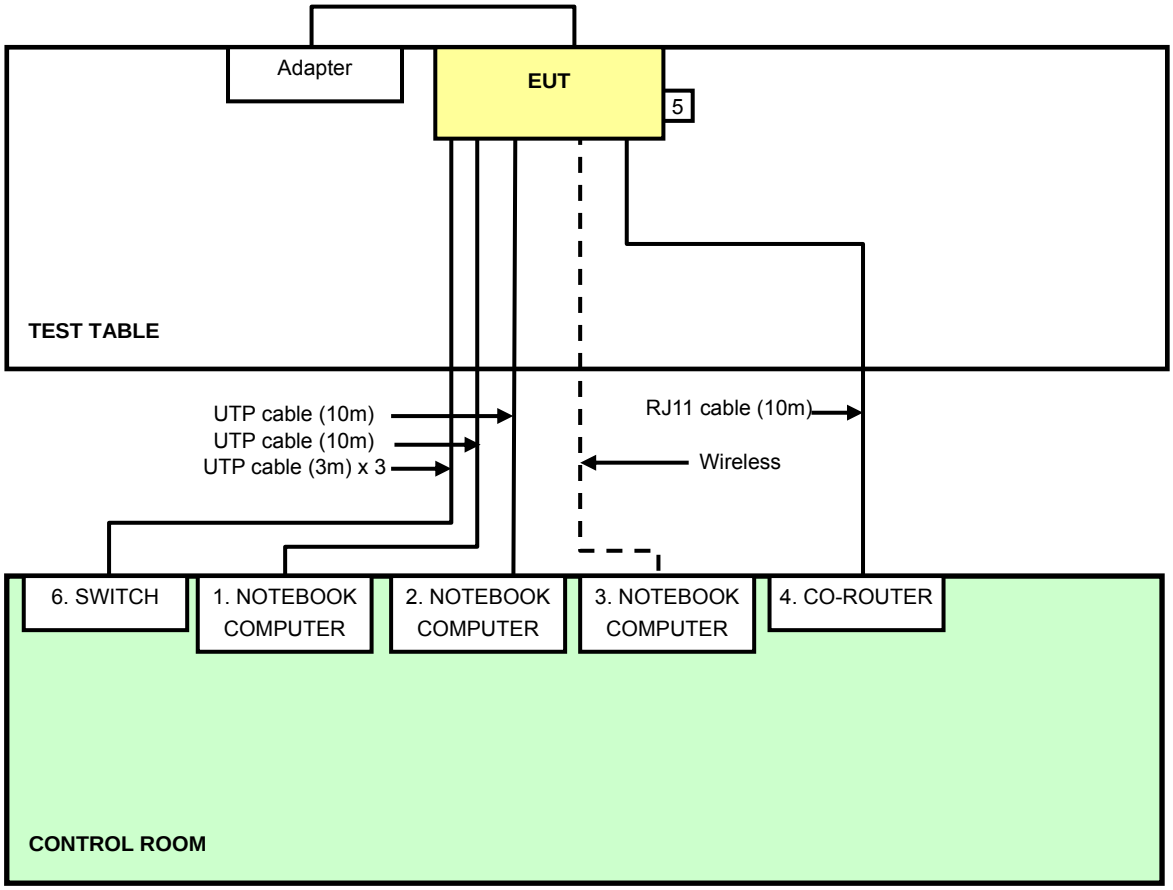
| For Conducted Emission test | | | | | |
|---|---|---|---|---|---|
| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
| 1 | NOTEBOOK COMPUTER | DELL | PP32LA | HSLB32S | FCC DoC |
| 2 | NOTEBOOK COMPUTER | DELL | PP27L | 6YLB32S | FCC DoC |
| 3 | NOTEBOOK COMPUTER | DELL | PP27L | 7YLB32S | FCC DoC |
| 4 | CO-ROUTER | ZyXEL | IES-1000 | S08024701597 | FCC DoC |
| 5 | USB Flash Drive | SanDisk | SDCZ2-512-A10 | 5597844849 | FCC DoC |
| 6 | SWITCH | hp | J9020A | NA | NA |
| For other test items | | | | | |
| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
| 1 | NOTEBOOK COMPUTER | DELL | PP32LA | FSLB32S | FCC DoC |
| 2 | NOTEBOOK COMPUTER | DELL | PP32LA | GSLB32S | FCC DoC |
| 3 | NOTEBOOK COMPUTER | ZyXEL | IES-1000 | S4Z3112558 | NA |
| 4 | HUB | ZyXEL | ES-116P | S060H02000215 | FCC DoC |
| 5 | iPod shuffle | Apple | MC749TA/A | CC4DMFJUDFDM | NA |

| For Conducted Emission test | |
|---|---|
| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
| 1 | UTP cable (10m) |
| 2 | UTP cable (10m) |
| 3 | UTP cable (10m) |
| 4 | RF cable (1m) |
| 5 | RF cable (1m) |
| 6 | NA |
| For other test items | |
| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
| 1 | UTP cable, 10m |
| 2 | UTP cable, 10m |
| 3 | UTP cable, 10m |
| 4 | RJ11 cable, 10m |
| 5 | USB cable, 0.1m |

**NOTE:** All power cords of the above support units are non shielded (1.8m).

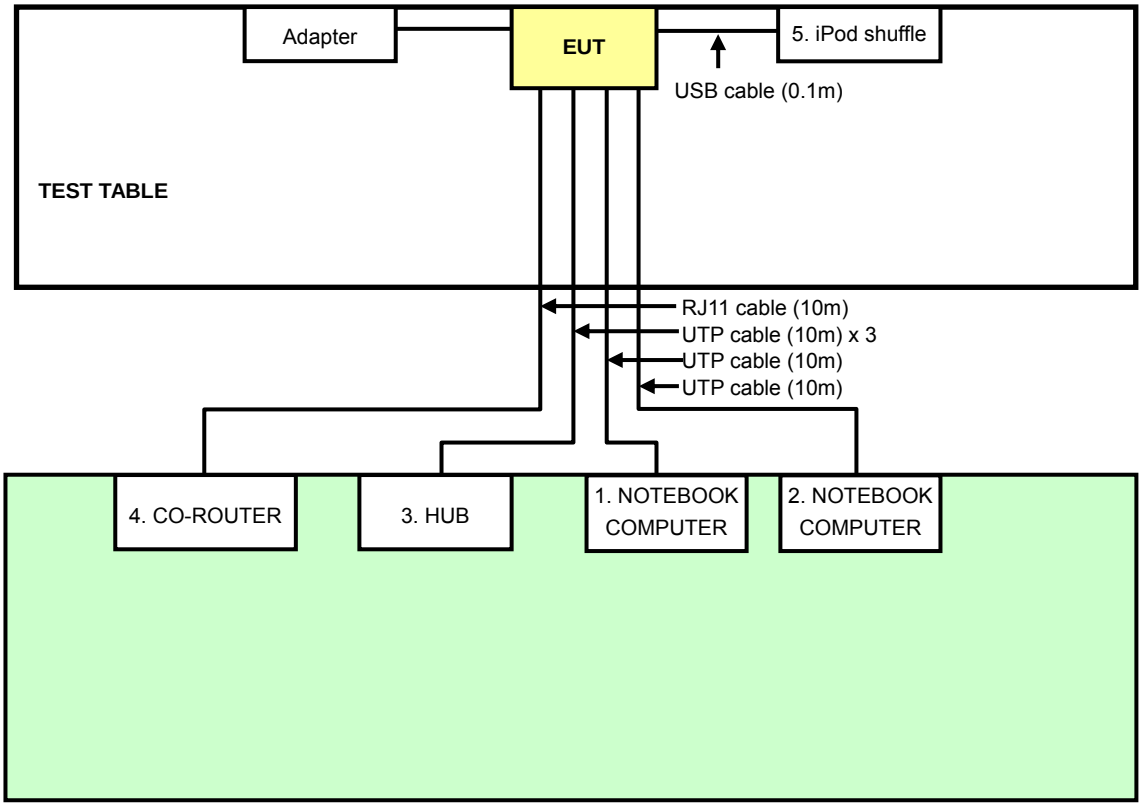
## 3.6 CONFIGURATION OF SYSTEM UNDER TEST

**For Conducted Emission test:**




**NOTE**: Item 5 is a USB Flash Drive.

## For Other test items:



# 4. TEST TYPES AND RESULTS

## 4.1 CONDUCTED EMISSION MEASUREMENT

### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 | 56 to 46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 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 0.50 MHz.

