

**Report No.:** RF190122E03-3

**FCC ID:** PKRISGSKR3MD8800

**Test Model:** SKR3MD8800

**Received Date:** Jan. 14, 2019

**Test Date:** Jan. 19 to 26, 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.

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Taiwan R.O.C.

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



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### Release Control Record

| Issue No.     | Description       | Date Issued   |
|---------------|-------------------|---------------|
| RF190122E03-3 | Original release. | Mar. 06, 2019 |

## 1 Certificate of Conformity

**Product:** 4G LTE Wireless Router

**Brand:** Inseego

**Test Model:** SKR3MD8800

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Inseego Corp.

**Test Date:** Jan. 19 to 26, 2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

47 CFR FCC Part 15, Subpart E (Section 15.407)

47 CFR FCC Part 22, Subpart H

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

| FCC Part 15, Subpart C, E (SECTION 15.247, 15.407), Part 22, Subpart H |                                              |        |                                                                                     |
|------------------------------------------------------------------------|----------------------------------------------|--------|-------------------------------------------------------------------------------------|
| FCC Clause                                                             | Test Item                                    | Result | Remarks                                                                             |
| 15.207<br>15.407(b)(6)                                                 | AC Power Conducted Emission                  | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -12.47dB at 0.43125MHz. |
| 15.205 / 15.209 /<br>15.247(d)<br>15.407(b)<br>(1/2/3/4(i/ii)/6)       | Radiated Emissions and Band Edge Measurement | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -4.8dB at 4874.00MHz.   |
| 2.1053<br>22.917                                                       | Radiated Spurious Emissions                  | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -37.78dB at 2474.1MHz.  |

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

|                       |                                                                                                                                                                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product               | 4G LTE Wireless Router                                                                                                                                                                                                                                              |
| Brand                 | Inseego                                                                                                                                                                                                                                                             |
| Test Model            | SKR3MD8800                                                                                                                                                                                                                                                          |
| Status of EUT         | ENGINEERING SAMPLE                                                                                                                                                                                                                                                  |
| Power Supply Rating   | 12Vdc ~ 24Vdc                                                                                                                                                                                                                                                       |
| Modulation Type       | <b>For WLAN:</b><br>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<br><b>For BT-LE: DTS</b>                                                                                         |
| Modulation Technology | <b>For WLAN:</b> DSSS, OFDM<br><b>For BT-LE:</b> GFSK                                                                                                                                                                                                               |
| Transfer Rate         | <b>For WLAN:</b><br>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<br><b>For BT-LE:</b> up to 2Mbps                                                                                                        |
| Operating Frequency   | <b>For WLAN:</b><br><b>2.4GHz:</b> 2.412 ~ 2.462GHz<br><b>5GHz:</b> 5.18~ 5.24GHz, 5.745 ~ 5.825GHz<br><b>For BT-LE:</b> 2.402 ~ 2.480GHz                                                                                                                           |
| Number of Channel     | <b>For WLAN:</b><br><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<br><b>For BT-LE:</b> 40 |
| 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 |

3. 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         |                      |

4. 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. |                                                                      |

5. 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: All of modulation mode support beamforming function except 802.11a/b/g modulation mode. |                       |     |

6. 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.

### 3.1.1 Test Mode Applicability and Tested Channel Detail

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

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

**RE<1G**: Radiated Emission below 1GHz

**PLC**: Power Line Conducted Emission

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

| MODE                                                                                  | AVAILABLE CHANNEL       | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|---------------------------------------------------------------------------------------|-------------------------|----------------|-----------------------|-----------------|
| 802.11b<br>+<br>802.11a<br>+<br>Technology LE 1M (BT 4.0)<br>+<br>LTE Band 5 (1.4MHz) | 1 to 11                 | 6              | DSSS                  | DBPSK           |
|                                                                                       | 36 to 48,<br>149 to 165 | 149            | OFDM                  | BPSK            |
|                                                                                       | 0 to 39                 | 19             | DTS                   | GFSK            |
|                                                                                       | 20407 to 20643          | 20407          | OFDMA                 | QPSK            |

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

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

| MODE                                                                                  | AVAILABLE CHANNEL       | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|---------------------------------------------------------------------------------------|-------------------------|----------------|-----------------------|-----------------|
| 802.11b<br>+<br>802.11a<br>+<br>Technology LE 1M (BT 4.0)<br>+<br>LTE Band 5 (1.4MHz) | 1 to 11                 | 6              | DSSS                  | DBPSK           |
|                                                                                       | 36 to 48,<br>149 to 165 | 149            | OFDM                  | BPSK            |
|                                                                                       | 0 to 39                 | 19             | DTS                   | GFSK            |
|                                                                                       | 20407 to 20643          | 20407          | OFDMA                 | QPSK            |

