# FCC TEST REPORT
# (WLAN 15.247)

| | |
|---|---|
| **REPORT NO.:** | RF140808E04 |
| **MODEL NO.:** | QCNFA324 |
| **FCC ID:** | PPD-QCNFA324 |
| **RECEIVED:** | Aug. 08, 2014 |
| **TESTED:** | Aug. 27 to Oct. 15, 2014 |
| **ISSUED:** | Oct. 23, 2014 |

| | |
|---|---|
| **APPLICANT:** | Qualcomm Atheros, Inc. |
| **ADDRESS:** | 1700 Technology Drive, San Jose, CA 95110 |

| | |
|---|---|
| **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 |
|---|---|---|
| RF140808E04 | Original release | Oct. 23, 2014 |

# 1. CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | 2x2 802.11A/B/G/N/AC WiFi + Bluetooth Module |
| **BRAND NAME:** | Qualcomm Atheros |
| **MODEL NO.:** | QCNFA324 |
| **TEST SAMPLE:** | R&D SAMPLE |
| **APPLICANT:** | Qualcomm Atheros, Inc. |
| **TESTED:** | Aug. 27 to Oct. 15, 2014 |
| **STANDARDS:** | **FCC Part 15, Subpart C (Section 15.247)**<br>ANSI C63.10-2009 |

The above equipment (Model: QCNFA324) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and was in 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. 23, 2014
( Elsie Hsu, Specialist )

**APPROVED BY** : _____ , **DATE:** Oct. 23, 2014
( May Chen, Manager )

# 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 2.4GHz, 2400~2483.5MHz Band

| APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) | | | |
|---|---|---|---|
| **STANDARD SECTION** | **TEST TYPE** | **RESULT** | **REMARK** |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -16.78dB at 0.15000MHz |
| 15.247(d)<br>15.209 | Radiated Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -6.3dB at 32.96MHz |
| 15.247(d) | Band Edge Measurement | PASS | Meet the requirement of limit. |
| 15.247(a)(2) | 6dB bandwidth | PASS | Meet the requirement of limit. |
| 15.247(b) | Conducted Output power | PASS | Meet the requirement of limit. |
| 15.247(e) | Power Spectral Density | PASS | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | PASS | Antenna connector is IPEX not a standard connector. |

**NOTE:** 1. For WLAN: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.35GHz, 5.47~5.6GHz, 5.65~5.725GHz & 5.725~5.850GHz RF parameters was recorded in another test report.

2. The DFS report 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 | 2.86 dB |
| Radiated emissions (30MHz-1GHz) | 5.37 dB |
| Radiated emissions (1GHz -6GHz) | 3.72 dB |
| Radiated emissions (6GHz -18GHz) | 4.00 dB |
| Radiated emissions (18GHz -40GHz) | 4.11 dB |

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | 2x2 802.11A/B/G/N/AC WiFi + Bluetooth Module |
| **MODEL NO.** | QCNFA324 |
| **POWER SUPPLY** | DC 3.3V from host equipment |
| **MODULATION TYPE** | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz |
| **MODULATION TECHNOLOGY** | DSSS,OFDM |
| **TRANSFER RATE** | 802.11b: up to 11Mbps<br>802.11a/g: up to 54Mbps<br>802.11n : up to 400Mbps<br>802.11ac: up to 866.7Mbps |
| **OPERATING FREQUENCY** | **For 15.407**<br>802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.72GHz, 5.745 ~ 5.825GHz |
| | **For 15.247**<br>2.4GHz: 2.412 ~ 2.462GHz |
| **NUMBER OF CHANNEL** | **For 15.407**<br>25 for 802.11a, 802.11n (HT20), VHT20<br>12 for 802.11n (HT40), VHT40<br>6 for 802.11ac (VHT80) |
| | **For 15.247**<br>11 for 802.11b, 802.11g, 802.11n (HT20)<br>7 for 802.11n (HT40) |

| | |
|---|---|
| **MAXIMUM OUTPUT POWER** | **For 15.407**<br>802.11a: 80.808 mW<br>802.11ac (VHT20): 65.326mW<br>802.11ac (VHT40): 50.052mW<br>802.11ac (VHT80): 44.691mW<br>**For 15.247**<br>802.11b: 250.042mW<br>802.11g: 485.327mW<br>VHT20: 482.537mW<br>VHT40: 205.692mW |
| **ANTENNA TYPE** | See item 3.2 |
| **ANTENNA CONNECTOR** | See item 3.2 |
| **DATA CABLE** | NA |
| **I/O PORTS** | NA |
| **ASSOCIATED DEVICES** | NA |

**NOTE:**

1. There are Bluetooth technology and WLAN technology used for the EUT.
2. QCNFA324 supports two digital interfaces (USB and UART) for Bluetooth digital end data communication. The Bluetooth RF end is exactly same in both implementations.

| Variant No. | Interface |
|---|---|
| SKU #1 | USB interface for BT |
| SKU #2 | UART interface for BT |
| From the above Variants, SKU #1 was selected as representative model for the test and its data was recorded in this report. | |

3. The EUT incorporates a 2T2R function.

| MODULATION MODE | DATA RATE (MCS) | TX & RX CONFIGURATION | |
|---|---|---|---|
| **802.11b** | 1 ~ 11Mbps | 2TX CDD / Beamforming | 2RX |
| **802.11g** | 6 ~ 54Mbps | 2TX CDD / Beamforming | 2RX |
| **802.11n (HT20) (2.4GHz)** | MCS 0~7 | 2TX CDD / Beamforming | 2RX |
| | MCS 8~15 | 2TX / Beamforming | 2RX |
| **802.11n (HT40) (2.4GHz)** | MCS 0~7 | 2TX CDD / Beamforming | 2RX |
| | MCS 8~15 | 2TX / Beamforming | 2RX |
| **VHT20 (2.4GHz)** | MCS 0~8, Nss=1 | 2TX CDD / Beamforming | 2RX |
| | MCS 0~8, Nss=2 | 2TX / Beamforming | 2RX |
| **VHT40 (2.4GHz)** | MCS 0~9, Nss=1 | 2TX CDD / Beamforming | 2RX |
| | MCS 0~9, Nss=2 | 2TX / Beamforming | 2RX |
| **802.11a** | 6 ~ 54Mbps | 2TX CDD / Beamforming | 2RX |
| **802.11n (HT20) (5GHz)** | MCS 0~7 | 2TX CDD / Beamforming | 2RX |
| | MCS 8~15 | 2TX / Beamforming | 2RX |
| **802.11n (HT40) (5GHz)** | MCS 0~7 | 2TX CDD / Beamforming | 2RX |
| | MCS 8~15 | 2TX / Beamforming | 2RX |
| **802.11ac (VHT20) (5GHz)** | MCS 0~8, Nss=1 | 2TX CDD / Beamforming | 2RX |
| | MCS 0~8, Nss=2 | 2TX / Beamforming | 2RX |
| **802.11ac (VHT40) (5GHz)** | MCS 0~9, Nss=1 | 2TX CDD / Beamforming | 2RX |
| | MCS 0~9, Nss=2 | 2TX / Beamforming | 2RX |
| **802.11ac (VHT80) (5GHz)** | MCS 0~9, Nss=1 | 2TX CDD / Beamforming | 2RX |
| | MCS 0~9, Nss=2 | 2TX / Beamforming | 2RX |

4. The EUT was pre-tested under the following modes:

| Test Mode | Data rate |
|---|---|
| Mode A | 400ns GI |
| **Mode B** | **800ns GI** |

From the above modes, the worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

5. Spurious Emission (conducted & radiated emission) of the simultaneous operation (WiFi <5GHz> & Bluetooth) have been evaluated and no non-compliance found. The detail combinations of transmitters / frequencies / modes as below table

| Mode | Available Channel | Tested Channel | Modulation Technology |
|---|---|---|---|
| 5 GHz (802.11a) + Bluetooth (GFSK) | 149 to 165 | 165 | OFDM |
| | 0 to 78 | 0 | FHSS |

6. 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 ANTENNA

The antenna gain was declared by client; please refer to the following table:

| Antenna set 1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Transmitter Circuit | Brand | Model | Antenna Type | 2.4GHz Gain with cable loss (dBi) | 5GHz Gain with cable loss (dBi) | 2.4GHz Cable Loss (dBi) | 5G Cable Loss (dBi) | Connector Type | Cable Length (mm) |
| Chain (0) | WNC | 81-EBJ15.005 | PIFA | 3.62 | Band 1&2: 3.08<br>Band 3: 4.76<br>Band 4: 4.76 | 1.15 | Band 1&2:1.70<br>Band 3: 1.74<br>Band 4: 1.79 | IPEX | 300 |
| Chain (1) | WNC | 81-EBJ15.005 | PIFA | 3.62 | Band 1&2: 3.08<br>Band 3: 4.76<br>Band 4: 4.76 | 1.15 | Band 1&2:1.70<br>Band 3: 1.74<br>Band 4: 1.79 | IPEX | 300 |

| Antenna set 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Transmitter Circuit | Brand | Model | Antenna Type | 2.4GHz Gain with cable loss (dBi) | 5GHz Gain with cable loss (dBi) | Cable Loss (dBi) | Connector Type | Cable Length (mm) |
| Chain (0) | Tongda | T-543-8201044-A (Ant 1) | PIFA | 3.572 | Band 1&2: 3.002<br>Band 3: 4.546<br>Band 4: 4.416 | NA | IPEX | 77 |
| Chain (1) | Tongda | T-543-8201044-A (Ant 2) | PIFA | 3.325 | Band 1&2: 2.942<br>Band 3: 4.622<br>Band 4: 4.586 | NA | IPEX | 71 |

Note: 1. Above antenna gains of antenna are Total (H+V).
2. All of antenna can be application for WLAN and Bluetooth.

## 3.3 DESCRIPTION OF TEST MODES

### Operated in 2400 ~ 2483.5MHz band:

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), VHT20:

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|
| 1 | 2412MHz | 7 | 2442MHz |
| 2 | 2417MHz | 8 | 2447MHz |
| 3 | 2422MHz | 9 | 2452MHz |
| 4 | 2427MHz | 10 | 2457MHz |
| 5 | 2432MHz | 11 | 2462MHz |
| 6 | 2437MHz | | |

7 channels are provided for 802.11n (HT 40), VHT40:

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

## 3.3.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO | | | | | DESCRIPTION |
|---|---|---|---|---|---|---|
| | PLC | UE < 1G | UE ≥ 1G | APCM | OB | |
| 1 | √ | √ | √ | √ | √ | Antenna set 1 |
| 2 | - | √ | √ | - | - | Antenna set 2 |

Where **PLC:** Power Line Conducted Emission **UE < 1G:** Unwanted Emission below 1GHz

**UE ≥ 1G:** Unwanted Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

**OB:** Conducted Out-Band Emission Measurement

Note 1. "-"means no effect.

**AC 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 | DATA RATE (Mbps) |
|---|---|---|---|---|
| 802.11g | 1 to 11 | 6 | OFDM | 6 |

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

☒ Radiated versus Conducted Measurements

☒ 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 | DATA RATE (Mbps) |
|---|---|---|---|---|
| 802.11g | 1 to 11 | 6 | OFDM | 6 |

**UNWANTED EMISSION TEST (ABOVE 1 GHz):**

☒ Radiated versus Conducted Measurements
☒ 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 | DATA RATE (Mbps) |
|---|---|---|---|---|
| 802.11b | 1 to 11 | 1, 6, 11 | DSSS | 1 |
| 802.11g | 1 to 11 | 1, 6, 11 | OFDM | 6 |
| VHT20 | 1 to 11 | 1, 6, 11 | OFDM | 6.5 |
| VHT40 | 3 to 9 | 3, 6, 9 | OFDM | 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 | DATA RATE (Mbps) |
|---|---|---|---|---|
| 802.11b | 1 to 11 | 1, 6, 11 | DSSS | 1 |
| 802.11g | 1 to 11 | 1, 6, 11 | OFDM | 6 |
| VHT20 | 1 to 11 | 1, 6, 11 | OFDM | 6.5 |
| VHT40 | 3 to 9 | 3, 6, 9 | OFDM | 13.5 |

**CONDUCTED OUT-BAND EMISSION 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 | DATA RATE (Mbps) |
|---|---|---|---|---|
| 802.11b | 1 to 11 | 1, 6, 11 | DSSS | 1 |
| 802.11g | 1 to 11 | 1, 6, 11 | OFDM | 6 |
| VHT20 | 1 to 11 | 1, 6, 11 | OFDM | 6.5 |
| VHT40 | 3 to 9 | 3, 6, 9 | OFDM | 13.5 |

## TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY |
|---|---|---|---|
| PLC | 30deg. C, 70%RH | 120Vac, 60Hz | Mike Hsieh |
| RE<1G | 19deg. C, 65%RH | 120Vac, 60Hz | Andy Ho |
| RE≥1G | 23deg. C, 69%RH | 120Vac, 60Hz | Robert Cheng |
| APCM | 25deg. C, 60%RH | 120Vac, 60Hz | James Chan |
| OB | 25deg. C, 60%RH | 120Vac, 60Hz | James Chan |

## 3.4 DUTY CYCLE OF TEST SIGNAL

**For 2.4GHz**

Duty cycle of test signal is < 98%, duty factor shall be considered.

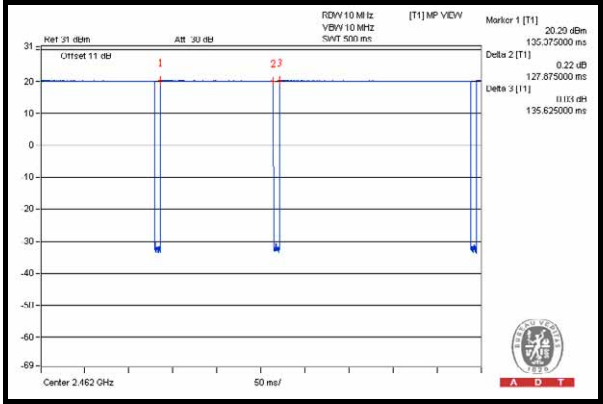
**802.11b**: Duty cycle = 127.875 ms/135.625 ms = 0.943, Duty factor = 10 * log( 1/0.943) = 0.25

**802.11g**: Duty cycle = 21.4 ms/28.4 ms = 0.754, Duty factor = 10 * log( 1/0.754) = 1.2

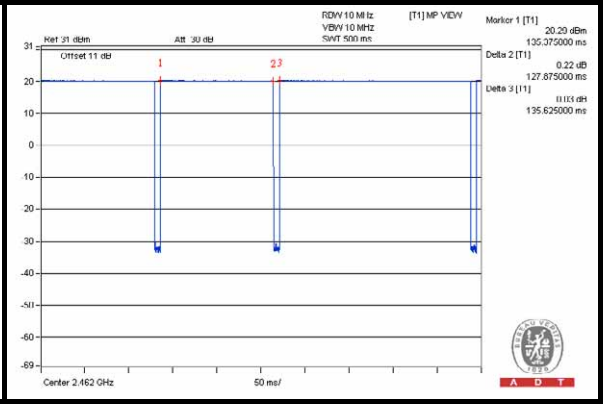
**VHT20:** Duty cycle = 19.7 ms/26.7 ms = 0.738, Duty factor = 10 * log( 1/0.738) = 1.3

**VHT40:** Duty cycle = 9.512 ms/16.512 ms = 0.576, Duty factor = 10 * log( 1/0.576) = 2.4

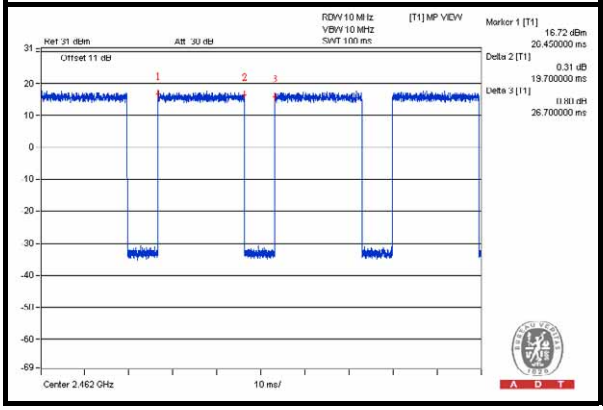
**802.11b**



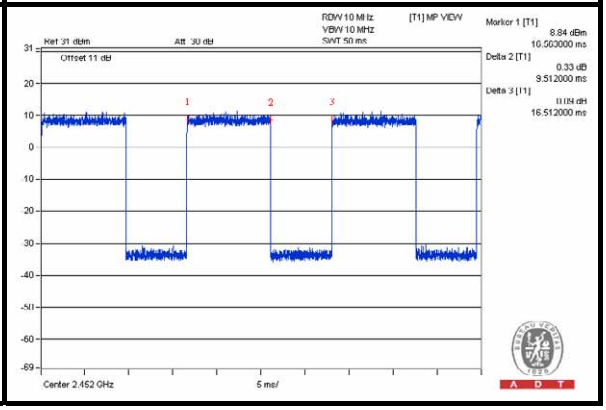

**802.11g**




**VHT20**




**VHT40**



## 3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

**FCC Part 15, Subpart C (15.247)**
**558074 D01 DTS Meas Guidance v03r02**
**662911 D01 Multiple Transmitter Output v02r01**
**ANSI C63.10-2009**

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

## 3.6 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.

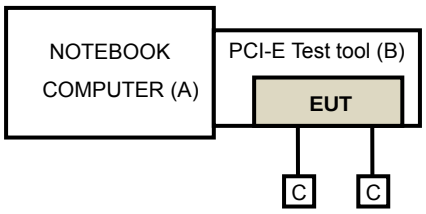
| No. | Product | Brand | Model No. | Serial No. | FCC ID | Remark |
|---|---|---|---|---|---|---|
| A | NOTEBOOK COMPUTER | DELL | E6420 | H62T3R1 | FCC DoC | Provided by Lab |
| B | PCI-E Test tool | Qualcomm Atheros | NA | NA | NA | Supplied by Client |
| C | 50ohm terminal resistor | NA | NA | NA | NA | Provided by Lab |
| | | NA | NA | NA | NA | Provided by Lab |

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

| No. | Cable | Qty. | Length (m) | Shielded (Yes/ No) | Cores (Number) | Remark |
|---|---|---|---|---|---|---|
| 1 | RF cable | 1 | 0.1 | No | 0 | Provided by Lab |
| 2 | RF cable | 1 | 0.2 | No | 0 | Provided by Lab |

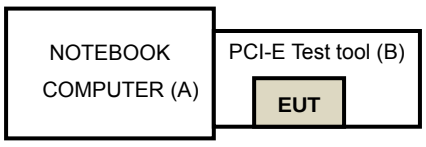
## 3.7 CONFIGURATION OF SYSTEM UNDER TEST

**For Unwanted Emission test (Radiated Measurement)**




**Note:** Support unit C is 50ohm terminal resistor.

**For other test items:**



# 4. TEST TYPES AND RESULTS (FOR 2.4GHz, 2400 ~ 2483.5MHz Band)

## 4.1 CONDUCTED OUTPUT POWER MEASUREMENT

### 4.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

### 4.1.2 INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Power Meter Anritsu | ML2495A | 1014008 | Apr. 30, 2014 | Apr. 29, 2015 |
| Power Sensor Anritsu | MA2411B | 0917122 | Apr. 30, 2014 | Apr. 29, 2015 |

**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. 10, 2014

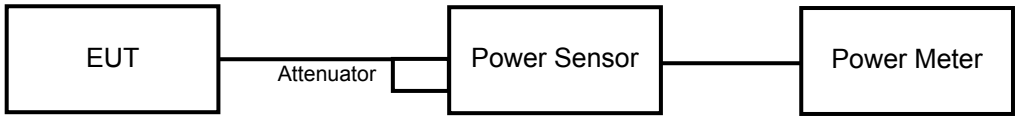
### 4.1.3 TEST PROCEDURES

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

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.1.5 TEST SETUP




### 4.1.6 EUT OPERATING CONDITIONS

The software (QCRT Version: 3.0.29.0) provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

## 4.1.7 TEST RESULTS

### FOR PEAK POWER

### 802.11b

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | | | |
| 1 | 2412 | 20.21 | 20.29 | 211.859 | 23.26 | 29.37 | PASS |
| 6 | 2437 | 20.62 | 20.72 | 233.377 | 23.68 | 29.37 | PASS |
| 11 | 2462 | 20.76 | 21.17 | 250.042 | 23.98 | 29.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , therefore the limit needs to reduce, so the power limit shall be reduced to 30-(6.63-6) = 29.37dBm.