### 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Test Receiver | ESCS 30 | 100375 | Mar. 12, 2012 | Mar.11, 2013 |
| Line-Impedance Stabilization Network (for EUT) SCHWARZBECK | NSLK8127 | 8127-522 | Sep. 06, 2012 | Sep. 05, 2013 |
| Line-Impedance Stabilization Network (for Peripheral) | ENV216 | 100072 | June 08,2012 | June 07,2013 |
| RF Cable (JYEBAO) | 5DFB | COCCAB-001 | Aug. 28, 2012 | Aug. 27, 2013 |
| 50 ohms Terminator | 50 | EMC-3 | Sep. 25, 2012 | Sep. 24, 2013 |
| Software ADT | BV ADT_Cond_V7.3.7.3 | 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 Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Oct. 03, 2012

### 4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.

b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

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

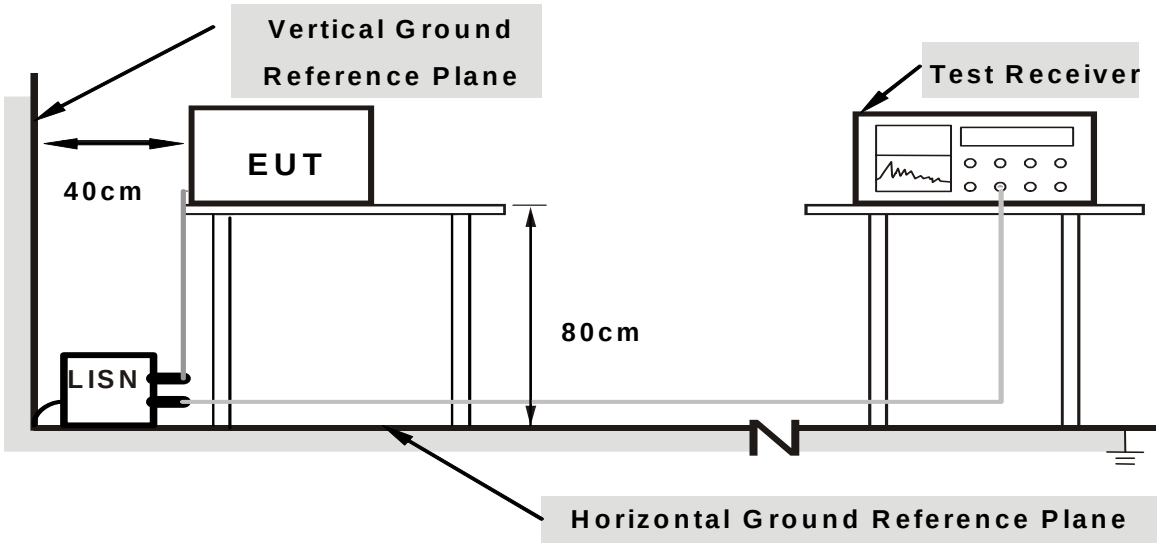
d. The frequency range from 150kHz to 30MHz was searched. At least the disturbance levels and the frequencies of six highest disturbances from each mains port were recorded.

**Note:** 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




**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 related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of all equipment.
2. Support units 1~3 (Notebook Computer) run “Ping.exe” program to enable all functions of EUT via UTP cables and wireless.
3. The support unit 4 (CO-ROUTER) links EUT via one RJ11 cable.

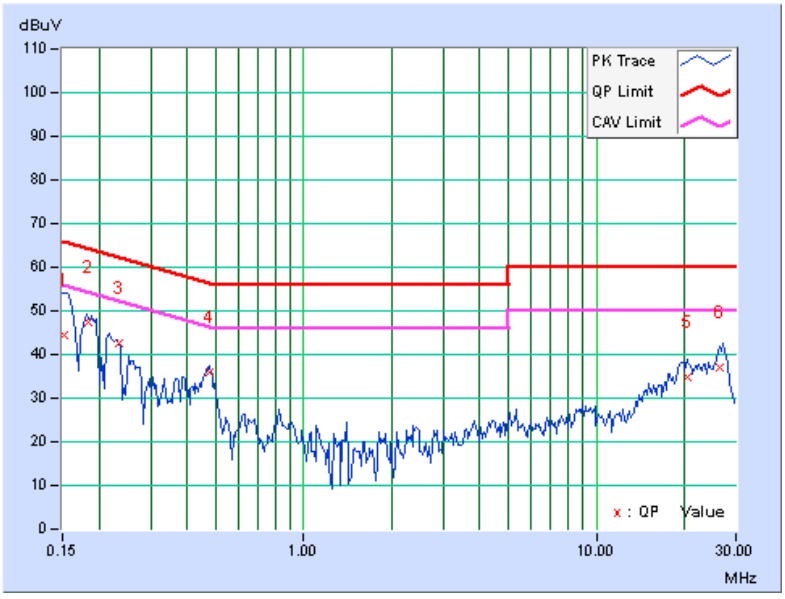
## 4.1.7 TEST RESULTS(MODE 1)

| PHASE | Line (L) | 6dB BANDWIDTH | 9 kHz |
|---|---|---|---|

| | Freq. | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| No | | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15116 | 0.11 | 44.32 | 43.22 | 44.43 | 43.33 | 65.94 | 55.94 | -21.51 | -12.61 |
| 2 | 0.18322 | 0.11 | 47.46 | 36.67 | 47.57 | 36.78 | 64.34 | 54.34 | -16.76 | -17.55 |
| 3 | 0.23330 | 0.13 | 42.42 | 29.69 | 42.55 | 29.82 | 62.33 | 52.33 | -19.78 | -22.51 |
| 4 | 0.47382 | 0.16 | 35.72 | 27.42 | 35.88 | 27.58 | 56.45 | 46.45 | -20.56 | -18.86 |
| 5 | 20.39078 | 0.92 | 33.87 | 26.42 | 34.79 | 27.34 | 60.00 | 50.00 | -25.21 | -22.66 |
| 6 | 26.54681 | 1.10 | 35.78 | 29.72 | 36.88 | 30.82 | 60.00 | 50.00 | -23.12 | -19.18 |

**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.

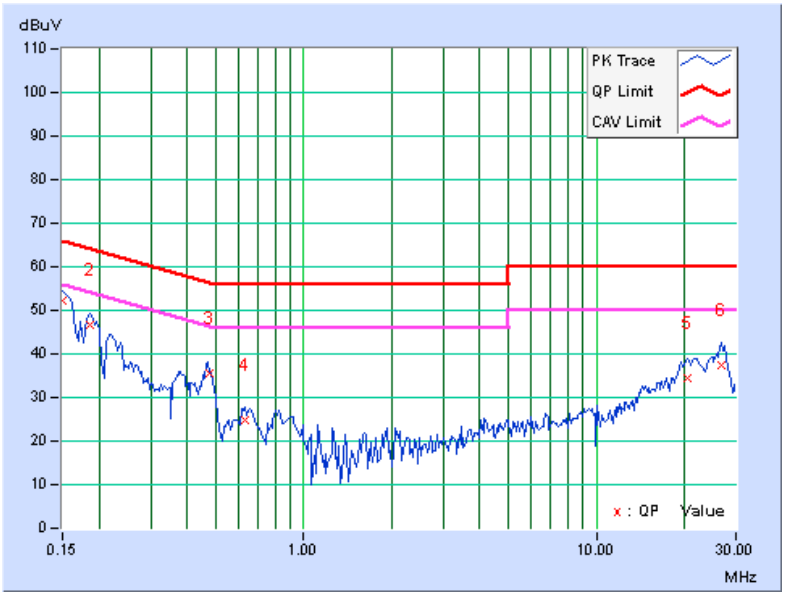


| PHASE | Neutral (N) | 6dB BANDWIDTH | 9 kHz |
|---|---|---|---|

| | Freq. | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| No | | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15022 | 0.09 | 52.18 | 43.71 | 52.27 | 43.80 | 65.99 | 55.99 | -13.72 | -12.19 |
| 2 | 0.18563 | 0.10 | 46.71 | 37.32 | 46.81 | 37.42 | 64.23 | 54.23 | -17.42 | -16.81 |
| 3 | 0.47633 | 0.15 | 35.23 | 27.88 | 35.38 | 28.03 | 56.40 | 46.40 | -21.02 | -18.37 |
| 4 | 0.63066 | 0.16 | 24.67 | 15.74 | 24.83 | 15.90 | 56.00 | 46.00 | -31.17 | -30.10 |
| 5 | 20.62122 | 0.61 | 33.87 | 27.33 | 34.48 | 27.94 | 60.00 | 50.00 | -25.52 | -22.06 |
| 6 | 26.76963 | 0.75 | 36.71 | 30.44 | 37.46 | 31.19 | 60.00 | 50.00 | -22.54 | -18.81 |

**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.



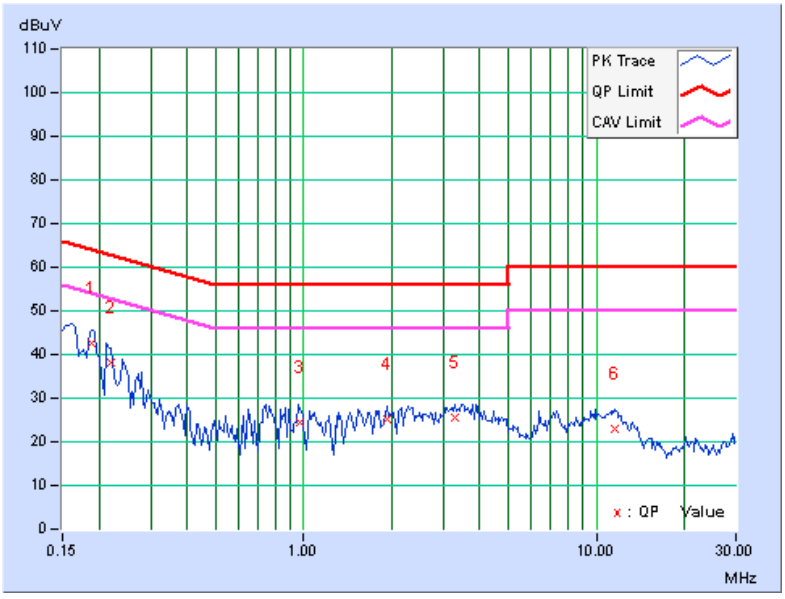
## 4.1.8 TEST RESULTS(MODE 2)

| PHASE | Line (L) | 6dB BANDWIDTH | 9 kHz |
|---|---|---|---|

| | Freq. | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| No | | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| **1** | **0.18926** | **0.12** | **42.62** | **39.44** | **42.74** | **39.56** | **64.07** | **54.07** | **-21.33** | **-14.51** |
| 2 | 0.21938 | 0.12 | 38.16 | 33.78 | 38.28 | 33.90 | 62.84 | 52.84 | -24.56 | -18.94 |
| 3 | 0.97108 | 0.19 | 24.28 | 21.37 | 24.47 | 21.56 | 56.00 | 46.00 | -31.53 | -24.44 |
| 4 | 1.91784 | 0.23 | 25.08 | 22.97 | 25.31 | 23.20 | 56.00 | 46.00 | -30.69 | -22.80 |
| 5 | 3.30472 | 0.26 | 25.24 | 19.85 | 25.50 | 20.11 | 56.00 | 46.00 | -30.50 | -25.89 |
| 6 | 11.54311 | 0.62 | 22.44 | 17.72 | 23.06 | 18.34 | 60.00 | 50.00 | -36.94 | -31.66 |

