# FCC Test Report

| | |
|---|---|
| **Report No.:** | RF150415D03 |
| **FCC ID:** | PY315200306 |
| **Test Model:** | D7000 |
| **Received Date:** | Apr. 15, 2015 |
| **Test Date:** | Apr. 20 ~ May 15, 2015 |
| **Issued Date:** | May 18, 2015 |
| **Applicant:** | NETGEAR INC. |
| **Address:** | 350 East Plumeria Drive, San Jose, CA 95134, USA |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **Lab Address:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.) |

## Table of Contents

## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF150415D03 | Original release. | May 18, 2015 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | AC1900 WiFi VDSL/ADSL Modem Router |
| **Brand:** | NETGEAR |
| **Test Model:** | D7000 |
| **Sample Status:** | Engineering sample |
| **Applicant:** | NETGEAR INC. |
| **Test Date:** | Apr. 20 ~ May 15, 2015 |
| **Standards:** | 47 CFR FCC Part 15, Subpart C (Section 15.247)<br>ANSI C63.10:2009 |

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** _____ , **Date:** May 18, 2015

Celia Chen / Senior Specialist

**Approved by :** _____ , **Date:** May 18, 2015

Rex Lai / Assistant Manager

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (SECTION 15.247) | | | |
|---|---|---|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -10.86dB at 0.55625MHz. |
| 15.205 / 15.209 / 15.247(d) | Radiated Emissions and Band Edge Measurement | PASS | Meet the requirement of limit. Minimum passing margin is -0.4dB at 2390.00MHz, 2483.50MHz. |
| 15.247(d) | Antenna Port Emission | PASS | Meet the requirement of limit. |
| 15.247(a)(2) | 6dB bandwidth | PASS | Meet the requirement of limit. |
| 15.247(b) | Conducted 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 R-SMA not a standard connector. |

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Expended Uncertainty (k=2) (±) |
|---|---|---|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 3.43 dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 1000MHz | 4.00 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 40GHz | 3.36 dB |

### 2.2 Modification Record

There were no modifications required for compliance.

## 3 General Information

### 3.1 General Description of EUT

| | |
|---|---|
| Product | AC1900 WiFi VDSL/ADSL Modem Router |
| Brand | NETGEAR |
| Test Model | D7000 |
| Status of EUT | Engineering sample |
| Power Supply Rating | 12Vdc from Adapter |
| Modulation Type | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in 11ac mode only. |
| Modulation Technology | DSSS, OFDM |
| Transfer Rate | 802.11b:11/5.5/2/1Mbps<br>802.11a/g: 54/48/36/24/18/12/9/6Mbps<br>802.11n: up to 450Mbps<br>802.11ac: up to 1299.9Mbps |
| Operating Frequency | **2.4GHz:** 2412 ~ 2462MHz<br>**5.0GHz:** 5745 ~ 5825MHz |
| Number of Channel | **2.4GHz:** 11 for 802.11b, 802.11g, 802.11n (HT20)<br>7 for 802.11n (HT40)<br>**5.0GHz:** 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)<br>2 for 802.11n (HT40), 802.11ac (VHT40)<br>1 for 802.11ac (VHT80) |
| Output Power | **2.4GHz**<br>802.11b: 896.412mW<br>802.11g: 746.230mW<br>802.11n (HT20): 749.062mW<br>802.11n (HT40): 248.623mW<br>**5.0GHz**<br>**CDD Mode:**<br>802.11a: 920.667mW<br>**Beamforming Mode:**<br>802.11ac (VHT20): 810.096mW<br>802.11ac (VHT40): 824.373mW<br>802.11ac (VHT80): 430.303mW |
| Antenna Type | **2.4GHz:**<br>Dipole antenna with 1dBi gain<br>**5.0GHz:**<br>Dipole antenna with 2dBi gain |
| Antenna Connector | R-SMA connector |
| Accessory Device | Adapter |
| Data Cable Supplied | Non-shielded DC cable (1.8m)<br>Non-shielded RJ11 cable (1.5m)<br>Non-shielded RJ45 cable (1.5m) |

Note:

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

| Modulation Mode | TX Function | | |
|---|---|---|---|
| | 2.4GHz | 5.0GHz (Non-Beamforming) | 5.0GHz (Beamforming) |
| 802.11b | 3TX | - | - |
| 802.11g | 3TX | - | - |
| 802.11a | - | 3TX | - |
| 802.11n (HT20) | 3TX | 3TX | - |
| 802.11n (HT40) | 3TX | 3TX | - |
| 802.11ac (VHT20) | - | 3TX | 3TX |
| 802.11ac (VHT40) | - | 3TX | 3TX |
| 802.11ac (VHT80) | - | 3TX | 3TX |

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

2. The EUT uses following adapter.

| Adapter | 1 | 2 | 3 |
|---|---|---|---|
| Brand | NETGEAR | NETGEAR | NETGEAR |
| Model | AD898020 | AD898220 | AD898120 |
| AC Input Power | 100-240V, 50/60Hz, 1.0A | 100-240V, 50/60Hz, 1.0A | 100-240V, 50/60Hz, 1.0A |
| DC Output Power | 12V, 3.5A | 12V, 3.5A | 12V, 3.5A |
| Plug Type | EU Plug | UK Plug | AU Plug |
| The adapter 1-3 are identical with each other except for their plug type difference | | | |

| Adapter | 4 |
|---|---|
| Brand | NETGEAR |
| Model | MU42-3120350-A1 |
| AC Input Power | 100-240V, 50/60Hz, 1.5A |
| DC Output Power | 12V, 3.5A |
| Plug Type | US Plug |

| Adapter | 5 | 6 | 7 | 8 |
|---|---|---|---|---|
| Brand | NETGEAR | NETGEAR | NETGEAR | NETGEAR |
| Model | 2ABN42F NA | 2AAF042F GE | 2AAF042F AU | 2AAF042F UK |
| AC Input Power | 100-240V, 50/60Hz, 1.3A | 100-240V, 50/60Hz, 1.3A | 100-240V, 50/60Hz, 1.3A | 100-240V, 50/60Hz, 1.3A |
| DC Output Power | 12.0V, 3.5A | 12.0V, 3.5A | 12.0V, 3.5A | 12.0V, 3.5A |
| Plug Type | US Plug | EU Plug | AU Plug | UK Plug |
| The adapter 5-8 are identical with each other except for their plug type difference | | | | |

After pre-tested above adapters, **adapter 1** was selected as a representative one and therefore only its test data was recorded in this report.

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 Description of Test Modes

**FOR 2.4GHz:**

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

| 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 (HT40):

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

**FOR 5.0GHz (5745 ~ 5825MHz):**

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

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

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

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

1 channel is provided for 802.11ac (VHT80):

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

### 3.2.1 Test Mode Applicability and Tested Channel Detail

**FOR 2.4GHz:**

| 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

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

**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.

| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|---|
| - | 802.11b | 1 to 11 | 1, 6, 11 | DSSS | DBPSK | 1.0 |
| - | 802.11g | 1 to 11 | 1, 6, 11 | OFDM | BPSK | 6.0 |
| - | 802.11n (HT20) | 1 to 11 | 1, 6, 11 | OFDM | BPSK | 19.5 |
| - | 802.11n (HT40) | 3 to 9 | 3, 6, 9 | OFDM | BPSK | 40.5 |

**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.

| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|---|
| - | 802.11b | 1 to 11 | 6 | DSSS | DBPSK | 1.0 |

**Power Line Conducted Emission Test:**

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

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

| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|---|
| - | 802.11b | 1 to 11 | 6 | DSSS | DBPSK | 1.0 |

**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.

| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|---|
| - | 802.11b | 1 to 11 | 1, 11 | DSSS | DBPSK | 1.0 |
| - | 802.11g | 1 to 11 | 1, 11 | OFDM | BPSK | 6.0 |
| - | 802.11n (HT20) | 1 to 11 | 1, 11 | OFDM | BPSK | 19.5 |
| - | 802.11n (HT40) | 3 to 9 | 3, 9 | OFDM | BPSK | 40.5 |

**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.

| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|---|---|---|
| - | 802.11b | 1 to 11 | 1, 6, 11 | DSSS | DBPSK | 1.0 |
| - | 802.11g | 1 to 11 | 1, 6, 11 | OFDM | BPSK | 6.0 |
| - | 802.11n (HT20) | 1 to 11 | 1, 6, 11 | OFDM | BPSK | 19.5 |
| - | 802.11n (HT40) | 3 to 9 | 3, 6, 9 | OFDM | BPSK | 40.5 |

**Test Condition:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| RE≥1G | 24deg. C, 72%RH | 120Vac, 60Hz | Dalen Dai |
| RE<1G | 24deg. C, 72%RH | 120Vac, 60Hz | Dalen Dai |
| PLC | 22deg. C, 71%RH | 120Vac, 60Hz | Aaron You |
| APCM | 25deg. C, 60%RH | 120Vac, 60Hz | Saxon Lee |

## FOR 5.0 GHz (5745 ~ 5825MHz):

| 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

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

### Radiated Emission Test (Above 1GHz):

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

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

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.0 |
| **Beamforming MODE** | | | | | | |
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11ac (VHT20) | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 19.5 |
| - | 802.11ac (VHT40) | 151 to 159 | 151, 159 | OFDM | BPSK | 40.5 |
| - | 802.11ac (VHT80) | 155 | 155 | OFDM | BPSK | 87.9 |

### Radiated Emission Test (Below 1GHz):

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

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

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

**Power Line Conducted Emission Test:**

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

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

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

**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.

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 149, 165 | OFDM | BPSK | 6.0 |
| Beamforming MODE | | | | | | |
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11ac (VHT20) | 149 to 165 | 149, 165 | OFDM | BPSK | 19.5 |
| - | 802.11ac (VHT40) | 151 to 159 | 151, 159 | OFDM | BPSK | 40.5 |
| - | 802.11ac (VHT80) | 155 | 155 | OFDM | BPSK | 87.9 |

**Antenna Port Conducted Measurement:**

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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

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

| CDD MODE | | | | | | |
|---|---|---|---|---|---|---|
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11a | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.0 |
| Beamforming MODE | | | | | | |
| EUT CONFIGURE MODE | MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| - | 802.11ac (VHT20) | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 19.5 |
| - | 802.11ac (VHT40) | 151 to 159 | 151, 159 | OFDM | BPSK | 40.5 |
| - | 802.11ac (VHT80) | 155 | 155 | OFDM | BPSK | 87.9 |

## Test Condition:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| RE≥1G | 24deg. C, 72%RH | 120Vac, 60Hz | Dalen Dai |
| RE<1G | 24deg. C, 72%RH | 120Vac, 60Hz | Dalen Dai |
| PLC | 24deg. C, 70%RH | 120Vac, 60Hz | Aaron You |
| APCM | 25deg. C, 60%RH | 120Vac, 60Hz | Saxon Lee |

### 3.3 Duty Cycle of Test Signal

**For 2.4GHz:**

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

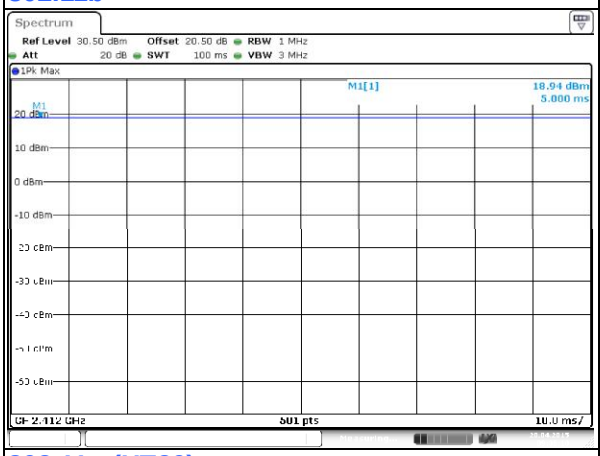
**802.11b**: Duty cycle of test signal is 100 %, duty factor is not required.

**802.11g:** Duty cycle = 2.04/2.18 = 0.936, Duty factor = 10 * log( 1/0.936) = 0.29

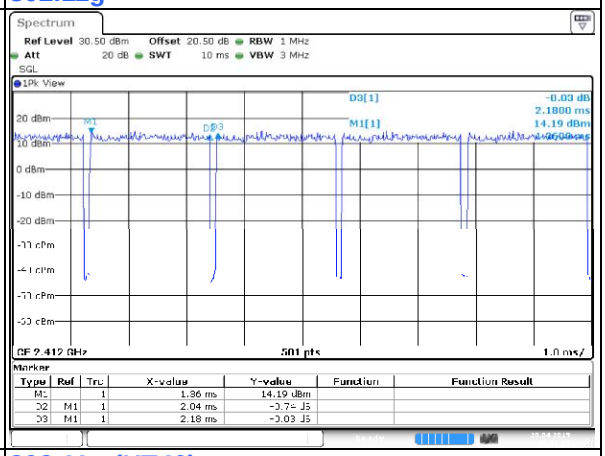
**802.11n (HT20):** Duty cycle = 0.652/0.776 = 0.84, Duty factor = 10 * log( 1/0.84) = 0.76

**802.11n (HT40):** Duty cycle = 0.316/0.452 = 0.699, Duty factor = 10 * log( 1/0.699) = 1.55

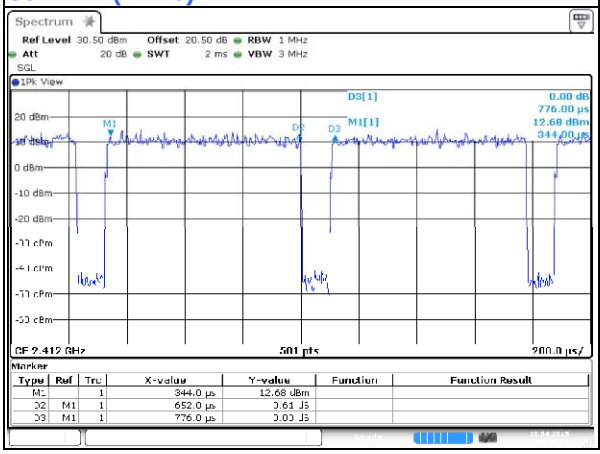
**802.11b**



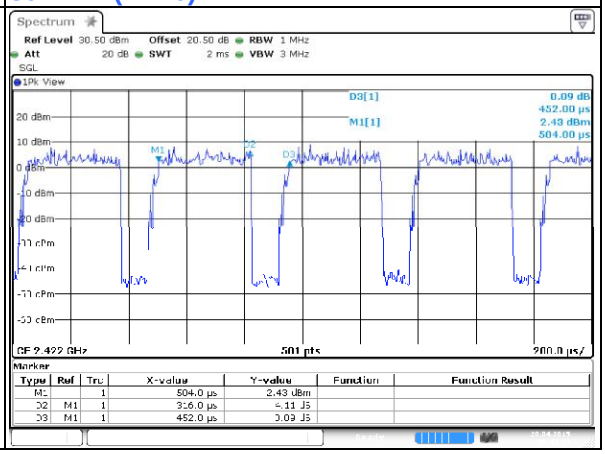

**802.11g**




**802.11n (HT20)**




**802.11n (HT40)**



**For 5GHz (5745 ~ 5825MHz):**

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

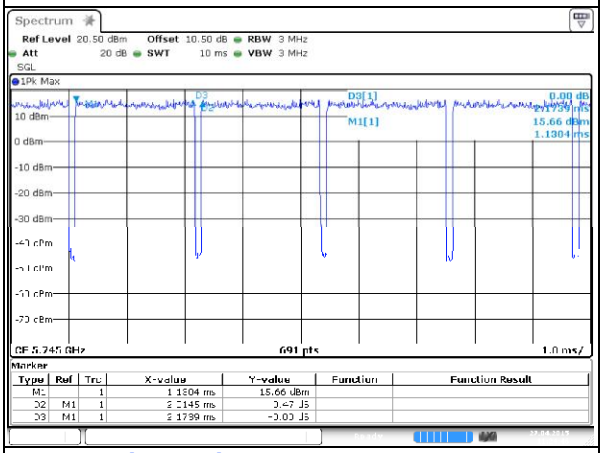
**802.11a**: Duty cycle = 2.014/2.173 = 0.927, Duty factor = 10 * log( 1/0.927) = 0.33

**802.11ac (VHT20):** Duty cycle = 0.612/0.721 = 0.849, Duty factor = 10 * log( 1/0.849) = 0.71

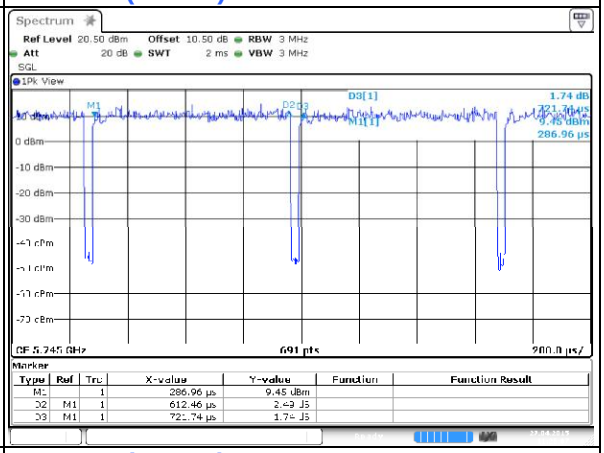
**802.11ac (VHT40):** Duty cycle = 0.321/0.358 = 0.897, Duty factor = 10 * log( 1/0.897) = 0.47

**802.11ac (VHT80):** Duty cycle = 0.182/0.22 = 0.827, Duty factor = 10 * log( 1/0.827) = 0.82

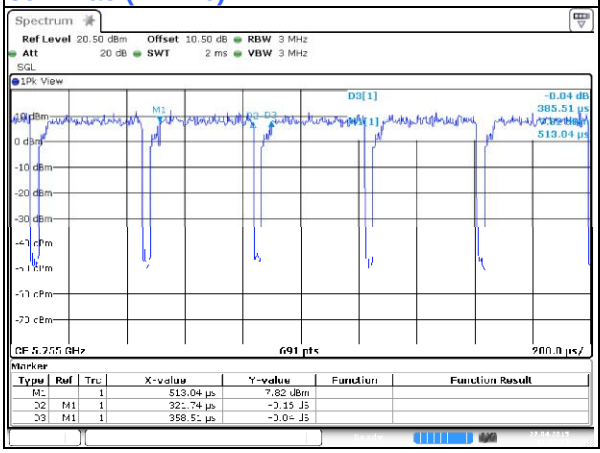
**802.11a**



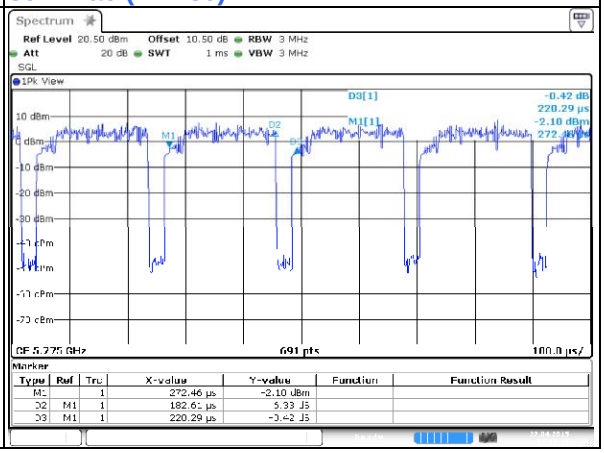

**802.11ac (VHT20)**




**802.11ac (VHT40)**




**802.11ac (VHT80)**



## 3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | EUT | NETGEAR | D7000 | - | - | - |
| B. | AC ADAPTER | NETGEAR | AD898020 | N/A | FCC DoC Approved | Supplied by client |
| C. | LOAD | N/A | N/A | N/A | N/A | Provided by Lab |
| D. | NOTEBOOK COMPUTER | DELL | PP27L | 8SNZ12S | FCC DoC Approved | Provided by Lab |
| E. | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WX11E91KL726 | FCC DoC Approved | Provided by Lab |
| | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WXH1A91A6872 | FCC DoC Approved | Provided by Lab |

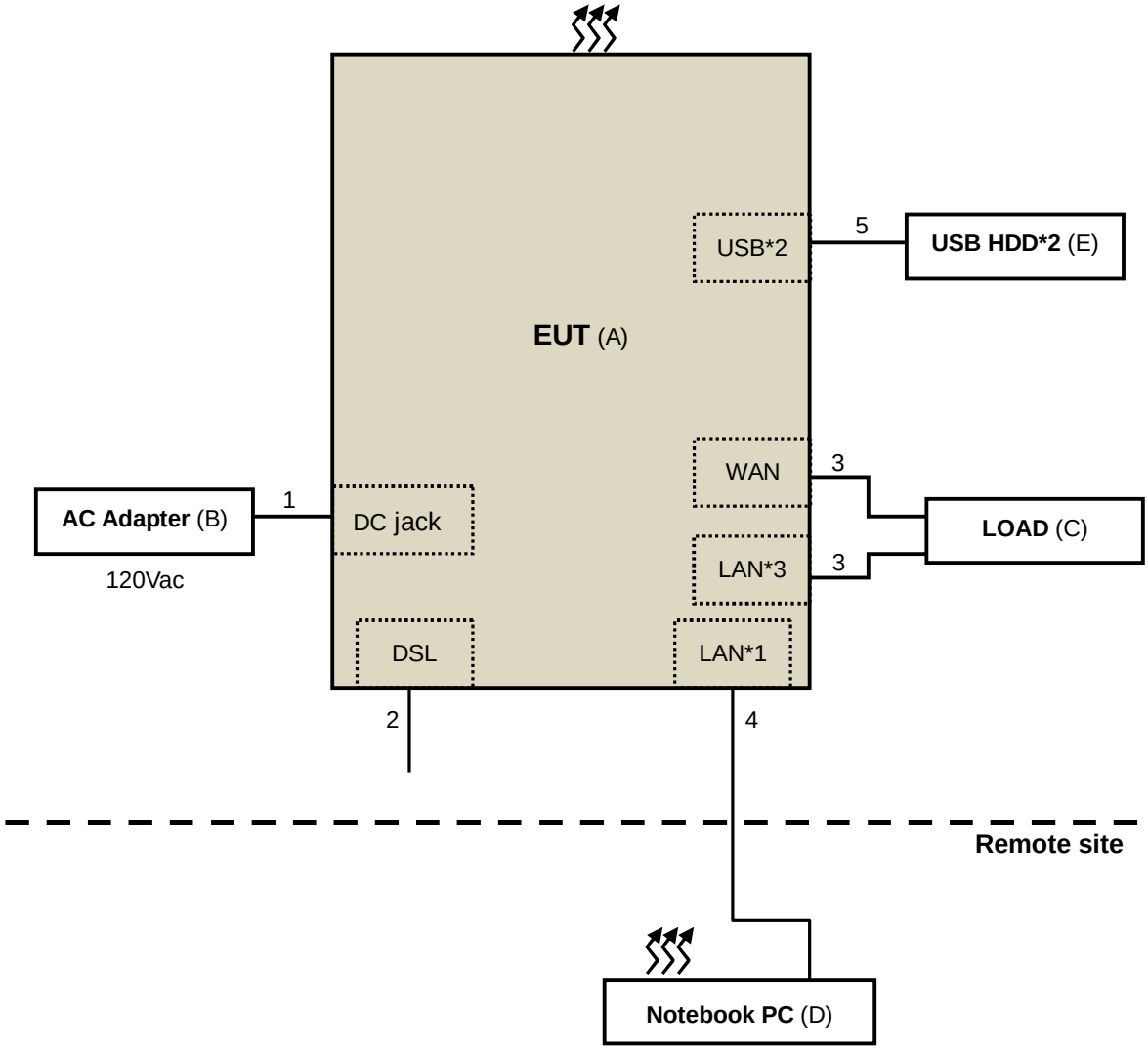
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item D acted as communication partners to transfer data.

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| 1. | DC cable | 1 | 1.8 | N | 0 | Supplied by client |
| 2. | RJ11 cable | 1 | 1.5 | N | 0 | Supplied by client |
| 3. | RJ45 cable | 4 | 1.8 | N | 0 | Provided by Lab |
| 4. | RJ45 cable | 1 | 10 | N | 0 | Provided by Lab |
| 5. | USB cable | 2 | 0.5 | Y | 0 | Provided by Lab |

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

### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied 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.

**NOTE:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

## 4 Test Types and Results (For 2.4GHz band)

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB 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 30dB under any condition of modulation.

4.1.2 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| HP Preamplifier | 8447D | 2432A03504 | Feb. 26, 2015 | Feb. 25, 2016 |
| HP Preamplifier | 8449B | 3008A01201 | Feb. 26, 2015 | Feb. 25, 2016 |
| MITEQ Preamplifier | AMF-6F-260400-33-8P | 892164 | Mar. 01, 2015 | Feb. 28, 2016 |
| Agilent Spectrum | E4446A | MY51100050 | Oct. 24, 2014 | Oct. 23, 2015 |
| Agilent TEST RECEIVER | N9038A | MY51210129 | Jan. 20, 2015 | Jan. 19, 2016 |
| Schwarzbeck Antenna | VULB 9168 | 139 | Feb. 04, 2015 | Feb. 03, 2016 |
| Schwarzbeck Antenna | VHBA 9123 | 480 | May 29, 2013 | May 28, 2015 |
| Schwarzbeck Horn Antenna | BBHA-9170 | 212 | Feb. 09, 2015 | Feb. 08, 2016 |
| Schwarzbeck Horn Antenna | BBHA 9120-D1 | D130 | Feb. 10, 2015 | Feb. 09, 2016 |
| ADT. Turn Table | TT100 | 0306 | NA | NA |
| ADT. Tower | AT100 | 0306 | NA | NA |
| Software | ADT_Radiated_V7.6.15.9.4 | NA | NA | NA |
| SUHNER RF cable | SF104 | CABLE-CH6 | Aug. 15, 2014 | Aug. 14, 2015 |
| SUHNER RF cable | SF102 | Cable-CH8-3.6m | Aug. 15, 2014 | Aug. 14, 2015 |
| EMCO Horn Antenna | 3115 | 00028257 | Feb. 05, 2015 | Feb. 04, 2016 |
| Highpass filter Wainwright Instruments | WHK 3.1/18G-10SS | SN 8 | NA | NA |
| ROHDE & SCHWARZ Spectrum Analyzer | FSV40 | 101042 | Sep. 29, 2014 | Sep. 28, 2015 |
| Anritsu Power Sensor | MA2411B | 0738404 | Apr. 21, 2015 | Apr. 20, 2016 |
| Anritsu Power Meter | ML2495A | 0842014 | Apr. 21, 2015 | Apr. 20, 2016 |

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

### 4.1.3 Test Procedures

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

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

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

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

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

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

**Note:**

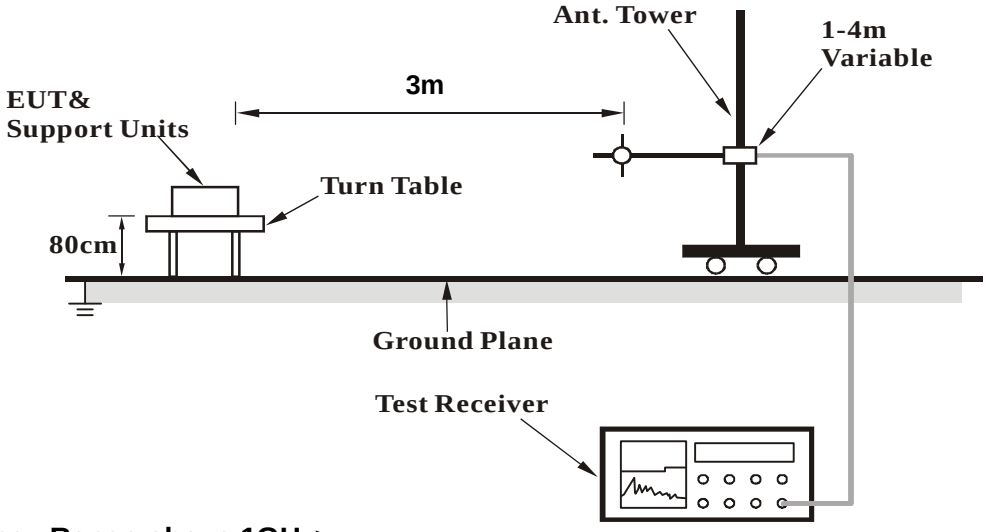
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

### 4.1.4 Deviation from Test Standard

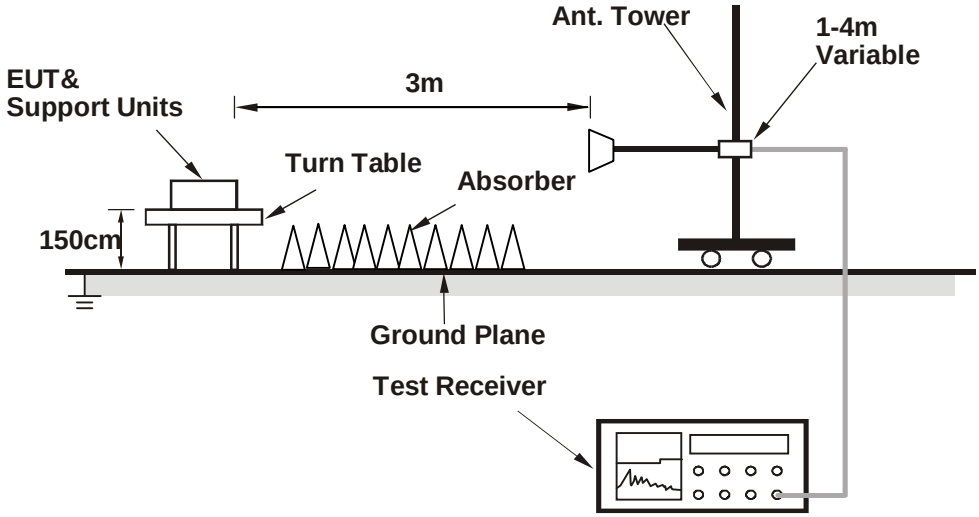
No deviation.

