

**Report No.:** RF190122E02

**FCC ID:** PKRNVWSKR5MD8800

**Test Model:** SKR5MD8800

**Received Date:** Jan. 15, 2019

**Test Date:** Jan. 19 to 23, 2019

**Issued Date:** Mar. 06, 2019

**Applicant:** Inseego Corp.

**Address:** 9605 Scranton Road Suite 300, San Diego, CA 92121 United States

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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Taiwan R.O.C.

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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## Table of Contents

|                                                                  |           |
|------------------------------------------------------------------|-----------|
| <b>Release Control Record .....</b>                              | <b>4</b>  |
| <b>1 Certificate of Conformity.....</b>                          | <b>5</b>  |
| <b>2 Summary of Test Results .....</b>                           | <b>6</b>  |
| 2.1 Measurement Uncertainty .....                                | 6         |
| 2.2 Modification Record .....                                    | 6         |
| <b>3 General Information.....</b>                                | <b>7</b>  |
| 3.1 General Description of EUT (WLAN) .....                      | 7         |
| 3.2 Description of Test Modes .....                              | 10        |
| 3.2.1 Test Mode Applicability and Tested Channel Detail .....    | 11        |
| 3.3 Duty Cycle of Test Signal .....                              | 13        |
| 3.4 Description of Support Units .....                           | 14        |
| 3.4.1 Configuration of System under Test .....                   | 15        |
| 3.5 General Description of Applied Standards .....               | 17        |
| <b>4 Test Types and Results .....</b>                            | <b>18</b> |
| 4.1 Radiated Emission and Bandedge Measurement.....              | 18        |
| 4.1.1 Limits of Radiated Emission and Bandedge Measurement ..... | 18        |
| 4.1.2 Test Instruments .....                                     | 19        |
| 4.1.3 Test Procedures.....                                       | 20        |
| 4.1.4 Deviation from Test Standard .....                         | 20        |
| 4.1.5 Test Setup.....                                            | 21        |
| 4.1.6 EUT Operating Conditions.....                              | 22        |
| 4.1.7 Test Results .....                                         | 23        |
| 4.2 Conducted Emission Measurement .....                         | 37        |
| 4.2.1 Limits of Conducted Emission Measurement .....             | 37        |
| 4.2.2 Test Instruments .....                                     | 37        |
| 4.2.3 Test Procedures.....                                       | 38        |
| 4.2.4 Deviation from Test Standard .....                         | 38        |
| 4.2.5 Test Setup.....                                            | 38        |
| 4.2.6 EUT Operating Conditions.....                              | 38        |
| 4.2.7 Test Results .....                                         | 39        |
| 4.3 6dB Bandwidth Measurement .....                              | 41        |
| 4.3.1 Limits of 6dB Bandwidth Measurement.....                   | 41        |
| 4.3.2 Test Setup.....                                            | 41        |
| 4.3.3 Test Instruments .....                                     | 41        |
| 4.3.4 Test Procedure .....                                       | 41        |
| 4.3.5 Deviation from Test Standard .....                         | 41        |
| 4.3.6 EUT Operating Conditions.....                              | 41        |
| 4.3.7 Test Result.....                                           | 42        |
| 4.4 Conducted Output Power Measurement.....                      | 44        |
| 4.4.1 Limits of Conducted Output Power Measurement .....         | 44        |
| 4.4.2 Test Setup.....                                            | 44        |
| 4.4.3 Test Instruments .....                                     | 44        |
| 4.4.4 Test Procedures.....                                       | 44        |
| 4.4.5 Deviation from Test Standard .....                         | 44        |
| 4.4.6 EUT Operating Conditions.....                              | 44        |
| 4.4.7 Test Results .....                                         | 45        |
| 4.5 Power Spectral Density Measurement.....                      | 47        |
| 4.5.1 Limits of Power Spectral Density Measurement .....         | 47        |
| 4.5.2 Test Setup.....                                            | 47        |
| 4.5.3 Test Instruments .....                                     | 47        |
| 4.5.4 Test Procedure .....                                       | 47        |
| 4.5.5 Deviation from Test Standard .....                         | 48        |
| 4.5.6 EUT Operating Condition .....                              | 48        |

|                                                                 |           |
|-----------------------------------------------------------------|-----------|
| 4.5.7 Test Results .....                                        | 49        |
| 4.6 Conducted Out of Band Emission Measurement .....            | 52        |
| 4.6.1 Limits of Conducted Out of Band Emission Measurement..... | 52        |
| 4.6.2 Test Setup.....                                           | 52        |
| 4.6.3 Test Instruments .....                                    | 52        |
| 4.6.4 Test Procedure .....                                      | 52        |
| 4.6.5 Deviation from Test Standard .....                        | 52        |
| 4.6.6 EUT Operating Condition .....                             | 52        |
| 4.6.7 Test Results .....                                        | 52        |
| <b>5 Pictures of Test Arrangements.....</b>                     | <b>61</b> |
| <b>Appendix – Information of the Testing Laboratories .....</b> | <b>62</b> |

### Release Control Record

| Issue No.   | Description       | Date Issued   |
|-------------|-------------------|---------------|
| RF190122E02 | Original release. | Mar. 06, 2019 |

## 1 Certificate of Conformity

**Product:** 4G LTE Wireless Router

**Brand:** Inseego

**Test Model:** SKR5MD8800

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Inseego Corp.

**Test Date:** Jan. 19 to 23, 2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10: 2013

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

**Prepared by :** Phoenix Huang, **Date:** Mar. 06, 2019  
Phoenix Huang / Specialist

**Approved by :** May Chen, **Date:** Mar. 06, 2019  
May Chen / 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.<br>Minimum passing margin is -12.69dB at 0.42734MHz.              |
| 15.205 /<br>15.209 /<br>15.247(d)              | Radiated Emissions and Band Edge Measurement | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -0.1dB at 2390.00MHz and 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.                                             |

Note:

Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 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      | Expanded Uncertainty (k=2) ( $\pm$ ) |
|------------------------------------|----------------|--------------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 1.84 dB                              |
| Radiated Emissions up to 1 GHz     | 30MHz ~ 1GHz   | 4.87 dB                              |
| Radiated Emissions above 1 GHz     | 1GHz ~ 6GHz    | 5.12 dB                              |
|                                    | 6GHz ~ 18GHz   | 4.86 dB                              |
|                                    | 18GHz ~ 40GHz  | 5.24 dB                              |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT (WLAN)

|                       |                                                                                                                                                                                                                                                                                         |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product               | 4G LTE Wireless Router                                                                                                                                                                                                                                                                  |
| Brand                 | Inseego                                                                                                                                                                                                                                                                                 |
| Test Model            | SKR5MD8800                                                                                                                                                                                                                                                                              |
| Status of EUT         | ENGINEERING SAMPLE                                                                                                                                                                                                                                                                      |
| Power Supply Rating   | 12Vdc ~ 24Vdc                                                                                                                                                                                                                                                                           |
| Modulation Type       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz                                                                                                                                                          |
| Modulation Technology | DSSS, OFDM                                                                                                                                                                                                                                                                              |
| Transfer Rate         | 802.11b: up to 11Mbps<br>802.11a/g: up to 54Mbps<br>802.11n: up to 300Mbps<br>802.11ac: up to 866.7Mbps                                                                                                                                                                                 |
| Operating Frequency   | <b>2.4GHz:</b> 2.412 ~ 2.462GHz<br><b>5GHz:</b> 5.18~ 5.24GHz, 5.745 ~ 5.825GHz                                                                                                                                                                                                         |
| Number of Channel     | <b>2.4GHz:</b><br>802.11b, 802.11g, 802.11n (HT20), VHT20: 11<br>802.11n (HT40), VHT40: 7<br><b>5GHz:</b><br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 9<br>802.11n (HT40), 802.11ac (VHT40): 4<br>802.11ac (VHT80): 2                                                                 |
| Output Power          | <b>2.412 ~ 2.462GHz</b><br><b>CDD Mode:</b> 855.093mW<br><b>Beamforming Mode:</b> 770.217mW<br><b>5.18 ~ 5.24GHz</b><br><b>CDD Mode:</b> 570.326mW<br><b>Beamforming Mode:</b> 482.677mW<br><b>5.745 ~ 5.825GHz</b><br><b>CDD Mode:</b> 804.638mW<br><b>Beamforming Mode:</b> 473.195mW |
| Antenna Type          | Refer to Note                                                                                                                                                                                                                                                                           |
| Antenna Connector     | Refer to Note                                                                                                                                                                                                                                                                           |
| Accessory Device      | NA                                                                                                                                                                                                                                                                                      |
| Data Cable Supplied   | NA                                                                                                                                                                                                                                                                                      |

Note:

1. The EUT has below radios as following table:

| Radio 1               | Radio 2         | Radio 3 |
|-----------------------|-----------------|---------|
| WLAN (2.4GHz + 5GHz ) | Bluetooth + GPS | WWAN    |

2. Simultaneously transmission condition.

| Condition | Technology    |             |           |      |
|-----------|---------------|-------------|-----------|------|
| 1         | WLAN (2.4GHz) | WLAN (5GHz) | Bluetooth | WWAN |

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

3. The EUT inside has one WWAN module which FCC ID: PKRNVWMD8800.

4. The antennas and antenna RF cables (option) provided to the EUT, please refer to the following table:

| Antenna No.           | Brand Name | Model Name       | Antenna Gain (dBi) | Frequency Range      | Antenna Type | Antenna Connector Type |
|-----------------------|------------|------------------|--------------------|----------------------|--------------|------------------------|
| WLAN_1                | RF link    | RF21S00506AX1    | 4.11               | 2.4~2.4835 GHz       | Dipole       | R-SMA                  |
|                       |            |                  | 6.12               | 5.15~5.85 GHz        |              |                        |
| WLAN_2                | M.gear     | C037-511343-A    | 4.11               | 2.4~2.4835 GHz       | Dipole       | R-SMA                  |
|                       |            |                  | 6.12               | 5.15~5.85 GHz        |              |                        |
| BT_ANT                | RF link    | RF21S00506AX1    | 4.11               | 2,402~2,480 GHz      | Dipole       | R-SMA                  |
| WWAN_1_1              | -          | SWX-614XRSXX-999 | 2.1                | 1850 MHz to 1910 MHz | Dipole       | SMA                    |
|                       |            |                  | 1.8                | 1710 MHz to 1755 MHz |              |                        |
|                       |            |                  | 1.8                | 824 MHz to 849 MHz   |              |                        |
|                       |            |                  | 2.7                | 2500 MHz to 2570 MHz |              |                        |
|                       |            |                  | 0.4                | 777 MHz to 787 MHz   |              |                        |
|                       |            |                  | 0.4                | 788 MHz to 798 MHz   |              |                        |
|                       |            |                  | 1.8                | 1710 MHz to 1780 MHz |              |                        |
| WWAN_1_2              | -          | SWX-614XRSXX-999 | 2.1                | 1850 MHz to 1910 MHz | Dipole       | SMA                    |
|                       |            |                  | 1.8                | 1710 MHz to 1755 MHz |              |                        |
|                       |            |                  | 1.8                | 824 MHz to 849 MHz   |              |                        |
|                       |            |                  | 2.7                | 2500 MHz to 2570 MHz |              |                        |
|                       |            |                  | 0.4                | 777 MHz to 787 MHz   |              |                        |
|                       |            |                  | 0.4                | 788 MHz to 798 MHz   |              |                        |
|                       |            |                  | 1.8                | 1710 MHz to 1780 MHz |              |                        |
| WWAN_2_1              | -          | SWX-6141SAXX-508 | 3.56               | 3550 MHz to 3700 MHz | Dipole       | SMA                    |
| WWAN_2_2              | -          | SWX-6141SAXX-508 | 3.56               | 3550 MHz to 3700 MHz | Dipole       | SMA                    |
| WWAN_3_1<br>(Rx only) | -          | RF21S00773A      | 3.5                | 5.15~5.85 GHz        | Dipole       | SMA                    |
| WWAN_3_2<br>(Rx only) | -          | RF21S00773A      | 3.5                | 5.15~5.85 GHz        | Dipole       | SMA                    |
| GPS_ANT               | -          | -                | 2.4                | 1575.4               | Dipole       | SMA                    |

| Antenna RF Cable (Option) |                 |                      |                      |
|---------------------------|-----------------|----------------------|----------------------|
| For WLAN & BT             | Cable Loss (dB) | Frequency Range      | Cable Connector Type |
|                           | 3.5             | 1850 MHz to 1910 MHz | R-SMA                |
|                           | 3.5             | 1710 MHz to 1755 MHz |                      |
|                           | 2.5             | 824 MHz to 849 MHz   |                      |
|                           | 4.5             | 2.4~2.4835 GHz       |                      |
|                           | 4.5             | 2500 MHz to 2570 MHz |                      |
|                           | 2.5             | 777 MHz to 787 MHz   |                      |
|                           | 2.5             | 788 MHz to 798 MHz   |                      |
|                           | 3.5             | 1710 MHz to 1780 MHz |                      |
|                           | 4.5             | 3550 MHz to 3700 MHz |                      |
|                           | 6.93            | 5.15~5.85GHz         |                      |
| For WWAN & GPS            | Cable Loss (dB) | Frequency Range      | Cable Connector Type |
|                           | 3.5             | 1850 MHz to 1910 MHz | SMA                  |
|                           | 3.5             | 1710 MHz to 1755 MHz |                      |
|                           | 2.5             | 824 MHz to 849 MHz   |                      |
|                           | 4.5             | 2.4~2.4835 GHz       |                      |
|                           | 4.5             | 2500 MHz to 2570 MHz |                      |
|                           | 2.5             | 777 MHz to 787 MHz   |                      |
|                           | 2.5             | 788 MHz to 798 MHz   |                      |
|                           | 3.5             | 1710 MHz to 1780 MHz |                      |
|                           | 4.5             | 3550 MHz to 3700 MHz |                      |
|                           | 6.93            | 5.15~5.85GHz         |                      |

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

| For Radiated Emission test                                                                                                              |                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Pre-test Mode                                                                                                                           | Description                                                          |
| <b>Mode A</b>                                                                                                                           | <b>EUT (Y plane) without antenna cable: 12Vdc power from adapter</b> |
| Mode B                                                                                                                                  | EUT (X plane) without antenna cable: 12Vdc power from adapter        |
| Mode C                                                                                                                                  | EUT (X plane) without antenna cable: 12Vdc power from power supply   |
| Mode D                                                                                                                                  | EUT (X plane) without antenna cable: 24Vdc power from power supply   |
| Mode E                                                                                                                                  | EUT (Y plane) with antenna cable: 12Vdc power from adapter           |
| From the above modes, the worst case was found in <b>Mode A</b> . Therefore only the test data of the mode was recorded in this report. |                                                                      |
| For AC Power Conducted Emission test                                                                                                    |                                                                      |
| Pre-test Mode                                                                                                                           | Description                                                          |
| <b>Mode F</b>                                                                                                                           | <b>12Vdc power from adapter</b>                                      |
| Mode G                                                                                                                                  | 12Vdc power from power supply                                        |
| Mode H                                                                                                                                  | 24Vdc power from power supply                                        |
| From the above modes, the worst case was found in <b>Mode F</b> . Therefore only the test data of the mode was recorded in this report. |                                                                      |

6. The EUT incorporates a MIMO function.

| 2.4GHz Band      |                       |     |
|------------------|-----------------------|-----|
| MODULATION MODE  | TX & RX CONFIGURATION |     |
| 802.11b          | 2TX                   | 2RX |
| 802.11g          | 2TX                   | 2RX |
| 802.11n (HT20)   | 2TX                   | 2RX |
| 802.11n (HT40)   | 2TX                   | 2RX |
| VHT20            | 2TX                   | 2RX |
| VHT40            | 2TX                   | 2RX |
| 5GHz Band        |                       |     |
| MODULATION MODE  | TX & RX CONFIGURATION |     |
| 802.11a          | 2TX                   | 2RX |
| 802.11n (HT20)   | 2TX                   | 2RX |
| 802.11n (HT40)   | 2TX                   | 2RX |
| 802.11ac (VHT20) | 2TX                   | 2RX |
| 802.11ac (VHT40) | 2TX                   | 2RX |
| 802.11ac (VHT80) | 2TX                   | 2RX |

Note:

1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

7. 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

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

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

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

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

### 3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where **RE≥1G**: Radiated Emission above 1GHz & Bandedge Measurement

**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 2 axis. The worst case was found when positioned on **Y-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 |                   |                |                       |                 |                  |
|----------|-------------------|----------------|-----------------------|-----------------|------------------|
| MODE     | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| 802.11b  | 1 to 11           | 1, 6, 11       | DSSS                  | DBPSK           | 1                |
| 802.11g  | 1 to 11           | 1, 6, 11       | OFDM                  | BPSK            | 6                |
| VHT20    | 1 to 11           | 1, 6, 11       | OFDM                  | BPSK            | 6.5              |
| VHT40    | 3 to 9            | 3, 6, 9        | OFDM                  | BPSK            | 13.5             |

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

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

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

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

### 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                             |                   |                |                       |                 |                  |
|--------------------------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| 802.11b                              | 1 to 11           | 1, 6, 11       | DSSS                  | DBPSK           | 1                |
| 802.11g                              | 1 to 11           | 1, 6, 11       | OFDM                  | BPSK            | 6                |
| VHT20                                | 1 to 11           | 1, 6, 11       | OFDM                  | BPSK            | 6.5              |
| VHT40                                | 3 to 9            | 3, 6, 9        | OFDM                  | BPSK            | 13.5             |
| Beamforming Mode (output power only) |                   |                |                       |                 |                  |
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| VHT20                                | 1 to 11           | 1, 6, 11       | OFDM                  | BPSK            | 6.5              |
| VHT40                                | 3 to 9            | 3, 6, 9        | OFDM                  | BPSK            | 13.5             |

### Test Condition:

| APPLICABLE TO         | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM)  | TESTED BY     |
|-----------------------|--------------------------|-----------------------|---------------|
| RE <sub>≥</sub> 1G    | 22deg. C, 67%RH          | 120Vac, 60Hz (System) | Rey Chen      |
| RE <sub>&lt;</sub> 1G | 22deg. C, 69%RH          | 120Vac, 60Hz (System) | Steven Chiang |
| PLC                   | 23deg. C, 74%RH          | 120Vac, 60Hz (System) | Andy Ho       |
| APCM                  | 25deg. C, 60%RH          | 12Vdc                 | Anderson Chen |

### 3.3 Duty Cycle of Test Signal

If duty cycle of test signal is  $\geq 98\%$ , duty factor is not required.