**REMARKS:**

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

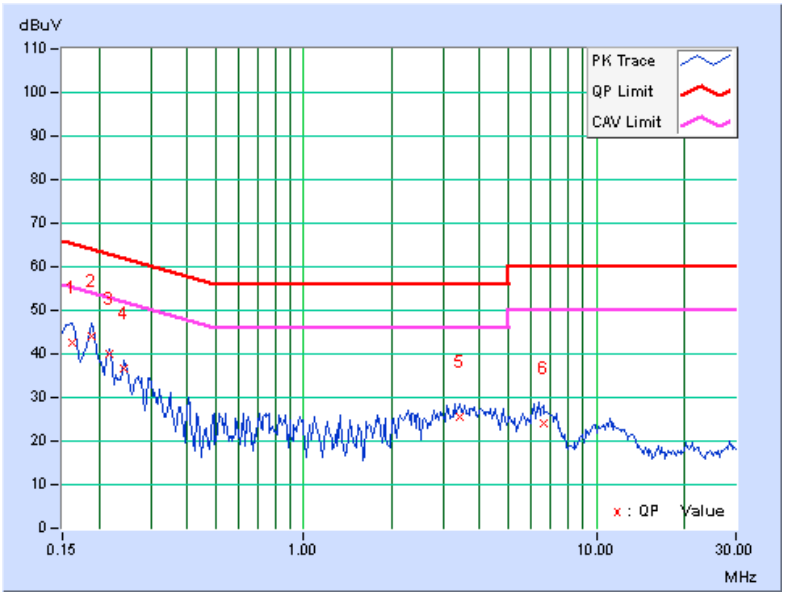


| PHASE | Neutral (N) | 6dB BANDWIDTH | 9 kHz |
|---|---|---|---|

| | Freq. | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| No | | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.16172 | 0.09 | 42.53 | 37.74 | 42.62 | 37.83 | 65.38 | 55.38 | -22.76 | -17.55 |
| 2 | 0.18906 | 0.10 | 43.84 | 38.96 | 43.94 | 39.06 | 64.08 | 54.08 | -20.14 | -15.02 |
| 3 | 0.21641 | 0.10 | 39.74 | 35.44 | 39.84 | 35.54 | 62.96 | 52.96 | -23.11 | -17.41 |
| 4 | 0.24375 | 0.11 | 36.57 | 33.40 | 36.68 | 33.51 | 61.97 | 51.97 | -25.29 | -18.46 |
| 5 | 3.41016 | 0.23 | 25.32 | 21.46 | 25.55 | 21.69 | 56.00 | 46.00 | -30.45 | -24.31 |
| 6 | 6.59766 | 0.32 | 23.91 | 18.71 | 24.23 | 19.03 | 60.00 | 50.00 | -35.77 | -30.97 |

**REMARKS:**

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



## 4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 4.2.1 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.

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

| **Frequencies (MHz)** | **EIRP Limit (dBm)** | **Equivalent Field Strength at 3m (dBμV/m)** *Note 3 |
|---|---|---|
| 5150~5250 | -27 | 68.3 |
| 5250~5350 | -27 | 68.3 |
| 5470~5725 | -27 | 68.3 |
| 5725~5825 | -27 *Note 1 | 68.3 |
| | -17 *Note 2 | 78.3 |

**Notes:**

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. 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)

## 4.2.3 TEST INSTRUMENTS

**For below 1GHz test:**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Spectrum Analyzer Agilent | E4446A | MY48250254 | July 09, 2012 | July 08, 2013 |
| Pre-Selector Agilent | N9039A | MY46520311 | July 09, 2012 | July 08, 2013 |
| Signal Generator Agilent | N5181A | MY49060517 | July 09, 2012 | July 08, 2013 |
| Pre-Amplifier Mini-Circuits | ZFL-1000VH2B | AMP-ZFL-03 | Nov. 15, 2011 | Nov. 14, 2012 |
| Pre-Amplifier Agilent | 8449B | 3008A02578 | June 26, 2012 | June 25, 2013 |
| Pre-Amplifier SPACEK LABS | SLKKa-48-6 | 9K16 | Nov. 15, 2011 | Nov. 14, 2012 |
| Trilog Broadband Antenna SCHWARZBECK | VULB 9168 | 9168-360 | Apr. 09, 2012 | Apr. 08, 2013 |
| Horn_Antenna AISI | AIH.8018 | 0000320091110 | Nov. 14, 2011 | Nov. 13, 2012 |
| Horn_Antenna SCHWARZBECK | BBHA 9170 | 9170-424 | Oct. 07, 2011 | Oct. 06, 2012 |
| RF Cable | NA | RF104-201<br>RF104-203<br>RF104-204 | Dec. 26, 2011 | Dec. 25, 2012 |
| RF Cable | NA | CHGCAB_001 | Oct. 07, 2011 | Oct. 06, 2012 |
| Software | ADT_Radiated_V8.7.05 | NA | NA | NA |
| Antenna Tower & Turn Table CT | NA | NA | NA | NA |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Oct. 02, 2012

**For above 1GHz test:**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Spectrum Analyzer<br>Agilent | E4446A | MY48250254 | July 09, 2012 | July 08, 2013 |
| Pre-Selector<br>Agilent | N9039A | MY46520311 | July 09, 2012 | July 08, 2013 |
| Signal Generator<br>Agilent | N5181A | MY49060517 | July 09, 2012 | July 08, 2013 |
| Pre-Amplifier<br>Mini-Circuits | ZFL-1000VH2 B | AMP-ZFL-03 | Nov. 15, 2011 | Nov. 14, 2012 |
| Pre-Amplifier<br>Agilent | 8449B | 3008A02578 | June 26, 2012 | June 25, 2013 |
| Pre-Amplifier<br>SPACEK LABS | SLKKa-48-6 | 9K16 | Nov. 15, 2011 | Nov. 14, 2012 |
| Trilog Broadband Antenna<br>SCHWARZBECK | VULB 9168 | 9168-360 | Apr. 09, 2012 | Apr. 08, 2013 |
| Horn_Antenna<br>AISI | AIH.8018 | 0000320091110 | Nov. 14, 2011 | Nov. 13, 2012 |
| Horn_Antenna<br>SCHWARZBECK | BBHA 9170 | 9170-424 | Oct. 12, 2012 | Oct. 11, 2013 |
| RF Cable | NA | RF104-201<br>RF104-203<br>RF104-204 | Dec. 26, 2011 | Dec. 25, 2012 |
| RF Cable | NA | CHGCAB_001 | Oct. 06, 2012 | Oct. 05, 2013 |
| Software | ADT_Radiated _V8.7.05 | NA | NA | NA |
| Antenna Tower & Turn Table CT | NA | NA | NA | NA |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Oct. 15, 2012

### 4.2.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

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

c. The 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.

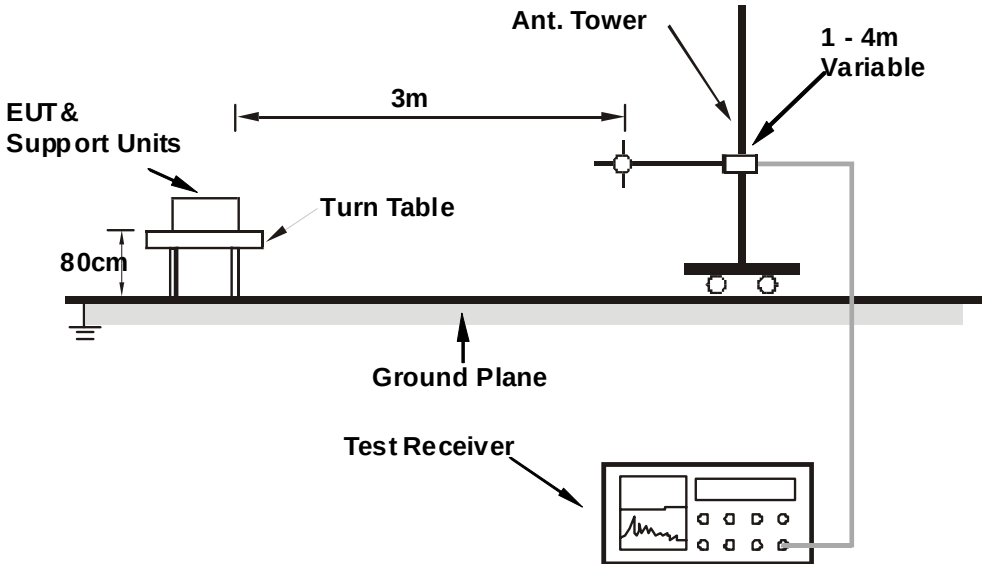
**NOTE:**

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 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 4.2.5 DEVIATION FROM TEST STANDARD

No deviation

### 4.2.6 TEST SETUP




For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 4.2.7 EUT OPERATING CONDITION

1. Turn on the power of EUT.
2. The communication partner run test program “Telnet paste command” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

## 4.2.8 TEST RESULTS

**BELOW 1GHz WORST-CASE DATA**

**802.11n(HT20)**

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 48 | **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 | 243.84 | 38.4 QP | 46.0 | -7.6 | 1.00 H | 92 | 25.34 | 13.08 |
| 2 | 275.40 | 34.6 QP | 46.0 | -11.4 | 1.00 H | 80 | 20.29 | 14.32 |
| 3 | 375.06 | 37.6 QP | 46.0 | -8.4 | 1.00 H | 298 | 20.34 | 17.22 |
| 4 | 500.01 | 41.3 QP | 46.0 | -4.7 | 2.00 H | 360 | 20.94 | 20.39 |
| 5 | 700.02 | 42.4 QP | 46.0 | -3.6 | 1.00 H | 325 | 18.43 | 23.97 |
| 6 | 875.04 | 42.0 QP | 46.0 | -4.0 | 1.50 H | 285 | 14.91 | 27.12 |
| **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 | 37.50 | 34.7 QP | 40.0 | -5.3 | 1.00 V | 243 | 21.29 | 13.45 |
| 2 | 74.21 | 30.0 QP | 40.0 | -10.0 | 1.00 V | 259 | 18.59 | 11.40 |
| 3 | 124.93 | 36.2 QP | 43.5 | -7.3 | 1.00 V | 7 | 23.33 | 12.91 |
| 4 | 500.00 | 37.8 QP | 46.0 | -8.2 | 1.00 V | 360 | 17.39 | 20.39 |
| 5 | 799.93 | 41.2 QP | 46.0 | -4.8 | 1.00 V | 360 | 15.27 | 25.92 |
| 6 | 875.03 | 39.5 QP | 46.0 | -6.5 | 1.00 V | 1 | 12.39 | 27.12 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

