# FCC TEST REPORT (15.407)

**REPORT NO.:** RF981030L05-1

**MODEL NO.:** DIR-665

**RECEIVED:** Oct. 29, 2009

**TESTED:** Oct. 29 ~ Dec. 10, 2009

**ISSUED:** Dec. 17, 2009

**APPLICANT:** D-Link Corporation

**ADDRESS:** 17595 Mt. Herrmann, Fountain Valley, CA 92708, U.S.A.

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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# 1. CERTIFICATION

**PRODUCT:** Xtreme N 450 Dual Band Gigabit Router

**MODEL NO.:** DIR-665

**BRAND:** D-Link

**APPLICANT:** D-Link Corporation

**TEST SAMPLE:** ENGINEERING SAMPLE

**TESTED:** Oct. 29 ~ Dec. 10, 2009

**STANDARDS:** **FCC Part 15, Subpart E (Section 15.407)**
ANSI C63.4-2003

The above equipment (Model: DIR-665) 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** : Andrea Hsia , **DATE:** Dec. 17, 2009
Andrea Hsia / Specialist

**TECHNICAL ACCEPTANCE** : Long Chen , **DATE:** Dec. 17, 2009
Responsible for RF Long Chen / Senior Engineer

**APPROVED BY** : Gary Chang , **DATE:** Dec. 17, 2009
Gary Chang / Assistant Manager

# 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407) | | | |
|---|---|---|---|
| **STANDARD SECTION** | **TEST TYPE AND LIMIT** | **RESULT** | **REMARK** |
| 15.407(b)(5) | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -10.11dB at 0.150MHz. |
| 15.407(b/1/2/3) (b)(5) | Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz | PASS | Meet the requirement of limit. Minimum passing margin is -1.3dB at 125.17MHz. |
| 15.407(a/1/2/3) | 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/1/2/3) | 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 | Antenna connector is RSMA 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 | UNCERTAINTY |
|---|---|---|
| Conducted emissions | 150kHz~30MHz | 2.44 dB |
| Radiated emissions | 30MHz ~ 200MHz | 2.93 dB |
| | 200MHz ~1000MHz | 2.95 dB |
| | 1GHz ~ 18GHz | 2.26 dB |
| | 18GHz ~ 40GHz | 1.94 dB |

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

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | Xtreme N 450 Dual Band Gigabit Router |
| **MODEL NO.** | DIR-665 |
| **FCC ID** | KA2IR665A1 |
| **POWER SUPPLY** | 12Vdc |
| **MODULATION TYPE** | 64QAM, 16QAM, QPSK, BPSK for OFDM |
| **MODULATION TECHNOLOGY** | OFDM |
| **TRANSFER RATE** | 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps<br>802.11n: up to 270.0Mbps |
| **OPERATING FREQUENCY** | 5180.0 ~ 5240.0MHz |
| **NUMBER OF CHANNEL** | 4 for 802.11a, 802.11n (20MHz)<br>2 for 802.11n (40MHz) |
| **OUTPUT POWER** | 49.2mW |
| **ANTENNA TYPE** | Dipole antenna with 2.0dBi gain |
| **DATA CABLE** | NA |
| **I/O PORTS** | RJ45 |
| **ASSOCIATED DEVICES** | Adapter |

**NOTE:**

1. The EUT is a Xtreme N 450 Dual Band Gigabit Router. The functions of EUT listed as below:

| | TEST STANDARD | REFERENCE REPORT |
|---|---|---|
| **WLAN 802.11b/g, 802.11n** | FCC Part 15, Subpart C (Section 15.247) | RF981030L05 |
| **WLAN 802.11a, 802.11n (5745~5825 MHz)** | | |
| **WLAN 802.11a, 802.11n (5180~ 5240MHz)** | FCC Part 15, Subpart E (Section 15.407) | RF981030L05-1 |

2. The frequency bands used in this EUT are listed as follows:

| Frequency Band (MHz) | 2412~2462 | 5180~5240 | 5745~5825 |
|---|---|---|---|
| **802.11b** | √ | | |
| **802.11g** | √ | | |
| **802.11a** | | √ | √ |
| **802.11n (20MHz)** | √ | √ | √ |
| **802.11n (40MHz)** | √ | √ | √ |

3. The EUT was powered by the following adapter:

| | |
|---|---|
| **BRAND:** | D-Link |
| **MODEL:** | CG2412-B |
| **INPUT:** | 100-120Vac, 50-60Hz, 0.5A |
| **OUTPUT:** | 12Vdc, 2A |
| **POWER LINE:** | 1.8 m non-shielded cable without core |

4. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and three receivers.

| MODULATION MODE | TX FUNCTION |
|---|---|
| **802.11b** | 3TX |
| **802.11g** | 3TX |
| **802.11a** | 3TX |
| **802.11n (20MHz)** | 3TX |
| **802.11n (40MHz)** | 3TX |

5. The above EUT information was 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

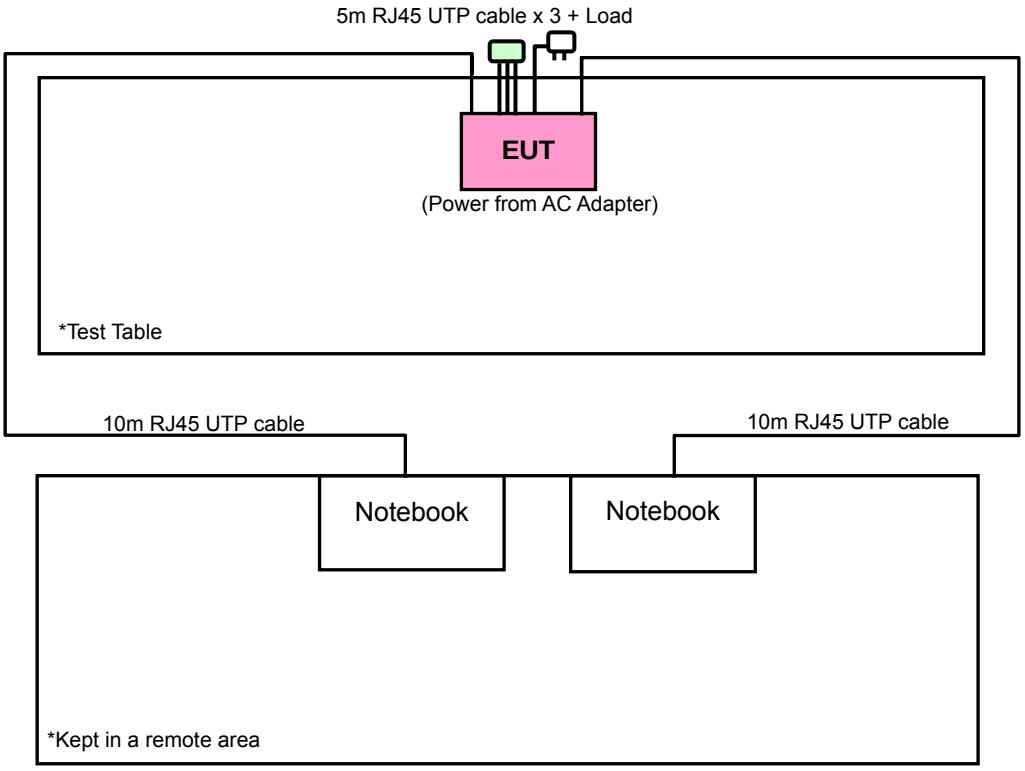
4 channels are provided for 802.11a and 802.11n (20MHz):

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

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

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

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



## 3.2.2 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.

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11a | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.0 |
| 802.11n (20MHz) | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.5 |
| 802.11n (40MHz) | 38 to 46 | 38, 46 | OFDM | BPSK | 13.5 |

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

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

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

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11n (20MHz) | 36 to 48 | 48 | OFDM | BPSK | 6.5 |

**POWER LINE CONDUCTED EMISSION TEST:**

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

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

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11n (20MHz) | 36 to 48 | 48 | OFDM | BPSK | 6.5 |

**BANDEDGE 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, 48 | OFDM | BPSK | 6.0 |
| 802.11n (20MHz) | 36 to 48 | 36, 48 | OFDM | BPSK | 6.5 |
| 802.11n (40MHz) | 38 to 46 | 38, 46 | OFDM | BPSK | 13.5 |

**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.

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|
| 802.11a | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.0 |
| 802.11n (20MHz) | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.5 |
| 802.11n (40MHz) | 38 to 46 | 38, 46 | OFDM | BPSK | 13.5 |

**TEST CONDITION:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY |
|---|---|---|---|
| RE≥1G | 24deg. C, 65%RH, 999 hPa | 120Vac, 60Hz | Mark Liao |
| RE<1G | 26deg. C, 65%RH, 999 hPa | 120Vac, 60Hz | Lori Chiu |
| PLC | 23deg. C, 70%RH, 988 hPa | 120Vac, 60Hz | Scott Yang |
| APCM | 23deg. C, 70%RH, 999 hPa | 120Vac, 60Hz | Dean Wang |

## 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)**
**ANSI C63.4-2003**

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

## 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.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|---|---|---|---|---|---|
| 1 | NOTEBOOK | DELL | PP05L | 25191592336 | E2K24CLNS |
| 2 | NOTEBOOK | DELL | PP05L | 12130898320 | E2K24CLNS |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|---|---|
| 1 | 10m UTP RJ45 cable |
| 2 | 10m UTP RJ45 cable |

**NOTE:** 1. All power cords of the above support units are non shielded (1.8m).
2. Item 1-2 acted as a communication partner to transfer data.

# 4. TEST TYPES AND RESULTS

## 4.1 RADIATED EMISSION MEASUREMENT

### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| 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. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

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

| FREQUENCIES (MHz) | EIRP LIMIT (dBm) | EQUIVALENT FIELD STRENGTH AT 3m (dBμV/m) *NOTE 3 |
|---|---|---|
| | PK | PK |
| 5150 ~ 5250 | -27 | 68.3 |

**NOTE:**

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).

### 4.1.3 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| Test Receiver ROHDE & SCHWARZ | ESIB7 | 100212 | May 25, 2009 | May 24, 2010 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP40 | 100040 | Jul. 07, 2009 | Jul. 06, 2010 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-156 | Apr. 30, 2009 | Apr. 29, 2010 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-563 | Aug. 10, 2009 | Aug. 09, 2010 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | BBHA9170242 | Jan. 06, 2009 | Jan. 05, 2010 |
| Preamplifier Agilent | 8449B | 3008A01910 | Sep. 11, 2009 | Sep. 10, 2010 |
| Preamplifier Agilent | 8447D | 2944A10638 | Dec. 26, 2008 | Dec. 25, 2009 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 218190/4 231241/4 | May 13, 2009 | May 12, 2010 |
| RF signal cable Worken | 8D-FB | Cable-HYCH9-01 | Aug. 17, 2009 | Aug. 16, 2010 |
| Software | ADT_Radiated_ V7.6.15.9.2 | NA | NA | NA |
| Antenna Tower EMCO | 2070/2080 | 512.835.4684 | NA | NA |
| Turn Table EMCO | 2087-2.03 | NA | NA | NA |
| Antenna Tower &Turn Table Controller EMCO | 2090 | NA | NA | NA |
| 26GHz ~ 40GHz Amplifier | EM26400 | 07026401 | Aug. 27, 2009 | Aug. 26, 2010 |

**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 HwaYa Chamber 9.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 460141.

5. The IC Site Registration No. is IC 7450F-4.

### 4.1.4 TEST PROCEDURES

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

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

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

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

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

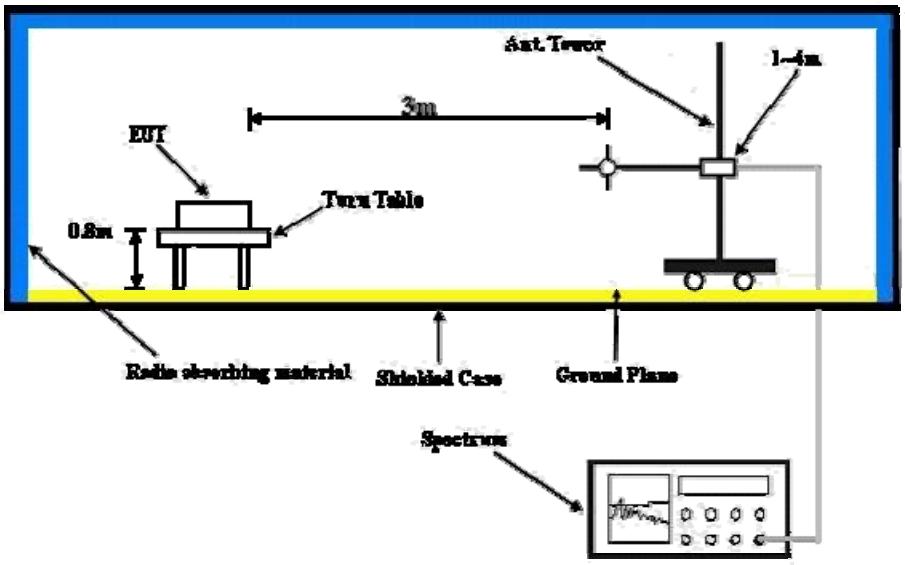
**NOTE:**

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

### 4.1.5 DEVIATION FROM TEST STANDARD

No deviation

### 4.1.6 TEST SETUP




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

### 4.1.7 EUT OPERATING CONDITION

a. Placed the EUT on the testing table.
b. Prepared notebook systems to act as a communication partner and placed them outside of testing area.
c. The communication partners connected with EUT via a UTP cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partners sent data to EUT by command "PING".

## 4.1.8 TEST RESULTS

**802.11a**

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 36 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 48.3 PK | 74.0 | -25.7 | 1.13 H | 140 | 9.43 | 38.91 |
| 2 | 5150.00 | 34.9 AV | 54.0 | -19.1 | 1.13 H | 140 | -4.00 | 38.91 |
| 3 | *5180.00 | 97.7 PK | | | 1.34 H | 276 | 58.72 | 38.96 |
| 4 | *5180.00 | 87.3 AV | | | 1.34 H | 276 | 48.33 | 38.96 |
| 5 | #10360.00 | 58.3 PK | 68.3 | -10.0 | 1.08 H | 35 | 9.70 | 48.60 |
| **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 | 61.4 PK | 74.0 | -12.6 | 1.07 V | 160 | 22.52 | 38.91 |
| 2 | 5150.00 | 46.8 AV | 54.0 | -7.2 | 1.07 V | 160 | 7.87 | 38.91 |
| 3 | *5180.00 | 113.2 PK | | | 1.07 V | 175 | 74.20 | 38.96 |
| 4 | *5180.00 | 103.0 AV | | | 1.07 V | 175 | 64.05 | 38.96 |
| 5 | #10360.00 | 59.5 PK | 68.3 | -8.8 | 1.31 V | 4 | 10.90 | 48.60 |

**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 the restricted band.

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 40 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 99.3 PK | | | 1.06 H | 143 | 60.29 | 38.99 |
| 2 | *5200.00 | 88.9 AV | | | 1.06 H | 143 | 49.94 | 38.99 |
| 3 | #10400.00 | 59.6 PK | 68.3 | -8.7 | 1.24 H | 251 | 11.00 | 48.63 |
| 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 | 111.7 PK | | | 1.29 V | 229 | 72.75 | 38.99 |
| 2 | *5200.00 | 101.1 AV | | | 1.29 V | 229 | 62.13 | 38.99 |
| 3 | #10400.00 | 59.8 PK | 68.3 | -8.5 | 1.16 V | 193 | 11.21 | 48.63 |

**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 the restricted band.

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 48 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 99.8 PK | | | 1.40 H | 273 | 60.78 | 39.05 |
| 2 | *5240.00 | 89.1 AV | | | 1.40 H | 273 | 50.06 | 39.05 |
| 3 | 5350.00 | 48.8 PK | 74.0 | -25.2 | 1.27 H | 9 | 9.56 | 39.22 |
| 4 | 5350.00 | 36.0 AV | 54.0 | -18.0 | 1.27 H | 9 | -3.18 | 39.22 |
| 5 | #10480.00 | 59.4 PK | 68.3 | -8.9 | 1.19 H | 158 | 10.55 | 48.87 |
| 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 | 113.9 PK | | | 1.29 V | 215 | 74.87 | 39.05 |
| 2 | *5240.00 | 103.3 AV | | | 1.29 V | 215 | 64.27 | 39.05 |
| 3 | 5350.00 | 56.3 PK | 74.0 | -17.7 | 1.14 V | 216 | 17.06 | 39.22 |
| 4 | 5350.00 | 43.9 AV | 54.0 | -10.1 | 1.14 V | 216 | 4.71 | 39.22 |
| 5 | #10480.00 | 60.1 PK | 68.3 | -8.2 | 1.28 V | 42 | 11.24 | 48.87 |

**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 the restricted band.

### 802.11n (20MHz)

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 36 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 46.2 PK | 74.0 | -27.8 | 1.19 H | 196 | 7.30 | 38.91 |
| 2 | 5150.00 | 35.1 AV | 54.0 | -18.9 | 1.19 H | 196 | -3.86 | 38.91 |
| 3 | *5180.00 | 99.3 PK | | | 1.43 H | 272 | 60.36 | 38.96 |
| 4 | *5180.00 | 88.5 AV | | | 1.43 H | 272 | 49.55 | 38.96 |
| 5 | #10360.00 | 59.5 PK | 68.3 | -8.8 | 1.15 H | 72 | 10.94 | 48.60 |
| 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 | 63.7 PK | 74.0 | -10.3 | 1.19 V | 180 | 24.80 | 38.91 |
| 2 | 5150.00 | 46.7 AV | 54.0 | -7.3 | 1.19 V | 180 | 7.81 | 38.91 |
| 3 | *5180.00 | 113.9 PK | | | 1.19 V | 216 | 74.98 | 38.96 |
| 4 | *5180.00 | 103.3 AV | | | 1.19 V | 216 | 64.38 | 38.96 |
| 5 | #10360.00 | 61.2 PK | 68.3 | -7.1 | 1.31 V | 255 | 12.55 | 48.60 |

**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 the restricted band.

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 40 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 97.5 PK | | | 1.11 H | 141 | 58.46 | 38.99 |
| 2 | *5200.00 | 87.8 AV | | | 1.11 H | 141 | 48.82 | 38.99 |
| 3 | #10400.00 | 59.7 PK | 68.3 | -8.6 | 1.12 H | 153 | 11.04 | 48.63 |
| 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 | 112.8 PK | | | 1.07 V | 164 | 73.82 | 38.99 |
| 2 | *5200.00 | 102.6 AV | | | 1.07 V | 164 | 63.60 | 38.99 |
| 3 | #10400.00 | 61.6 PK | 68.3 | -6.7 | 1.22 V | 293 | 12.95 | 48.63 |

