



**CFR 47 FCC PART 15 SUBPART C**

**TEST REPORT**

*For*

**Seura Outdoor Entertainment**

**MODEL NUMBER: SHD2-55**

**FCC ID: 2AVE3SHD2-55A**

**PROJECT NUMBER: 4789257350**

**REPORT NUMBER: 4789257350-4**

**ISSUE DATE: Apr. 02, 2020**

*Prepared for*

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Revision History

| <u>Rev.</u> | <u>Issue Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-------------------|------------------|-------------------|
| V0          | 04/02/2020        | Initial Issue    |                   |



| <b>Summary of Test Results</b>  |   |   |                     |
|---|---|---|---------------------|
| <b>Clause</b>   | <b>Test Items</b>                         | <b>FCC/IC Rules</b>                                       | <b>Test Results</b> |
| 1   | 6dB Bandwidth                             | FCC Part 15.247 (a) (2)                                   | Pass                |
| 2   | Peak Conducted Output Power               | FCC Part 15.247 (b) (3)                                   | Pass                |
| 3   | Power Spectral Density                    | FCC Part 15.247 (e)                                       | Pass                |
| 4   | Conducted Bandedge and Spurious Emission  | FCC Part 15.247 (d)                                       | Pass                |
| 5   | Radiated Bandedge and Spurious Emission   | FCC Part 15.247 (d)<br>FCC Part 15.209<br>FCC Part 15.205 | Pass                |
| 6   | Conducted Emission Test For AC Power Port | FCC Part 15.207   | Pass                |
| 7   | Antenna Requirement                       | FCC Part 15.203   | Pass                |
| Remark:<br>The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C> when <Accuracy Method> decision rule is applied. |   |   |                     |



## TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>1. ATTESTATION OF TEST RESULTS .....</b>                | <b>5</b>  |
| <b>2. TEST METHODOLOGY .....</b>                           | <b>6</b>  |
| <b>3. FACILITIES AND ACCREDITATION .....</b>               | <b>6</b>  |
| <b>4. CALIBRATION AND UNCERTAINTY .....</b>                | <b>7</b>  |
| 4.1. <i>MEASURING INSTRUMENT CALIBRATION .....</i>         | <i>7</i>  |
| 4.2. <i>MEASUREMENT UNCERTAINTY.....</i>                   | <i>7</i>  |
| <b>5. EQUIPMENT UNDER TEST .....</b>                       | <b>8</b>  |
| 5.1. <i>DESCRIPTION OF EUT .....</i>                       | <i>8</i>  |
| 5.2. <i>MAXIMUM OUTPUT POWER.....</i>                      | <i>8</i>  |
| 5.3. <i>CHANNEL LIST .....</i>                             | <i>8</i>  |
| 5.4. <i>TEST CHANNEL CONFIGURATION.....</i>                | <i>8</i>  |
| 5.5. <i>THE WORSE CASE CONFIGURATIONS .....</i>            | <i>9</i>  |
| 5.6. <i>DESCRIPTION OF AVAILABLE ANTENNAS .....</i>        | <i>9</i>  |
| 5.7. <i>THE WORSE CASE CONFIGURATIONS .....</i>            | <i>9</i>  |
| 5.8. <i>DESCRIPTION OF TEST SETUP.....</i>                 | <i>10</i> |
| <b>6. MEASURING INSTRUMENT AND SOFTWARE USED .....</b>     | <b>11</b> |
| <b>7. MEASUREMENT METHODS .....</b>                        | <b>12</b> |
| <b>8. ANTENNA PORT TEST RESULTS .....</b>                  | <b>13</b> |
| 8.1. <i>ON TIME AND DUTY CYCLE.....</i>                    | <i>13</i> |
| 8.2. <i>6 dB DTS BANDWIDTH.....</i>                        | <i>15</i> |
| 8.3. <i>PEAK CONDUCTED OUTPUT POWER.....</i>               | <i>18</i> |
| 8.4. <i>POWER SPECTRAL DENSITY.....</i>                    | <i>21</i> |
| 8.5. <i>CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS.....</i> | <i>24</i> |
| <b>9. RADIATED TEST RESULTS.....</b>                       | <b>39</b> |
| 9.1. <i>RESTRICTED BANDEDGE .....</i>                      | <i>45</i> |
| 9.2. <i>SPURIOUS EMISSIONS (1~18GHz).....</i>              | <i>50</i> |
| 9.3. <i>SPURIOUS EMISSIONS (18~26GHz).....</i>             | <i>56</i> |
| 9.4. <i>SPURIOUS EMISSIONS (0.03 ~ 1 GHz).....</i>         | <i>58</i> |
| 9.5. <i>SPURIOUS EMISSIONS BELOW 30M.....</i>              | <i>60</i> |
| <b>10. AC POWER LINE CONDUCTED EMISSIONS .....</b>         | <b>63</b> |
| <b>11. ANTENNA REQUIREMENTS .....</b>                      | <b>66</b> |



# 1. ATTESTATION OF TEST RESULTS

## Applicant Information

Company Name: PAN International (USA)  
Address: 48008 Fremont Blvd Fremont, CA 94538 United States

## Manufacturer Information

Company Name: PAN International (USA)  
Address: 48008 Fremont Blvd Fremont, CA 94538 United States

## EUT Description

EUT Name: Seura Outdoor Entertainment  
Model: SHD2-55  
Sample Status: Normal  
Sample Received Date: Dec. 25, 2019  
Date of Tested: Dec. 26, 2019 ~ Apr 15, 2020

| APPLICABLE STANDARDS         |              |
|------------------------------|--------------|
| STANDARD                     | TEST RESULTS |
| CFR 47 FCC PART 15 SUBPART C | PASS         |

Tested By:

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Reviewed By:

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Laboratory Leader



## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

|                           |   |
|---------------------------|---|
| Accreditation Certificate | <p><b>A2LA (Certificate No.: 4829.01)</b><br/><b>UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.</b></p> <p><b>FCC (FCC Designation No.: CN1247)</b><br/><b>UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</b></p> <p><b>IC (IC Designation No.: 25056)</b><br/><b>UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</b></p> |
|---------------------------|---|

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Item   | Uncertainty           |
|---|-----------------------|
| Conduction emission   | 3.00dB                |
| Radiation Emission test(include Fundamental emission)<br>(9kHz-30MHz)   | 3.32dB                |
| Radiation Emission test(include Fundamental emission)<br>(30MHz-1GHz)   | 3.27dB                |
| Radiation Emission test<br>(1GHz to 26GHz)( include Fundamental emission)   | 3.80dB (1GHz-18Gz)    |
|   | 4.11dB (18GHz-26.5Gz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |                       |



## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

|                     |                             |                     |  |
|---------------------|-----------------------------|---------------------|--|
| Equipment           | Seura Outdoor Entertainment |                     |  |
| Model Name          | SHD2-55                     |                     |  |
| Product Description | Operation Frequency         | 2402 MHz ~ 2480 MHz |  |
|                     | Modulation Type             | Data Rate           |  |
|                     | GFSK                        | 1Mbps               |  |
| Power Supply        | AC 120V                     |                     |  |
| Bluetooth Version   | LE                          |                     |  |
| Hardware Version    | V1.0                        |                     |  |

### 5.2. MAXIMUM OUTPUT POWER

| Bluetooth Mode | Frequency (MHz) | Channel Number | Max Output Power(dBm) |
|----------------|-----------------|----------------|-----------------------|
| BLE            | 2402-2480       | 0-39[40]       | 1.59                  |

### 5.3. CHANNEL LIST

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 0       | 2402            | 11      | 2424            | 22      | 2446            | 33      | 2468            |
| 1       | 2404            | 12      | 2426            | 23      | 2448            | 34      | 2470            |
| 2       | 2406            | 13      | 2428            | 24      | 2450            | 35      | 2472            |
| 3       | 2408            | 14      | 2430            | 25      | 2452            | 36      | 2474            |
| 4       | 2410            | 15      | 2432            | 26      | 2454            | 37      | 2476            |
| 5       | 2412            | 16      | 2434            | 27      | 2456            | 38      | 2478            |
| 6       | 2414            | 17      | 2436            | 28      | 2458            | 39      | 2480            |
| 7       | 2416            | 18      | 2438            | 29      | 2460            |         |                 |
| 8       | 2418            | 19      | 2440            | 30      | 2462            |         |                 |
| 9       | 2420            | 20      | 2442            | 31      | 2464            |         |                 |
| 10      | 2422            | 21      | 2444            | 32      | 2468            |         |                 |

### 5.4. TEST CHANNEL CONFIGURATION

| Test Mode | Test Channel   |       | Frequency |
|-----------|----------------|-------|-----------|
| GFSK      | Low Channel    | CH 0  | 2402MHz   |
|           | Middle Channel | CH 19 | 2440MHz   |
|           | High Channel   | CH 39 | 2480MHz   |





### 5.5. THE WORSE CASE CONFIGURATIONS

| The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band |                         |              |       |       |
|--|-------------------------|--------------|-------|-------|
| Test Software  |                         | SecureCRT    |       |       |
| Modulation Type  | Transmit Antenna Number | Test Channel |       |       |
|  |                         | CH 00        | CH 19 | CH 39 |
| GFSK   | 1                       | 37           | 37    | 37    |

### 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

| Ant. | Frequency (MHz) | Antenna Type  | Antenna Gain (dBi) |
|------|-----------------|---------------|--------------------|
| 1    | 2402-2480       | Patch Antenna | 2.99               |

| Test Mode | Transmit and Receive Mode                    | Description  |
|-----------|--|--|
| BLE       | <input checked="" type="checkbox"/> 1TX, 1RX | ANT 1 can be used as transmitting/receiving antenna. |

### 5.7. THE WORSE CASE CONFIGURATIONS

For the product, there is only one transmission antenna, so only the worst data for the antenna1 is recorded in the report.

Worst-case data rates as provided by the client were:

| Bluetooth Mode | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|----------------|-----------------------|-----------------|------------------|
| BLE            | DTS                   | GFSK            | 1Mbit/s          |

## 5.8. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Item | Equipment | Brand Name | Model Name | P/N |
|------|-----------|------------|------------|-----|
| 1    | Laptop    | ThinkPad   | E550c      | N/A |

### I/O CABLES

| Cable No | Port  | Connector Type | Cable Type   | Cable Length(m) | Remarks |
|----------|-------|----------------|--------------|-----------------|---------|
| 1        | RS232 | USB            | USB to RS232 | 1               | N/A     |
| 2        | HDMI  | HDMI           | HDMI Cable   | 1               | N/A     |
| 3        | LAN   | LAN            | LAN          | 1               | N/A     |
| 4        | USB   | USB            | USB          | 1               | N/A     |

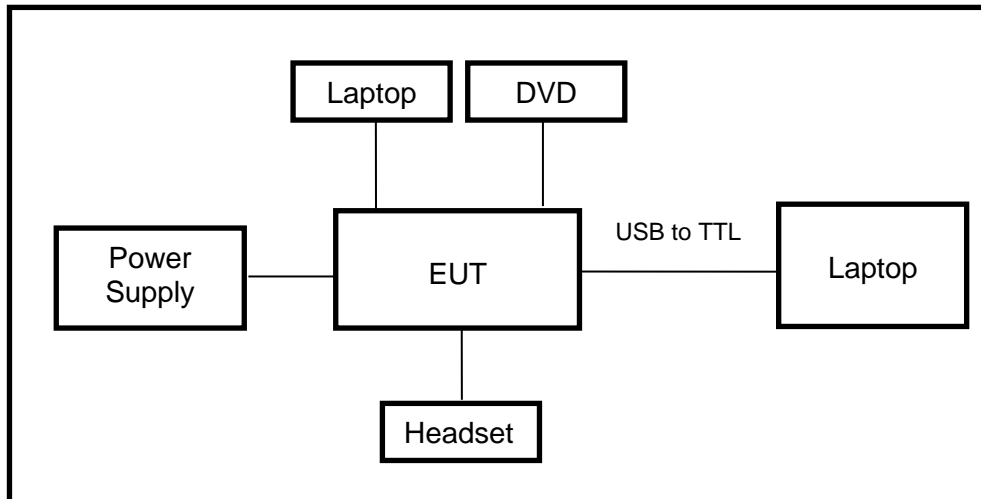
### ACCESSORIES

| Item | Accessory | Brand Name | Model Name  | Description |
|------|-----------|------------|-------------|-------------|
| 1    | Headset   | Logitech   | H111        | N/A         |
| 2    | DVD       | Philips    | DVP3690K/93 | N/A         |
| 3    | Laptop    | ThinkPad   | E580        | N/A         |
| 4    | Laptop    | ThinkPad   | E550c       | N/A         |

### TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

### SETUP DIAGRAM FOR TESTS





## 6. MEASURING INSTRUMENT AND SOFTWARE USED

| Conducted Emissions (Instrument)    |   |                                  |                                     |             |                 |            |            |
|-------------------------------------|---|----------------------------------|-------------------------------------|-------------|-----------------|------------|------------|
| Used                                | Equipment                               | Manufacturer                     | Model No.                           | Serial No.  | Upper Last Cal. | Last Cal.  | Next Cal.  |
| <input checked="" type="checkbox"/> | EMI Test Receiver                       | R&S                              | ESR3                                | 126700      | 2018-12-13      | 2019-12-12 | 2020-12-11 |
| <input checked="" type="checkbox"/> | Two-Line V-Network                      | R&S                              | ENV216                              | 126701      | 2018-12-13      | 2019-12-12 | 2020-12-11 |
| <input checked="" type="checkbox"/> | Artificial Mains Networks               | R&S                              | ENY81                               | 126711      | 2018-12-13      | 2019-12-12 | 2020-12-11 |
| Software                            |   |                                  |                                     |             |                 |            |            |
| Used                                | Description                             |                                  | Manufacturer                        | Name        | Version         |            |            |
| <input checked="" type="checkbox"/> | Test Software for Conducted disturbance |                                  | R&S                                 | EMC32       | Ver. 9.25       |            |            |
| Radiated Emissions (Instrument)     |   |                                  |                                     |             |                 |            |            |
| Used                                | Equipment                               | Manufacturer                     | Model No.                           | Serial No.  | Upper Last Cal. | Last Cal.  | Next Cal.  |
| <input checked="" type="checkbox"/> | Spectrum Analyzer                       | Keysight                         | N9010B                              | MY57110128  | 2018-05-30      | 2019-05-29 | 2020-05-28 |
| <input checked="" type="checkbox"/> | EMI test receiver                       | R&S                              | ESR26                               | 1267603     | 2018-12-13      | 2019-12-12 | 2020-12-11 |
| <input checked="" type="checkbox"/> | Receiver Antenna (9kHz-30MHz)           | Schwarzbeck                      | FMZB 1513                           | 513-265     | 2018-06-17      | 2019-06-16 | 2020-06-15 |
| <input checked="" type="checkbox"/> | Receiver Antenna (30MHz-1GHz)           | SunAR RF Motion                  | JB1                                 | 126704      | N/A             | 2019-01-28 | 2022-01-27 |
| <input checked="" type="checkbox"/> | Receiver Antenna (1GHz-18GHz)           | R&S                              | HF907                               | 126705      | 2019-01-26      | 2020-01-25 | 2021-01-24 |
| <input checked="" type="checkbox"/> | Receiver Antenna (18GHz-26.5GHz)        | Schwarzbeck                      | BBHA9170                            | 126706      | 2019-02-06      | 2020-02-05 | 2021-02-04 |
| <input checked="" type="checkbox"/> | Pre-amplification (To 1GHz)             | R&S                              | SCU-03D                             | 134666      | 2019-02-06      | 2020-02-05 | 2021-02-04 |
| <input checked="" type="checkbox"/> | Pre-amplification (To 18GHz)            | Compliance Direction System Inc. | PAP-1G18-50                         | 14140-13467 | 2019-03-18      | 2020-03-17 | 2021-03-16 |
| <input checked="" type="checkbox"/> | Pre-amplification (To 26.5GHz)          | R&S                              | SCU-26D                             | 134668      | 2019-02-06      | 2020-02-05 | 2021-02-04 |
| <input checked="" type="checkbox"/> | Band Reject Filter                      | Wainwright                       | WRCJV8-2350-2400-2483.5-2533.5-40SS | 1           | 2018-05-30      | 2019-05-29 | 2020-05-28 |
| <input checked="" type="checkbox"/> | Highpass Filter                         | Wainwright                       | WHKX10-2700-3000-18000-40SS         | 2           | 2018-05-30      | 2019-05-29 | 2020-05-28 |
| Software                            |   |                                  |                                     |             |                 |            |            |
| Used                                | Description                             |                                  | Manufacturer                        | Name        | Version         |            |            |
| <input checked="" type="checkbox"/> | Test Software for Radiated disturbance  |                                  | Tonscend                            | JS32        | V1.0            |            |            |
| Other instruments                   |   |                                  |                                     |             |                 |            |            |
| Used                                | Equipment                               | Manufacturer                     | Model No.                           | Serial No.  | Upper Last Cal. | Next Cal.  |            |
| <input checked="" type="checkbox"/> | Spectrum Analyzer                       | Keysight                         | N9010B                              | MY57110128  | 2018-05-30      | 2019-05-29 | 2020-05-28 |



## 7. MEASUREMENT METHODS

| No. | Test Item                                     | KDB Name                                      | Section         |
|-----|---|---|-----------------|
| 1   | 6dB Bandwidth                                 | KDB 558074 D01 15.247<br>Meas Guidance v05r02 | 8.2             |
| 2   | Peak Output Power                             | KDB 558074 D01 15.247<br>Meas Guidance v05r02 | 8.3.1.3/8.3.2.3 |
| 3   | Power Spectral Density                        | KDB 558074 D01 15.247<br>Meas Guidance v05r02 | 8.4             |
| 4   | Out-of-band emissions in non-restricted bands | KDB 558074 D01 15.247<br>Meas Guidance v05r02 | 8.5             |
| 5   | Out-of-band emissions in restricted bands     | KDB 558074 D01 15.247<br>Meas Guidance v05r02 | 8.6             |
| 6   | Band-edge                                     | KDB 558074 D01 15.247<br>Meas Guidance v05r02 | 8.7             |
| 7   | Conducted Emission Test For AC Power Port     | ANSI C63.10-2013                              | 6.2             |



## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

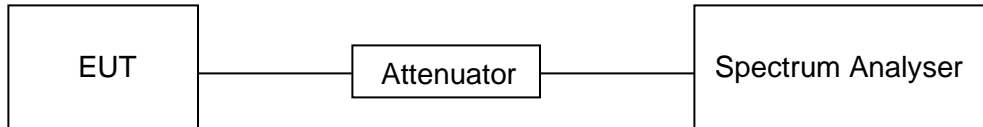
#### LIMITS

None; for reporting purposes only

#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

#### TEST SETUP



#### TEST ENVIRONMENT

|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |

#### RESULTS

| Mode | On Time (msec) | Period (msec) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (db) | 1/T Minimum VBW (KHz) | Final setting For VBW (KHz) |
|------|----------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|-----------------------------|
| BLE  | 0.379          | 0.6250        | 0.6064                | 60.64%         | 2.17                              | 2.64                  | 3                           |

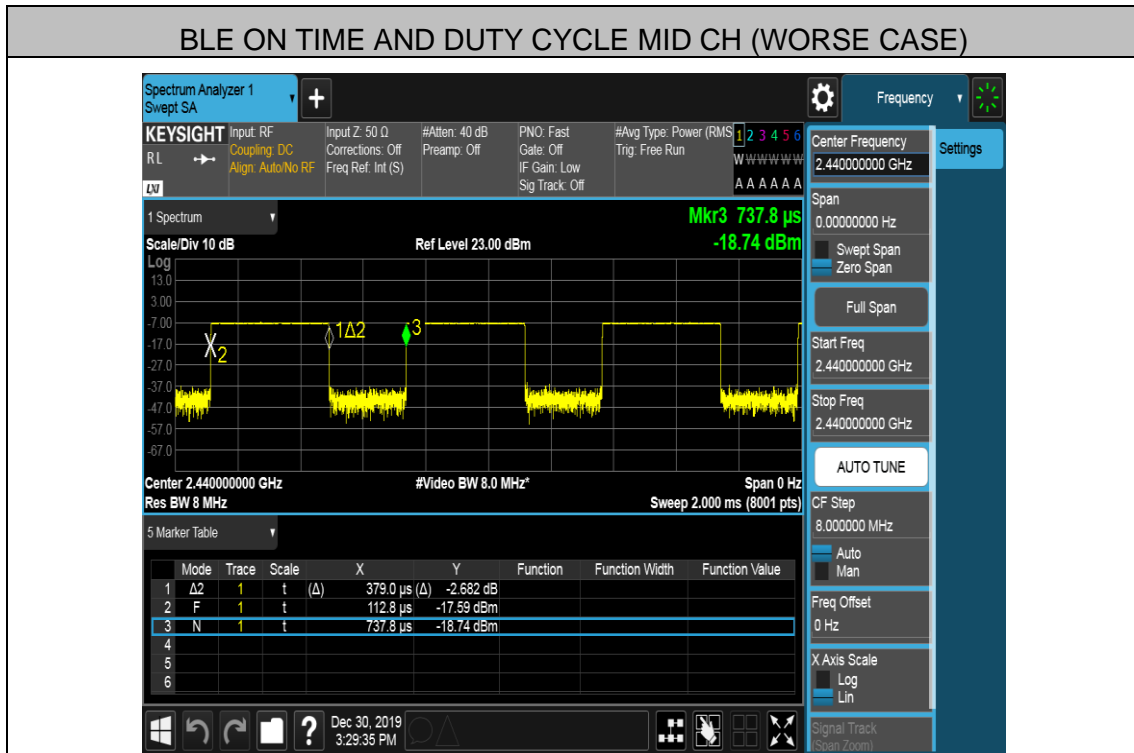
Note:

Duty Cycle Correction Factor=10log (1/x).

Where: x is Duty Cycle (Linear)

Where: T is On Time

If that calculated VBW is not available on the analyzer then the next higher value should be used.



