



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

CERTIFICATION TEST REPORT

For

Wemo Smart Dimmer

MODEL NUMBER: WDS070

FCC ID: K7S-WDS070

IC: 3623A-WDS070

REPORT NUMBER: 4790220674.1-3

ISSUE DATE: February 10, 2022

Prepared for

**Belkin International, Inc.
555 S. Aviation Blvd., Suite 180, El Segundo, CA 90245, USA**

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch

Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China

Tel: +86 769 22038881

Fax: +86 769 33244054

Website: www.ul.com



Revision History

| Rev. | Issue Date | Revisions | Revised By |
|------|------------|---------------|------------|
| V0 | 2/10/2022 | Initial Issue | |



| Summary of Test Results | | | |
|--|---|---|--------------|
| Clause | Test Items | FCC/ISED Rules | Test Results |
| 1 | 6dB Bandwidth and 99% Occupied Bandwidth | FCC Part 15.247 (a) (2) RSS-247 Clause 5.2 (a) ISED RSS-Gen Clause 6.7 | Pass |
| 2 | Peak Conducted Output Power | FCC Part 15.247 (b) (3) RSS-247 Clause 5.4 (d) | Pass |
| 3 | Power Spectral Density | FCC Part 15.247 (e) RSS-247 Clause 5.2 (b) | Pass |
| 4 | Conducted Bandedge and Spurious Emission | FCC Part 15.247 (d) RSS-247 Clause 5.5 | Pass |
| 5 | Radiated Bandedge and Spurious Emission | FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 | Pass |
| 6 | Conducted Emission Test for AC Power Port | FCC Part 15.207 RSS-GEN Clause 8.8 | Pass |
| 7 | Antenna Requirement | FCC Part 15.203 RSS-GEN Clause 6.8 | Pass |
| <p>Note:</p> <p>1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.</p> <p>2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >< ISED RSS-247 > when <Accuracy Method> decision rule is applied.</p> | | | |

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Belkin International, Inc.
Address: 555 S. Aviation Blvd., Suite 180, El Segundo, CA 90245, USA

Manufacturer Information

Company Name: Belkin International, Inc.
Address: 555 S. Aviation Blvd., Suite 180, El Segundo, CA 90245, USA

EUT Information

EUT Name: Wemo Smart Dimmer
Model: WDS070
Brand: wemo
Sample Received Date: December 15, 2021
Sample Status: Normal
Sample ID: 4492612
Date of Tested: December 15~31, 2021

| APPLICABLE STANDARDS | |
|------------------------------|--------------|
| STANDARD | TEST RESULTS |
| CFR 47 FCC PART 15 SUBPART C | PASS |
| ISED RSS-247 Issue 2 | PASS |
| ISED RSS-GEN Issue 5 | PASS |

Prepared By:

Checked By:

Kebo Zhang
Project Engineer

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo
Laboratory Manager



2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

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>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>ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.</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

Note 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.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.



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 | 3.62 dB |
| Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz) | 2.2 dB |
| Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz) | 4.00 dB |
| Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz) | 5.78 dB (1 GHz ~ 18 GHz) |
| | 5.23 dB (18 GHz ~ 26 GHz) |
| Duty Cycle | ±0.028% |
| DTS and 99% Occupied Bandwidth | ±0.0196% |
| Maximum Conducted Output Power | ±0.686 dB |
| Maximum Power Spectral Density Level | ±0.743 dB |
| Conducted Band-edge Compliance | ±1.328 dB |
| Conducted Unwanted Emissions In Non-restricted Frequency Bands | ±0.746 dB (9 kHz ~ 1 GHz) |
| | ±1.328dB (1 GHz ~ 26 GHz) |
| 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 | Wemo Smart Dimmer | | |
| Model | WDS070 | | |
| Product Description | Operation Frequency | 2405 MHz ~ 2480 MHz | |
| | Modulation Type | Data Rate | |
| | O-QPSK | 250kbps | |
| Rated Input | AC 120 V,60 Hz | | |

5.2. 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 | 26 | 2480 |

5.3. MAXIMUM PEAK OUTPUT POWER

| Mode | Frequency (MHz) | Channel Number | Max Output PEAK Power (dBm) |
|--------|-----------------|----------------|-----------------------------|
| Thread | 2405-2480 | 11-26 [11] | 11.15 |

5.4. TEST CHANNEL CONFIGURATION

| Test Mode | Test Channel | Frequency |
|-----------|---------------------|---------------------------|
| Thread | CH 11, CH 19, CH 26 | 2405MHz, 2445MHz, 2480MHz |

5.5. THE WORSE CASE POWER SETTING PARAMETER

| The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band | | | | |
|--|-------------------------|--------------|-------|-------|
| Test Software | | UartAssis | | |
| Modulation Type | Transmit Antenna Number | Test Channel | | |
| | | CH 11 | CH 19 | CH 26 |
| O-QPSK | 1 | 10 | 10 | 10 |



5.6. DESCRIPTION OF AVAILABLE ANTENNAS

| Ant. | Frequency (MHz) | Antenna Type | Antenna Gain (dBi) |
|------|-----------------|--------------|--------------------|
| 1 | 2405-2480 | PCB | 0.8 |

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

Note: 1. The value of the antenna gain was declared by customer.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| Item | Equipment | Brand Name | Model Name | Remarks |
|------|-------------|------------|------------|---------|
| 1 | Laptop | Lenovo | E14 | |
| 2 | USB TO UART | / | / | / |
| 3 | LED Lamp | N/A | N/A | 100W |

I/O CABLES

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|----------|------|----------------|------------|-----------------|---------|
| 1 | USB | / | / | 1.0 | / |
| 2 | AC | Unshielded | NO | 1.0 | / |

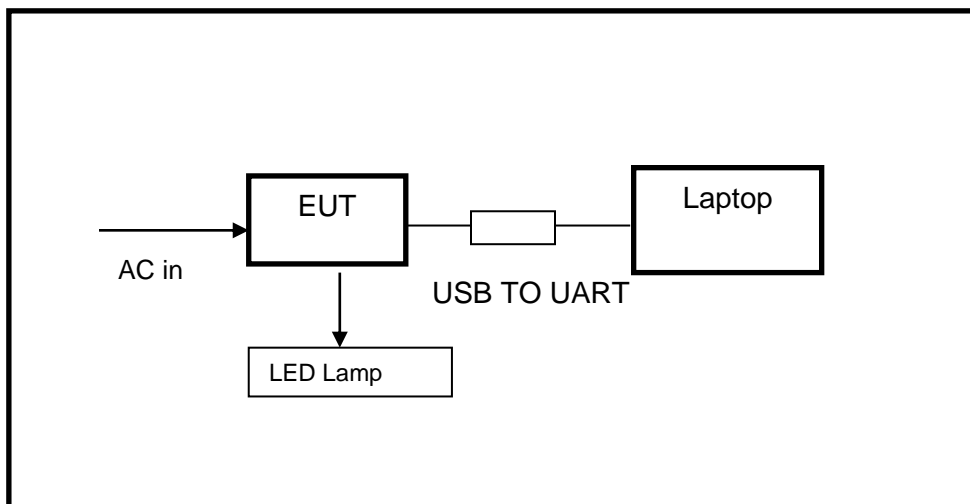
ACCESSORIES

| Item | Accessory | Brand Name | Model Name | Description |
|------|-----------|------------|------------|-------------|
| / | / | / | / | / |

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

| Radiated Emissions | | | | | |
|--------------------------------------|---------------|-------------------------------------|---------------|---------------|---------------|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Due Date |
| MXE EMI Receiver | KESIGHT | N9038A | MY56400036 | Oct.30, 2021 | Oct.29, 2022 |
| Hybrid Log Periodic Antenna | TDK | HLP-3003C | 130959 | Aug.02, 2021 | Aug.01, 2024 |
| Preamplifier | HP | 8447D | 2944A09099 | Oct.30, 2021 | Oct.29, 2022 |
| EMI Measurement Receiver | R&S | ESR26 | 101377 | Oct.30, 2021 | Oct.29, 2022 |
| Horn Antenna | TDK | HRN-0118 | 130940 | July 20, 2021 | July 19, 2024 |
| Preamplifier | TDK | PA-02-0118 | TRS-305-00067 | Oct.30, 2021 | Oct.29, 2022 |
| Horn Antenna | Schwarzbeck | BBHA9170 | 697 | July 20, 2021 | July 19, 2024 |
| Preamplifier | TDK | PA-02-2 | TRS-307-00003 | Oct.31, 2021 | Oct.30, 2022 |
| Preamplifier | TDK | PA-02-3 | TRS-308-00002 | Oct.31, 2021 | Oct.30, 2022 |
| Loop antenna | Schwarzbeck | 1519B | 00008 | Jan.17, 2019 | Jan.17,2022 |
| Preamplifier | TDK | PA-02-001-3000 | TRS-302-00050 | Oct.31, 2021 | Oct.30, 2022 |
| Preamplifier | Mini-Circuits | ZX60-83LN-S+ | SUP01201941 | Oct.31, 2021 | Oct.30, 2022 |
| High Pass Filter | Wi | WHKX10-2700-3000-18000-40SS | 23 | Oct.31, 2021 | Oct.30, 2022 |
| Band Reject Filter | Wainwright | WRCJV8-2350-2400-2483.5-2533.5-40SS | 4 | Oct.31, 2021 | Oct.30, 2022 |
| Software | | | | | |
| Description | | | Manufacturer | Name | Version |
| Test Software for Radiated Emissions | | | Farad | EZ-EMC | Ver. UL-3A1 |



| R&S TS 8997 Test System | | | | | |
|---------------------------|--------------|-------------------------|------------|--------------|--------------|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Due. Date |
| Power sensor, Power Meter | R&S | OSP120 | 100921 | Mar.23,2021 | Mar.22,2022 |
| Vector Signal Generator | R&S | SMBV100A | 261637 | Oct.30, 2021 | Oct.29, 2022 |
| Signal Generator | R&S | SMB100A | 178553 | Oct.30, 2021 | Oct.29, 2022 |
| Signal Analyzer | R&S | FSV40 | 101118 | Oct.30, 2021 | Oct.29, 2022 |
| Software | | | | | |
| Description | Manufacturer | Name | | Version | |
| Tonsend SRD Test System | Tonsend | JS1120-3 RF Test System | | 2.6.77.0518 | |



7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

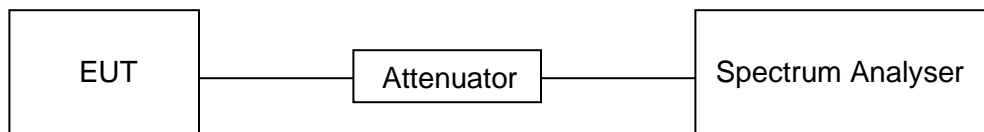
LIMITS

None; for reporting purposes only.

PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

| | | | |
|---------------------|---------|-------------------|----------------|
| Temperature | 23.8 °C | Relative Humidity | 45.2 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V,60 Hz |

RESULTS

Please refer to appendix G.

7.2. 6 dB DTS BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

LIMITS

| CFR 47FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2 | | | |
|---|-------------------------|------------------------------------|-----------------------|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(a)(2) ISED RSS-247 5.2 (a) | 6 dB Bandwidth | ≥ 500 kHz | 2400-2483.5 |
| ISED RSS-Gen Clause 6.7 | 99 % Occupied Bandwidth | None; for reporting purposes only. | 2400-2483.5 |

TEST PROCEDURE

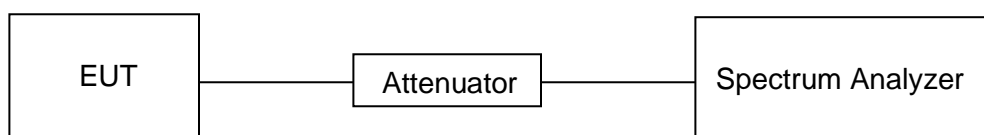
Connect the EUT to the spectrum analyser and use the following settings:

| | |
|------------------|---|
| Center Frequency | The center frequency of the channel under test |
| Frequency Span | For 6 dB Bandwidth: Enough to capture all products of the modulation carrier emission For 99 % Occupied Bandwidth: Between 1.5 times and 5.0 times the OBW |
| Detector | Peak |
| RBW | For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth |
| VBW | For 6 dB Bandwidth: $\geq 3 \times$ RBW For 99 % Occupied Bandwidth: $\geq 3 \times$ RBW |
| Trace | Max hold |
| Sweep | Auto couple |

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) 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 | 23.8 °C | Relative Humidity | 45.2 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V,60 Hz |

RESULTS

Please refer to appendix A & B.