#### Power Line Conducted Emission Test:

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

| MODE                                                                                  | AVAILABLE CHANNEL       | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|---------------------------------------------------------------------------------------|-------------------------|----------------|-----------------------|-----------------|
| 802.11b<br>+<br>802.11a<br>+<br>Technology LE 1M (BT 4.0)<br>+<br>LTE Band 5 (1.4MHz) | 1 to 11                 | 6              | DSSS                  | DBPSK           |
|                                                                                       | 36 to 48,<br>149 to 165 | 149            | OFDM                  | BPSK            |
|                                                                                       | 0 to 39                 | 19             | DTS                   | GFSK            |
|                                                                                       | 20407 to 20643          | 20407          | OFDMA                 | QPSK            |

### Conducted Out-Band Emission Measurement:

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

| MODE                    | AVAILABLE CHANNEL       | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|-------------------------|-------------------------|----------------|-----------------------|-----------------|
| 802.11b<br>+<br>802.11a | 1 to 11                 | 6              | DSSS                  | DBPSK           |
|                         | 36 to 48,<br>149 to 165 | 149            | OFDM                  | BPSK            |

### Test Condition:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY     |
|---------------|--------------------------|----------------------|---------------|
| RE $\geq$ 1G  | 22deg. C, 67%RH          | 120Vac, 60Hz         | Rey Chen      |
|               | 23deg. C, 68%RH          | 120Vac, 60Hz         | Andy Ho       |
| RE<1G         | 22deg. C, 69%RH          | 120Vac, 60Hz         | Rey Chen      |
| PLC           | 23deg. C, 74%RH          | 120Vac, 60Hz         | Andy Ho       |
| OB            | 25deg. C, 60%RH          | 120Vac, 60Hz         | Anderson Chen |

### 3.2 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. | DC Power Supply | GOOD WILL INSTRUMENT CO., LTD. | GPC-3030D | 7700087      | NA      | Provided by Lab    |
| B. | PoE Load        | Luxul                          | XAP-1440  | NA           | NA      | Supplied by client |
| C. | Laptop          | DELL                           | E6420     | B92T3R1      | FCC DoC | Provided by Lab    |
| D. | iPod            | Apple                          | MD778TA/A | CC4JMH7LF4T1 | NA      | Provided by Lab    |
| E. | SIM Card        | R&S                            | CRT-Z3    | NA           | NA      | Provided by Lab    |
| F. | Adapter         | CWT                            | 2ABF060F  | NA           | NA      | Supplied by client |
| G. | Simulator       | Anritsu                        | MT8820C   | 6201127458   | NA      | Provided by Lab    |

Note:

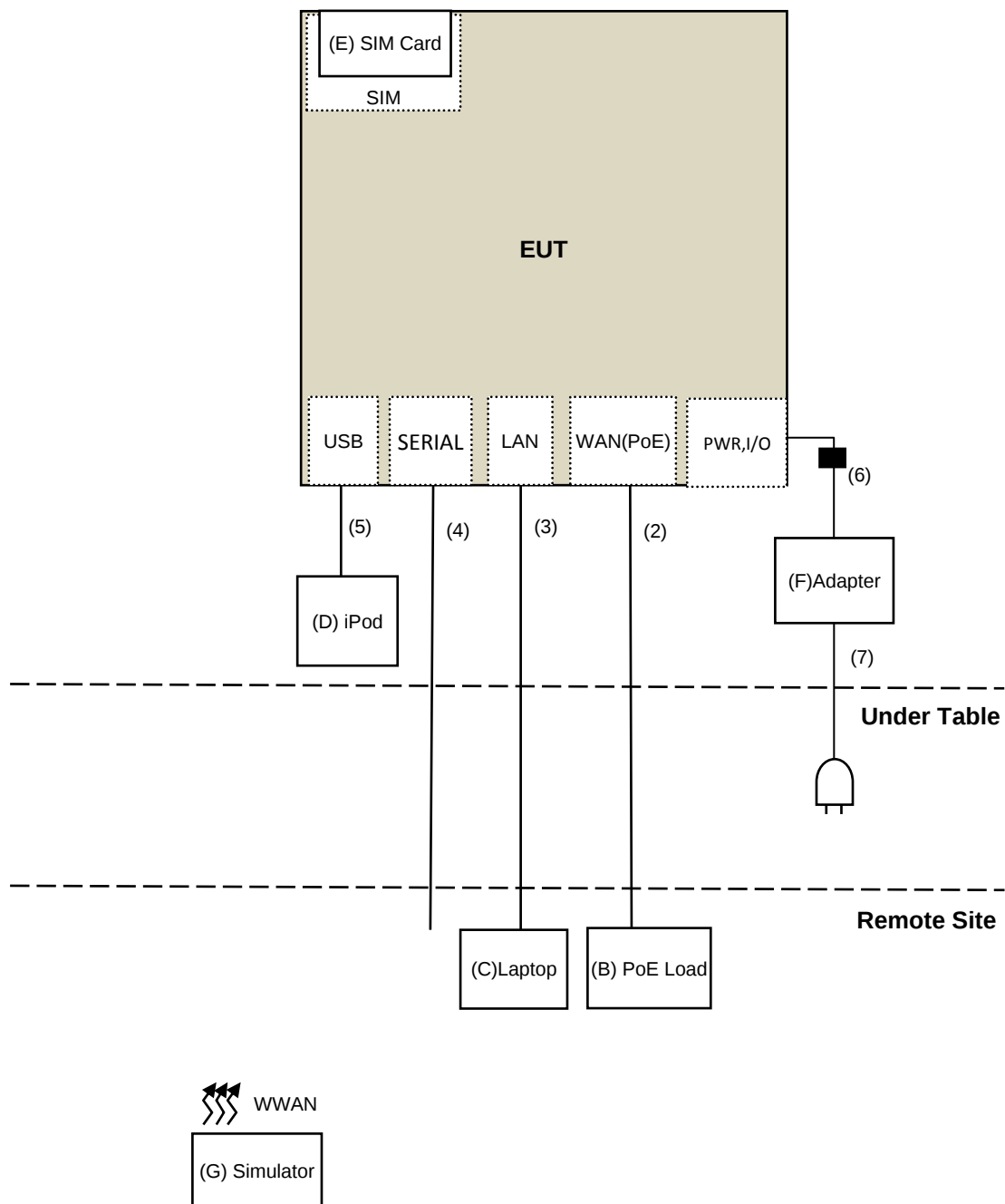
1. All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks            |
|----|--------------|------|------------|--------------------|--------------|--------------------|
| 1. | DC Cable     | 1    | 1.4        | No                 | 0            | 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. | DC Cable     | 1    | 1.2        | No                 | 1            | Supplied by client |
| 7. | AC Cable     | 1    | 0.8        | No                 | 0            | Supplied by client |