**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 the restricted band.

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 48 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 99.1 PK | | | 1.35 H | 291 | 60.07 | 39.05 |
| 2 | *5240.00 | 88.3 AV | | | 1.35 H | 291 | 49.20 | 39.05 |
| 3 | 5350.00 | 49.2 PK | 74.0 | -24.8 | 1.14 H | 11 | 9.96 | 39.22 |
| 4 | 5350.00 | 36.4 AV | 54.0 | -17.6 | 1.14 H | 11 | -2.82 | 39.22 |
| 5 | #10480.00 | 59.8 PK | 68.3 | -8.5 | 1.22 H | 182 | 10.90 | 48.87 |
| 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 | 113.3 PK | | | 1.44 V | 345 | 74.24 | 39.05 |
| 2 | *5240.00 | 102.9 AV | | | 1.44 V | 345 | 63.89 | 39.05 |
| 3 | 5350.00 | 55.6 PK | 74.0 | -18.4 | 1.43 V | 6 | 16.36 | 39.22 |
| 4 | 5350.00 | 43.0 AV | 54.0 | -11.0 | 1.43 V | 6 | 3.75 | 39.22 |
| 5 | #10480.00 | 61.6 PK | 68.3 | -6.7 | 1.25 V | 293 | 12.72 | 48.87 |

**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 the restricted band.

### 802.11n (40MHz)

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 38 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 47.3 PK | 74.0 | -26.7 | 1.14 H | 199 | 8.37 | 38.91 |
| 2 | 5150.00 | 35.5 AV | 54.0 | -18.5 | 1.14 H | 199 | -3.37 | 38.91 |
| 3 | *5190.00 | 92.6 PK | | | 1.12 H | 271 | 53.60 | 38.97 |
| 4 | *5190.00 | 81.6 AV | | | 1.12 H | 271 | 42.60 | 38.97 |
| 5 | #10380.00 | 57.9 PK | 68.3 | -10.4 | 1.28 H | 93 | 9.25 | 48.62 |
| 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 | 61.0 PK | 74.0 | -13.0 | 1.07 V | 160 | 22.08 | 38.91 |
| 2 | 5150.00 | 45.9 AV | 54.0 | -8.1 | 1.07 V | 160 | 6.96 | 38.91 |
| 3 | *5190.00 | 106.6 PK | | | 1.07 V | 164 | 67.64 | 38.97 |
| 4 | *5190.00 | 96.1 AV | | | 1.07 V | 164 | 57.15 | 38.97 |
| 5 | #10380.00 | 59.1 PK | 68.3 | -9.2 | 1.15 V | 120 | 10.43 | 48.62 |

**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 the restricted band.

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 46 | FREQUENCY RANGE | 1 ~ 40GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 65%RH<br>1000 hPa | TESTED BY | Mark Liao |

| 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 | 91.1 PK | | | 1.18 H | 210 | 52.08 | 39.04 |
| 2 | *5230.00 | 80.1 AV | | | 1.18 H | 210 | 41.05 | 39.04 |
| 3 | 5350.00 | 48.4 PK | 74.0 | -25.6 | 1.14 H | 321 | 9.19 | 39.22 |
| 4 | 5350.00 | 36.6 AV | 54.0 | -17.4 | 1.14 H | 321 | -2.61 | 39.22 |
| 5 | #10460.00 | 58.4 PK | 68.3 | -9.9 | 1.19 H | 32 | 9.60 | 48.81 |
| 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 | 104.2 PK | | | 1.03 V | 216 | 65.14 | 39.04 |
| 2 | *5230.00 | 94.2 AV | | | 1.03 V | 216 | 55.11 | 39.04 |
| 3 | 5350.00 | 53.4 PK | 74.0 | -20.6 | 1.04 V | 166 | 14.17 | 39.22 |
| 4 | 5350.00 | 39.9 AV | 54.0 | -14.1 | 1.04 V | 166 | 0.67 | 39.22 |
| 5 | #10460.00 | 59.8 PK | 68.3 | -8.5 | 1.27 V | 193 | 10.94 | 48.81 |

**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 the restricted band.

## BELOW 1GHz WORST-CASE DATA：802.11n (20MHz)

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|---|---|---|---|
| CHANNEL | Channel 48 | FREQUENCY RANGE | Below 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 65%RH 999 hPa | TESTED BY | Lori Chiu |

| 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** | **125.17** | **42.2 QP** | **43.5** | **-1.3** | **1.50 H** | **259** | **30.27** | **11.95** |
| 2 | 142.67 | 41.3 QP | 43.5 | -2.2 | 2.00 H | 280 | 28.37 | 12.90 |
| 3 | 191.28 | 37.1 QP | 43.5 | -6.4 | 1.50 H | 130 | 25.77 | 11.29 |
| 4 | 420.70 | 43.1 QP | 46.0 | -2.9 | 1.00 H | 319 | 26.37 | 16.75 |
| 5 | 550.97 | 39.2 QP | 46.0 | -6.8 | 1.50 H | 262 | 18.42 | 20.79 |
| 6 | 875.67 | 44.0 QP | 46.0 | -2.0 | 1.00 H | 199 | 18.09 | 25.88 |
| **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 | 53.23 | 37.4 QP | 40.0 | -2.6 | 1.00 V | 244 | 23.78 | 13.59 |
| 2 | 94.06 | 37.3 QP | 43.5 | -6.2 | 1.00 V | 307 | 28.01 | 9.26 |
| 3 | 127.11 | 41.7 QP | 43.5 | -1.8 | 1.25 V | 82 | 29.62 | 12.03 |
| 4 | 142.67 | 40.9 QP | 43.5 | -2.6 | 1.00 V | 247 | 27.97 | 12.90 |
| 5 | 422.65 | 42.2 QP | 46.0 | -3.8 | 1.25 V | 220 | 25.35 | 16.81 |
| 6 | 875.67 | 42.9 QP | 46.0 | -3.1 | 1.25 V | 244 | 17.02 | 25.88 |

**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.

## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 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 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| Test Receiver ROHDE & SCHWARZ | ESCS30 | 100288 | Sep. 24, 2009 | Sep. 23, 2010 |
| RF signal cable Woken | 5D-FB | Cable-HYCO2-01 | Dec. 31, 2008 | Dec. 30, 2009 |
| LISN ROHDE & SCHWARZ | ESH2-Z5 | 100100 | Dec. 29, 2008 | Dec. 28, 2009 |
| LISN ROHDE & SCHWARZ | ESH3-Z5 | 100311 | Jul. 29, 2009 | Jul. 28, 2010 |
| Software ADT | ADT_Cond_ V7.3.7 | 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 HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-2047.

### 4.2.3 TEST PROCEDURES

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

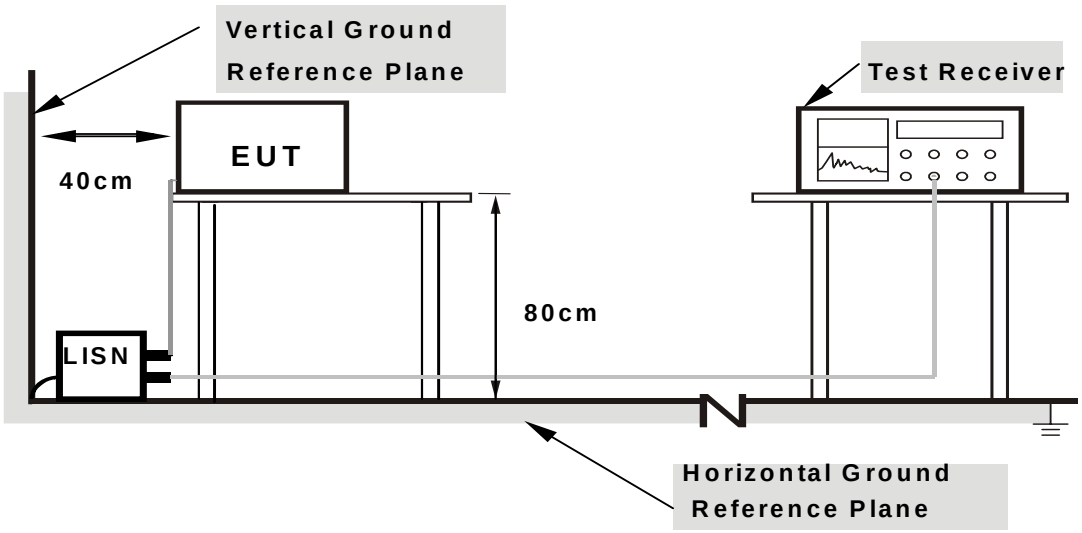
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

### 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 CONDITIONS

Same as 4.1.6.

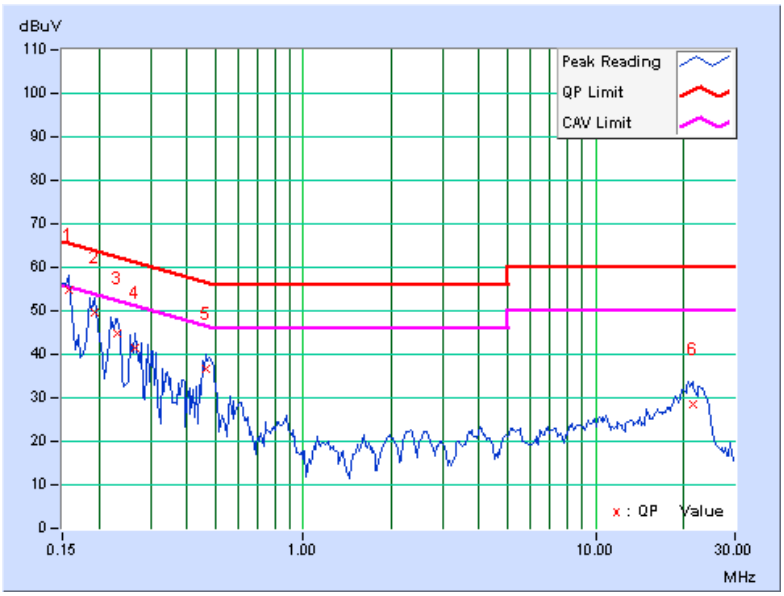
## 4.2.7 TEST RESULTS

**CONDUCTED WORST-CASE DATA：802.11n (20MHz)**

| PHASE | Line 1 | 6dB BANDWIDTH | 9kHz |
|---|---|---|---|

| | 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 | 0.158 | 0.13 | 54.63 | - | 54.76 | - | 65.58 | 55.58 | -10.82 | - |
| 2 | 0.193 | 0.13 | 49.44 | - | 49.57 | - | 63.91 | 53.91 | -14.34 | - |
| 3 | 0.232 | 0.13 | 44.50 | - | 44.63 | - | 62.38 | 52.38 | -17.75 | - |
| 4 | 0.267 | 0.13 | 41.19 | - | 41.32 | - | 61.20 | 51.20 | -19.88 | - |
| 5 | 0.463 | 0.14 | 36.64 | - | 36.78 | - | 56.65 | 46.65 | -19.86 | - |
| 6 | 21.531 | 0.66 | 27.80 | - | 28.46 | - | 60.00 | 50.00 | -31.54 | - |

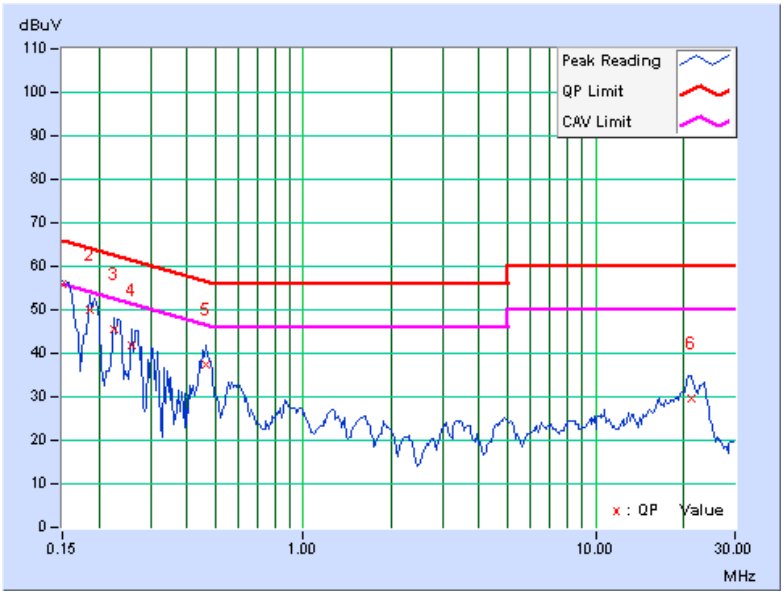
**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



| PHASE | Line 2 | 6dB BANDWIDTH | 9kHz |
|---|---|---|---|

| | 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** | **0.150** | **0.13** | **55.76** | **-** | **55.89** | **-** | **66.00** | **56.00** | **-10.11** | **-** |
| 2 | 0.185 | 0.13 | 49.86 | - | 49.99 | - | 64.25 | 54.25 | -14.26 | - |
| 3 | 0.224 | 0.13 | 45.30 | - | 45.43 | - | 62.66 | 52.66 | -17.23 | - |
| 4 | 0.259 | 0.14 | 41.76 | - | 41.90 | - | 61.45 | 51.45 | -19.56 | - |
| 5 | 0.463 | 0.15 | 37.44 | - | 37.59 | - | 56.65 | 46.65 | -19.06 | - |
| 6 | 21.215 | 0.81 | 28.79 | - | 29.60 | - | 60.00 | 50.00 | -30.40 | - |

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



## 4.3 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### 4.3.1 LIMITS OF MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

| FREQUENCY BAND | LIMIT |
|---|---|
| 5.15 ~ 5.25GHz | The lesser of 50mW (17dBm) or 4dBm + 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. | DATE OF CALIBRATION | CALIBRATED UNTIL |
|---|---|---|---|---|
| High Speed Peak Power Meter | ML2495A | 0824012 | Aug. 10, 2009 | Aug. 09, 2010 |
| Power Sensor | MA2411B | 0738138 | Aug. 10, 2009 | Aug. 09, 2010 |

**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. Measurement Bandwidth of ML2495A is 65MHz greater than 26dB bandwidth of emission.

**FOR 26dB OCCUPIED BANDWIDTH**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | FSP40 | 100040 | Jul. 07, 2009 | Jul. 06, 2010 |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.3.3 TEST PROCEDURE

**FOR POWER OUTPUT MEASUREMENT**

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

**FOR 26dB OCCUPIED BANDWIDTH**

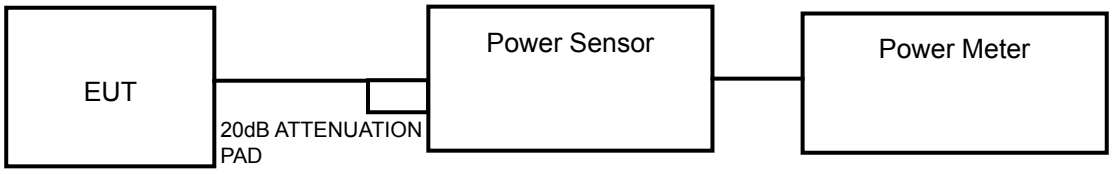
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

### 4.3.4 DEVIATION FROM TEST STANDARD

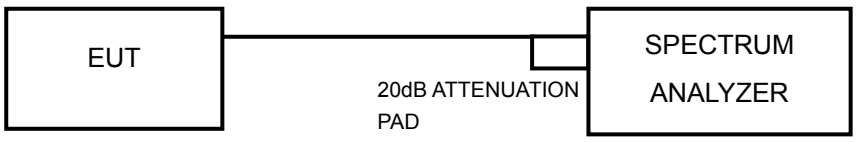
No deviation

### 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

| CHAN. | CHAN. FREQ. (MHz) | POWER OUTPUT (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 36 | 5180 | 12.0 | 11.0 | 13.0 | 48.4 | 16.8 | 17 | PASS |
| 40 | 5200 | 10.5 | 12.5 | 12.5 | 46.8 | 16.7 | 17 | PASS |
| 48 | 5240 | 11.0 | 13.7 | 11.0 | 48.6 | 16.9 | 17 | PASS |

### 802.11n (20MHz)

| CHAN. | CHAN. FREQ. (MHz) | POWER OUTPUT (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 36 | 5180 | 12.5 | 10.5 | 13.0 | 49.0 | 16.9 | 17 | PASS |
| 40 | 5200 | 10.5 | 12.5 | 12.5 | 46.8 | 16.7 | 17 | PASS |
| 48 | 5240 | 11.0 | 13.8 | 11.0 | 49.2 | 16.9 | 17 | PASS |

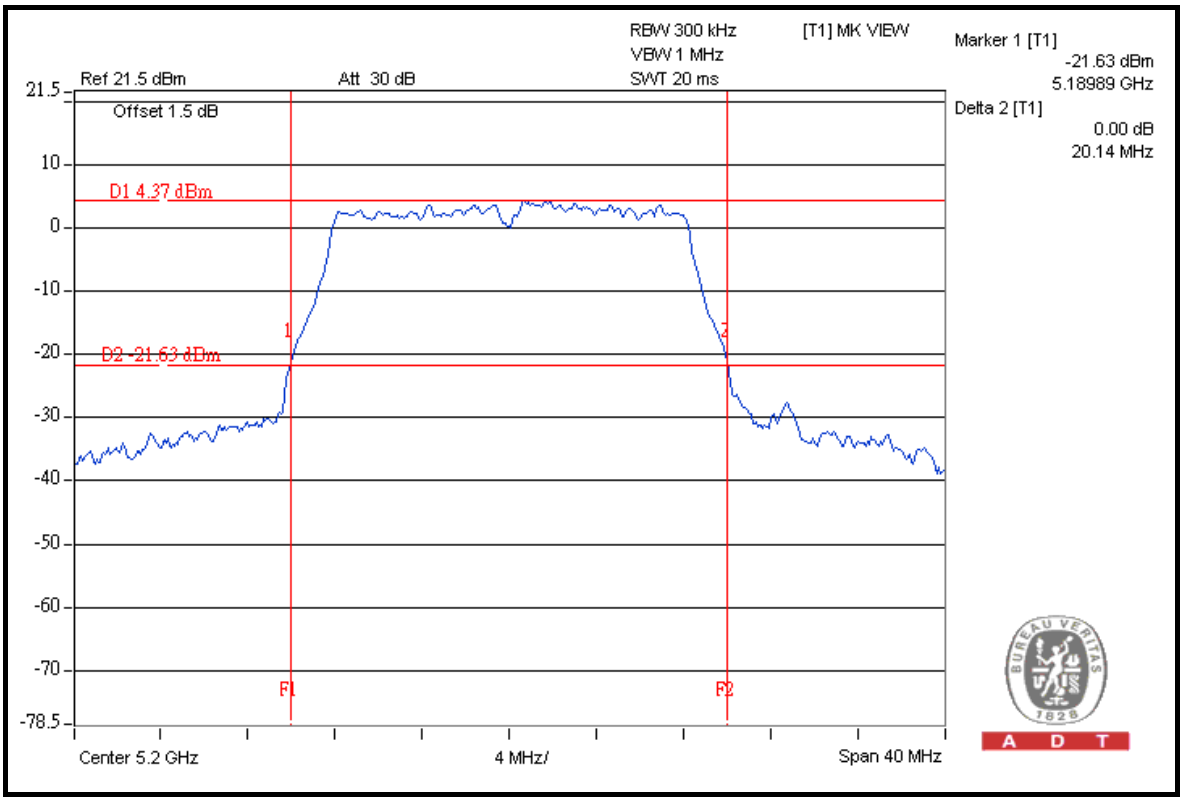
### 802.11n (40MHz)

| CHAN. | CHAN. FREQ. (MHz) | POWER OUTPUT (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | POWER LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 38 | 5190 | 8.1 | 8.2 | 10.1 | 23.3 | 13.7 | 17 | PASS |
| 46 | 5230 | 7.2 | 11.1 | 8.1 | 24.6 | 13.9 | 17 | PASS |