## 8.2. 6 dB DTS BANDWIDTH

### LIMITS

| FCC Part15 (15.247) Subpart C |               |                      |                       |
|-------------------------------|---------------|----------------------|-----------------------|
| Section                       | Test Item     | Limit                | Frequency Range (MHz) |
| FCC 15.247(a)(2)              | 6dB Bandwidth | $\geq 500\text{KHz}$ | 2400-2483.5           |

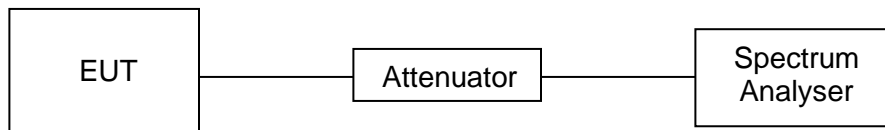
### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

|                  |  |
|------------------|--|
| Center Frequency | The center frequency of the channel under test |
| Detector         | Peak   |
| RBW              | For 6 dB Bandwidth :100K                       |
| VBW              | For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ |
| Trace            | Max hold                                       |
| Sweep            | Auto couple                                    |

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### TEST SETUP



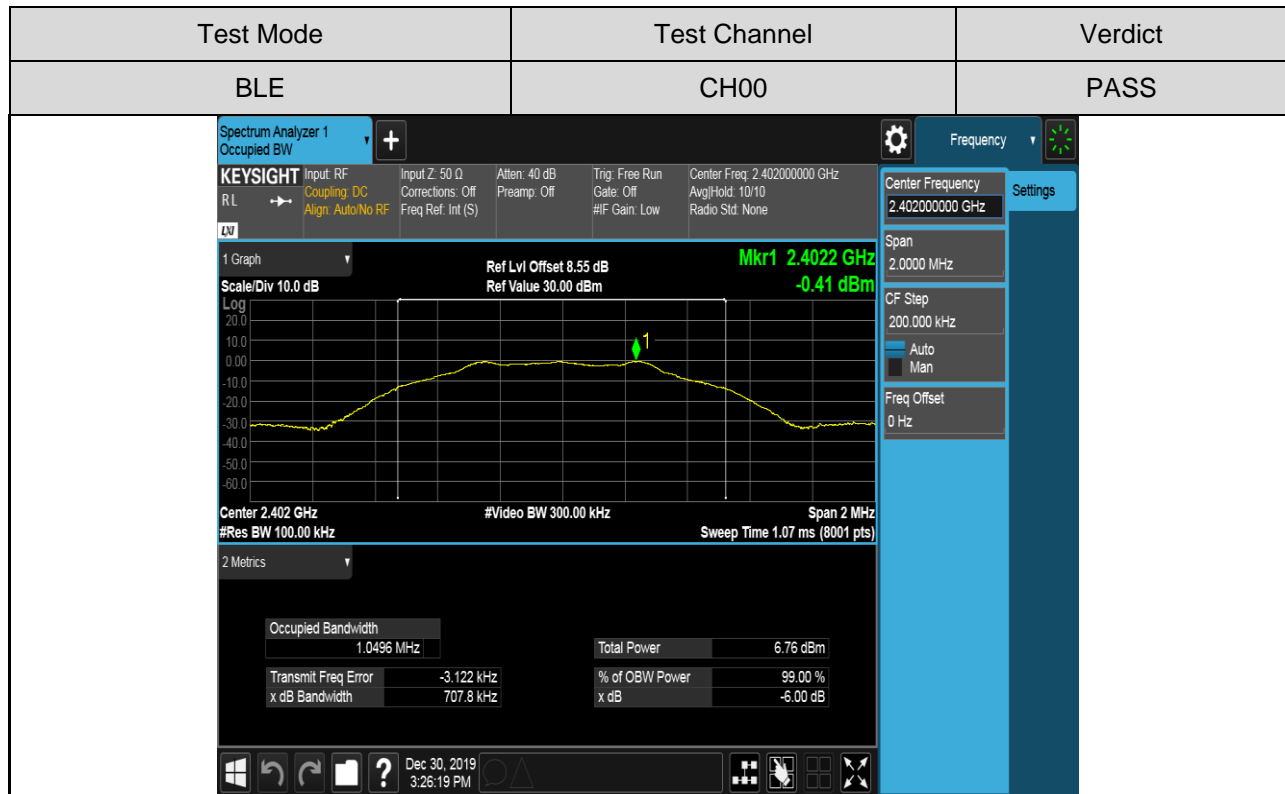
### TEST ENVIRONMENT

|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |

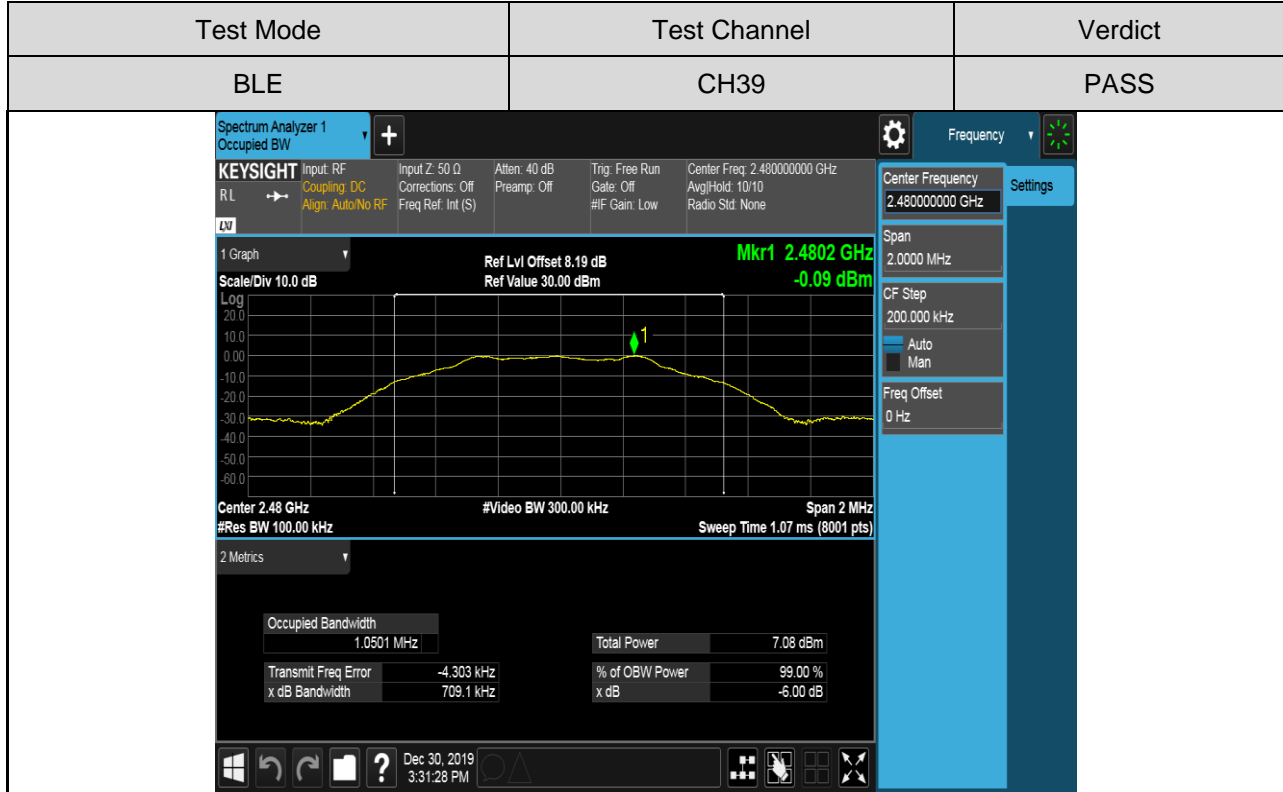
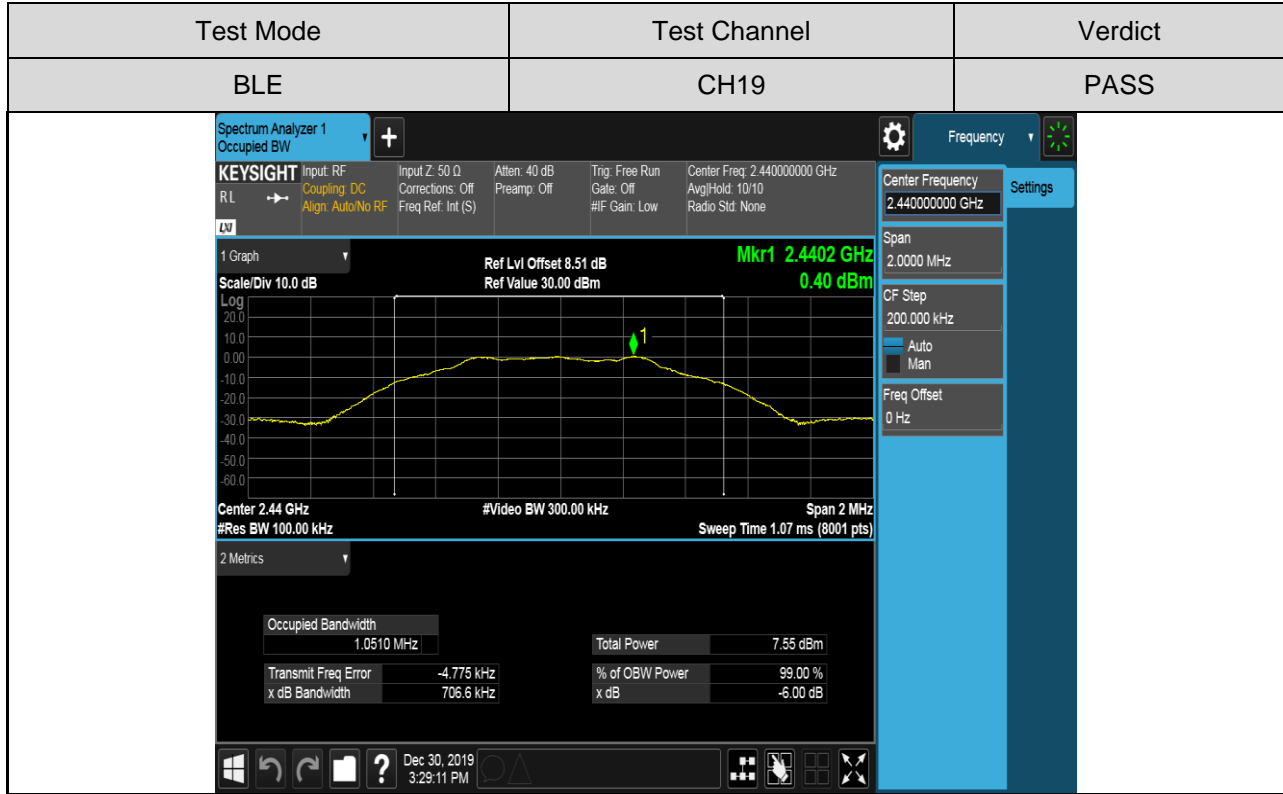


**RESULTS**

| Channel | Frequency (MHz) | 6dB bandwidth (MHz) | Limit (kHz) | Result |
|---------|-----------------|---------------------|-------------|--------|
| CH00    | 2402            | 0.7078              | 500         | Pass   |
| CH19    | 2440            | 0.7066              | 500         | Pass   |
| CH39    | 2480            | 0.7091              | 500         | Pass   |









### 8.3. PEAK CONDUCTED OUTPUT POWER

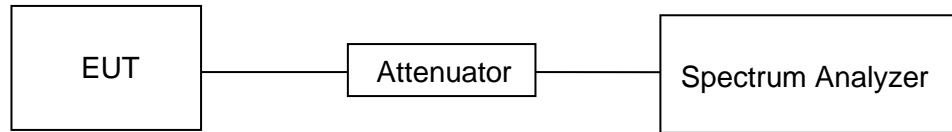
#### LIMITS

| CFR 47 FCC Part15 (15.247) Subpart C  |                   |                                |                       |
|---|-------------------|--------------------------------|-----------------------|
| Section   | Test Item         | Limit                          | Frequency Range (MHz) |
| CFR 47 FCC 15.247(b)(3)   | Peak Output Power | 1 watt or 30dBm<br>(See note1) | 2400-2483.5           |
| <b>Note:</b><br>1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. |                   |                                |                       |

#### TEST PROCEDURE

Refer to the subclause 8.3.1.1 of KDB558074 and the subclause 11.9.1.1 of ANSI C63.10. Place the EUT on the table and set it in the transmitting mode. Allow trace to fully stabilize and use peak marker function to determine the peak amplitude level.

#### TEST SETUP



#### TEST ENVIRONMENT

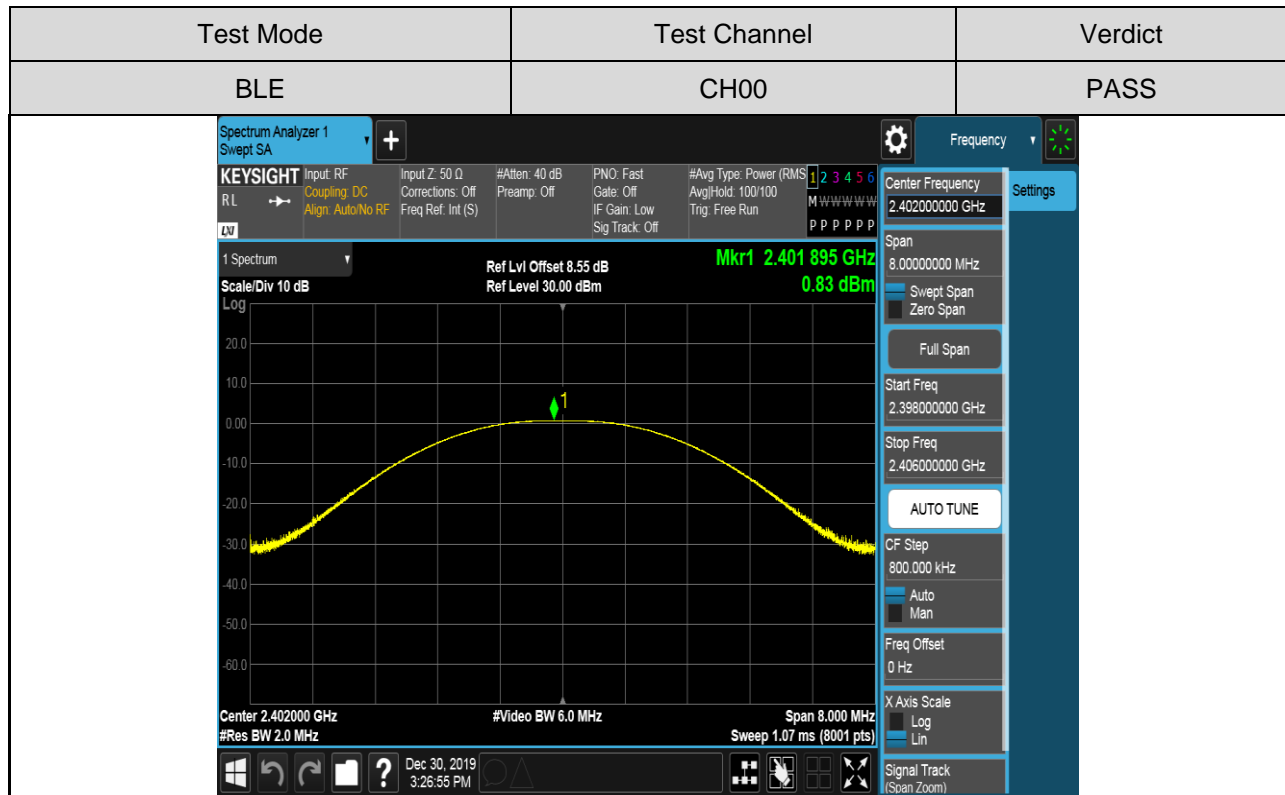
|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |

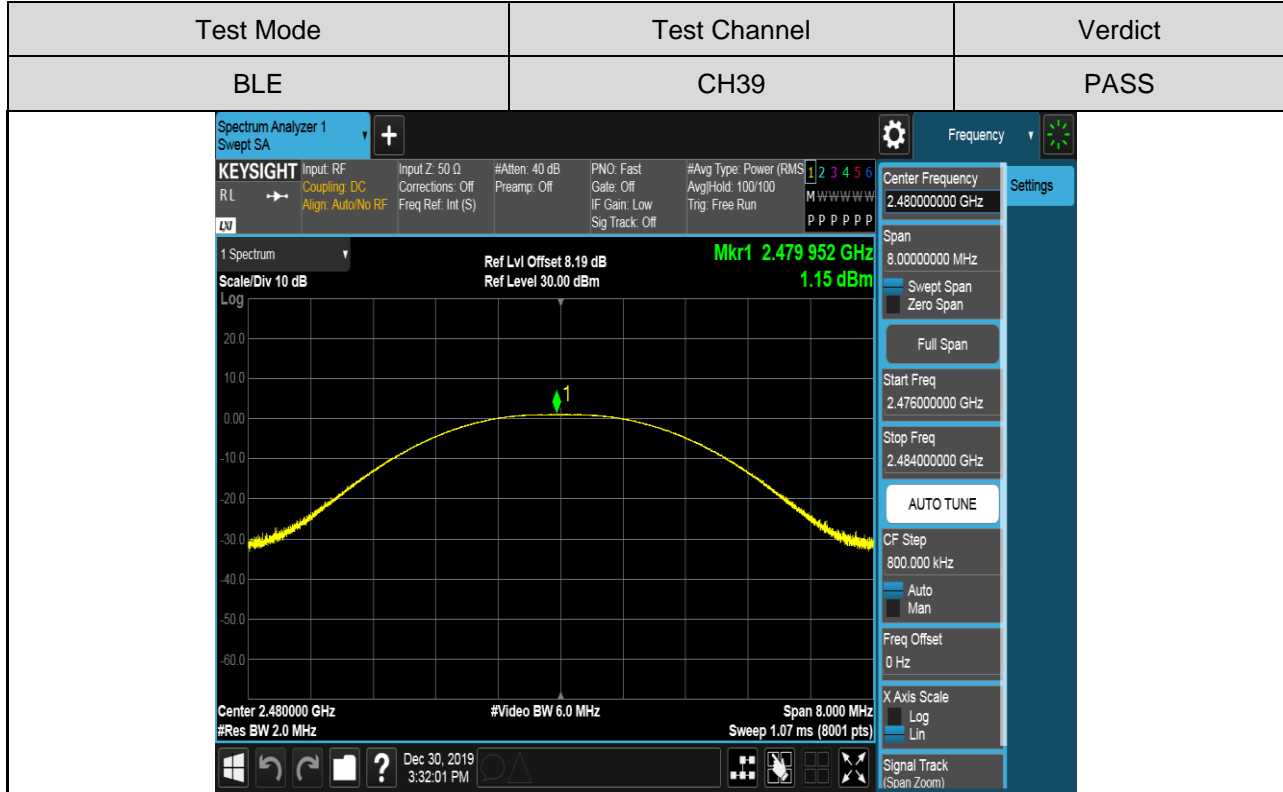
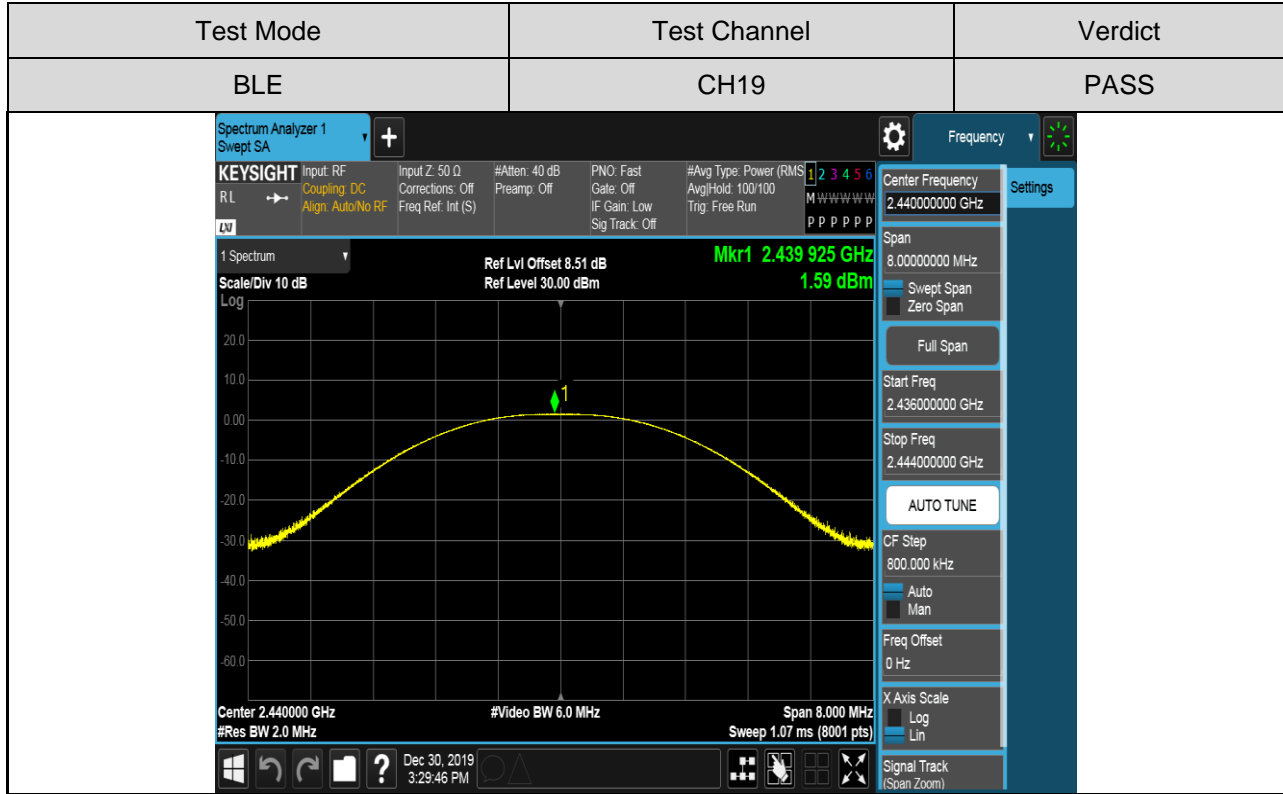