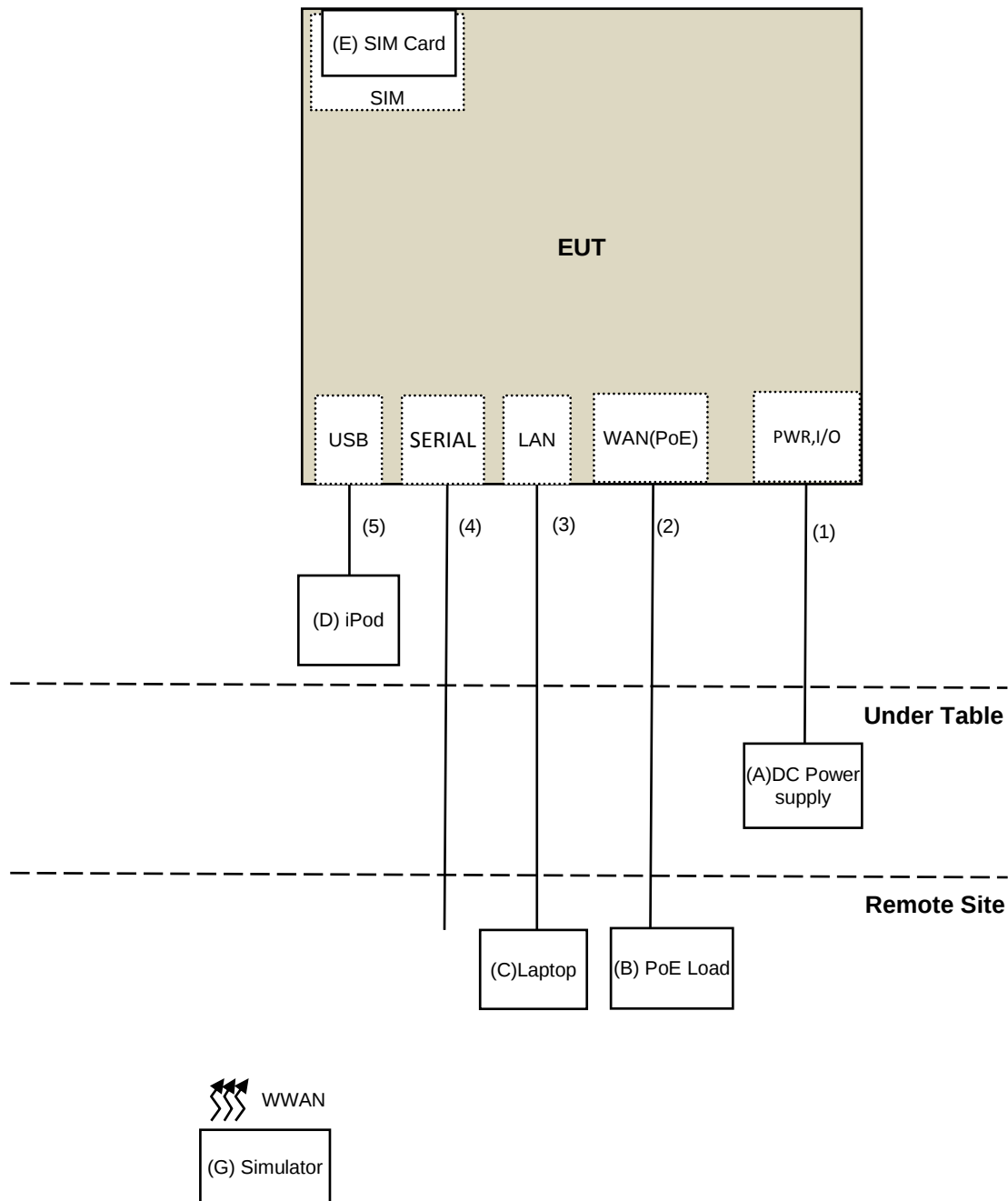
Note: The core(s) is(are) originally attached to the cable(s).