7.3. CONDUCTED OUTPUT POWER

LIMITS

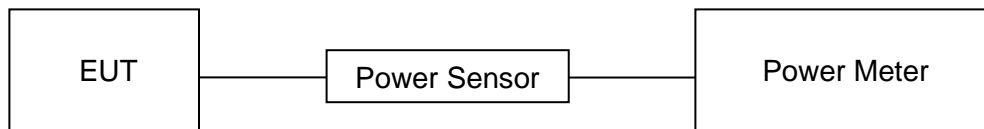
| CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2 | | | |
|--|-----------------------------|------------------|-----------------------|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(b)(3) ISED RSS-247 5.4 (d) | Peak Conducted Output Power | 1 watt or 30 dBm | 2400-2483.5 |

TEST PROCEDURE

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

TEST SETUP



TEST ENVIRONMENT

| | | | |
|---------------------|---------|-------------------|----------------|
| Temperature | 23.8 °C | Relative Humidity | 45.2 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V,60 Hz |

RESULTS

Please refer to appendix C.



7.4. POWER SPECTRAL DENSITY

LIMITS

| CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2 | | | |
|--|------------------------|-------------------------|-----------------------|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC §15.247 (e) ISED RSS-247 5.2 (b) | Power Spectral Density | 8 dBm in any 3 kHz band | 2400-2483.5 |

TEST PROCEDURE

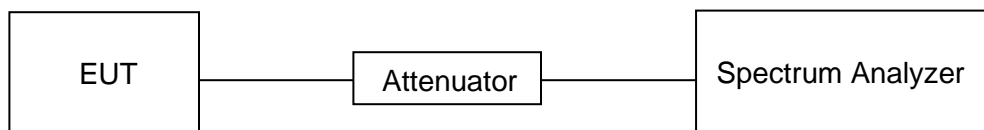
Connect the EUT to the spectrum analyser and use the following settings:

| | |
|------------------|--|
| Center Frequency | The center 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



TEST ENVIRONMENT

| | | | |
|---------------------|---------|-------------------|-----------------|
| Temperature | 23.8 °C | Relative Humidity | 45.2 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V, 60 Hz |



RESULTS

Please refer to appendix D.



7.5. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

LIMITS

| CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2 | | |
|--|---|---|
| Section | Test Item | Limit |
| CFR 47 FCC §15.247 (d) ISED 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 EUT to the spectrum analyser and use the following settings for reference level measurement:

| | |
|------------------|--|
| Center Frequency | The center frequency of the channel under test |
| Detector | Peak |
| RBW | 100 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 PSD level.

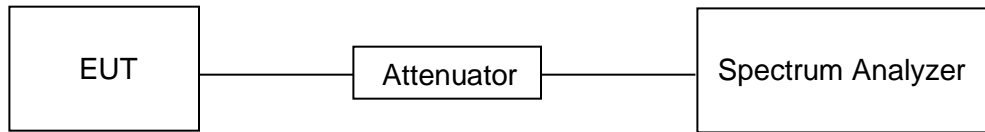
Change the settings for emission level measurement:

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

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.



TEST SETUP



TEST ENVIRONMENT

| | | | |
|---------------------|---------|-------------------|----------------|
| Temperature | 23.8 °C | Relative Humidity | 45.2 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V,60 Hz |

RESULTS

Please refer to appendix E & F.



8. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Please refer to ISSED RSS-GEN Clause 8.9 and Clause 8.10.

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

| Emissions radiated outside of the specified frequency bands above 30 MHz | | | |
|--|------------------------------------|--------------------------------------|---------|
| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m | |
| | | Quasi-Peak | |
| 30 - 88 | 100 | 40 | |
| 88 - 216 | 150 | 43.5 | |
| 216 - 960 | 200 | 46 | |
| Above 960 | 500 | 54 | |
| Above 1000 | 500 | Peak | Average |
| | | 74 | 54 |

| FCC Emissions radiated outside of the specified frequency bands below 30 MHz | | |
|--|-----------------------------------|-------------------------------|
| 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 |

ISED General field strength limits at frequencies below 30 MHz

| Table 6 – General field strength limits at frequencies below 30 MHz | | |
|---|--|--------------------------|
| Frequency | Magnetic field strength (H-Field) (μA/m) | Measurement distance (m) |
| 9 - 490 kHz ^{Note 1} | 6.37/F (F in kHz) | 300 |
| 490 - 1705 kHz | 63.7/F (F in kHz) | 30 |
| 1.705 - 30 MHz | 0.08 | 30 |

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.



ISED Restricted bands please refer to ISED RSS-GEN Clause 8.10

| MHz | MHz | GHz |
|---------------------|-----------------------|---------------|
| 0.090 - 0.110 | 149.9 - 150.05 | 9.0 - 9.2 |
| 0.495 - 0.505 | 156.52475 - 156.52525 | 9.3 - 9.5 |
| 2.1735 - 2.1905 | 156.7 - 156.9 | 10.6 - 12.7 |
| 3.020 - 3.028 | 162.0125 - 167.17 | 13.25 - 13.4 |
| 4.125 - 4.128 | 167.72 - 173.2 | 14.47 - 14.5 |
| 4.17725 - 4.17775 | 240 - 285 | 15.35 - 16.2 |
| 4.20725 - 4.20775 | 322 - 335.4 | 17.7 - 21.4 |
| 5.677 - 5.683 | 399.9 - 410 | 22.01 - 23.12 |
| 6.215 - 6.218 | 608 - 614 | 23.6 - 24.0 |
| 6.26775 - 6.26825 | 960 - 1427 | 31.2 - 31.8 |
| 6.31175 - 6.31225 | 1435 - 1626.5 | 36.43 - 36.5 |
| 8.291 - 8.294 | 1645.5 - 1646.5 | Above 38.6 |
| 8.362 - 8.366 | 1660 - 1710 | |
| 8.37625 - 8.38675 | 1718.8 - 1722.2 | |
| 8.41425 - 8.41475 | 2200 - 2300 | |
| 12.29 - 12.293 | 2310 - 2390 | |
| 12.51975 - 12.52025 | 2483.5 - 2500 | |
| 12.57675 - 12.57725 | 2655 - 2900 | |
| 13.36 - 13.41 | 3260 - 3267 | |
| 16.42 - 16.423 | 3332 - 3339 | |
| 16.69475 - 16.69525 | 3345.8 - 3358 | |
| 16.80425 - 16.80475 | 3500 - 4400 | |
| 25.5 - 25.67 | 4500 - 5150 | |
| 37.5 - 38.25 | 5350 - 5460 | |
| 73 - 74.6 | 7250 - 7750 | |
| 74.8 - 75.2 | 8025 - 8500 | |
| 108 - 138 | | |

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

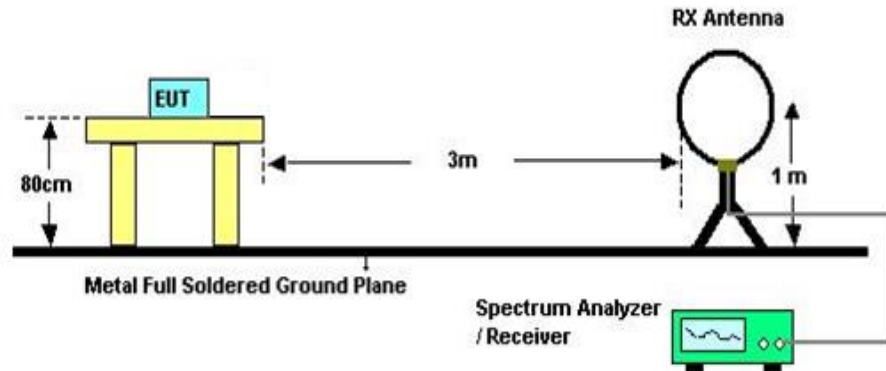
| MHz | MHz | MHz | GHz |
|--------------------------|---------------------|---------------|------------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| ¹ 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 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 30 MHz

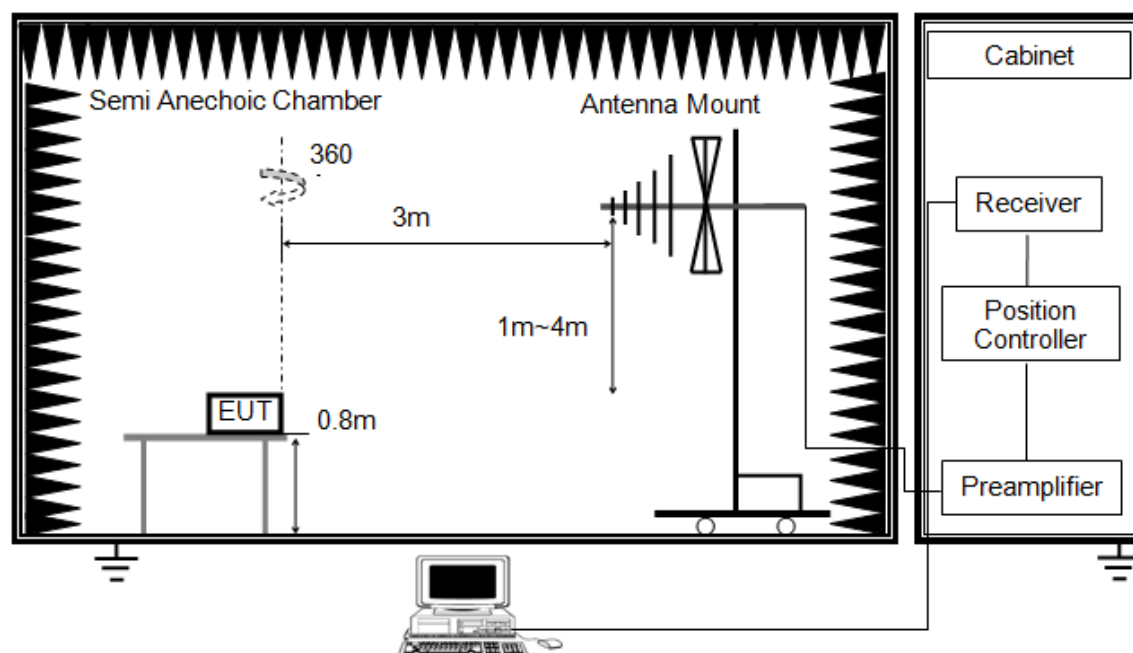


The setting of the spectrum analyser

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

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.
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 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m 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 1 GHz, 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 and average 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 and average detector and reported.
7. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to $Y - 51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz

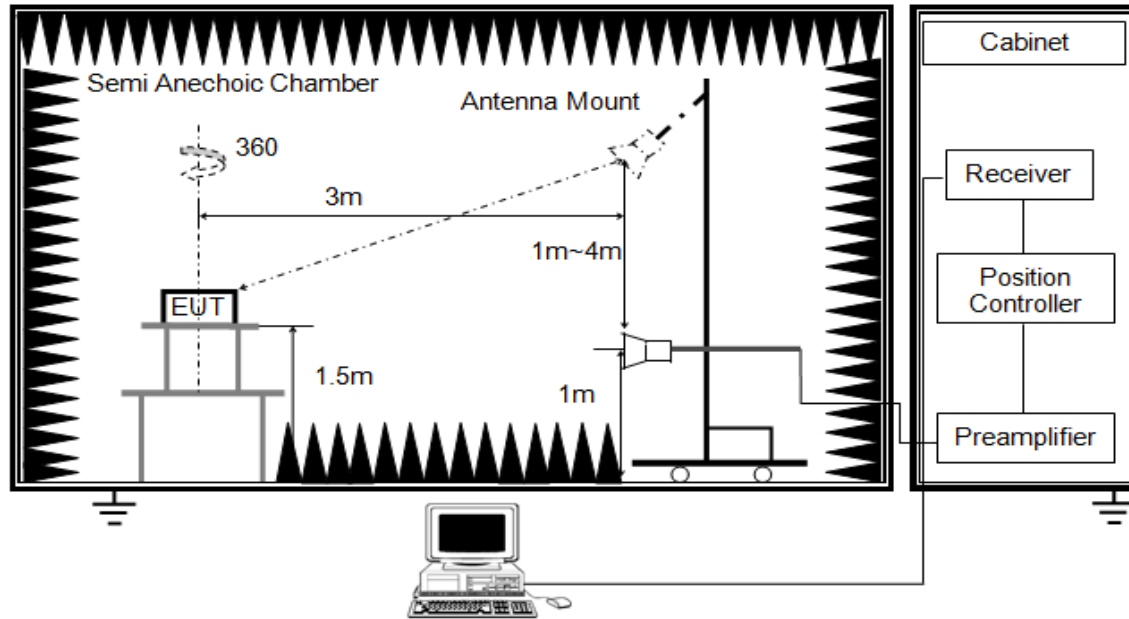


The setting of the spectrum analyser

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

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.
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 80 cm 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 1 GHz, 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 1 GHz