**RESULTS**

| Test Channel | Frequency | Maximum Conducted Output Power(PK) | Result |
|--------------|-----------|------------------------------------|--------|
|              | (MHz)     | (dBm)                              |        |
| CH00         | 2402      | 0.83                               | PASS   |
| CH19         | 2440      | 1.59                               | PASS   |
| CH39         | 2480      | 1.15                               | PASS   |

**Test Graphs:**





## 8.4. POWER SPECTRAL DENSITY

### LIMITS

| CFR 47 FCC Part15 (15.247) Subpart C  |                        |                            |                       |
|---|------------------------|----------------------------|-----------------------|
| Section   | Test Item              | Limit                      | Frequency Range (MHz) |
| CFR 47 FCC §15.247 (e)  | Power Spectral Density | 8 dBm/3 kHz<br>(See note1) | 2400-2483.5           |
| <b>Note:</b><br>1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. |                        |                            |                       |

### TEST PROCEDURE

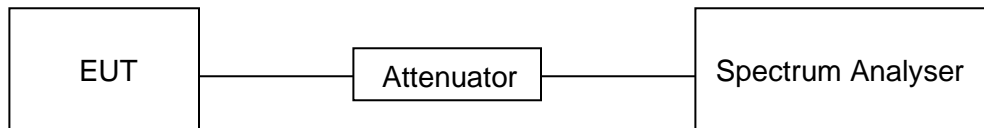
Connect the UUT to the spectrum analyser and use the following settings:

|                  |  |
|------------------|--|
| Center Frequency | The centre frequency of the channel under test       |
| Detector         | Peak   |
| RBW              | $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ |
| VBW              | $\geq 3 \times \text{RBW}$                           |
| Span             | 1.5 x DTS bandwidth                                  |
| Trace            | Max hold   |
| Sweep time       | Auto couple.   |

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### TEST SETUP



### TEST ENVIRONMENT

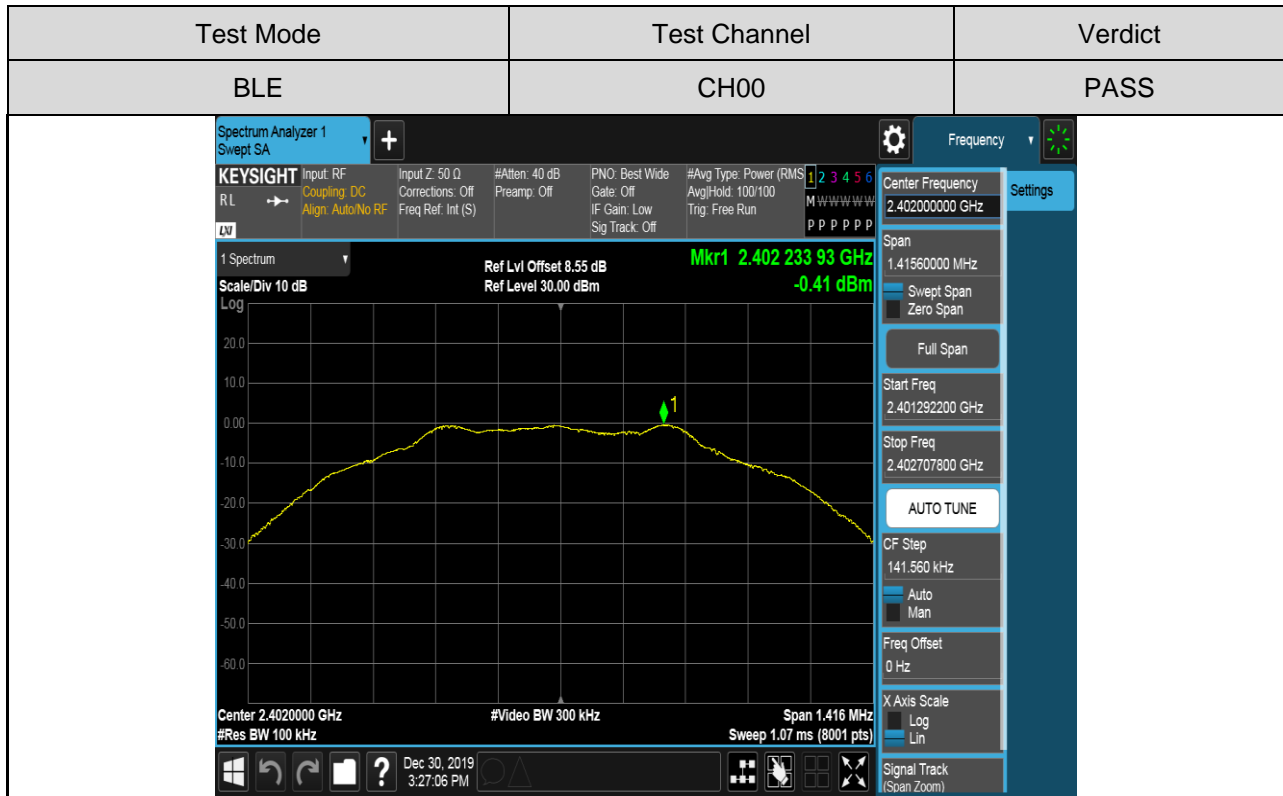
|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |

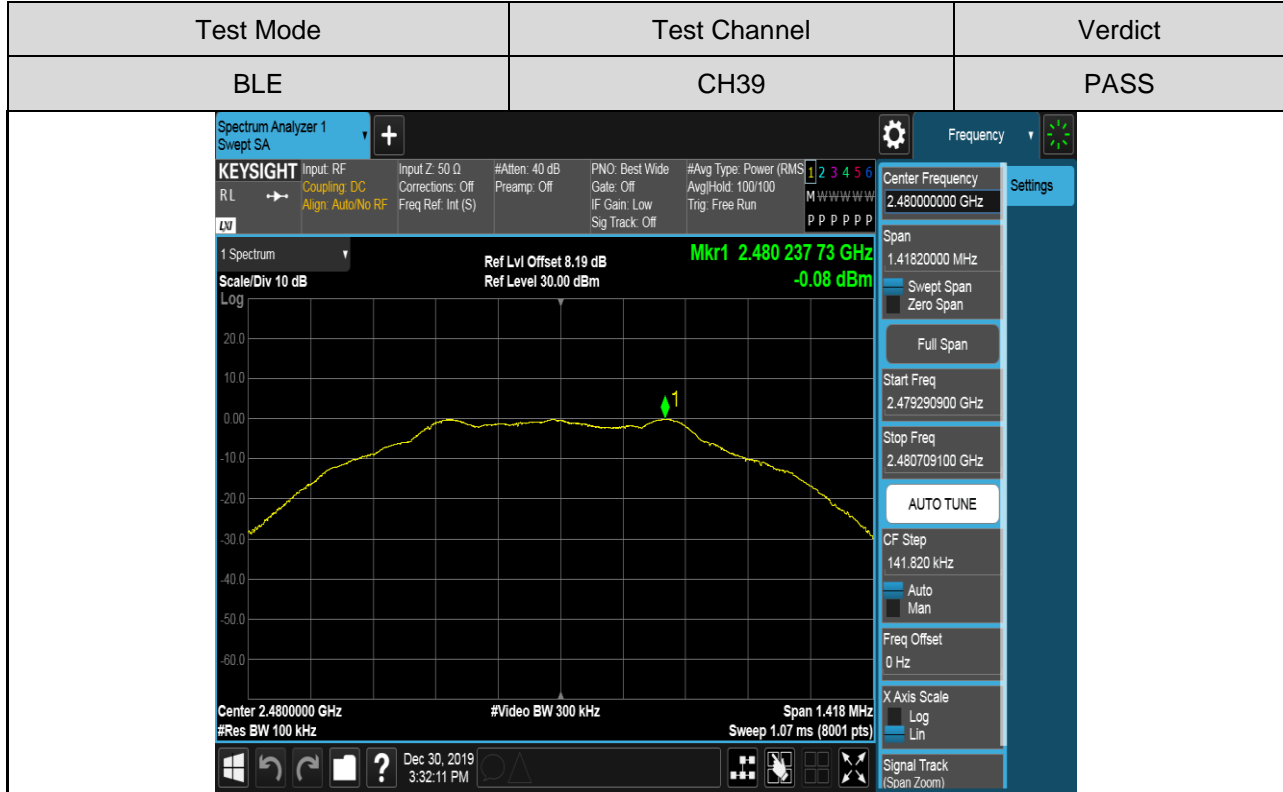
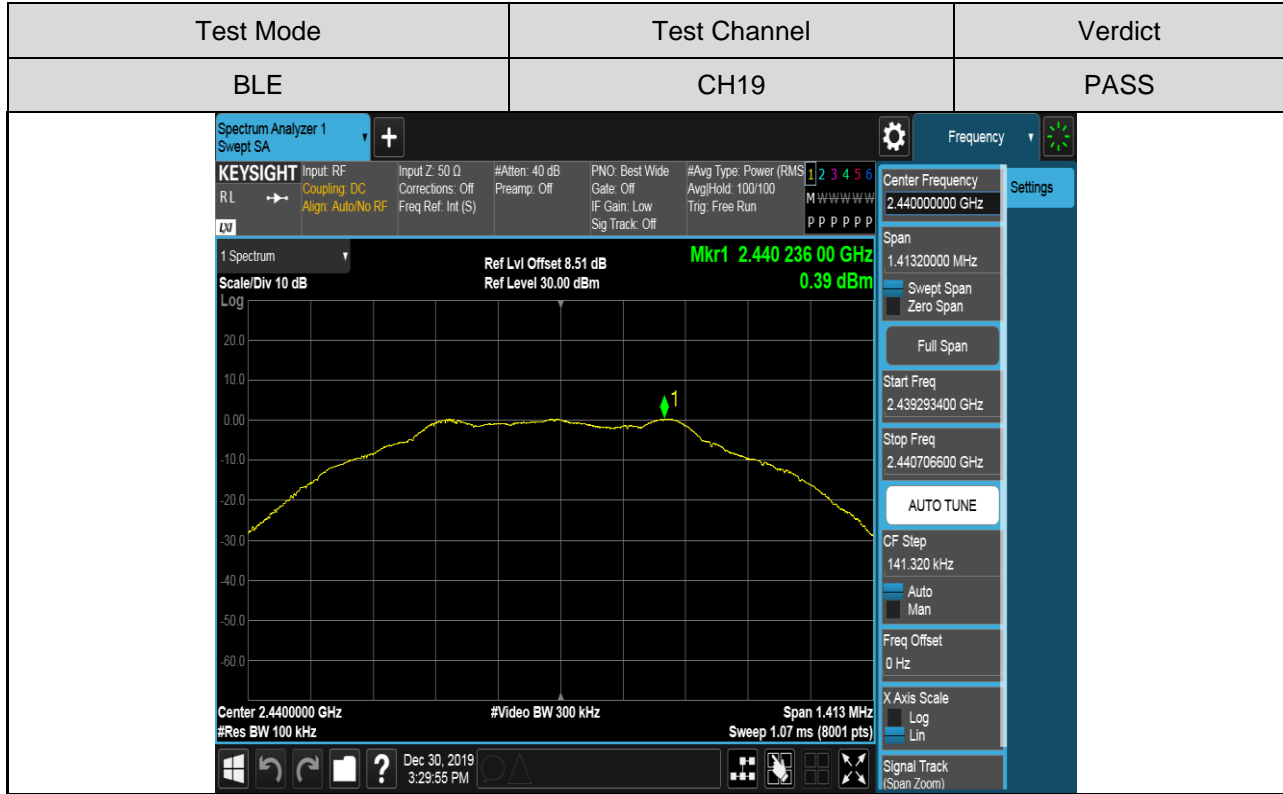


**RESULTS**

| Test Channel | Frequency | Power Spectral Density | Limit      | Result |
|--------------|-----------|------------------------|------------|--------|
|              | (MHz)     | (dBm/100kHz)           | (dBm/3kHz) |        |
| CH00         | 2402 MHz  | -0.41                  | 8          | PASS   |
| CH19         | 2440 MHz  | 0.39                   | 8          | PASS   |
| CH39         | 2480 MHz  | -0.08                  | 8          | PASS   |

**Test Graphs:**







## 8.5. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

### LIMITS

| CFR 47 FCC Part15 (15.247) Subpart C |   |   |
|--------------------------------------|---|---|
| Section                              | Test Item                                 | Limit   |
| CFR 47 FCC §15.247 (d)               | Conducted Bandedge and Spurious Emissions | at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power |

### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

|                  |  |
|------------------|--|
| Center Frequency | The centre frequency of the channel under test |
| Detector         | Peak   |
| RBW              | 100K   |
| VBW              | $\geq 3 \times \text{RBW}$                     |
| Span             | 1.5 x DTS bandwidth                            |
| Trace            | Max hold                                       |
| Sweep time       | Auto couple.                                   |

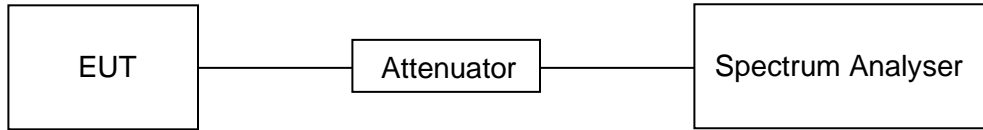
Use the peak marker function to determine the maximum PSD level.

|                    |   |
|--------------------|---|
| Span               | Set the center frequency and span to encompass frequency range to be measured |
| Detector           | Peak  |
| RBW                | 100K  |
| VBW                | $\geq 3 \times \text{RBW}$  |
| measurement points | $\geq \text{span}/\text{RBW}$   |
| Trace              | Max hold  |
| Sweep time         | Auto couple.  |

Use the peak marker function to determine the maximum amplitude level.



**TEST SETUP**



**TEST ENVIRONMENT**

|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |

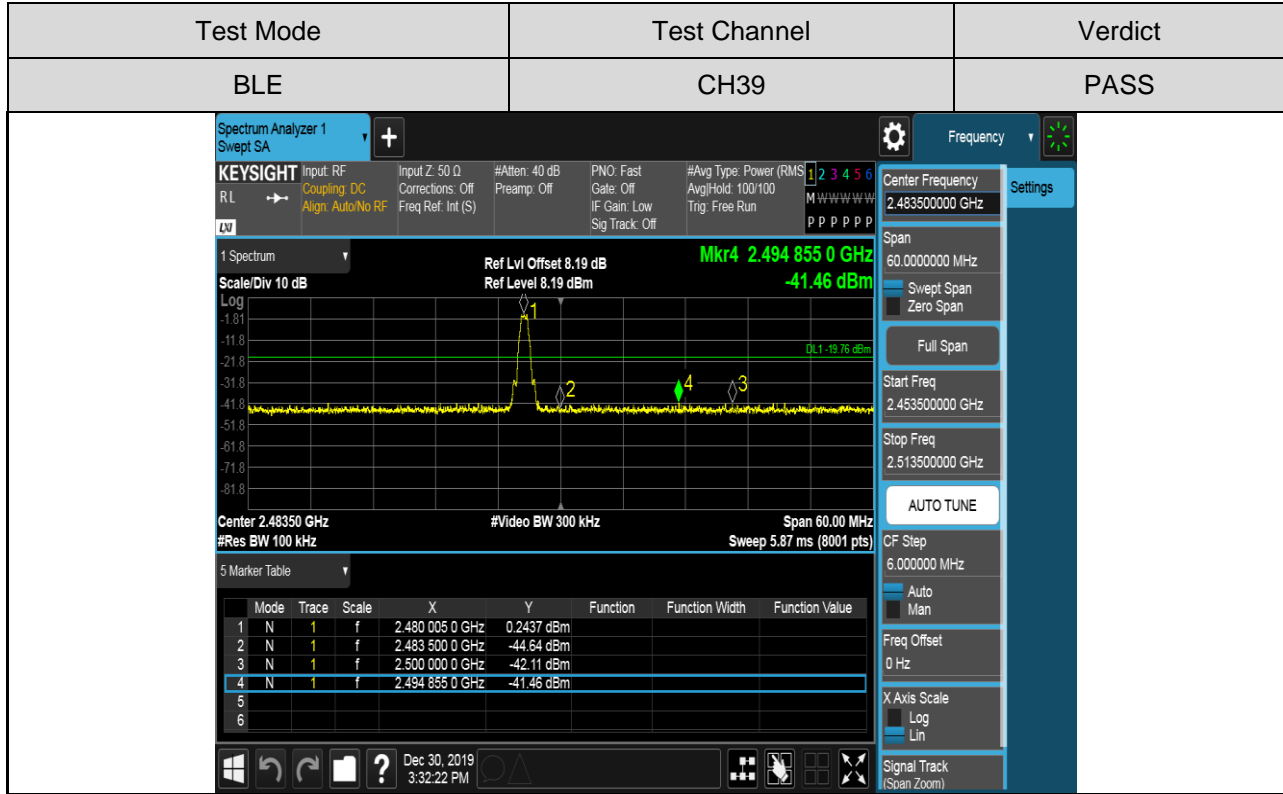
**Part I: Conducted Bandedge**

**RESULTS**

| Test Mode | Test Channel | Verdict |
|-----------|--------------|---------|
| BLE       | CH00         | PASS    |

| Mode | Trace | Scale | X | Y               | Function    | Function Width | Function Value |
|------|-------|-------|---|-----------------|-------------|----------------|----------------|
| 1    | N     | 1     | f | 2.402 235 0 GHz | -0.1790 dBm |                |                |
| 2    | N     | 1     | f | 2.400 000 0 GHz | -43.97 dBm  |                |                |
| 3    | N     | 1     | f | 2.390 000 0 GHz | -45.38 dBm  |                |                |
| 4    | N     | 1     | f | 2.382 600 0 GHz | -42.31 dBm  |                |                |
| 5    |       |       |   |                 |             |                |                |
| 6    |       |       |   |                 |             |                |                |





**Part II: Conducted Emission**

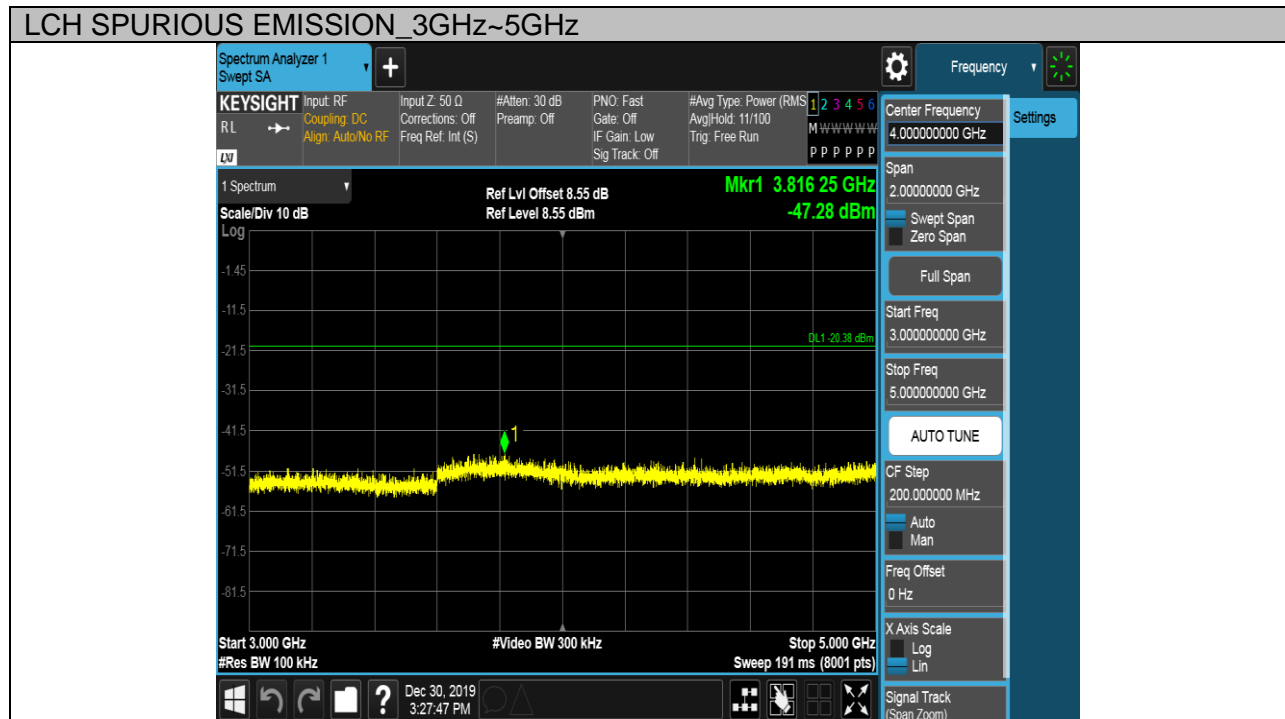
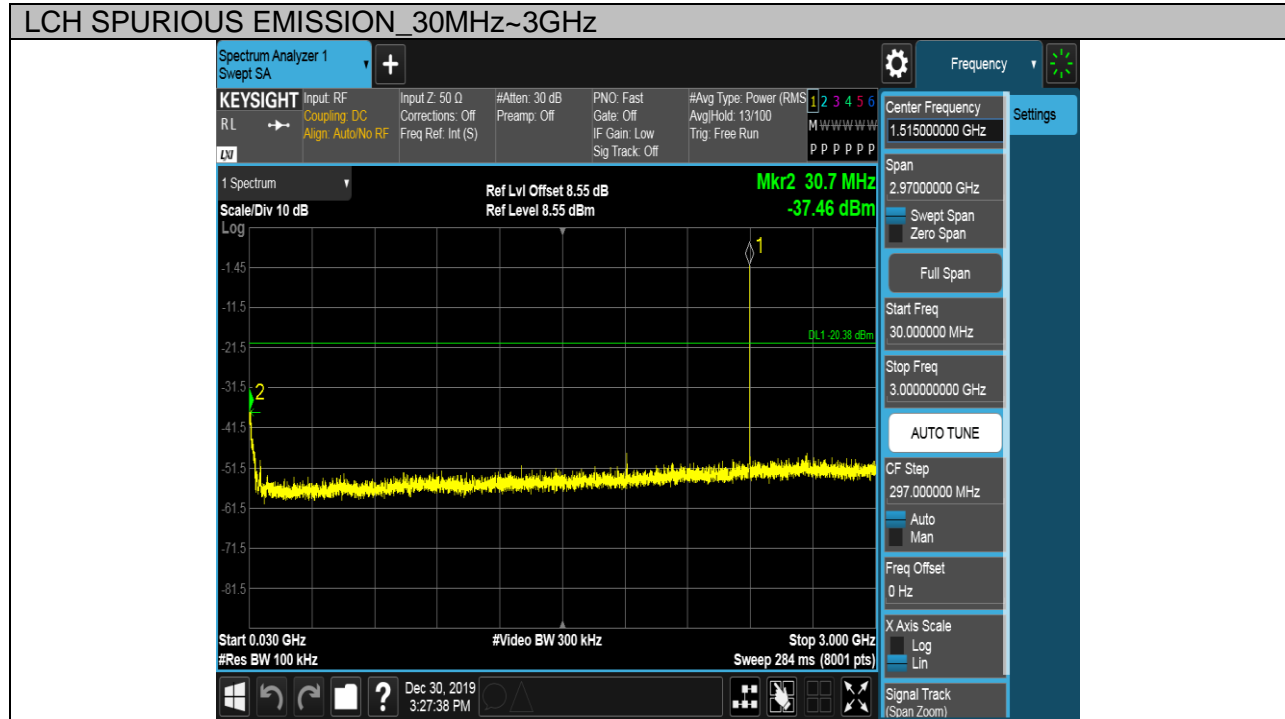
**Test Plots**