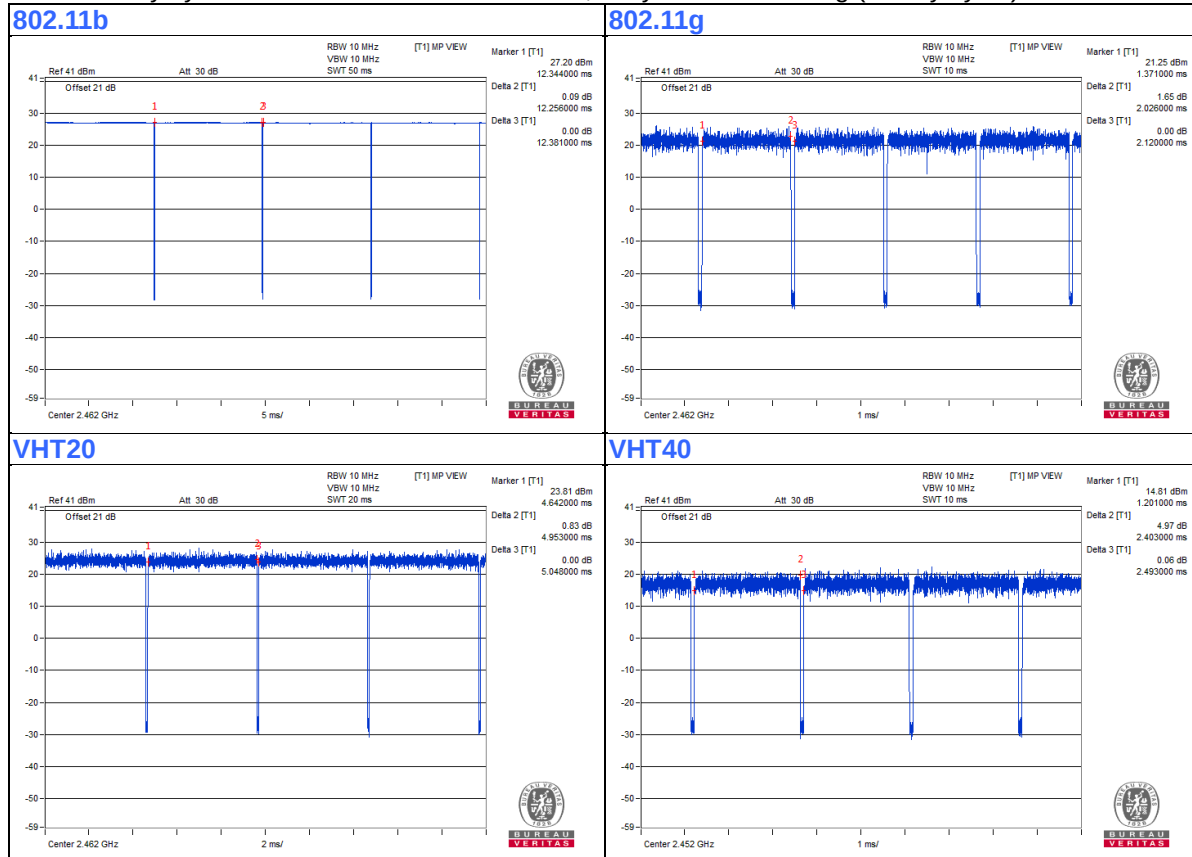
If duty cycle of test signal is  $< 98\%$ , duty factor shall be considered.

**802.11b:** Duty cycle = 12.256 ms/12.381 ms = 0.99

**802.11g:** Duty cycle = 2.026 ms/2.12 ms = 0.956, Duty factor =  $10 * \log(1/\text{Duty cycle}) = 0.2$

**VHT20:** Duty cycle = 4.953 ms/5.048 ms = 0.981

**VHT40:** Duty cycle = 2.403 ms/2.493 ms = 0.964, Duty factor =  $10 * \log(1/\text{Duty cycle}) = 0.16$



### 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. | Adapter  | CWT   | 2ABF060F  | NA           | NA      | Supplied by client |
| B. | PoE Load | Luxul | XAP-1440  | NA           | NA      | Supplied by client |
| C. | Laptop   | DELL  | E6420     | B92T3R1      | FCC DoC | Provided by Lab    |
| D. | iPod     | Apple | MC749TA/A | CC4DN25WDFDM | NA      | Provided by Lab    |
| E. | SIM Card | R&S   | CRT-Z3    | NA           | NA      | Provided by Lab    |

Note:

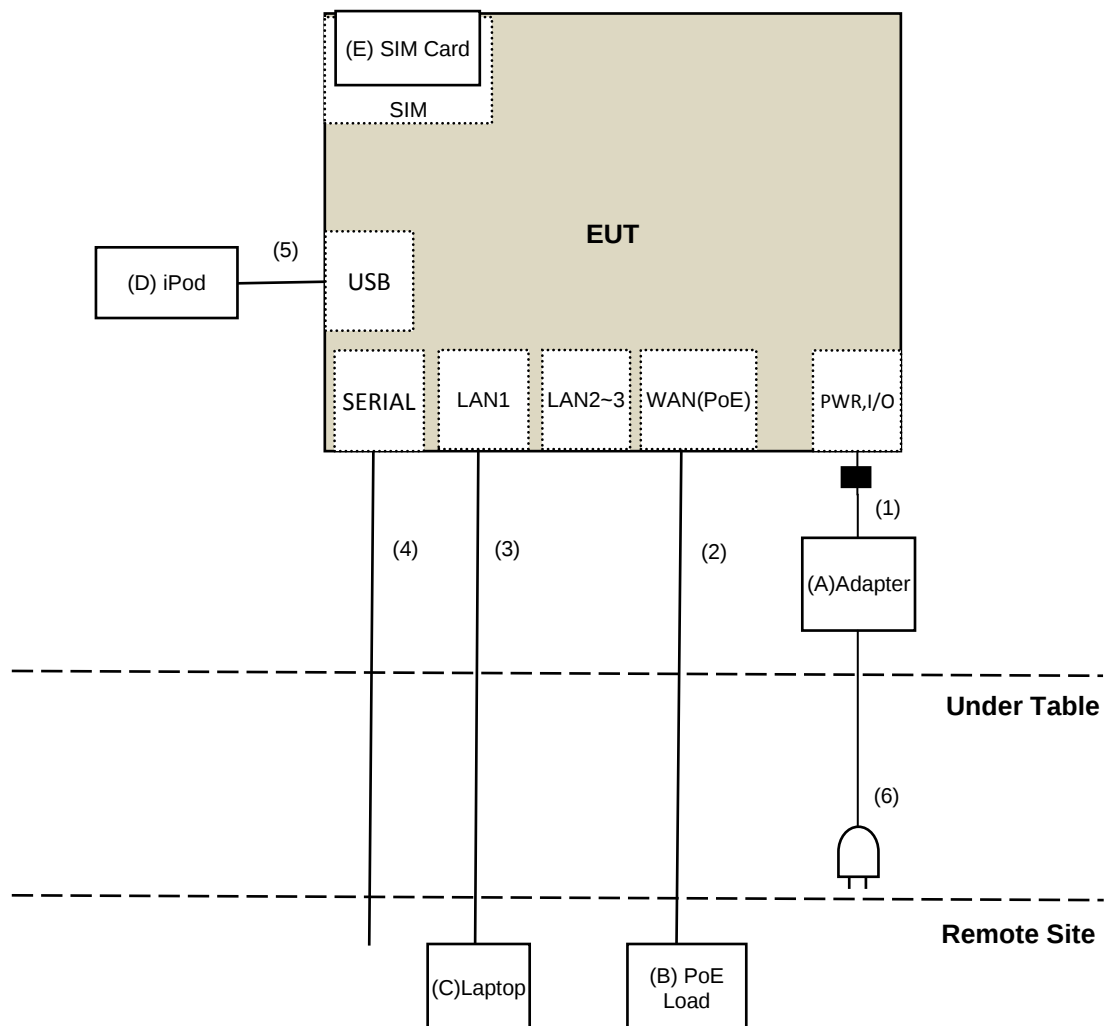
1. All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks            |
|----|--------------|------|------------|--------------------|--------------|--------------------|
| 1. | DC Cable     | 1    | 1.2        | No                 | 1            | Supplied by client |
| 2. | RJ-45 Cable  | 1    | 10         | No                 | 0            | Provided by Lab    |
| 3. | RJ-45 Cable  | 1    | 10         | No                 | 0            | Provided by Lab    |
| 4. | RJ-45 Cable  | 1    | 10         | No                 | 0            | Provided by Lab    |
| 5. | USB Cable    | 1    | 0.1        | Yes                | 0            | Provided by Lab    |
| 6. | AC Cable     | 1    | 0.8        | No                 | 0            | Supplied by client |

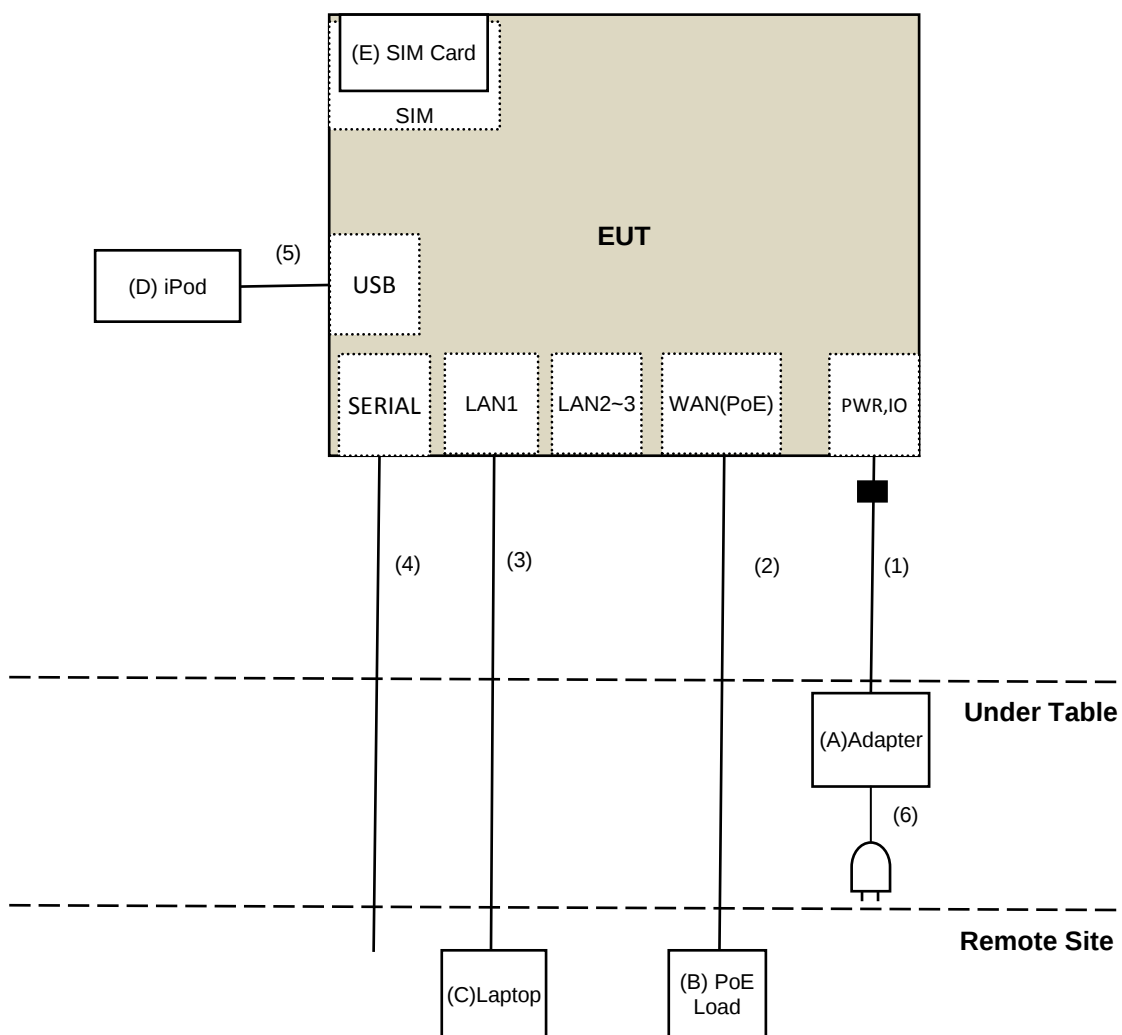
Note: The core(s) is(are) originally attached to the cable(s).

### 3.4.1 Configuration of System under Test

For Power Line Conducted Emission test:



For other 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)**

**KDB 558074 D01 15.247 Meas Guidance v05**

**KDB 662911 D01 Multiple Transmitter Output v02r01**

**ANSI C63.10-2013**

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

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

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

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. 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 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

| DESCRIPTION & MANUFACTURER                    | MODEL NO.            | SERIAL NO.    | CALIBRATED DATE | CALIBRATED UNTIL |
|-----------------------------------------------|----------------------|---------------|-----------------|------------------|
| Test Receiver Keysight                        | N9038A               | MY54450088    | July 05, 2018   | July 04, 2019    |
| Pre-Amplifier EMCi                            | EMC001340            | 980142        | Feb. 09, 2018   | Feb. 08, 2019    |
| Loop Antenna Electro-Metrics                  | EM-6879              | 269           | Sep. 07, 2018   | Sep. 06, 2019    |
| RF Cable                                      | NA                   | LOOPCAB-001   | Jan. 14, 2019   | Jan. 13, 2020    |
| RF Cable                                      | NA                   | LOOPCAB-002   | Jan. 14, 2019   | Jan. 13, 2020    |
| Pre-Amplifier Mini-Circuits                   | ZFL-1000VH2B         | AMP-ZFL-01    | Oct. 30, 2018   | Oct. 29, 2019    |
| Trilog Broadband Antenna SCHWARZBECK          | VULB 9168            | 9168-406      | Nov. 22, 2018   | Nov. 21, 2019    |
| RF Cable                                      | 8D                   | 966-4-1       | Mar. 21, 2018   | Mar. 20, 2019    |
| RF Cable                                      | 8D                   | 966-4-2       | Mar. 21, 2018   | Mar. 20, 2019    |
| RF Cable                                      | 8D                   | 966-4-3       | Mar. 21, 2018   | Mar. 20, 2019    |
| Fixed attenuator Mini-Circuits                | UNAT-5+              | PAD-3m-4-01   | Sep. 27, 2018   | Sep. 26, 2019    |
| Horn_Antenna SCHWARZBECK                      | BBHA 9120D           | 9120D-783     | Nov. 25, 2018   | Nov. 24, 2019    |
| Pre-Amplifier Mini-Circuits                   | ZVA-183-S+           | AMP-ZVA-03    | May 10, 2018    | May 09, 2019     |
| RF Cable                                      | EMC104-SM-SM-1200    | 160923        | Jan. 29, 2018   | Jan. 28, 2019    |
| RF Cable                                      | EMC104-SM-SM-2000    | 150318        | Jan. 29, 2018   | Jan. 28, 2019    |
| RF Cable                                      | EMC104-SM-SM-5000    | 150321        | Jan. 29, 2018   | Jan. 28, 2019    |
| Pre-Amplifier EMCi                            | EMC184045SE          | 980387        | Jan. 29, 2018   | Jan. 28, 2019    |
| Horn_Antenna SCHWARZBECK                      | BBHA 9170            | BBHA9170608   | Nov. 25, 2018   | Nov. 24, 2019    |
| RF Cable                                      | EMC102-KM-KM-1200    | 160925        | Jan. 29, 2018   | Jan. 28, 2019    |
| Software                                      | ADT_Radiated_V8.7.08 | NA            | NA              | NA               |
| Boresight Antenna Tower & Turn Table Max-Full | MF-7802BS            | MF780208530   | NA              | NA               |
| Spectrum Analyzer R&S                         | FSV40                | 100964        | June 20, 2018   | June 19, 2019    |
| Power meter Anritsu                           | ML2495A              | 1014008       | May 09, 2018    | May 08, 2019     |
| Power sensor Anritsu                          | MA2411B              | 0917122       | May 09, 2018    | May 08, 2019     |
| Fixed Attenuator Mini-Circuits                | MDCS18N-10           | MDCS18N-10-01 | Apr. 16, 2018   | Apr. 15, 2019    |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. The CANADA Site Registration No. is 20331-2
4. Tested Date: Jan. 19 to 23, 2019