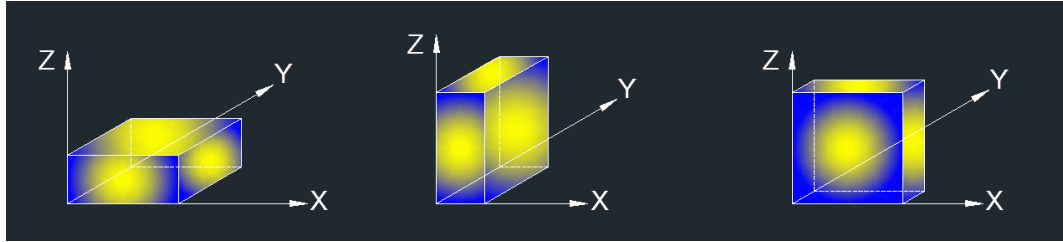


The setting of the spectrum analyser

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

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.
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 1.5 m 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 1 GHz, 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 7.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

TEST ENVIRONMENT

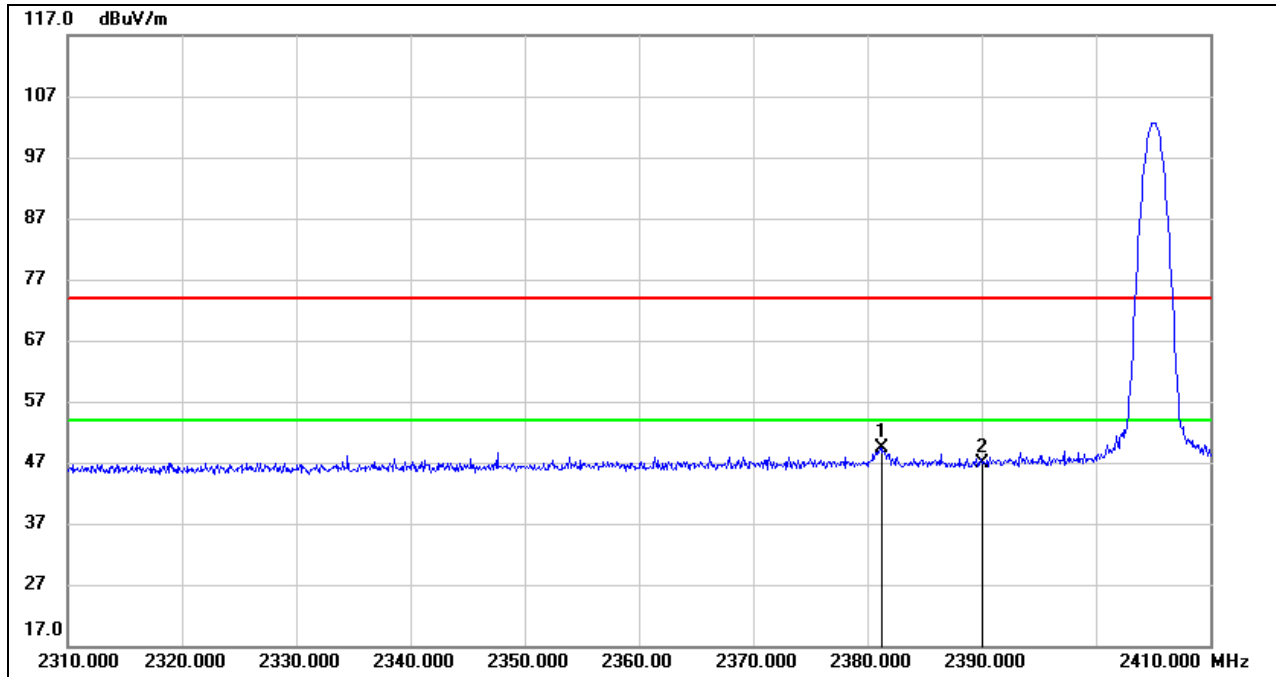
| | | | |
|---------------------|---------|-------------------|----------------|
| Temperature | 24.2 °C | Relative Humidity | 35.2 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V,60 Hz |

RESULTS

8.1. RESTRICTED BANDEDGE

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

PEAK



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 2381.300 | 16.83 | 32.59 | 49.42 | 74.00 | -24.58 | peak |
| 2 | 2390.000 | 14.31 | 32.66 | 46.97 | 74.00 | -27.03 | peak |

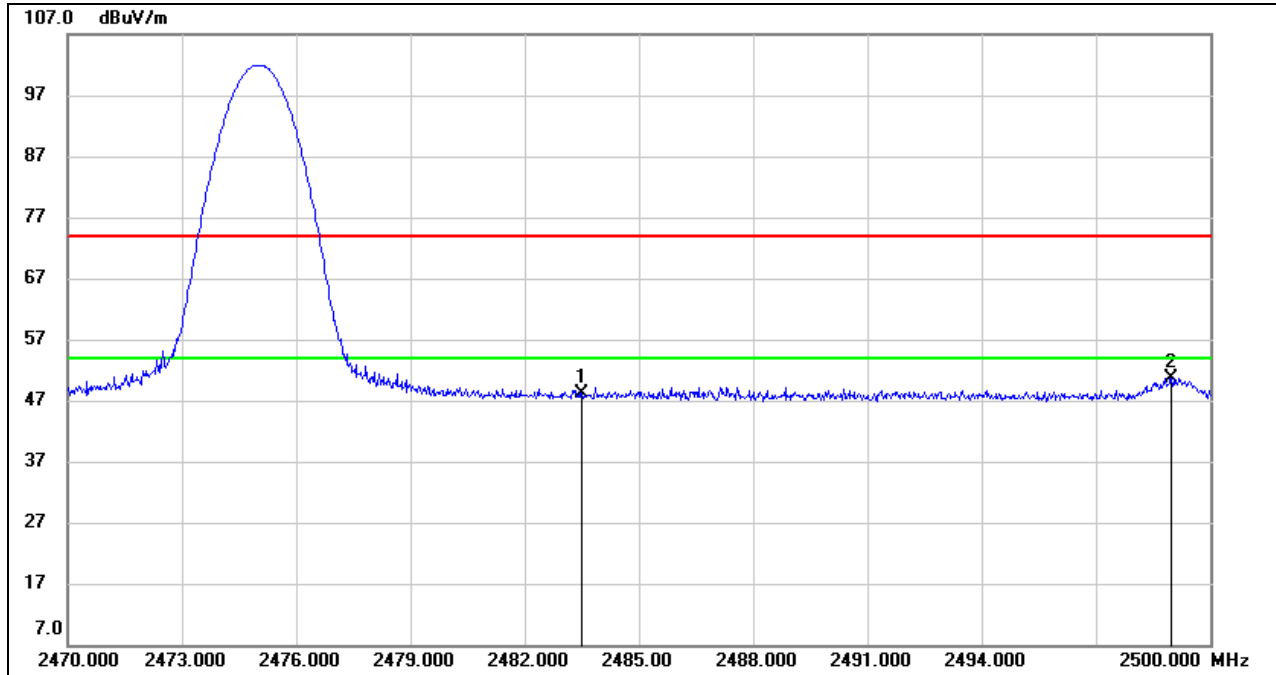
Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

PEAK



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 2483.500 | 15.08 | 33.10 | 48.18 | 74.00 | -25.82 | peak |
| 2 | 2498.980 | 17.57 | 33.16 | 50.73 | 74.00 | -23.27 | peak |

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

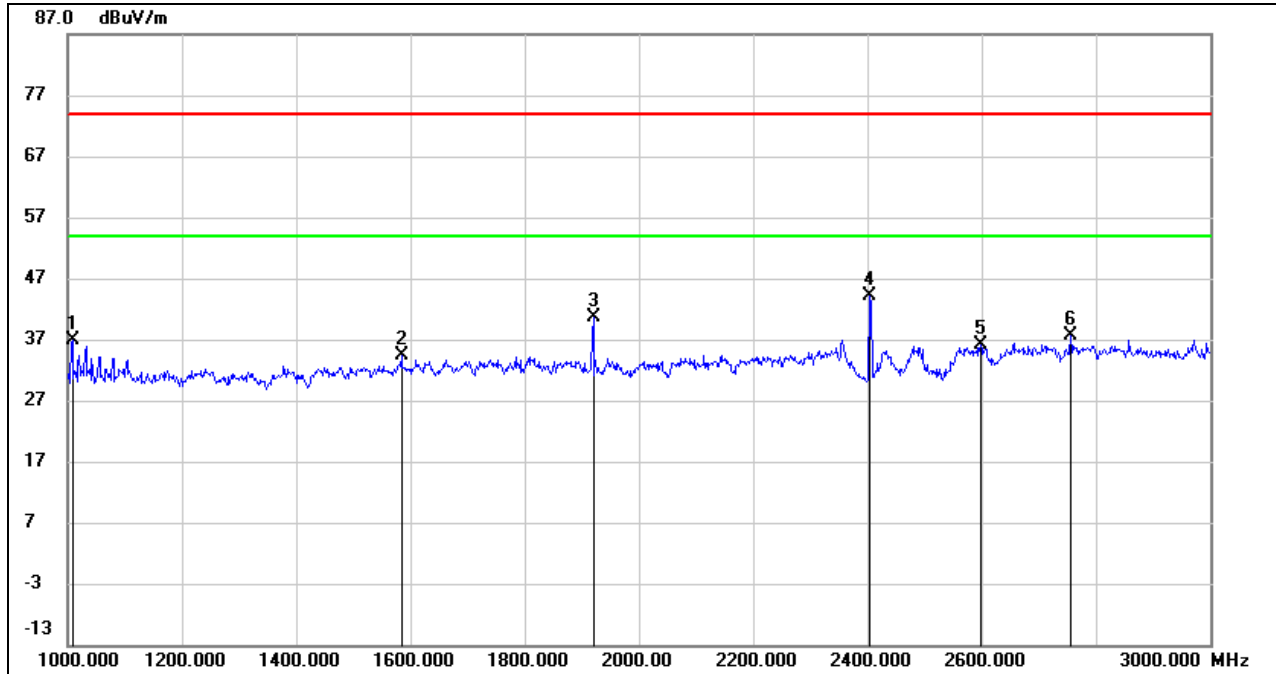
2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.

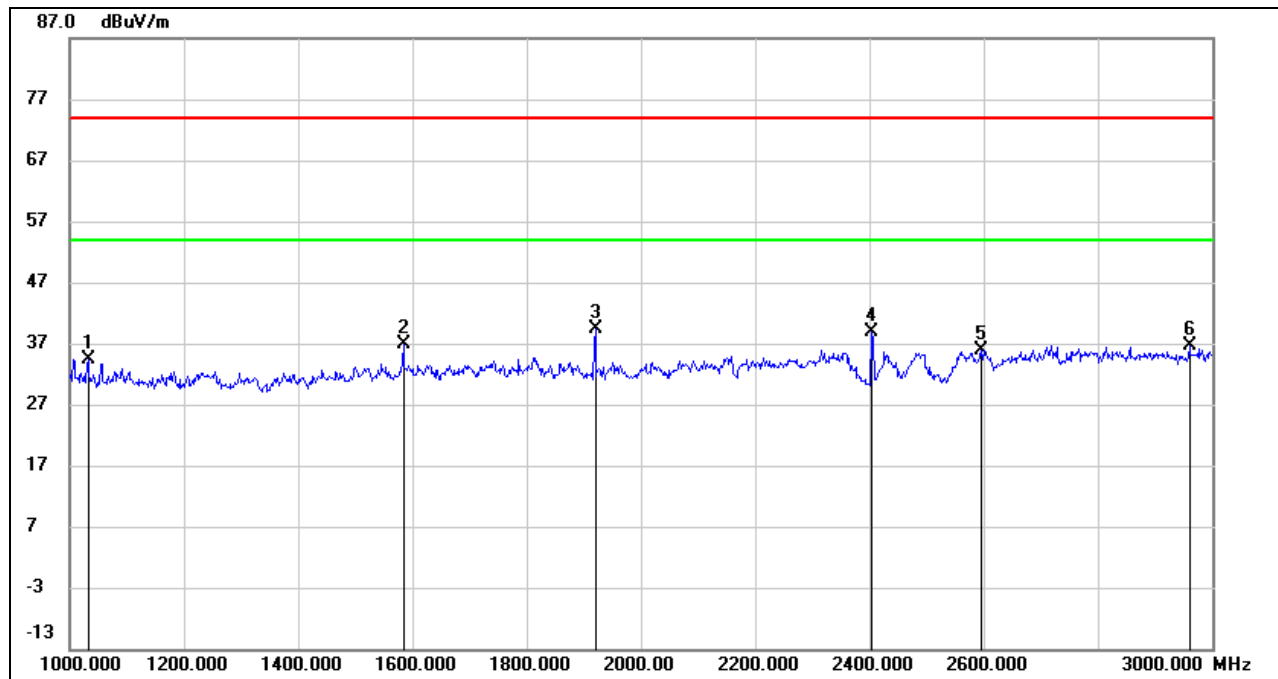
8.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz)

