



**FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2**

CERTIFICATION TEST REPORT

For

Cable-free, Radio-free, Autonomous Data Recorder

MODEL NUMBER: GSX-3

FCC ID: WAOGSXLC

IC: 7733A-GSXLC

REPORT NUMBER: 4788200403.1-3

ISSUE DATE: May 3, 2018

Prepared for

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Prepared by

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Revision History

| Rev. | Issue Date | Revisions | Revised By |
|------|------------|---------------|------------|
| -- | 05/03/2018 | Initial Issue | |



| Summary of Test Results | | | |
|-------------------------|---|--|--------------|
| Clause | Test Items | FCC/IC Rules | Test Results |
| 1 | 6dB Bandwidth and 99% Bandwidth | FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a) | PASS |
| 2 | Peak Conducted Output Power | FCC 15.247 (b) (3) RSS-247 Clause 5.4 € | PASS |
| 3 | Power Spectral Density | FCC 15.247 € RSS-247 Clause 5.2 (b) | PASS |
| 4 | Conducted Bandedge and Spurious Emission | FCC 15.247 (d) RSS-247 Clause 5.5 | PASS |
| 5 | Radiated Bandedge and Spurious Emission | FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 | PASS |
| 6 | Conducted Emission Test For AC Power Port | FCC 15.207 RSS-GEN Clause 8.8 | PASS |
| 7 | Antenna Requirement | FCC 15.203 RSS-GEN Clause 8.3 | PASS |



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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Geospace Technologies Inc.
Address: 7007 Pinemont Houston, TX 77040.USA

Manufacturer Information

Company Name: Geospace Technologies Inc.
Address: 7007 Pinemont Houston, TX 77040.USA

EUT Description

EUT Name: Cable-free, Radio-free, Autonomous Data Recorder
Model: GSX-3
Brand Name: /
Sample Status: Normal
Sample ID: 1230384
Sample Received Date: October 26, 2017
Date of Tested: November 15, 2017 ~ May 02, 2018

| APPLICABLE STANDARDS | |
|-----------------------|--------------|
| STANDARD | TEST RESULTS |
| FCC Part 15 Subpart C | PASS |
| ISED RSS-247 Issue 2 | PASS |
| ISED RSS-GEN Issue 4 | PASS |

Tested By:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB414788 D01 Radiated Test Site v01, ANSI C63.10-2013, 558074 D01 DTS Meas Guidance v04, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ISED RSS-247 Issue 2, ISED RSS-GEN Issue 4.

3. FACILITIES AND ACCREDITATION

| | |
|---------------------------|--|
| Accreditation Certificate | <p>A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been assessed and proved to be in compliance with A2LA.</p> <p>IAS (Lab Code: TL-702) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has demonstrated compliance with ISO/IEC Standard 17025:2005, General requirements for the competence of testing and calibration laboratories</p> <p>FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p>IC(Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.</p> <p>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B, the VCCI registration No. is C-20012 and T-20011</p> |
|---------------------------|--|

Note:

1. All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
2. The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch 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.
3. For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OATS.



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 |
|---|---------------------|
| Uncertainty for Conduction emission test | 2.90dB |
| Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz) | 2.2dB |
| Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz) | 4.52dB |
| Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission) | 5.04dB(1-6GHz) |
| | 5.30dB (6GHz-18Gz) |
| | 5.23dB (18GHz-26Gz) |
| 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

| | | | |
|---------------------|--|---------------------|-----------|
| EUT Name | Cable-free, Radio-free, Autonomous Data Recorder | | |
| EUT Description | The EUT is a Data Recorder with ZigBee. | | |
| Model | GSX-3 | | |
| Product Description | Operation Frequency | 2405 MHz ~ 2475 MHz | |
| | Modulation Type | | Data Rate |
| | O-QPSK | | 250kbs |
| Hardware Version | 1A | | |
| Software Version | 4.39 | | |
| Rated Power | DC 16V by external battery | | |

5.2. MAXIMUM OUTPUT POWER

| Mode | Frequency (MHz) | Channel Number | Max Output Power (dBm) |
|--------|-----------------|----------------|------------------------|
| ZigBee | 2405-2475 | 11-25 [15] | 1.819 |

5.3. CHANNEL LIST

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 11 | 2405 | 15 | 2425 | 19 | 2445 | 23 | 2465 |
| 12 | 2410 | 16 | 2430 | 20 | 2450 | 24 | 2470 |
| 13 | 2415 | 17 | 2435 | 21 | 2455 | 25 | 2475 |
| 14 | 2420 | 18 | 2440 | 22 | 2460 | | |

5.4. TEST CHANNEL CONFIGURATION

| Test Mode | Test Channel | Frequency |
|-----------|---------------------|---------------------------|
| ZigBee | CH 11, CH 18, CH 25 | 2405MHz, 2440MHz, 2475MHz |



5.5. THE WORSE CASE POWER SETTING PARAMETER

| The Worst Case Power Setting Parameter under 2400 ~ 2483.5MHz Band | | | | |
|--|-------------------------|--------------|------------|------------|
| Test Software | | GSRTTester | | |
| Modulation Type | Transmit Antenna Number | Test Channel | | |
| | | CH 11 | CH 18 | CH 25 |
| O-QPSK | 1 | Full Power | Full Power | Full Power |

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

| Ant. | Frequency (MHz) | Antenna Type | Antenna Gain (dBi) |
|------|-----------------|--------------|--------------------|
| 1 | 2405-2475 | PCB Antenna | 3.3 |

| Test Mode | Transmit and Receive Mode | Description |
|-----------|---------------------------|--|
| ZigBee | ☒1TX, 1RX | Chain 1 can be used as transmitting/receiving antenna. |

5.7. TEST ENVIRONMENT

| Environment Parameter | Selected Values During Tests | |
|-----------------------|------------------------------|-----------|
| Relative Humidity | 55 ~ 65% | |
| Atmospheric Pressure: | 1025Pa | |
| Temperature | TN | 23 ~ 28°C |
| Voltage : | VL | N/A |
| | VN | DC 16V |
| | VH | N/A |

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature



5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| Item | Equipment | Brand Name | Model Name | P/N |
|------|---|------------|------------|----------------|
| 1 | Laptop | ThinkPad | T460S | PB-4600Y 12/10 |
| 2 | Power Cable (Combined With Network Cable) | GEOSPACE | N/A | N/A |
| 3 | USB to Serial Cable | N/A | N/A | N/A |

I/O CABLES

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|----------|-------|----------------|------------|-----------------|---------|
| 1 | Power | N/A | Unshielded | 1.0 | N/A |

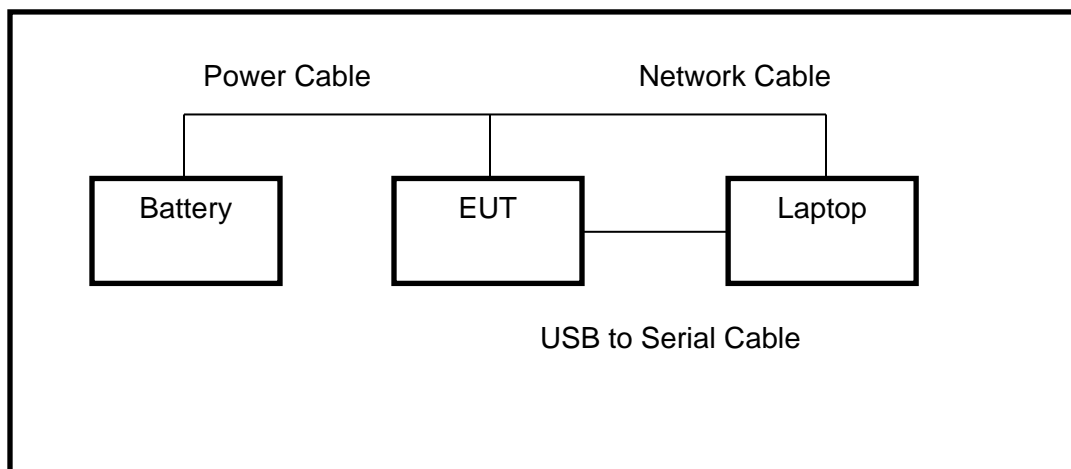
ACCESSORY

| Item | Accessory | Brand Name | Model Name | S/N |
|------|-----------|------------|---------------------|----------|
| 1 | Battery | GEOSPACE | GEOSPACE BX Battery | 00127530 |

TEST SETUP

The EUT can work in an engineer mode with software through a Laptop before the test.

SETUP DIAGRAM FOR TEST





5.9. MEASURING INSTRUMENT AND SOFTWARE USED

The previous calibrated time:

| Conducted Emissions | | | | | | |
|-------------------------------------|---|--------------|------------|---------------|---------------|---------------|
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| <input checked="" type="checkbox"/> | EMI Test Receiver | R&S | ESR3 | 101961 | Dec.20, 2016 | Dec.19, 2017 |
| <input checked="" type="checkbox"/> | Two-Line V-Network | R&S | ENV216 | 101983 | Dec.20, 2016 | Dec.19, 2017 |
| <input checked="" type="checkbox"/> | Artificial Mains Networks | Schwarzbeck | NSLK 8126 | 8126465 | Feb.10, 2017 | Feb.10, 2018 |
| Software | | | | | | |
| Used | Description | | | Manufacturer | Name | Version |
| <input checked="" type="checkbox"/> | Test Software for Conducted disturbance | | | Farad | EZ-EMC | Ver. UL-3A1 |
| Radiated Emissions | | | | | | |
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| <input checked="" type="checkbox"/> | MXE EMI Receiver | KESIGHT | N9038A | MY56400036 | Feb. 24, 2017 | Feb. 24, 2018 |
| <input checked="" type="checkbox"/> | Hybrid Log Periodic Antenna | TDK | HLP-3003C | 130960 | Jan.09, 2016 | Jan.09, 2019 |
| <input checked="" type="checkbox"/> | Preamplifier | HP | 8447D | 2944A09099 | Feb. 13, 2017 | Feb. 13, 2018 |
| <input checked="" type="checkbox"/> | EMI Measurement Receiver | R&S | ESR26 | 101377 | Dec. 20, 2016 | Dec. 20, 2017 |
| <input checked="" type="checkbox"/> | Horn Antenna | TDK | HRN-0118 | 130939 | Jan. 09, 2016 | Jan. 09, 2019 |
| <input checked="" type="checkbox"/> | High Gain Horn Antenna | Schwarzbeck | BBHA-9170 | 691 | Jan.06, 2016 | Jan.06, 2019 |
| <input checked="" type="checkbox"/> | Preamplifier | TDK | PA-02-0118 | TRS-305-00066 | Jan. 14, 2017 | Jan. 14, 2018 |
| <input checked="" type="checkbox"/> | Preamplifier | TDK | PA-02-2 | TRS-307-00003 | Dec. 20, 2016 | Dec. 20, 2017 |
| <input checked="" type="checkbox"/> | Loop antenna | Schwarzbeck | 1519B | 00008 | Mar. 26, 2016 | Mar. 26, 2019 |
| Software | | | | | | |
| Used | Description | | | Manufacturer | Name | Version |
| <input checked="" type="checkbox"/> | Test Software for Radiated disturbance | | | Farad | EZ-EMC | Ver. UL-3A1 |
| Other instruments | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | Keysight | N9030A | MY55410512 | Dec. 20, 2016 | Dec. 20, 2017 |
| <input checked="" type="checkbox"/> | Power Meter | Keysight | N9031A | MY55416024 | Feb. 13, 2017 | Feb. 13, 2018 |
| <input checked="" type="checkbox"/> | Power Sensor | Keysight | N9323A | MY55440013 | Feb. 13, 2017 | Feb. 13, 2018 |



The last calibrated time:

The last calibrated time:

| Conducted Emissions | | | | | | |
|-------------------------------------|---|--------------|--------------|---------------|---------------|---------------|
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| <input checked="" type="checkbox"/> | EMI Test Receiver | R&S | ESR3 | 101961 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Two-Line V-Network | R&S | ENV216 | 101983 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Artificial Mains Networks | Schwarzbeck | NSLK 8126 | 8126465 | Dec.12,2017 | Dec.11,2018 |
| Software | | | | | | |
| Used | Description | | Manufacturer | Name | | Version |
| <input checked="" type="checkbox"/> | Test Software for Conducted disturbance | | Farad | EZ-EMC | | Ver. UL-3A1 |
| Radiated Emissions | | | | | | |
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| <input checked="" type="checkbox"/> | MXE EMI Receiver | KESIGHT | N9038A | MY56400036 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Hybrid Log Periodic Antenna | TDK | HLP-3003C | 130960 | Jan.09, 2016 | Jan.09, 2019 |
| <input checked="" type="checkbox"/> | Preamplifier | HP | 8447D | 2944A09099 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | EMI Measurement Receiver | R&S | ESR26 | 101377 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Horn Antenna | TDK | HRN-0118 | 130939 | Jan. 09, 2016 | Jan. 09, 2019 |
| <input checked="" type="checkbox"/> | High Gain Horn Antenna | Schwarzbeck | BBHA-9170 | 691 | Jan.06, 2016 | Jan.06, 2019 |
| <input checked="" type="checkbox"/> | Preamplifier | TDK | PA-02-0118 | TRS-305-00066 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Preamplifier | TDK | PA-02-2 | TRS-307-00003 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Loop antenna | Schwarzbeck | 1519B | 00008 | Mar. 26, 2016 | Mar. 25, 2019 |
| Software | | | | | | |
| Used | Description | | Manufacturer | Name | | Version |
| <input checked="" type="checkbox"/> | Test Software for Radiated disturbance | | Farad | EZ-EMC | | Ver. UL-3A1 |
| Other instruments | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | Keysight | N9030A | MY55410512 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Power Meter | Keysight | N1911A | MY55416024 | Dec.12,2017 | Dec.11,2018 |
| <input checked="" type="checkbox"/> | Power Sensor | Keysight | N1921A | MY51100041 | Dec.12,2017 | Dec.11,2018 |



6. MEASUREMENT METHODS

| No. | Test Item | KDB Name | Section |
|-----|---|--------------------------------------|---------|
| 1 | 6 dB Bandwidth | KDB 558074 D01 DTS Meas Guidance v04 | 8.0 |
| 2 | Peak Output Power | KDB 558074 D01 DTS Meas Guidance v04 | 9.1.1 |
| 3 | Power Spectral Density | KDB 558074 D01 DTS Meas Guidance v04 | 10.2 |
| 4 | Out-of-band emissions in non-restricted bands | KDB 558074 D01 DTS Meas Guidance v04 | 11.0 |
| 5 | Out-of-band emissions in restricted bands | KDB 558074 D01 DTS Meas Guidance v04 | 12.1 |
| 6 | Band-edge | KDB 558074 D01 DTS Meas Guidance v04 | 13.3.2 |
| 7 | Conducted Emission Test For AC Power Port | ANSI C63.10-2013 | 7.3 |



7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

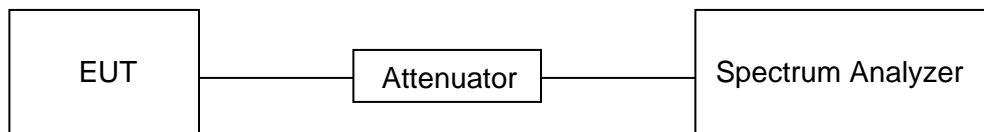
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP