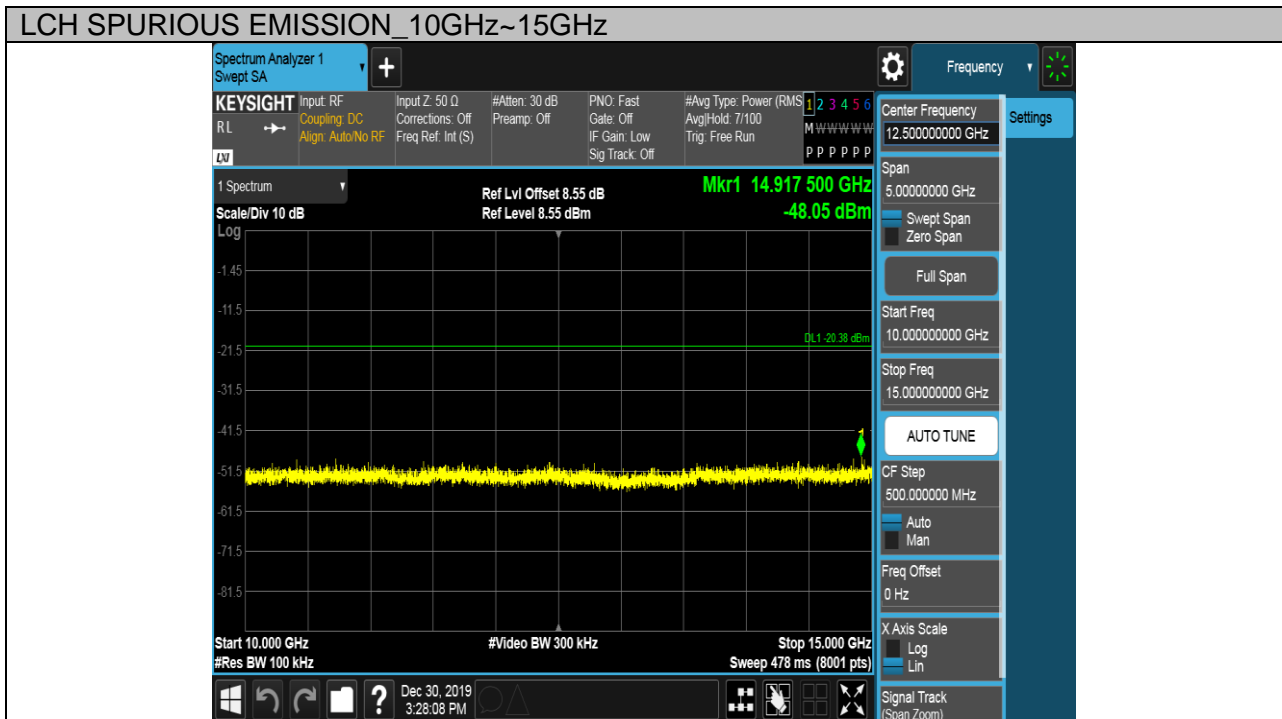
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| BLE       | CH00    | PASS    |

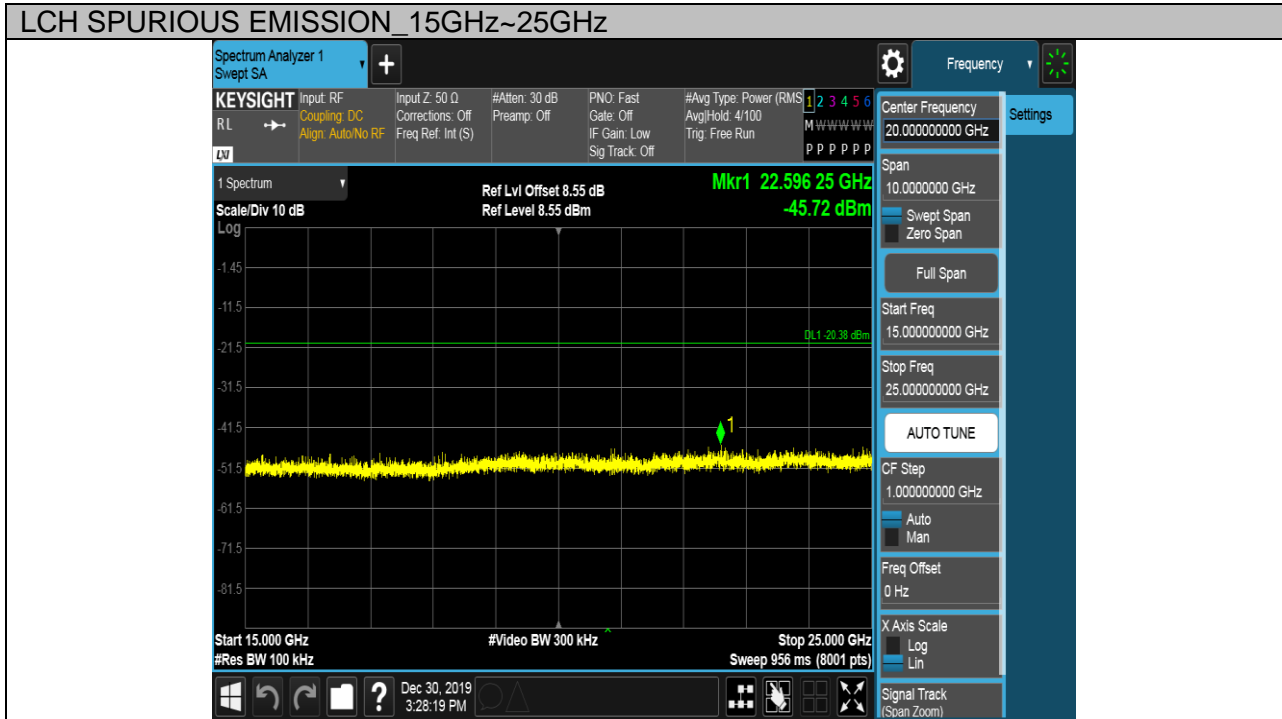




Puw test Plot





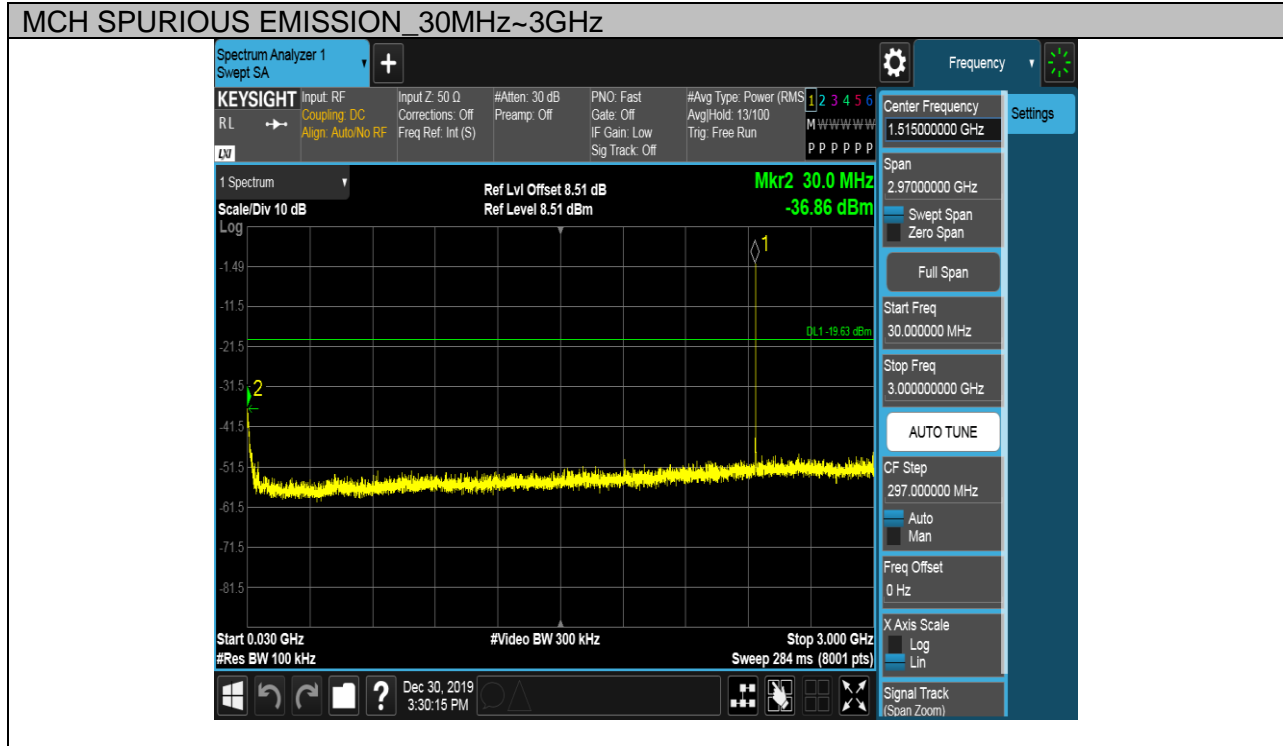


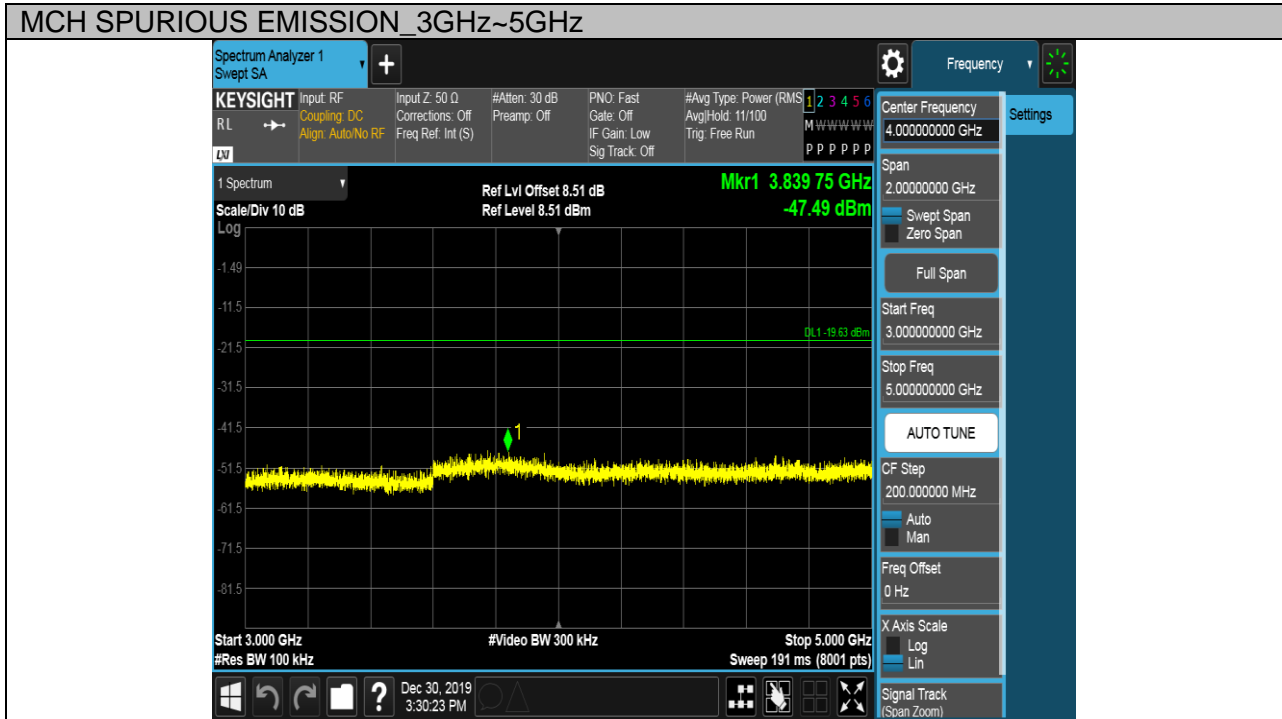


| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| BLE       | CH19    | PASS    |

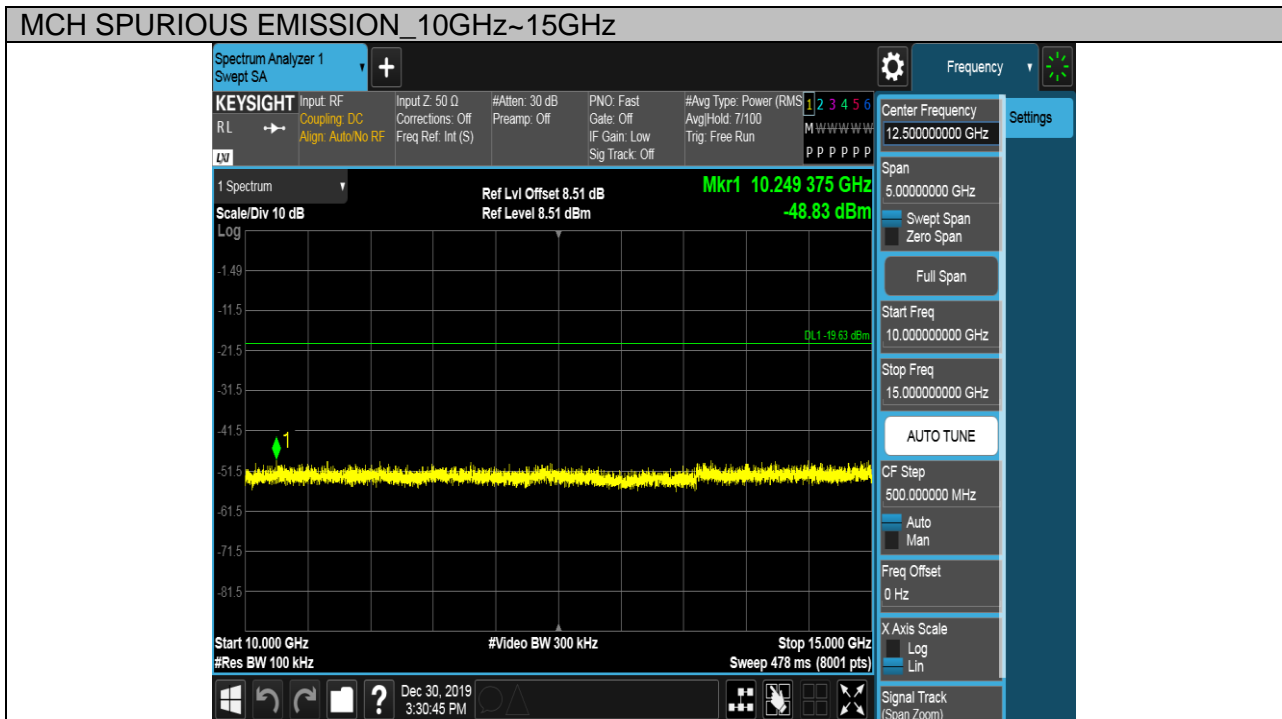
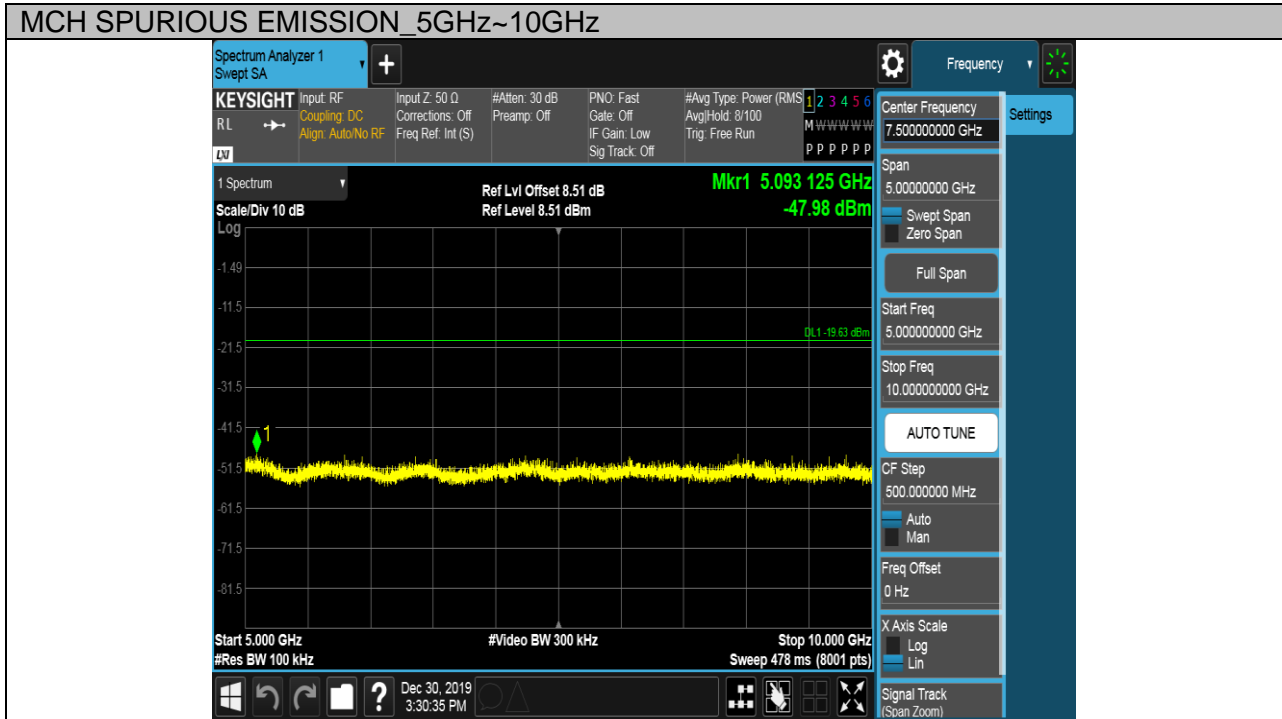