### 3.2.1 Configuration of System under Test

For Power Line Conducted Emission test:



For other test:



## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

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

For 47 CFR FCC Part 15:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

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

#### Note:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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.

Limits of unwanted emission out of the restricted bands

| Applicable To                                                                                    |                                                     | Limit                                                                                                                               |                                                                                                                                         |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedure<br>New Rules v02r01                                       |                                                     | Field Strength at 3m                                                                                                                |                                                                                                                                         |
|                                                                                                  |                                                     | PK:74 (dBuV/m)                                                                                                                      | AV:54 (dBuV/m)                                                                                                                          |
| Frequency Band                                                                                   | Applicable To                                       | EIRP Limit                                                                                                                          | Equivalent Field Strength at 3m                                                                                                         |
| 5150~5250 MHz                                                                                    | 15.407(b)(1)                                        | PK:-27 (dBm/MHz)                                                                                                                    | PK:68.2(dBuV/m)                                                                                                                         |
| 5250~5350 MHz                                                                                    | 15.407(b)(2)                                        |                                                                                                                                     |                                                                                                                                         |
| 5470~5725 MHz                                                                                    | 15.407(b)(3)                                        |                                                                                                                                     |                                                                                                                                         |
| 5725~5850 MHz                                                                                    | <input checked="" type="checkbox"/> 15.407(b)(4)(i) | PK:-27 (dBm/MHz) <sup>*1</sup><br>PK:10 (dBm/MHz) <sup>*2</sup><br>PK:15.6 (dBm/MHz) <sup>*3</sup><br>PK:27 (dBm/MHz) <sup>*4</sup> | PK: 68.2(dBuV/m) <sup>*1</sup><br>PK:105.2 (dBuV/m) <sup>*2</sup><br>PK: 110.8(dBuV/m) <sup>*3</sup><br>PK:122.2 (dBuV/m) <sup>*4</sup> |
|                                                                                                  | <input type="checkbox"/> 15.407(b)(4)(ii)           | Emission limits in section 15.247(d)                                                                                                |                                                                                                                                         |
| <sup>*1</sup> beyond 75 MHz or more above of the band edge.                                      |                                                     | <sup>*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.                                                |                                                                                                                                         |
| <sup>*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. |                                                     | <sup>*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.                |                                                                                                                                         |

#### Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

For 47 CFR FCC Part 22:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

#### 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    |
| 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 26, 2019

#### 4.1.3 Test Procedures

For 47 CFR FCC Part 15:

##### **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 detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 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.

For 47 CFR FCC Part 22:

- a. The power was measured with Spectrum Analyzer.
- b. Substitution method is used for EIRP measurement. In the semi-anechoic chamber, EUT placed on the 0.8m/1.5m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step b. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution antenna}.$
- e. ERP power can be calculated form EIRP power by subtracting the gain of dipole,  $ERP \text{ power} = EIRP \text{ power} - 2.15dBi.$

**Note:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

#### 4.1.4 Deviation from Test Standard

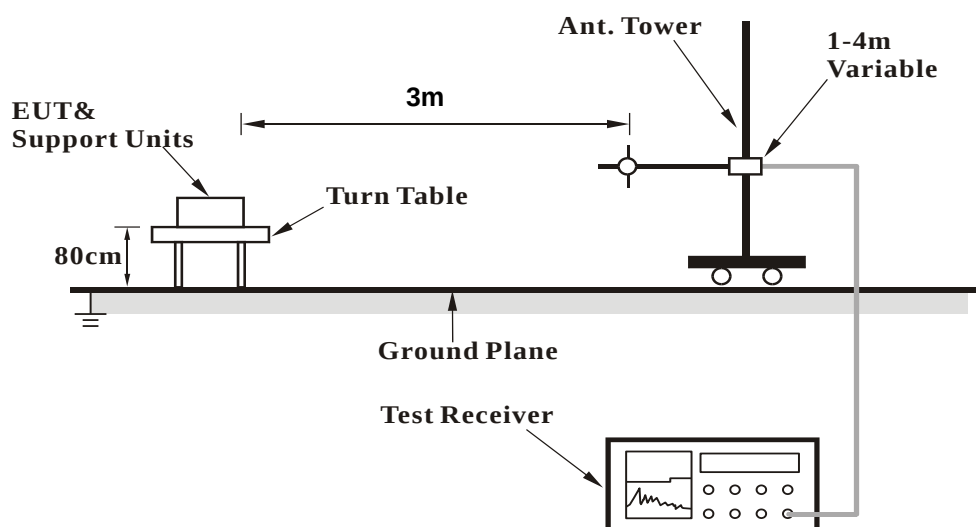
No deviation.