4.1.5 Test Set Up

**<Frequency Range below 1GHz>**




**<Frequency Range above 1GHz>**




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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

**Above 1GHz Data：**

**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 | 2390.00 | 61.6 PK | 74.0 | -12.4 | 1.24 H | 69 | 65.94 | -4.34 |
| 2 | 2390.00 | 48.9 AV | 54.0 | -5.2 | 1.24 H | 69 | 53.19 | -4.34 |
| 3 | *2412.00 | 109.4 PK | | | 1.24 H | 69 | 113.61 | -4.21 |
| 4 | *2412.00 | 105.3 AV | | | 1.24 H | 69 | 109.52 | -4.21 |
| 5 | 4824.00 | 49.6 PK | 74.0 | -24.4 | 1.46 H | 192 | 46.65 | 2.95 |
| 6 | 4824.00 | 44.1 AV | 54.0 | -9.9 | 1.46 H | 192 | 41.17 | 2.95 |
| **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 | 2390.00 | 64.4 PK | 74.0 | -9.6 | 1.75 V | 16 | 68.72 | -4.34 |
| 2 | 2390.00 | 53.4 AV | 54.0 | -0.6 | 1.75 V | 16 | 57.74 | -4.34 |
| 3 | *2412.00 | 120.1 PK | | | 1.75 V | 16 | 124.32 | -4.21 |
| 4 | *2412.00 | 116.2 AV | | | 1.75 V | 16 | 120.37 | -4.21 |
| 5 | 4824.00 | 55.5 PK | 74.0 | -18.5 | 2.04 V | 334 | 52.57 | 2.95 |
| 6 | 4824.00 | 51.2 AV | 54.0 | -2.8 | 2.04 V | 334 | 48.29 | 2.95 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | 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 | *2437.00 | 110.2 PK | | | 1.23 H | 69 | 114.27 | -4.09 |
| 2 | *2437.00 | 106.0 AV | | | 1.23 H | 69 | 110.13 | -4.09 |
| 3 | 4874.00 | 50.9 PK | 74.0 | -23.1 | 1.59 H | 196 | 47.80 | 3.06 |
| 4 | 4874.00 | 45.2 AV | 54.0 | -8.9 | 1.59 H | 196 | 42.09 | 3.06 |
| 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 | *2437.00 | 121.0 PK | | | 1.72 V | 19 | 125.08 | -4.09 |
| 2 | *2437.00 | 116.9 AV | | | 1.72 V | 19 | 120.95 | -4.09 |
| 3 | 4874.00 | 56.2 PK | 74.0 | -17.8 | 1.98 V | 68 | 53.17 | 3.06 |
| 4 | 4874.00 | 52.1 AV | 54.0 | -1.9 | 1.98 V | 68 | 49.08 | 3.06 |

**REMARKS:**

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

| CHANNEL | TX Channel 11 | 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 | *2462.00 | 108.1 PK | | | 1.27 H | 65 | 112.09 | -3.95 |
| 2 | *2462.00 | 104.0 AV | | | 1.27 H | 65 | 107.93 | -3.95 |
| 3 | 2483.50 | 61.3 PK | 74.0 | -12.7 | 1.27 H | 65 | 65.18 | -3.85 |
| 4 | 2483.50 | 49.6 AV | 54.0 | -4.4 | 1.27 H | 65 | 53.49 | -3.85 |
| 5 | 4924.00 | 48.5 PK | 74.0 | -25.5 | 1.51 H | 194 | 45.29 | 3.21 |
| 6 | 4924.00 | 42.9 AV | 54.0 | -11.1 | 1.51 H | 194 | 39.71 | 3.21 |
| 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 | *2462.00 | 118.4 PK | | | 1.88 V | 10 | 122.38 | -3.95 |
| 2 | *2462.00 | 114.3 AV | | | 1.88 V | 10 | 118.27 | -3.95 |
| 3 | 2483.50 | 65.1 PK | 74.0 | -8.9 | 1.88 V | 10 | 68.95 | -3.85 |
| 4 | 2483.50 | 53.4 AV | 54.0 | -0.6 | 1.88 V | 10 | 57.27 | -3.85 |
| 5 | 4924.00 | 53.8 PK | 74.0 | -20.2 | 2.01 V | 74 | 50.61 | 3.21 |
| 6 | 4924.00 | 49.1 AV | 54.0 | -4.9 | 2.01 V | 74 | 45.93 | 3.21 |

**REMARKS:**

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

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 | 2390.00 | 66.3 PK | 74.0 | -7.7 | 1.00 H | 251 | 70.64 | -4.34 |
| 2 | 2390.00 | 49.5 AV | 54.0 | -4.5 | 1.00 H | 251 | 53.86 | -4.34 |
| 3 | *2412.00 | 108.9 PK | | | 1.00 H | 251 | 113.09 | -4.21 |
| 4 | *2412.00 | 99.3 AV | | | 1.00 H | 251 | 103.47 | -4.21 |
| 5 | 4824.00 | 48.2 PK | 74.0 | -25.8 | 1.08 H | 227 | 45.25 | 2.95 |
| 6 | 4824.00 | 33.9 AV | 54.0 | -20.1 | 1.08 H | 227 | 30.94 | 2.95 |
| 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 | 2390.00 | 72.6 PK | 74.0 | -1.5 | 1.95 V | 17 | 76.89 | -4.34 |
| 2 | 2390.00 | 53.3 AV | 54.0 | -0.7 | 1.95 V | 17 | 57.62 | -4.34 |
| 3 | *2412.00 | 117.4 PK | | | 1.95 V | 17 | 121.63 | -4.21 |
| 4 | *2412.00 | 107.6 AV | | | 1.95 V | 17 | 111.77 | -4.21 |
| 5 | 4824.00 | 49.8 PK | 74.0 | -24.2 | 1.42 V | 30 | 46.81 | 2.95 |
| 6 | 4824.00 | 35.5 AV | 54.0 | -18.5 | 1.42 V | 30 | 32.56 | 2.95 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | 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 | *2437.00 | 115.9 PK | | | 1.03 H | 277 | 119.98 | -4.09 |
| 2 | *2437.00 | 105.6 AV | | | 1.03 H | 277 | 109.64 | -4.09 |
| 3 | 4874.00 | 48.9 PK | 74.0 | -25.1 | 1.24 H | 293 | 45.81 | 3.06 |
| 4 | 4874.00 | 34.8 AV | 54.0 | -19.2 | 1.24 H | 293 | 31.75 | 3.06 |
| 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 | *2437.00 | 123.8 PK | | | 2.55 V | 171 | 127.84 | -4.09 |
| 2 | *2437.00 | 113.4 AV | | | 2.55 V | 171 | 117.53 | -4.09 |
| 3 | 4874.00 | 50.7 PK | 74.0 | -23.3 | 1.10 V | 167 | 47.62 | 3.06 |
| 4 | 4874.00 | 37.8 AV | 54.0 | -16.3 | 1.10 V | 167 | 34.69 | 3.06 |

**REMARKS:**

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

| CHANNEL | TX Channel 11 | 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 | *2462.00 | 107.0 PK | | | 1.02 H | 265 | 110.96 | -3.95 |
| 2 | *2462.00 | 96.8 AV | | | 1.02 H | 265 | 100.78 | -3.95 |
| 3 | 2483.50 | 63.6 PK | 74.0 | -10.4 | 1.02 H | 265 | 67.46 | -3.85 |
| 4 | 2483.50 | 49.4 AV | 54.0 | -4.6 | 1.02 H | 265 | 53.29 | -3.85 |
| 5 | 4924.00 | 47.8 PK | 74.0 | -26.2 | 1.31 H | 277 | 44.63 | 3.21 |
| 6 | 4924.00 | 33.6 AV | 54.0 | -20.4 | 1.31 H | 277 | 30.41 | 3.21 |
| 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 | *2462.00 | 114.6 PK | | | 2.07 V | 353 | 118.54 | -3.95 |
| 2 | *2462.00 | 104.6 AV | | | 2.07 V | 353 | 108.53 | -3.95 |
| 3 | 2483.50 | 72.6 PK | 74.0 | -1.4 | 2.07 V | 353 | 76.48 | -3.85 |
| 4 | 2483.50 | 53.4 AV | 54.0 | -0.6 | 2.07 V | 353 | 57.23 | -3.85 |
| 5 | 4924.00 | 49.5 PK | 74.0 | -24.5 | 1.25 V | 84 | 46.31 | 3.21 |
| 6 | 4924.00 | 35.1 AV | 54.0 | -18.9 | 1.25 V | 84 | 31.88 | 3.21 |

**REMARKS:**

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

## 802.11n (HT20)

| 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 | 2390.00 | 63.7 PK | 74.0 | -10.3 | 1.00 H | 155 | 68.07 | -4.34 |
| 2 | 2390.00 | 48.5 AV | 54.0 | -5.5 | 1.00 H | 155 | 52.82 | -4.34 |
| 3 | *2412.00 | 108.0 PK | | | 1.00 H | 155 | 112.24 | -4.21 |
| 4 | *2412.00 | 95.6 AV | | | 1.00 H | 155 | 99.81 | -4.21 |
| 5 | 4824.00 | 47.6 PK | 74.0 | -26.4 | 1.00 H | 265 | 44.69 | 2.95 |
| 6 | 4824.00 | 33.2 AV | 54.0 | -20.8 | 1.00 H | 265 | 30.26 | 2.95 |
| **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 | 2390.00 | 70.8 PK | 74.0 | -3.2 | 1.48 V | 199 | 75.13 | -4.34 |
| **2** | **2390.00** | **53.6 AV** | **54.0** | **-0.4** | **1.48 V** | **199** | **57.91** | **-4.34** |
| 3 | *2412.00 | 116.5 PK | | | 1.48 V | 199 | 120.72 | -4.21 |
| 4 | *2412.00 | 104.3 AV | | | 1.48 V | 199 | 108.55 | -4.21 |
| 5 | 4824.00 | 48.2 PK | 74.0 | -25.8 | 1.34 V | 105 | 45.27 | 2.95 |
| 6 | 4824.00 | 34.4 AV | 54.0 | -19.6 | 1.34 V | 105 | 31.46 | 2.95 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | 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 | *2437.00 | 113.3 PK | | | 1.02 H | 161 | 117.34 | -4.09 |
| 2 | *2437.00 | 99.9 AV | | | 1.02 H | 161 | 103.97 | -4.09 |
| 3 | 4874.00 | 49.0 PK | 74.0 | -25.1 | 1.12 H | 294 | 45.89 | 3.06 |
| 4 | 4874.00 | 35.1 AV | 54.0 | -18.9 | 1.12 H | 294 | 32.05 | 3.06 |
| 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 | *2437.00 | 121.6 PK | | | 1.47 V | 201 | 125.72 | -4.09 |
| 2 | *2437.00 | 108.7 AV | | | 1.47 V | 201 | 112.83 | -4.09 |
| 3 | 4874.00 | 50.2 PK | 74.0 | -23.8 | 1.27 V | 96 | 47.18 | 3.06 |
| 4 | 4874.00 | 36.6 AV | 54.0 | -17.4 | 1.27 V | 96 | 33.52 | 3.06 |

**REMARKS:**

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

| CHANNEL | TX Channel 11 | 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 | *2462.00 | 106.0 PK | | | 1.03 H | 145 | 109.93 | -3.95 |
| 2 | *2462.00 | 92.8 AV | | | 1.03 H | 145 | 96.77 | -3.95 |
| 3 | 2483.50 | 61.6 PK | 74.0 | -12.4 | 1.03 H | 145 | 65.49 | -3.85 |
| 4 | 2483.50 | 48.7 AV | 54.0 | -5.3 | 1.03 H | 145 | 52.57 | -3.85 |
| 5 | 4924.00 | 46.7 PK | 74.0 | -27.3 | 1.00 H | 291 | 43.51 | 3.21 |
| 6 | 4924.00 | 33.1 AV | 54.0 | -20.9 | 1.00 H | 291 | 29.88 | 3.21 |
| **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 | *2462.00 | 113.4 PK | | | 1.49 V | 197 | 117.37 | -3.95 |
| 2 | *2462.00 | 101.0 AV | | | 1.49 V | 197 | 104.95 | -3.95 |
| 3 | 2483.50 | 71.0 PK | 74.0 | -3.0 | 1.49 V | 197 | 74.89 | -3.85 |
| **4** | **2483.50** | **53.6 AV** | **54.0** | **-0.4** | **1.49 V** | **197** | **57.48** | **-3.85** |
| 5 | 4924.00 | 48.1 PK | 74.0 | -25.9 | 1.29 V | 83 | 44.93 | 3.21 |
| 6 | 4924.00 | 34.4 AV | 54.0 | -19.6 | 1.29 V | 83 | 31.15 | 3.21 |

**REMARKS:**

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

## 802.11n (HT40)

| 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 | 2390.00 | 64.7 PK | 74.0 | -9.3 | 1.17 H | 207 | 69.07 | -4.34 |
| 2 | 2390.00 | 48.6 AV | 54.0 | -5.5 | 1.17 H | 207 | 52.89 | -4.34 |
| 3 | *2422.00 | 104.7 PK | | | 1.17 H | 207 | 108.81 | -4.16 |
| 4 | *2422.00 | 91.6 AV | | | 1.17 H | 207 | 95.74 | -4.16 |
| 5 | 4844.00 | 47.8 PK | 74.0 | -26.2 | 1.01 H | 254 | 44.81 | 2.99 |
| 6 | 4844.00 | 34.6 AV | 54.0 | -19.5 | 1.01 H | 254 | 31.56 | 2.99 |
| 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 | 2390.00 | 73.5 PK | 74.0 | -0.5 | 1.32 V | 203 | 77.82 | -4.34 |
| 2 | 2390.00 | 52.2 AV | 54.0 | -1.8 | 1.32 V | 203 | 56.56 | -4.34 |
| 3 | *2422.00 | 113.3 PK | | | 1.32 V | 203 | 117.44 | -4.16 |
| 4 | *2422.00 | 98.6 AV | | | 1.32 V | 203 | 102.79 | -4.16 |
| 5 | 4844.00 | 48.4 PK | 74.0 | -25.6 | 1.56 V | 129 | 45.38 | 2.99 |
| 6 | 4844.00 | 35.2 AV | 54.0 | -18.8 | 1.56 V | 129 | 32.17 | 2.99 |

**REMARKS:**

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

| CHANNEL | TX Channel 6 | 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 | *2437.00 | 103.8 PK | | | 1.21 H | 210 | 107.92 | -4.09 |
| 2 | *2437.00 | 91.1 AV | | | 1.21 H | 210 | 95.14 | -4.09 |
| 3 | 2483.50 | 65.1 PK | 74.0 | -8.9 | 1.21 H | 210 | 68.91 | -3.85 |
| 4 | 2483.50 | 48.5 AV | 54.0 | -5.5 | 1.21 H | 210 | 52.37 | -3.85 |
| 5 | 4874.00 | 47.7 PK | 74.0 | -26.3 | 1.03 H | 277 | 44.63 | 3.06 |
| 6 | 4874.00 | 34.3 AV | 54.0 | -19.7 | 1.03 H | 277 | 31.27 | 3.06 |
| 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 | *2437.00 | 113.5 PK | | | 2.06 V | 350 | 117.56 | -4.09 |
| 2 | *2437.00 | 99.6 AV | | | 2.06 V | 350 | 103.64 | -4.09 |
| 3 | 2483.50 | 73.5 PK | 74.0 | -0.5 | 2.06 V | 350 | 77.32 | -3.85 |
| 4 | 2483.50 | 51.4 AV | 54.0 | -2.6 | 2.06 V | 350 | 55.27 | -3.85 |
| 5 | 4874.00 | 48.6 PK | 74.0 | -25.4 | 1.41 V | 139 | 45.53 | 3.06 |
| 6 | 4874.00 | 35.5 AV | 54.0 | -18.5 | 1.41 V | 139 | 32.41 | 3.06 |

**REMARKS:**

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

| CHANNEL | TX Channel 9 | 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 | *2452.00 | 101.9 PK | | | 1.30 H | 223 | 105.92 | -4.01 |
| 2 | *2452.00 | 87.9 AV | | | 1.30 H | 223 | 91.87 | -4.01 |
| 3 | 2483.50 | 66.1 PK | 74.0 | -7.9 | 1.30 H | 223 | 69.94 | -3.85 |
| 4 | 2483.50 | 49.6 AV | 54.0 | -4.4 | 1.30 H | 223 | 53.49 | -3.85 |
| 5 | 4904.00 | 48.0 PK | 74.0 | -26.0 | 1.05 H | 307 | 44.85 | 3.14 |
| 6 | 4904.00 | 34.6 AV | 54.0 | -19.4 | 1.05 H | 307 | 31.43 | 3.14 |
| 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 | *2452.00 | 110.4 PK | | | 1.44 V | 196 | 114.42 | -4.01 |
| 2 | *2452.00 | 96.4 AV | | | 1.44 V | 196 | 100.36 | -4.01 |
| 3 | 2483.50 | 73.1 PK | 74.0 | -0.9 | 1.44 V | 196 | 76.99 | -3.85 |
| 4 | 2483.50 | 53.5 AV | 54.0 | -0.5 | 1.44 V | 196 | 57.38 | -3.85 |
| 5 | 4904.00 | 49.1 PK | 74.0 | -25.0 | 1.22 V | 277 | 45.91 | 3.14 |
| 6 | 4904.00 | 35.7 AV | 54.0 | -18.3 | 1.22 V | 277 | 32.56 | 3.14 |

**REMARKS:**

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

**Below 1GHz Data:**

**802.11b**

| CHANNEL | TX Channel 6 | DETECTOR FUNCTION | Quasi-Peak (QP) |
|---|---|---|---|
| FREQUENCY RANGE | 30MHz ~ 1GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 35.04 | 22.8 QP | 40.0 | -17.2 | 1.46 H | 102 | 38.12 | -15.28 |
| 2 | 109.35 | 33.9 QP | 43.5 | -9.6 | 1.68 H | 269 | 51.17 | -17.28 |
| 3 | 167.77 | 27.0 QP | 43.5 | -16.5 | 1.33 H | 177 | 40.67 | -13.65 |
| 4 | 195.92 | 25.8 QP | 43.5 | -17.7 | 2.27 H | 111 | 42.14 | -16.31 |
| 5 | 371.19 | 24.4 QP | 46.0 | -21.6 | 1.74 H | 67 | 35.39 | -10.99 |
| 6 | 532.46 | 36.9 QP | 46.0 | -9.1 | 1.92 H | 159 | 44.85 | -7.95 |
| **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 | 35.07 | 36.2 QP | 40.0 | -3.8 | 1.77 V | 187 | 51.50 | -15.27 |
| 2 | 107.99 | 34.4 QP | 43.5 | -9.1 | 1.35 V | 178 | 51.87 | -17.43 |
| 3 | 166.96 | 26.6 QP | 43.5 | -16.9 | 1.62 V | 73 | 40.30 | -13.66 |
| 4 | 350.58 | 28.9 QP | 46.0 | -17.1 | 1.88 V | 118 | 40.53 | -11.63 |
| 5 | 532.41 | 37.6 QP | 46.0 | -8.4 | 1.93 V | 118 | 45.55 | -7.95 |
| 6 | 874.95 | 27.4 QP | 46.0 | -18.6 | 2.17 V | 48 | 29.44 | -2.08 |

**REMARKS:**

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

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

| Frequency (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| ROHDE & SCHWARZ TEST RECEIVER | ESCS 30 | 100292 | Dec. 18, 2014 | Dec. 17, 2015 |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT) | ESH2-Z5 | 100104 | Dec. 04, 2014 | Dec. 03, 2015 |
| LISN With Adapter (for EUT) | AD10 | C09Ada-001 | Dec. 04, 2014 | Dec. 03, 2015 |
| ROHDE & SCHWARZ Artificial Mains Network (for peripherals) | ESH3-Z5 | 847265/023 | Oct. 21, 2014 | Oct. 20, 2015 |
| SCHWARZBECK Artificial Mains Network (For EUT) | NNLK8129 | 8129229 | May 08, 2014 | May 07, 2015 |
| Software | ADT_Cond_V7.3.7 | NA | NA | NA |
| RF cable (JYEBAO) | 5D-FB | Cable-C09.01 | Feb. 24, 2015 | Feb. 23, 2016 |
| SUHNER Terminator (For ROHDE & SCHWARZ LISN) | 65BNC-5001 | E1-010789 | May 20, 2014 | May 19, 2015 |
| ROHDE & SCHWARZ Artificial Mains Network (For TV EUT) | ESH3-Z5 | 100220 | Nov. 20, 2014 | Nov. 19, 2015 |
| LISN With Adapter (for TV EUT) | 100220 | N/A | Nov. 20, 2014 | Nov. 19, 2015 |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 9.
3. The VCCI Site Registration No. C-1312.

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.

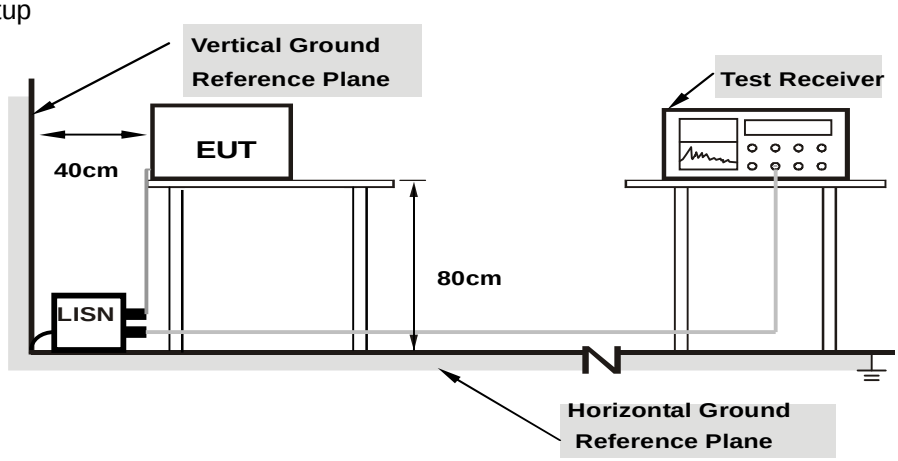
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup




**Note: 1.Support units were connected to second LISN.**

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

4.2.6 EUT Operating Conditions

Same as item 4.1.6.

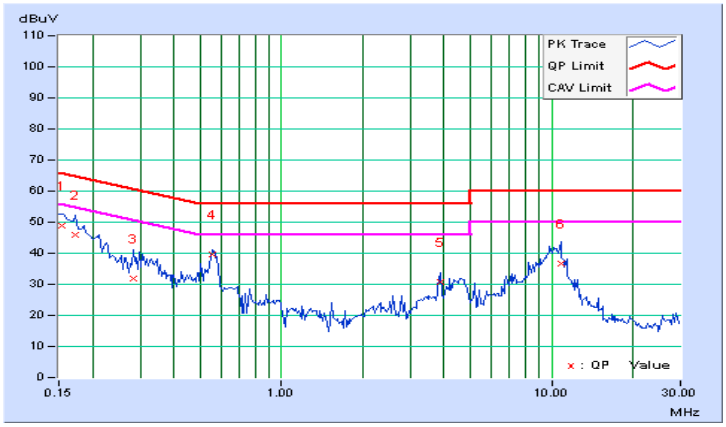
4.2.7 Test Results

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

| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15391 | 0.22 | 48.67 | 33.79 | 48.89 | 34.01 | 65.79 | 55.79 | -16.90 | -21.78 |
| 2 | 0.17344 | 0.23 | 45.55 | 32.20 | 45.78 | 32.43 | 64.79 | 54.79 | -19.02 | -22.37 |
| 3 | 0.28281 | 0.28 | 31.73 | 18.88 | 32.01 | 19.16 | 60.73 | 50.73 | -28.73 | -31.58 |
| **4** | **0.55625** | **0.36** | **39.27** | **34.78** | **39.63** | **35.14** | **56.00** | **46.00** | **-16.37** | **-10.86** |
| 5 | 3.88672 | 0.67 | 29.92 | 19.47 | 30.59 | 20.14 | 56.00 | 46.00 | -25.41 | -25.86 |
| 6 | 10.80078 | 0.98 | 35.66 | 30.08 | 36.64 | 31.06 | 60.00 | 50.00 | -23.36 | -18.94 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

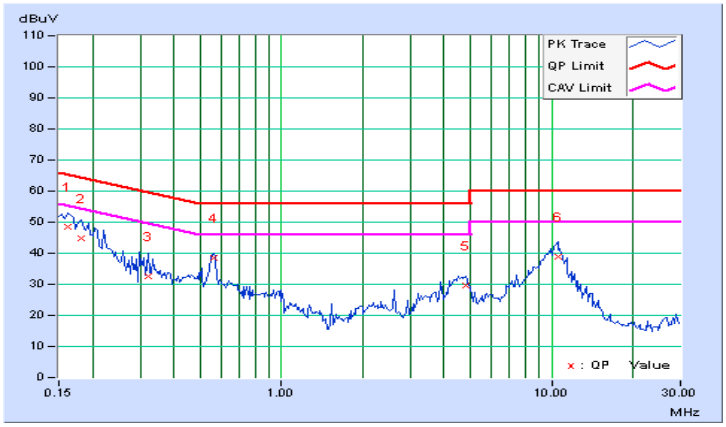


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.16172 | 0.22 | 48.14 | 34.01 | 48.36 | 34.23 | 65.38 | 55.38 | -17.01 | -21.14 |
| 2 | 0.18125 | 0.24 | 44.67 | 32.78 | 44.91 | 33.02 | 64.43 | 54.43 | -19.52 | -21.41 |
| 3 | 0.32188 | 0.29 | 32.43 | 25.74 | 32.72 | 26.03 | 59.66 | 49.66 | -26.94 | -23.63 |
| 4 | 0.56016 | 0.35 | 38.30 | 33.22 | 38.65 | 33.57 | 56.00 | 46.00 | -17.35 | -12.43 |
| 5 | 4.78906 | 0.70 | 29.01 | 20.83 | 29.71 | 21.53 | 56.00 | 46.00 | -26.29 | -24.47 |
| 6 | 10.51953 | 0.91 | 38.06 | 32.52 | 38.97 | 33.43 | 60.00 | 50.00 | -21.03 | -16.57 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

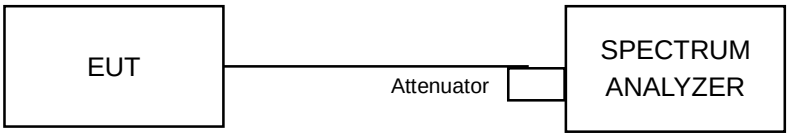


## 4.3 6dB Bandwidth Measurement

### 4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.3.2 Test Setup




### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.3.4 Test Procedure

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

### 4.3.5 Deviation fromTest Standard

No deviation.

### 4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

**802.11b**

| Channel | Frequency (MHz) | 6db Bandwidth (MHz) | | | Minimum Limit (MHz) | Pass / Fail |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 1 | 2412 | 8.57 | 8.58 | 8.58 | 0.5 | PASS |
| 6 | 2437 | 8.61 | 8.10 | 9.07 | 0.5 | PASS |
| 11 | 2462 | 8.10 | 8.58 | 8.10 | 0.5 | PASS |

**802.11g**

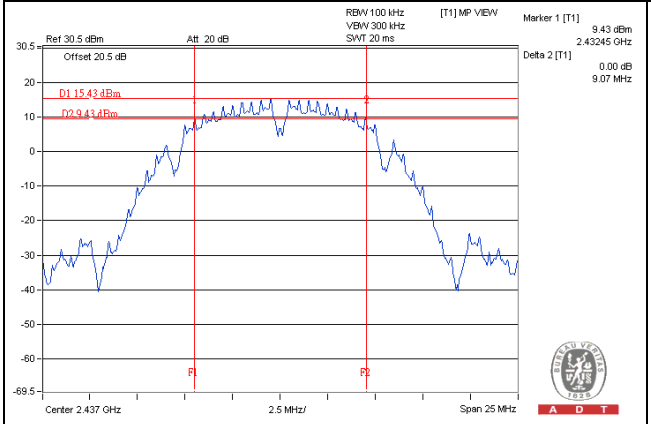
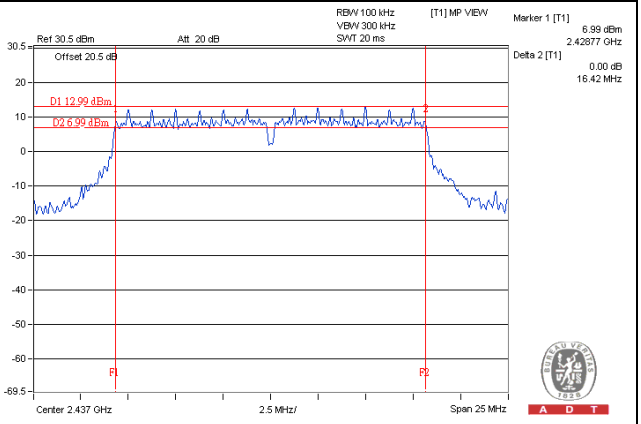
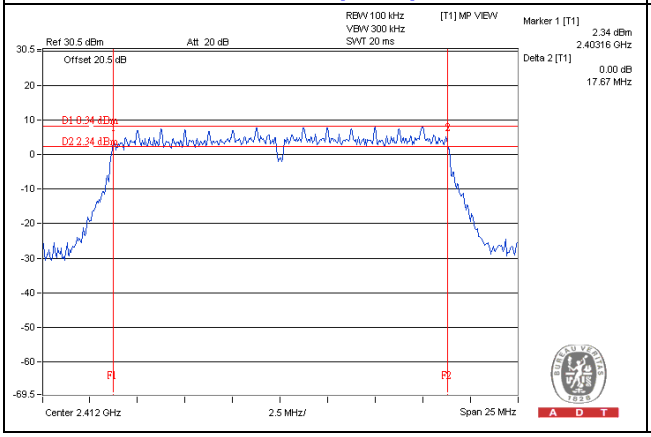
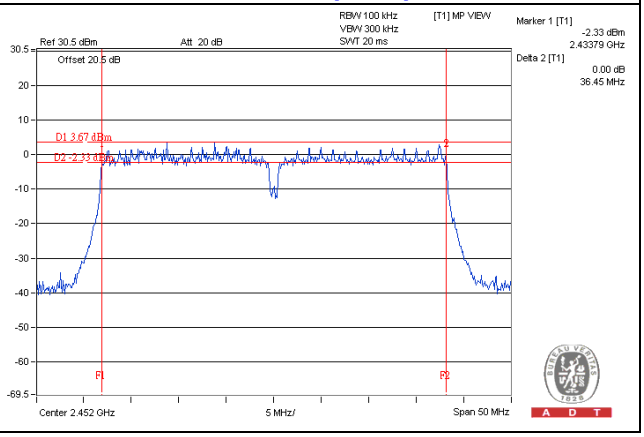
| Channel | Frequency (MHz) | 6db Bandwidth (MHz) | | | Minimum Limit (MHz) | Pass / Fail |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 1 | 2412 | 16.39 | 16.41 | 16.39 | 0.5 | PASS |
| 6 | 2437 | 16.39 | 16.38 | 16.42 | 0.5 | PASS |
| 11 | 2462 | 16.38 | 16.37 | 16.39 | 0.5 | PASS |

**802.11n (HT20)**

| Channel | Frequency (MHz) | 6db Bandwidth (MHz) | | | Minimum Limit (MHz) | Pass / Fail |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 1 | 2412 | 17.29 | 17.67 | 17.03 | 0.5 | Pass |
| 6 | 2437 | 17.63 | 17.63 | 17.66 | 0.5 | Pass |
| 11 | 2462 | 17.61 | 17.66 | 17.61 | 0.5 | Pass |

**802.11n (HT40)**

| Channel | Frequency (MHz) | 6db Bandwidth (MHz) | | | Minimum Limit (MHz) | Pass / Fail |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 3 | 2422 | 35.87 | 35.93 | 35.86 | 0.5 | Pass |
| 6 | 2437 | 36.18 | 35.89 | 36.10 | 0.5 | Pass |
| 9 | 2452 | 35.82 | 36.45 | 35.88 | 0.5 | Pass |

| Spectrum Plot of Worst Value | |
|---|---|
| **802.11b** | **802.11g** |
|  |  |
| **802.11n (HT20)** | **802.11n (HT40)** |
|  |  |

## 4.4 Conducted Output Power Measurement

### 4.4.1 Limits of Conducted Output Power Measurement

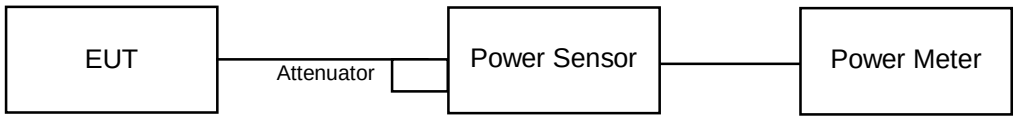
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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.

### 4.4.2 Test Setup




### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.4 Test Procedures

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

### 4.4.5 Deviation from Test Standard

No deviation.