## ABOVE 1GHz DATA

### 802.11a

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 36 | **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 | 5150.00 | 57.6 PK | 74.0 | -16.4 | 1.00 H | 30 | 29.30 | 28.30 |
| 2 | 5150.00 | 46.8 AV | 54.0 | -7.2 | 1.00 H | 30 | 18.50 | 28.30 |
| 3 | *5180.00 | 95.9 PK | | | 1.09 H | 0 | 67.60 | 28.30 |
| 4 | *5180.00 | 85.9 AV | | | 1.09 H | 0 | 57.60 | 28.30 |
| 5 | #10360.00 | 55.0 PK | 68.3 | -13.3 | 1.00 H | 88 | 26.70 | 28.30 |
| 6 | 15540.00 | 63.6 PK | 74.0 | -10.4 | 1.00 H | 210 | 35.30 | 28.30 |
| 7 | 15540.00 | 51.0 AV | 54.0 | -3.0 | 1.00 H | 210 | 22.70 | 28.30 |
| **ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M** | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 5150.00 | 63.2 PK | 74.0 | -10.8 | 1.00 V | 21 | 34.90 | 28.30 |
| 2 | 5150.00 | 51.0 AV | 54.0 | -3.0 | 1.00 V | 21 | 22.70 | 28.30 |
| 3 | *5180.00 | 110.5 PK | | | 1.00 V | 21 | 82.20 | 28.30 |
| 4 | *5180.00 | 100.1 AV | | | 1.00 V | 21 | 71.80 | 28.30 |
| 5 | #10360.00 | 54.6 PK | 68.3 | -13.7 | 1.00 V | 45 | 26.30 | 28.30 |
| 6 | 15540.00 | 62.9 PK | 74.0 | -11.1 | 1.05 V | 143 | 34.60 | 28.30 |
| 7 | 15540.00 | 51.0 AV | 54.0 | -3.0 | 1.05 V | 143 | 22.70 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

| 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 | *5200.00 | 96.4 PK | | | 1.05 H | 0 | 68.10 | 28.30 |
| 2 | *5200.00 | 86.4 AV | | | 1.05 H | 0 | 58.10 | 28.30 |
| 3 | #10400.00 | 55.0 PK | 68.3 | -13.3 | 1.00 H | 78 | 26.70 | 28.30 |
| 4 | 15600.00 | 62.9 PK | 74.0 | -11.1 | 1.00 H | 198 | 34.60 | 28.30 |
| 5 | 15600.00 | 50.8 AV | 54.0 | -3.2 | 1.00 H | 198 | 22.50 | 28.30 |
| 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 | *5200.00 | 111.0 PK | | | 1.00 V | 16 | 82.70 | 28.30 |
| 2 | *5200.00 | 100.2 AV | | | 1.00 V | 16 | 71.90 | 28.30 |
| 3 | #10400.00 | 54.5 PK | 68.3 | -13.8 | 1.02 V | 36 | 26.20 | 28.30 |
| 4 | 15600.00 | 62.5 PK | 74.0 | -11.5 | 1.05 V | 158 | 34.20 | 28.30 |
| 5 | 15600.00 | 50.6 AV | 54.0 | -3.4 | 1.05 V | 158 | 22.30 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 48 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

| 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 | *5240.00 | 96.6 PK | | | 1.00 H | 11 | 68.30 | 28.30 |
| 2 | *5240.00 | 86.5 AV | | | 1.00 H | 11 | 58.20 | 28.30 |
| 3 | 5350.00 | 59.5 PK | 74.0 | -14.5 | 1.00 H | 11 | 31.20 | 28.30 |
| 4 | 5350.00 | 47.1 AV | 54.0 | -6.9 | 1.00 H | 11 | 18.80 | 28.30 |
| 5 | #10480.00 | 55.2 PK | 68.3 | -13.1 | 1.00 H | 72 | 26.90 | 28.30 |
| 6 | 15720.00 | 62.6 PK | 74.0 | -11.4 | 1.02 H | 199 | 34.30 | 28.30 |
| 7 | 15720.00 | 50.5 AV | 54.0 | -3.5 | 1.02 H | 199 | 22.20 | 28.30 |
| 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 | *5240.00 | 111.2 PK | | | 1.03 V | 17 | 82.90 | 28.30 |
| 2 | *5240.00 | 100.6 AV | | | 1.03 V | 17 | 72.30 | 28.30 |
| 3 | 5350.00 | 59.2 PK | 74.0 | -14.8 | 1.03 V | 17 | 30.90 | 28.30 |
| 4 | 5350.00 | 46.8 AV | 54.0 | -7.2 | 1.03 V | 17 | 18.50 | 28.30 |
| 5 | #10480.00 | 54.7 PK | 68.3 | -13.6 | 1.04 V | 46 | 26.40 | 28.30 |
| 6 | 15720.00 | 62.3 PK | 74.0 | -11.7 | 1.08 V | 163 | 34.00 | 28.30 |
| 7 | 15720.00 | 50.6 AV | 54.0 | -3.4 | 1.08 V | 163 | 22.30 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

### 802.11n (20MHz)

| CHANNEL | TX Channel 36 | 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 | 5150.00 | 58.0 PK | 74.0 | -16.0 | 1.03 H | 85 | 29.70 | 28.30 |
| 2 | 5150.00 | 46.6 AV | 54.0 | -7.4 | 1.03 H | 85 | 18.30 | 28.30 |
| 3 | *5180.00 | 106.2 PK | | | 1.03 H | 85 | 77.90 | 28.30 |
| 4 | *5180.00 | 94.2 AV | | | 1.03 H | 85 | 65.90 | 28.30 |
| 5 | #10360.00 | 54.8 PK | 68.3 | -13.5 | 1.00 H | 55 | 26.50 | 28.30 |
| 6 | 15540.00 | 62.0 PK | 74.0 | -12.0 | 1.00 H | 179 | 33.70 | 28.30 |
| 7 | 15540.00 | 50.2 AV | 54.0 | -3.8 | 1.00 H | 179 | 21.90 | 28.30 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 5150.00 | 59.4 PK | 74.0 | -14.6 | 1.00 V | 19 | 31.10 | 28.30 |
| 2 | 5150.00 | 48.4 AV | 54.0 | -5.6 | 1.00 V | 19 | 20.10 | 28.30 |
| 3 | *5180.00 | 107.4 PK | | | 1.00 V | 19 | 79.10 | 28.30 |
| 4 | *5180.00 | 96.0 AV | | | 1.00 V | 19 | 67.70 | 28.30 |
| 5 | #10360.00 | 55.0 PK | 68.3 | -13.3 | 1.00 V | 52 | 26.70 | 28.30 |
| 6 | 15540.00 | 62.6 PK | 74.0 | -11.4 | 1.00 V | 142 | 34.30 | 28.30 |
| 7 | 15540.00 | 51.0 AV | 54.0 | -3.0 | 1.00 V | 142 | 22.70 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

| 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 | *5200.00 | 106.7 PK | | | 1.04 H | 86 | 78.40 | 28.30 |
| 2 | *5200.00 | 94.6 AV | | | 1.04 H | 86 | 66.30 | 28.30 |
| 3 | #10400.00 | 54.9 PK | 68.3 | -13.4 | 1.05 H | 49 | 26.60 | 28.30 |
| 4 | 15600.00 | 62.2 PK | 74.0 | -11.8 | 1.01 H | 170 | 33.90 | 28.30 |
| 5 | 15600.00 | 50.5 AV | 54.0 | -3.5 | 1.01 H | 170 | 22.20 | 28.30 |
| 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 | *5200.00 | 107.8 PK | | | 1.05 V | 29 | 79.50 | 28.30 |
| 2 | *5200.00 | 96.4 AV | | | 1.05 V | 29 | 68.10 | 28.30 |
| 3 | #10400.00 | 53.9 PK | 68.3 | -14.4 | 1.00 V | 40 | 25.60 | 28.30 |
| 4 | 15600.00 | 62.2 PK | 74.0 | -11.8 | 1.00 V | 147 | 33.90 | 28.30 |
| 5 | 15600.00 | 51.2 AV | 54.0 | -2.8 | 1.00 V | 147 | 22.90 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 48 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

| 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 | *5240.00 | 106.8 PK | | | 1.10 H | 90 | 78.50 | 28.30 |
| 2 | *5240.00 | 94.9 AV | | | 1.10 H | 90 | 66.60 | 28.30 |
| 3 | 5350.00 | 57.8 PK | 74.0 | -16.2 | 1.00 H | 76 | 29.50 | 28.30 |
| 4 | 5350.00 | 46.5 AV | 54.0 | -7.5 | 1.00 H | 76 | 18.20 | 28.30 |
| 5 | #10480.00 | 54.2 PK | 68.3 | -14.1 | 1.11 H | 34 | 25.90 | 28.30 |
| 6 | 15720.00 | 62.1 PK | 74.0 | -11.9 | 1.00 H | 172 | 33.80 | 28.30 |
| 7 | 15720.00 | 50.2 AV | 54.0 | -3.8 | 1.00 H | 172 | 21.90 | 28.30 |
| 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 | *5240.00 | 108.5 PK | | | 1.01 V | 22 | 80.20 | 28.30 |
| 2 | *5240.00 | 96.4 AV | | | 1.01 V | 22 | 68.10 | 28.30 |
| 3 | 5350.00 | 60.3 PK | 74.0 | -13.7 | 1.01 V | 22 | 32.00 | 28.30 |
| 4 | 5350.00 | 46.5 AV | 54.0 | -7.5 | 1.01 V | 22 | 18.20 | 28.30 |
| 5 | #10480.00 | 53.7 PK | 68.3 | -14.6 | 1.00 V | 16 | 25.40 | 28.30 |
| 6 | 15720.00 | 61.6 PK | 74.0 | -12.4 | 1.00 V | 139 | 33.30 | 28.30 |
| 7 | 15720.00 | 50.7 AV | 54.0 | -3.3 | 1.00 V | 139 | 22.40 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