### 802.11g

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | | | |
| 1 | 2412 | 19.87 | 19.31 | 182.361 | 22.61 | 29.37 | PASS |
| 6 | 2437 | 23.83 | 23.87 | 485.327 | 26.86 | 29.37 | PASS |
| 11 | 2462 | 19.59 | 19.75 | 185.397 | 22.68 | 29.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , therefore the limit needs to reduce, so the power limit shall be reduced to 30-(6.63-6) = 29.37dBm.

## VHT20

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | | | |
| 1 | 2412 | 19.28 | 19.03 | 164.706 | 22.17 | 29.37 | PASS |
| 6 | 2437 | 23.82 | 23.83 | 482.537 | 26.84 | 29.37 | PASS |
| 11 | 2462 | 18.86 | 19.03 | 156.896 | 21.96 | 29.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , therefore the limit needs to reduce, so the power limit shall be reduced to 30-(6.63-6) = 29.37dBm.

## VHT40

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | | | |
| 3 | 2422 | 17.43 | 17.18 | 107.575 | 29.37 | 29.37 | PASS |
| 6 | 2437 | 19.02 | 21.00 | 205.692 | 29.37 | 29.37 | PASS |
| 9 | 2452 | 15.03 | 15.22 | 65.108 | 29.37 | 29.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , therefore the limit needs to reduce, so the power limit shall be reduced to 30-(6.63-6) = 29.37dBm.

## FOR AVERAGE POWER

### 802.11b

| CHANNEL | FREQUENCY (MHz) | AVERAGE POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 1 | 2412 | 17.92 | 18.02 | 125.331 | 20.98 |
| 6 | 2437 | 18.40 | 18.57 | 141.128 | 21.50 |
| 11 | 2462 | 18.28 | 18.88 | 144.566 | 21.60 |

### 802.11g

| CHANNEL | FREQUENCY (MHz) | AVERAGE POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 1 | 2412 | 13.88 | 13.45 | 46.565 | 16.68 |
| 6 | 2437 | 18.04 | 18.11 | 128.394 | 21.09 |
| 11 | 2462 | 13.62 | 13.62 | 46.028 | 16.63 |

### VHT20

| CHANNEL | FREQUENCY (MHz) | AVERAGE POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 1 | 2412 | 13.32 | 12.43 | 38.976 | 15.91 |
| 6 | 2437 | 18.01 | 18.04 | 126.921 | 21.04 |
| 11 | 2462 | 12.42 | 12.34 | 34.598 | 15.39 |

### VHT40

| CHANNEL | FREQUENCY (MHz) | AVERAGE POWER (dBm) | | TOTAL POWER (mW) | TOTAL POWER (dBm) |
|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | | |
| 3 | 2422 | 11.07 | 10.68 | 24.489 | 13.89 |
| 6 | 2437 | 14.30 | 14.78 | 56.976 | 17.56 |
| 9 | 2452 | 8.50 | 8.31 | 13.855 | 11.42 |

## 4.2 POWER SPECTRAL DENSITY MEASUREMENT

### 4.2.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| SPECTRUM ANALYZER R&S | FSP 40 | 100060 | May 08, 2014 | May 07, 2015 |

**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. 07, 2014

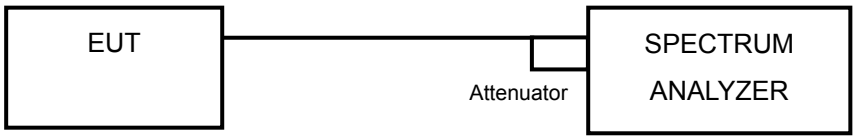
### 4.2.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.2.5 TEST SETUP




### 4.2.6 EUT OPERATING CONDITION

Same as Item 4.1.6

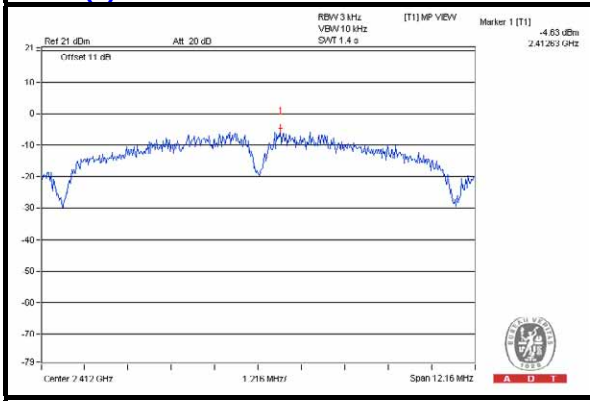
## 4.2.7 TEST RESULTS

**802.11b**

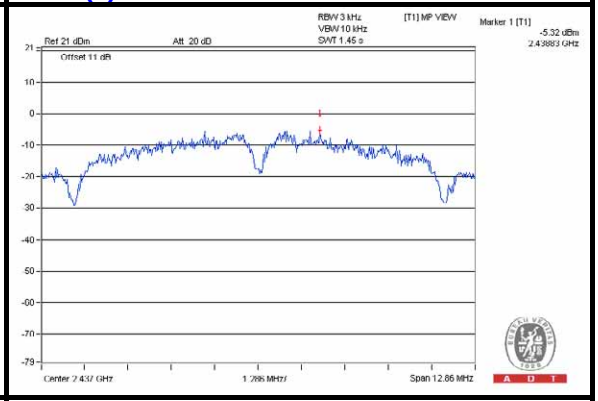
| TX chain | Channel | FREQ. (MHz) | PSD (dBm) | 10 log (N=2) dB | Total PSD (dBm) | Limit (dBm) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2412 | -4.63 | 3.01 | -1.62 | 7.37 | PASS |
| | 6 | 2437 | -5.32 | 3.01 | -2.31 | 7.37 | PASS |
| | 11 | 2462 | -4.85 | 3.01 | -1.84 | 7.37 | PASS |
| 1 | 1 | 2412 | -4.03 | 3.01 | -1.02 | 7.37 | PASS |
| | 6 | 2437 | -5.41 | 3.01 | -2.40 | 7.37 | PASS |
| | 11 | 2462 | -3.87 | 3.01 | -0.86 | 7.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.

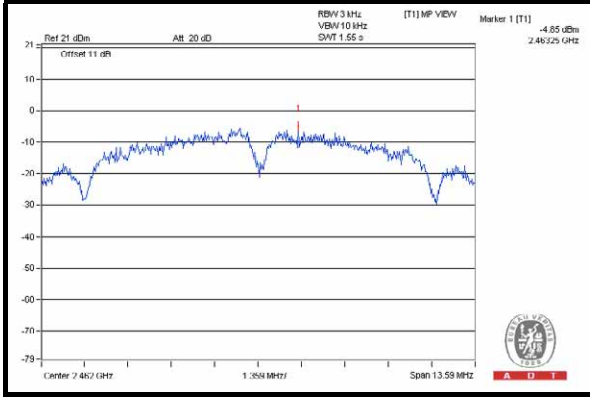
**Chain(0) : CH1**

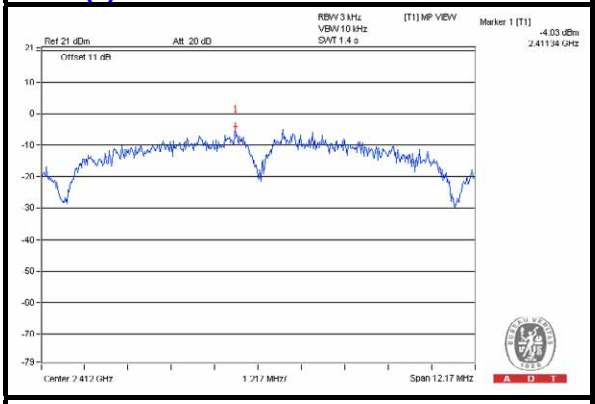
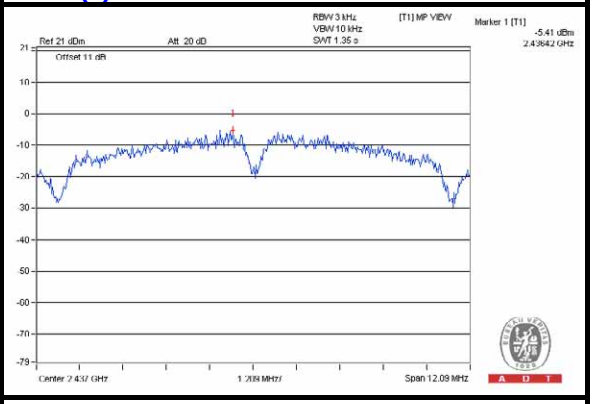
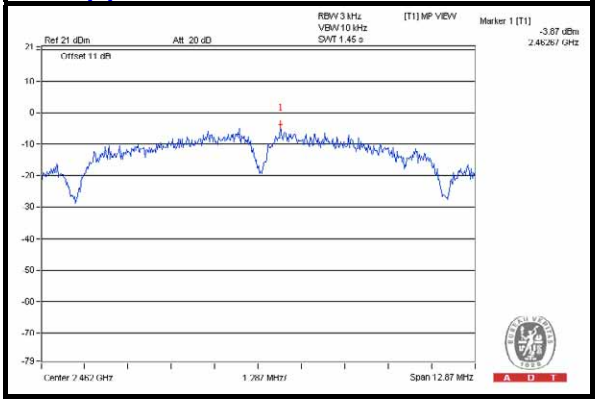



**Chain(0) : CH6**




**Chain(0) : CH11**



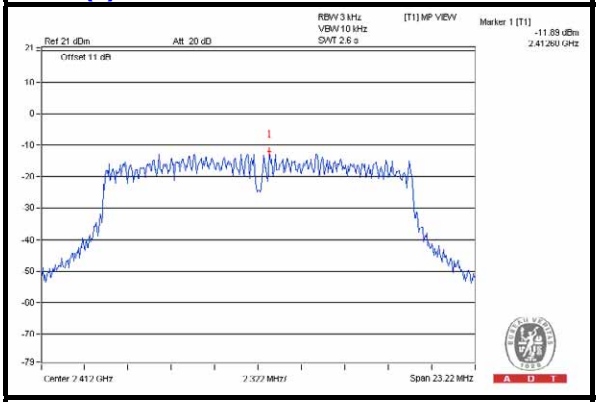
| Chain(1) : CH1 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH11** | |
|  | |

## 802.11g

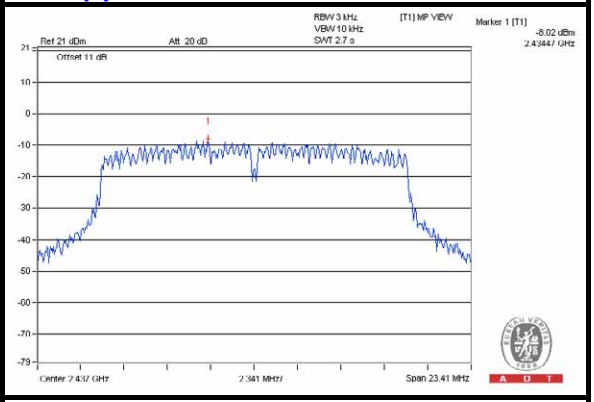
| TX chain | Channel | FREQ. (MHz) | PSD (dBm) | 10 log (N=2) dB | Total PSD (dBm) | Limit (dBm) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2412 | -11.89 | 3.01 | -8.88 | 7.37 | PASS |
| | 6 | 2437 | -8.02 | 3.01 | -5.01 | 7.37 | PASS |
| | 11 | 2462 | -13.22 | 3.01 | -10.21 | 7.37 | PASS |
| 1 | 1 | 2412 | -10.90 | 3.01 | -7.89 | 7.37 | PASS |
| | 6 | 2437 | -8.72 | 3.01 | -5.71 | 7.37 | PASS |
| | 11 | 2462 | -13.54 | 3.01 | -10.53 | 7.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.

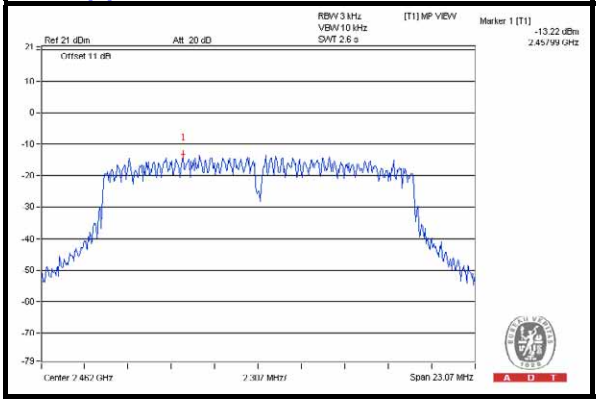
**Chain(0) : CH1**

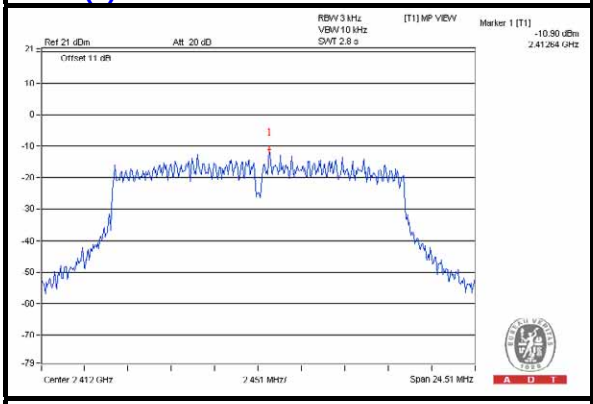
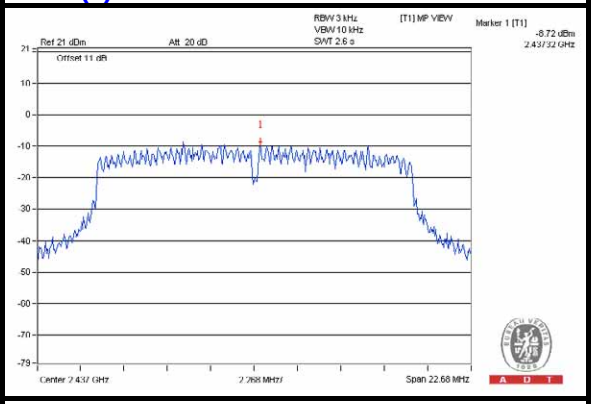
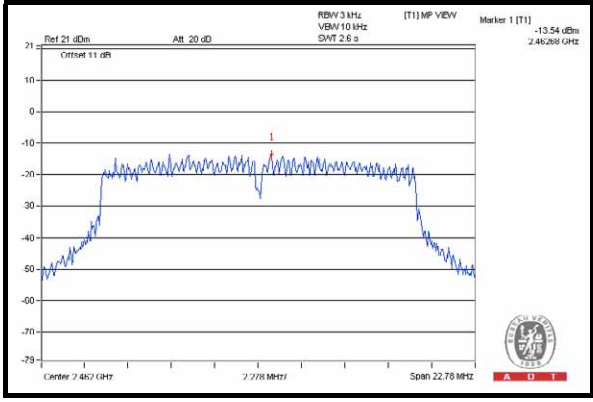



**Chain(0) : CH6**




**Chain(0) : CH11**



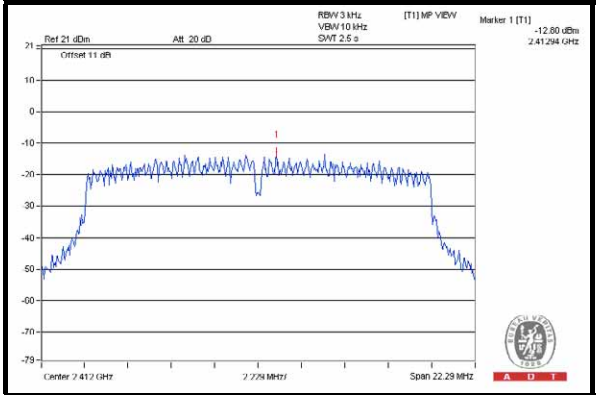
| Chain(1) : CH1 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH11** | |
|  | |

## VHT20

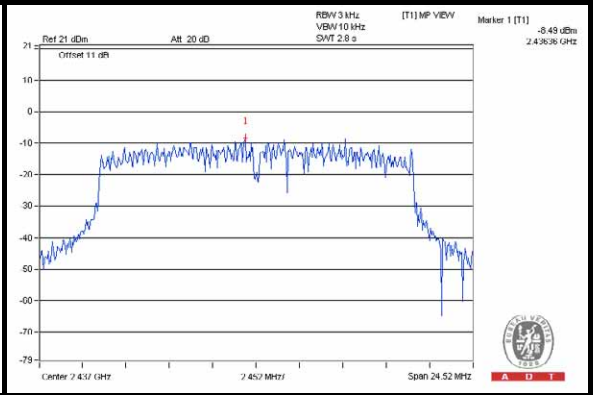
| TX chain | Channel | FREQ. (MHz) | PSD (dBm) | 10 log (N=2) dB | Total PSD (dBm) | Limit (dBm) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2412 | -12.80 | 3.01 | -9.79 | 7.37 | PASS |
| | 6 | 2437 | -8.49 | 3.01 | -5.48 | 7.37 | PASS |
| | 11 | 2462 | -14.60 | 3.01 | -11.59 | 7.37 | PASS |
| 1 | 1 | 2412 | -14.42 | 3.01 | -11.41 | 7.37 | PASS |
| | 6 | 2437 | -8.99 | 3.01 | -5.98 | 7.37 | PASS |
| | 11 | 2462 | -14.80 | 3.01 | -11.79 | 7.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.