### 4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

**802.11b**

| Chan. | Chan. Freq. (MHz) | Average Power (dBm) | | | Total Power (mW) | Total Power (dBm) | Limit (dBm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|
| | | Chain 0 | Chain 1 | Chain 2 | | | | |
| 1 | 2412 | 23.94 | 23.90 | 23.76 | 730.897 | 28.64 | 30 | Pass |
| 6 | 2437 | 24.82 | 24.78 | 24.66 | **896.412** | 29.53 | 30 | Pass |
| 11 | 2462 | 23.02 | 23.00 | 22.90 | 594.957 | 27.74 | 30 | Pass |

**802.11g**

| Chan. | Chan. Freq. (MHz) | Average Power (dBm) | | | Total Power (mW) | Total Power (dBm) | Limit (dBm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|
| | | Chain 0 | Chain 1 | Chain 2 | | | | |
| 1 | 2412 | 19.73 | 19.63 | 19.50 | 274.930 | 24.39 | 30 | Pass |
| 6 | 2437 | 24.06 | 23.85 | 23.96 | **746.230** | 28.73 | 30 | Pass |
| 11 | 2462 | 17.63 | 17.51 | 17.03 | 164.773 | 22.17 | 30 | Pass |

**802.11n (HT20)**

| Chan. | Chan. Freq. (MHz) | Average Power (dBm) | | | Total Power (mW) | Total Power (dBm) | Limit (dBm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|
| | | Chain 0 | Chain 1 | Chain 2 | | | | |
| 1 | 2412 | 19.54 | 19.48 | 19.32 | 264.173 | 24.22 | 30 | Pass |
| 6 | 2437 | 24.04 | 24.01 | 23.87 | **749.062** | 28.75 | 30 | Pass |
| 11 | 2462 | 17.31 | 17.26 | 17.01 | 157.272 | 21.97 | 30 | Pass |

**802.11n (HT40)**

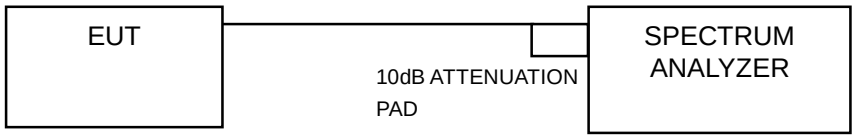
| Chan. | Chan. Freq. (MHz) | Average Power (dBm) | | | Total Power (mW) | Total Power (dBm) | Limit (dBm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|
| | | Chain 0 | Chain 1 | Chain 2 | | | | |
| 3 | 2422 | 18.78 | 18.59 | 18.28 | 215.084 | 23.33 | 30 | Pass |
| 6 | 2437 | 19.34 | 19.29 | 18.91 | **248.623** | 23.96 | 30 | Pass |
| 9 | 2452 | 16.52 | 16.48 | 16.04 | 129.517 | 21.12 | 30 | Pass |

## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 Test Setup




### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

For AVG. power (duty cycle ≥ 98%)
a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

For AVG. power (duty cycle < 98%)
a) Measure the duty cycle (x).
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Conditions

Same as Item 4.3.6

4.5.7 Test Results

**802.11b**

| TX chain | Channel | Freq. (MHz) | PSD (dBm) | 10 log (N=3) dB | Total PSD (dBm) | Limit (dBm) | Pass /Fail |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2412 | 1.98 | 4.77 | 6.75 | 8.00 | Pass |
| | 6 | 2437 | 1.96 | 4.77 | 6.73 | 8.00 | Pass |
| | 11 | 2462 | 1.78 | 4.77 | 6.55 | 8.00 | Pass |
| 1 | 1 | 2412 | 1.59 | 4.77 | 6.36 | 8.00 | Pass |
| | 6 | 2437 | 2.04 | 4.77 | 6.81 | 8.00 | Pass |
| | 11 | 2462 | 0.95 | 4.77 | 5.72 | 8.00 | Pass |
| 2 | 1 | 2412 | 0.98 | 4.77 | 5.75 | 8.00 | Pass |
| | 6 | 2437 | 2.29 | 4.77 | 7.06 | 8.00 | Pass |
| | 11 | 2462 | 0.95 | 4.77 | 5.72 | 8.00 | Pass |

**802.11g**

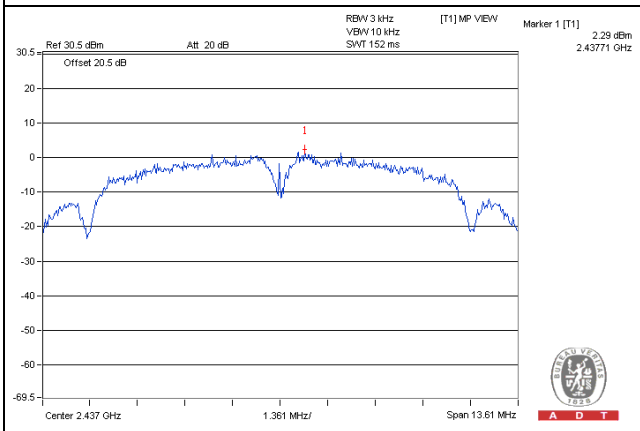
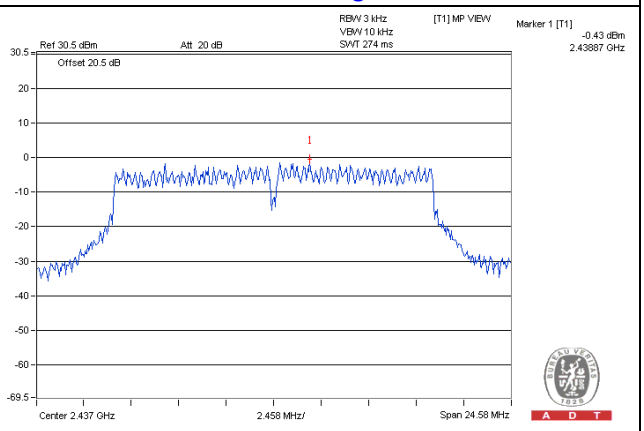
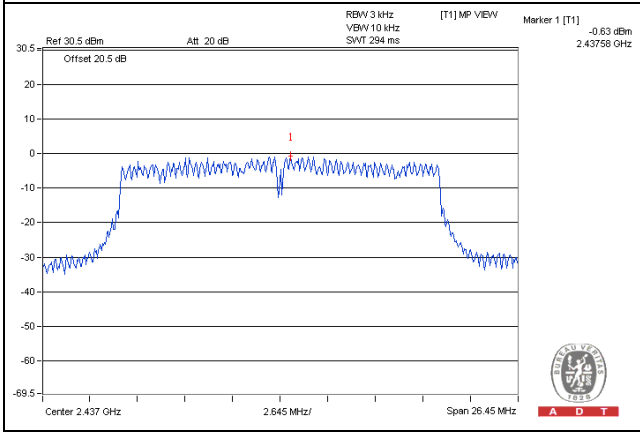
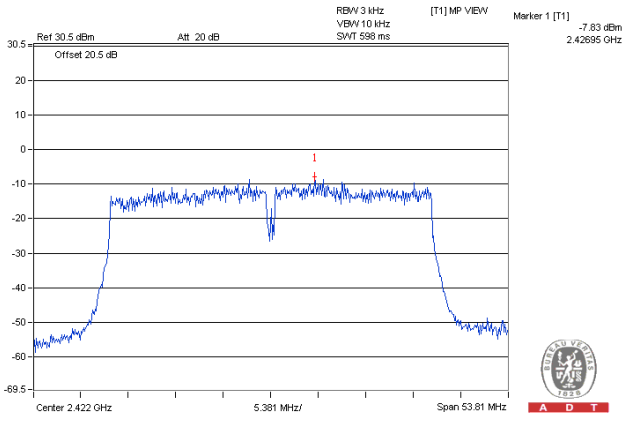
| TX chain | Channel | Freq. (MHz) | PSD (dBm) | 10 log (N=3) dB | Total PSD (dBm) | Limit (dBm) | Pass /Fail |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2412 | -5.28 | 4.77 | -0.22 | 8.00 | Pass |
| | 6 | 2437 | -0.43 | 4.77 | 4.63 | 8.00 | Pass |
| | 11 | 2462 | -7.26 | 4.77 | -2.20 | 8.00 | Pass |
| 1 | 1 | 2412 | -6.10 | 4.77 | -1.04 | 8.00 | Pass |
| | 6 | 2437 | -0.68 | 4.77 | 4.38 | 8.00 | Pass |
| | 11 | 2462 | -7.35 | 4.77 | -2.29 | 8.00 | Pass |
| 2 | 1 | 2412 | -5.50 | 4.77 | -0.44 | 8.00 | Pass |
| | 6 | 2437 | -0.96 | 4.77 | 4.10 | 8.00 | Pass |
| | 11 | 2462 | -8.08 | 4.77 | -3.02 | 8.00 | Pass |

### 802.11n (HT20)

| TX chain | Channel | Freq. (MHz) | PSD (dBm) | 10 log (N=3) dB | Total PSD (dBm) | Limit (dBm) | Pass /Fail |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2412 | -4.94 | 4.77 | 0.59 | 8.00 | Pass |
| | 6 | 2437 | -1.02 | 4.77 | 4.51 | 8.00 | Pass |
| | 11 | 2462 | -8.43 | 4.77 | -2.90 | 8.00 | Pass |
| 1 | 1 | 2412 | -5.59 | 4.77 | -0.06 | 8.00 | Pass |
| | 6 | 2437 | -0.63 | 4.77 | 4.90 | 8.00 | Pass |
| | 11 | 2462 | -8.50 | 4.77 | -2.97 | 8.00 | Pass |
| 2 | 1 | 2412 | -5.76 | 4.77 | -0.23 | 8.00 | Pass |
| | 6 | 2437 | -1.52 | 4.77 | 4.01 | 8.00 | Pass |
| | 11 | 2462 | -8.54 | 4.77 | -3.01 | 8.00 | Pass |

### 802.11n (HT40)

| TX chain | Channel | Freq. (MHz) | PSD (dBm) | 10 log (N=3) dB | Total PSD (dBm) | Limit (dBm) | Pass /Fail |
|---|---|---|---|---|---|---|---|
| 0 | 3 | 2422 | -7.83 | 4.77 | -1.51 | 8.00 | Pass |
| | 6 | 2437 | -8.22 | 4.77 | -1.90 | 8.00 | Pass |
| | 9 | 2452 | -12.55 | 4.77 | -6.23 | 8.00 | Pass |
| 1 | 3 | 2422 | -9.21 | 4.77 | -2.89 | 8.00 | Pass |
| | 6 | 2437 | -7.95 | 4.77 | -1.63 | 8.00 | Pass |
| | 9 | 2452 | -12.69 | 4.77 | -6.37 | 8.00 | Pass |
| 2 | 3 | 2422 | -9.35 | 4.77 | -3.03 | 8.00 | Pass |
| | 6 | 2437 | -9.93 | 4.77 | -3.61 | 8.00 | Pass |
| | 9 | 2452 | -11.48 | 4.77 | -5.16 | 8.00 | Pass |

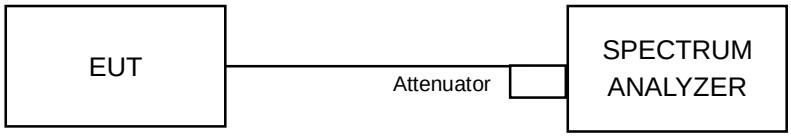
| Spectrum Plot of Worst Value | |
|---|---|
| **802.11b** | **802.11g** |
|  |  |
| **802.11n (HT20)** | **802.11n (HT40)** |
|  |  |

## 4.6 Conducted Out of Band Emission Measurement

### 4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 Test Setup




### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

**MEASUREMENT PROCEDURE REF**

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 OOBE**

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.

### 4.6.5 Deviation from Test Standard

No deviation.

### 4.6.6 EUT Operating Conditions

Same as Item 4.3.6

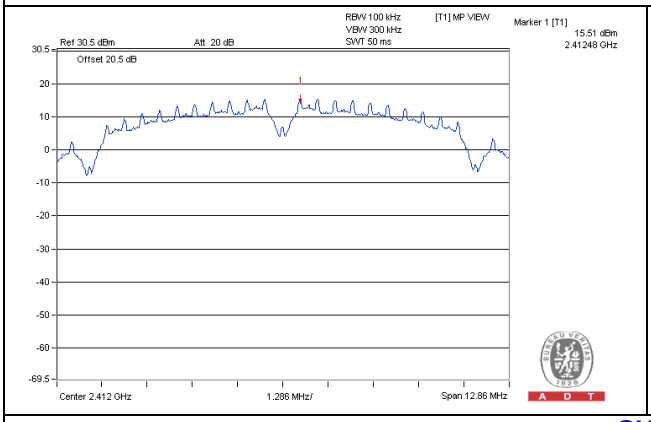
### 4.6.7 Test Results

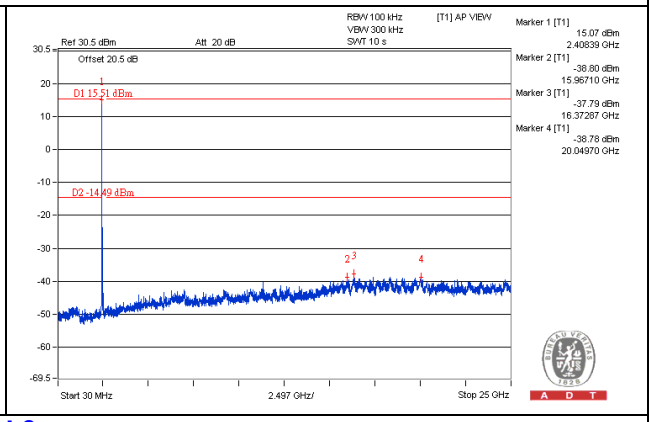
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