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



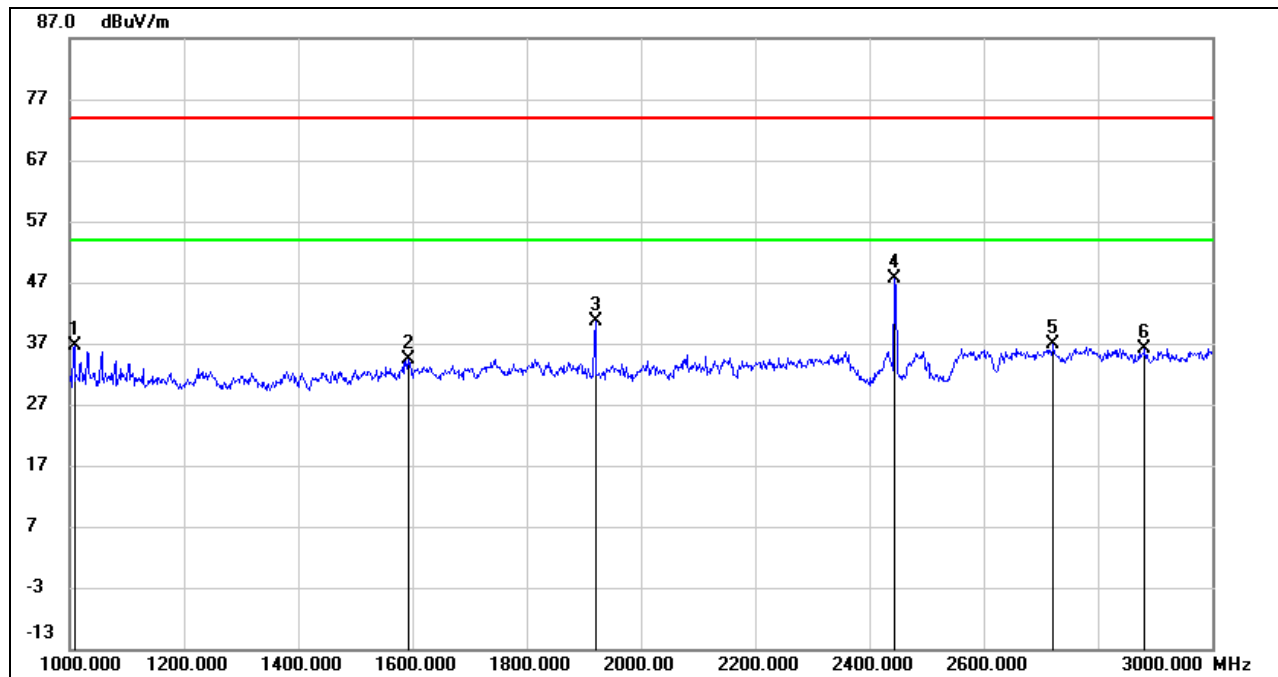
| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------|-----------------|----------------|-------------|-------------|
| 1 | 1008.000 | 51.89 | -15.02 | 36.87 | 74.00 | -37.13 | peak |
| 2 | 1584.000 | 46.46 | -12.08 | 34.38 | 74.00 | -39.62 | peak |
| 3 | 1920.000 | 51.70 | -11.02 | 40.68 | 74.00 | -33.32 | peak |
| 4 | 2405.000 | 53.17 | -9.06 | 44.11 | / | / | Fundamental |
| 5 | 2599.000 | 44.80 | -8.64 | 36.16 | 74.00 | -37.84 | peak |
| 6 | 2756.000 | 45.45 | -7.90 | 37.55 | 74.00 | -36.45 | peak |

Note: 1. Peak Result = 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) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------|-----------------|----------------|-------------|-------------|
| 1 | 1032.000 | 49.32 | -14.87 | 34.45 | 74.00 | -39.55 | peak |
| 2 | 1584.000 | 49.06 | -12.08 | 36.98 | 74.00 | -37.02 | peak |
| 3 | 1920.000 | 50.50 | -11.02 | 39.48 | 74.00 | -34.52 | peak |
| 4 | 2405.000 | 47.83 | -9.06 | 38.77 | / | / | Fundamental |
| 5 | 2597.000 | 44.63 | -8.66 | 35.97 | 74.00 | -38.03 | peak |
| 6 | 2961.000 | 43.90 | -7.21 | 36.69 | 74.00 | -37.31 | peak |

Note: 1. Peak Result = 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)**

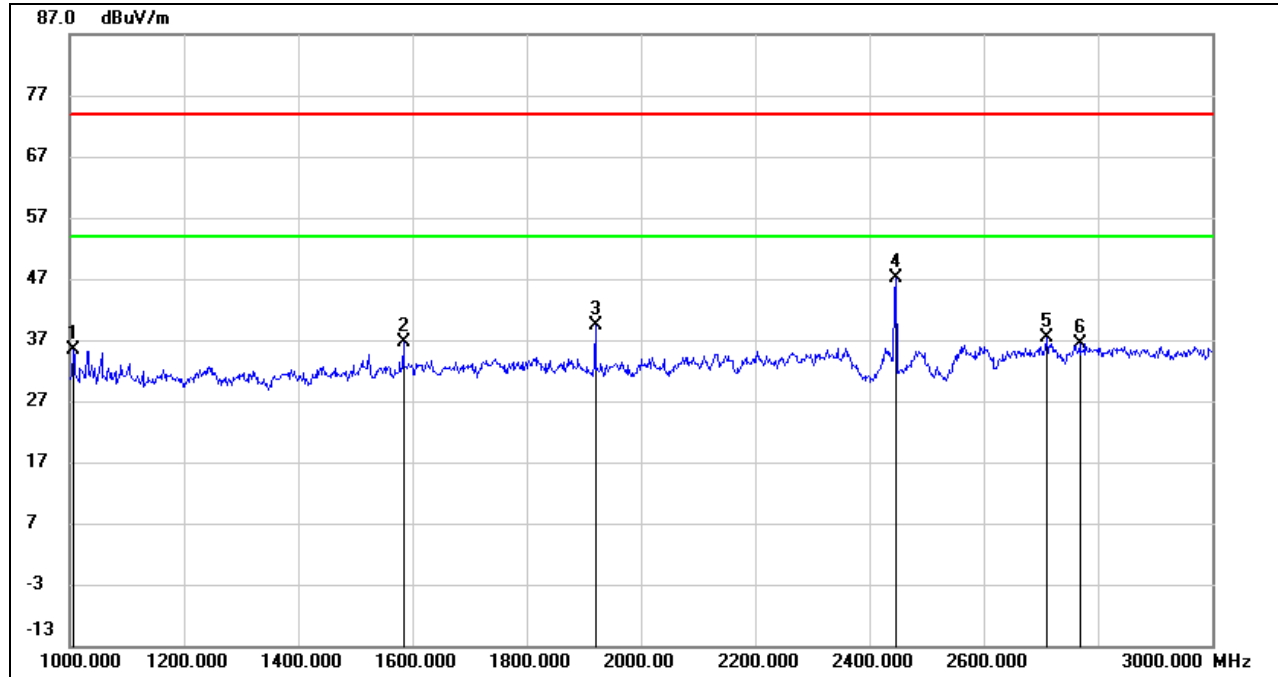
| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------|-----------------|----------------|-------------|-------------|
| 1 | 1008.000 | 51.77 | -15.02 | 36.75 | 74.00 | -37.25 | peak |
| 2 | 1593.000 | 46.49 | -12.03 | 34.46 | 74.00 | -39.54 | peak |
| 3 | 1920.000 | 51.55 | -11.02 | 40.53 | 74.00 | -33.47 | peak |
| 4 | 2445.000 | 56.47 | -8.95 | 47.52 | / | / | Fundamental |
| 5 | 2723.000 | 44.90 | -8.06 | 36.84 | 74.00 | -37.16 | peak |
| 6 | 2882.000 | 43.65 | -7.44 | 36.21 | 74.00 | -37.79 | peak |

Note: 1. Peak Result = 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)



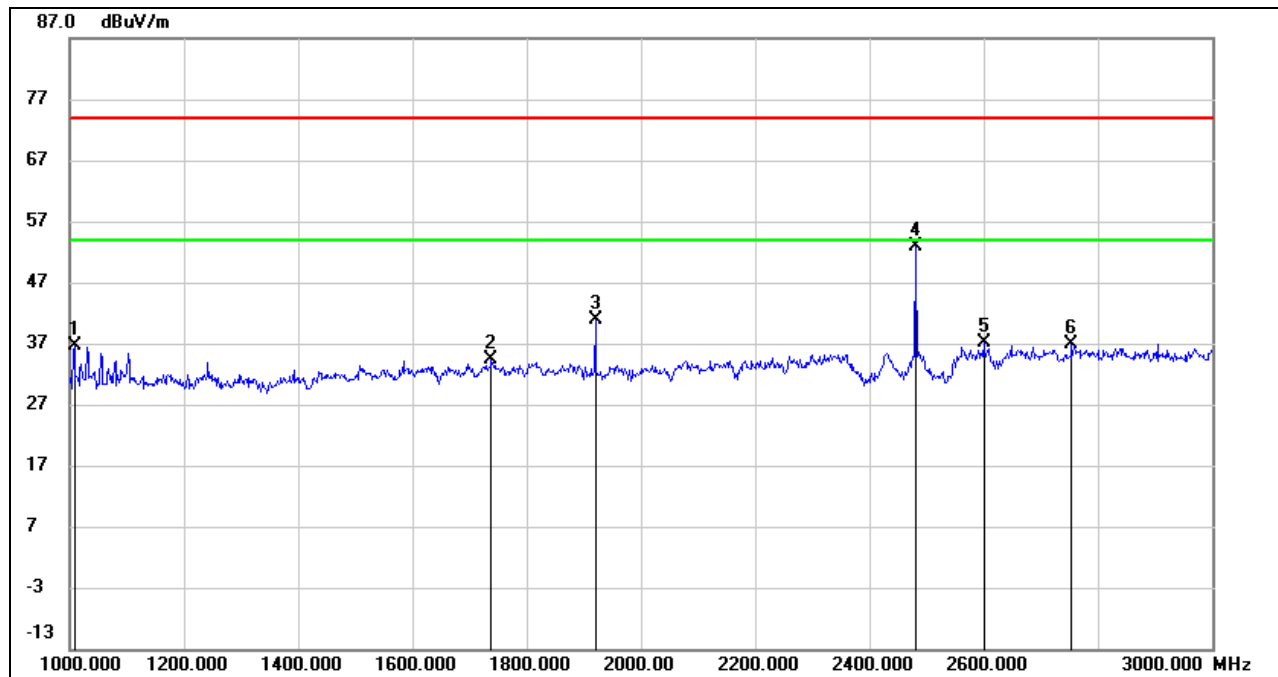
| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|-------------|
| 1 | 1006.000 | 50.41 | -15.04 | 35.37 | 74.00 | -38.63 | peak |
| 2 | 1584.000 | 48.78 | -12.08 | 36.70 | 74.00 | -37.30 | peak |
| 3 | 1920.000 | 50.36 | -11.02 | 39.34 | 74.00 | -34.66 | peak |
| 4 | 2445.000 | 56.10 | -8.95 | 47.15 | / | / | Fundamental |
| 5 | 2710.000 | 45.39 | -8.12 | 37.27 | 74.00 | -36.73 | peak |
| 6 | 2768.000 | 44.21 | -7.84 | 36.37 | 74.00 | -37.63 | peak |

Note: 1. Peak Result = 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.