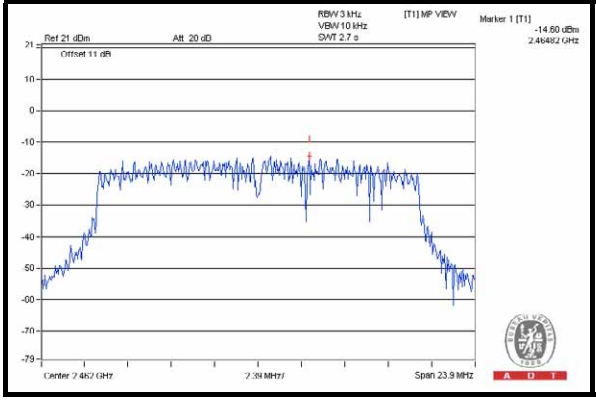
**Chain(0) : CH1**

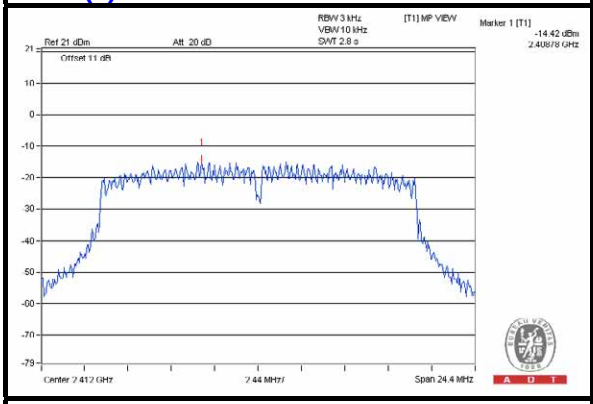
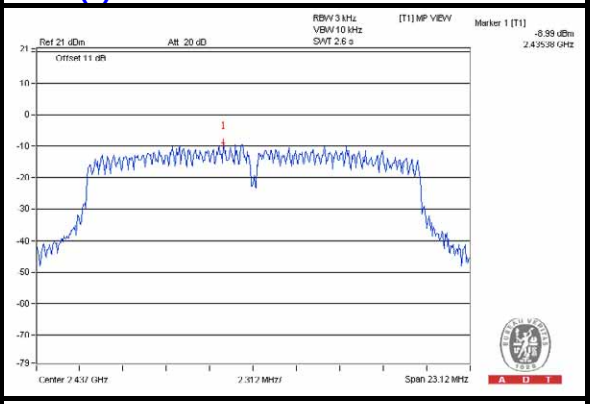
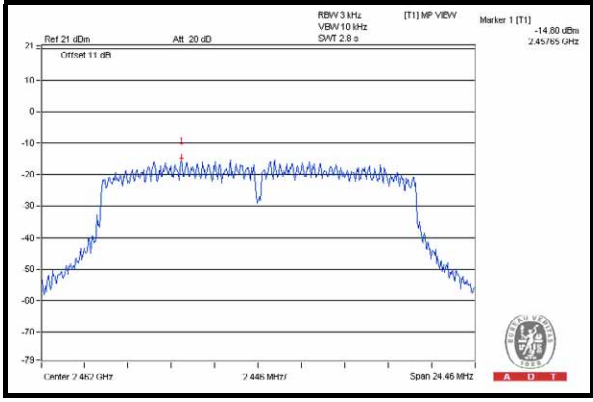



**Chain(0) : CH6**




**Chain(0) : CH11**



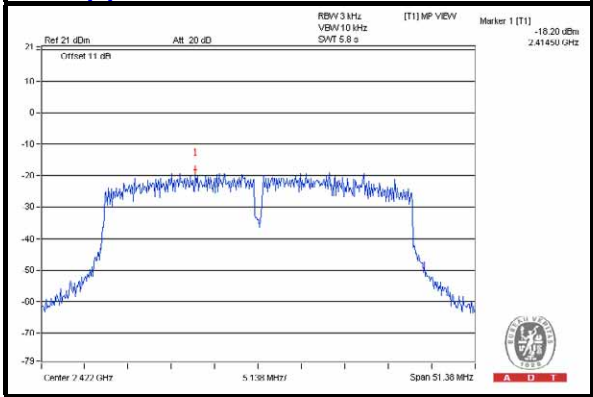
| Chain(1) : CH1 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH11** | |
|  | |

## VHT40

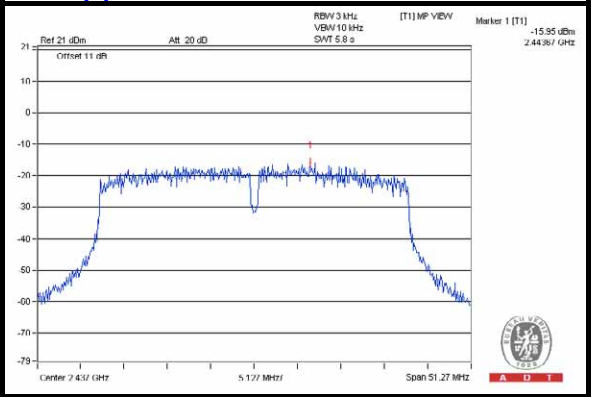
| TX chain | Channel | FREQ. (MHz) | PSD (dBm) | 10 log (N=2) dB | Total PSD (dBm) | Limit (dBm) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 3 | 2422 | -18.20 | 3.01 | -15.19 | 7.37 | PASS |
| | 6 | 2437 | -15.95 | 3.01 | -12.94 | 7.37 | PASS |
| | 9 | 2452 | -20.75 | 3.01 | -17.74 | 7.37 | PASS |
| 1 | 3 | 2422 | -18.18 | 3.01 | -15.17 | 7.37 | PASS |
| | 6 | 2437 | -15.77 | 3.01 | -12.76 | 7.37 | PASS |
| | 9 | 2452 | -21.89 | 3.01 | -18.88 | 7.37 | PASS |

**NOTE:** Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.

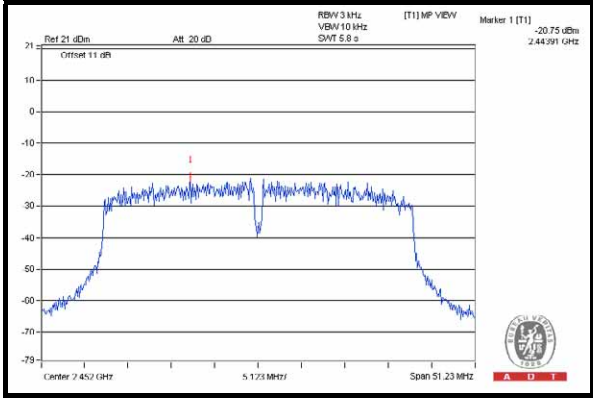
**Chain(0) : CH3**

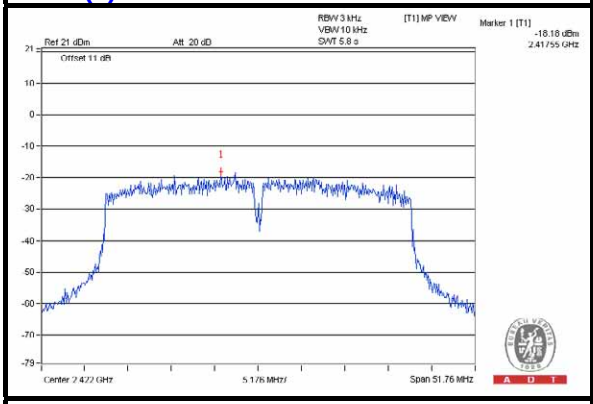
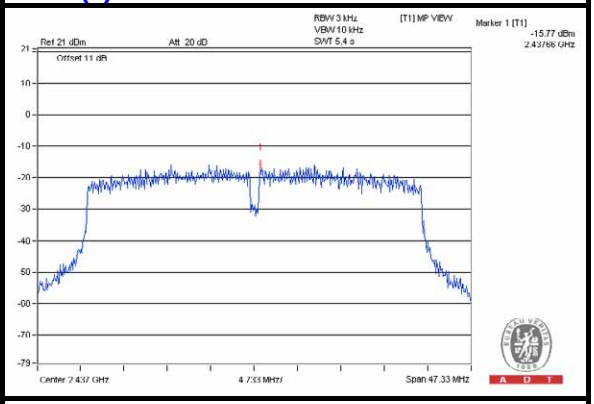
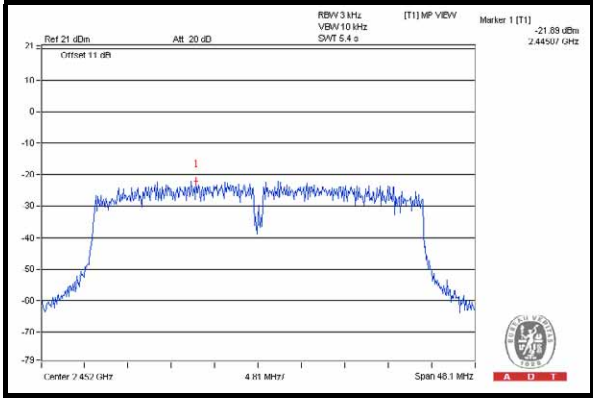



**Chain(0) : CH6**




**Chain(0) : CH9**



| Chain(1) : CH3 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH9** | |
|  | |

## 4.3 6dB BANDWIDTH MEASUREMENT

### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| SPECTRUM ANALYZER R&S | FSP 40 | 100060 | May 08, 2014 | May 07, 2015 |

**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. 07, 2014

### 4.3.3 TEST PROCEDURE

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

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.3.5 TEST SETUP

### 4.3.6 EUT OPERATING CONDITIONS

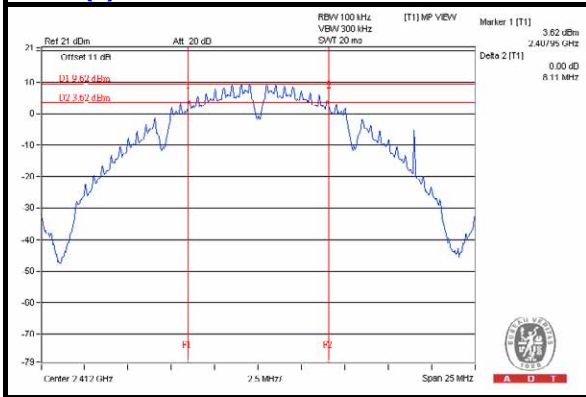
Same as Item 4.1.6

## 4.3.7 TEST RESULTS

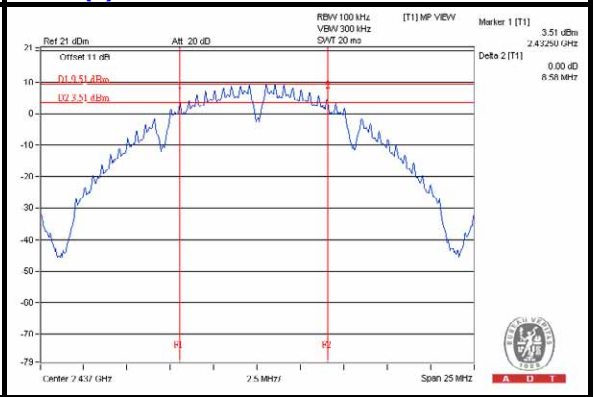
**802.11b**

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | |
| 1 | 2412 | 8.11 | 8.11 | 0.5 | PASS |
| 6 | 2437 | 8.58 | 8.06 | 0.5 | PASS |
| 11 | 2462 | 9.06 | 8.58 | 0.5 | PASS |

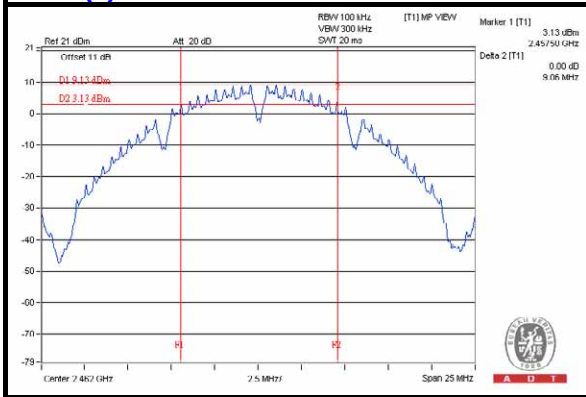
**Chain(0) : CH1**

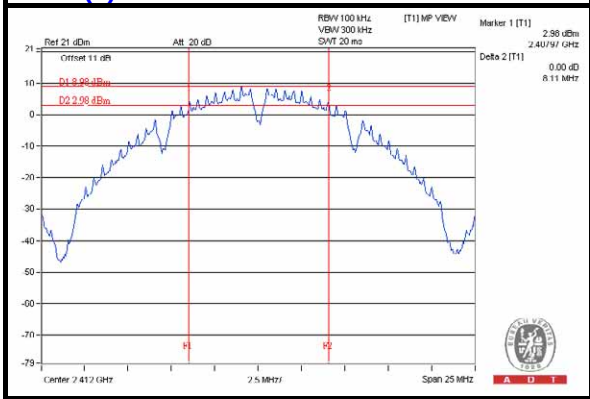
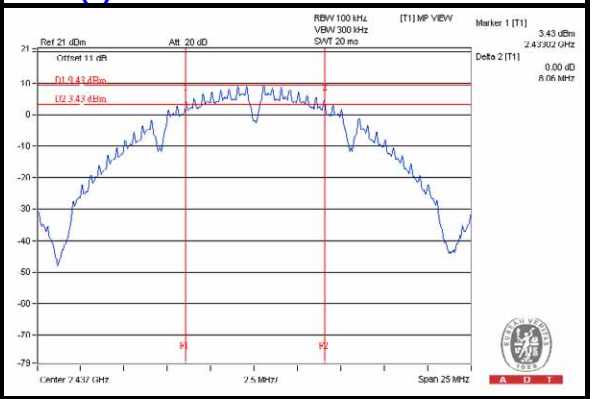
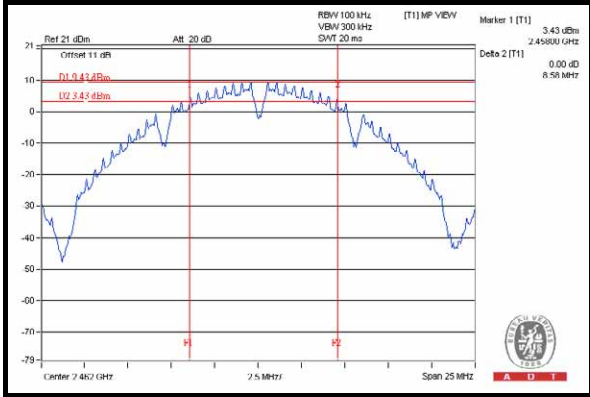



**Chain(0) : CH6**




**Chain(0) : CH11**

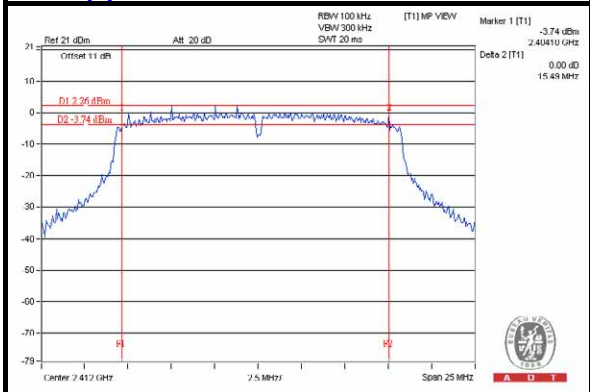


| Chain(1) : CH1 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH11** | |
|  | |

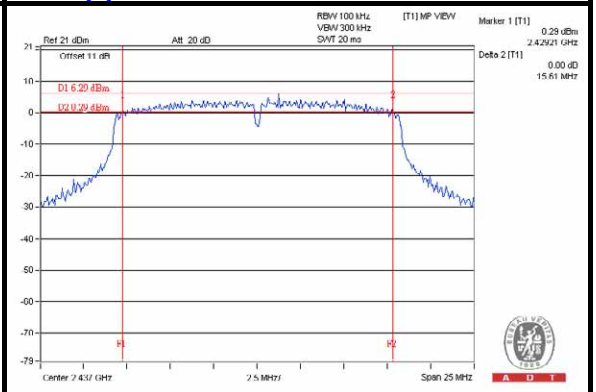
## 802.11g

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | |
| 1 | 2412 | 15.49 | 16.34 | 0.5 | PASS |
| 6 | 2437 | 15.61 | 15.12 | 0.5 | PASS |
| 11 | 2462 | 15.38 | 15.19 | 0.5 | PASS |