## 802.11b

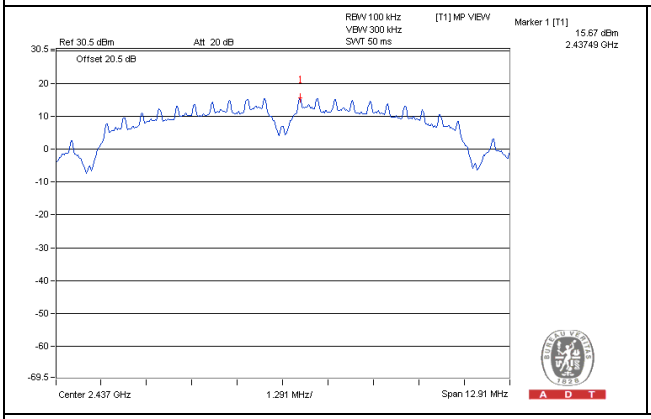
## CHAIN 0

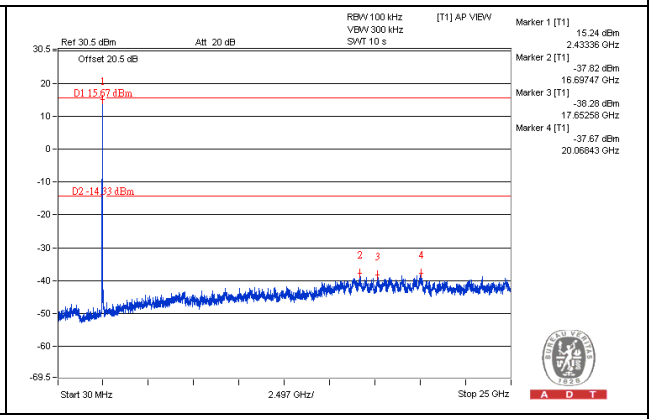
### CH 1



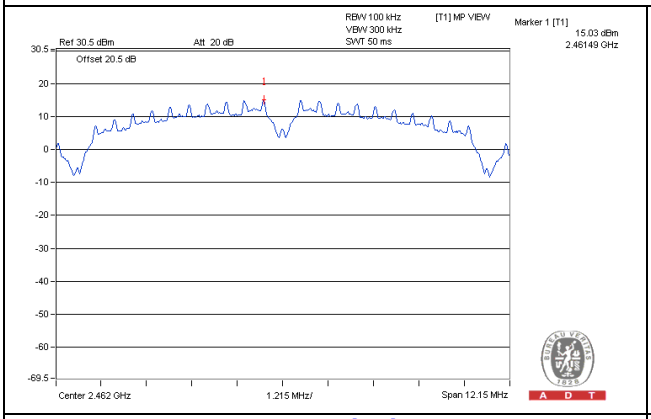



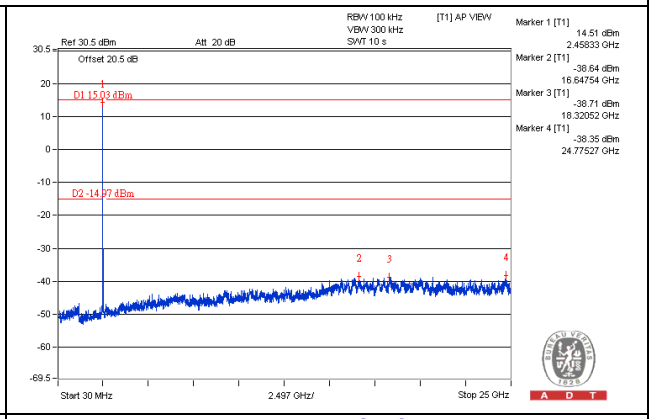

### CH 6



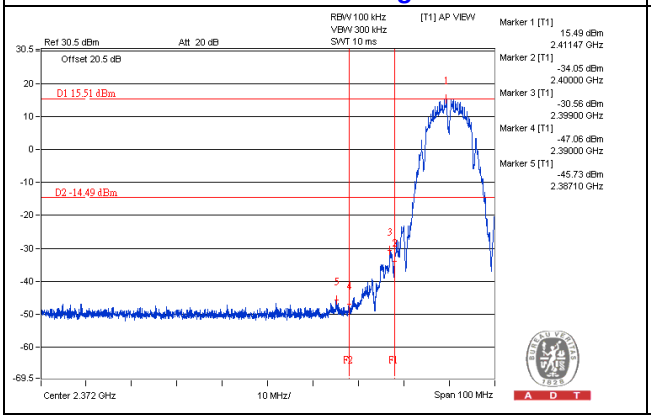




### CH 11

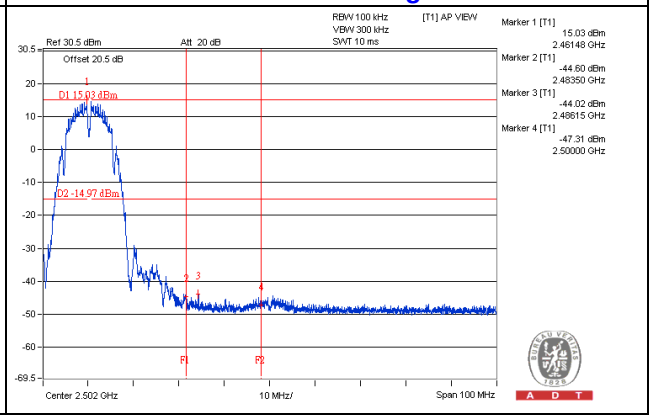



### CH 1 Band edge

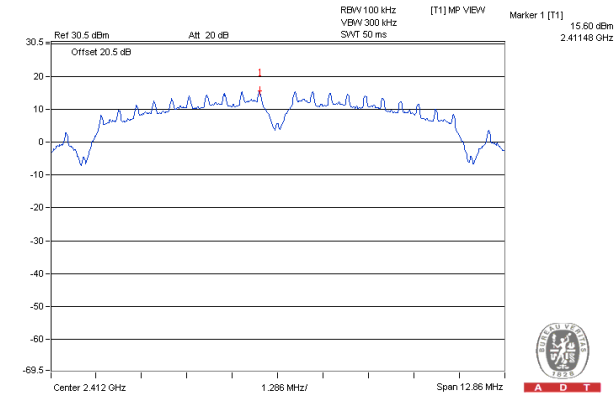


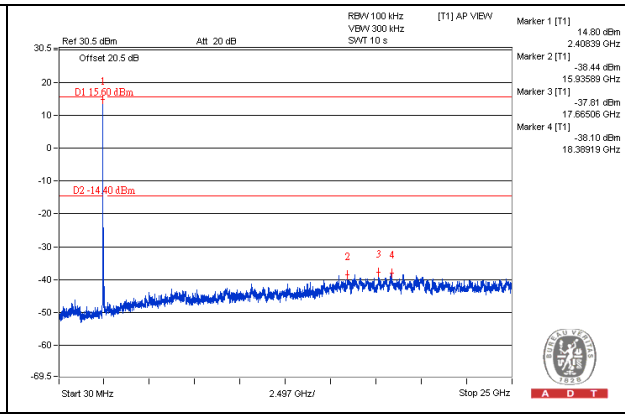

### CH 11 Band edge



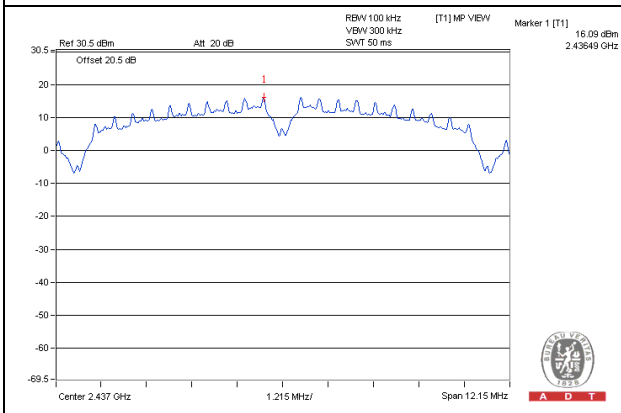
## CHAIN 1

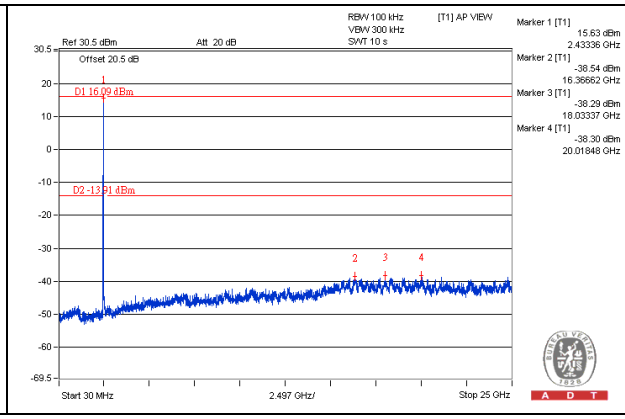
### CH 1



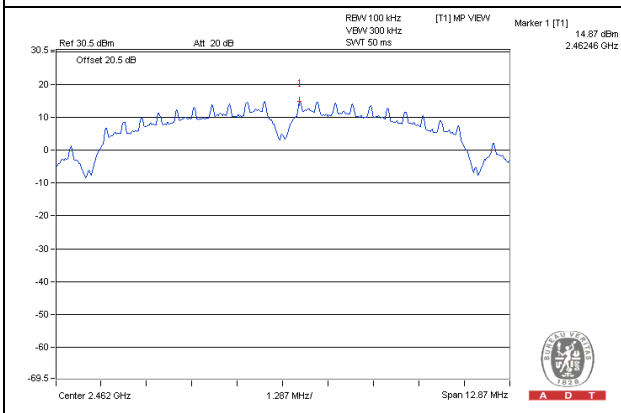



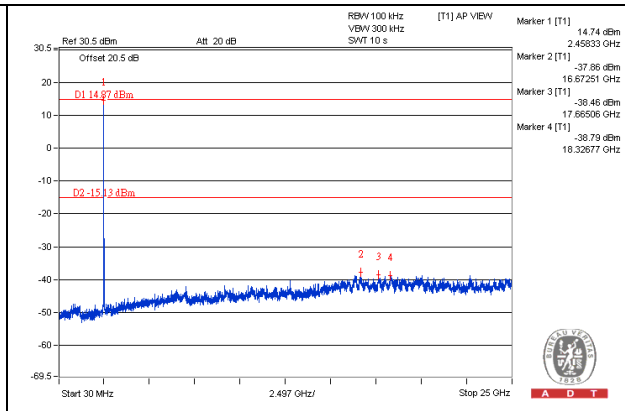

### CH 6



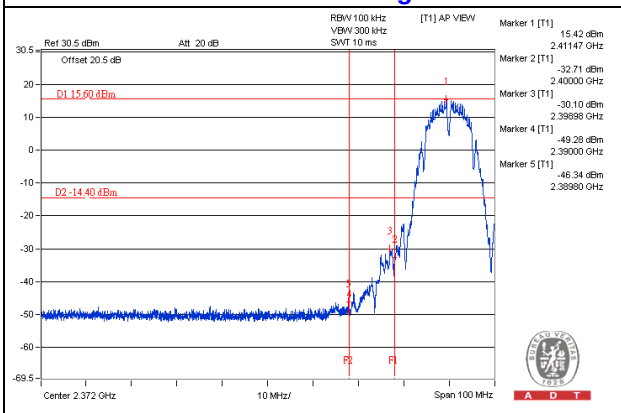




### CH 11

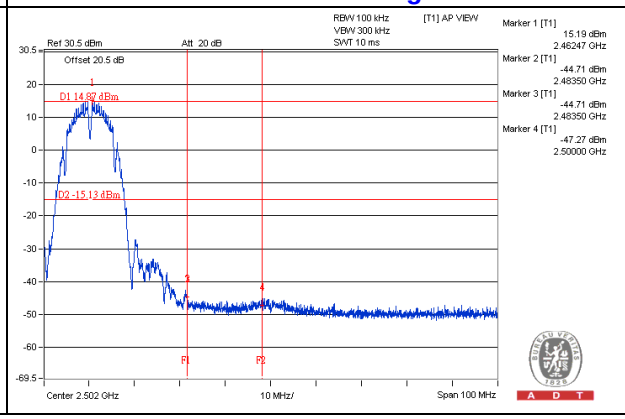



### CH 1 Band edge

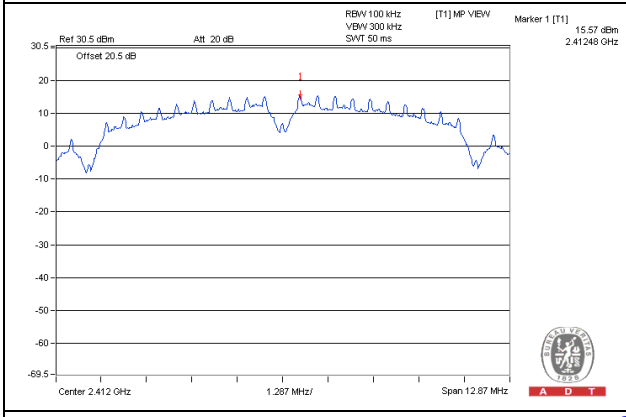


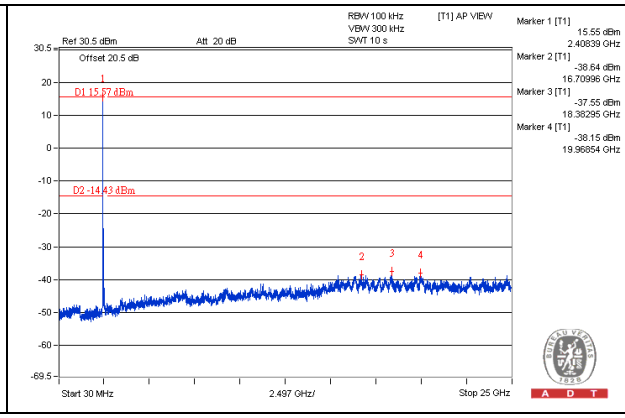

### CH 11 Band edge



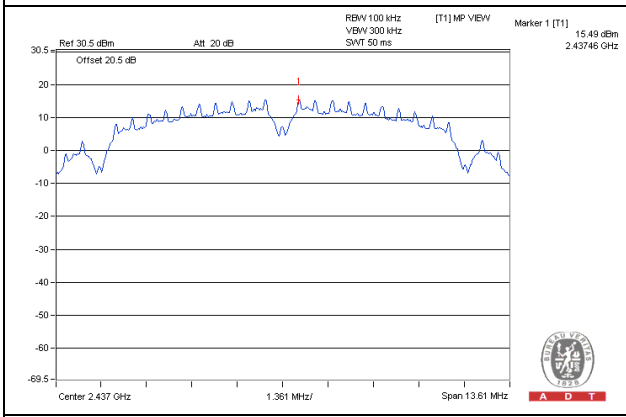
## CHAIN 2

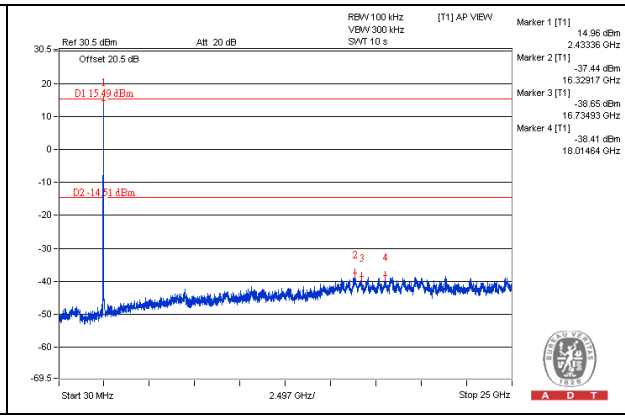
### CH 1



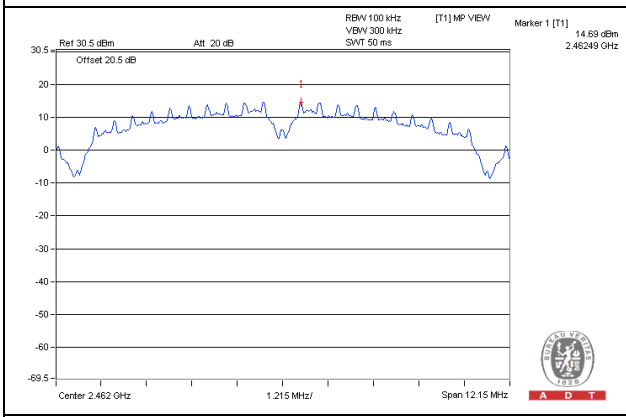



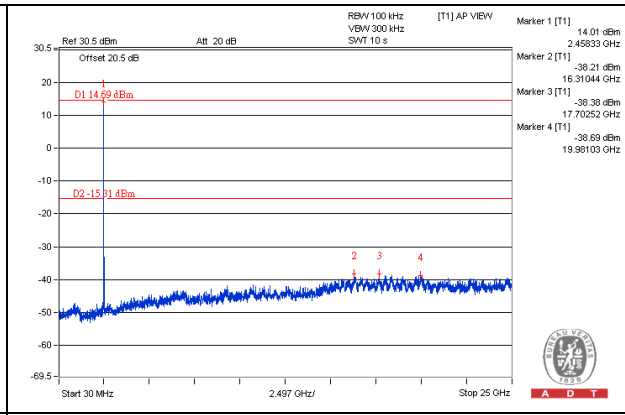

### CH 6



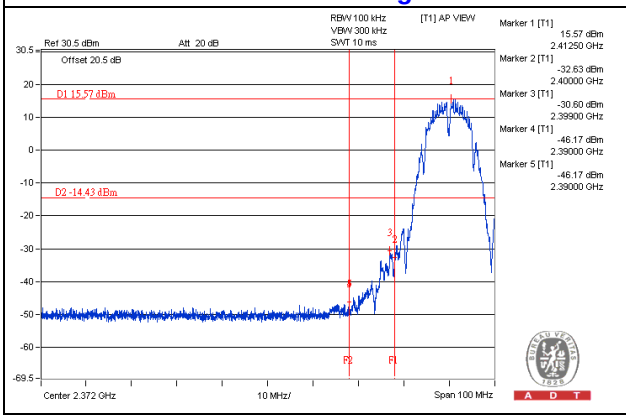




### CH 11

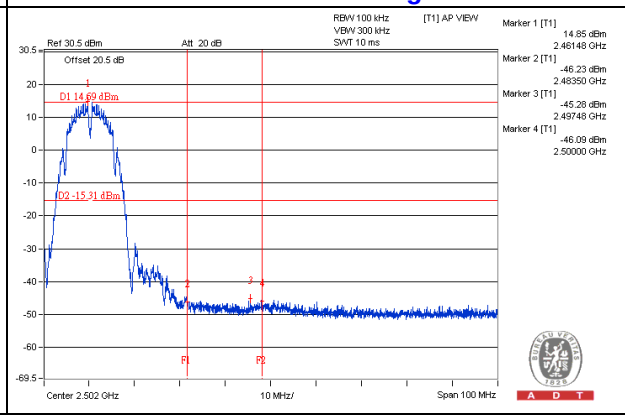



### CH 1 Band edge

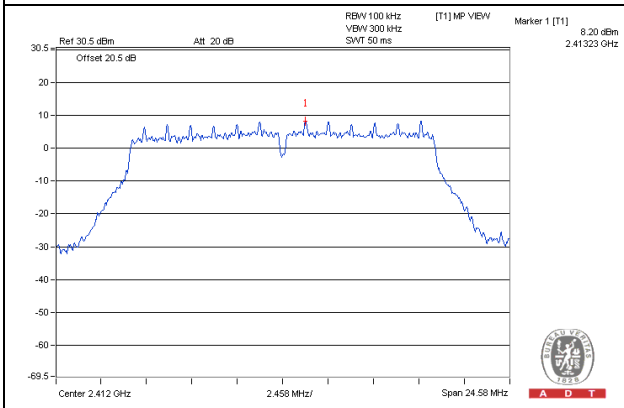


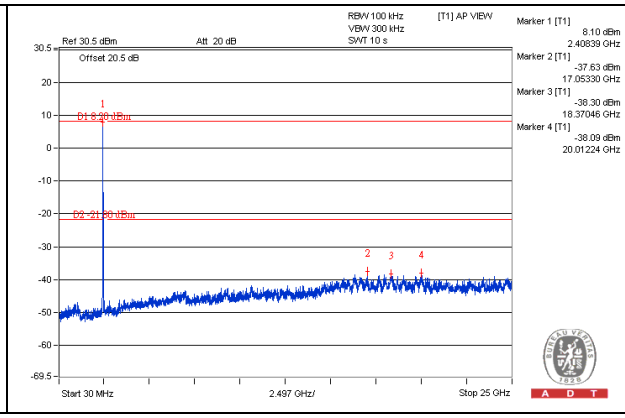

### CH 11 Band edge



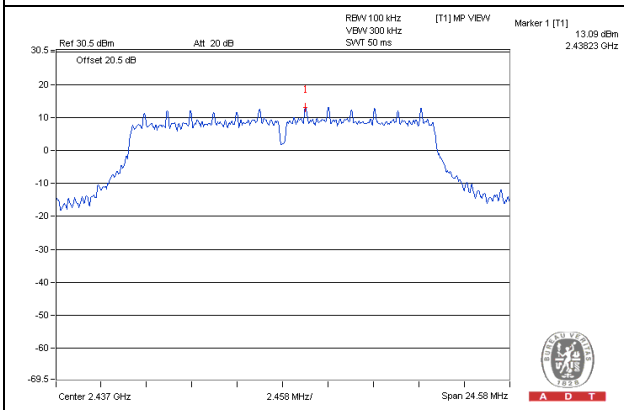
## 802.11g
## CHAIN 0

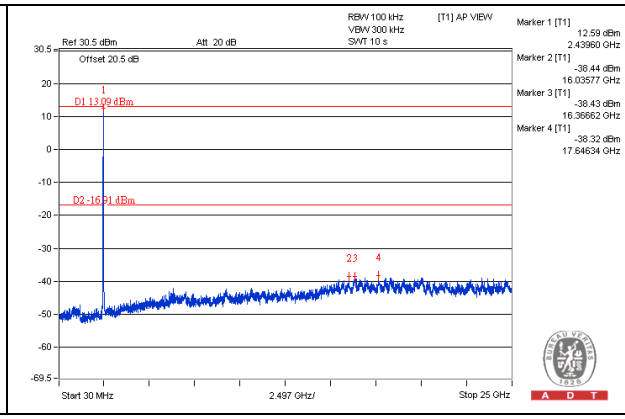
### CH 1



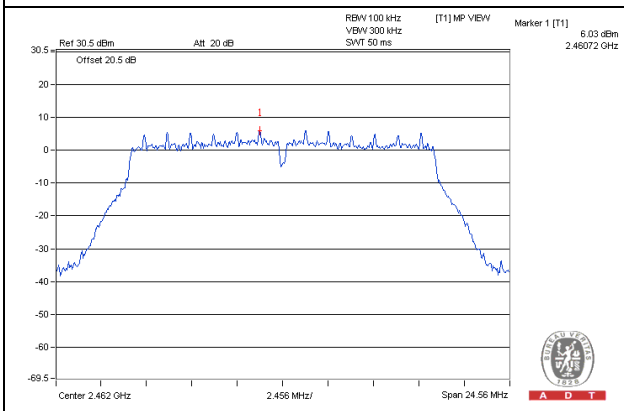



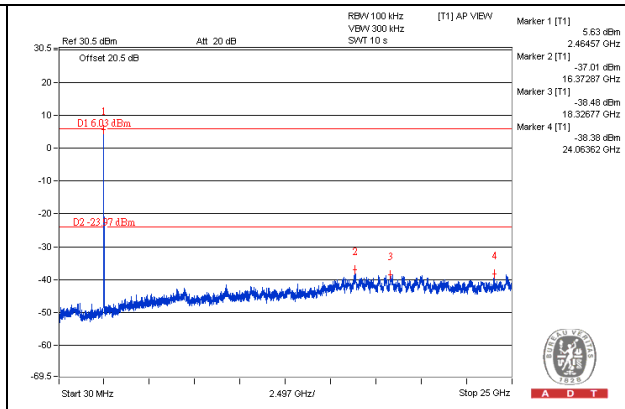

### CH 6



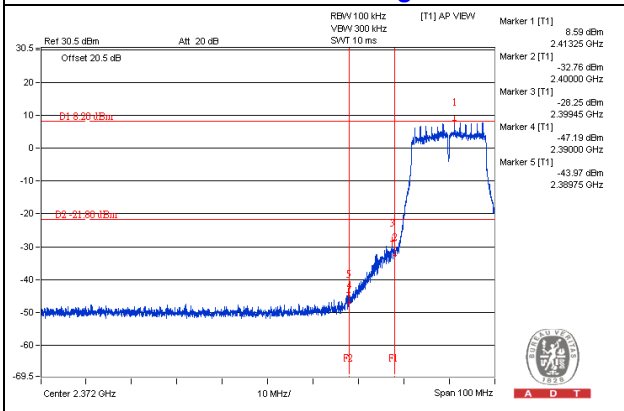




### CH 11

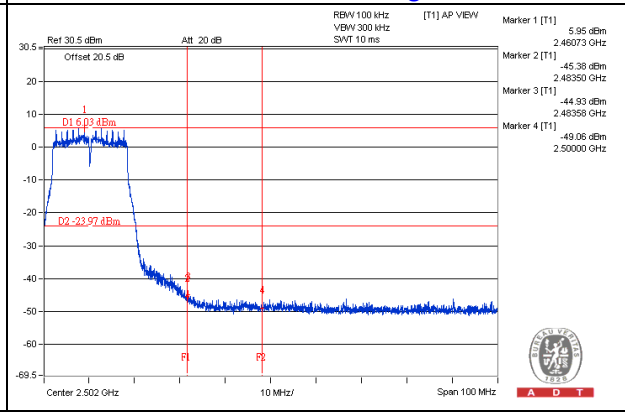



### CH 1 Band edge

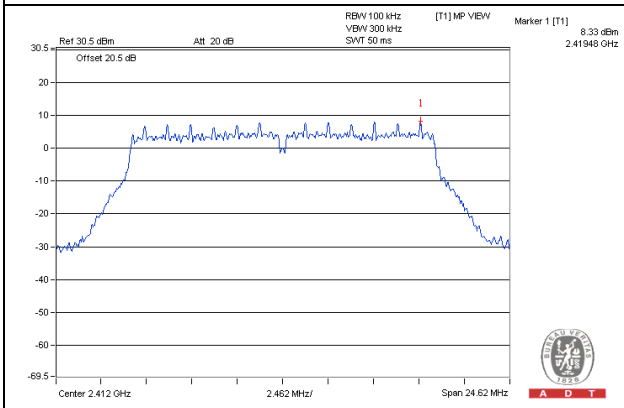


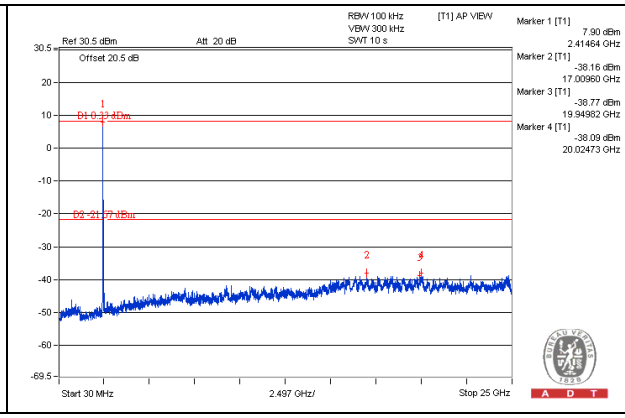

### CH 11 Band edge



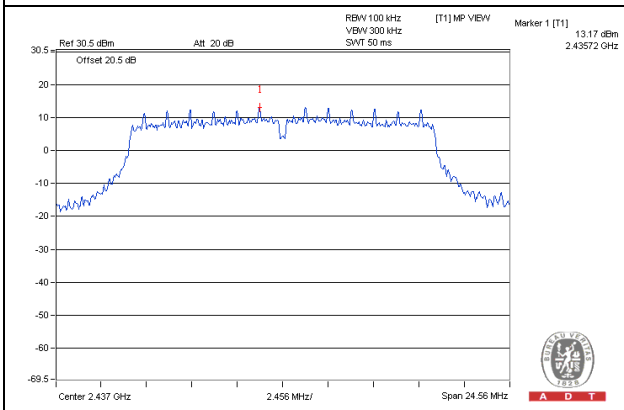
## CHAIN 1

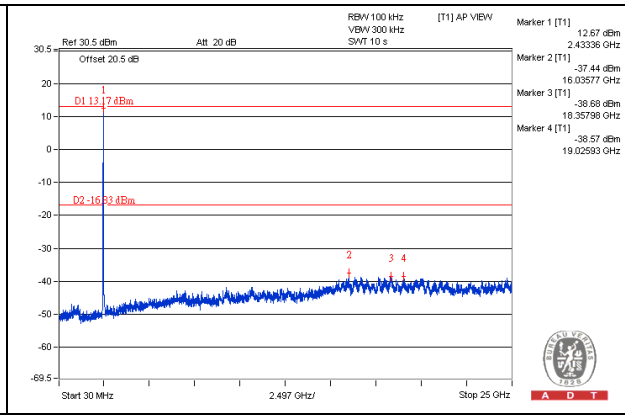
### CH 1



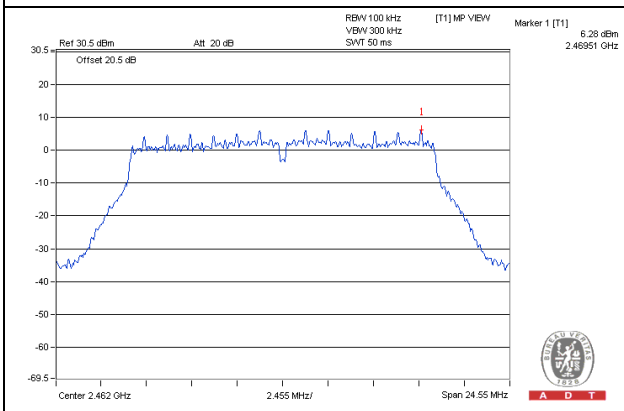



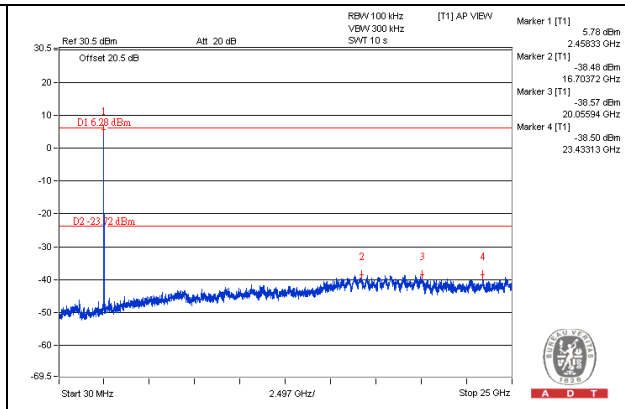

### CH 6



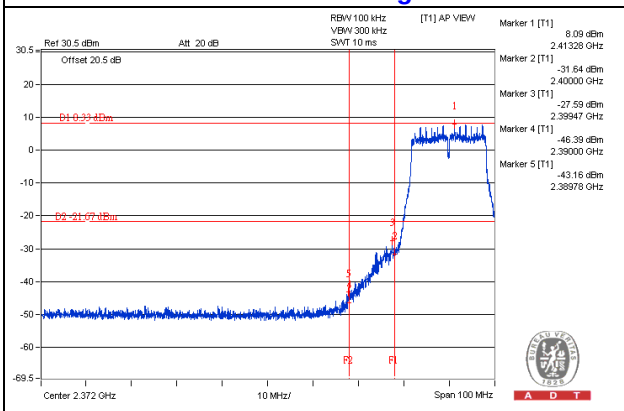




### CH 11

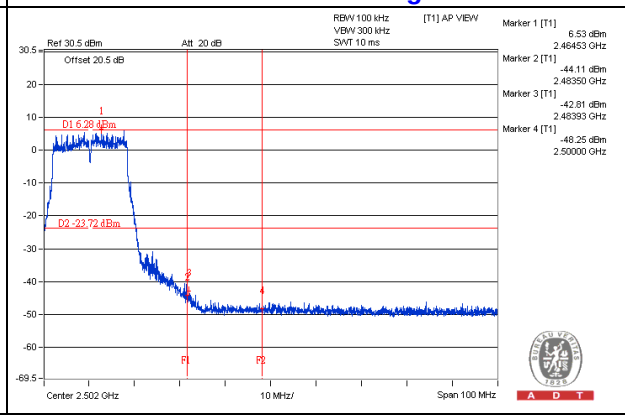



### CH 1 Band edge

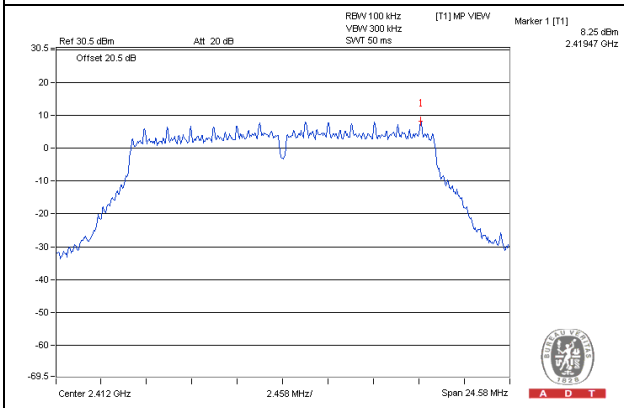


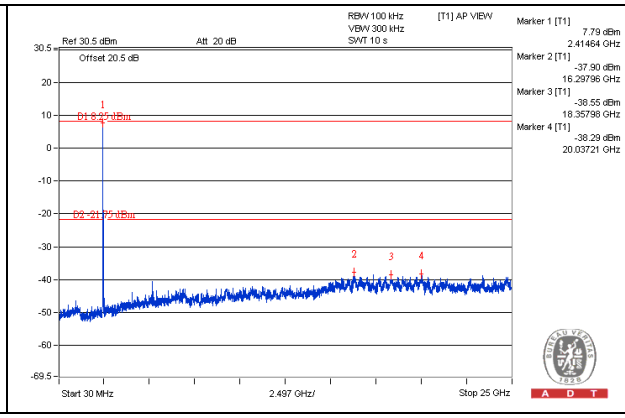

### CH 11 Band edge



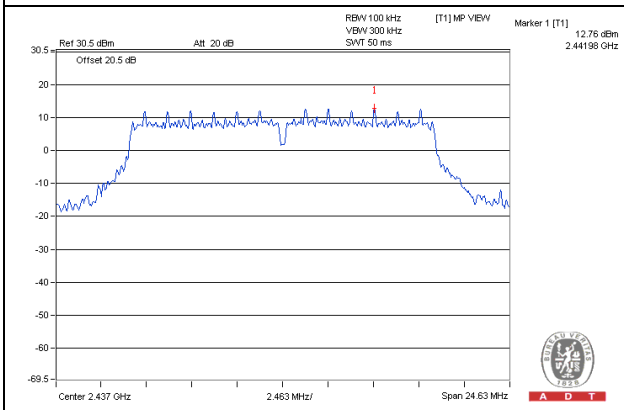
## CHAIN 2

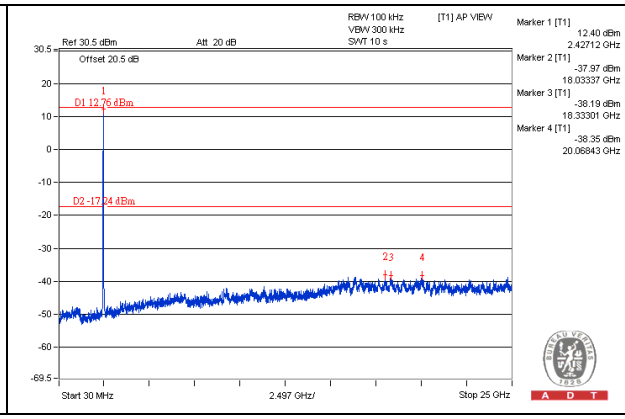
### CH 1



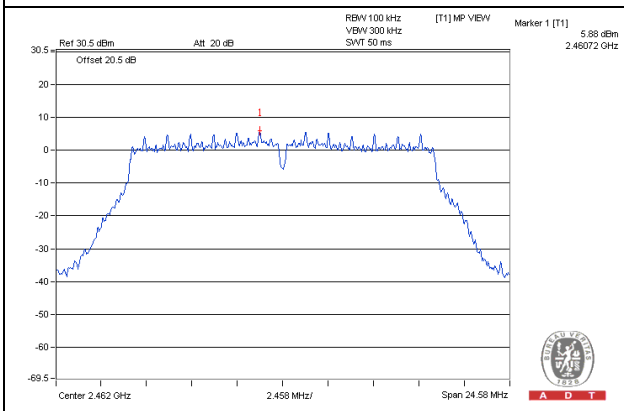



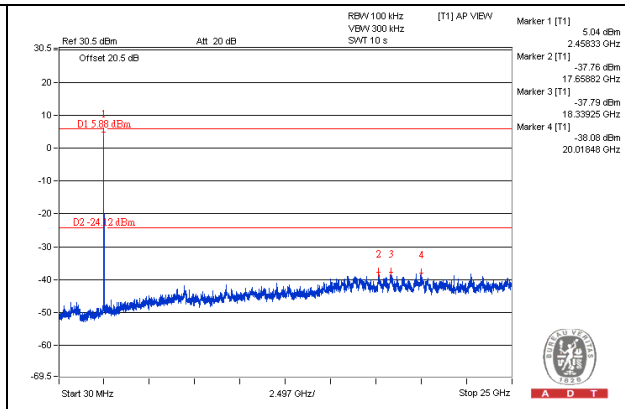

### CH 6



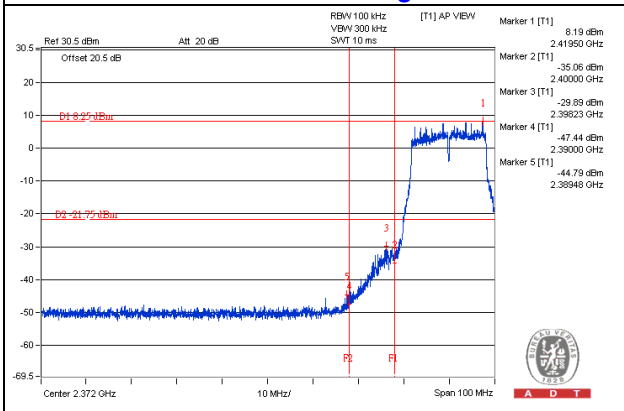




### CH 11

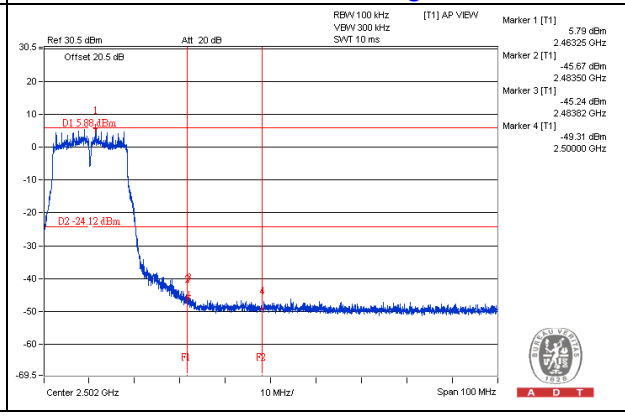



### CH 1 Band edge

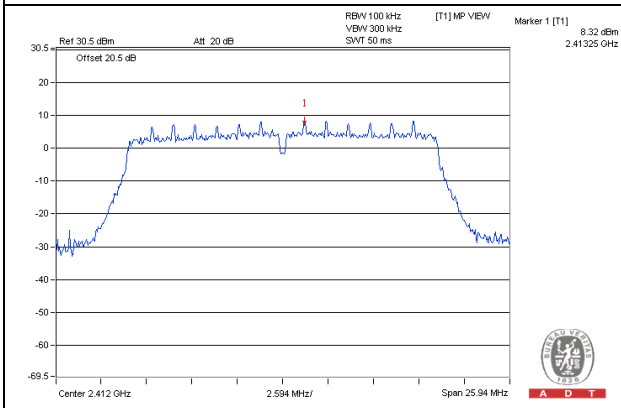


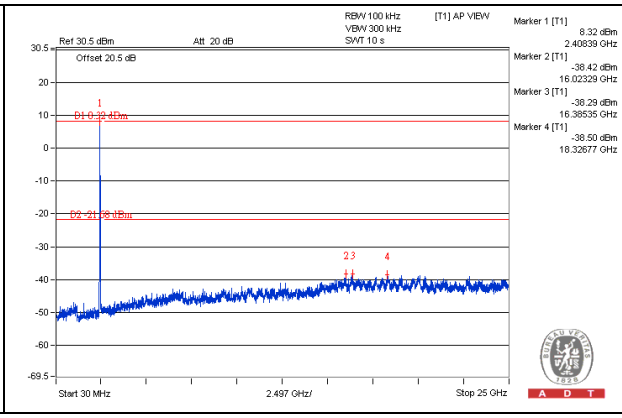

### CH 11 Band edge



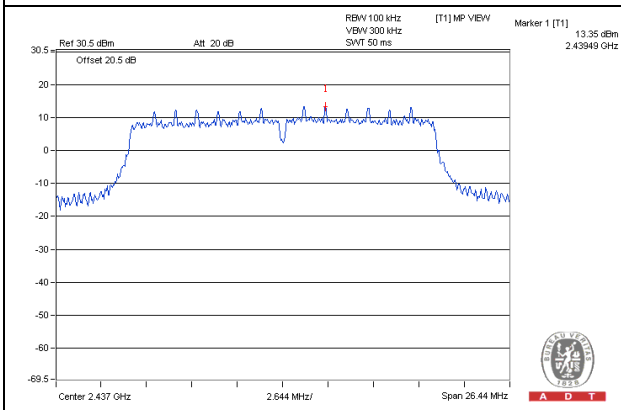
## 802.11n (HT20)
## CHAIN 0

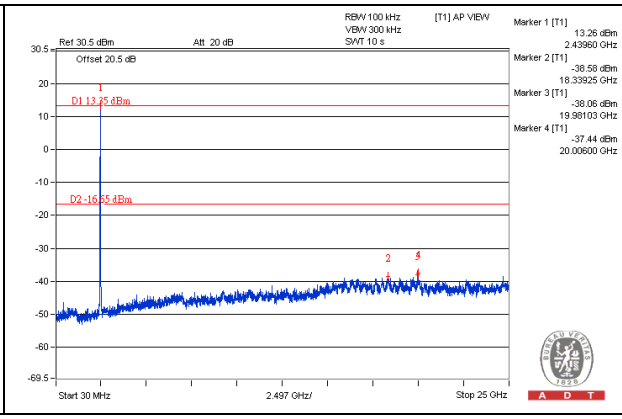
### CH 1



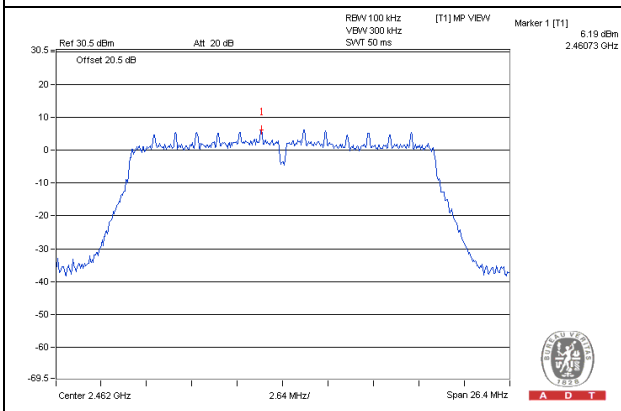



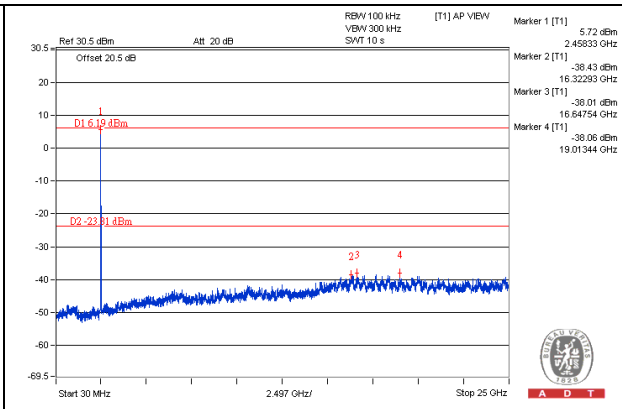

### CH 6



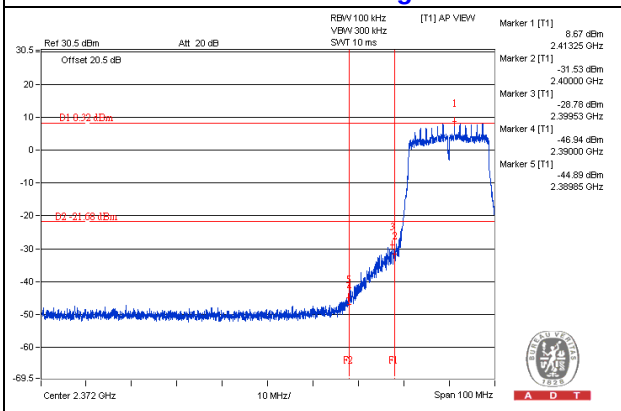




### CH 11

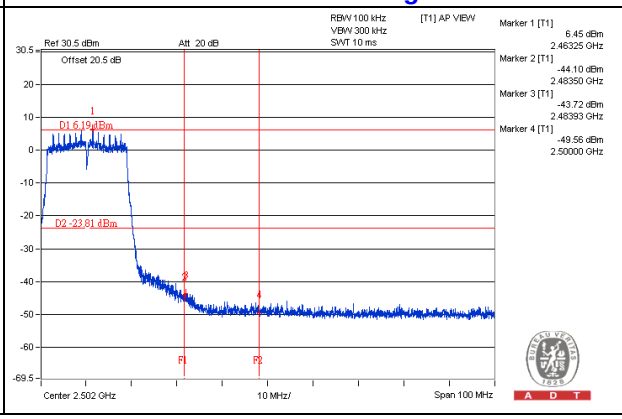



### CH 1 Band edge

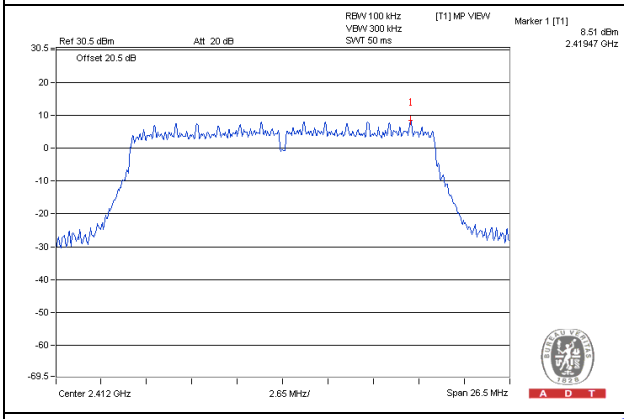


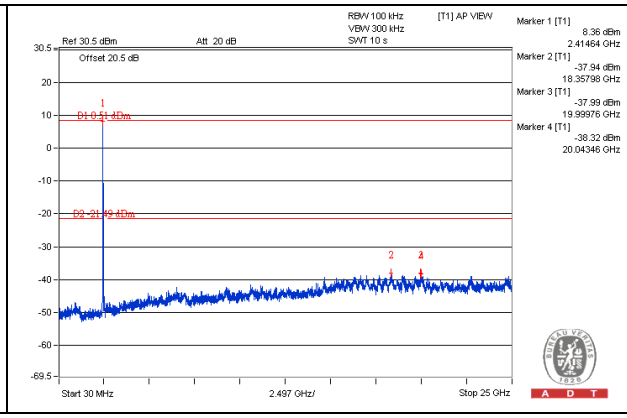

### CH 11 Band edge



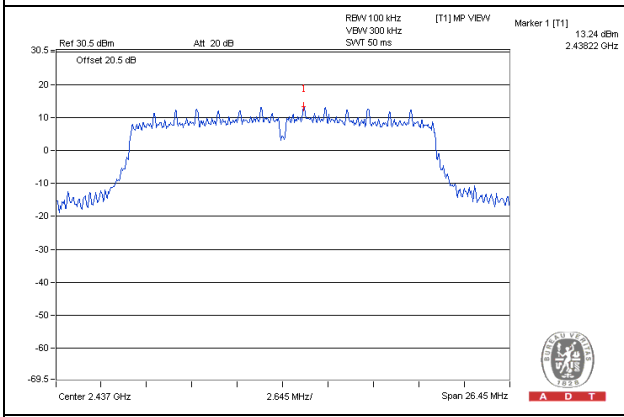
## CHAIN 1

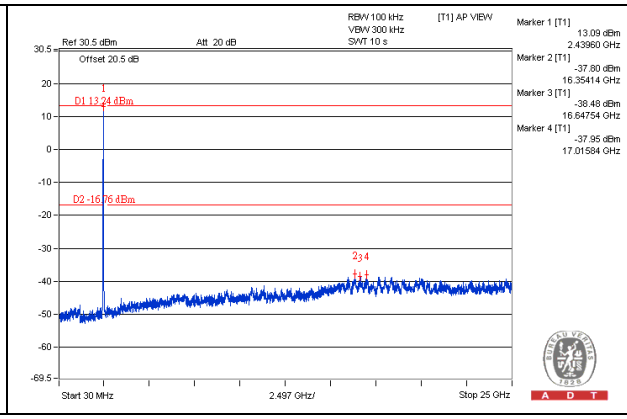
### CH 1



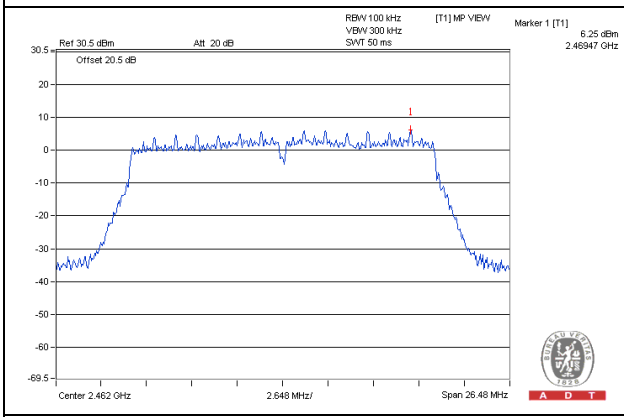



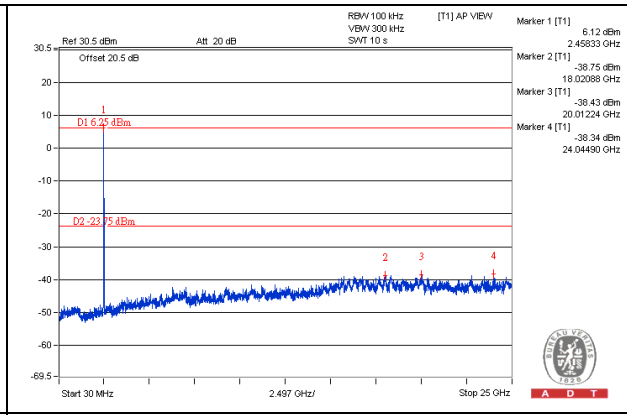

### CH 6



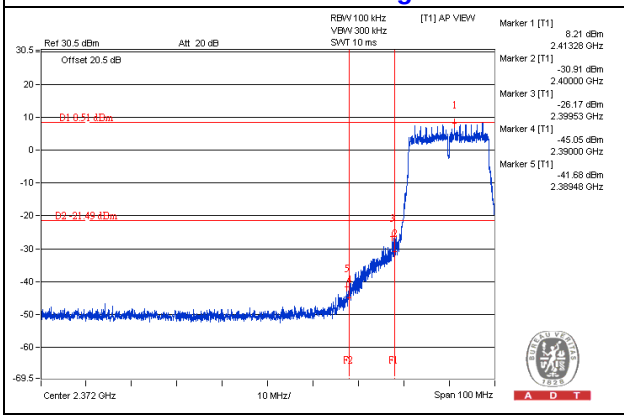




### CH 11

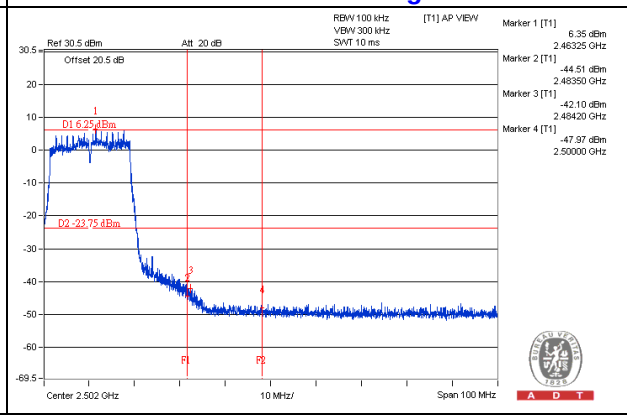



### CH 1 Band edge

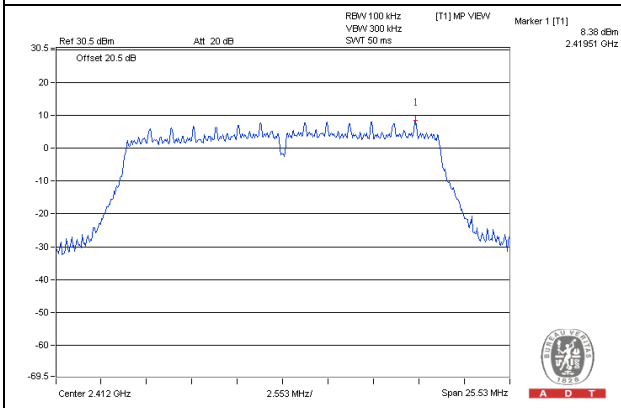


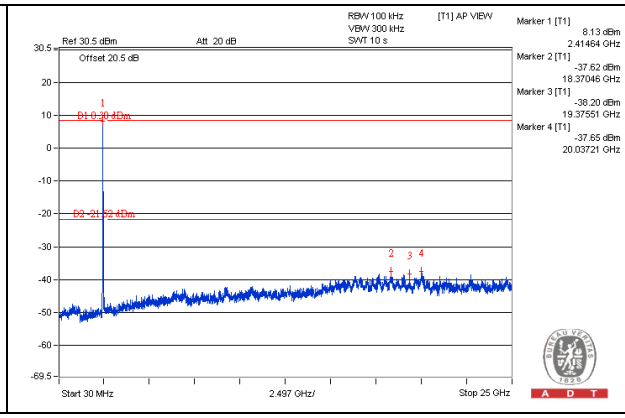

### CH 11 Band edge



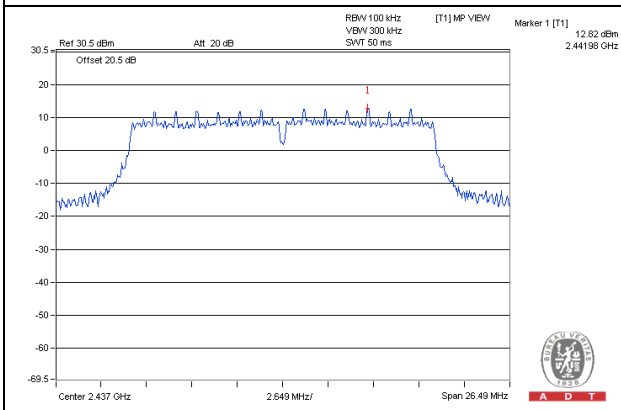
## CHAIN 2

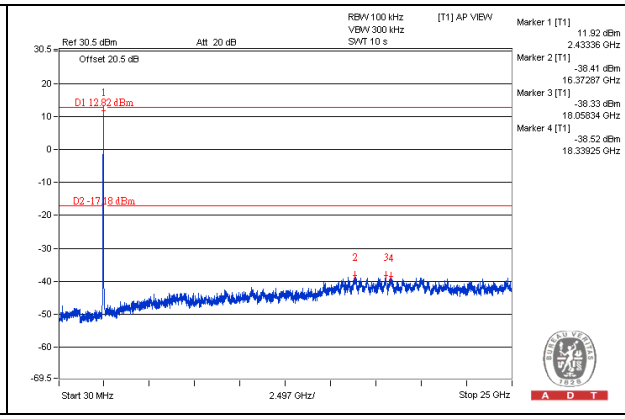
### CH 1



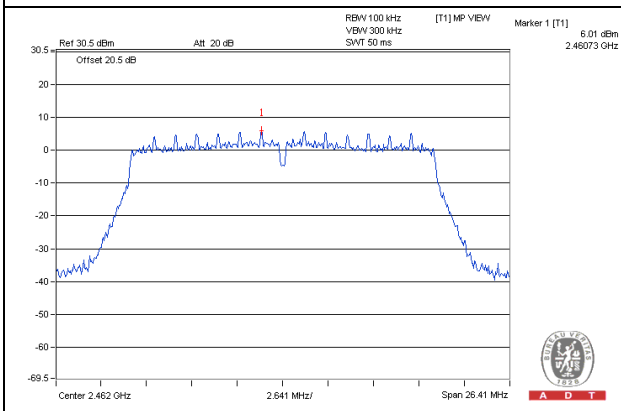



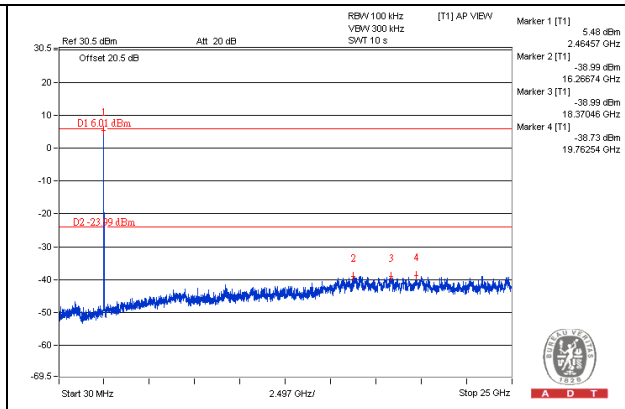

### CH 6



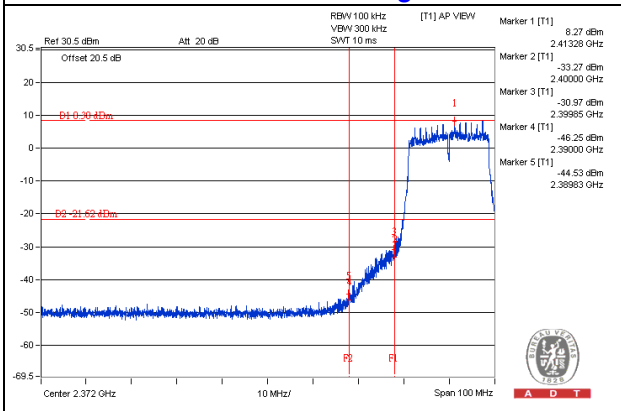




### CH 11

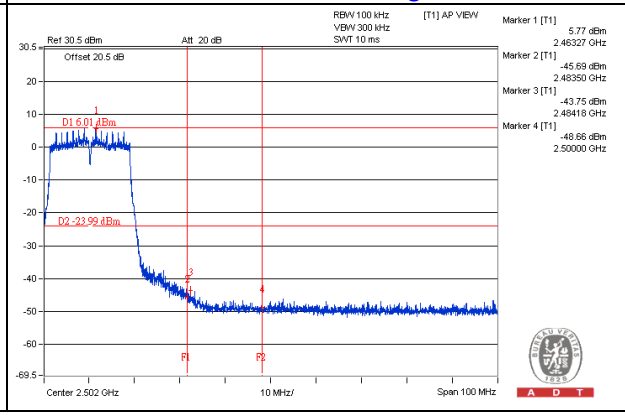



### CH 1 Band edge

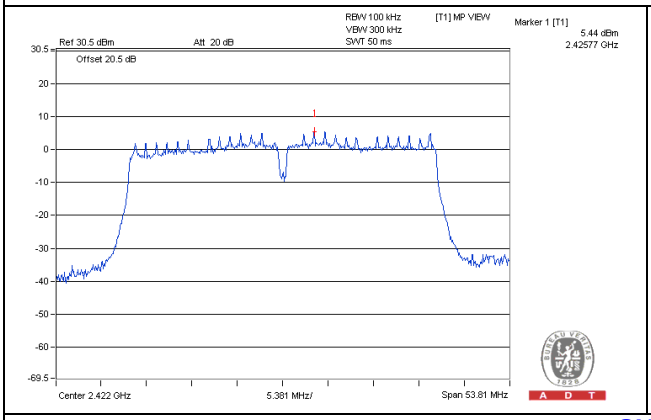


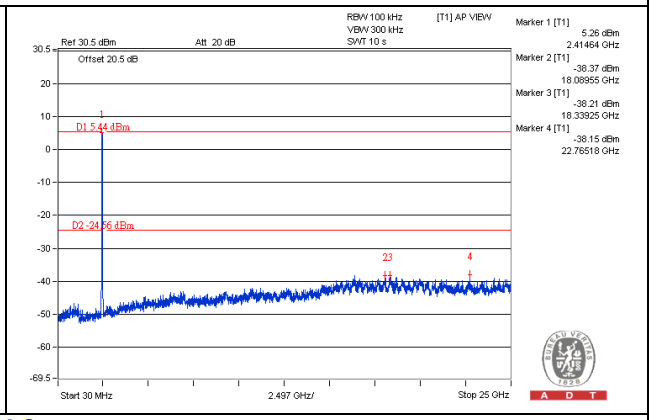

### CH 11 Band edge



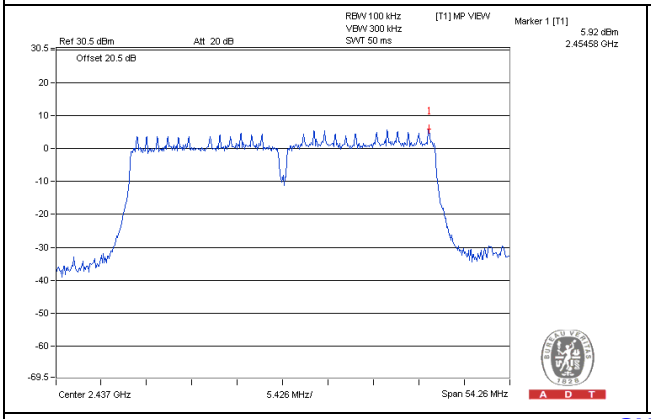
## 802.11n (HT40)
## CHAIN 0

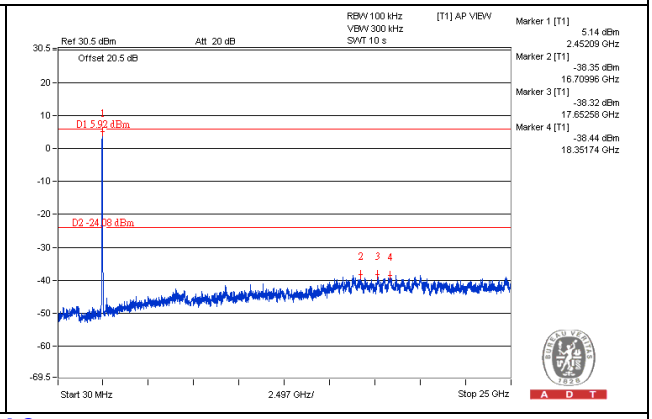
### CH 3



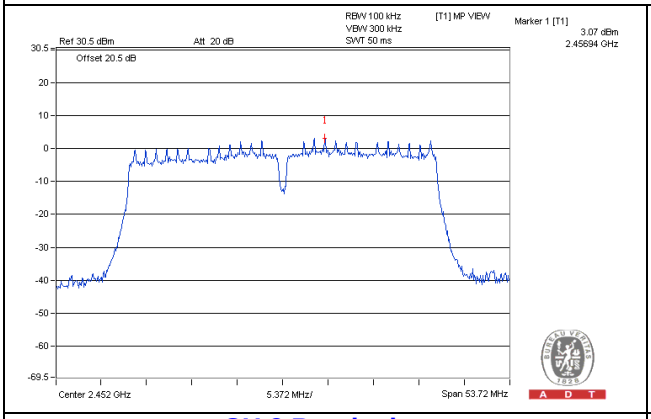



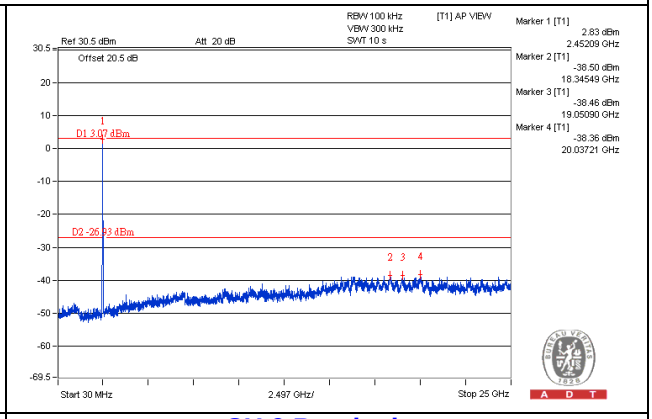

### CH 6



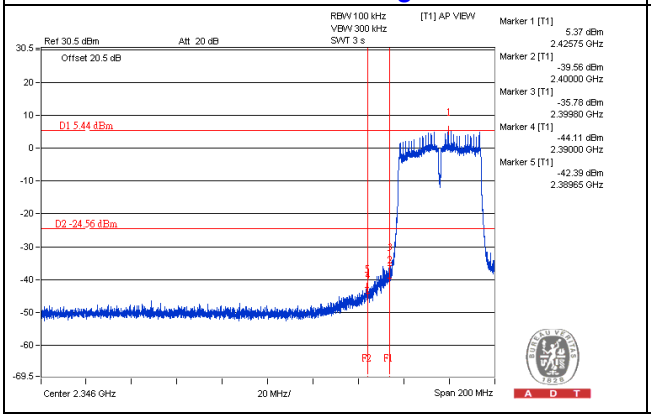




### CH 9

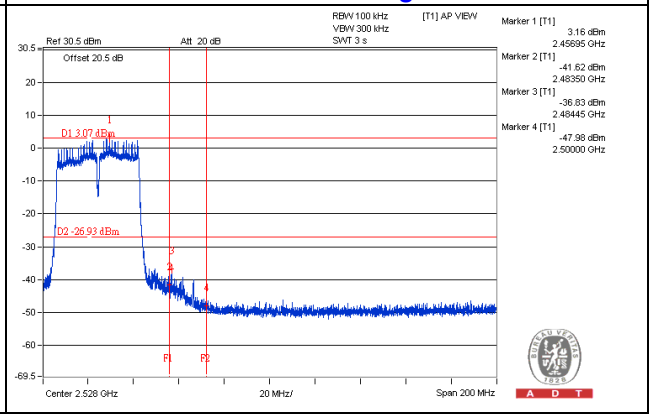



### CH 3 Band edge

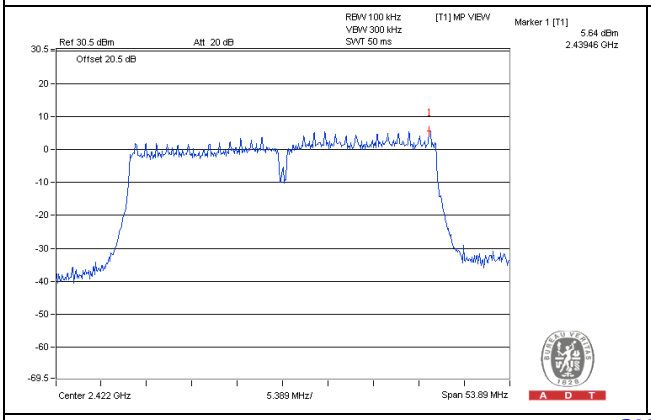


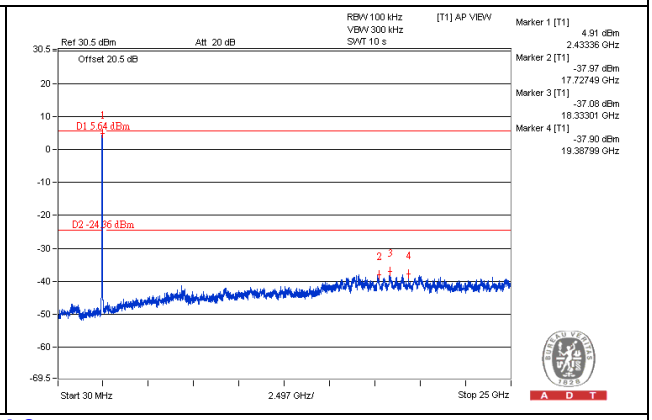

### CH 9 Band edge



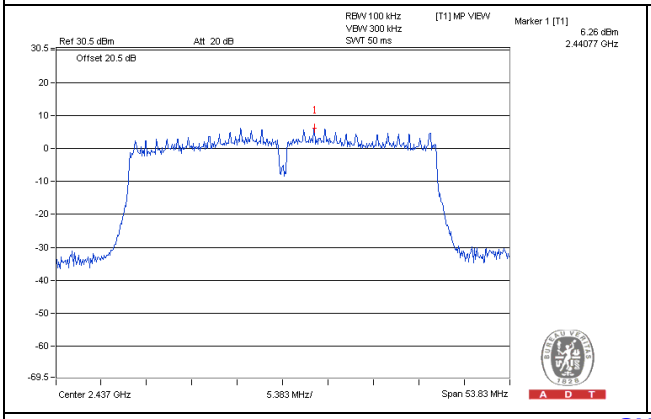
## CHAIN 1

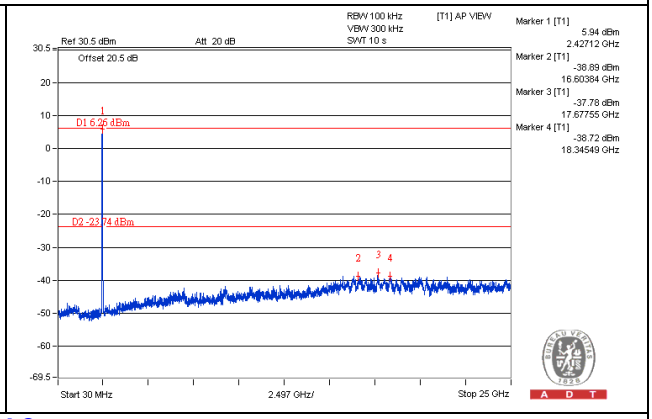
### CH 3



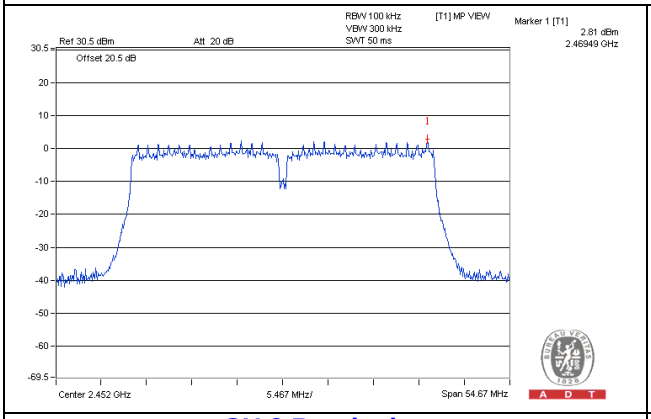



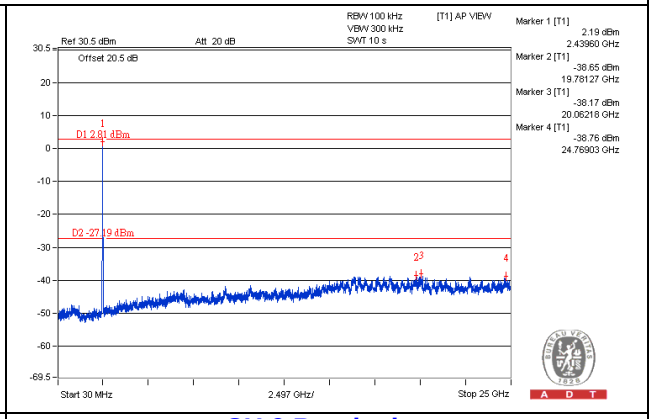

### CH 6



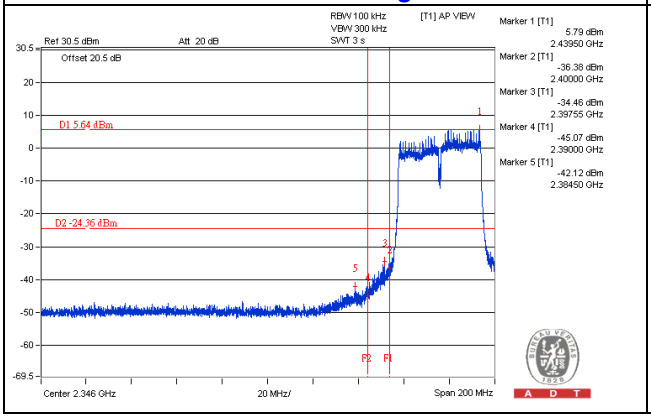




### CH 9

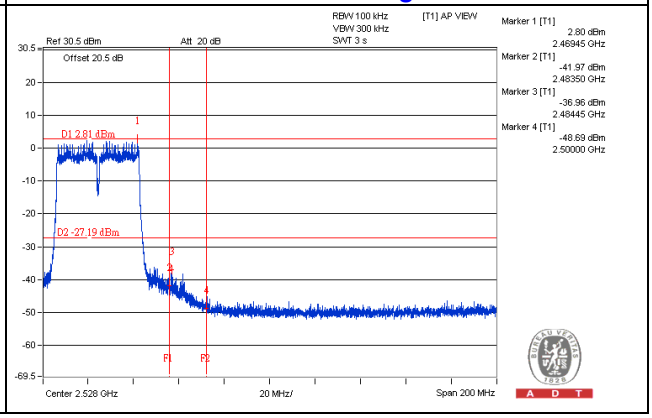



### CH 3 Band edge

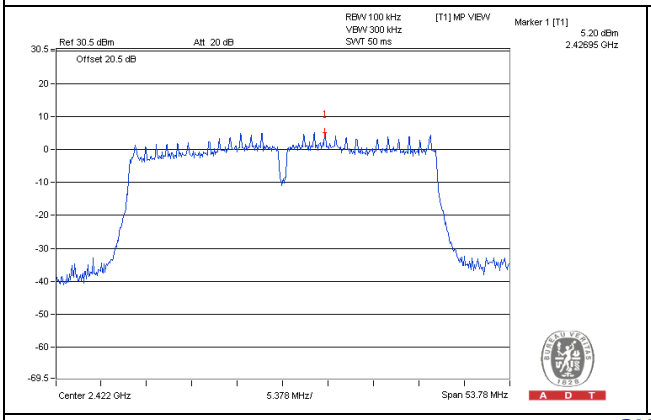


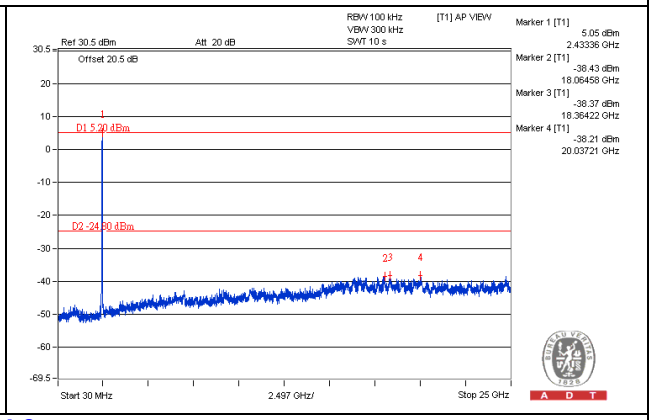

### CH 9 Band edge



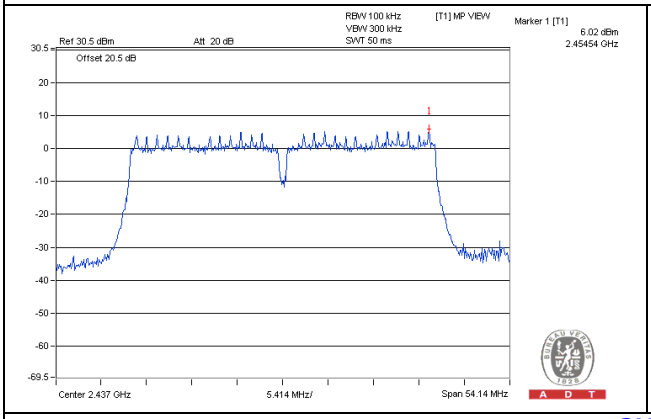
## CHAIN 2

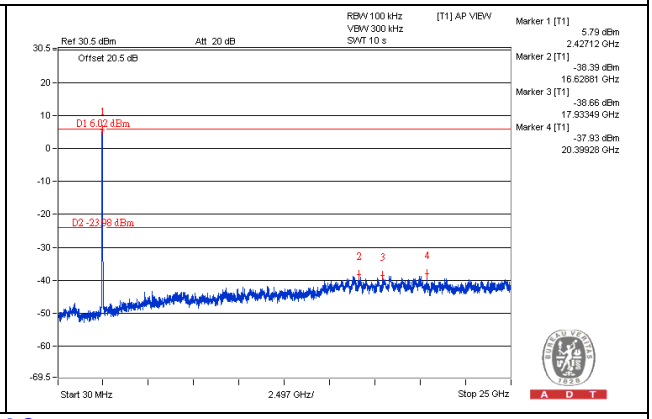