## 26dB OCCUPIED BANDWIDTH: 802.11a

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc OCCUPIED BANDWIDTH (MHz) | | | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | |
| 36 | 5180 | 20.00 | 20.05 | 20.01 | PASS |
| 40 | 5200 | 19.97 | 20.14 | 19.97 | PASS |
| 48 | 5240 | 20.04 | 20.09 | 19.98 | PASS |

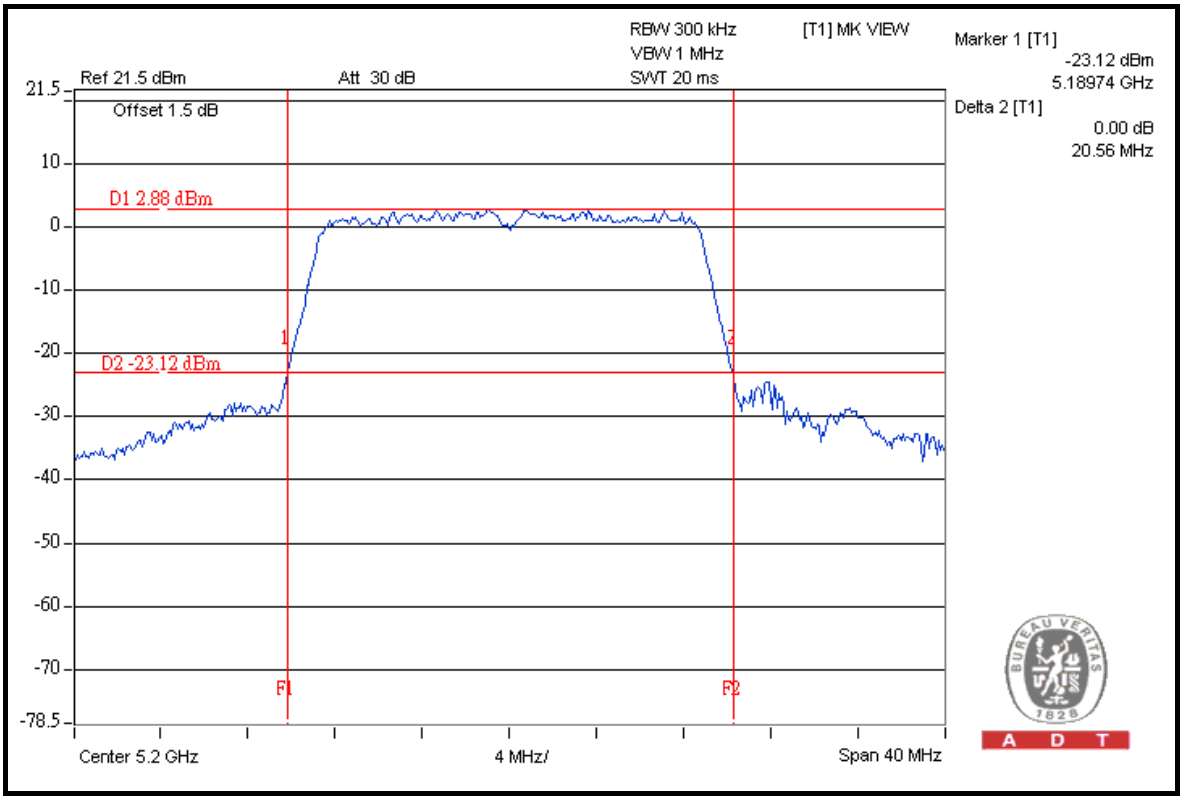
## FOR CHAIN 1: CH 40



## DRAFT 802.11n (20MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc OCCUPIED BANDWIDTH (MHz) | | | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | |
| 36 | 5180 | 20.51 | 20.34 | 20.53 | PASS |
| 40 | 5200 | 20.35 | 20.43 | 20.56 | PASS |
| 48 | 5240 | 20.53 | 20.39 | 20.47 | PASS |

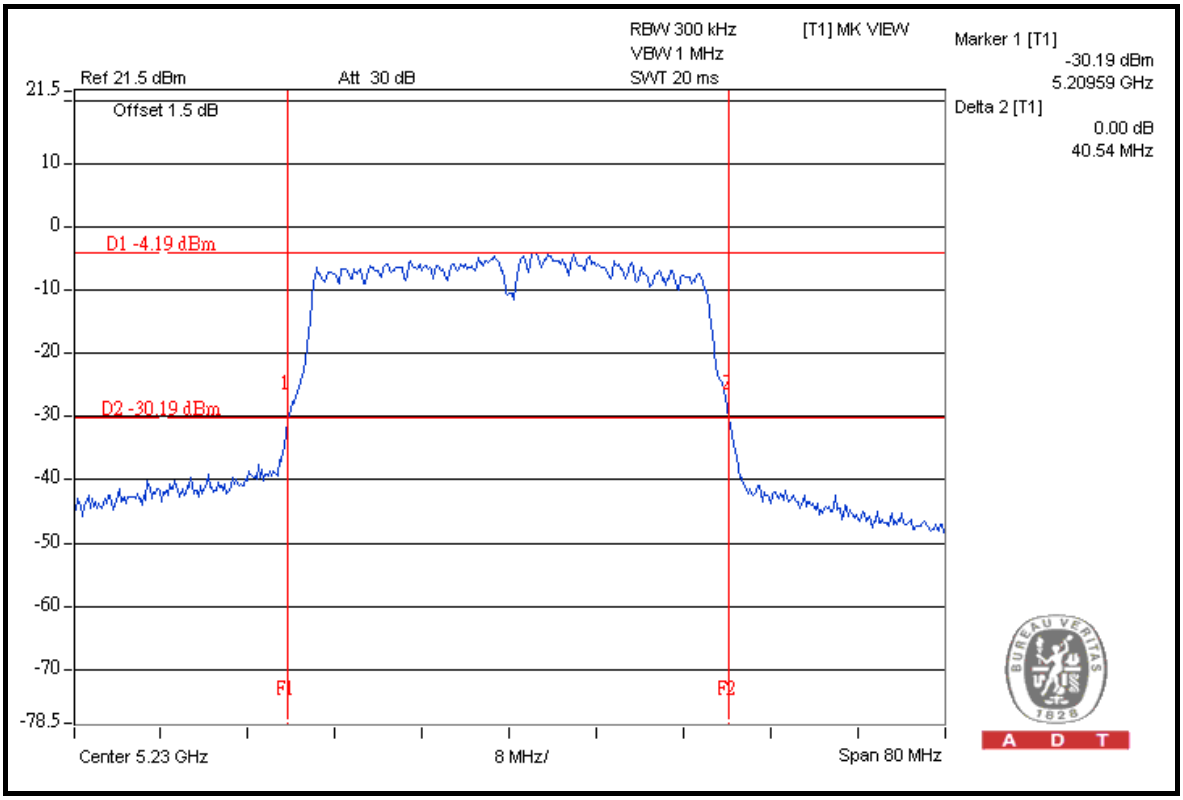
## FOR CHAIN 2: CH 40



### 802.11n (40MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | 26dBc OCCUPIED BANDWIDTH (MHz) | | | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | |
| 38 | 5190 | 40.31 | 40.31 | 40.44 | PASS |
| 46 | 5230 | 40.54 | 40.31 | 40.37 | PASS |

### FOR CHAIN 0: CH 46



## 4.4 PEAK POWER EXCURSION MEASUREMENT

### 4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

| FREQUENCY BAND | LIMIT |
|---|---|
| 5.15 ~ 5.25GHz | 13dB |

### 4.4.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | FSP40 | 100040 | Jul. 07, 2009 | Jul. 06, 2010 |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.4.3 TEST PROCEDURE

a. The transmitter output was connected to the spectrum analyzer.

b. Set the spectrum bandwidth span to view the entire spectrum.

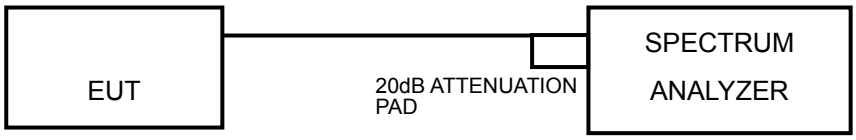
c. Using peak detector and Max-hold function for Trace 1 (RB = 1MHz, VB = 3MHz) and 2 (RB = 1MHz, VB = 300kHz).

d. The differences between Trace1 and Trace 2 in any 1MHz band at f1 to f2 range were recorded and showed to another trace.

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.4.5 TEST SETUP




### 4.4.6 EUT OPERATING CONDITIONS

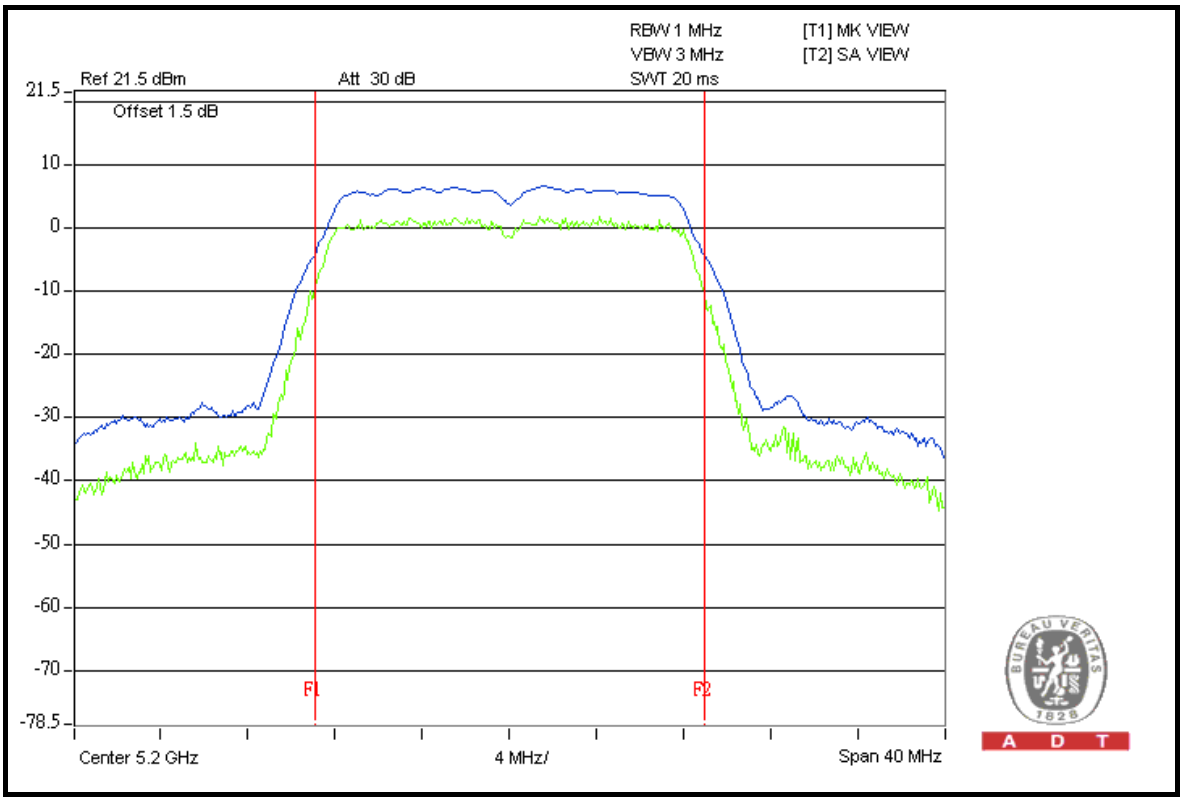
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

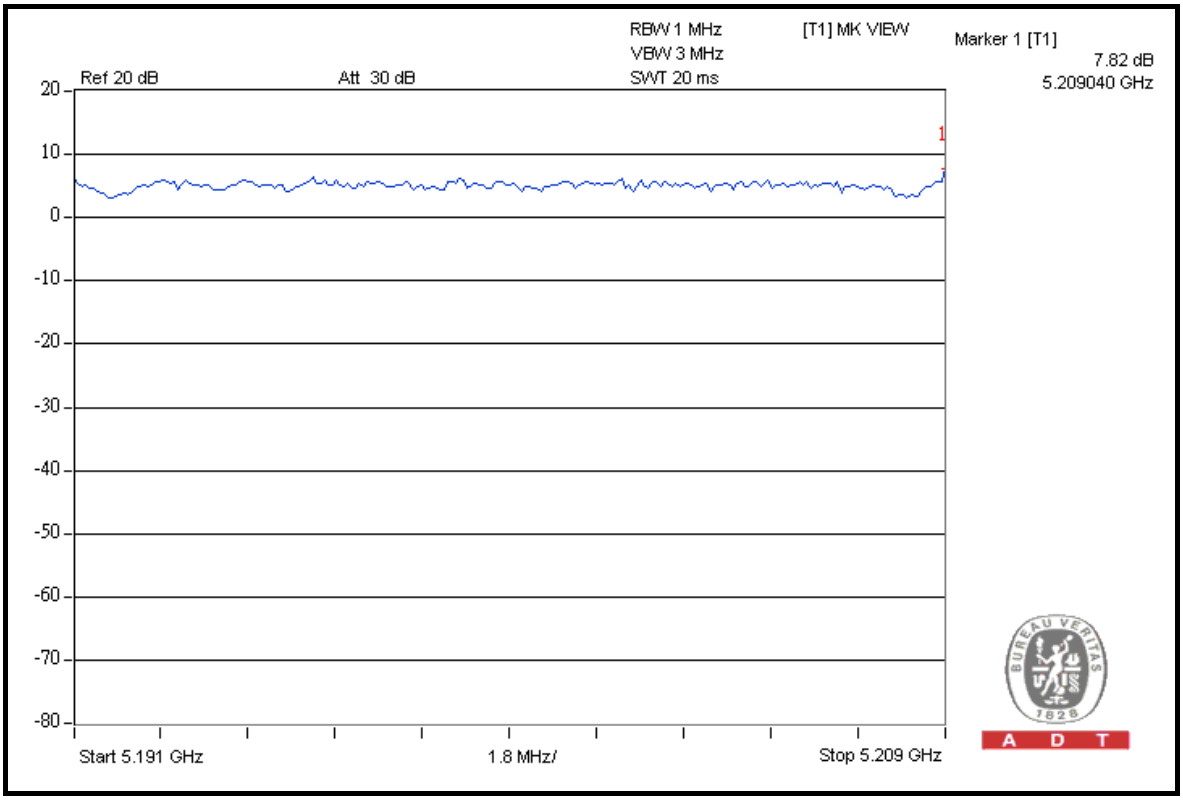
## 4.4.7 TEST RESULTS

**802.11a**

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER EXCURSION (dB) | | | PEAK to AVERAGE EXCURSION LIMIT (dB) | PASS/FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 36 | 5180 | 7.01 | 6.60 | 6.18 | 13 | PASS |
| 40 | 5200 | 7.82 | 6.63 | 6.62 | 13 | PASS |
| 48 | 5240 | 6.65 | 6.67 | 6.38 | 13 | PASS |