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

##### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

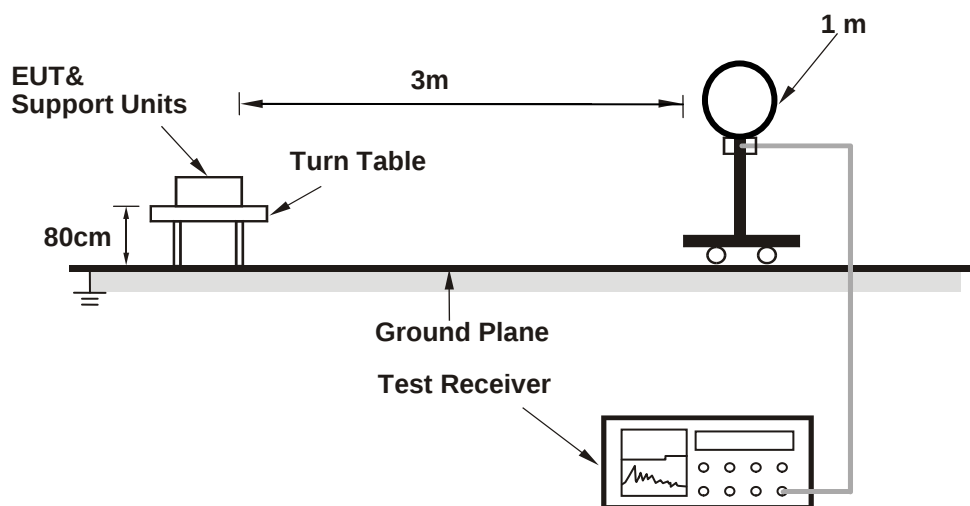
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

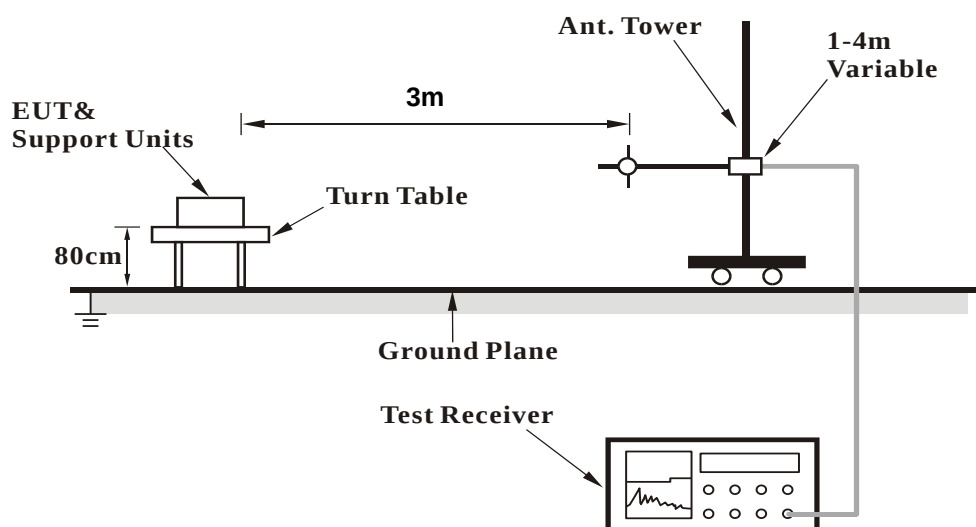
No deviation.

#### 4.1.5 Test Setup

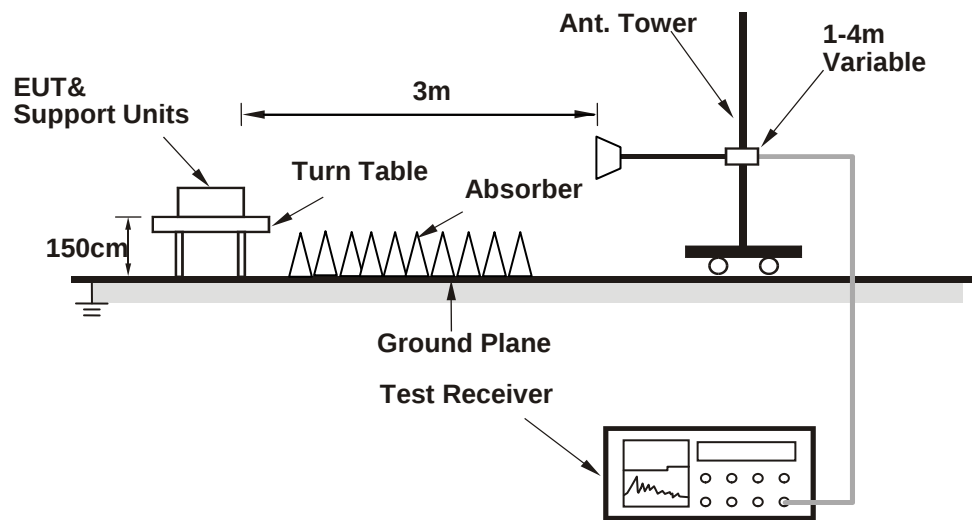
##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



## For Radiated emission above 1GHz



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

### 4.1.6 EUT Operating Conditions

- Connected the EUT with the Laptop which is placed on remote site.
- Controlling software (QDART-Connectivity (1.0.38)) has been activated to set the EUT on specific status.

#### 4.1.7 Test Results

##### CDD Mode

##### Above 1GHz Data:

##### 802.11b

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 55.3 PK                       | 74.0              | -18.7          | 2.07 H                   | 231                        | 57.3                   | -2.0                           |
| 2                                                   | 2390.00        | 45.3 AV                       | 54.0              | -8.7           | 2.07 H                   | 231                        | 47.3                   | -2.0                           |
| 3                                                   | *2412.00       | 108.8 PK                      |                   |                | 2.07 H                   | 231                        | 110.9                  | -2.1                           |
| 4                                                   | *2412.00       | 106.6 AV                      |                   |                | 2.07 H                   | 231                        | 108.7                  | -2.1                           |
| 5                                                   | 4824.00        | 40.5 PK                       | 74.0              | -33.5          | 1.67 H                   | 342                        | 38.5                   | 2.0                            |
| 6                                                   | 4824.00        | 34.3 AV                       | 54.0              | -19.7          | 1.67 H                   | 342                        | 32.3                   | 2.0                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 59.6 PK                       | 74.0              | -14.4          | 2.08 V                   | 153                        | 61.6                   | -2.0                           |
| 2                                                   | 2390.00        | 53.8 AV                       | 54.0              | -0.2           | 2.08 V                   | 153                        | 55.8                   | -2.0                           |
| 3                                                   | *2412.00       | 117.2 PK                      |                   |                | 2.08 V                   | 153                        | 119.3                  | -2.1                           |
| 4                                                   | *2412.00       | 114.9 AV                      |                   |                | 2.08 V                   | 153                        | 117.0                  | -2.1                           |
| 5                                                   | 4824.00        | 43.8 PK                       | 74.0              | -30.2          | 1.09 V                   | 360                        | 41.8                   | 2.0                            |
| 6                                                   | 4824.00        | 40.0 AV                       | 54.0              | -14.0          | 1.09 V                   | 360                        | 38.0                   | 2.0                            |

##### 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.

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 6 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2388.00        | 51.8 PK                       | 74.0              | -22.2          | 2.12 H                   | 238                        | 53.8                   | -2.0                           |
| 2                                                   | 2388.00        | 36.6 AV                       | 54.0              | -17.4          | 2.12 H                   | 238                        | 38.6                   | -2.0                           |
| 3                                                   | *2437.00       | 111.2 PK                      |                   |                | 2.12 H                   | 238                        | 113.4                  | -2.2                           |
| 4                                                   | *2437.00       | 109.0 AV                      |                   |                | 2.12 H                   | 238                        | 111.2                  | -2.2                           |
| 5                                                   | 2483.50        | 51.5 PK                       | 74.0              | -22.5          | 2.12 H                   | 238                        | 53.7                   | -2.2                           |
| 6                                                   | 2483.50        | 35.7 AV                       | 54.0              | -18.3          | 2.12 H                   | 238                        | 37.9                   | -2.2                           |
| 7                                                   | 4874.00        | 40.5 PK                       | 74.0              | -33.5          | 1.63 H                   | 337                        | 38.5                   | 2.0                            |
| 8                                                   | 4874.00        | 34.5 AV                       | 54.0              | -19.5          | 1.63 H                   | 337                        | 32.5                   | 2.0                            |
| 9                                                   | 7311.00        | 43.2 PK                       | 74.0              | -30.8          | 1.30 H                   | 300                        | 34.7                   | 8.5                            |
| 10                                                  | 7311.00        | 35.2 AV                       | 54.0              | -18.8          | 1.30 H                   | 300                        | 26.7                   | 8.5                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | 2388.00        | 56.1 PK                       | 74.0              | -17.9          | 2.06 V                   | 153                        | 58.1                   | -2.0                           |
| 2                                                 | 2388.00        | 45.1 AV                       | 54.0              | -8.9           | 2.06 V                   | 153                        | 47.1                   | -2.0                           |
| 3                                                 | *2437.00       | 119.6 PK                      |                   |                | 2.06 V                   | 153                        | 121.8                  | -2.2                           |
| 4                                                 | *2437.00       | 117.3 AV                      |                   |                | 2.06 V                   | 153                        | 119.5                  | -2.2                           |
| 5                                                 | 2483.50        | 55.8 PK                       | 74.0              | -18.2          | 2.06 V                   | 153                        | 58.0                   | -2.2                           |
| 6                                                 | 2483.50        | 44.2 AV                       | 54.0              | -9.8           | 2.06 V                   | 153                        | 46.4                   | -2.2                           |
| 7                                                 | 4874.00        | 44.1 PK                       | 74.0              | -29.9          | 1.12 V                   | 360                        | 42.1                   | 2.0                            |
| 8                                                 | 4874.00        | 40.5 AV                       | 54.0              | -13.5          | 1.12 V                   | 360                        | 38.5                   | 2.0                            |
| 9                                                 | 7311.00        | 45.1 PK                       | 74.0              | -28.9          | 2.34 V                   | 340                        | 36.6                   | 8.5                            |
| 10                                                | 7311.00        | 37.0 AV                       | 54.0              | -17.0          | 2.34 V                   | 340                        | 28.5                   | 8.5                            |

#### 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.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 11 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2462.00       | 110.2 PK                      |                   |                | 2.05 H                   | 224                        | 112.4                  | -2.2                           |
| 2                                                   | *2462.00       | 107.5 AV                      |                   |                | 2.05 H                   | 224                        | 109.7                  | -2.2                           |
| 3                                                   | 2486.20        | 55.7 PK                       | 74.0              | -18.3          | 2.05 H                   | 224                        | 57.9                   | -2.2                           |
| 4                                                   | 2486.20        | 45.3 AV                       | 54.0              | -8.7           | 2.05 H                   | 224                        | 47.5                   | -2.2                           |
| 5                                                   | 4924.00        | 39.4 PK                       | 74.0              | -34.6          | 1.69 H                   | 342                        | 37.4                   | 2.0                            |
| 6                                                   | 4924.00        | 33.4 AV                       | 54.0              | -20.6          | 1.69 H                   | 342                        | 31.4                   | 2.0                            |
| 7                                                   | 7386.00        | 42.3 PK                       | 74.0              | -31.7          | 1.35 H                   | 291                        | 33.7                   | 8.6                            |
| 8                                                   | 7386.00        | 34.2 AV                       | 54.0              | -19.8          | 1.35 H                   | 291                        | 25.6                   | 8.6                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2462.00       | 118.6 PK                      |                   |                | 2.16 V                   | 183                        | 120.8                  | -2.2                           |
| 2                                                   | *2462.00       | 115.8 AV                      |                   |                | 2.16 V                   | 183                        | 118.0                  | -2.2                           |
| 3                                                   | 2486.20        | 60.0 PK                       | 74.0              | -14.0          | 2.16 V                   | 183                        | 62.2                   | -2.2                           |
| 4                                                   | 2486.20        | 53.8 AV                       | 54.0              | -0.2           | 2.16 V                   | 183                        | 56.0                   | -2.2                           |
| 5                                                   | 4924.00        | 43.2 PK                       | 74.0              | -30.8          | 1.12 V                   | 353                        | 41.2                   | 2.0                            |
| 6                                                   | 4924.00        | 39.8 AV                       | 54.0              | -14.2          | 1.12 V                   | 353                        | 37.8                   | 2.0                            |
| 7                                                   | 7386.00        | 44.0 PK                       | 74.0              | -30.0          | 2.38 V                   | 340                        | 35.4                   | 8.6                            |
| 8                                                   | 7386.00        | 35.8 AV                       | 54.0              | -18.2          | 2.38 V                   | 340                        | 27.2                   | 8.6                            |

**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<br>FUNCTION | Peak (PK)    |
| FREQUENCY RANGE | 1GHz ~ 25GHz |                      | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 62.4 PK                       | 74.0              | -11.6          | 2.02 H                   | 241                        | 64.4                   | -2.0                           |
| 2                                                   | 2390.00        | 45.1 AV                       | 54.0              | -8.9           | 2.02 H                   | 241                        | 47.1                   | -2.0                           |
| 3                                                   | *2412.00       | 106.6 PK                      |                   |                | 2.02 H                   | 241                        | 108.7                  | -2.1                           |
| 4                                                   | *2412.00       | 96.2 AV                       |                   |                | 2.02 H                   | 241                        | 98.3                   | -2.1                           |
| 5                                                   | 4824.00        | 39.3 PK                       | 74.0              | -34.7          | 1.69 H                   | 329                        | 37.3                   | 2.0                            |
| 6                                                   | 4824.00        | 33.2 AV                       | 54.0              | -20.8          | 1.69 H                   | 329                        | 31.2                   | 2.0                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 66.7 PK                       | 74.0              | -7.3           | 2.06 V                   | 152                        | 68.7                   | -2.0                           |
| 2                                                   | 2390.00        | 53.6 AV                       | 54.0              | -0.4           | 2.06 V                   | 152                        | 55.6                   | -2.0                           |
| 3                                                   | *2412.00       | 115.0 PK                      |                   |                | 2.06 V                   | 152                        | 117.1                  | -2.1                           |
| 4                                                   | *2412.00       | 104.5 AV                      |                   |                | 2.06 V                   | 152                        | 106.6                  | -2.1                           |
| 5                                                   | 4824.00        | 43.1 PK                       | 74.0              | -30.9          | 1.08 V                   | 338                        | 41.1                   | 2.0                            |
| 6                                                   | 4824.00        | 39.8 AV                       | 54.0              | -14.2          | 1.08 V                   | 338                        | 37.8                   | 2.0                            |