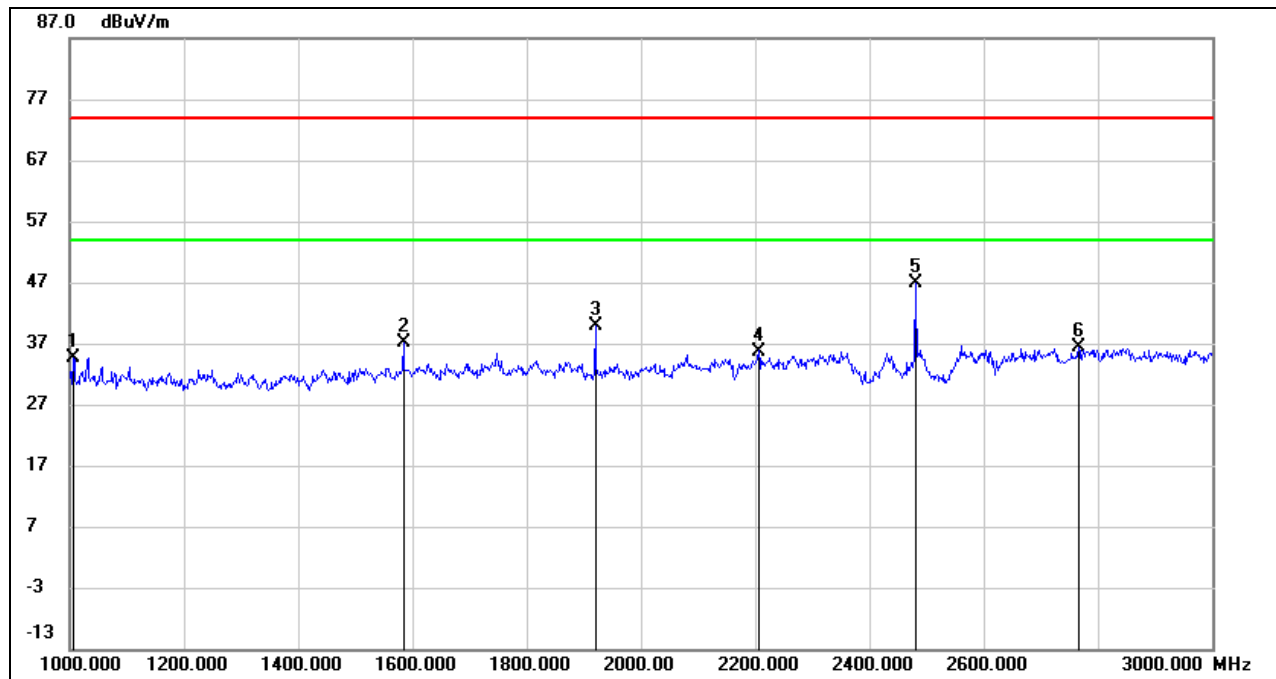
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------|-----------------|----------------|-------------|-------------|
| 1 | 1008.000 | 51.65 | -15.02 | 36.63 | 74.00 | -37.37 | peak |
| 2 | 1738.000 | 45.49 | -11.14 | 34.35 | 74.00 | -39.65 | peak |
| 3 | 1920.000 | 51.84 | -11.02 | 40.82 | 74.00 | -33.18 | peak |
| 4 | 2480.000 | 61.87 | -8.87 | 53.00 | / | / | Fundamental |
| 5 | 2600.000 | 45.73 | -8.64 | 37.09 | 74.00 | -36.91 | peak |
| 6 | 2754.000 | 44.78 | -7.91 | 36.87 | 74.00 | -37.13 | peak |

Note: 1. Peak Result = 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) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|-------------|
| 1 | 1006.000 | 49.75 | -15.04 | 34.71 | 74.00 | -39.29 | peak |
| 2 | 1584.000 | 49.17 | -12.08 | 37.09 | 74.00 | -36.91 | peak |
| 3 | 1920.000 | 50.91 | -11.02 | 39.89 | 74.00 | -34.11 | peak |
| 4 | 2206.000 | 45.61 | -9.86 | 35.75 | 74.00 | -38.25 | peak |
| 5 | 2480.000 | 55.83 | -8.87 | 46.96 | / | / | Fundamental |
| 6 | 2766.000 | 44.12 | -7.85 | 36.27 | 74.00 | -37.73 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.

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

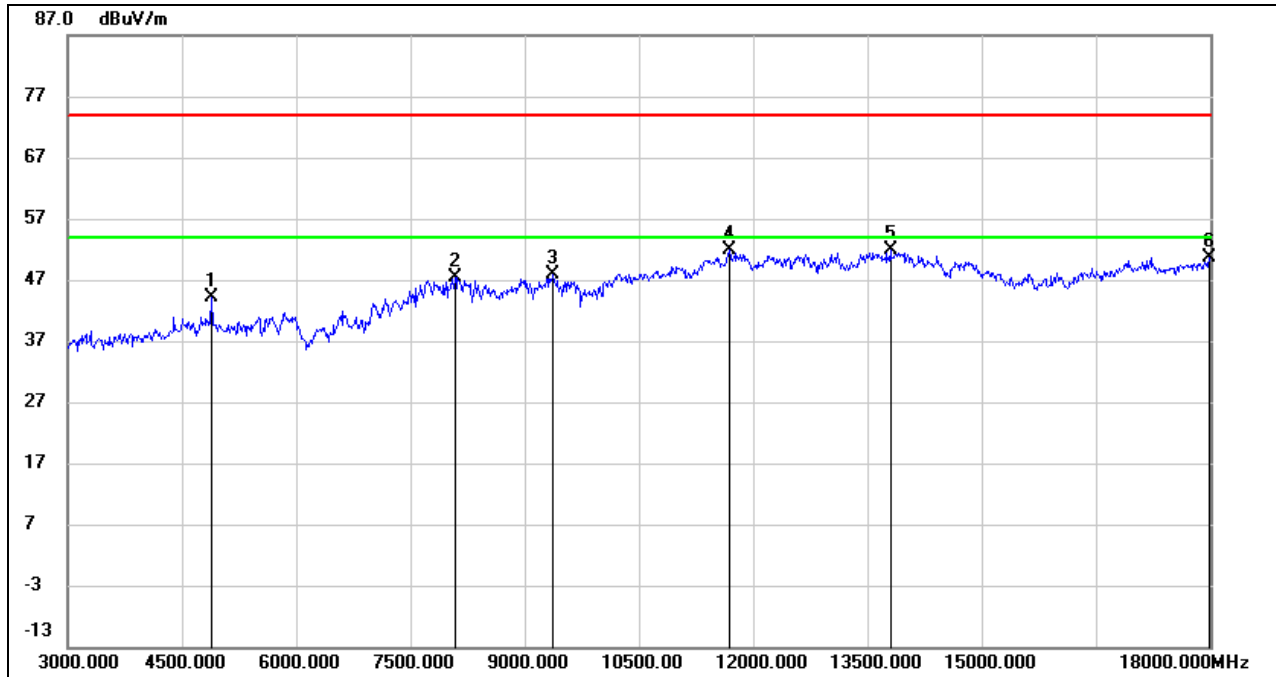
3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for BRF losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

8.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz)

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 4890.000 | 44.02 | -0.01 | 44.01 | 74.00 | -29.99 | peak |
| 2 | 8085.000 | 37.99 | 9.33 | 47.32 | 74.00 | -26.68 | peak |
| 3 | 9375.000 | 37.36 | 10.63 | 47.99 | 74.00 | -26.01 | peak |
| 4 | 11692.500 | 34.92 | 17.06 | 51.98 | 74.00 | -22.02 | peak |
| 5 | 13807.500 | 32.47 | 19.42 | 51.89 | 74.00 | -22.11 | peak |
| 6 | 17992.500 | 25.70 | 24.92 | 50.62 | 74.00 | -23.38 | peak |

Note: 1. Peak Result = 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.

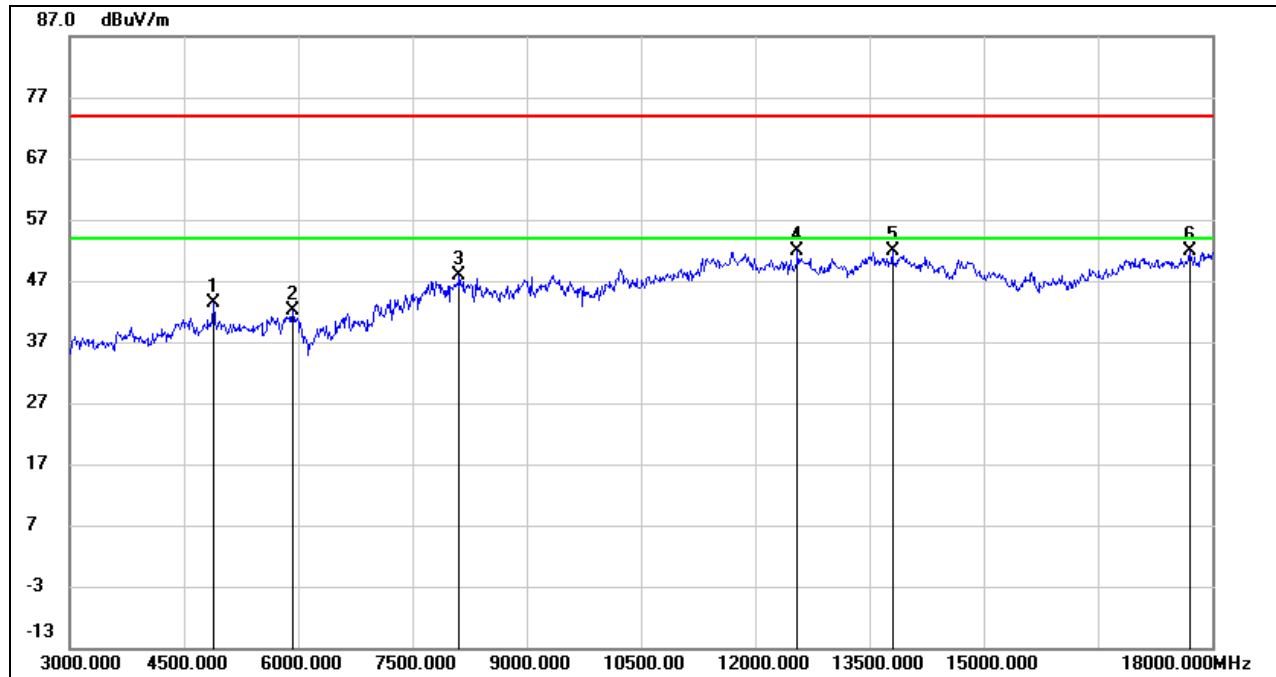
4. AVG: $VBW=1/T_{on}$, where: T_{on} is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.

6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

8. *-indicates frequency out of 47CFR Pt 15 / ISSED RSS-Restricted band.

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

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 4890.000 | 43.39 | -0.01 | 43.38 | 74.00 | -30.62 | peak |
| 2 | 5925.000 | 38.75 | 3.30 | 42.05 | 74.00 | -31.95 | peak |
| 3 | 8122.500 | 38.52 | 9.47 | 47.99 | 74.00 | -26.01 | peak |
| 4 | 12555.000 | 34.71 | 17.06 | 51.77 | 74.00 | -22.23 | peak |
| 5 | 13800.000 | 32.52 | 19.43 | 51.95 | 74.00 | -22.05 | peak |
| 6 | 17700.000 | 28.43 | 23.33 | 51.76 | 74.00 | -22.24 | peak |

Note: 1. Peak Result = 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.

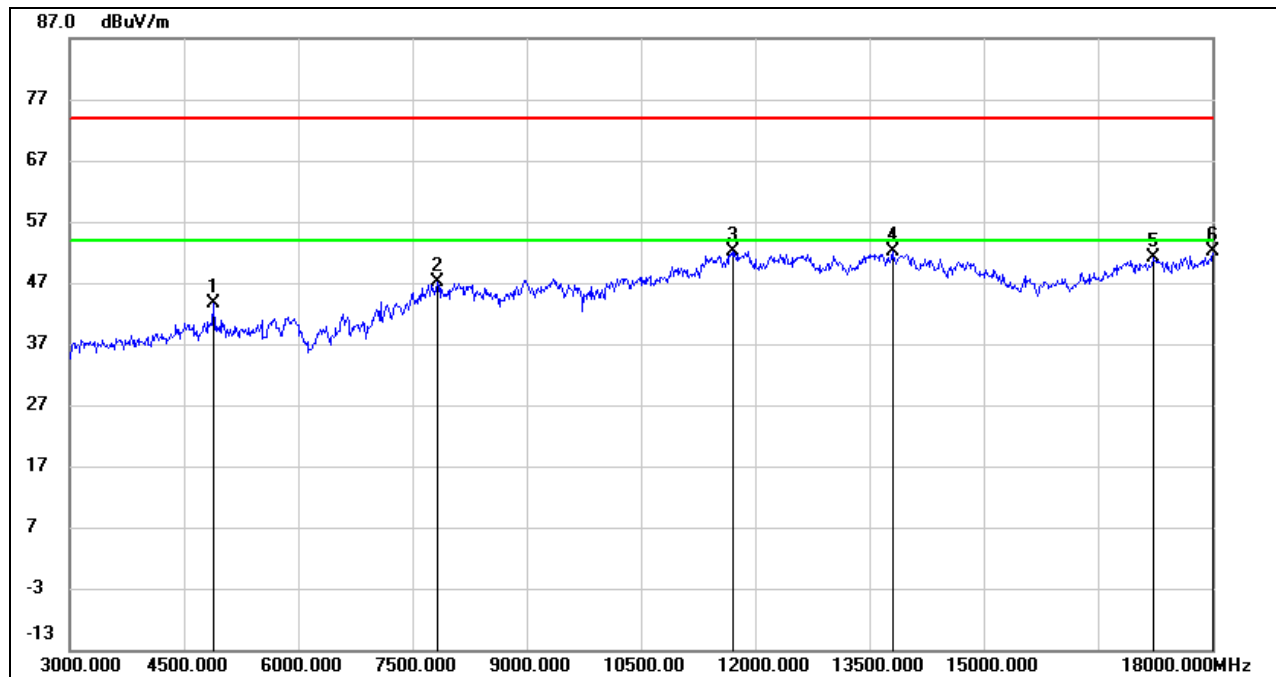
4. AVG: $VBW=1/Ton$, where: Ton is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.