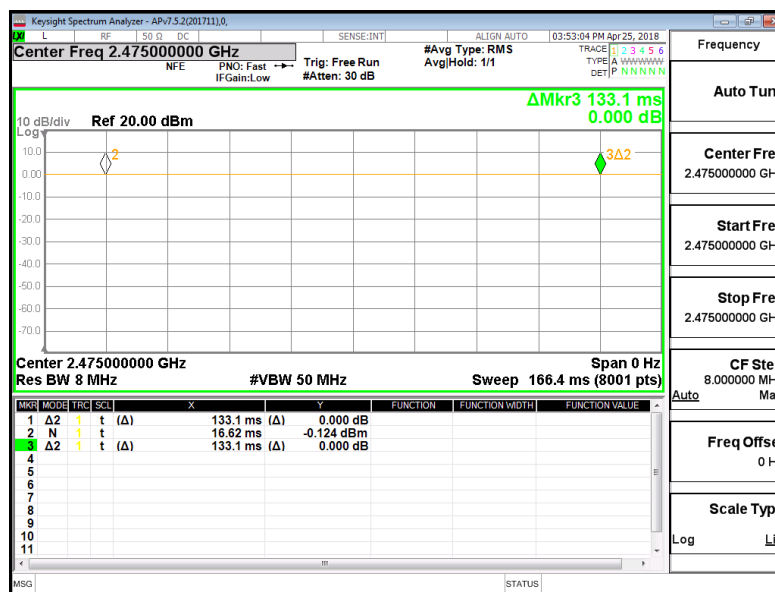


RESULTS

| Mode | On Time (msec) | Period (msec) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (db) | 1/T Minimum VBW (KHz) |
|--------|----------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|
| ZigBee | 133.1 | 133.1 | 1 | 100 | 0 | 0.01 |

Note: Duty Cycle Correction Factor= $10\log(1/x)$.
Where: x is Duty Cycle(Linear)
Where: T is On Time (transmit duration)

ON TIME AND DUTY CYCLE HIGH CH





7.2. 99% & 6 dB DTS BANDWIDTH

LIMITS

| FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2 | | | |
|--|----------------|------------------------------|-----------------------|
| Section | Test Item | Limit | Frequency Range (MHz) |
| FCC 15.247(a)(2) RSS-247 5.1 (a) | 6 dB Bandwidth | $\geq 500\text{KHz}$ | 2400-2483.5 |
| RSS-Gen Clause 6.6 | 99% Bandwidth | For reporting purposes only. | 2400-2483.5 |

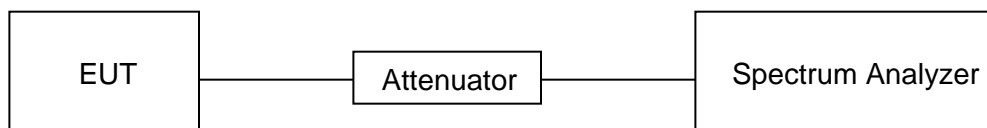
TEST PROCEDURE

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 | For 6dB Bandwidth :100K For 99% Bandwidth :1% to 5% of the occupied bandwidth |
| VBW | For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ For 99% Bandwidth : approximately $3 \times \text{RBW}$ |
| 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 and 99% relative to the maximum level measured in the fundamental emission.

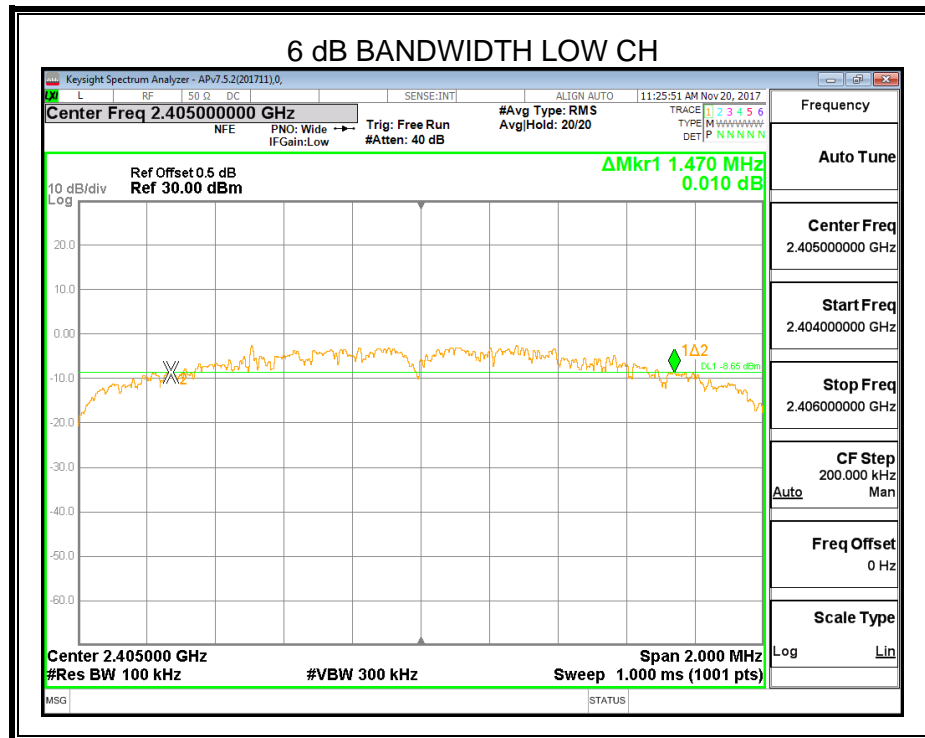
TEST SETUP

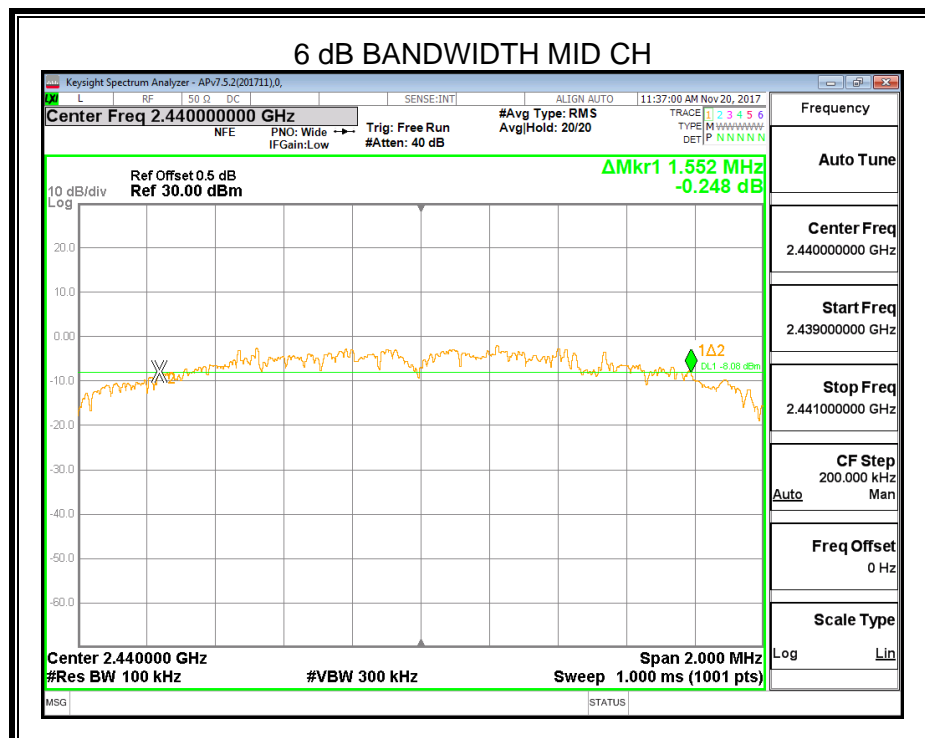
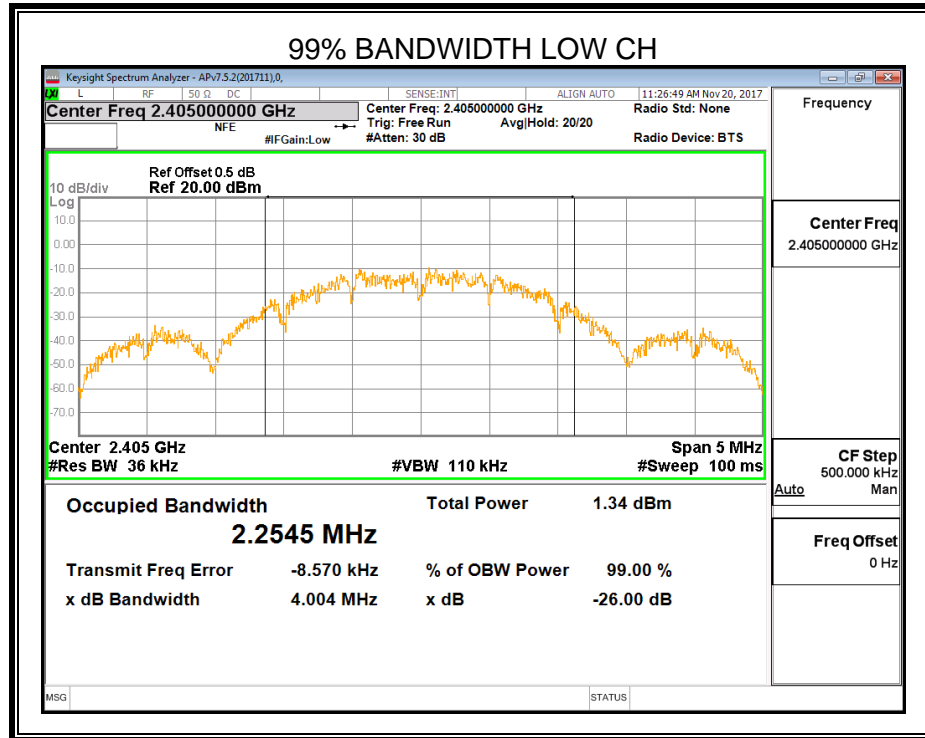


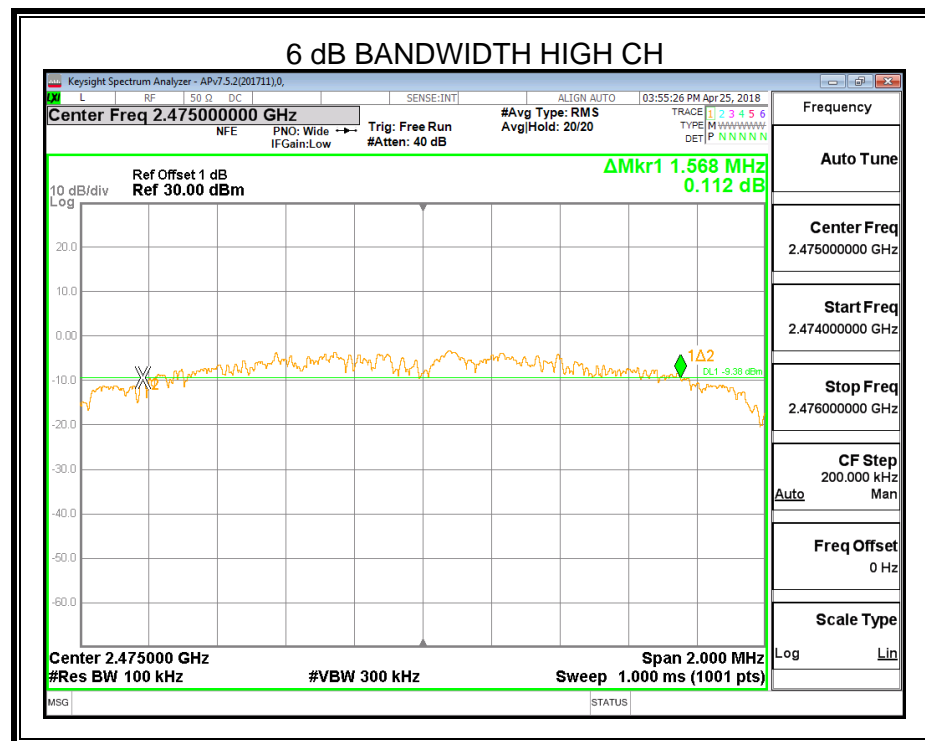
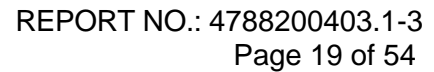


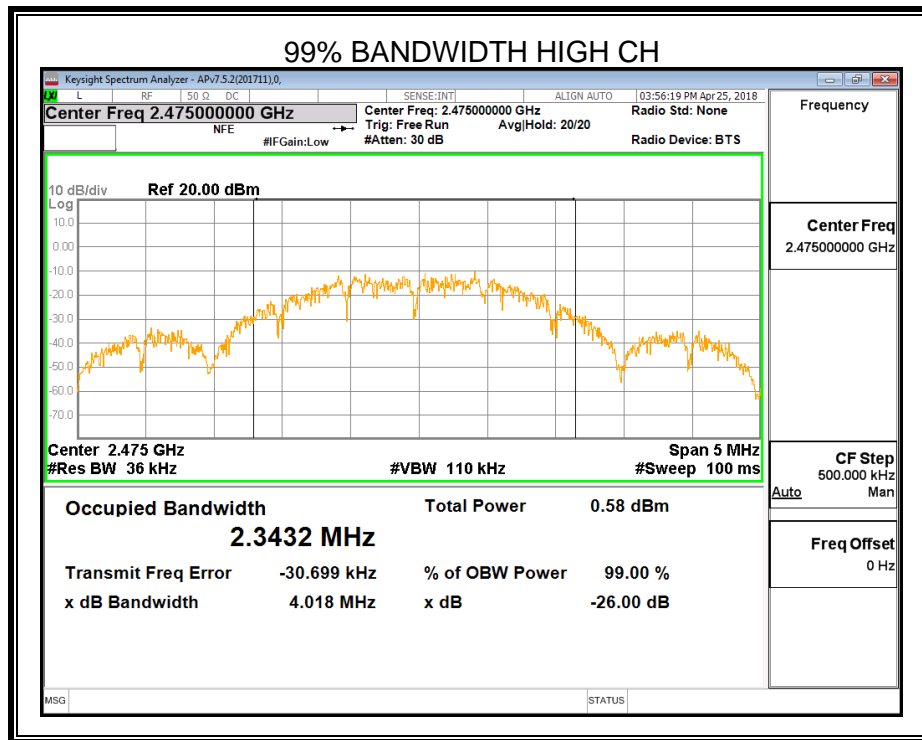
RESULTS

| Channel | Frequency (MHz) | 6dB bandwidth (MHz) | 99% Bandwidth (MHz) | Limit (kHz) | Result |
|---------|-----------------|---------------------|---------------------|-------------|--------|
| Low | 2405 | 1.470 | 2.2545 | 500 | Pass |
| Middle | 2440 | 1.552 | 2.2779 | 500 | Pass |
| High | 2475 | 1.568 | 2.3432 | 500 | Pass |











7.3. PEAK CONDUCTED OUTPUT POWER

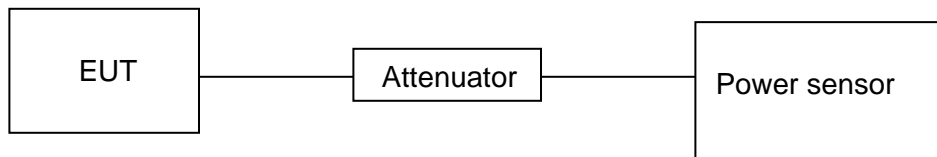
LIMITS

| FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2 | | | |
|--|----------------------|-----------------|--------------------------|
| Section | Test Item | Limit | Frequency Range (MHz) |
| FCC 15.247(b)(3) RSS-247 5.4 (e) | Peak Output Power | 1 watt or 30dBm | 2400-2483.5 |

TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure peak power each channel.