## 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.

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 6 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 61.1 PK                       | 74.0              | -12.9          | 2.12 H                   | 226                        | 63.1                   | -2.0                           |
| 2                                                   | 2390.00        | 42.2 AV                       | 54.0              | -11.8          | 2.12 H                   | 226                        | 44.2                   | -2.0                           |
| 3                                                   | *2437.00       | 112.5 PK                      |                   |                | 2.12 H                   | 226                        | 114.7                  | -2.2                           |
| 4                                                   | *2437.00       | 102.3 AV                      |                   |                | 2.12 H                   | 226                        | 104.5                  | -2.2                           |
| 5                                                   | 2483.50        | 62.0 PK                       | 74.0              | -12.0          | 2.12 H                   | 226                        | 64.2                   | -2.2                           |
| 6                                                   | 2483.50        | 40.7 AV                       | 54.0              | -13.3          | 2.12 H                   | 226                        | 42.9                   | -2.2                           |
| 7                                                   | 4874.00        | 40.5 PK                       | 74.0              | -33.5          | 1.65 H                   | 336                        | 38.5                   | 2.0                            |
| 8                                                   | 4874.00        | 34.3 AV                       | 54.0              | -19.7          | 1.65 H                   | 336                        | 32.3                   | 2.0                            |
| 9                                                   | 7311.00        | 43.1 PK                       | 74.0              | -30.9          | 1.29 H                   | 298                        | 34.6                   | 8.5                            |
| 10                                                  | 7311.00        | 35.0 AV                       | 54.0              | -19.0          | 1.29 H                   | 298                        | 26.5                   | 8.5                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | 2390.00        | 65.4 PK                       | 74.0              | -8.6           | 2.03 V                   | 152                        | 67.4                   | -2.0                           |
| 2                                                 | 2390.00        | 50.7 AV                       | 54.0              | -3.3           | 2.03 V                   | 152                        | 52.7                   | -2.0                           |
| 3                                                 | *2437.00       | 120.9 PK                      |                   |                | 2.03 V                   | 152                        | 123.1                  | -2.2                           |
| 4                                                 | *2437.00       | 110.6 AV                      |                   |                | 2.03 V                   | 152                        | 112.8                  | -2.2                           |
| 5                                                 | 2483.50        | 66.3 PK                       | 74.0              | -7.7           | 2.03 V                   | 152                        | 68.5                   | -2.2                           |
| 6                                                 | 2483.50        | 49.2 AV                       | 54.0              | -4.8           | 2.03 V                   | 152                        | 51.4                   | -2.2                           |
| 7                                                 | 4874.00        | 44.8 PK                       | 74.0              | -29.2          | 1.11 V                   | 346                        | 42.8                   | 2.0                            |
| 8                                                 | 4874.00        | 41.0 AV                       | 54.0              | -13.0          | 1.11 V                   | 346                        | 39.0                   | 2.0                            |
| 9                                                 | 7311.00        | 44.6 PK                       | 74.0              | -29.4          | 2.36 V                   | 352                        | 36.1                   | 8.5                            |
| 10                                                | 7311.00        | 36.7 AV                       | 54.0              | -17.3          | 2.36 V                   | 352                        | 28.2                   | 8.5                            |

#### 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<br>FUNCTION | Peak (PK)    |
| FREQUENCY RANGE | 1GHz ~ 25GHz  |                      | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2462.00       | 107.9 PK                      |                   |                | 2.08 H                   | 226                        | 110.1                  | -2.2                           |
| 2                                                   | *2462.00       | 97.1 AV                       |                   |                | 2.08 H                   | 226                        | 99.3                   | -2.2                           |
| 3                                                   | 2483.50        | 65.8 PK                       | 74.0              | -8.2           | 2.08 H                   | 226                        | 68.0                   | -2.2                           |
| 4                                                   | 2483.50        | 45.4 AV                       | 54.0              | -8.6           | 2.08 H                   | 226                        | 47.6                   | -2.2                           |
| 5                                                   | 4924.00        | 38.9 PK                       | 74.0              | -35.1          | 1.74 H                   | 342                        | 36.9                   | 2.0                            |
| 6                                                   | 4924.00        | 33.0 AV                       | 54.0              | -21.0          | 1.74 H                   | 342                        | 31.0                   | 2.0                            |
| 7                                                   | 7386.00        | 42.0 PK                       | 74.0              | -32.0          | 1.36 H                   | 290                        | 33.4                   | 8.6                            |
| 8                                                   | 7386.00        | 34.2 AV                       | 54.0              | -19.8          | 1.36 H                   | 290                        | 25.6                   | 8.6                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2462.00       | 116.3 PK                      |                   |                | 2.06 V                   | 214                        | 118.5                  | -2.2                           |
| 2                                                   | *2462.00       | 105.4 AV                      |                   |                | 2.06 V                   | 214                        | 107.6                  | -2.2                           |
| 3                                                   | 2483.50        | 70.1 PK                       | 74.0              | -3.9           | 2.06 V                   | 214                        | 72.3                   | -2.2                           |
| 4                                                   | 2483.50        | 53.9 AV                       | 54.0              | -0.1           | 2.06 V                   | 214                        | 56.1                   | -2.2                           |
| 5                                                   | 4924.00        | 43.6 PK                       | 74.0              | -30.4          | 1.14 V                   | 340                        | 41.6                   | 2.0                            |
| 6                                                   | 4924.00        | 40.0 AV                       | 54.0              | -14.0          | 1.14 V                   | 340                        | 38.0                   | 2.0                            |
| 7                                                   | 7386.00        | 43.9 PK                       | 74.0              | -30.1          | 2.36 V                   | 325                        | 35.3                   | 8.6                            |
| 8                                                   | 7386.00        | 35.5 AV                       | 54.0              | -18.5          | 2.36 V                   | 325                        | 26.9                   | 8.6                            |

**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.

## VHT20

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 61.5 PK                       | 74.0              | -12.5          | 2.09 H                   | 241                        | 63.5                   | -2.0                           |
| 2                                                   | 2390.00        | 45.4 AV                       | 54.0              | -8.6           | 2.09 H                   | 241                        | 47.4                   | -2.0                           |
| 3                                                   | *2412.00       | 106.6 PK                      |                   |                | 2.09 H                   | 241                        | 108.7                  | -2.1                           |
| 4                                                   | *2412.00       | 96.8 AV                       |                   |                | 2.09 H                   | 241                        | 98.9                   | -2.1                           |
| 5                                                   | 4824.00        | 39.3 PK                       | 74.0              | -34.7          | 1.71 H                   | 350                        | 37.3                   | 2.0                            |
| 6                                                   | 4824.00        | 33.5 AV                       | 54.0              | -20.5          | 1.71 H                   | 350                        | 31.5                   | 2.0                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 65.8 PK                       | 74.0              | -8.2           | 2.28 V                   | 135                        | 67.8                   | -2.0                           |
| 2                                                   | 2390.00        | 53.9 AV                       | 54.0              | -0.1           | 2.28 V                   | 135                        | 55.9                   | -2.0                           |
| 3                                                   | *2412.00       | 115.0 PK                      |                   |                | 2.28 V                   | 135                        | 117.1                  | -2.1                           |
| 4                                                   | *2412.00       | 105.1 AV                      |                   |                | 2.28 V                   | 135                        | 107.2                  | -2.1                           |
| 5                                                   | 4824.00        | 43.0 PK                       | 74.0              | -31.0          | 1.10 V                   | 353                        | 41.0                   | 2.0                            |
| 6                                                   | 4824.00        | 39.6 AV                       | 54.0              | -14.4          | 1.10 V                   | 353                        | 37.6                   | 2.0                            |

### 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.

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 6 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2388.70        | 61.4 PK                       | 74.0              | -12.6          | 2.05 H                   | 224                        | 63.4                   | -2.0                           |
| 2                                                   | 2388.70        | 40.4 AV                       | 54.0              | -13.6          | 2.05 H                   | 224                        | 42.4                   | -2.0                           |
| 3                                                   | *2437.00       | 112.5 PK                      |                   |                | 2.05 H                   | 224                        | 114.7                  | -2.2                           |
| 4                                                   | *2437.00       | 102.3 AV                      |                   |                | 2.05 H                   | 224                        | 104.5                  | -2.2                           |
| 5                                                   | 2483.50        | 62.2 PK                       | 74.0              | -11.8          | 2.05 H                   | 224                        | 64.4                   | -2.2                           |
| 6                                                   | 2483.50        | 42.0 AV                       | 54.0              | -12.0          | 2.05 H                   | 224                        | 44.2                   | -2.2                           |
| 7                                                   | 4874.00        | 40.8 PK                       | 74.0              | -33.2          | 1.66 H                   | 346                        | 38.8                   | 2.0                            |
| 8                                                   | 4874.00        | 34.9 AV                       | 54.0              | -19.1          | 1.66 H                   | 346                        | 32.9                   | 2.0                            |
| 9                                                   | 7311.00        | 43.5 PK                       | 74.0              | -30.5          | 1.31 H                   | 293                        | 35.0                   | 8.5                            |
| 10                                                  | 7311.00        | 35.7 AV                       | 54.0              | -18.3          | 1.31 H                   | 293                        | 27.2                   | 8.5                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | 2388.70        | 65.7 PK                       | 74.0              | -8.3           | 2.19 V                   | 141                        | 67.7                   | -2.0                           |
| 2                                                 | 2388.70        | 48.9 AV                       | 54.0              | -5.1           | 2.19 V                   | 141                        | 50.9                   | -2.0                           |
| 3                                                 | *2437.00       | 120.9 PK                      |                   |                | 2.19 V                   | 141                        | 123.1                  | -2.2                           |
| 4                                                 | *2437.00       | 110.6 AV                      |                   |                | 2.19 V                   | 141                        | 112.8                  | -2.2                           |
| 5                                                 | 2483.50        | 66.5 PK                       | 74.0              | -7.5           | 2.19 V                   | 141                        | 68.7                   | -2.2                           |
| 6                                                 | 2483.50        | 50.5 AV                       | 54.0              | -3.5           | 2.19 V                   | 141                        | 52.7                   | -2.2                           |
| 7                                                 | 4874.00        | 43.4 PK                       | 74.0              | -30.6          | 1.17 V                   | 360                        | 41.4                   | 2.0                            |
| 8                                                 | 4874.00        | 40.0 AV                       | 54.0              | -14.0          | 1.17 V                   | 360                        | 38.0                   | 2.0                            |
| 9                                                 | 7311.00        | 45.5 PK                       | 74.0              | -28.5          | 2.39 V                   | 334                        | 37.0                   | 8.5                            |
| 10                                                | 7311.00        | 37.3 AV                       | 54.0              | -16.7          | 2.39 V                   | 334                        | 28.8                   | 8.5                            |

#### 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.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 11 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2462.00       | 108.5 PK                      |                   |                | 2.07 H                   | 225                        | 110.7                  | -2.2                           |
| 2                                                   | *2462.00       | 97.5 AV                       |                   |                | 2.07 H                   | 225                        | 99.7                   | -2.2                           |
| 3                                                   | 2483.50        | 67.7 PK                       | 74.0              | -6.3           | 2.07 H                   | 225                        | 69.9                   | -2.2                           |
| 4                                                   | 2483.50        | 45.3 AV                       | 54.0              | -8.7           | 2.07 H                   | 225                        | 47.5                   | -2.2                           |
| 5                                                   | 4924.00        | 39.1 PK                       | 74.0              | -34.9          | 1.71 H                   | 331                        | 37.1                   | 2.0                            |
| 6                                                   | 4924.00        | 33.1 AV                       | 54.0              | -20.9          | 1.71 H                   | 331                        | 31.1                   | 2.0                            |
| 7                                                   | 7386.00        | 42.1 PK                       | 74.0              | -31.9          | 1.29 H                   | 279                        | 33.5                   | 8.6                            |
| 8                                                   | 7386.00        | 34.0 AV                       | 54.0              | -20.0          | 1.29 H                   | 279                        | 25.4                   | 8.6                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2462.00       | 116.9 PK                      |                   |                | 2.23 V                   | 155                        | 119.1                  | -2.2                           |
| 2                                                   | *2462.00       | 105.8 AV                      |                   |                | 2.23 V                   | 155                        | 108.0                  | -2.2                           |
| 3                                                   | 2483.50        | 72.0 PK                       | 74.0              | -2.0           | 2.23 V                   | 155                        | 74.2                   | -2.2                           |
| 4                                                   | 2483.50        | 53.8 AV                       | 54.0              | -0.2           | 2.23 V                   | 155                        | 56.0                   | -2.2                           |
| 5                                                   | 4924.00        | 43.1 PK                       | 74.0              | -30.9          | 1.11 V                   | 338                        | 41.1                   | 2.0                            |
| 6                                                   | 4924.00        | 39.6 AV                       | 54.0              | -14.4          | 1.11 V                   | 338                        | 37.6                   | 2.0                            |
| 7                                                   | 7386.00        | 43.5 PK                       | 74.0              | -30.5          | 2.42 V                   | 328                        | 34.9                   | 8.6                            |
| 8                                                   | 7386.00        | 35.3 AV                       | 54.0              | -18.7          | 2.42 V                   | 328                        | 26.7                   | 8.6                            |

**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.

# VHT40

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | 2390.00     | 62.4 PK                 | 74.0           | -11.6       | 2.06 H             | 230                  | 64.4             | -2.0                     |
| 2                                                   | 2390.00     | 45.3 AV                 | 54.0           | -8.7        | 2.06 H             | 230                  | 47.3             | -2.0                     |
| 3                                                   | *2422.00    | 100.5 PK                |                |             | 2.06 H             | 230                  | 102.6            | -2.1                     |
| 4                                                   | *2422.00    | 90.9 AV                 |                |             | 2.06 H             | 230                  | 93.0             | -2.1                     |
| 5                                                   | 4844.00     | 39.3 PK                 | 74.0           | -34.7       | 1.72 H             | 326                  | 37.4             | 1.9                      |
| 6                                                   | 4844.00     | 33.2 AV                 | 54.0           | -20.8       | 1.72 H             | 326                  | 31.3             | 1.9                      |
| 7                                                   | 7266.00     | 41.6 PK                 | 74.0           | -32.4       | 1.34 H             | 299                  | 33.1             | 8.5                      |
| 8                                                   | 7266.00     | 33.7 AV                 | 54.0           | -20.3       | 1.34 H             | 299                  | 25.2             | 8.5                      |
| 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     | 66.7 PK                 | 74.0           | -7.3        | 1.92 V             | 205                  | 68.7             | -2.0                     |
| 2                                                   | 2390.00     | 53.8 AV                 | 54.0           | -0.2        | 1.92 V             | 205                  | 55.8             | -2.0                     |
| 3                                                   | *2422.00    | 108.9 PK                |                |             | 1.92 V             | 205                  | 111.0            | -2.1                     |
| 4                                                   | *2422.00    | 99.2 AV                 |                |             | 1.92 V             | 205                  | 101.3            | -2.1                     |
| 5                                                   | 4844.00     | 42.9 PK                 | 74.0           | -31.1       | 1.09 V             | 350                  | 41.0             | 1.9                      |
| 6                                                   | 4844.00     | 39.3 AV                 | 54.0           | -14.7       | 1.09 V             | 350                  | 37.4             | 1.9                      |
| 7                                                   | 7266.00     | 43.5 PK                 | 74.0           | -30.5       | 2.38 V             | 329                  | 35.0             | 8.5                      |
| 8                                                   | 7266.00     | 35.6 AV                 | 54.0           | -18.4       | 2.38 V             | 329                  | 27.1             | 8.5                      |

## 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.

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 6 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 2390.00        | 60.9 PK                       | 74.0              | -13.1          | 2.08 H                   | 217                        | 62.9                   | -2.0                           |
| 2                                                   | 2390.00        | 42.9 AV                       | 54.0              | -11.1          | 2.08 H                   | 217                        | 44.9                   | -2.0                           |
| 3                                                   | *2437.00       | 104.2 PK                      |                   |                | 2.08 H                   | 217                        | 106.4                  | -2.2                           |
| 4                                                   | *2437.00       | 93.9 AV                       |                   |                | 2.08 H                   | 217                        | 96.1                   | -2.2                           |
| 5                                                   | 2483.50        | 64.7 PK                       | 74.0              | -9.3           | 2.08 H                   | 217                        | 66.9                   | -2.2                           |
| 6                                                   | 2483.50        | 45.3 AV                       | 54.0              | -8.7           | 2.08 H                   | 217                        | 47.5                   | -2.2                           |
| 7                                                   | 4874.00        | 40.3 PK                       | 74.0              | -33.7          | 1.62 H                   | 350                        | 38.3                   | 2.0                            |
| 8                                                   | 4874.00        | 34.5 AV                       | 54.0              | -19.5          | 1.62 H                   | 350                        | 32.5                   | 2.0                            |
| 9                                                   | 7311.00        | 42.7 PK                       | 74.0              | -31.3          | 1.31 H                   | 312                        | 34.2                   | 8.5                            |
| 10                                                  | 7311.00        | 34.7 AV                       | 54.0              | -19.3          | 1.31 H                   | 312                        | 26.2                   | 8.5                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | 2390.00        | 65.2 PK                       | 74.0              | -8.8           | 2.00 V                   | 216                        | 67.2                   | -2.0                           |
| 2                                                 | 2390.00        | 51.4 AV                       | 54.0              | -2.6           | 2.00 V                   | 216                        | 53.4                   | -2.0                           |
| 3                                                 | *2437.00       | 112.6 PK                      |                   |                | 2.00 V                   | 216                        | 114.8                  | -2.2                           |
| 4                                                 | *2437.00       | 102.2 AV                      |                   |                | 2.00 V                   | 216                        | 104.4                  | -2.2                           |
| 5                                                 | 2483.50        | 69.0 PK                       | 74.0              | -5.0           | 2.00 V                   | 216                        | 71.2                   | -2.2                           |
| 6                                                 | 2483.50        | 53.8 AV                       | 54.0              | -0.2           | 2.00 V                   | 216                        | 56.0                   | -2.2                           |
| 7                                                 | 4874.00        | 44.3 PK                       | 74.0              | -29.7          | 1.09 V                   | 352                        | 42.3                   | 2.0                            |
| 8                                                 | 4874.00        | 40.7 AV                       | 54.0              | -13.3          | 1.09 V                   | 352                        | 38.7                   | 2.0                            |
| 9                                                 | 7311.00        | 45.0 PK                       | 74.0              | -29.0          | 2.39 V                   | 349                        | 36.5                   | 8.5                            |
| 10                                                | 7311.00        | 37.2 AV                       | 54.0              | -16.8          | 2.39 V                   | 349                        | 28.7                   | 8.5                            |