6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

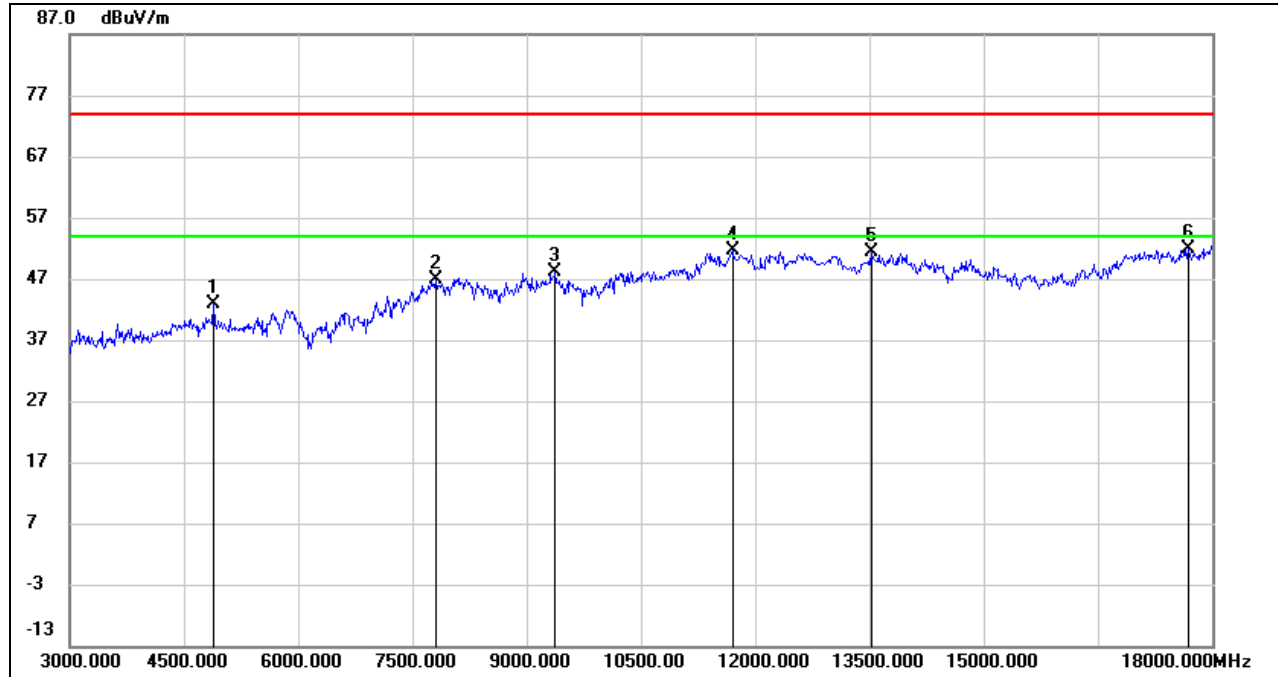
8. *-indicates frequency out of 47CFR Pt 15 / ISSED RSS-Restricted band.

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 4890.000 | 43.56 | -0.01 | 43.55 | 74.00 | -30.45 | peak |
| 2 | 7837.500 | 38.49 | 8.53 | 47.02 | 74.00 | -26.98 | peak |
| 3 | 11715.000 | 35.14 | 17.09 | 52.23 | 74.00 | -21.77 | peak |
| 4 | 13807.500 | 32.70 | 19.42 | 52.12 | 74.00 | -21.88 | peak |
| 5 | 17235.000 | 30.19 | 20.98 | 51.17 | 74.00 | -22.83 | peak |
| 6 | 18000.000 | 27.27 | 24.97 | 52.24 | 74.00 | -21.76 | peak |

- Note: 1. Peak Result = 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. AVG: $VBW=1/Ton$, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
8. *-indicates frequency out of 47CFR Pt 15 / ISSED RSS-Restricted band.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------|-----------------|----------------|-------------|--------|
| 1 | 4890.000 | 42.90 | -0.01 | 42.89 | 74.00 | -31.11 | peak |
| 2 | 7822.500 | 38.23 | 8.60 | 46.83 | 74.00 | -27.17 | peak |
| 3 | 9382.500 | 37.40 | 10.67 | 48.07 | 74.00 | -25.93 | peak |
| 4 | 11700.000 | 34.46 | 17.11 | 51.57 | 74.00 | -22.43 | peak |
| 5 | 13537.500 | 32.15 | 19.15 | 51.30 | 74.00 | -22.70 | peak |
| 6 | 17685.000 | 28.79 | 23.18 | 51.97 | 74.00 | -22.03 | peak |

Note: 1. Peak Result = 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.

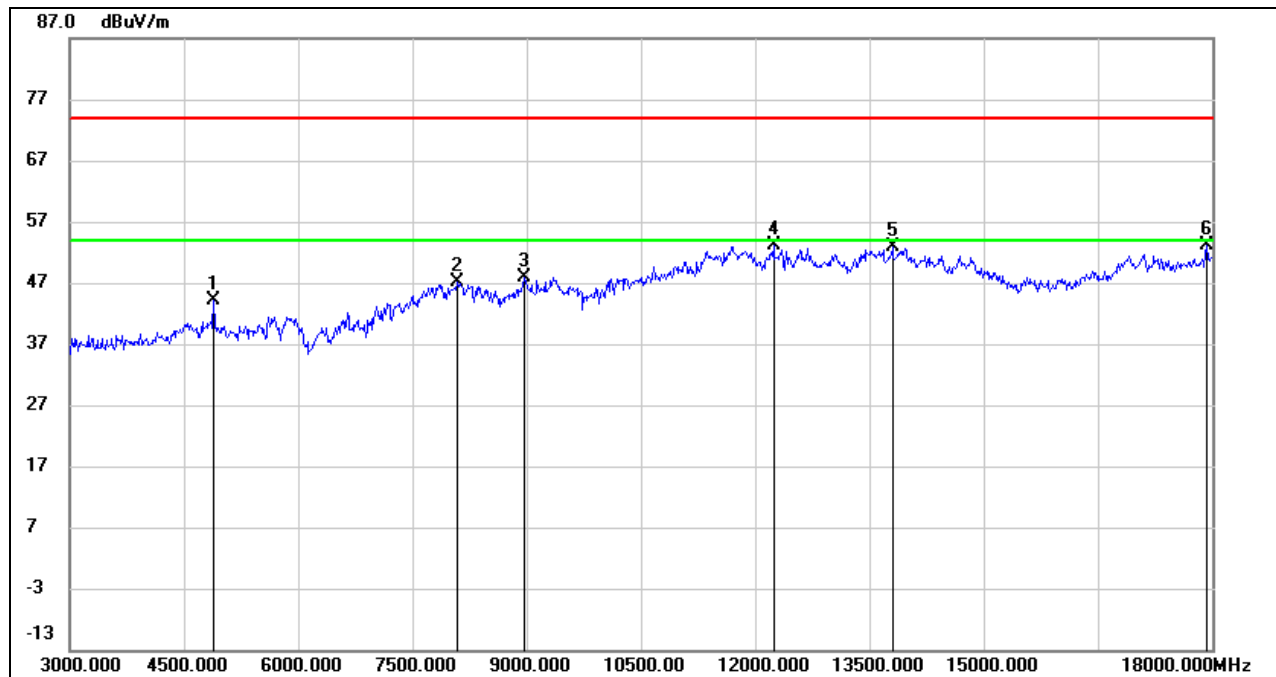
4. AVG: $VBW=1/Ton$, where: Ton is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.

6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

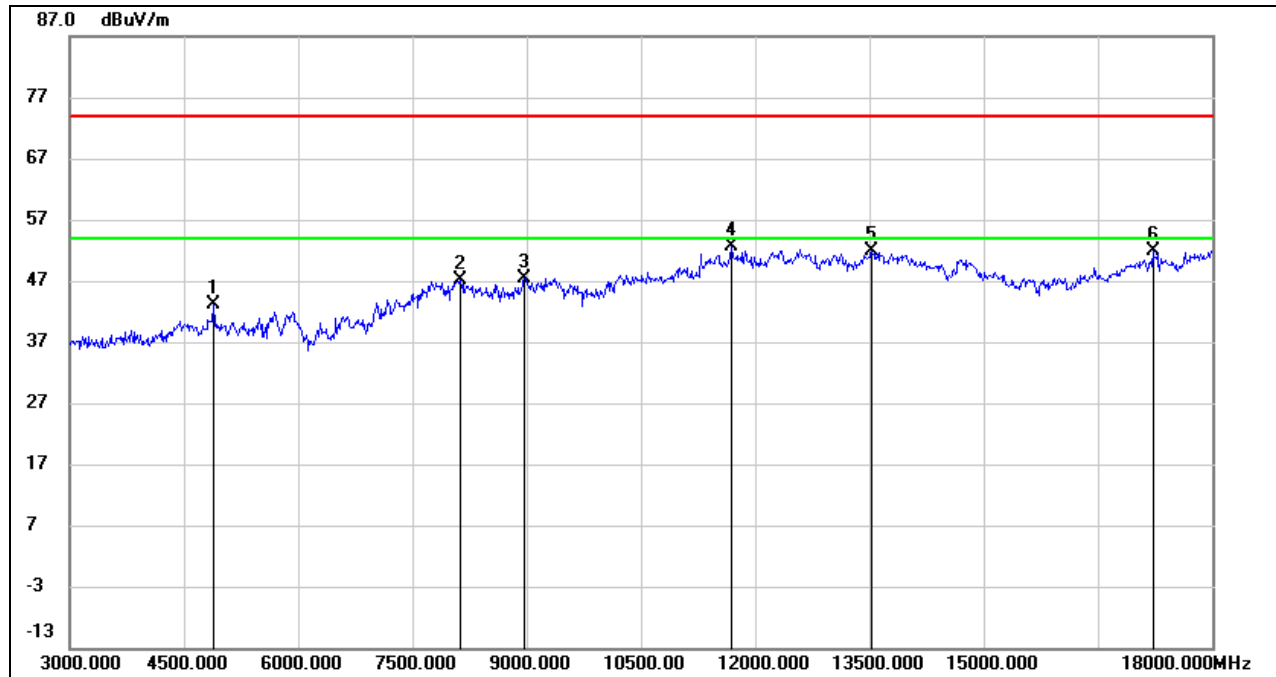
8. *-indicates frequency out of 47CFR Pt 15 / ISED RSS-Restricted band.

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

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 4890.000 | 44.16 | -0.01 | 44.15 | 74.00 | -29.85 | peak |
| 2 | 8085.000 | 37.70 | 9.33 | 47.03 | 74.00 | -26.97 | peak |
| 3 | 8977.500 | 37.55 | 10.33 | 47.88 | 74.00 | -26.12 | peak |
| 4 | 12247.500 | 35.52 | 17.52 | 53.04 | 74.00 | -20.96 | peak |
| 5 | 13807.500 | 33.48 | 19.42 | 52.90 | 74.00 | -21.10 | peak |
| 6 | 17932.500 | 28.71 | 24.52 | 53.23 | 74.00 | -20.77 | peak |

- Note: 1. Peak Result = 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. AVG: $VBW=1/Ton$, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
8. *-indicates frequency out of 47CFR Pt 15 / ISSED RSS-Restricted band.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



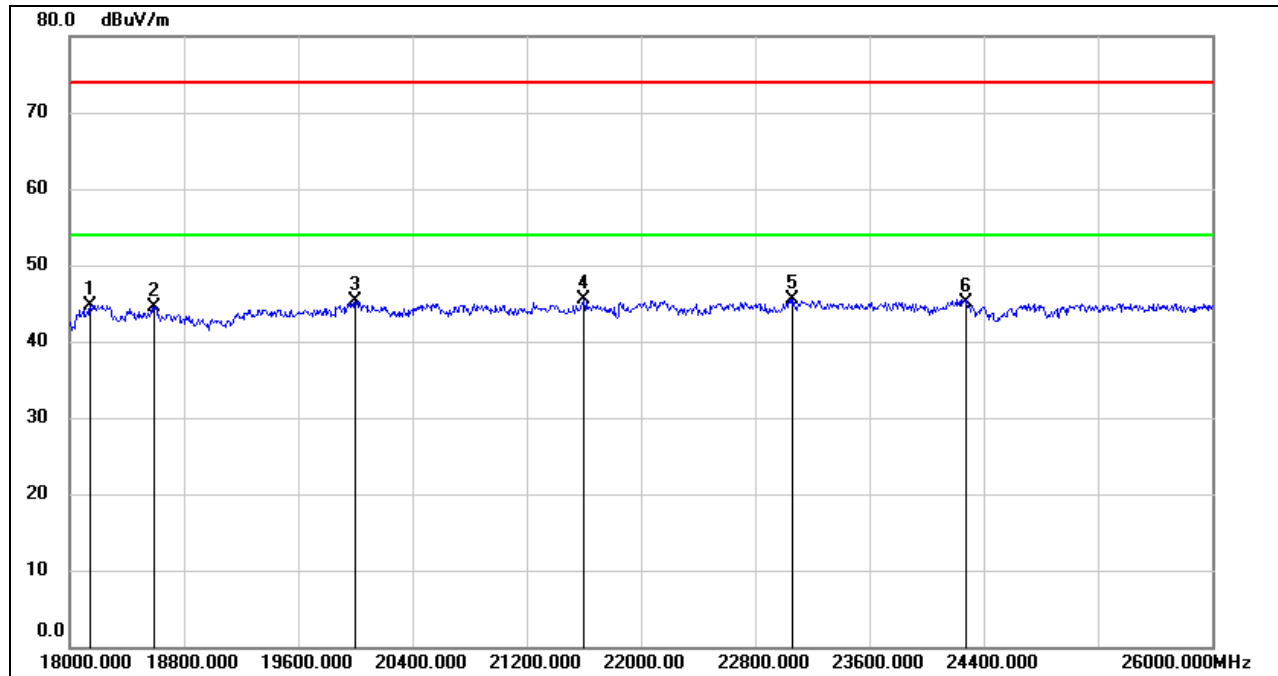
| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 4890.000 | 43.05 | -0.01 | 43.04 | 74.00 | -30.96 | peak |
| 2 | 8137.500 | 37.60 | 9.41 | 47.01 | 74.00 | -26.99 | peak |
| 3 | 8970.000 | 37.30 | 10.18 | 47.48 | 74.00 | -26.52 | peak |
| 4 | 11685.000 | 35.51 | 17.02 | 52.53 | 74.00 | -21.47 | peak |
| 5 | 13530.000 | 32.82 | 19.17 | 51.99 | 74.00 | -22.01 | peak |
| 6 | 17227.500 | 30.99 | 20.92 | 51.91 | 74.00 | -22.09 | peak |

- Note: 1. Peak Result = 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. AVG: $VBW=1/Ton$, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
8. *-indicates frequency out of 47CFR Pt 15 / ISSED RSS-Restricted band.