TEST SETUP



RESULTS

| Test Channel | Frequency | Maximum Conducted Output Power(PK) | LIMIT |
|--------------|-----------|------------------------------------|-------|
| | (MHz) | (dBm) | dBm |
| Low | 2405 | 1.819 | 30 |
| Middle | 2440 | 1.499 | 30 |
| High | 2475 | 0.886 | 30 |



7.4. POWER SPECTRAL DENSITY

LIMITS

| FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2 | | | |
|--|------------------------|-------------------------|-----------------------|
| Section | Test Item | Limit | Frequency Range (MHz) |
| FCC §15.247 (e) RSS-247 5.2 (b) | Power Spectral Density | 8 dBm in any 3 kHz band | 2400-2483.5 |

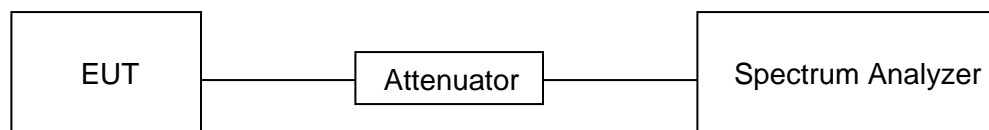
TEST PROCEDURE

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 | $1.5 \times \text{DTS bandwidth}$ |
| 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.

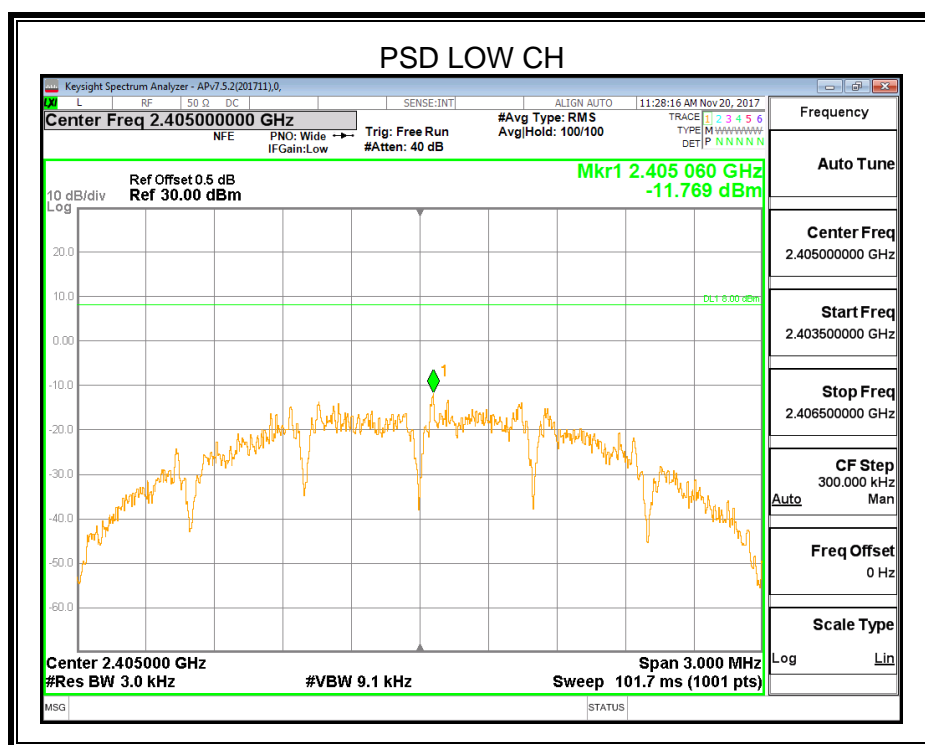
TEST SETUP

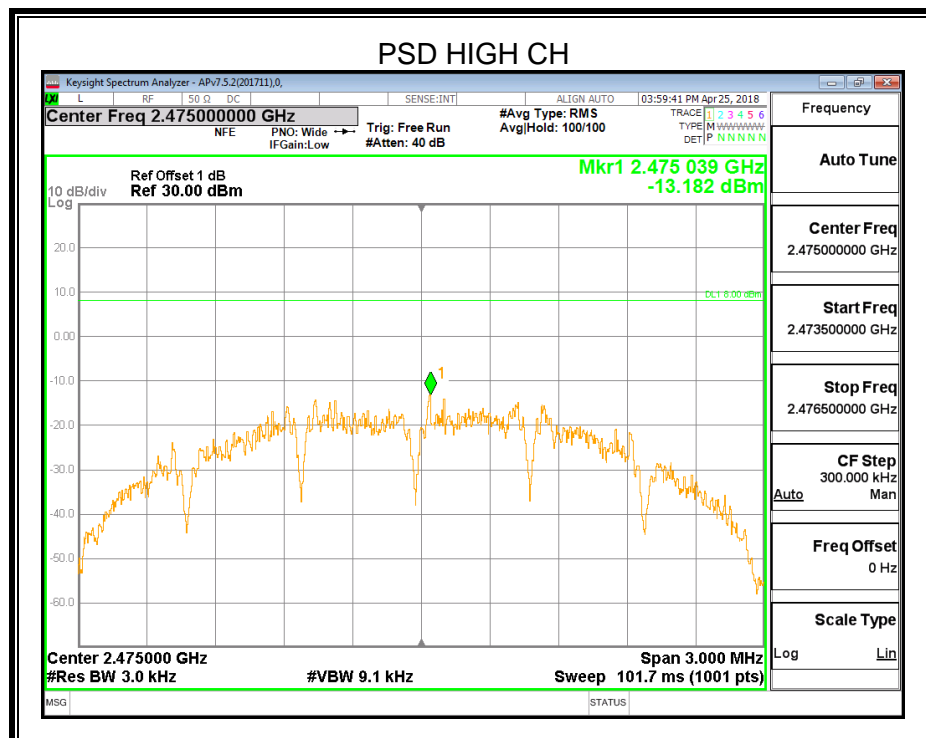
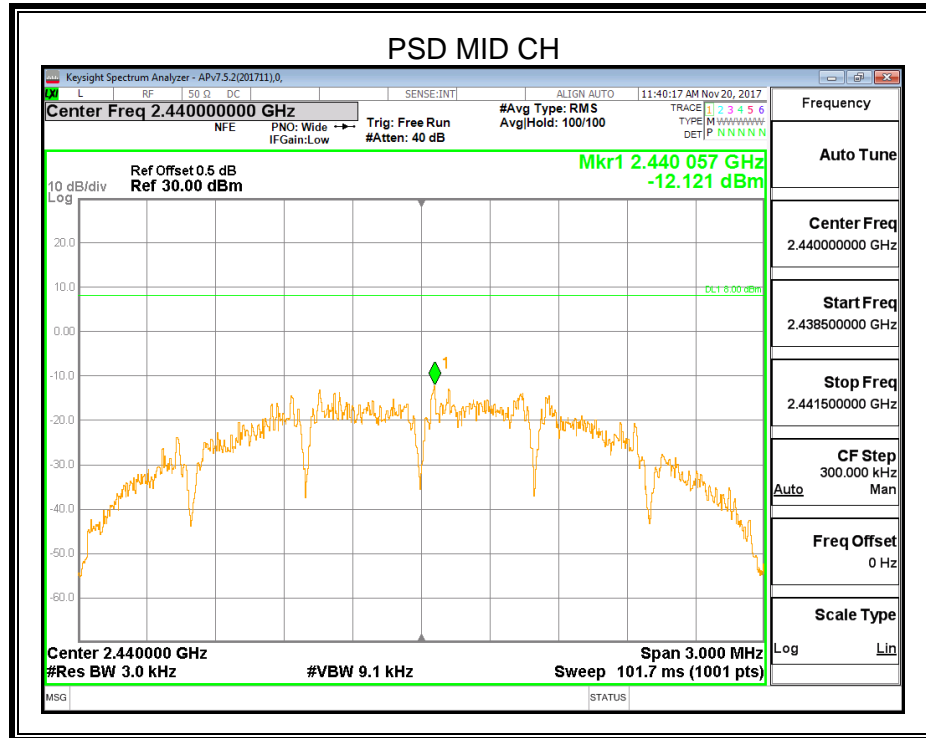




RESULTS

| Frequency | Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|-----------|-----------------------------------|------------------|--------|
| 2405 MHz | -11.769 | 8 | PASS |
| 2440 MHz | -12.121 | 8 | PASS |
| 2475 MHz | -13.182 | 8 | PASS |







7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

| FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2 | | |
|--|---|---|
| Section | Test Item | Limit |
| FCC §15.247 (d) RSS-247 5.5 | 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:

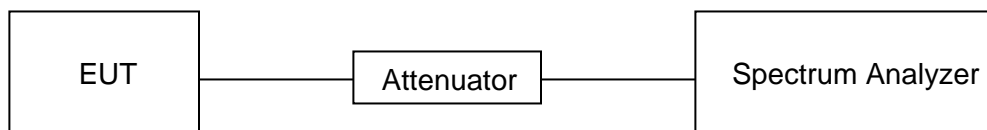
| | |
|------------------|--|
| Center Frequency | The centre frequency of the channel under test |
| Detector | Peak |
| RBW | 100K |
| VBW | $\geq 3 \times \text{RBW}$ |
| Span | 1.5 x DTS bandwidth |
| Trace | Max hold |
| Sweep time | Auto couple. |

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

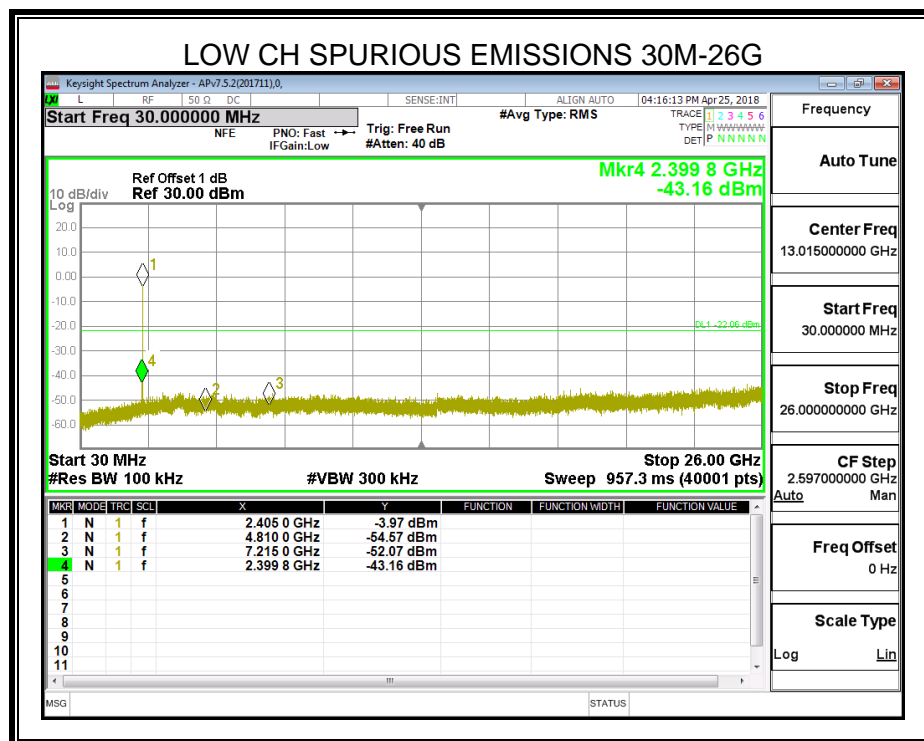
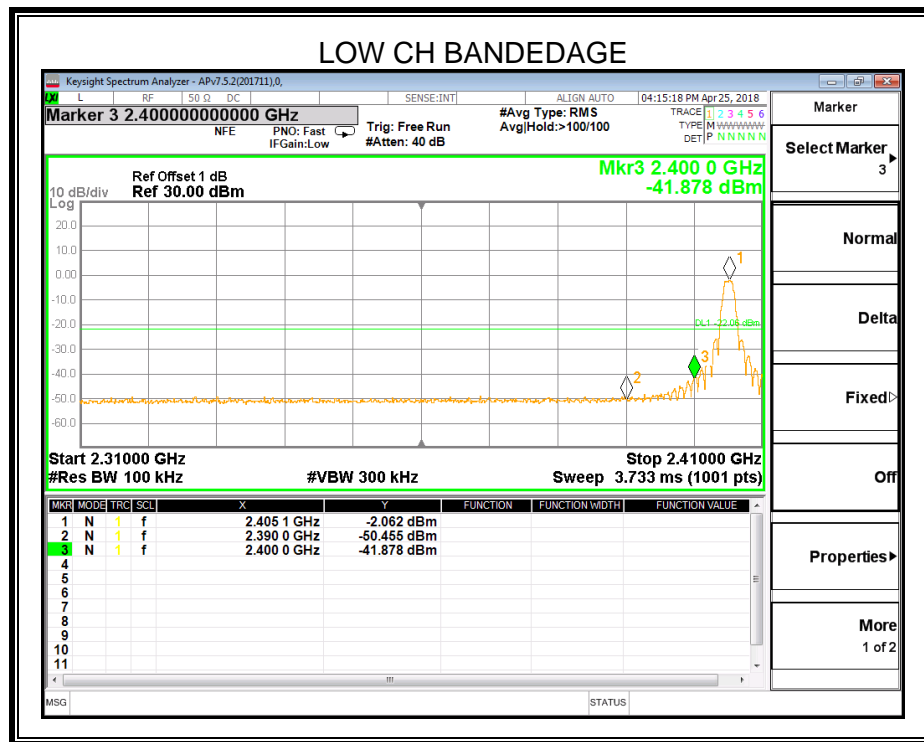
| | |
|--------------------|---|
| Span | Set the center frequency and span to encompass frequency range to be measured |
| Detector | Peak |
| RBW | 100K |
| VBW | $\geq 3 \times \text{RBW}$ |
| measurement points | $\geq \text{span}/\text{RBW}$ |
| Trace | Max hold |
| Sweep time | Auto couple. |