## FOR CHAIN 0: CH 40

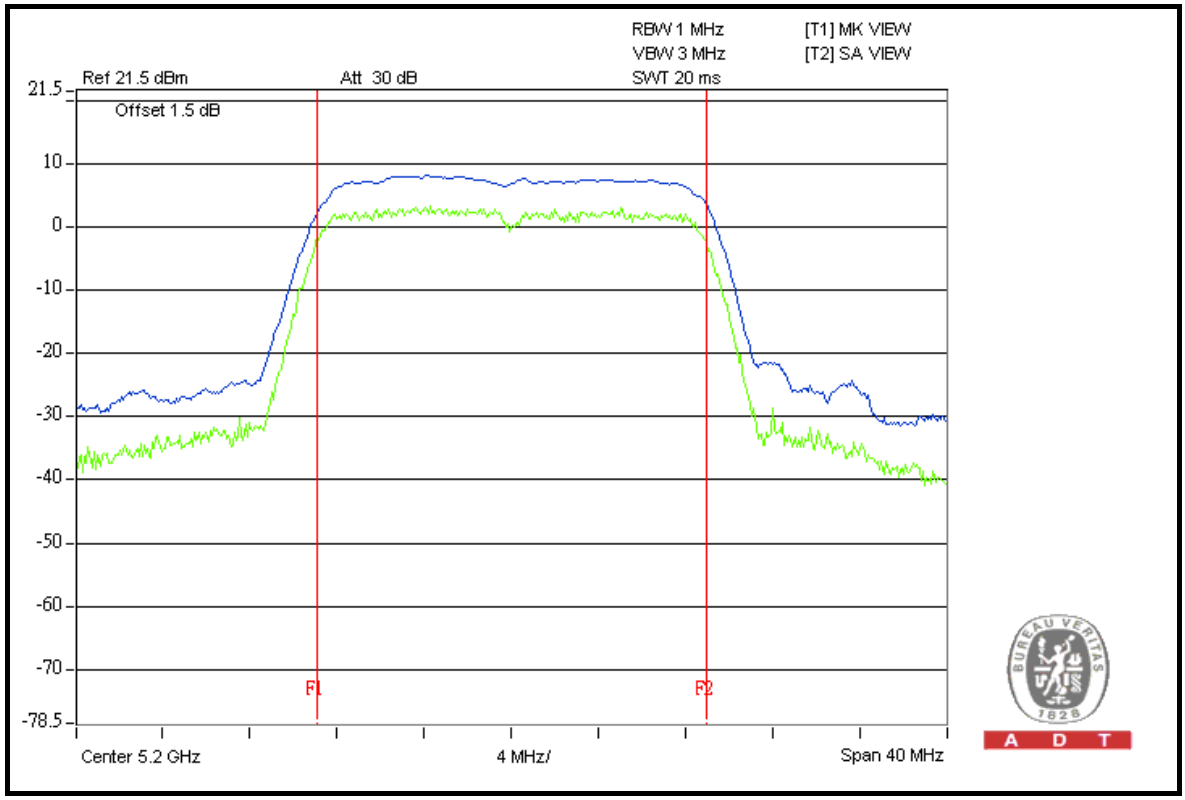


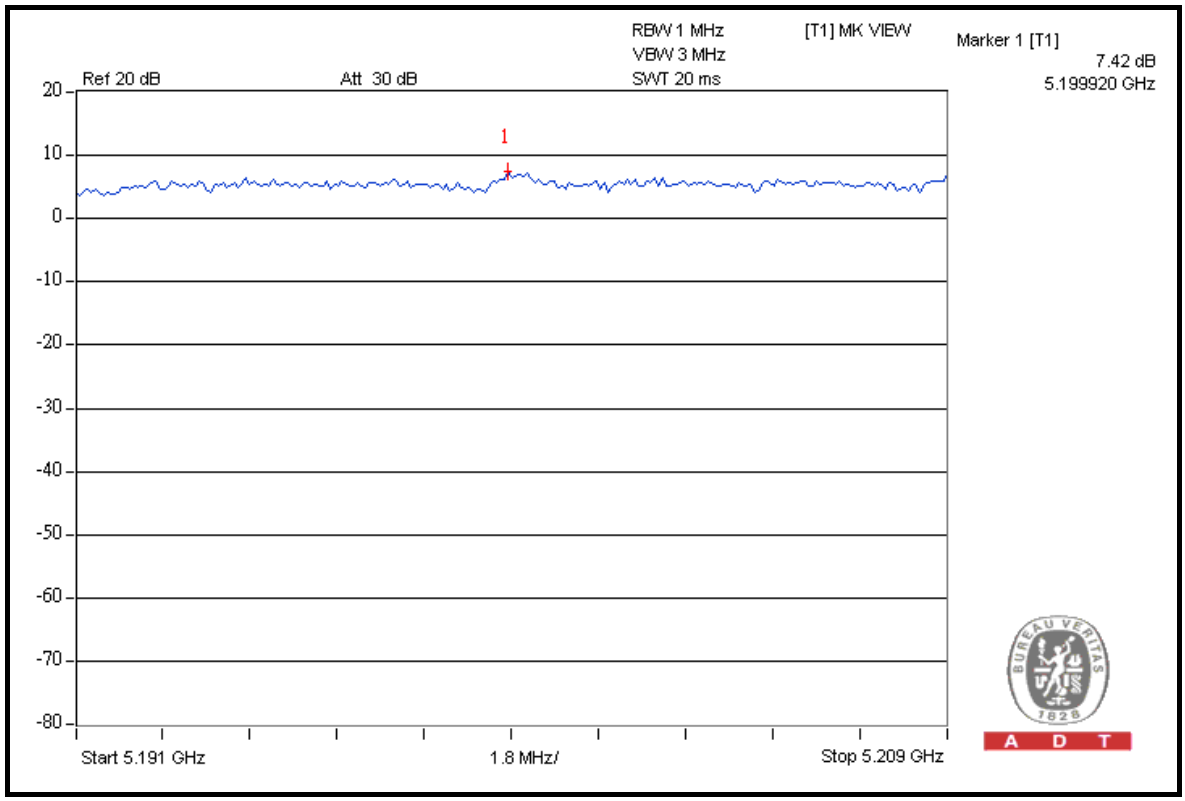



### 802.11n (20MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER EXCURSION (dB) | | | PEAK to AVERAGE EXCURSION LIMIT (dB) | PASS/FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 36 | 5180 | 6.70 | 7.26 | 6.63 | 13 | PASS |
| 40 | 5200 | 6.95 | 7.42 | 6.76 | 13 | PASS |
| 48 | 5240 | 7.24 | 6.90 | 6.79 | 13 | PASS |

## FOR CHAIN 1: CH 40

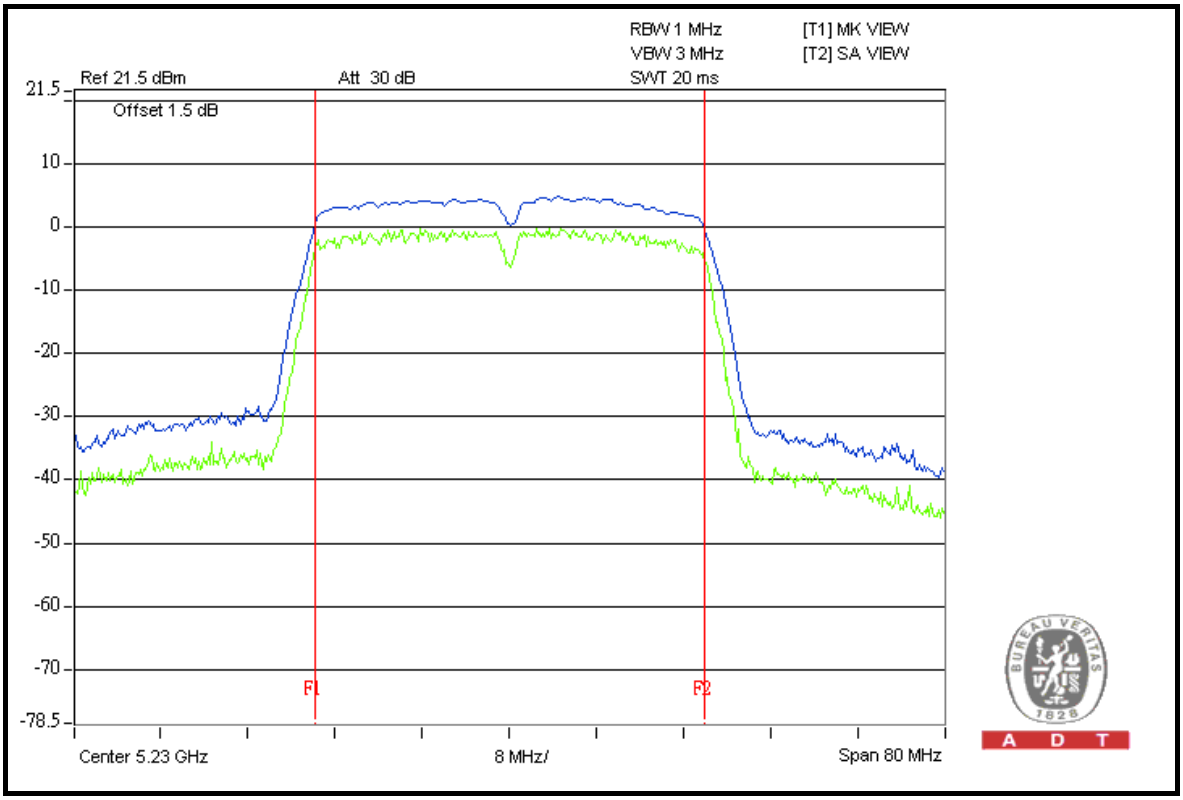


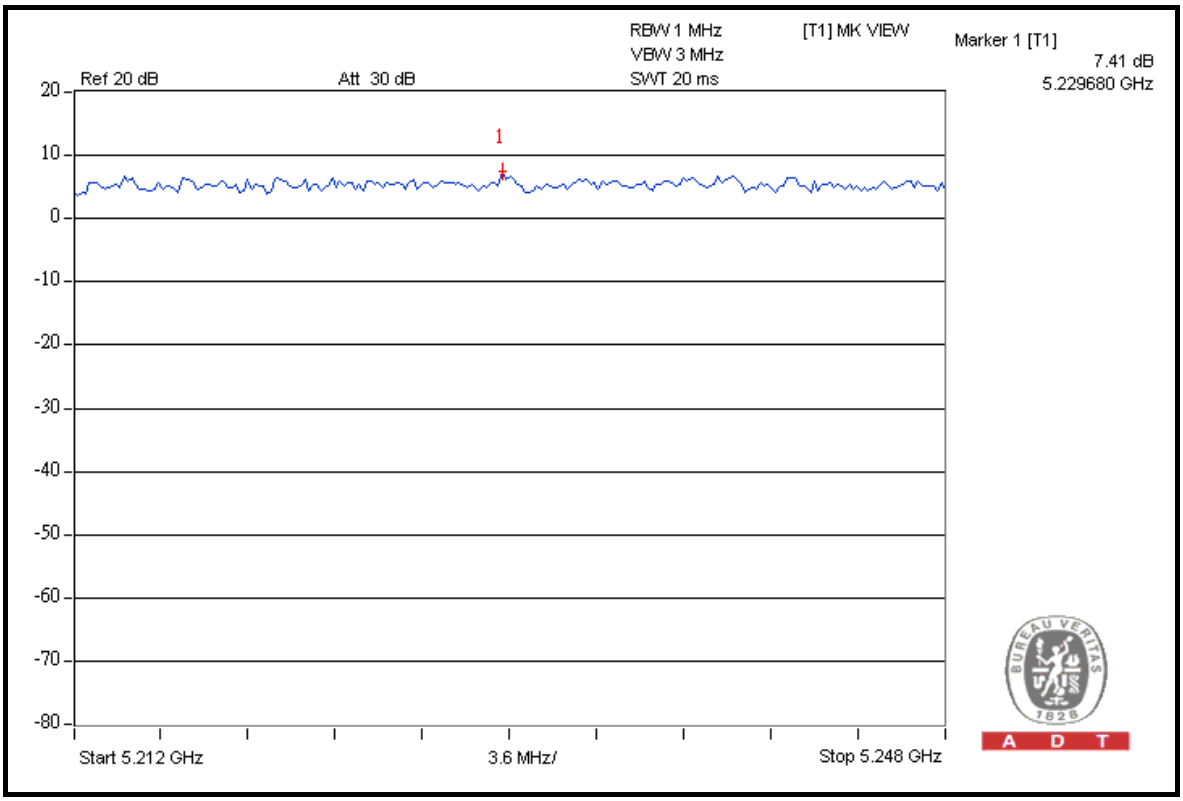



### 802.11n (40MHz)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER EXCURSION (dB) | | | PEAK to AVERAGE EXCURSION LIMIT (dB) | PASS/FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 38 | 5190 | 6.75 | 6.62 | 5.93 | 13 | PASS |
| 46 | 5230 | 7.08 | 7.41 | 6.93 | 13 | PASS |

## FOR CHAIN 1: CH 46



## 4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

| FREQUENCY BAND | LIMIT |
|---|---|
| 5.15 ~ 5.25GHz | 4dBm |

### 4.5.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | FSP40 | 100040 | Jul. 07, 2009 | Jul. 06, 2010 |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.5.3 TEST PROCEDURES

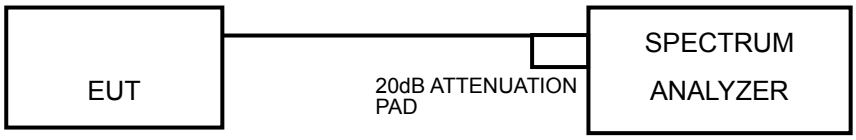
a. The transmitter output was connected to the spectrum analyzer.

b. Set RBW = 1MHz, VBW = 3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP




### 4.5.6 EUT OPERATING CONDITIONS

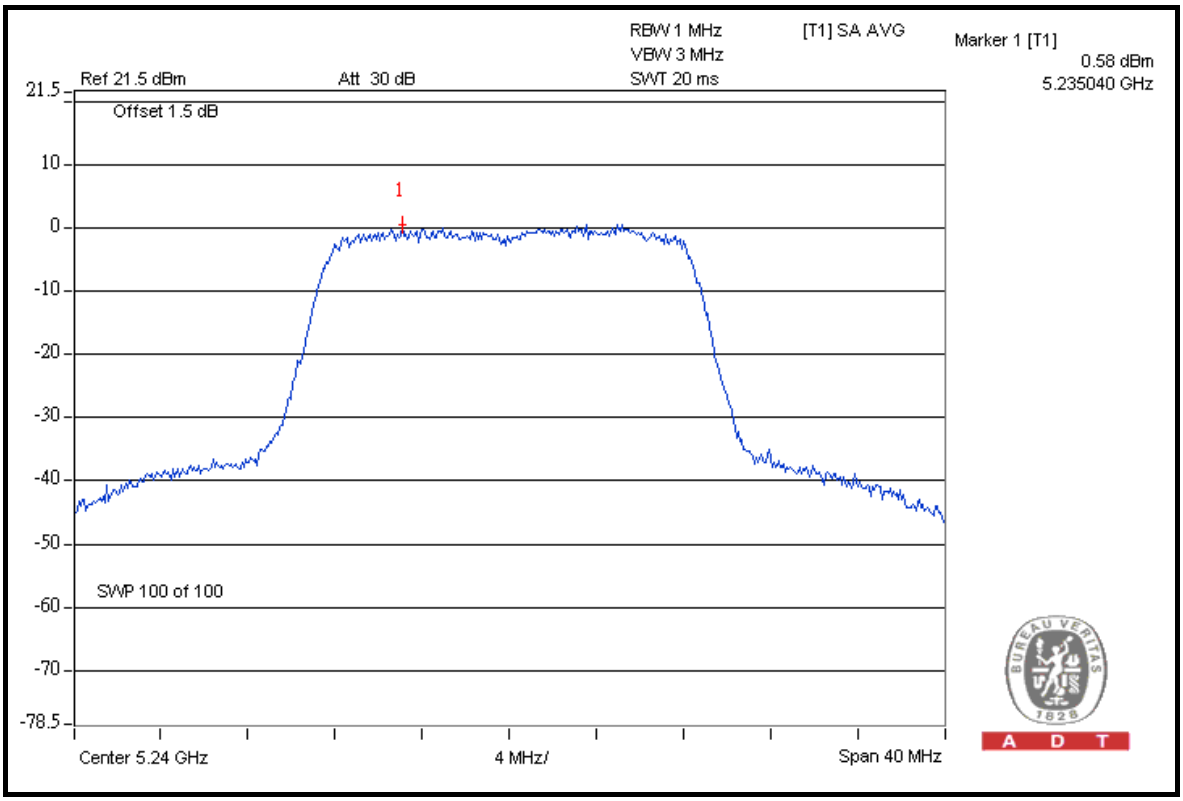
Same as 5.3.6

## 4.5.7 TEST RESULTS

### 802.11a

| CHAN. | CHAN. FREQ. (MHz) | RF POWER LEVEL IN 3kHz BW (dBm) | | | TOTAL POWER DENSITY (dBm) | MAX. LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | |
| 36 | 5180 | -1.1 | -1.6 | -0.5 | 3.7 | 4 | PASS |
| 40 | 5200 | -2.7 | -0.4 | -0.8 | 3.6 | 4 | PASS |
| 48 | 5240 | -2.9 | 0.6 | -3.7 | 3.2 | 4 | PASS |

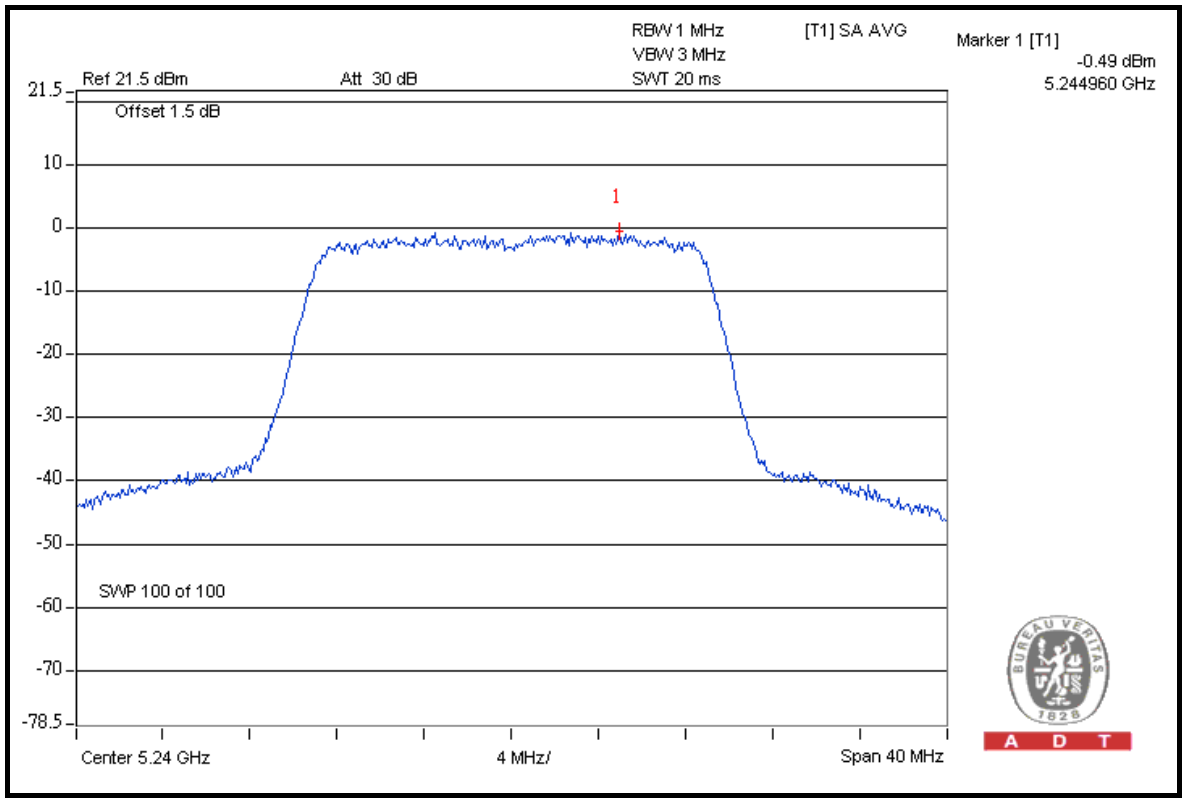
### FOR CHAIN 1: CH 48



## 802.11n (20MHz)

| CHAN. | CHAN. FREQ. (MHz) | RF POWER LEVEL IN 3kHz BW (dBm) | | | TOTAL POWER DENSITY (dBm) | MAX. LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | |
| 36 | 5180 | -1.9 | -3.7 | -1.3 | 2.6 | 4 | PASS |
| 40 | 5200 | -3.5 | -1.2 | -1.4 | 2.9 | 4 | PASS |
| 48 | 5240 | -3.9 | -0.5 | -3.7 | 2.4 | 4 | PASS |