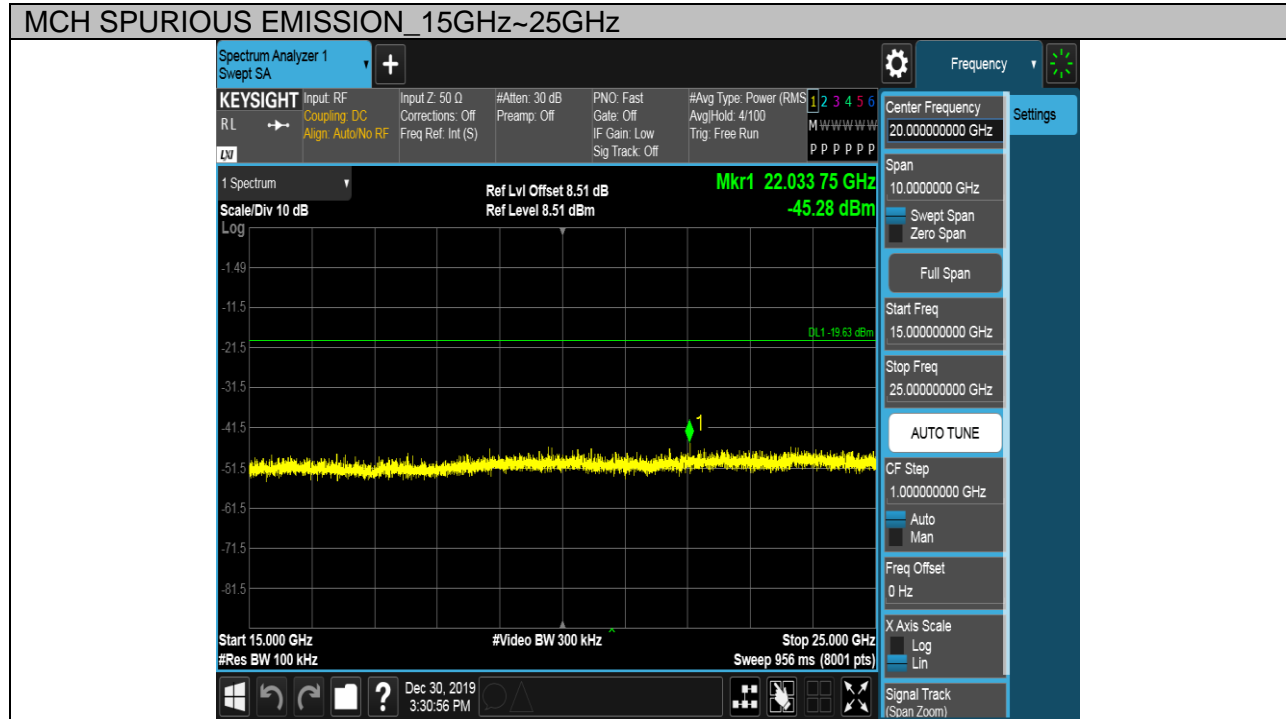
### Puw test Plot









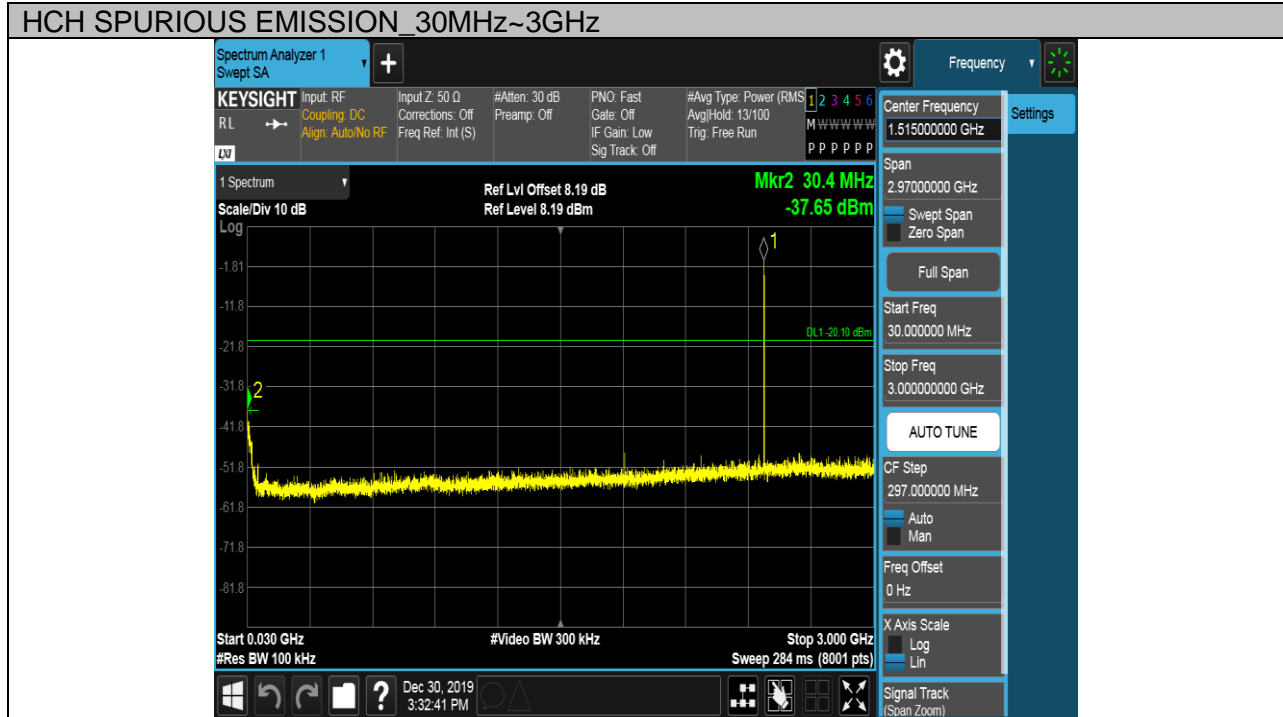


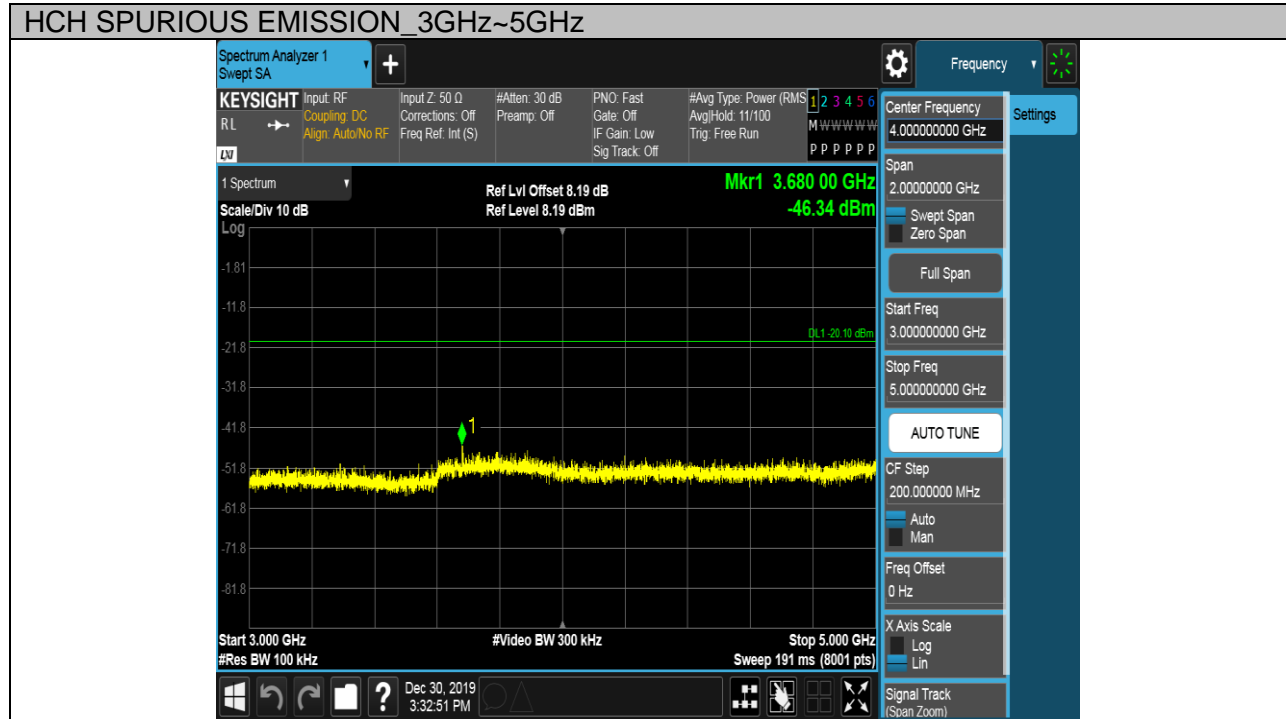


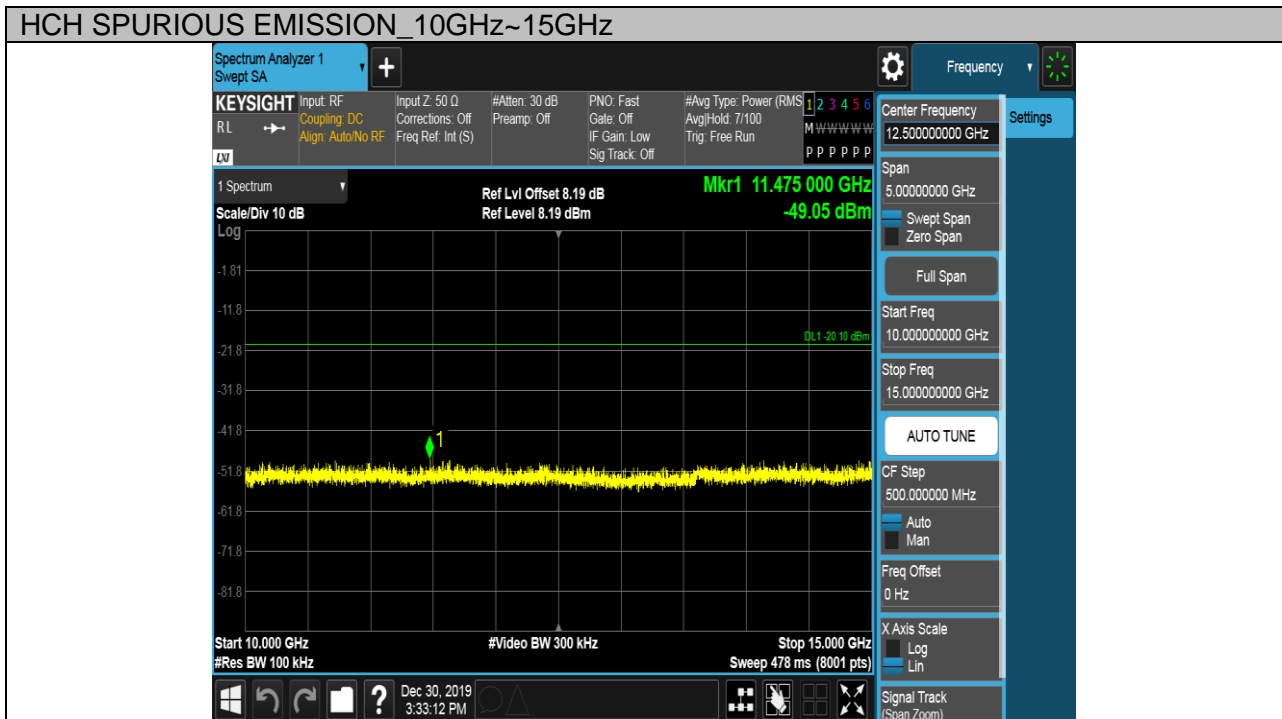
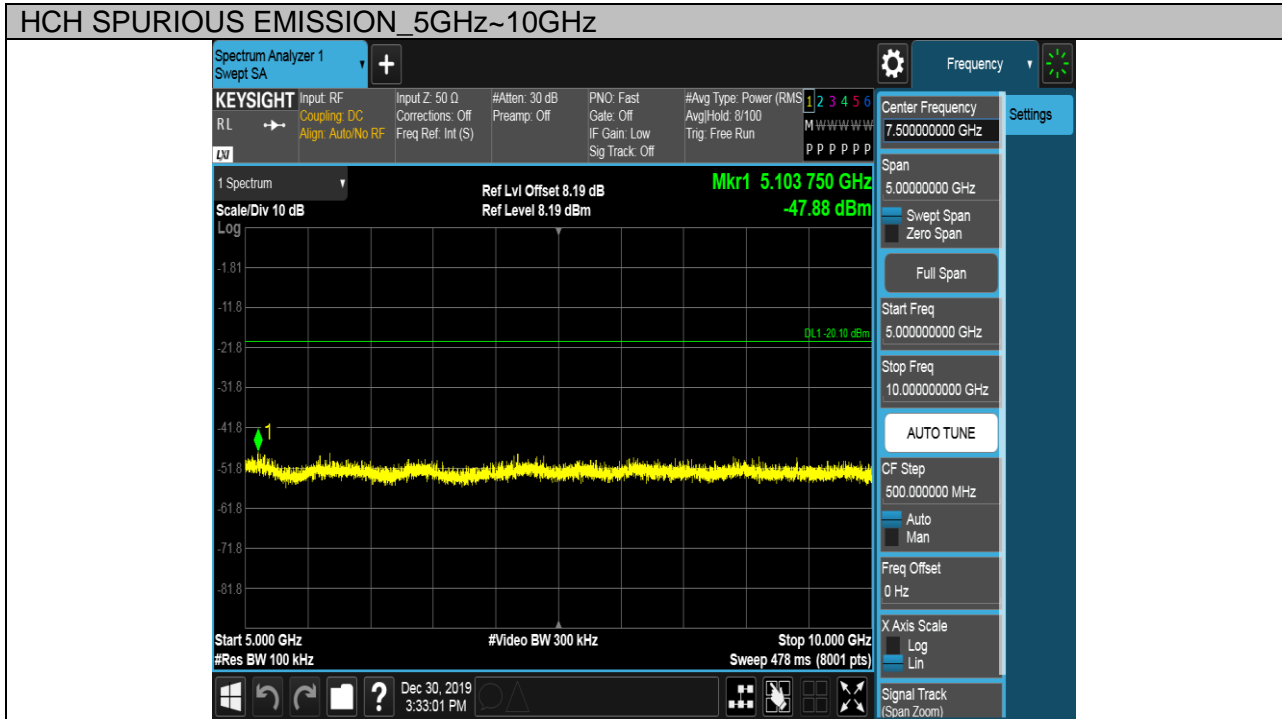
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| BLE       | CH39    | PASS    |

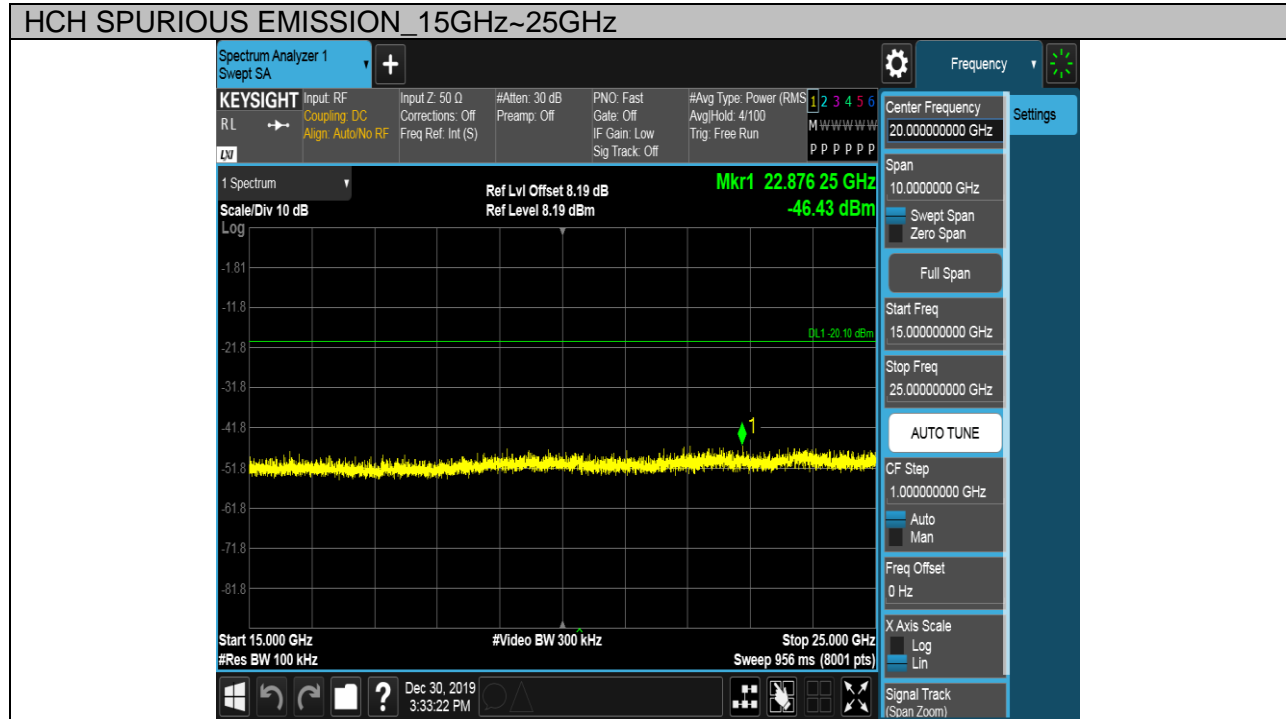


### Puw test Plot











## 9. RADIATED TEST RESULTS

### LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

| Frequency (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                             |
| 960~1000        | 500                               | 3                             |

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.



Radiation Disturbance Test Limit for FCC (Above 1G)

| Frequency (MHz) | dB(uV/m) (at 3 meters) |         |
|-----------------|------------------------|---------|
|                 | Peak                   | Average |
| Above 1000      | 74                     | 54      |

FCC Restricted bands of operation:

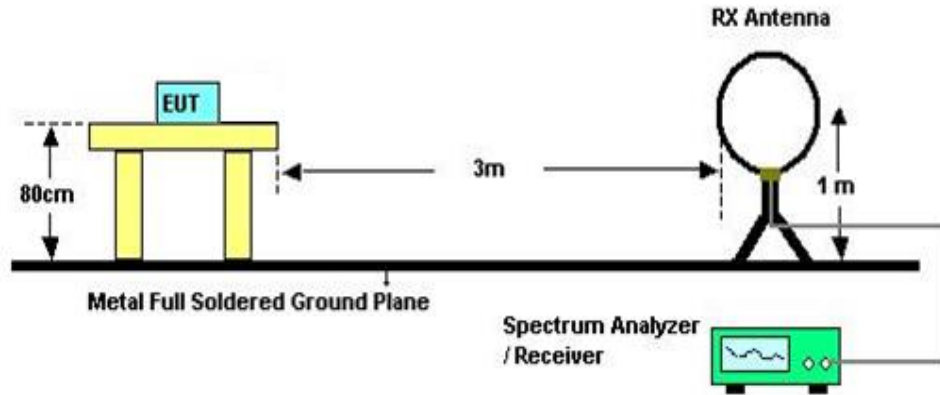
| MHz                      | MHz                 | MHz           | GHz              |
|--------------------------|---------------------|---------------|------------------|
| 0.090-0.110              | 16.42-16.423        | 399.9-410     | 4.5-5.15         |
| <sup>1</sup> 0.495-0.505 | 16.69475-16.69525   | 608-614       | 5.35-5.46        |
| 2.1735-2.1905            | 16.80425-16.80475   | 960-1240      | 7.25-7.75        |
| 4.125-4.128              | 25.5-25.67          | 1300-1427     | 8.025-8.5        |
| 4.17725-4.17775          | 37.5-38.25          | 1435-1626.5   | 9.0-9.2          |
| 4.20725-4.20775          | 73-74.6             | 1645.5-1646.5 | 9.3-9.5          |
| 6.215-6.218              | 74.8-75.2           | 1660-1710     | 10.6-12.7        |
| 6.26775-6.26825          | 108-121.94          | 1718.8-1722.2 | 13.25-13.4       |
| 6.31175-6.31225          | 123-138             | 2200-2300     | 14.47-14.5       |
| 8.291-8.294              | 149.9-150.05        | 2310-2390     | 15.35-16.2       |
| 8.362-8.366              | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4        |
| 8.37625-8.38675          | 156.7-156.9         | 2690-2900     | 22.01-23.12      |
| 8.41425-8.41475          | 162.0125-167.17     | 3260-3267     | 23.6-24.0        |
| 12.29-12.293             | 167.72-173.2        | 3332-3339     | 31.2-31.8        |
| 12.51975-12.52025        | 240-285             | 3345.8-3358   | 36.43-36.5       |
| 12.57675-12.57725        | 322-335.4           | 3600-4400     | ( <sup>2</sup> ) |
| 13.36-13.41              |                     |               |                  |

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.  
<sup>2</sup>Above 38.6c



**TEST SETUP AND PROCEDURE**

Below 30MHz

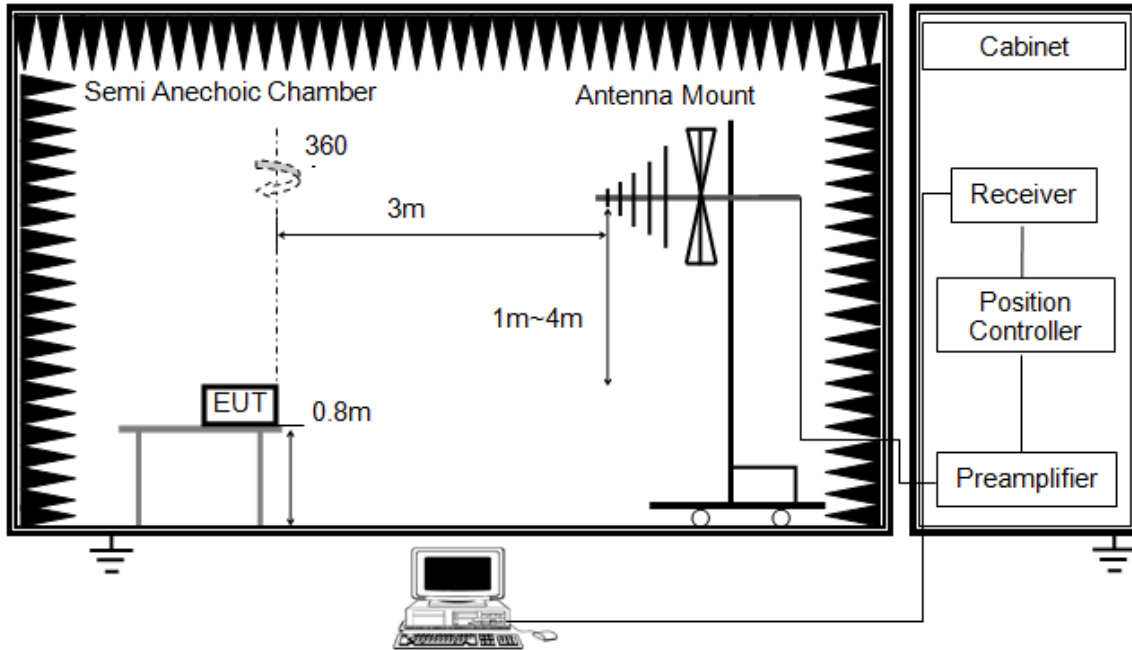


The setting of the spectrum analyser

|          |  |
|----------|--|
| RBW      | 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz) |
| VBW      | 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz) |
| Sweep    | Auto   |
| Detector | Peak/QP/ Average   |
| Trace    | Max hold   |