### CH 3



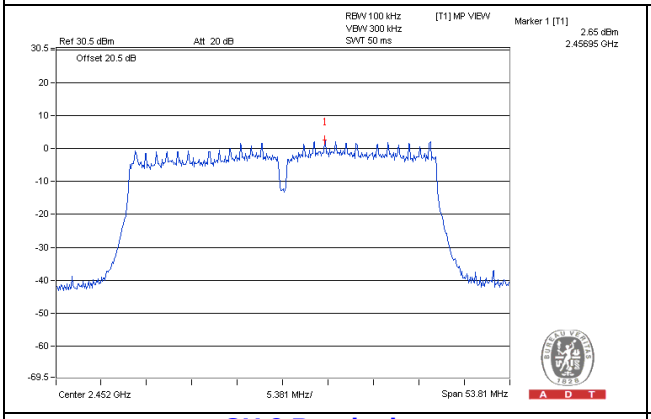



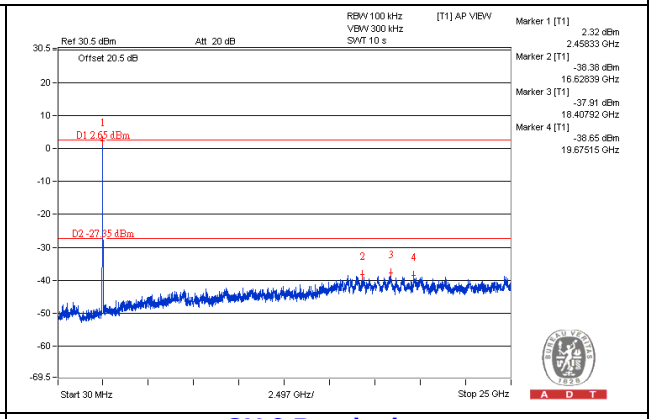

### CH 6



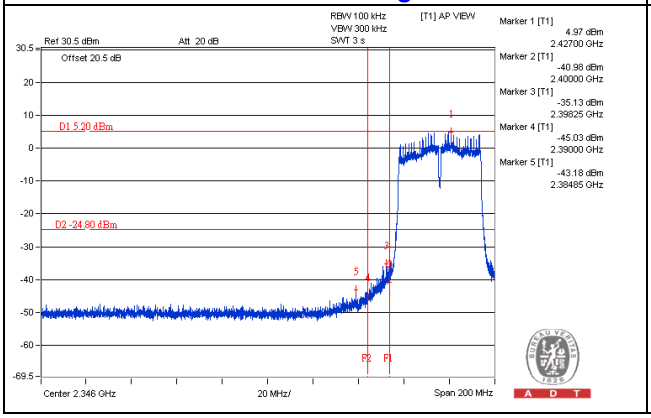




### CH 9

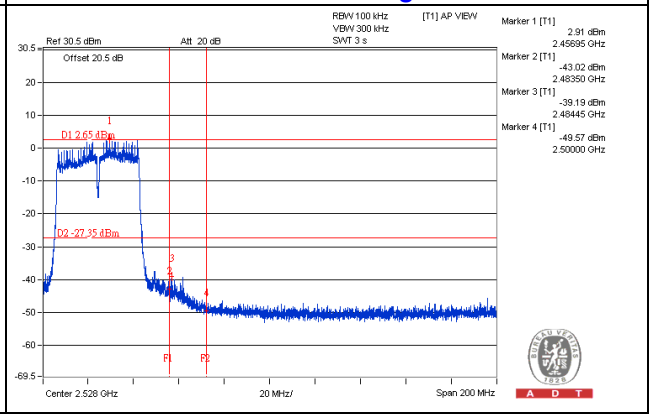



### CH 3 Band edge




### CH 9 Band edge



## 5 Test Types and Results (For 5GHz band)

### 5.1 Radiated Emission and Bandedge Measurement

5.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB 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 30dB under any condition of modulation.

5.1.2 Test Instruments

Same as item 4.1.2.

5.1.3 Test Procedure

Same as item 4.1.3.

5.1.4 Deviation from Test Standard

No deviation.

5.1.5 Test Setup

Same as item 4.1.5.

5.1.6 EUT Operating Conditions

Same as item 4.1.6.

5.1.7 Test Results

**Above 1GHz Data：**

**CDD MODE**

**802.11a**

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | *5745.00 | 105.9 PK | | | 1.00 H | 232 | 101.26 | 4.66 |
| 2 | *5745.00 | 96.2 AV | | | 1.00 H | 232 | 91.58 | 4.66 |
| 3 | 11490.00 | 57.7 PK | 74.0 | -16.4 | 1.22 H | 217 | 43.99 | 13.66 |
| 4 | 11490.00 | 44.7 AV | 54.0 | -9.3 | 1.22 H | 217 | 31.05 | 13.66 |
| **ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M** | | | | | | | | |
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | *5745.00 | 119.0 PK | | | 1.89 V | 327 | 114.35 | 4.66 |
| 2 | *5745.00 | 109.6 AV | | | 1.89 V | 327 | 104.92 | 4.66 |
| 3 | 11490.00 | 64.3 PK | 74.0 | -9.7 | 1.62 V | 11 | 50.63 | 13.66 |
| 4 | 11490.00 | 52.4 AV | 54.0 | -1.6 | 1.62 V | 11 | 38.77 | 13.66 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5785.00 | 107.9 PK | | | 1.00 H | 238 | 103.17 | 4.72 |
| 2 | *5785.00 | 97.7 AV | | | 1.00 H | 238 | 92.94 | 4.72 |
| 3 | 11570.00 | 57.1 PK | 74.0 | -16.9 | 1.00 H | 227 | 43.19 | 13.90 |
| 4 | 11570.00 | 44.6 AV | 54.0 | -9.4 | 1.00 H | 227 | 30.71 | 13.90 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5785.00 | 121.7 PK | | | 1.93 V | 332 | 116.93 | 4.72 |
| 2 | *5785.00 | 111.5 AV | | | 1.93 V | 332 | 106.74 | 4.72 |
| 3 | 11570.00 | 62.0 PK | 74.0 | -12.0 | 1.91 V | 354 | 48.12 | 13.90 |
| 4 | 11570.00 | 47.7 AV | 54.0 | -6.3 | 1.91 V | 354 | 33.76 | 13.90 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5825.00 | 107.5 PK | | | 1.16 H | 240 | 102.74 | 4.79 |
| 2 | *5825.00 | 97.7 AV | | | 1.16 H | 240 | 92.86 | 4.79 |
| 3 | 11650.00 | 56.9 PK | 74.0 | -17.2 | 1.00 H | 179 | 43.29 | 13.56 |
| 4 | 11650.00 | 44.2 AV | 54.0 | -9.8 | 1.00 H | 179 | 30.61 | 13.56 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5825.00 | 121.4 PK | | | 2.02 V | 229 | 116.58 | 4.79 |
| 2 | *5825.00 | 111.4 AV | | | 2.02 V | 229 | 106.61 | 4.79 |
| 3 | 11650.00 | 61.9 PK | 74.0 | -12.1 | 1.76 V | 341 | 48.36 | 13.56 |
| 4 | 11650.00 | 47.5 AV | 54.0 | -6.5 | 1.76 V | 341 | 33.91 | 13.56 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

## Beamforming MODE

### 802.11ac (VHT20)

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | *5745.00 | 106.5 PK | | | 1.00 H | 241 | 101.84 | 4.66 |
| 2 | *5745.00 | 96.1 AV | | | 1.00 H | 241 | 91.45 | 4.66 |
| 3 | 11490.00 | 57.2 PK | 74.0 | -16.8 | 1.43 H | 209 | 43.58 | 13.66 |
| 4 | 11490.00 | 44.0 AV | 54.0 | -10.1 | 1.43 H | 209 | 30.29 | 13.66 |
| **ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M** | | | | | | | | |
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| **1** | *5745.00 | 119.6 PK | | | 2.25 V | 313 | 114.91 | 4.66 |
| 2 | *5745.00 | 109.6 AV | | | 2.25 V | 313 | 104.98 | 4.66 |
| 3 | 11490.00 | 64.9 PK | 74.0 | -9.1 | 2.38 V | 346 | 51.22 | 13.66 |
| 4 | 11490.00 | 51.9 AV | 54.0 | -2.1 | 2.38 V | 346 | 38.27 | 13.66 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5785.00 | 107.6 PK | | | 1.00 H | 241 | 102.88 | 4.72 |
| 2 | *5785.00 | 97.6 AV | | | 1.00 H | 241 | 92.83 | 4.72 |
| 3 | 11570.00 | 54.9 PK | 74.0 | -19.1 | 1.00 H | 241 | 41.02 | 13.90 |
| 4 | 11570.00 | 42.5 AV | 54.0 | -11.5 | 1.00 H | 241 | 28.63 | 13.90 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5785.00 | 122.0 PK | | | 2.16 V | 313 | 117.27 | 4.72 |
| 2 | *5785.00 | 111.0 AV | | | 2.16 V | 313 | 106.29 | 4.72 |
| 3 | 11570.00 | 61.0 PK | 74.0 | -13.1 | 2.39 V | 327 | 47.05 | 13.90 |
| 4 | 11570.00 | 47.1 AV | 54.0 | -6.9 | 2.39 V | 327 | 33.21 | 13.90 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5825.00 | 105.3 PK | | | 1.00 H | 243 | 100.55 | 4.79 |
| 2 | *5825.00 | 96.3 AV | | | 1.00 H | 243 | 91.48 | 4.79 |
| 3 | 11650.00 | 53.8 PK | 74.0 | -20.2 | 1.45 H | 217 | 40.26 | 13.56 |
| 4 | 11650.00 | 41.9 AV | 54.0 | -12.1 | 1.45 H | 217 | 28.31 | 13.56 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5825.00 | 121.6 PK | | | 2.21 V | 311 | 116.76 | 4.79 |
| 2 | *5825.00 | 111.5 AV | | | 2.21 V | 311 | 106.75 | 4.79 |
| 3 | 11650.00 | 60.7 PK | 74.0 | -13.3 | 2.43 V | 336 | 47.13 | 13.56 |
| 4 | 11650.00 | 46.7 AV | 54.0 | -7.4 | 2.43 V | 336 | 33.09 | 13.56 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