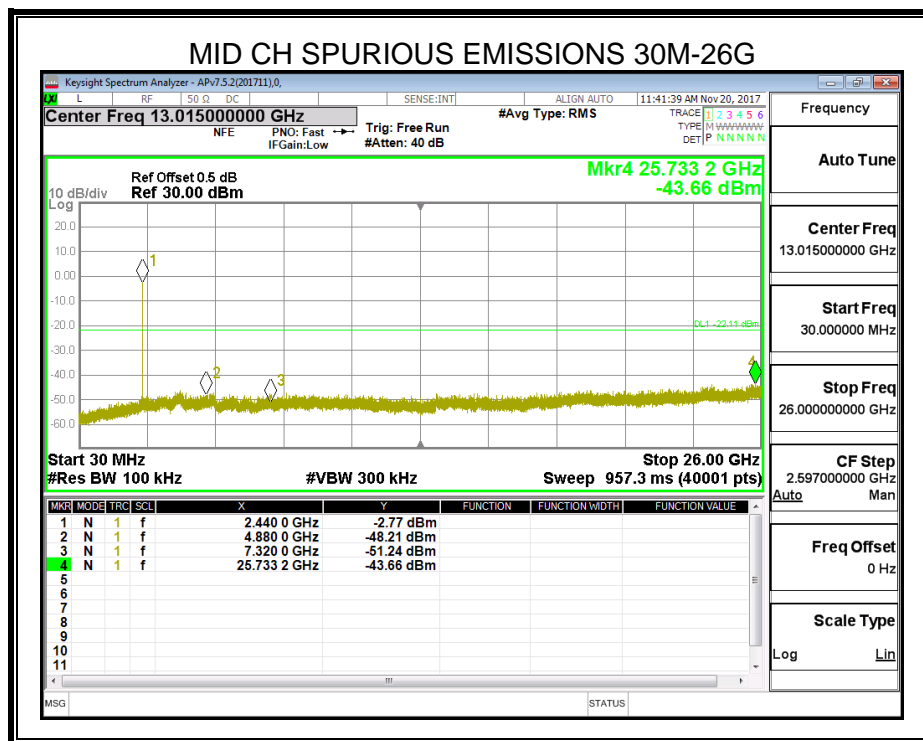
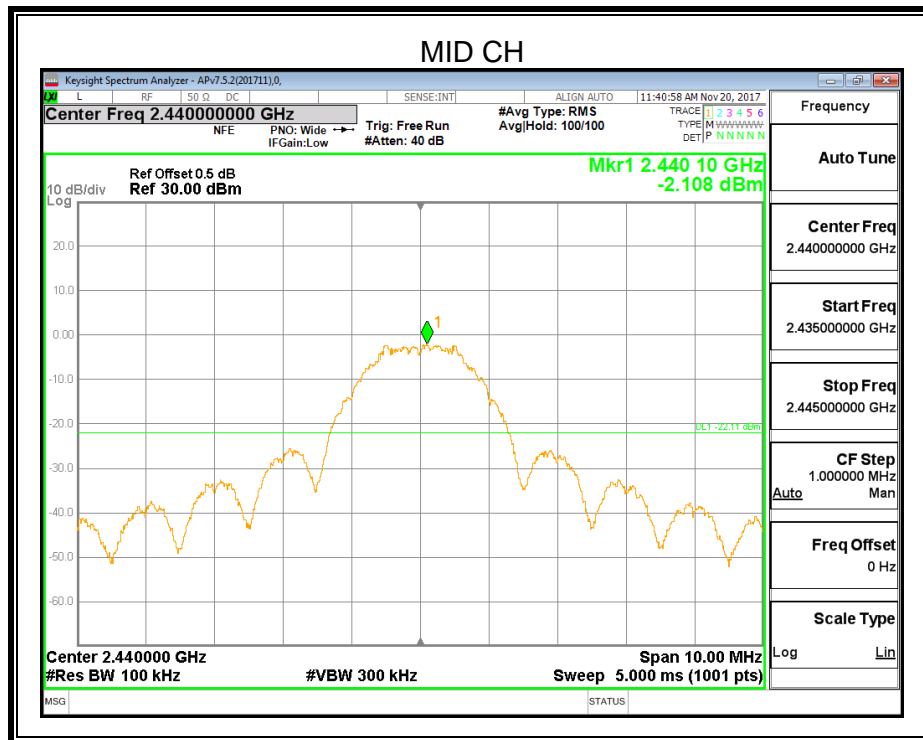
Use the peak marker function to determine the maximum amplitude level.

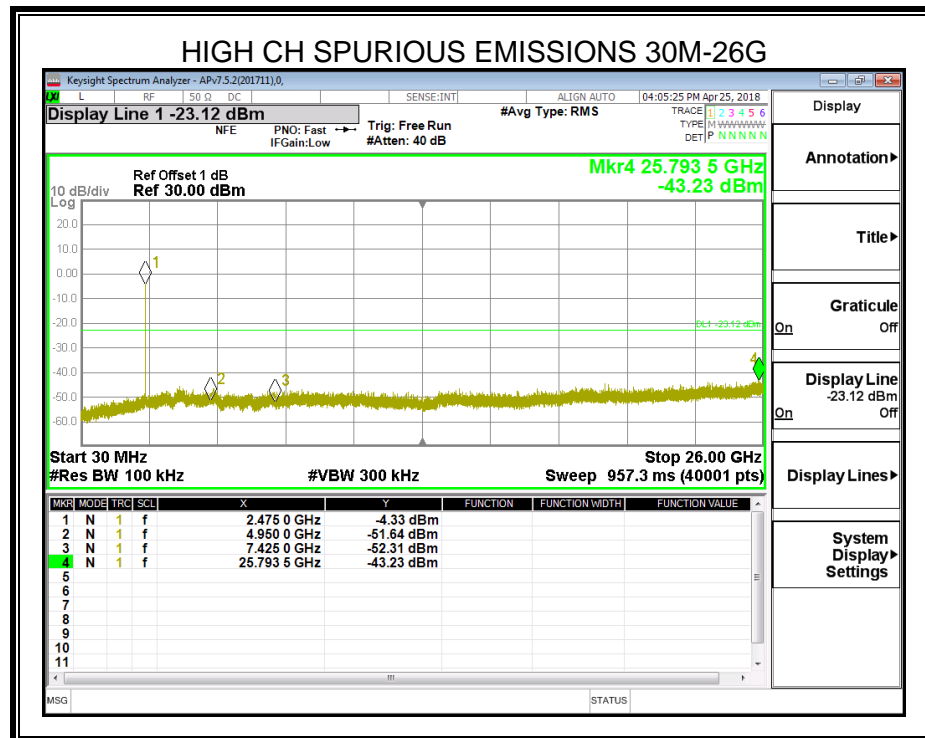
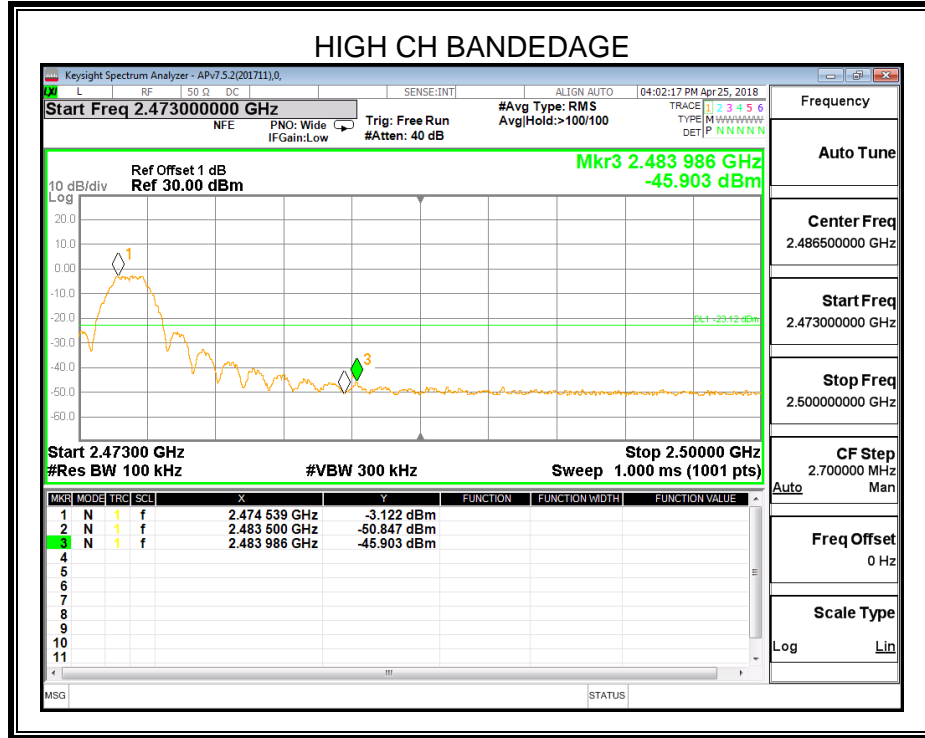
TEST SETUP



RESULTS









8. RADIATED TEST RESULTS

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to RSS-GEN Clause 8.9 (Transmitter)

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 |

Restricted bands of operation

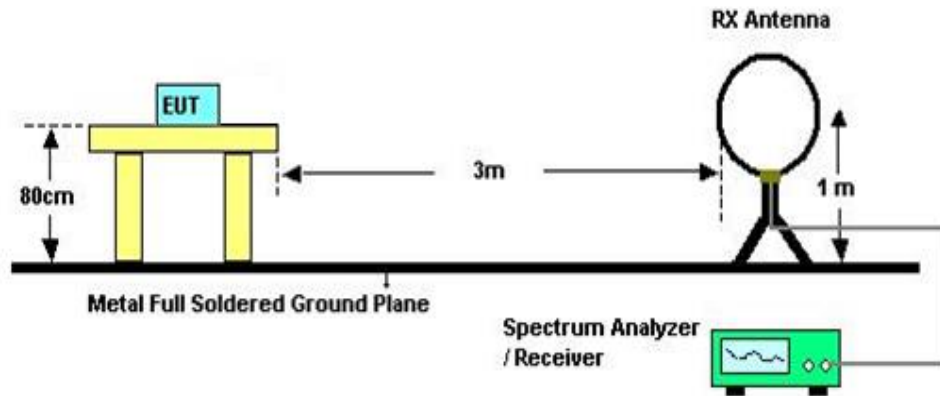
| MHz | MHz | MHz | GHz |
|--------------------------|---------------------|---------------|------------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| ¹ 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 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 | (²) |
| 13.36-13.41 | | | |

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz

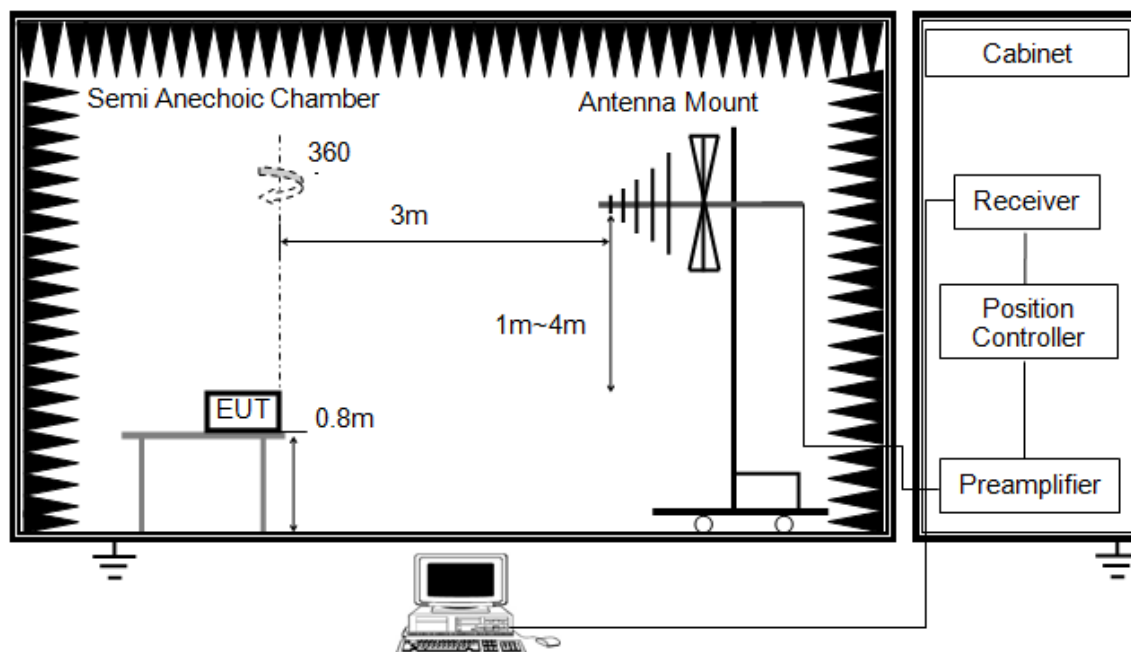


The setting of the spectrum analyzer

| | |
|-------|--|
| 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 |
| Trace | Max hold |

1. The testing follows the guidelines in ANSI C63.10-2013 and 414788 D01 Radiated Test Site v01.
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 and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm meter 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. 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. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G and above 30MHz

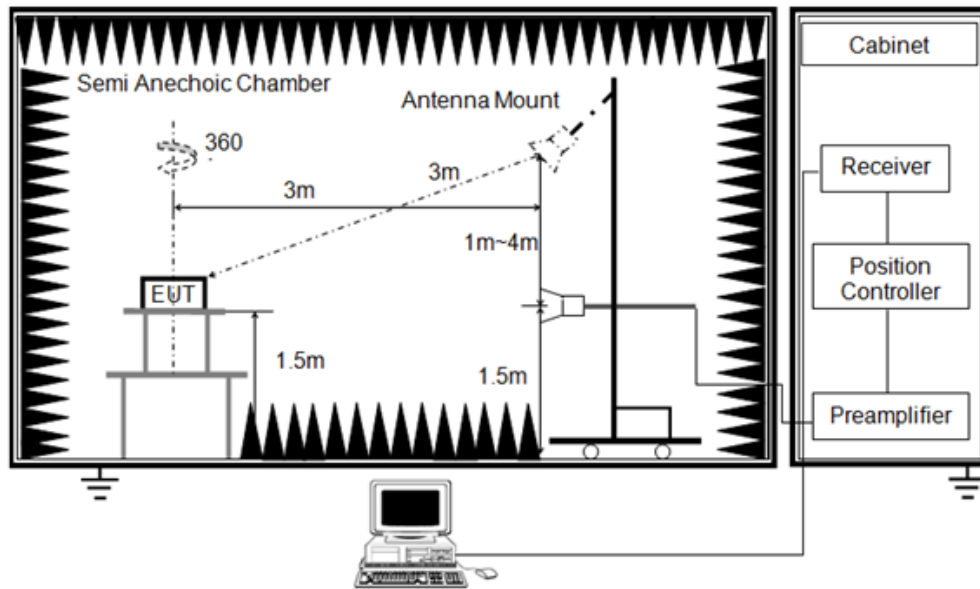


The setting of the spectrum analyzer

| | |
|----------|----------|
| 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 0.8m 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 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.