#### 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<br>FUNCTION | Peak (PK)    |
| FREQUENCY RANGE | 1GHz ~ 25GHz |                      | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2452.00       | 103.7 PK                      |                   |                | 2.01 H                   | 223                        | 105.9                  | -2.2                           |
| 2                                                   | *2452.00       | 93.5 AV                       |                   |                | 2.01 H                   | 223                        | 95.7                   | -2.2                           |
| 3                                                   | 2483.50        | 62.5 PK                       | 74.0              | -11.5          | 2.01 H                   | 223                        | 64.7                   | -2.2                           |
| 4                                                   | 2483.50        | 45.4 AV                       | 54.0              | -8.6           | 2.01 H                   | 223                        | 47.6                   | -2.2                           |
| 5                                                   | 4904.00        | 39.7 PK                       | 74.0              | -34.3          | 1.67 H                   | 333                        | 37.7                   | 2.0                            |
| 6                                                   | 4904.00        | 33.6 AV                       | 54.0              | -20.4          | 1.67 H                   | 333                        | 31.6                   | 2.0                            |
| 7                                                   | 7356.00        | 42.0 PK                       | 74.0              | -32.0          | 1.30 H                   | 306                        | 33.5                   | 8.5                            |
| 8                                                   | 7356.00        | 34.1 AV                       | 54.0              | -19.9          | 1.30 H                   | 306                        | 25.6                   | 8.5                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *2452.00       | 112.1 PK                      |                   |                | 1.95 V                   | 219                        | 114.3                  | -2.2                           |
| 2                                                   | *2452.00       | 101.8 AV                      |                   |                | 1.95 V                   | 219                        | 104.0                  | -2.2                           |
| 3                                                   | 2483.50        | 66.8 PK                       | 74.0              | -7.2           | 1.95 V                   | 219                        | 69.0                   | -2.2                           |
| 4                                                   | 2483.50        | 53.9 AV                       | 54.0              | -0.1           | 1.95 V                   | 219                        | 56.1                   | -2.2                           |
| 5                                                   | 4904.00        | 42.8 PK                       | 74.0              | -31.2          | 1.14 V                   | 353                        | 40.8                   | 2.0                            |
| 6                                                   | 4904.00        | 39.4 AV                       | 54.0              | -14.6          | 1.14 V                   | 353                        | 37.4                   | 2.0                            |
| 7                                                   | 7356.00        | 43.8 PK                       | 74.0              | -30.2          | 2.41 V                   | 344                        | 35.3                   | 8.5                            |
| 8                                                   | 7356.00        | 35.6 AV                       | 54.0              | -18.4          | 2.41 V                   | 344                        | 27.1                   | 8.5                            |

**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:

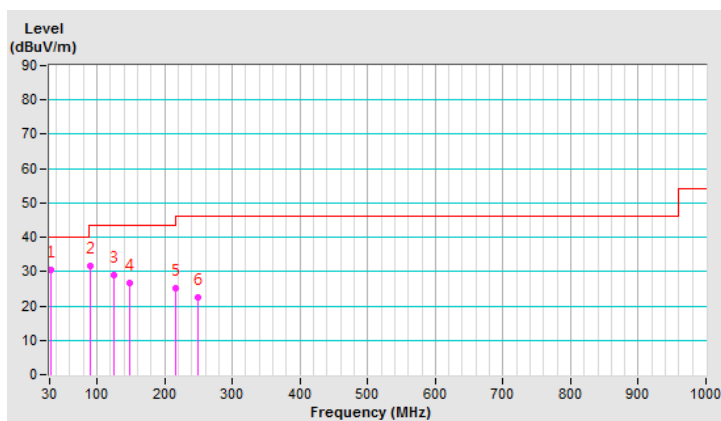
## 802.11b

|                 |              |                      |                 |
|-----------------|--------------|----------------------|-----------------|
| CHANNEL         | TX Channel 6 | DETECTOR<br>FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz  |                      |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 31.02          | 30.3 QP                       | 40.0              | -9.7           | 1.00 H                   | 58                         | 40.0                   | -9.7                           |
| 2                                                   | 90.16          | 31.6 QP                       | 43.5              | -11.9          | 2.00 H                   | 64                         | 44.9                   | -13.3                          |
| 3                                                   | 125.01         | 28.8 QP                       | 43.5              | -14.7          | 1.50 H                   | 40                         | 38.2                   | -9.4                           |
| 4                                                   | 148.78         | 26.7 QP                       | 43.5              | -16.8          | 2.00 H                   | 269                        | 34.6                   | -7.9                           |
| 5                                                   | 215.97         | 25.2 QP                       | 43.5              | -18.3          | 1.00 H                   | 265                        | 35.6                   | -10.4                          |
| 6                                                   | 250.02         | 22.5 QP                       | 46.0              | -23.5          | 1.00 H                   | 62                         | 31.2                   | -8.7                           |

### 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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

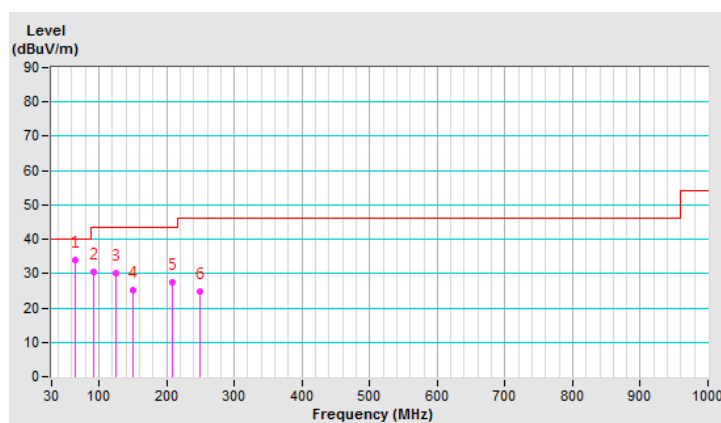


|                        |              |                              |                 |
|------------------------|--------------|------------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 6 | <b>DETECTOR<br/>FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | 9kHz ~ 1GHz  |                              |                 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | 64.36          | 34.0 QP                       | 40.0              | -6.0           | 1.00 V                   | 131                        | 43.5                   | -9.5                           |
| 2                                                 | 92.32          | 30.5 QP                       | 43.5              | -13.0          | 1.50 V                   | 77                         | 43.5                   | -13.0                          |
| 3                                                 | 125.01         | 29.9 QP                       | 43.5              | -13.6          | 1.00 V                   | 8                          | 39.3                   | -9.4                           |
| 4                                                 | 149.79         | 25.2 QP                       | 43.5              | -18.3          | 1.00 V                   | 158                        | 33.1                   | -7.9                           |
| 5                                                 | 209.04         | 27.6 QP                       | 43.5              | -15.9          | 1.00 V                   | 1                          | 38.0                   | -10.4                          |
| 6                                                 | 250.00         | 24.8 QP                       | 46.0              | -21.2          | 1.50 V                   | 336                        | 33.5                   | -8.7                           |

**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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 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. | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------------------------------------|-------------------------|------------|-----------------|------------------|
| Test Receiver<br>R&S                                               | ESCS 30                 | 847124/029 | Oct. 24, 2018   | Oct. 23, 2019    |
| Line-Impedance<br>Stabilization Network<br>(for EUT)<br>R&S        | ESH3-Z5                 | 848773/004 | Oct. 22, 2018   | Oct. 21, 2019    |
| Line-Impedance<br>Stabilization Network<br>(for Peripheral)<br>R&S | ENV216                  | 100072     | June 04, 2018   | June 03, 2019    |
| 50 ohms Terminator                                                 | N/A                     | 3          | Oct. 22, 2018   | Oct. 21, 2019    |
| RF Cable                                                           | 5D-FB                   | COCCAB-001 | Sep. 28, 2018   | Sep. 27, 2019    |
| Fixed attenuator<br>EMCI                                           | STI02-2200-10           | 003        | Mar. 16, 2018   | Mar. 15, 2019    |
| Software<br>BVADT                                                  | BVADT_Cond_<br>V7.3.7.4 | NA         | NA              | NA               |

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
- 3 Tested Date: Jan. 23, 2019

#### 4.2.3 Test Procedures

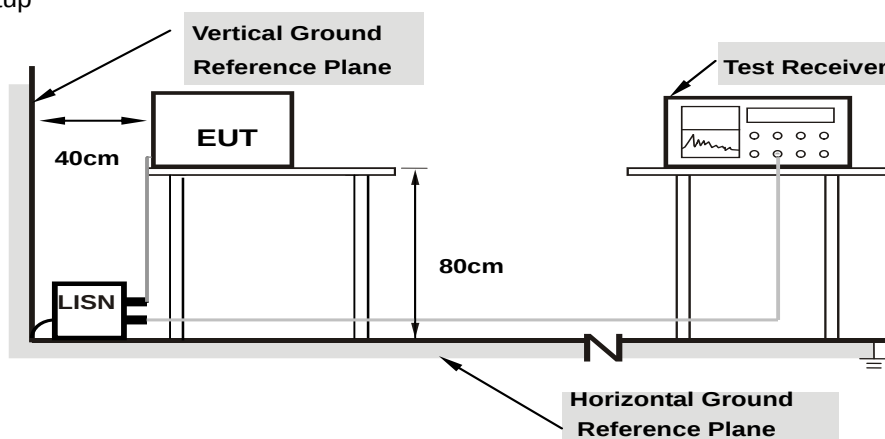
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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 4.1.6.

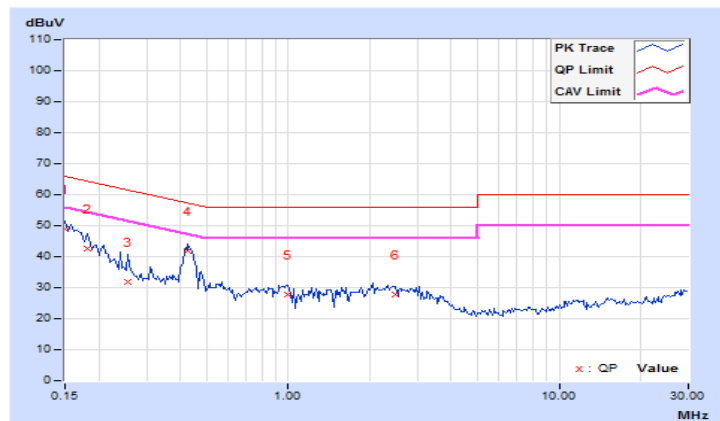
#### 4.2.7 Test Results

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

| No       | Freq.          | Corr.        | Reading Value |              | Emission Level |              | Limit        |              | Margin        |               |
|----------|----------------|--------------|---------------|--------------|----------------|--------------|--------------|--------------|---------------|---------------|
|          | [MHz]          | Factor       | [dB (uV)]     |              | [dB (uV)]      |              | [dB (uV)]    |              | (dB)          |               |
|          |                | (dB)         | Q.P.          | AV.          | Q.P.           | AV.          | Q.P.         | AV.          | Q.P.          | AV.           |
| 1        | 0.15000        | 10.02        | 39.04         | 24.58        | 49.06          | 34.60        | 66.00        | 56.00        | -16.94        | -21.40        |
| 2        | 0.18125        | 10.03        | 32.54         | 26.73        | 42.57          | 36.76        | 64.43        | 54.43        | -21.86        | -17.67        |
| 3        | 0.25547        | 10.05        | 21.90         | 10.39        | 31.95          | 20.44        | 61.58        | 51.58        | -29.63        | -31.14        |
| <b>4</b> | <b>0.42734</b> | <b>10.07</b> | <b>31.67</b>  | <b>24.54</b> | <b>41.74</b>   | <b>34.61</b> | <b>57.30</b> | <b>47.30</b> | <b>-15.56</b> | <b>-12.69</b> |
| 5        | 0.98984        | 10.11        | 17.78         | 9.30         | 27.89          | 19.41        | 56.00        | 46.00        | -28.11        | -26.59        |
| 6        | 2.47656        | 10.18        | 17.59         | 10.50        | 27.77          | 20.68        | 56.00        | 46.00        | -28.23        | -25.32        |

#### 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

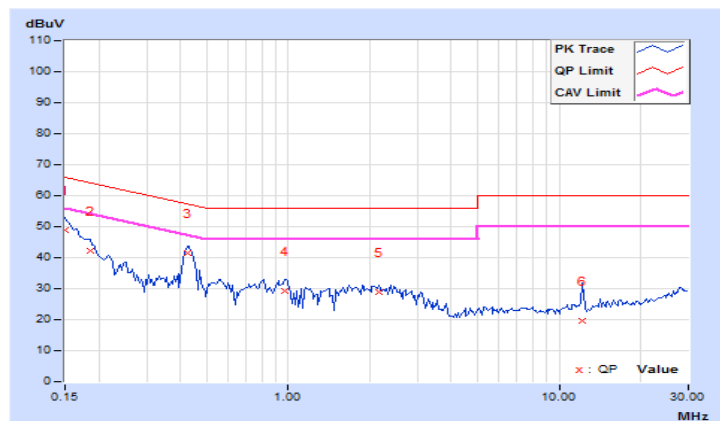


|       |             |                   |                                |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|

| No | Freq.<br>[MHz] | Corr.  | Reading Value |       | Emission Level |       | Limit     |       | Margin |        |
|----|----------------|--------|---------------|-------|----------------|-------|-----------|-------|--------|--------|
|    |                | Factor | [dB (uV)]     |       | [dB (uV)]      |       | [dB (uV)] |       | (dB)   |        |
|    |                | (dB)   | Q.P.          | AV.   | Q.P.           | AV.   | Q.P.      | AV.   | Q.P.   | AV.    |
| 1  | 0.15000        | 9.93   | 38.86         | 24.40 | 48.79          | 34.33 | 66.00     | 56.00 | -17.21 | -21.67 |
| 2  | 0.18516        | 9.94   | 32.44         | 19.29 | 42.38          | 29.23 | 64.25     | 54.25 | -21.87 | -25.02 |
| 3  | 0.42344        | 9.96   | 31.49         | 24.54 | 41.45          | 34.50 | 57.38     | 47.38 | -15.93 | -12.88 |
| 4  | 0.97422        | 9.99   | 19.12         | 11.62 | 29.11          | 21.61 | 56.00     | 46.00 | -26.89 | -24.39 |
| 5  | 2.15234        | 10.05  | 18.82         | 11.52 | 28.87          | 21.57 | 56.00     | 46.00 | -27.13 | -24.43 |
| 6  | 12.22656       | 10.49  | 9.04          | 1.98  | 19.53          | 12.47 | 60.00     | 50.00 | -40.47 | -37.53 |

#### 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

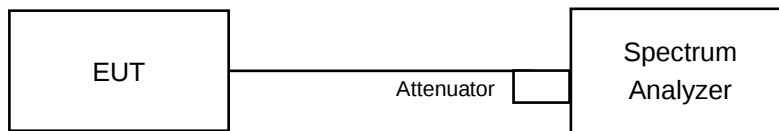


### 4.3 6dB Bandwidth Measurement

#### 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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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 from Test 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 Result

##### CDD Mode

##### 802.11b

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 |                     |             |
| 1       | 2412            | 9.08                | 8.61    | 0.5                 | Pass        |
| 6       | 2437            | 9.54                | 8.58    | 0.5                 | Pass        |
| 11      | 2462            | 8.11                | 8.55    | 0.5                 | Pass        |

##### 802.11g

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 |                     |             |
| 1       | 2412            | 15.40               | 16.43   | 0.5                 | Pass        |
| 6       | 2437            | 15.99               | 16.38   | 0.5                 | Pass        |
| 11      | 2462            | 16.36               | 16.41   | 0.5                 | Pass        |

##### VHT20

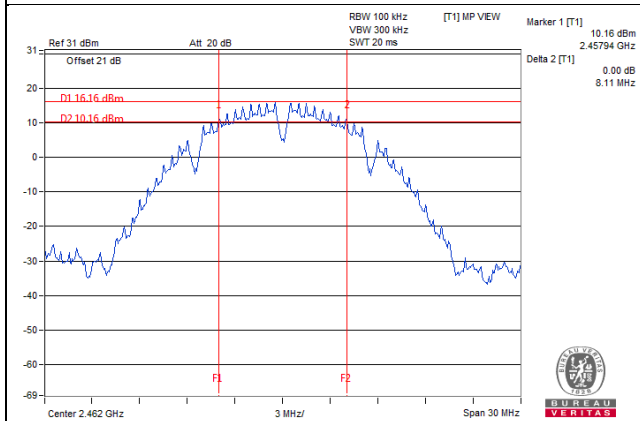
| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 |                     |             |
| 1       | 2412            | 16.96               | 17.65   | 0.5                 | Pass        |
| 6       | 2437            | 16.59               | 17.63   | 0.5                 | Pass        |
| 11      | 2462            | 17.65               | 17.66   | 0.5                 | Pass        |