### 802.11n (40MHz)

| CHANNEL | TX Channel 38 | 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 | 5150.00 | 61.7 PK | 74.0 | -12.3 | 1.02 H | 86 | 33.40 | 28.30 |
| 2 | 5150.00 | 50.8 AV | 54.0 | -3.2 | 1.02 H | 86 | 22.50 | 28.30 |
| 3 | *5190.00 | 101.9 PK | | | 1.02 H | 86 | 73.60 | 28.30 |
| 4 | *5190.00 | 88.9 AV | | | 1.02 H | 86 | 60.60 | 28.30 |
| 5 | #10380.00 | 54.6 PK | 68.3 | -13.7 | 1.00 H | 9 | 26.30 | 28.30 |
| 6 | 15570.00 | 61.7 PK | 74.0 | -12.3 | 1.00 H | 184 | 33.40 | 28.30 |
| 7 | 15570.00 | 49.6 AV | 54.0 | -4.4 | 1.00 H | 184 | 21.30 | 28.30 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 5150.00 | 65.8 PK | 74.0 | -8.2 | 1.03 V | 20 | 37.50 | 28.30 |
| **2** | **5150.00** | **52.9 AV** | **54.0** | **-1.1** | **1.03 V** | **20** | **24.60** | **28.30** |
| 3 | *5190.00 | 102.9 PK | | | 1.03 V | 20 | 74.60 | 28.30 |
| 4 | *5190.00 | 91.1 AV | | | 1.03 V | 20 | 62.80 | 28.30 |
| 5 | #10380.00 | 53.8 PK | 68.3 | -14.5 | 1.00 V | 21 | 25.50 | 28.30 |
| 6 | 15570.00 | 61.2 PK | 74.0 | -12.8 | 1.00 V | 128 | 32.90 | 28.30 |
| 7 | 15570.00 | 50.7 AV | 54.0 | -3.3 | 1.00 V | 128 | 22.40 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

| CHANNEL | TX Channel 46 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

| 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 | *5230.00 | 104.2 PK | | | 1.00 H | 99 | 75.90 | 28.30 |
| 2 | *5230.00 | 90.3 AV | | | 1.00 H | 99 | 62.00 | 28.30 |
| 3 | 5350.00 | 58.5 PK | 74.0 | -15.5 | 1.00 H | 99 | 30.20 | 28.30 |
| 4 | 5350.00 | 46.7 AV | 54.0 | -7.3 | 1.00 H | 99 | 18.40 | 28.30 |
| 5 | #10460.00 | 54.4 PK | 68.3 | -13.9 | 1.00 H | 1 | 26.10 | 28.30 |
| 6 | 15690.00 | 62.2 PK | 74.0 | -11.8 | 1.00 H | 196 | 33.90 | 28.30 |
| 7 | 15690.00 | 49.9 AV | 54.0 | -4.1 | 1.00 H | 196 | 21.60 | 28.30 |
| 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 | *5230.00 | 104.8 PK | | | 1.05 V | 17 | 76.50 | 28.30 |
| 2 | *5230.00 | 92.3 AV | | | 1.05 V | 17 | 64.00 | 28.30 |
| 3 | 5350.00 | 59.3 PK | 74.0 | -14.7 | 1.05 V | 17 | 31.00 | 28.30 |
| 4 | 5350.00 | 46.4 AV | 54.0 | -7.6 | 1.05 V | 17 | 18.10 | 28.30 |
| 5 | #10460.00 | 54.0 PK | 68.3 | -14.3 | 1.00 V | 37 | 25.70 | 28.30 |
| 6 | 15690.00 | 61.7 PK | 74.0 | -12.3 | 1.00 V | 123 | 33.40 | 28.30 |
| 7 | 15690.00 | 51.0 AV | 54.0 | -3.0 | 1.00 V | 123 | 22.70 | 28.30 |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## 4.3 PEAK TRANSMIT POWER MEASUREMENT

### 4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

| Frequency Band | Limit |
|---|---|
| 5.15 – 5.25GHz | The lesser of 50mW (17dBm) or 4dBm + 10logB |
| 5.25 – 5.35GHz | The lesser of 250mW (24dBm) or 11dBm + 10logB |
| 5.47 – 5.725GHz | The lesser of 250mW (24dBm) or 11dBm + 10logB |
| 5.725 – 5.825GHz | The lesser of 1W (30dBm) or 17dBm + 10logB |

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

### 4.3.2 TEST INSTRUMENTS

**FOR POWER OUTPUT MEASUREMENT**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Power Meter | ML2495A | 0824006 | May 10, 2012 | May 09, 2013 |
| Peak Power Sensor | MA2411B | 0738172 | May 10, 2012 | May 09, 2013 |

**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. Tested date : Oct. 15, 2012

**FOR 26dB OCCUPIED BANDWIDTH**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Spectrum Analyzer | E4446A | MY48250254 | July 09, 2012 | July 08, 2013 |

**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. Tested date : Oct. 15, 2012

### 4.3.3 TEST PROCEDURE

**FOR AVERAGE POWER MEASUREMENT**

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

**FOR 26dB OCCUPIED BANDWIDTH**

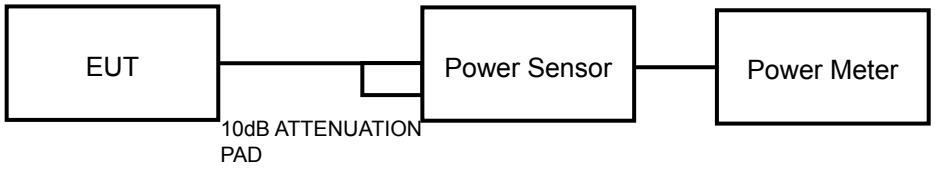
1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement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

## 4.3.4 DEVIATION FROM TEST STANDARD

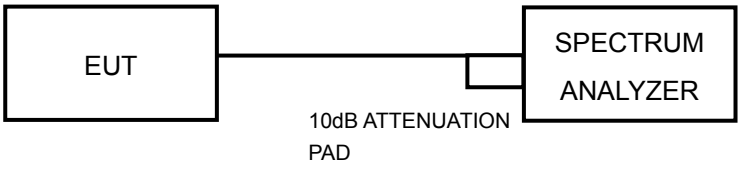
No deviation

## 4.3.5 TEST SETUP

**FOR POWER OUTPUT MEASUREMENT**




**FOR 26dB OCCUPIED BANDWIDTH**




## 4.3.6 EUT OPERATING CONDITIONS

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

## 4.3.7 TEST RESULTS

### POWER OUTPUT: 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | AVERAGE POWER (mW) | AVERAGE POWER (dBm) | POWER LIMIT (dBm) | PASS/FAIL |
|---|---|---|---|---|---|
| 36 | 5180 | 25.704 | 14.10 | 17 | PASS |
| 40 | 5200 | 25.704 | 14.10 | 17 | PASS |
| 48 | 5240 | 26.303 | 14.20 | 17 | PASS |

### 802.11n (HT20)

| CHAN. | CHAN. FREQ. (MHz) | AVERAGE POWER (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 36 | 5180 | 11.10 | 11.20 | 11.70 | 40.856 | 16.11 | 17 | PASS |
| 40 | 5200 | 11.10 | 11.20 | 11.50 | 40.190 | 16.04 | 17 | PASS |
| 48 | 5240 | 10.80 | 10.00 | 10.60 | 33.505 | 15.25 | 17 | PASS |

### 802.11n (HT40)

| CHAN. | CHAN. FREQ. (MHz) | AVERAGE POWER (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 38 | 5190 | 10.80 | 10.20 | 10.20 | 32.965 | 15.18 | 17 | PASS |
| 46 | 5230 | 12.30 | 11.90 | 11.50 | 46.595 | 16.68 | 17 | PASS |

## 26dB BANDWIDTH:

### 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc BANDWIDTH (MHz) | PASS / FAIL |
|---|---|---|---|
| 36 | 5180 | 26.33 | PASS |
| 40 | 5200 | 25.71 | PASS |
| 48 | 5240 | 23.38 | PASS |

### 802.11n (HT20)

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc BANDWIDTH (MHz) | | |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 1 |
| 36 | 5180 | 25.16 | 25.16 | 25.15 |
| 40 | 5200 | 25.21 | 25.20 | 25.22 |
| 48 | 5240 | 25.13 | 25.17 | 22.81 |

### 802.11n (HT40)

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc BANDWIDTH (MHz) | | |
|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 1 |
| 38 | 5190 | 40.49 | 40.22 | 40.36 |
| 46 | 5230 | 40.61 | 40.08 | 40.59 |

## 4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

| Frequency Band | Limit |
|---|---|
| 5.15 ~ 5.25GHz | 4dBm |
| 5.25 ~ 5.35GHz | 11dBm |
| 5.47 – 5.725GHz | 11dBm |
| 5.725 ~ 5.825GHz | 17dBm |

### 4.4.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S Spectrum Analyzer | FSP40 | 100036 | Dec. 14, 2011 | Dec. 13, 2012 |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 15, 2012

### 4.4.3 TEST PROCEDURES

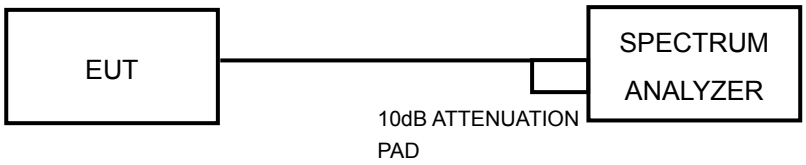
Using method SA-1

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1 MHz, Set VBW ≥ 3 MHz, 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

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.4.5 TEST SETUP




## 4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6

## 4.4.7 TEST RESULTS

**802.11a**

| CHANNEL | FREQUENCY (MHz) | PSD (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---|---|---|---|---|
| 36 | 5180 | 2.31 | 4 | PASS |
| 40 | 5200 | 2.41 | 4 | PASS |
| 48 | 5240 | 2.71 | 4 | PASS |

**802.11n (HT20)**

| CHAN. | CHAN. FREQ. (MHz) | PSD (dBm) | | | TOTAL POWER DENSITY (dBm) | MAX. LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | |
| 36 | 5180 | -0.93 | -1.10 | -0.91 | 3.79 | 4 | PASS |
| 40 | 5200 | -0.92 | -1.01 | -0.64 | 3.92 | 4 | PASS |
| 48 | 5240 | -0.90 | -1.54 | -1.27 | 3.54 | 4 | 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.