Above 1G



The setting of the spectrum analyzer

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

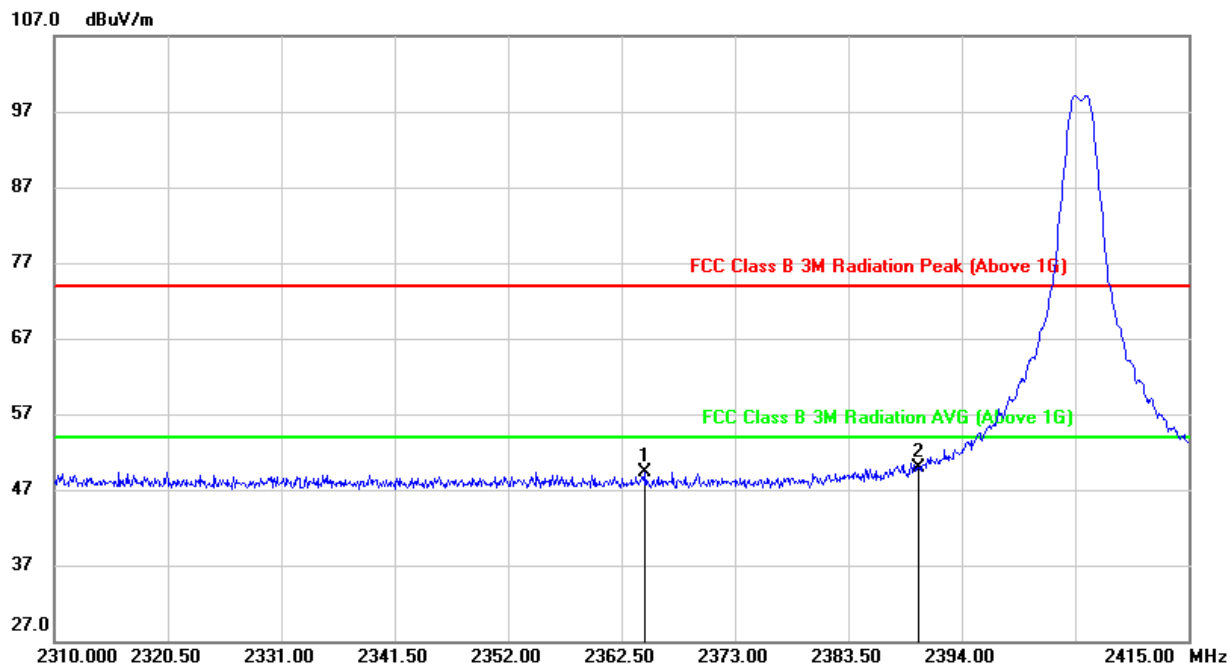
1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 average power measurement, set the Detector to RMS, the detector and averaging type may be set for linear voltage averaging, while maintaining all of the other instrument settings, if the duty cycle of the EUT is less than 98%, the Duty Cycle Correction Factor shall be added to the measured emission levels. For the Duty Cycle and Correction Factor please refer to clause 7.1.ON TIME AND DUTY CYCLE.

Note: For all radiated measurements, EUT was worked in stand-alone mode(with external battery) but it can simulated the communication between PC and the accessories through software.



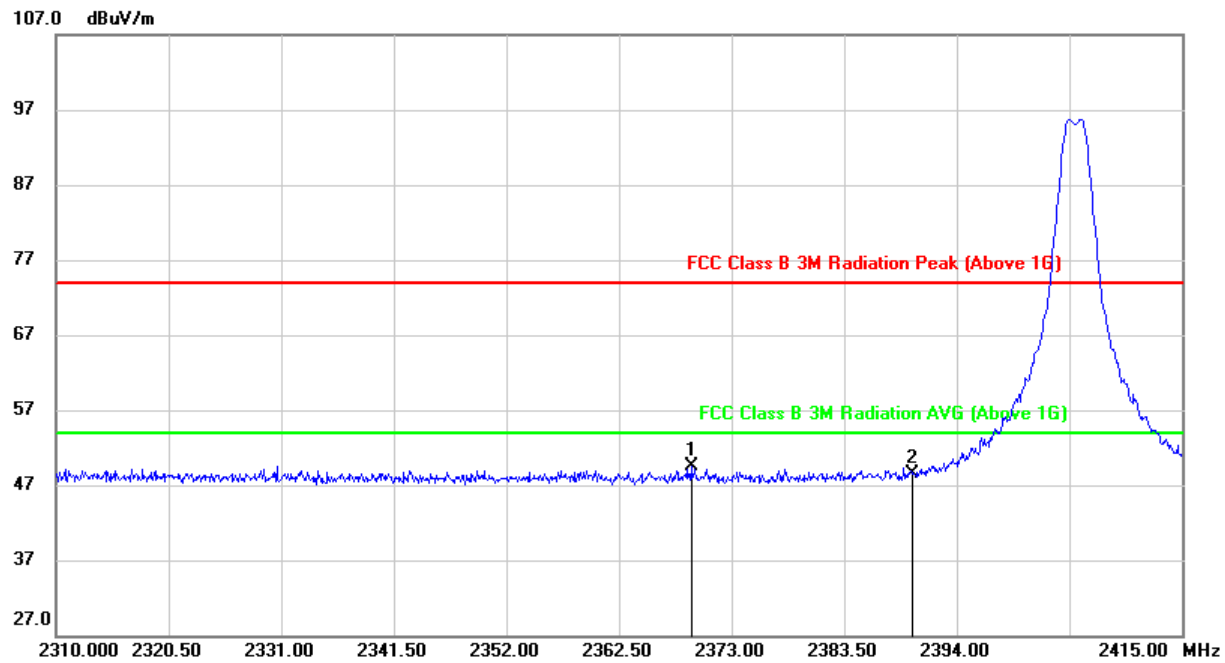
8.1. RESTRICTED BANDEDGE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 2364.705 | 16.06 | 33.32 | 49.38 | 74.00 | -24.62 | peak |
| 2 | 2390.000 | 16.76 | 33.14 | 49.90 | 74.00 | -24.10 | 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.

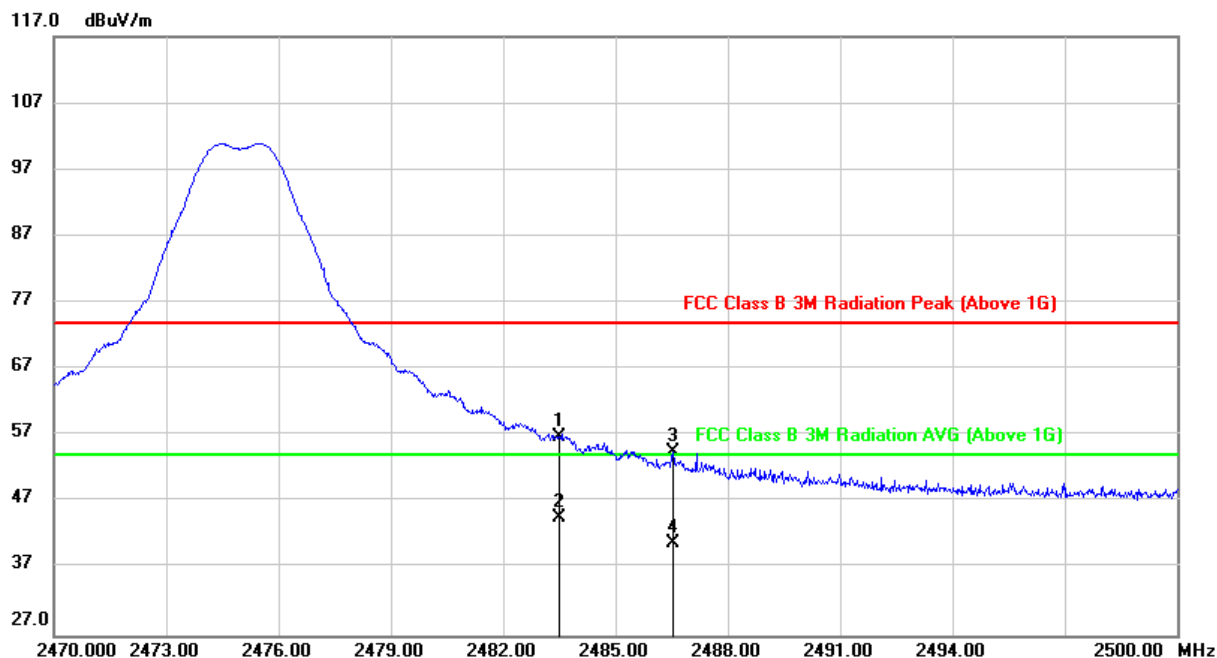
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 2369.220 | 16.14 | 33.40 | 49.54 | 74.00 | -24.46 | peak |
| 2 | 2390.000 | 15.23 | 33.24 | 48.47 | 74.00 | -25.53 | 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.



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 2483.500 | 24.11 | 32.78 | 56.89 | 74.00 | -17.11 | peak |
| 2 | 2483.500 | 11.82 | 32.78 | 44.60 | 54.00 | -9.40 | AVG |
| 3 | 2486.530 | 21.66 | 32.79 | 54.45 | 74.00 | -19.55 | peak |
| 4 | 2486.530 | 7.95 | 32.79 | 40.74 | 54.00 | -13.26 | AVG |

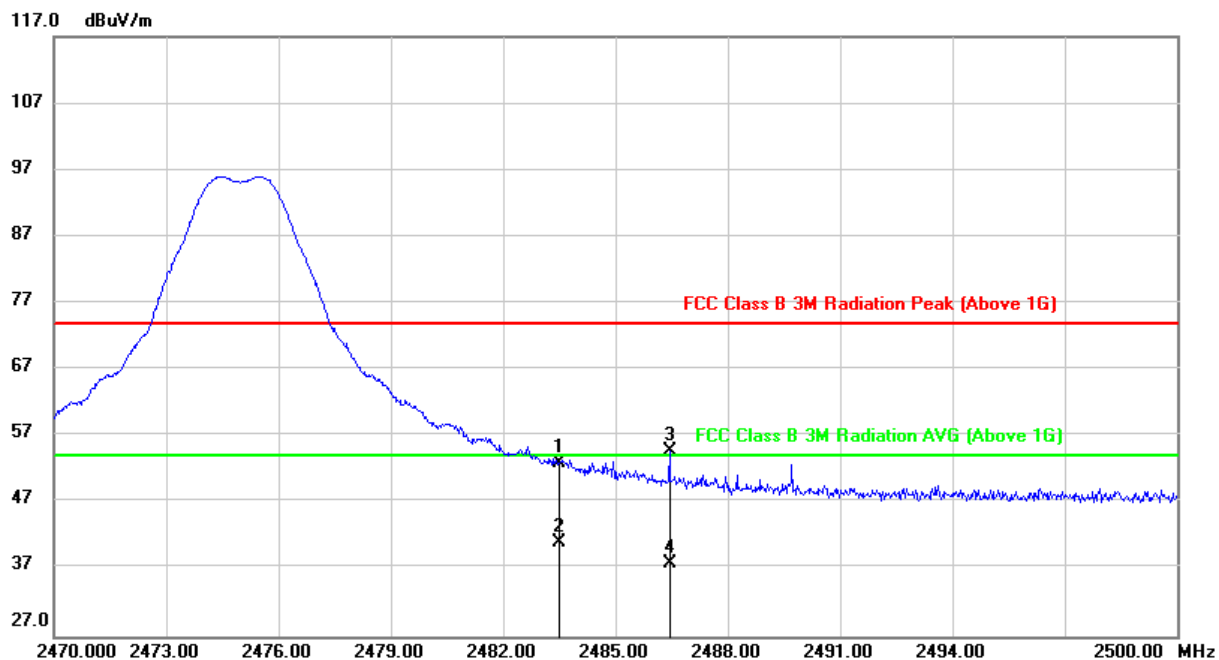
Note: 1. Measurement = Reading Level + Correct Factor.

2. AVG: RMS detector, the detector and averaging type may be set for linear voltage averaging.

3. Peak: Peak detector.



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 2483.500 | 20.16 | 32.88 | 53.04 | 74.00 | -20.96 | peak |
| 2 | 2483.500 | 8.18 | 32.88 | 41.06 | 54.00 | -12.94 | AVG |
| 3 | 2486.440 | 21.80 | 32.89 | 54.69 | 74.00 | -19.31 | peak |
| 4 | 2486.440 | 4.94 | 32.89 | 37.83 | 54.00 | -16.17 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.

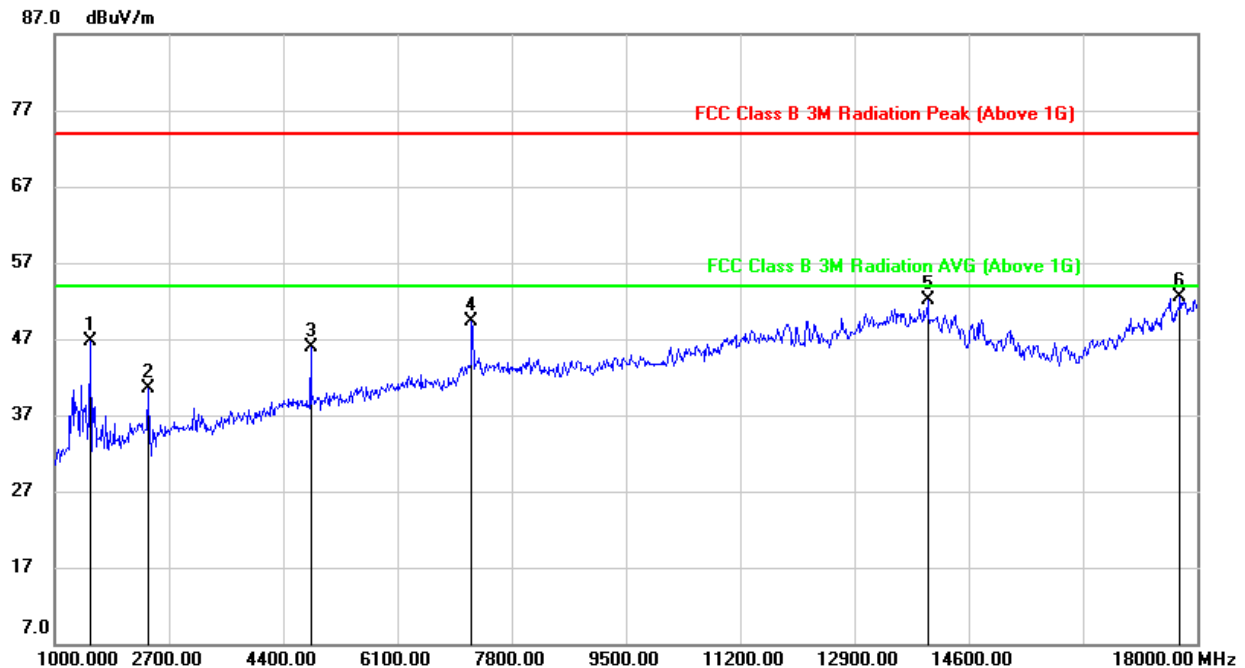
2. AVG: RMS detector, the detector and averaging type may be set for linear voltage averaging.