## 802.11ac (VHT40)

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5755.00 | 105.7 PK | | | 1.36 H | 243 | 100.98 | 4.67 |
| 2 | *5755.00 | 96.2 AV | | | 1.36 H | 243 | 91.48 | 4.67 |
| 3 | 11510.00 | 55.8 PK | 74.0 | -18.2 | 1.39 H | 234 | 42.11 | 13.67 |
| 4 | 11510.00 | 43.4 AV | 54.0 | -10.6 | 1.39 H | 234 | 29.73 | 13.67 |
| **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 | *5755.00 | 115.9 PK | | | 2.10 V | 317 | 111.23 | 4.67 |
| 2 | *5755.00 | 105.5 AV | | | 2.10 V | 317 | 100.86 | 4.67 |
| 3 | 11510.00 | 61.6 PK | 74.0 | -12.4 | 2.38 V | 330 | 47.93 | 13.67 |
| 4 | 11510.00 | 47.7 AV | 54.0 | -6.3 | 2.38 V | 330 | 34.02 | 13.67 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5795.00 | 107.3 PK | | | 1.00 H | 232 | 102.60 | 4.74 |
| 2 | *5795.00 | 94.9 AV | | | 1.00 H | 232 | 90.11 | 4.74 |
| 3 | 11590.00 | 55.1 PK | 74.0 | -18.9 | 1.52 H | 228 | 41.15 | 13.98 |
| 4 | 11590.00 | 42.6 AV | 54.0 | -11.4 | 1.52 H | 228 | 28.65 | 13.98 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *5795.00 | 120.7 PK | | | 2.02 V | 315 | 115.99 | 4.74 |
| 2 | *5795.00 | 108.9 AV | | | 2.02 V | 315 | 104.19 | 4.74 |
| 3 | 11590.00 | 61.3 PK | 74.0 | -12.7 | 2.44 V | 347 | 47.35 | 13.98 |
| 4 | 11590.00 | 47.8 AV | 54.0 | -6.2 | 2.44 V | 347 | 33.78 | 13.98 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

### 802.11ac (VHT80)

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | *5775.00 | 100.5 PK | | | 1.00 H | 240 | 95.77 | 4.72 |
| 2 | *5775.00 | 89.5 AV | | | 1.00 H | 240 | 84.80 | 4.72 |
| 3 | 11550.00 | 54.7 PK | 74.0 | -19.3 | 1.55 H | 216 | 40.89 | 13.82 |
| 4 | 11550.00 | 42.5 AV | 54.0 | -11.5 | 1.55 H | 216 | 28.66 | 13.82 |
| **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 | *5775.00 | 114.1 PK | | | 2.10 V | 314 | 109.42 | 4.72 |
| 2 | *5775.00 | 102.4 AV | | | 2.10 V | 314 | 97.69 | 4.72 |
| 3 | 11550.00 | 60.7 PK | 74.0 | -13.3 | 2.50 V | 351 | 46.85 | 13.82 |
| 4 | 11550.00 | 46.8 AV | 54.0 | -7.2 | 2.50 V | 351 | 32.97 | 13.82 |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

**Below 1GHz Data:**

**CDD MODE**

**802.11a**

| | | | |
|---|---|---|---|
| **CHANNEL** | TX Channel 157 | **DETECTOR FUNCTION** | Quasi-Peak (QP) |
| **FREQUENCY RANGE** | 30MHz ~ 1GHz | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NO.** | **FREQ. (MHz)** | **EMISSION LEVEL (dBuV/m)** | **LIMIT (dBuV/m)** | **MARGIN (dB)** | **ANTENNA HEIGHT (m)** | **TABLE ANGLE (Degree)** | **RAW VALUE (dBuV)** | **CORRECTION FACTOR (dB/m)** |
| 1 | 106.44 | 33.5 QP | 43.5 | -10.0 | 1.53 H | 267 | 51.01 | -17.52 |
| 2 | 169.97 | 27.4 QP | 43.5 | -16.1 | 1.49 H | 190 | 41.28 | -13.86 |
| 3 | 201.11 | 28.5 QP | 43.5 | -15.0 | 2.17 H | 110 | 44.79 | -16.30 |
| 4 | 334.68 | 26.2 QP | 46.0 | -19.8 | 2.08 H | 142 | 37.80 | -11.61 |
| 5 | 532.46 | 37.2 QP | 46.0 | -8.8 | 1.77 H | 172 | 45.12 | -7.95 |
| 6 | 861.69 | 27.2 QP | 46.0 | -18.8 | 1.65 H | 43 | 29.42 | -2.20 |
| **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 | 34.96 | 36.4 QP | 40.0 | -3.6 | 1.85 V | 182 | 51.72 | -15.28 |
| 2 | 107.45 | 34.2 QP | 43.5 | -9.3 | 1.73 V | 215 | 51.69 | -17.47 |
| 3 | 147.52 | 27.4 QP | 43.5 | -16.1 | 1.94 V | 79 | 41.14 | -13.74 |
| 4 | 329.18 | 31.4 QP | 46.0 | -14.6 | 1.66 V | 138 | 42.99 | -11.63 |
| 5 | 532.46 | 37.3 QP | 46.0 | -8.7 | 1.71 V | 118 | 45.29 | -7.95 |
| 6 | 828.73 | 27.2 QP | 46.0 | -18.8 | 1.22 V | 88 | 29.74 | -2.56 |

**REMARKS:**

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

## 5.2 Conducted Emission Measurement

### 5.2.1 Limits of Conducted Emission Measurement T

| Frequency (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 5.2.2 Test Instruments

Same as item 4.2.2.

### 5.2.3 Test Procedure

Same as item 4.2.3.

### 5.2.4 Deviation from Test Standard

No deviation.

### 5.2.5 Test Setup

Same as item 4.2.5.

### 5.2.6 EUT Operating Conditions

Same as item 4.1.6.

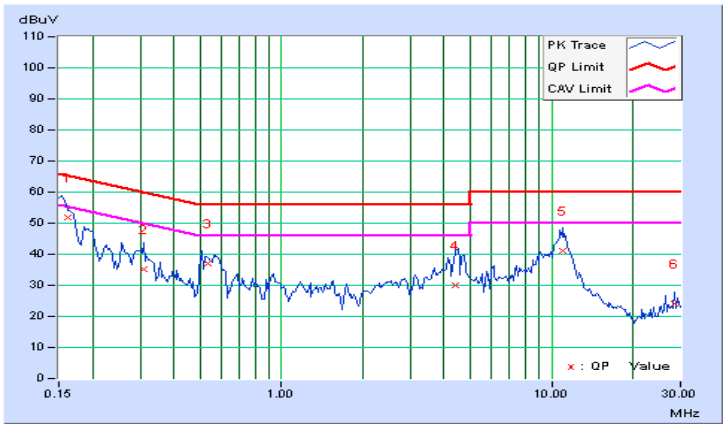
5.2.7 Test Results

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

| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.16283 | 0.21 | 51.62 | 43.75 | 51.83 | 43.96 | 65.32 | 55.32 | -13.49 | -11.36 |
| 2 | 0.31011 | 0.25 | 34.88 | 23.43 | 35.13 | 23.68 | 59.97 | 49.97 | -24.84 | -26.29 |
| 3 | 0.53155 | 0.29 | 36.71 | 31.22 | 37.00 | 31.51 | 56.00 | 46.00 | -19.00 | -14.49 |
| 4 | 4.40629 | 0.57 | 29.43 | 20.31 | 30.00 | 20.88 | 56.00 | 46.00 | -26.00 | -25.12 |
| 5 | 11.00786 | 0.80 | 40.22 | 35.02 | 41.02 | 35.82 | 60.00 | 50.00 | -18.98 | -14.18 |
| 6 | 28.62473 | 1.13 | 22.91 | 20.55 | 24.04 | 21.68 | 60.00 | 50.00 | -35.96 | -28.32 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

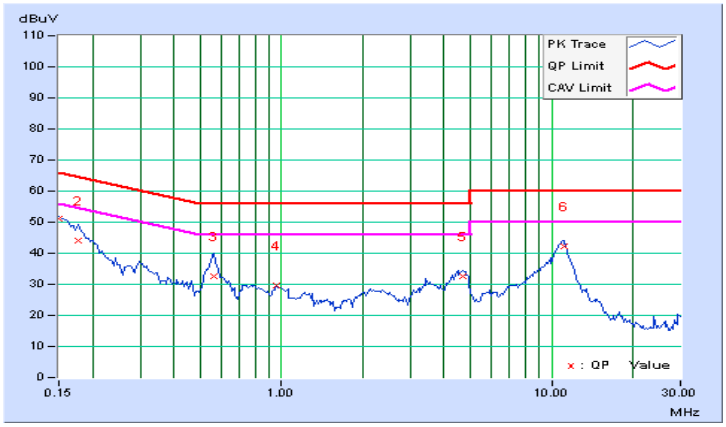


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|

| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15005 | 0.21 | 50.77 | 43.72 | 50.98 | 43.93 | 66.00 | 56.00 | -15.02 | -12.07 |
| 2 | 0.17711 | 0.22 | 44.01 | 27.55 | 44.23 | 27.77 | 64.62 | 54.62 | -20.39 | -26.85 |
| 3 | 0.56021 | 0.31 | 32.33 | 28.12 | 32.64 | 28.43 | 56.00 | 46.00 | -23.36 | -17.57 |
| 4 | 0.96259 | 0.37 | 29.25 | 24.51 | 29.62 | 24.88 | 56.00 | 46.00 | -26.38 | -21.12 |
| 5 | 4.69135 | 0.59 | 31.89 | 23.66 | 32.48 | 24.25 | 56.00 | 46.00 | -23.52 | -21.75 |
| 6 | 11.10128 | 0.77 | 41.37 | 35.89 | 42.14 | 36.66 | 60.00 | 50.00 | -17.86 | -13.34 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



## 5.3 6dB Bandwidth Measurement

### 5.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 5.3.2 Test Setup

Same as item 4.3.2.

### 5.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 5.3.4 Test Procedure

Same as item 4.3.4.

### 5.3.5 Deviation fromTest Standard

No deviation.

### 5.3.6 EUT Operating Conditions

Same as item 4.3.6.

5.3.7 Test Result

**CDD MODE**

**802.11a**

| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 149 | 5745 | 16.38 | 16.38 | 16.38 | 0.5 | PASS |
| 157 | 5785 | 16.40 | 16.37 | 16.39 | 0.5 | PASS |
| 165 | 5825 | 16.40 | 16.39 | 16.38 | 0.5 | PASS |

**Beamforming MODE**

**802.11ac (VHT20)**

| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 149 | 5745 | 17.63 | 17.62 | 17.63 | 0.5 | PASS |
| 157 | 5785 | 17.63 | 17.62 | 17.63 | 0.5 | PASS |
| 165 | 5825 | 17.64 | 17.64 | 17.63 | 0.5 | PASS |

**802.11ac (VHT40)**

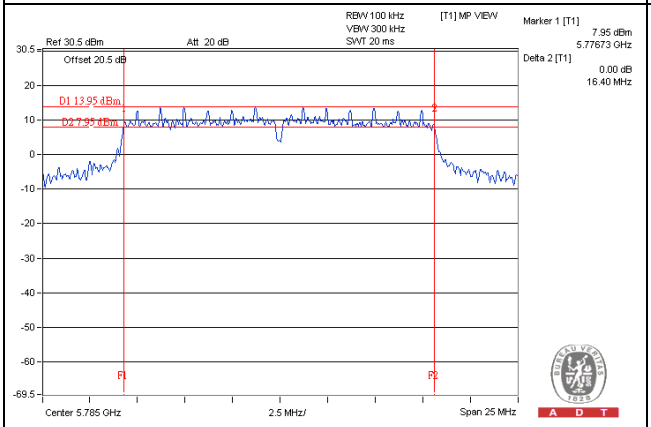
| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 151 | 5755 | 36.40 | 36.39 | 36.41 | 0.5 | PASS |
| 159 | 5795 | 36.39 | 36.16 | 36.36 | 0.5 | PASS |

**802.11ac (VHT80)**

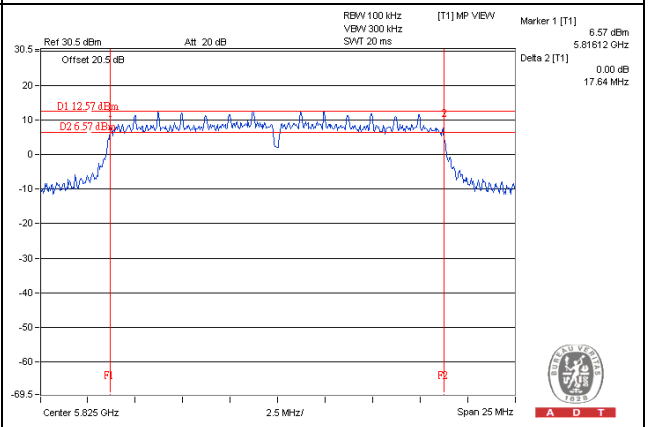
| CHANNEL | FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) | | | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | |
| 155 | 5775 | 75.82 | 75.92 | 75.79 | 0.5 | PASS |

## SPECTRUM PLOT OF WORST VALUE

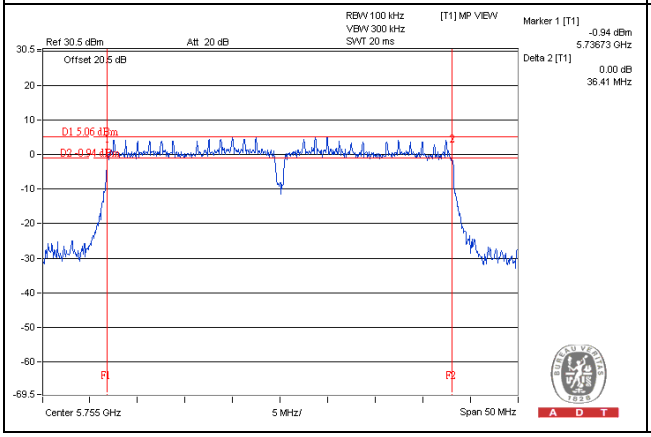
### 802.11a



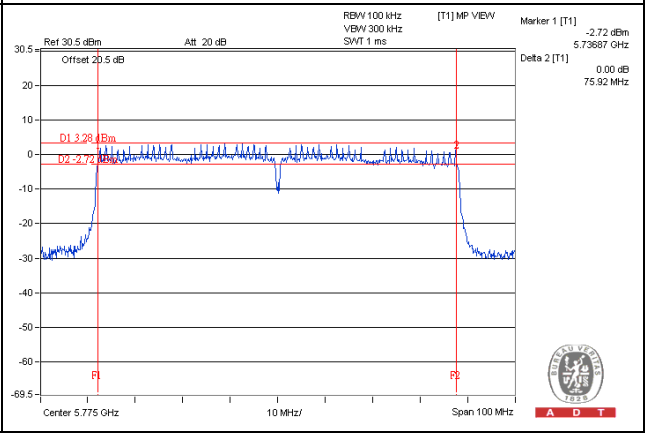

### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)



## 5.4 Conducted Output Power

### 5.4.1 Limits OF Conducted Output Power Measurement

For systems using digital modulation in the 5725 –5850 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v02r01 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.

### 5.4.2 Test Setup

Same as Item 4.4.2.

### 5.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 5.4.4 Test Procedures

Same as Item 4.4.4.

### 5.4.5 Deviation from Test Standard

No deviation.

### 5.4.6 EUT Operating Conditions

Same as Item 4.4.6.

5.4.7 Test Results

**CDD MODE**

**802.11a**

| CHAN. | CHAN. FREQ. (MHz) | AVERAGE POWER (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 149 | 5745 | 25.55 | 24.47 | 24.21 | 902.453 | 29.55 | 30 | PASS |
| 157 | 5785 | 25.52 | 24.69 | 24.31 | **920.667** | 29.64 | 30 | PASS |
| 165 | 5825 | 25.49 | 24.55 | 24.27 | 906.400 | 29.57 | 30 | PASS |

**Beamforming MODE**

**802.11ac (VHT20)**

| CHAN. | CHAN. FREQ. (MHz) | AVERAGE POWER (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 149 | 5745 | 24.81 | 23.92 | 23.93 | 796.467 | 29.01 | 29.23 | PASS |
| 157 | 5785 | 24.93 | 23.99 | 23.95 | **810.096** | 29.09 | 29.23 | PASS |
| 165 | 5825 | 24.90 | 23.94 | 23.97 | 806.231 | 29.06 | 29.23 | PASS |

**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the conducted power limit shall be reduced to 30-(6.77-6) = 29.23dBm.

**802.11ac (VHT40)**

| CHAN. | CHAN. FREQ. (MHz) | AVERAGE POWER (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 151 | 5755 | 23.22 | 22.51 | 22.24 | 555.626 | 27.45 | 29.23 | PASS |
| 159 | 5795 | 24.77 | 24.31 | 24.06 | **824.373** | 29.16 | 29.23 | PASS |

**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the conducted power limit shall be reduced to 30-(6.77-6) = 29.23dBm.

**802.11ac (VHT80)**

| CHAN. | CHAN. FREQ. (MHz) | AVERAGE POWER (dBm) | | | TOTAL POWER (mW) | TOTAL POWER (dBm) | LIMIT (dBm) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| | | CHAIN 0 | CHAIN 1 | CHAIN 2 | | | | |
| 155 | 5775 | 22.07 | 21.59 | 20.97 | **430.303** | 26.34 | 29.23 | PASS |

**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the conducted power limit shall be reduced to 30-(6.77-6) = 29.23dBm.

## 5.5 Power Spectral Density Measurement

### 5.5.1 Limits OF Power Spectral Density Measurement

Same as item 4.5.1.

### 5.5.2 Test Setup

Same as item 4.5.2.

### 5.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 5.5.4 Test Procedure

Same as item 4.5.4.

### 5.5.5 Deviation from Test Standard

No deviation.

### 5.5.6 EUT Operating Conditions

Same as Item 4.3.6

5.5.7 Test Results

## CDD MODE

### 802.11a

| TX chain | Channel | Freq. (MHz) | PSD (dBm/3kHz) | 10 log (N=3) dB | Total PSD (dBm/3kHz) | Limit (dBm/3kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 149 | 5745 | -0.51 | 4.77 | 4.59 | 7.23 | PASS |
| | 157 | 5785 | -0.19 | 4.77 | 4.91 | 7.23 | PASS |
| | 165 | 5825 | -0.84 | 4.77 | 4.26 | 7.23 | PASS |
| 1 | 149 | 5745 | -1.09 | 4.77 | 4.01 | 7.23 | PASS |
| | 157 | 5785 | -1.63 | 4.77 | 3.47 | 7.23 | PASS |
| | 165 | 5825 | -0.67 | 4.77 | 4.43 | 7.23 | PASS |
| 2 | 149 | 5745 | -0.63 | 4.77 | 4.47 | 7.23 | PASS |
| | 157 | 5785 | -2.00 | 4.77 | 3.10 | 7.23 | PASS |
| | 165 | 5825 | -2.04 | 4.77 | 3.06 | 7.23 | PASS |

**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

## Beamforming MODE

### 802.11ac (VHT20)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/3kHz) | 10 log (N=3) dB | Total PSD (dBm/3kHz) | Limit (dBm/3kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 149 | 5745 | -3.34 | 4.77 | 2.14 | 7.23 | PASS |
| | 157 | 5785 | -0.35 | 4.77 | 5.13 | 7.23 | PASS |
| | 165 | 5825 | -2.41 | 4.77 | 3.07 | 7.23 | PASS |
| 1 | 149 | 5745 | -5.99 | 4.77 | -0.51 | 7.23 | PASS |
| | 157 | 5785 | -1.93 | 4.77 | 3.55 | 7.23 | PASS |
| | 165 | 5825 | -1.67 | 4.77 | 3.81 | 7.23 | PASS |
| 2 | 149 | 5745 | -5.64 | 4.77 | -0.16 | 7.23 | PASS |
| | 157 | 5785 | -2.16 | 4.77 | 3.32 | 7.23 | PASS |
| | 165 | 5825 | -2.68 | 4.77 | 2.80 | 7.23 | PASS |

**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

### 802.11ac (VHT40)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/3kHz) | 10 log (N=3) dB | Total PSD (dBm/3kHz) | Limit (dBm/3kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 151 | 5755 | -8.32 | 4.77 | -3.08 | 7.23 | PASS |
| | 159 | 5795 | -3.28 | 4.77 | 1.96 | 7.23 | PASS |
| 1 | 151 | 5755 | -8.98 | 4.77 | -3.74 | 7.23 | PASS |
| | 159 | 5795 | -4.28 | 4.77 | 0.96 | 7.23 | PASS |
| 2 | 151 | 5755 | -9.20 | 4.77 | -3.96 | 7.23 | PASS |
| | 159 | 5795 | -5.33 | 4.77 | -0.09 | 7.23 | PASS |

**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

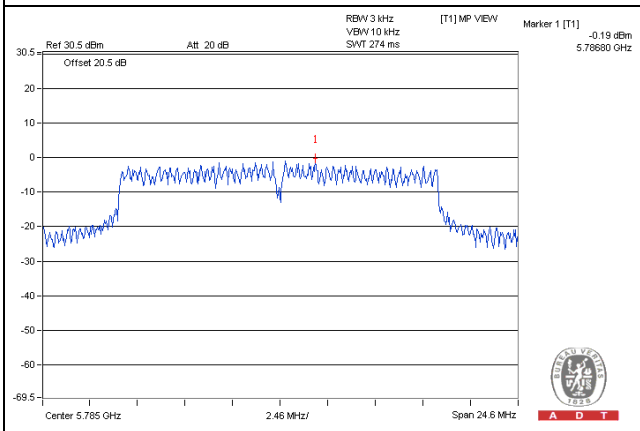
### 802.11ac (VHT80)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/3kHz) | 10 log (N=3) dB | Total PSD (dBm/3kHz) | Limit (dBm/3kHz) | PASS /FAIL |
|---|---|---|---|---|---|---|---|
| 0 | 155 | 5775 | -10.12 | 4.77 | -4.53 | 7.23 | PASS |
| 1 | 155 | 5775 | -11.77 | 4.77 | -6.18 | 7.23 | PASS |
| 2 | 155 | 5775 | -11.76 | 4.77 | -6.17 | 7.23 | PASS |

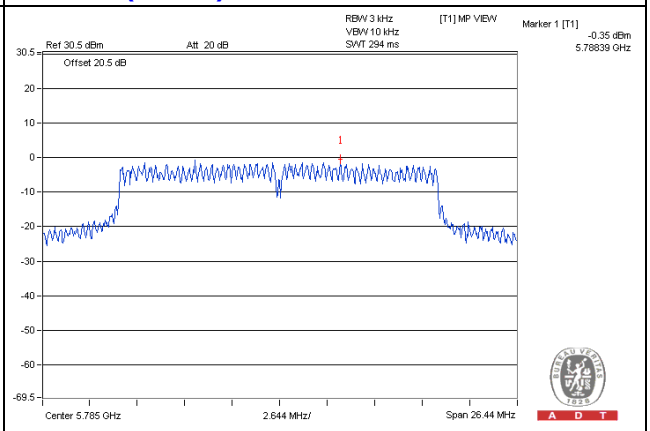
**NOTE:** Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

## SPECTRUM PLOT OF WORST VALUE

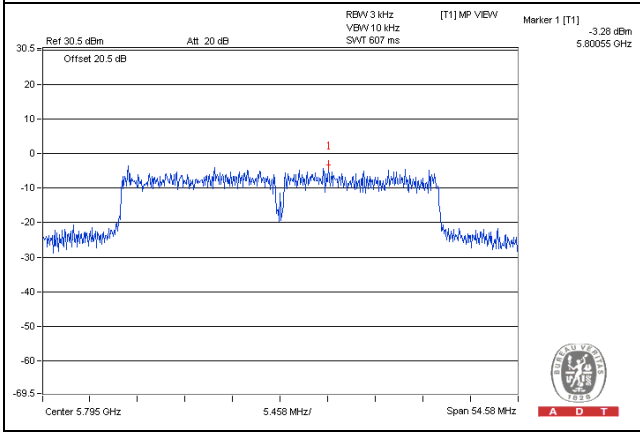
### 802.11a



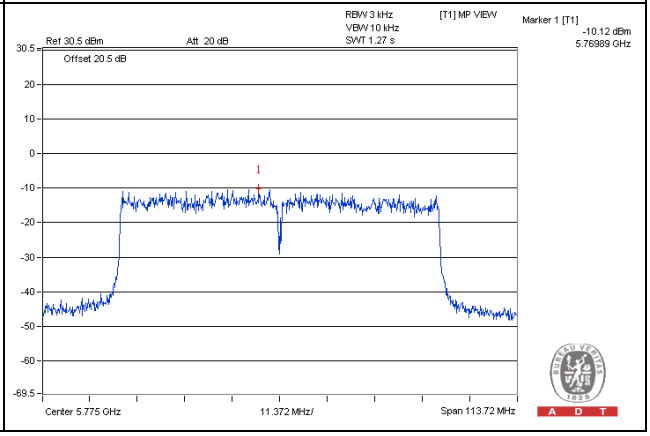

### 802.11ac (VHT20)




### 802.11ac (VHT40)




### 802.11ac (VHT80)



## 5.6 Conducted Out of Band Emission Measurement

### 5.6.1 Limits of Conducted Out of Band Emission Measurement

Below –30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 5.6.2 Test Setup

Same as Item 4.6.2

### 5.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 5.6.4 Test Procedure

Same as Item 4.6.4

### 5.6.5 Deviation from Test Standard

No deviation.

### 5.6.6 EUT Operating Conditions

Same as Item 4.3.6

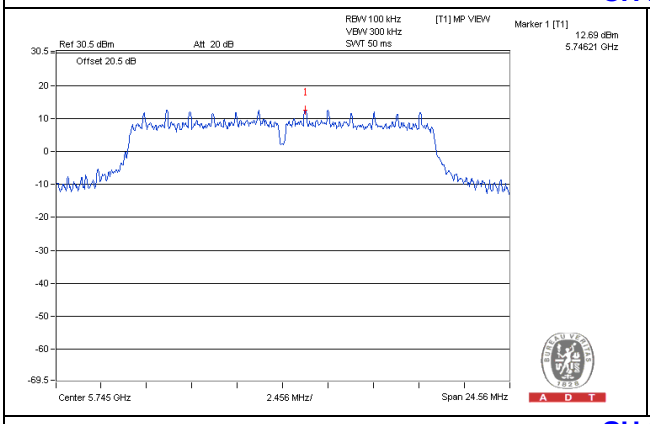
### 5.6.7 Test Results

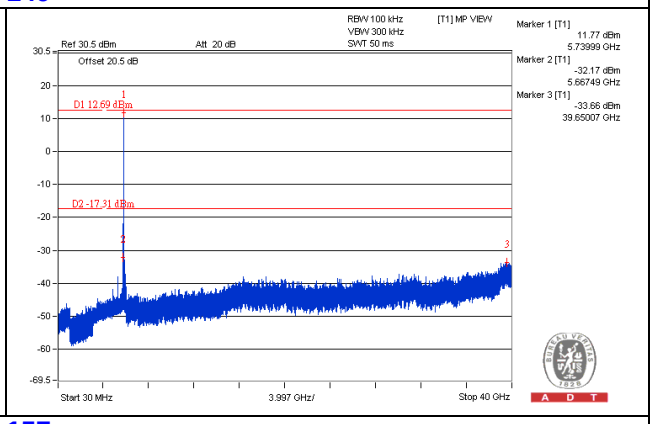
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