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G

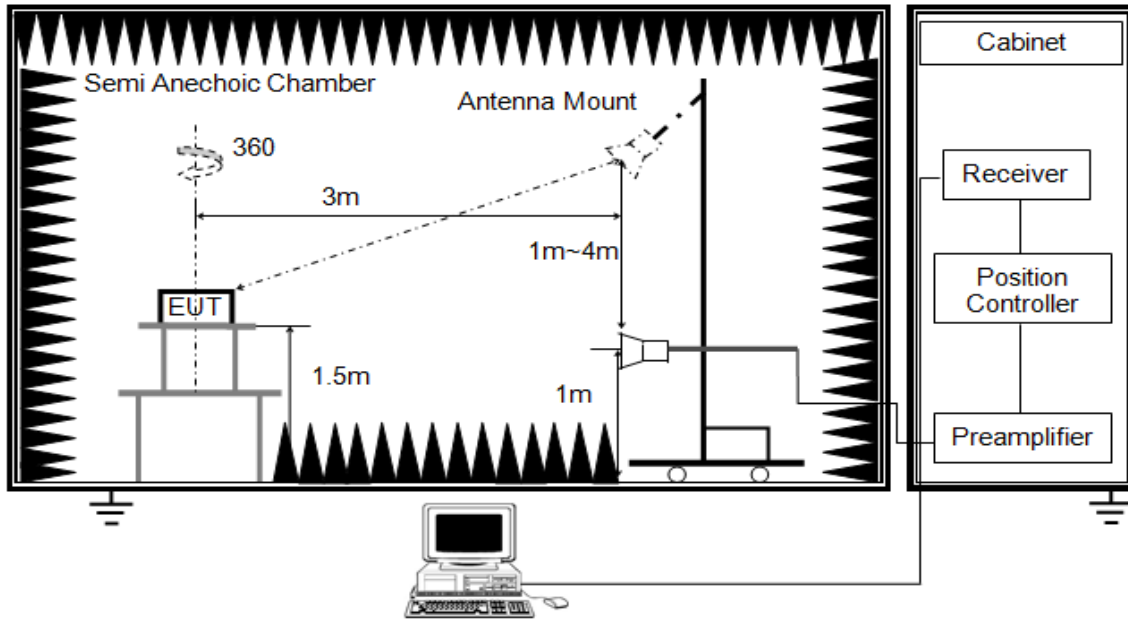


The setting of the spectrum analyser

|          |          |
|----------|----------|
| RBW      | 120K     |
| VBW      | 300K     |
| Sweep    | Auto     |
| Detector | Peak/QP  |
| Trace    | Max hold |

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.
5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

ABOVE 1G

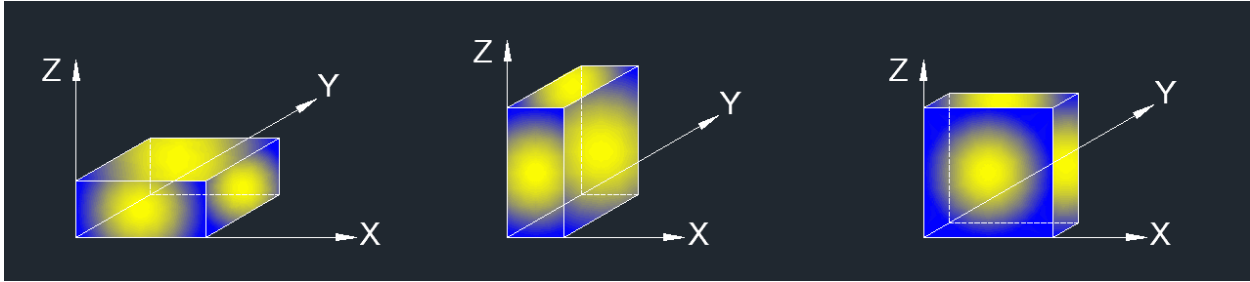


The setting of the spectrum analyser

|          |                             |
|----------|-----------------------------|
| RBW      | 1M                          |
| VBW      | PEAK: 3M<br>AVG: see note 6 |
| Sweep    | Auto                        |
| Detector | Peak                        |
| Trace    | Max hold                    |

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 8.1.ON TIME AND DUTY CYCLE.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:



Note: For all radiated test, EUT can only work in one axis(Z axis), so only this case (Z axis) data recorded in the report.

### **TEST ENVIRONMENT**

|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |



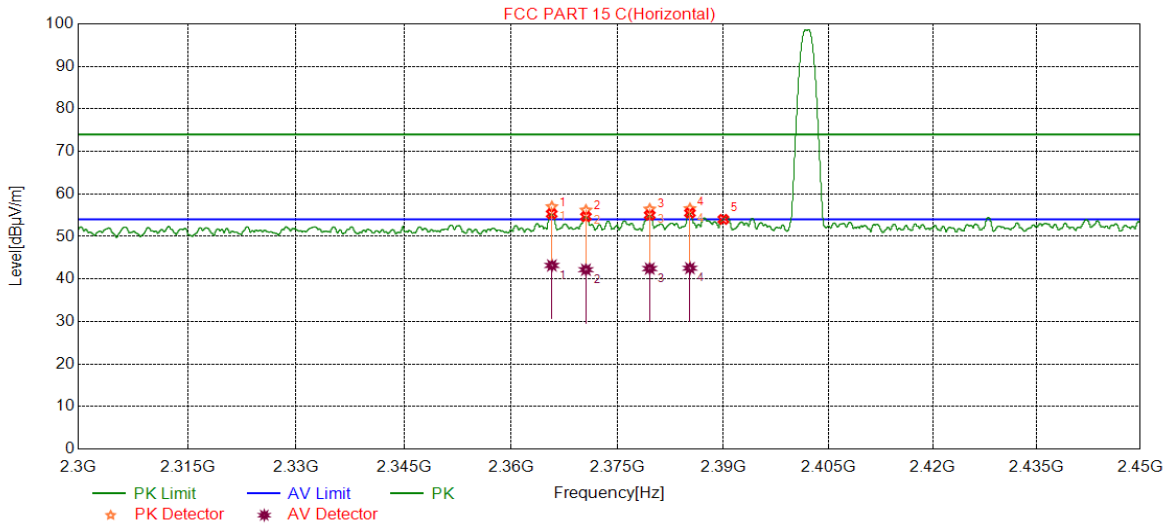
### 9.1. RESTRICTED BANDEDGE

Test Result Table

| Test Mode | Channel | P <sub>uw</sub> (dBm) | Verdict |
|-----------|---------|-----------------------|---------|
| BLE       | CH00    | <Limit                | PASS    |
|           | CH39    | <Limit                | PASS    |



**RESTRICTED BANDEDGE (CH00, HORIZONTAL)**

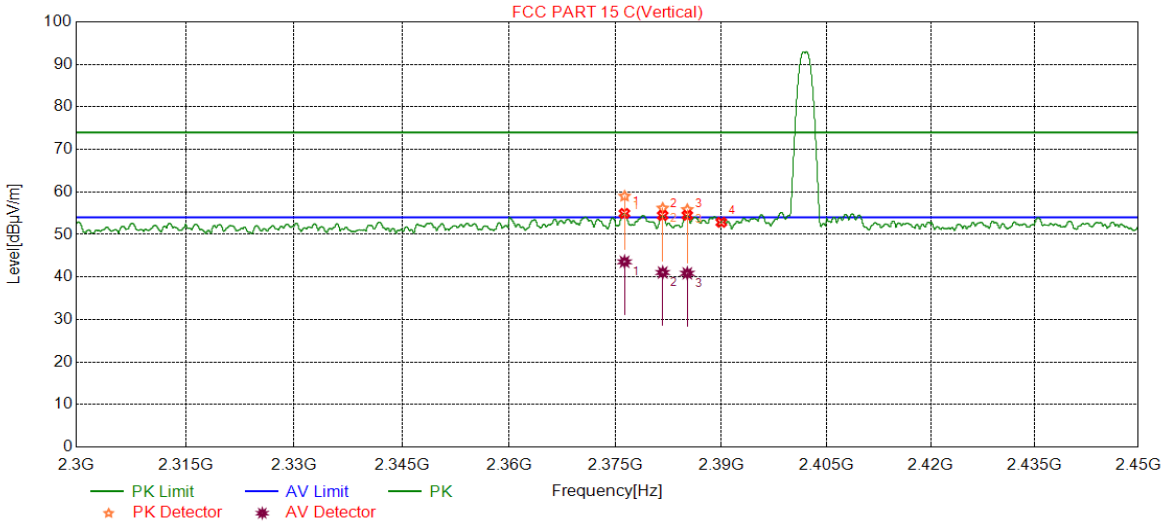


| No. | Frequency<br>(MHz) | Reading Level<br>(dBuV/m) | Correct Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|---------------------------|------------------------|--------------------|-------------------|----------------|---------|
| 1   | 2365.7301          | 43.21                     | 13.79                  | 57.00              | 74.00             | -17.00         | peak    |
|     |                    | 29.39                     | 13.79                  | 43.18              | 54.00             | -10.82         | average |
| 2   | 2370.5276          | 42.32                     | 13.86                  | 56.18              | 74.00             | -17.82         | peak    |
|     |                    | 28.31                     | 13.86                  | 42.17              | 54.00             | -11.83         | average |
| 3   | 2379.5474          | 42.43                     | 14.01                  | 56.44              | 74.00             | -17.56         | peak    |
|     |                    | 28.43                     | 14.01                  | 42.44              | 54.00             | -11.56         | average |
| 4   | 2385.2482          | 42.49                     | 14.04                  | 56.53              | 74.00             | -17.47         | peak    |
|     |                    | 28.49                     | 14.04                  | 42.53              | 54.00             | -11.47         | average |
| 5   | 2390.0000          | 39.90                     | 14.09                  | 53.99              | 74.00             | -20.01         | peak    |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**RESTRICTED BANDEDGE (CH00, VERTICAL)**

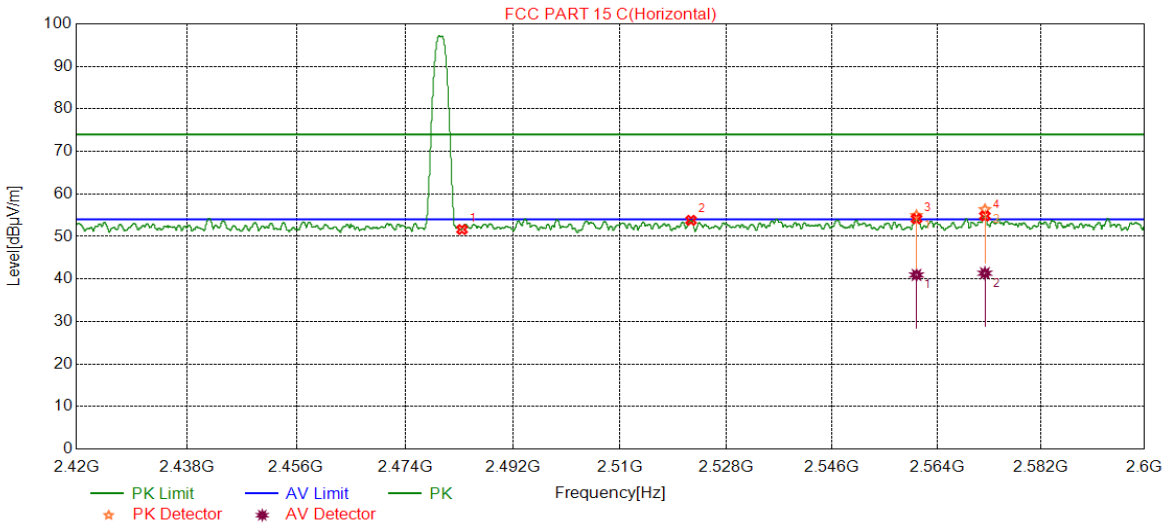


| No. | Frequency<br>(MHz) | Reading Level<br>(dBuV/m) | Correct Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|---------------------------|------------------------|--------------------|-------------------|----------------|---------|
| 1   | 2376.2686          | 45.06                     | 13.94                  | 59.00              | 74.00             | -15.00         | peak    |
|     |                    | 29.62                     | 13.94                  | 43.56              | 54.00             | -10.44         | average |
| 2   | 2381.6665          | 42.13                     | 14.05                  | 56.18              | 74.00             | -17.82         | peak    |
|     |                    | 26.99                     | 14.05                  | 41.04              | 54.00             | -12.96         | average |
| 3   | 2385.1544          | 41.79                     | 14.05                  | 55.84              | 74.00             | -18.16         | peak    |
|     |                    | 26.79                     | 14.05                  | 40.84              | 54.00             | -13.16         | average |
| 4   | 2390.0000          | 38.76                     | 14.09                  | 52.85              | 74.00             | -21.15         | peak    |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**RESTRICTED BANDEDGE (CH39, HORIZONTAL)**



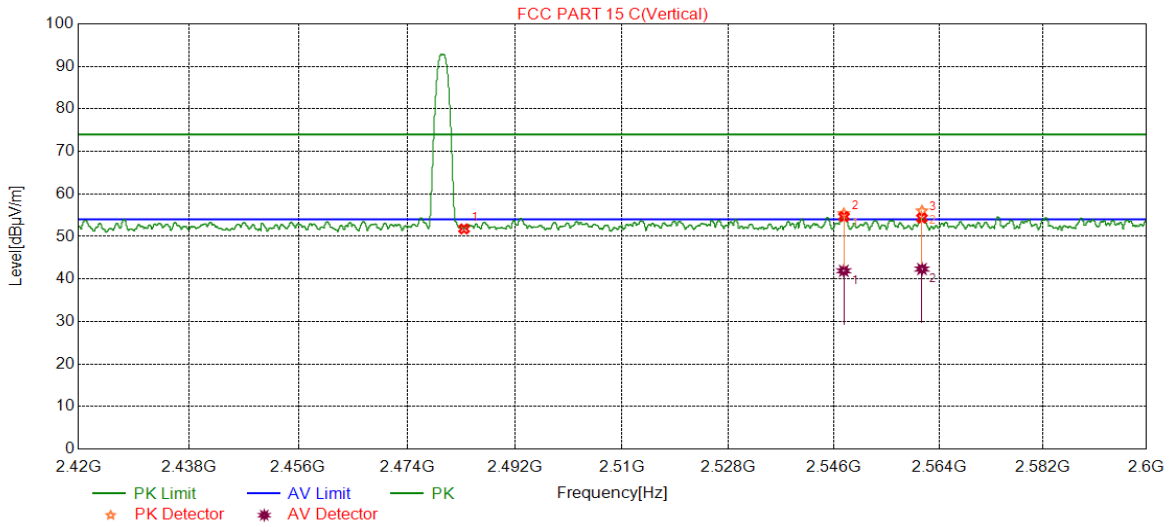
| No. | Frequency (MHz) | Reading Level (dBuV/m) | Correct Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark  |
|-----|-----------------|------------------------|---------------------|-----------------|----------------|-------------|---------|
| 1   | 2483.5000       | 37.74                  | 13.88               | 51.62           | 74.00          | -22.38      | peak    |
| 2   | 2521.9982       | 39.53                  | 14.26               | 53.79           | 74.00          | -20.21      | peak    |
| 3   | 2560.4680       | 40.48                  | 14.46               | 54.94           | 74.00          | -19.06      | peak    |
|     |                 | 26.48                  | 14.46               | 40.94           | 54.00          | -13.06      | average |
| 4   | 2572.2592       | 41.91                  | 14.43               | 56.34           | 74.00          | -17.66      | peak    |
|     |                 | 26.91                  | 14.43               | 41.34           | 54.00          | -12.66      | average |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.





**RESTRICTED BANDEDGE (CH39, VERTICAL)**

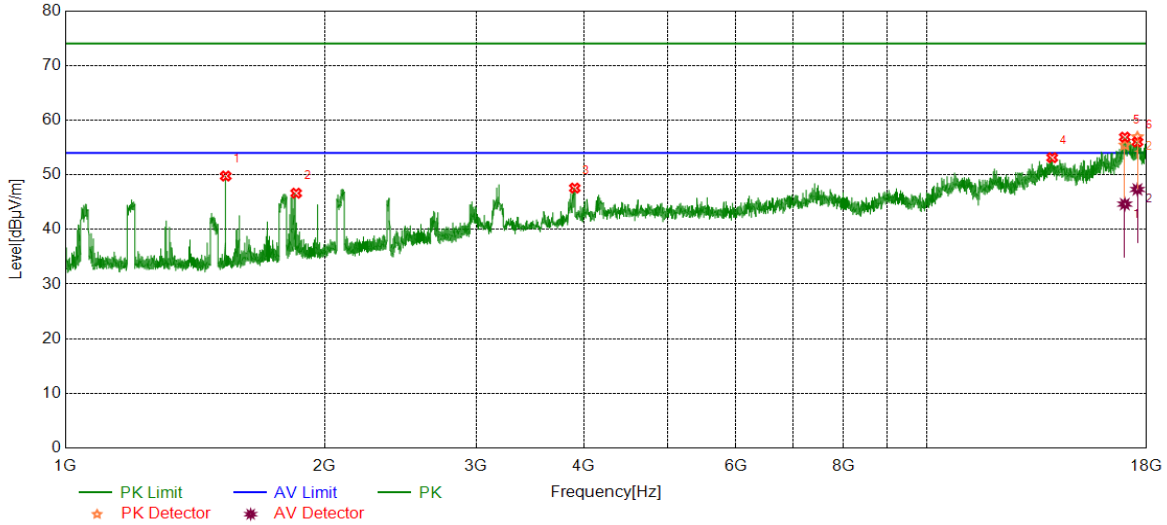


| No. | Frequency<br>(MHz) | Reading Level<br>(dBuV/m) | Correct Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|---------------------------|------------------------|--------------------|-------------------|----------------|---------|
| 1   | 2483.5000          | 37.89                     | 13.88                  | 51.77              | 74.00             | -22.23         | peak    |
| 2   | 2547.6549          | 40.98                     | 14.39                  | 55.37              | 74.00             | -18.63         | peak    |
|     |                    | 27.52                     | 14.39                  | 41.91              | 54.00             | -12.09         | average |
| 3   | 2561.0682          | 41.55                     | 14.46                  | 56.01              | 74.00             | -17.99         | peak    |
|     |                    | 27.87                     | 14.46                  | 42.33              | 54.00             | -11.67         | average |

- Note:
1. Measurement = Reading Level + Correct Factor.
  2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
  3. Peak: Peak detector.
  4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

## 9.2. SPURIOUS EMISSIONS (1~18GHz)

### HARMONICS AND SPURIOUS EMISSIONS (CH00, HORIZONTAL)

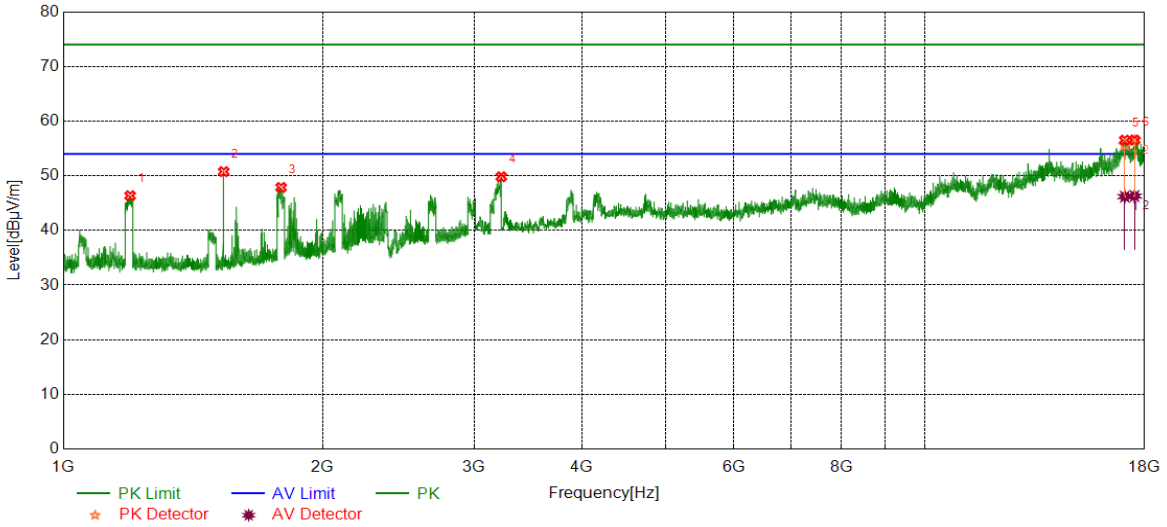


| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|---------|
| 1   | 1535.8170          | 55.45                        | -5.68                     | 49.77              | 74.00             | -24.23         | peak    |
| 2   | 1853.8567          | 50.26                        | -3.63                     | 46.63              | 74.00             | -27.37         | peak    |
| 3   | 3903.8630          | 43.74                        | 3.83                      | 47.57              | 74.00             | -26.43         | peak    |
| 4   | 13985.1231         | 36.78                        | 16.35                     | 53.13              | 74.00             | -20.87         | peak    |
| 5   | 16979.8725         | 34.78                        | 20.65                     | 55.43              | 74.00             | -18.57         | peak    |
|     |                    | 23.98                        | 20.65                     | 44.63              | 54.00             | -9.37          | average |
| 6   | 17563.0704         | 37.59                        | 19.35                     | 56.94              | 74.00             | -17.06         | peak    |
|     |                    | 27.97                        | 19.35                     | 47.32              | 54.00             | -6.68          | average |

- Note:
1. Measurement = Reading Level + Correct Factor.
  2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
  3. Peak: Peak detector.
  4. For below 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
  5. For above 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.
  6. Proper operation of the transmitter prior to adding the filter to the measurement chain.
  7. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**HARMONICS AND SPURIOUS EMISSIONS (CH00, VERTICAL)**