3. Peak: Peak detector.



8.2. SPURIOUS EMISSIONS (1~18GHz)

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

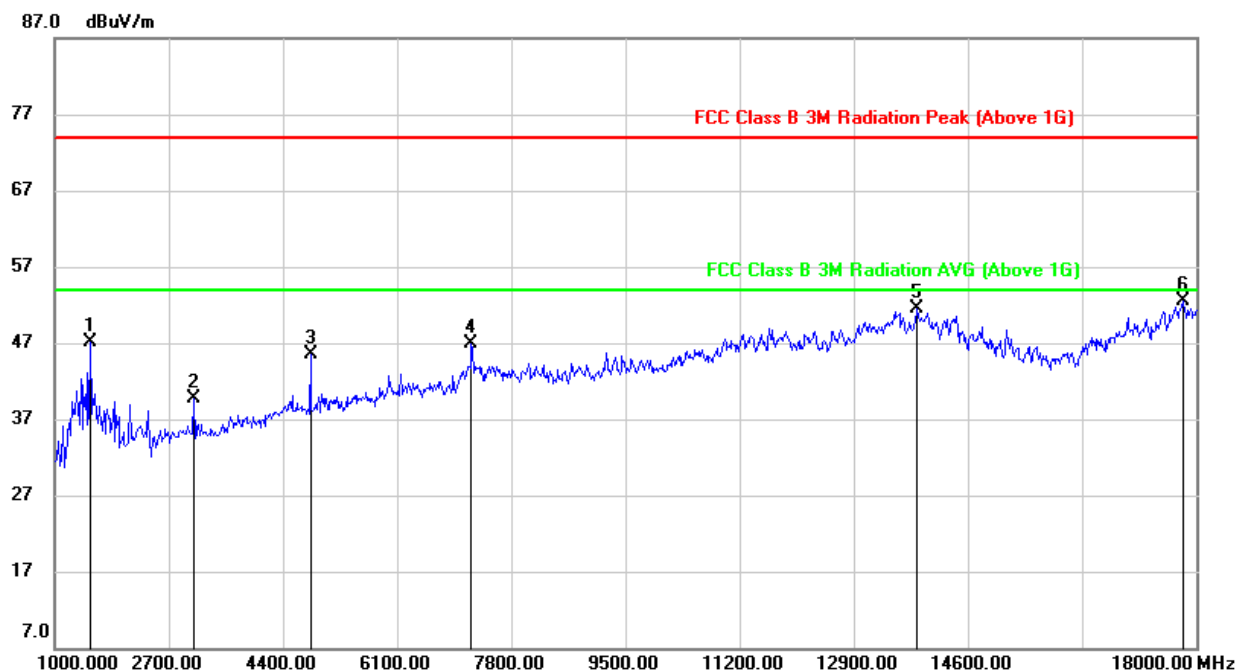


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 1527.000 | 59.58 | -12.80 | 46.78 | 74.00 | -27.22 | peak |
| 2 | 2394.000 | 49.36 | -8.94 | 40.42 | 74.00 | -33.58 | peak |
| 3 | 4808.000 | 47.61 | -1.73 | 45.88 | 74.00 | -28.12 | peak |
| 4 | 7205.000 | 43.43 | 5.82 | 49.25 | 74.00 | -24.75 | peak |
| 5 | 13988.000 | 33.19 | 18.89 | 52.08 | 74.00 | -21.92 | peak |
| 6 | 17745.000 | 27.32 | 25.16 | 52.48 | 74.00 | -21.52 | 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.



HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)

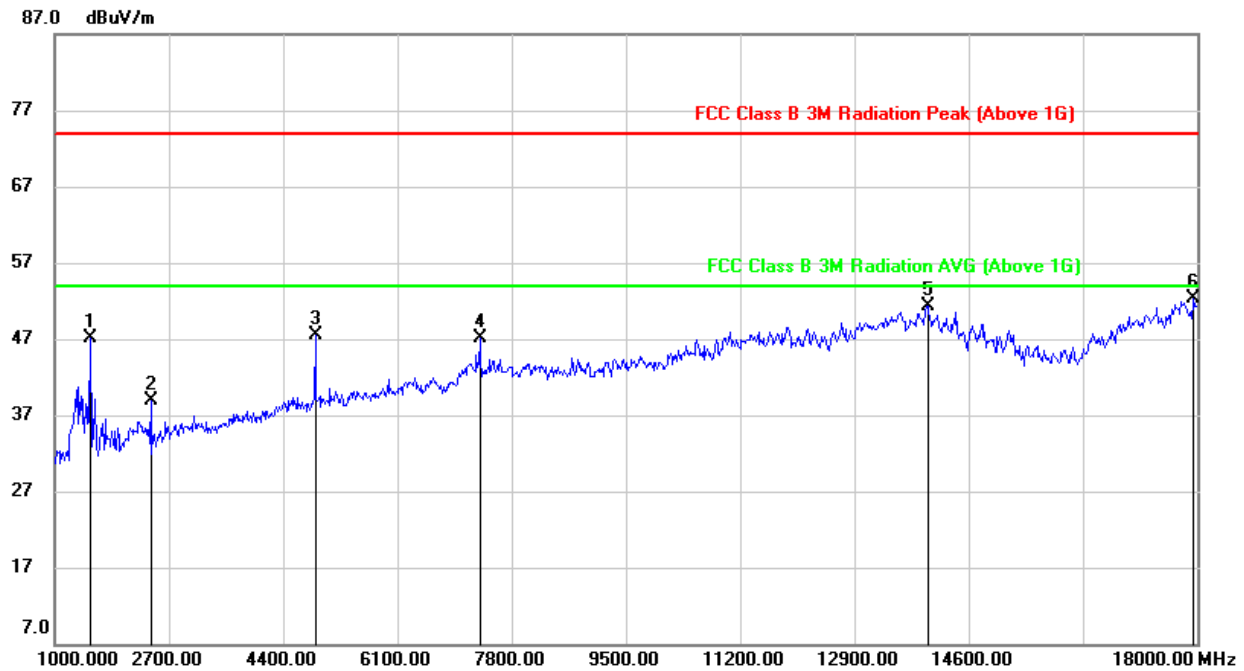


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 1527.000 | 59.96 | -12.79 | 47.17 | 74.00 | -26.83 | peak |
| 2 | 3074.000 | 46.48 | -6.85 | 39.63 | 74.00 | -34.37 | peak |
| 3 | 4808.000 | 47.06 | -1.64 | 45.42 | 74.00 | -28.58 | peak |
| 4 | 7205.000 | 40.96 | 5.90 | 46.86 | 74.00 | -27.14 | peak |
| 5 | 13835.000 | 32.18 | 19.30 | 51.48 | 74.00 | -22.52 | peak |
| 6 | 17796.000 | 26.17 | 26.24 | 52.41 | 74.00 | -21.59 | 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.



HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)

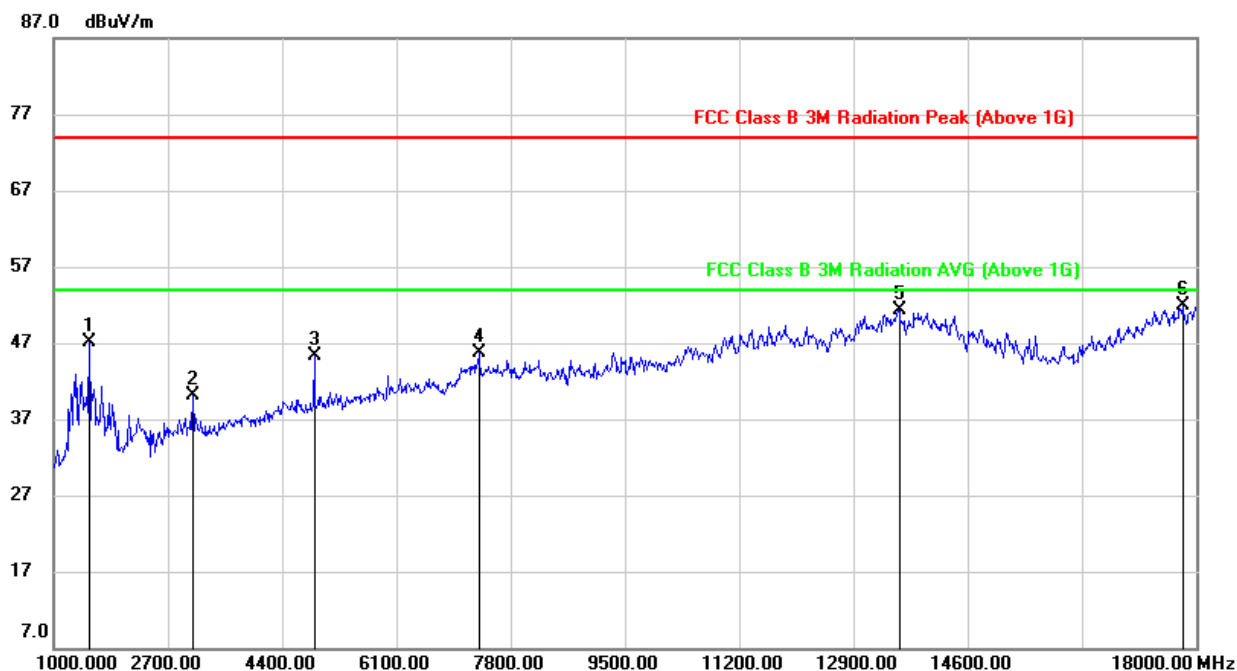


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 1527.000 | 59.85 | -12.80 | 47.05 | 74.00 | -26.95 | peak |
| 2 | 2428.000 | 48.04 | -9.11 | 38.93 | 74.00 | -35.07 | peak |
| 3 | 4876.000 | 48.40 | -0.93 | 47.47 | 74.00 | -26.53 | peak |
| 4 | 7324.000 | 41.35 | 5.72 | 47.07 | 74.00 | -26.93 | peak |
| 5 | 13988.000 | 32.33 | 18.89 | 51.22 | 74.00 | -22.78 | peak |
| 6 | 17949.000 | 25.66 | 26.57 | 52.23 | 74.00 | -21.77 | 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.



HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)

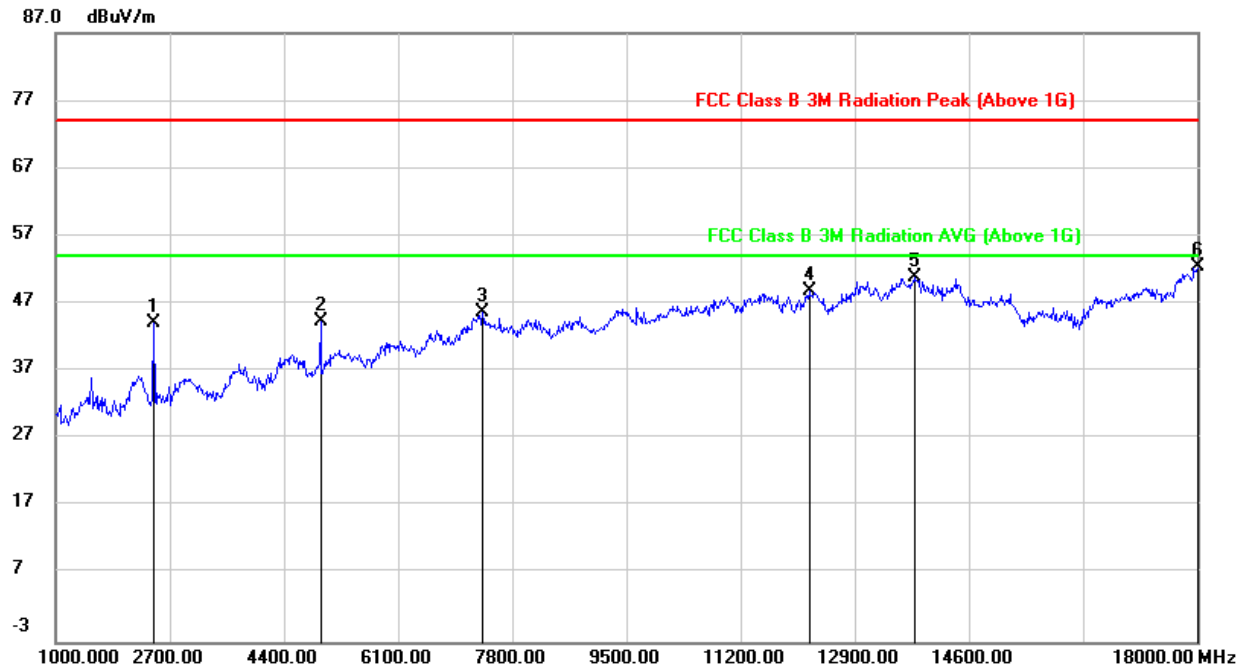


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 1527.000 | 59.88 | -12.79 | 47.09 | 74.00 | -26.91 | peak |
| 2 | 3074.000 | 47.05 | -6.85 | 40.20 | 74.00 | -33.80 | peak |
| 3 | 4876.000 | 46.33 | -0.98 | 45.35 | 74.00 | -28.65 | peak |
| 4 | 7324.000 | 39.92 | 5.77 | 45.69 | 74.00 | -28.31 | peak |
| 5 | 13580.000 | 32.25 | 19.06 | 51.31 | 74.00 | -22.69 | peak |
| 6 | 17796.000 | 25.75 | 26.24 | 51.99 | 74.00 | -22.01 | 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.

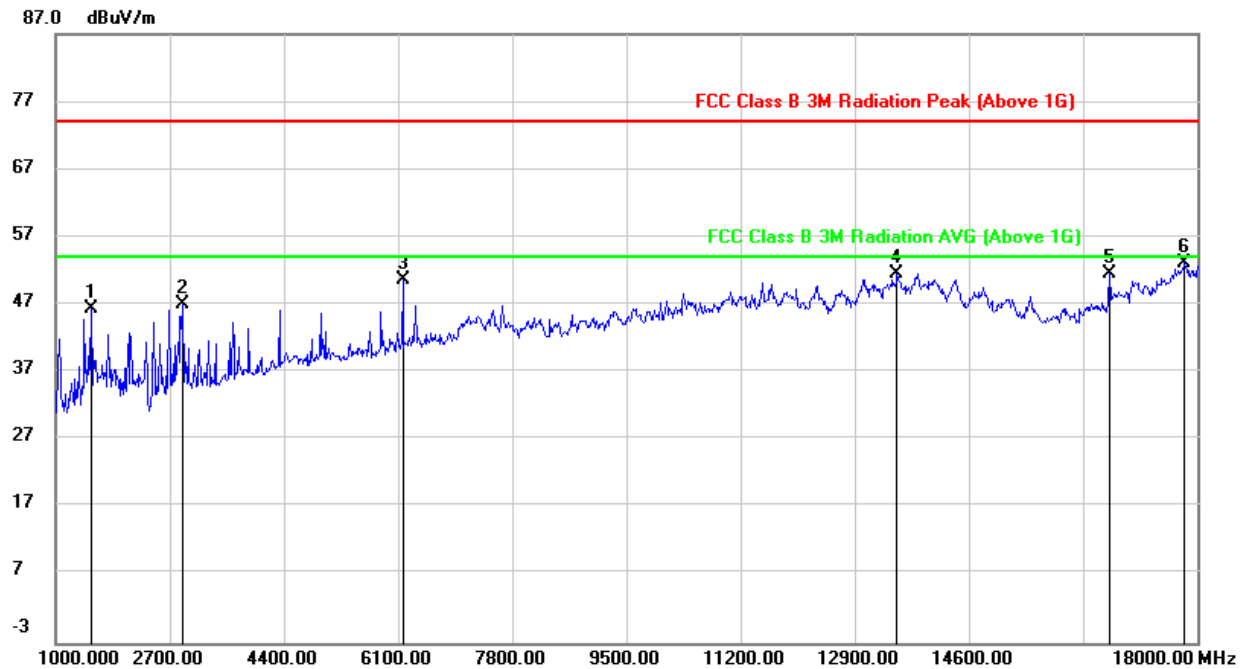


HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 2462.000 | 53.45 | -9.26 | 44.19 | 74.00 | -29.81 | peak |
| 2 | 4944.000 | 45.08 | -0.77 | 44.31 | 74.00 | -29.69 | peak |
| 3 | 7358.000 | 39.85 | 5.87 | 45.72 | 74.00 | -28.28 | peak |
| 4 | 12220.000 | 34.58 | 14.29 | 48.87 | 74.00 | -25.13 | peak |
| 5 | 13801.000 | 32.42 | 18.54 | 50.96 | 74.00 | -23.04 | peak |
| 6 | 18000.000 | 27.60 | 24.81 | 52.41 | 74.00 | -21.59 | 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.