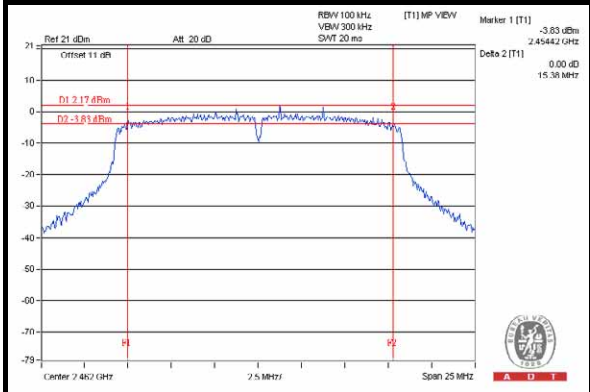
**Chain(0) : CH1**

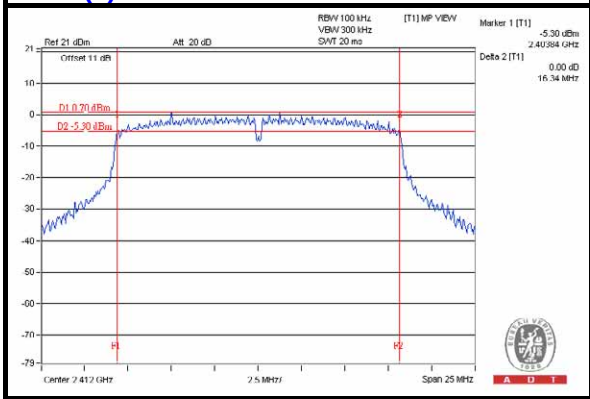
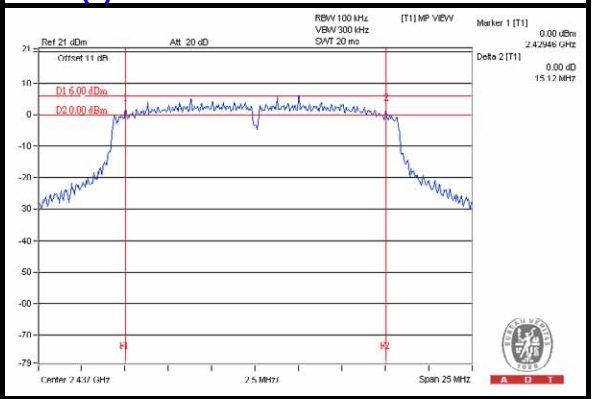
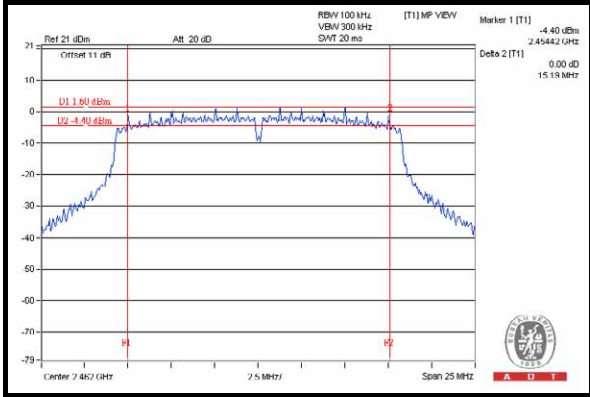



**Chain(0) : CH6**




**Chain(0) : CH11**

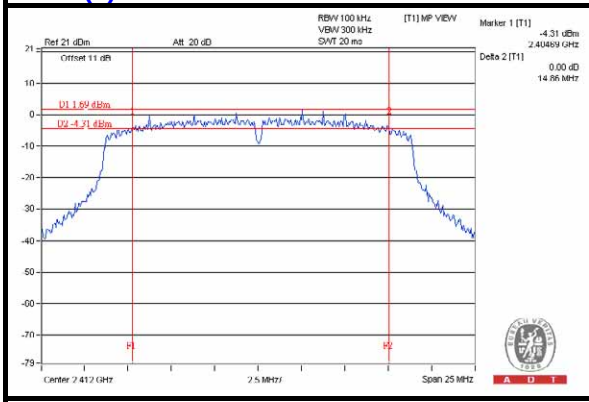


| Chain(1) : CH1 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH11** | |
|  | |

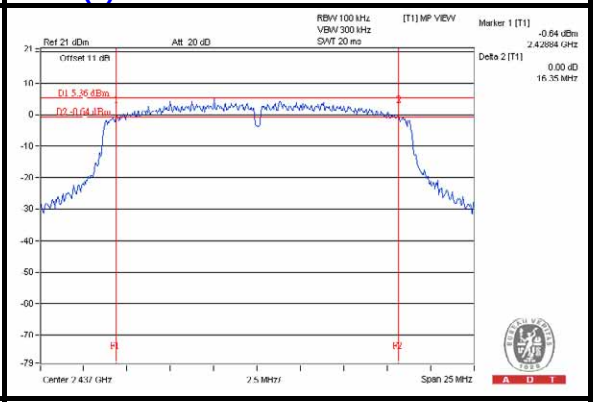
## VHT20

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | |
| 1 | 2412 | 14.86 | 16.27 | 0.5 | PASS |
| 6 | 2437 | 16.35 | 15.42 | 0.5 | PASS |
| 11 | 2462 | 15.94 | 16.31 | 0.5 | PASS |

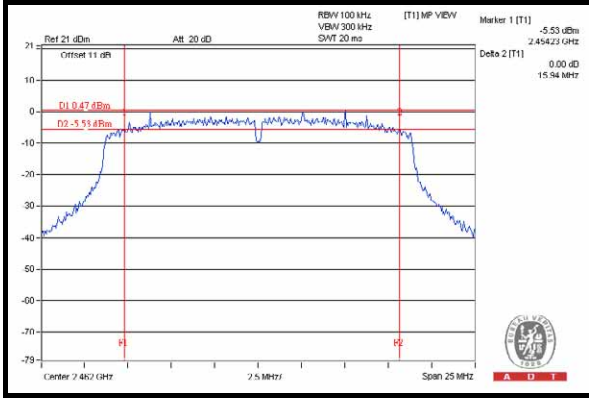
**Chain(0) : CH1**



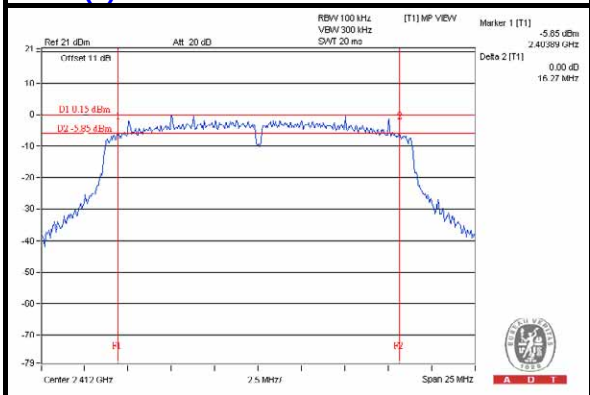

**Chain(0) : CH6**



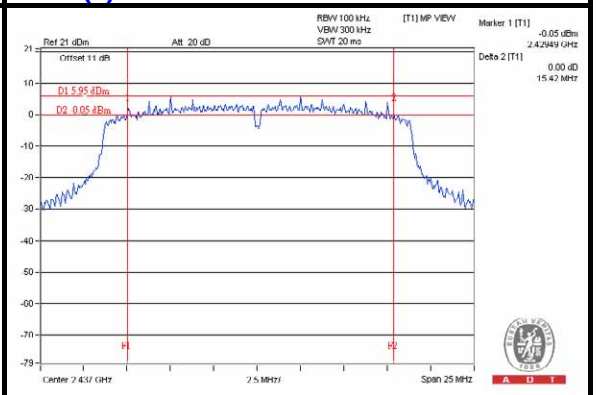

**Chain(0) : CH11**



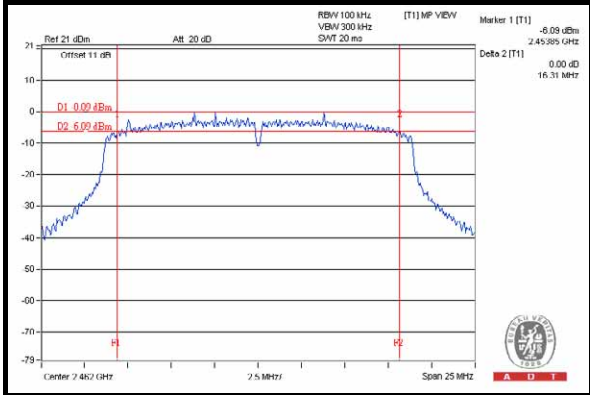
## Chain(1) : CH1




## Chain(1) : CH6



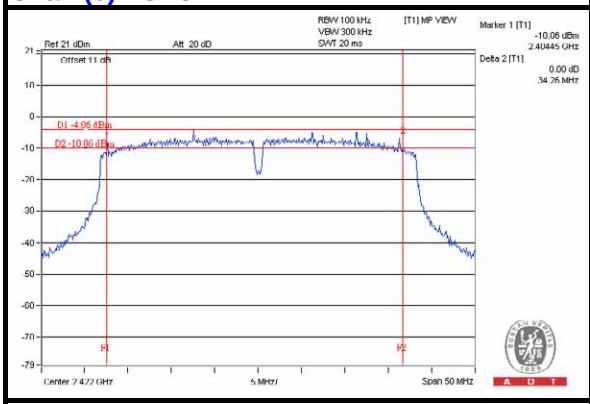

## Chain(1) : CH11



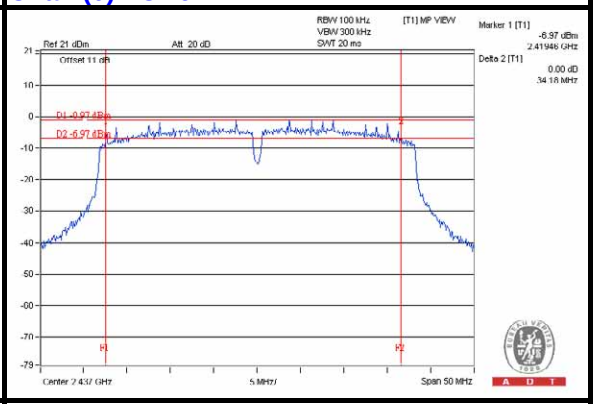
## VHT40

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|
| | | CHAIN(0) | CHAIN(1) | | |
| 3 | 2422 | 34.26 | 34.51 | 0.5 | PASS |
| 6 | 2437 | 34.18 | 31.55 | 0.5 | PASS |
| 9 | 2452 | 34.15 | 32.07 | 0.5 | PASS |

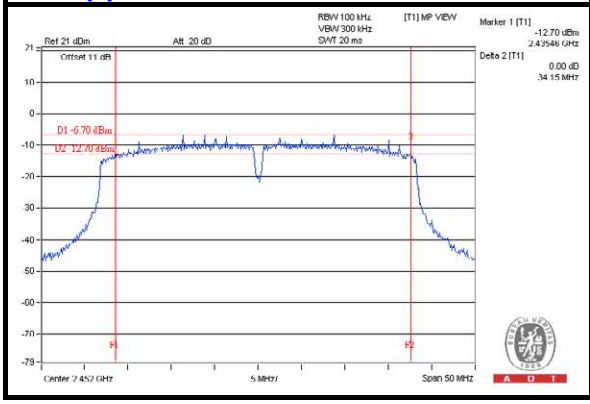
**Chain(0) : CH3**

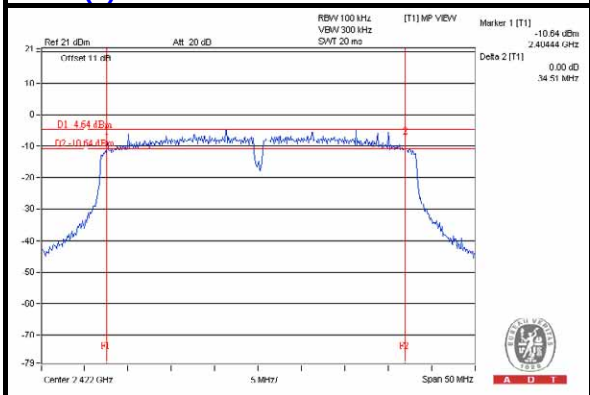
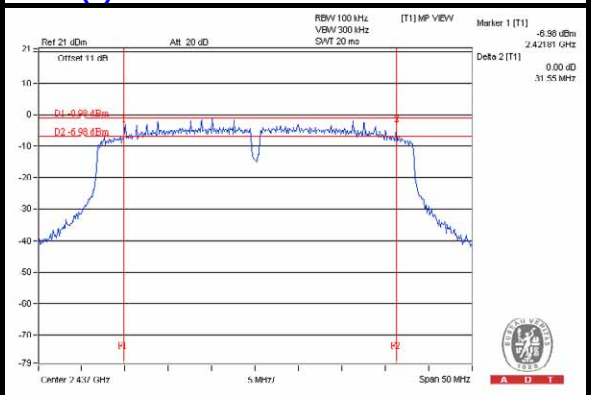
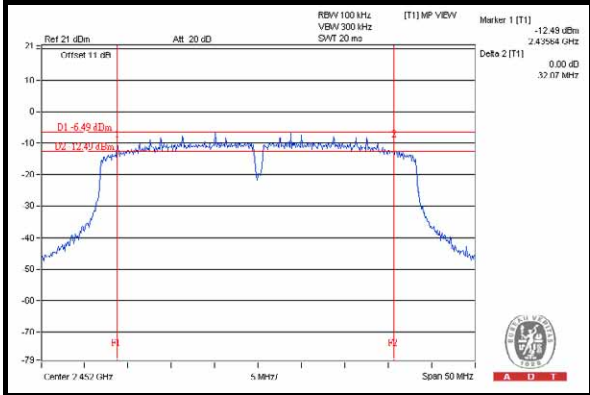



**Chain(0) : CH6**




**Chain(0) : CH9**



| Chain(1) : CH3 | Chain(1) : CH6 |
| --- | --- |
|  |  |
| **Chain(1) : CH9** | |
|  | |

## 4.4 CONDUCTED OUT-BAND EMISSION MEASUREMENT

### 4.4.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.4.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| SPECTRUM ANALYZER R&S | FSP 40 | 100060 | May 08, 2014 | May 07, 2015 |

**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. 07, 2014

### 4.4.3 TEST PROCEDURE

**Measurement Procedure - Reference Level**

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

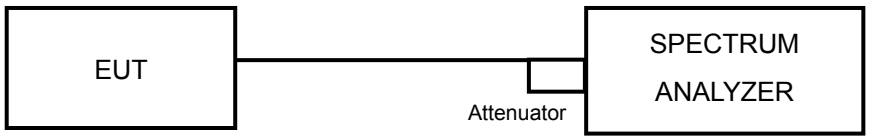
**Measurement Procedure –Unwanted Emission Level**

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.4.5 EUT OPERATING CONDITION