**802.11n (HT40)**

| CHAN. | CHAN. FREQ. (MHz) | PSD (dBm) | | | TOTAL POWER DENSITY (dBm) | MAX. LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | |
| 38 | 5190 | -3.97 | -3.91 | -4.51 | 0.65 | 4 | PASS |
| 46 | 5230 | -1.77 | -2.06 | -1.89 | 2.87 | 4 | 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.

## 4.5 PEAK POWER EXCURSION MEASUREMENT

### 4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

### 4.5.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S Spectrum Analyzer | FSP40 | 100036 | Dec. 14, 2011 | Dec. 13, 2012 |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 15, 2012

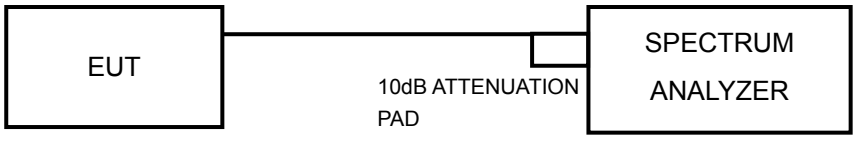
### 4.5.3 TEST PROCEDURE

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

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP




### 4.5.6 EUT OPERATING CONDITIONS

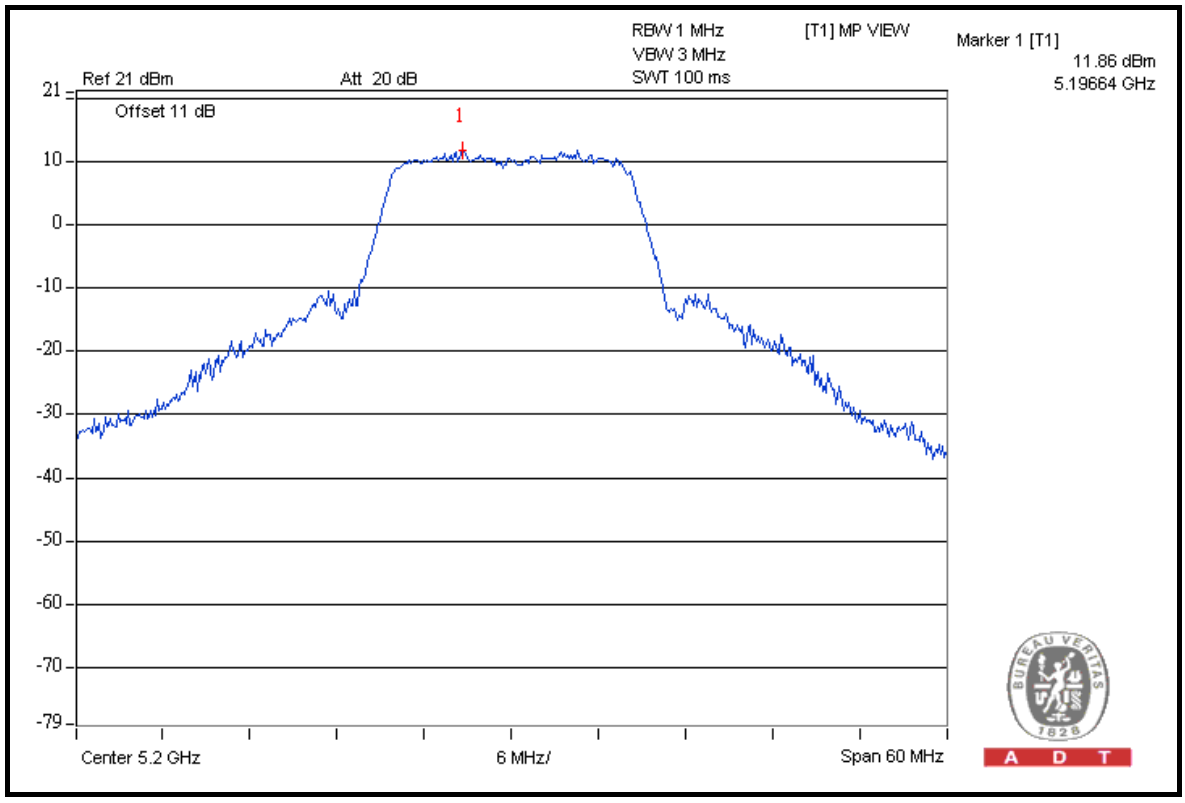
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

## 4.5.7 TEST RESULTS

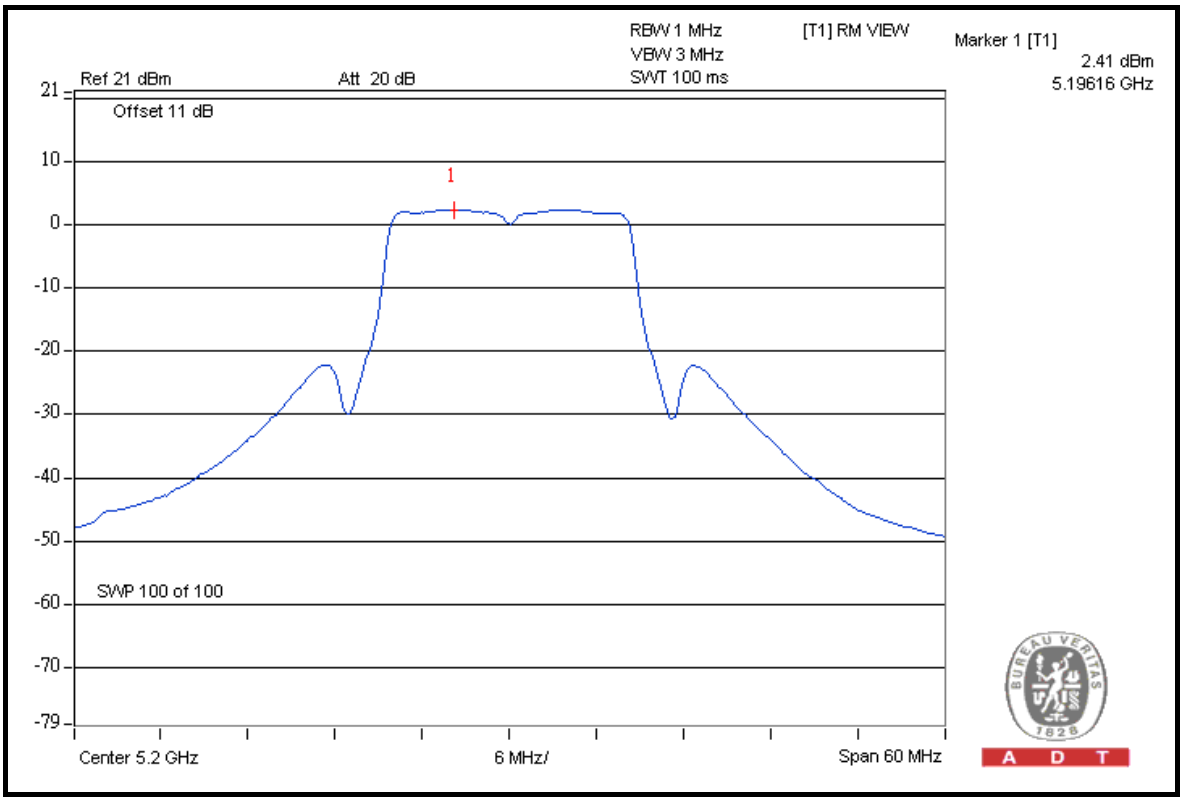
**802.11a**

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK VALUE (dBm) | PPSD (dBm) | PEAK EXCURSION (dB) | LIMIT (dB) | PASS/FAIL |
|---|---|---|---|---|---|---|
| 36 | 5180 | 11.52 | 2.31 | 9.21 | 13 | PASS |
| 40 | 5220 | 11.86 | 2.41 | 9.45 | 13 | PASS |
| 48 | 5240 | 11.85 | 2.71 | 9.14 | 13 | PASS |