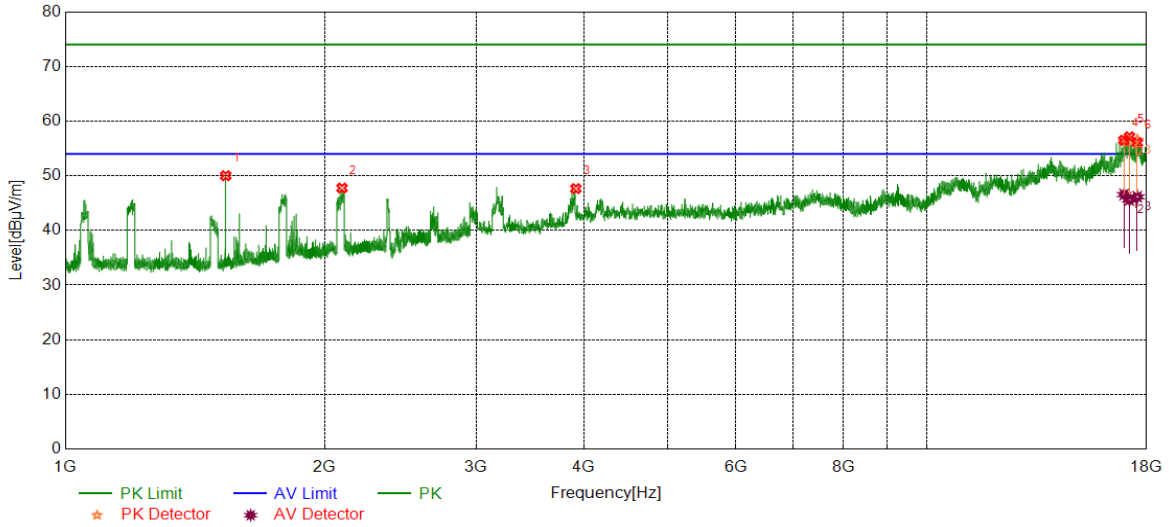


| No. | Frequency (MHz) | Reading Level (dBuV/m) | Correct Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark  |
|-----|-----------------|------------------------|---------------------|-----------------|----------------|-------------|---------|
| 1   | 1195.7745       | 51.89                  | -5.54               | 46.35           | 74.00          | -27.65      | peak    |
| 2   | 1535.8170       | 56.44                  | -5.68               | 50.76           | 74.00          | -23.24      | peak    |
| 3   | 1790.3488       | 51.85                  | -3.98               | 47.87           | 74.00          | -26.13      | peak    |
| 4   | 3225.0281       | 48.06                  | 1.76                | 49.82           | 74.00          | -24.18      | peak    |
| 5   | 17069.8837      | 35.08                  | 20.52               | 55.60           | 74.00          | -18.40      | peak    |
|     |                 | 25.67                  | 20.52               | 46.19           | 54.00          | -7.81       | average |
| 6   | 17523.6905      | 37.07                  | 19.40               | 56.47           | 74.00          | -17.53      | peak    |
|     |                 | 26.89                  | 19.40               | 46.29           | 54.00          | -7.71       | average |

- Note:
1. Measurement = Reading Level + Correct Factor.
  2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
  3. Peak: Peak detector.
  4. For below 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
  5. For above 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.
  6. Proper operation of the transmitter prior to adding the filter to the measurement chain.
  7. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**HARMONICS AND SPURIOUS EMISSIONS (CH19, HORIZONTAL)**

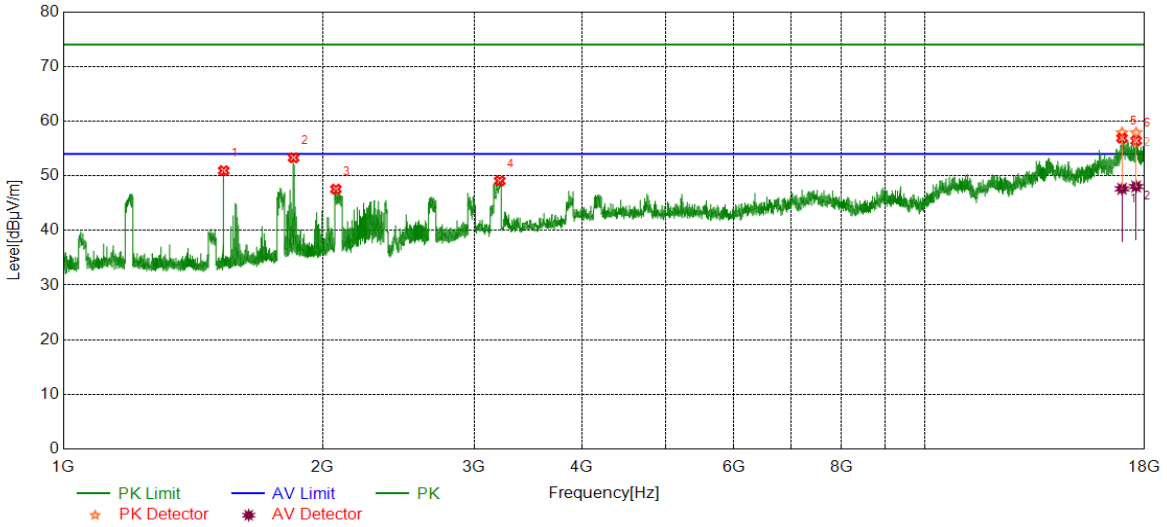


| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|---------|
| 1   | 1535.8170          | 55.69                        | -5.68                     | 50.01              | 74.00             | -23.99         | peak    |
| 2   | 2095.8870          | 50.31                        | -2.56                     | 47.75              | 74.00             | -26.25         | peak    |
| 3   | 3915.1144          | 43.76                        | 3.89                      | 47.65              | 74.00             | -26.35         | peak    |
| 4   | 16946.1183         | 36.36                        | 19.94                     | 56.30              | 74.00             | -17.70         | peak    |
|     |                    | 26.62                        | 19.94                     | 46.56              | 54.00             | -7.44          | average |
| 5   | 17193.6492         | 37.03                        | 19.31                     | 56.34              | 74.00             | -17.66         | peak    |
|     |                    | 26.27                        | 19.31                     | 45.58              | 54.00             | -8.42          | average |
| 6   | 17557.4447         | 37.32                        | 19.23                     | 56.55              | 74.00             | -17.45         | peak    |
|     |                    | 26.91                        | 19.23                     | 46.14              | 54.00             | -7.86          | average |

- Note:
1. Measurement = Reading Level + Correct Factor.
  2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
  3. Peak: Peak detector.
  4. For below 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
  5. For above 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.
  6. Proper operation of the transmitter prior to adding the filter to the measurement chain.
  7. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**HARMONICS AND SPURIOUS EMISSIONS (CH19, VERTICAL)**

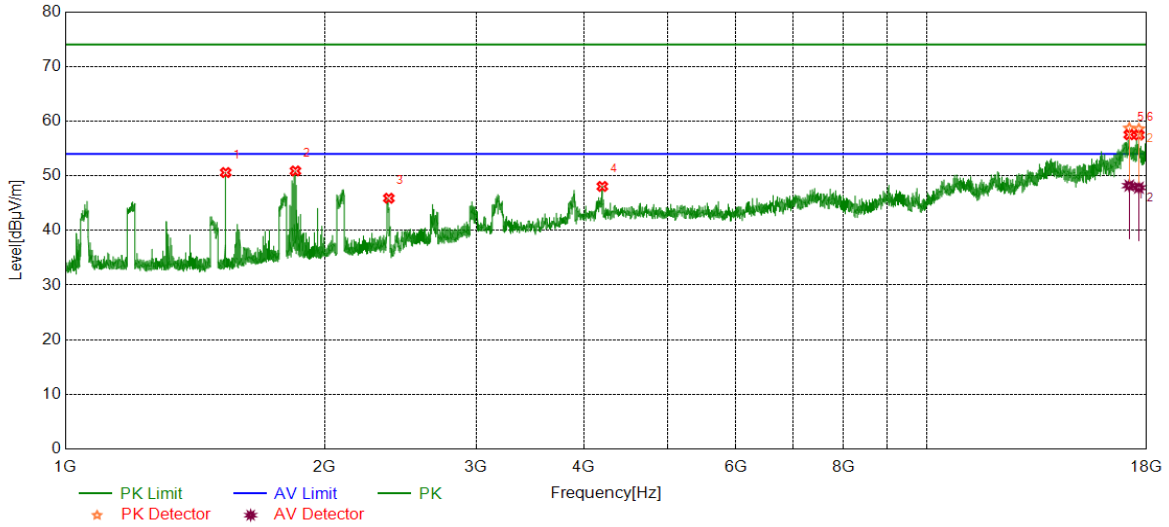


| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|---------|
| 1   | 1535.8170          | 56.62                        | -5.68                     | 50.94              | 74.00             | -23.06         | peak    |
| 2   | 1850.8564          | 56.94                        | -3.64                     | 53.30              | 74.00             | -20.70         | peak    |
| 3   | 2072.6341          | 50.32                        | -2.77                     | 47.55              | 74.00             | -26.45         | peak    |
| 4   | 3211.9015          | 47.24                        | 1.82                      | 49.06              | 74.00             | -24.94         | peak    |
| 5   | 16944.2430         | 37.89                        | 19.99                     | 57.88              | 74.00             | -16.12         | peak    |
|     |                    | 27.63                        | 19.99                     | 47.62              | 54.00             | -6.38          | average |
| 6   | 17594.9494         | 38.3                         | 19.58                     | 57.88              | 74.00             | -16.12         | peak    |
|     |                    | 28.45                        | 19.58                     | 48.03              | 54.00             | -5.97          | average |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. For below 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.  
 5. For above 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.  
 6. Proper operation of the transmitter prior to adding the filter to the measurement chain.  
 7. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**HARMONICS AND SPURIOUS EMISSIONS (CH39, HORIZONTAL)**

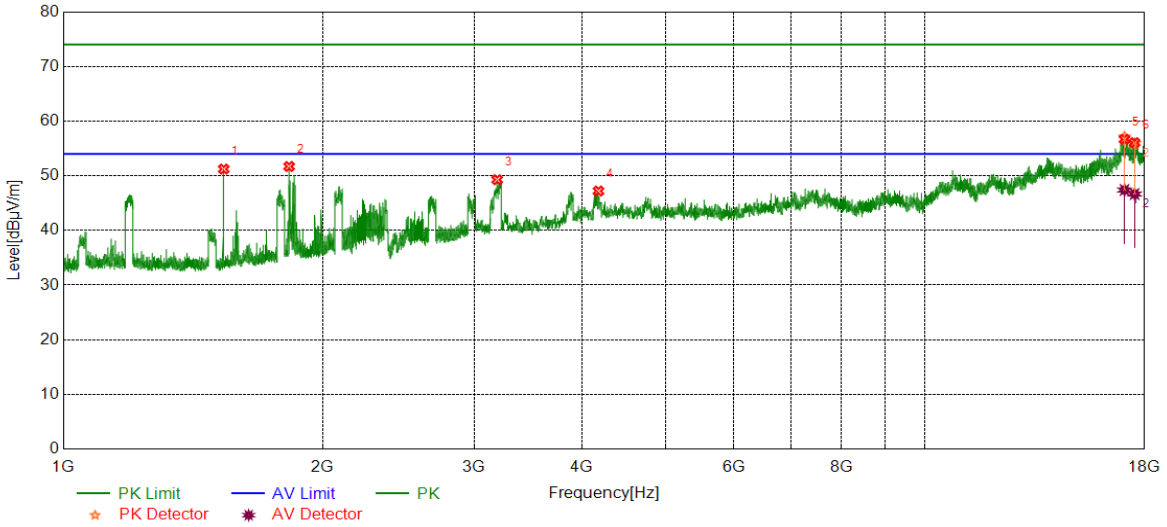


| No. | Frequency (MHz) | Reading Level (dBuV/m) | Correct Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark  |
|-----|-----------------|------------------------|---------------------|-----------------|----------------|-------------|---------|
| 1   | 1535.8170       | 56.27                  | -5.68               | 50.59           | 74.00          | -23.41      | peak    |
| 2   | 1850.3563       | 54.53                  | -3.65               | 50.88           | 74.00          | -23.12      | peak    |
| 3   | 2374.9219       | 47.43                  | -1.54               | 45.89           | 74.00          | -28.11      | peak    |
| 4   | 4202.0253       | 43.58                  | 4.47                | 48.05           | 74.00          | -25.95      | peak    |
| 5   | 17182.3978      | 39.14                  | 19.58               | 58.72           | 74.00          | -15.28      | peak    |
|     |                 | 28.62                  | 19.58               | 48.20           | 54.00          | -5.80       | average |
| 6   | 17630.5788      | 39.28                  | 19.30               | 58.58           | 74.00          | -15.42      | peak    |
|     |                 | 28.52                  | 19.30               | 47.82           | 54.00          | -6.18       | average |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. For below 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.  
 5. For above 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.  
 6. Proper operation of the transmitter prior to adding the filter to the measurement chain.  
 7. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**HARMONICS AND SPURIOUS EMISSIONS (CH39, VERTICAL)**



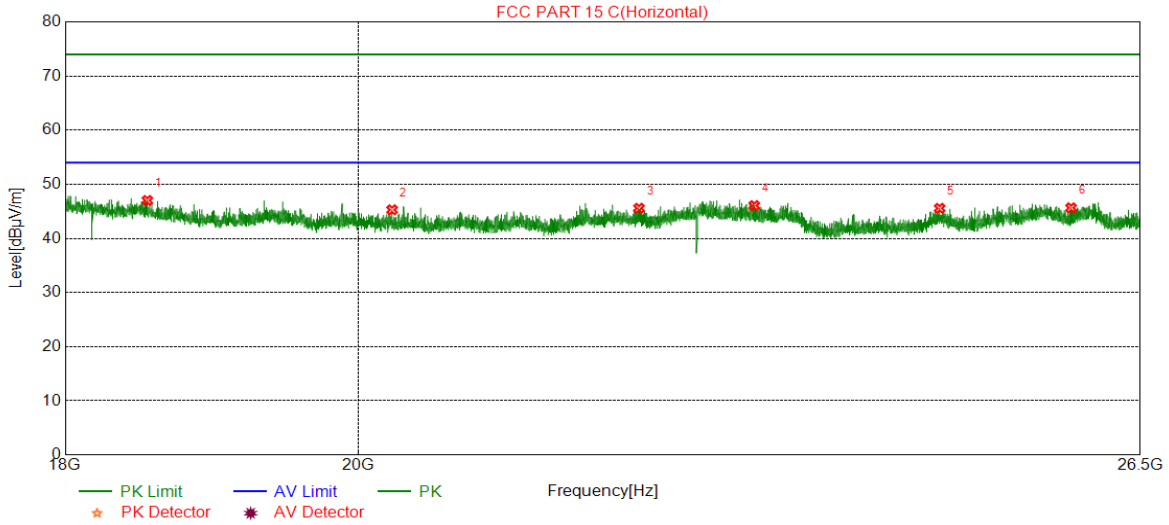
| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|---------|
| 1   | 1535.8170          | 56.91                        | -5.68                     | 51.23              | 74.00             | -22.77         | peak    |
| 2   | 1829.1036          | 55.58                        | -3.88                     | 51.70              | 74.00             | -22.30         | peak    |
| 3   | 3189.3987          | 47.24                        | 2.04                      | 49.28              | 74.00             | -24.72         | peak    |
| 4   | 4181.3977          | 42.70                        | 4.51                      | 47.21              | 74.00             | -26.79         | peak    |
| 5   | 17056.7571         | 36.61                        | 20.50                     | 57.11              | 74.00             | -16.89         | peak    |
|     |                    | 26.90                        | 20.50                     | 47.40              | 54.00             | -6.60          | average |
| 6   | 17525.5657         | 36.76                        | 19.14                     | 55.90              | 74.00             | -18.10         | peak    |
|     |                    | 27.53                        | 19.14                     | 46.67              | 54.00             | -7.33          | average |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. For below 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.  
 5. For above 3GHz part, Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.  
 6. Proper operation of the transmitter prior to adding the filter to the measurement chain.  
 7. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



### 9.3. SPURIOUS EMISSIONS (18~26GHz)

#### SPURIOUS EMISSIONS (CH19, WORST-CASE CONFIGURATION, HORIZONTAL)



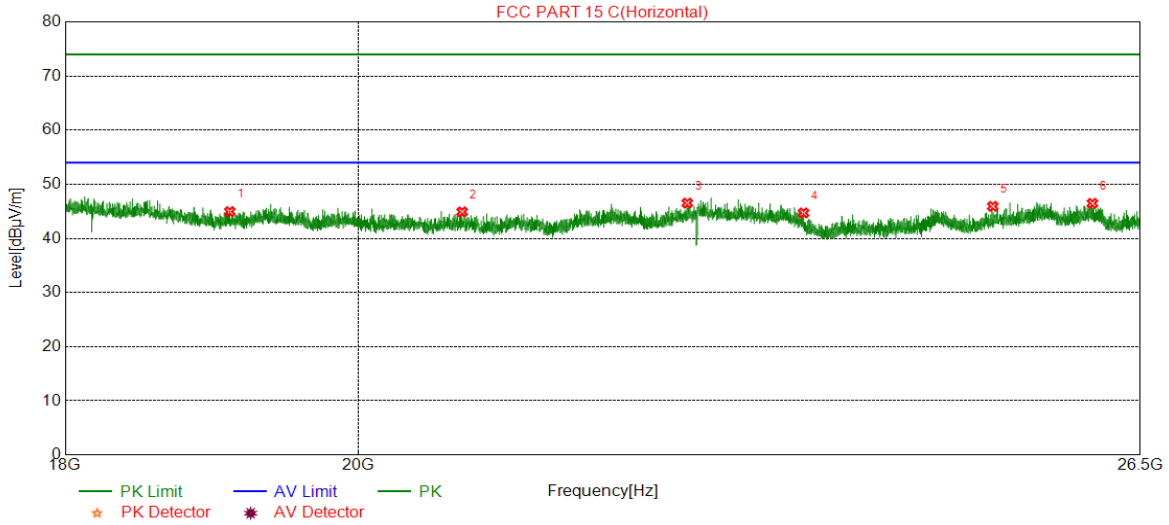
| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|--------|
| 1   | 18539.8040         | 47.96                        | -0.95                     | 47.01              | 74.00             | -26.99         | peak   |
| 2   | 20246.7747         | 45.91                        | -0.63                     | 45.28              | 74.00             | -28.72         | peak   |
| 3   | 22128.0128         | 45.24                        | 0.33                      | 45.57              | 74.00             | -28.43         | peak   |
| 4   | 23064.8065         | 45.01                        | 1.05                      | 46.06              | 74.00             | -27.94         | peak   |
| 5   | 24656.1656         | 45.92                        | -0.36                     | 45.56              | 74.00             | -28.44         | peak   |
| 6   | 25850.5351         | 44.23                        | 1.42                      | 45.65              | 74.00             | -28.35         | peak   |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.





**SPURIOUS EMISSIONS (CH19, WORST-CASE CONFIGURATION, VERTICAL)**



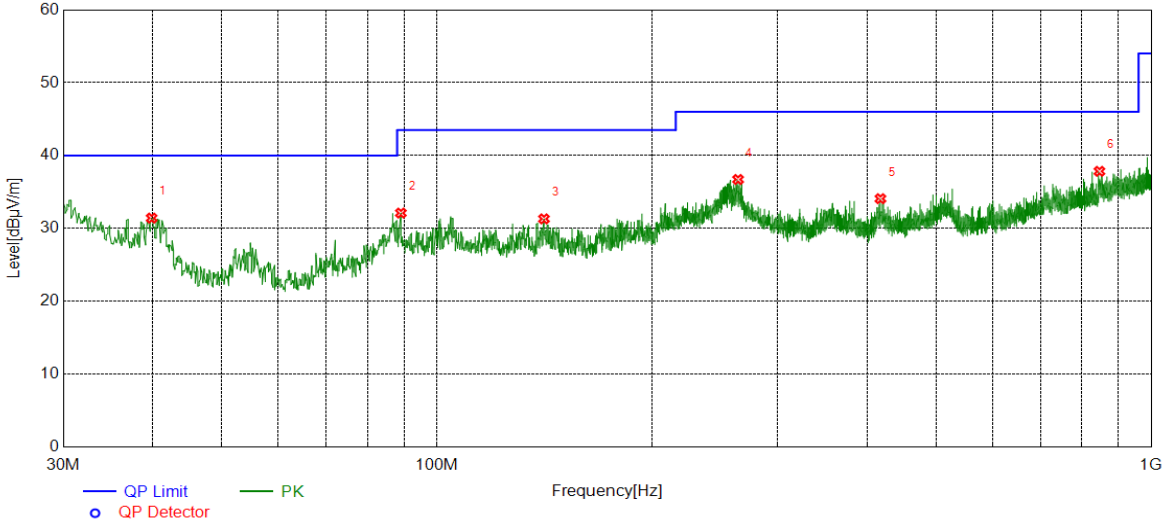
| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|--------|
| 1   | 19098.3098         | 45.99                        | -1.04                     | 44.95              | 74.00             | -29.05         | peak   |
| 2   | 20763.6264         | 45.78                        | -0.88                     | 44.90              | 74.00             | -29.10         | peak   |
| 3   | 22515.6516         | 45.70                        | 0.82                      | 46.52              | 74.00             | -27.48         | peak   |
| 4   | 23477.9478         | 44.77                        | -0.07                     | 44.70              | 74.00             | -29.30         | peak   |
| 5   | 25132.2132         | 45.68                        | 0.24                      | 45.92              | 74.00             | -28.08         | peak   |
| 6   | 26049.4549         | 44.90                        | 1.57                      | 46.47              | 74.00             | -27.53         | peak   |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Peak: Peak detector.  
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: All constructions and test modes have been tested, only the worst data record in the report