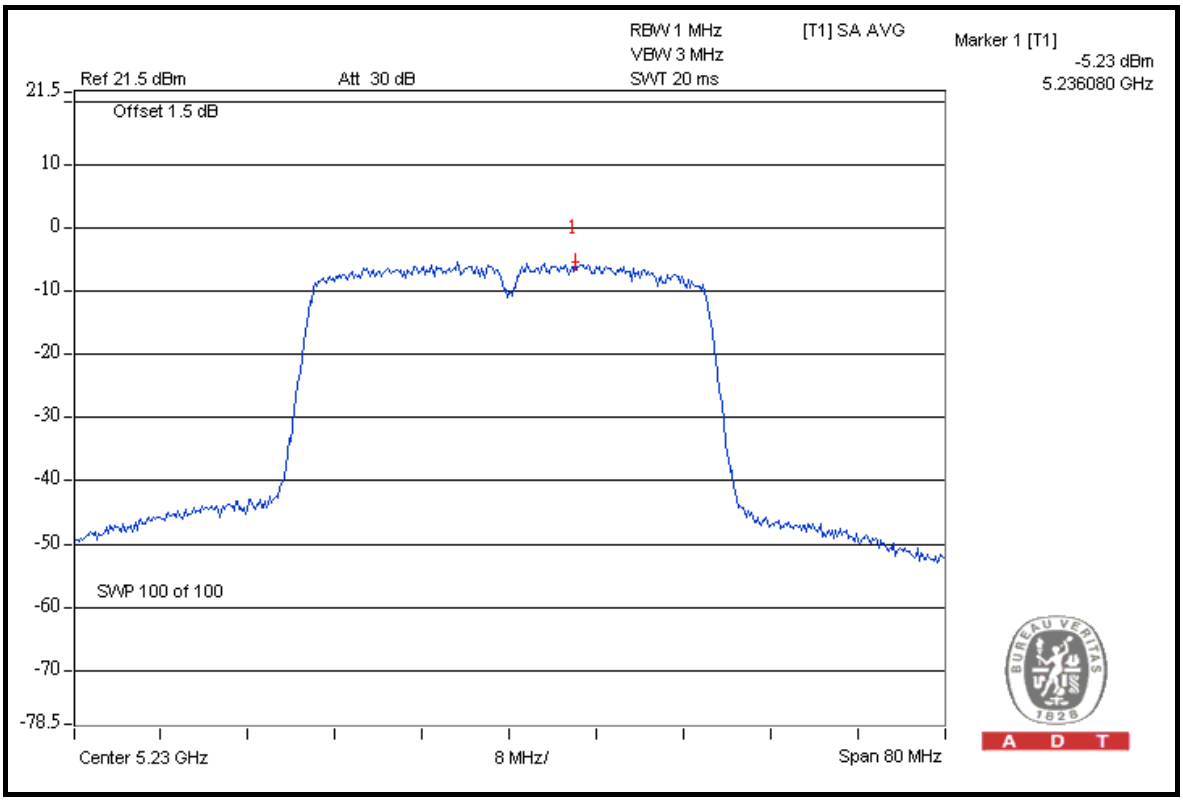
## FOR CHAIN 1: CH 48



## 802.11n (40MHz)

| CHAN. | CHAN. FREQ. (MHz) | RF POWER LEVEL IN 3kHz BW (dBm) | | | TOTAL POWER DENSITY (dBm) | MAX. LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | |
| 38 | 5190 | -8.1 | -8.3 | -5.7 | -2.5 | 4 | PASS |
| 46 | 5230 | -8.8 | -5.2 | -7.6 | -2.2 | 4 | PASS |

## FOR CHAIN 1: CH 46



## 4.6 FREQUENCY STABILITY

### 4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of –30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

### 4.6.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | FSP40 | 100040 | Jul. 07, 2009 | Jul. 06, 2010 |
| WIT STANDARD TEMPERATURE AND HUMIDITY CHAMBER | TH-4S-C | W981030 | Jun. 24, 2009 | Jun. 23, 2010 |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.6.3 TEST PROCEDURE

a. The EUT was placed inside the environmental test chamber and powered by nominal DC 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.

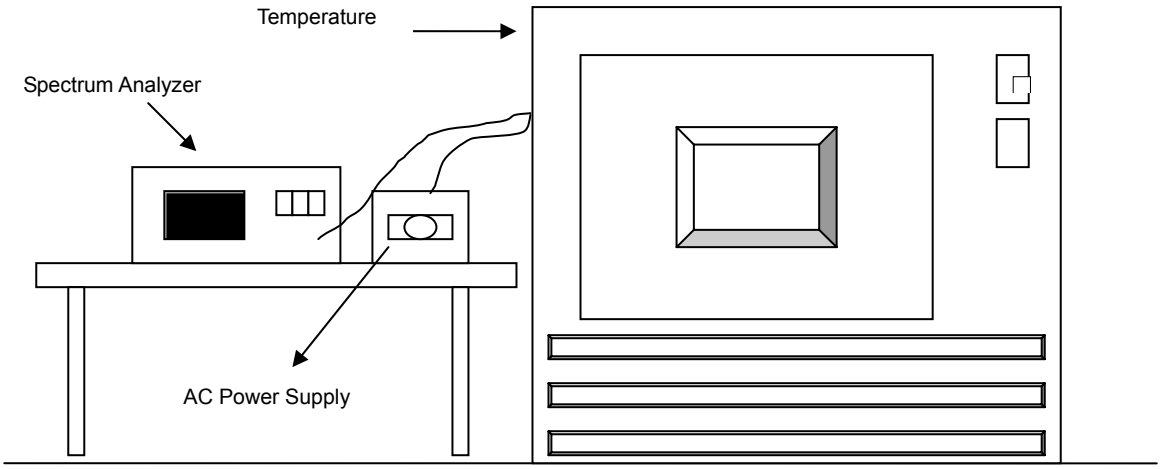
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.

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.

## 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.6.5 TEST SETUP




## 4.6.6 EUT OPERATING CONDITION

Same as Item 4.1.6

## 4.6.7 TEST RESULTS

| FREQUEMCY STABILITY VERSUS TEMP. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OPERATING FREQUENCY: 5200MHz | | | | | | | | | |
| TEMP. (℃) | POWER SUPPLY (Vdc) | 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 |
| 55 | 110.0 | 5199.988027 | -2.302 | 5199.988283 | -2.253 | 5199.987957 | -2.316 | 5199.988146 | -2.280 |
| 50 | 110.0 | 5199.988766 | -2.160 | 5199.988616 | -2.189 | 5199.989043 | -2.107 | 5199.989062 | -2.103 |
| 40 | 110.0 | 5199.990281 | -1.869 | 5199.990376 | -1.851 | 5199.990105 | -1.903 | 5199.990648 | -1.798 |
| 30 | 110.0 | 5199.991190 | -1.694 | 5199.991246 | -1.683 | 5199.991554 | -1.624 | 5199.991314 | -1.670 |
| 20 | 110.0 | 5199.992426 | -1.457 | 5199.992666 | -1.410 | 5199.992952 | -1.355 | 5199.992609 | -1.421 |
| 10 | 110.0 | 5199.990877 | -1.754 | 5199.990979 | -1.735 | 5199.990784 | -1.772 | 5199.991481 | -1.638 |
| 0 | 110.0 | 5199.989702 | -1.980 | 5199.989608 | -1.998 | 5199.989622 | -1.996 | 5199.989522 | -2.015 |
| -10 | 110.0 | 5199.989338 | -2.050 | 5199.989641 | -1.992 | 5199.989252 | -2.067 | 5199.989687 | -1.983 |
| -20 | 110.0 | 5199.988666 | -2.180 | 5199.988525 | -2.207 | 5199.989006 | -2.114 | 5199.988628 | -2.187 |

| FREQUEMCY STABILITY VERSUS VOLTAGE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OPERATING FREQUENCY: 5320MHz | | | | | | | | | |
| 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 | 93.5 | 5199.991505 | -1.634 | 5199.991864 | -1.565 | 5199.991593 | -1.617 | 5199.991574 | -1.620 |
| | 110.0 | 5199.991190 | -1.694 | 5199.991246 | -1.683 | 5199.991554 | -1.624 | 5199.991314 | -1.670 |
| | 126.5 | 5199.990771 | -1.775 | 5199.991045 | -1.722 | 5199.990883 | -1.753 | 5199.990797 | -1.770 |

## 4.7 BAND EDGES MEASUREMENT

### 4.7.1 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| Test Receiver ROHDE & SCHWARZ | ESIB7 | 100212 | May 25, 2009 | May 24, 2010 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP40 | 100040 | Jul. 07, 2009 | Jul. 06, 2010 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-156 | Apr. 30, 2009 | Apr. 29, 2010 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-563 | Aug. 10, 2009 | Aug. 09, 2010 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | BBHA9170242 | Jan. 06, 2009 | Jan. 05, 2010 |
| Preamplifier Agilent | 8449B | 3008A01910 | Sep. 11, 2009 | Sep. 10, 2010 |
| Preamplifier Agilent | 8447D | 2944A10638 | Dec. 26, 2008 | Dec. 25, 2009 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 218190/4 231241/4 | May 13, 2009 | May 12, 2010 |
| RF signal cable Worken | 8D-FB | Cable-HYCH9-01 | Aug. 17, 2009 | Aug. 16, 2010 |
| Software | ADT_Radiated_ V7.6.15.9.2 | NA | NA | NA |
| Antenna Tower EMCO | 2070/2080 | 512.835.4684 | NA | NA |
| Turn Table EMCO | 2087-2.03 | NA | NA | NA |
| Antenna Tower &Turn Table Controller EMCO | 2090 | NA | NA | NA |
| 26GHz ~ 40GHz Amplifier | EM26400 | 07026401 | Aug. 27, 2009 | Aug. 26, 2010 |

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.7.2 TEST PROCEDURE

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

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

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

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

e. Set both RBW and VBW of spectrum analyzer to 1MHz and 3MHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

**NOTE:** The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz

### 4.7.3 EUT OPERATING CONDITION

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

### 4.7.4 TEST RESULTS

For signals in the restricted bands above and below the 5.15 to 5.25GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak filed strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

The spectrum plots (Peak RBW = 1MHz, VBW = 3MHz) are attached on the following pages.

**802.11a**

**RESTRICT BAND (4500 ~ 5150 MHz)**

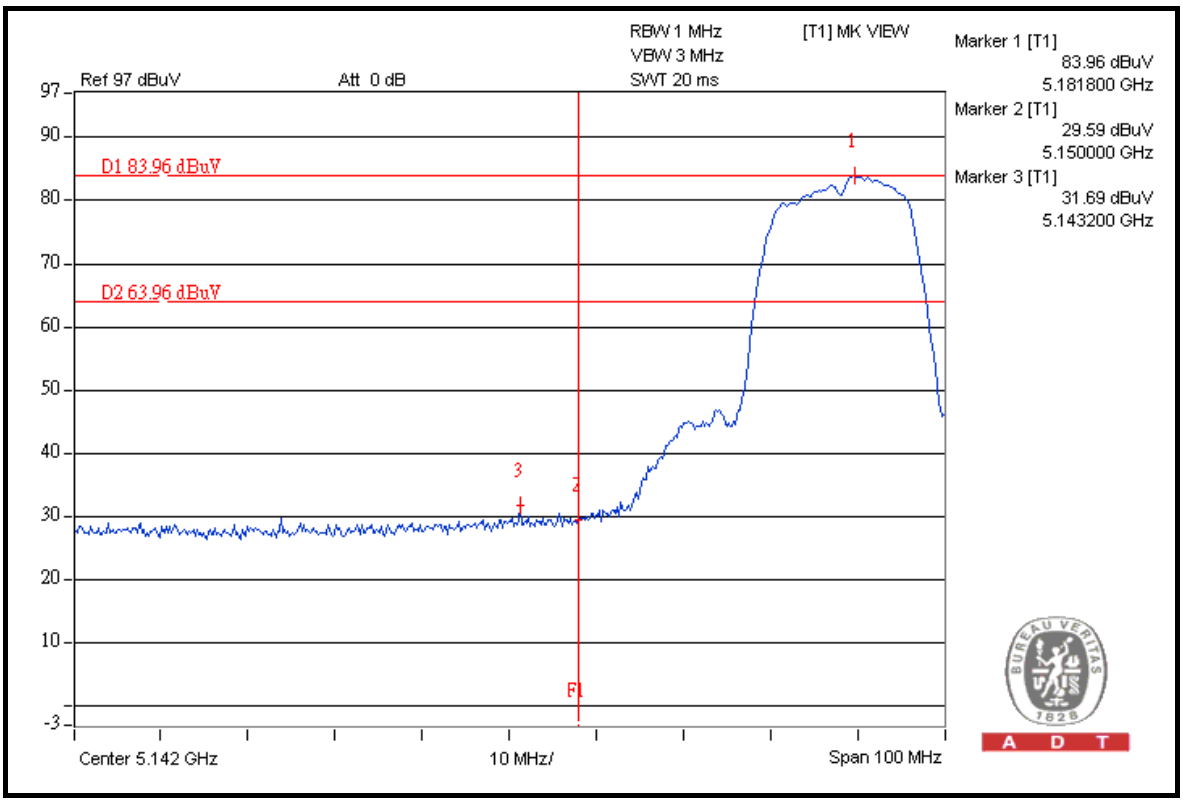
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|---|---|---|---|---|
| 5180.00 (PK) | 113.2 | 52.27 | 60.93 | 74.00 |
| 5180.00 (AV) | 103.0 | 56.02 | 46.98 | 54.00 |

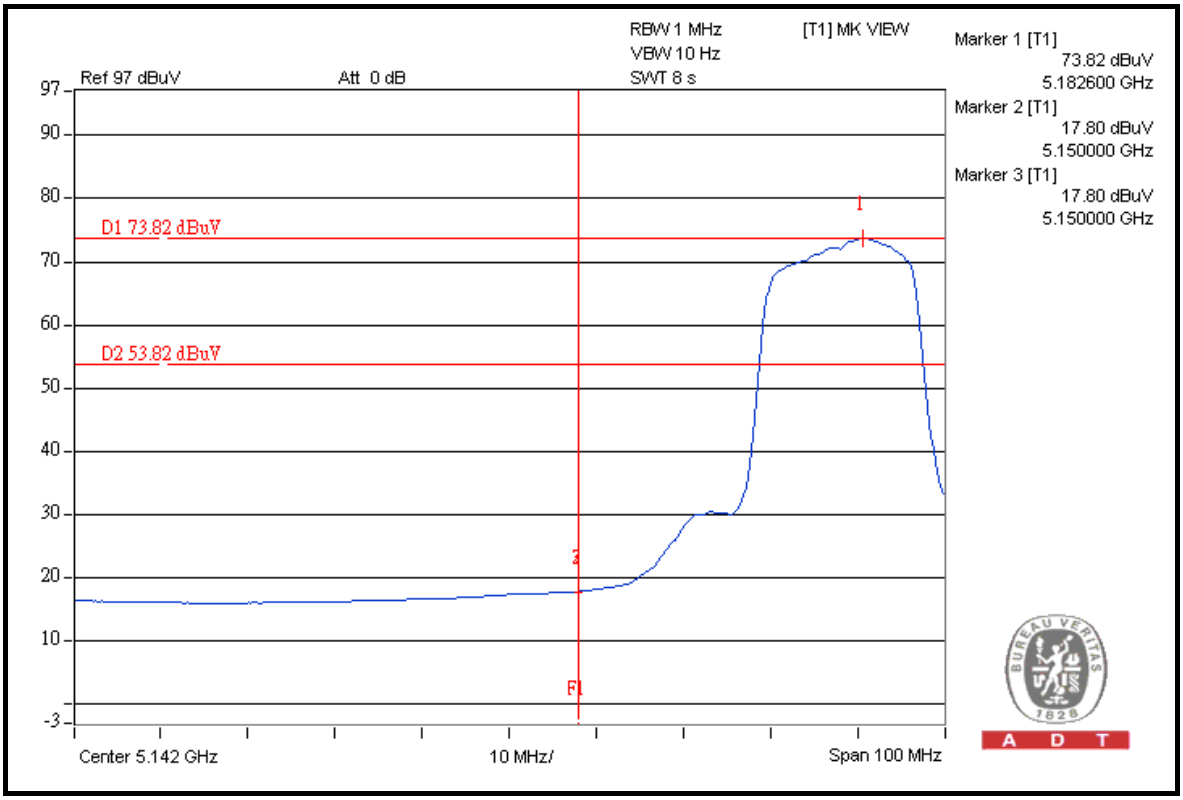
**RESTRICT BAND (5350 ~ 5460 MHz)**

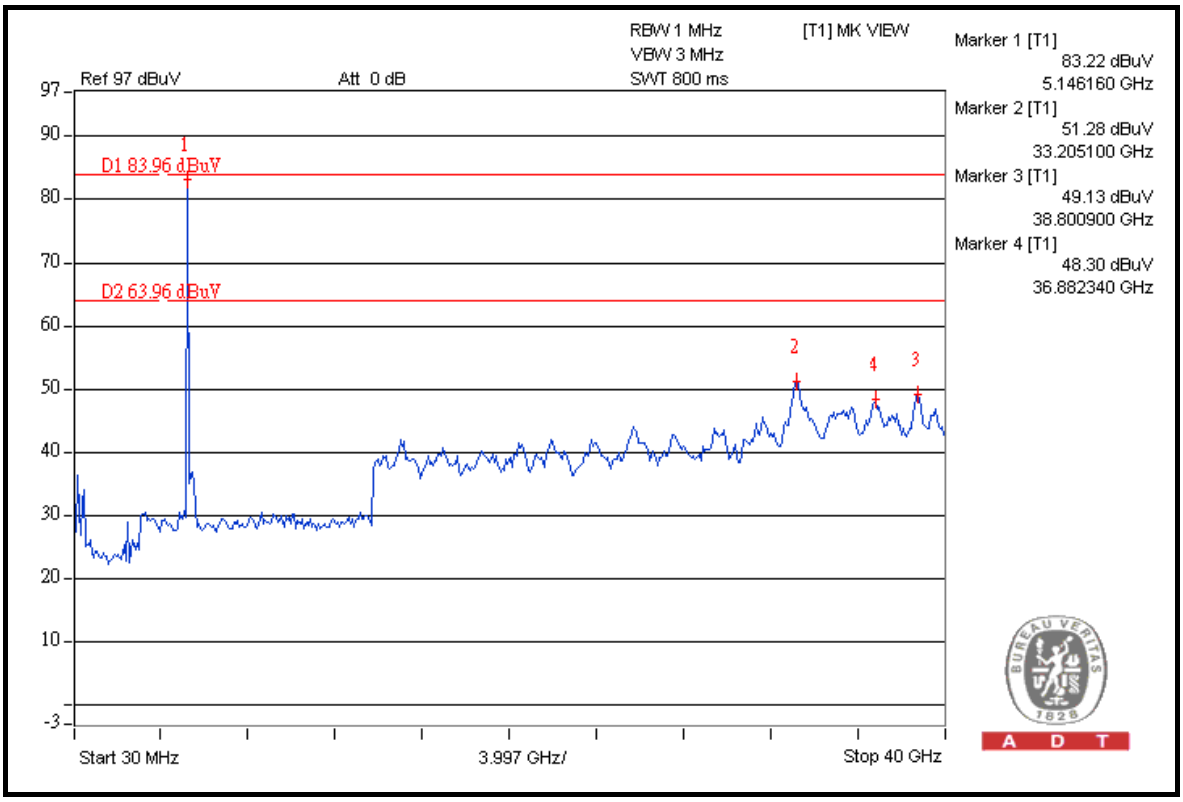
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|---|---|---|---|---|
| 5320.00 (PK) | 113.9 | 47.61 | 66.29 | 74.00 |
| 5320.00 (AV) | 103.3 | 51.37 | 51.93 | 54.00 |