##### VHT40

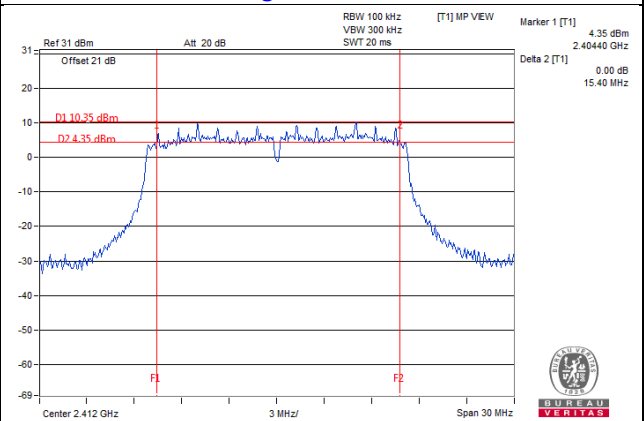
| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 |                     |             |
| 3       | 2422            | 34.05               | 35.30   | 0.5                 | Pass        |
| 6       | 2437            | 35.17               | 35.24   | 0.5                 | Pass        |
| 9       | 2452            | 35.22               | 35.47   | 0.5                 | Pass        |

## Spectrum Plot of Worst Value

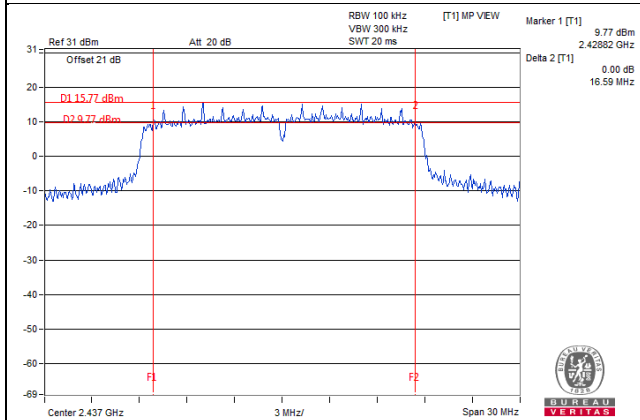
### 802.11b\_Chain 0 / CH11



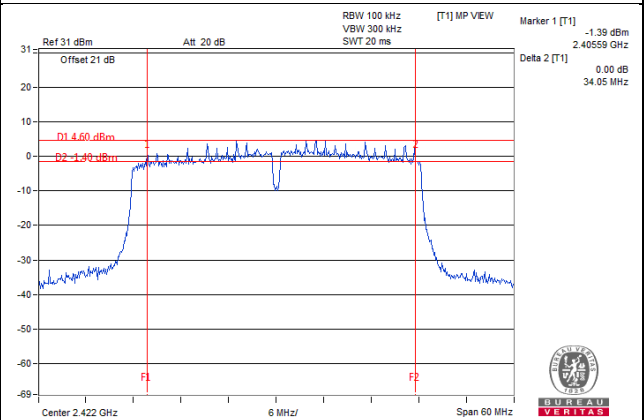
### 802.11g\_Chain 0 / CH1



### VHT20\_Chain 0 / CH6



### VHT40\_Chain 0 / CH3



## 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,

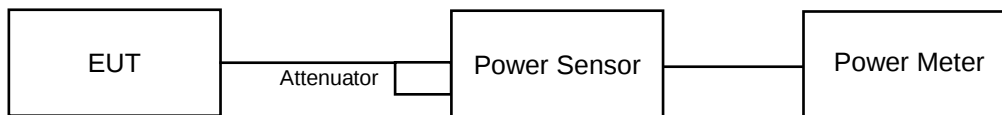
Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{ANT}$ ;

Array Gain =  $5 \log(N_{ANT}/N_{SS})$  dB or 3 dB, whichever is less for 20-MHz channel widths with  $N_{ANT} \geq 5$ .

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

### 4.4.2 Test Setup



### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.4 Test Procedures

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

### 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

##### CDD Mode

##### 802.11b

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Limit (dBm) | Pass / Fail |
|-------|----------------------|---------------------|---------|------------------------|----------------------|-------------|-------------|
|       |                      | Chain 0             | Chain 1 |                        |                      |             |             |
| 1     | 2412                 | 24.45               | 24.68   | 572.377                | 27.58                | 30          | Pass        |
| 6     | 2437                 | 26.10               | 26.51   | 855.093                | 29.32                | 30          | Pass        |
| 11    | 2462                 | 26.62               | 25.92   | 850.039                | 29.29                | 30          | Pass        |

##### 802.11g

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Limit (dBm) | Pass / Fail |
|-------|----------------------|---------------------|---------|------------------------|----------------------|-------------|-------------|
|       |                      | Chain 0             | Chain 1 |                        |                      |             |             |
| 1     | 2412                 | 20.71               | 20.25   | 223.686                | 23.50                | 30          | Pass        |
| 6     | 2437                 | 25.91               | 25.90   | 778.987                | 28.92                | 30          | Pass        |
| 11    | 2462                 | 19.71               | 19.25   | 177.681                | 22.50                | 30          | Pass        |

##### VHT20

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Limit (dBm) | Pass / Fail |
|-------|----------------------|---------------------|---------|------------------------|----------------------|-------------|-------------|
|       |                      | Chain 0             | Chain 1 |                        |                      |             |             |
| 1     | 2412                 | 20.74               | 20.09   | 220.671                | 23.44                | 30          | Pass        |
| 6     | 2437                 | 25.94               | 25.77   | 770.217                | 28.87                | 30          | Pass        |
| 11    | 2462                 | 21.99               | 21.45   | 297.762                | 24.74                | 30          | Pass        |

##### VHT40

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Limit (dBm) | Pass / Fail |
|-------|----------------------|---------------------|---------|------------------------|----------------------|-------------|-------------|
|       |                      | Chain 0             | Chain 1 |                        |                      |             |             |
| 3     | 2422                 | 18.53               | 18.80   | 147.143                | 21.68                | 30          | Pass        |
| 6     | 2437                 | 20.88               | 20.41   | 232.363                | 23.66                | 30          | Pass        |
| 9     | 2452                 | 18.52               | 18.19   | 137.038                | 21.37                | 30          | Pass        |

## Beamforming Mode

### VHT20

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Limit (dBm) | Pass / Fail |
|-------|----------------------|---------------------|---------|------------------------|----------------------|-------------|-------------|
|       |                      | Chain 0             | Chain 1 |                        |                      |             |             |
| 1     | 2412                 | 20.74               | 20.09   | 220.671                | 23.44                | 28.88       | Pass        |
| 6     | 2437                 | 25.94               | 25.77   | 770.217                | 28.87                | 28.88       | Pass        |
| 11    | 2462                 | 21.99               | 21.45   | 297.762                | 24.74                | 28.88       | Pass        |

Note: The directional gain =  $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$  , so the power limit shall be reduced to  $30 - (7.12 - 6) = 28.88\text{dBm}$ .

### VHT40

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Limit (dBm) | Pass / Fail |
|-------|----------------------|---------------------|---------|------------------------|----------------------|-------------|-------------|
|       |                      | Chain 0             | Chain 1 |                        |                      |             |             |
| 3     | 2422                 | 18.53               | 18.80   | 147.143                | 21.68                | 28.88       | Pass        |
| 6     | 2437                 | 20.88               | 20.41   | 232.363                | 23.66                | 28.88       | Pass        |
| 9     | 2452                 | 18.52               | 18.19   | 137.038                | 21.37                | 28.88       | Pass        |

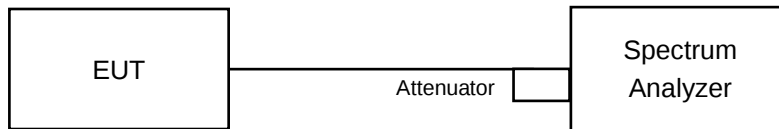
Note: The directional gain =  $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$  , so the power limit shall be reduced to  $30 - (7.12 - 6) = 28.88\text{dBm}$ .

## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

### 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 802.11b, VHT20

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set VBW  $\geq 3 \times \text{RBW}$ .
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

#### For 802.11g, VHT40

- Measure the duty cycle (x).
- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set VBW  $\geq 3 \times \text{RBW}$ .
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- Sweep time = auto couple.
- Do not use sweep triggering. Allow sweep to "free run".
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- 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 Condition

Same as Item 4.3.6

#### 4.5.7 Test Results

##### CDD Mode

##### 802.11b

| TX chain | Channel | Freq. (MHz) | PSD (dBm/3kHz) | 10 log (N=2) dB | Total PSD (dBm/3kHz) | Limit (dBm/3kHz) | Pass /Fail |
|----------|---------|-------------|----------------|-----------------|----------------------|------------------|------------|
| 0        | 1       | 2412        | -5.64          | 3.01            | -2.63                | 6.88             | Pass       |
|          | 6       | 2437        | -4.86          | 3.01            | -1.85                | 6.88             | Pass       |
|          | 11      | 2462        | -6.27          | 3.01            | -3.26                | 6.88             | Pass       |
| 1        | 1       | 2412        | -6.62          | 3.01            | -3.61                | 6.88             | Pass       |
|          | 6       | 2437        | -4.81          | 3.01            | -1.80                | 6.88             | Pass       |
|          | 11      | 2462        | -8.21          | 3.01            | -5.20                | 6.88             | Pass       |

Note: 1. The directional gain =  $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8-(7.12-6) = 6.88\text{dBm}$ .

##### 802.11g

| TX chain | Channel | Freq. (MHz) | PSD W/O Duty Factor (dBm/3kHz) | 10 log (N=2) dB | Duty Factor (dB) | Total PSD With Duty Factor (dBm/3kHz) | Limit (dBm/3kHz) | Pass /Fail |
|----------|---------|-------------|--------------------------------|-----------------|------------------|---------------------------------------|------------------|------------|
| 0        | 1       | 2412        | -12.02                         | 3.01            | 0.20             | -8.81                                 | 6.88             | Pass       |
|          | 6       | 2437        | -6.79                          | 3.01            | 0.20             | -3.58                                 | 6.88             | Pass       |
|          | 11      | 2462        | -12.25                         | 3.01            | 0.20             | -9.04                                 | 6.88             | Pass       |
| 1        | 1       | 2412        | -13.14                         | 3.01            | 0.20             | -9.93                                 | 6.88             | Pass       |
|          | 6       | 2437        | -8.12                          | 3.01            | 0.20             | -4.91                                 | 6.88             | Pass       |
|          | 11      | 2462        | -11.98                         | 3.01            | 0.20             | -8.77                                 | 6.88             | Pass       |

Note: 1. The directional gain =  $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8-(7.12-6) = 6.88\text{dBm}$ .  
2. Refer to section 3.3 for duty cycle spectrum plot.

##### VHT20

| TX chain | Channel | Freq. (MHz) | PSD (dBm/3kHz) | 10 log (N=2) dB | Total PSD (dBm/3kHz) | Limit (dBm/3kHz) | Pass /Fail |
|----------|---------|-------------|----------------|-----------------|----------------------|------------------|------------|
| 0        | 1       | 2412        | -11.73         | 3.01            | -8.72                | 6.88             | Pass       |
|          | 6       | 2437        | -6.93          | 3.01            | -3.92                | 6.88             | Pass       |
|          | 11      | 2462        | -11.04         | 3.01            | -8.03                | 6.88             | Pass       |
| 1        | 1       | 2412        | -12.71         | 3.01            | -9.70                | 6.88             | Pass       |
|          | 6       | 2437        | -8.27          | 3.01            | -5.26                | 6.88             | Pass       |
|          | 11      | 2462        | -11.82         | 3.01            | -8.81                | 6.88             | Pass       |

Note: 1. The directional gain =  $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8-(7.12-6) = 6.88\text{dBm}$ .

#### VHT40

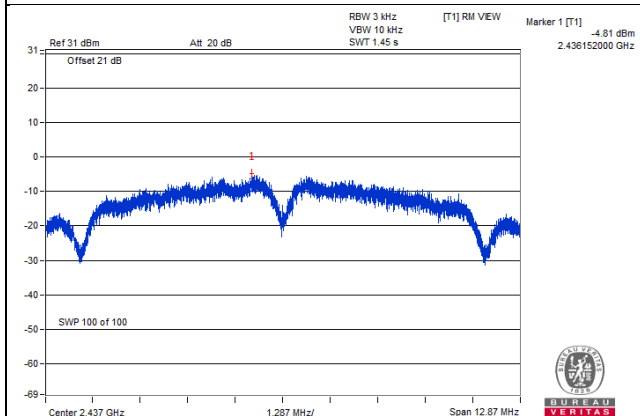
| TX chain | Channel | Freq.<br>(MHz) | PSD W/O Duty<br>Factor<br>(dBm/3kHz) | 10 log<br>(N=2) dB | Duty<br>Factor<br>(dB) | Total PSD<br>With Duty<br>Factor<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) | Pass<br>/Fail |
|----------|---------|----------------|--------------------------------------|--------------------|------------------------|------------------------------------------------|---------------------|---------------|
| 0        | 3       | 2422           | -16.58                               | 3.01               | 0.16                   | -13.41                                         | 6.88                | Pass          |
|          | 6       | 2437           | -14.86                               | 3.01               | 0.16                   | -11.69                                         | 6.88                | Pass          |
|          | 9       | 2452           | -16.86                               | 3.01               | 0.16                   | -13.69                                         | 6.88                | Pass          |
| 1        | 3       | 2422           | -17.28                               | 3.01               | 0.16                   | -14.11                                         | 6.88                | Pass          |
|          | 6       | 2437           | -15.32                               | 3.01               | 0.16                   | -12.15                                         | 6.88                | Pass          |
|          | 9       | 2452           | -18.21                               | 3.01               | 0.16                   | -15.04                                         | 6.88                | Pass          |

Note: 1. The directional gain =  $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8 - (7.12 - 6) = 6.88\text{dBm}$ .

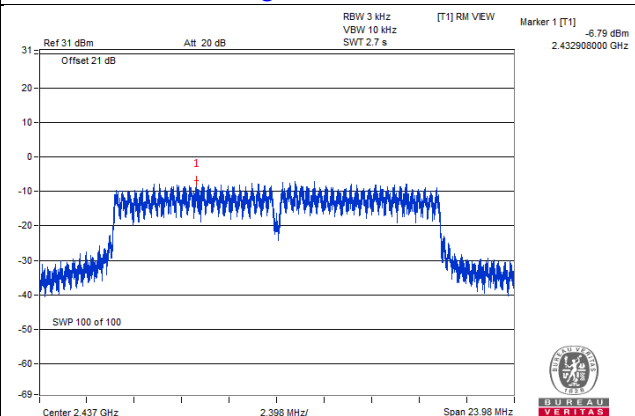
2. Refer to section 3.3 for duty cycle spectrum plot.