#### 4.1.5 Test Setup

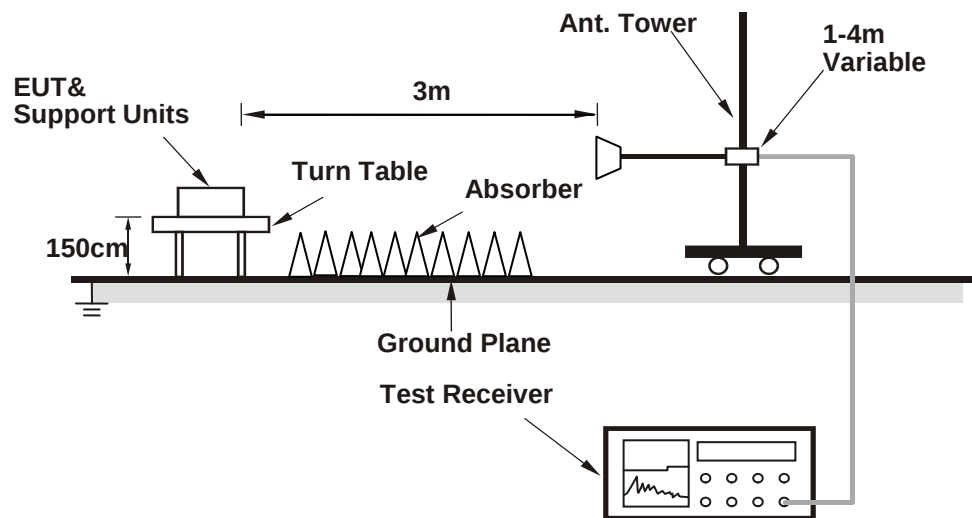
##### For Radiated emission below 30MHz



##### 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.
- Contorlling software (WLAN: QDART-Connectivity (1.0.38), BT 4.0: nRFgo Studio (1.21.2) / BT 5.0: termite 3.4) has been activated to set the EUT on specific status.

#### 4.1.7 Test Results

##### Above 1GHz Data:

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

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | 4874.00     | 42.0 PK                 | 74.0           | -32.0       | 1.88 H             | 294                  | 40.0             | 2.0                      |
| 2                                                   | 4874.00     | 38.7 AV                 | 54.0           | -15.3       | 1.88 H             | 294                  | 36.7             | 2.0                      |
| 3                                                   | 4880.00     | 39.4 PK                 | 74.0           | -34.6       | 1.68 H             | 238                  | 37.4             | 2.0                      |
| 4                                                   | 4880.00     | 28.2 AV                 | 54.0           | -25.8       | 1.68 H             | 238                  | 26.2             | 2.0                      |
| 5                                                   | 7311.00     | 43.4 PK                 | 74.0           | -30.6       | 2.05 H             | 321                  | 34.9             | 8.5                      |
| 6                                                   | 7311.00     | 31.6 AV                 | 54.0           | -22.4       | 2.05 H             | 321                  | 23.1             | 8.5                      |
| 7                                                   | 7320.00     | 45.5 PK                 | 74.0           | -28.5       | 1.74 H             | 159                  | 37.0             | 8.5                      |
| 8                                                   | 7320.00     | 34.7 AV                 | 54.0           | -19.3       | 1.74 H             | 159                  | 26.2             | 8.5                      |
| 9                                                   | 11490.00    | 49.4 PK                 | 74.0           | -24.6       | 2.33 H             | 246                  | 35.6             | 13.8                     |
| 10                                                  | 11490.00    | 36.9 AV                 | 54.0           | -17.1       | 2.33 H             | 246                  | 23.1             | 13.8                     |
| 11                                                  | 17235.00    | 49.9 PK                 | 68.2           | -18.3       | 2.51 H             | 360                  | 32.8             | 17.1                     |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                               | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                 | 4874.00     | 50.5 PK                 | 74.0           | -23.5       | 1.30 V             | 177                  | 48.5             | 2.0                      |
| 2                                                 | 4874.00     | 49.2 AV                 | 54.0           | -4.8        | 1.30 V             | 177                  | 47.2             | 2.0                      |
| 3                                                 | 4880.00     | 40.6 PK                 | 74.0           | -33.4       | 1.53 V             | 156                  | 38.6             | 2.0                      |
| 4                                                 | 4880.00     | 29.9 AV                 | 54.0           | -24.1       | 1.53 V             | 156                  | 27.9             | 2.0                      |
| 5                                                 | 7311.00     | 43.4 PK                 | 74.0           | -30.6       | 1.63 V             | 61                   | 34.9             | 8.5                      |
| 6                                                 | 7311.00     | 32.1 AV                 | 54.0           | -21.9       | 1.63 V             | 61                   | 23.6             | 8.5                      |
| 7                                                 | 7320.00     | 47.9 PK                 | 74.0           | -26.1       | 1.51 V             | 348                  | 39.4             | 8.5                      |
| 8                                                 | 7320.00     | 36.6 AV                 | 54.0           | -17.4       | 1.51 V             | 348                  | 28.1             | 8.5                      |
| 9                                                 | 11490.00    | 49.3 PK                 | 74.0           | -24.7       | 1.43 V             | 343                  | 35.5             | 13.8                     |
| 10                                                | 11490.00    | 37.6 AV                 | 54.0           | -16.4       | 1.43 V             | 343                  | 23.8             | 13.8                     |
| 11                                                | 17235.00    | 52.6 PK                 | 68.2           | -15.6       | 2.08 V             | 163                  | 35.5             | 17.1                     |