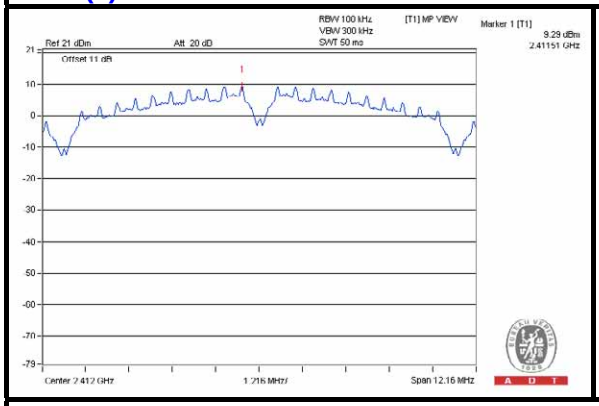


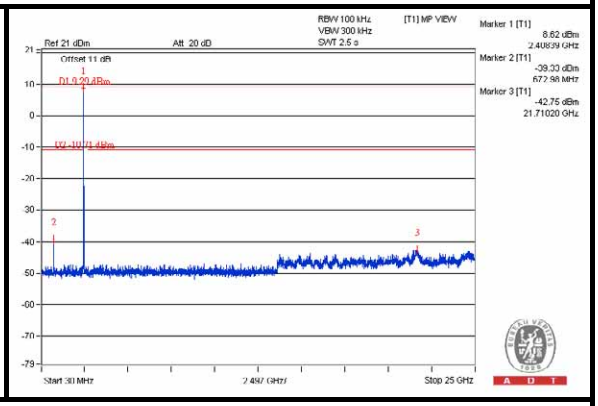

### 4.4.6 TEST RESULTS

he spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

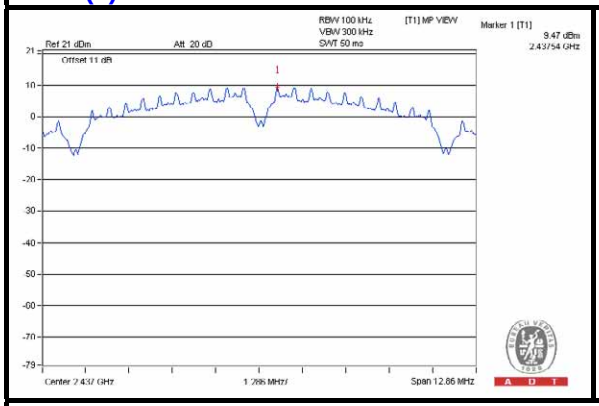
## 802.11b

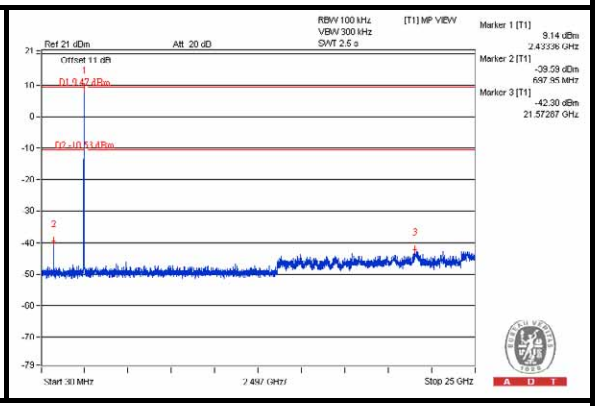
### Chain(0) : CH 1



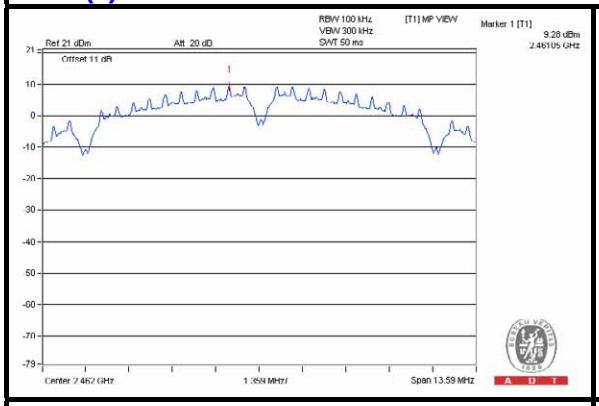



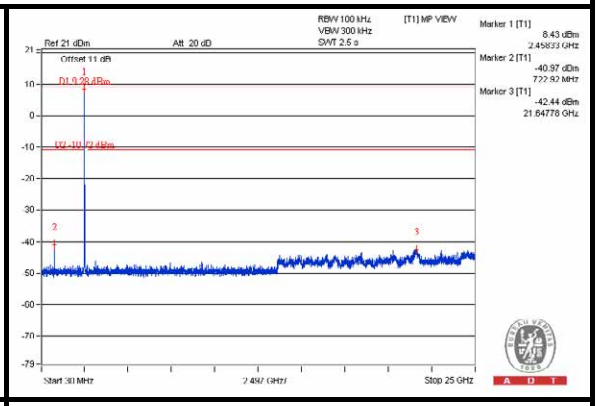

### Chain(0) : CH 6



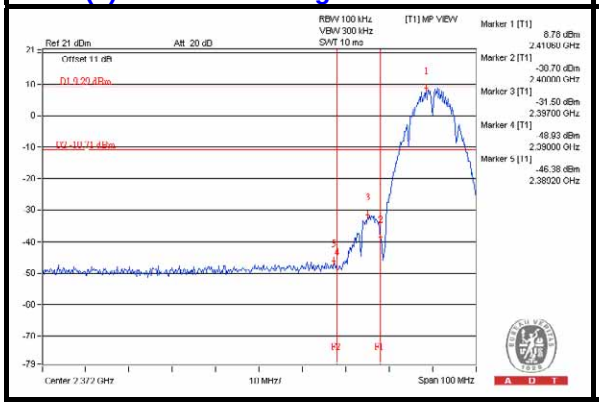




### Chain(0) : CH 11

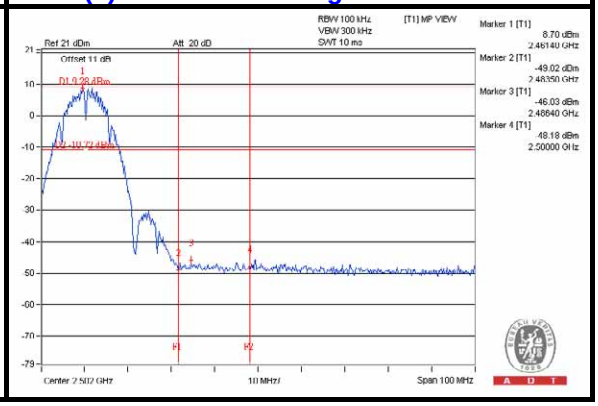


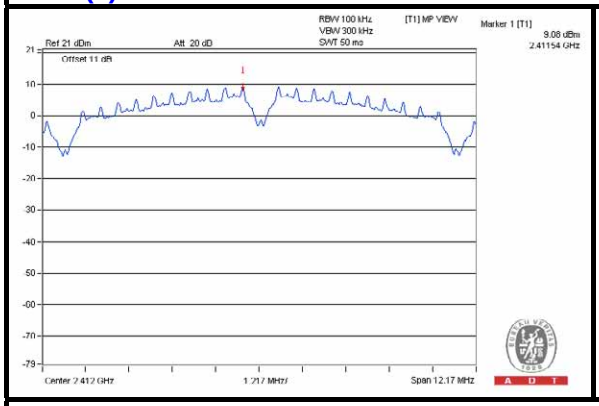

### Chain(0) : CH 1 Band edge

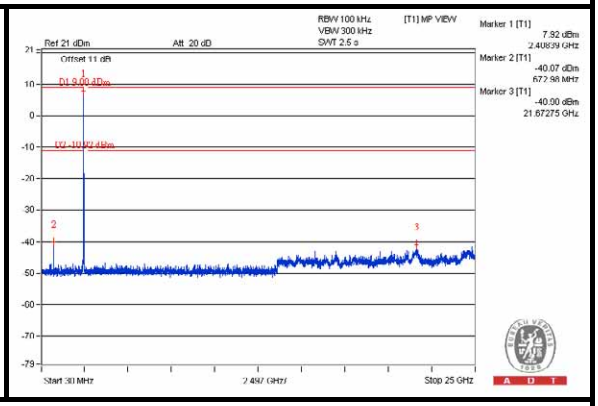



### Chain(0) : CH 11 Band edge

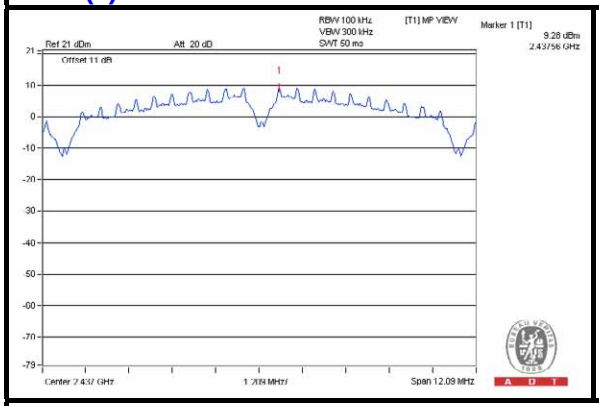


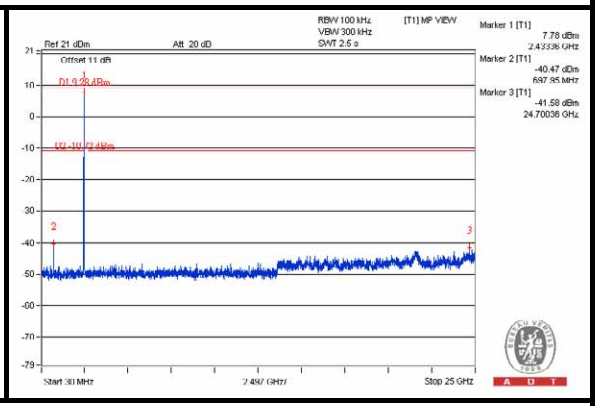
## Chain(1) : CH 1



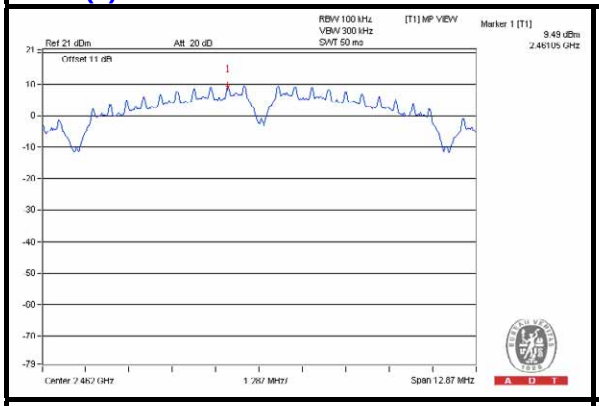



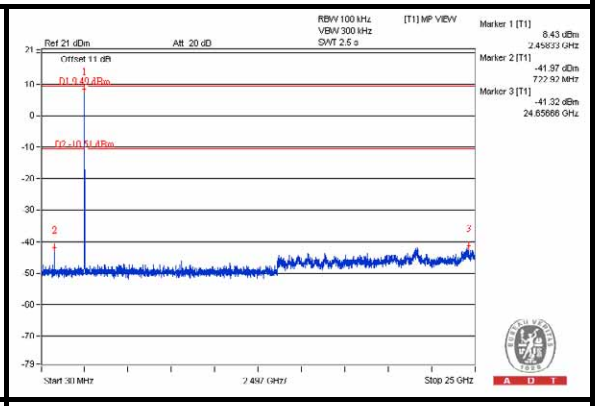

## Chain(1) : CH 6



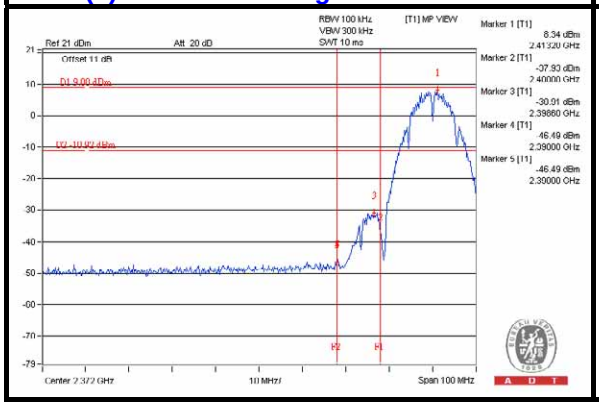




## Chain(1) : CH 11

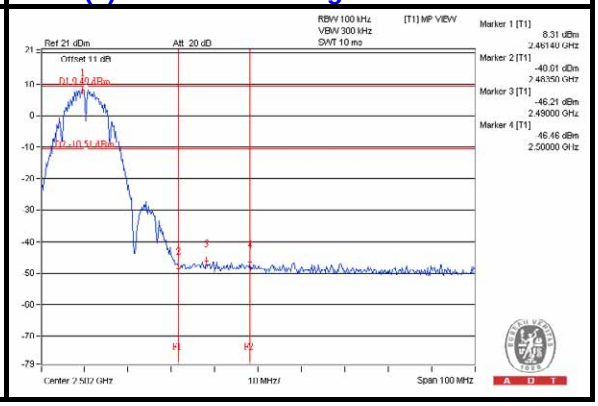



## Chain(1) : CH 1 Band edge

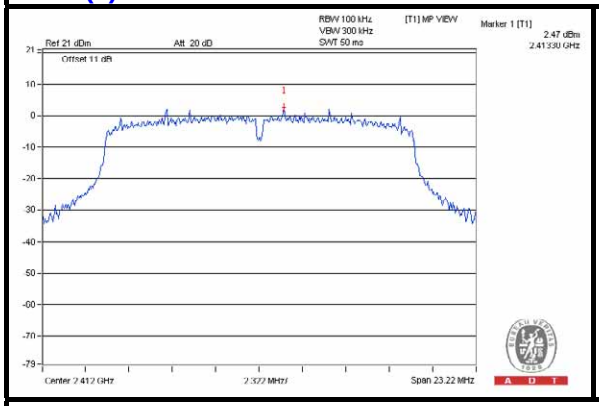


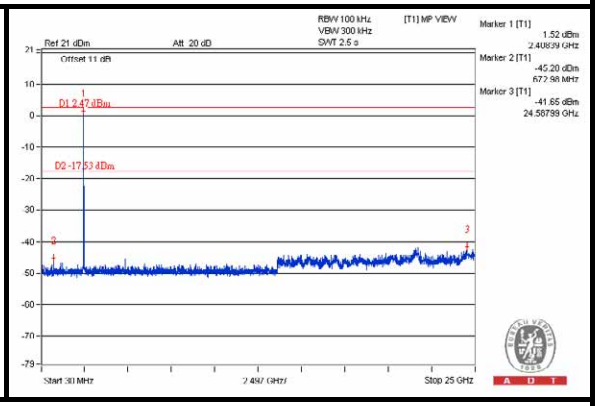

## Chain(1) : CH 11 Band edge



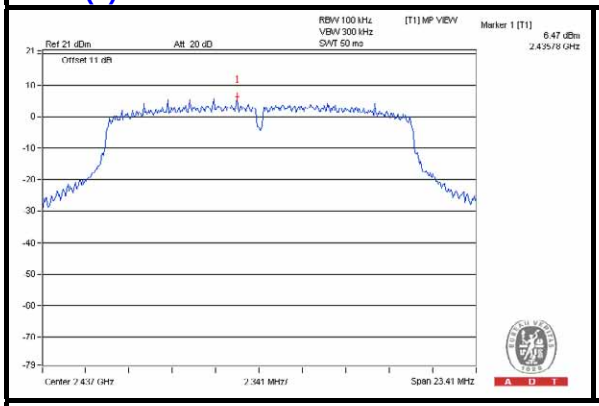
## 802.11g

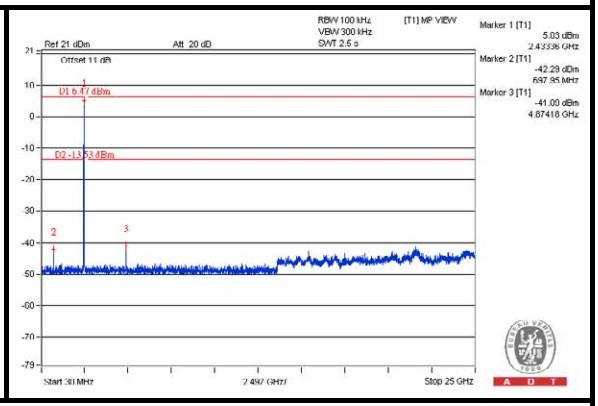
### Chain(0) : CH 1



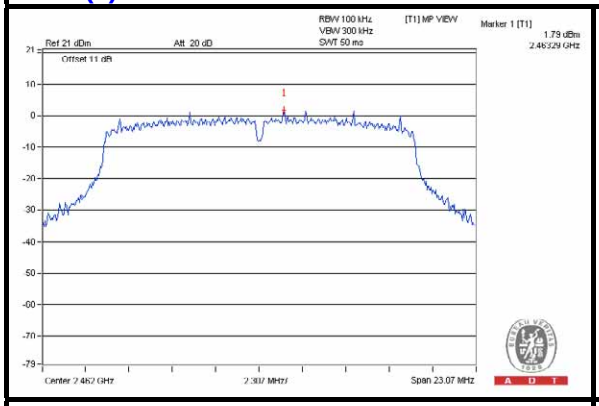



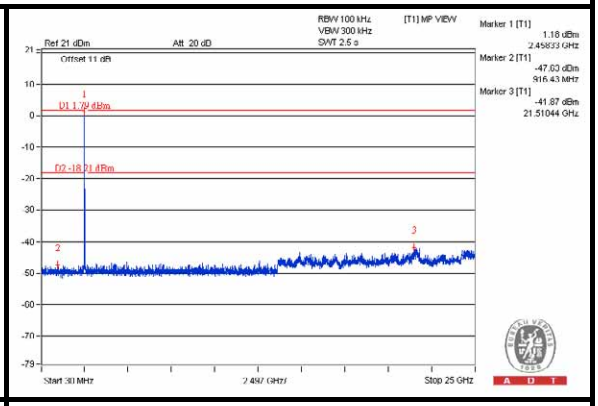

### Chain(0) : CH 6



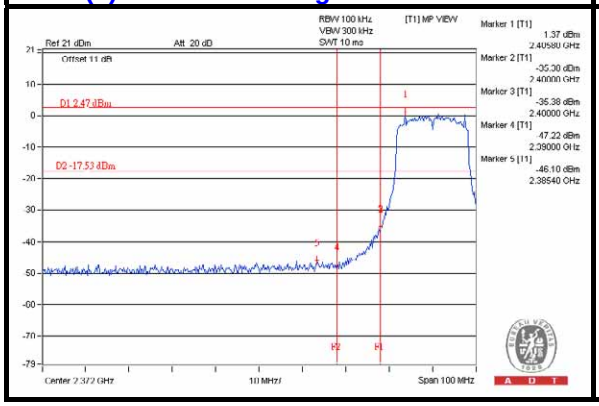




### Chain(0) : CH 11

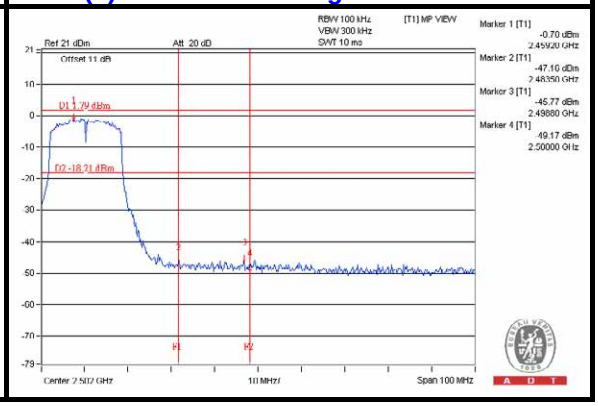


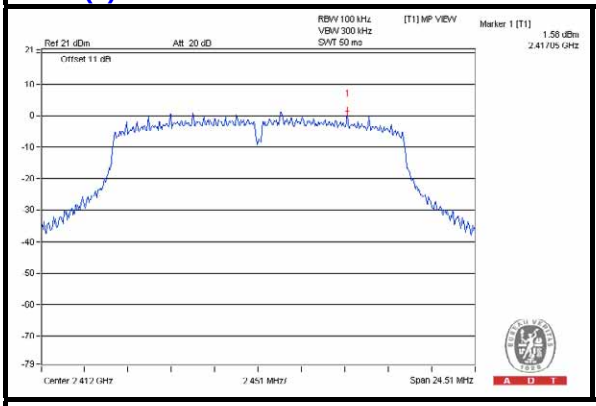

### Chain(0) : CH 1 Band edge

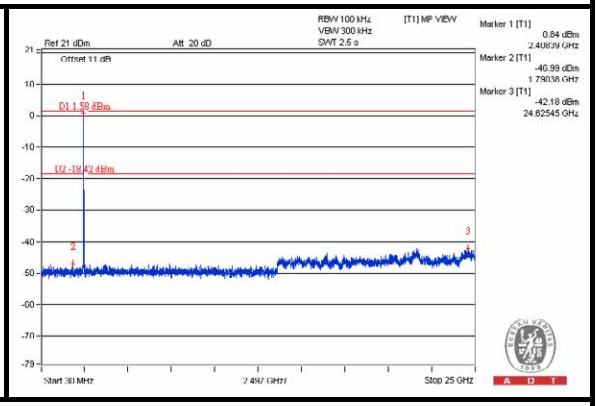



### Chain(0) : CH 11 Band edge

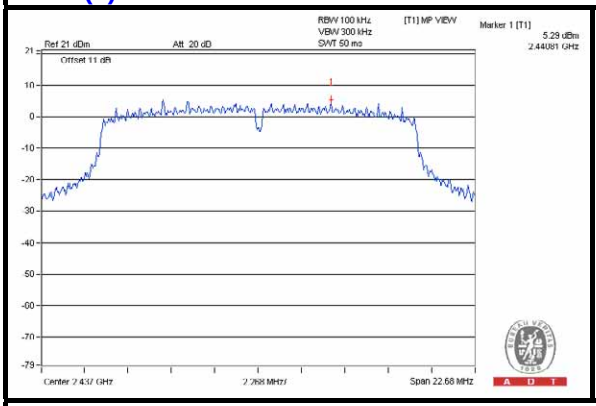


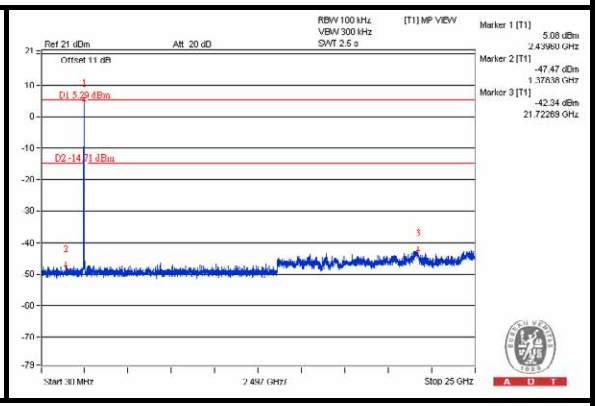
## Chain(1) : CH 1



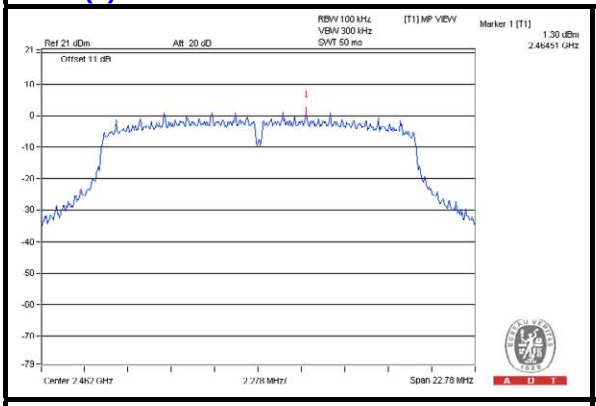



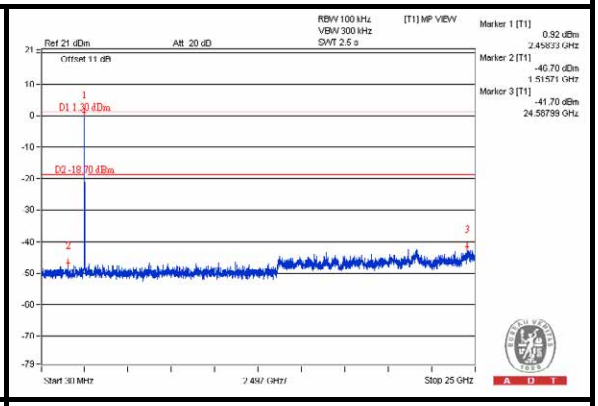

## Chain(1) : CH 6



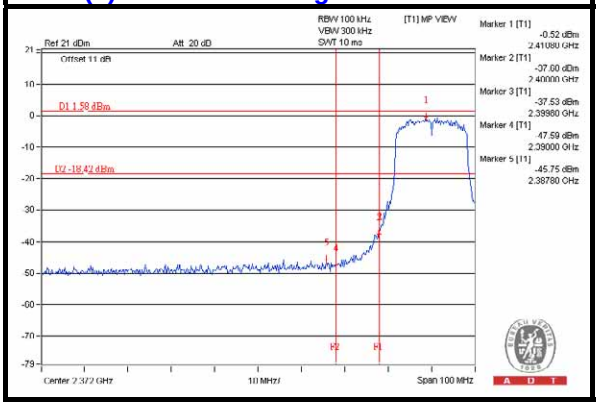




## Chain(1) : CH 11

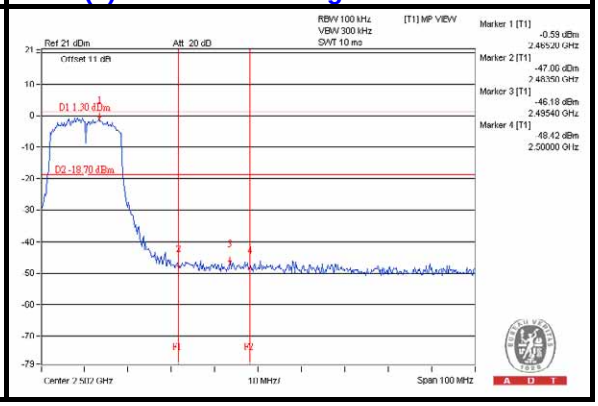



## Chain(1) : CH 1 Band edge

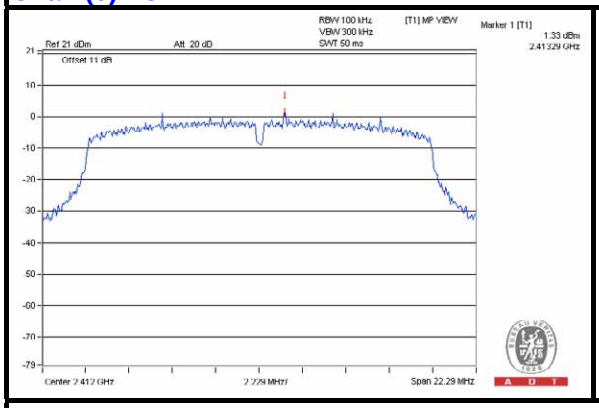


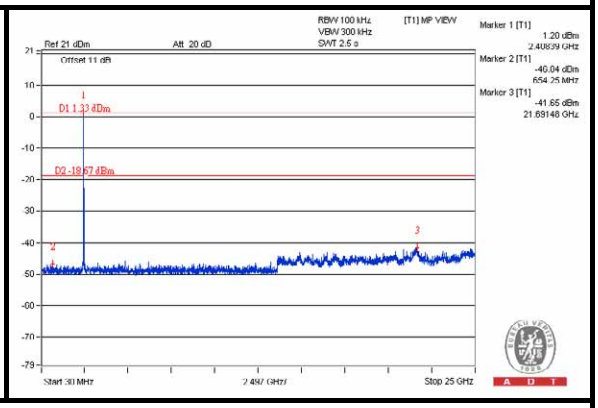

## Chain(1) : CH 11 Band edge



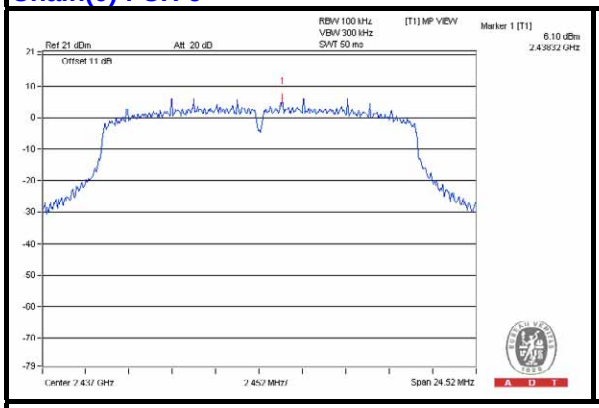