**PEAK VALUE: CH 40**



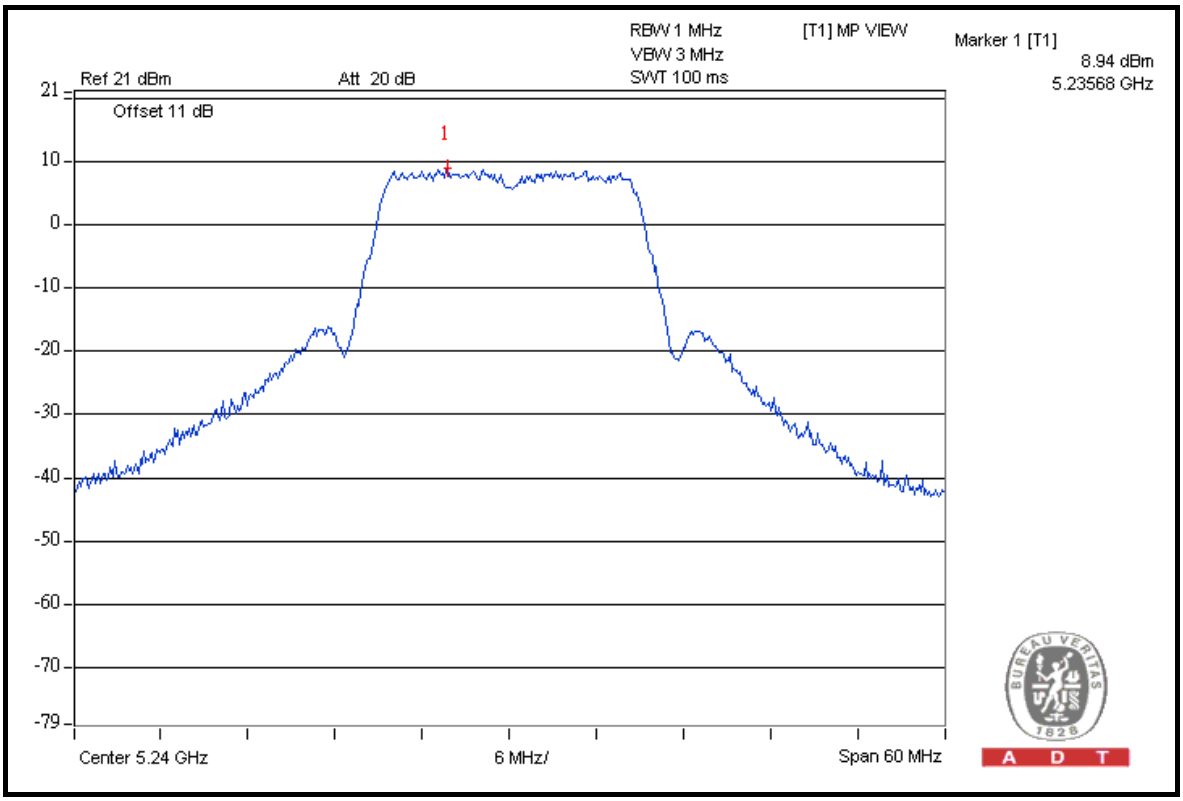
## PPSD: CH 40


RBW 1 MHz
VBW 3 MHz
SWT 100 ms
[T1] RM VIEW
Marker 1 [T1]
2.41 dBm
5.19616 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
1
SWP 100 of 100
Center 5.2 GHz
6 MHz/
Span 60 MHz

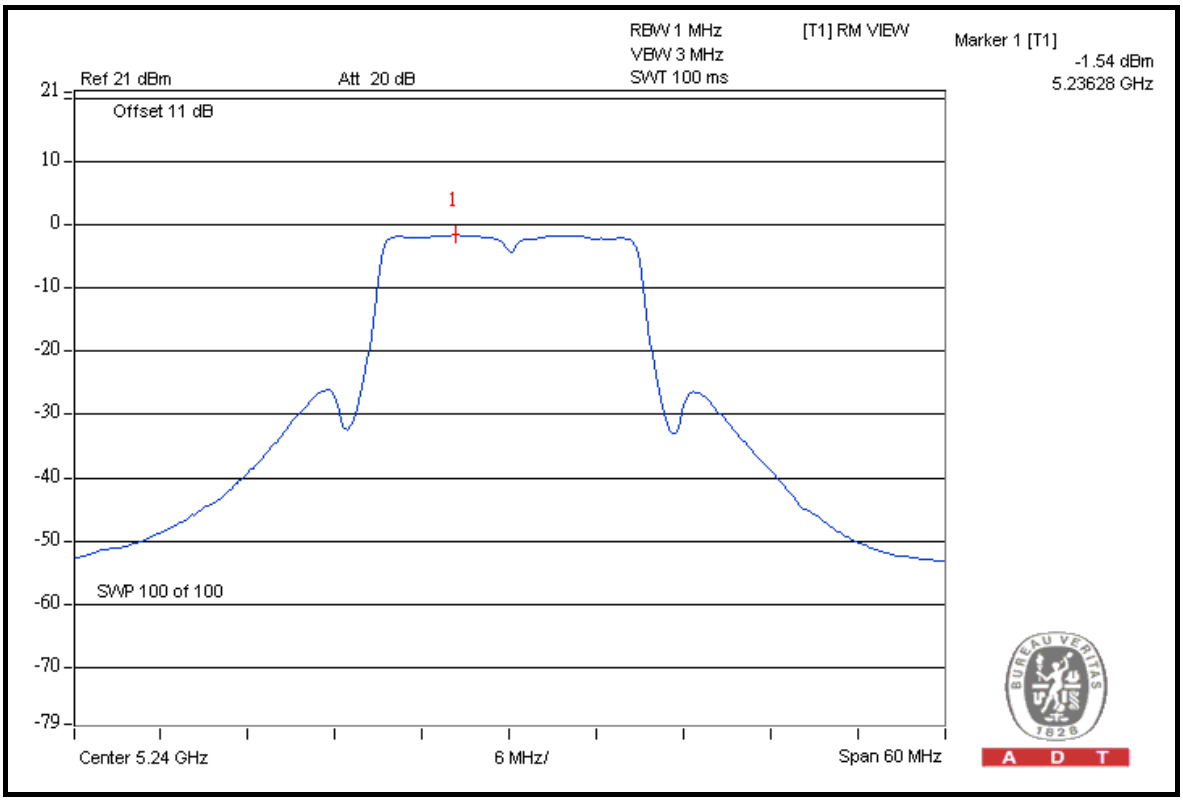
## 802.11n (HT20)

| TX chain | CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK VALUE (dBm) | PPSD (dBm) | PEAK EXCURSION (dB) | LIMIT (dB) | PASS/FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 36 | 5180 | 8.16 | -0.93 | 9.09 | 13 | PASS |
| | 40 | 5200 | 8.40 | -0.92 | 9.32 | 13 | PASS |
| | 48 | 5240 | 8.29 | -0.90 | 9.19 | 13 | PASS |
| 1 | 36 | 5180 | 9.22 | -1.10 | 10.32 | 13 | PASS |
| | 40 | 5200 | 9.42 | -1.01 | 10.43 | 13 | PASS |
| | 48 | 5240 | 8.94 | -1.54 | 10.48 | 13 | PASS |
| 2 | 36 | 5180 | 9.47 | -0.91 | 10.38 | 13 | PASS |
| | 40 | 5200 | 9.38 | -0.64 | 10.02 | 13 | PASS |
| | 48 | 5240 | 9.14 | -1.27 | 10.41 | 13 | PASS |

## PEAK VALUE: CH 48



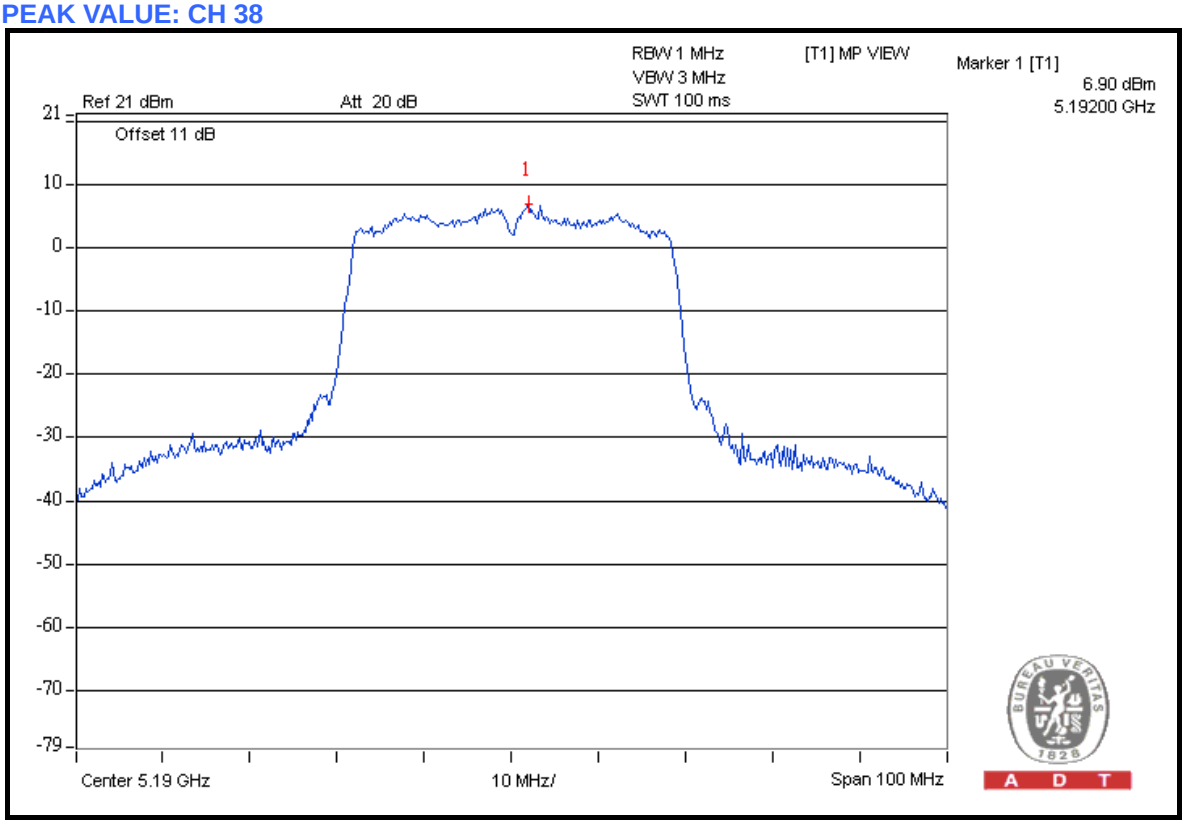
## PPSD: CH 36


RBW 1 MHz
VBW 3 MHz
SWT 100 ms
[T1] RM VIEW
Marker 1 [T1]
-1.54 dBm
5.23628 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
1
SWP 100 of 100
Center 5.24 GHz
6 MHz/
Span 60 MHz