# Spectrum Plot of Worst Value

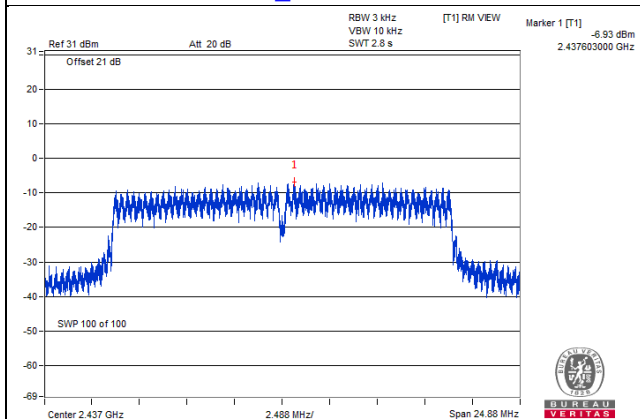
## 802.11b\_Chain 1 / CH6



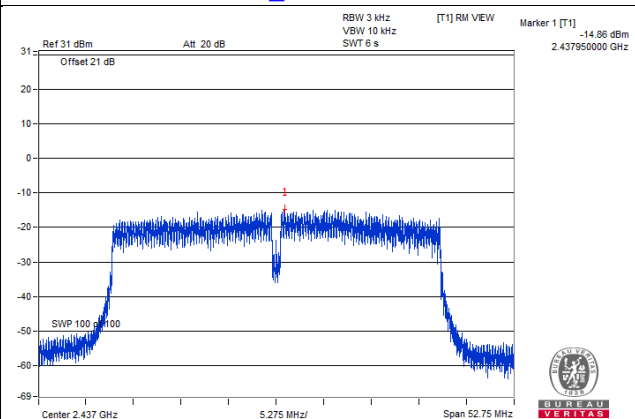
## 802.11g\_Chain 0 / CH6



## VHT20\_Chain 0 / CH6



## VHT40\_Chain 0 / CH6

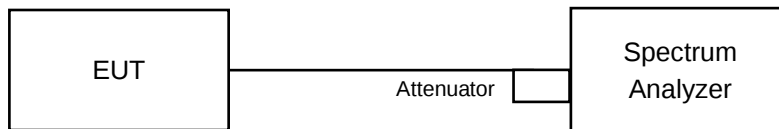


## 4.6 Conducted Out of Band Emission Measurement

### 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  $\geq$  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 OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  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 Condition

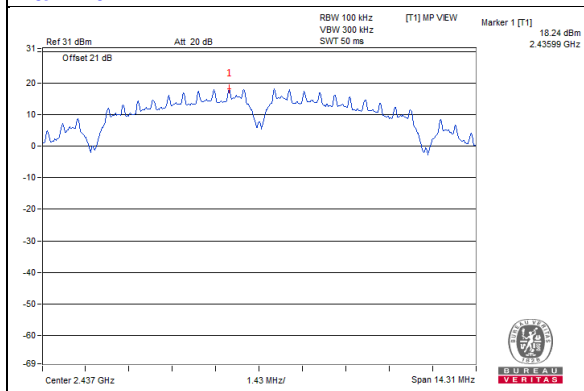
Same as Item 4.3.6

### 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.

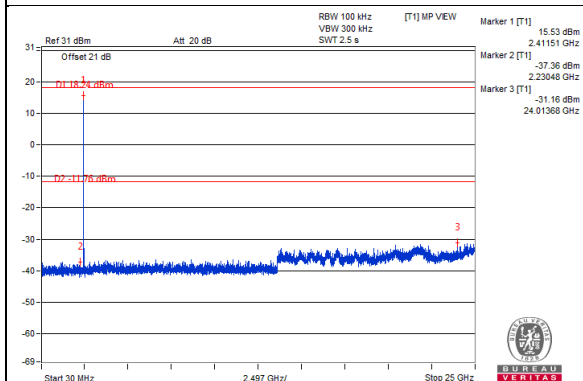
802.11b

### Maximum REF

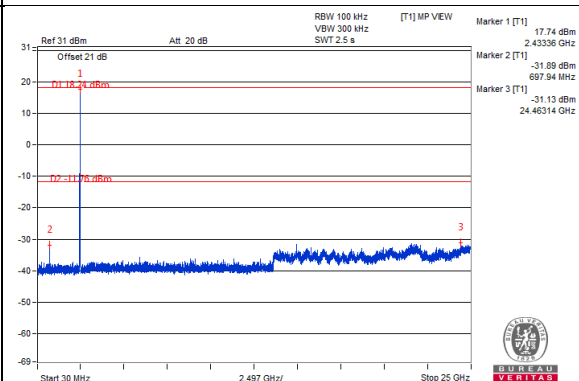


Chain 0

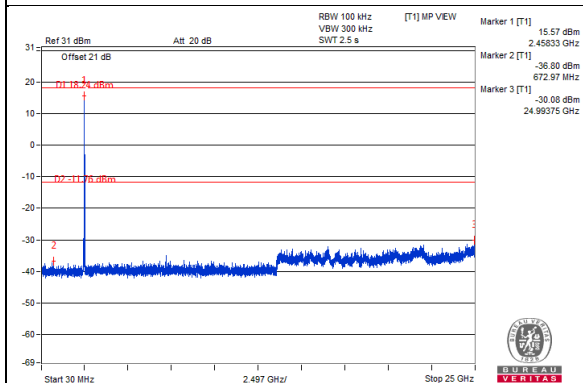
### CH 1



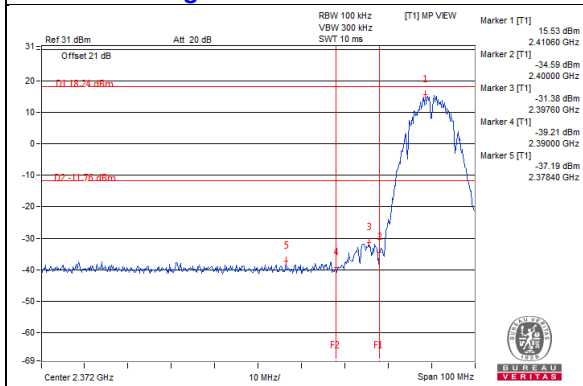
### CH 6



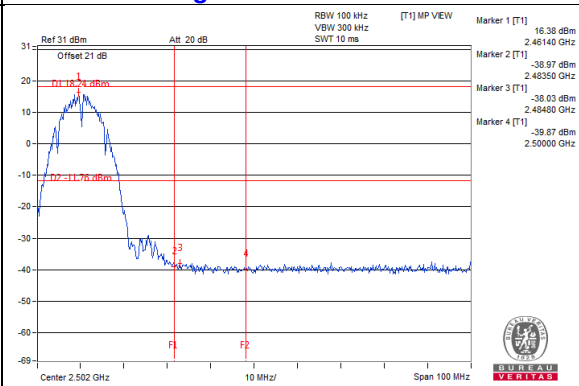
### CH 11



### CH 1 Band edge

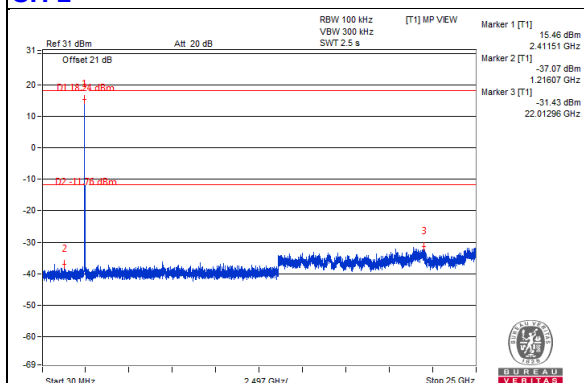


### CH 11 Band edge

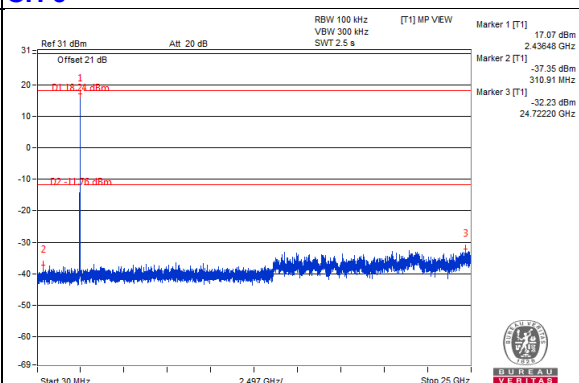


## Chain 1

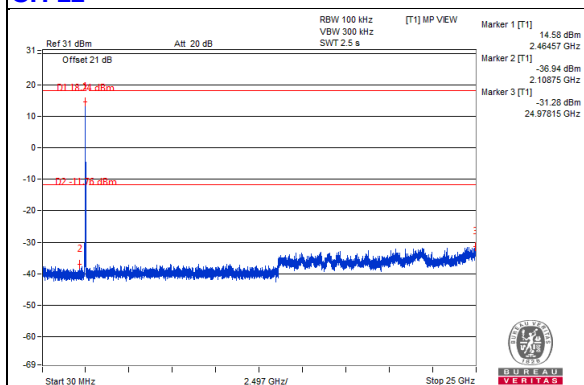
### CH 1



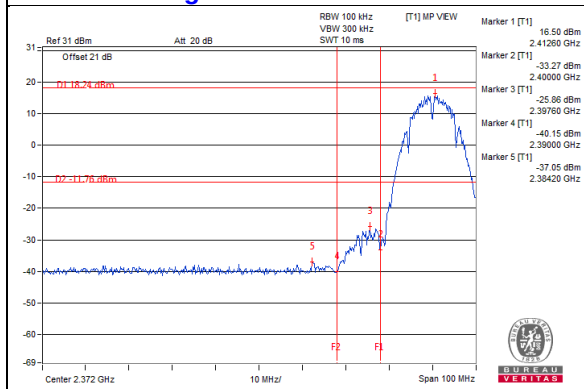
### CH 6



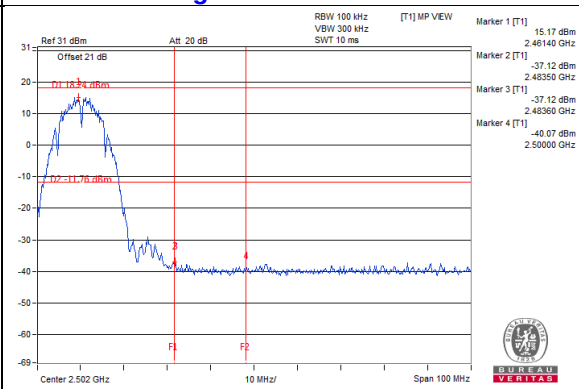
### CH 11



### CH 1 Band edge

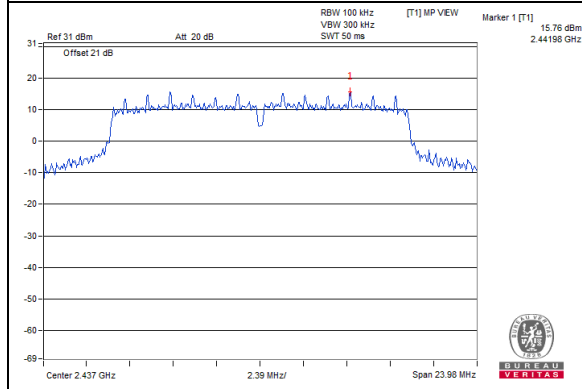


### CH 11 Band edge



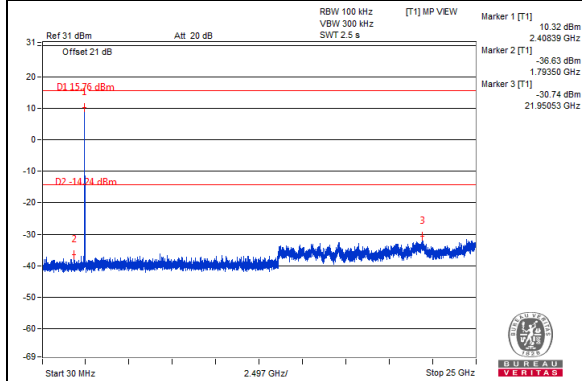
802.11g

### Maximum REF

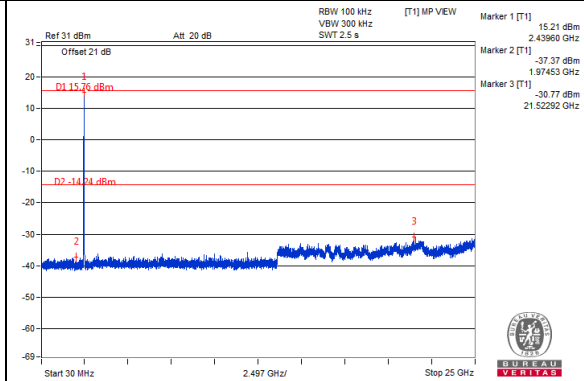


### Chain 0

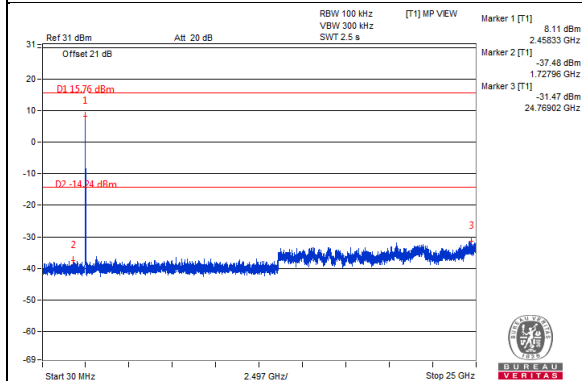
#### CH 1



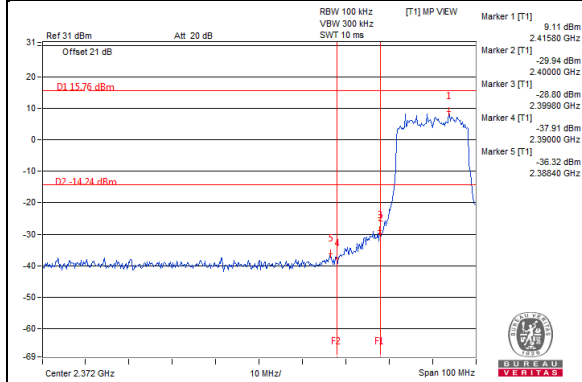
#### CH 6



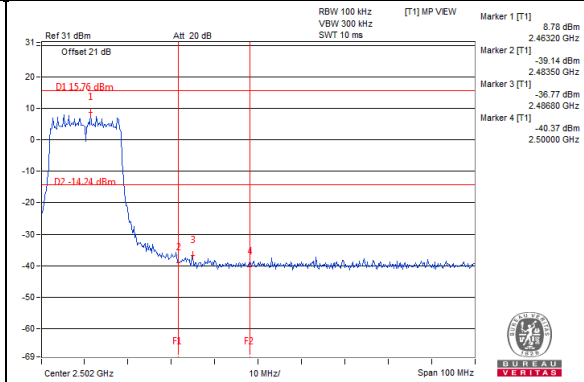
#### CH 11



#### CH 1 Band edge

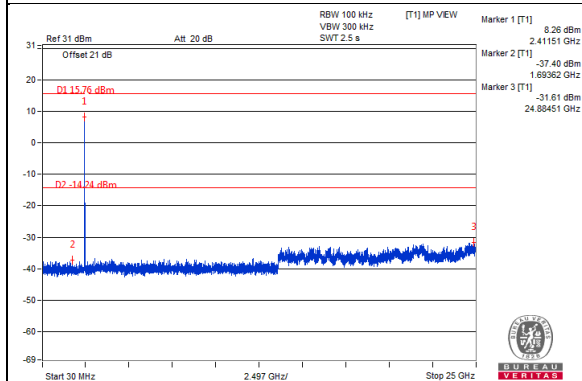


#### CH 11 Band edge

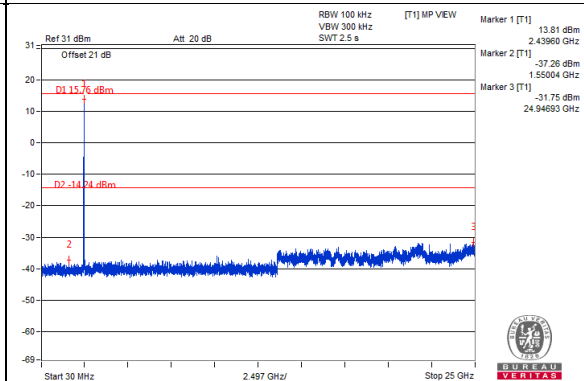


## Chain 1

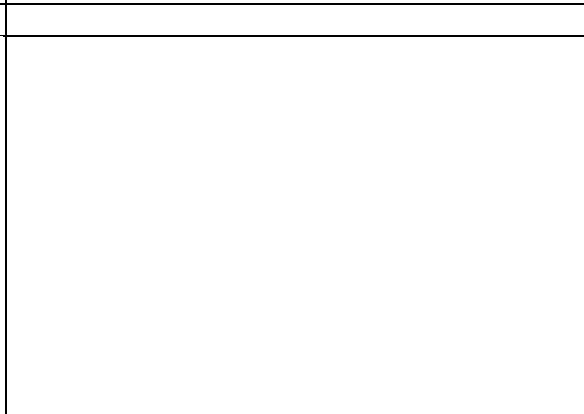
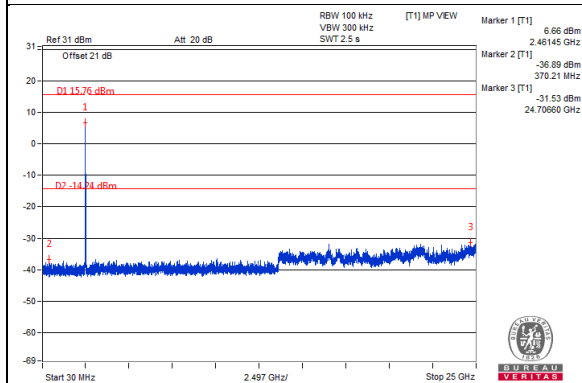
### CH 1