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**

| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 1527.000 | 59.17 | -12.74 | 46.43 | 74.00 | -27.57 | peak |
| 2 | 2887.000 | 54.28 | -7.33 | 46.95 | 74.00 | -27.05 | peak |
| 3 | 6168.000 | 48.08 | 2.66 | 50.74 | 74.00 | -23.26 | peak |
| 4 | 13529.000 | 32.79 | 18.75 | 51.54 | 74.00 | -22.46 | peak |
| 5 | 16691.000 | 32.96 | 18.61 | 51.57 | 74.00 | -22.43 | peak |
| 6 | 17813.000 | 28.78 | 24.44 | 53.22 | 74.00 | -20.78 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.

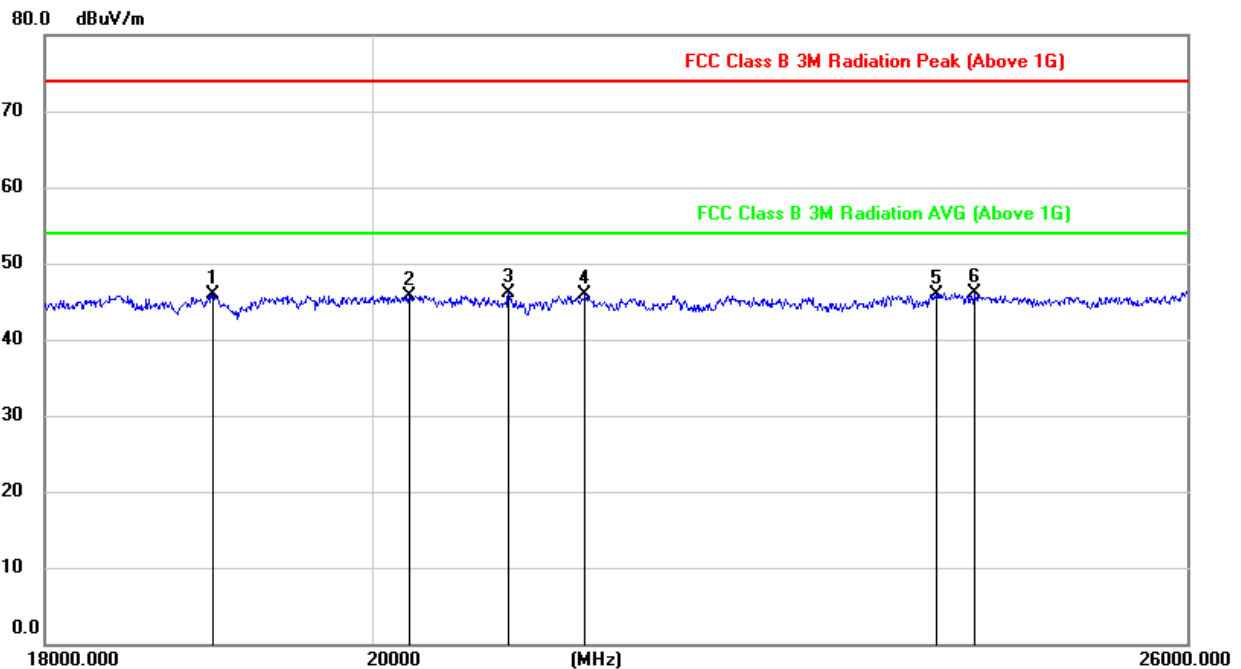
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



8.3. SPURIOUS EMISSIONS 18G ~ 26GHz

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



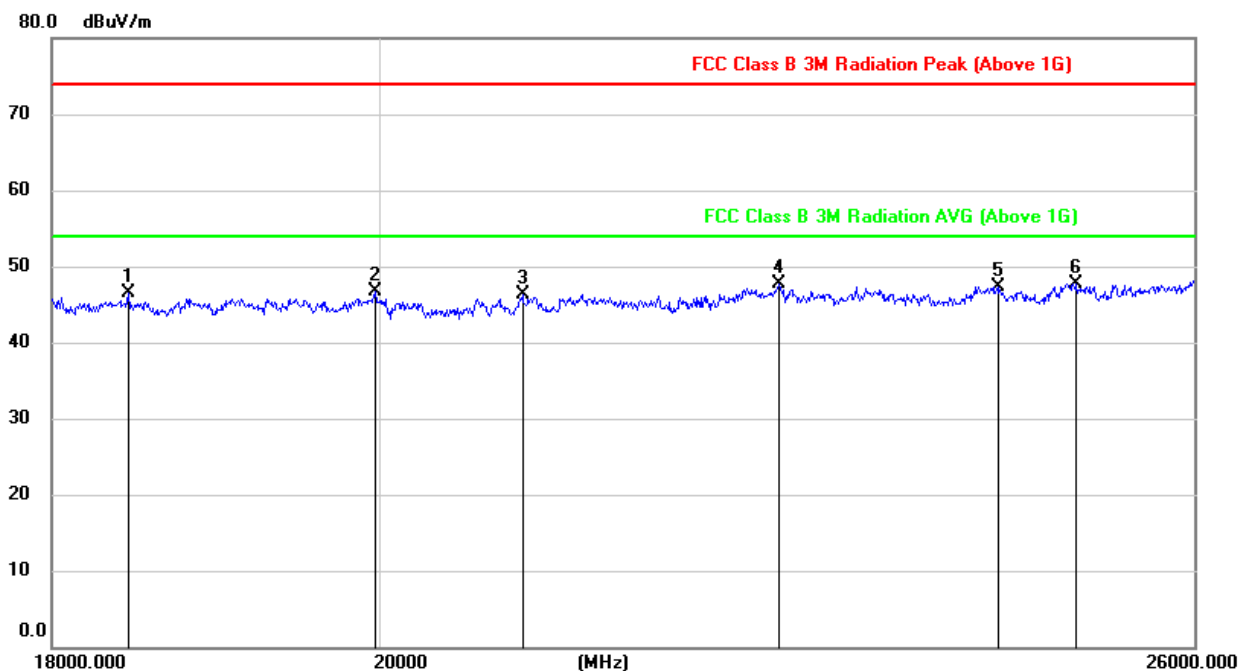
| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 18999.778 | 51.20 | -5.22 | 45.98 | 74.00 | -28.02 | peak |
| 2 | 20240.306 | 51.39 | -5.61 | 45.78 | 74.00 | -28.22 | peak |
| 3 | 20898.304 | 50.98 | -4.97 | 46.01 | 74.00 | -27.99 | peak |
| 4 | 21419.583 | 50.56 | -4.71 | 45.85 | 74.00 | -28.15 | peak |
| 5 | 23988.266 | 48.67 | -2.77 | 45.90 | 74.00 | -28.10 | peak |
| 6 | 24281.135 | 48.82 | -2.77 | 46.05 | 74.00 | -27.95 | 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.



SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 18448.984 | 51.77 | -5.32 | 46.45 | 74.00 | -27.55 | peak |
| 2 | 19974.129 | 52.20 | -5.42 | 46.78 | 74.00 | -27.22 | peak |
| 3 | 20944.464 | 51.24 | -4.93 | 46.31 | 74.00 | -27.69 | peak |
| 4 | 22751.076 | 51.37 | -3.69 | 47.68 | 74.00 | -26.32 | peak |
| 5 | 24415.437 | 49.86 | -2.50 | 47.36 | 74.00 | -26.64 | peak |
| 6 | 25033.649 | 49.82 | -2.04 | 47.78 | 74.00 | -26.22 | peak |

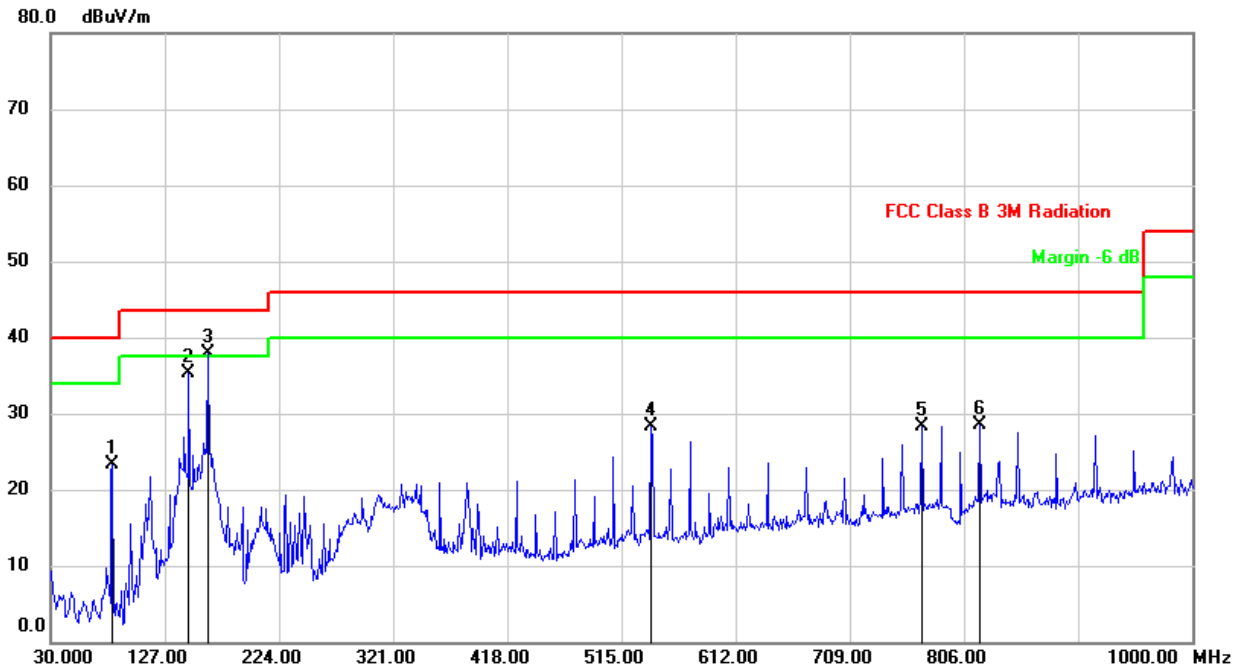
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.



8.4. SPURIOUS EMISSIONS 30M ~ 1 GHz

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)

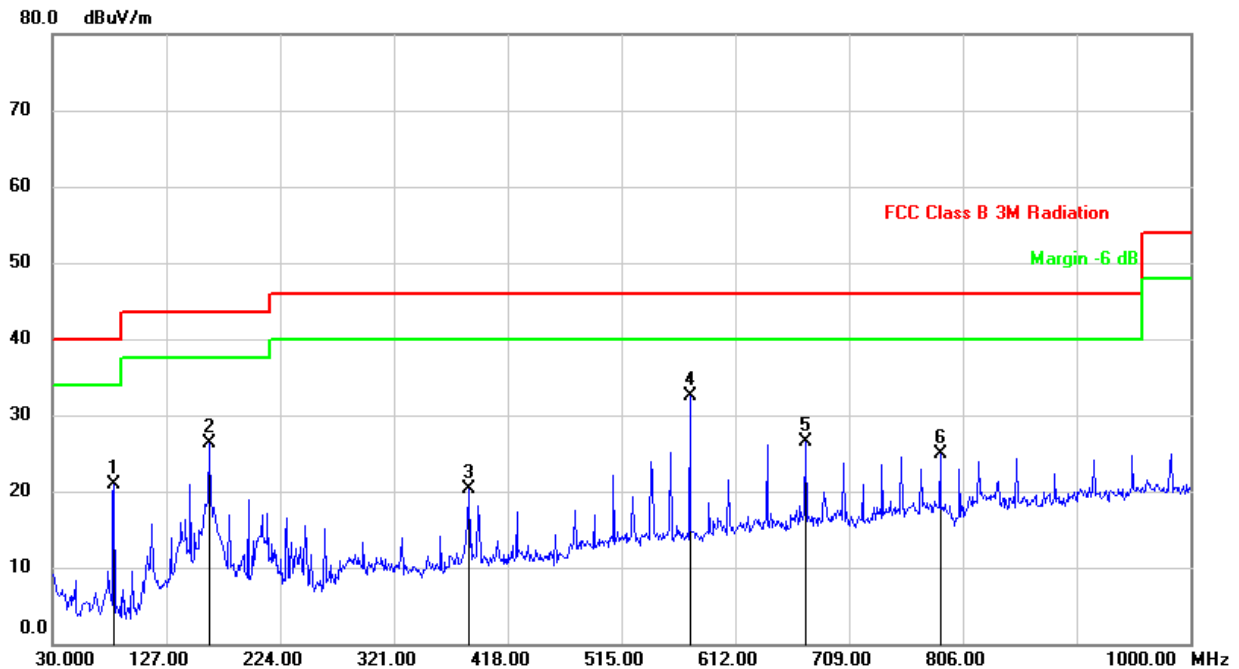


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 82.3800 | 55.75 | -32.43 | 23.32 | 40.00 | -16.68 | QP |
| 2 | 147.3700 | 64.57 | -29.19 | 35.38 | 43.50 | -8.12 | QP |
| 3 | 163.8600 | 66.44 | -28.63 | 37.81 | 43.50 | -5.69 | QP |
| 4 | 540.2199 | 49.59 | -21.34 | 28.25 | 46.00 | -17.75 | QP |
| 5 | 770.1100 | 46.36 | -18.13 | 28.23 | 46.00 | -17.77 | QP |
| 6 | 819.5800 | 45.21 | -16.77 | 28.44 | 46.00 | -17.56 | QP |

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 (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