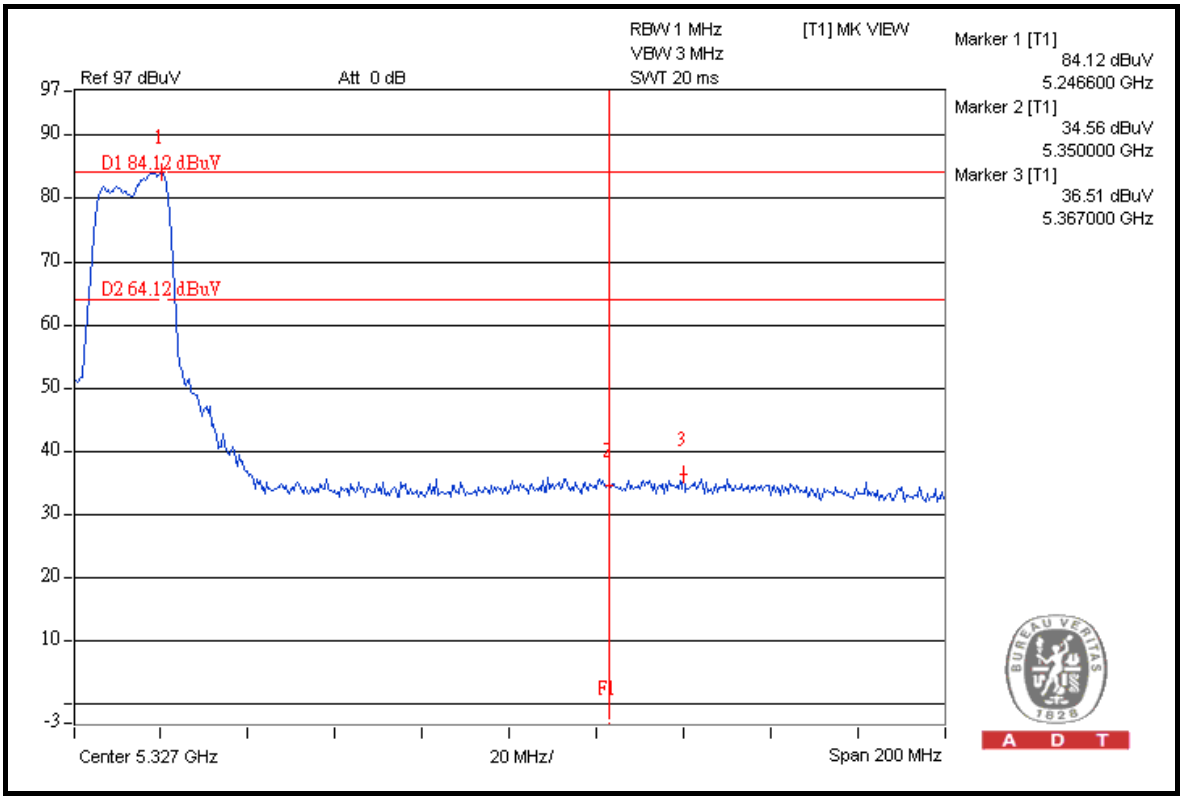
**NOTE:**

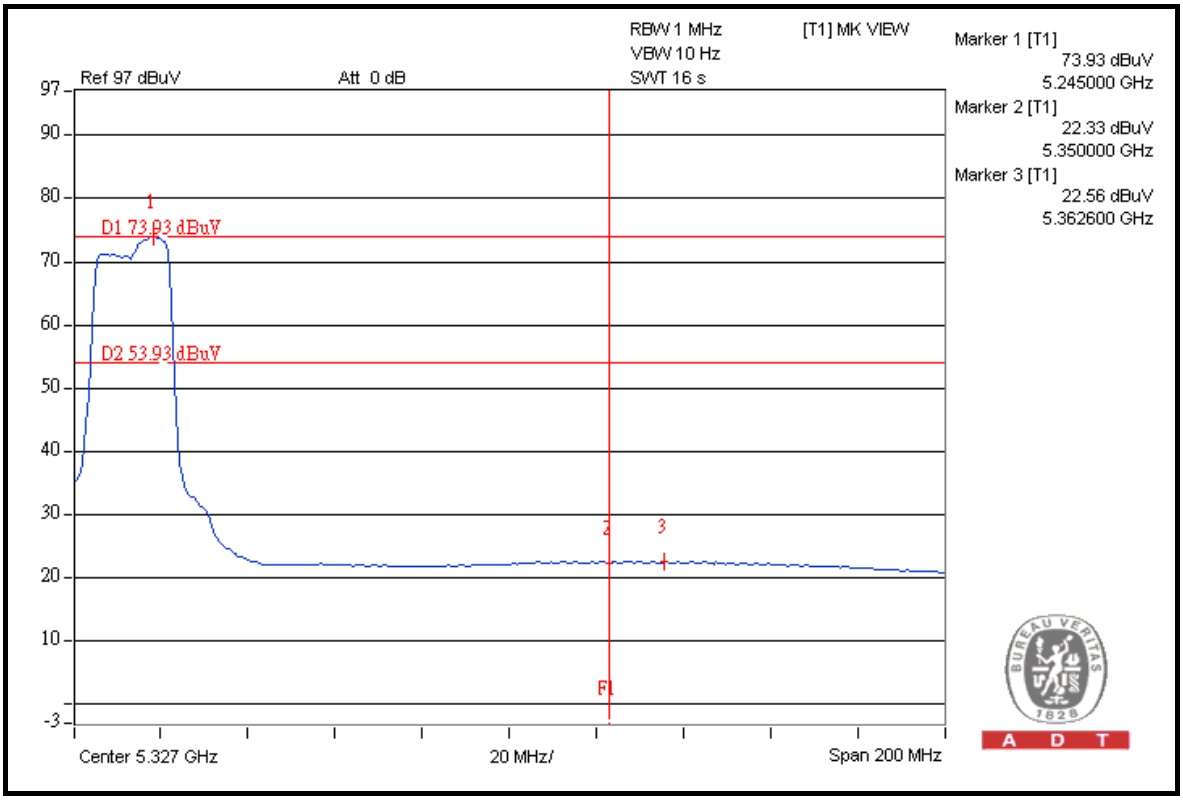
1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 3 pages.
2. Maximum field strength in restrict band = Fundamental emission – Delta.

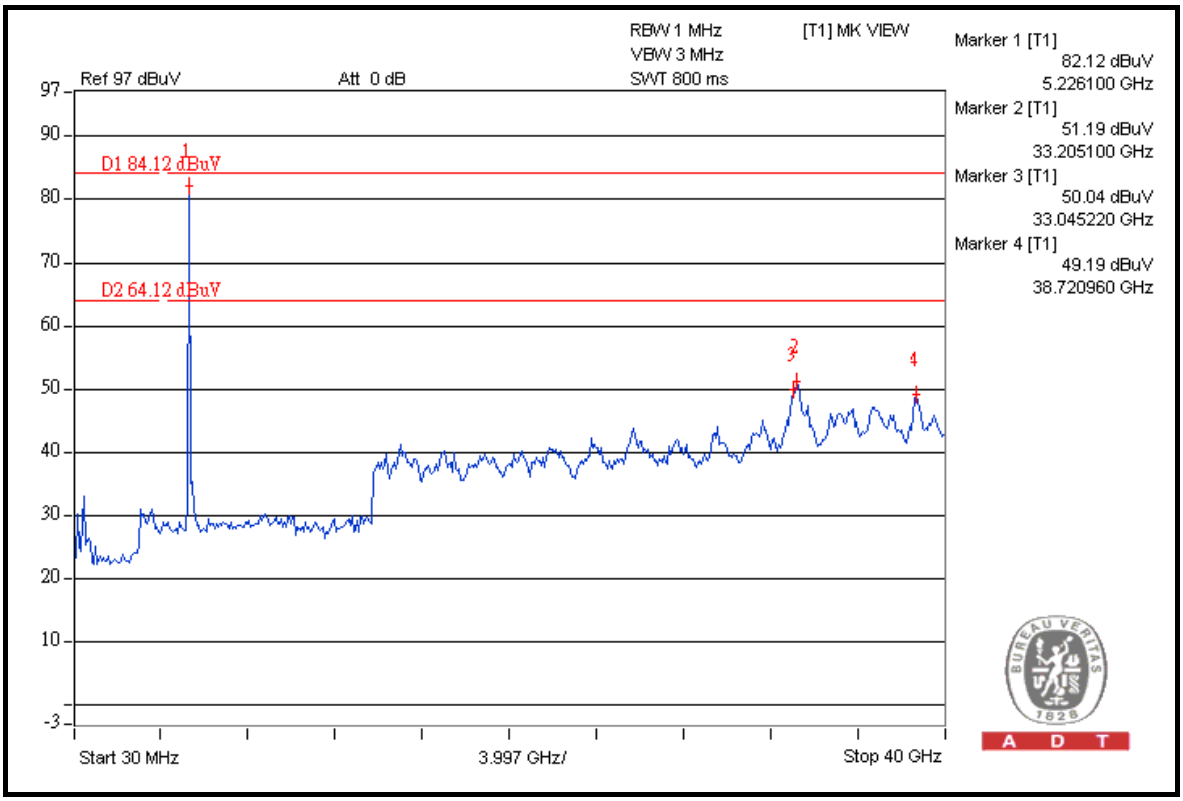

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
83.96 dBuV
5.181800 GHz
Marker 2 [T1]
29.59 dBuV
5.150000 GHz
Marker 3 [T1]
31.69 dBuV
5.143200 GHz
D1 83.96 dBuV
D2 63.96 dBuV
97
90
80
70
60
50
40
30
20
10
-3
Center 5.142 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 10 Hz
SWT 8 s
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
73.82 dBuV
5.182600 GHz
Marker 2 [T1]
17.80 dBuV
5.150000 GHz
Marker 3 [T1]
17.80 dBuV
5.150000 GHz
D1 73.82 dBuV
D2 53.82 dBuV
97
90
80
70
60
50
40
30
20
10
-3
Center 5.142 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 3 MHz
SWT 800 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 83.96 dBuV
D2 63.96 dBuV
Marker 1 [T1]
83.22 dBuV
5.146160 GHz
Marker 2 [T1]
51.28 dBuV
33.205100 GHz
Marker 3 [T1]
49.13 dBuV
38.800900 GHz
Marker 4 [T1]
48.30 dBuV
36.882340 GHz
Start 30 MHz
3.997 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 84.12 dBuV
D2 64.12 dBuV
Marker 1 [T1]
84.12 dBuV
5.246600 GHz
Marker 2 [T1]
34.56 dBuV
5.350000 GHz
Marker 3 [T1]
36.51 dBuV
5.367000 GHz
Center 5.327 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 10 Hz
SWT 16 s
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
73.93 dBuV
5.245000 GHz
Marker 2 [T1]
22.33 dBuV
5.350000 GHz
Marker 3 [T1]
22.56 dBuV
5.362600 GHz
D1 73.93 dBuV
D2 53.93 dBuV
Center 5.327 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 3 MHz
SWT 800 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
82.12 dBuV
5.226100 GHz
Marker 2 [T1]
51.19 dBuV
33.205100 GHz
Marker 3 [T1]
50.04 dBuV
33.045220 GHz
Marker 4 [T1]
49.19 dBuV
38.720960 GHz
D1 84.12 dBuV
D2 64.12 dBuV
Start 30 MHz
3.997 GHz/
Stop 40 GHz

## 802.11n (20MHz)

**RESTRICT BAND (4500 ~ 5150 MHz)**

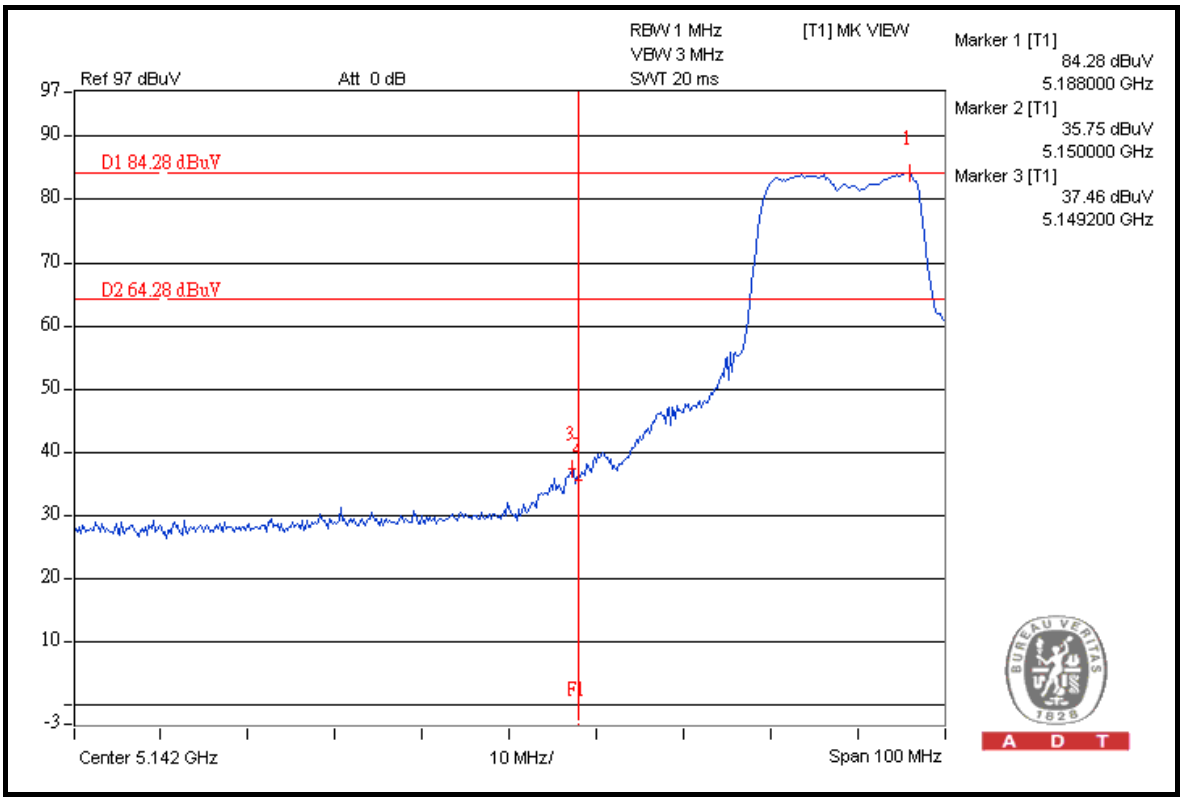
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|---|---|---|---|---|
| 5180.00 (PK) | 113.9 | 46.82 | 67.08 | 74.00 |
| 5180.00 (AV) | 103.3 | 53.73 | 49.57 | 54.00 |