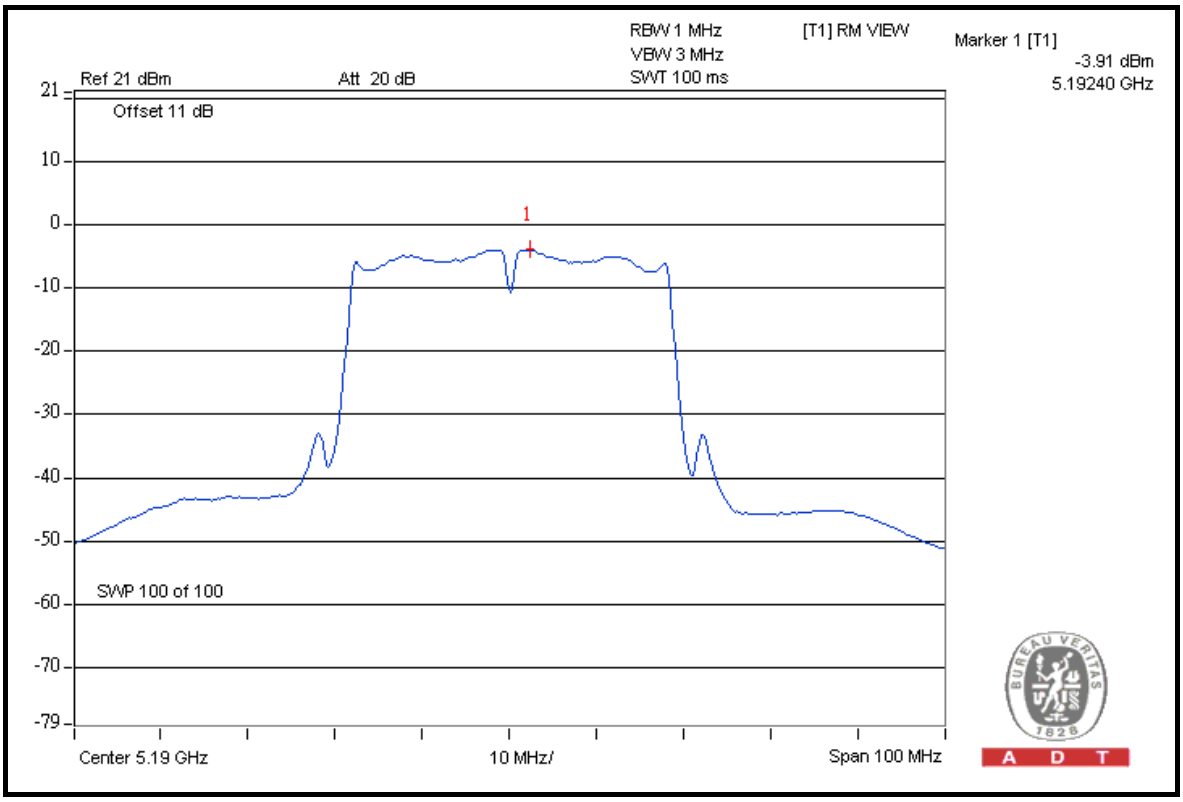
## 802.11n (HT40)

| TX chain | CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK VALUE (dBm) | PPSD (dBm) | PEAK EXCURSION (dB) | LIMIT (dB) | PASS/FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 38 | 5190 | 5.41 | -3.97 | 9.38 | 13 | PASS |
| | 46 | 5230 | 7.43 | -1.77 | 9.20 | 13 | PASS |
| 1 | 38 | 5190 | 6.90 | -3.91 | 10.81 | 13 | PASS |
| | 46 | 5230 | 8.61 | -2.06 | 10.67 | 13 | PASS |
| 2 | 38 | 5190 | 5.39 | -4.51 | 9.90 | 13 | PASS |
| | 46 | 5230 | 8.20 | -1.89 | 10.09 | 13 | PASS |

## PEAK VALUE: CH 38



## PPSD: CH 38


RBW 1 MHz
VBW 3 MHz
SWT 100 ms
[T1] RM VIEW
Marker 1 [T1]
-3.91 dBm
5.19240 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
1
SWP 100 of 100
Center 5.19 GHz
10 MHz/
Span 100 MHz

## 4.6 FREQUENCY STABILITY

### 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 INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S Spectrum Analyzer | FSP40 | 100036 | Dec. 14, 2011 | Dec. 13, 2012 |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 15, 2012

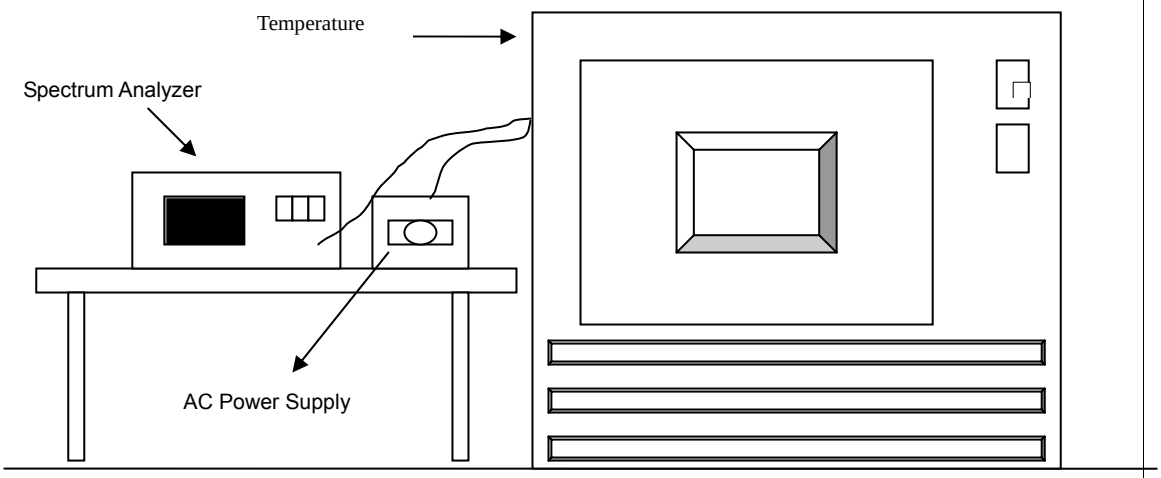
### 4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. 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.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. 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.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 TEST SETUP




### 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: 5180MHz | | | | | | | | | |
| TEMP. (℃) | POWER SUPPLY (Vac) | 0 MINUTE | | 2 MINUTE | | 5 MINUTE | | 10 MINUTE | |
| | | Measured Frequency | Frequency Drift | Measured Frequency | Frequency Drift | Measured Frequency | Frequency Drift | Measured Frequency | Frequency Drift |
| | | (MHz) | ppm | (MHz) | ppm | (MHz) | ppm | (MHz) | ppm |
| 50 | 120 | 5179.9987 | -0.2510 | 5180.0025 | 0.4826 | 5180.0057 | 1.1004 | 5179.9986 | -0.2703 |
| 40 | 120 | 5180.0007 | 0.1351 | 5180.0027 | 0.5212 | 5180.002 | 0.3861 | 5180.0026 | 0.5019 |
| 30 | 120 | 5179.9965 | -0.6757 | 5179.9959 | -0.7915 | 5179.9895 | -2.0270 | 5179.9931 | -1.3320 |
| 20 | 120 | 5180.0154 | 2.9730 | 5180.0152 | 2.9344 | 5180.0137 | 2.6448 | 5180.0077 | 1.4865 |
| 10 | 120 | 5179.9713 | -5.5405 | 5179.975 | -4.8263 | 5179.9777 | -4.3050 | 5179.9706 | -5.6757 |
| 0 | 120 | 5179.9997 | -0.0579 | 5180.0038 | 0.7336 | 5180.0034 | 0.6564 | 5180.0039 | 0.7529 |
| -10 | 120 | 5180.0227 | 4.3822 | 5180.027 | 5.2124 | 5180.0259 | 5.0000 | 5180.0256 | 4.9421 |
| -20 | 120 | 5179.9783 | -4.1892 | 5179.9788 | -4.0927 | 5179.9817 | -3.5328 | 5179.9766 | -4.5174 |
| -30 | 120 | 5180.0222 | 4.2857 | 5180.0207 | 3.9961 | 5180.0184 | 3.5521 | 5180.0242 | 4.6718 |

| FREQUEMCY STABILITY VERSUS VOLTAGE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OPERATING FREQUENCY: 5180MHz | | | | | | | | | |
| TEMP. (℃) | POWER SUPPLY (Vac) | 0 MINUTE | | 2 MINUTE | | 5 MINUTE | | 10 MINUTE | |
| | | Measured Frequency | Frequency Drift | Measured Frequency | Frequency Drift | Measured Frequency | Frequency Drift | Measured Frequency | Frequency Drift |
| | | (MHz) | ppm | (MHz) | ppm | (MHz) | ppm | (MHz) | ppm |
| 20 | 138 | 5180.0142 | 2.7413 | 5180.016 | 3.0888 | 5180.0136 | 2.6255 | 5180.0069 | 1.3320 |
| | 120 | 5180.0154 | 2.9730 | 5180.0152 | 2.9344 | 5180.0137 | 2.6448 | 5180.0077 | 1.4865 |
| | 102 | 5180.0153 | 2.9537 | 5180.0147 | 2.8378 | 5180.0148 | 2.8571 | 5180.0084 | 1.6216 |

# 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

# 6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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


**Linko EMC/RF Lab**:
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**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.

# 7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

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

**--- END ---**