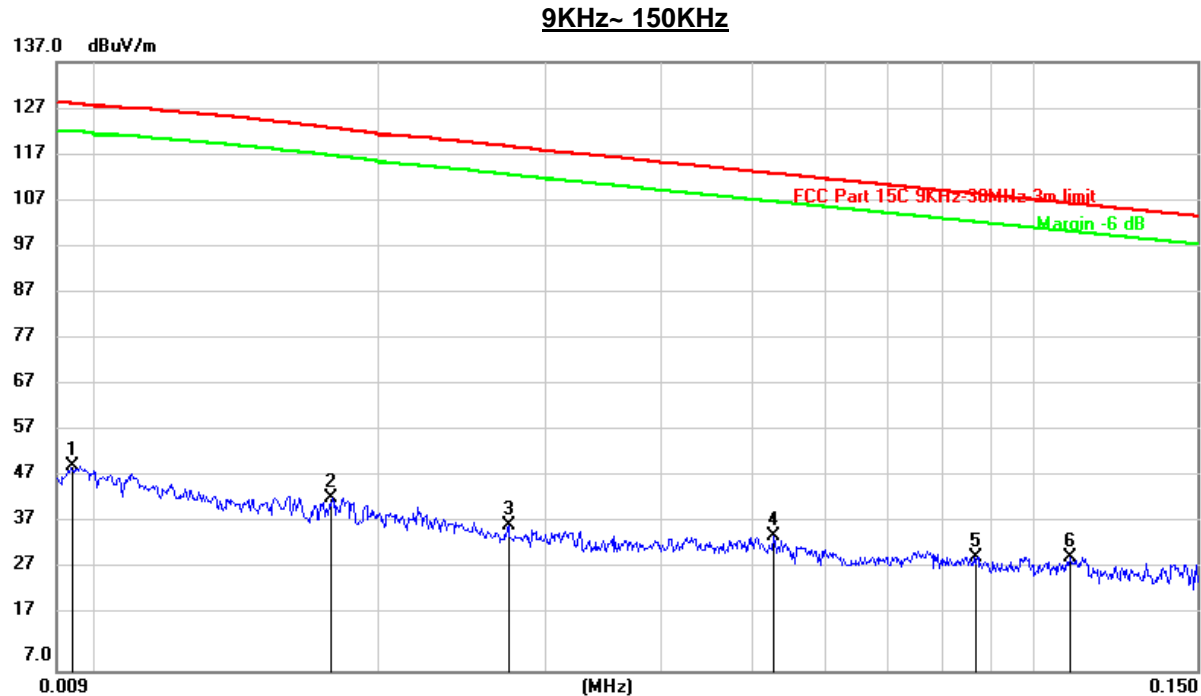
| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 82.3800 | 53.36 | -32.43 | 20.93 | 40.00 | -19.07 | QP |
| 2 | 163.8600 | 54.90 | -28.63 | 26.27 | 43.50 | -17.23 | QP |
| 3 | 385.0200 | 45.56 | -25.21 | 20.35 | 46.00 | -25.65 | QP |
| 4 | 573.2000 | 53.70 | -21.25 | 32.45 | 46.00 | -13.55 | QP |
| 5 | 672.1400 | 45.95 | -19.50 | 26.45 | 46.00 | -19.55 | QP |
| 6 | 786.6000 | 42.73 | -17.85 | 24.88 | 46.00 | -21.12 | QP |

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



8.5. SPURIOUS EMISSIONS BELOW 30M

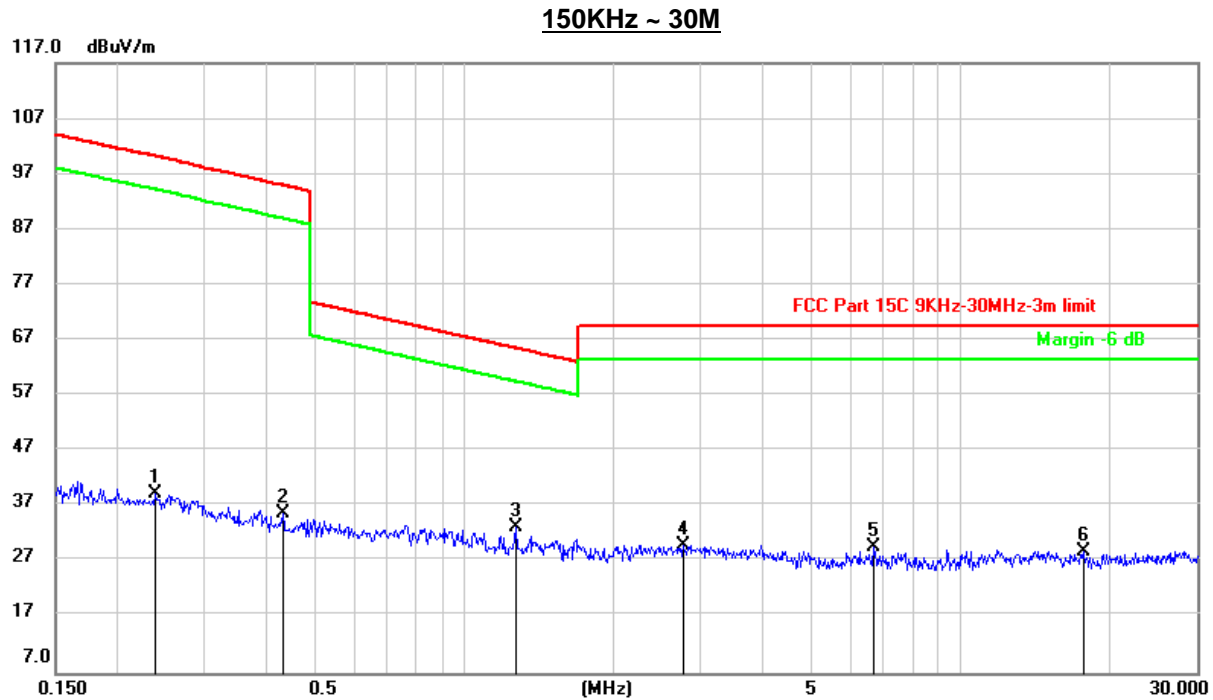
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



| No. | Frequency (KHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 0.0094 | 30.40 | 20.26 | 50.66 | 128.06 | -77.40 | peak |
| 2 | 0.0177 | 23.46 | 20.29 | 43.75 | 122.96 | -79.21 | peak |
| 3 | 0.0274 | 17.60 | 20.31 | 37.91 | 118.98 | -81.07 | peak |
| 4 | 0.0526 | 15.33 | 20.31 | 35.64 | 113.21 | -77.57 | peak |
| 5 | 0.0869 | 11.10 | 20.26 | 31.36 | 108.84 | -77.48 | peak |
| 6 | 0.1095 | 11.11 | 20.26 | 31.37 | 106.82 | -75.45 | 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.



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 0.2378 | 18.85 | 20.33 | 39.18 | 100.25 | -61.07 | peak |
| 2 | 0.4304 | 15.43 | 20.27 | 35.70 | 94.97 | -59.27 | peak |
| 3 | 1.2681 | 12.69 | 20.47 | 33.16 | 65.55 | -32.39 | peak |
| 4 | 2.7648 | 9.11 | 20.86 | 29.97 | 69.54 | -39.57 | peak |
| 5 | 6.6623 | 8.71 | 20.90 | 29.61 | 69.54 | -39.93 | peak |
| 6 | 17.6611 | 7.77 | 20.99 | 28.76 | 69.54 | -40.78 | peak |

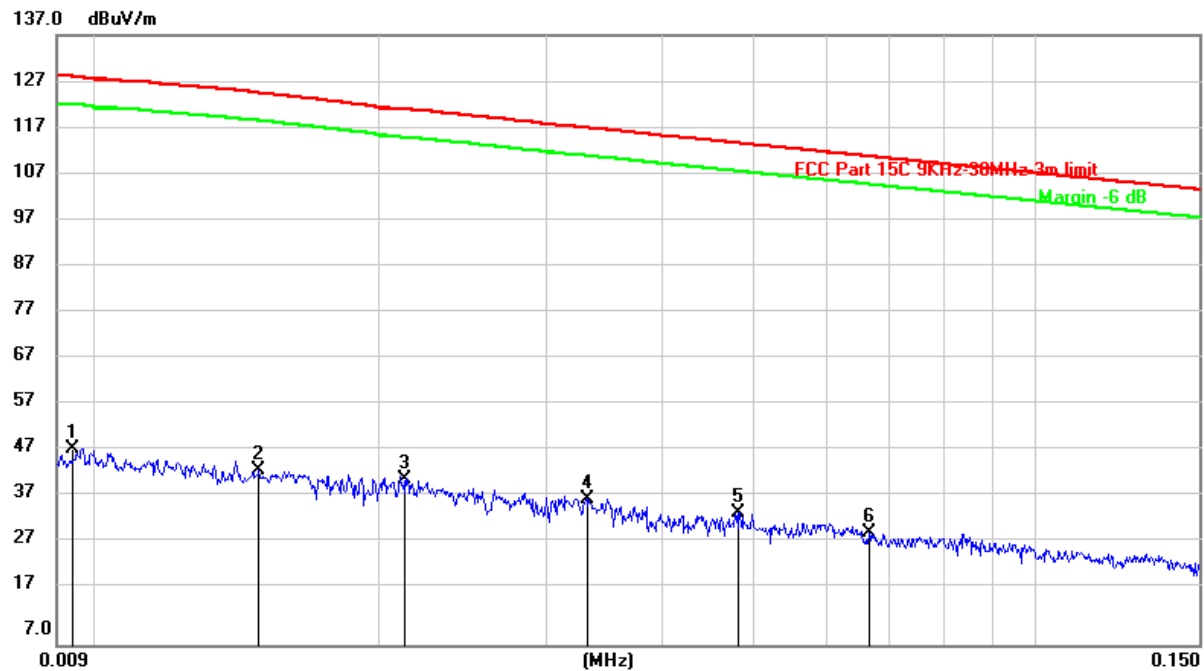
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.



SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)

9KHz~ 150KHz



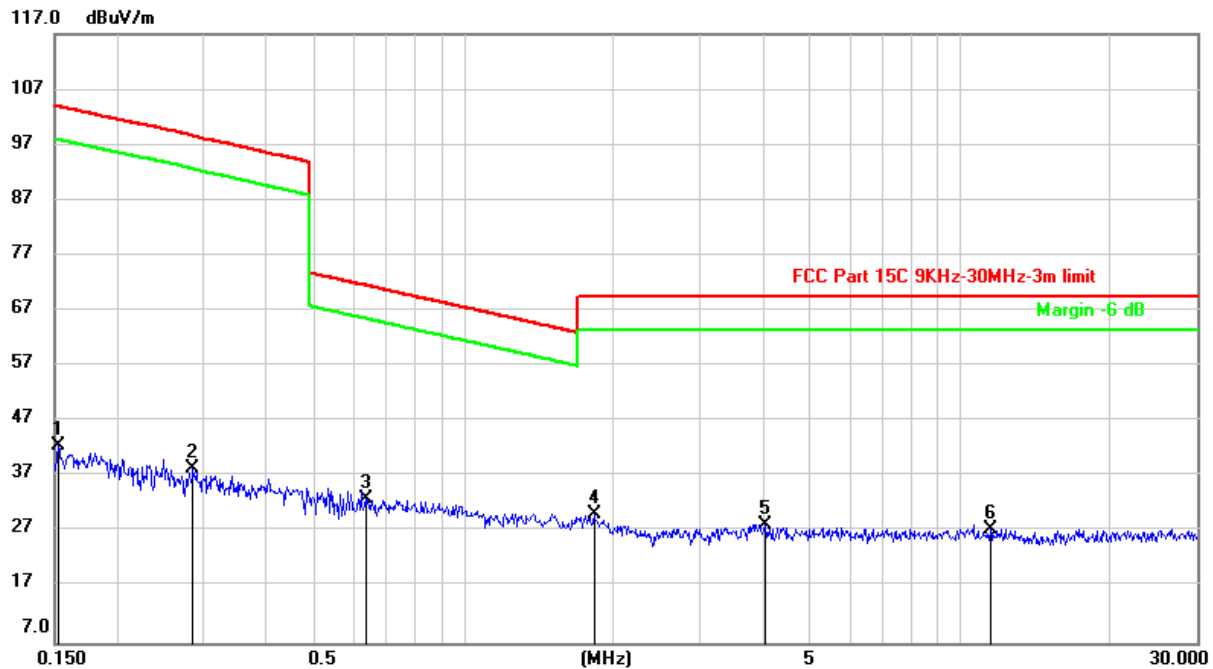
| No. | Frequency (KHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 0.0094 | 28.49 | 20.26 | 48.75 | 128.06 | -79.31 | peak |
| 2 | 0.0148 | 24.07 | 20.26 | 44.33 | 124.71 | -80.38 | peak |
| 3 | 0.0212 | 21.84 | 20.31 | 42.15 | 121.16 | -79.01 | peak |
| 4 | 0.0331 | 17.83 | 20.31 | 38.14 | 117.28 | -79.14 | peak |
| 5 | 0.0483 | 14.90 | 20.31 | 35.21 | 113.95 | -78.74 | peak |
| 6 | 0.0665 | 10.54 | 20.31 | 30.85 | 111.17 | -80.32 | 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.



150KHz ~ 30M



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------|--------------------|-------------------|----------------|--------|
| 1 | 0.1524 | 22.16 | 20.42 | 42.58 | 103.95 | -61.37 | peak |
| 2 | 0.2847 | 18.23 | 20.32 | 38.55 | 98.60 | -60.05 | peak |
| 3 | 0.6338 | 12.66 | 20.30 | 32.96 | 71.59 | -38.63 | peak |
| 4 | 1.8286 | 9.64 | 20.67 | 30.31 | 69.54 | -39.23 | peak |
| 5 | 4.0486 | 7.26 | 21.05 | 28.31 | 69.54 | -41.23 | peak |
| 6 | 11.4983 | 6.50 | 21.02 | 27.52 | 69.54 | -42.02 | 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.

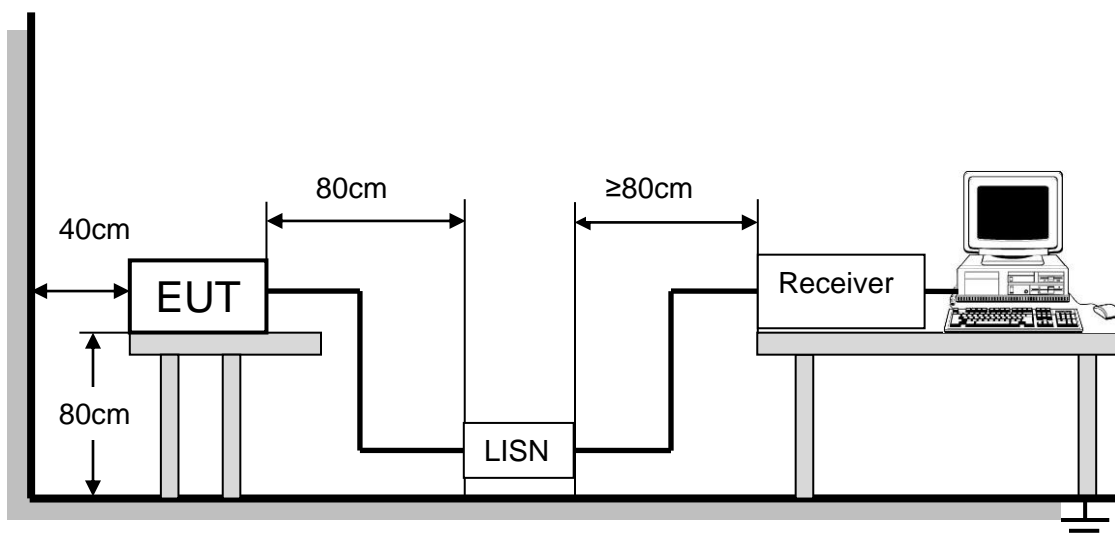
9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8.

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|-----------------|----------------|---------|----------------|-----------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 |

TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 0.8m 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 an Artificial Mains Network (A.M.N.). An 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 6.2 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 RESULTS

Not Applicable

Note: The EUT was power by external battery.



10. 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.

Antenna Connector

EUT has a PCB antenna without antenna connector.

Antenna Gain

The antenna gain of EUT is 3.3 dBi.

END OF REPORT