## VHT20

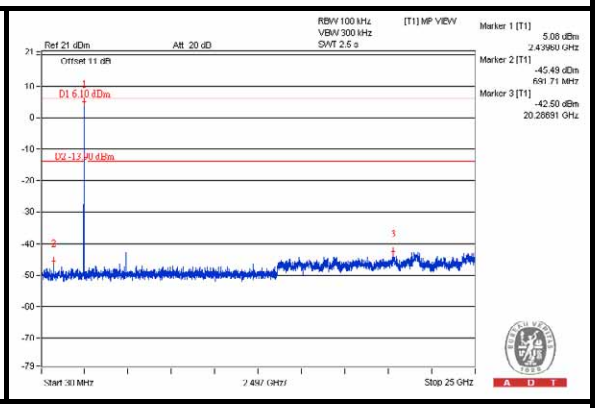
### Chain(0) : CH 1



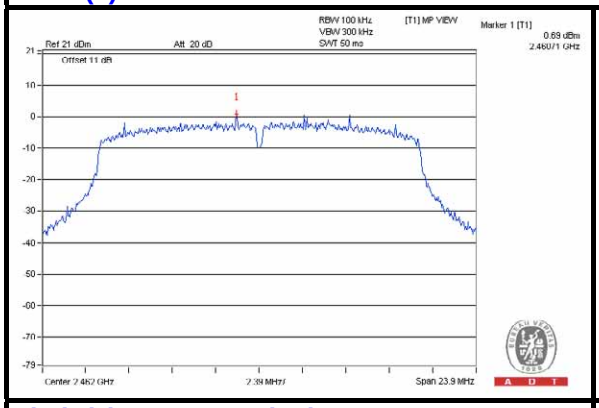



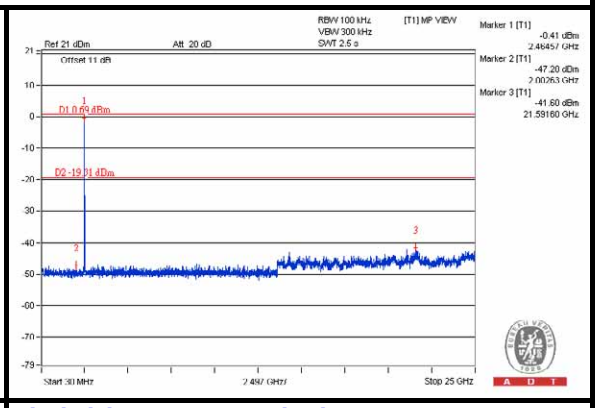

### Chain(0) : CH 6



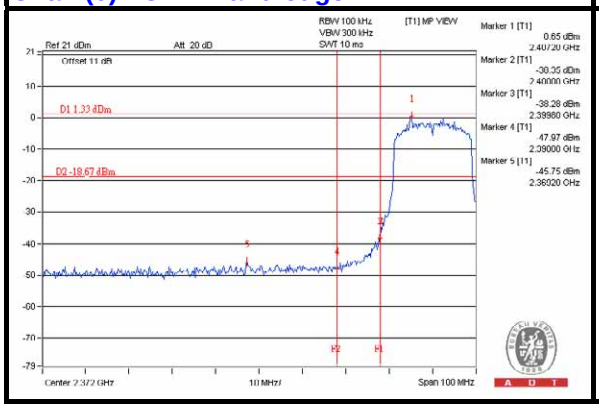




### Chain(0) : CH 11

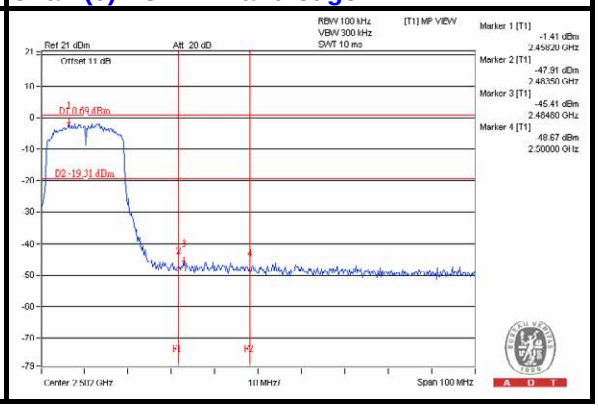


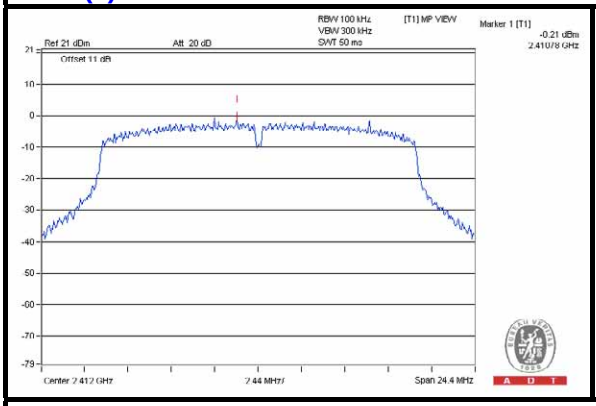

### Chain(0) : CH 1 Band edge

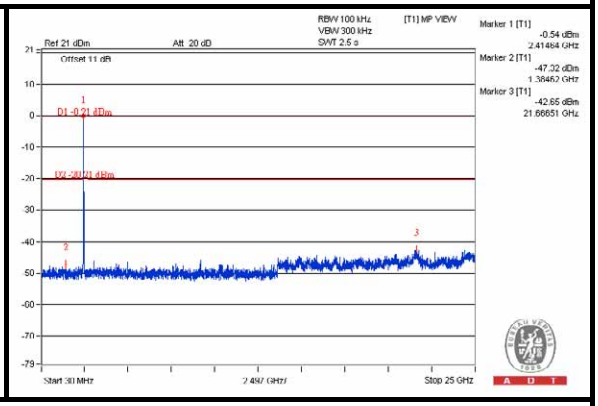



### Chain(0) : CH 11 Band edge

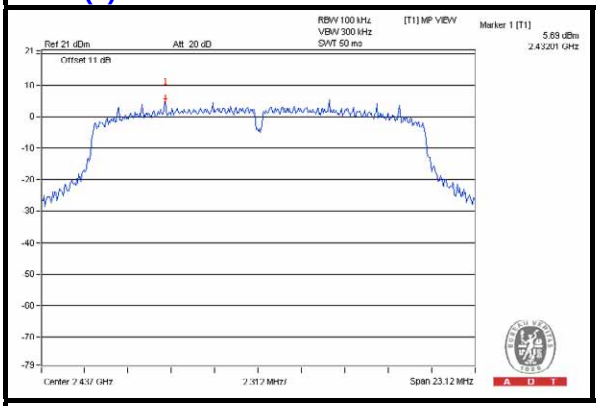


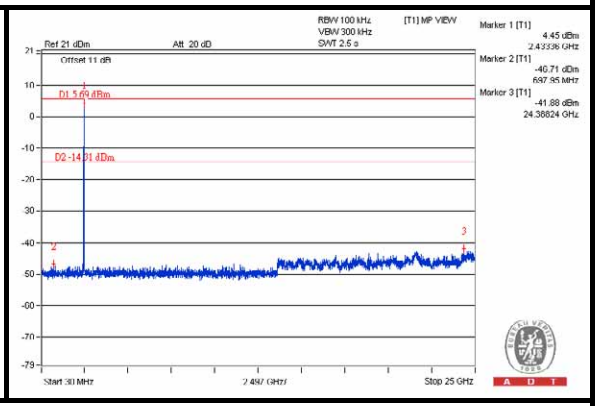
## Chain(1) : CH 1



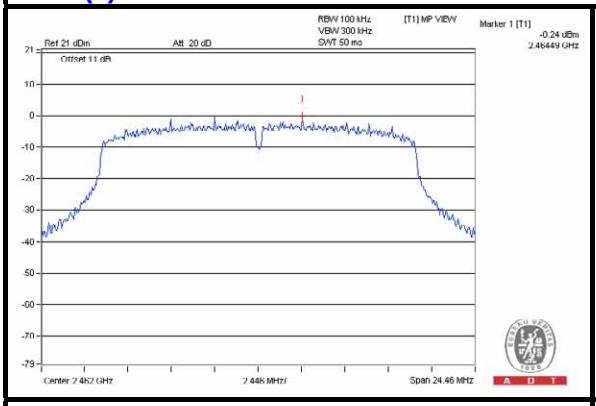



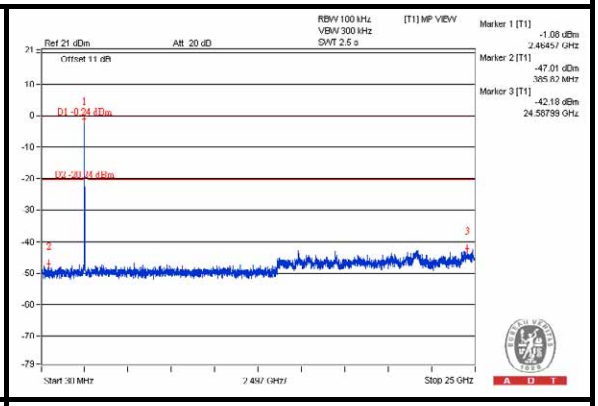

## Chain(1) : CH 6



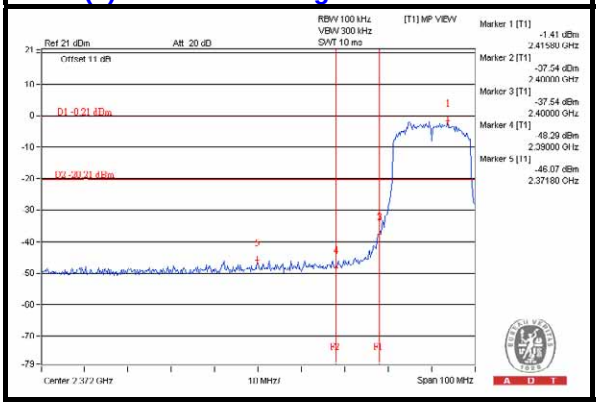




## Chain(1) : CH 11

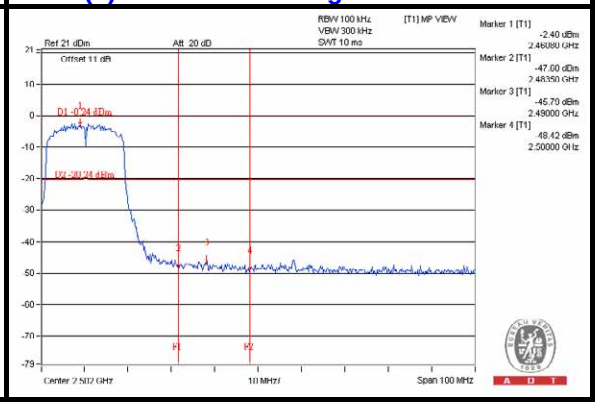



## Chain(1) : CH 1 Band edge

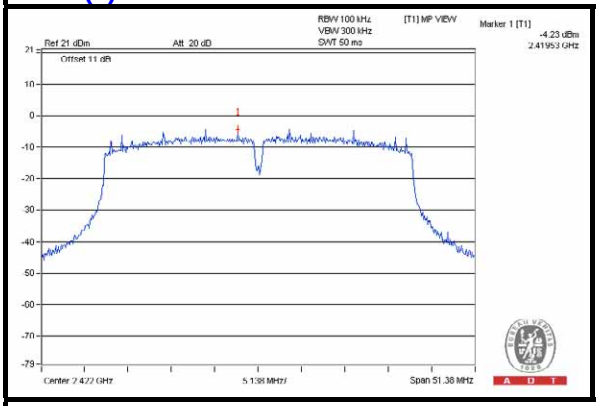


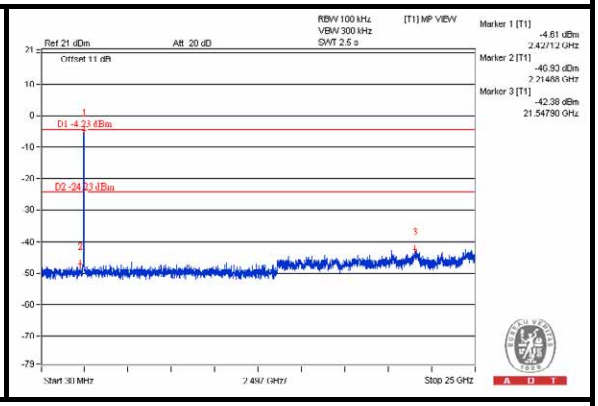

## Chain(1) : CH 11 Band edge



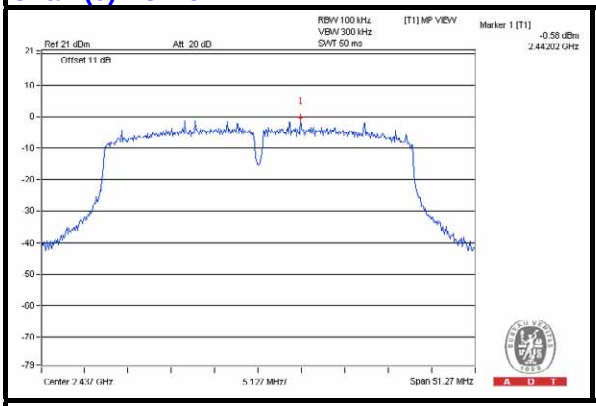
## VHT40

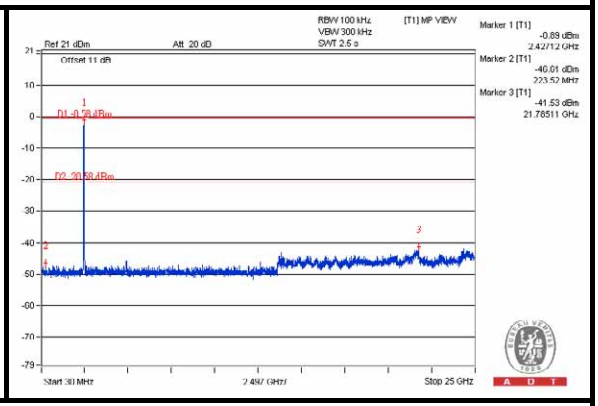
### Chain(0) : CH 3



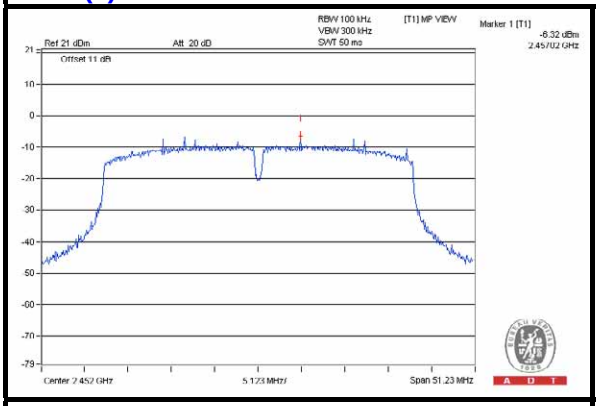



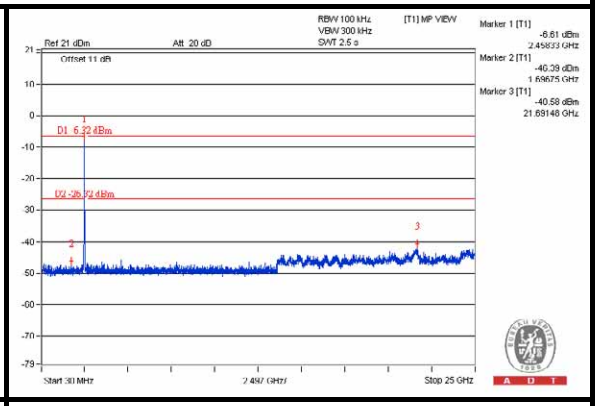

### Chain(0) : CH 6



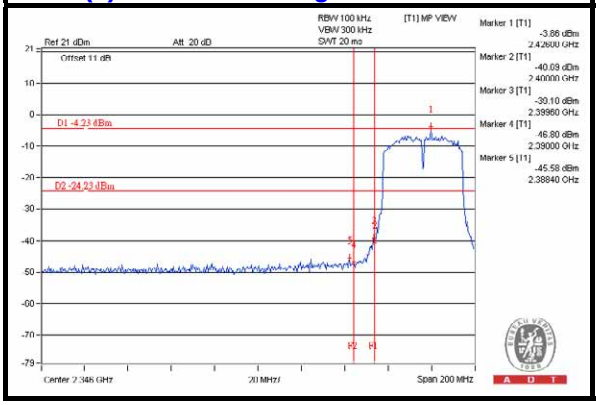




### Chain(0) : CH 9

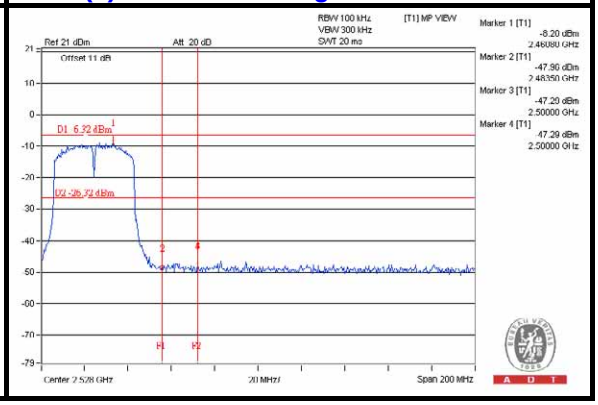


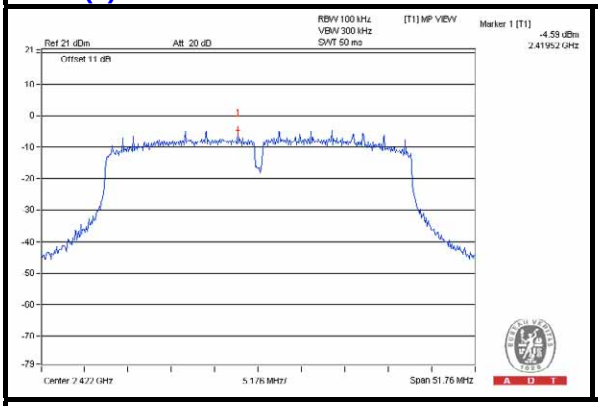

### Chain(0) : CH 3 Band edge

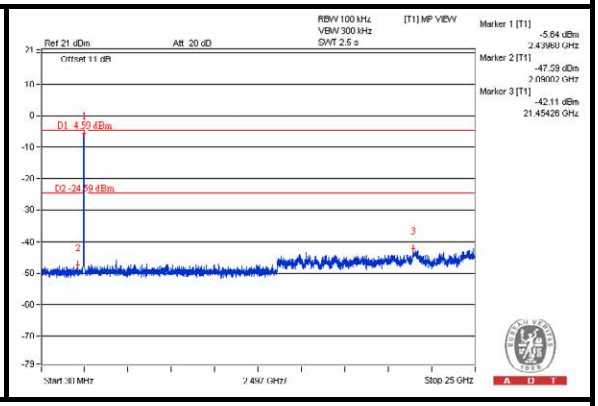



### Chain(0) : CH 9 Band edge

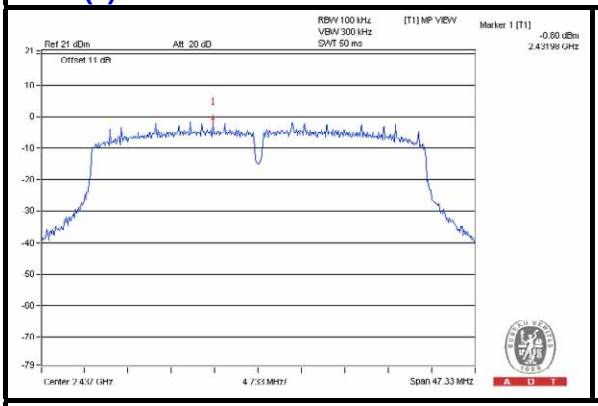


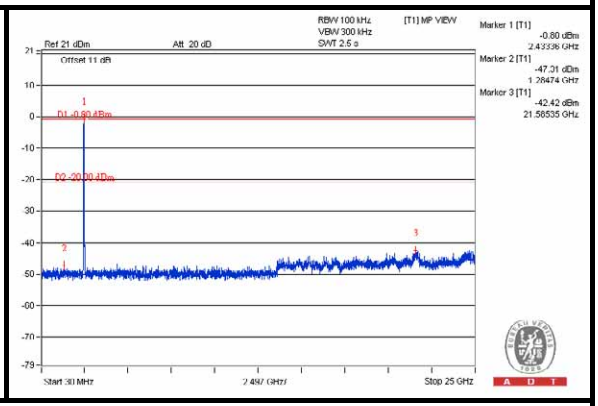
## Chain(1) : CH 3



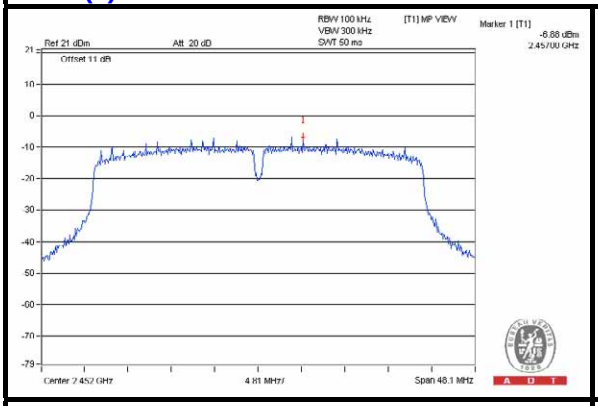



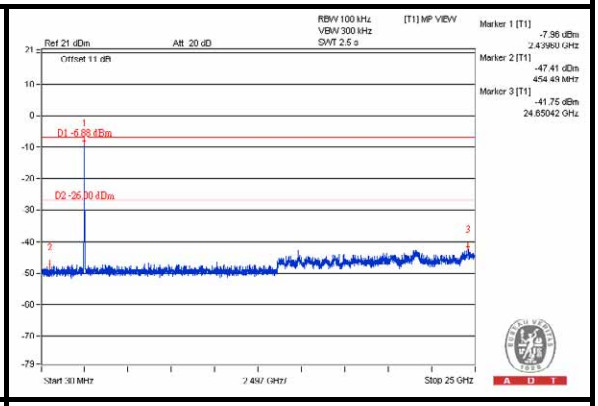

## Chain(1) : CH 6



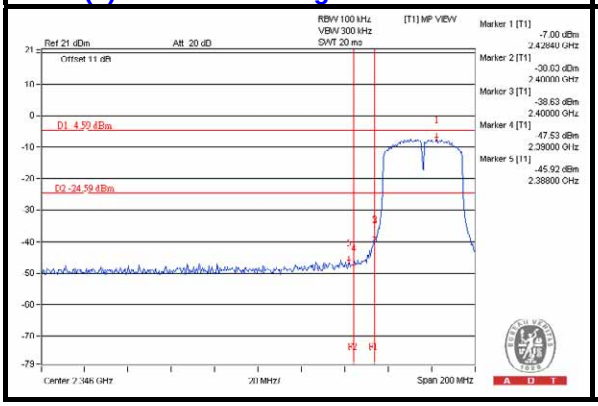




## Chain(1) : CH 9

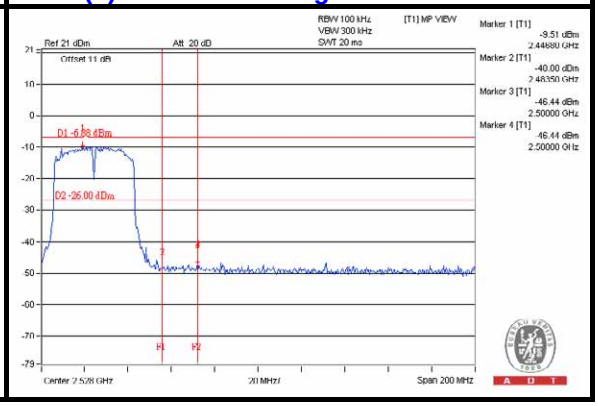



## Chain(1) : CH 3 Band edge




## Chain(1) : CH 9 Band edge



## 4.5 UNWANTED EMISSION MEASUREMENT(RADIATED VERSUS CONDUCTED)

### 4.5.1 LIMITS OF UNWANTED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

**NOTE**:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

## 4.5.2 TEST INSTRUMENTS

**Below 1GHz test**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| MXE EMI Receiver Agilent | N9038A | MY51210105 | July 21, 2014 | July 20, 2015 |
| Pre-Amplifier Mini-Circuits | ZFL-1000VH2 B | AMP-ZFL-03 | Nov. 13, 2013 | Nov. 12, 2014 |