### 9.4. SPURIOUS EMISSIONS (0.03 ~ 1 GHz)

#### SPURIOUS EMISSIONS (CH19, WORST-CASE CONFIGURATION, HORIZONTAL)

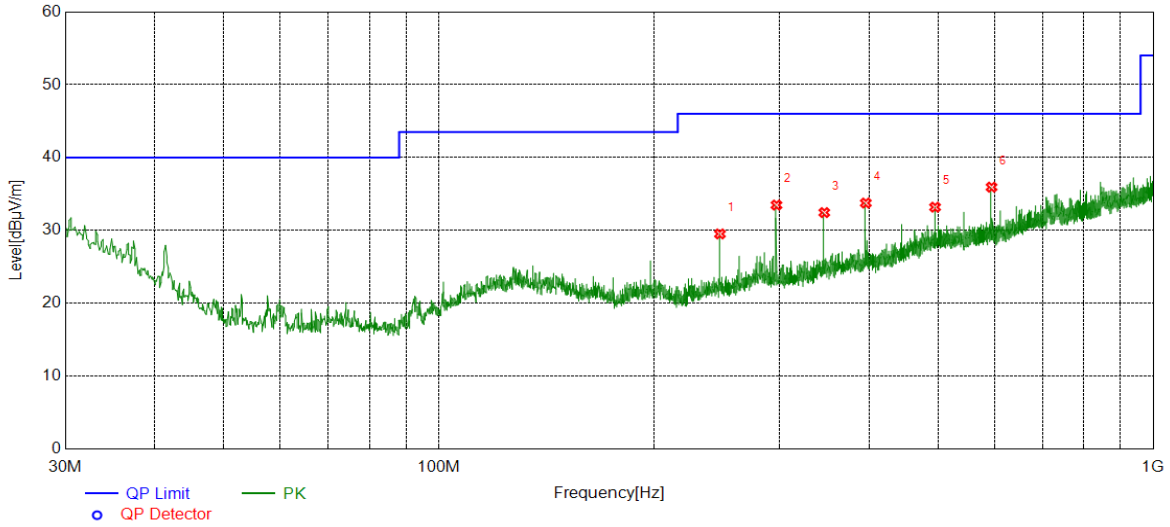


| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|--------|
| 1   | 39.8950            | 10.58                        | 20.84                     | 31.42              | 40.00             | -8.58          | peak   |
| 2   | 89.0789            | 17.75                        | 14.36                     | 32.11              | 43.50             | -11.39         | peak   |
| 3   | 141.2701           | 11.45                        | 19.86                     | 31.31              | 43.50             | -12.19         | peak   |
| 4   | 264.0844           | 17.37                        | 19.35                     | 36.72              | 46.00             | -9.28          | peak   |
| 5   | 417.8448           | 10.68                        | 23.40                     | 34.08              | 46.00             | -11.92         | peak   |
| 6   | 846.4336           | 7.46                         | 30.38                     | 37.84              | 46.00             | -8.16          | peak   |

Note: 1. Result Level = Read Level + Correct Factor.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



**SPURIOUS EMISSIONS (CH19, WORST-CASE CONFIGURATION, VERTICAL)**



| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|--------|
| 1   | 30.5214            | 8.94                         | 26.82                     | 35.76              | 40.00             | -4.24          | peak   |
| 2   | 35.9887            | 9.40                         | 23.33                     | 32.73              | 40.00             | -7.27          | peak   |
| 3   | 69.8710            | 22.57                        | 14.74                     | 37.31              | 40.00             | -2.69          | peak   |
| 4   | 221.2061           | 15.17                        | 17.67                     | 32.84              | 46.00             | -13.16         | peak   |
| 5   | 496.5197           | 8.48                         | 25.63                     | 34.11              | 46.00             | -11.89         | peak   |
| 6   | 844.8815           | 7.94                         | 30.36                     | 38.30              | 46.00             | -7.70          | peak   |

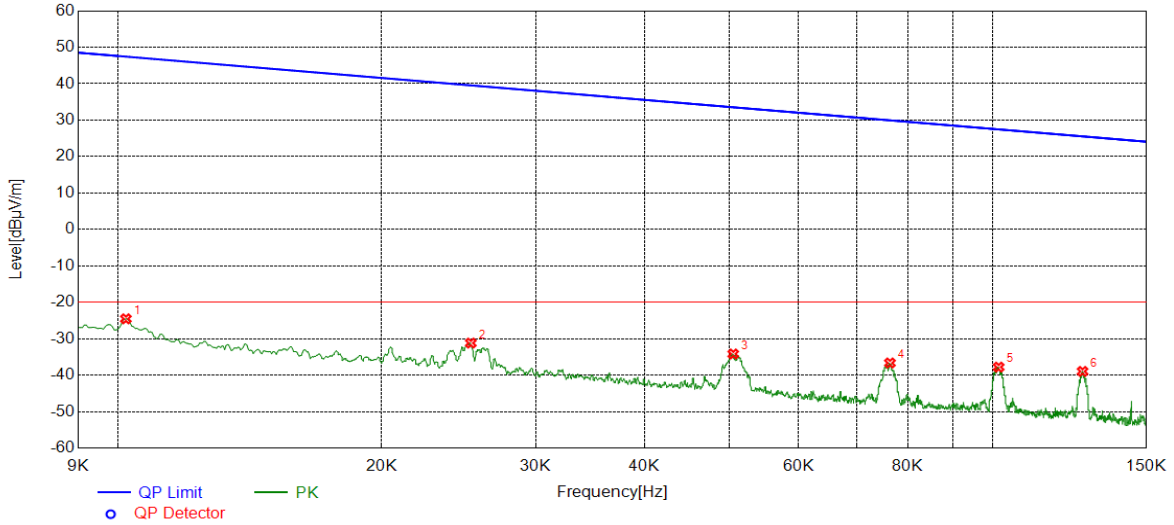
- Note: 1. Result Level = Read Level + Correct Factor.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Note: All constructions and test modes have been tested, only the worst data record in the report.

## 9.5. SPURIOUS EMISSIONS BELOW 30M

### SPURIOUS EMISSIONS (CH19, WORST-CASE CONFIGURATION, Face-on)

#### 9kHz ~ 150kHz

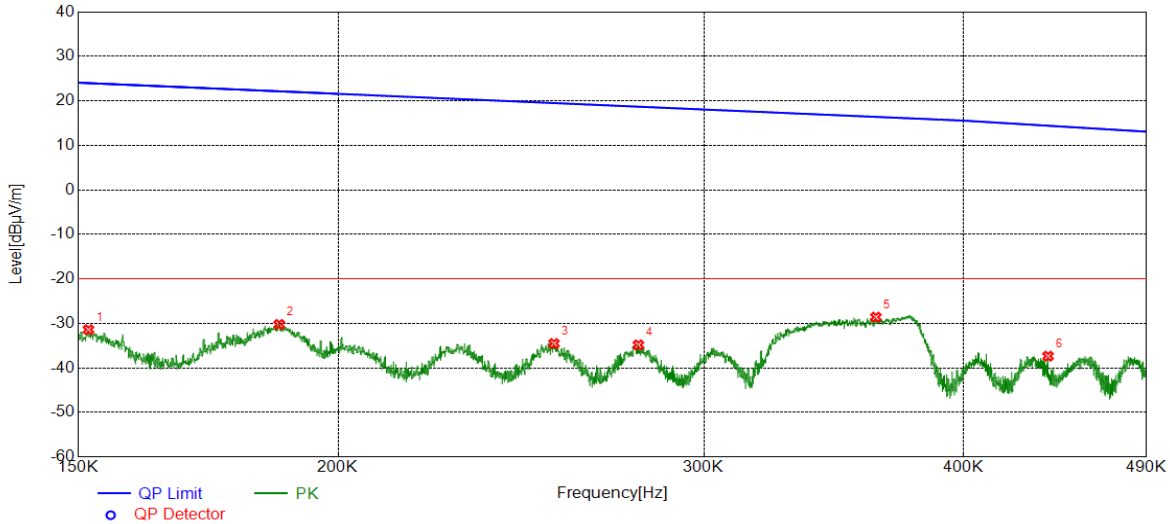


| No. | Frequency (MHz) | Reading Level (dBuV/m) | Correct Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------------|---------------------|-----------------|----------------|-------------|--------|
| 1   | 0.0102          | 36.72                  | -61.25              | -24.53          | 47.41          | -71.94      | peak   |
| 2   | 0.0253          | 29.80                  | -60.99              | -31.19          | 39.55          | -70.74      | peak   |
| 3   | 0.0505          | 26.98                  | -61.16              | -34.18          | 33.54          | -67.72      | peak   |
| 4   | 0.0763          | 24.86                  | -61.52              | -36.66          | 29.95          | -66.61      | peak   |
| 5   | 0.1016          | 23.08                  | -60.87              | -37.79          | 27.47          | -65.26      | peak   |
| 6   | 0.1267          | 22.20                  | -61.17              | -38.97          | 25.55          | -64.52      | peak   |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.  
 3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report



**150kHz ~ 490kHz**

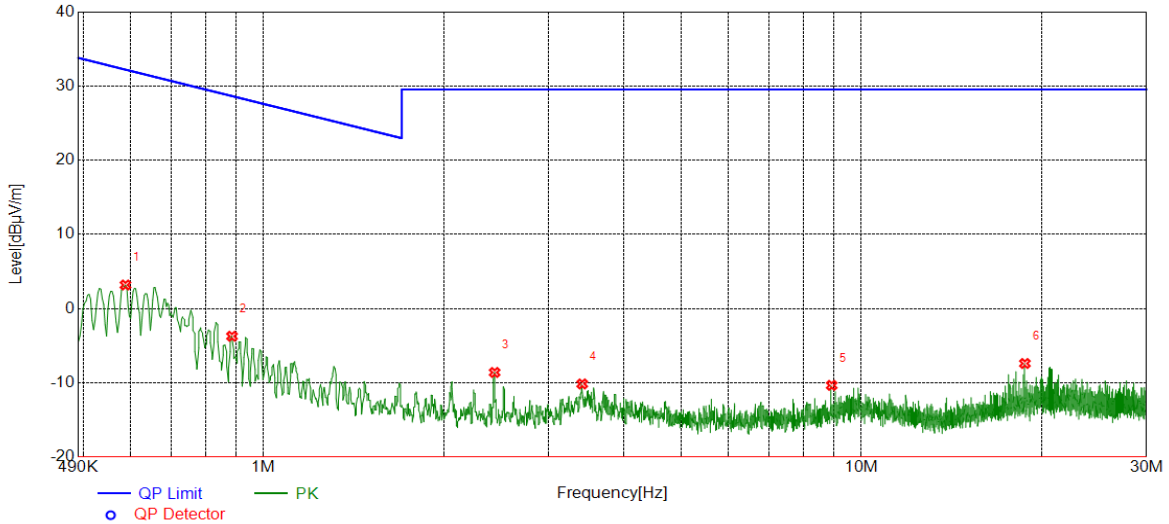


| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|--------|
| 1   | 0.1517             | 30.03                        | -61.44                    | -31.41             | 23.98             | -55.39         | peak   |
| 2   | 0.1874             | 31.03                        | -61.26                    | -30.23             | 22.15             | -52.38         | peak   |
| 3   | 0.2541             | 26.42                        | -60.94                    | -34.52             | 19.50             | -54.02         | peak   |
| 4   | 0.2790             | 26.08                        | -60.92                    | -34.84             | 18.69             | -53.53         | peak   |
| 5   | 0.3630             | 32.25                        | -60.84                    | -28.59             | 16.40             | -44.99         | peak   |
| 6   | 0.4393             | 23.42                        | -60.78                    | -37.36             | 14.41             | -51.77         | peak   |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.  
 3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report



**490kHz ~ 30MHz**



| No. | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Correct<br>Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|------------------------------|---------------------------|--------------------|-------------------|----------------|--------|
| 1   | 0.5874             | 23.93                        | -20.75                    | 3.18               | 32.22             | -29.04         | peak   |
| 2   | 0.8855             | 16.91                        | -20.64                    | -3.73              | 28.66             | -32.39         | peak   |
| 3   | 2.4349             | 11.83                        | -20.44                    | -8.61              | 29.54             | -38.15         | peak   |
| 4   | 3.4118             | 10.25                        | -20.41                    | -10.16             | 29.54             | -39.70         | peak   |
| 5   | 8.9189             | 8.93                         | -19.28                    | -10.35             | 29.54             | -39.89         | peak   |
| 6   | 18.7703            | 10.52                        | -17.92                    | -7.40              | 29.54             | -36.94         | peak   |

- Note: 1. Measurement = Reading Level + Correct Factor.  
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.  
 3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report

Note: All constructions and test modes and channels have been tested, only the worst data record in the report.

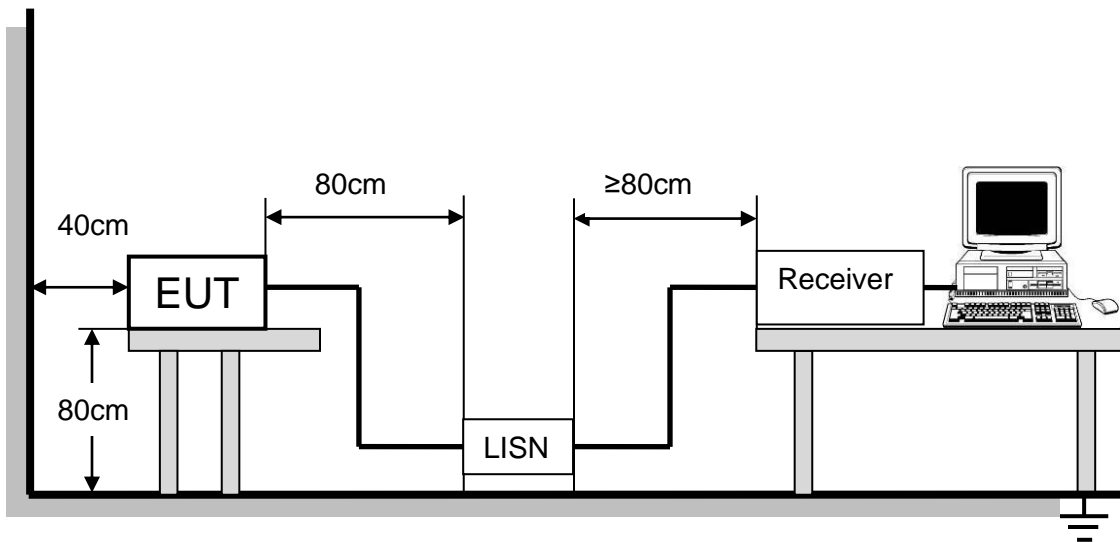
## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

Please refer to CFR 47 FCC §15.207 (a)

| FREQUENCY (MHz) | Quasi-peak | Average   |
|-----------------|------------|-----------|
| 0.15 -0.5       | 66 - 56 *  | 56 - 46 * |
| 0.50 -5.0       | 56.00      | 46.00     |
| 5.0 -30.0       | 60.00      | 50.00     |

### TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

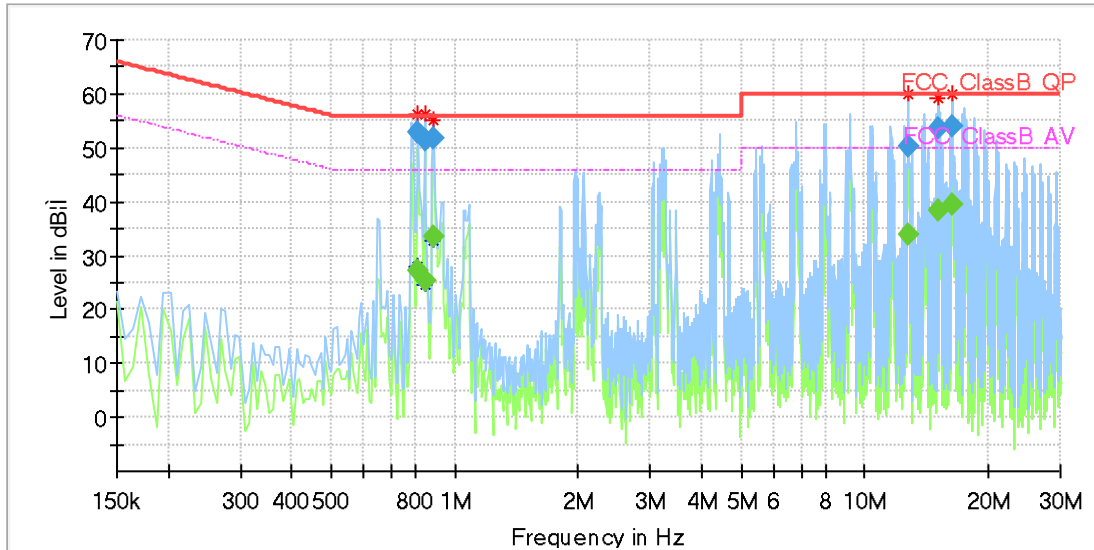
### TEST ENVIRONMENT

|                     |        |                   |         |
|---------------------|--------|-------------------|---------|
| Temperature         | 20°C   | Relative Humidity | 56%     |
| Atmosphere Pressure | 101kPa | Test Voltage      | AC 120V |



**TEST RESULTS**

**LINE N RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)**



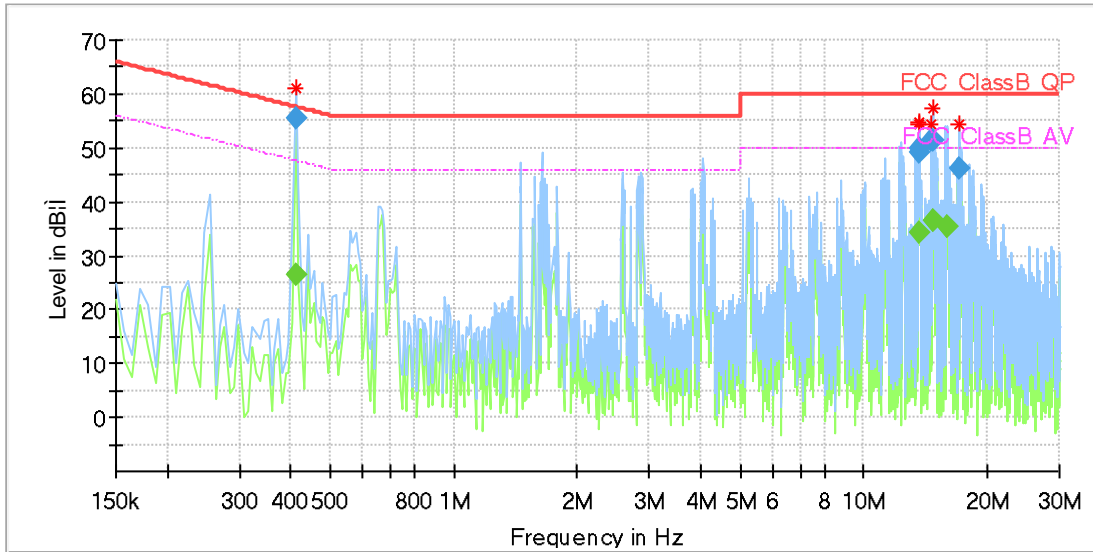
**Final\_Result**

| Frequency (MHz) | QuasiPeak (dBuV) | Average (dBuV) | Limit (dBuV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.814163        | ---              | 27.24          | 46.00        | 18.76       | 1000.0          | 9.000           | N    | OFF    | 9.5        |
| 0.814163        | 53.06            | ---            | 56.00        | 2.94        | 1000.0          | 9.000           | N    | OFF    | 9.5        |
| 0.844013        | ---              | 25.17          | 46.00        | 20.83       | 1000.0          | 9.000           | N    | OFF    | 9.6        |
| 0.844013        | 51.38            | ---            | 56.00        | 4.62        | 1000.0          | 9.000           | N    | OFF    | 9.6        |
| 0.888788        | ---              | 33.39          | 46.00        | 12.61       | 1000.0          | 9.000           | N    | OFF    | 9.8        |
| 0.888788        | 51.61            | ---            | 56.00        | 4.39        | 1000.0          | 9.000           | N    | OFF    | 9.8        |
| 12.769088       | 50.17            | ---            | 60.00        | 9.83        | 1000.0          | 9.000           | N    | OFF    | 9.8        |
| 12.769088       | ---              | 33.80          | 50.00        | 16.20       | 1000.0          | 9.000           | N    | OFF    | 9.8        |
| 15.172013       | 53.47            | ---            | 60.00        | 6.53        | 1000.0          | 9.000           | N    | OFF    | 9.7        |
| 15.172013       | ---              | 38.30          | 50.00        | 11.70       | 1000.0          | 9.000           | N    | OFF    | 9.7        |
| 16.366013       | ---              | 39.47          | 50.00        | 10.53       | 1000.0          | 9.000           | N    | OFF    | 9.8        |
| 16.366013       | 54.09            | ---            | 60.00        | 5.91        | 1000.0          | 9.000           | N    | OFF    | 9.8        |





**LINE L RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)**



**Final Result**

| Frequency (MHz) | QuasiPeak (dBuV) | Average (dBuV) | Limit (dBuV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.411188        | ---              | 26.43          | 47.62        | 21.19       | 1000.0          | 9.000           | L1   | OFF    | 9.7        |
| 0.411188        | 55.32            | ---            | 57.62        | 2.30        | 1000.0          | 9.000           | L1   | OFF    | 9.7        |
| 13.582500       | ---              | 34.16          | 50.00        | 15.84       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 13.582500       | 49.79            | ---            | 60.00        | 10.21       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 13.672050       | 49.24            | ---            | 60.00        | 10.76       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 14.589938       | 51.57            | ---            | 60.00        | 8.43        | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 14.739188       | ---              | 36.67          | 50.00        | 13.33       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 14.798888       | ---              | 36.64          | 50.00        | 13.36       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 14.798888       | 51.33            | ---            | 60.00        | 8.67        | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 15.970500       | ---              | 35.22          | 50.00        | 14.78       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 16.000350       | ---              | 35.21          | 50.00        | 14.79       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |
| 17.164500       | 46.04            | ---            | 60.00        | 13.96       | 1000.0          | 9.000           | L1   | OFF    | 9.8        |

Note: All the test modes have been tested, only the worst data record in the report.



## 11. ANTENNA REQUIREMENTS

### APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### RESULTS

Complies

**END OF REPORT**