8.4. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

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

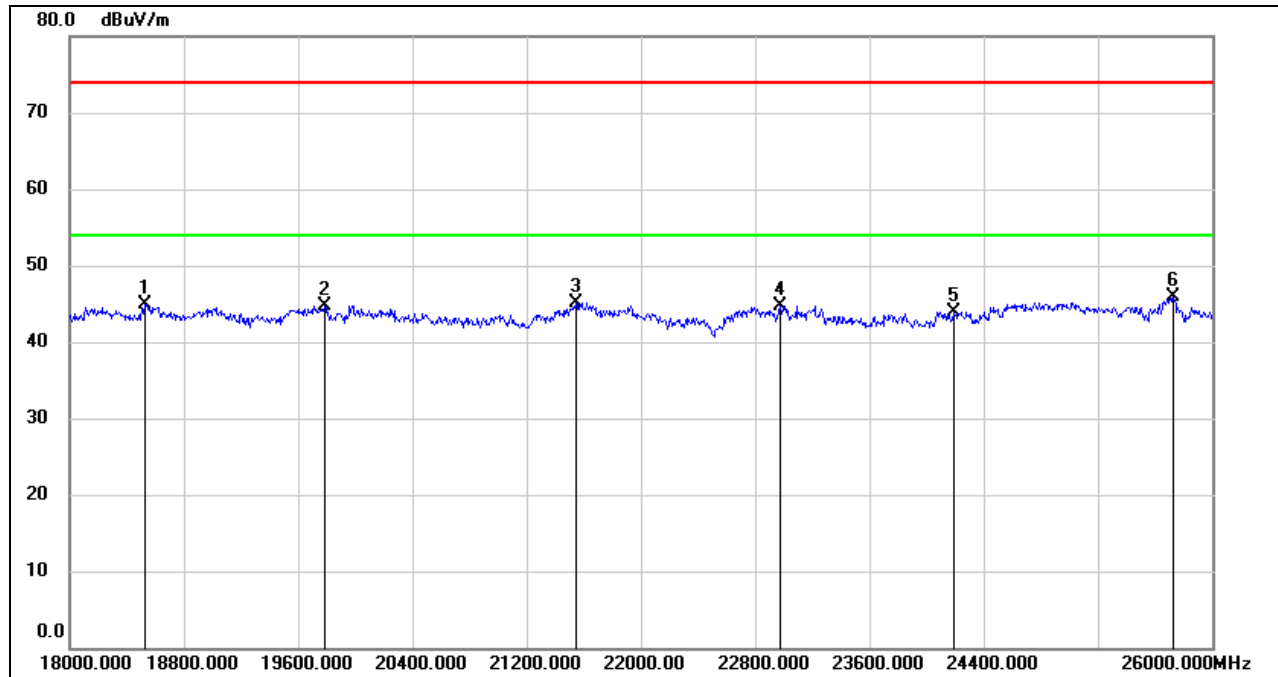


| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 18144.000 | 50.27 | -5.48 | 44.79 | 74.00 | -29.21 | peak |
| 2 | 18592.000 | 49.75 | -5.31 | 44.44 | 74.00 | -29.56 | peak |
| 3 | 20000.000 | 50.81 | -5.45 | 45.36 | 74.00 | -28.64 | peak |
| 4 | 21600.000 | 50.02 | -4.54 | 45.48 | 74.00 | -28.52 | peak |
| 5 | 23064.000 | 48.99 | -3.42 | 45.57 | 74.00 | -28.43 | peak |
| 6 | 24280.000 | 47.89 | -2.77 | 45.12 | 74.00 | -28.88 | peak |

Note: 1. Peak Result = 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.

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

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 18528.000 | 50.11 | -5.26 | 44.85 | 74.00 | -29.15 | peak |
| 2 | 19784.000 | 50.07 | -5.28 | 44.79 | 74.00 | -29.21 | peak |
| 3 | 21544.000 | 49.76 | -4.63 | 45.13 | 74.00 | -28.87 | peak |
| 4 | 22976.000 | 48.26 | -3.46 | 44.80 | 74.00 | -29.20 | peak |
| 5 | 24192.000 | 46.71 | -2.81 | 43.90 | 74.00 | -30.10 | peak |
| 6 | 25728.000 | 46.61 | -0.72 | 45.89 | 74.00 | -28.11 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.

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

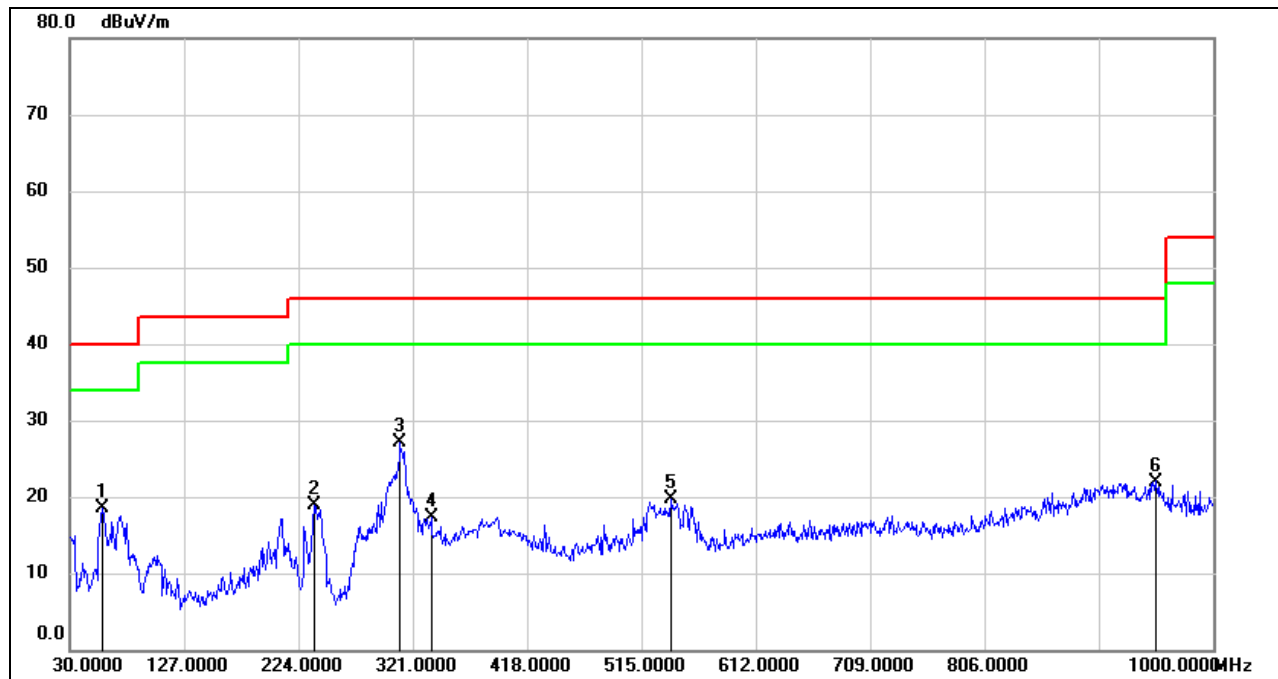
3. Peak: Peak detector.

Note: All the channels have been tested, only the worst data was recorded in the report.



8.5. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

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

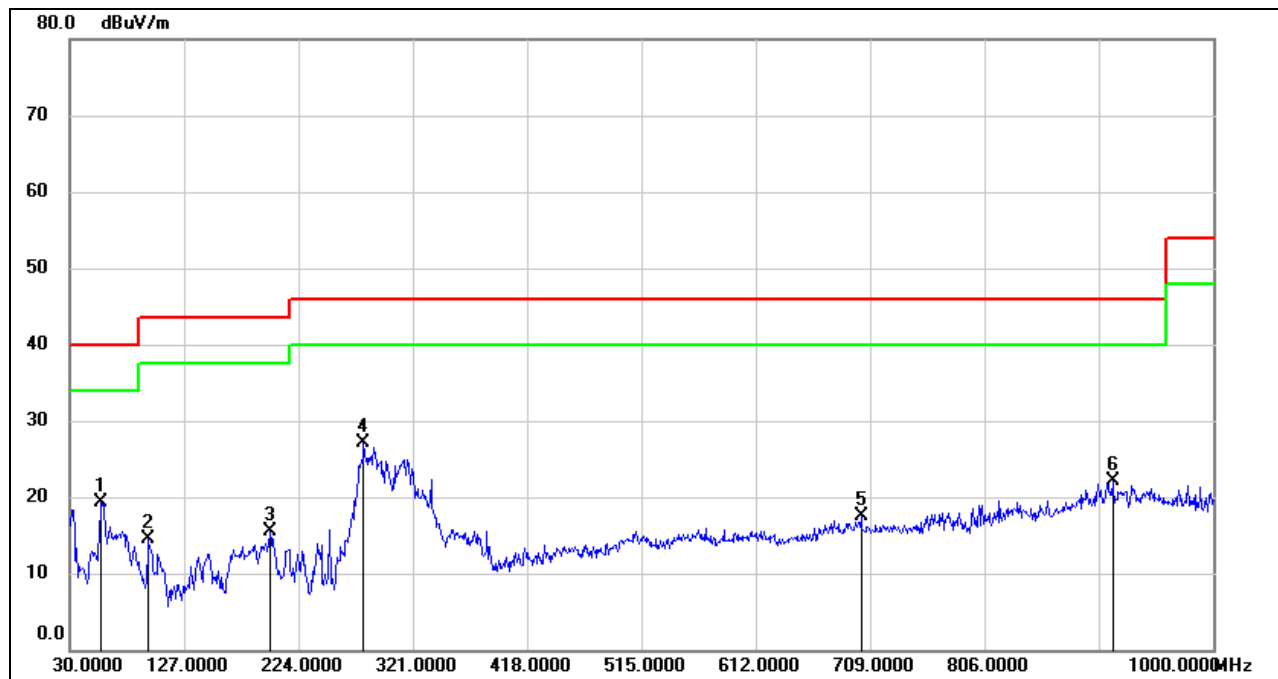


| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------|-----------------|----------------|-------------|--------|
| 1 | 57.1600 | 39.00 | -20.58 | 18.42 | 40.00 | -21.58 | QP |
| 2 | 237.5800 | 38.05 | -19.06 | 18.99 | 46.00 | -27.01 | QP |
| 3 | 310.3299 | 42.11 | -15.07 | 27.04 | 46.00 | -18.96 | QP |
| 4 | 336.5200 | 31.84 | -14.52 | 17.32 | 46.00 | -28.68 | QP |
| 5 | 540.2199 | 30.10 | -10.49 | 19.61 | 46.00 | -26.39 | QP |
| 6 | 951.5000 | 26.43 | -4.43 | 22.00 | 46.00 | -24.00 | 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) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| 1 | 56.1900 | 39.98 | -20.61 | 19.37 | 40.00 | -20.63 | QP |
| 2 | 96.9300 | 35.89 | -21.38 | 14.51 | 43.50 | -28.99 | QP |
| 3 | 199.7500 | 31.94 | -16.38 | 15.56 | 43.50 | -27.94 | QP |
| 4 | 279.2900 | 43.83 | -16.76 | 27.07 | 46.00 | -18.93 | QP |
| 5 | 701.2400 | 25.72 | -8.30 | 17.42 | 46.00 | -28.58 | QP |
| 6 | 914.6400 | 26.94 | -4.88 | 22.06 | 46.00 | -23.94 | 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.