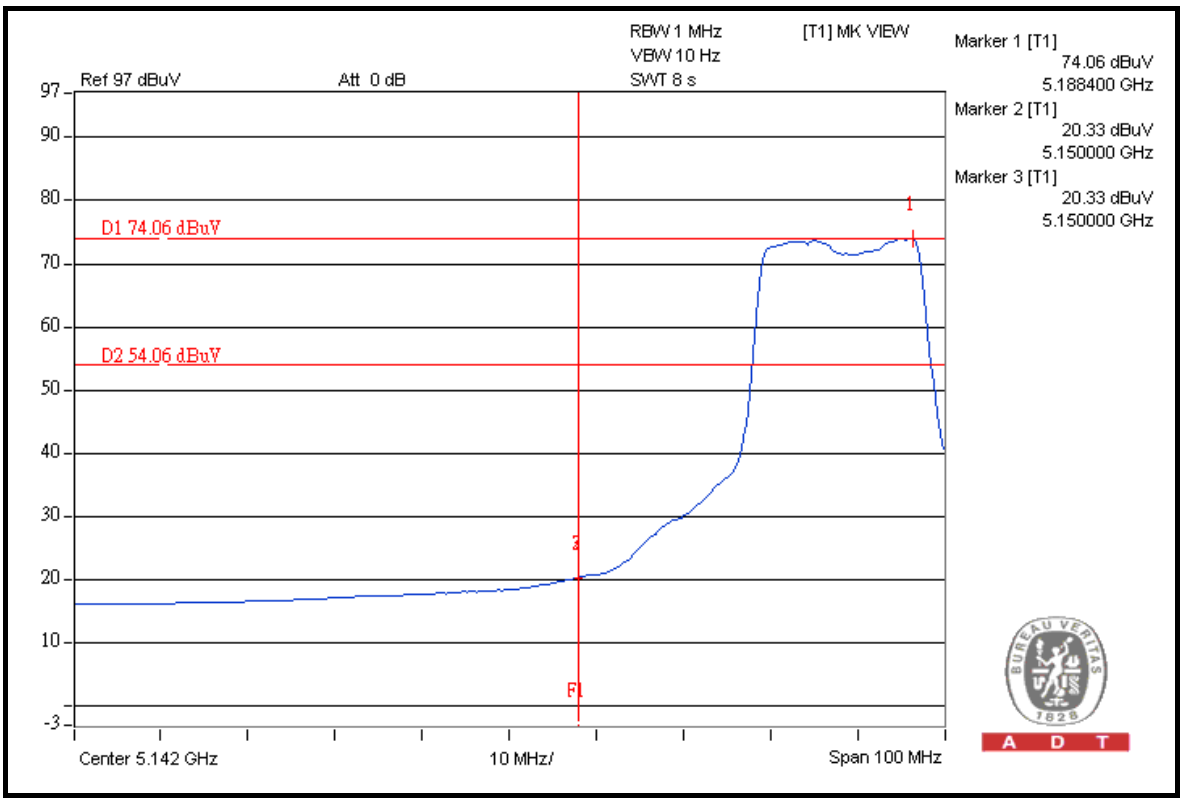
**RESTRICT BAND (5350 ~ 5460 MHz)**

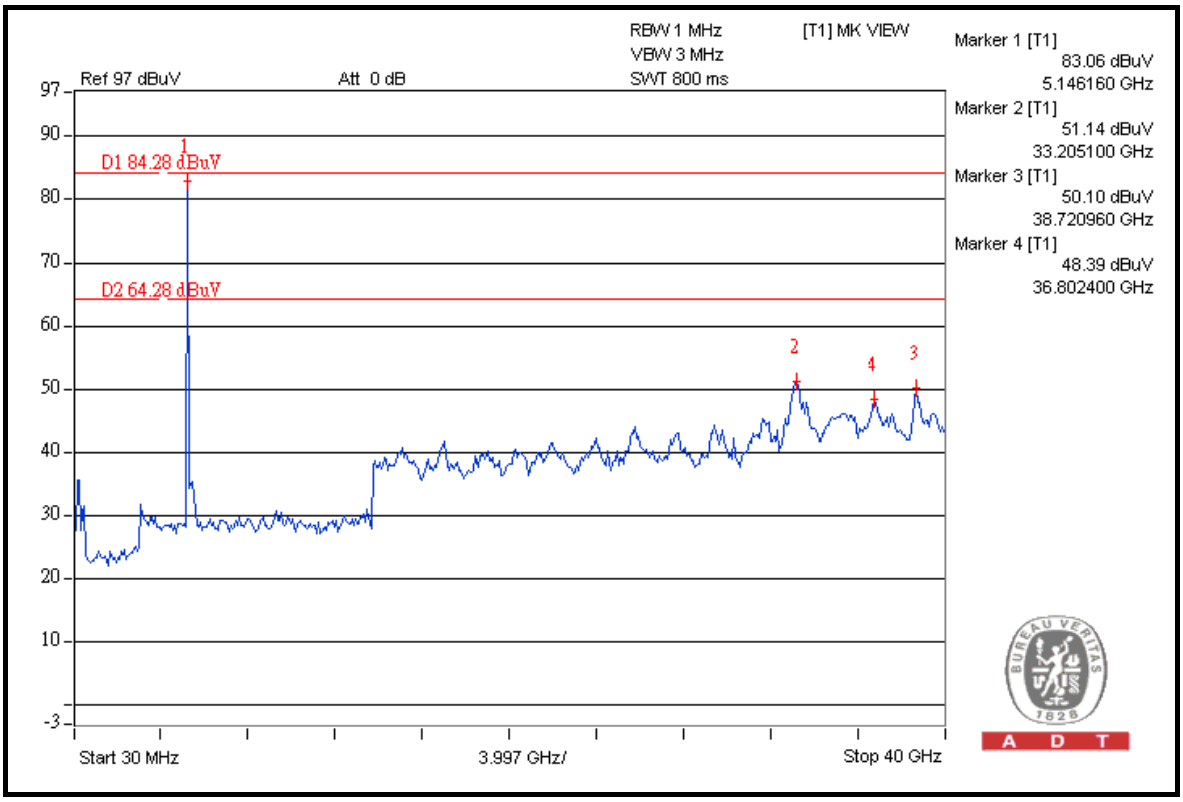
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|---|---|---|---|---|
| 5320.00 (PK) | 113.3 | 46.87 | 66.43 | 74.00 |
| 5320.00 (AV) | 102.9 | 49.98 | 52.92 | 54.00 |

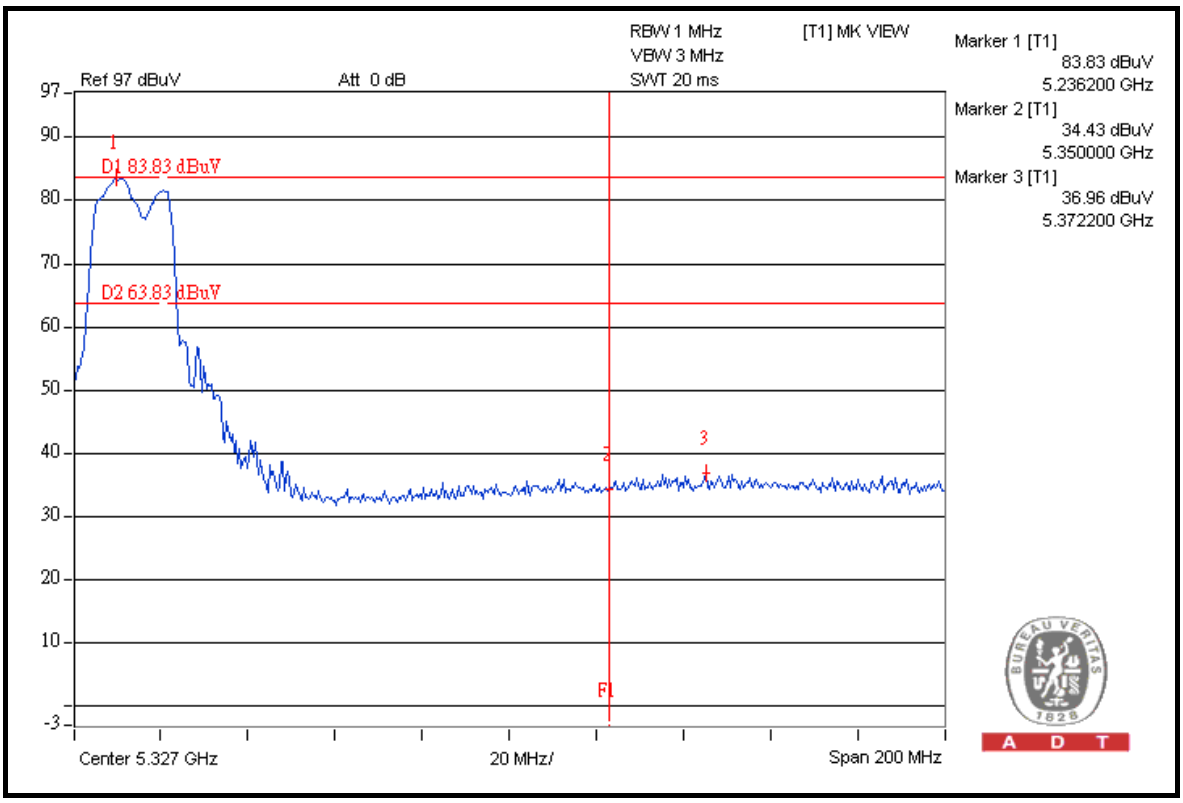
**NOTE:**

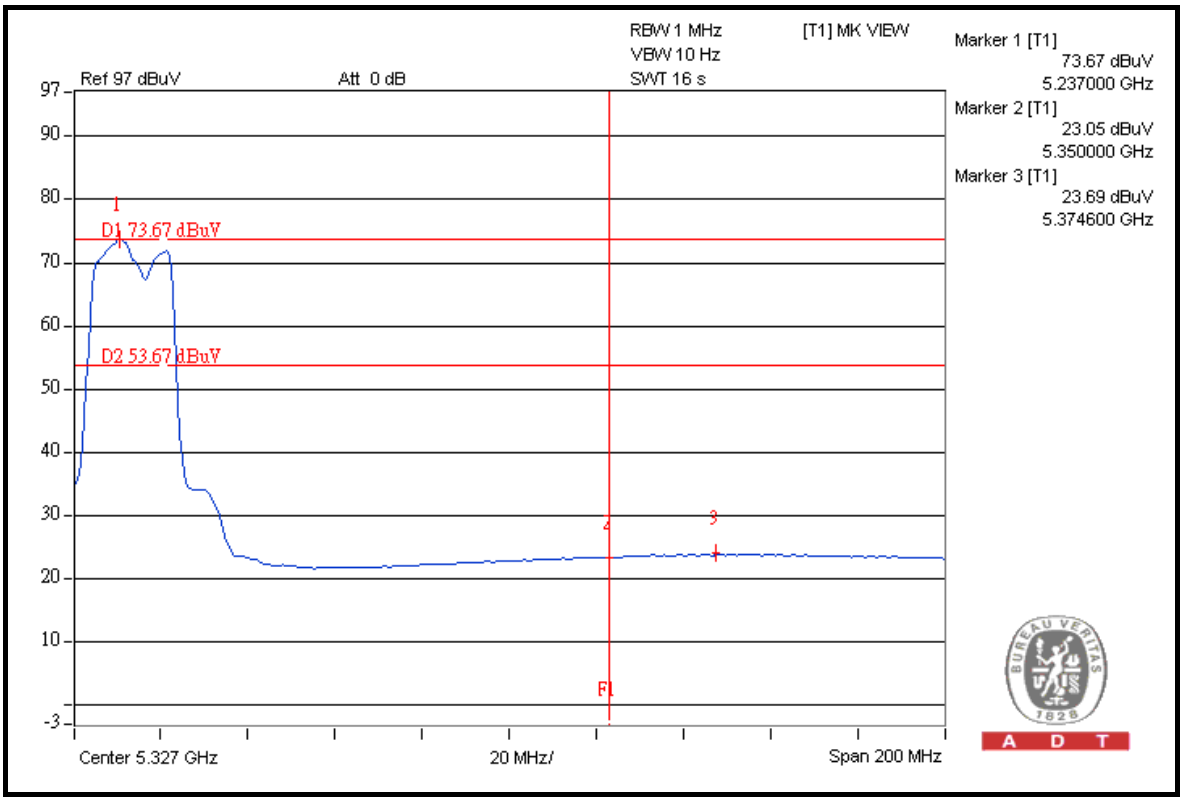
1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 3 pages.
2. Maximum field strength in restrict band = Fundamental emission – Delta.

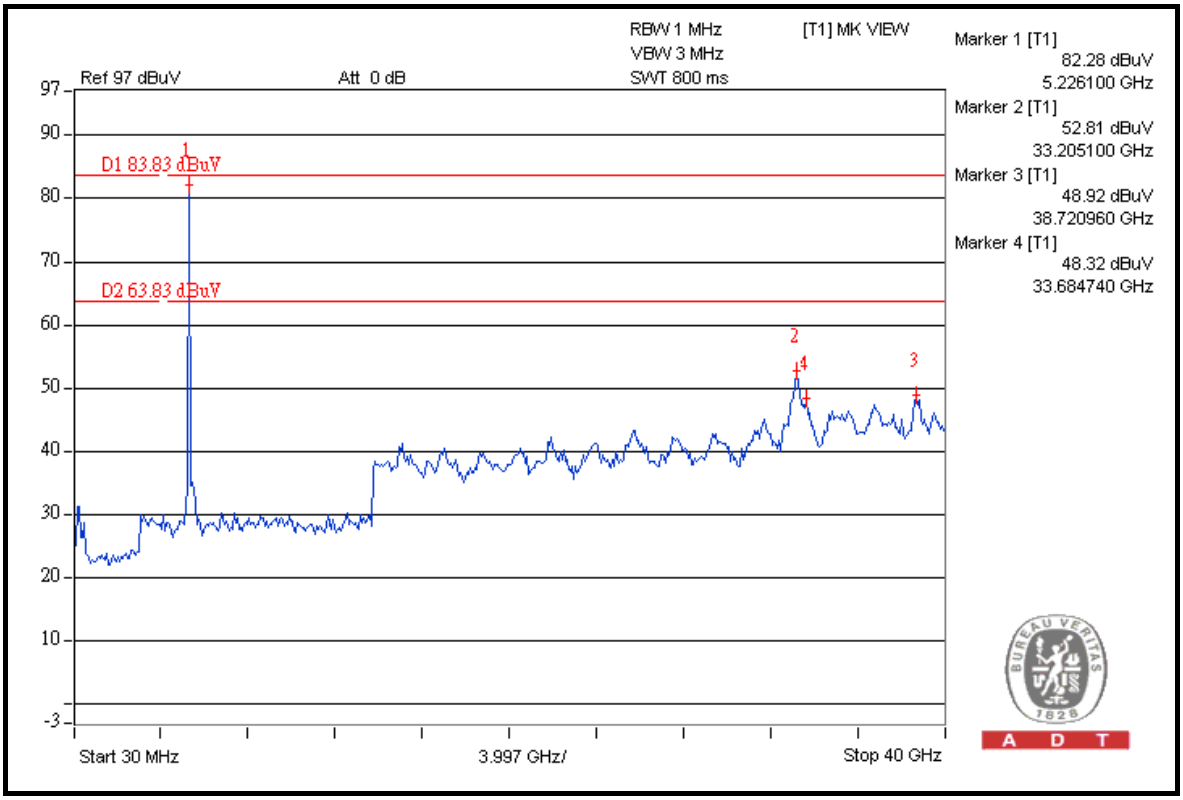

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 84.28 dBuV
D2 64.28 dBuV
Marker 1 [T1]
84.28 dBuV
5.188000 GHz
Marker 2 [T1]
35.75 dBuV
5.150000 GHz
Marker 3 [T1]
37.46 dBuV
5.149200 GHz
Center 5.142 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 10 Hz
SWT 8 s
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 74.06 dBuV
D2 54.06 dBuV
Marker 1 [T1]
74.06 dBuV
5.188400 GHz
Marker 2 [T1]
20.33 dBuV
5.150000 GHz
Marker 3 [T1]
20.33 dBuV
5.150000 GHz
Center 5.142 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 3 MHz
SWT 800 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 84.28 dBuV
D2 64.28 dBuV
Marker 1 [T1]
83.06 dBuV
5.146160 GHz
Marker 2 [T1]
51.14 dBuV
33.205100 GHz
Marker 3 [T1]
50.10 dBuV
38.720960 GHz
Marker 4 [T1]
48.39 dBuV
36.802400 GHz
Start 30 MHz
3.997 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 83.83 dBuV
D2 63.83 dBuV
Marker 1 [T1]
83.83 dBuV
5.236200 GHz
Marker 2 [T1]
34.43 dBuV
5.350000 GHz
Marker 3 [T1]
36.96 dBuV
5.372200 GHz
Center 5.327 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 10 Hz
SWT 16 s
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
73.67 dBuV
5.237000 GHz
Marker 2 [T1]
23.05 dBuV
5.350000 GHz
Marker 3 [T1]
23.69 dBuV
5.374600 GHz
D1 73.67 dBuV
D2 53.67 dBuV
Center 5.327 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 3 MHz
SWT 800 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
82.28 dBuV
5.226100 GHz
Marker 2 [T1]
52.81 dBuV
33.205100 GHz
Marker 3 [T1]
48.92 dBuV
38.720960 GHz
Marker 4 [T1]
48.32 dBuV
33.684740 GHz
D1 83.83 dBuV
D2 63.83 dBuV
Start 30 MHz
3.997 GHz/
Stop 40 GHz

## 802.11n (40MHz)

**RESTRICT BAND (4500 ~ 5150 MHz)**

| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|---|---|---|---|---|
| 5190.00 (PK) | 106.6 | 37.03 | 69.57 | 74.00 |
| 5190.00 (AV) | 96.1 | 44.46 | 51.64 | 54.00 |