#### 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

|      |                  |                 |               |
|------|------------------|-----------------|---------------|
| Mode | TX channel 20407 | Frequency Range | Above 1000MHz |
|------|------------------|-----------------|---------------|

| Antenna Polarity & Test Distance: Horizontal at 3 M |               |               |                       |                        |                      |             |               |
|-----------------------------------------------------|---------------|---------------|-----------------------|------------------------|----------------------|-------------|---------------|
| No.                                                 | Freq. (MHz)   | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Emission Value (dBm) | Limit (dBm) | Margin (dB)   |
| 1                                                   | 1649.4        | 42.47         | -60.11                | 6.27                   | -53.85               | -13         | -40.85        |
| 2                                                   | <b>2474.1</b> | <b>41.08</b>  | <b>-57.44</b>         | <b>6.66</b>            | <b>-50.78</b>        | <b>-13</b>  | <b>-37.78</b> |
| 3                                                   | 3298.8        | 36.84         | -66.10                | 7.56                   | -58.54               | -13         | -45.54        |
| 4                                                   | 6597.6        | 41.88         | -74.25                | 18.37                  | -55.88               | -13         | -42.88        |
| 5                                                   | 7422.3        | 44.03         | -64.99                | 10.92                  | -54.07               | -13         | -41.07        |
| 6                                                   | 8247          | 46.73         | -54.37                | 2.66                   | -51.71               | -13         | -38.71        |
| Antenna Polarity & Test Distance: Vertical at 3 M   |               |               |                       |                        |                      |             |               |
| No.                                                 | Freq. (MHz)   | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Emission Value (dBm) | Limit (dBm) | Margin (dB)   |
| 1                                                   | 1649.4        | 42.52         | -60.06                | 6.27                   | -53.80               | -13         | -40.80        |
| 2                                                   | 2474.1        | 39.91         | -58.61                | 6.66                   | -51.95               | -13         | -38.95        |
| 3                                                   | 3298.8        | 35.67         | -67.27                | 7.56                   | -59.71               | -13         | -46.71        |
| 4                                                   | 6597.6        | 41.1          | -75.03                | 18.37                  | -56.66               | -13         | -43.66        |
| 5                                                   | 7422.3        | 41.92         | -67.10                | 10.92                  | -56.18               | -13         | -43.18        |
| 6                                                   | 8247          | 47.42         | -53.68                | 2.66                   | -51.02               | -13         | -38.02        |

Remarks:

1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

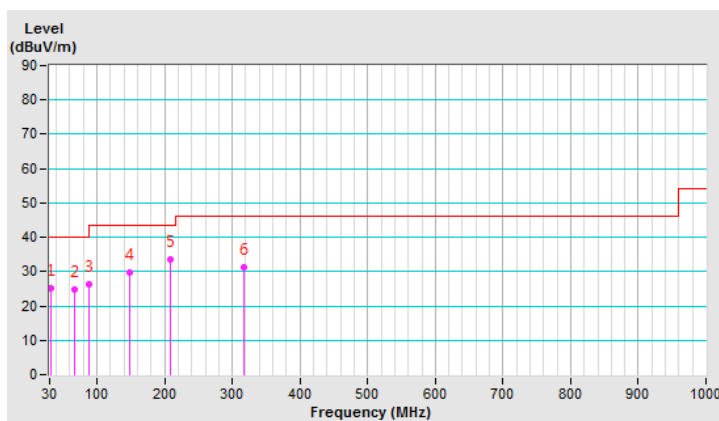
# Below 1GHz Data:

|                 |             |                   |                 |
|-----------------|-------------|-------------------|-----------------|
| FREQUENCY RANGE | 9kHz ~ 1GHz | DETECTOR FUNCTION | Quasi-Peak (QP) |
|-----------------|-------------|-------------------|-----------------|

| 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                                                   | 31.12       | 25.2 QP                 | 40.0           | -14.8       | 2.00 H             | 237                  | 34.9             | -9.7                     |
| 2                                                   | 67.36       | 24.8 QP                 | 40.0           | -15.2       | 1.00 H             | 256                  | 34.5             | -9.7                     |
| 3                                                   | 89.03       | 26.4 QP                 | 43.5           | -17.1       | 1.50 H             | 304                  | 39.8             | -13.4                    |
| 4                                                   | 147.54      | 29.6 QP                 | 43.5           | -13.9       | 2.00 H             | 142                  | 37.5             | -7.9                     |
| 5                                                   | 209.03      | 33.4 QP                 | 43.5           | -10.1       | 1.00 H             | 290                  | 43.8             | -10.4                    |
| 6                                                   | 316.18      | 31.3 QP                 | 46.0           | -14.7       | 2.50 H             | 112                  | 37.9             | -6.6                     |