| Trilog Broadband Antenna SCHWARZBECK | VULB 9168 | 9168-360 | Feb. 26, 2014 | Feb. 25, 2015 |
| RF Cable | NA | CHGCAB_001 | Oct. 05, 2013 | Oct. 04, 2014 |
| Horn_Antenna AISI | AIH.8018 | 0000320091110 | Aug. 27, 2014 | Aug. 26, 2015 |
| Pre-Amplifier Agilent | 8449B | 3008A02578 | June 24, 2014 | June 23, 2015 |
| RF Cable | NA | 131205<br>131214<br>SNMY23684/4 | Jan. 17, 2014 | Jan. 16, 2015 |
| Spectrum Analyzer R&S | FSV40 | 100964 | July 05, 2014 | July 04, 2015 |
| Pre-Amplifier SPACEK LABS | SLKKa-48-6 | 9K16 | Nov. 13, 2013 | Nov. 12, 2014 |
| Horn_Antenna SCHWARZBECK | BBHA 9170 | 9170-424 | Aug. 26, 2014 | Aug. 25, 2015 |
| RF Cable | NA | RF104-121<br>RF104-204 | Dec. 12, 2013 | Dec. 11, 2014 |
| 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: Aug. 27, 2014

**Above 1GHz test**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| MXE EMI Receiver Agilent | N9038A | MY50010156 | Aug. 11, 2014 | Aug. 10, 2015 |
| Pre-Amplifier Mini-Circuits | ZFL-1000VH2 B | AMP-ZFL-04 | Nov. 13, 2013 | Nov. 12, 2014 |
| Trilog Broadband Antenna SCHWARZBECK | VULB 9168 | 9168-361 | Feb. 27, 2014 | Feb. 26, 2015 |
| RF Cable | NA | CHHCAB_001 | Oct. 06, 2013 | Oct. 05, 2014 |
| Horn_Antenna AISI | AIH.8018 | 0000220091110 | Aug. 26, 2014 | Aug. 25, 2015 |
| Pre-Amplifier Agilent | 8449B | 3008A01923 | Oct. 29, 2013 | Oct. 28, 2014 |
| RF Cable | NA | 131206<br>131215<br>SNMY23685/4 | Jan. 17, 2014 | Jan. 16, 2015 |
| Spectrum Analyzer R&S | FSV40 | 100964 | July 05, 2014 | July 04, 2015 |
| Pre-Amplifier SPACEK LABS | SLKKa-48-6 | 9K16 | Nov. 13, 2013 | Nov. 12, 2014 |
| Horn_Antenna SCHWARZBECK | BBHA 9170 | 9170-424 | Aug. 26, 2014 | Aug. 25, 2015 |
| RF Cable | NA | RF104-121<br>RF104-204 | Dec. 12, 2013 | Dec. 11, 2014 |
| Software | ADT_Radiated _V8.7.07 | 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. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Aug. 28, 2014

### 4.5.3 TEST PROCEDURES

Following FCC KDB 558074 D01 DTS Meas. Guidance :
Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.