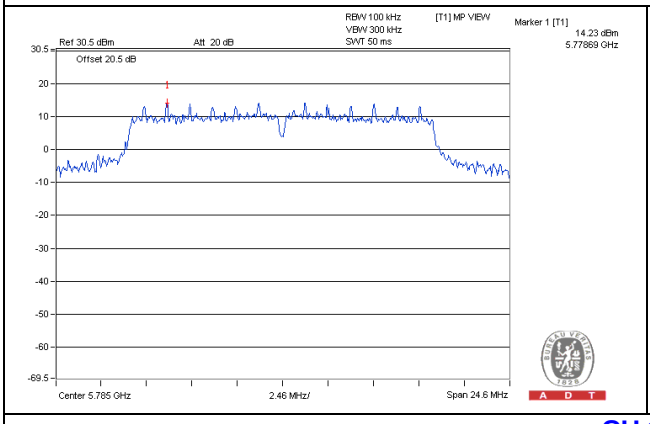
## 802.11a
## CHAIN 0

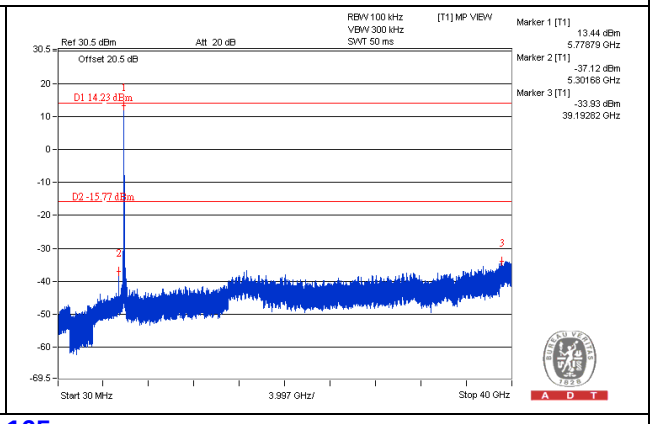
### CH 149



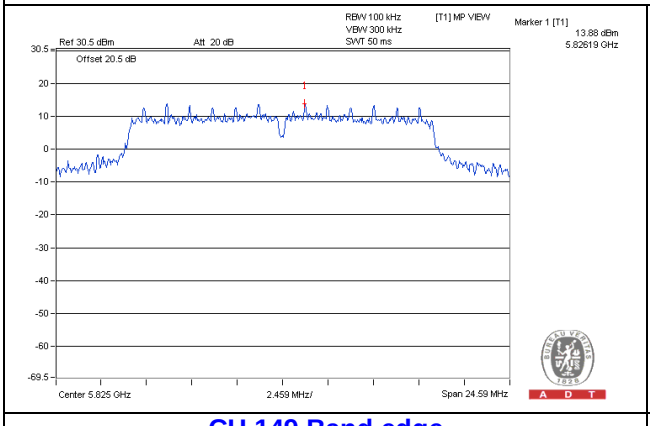



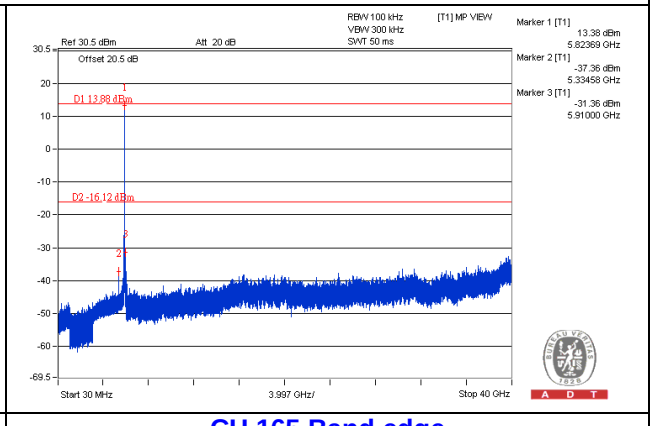

### CH 157



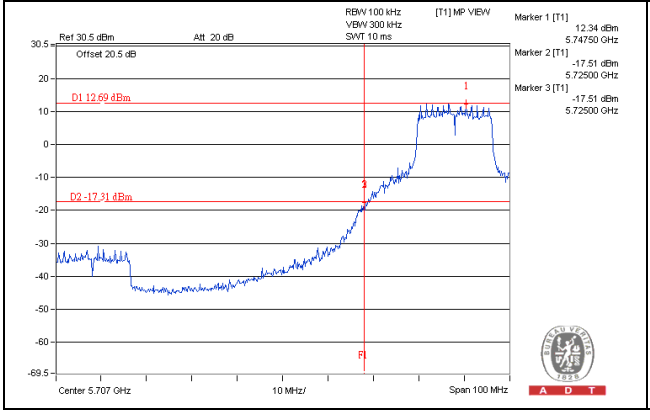




### CH 165

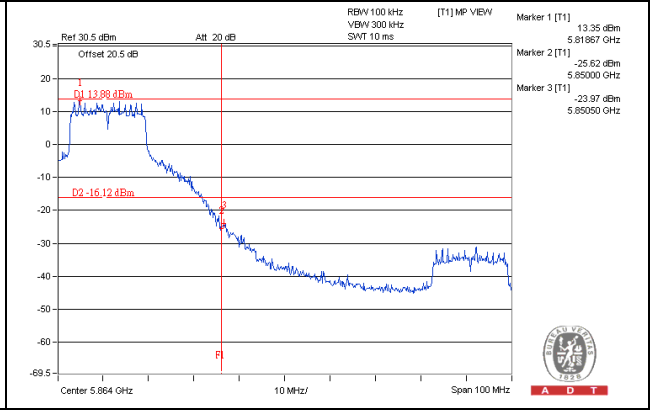



### CH 149 Band edge

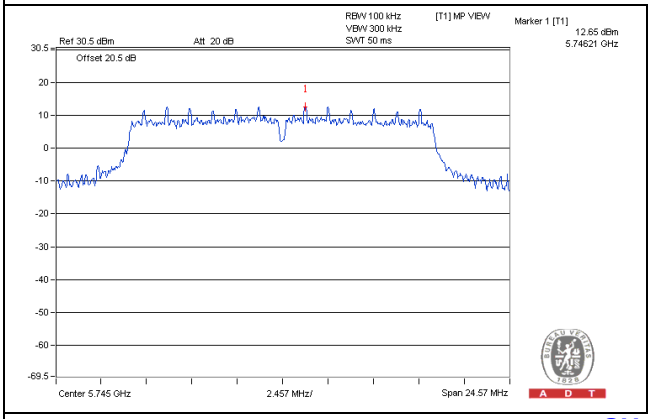


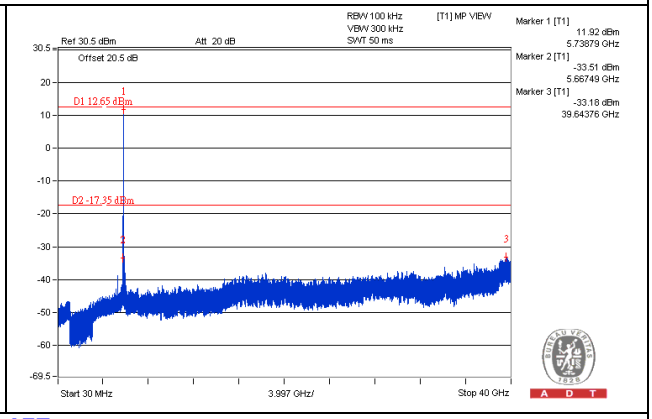

### CH 165 Band edge



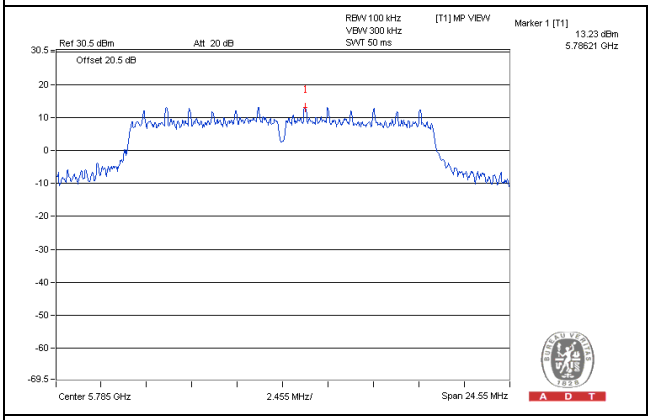
## CHAIN 1

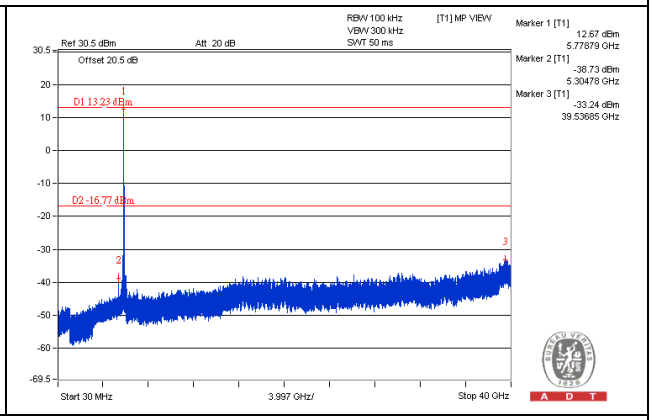
### CH 149



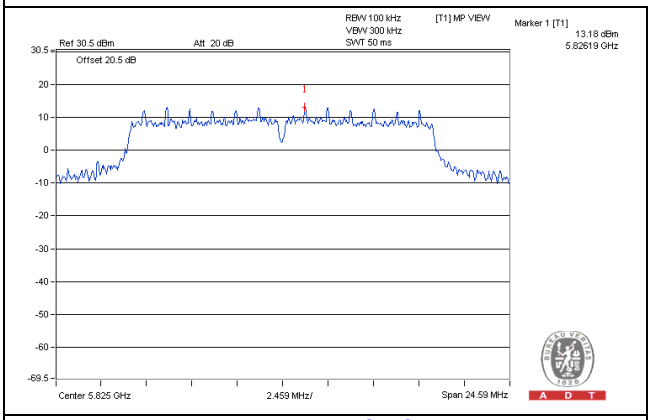



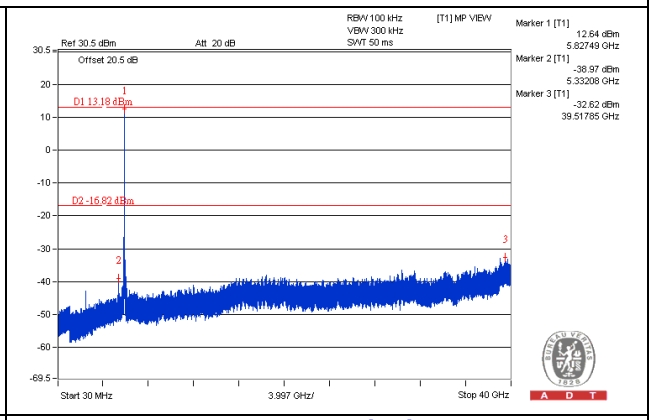

### CH 157



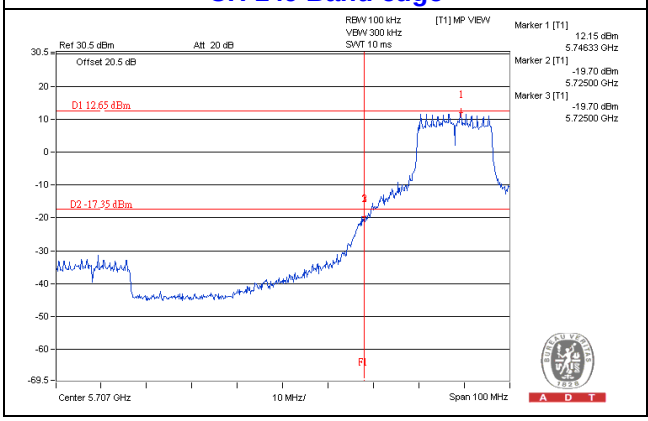




### CH 165

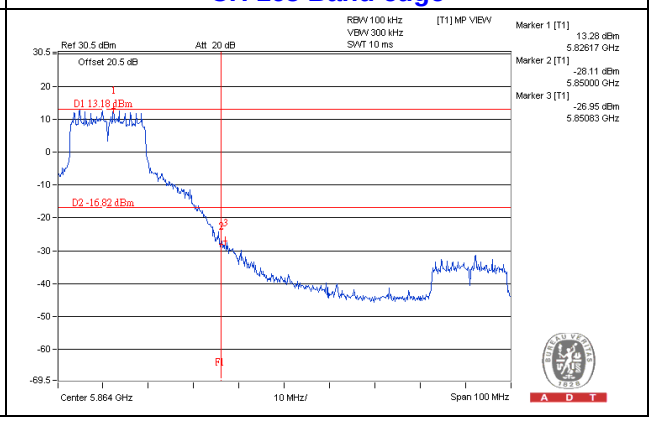



### CH 149 Band edge

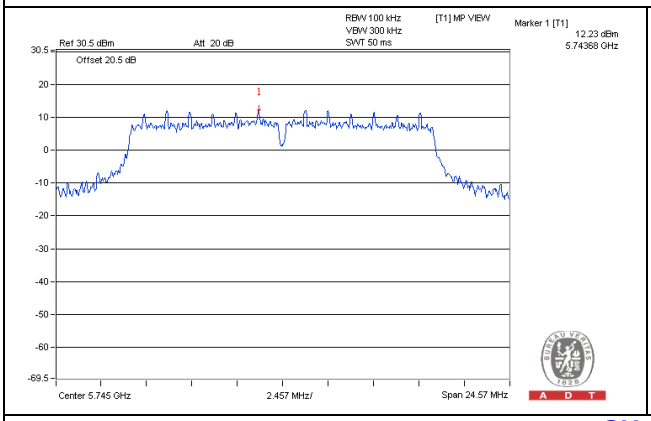


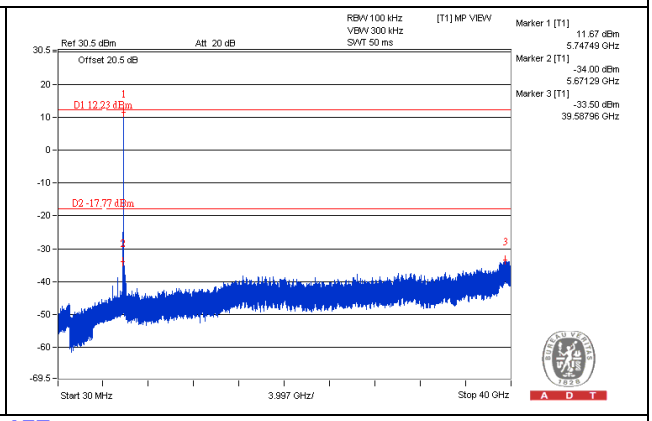

### CH 165 Band edge



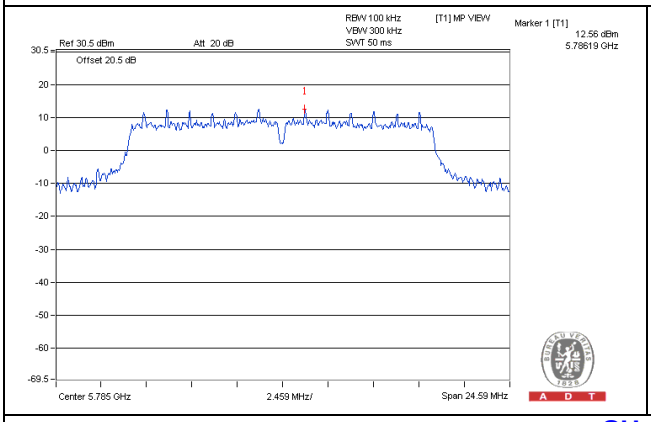
## CHAIN 2

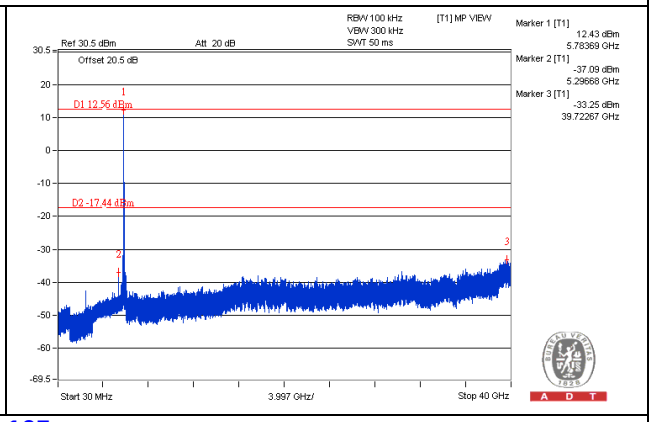
### CH 149



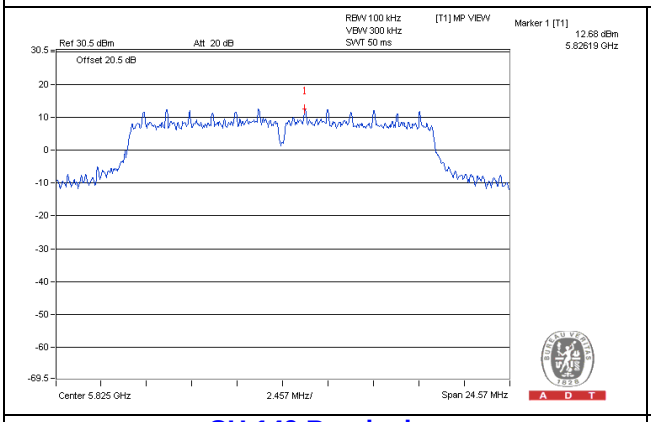



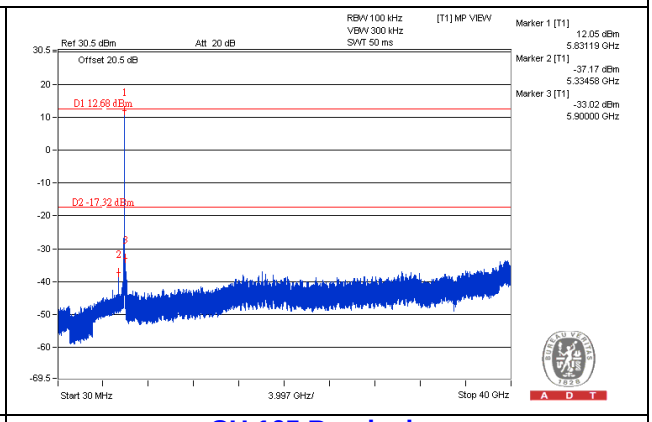

### CH 157



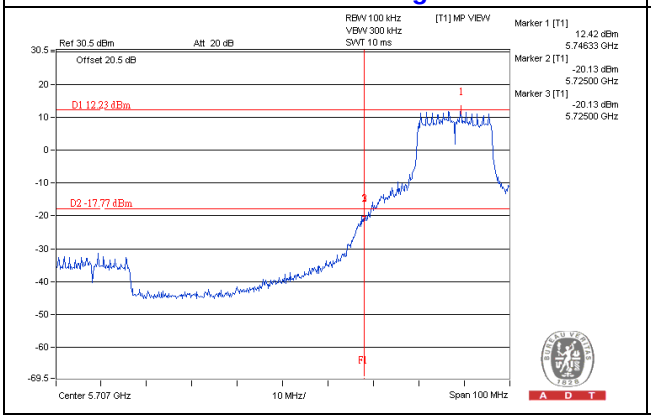




### CH 165

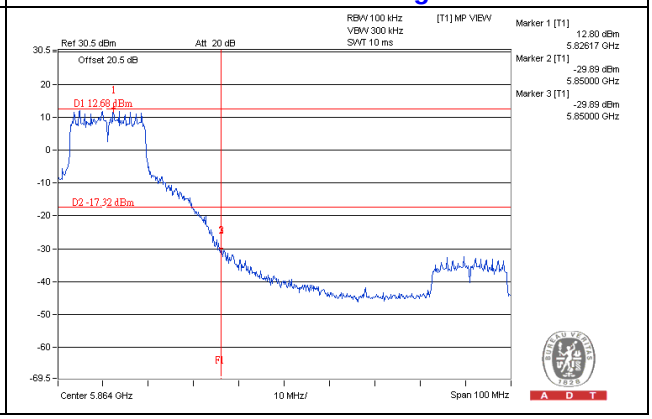



### CH 149 Band edge

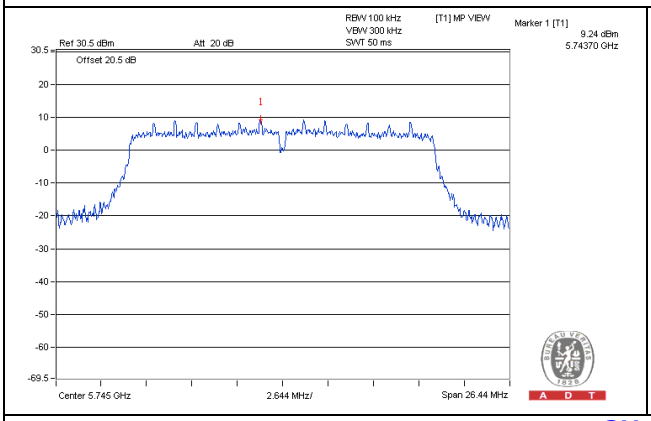


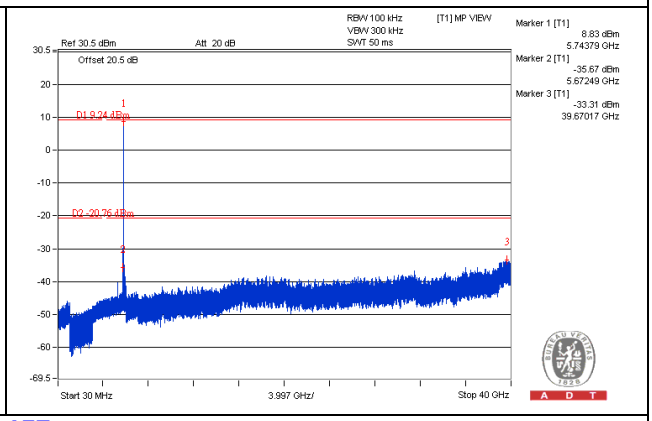

### CH 165 Band edge



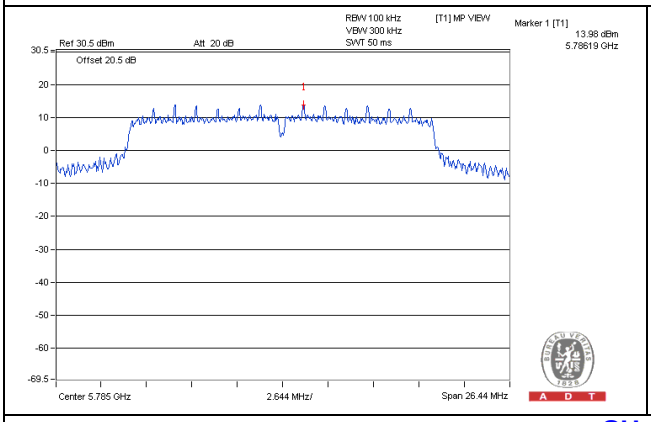
## 802.11ac (VHT20)
## CHAIN 0

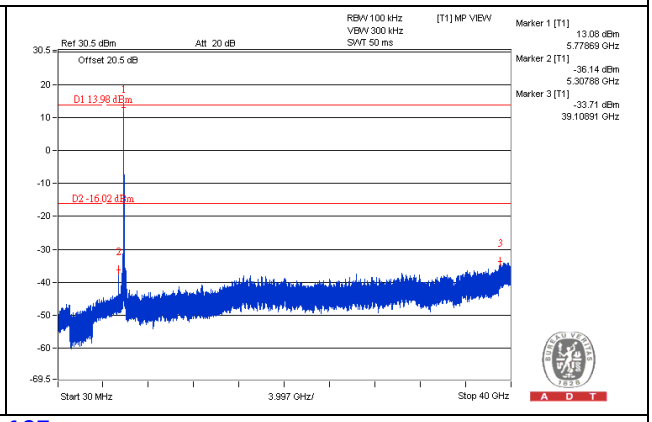
### CH 149



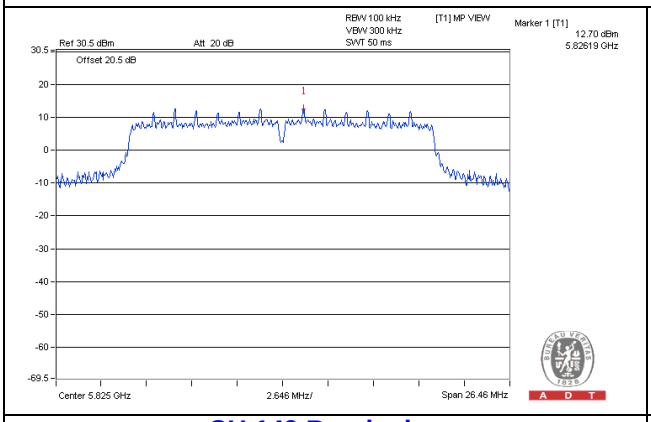



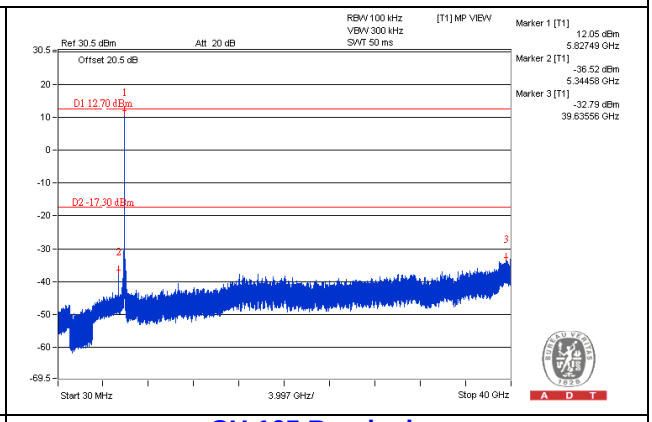

### CH 157



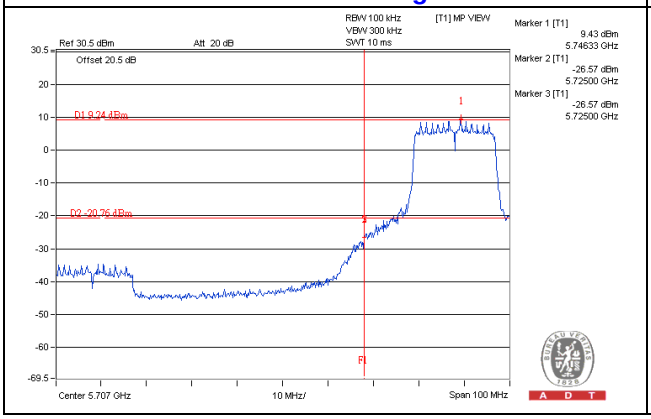




### CH 165

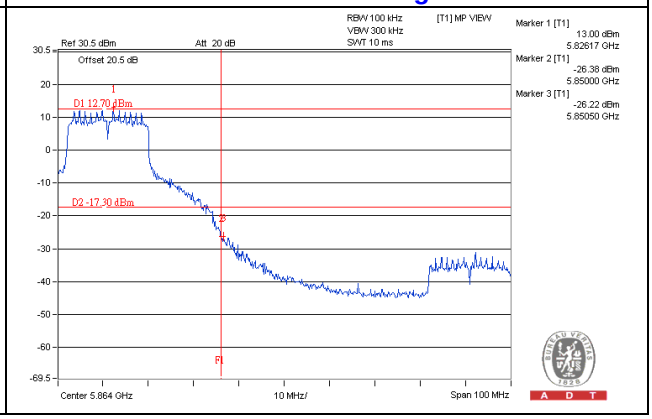



### CH 149 Band edge

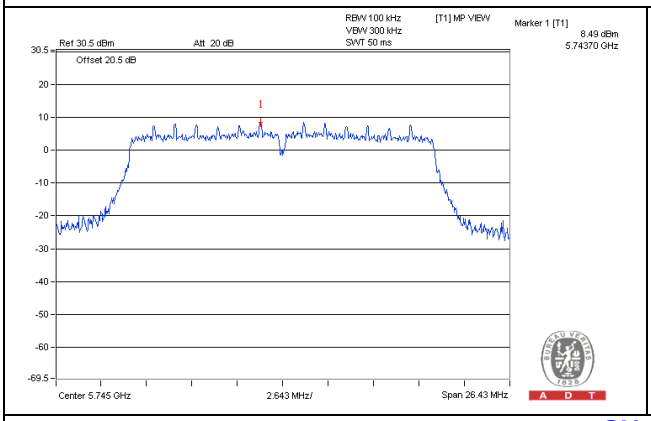


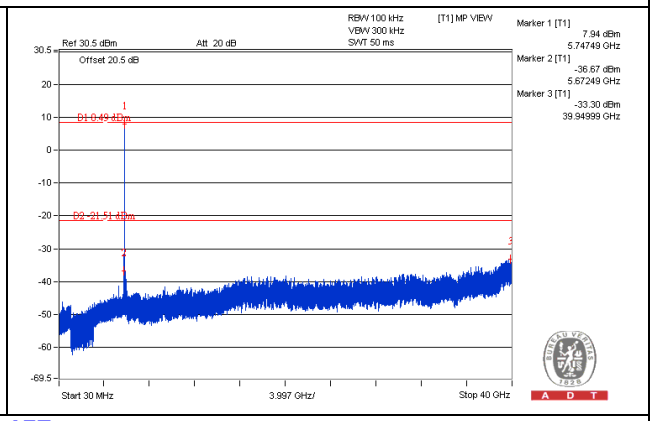

### CH 165 Band edge



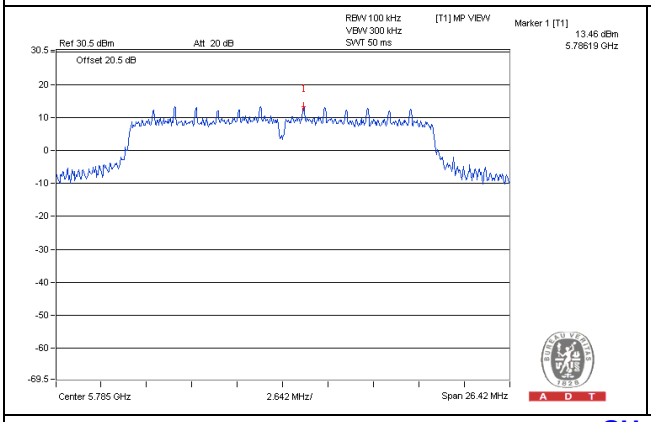
## CHAIN 1

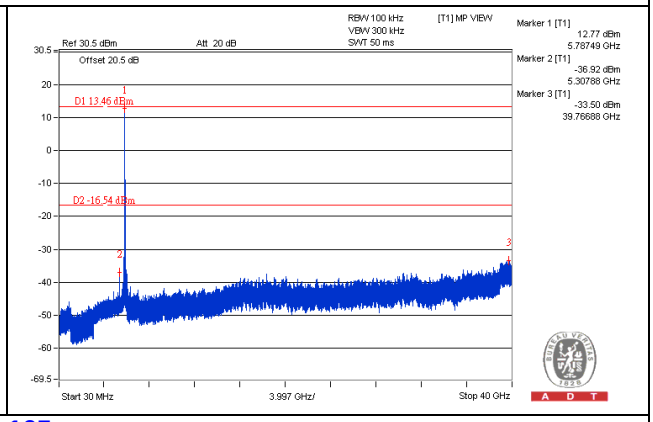
### CH 149



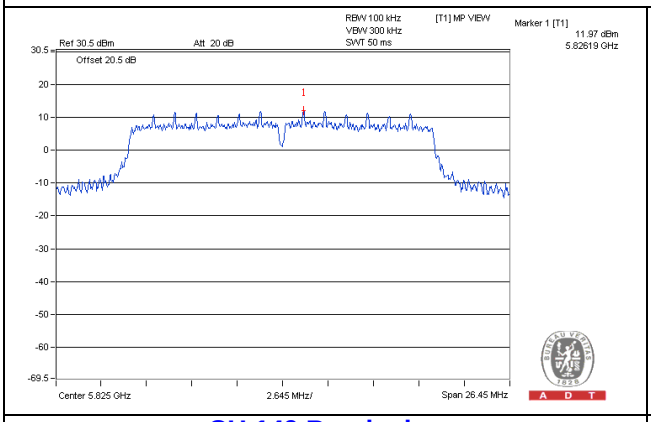



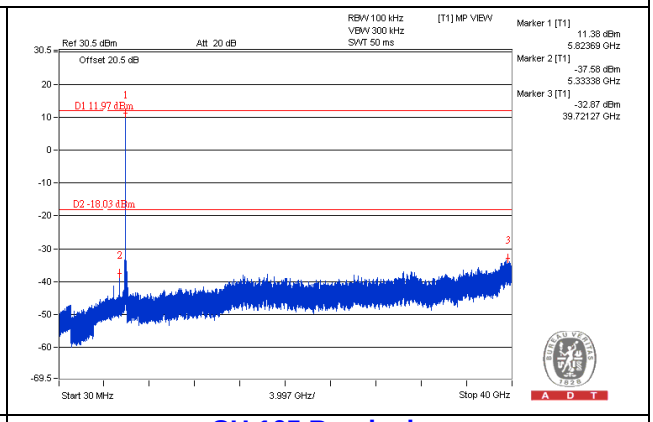

### CH 157



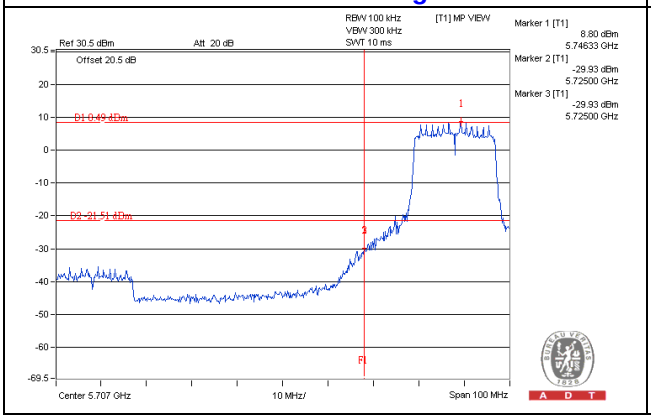




### CH 165

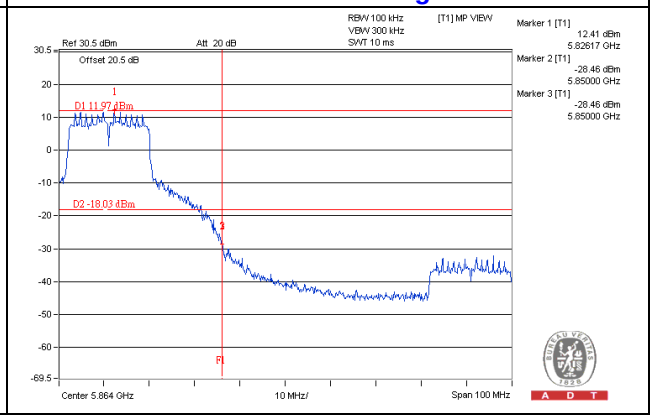



### CH 149 Band edge

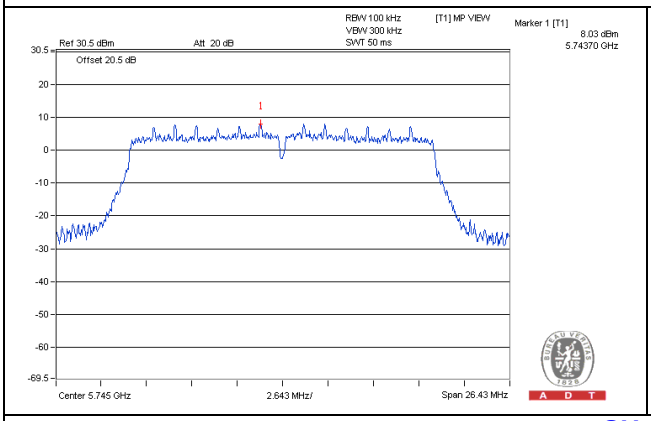


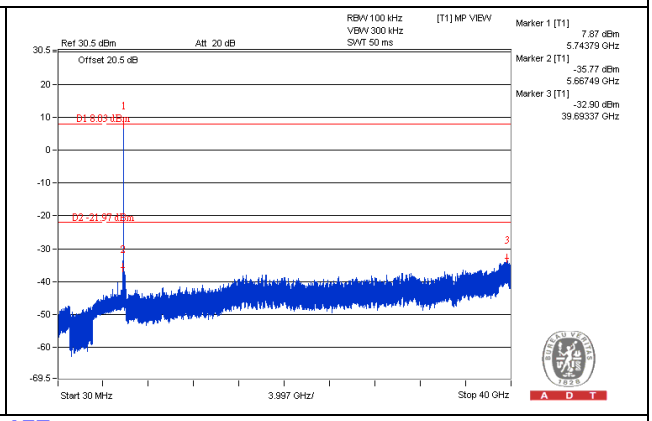

### CH 165 Band edge



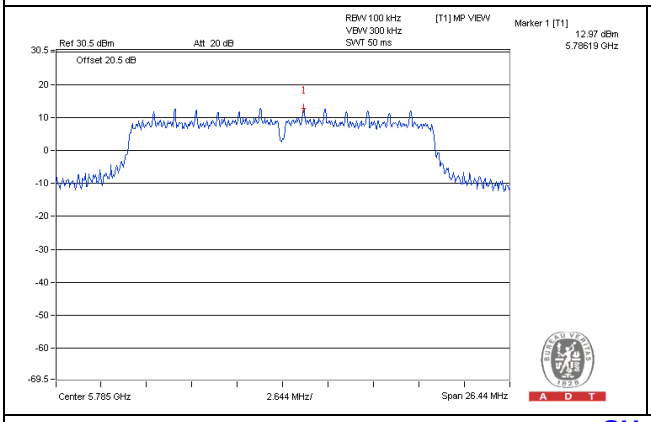
## CHAIN 2

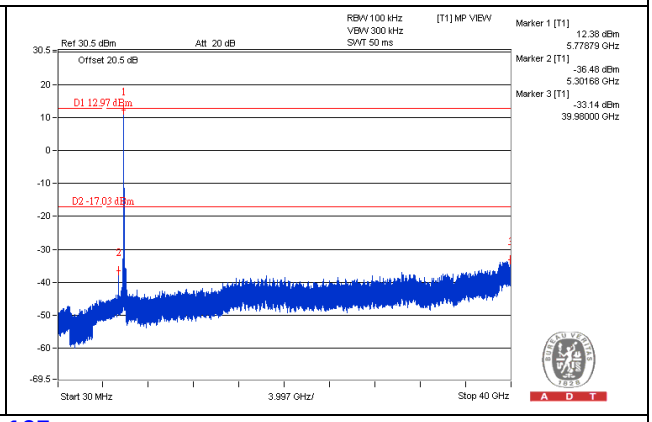
### CH 149



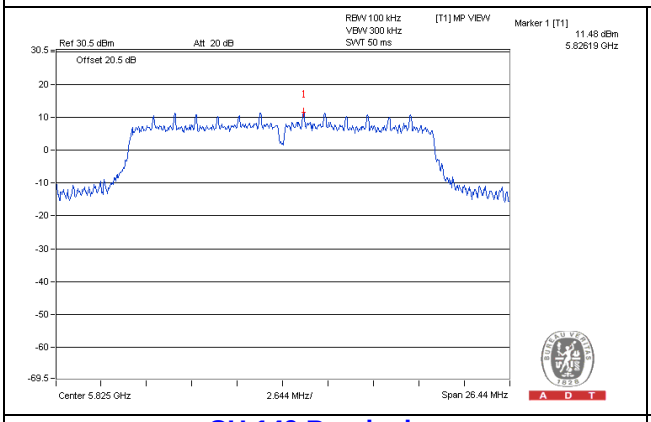



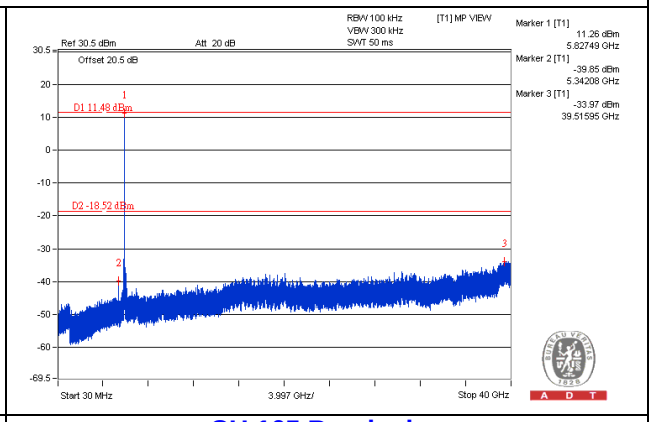