## 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. 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.

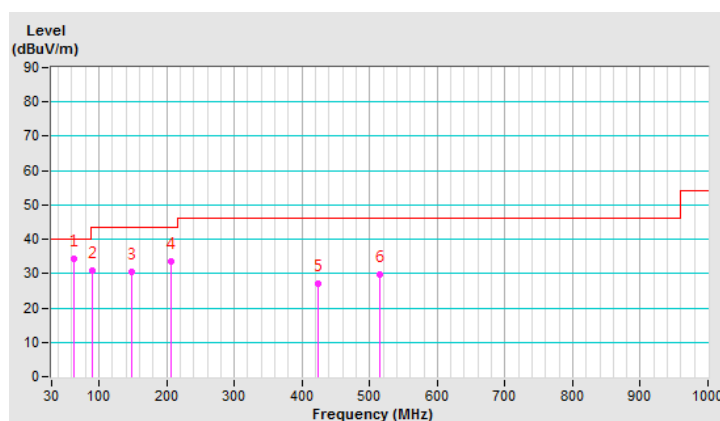


|                        |             |                          |                 |
|------------------------|-------------|--------------------------|-----------------|
| <b>FREQUENCY RANGE</b> | 9kHz ~ 1GHz | <b>DETECTOR FUNCTION</b> | Quasi-Peak (QP) |
|------------------------|-------------|--------------------------|-----------------|

| 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                                                 | 62.55       | 34.4 QP                 | 40.0           | -5.6        | 1.50 V             | 227                  | 43.5             | -9.1                     |
| 2                                                 | 90.77       | 30.8 QP                 | 43.5           | -12.7       | 1.00 V             | 117                  | 44.0             | -13.2                    |
| 3                                                 | 149.17      | 30.4 QP                 | 43.5           | -13.1       | 2.00 V             | 308                  | 38.2             | -7.8                     |
| 4                                                 | 206.27      | 33.4 QP                 | 43.5           | -10.1       | 1.50 V             | 237                  | 43.8             | -10.4                    |
| 5                                                 | 423.28      | 26.9 QP                 | 46.0           | -19.1       | 1.00 V             | 116                  | 30.5             | -3.6                     |
| 6                                                 | 514.04      | 29.8 QP                 | 46.0           | -16.2       | 1.50 V             | 239                  | 31.3             | -1.5                     |

#### 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. 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

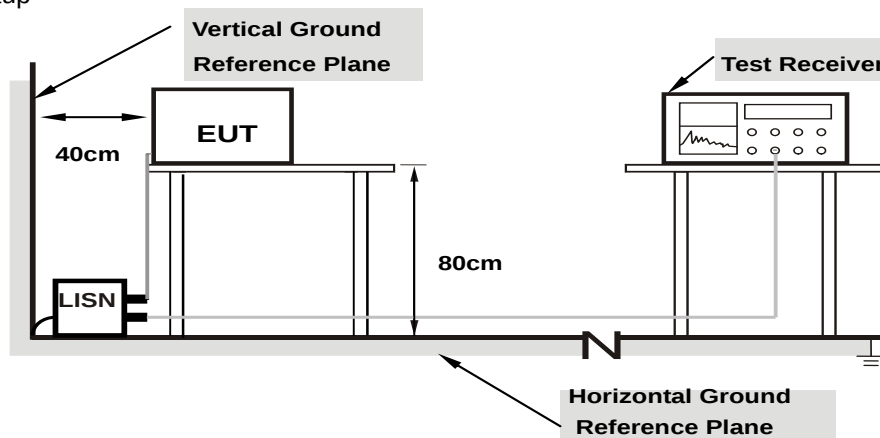
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

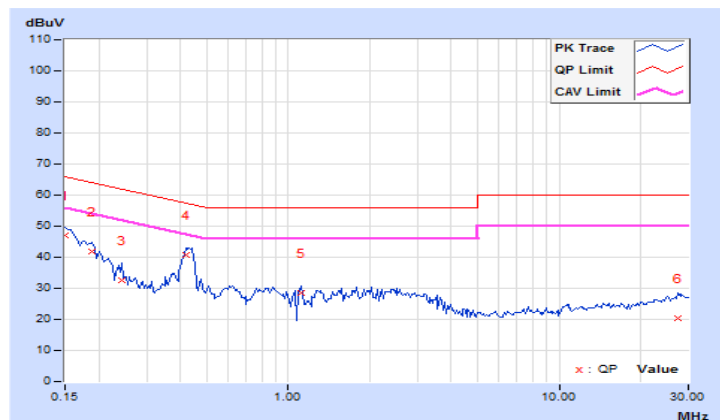
#### 4.2.7 Test Results

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

| No | Freq.<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        | 10.02  | 37.07         | 22.37 | 47.09          | 32.39 | 66.00     | 56.00 | -18.91 | -23.61 |
| 2  | 0.18906        | 10.04  | 31.66         | 19.50 | 41.70          | 29.54 | 64.08     | 54.08 | -22.38 | -24.54 |
| 3  | 0.24375        | 10.05  | 22.55         | 11.37 | 32.60          | 21.42 | 61.97     | 51.97 | -29.37 | -30.55 |
| 4  | 0.41953        | 10.07  | 30.65         | 23.58 | 40.72          | 33.65 | 57.46     | 47.46 | -16.74 | -13.81 |
| 5  | 1.11328        | 10.12  | 18.23         | 8.81  | 28.35          | 18.93 | 56.00     | 46.00 | -27.65 | -27.07 |
| 6  | 27.60156       | 11.19  | 9.12          | 3.79  | 20.31          | 14.98 | 60.00     | 50.00 | -39.69 | -35.02 |