The following steps was performed:

a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.

b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT

c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

d. EIRP adjustments for multiple outputs. (Follow the procedures specified in FCC KDB Publication 662911)

e. For all of Radiation emission test

e-1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

e-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

e-3. 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.

e-4. 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-5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

e-6. 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 Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

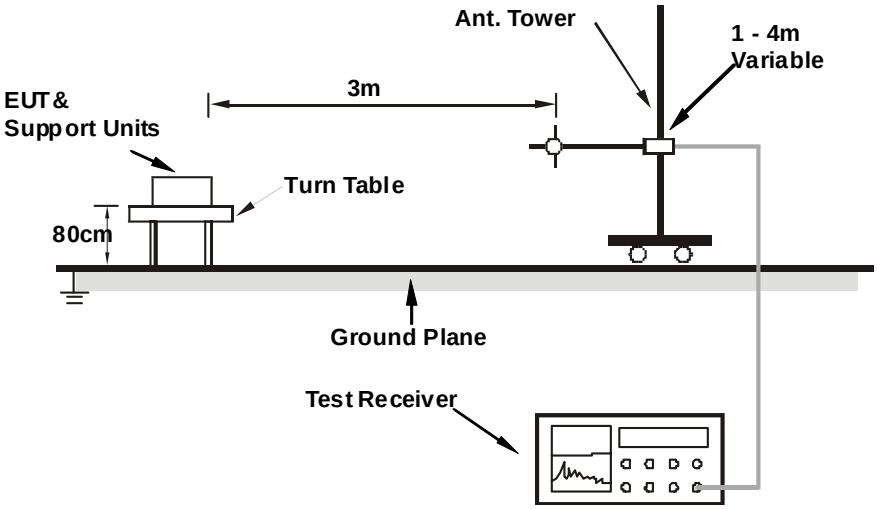
### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

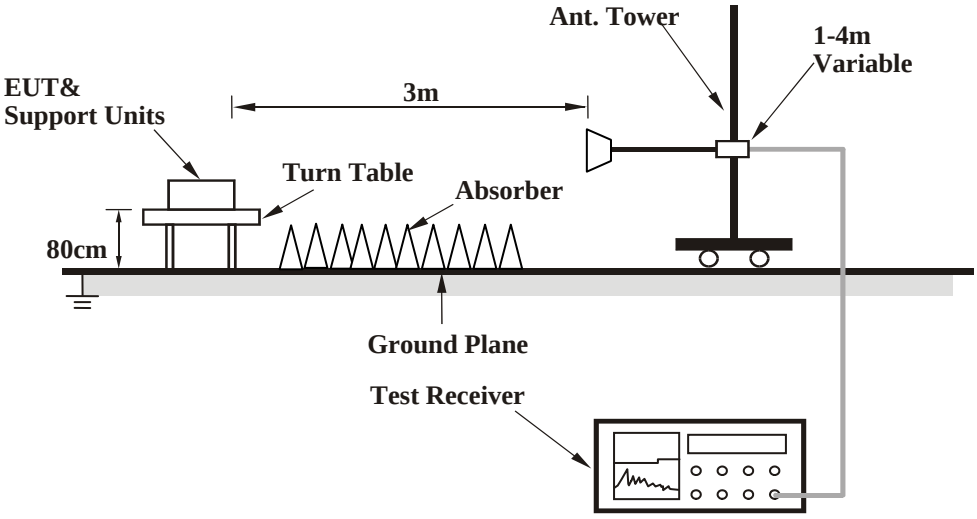
## 4.5.5 TEST SETUP

**For radiated configuration:**

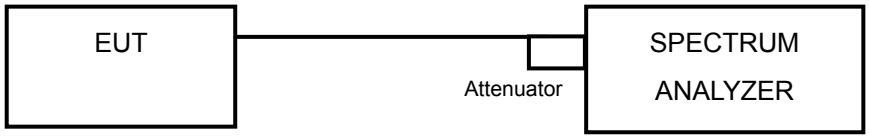
**<Frequency Range below 1GHz>**




**<Frequency Range above 1GHz>**




**For conducted configuration:**




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

### 4.5.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “QCRT Version: 3.0.29.0” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

## 4.5.7 TEST RESULTS (RADIATED MEASUREMENT)

| Radiated versus Conducted Measurement | |
|---|---|
| ☐ Conducted measurement | ☒ Radiated measurement |

For Radiated measurement:

The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)

For Conducted measurement:

The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).

**Radiated test was done with 50ohm terminator on antenna port**

**BELOW 1GHz WORST-CASE DATA**

**802.11g**

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | 89.41 | 33.3 QP | 43.5 | -10.2 | 2.00 H | 115 | 52.46 | -19.12 |
| 2 | 166.00 | 30.8 QP | 43.5 | -12.7 | 1.50 H | 223 | 44.28 | -13.49 |
| 3 | 255.09 | 38.0 QP | 46.0 | -8.0 | 1.00 H | 115 | 52.08 | -14.12 |
| 4 | 328.43 | 37.4 QP | 46.0 | -8.6 | 1.00 H | 145 | 48.91 | -11.49 |
| 5 | 666.51 | 36.1 QP | 46.0 | -9.9 | 1.00 H | 131 | 40.11 | -3.99 |
| 6 | 945.83 | 35.7 QP | 46.0 | -10.3 | 1.50 H | 306 | 34.72 | 0.96 |
| **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** | **32.96** | **33.7 QP** | **40.0** | **-6.3** | **1.00 V** | **345** | **48.13** | **-14.41** |
| 2 | 85.73 | 32.6 QP | 40.0 | -7.4 | 1.00 V | 89 | 51.56 | -19.00 |
| 3 | 166.04 | 33.1 QP | 43.5 | -10.4 | 1.00 V | 247 | 46.58 | -13.49 |
| 4 | 335.70 | 34.8 QP | 46.0 | -11.2 | 1.50 V | 156 | 46.11 | -11.35 |
| 5 | 666.47 | 34.8 QP | 46.0 | -11.2 | 1.00 V | 289 | 38.83 | -3.99 |
| 6 | 940.68 | 30.9 QP | 46.0 | -15.1 | 1.50 V | 354 | 30.03 | 0.86 |

**REMARKS:**

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

## ABOVE 1GHz DATA

### 802.11b

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 1 | **DETECTOR FUNCTION** | Peak (PK)<br>Average (AV) |
| **FREQUENCY RANGE** | 1GHz ~ 25GHz | | |

| 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 | 4824.00 | 53.1 PK | 74.0 | -20.9 | 1.53 H | 276 | 49.68 | 3.42 |
| 2 | 4824.00 | 47.0 AV | 54.0 | -7.0 | 1.53 H | 276 | 43.58 | 3.42 |
| **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 | 4824.00 | 52.2 PK | 74.0 | -21.8 | 1.19 V | 303 | 48.78 | 3.42 |
| 2 | 4824.00 | 47.3 AV | 54.0 | -6.7 | 1.19 V | 303 | 43.88 | 3.42 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4874.00 | 53.5 PK | 74.0 | -20.5 | 1.52 H | 258 | 50.10 | 3.40 |
| 2 | 4874.00 | 47.3 AV | 54.0 | -6.7 | 1.52 H | 258 | 43.90 | 3.40 |
| 3 | 7311.00 | 54.8 PK | 74.0 | -19.2 | 1.04 H | 281 | 47.04 | 7.76 |
| 4 | 7311.00 | 40.8 AV | 54.0 | -13.2 | 1.04 H | 281 | 33.04 | 7.76 |
| 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 | 4874.00 | 52.0 PK | 74.0 | -22.0 | 1.22 V | 311 | 48.60 | 3.40 |
| 2 | 4874.00 | 47.5 AV | 54.0 | -6.5 | 1.22 V | 311 | 44.10 | 3.40 |
| 3 | 7311.00 | 54.6 PK | 74.0 | -19.4 | 1.07 V | 47 | 46.84 | 7.76 |
| 4 | 7311.00 | 41.0 AV | 54.0 | -13.0 | 1.07 V | 47 | 33.24 | 7.76 |

**REMARKS:**

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

| CHANNEL | TX Channel 11 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4924.00 | 53.3 PK | 74.0 | -20.7 | 1.49 H | 261 | 49.91 | 3.39 |
| 2 | 4924.00 | 47.1 AV | 54.0 | -6.9 | 1.49 H | 261 | 43.71 | 3.39 |
| 3 | 7386.00 | 54.5 PK | 74.0 | -19.5 | 1.03 H | 286 | 46.45 | 8.05 |
| 4 | 7386.00 | 40.7 AV | 54.0 | -13.3 | 1.03 H | 286 | 32.65 | 8.05 |
| 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 | 4924.00 | 51.1 PK | 74.0 | -22.9 | 1.27 V | 306 | 47.71 | 3.39 |
| 2 | 4924.00 | 46.7 AV | 54.0 | -7.3 | 1.27 V | 306 | 43.31 | 3.39 |
| 3 | 7386.00 | 54.8 PK | 74.0 | -19.2 | 1.04 V | 23 | 46.75 | 8.05 |
| 4 | 7386.00 | 41.5 AV | 54.0 | -12.5 | 1.04 V | 23 | 33.45 | 8.05 |

**REMARKS:**

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

## 802.11g

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 1 | **DETECTOR FUNCTION** | Peak (PK)<br>Average (AV) |
| **FREQUENCY RANGE** | 1GHz ~ 25GHz | | |

| 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 | 4824.00 | 45.9 PK | 74.0 | -28.1 | 1.02 H | 233 | 42.48 | 3.42 |
| 2 | 4824.00 | 32.6 AV | 54.0 | -21.4 | 1.02 H | 233 | 29.18 | 3.42 |
| **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 | 4824.00 | 47.0 PK | 74.0 | -27.0 | 1.00 V | 49 | 43.58 | 3.42 |
| 2 | 4824.00 | 33.6 AV | 54.0 | -20.4 | 1.00 V | 49 | 30.18 | 3.42 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4874.00 | 46.2 PK | 74.0 | -27.8 | 1.00 H | 241 | 42.80 | 3.40 |
| 2 | 4874.00 | 33.0 AV | 54.0 | -21.0 | 1.00 H | 241 | 29.60 | 3.40 |
| 3 | 7311.00 | 54.3 PK | 74.0 | -19.7 | 1.04 H | 297 | 46.54 | 7.76 |
| 4 | 7311.00 | 40.3 AV | 54.0 | -13.7 | 1.04 H | 297 | 32.54 | 7.76 |
| **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 | 4874.00 | 47.0 PK | 74.0 | -27.0 | 1.00 V | 48 | 43.60 | 3.40 |
| 2 | 4874.00 | 33.5 AV | 54.0 | -20.5 | 1.00 V | 48 | 30.10 | 3.40 |
| 3 | 7311.00 | 54.0 PK | 74.0 | -20.0 | 1.00 V | 53 | 46.24 | 7.76 |
| 4 | 7311.00 | 40.2 AV | 54.0 | -13.8 | 1.00 V | 53 | 32.44 | 7.76 |

**REMARKS:**

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

| CHANNEL | TX Channel 11 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4924.00 | 46.1 PK | 74.0 | -27.9 | 1.00 H | 258 | 42.71 | 3.39 |
| 2 | 4924.00 | 32.7 AV | 54.0 | -21.3 | 1.00 H | 258 | 29.31 | 3.39 |
| 3 | 7386.00 | 54.4 PK | 74.0 | -19.6 | 1.00 H | 305 | 46.35 | 8.05 |
| 4 | 7386.00 | 40.4 AV | 54.0 | -13.6 | 1.00 H | 305 | 32.35 | 8.05 |
| 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 | 4924.00 | 47.2 PK | 74.0 | -26.8 | 1.04 V | 30 | 43.81 | 3.39 |
| 2 | 4924.00 | 33.6 AV | 54.0 | -20.4 | 1.04 V | 30 | 30.21 | 3.39 |
| 3 | 7386.00 | 54.3 PK | 74.0 | -19.7 | 1.00 V | 64 | 46.25 | 8.05 |
| 4 | 7386.00 | 40.7 AV | 54.0 | -13.3 | 1.00 V | 64 | 32.65 | 8.05 |

**REMARKS:**

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

## VHT20

| CHANNEL | TX Channel 1 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4824.00 | 46.1 PK | 74.0 | -27.9 | 1.05 H | 254 | 42.68 | 3.42 |
| 2 | 4824.00 | 32.8 AV | 54.0 | -21.2 | 1.05 H | 254 | 29.38 | 3.42 |
| **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 | 4824.00 | 47.7 PK | 74.0 | -26.3 | 1.01 V | 41 | 44.28 | 3.42 |
| 2 | 4824.00 | 34.2 AV | 54.0 | -19.8 | 1.01 V | 41 | 30.78 | 3.42 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4874.00 | 46.3 PK | 74.0 | -27.7 | 1.00 H | 243 | 42.90 | 3.40 |
| 2 | 4874.00 | 32.6 AV | 54.0 | -21.4 | 1.00 H | 243 | 29.20 | 3.40 |
| 3 | 7311.00 | 54.5 PK | 74.0 | -19.5 | 1.01 H | 301 | 46.74 | 7.76 |
| 4 | 7311.00 | 40.5 AV | 54.0 | -13.5 | 1.01 H | 301 | 32.74 | 7.76 |
| 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 | 4874.00 | 47.8 PK | 74.0 | -26.2 | 1.04 V | 38 | 44.40 | 3.40 |
| 2 | 4874.00 | 34.2 AV | 54.0 | -19.8 | 1.04 V | 38 | 30.80 | 3.40 |
| 3 | 7311.00 | 54.5 PK | 74.0 | -19.5 | 1.04 V | 42 | 46.74 | 7.76 |
| 4 | 7311.00 | 40.8 AV | 54.0 | -13.2 | 1.04 V | 42 | 33.04 | 7.76 |

**REMARKS:**

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

| CHANNEL | TX Channel 11 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4924.00 | 46.2 PK | 74.0 | -27.8 | 1.02 H | 254 | 42.81 | 3.39 |
| 2 | 4924.00 | 32.9 AV | 54.0 | -21.1 | 1.02 H | 254 | 29.51 | 3.39 |
| 3 | 7386.00 | 54.7 PK | 74.0 | -19.3 | 1.03 H | 288 | 46.65 | 8.05 |
| 4 | 7386.00 | 40.7 AV | 54.0 | -13.3 | 1.03 H | 288 | 32.65 | 8.05 |
| 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 | 4924.00 | 47.8 PK | 74.0 | -26.2 | 1.02 V | 31 | 44.41 | 3.39 |
| 2 | 4924.00 | 33.9 AV | 54.0 | -20.1 | 1.02 V | 31 | 30.51 | 3.39 |
| 3 | 7386.00 | 54.6 PK | 74.0 | -19.4 | 1.00 V | 46 | 46.55 | 8.05 |
| 4 | 7386.00 | 40.9 AV | 54.0 | -13.1 | 1.00 V | 46 | 32.85 | 8.05 |

**REMARKS:**

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

## VHT40

| CHANNEL | TX Channel 3 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | |

| 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 | 4844.00 | 46.2 PK | 74.0 | -27.8 | 1.00 H | 246 | 42.79 | 3.41 |
| 2 | 4844.00 | 32.9 AV | 54.0 | -21.1 | 1.00 H | 246 | 29.49 | 3.41 |
| 3 | 7266.00 | 54.5 PK | 74.0 | -19.5 | 1.00 H | 301 | 46.92 | 7.58 |
| 4 | 7266.00 | 40.3 AV | 54.0 | -13.7 | 1.00 H | 301 | 32.72 | 7.58 |
| **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 | 4844.00 | 47.2 PK | 74.0 | -26.8 | 1.00 V | 46 | 43.79 | 3.41 |
| 2 | 4844.00 | 33.4 AV | 54.0 | -20.6 | 1.00 V | 46 | 29.99 | 3.41 |
| 3 | 7266.00 | 54.4 PK | 74.0 | -19.6 | 1.00 V | 42 | 46.82 | 7.58 |
| 4 | 7266.00 | 40.5 AV | 54.0 | -13.5 | 1.00 V | 42 | 32.92 | 7.58 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4874.00 | 46.3 PK | 74.0 | -27.7 | 1.00 H | 238 | 42.90 | 3.40 |
| 2 | 4874.00 | 32.9 AV | 54.0 | -21.1 | 1.00 H | 238 | 29.50 | 3.40 |
| 3 | 7311.00 | 54.5 PK | 74.0 | -19.5 | 1.00 H | 308 | 46.74 | 7.76 |
| 4 | 7311.00 | 40.7 AV | 54.0 | -13.3 | 1.00 H | 308 | 32.94 | 7.76 |
| 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 | 4874.00 | 47.4 PK | 74.0 | -26.6 | 1.06 V | 37 | 44.00 | 3.40 |
| 2 | 4874.00 | 33.9 AV | 54.0 | -20.1 | 1.06 V | 37 | 30.50 | 3.40 |
| 3 | 7311.00 | 54.4 PK | 74.0 | -19.6 | 1.00 V | 45 | 46.64 | 7.76 |
| 4 | 7311.00 | 40.7 AV | 54.0 | -13.3 | 1.00 V | 45 | 32.94 | 7.76 |

**REMARKS:**

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

| CHANNEL | TX Channel 9 | DETECTOR FUNCTION | Peak (PK) |
|---|---|---|---|
| FREQUENCY RANGE | 1GHz ~ 25GHz | | 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 | 4904.00 | 46.1 PK | 74.0 | -27.9 | 1.02 H | 252 | 42.71 | 3.39 |
| 2 | 4904.00 | 32.6 AV | 54.0 | -21.4 | 1.02 H | 252 | 29.21 | 3.39 |
| 3 | 7356.00 | 54.0 PK | 74.0 | -20.0 | 1.02 H | 299 | 46.06 | 7.94 |
| 4 | 7356.00 | 39.9 AV | 54.0 | -14.1 | 1.02 H | 299 | 31.96 | 7.94 |
| 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 | 4904.00 | 47.4 PK | 74.0 | -26.6 | 1.00 V | 37 | 44.01 | 3.39 |
| 2 | 4904.00 | 33.5 AV | 54.0 | -20.5 | 1.00 V | 37 | 30.11 | 3.39 |
| 3 | 7356.00 | 54.3 PK | 74.0 | -19.7 | 1.06 V | 65 | 46.36 | 7.94 |
| 4 | 7356.00 | 40.8 AV | 54.0 | -13.2 | 1.06 V | 65 | 32.86 | 7.94 |

**REMARKS:**

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