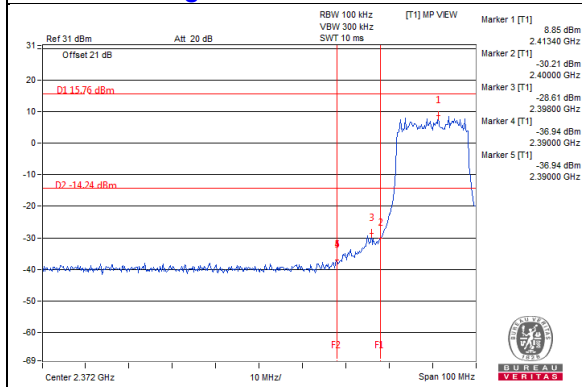
### CH 6



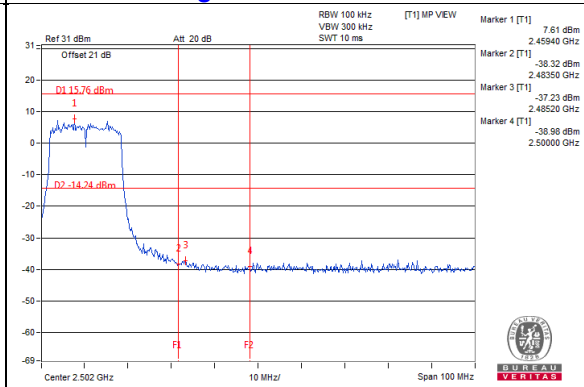
### CH 11



### CH 1 Band edge

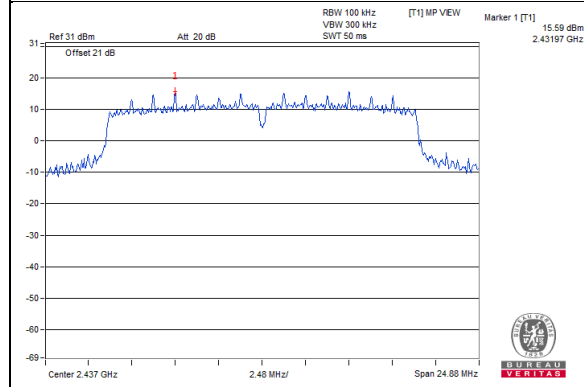


### CH 11 Band edge



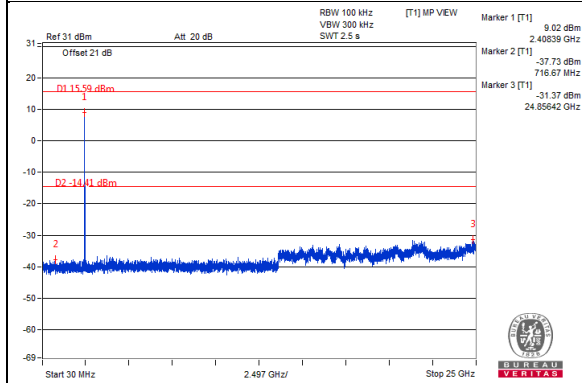
## VHT20

### Maximum REF

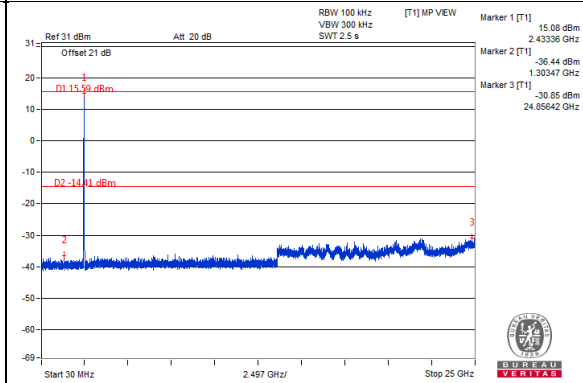


## Chain 0

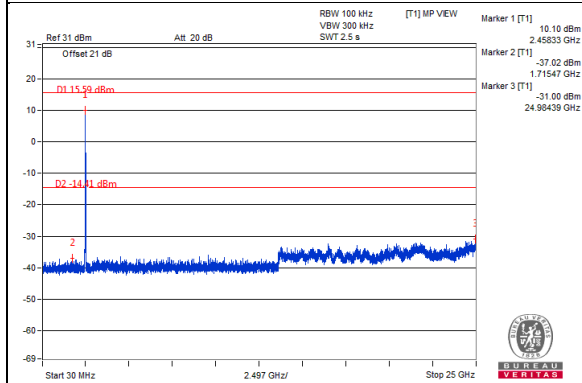
### CH 1



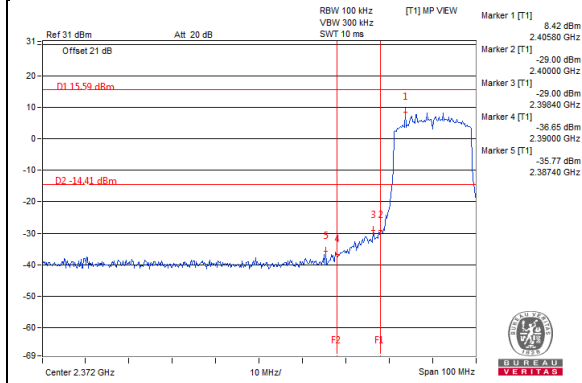
### CH 6



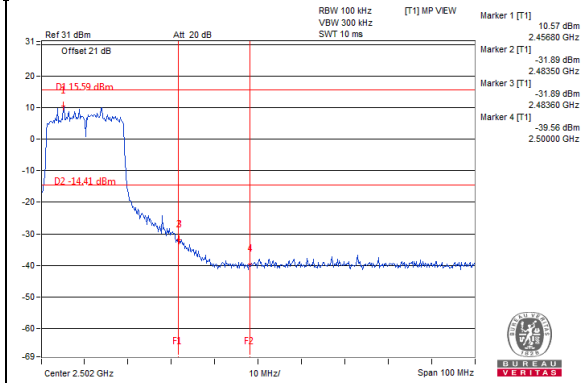
### CH 11



### CH 1 Band edge

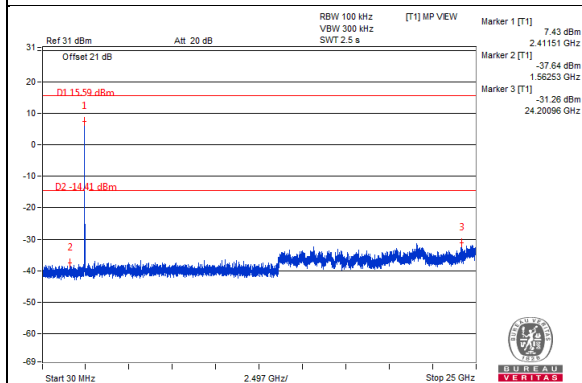


### CH 11 Band edge

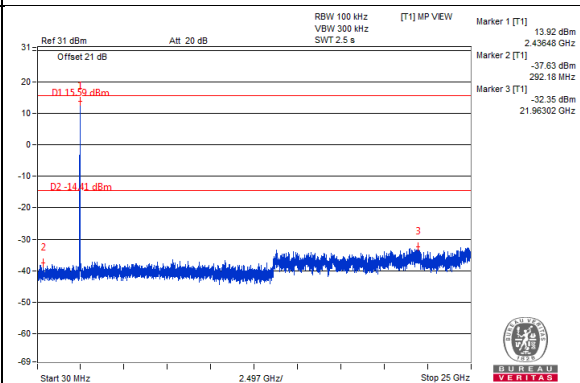


## Chain 1

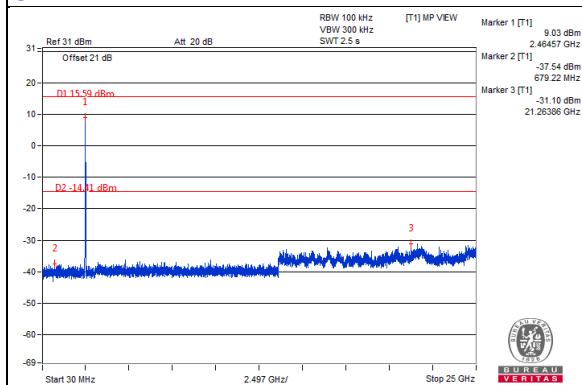
### CH 1



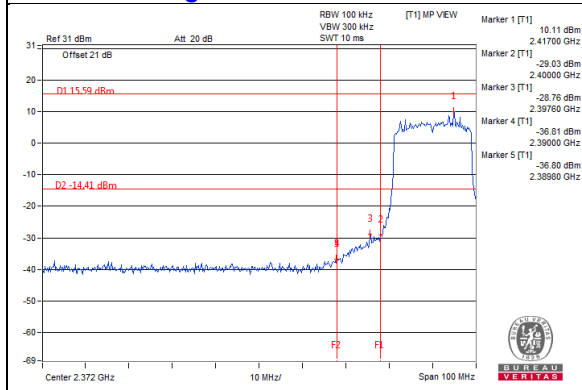
### CH 6



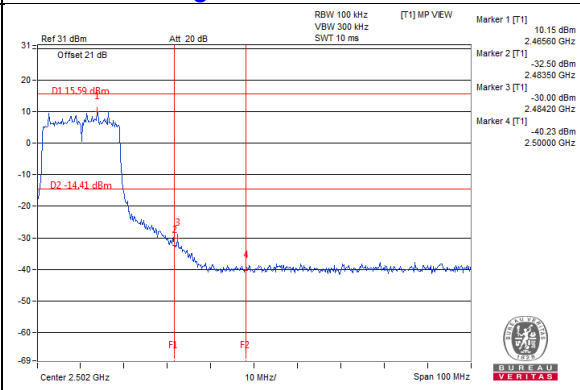
### CH 11



### CH 1 Band edge

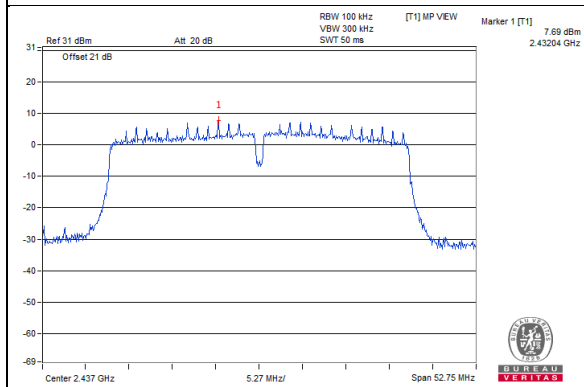


### CH 11 Band edge



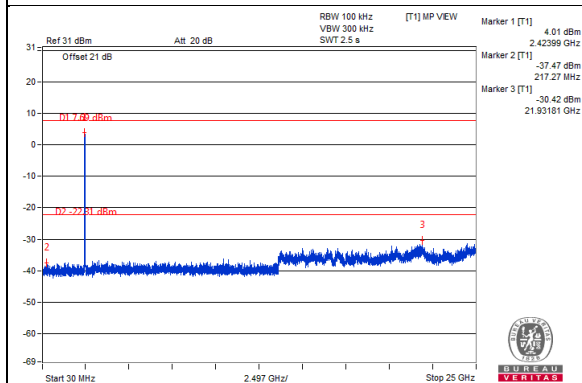
## VHT40

### Maximum REF

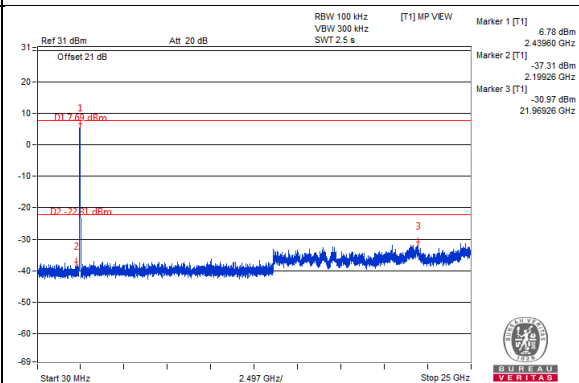


## Chain 0

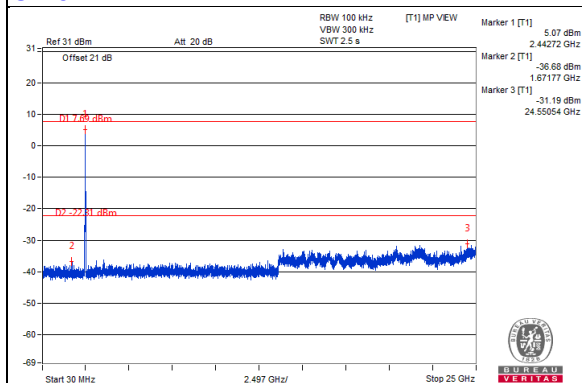
### CH 3



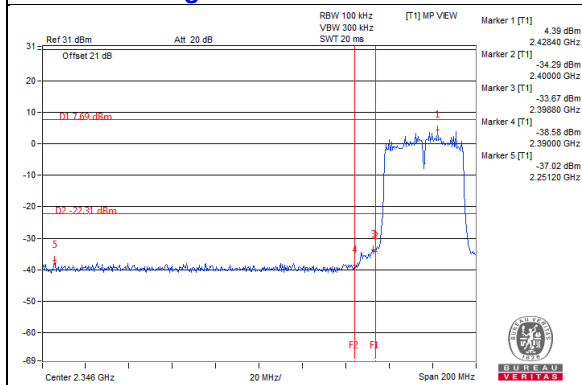
### CH 6



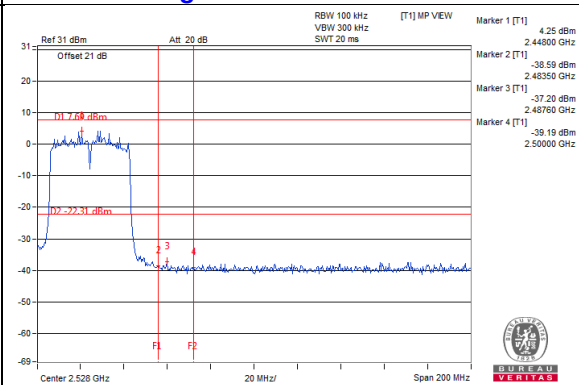
### CH 9



### CH 3 Band edge

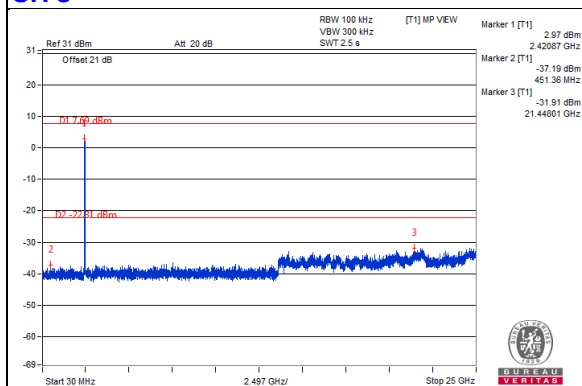


### CH 9 Band edge

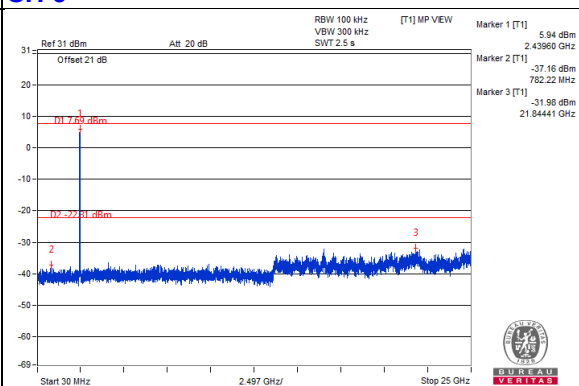


## Chain 1

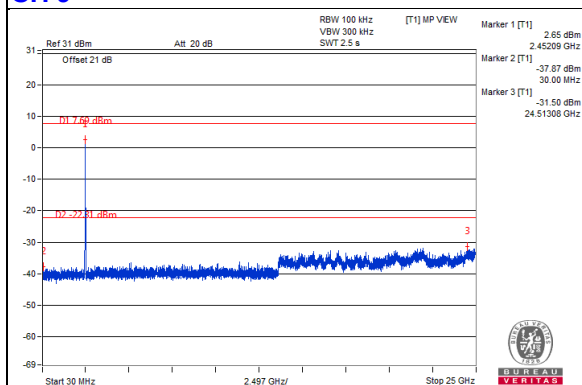
### CH 3



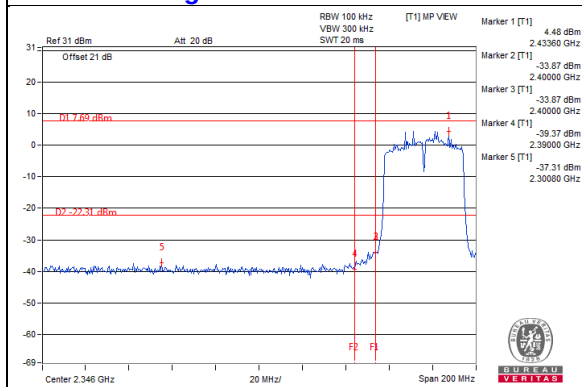
### CH 6



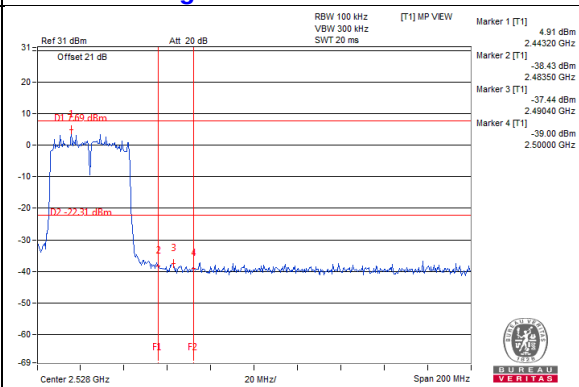
### CH 9



### CH 3 Band edge



### CH 9 Band edge



## 5 Pictures of Test Arrangements

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

## Appendix – Information of 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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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