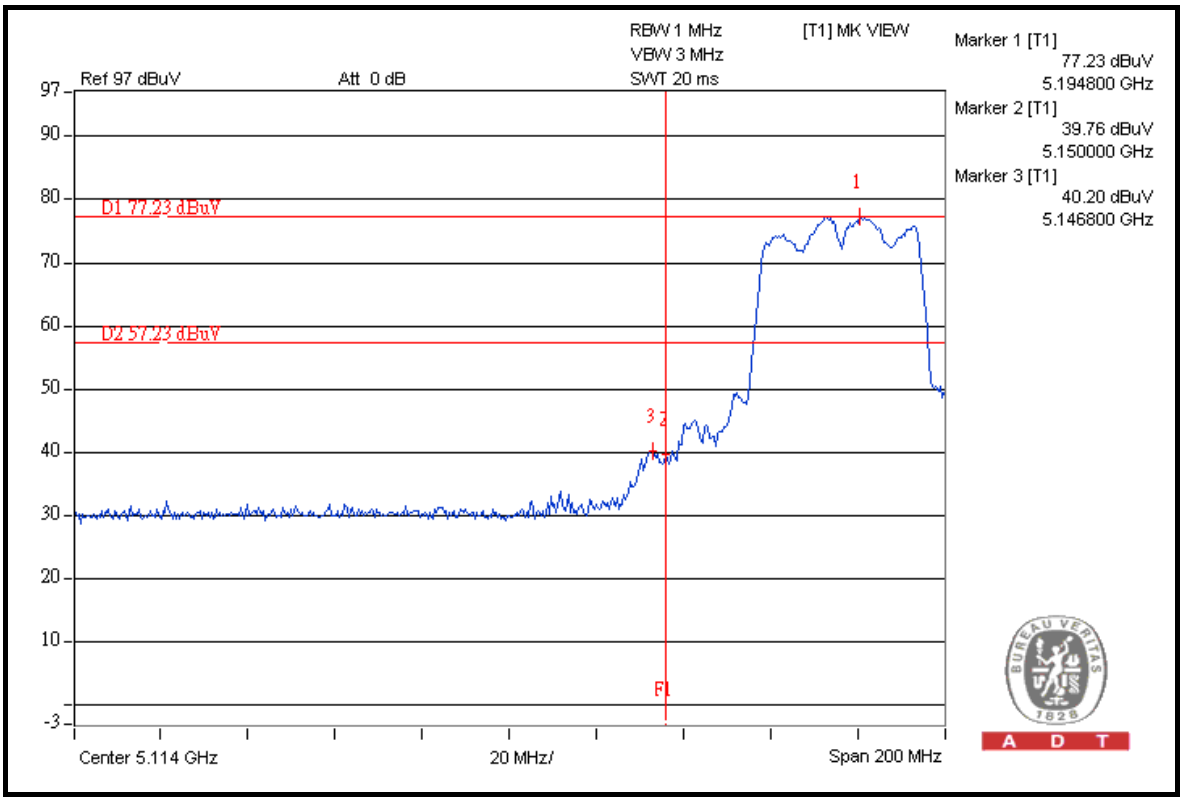
**RESTRICT BAND (5350 ~ 5460 MHz)**

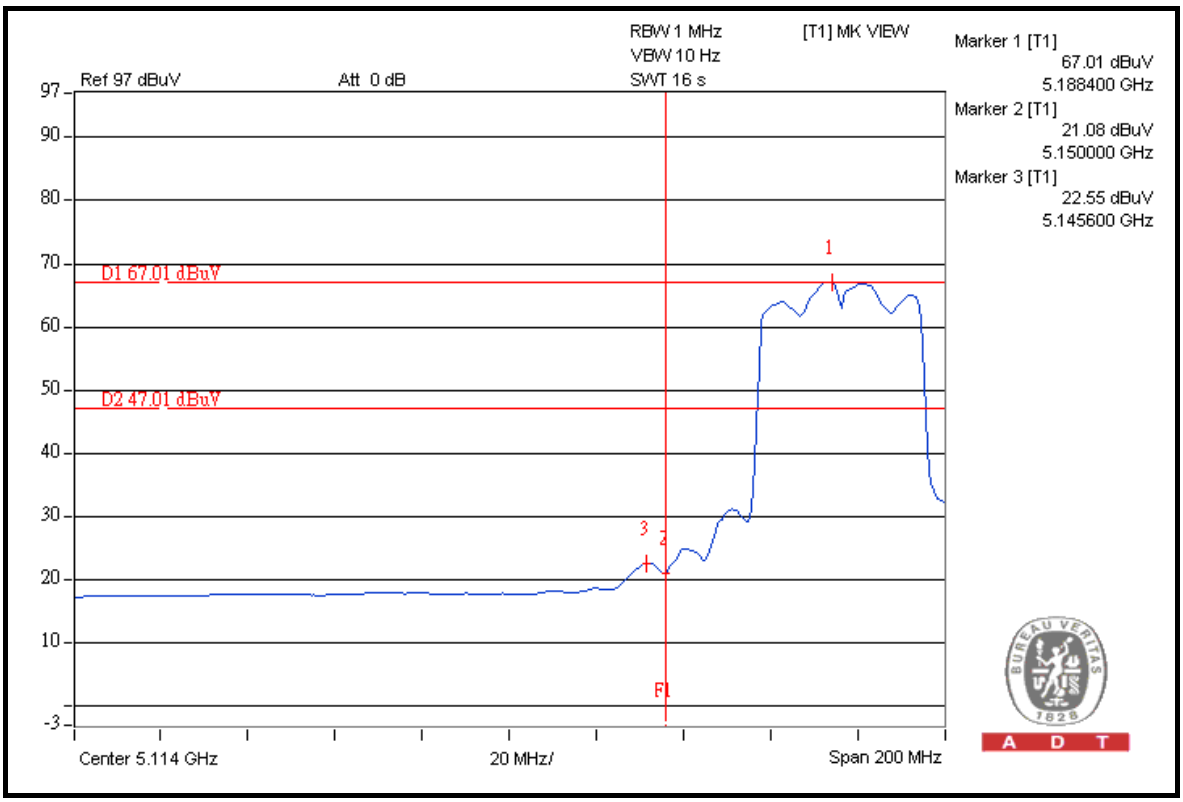
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|---|---|---|---|---|
| 5310.00 (PK) | 104.2 | 45.50 | 58.70 | 74.00 |
| 5310.00 (AV) | 94.2 | 47.83 | 46.37 | 54.00 |

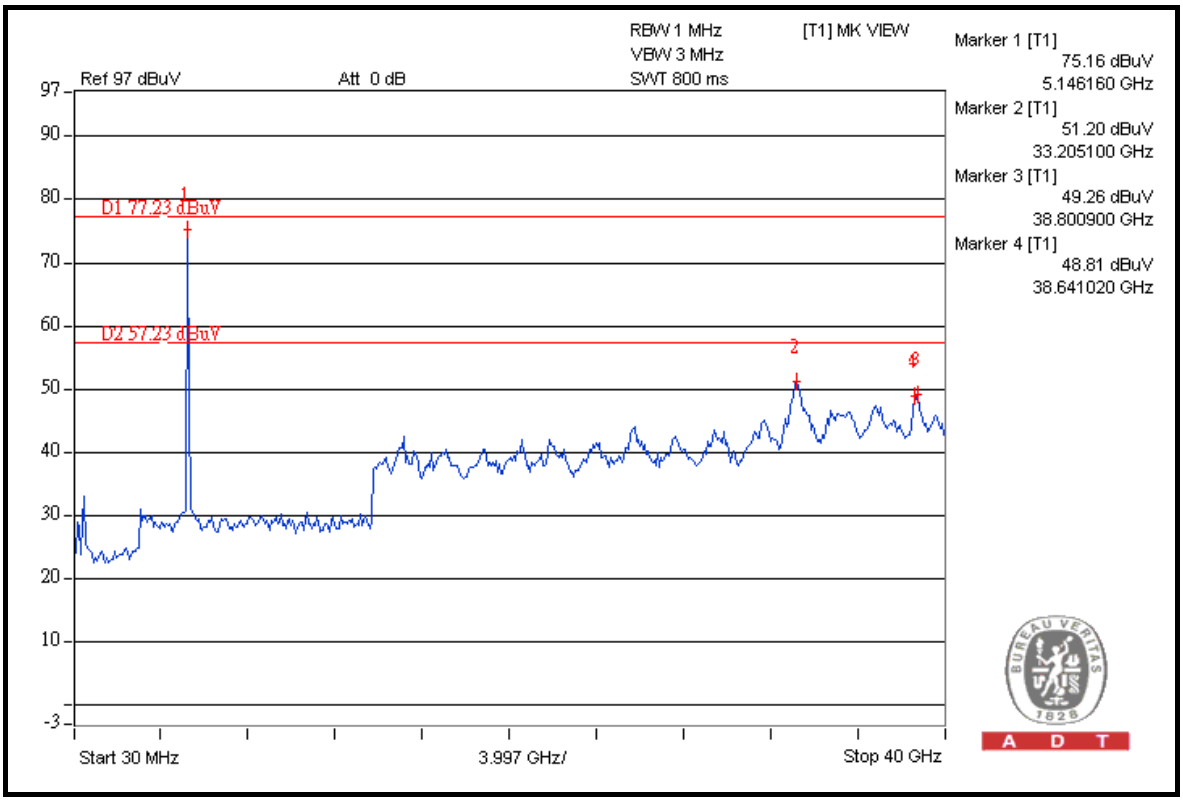
**NOTE:**

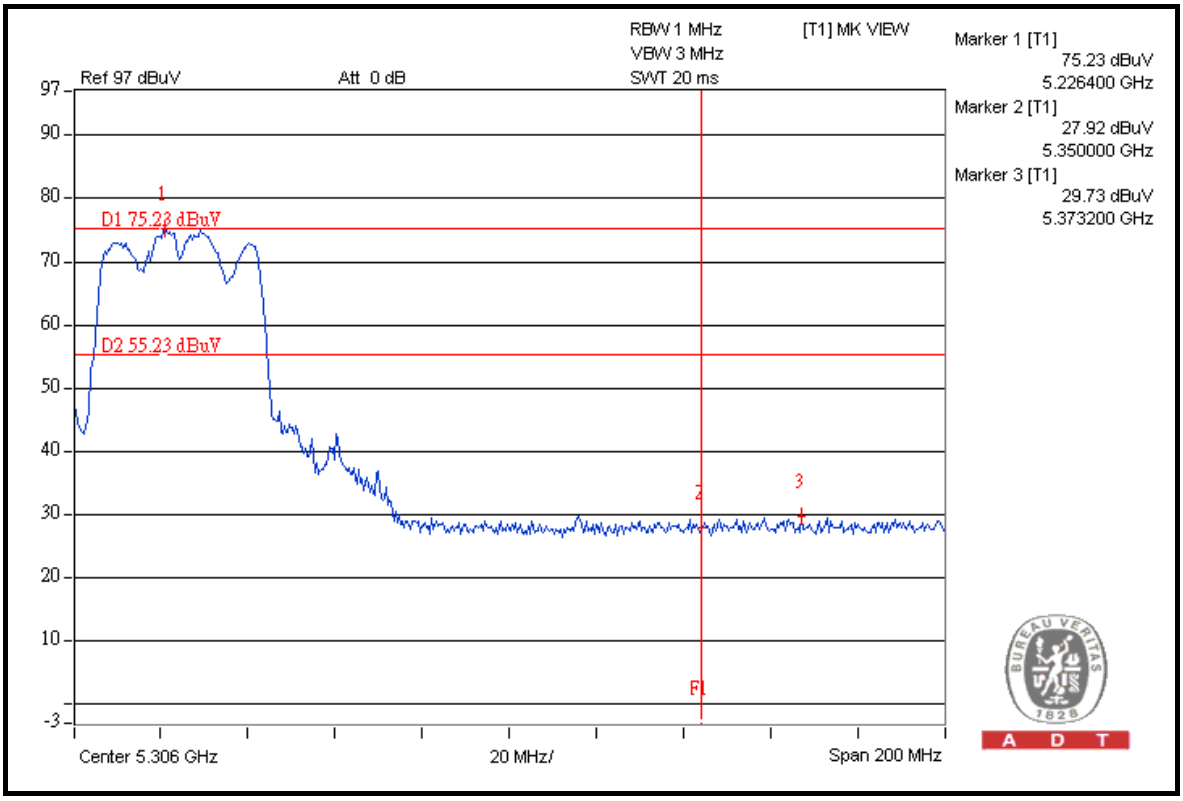
1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 3 pages.

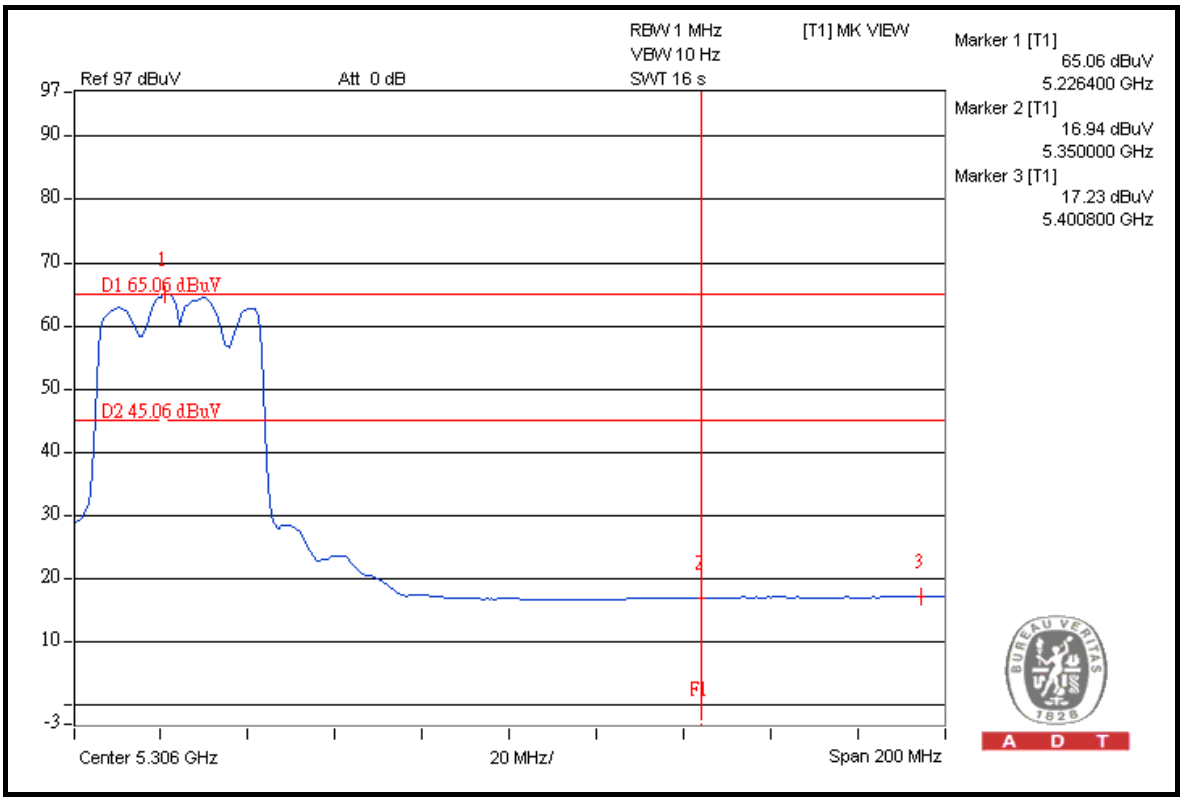
2. Maximum field strength in restrict band = Fundamental emission – Delta.

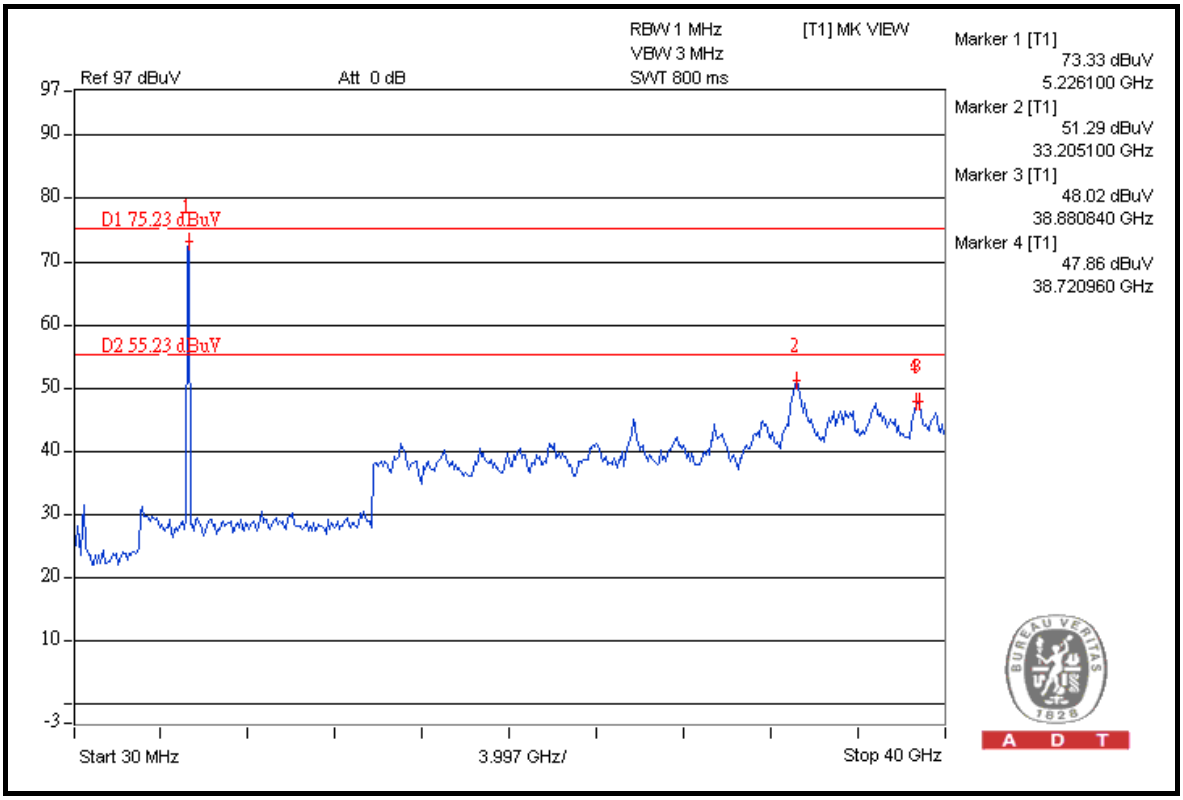

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
77.23 dBuV
5.194800 GHz
Marker 2 [T1]
39.76 dBuV
5.150000 GHz
Marker 3 [T1]
40.20 dBuV
5.146800 GHz
D1 77.23 dBuV
D2 57.23 dBuV
Center 5.114 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 10 Hz
SWT 16 s
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
67.01 dBuV
5.188400 GHz
Marker 2 [T1]
21.08 dBuV
5.150000 GHz
Marker 3 [T1]
22.55 dBuV
5.145600 GHz
D1 67.01 dBuV
D2 47.01 dBuV
Center 5.114 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 3 MHz
SWT 800 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 77.23 dBuV
D2 57.23 dBuV
Marker 1 [T1]
75.16 dBuV
5.146160 GHz
Marker 2 [T1]
51.20 dBuV
33.205100 GHz
Marker 3 [T1]
49.26 dBuV
38.800900 GHz
Marker 4 [T1]
48.81 dBuV
38.641020 GHz
Start 30 MHz
3.997 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
D1 75.23 dBuV
D2 55.23 dBuV
Marker 1 [T1]
75.23 dBuV
5.226400 GHz
Marker 2 [T1]
27.92 dBuV
5.350000 GHz
Marker 3 [T1]
29.73 dBuV
5.373200 GHz
Center 5.306 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 10 Hz
SWT 16 s
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
65.06 dBuV
5.226400 GHz
Marker 2 [T1]
16.94 dBuV
5.350000 GHz
Marker 3 [T1]
17.23 dBuV
5.400800 GHz
D1 65.06 dBuV
D2 45.06 dBuV
Center 5.306 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 3 MHz
SWT 800 ms
[T1] MK VIEW
Ref 97 dBuV
Att 0 dB
Marker 1 [T1]
73.33 dBuV
5.226100 GHz
Marker 2 [T1]
51.29 dBuV
33.205100 GHz
Marker 3 [T1]
48.02 dBuV
38.880840 GHz
Marker 4 [T1]
47.86 dBuV
38.720960 GHz
D1 75.23 dBuV
D2 55.23 dBuV
Start 30 MHz
3.997 GHz/
Stop 40 GHz

# 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 by the following approval agencies according to ISO/IEC 17025.

| | |
|---|---|
| **USA** | FCC, NVLAP |
| **Germany** | TUV Rheinland |
| **Japan** | VCCI |
| **Norway** | NEMKO |
| **Canada** | INDUSTRY CANADA , CSA |
| **R.O.C.** | TAF, BSMI, NCC |
| **Netherlands** | Telefication |
| **Singapore** | GOST-ASIA(MOU) |
| **Russia** | CERTIS(MOU) |

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. 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**:
Tel: 886-3-5935343
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab**:
Tel: 886-3-3183232
Fax: 886-3-3185050

**Web Site**: www.adt.com.tw

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 any modifications are made to the EUT by the lab during the test.

**---END---**