### CH 157



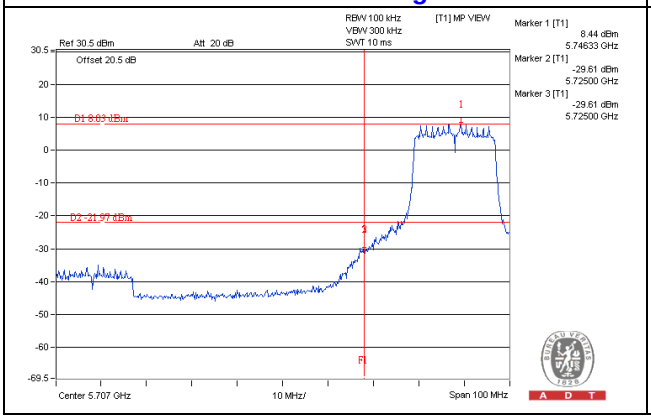




### CH 165

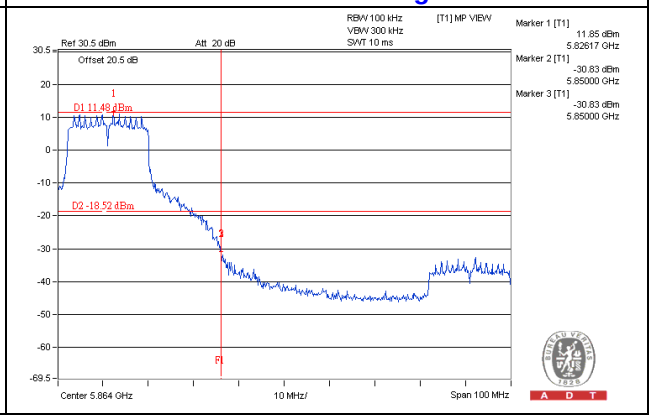



### CH 149 Band edge

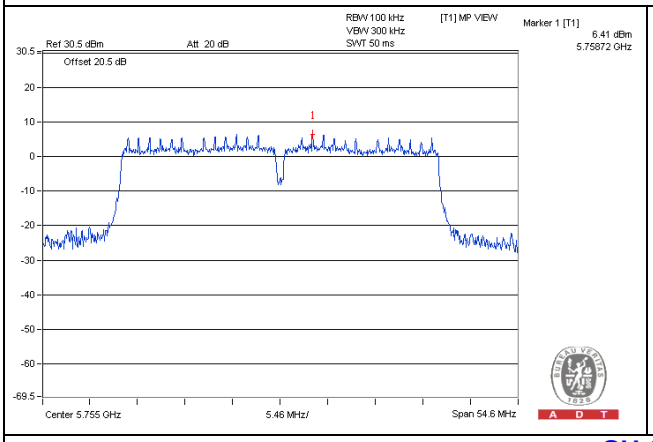


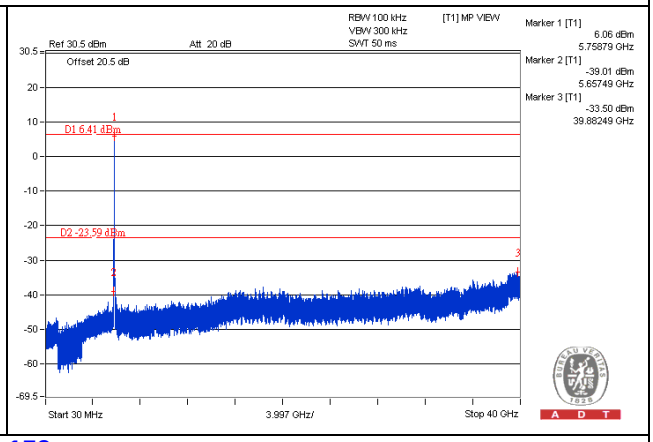

### CH 165 Band edge



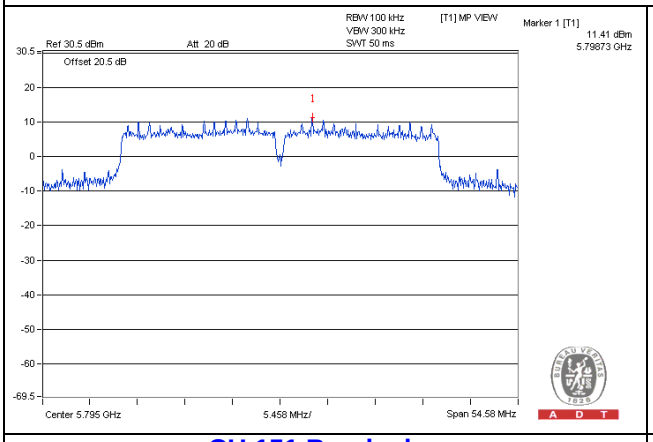
## 802.11ac (VHT40)
## CHAIN 0

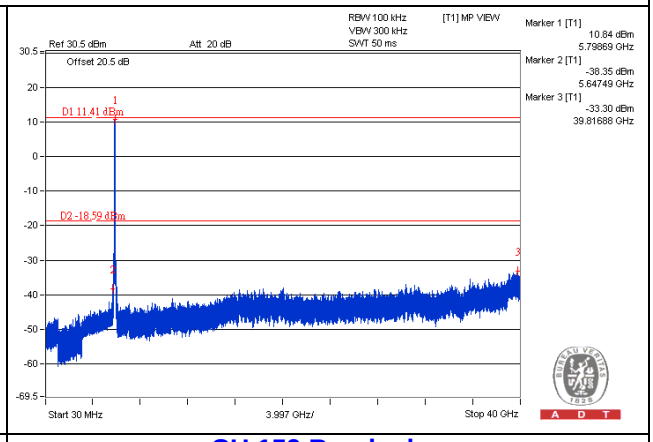
### CH 151



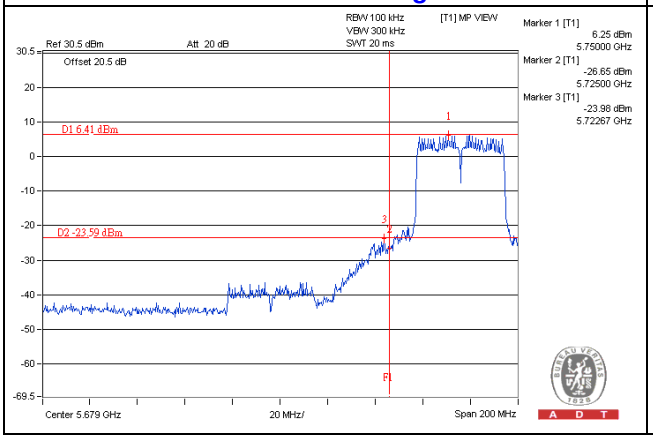




### CH 159

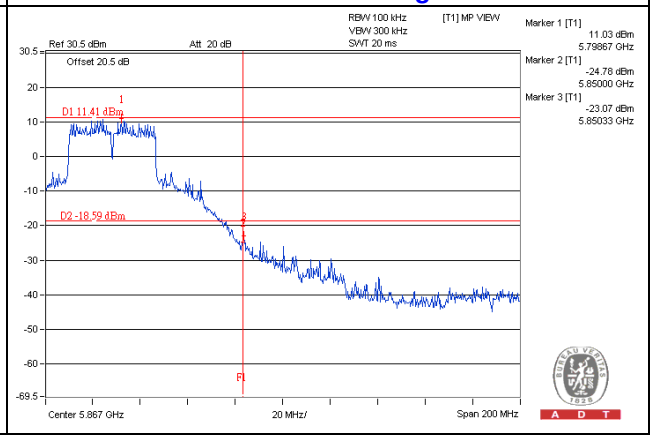



### CH 151 Band edge

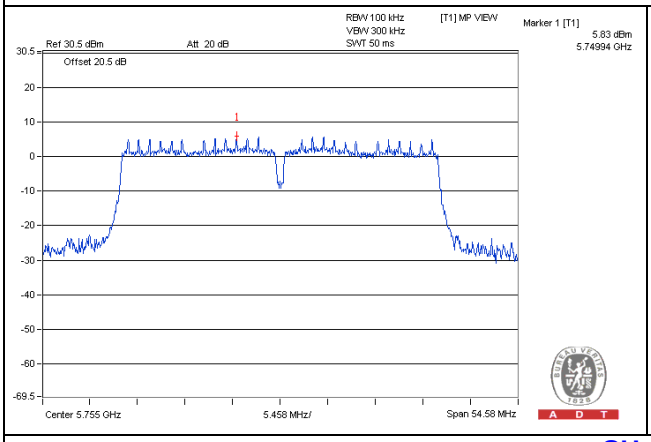


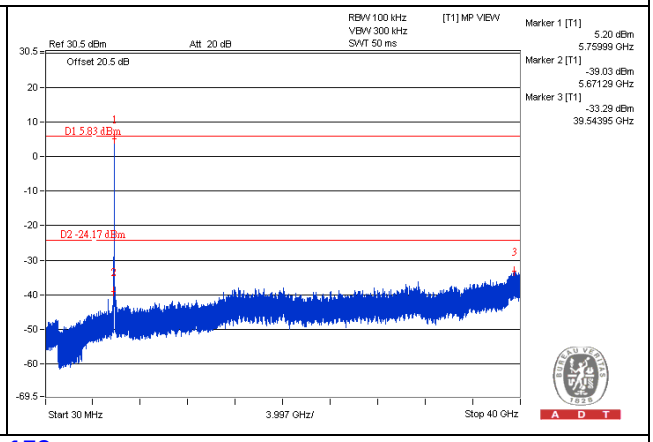

### CH 159 Band edge



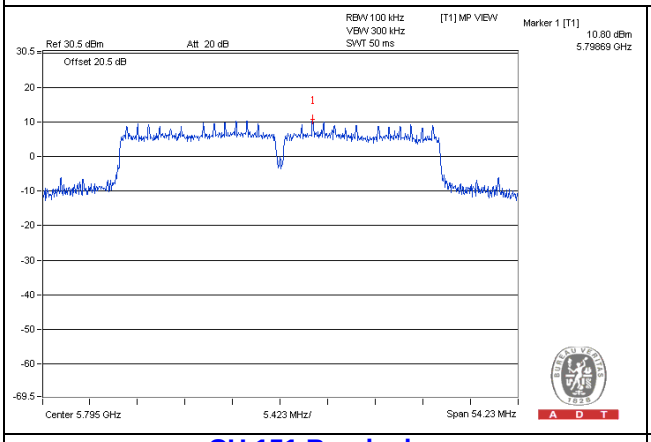
## CHAIN 1

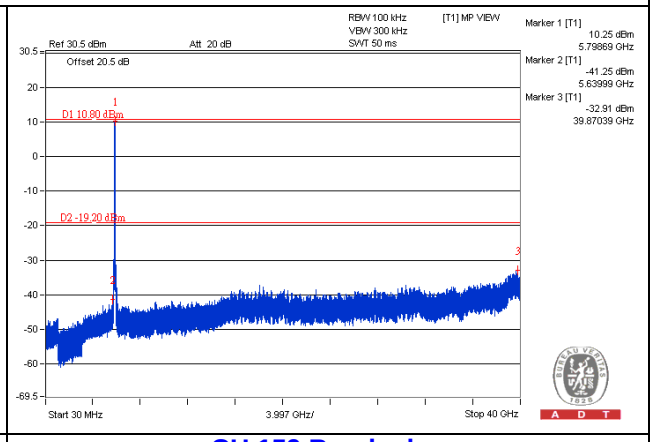
### CH 151



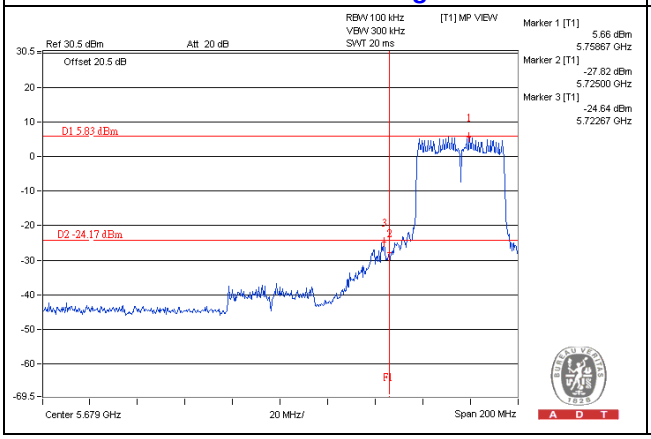




### CH 159

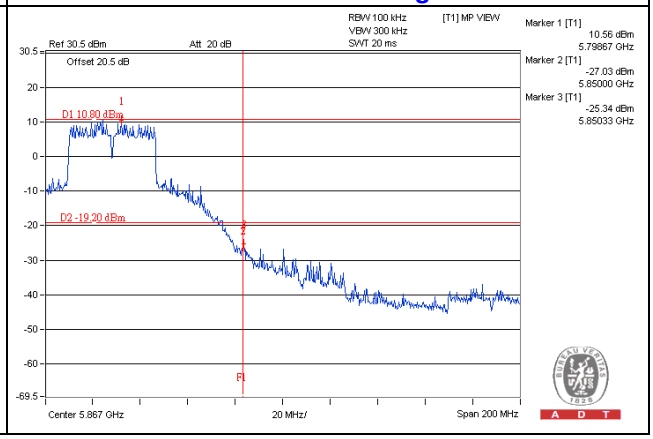



### CH 151 Band edge

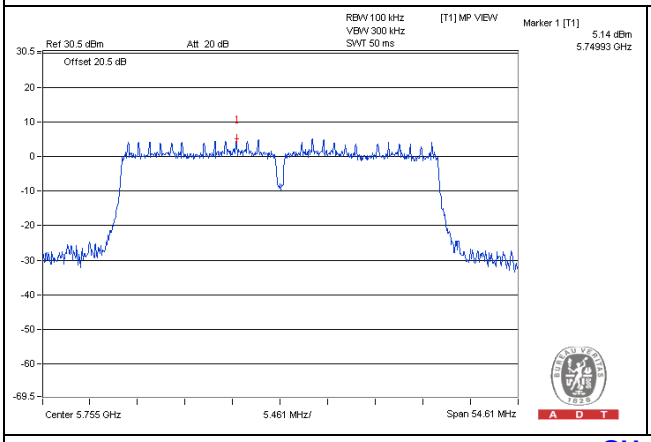


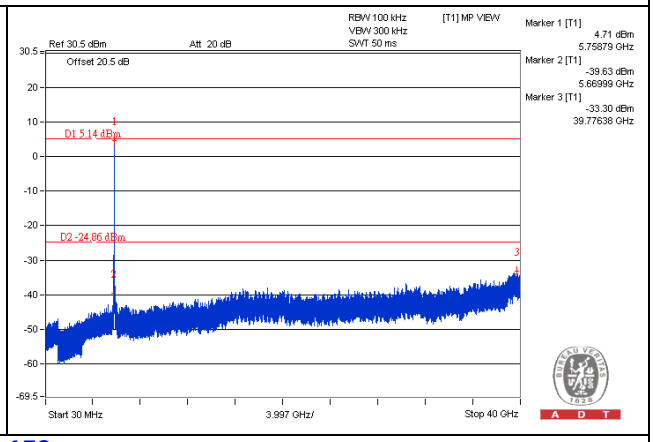

### CH 159 Band edge



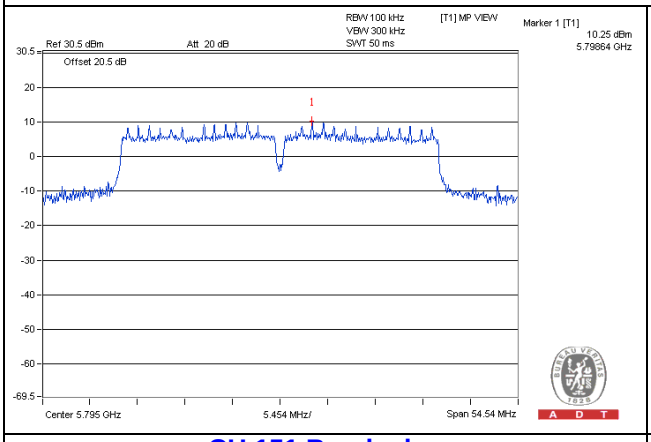
## CHAIN 2

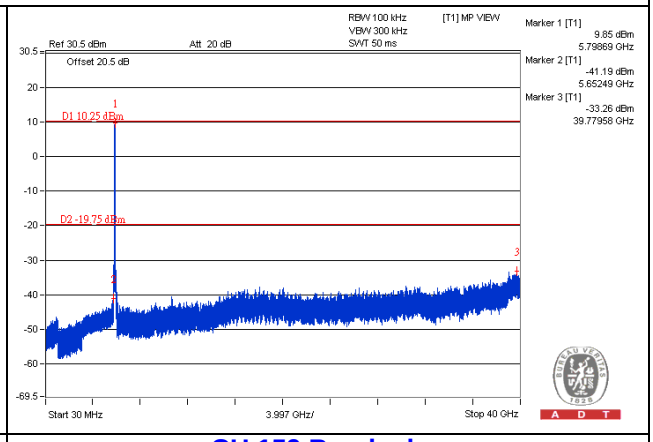
### CH 151



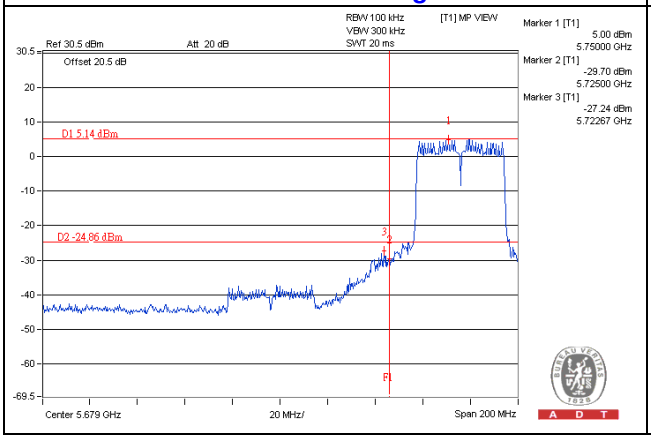




### CH 159

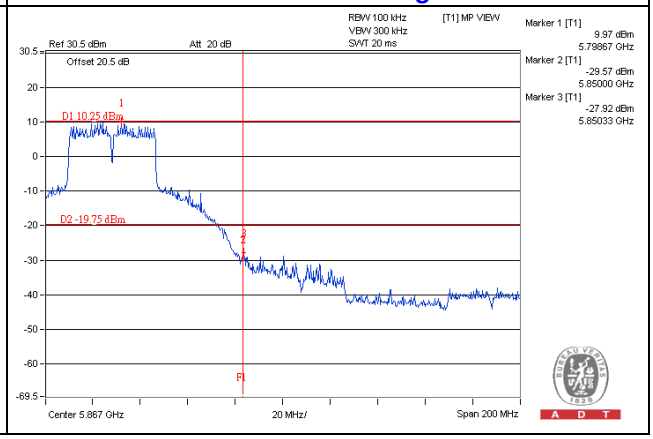



### CH 151 Band edge

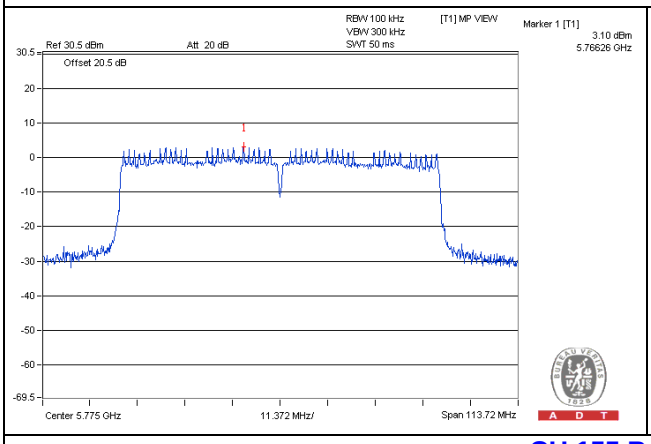


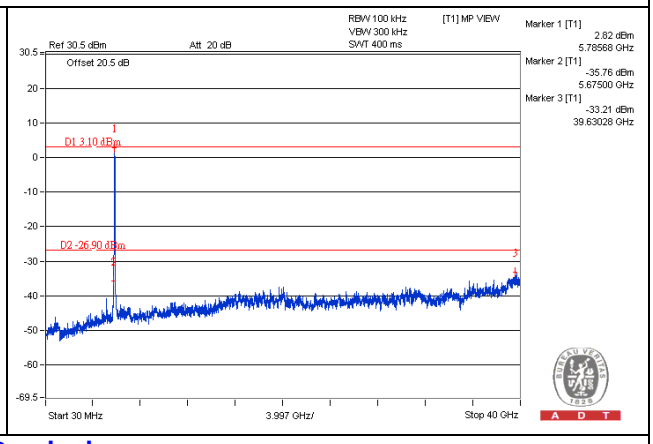

### CH 159 Band edge



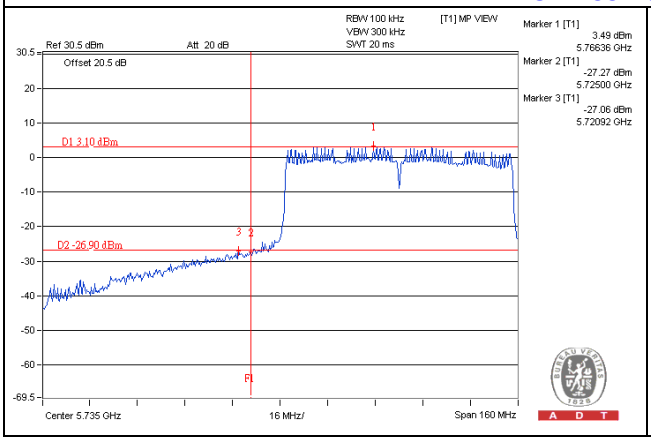
## 802.11ac (VHT80)
## CHAIN 0

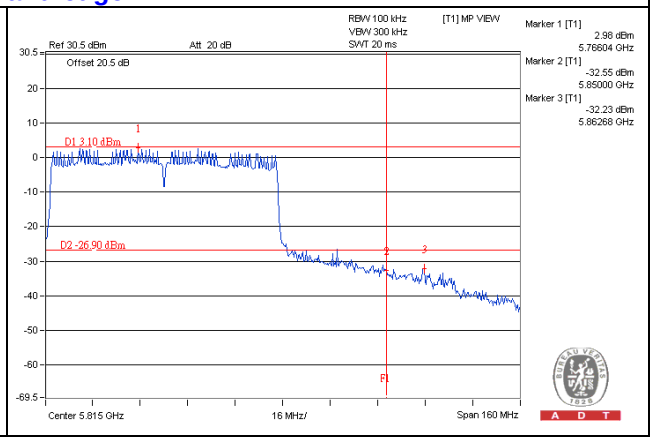
### CH 155



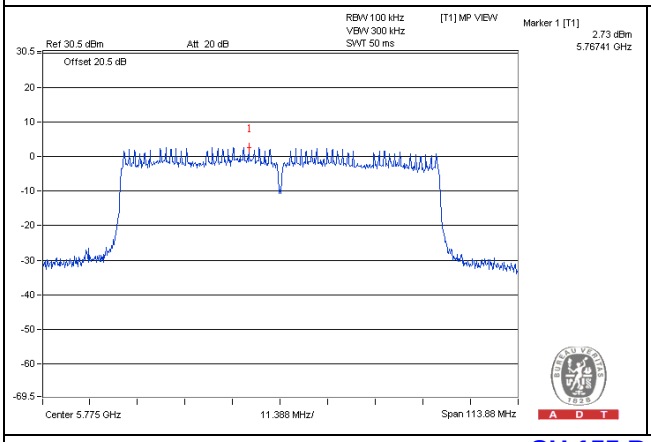

### CH 155 Band edge

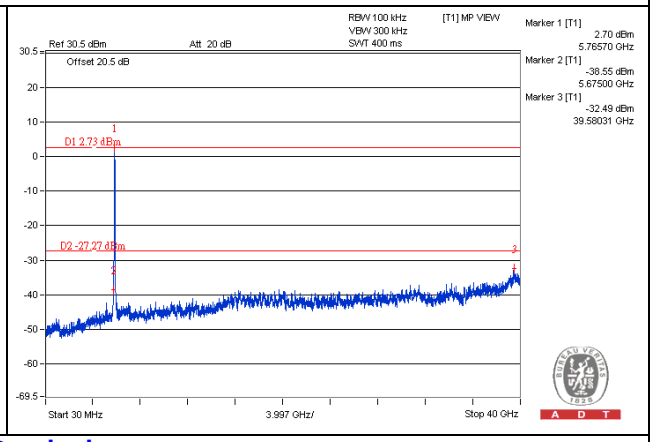


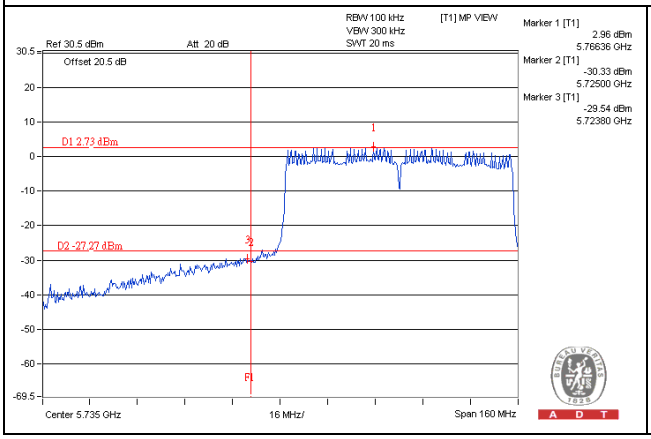
## CHAIN 1

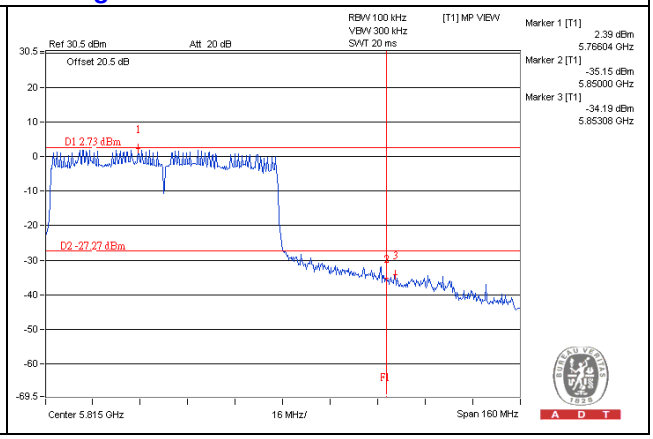
### CH 155



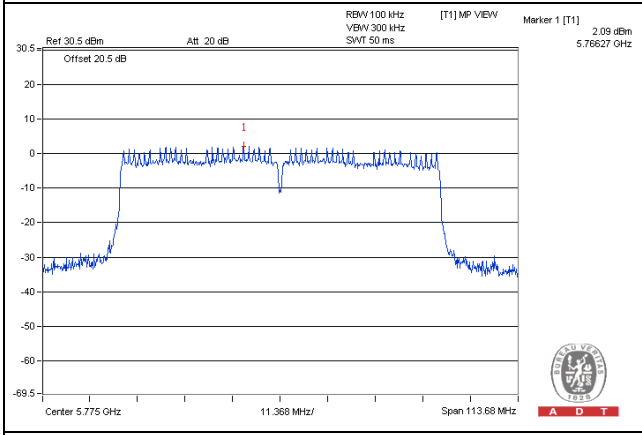

### CH 155 Band edge

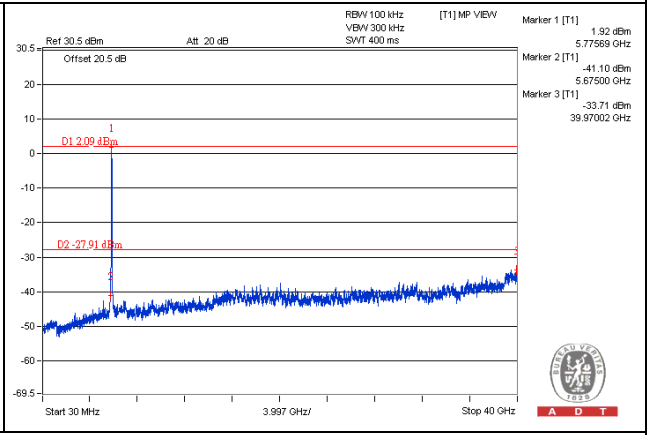


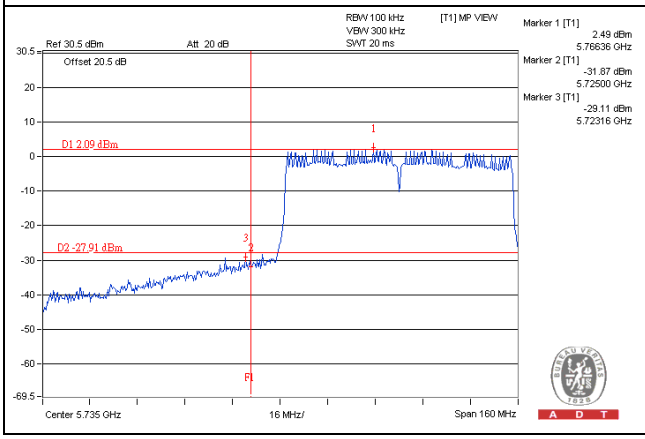
## CHAIN 2

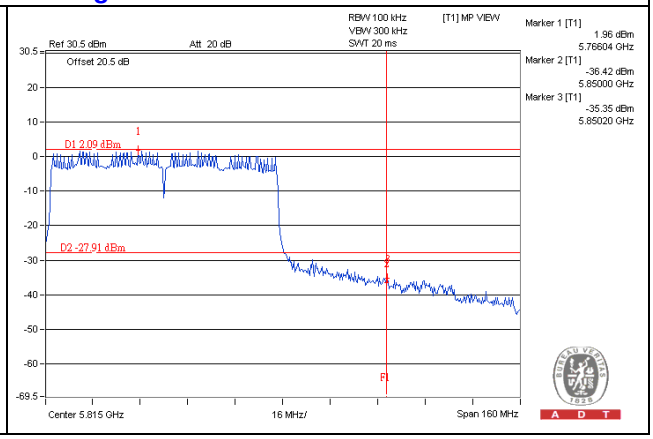
### CH 155




### CH 155 Band edge



## 6 Pictures of Test Arrangements

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

**Appendix – Information on the Testing Laboratories**

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

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


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

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

**Hwa Ya EMC/RF/Safety Lab**
Tel: 886-3-3183232
Fax: 886-3-3270892

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


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

**--- END ---**