#### 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

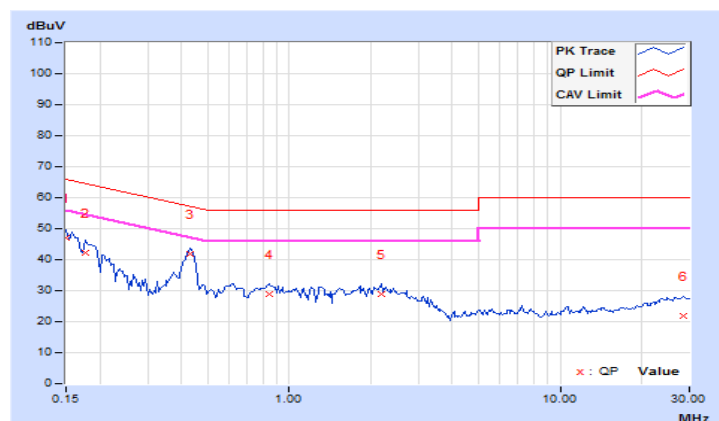


|       |             |                   |                                   |
|-------|-------------|-------------------|-----------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) /<br>Average (AV) |
|-------|-------------|-------------------|-----------------------------------|

| 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        | 37.19         | 22.41        | 47.12          | 32.34        | 66.00        | 56.00        | -18.88        | -23.66        |
| 2        | 0.17734        | 9.94        | 32.46         | 17.83        | 42.40          | 27.77        | 64.61        | 54.61        | -22.21        | -26.84        |
| <b>3</b> | <b>0.43125</b> | <b>9.96</b> | <b>31.71</b>  | <b>24.80</b> | <b>41.67</b>   | <b>34.76</b> | <b>57.23</b> | <b>47.23</b> | <b>-15.56</b> | <b>-12.47</b> |
| 4        | 0.84531        | 9.98        | 18.90         | 10.72        | 28.88          | 20.70        | 56.00        | 46.00        | -27.12        | -25.30        |
| 5        | 2.19922        | 10.05       | 18.92         | 11.86        | 28.97          | 21.91        | 56.00        | 46.00        | -27.03        | -24.09        |
| 6        | 28.63281       | 10.96       | 10.78         | 5.40         | 21.74          | 16.36        | 60.00        | 50.00        | -38.26        | -33.64        |

#### 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

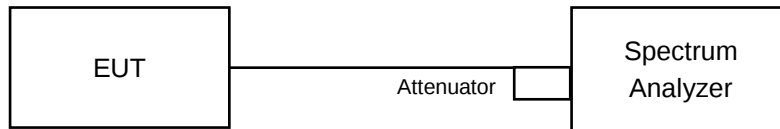


### 4.3 Conducted Out of Band Emission Measurement

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

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

#### 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 Procedures

##### 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.

#### 4.3.5 Deviation from Test Standard

No deviation.

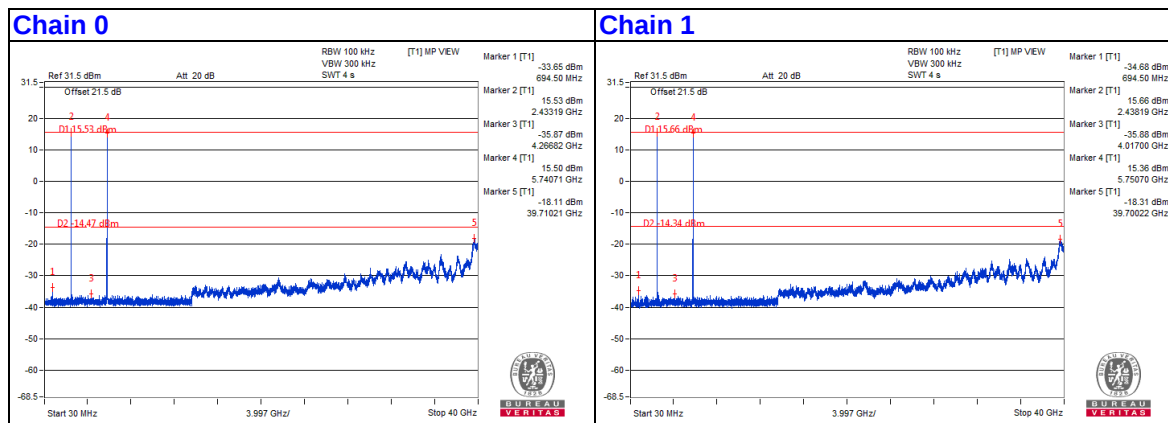
#### 4.3.6 EUT Operating Conditions

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 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.

## 2.4GHz\_802.11b CH6 + 5GHz\_802.11a CH149



## 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.

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

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

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