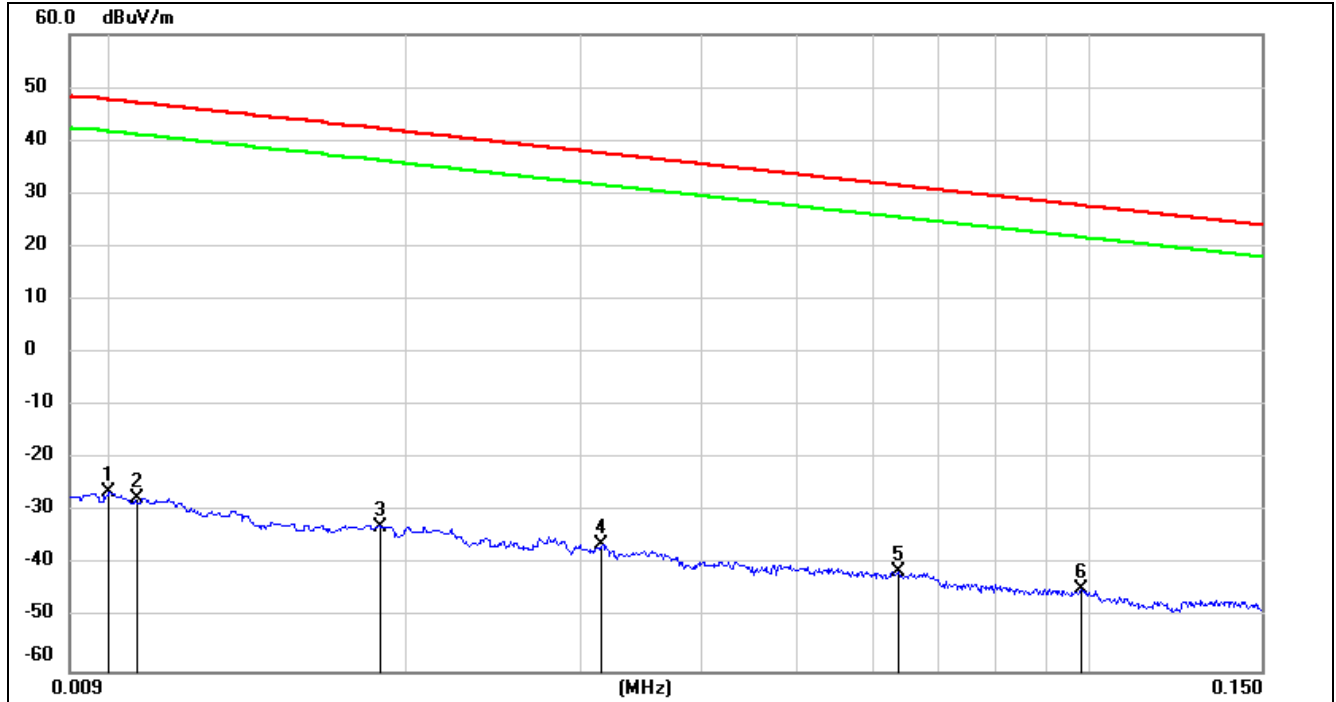
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note: All the channels have been tested, only the worst data was recorded in the report.

8.6. SPURIOUS EMISSIONS BELOW 30 MHz

SPURIOUS EMISSIONS (MID CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

9 kHz~ 150 kHz

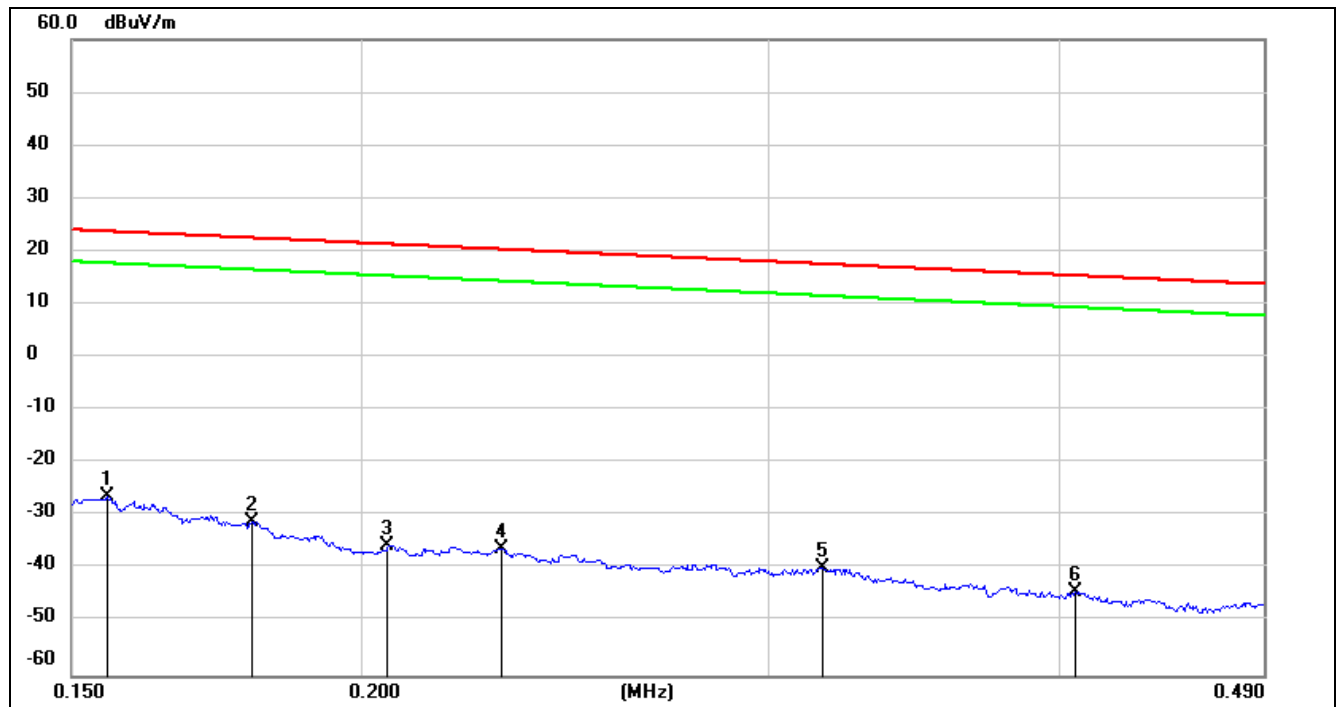


| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | FCC Result (dBuV/m) | FCC Limit (dBuV/m) | ISED Result (dBuA/m) | ISED Limit (dBuA/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|---------------------------|--------------------------|----------------------------|---------------------------|----------------|--------|
| 1 | 0.0100 | 75.22 | -101.40 | -26.18 | 47.6 | -77.68 | -3.90 | -73.78 | peak |
| 2 | 0.0106 | 73.88 | -101.39 | -27.51 | 47.09 | -79.01 | -4.41 | -74.60 | peak |
| 3 | 0.0188 | 68.64 | -101.35 | -32.71 | 42.12 | -84.21 | -9.38 | -74.83 | peak |
| 4 | 0.0316 | 65.24 | -101.40 | -36.16 | 37.61 | -87.66 | -13.89 | -73.77 | peak |
| 5 | 0.0636 | 60.31 | -101.54 | -41.23 | 31.53 | -92.73 | -19.97 | -72.76 | peak |
| 6 | 0.0981 | 57.27 | -101.78 | -44.51 | 27.77 | -96.01 | -23.73 | -72.28 | peak |

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120 π] = dBuV/m- 51.5).

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.

150 kHz ~ 490 kHz

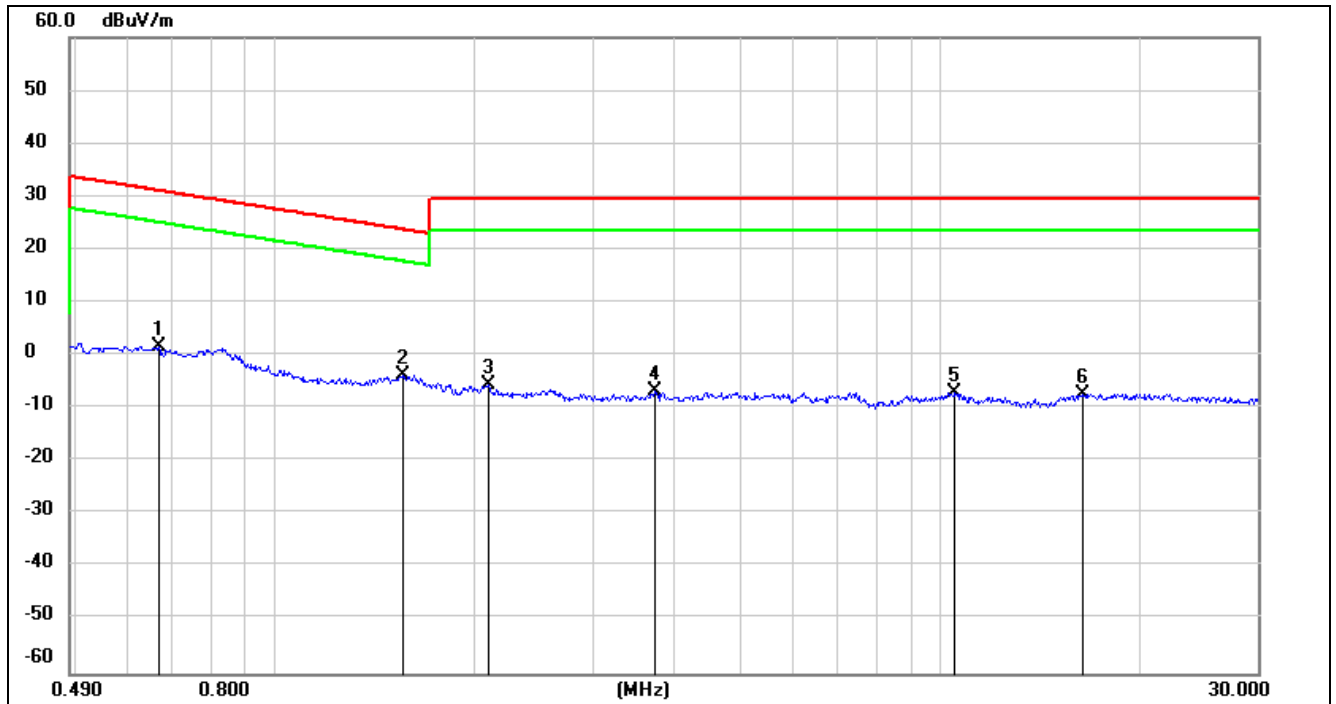
| No. | Frequency | Reading | Correct | FCC Result | FCC Limit | ISED Result | ISED Limit | Margin | Remark |
|-----|-----------|---------|---------|------------|-----------|-------------|------------|--------|--------|
| | (MHz) | (dBuV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuA/m) | (dBuA/m) | (dB) | |
| 1 | 0.1554 | 75.27 | -101.65 | -26.38 | 23.77 | -77.88 | -27.73 | -50.15 | peak |
| 2 | 0.1794 | 70.77 | -101.68 | -30.91 | 22.53 | -82.41 | -28.97 | -53.44 | peak |
| 3 | 0.2053 | 66.29 | -101.73 | -35.44 | 21.35 | -86.94 | -30.15 | -56.79 | peak |
| 4 | 0.2298 | 65.55 | -101.77 | -36.22 | 20.37 | -87.72 | -31.13 | -56.59 | peak |
| 5 | 0.3163 | 62.20 | -101.87 | -39.67 | 17.6 | -91.17 | -33.90 | -57.27 | peak |
| 6 | 0.4062 | 57.64 | -101.96 | -44.32 | 15.43 | -95.82 | -36.07 | -59.75 | peak |

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

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.

490 kHz ~ 30 MHz



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | FCC Result (dBuV/m) | FCC Limit (dBuV/m) | ISED Result (dBuA/m) | ISED Limit (dBuA/m) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-------------------|---------------------------|--------------------------|----------------------------|---------------------------|----------------|--------|
| 1 | 0.6671 | 63.75 | -62.10 | 1.65 | 31.12 | -49.85 | -20.38 | -29.47 | peak |
| 2 | 1.5564 | 58.18 | -62.02 | -3.84 | 23.76 | -55.34 | -27.74 | -27.60 | peak |
| 3 | 2.0939 | 56.39 | -61.79 | -5.4 | 29.54 | -56.90 | -21.96 | -34.94 | peak |
| 4 | 3.7100 | 54.70 | -61.41 | -6.71 | 29.54 | -58.21 | -21.96 | -36.25 | peak |
| 5 | 10.5234 | 53.80 | -60.82 | -7.02 | 29.54 | -58.52 | -21.96 | -36.56 | peak |
| 6 | 16.3959 | 53.67 | -60.96 | -7.29 | 29.54 | -58.79 | -21.96 | -36.83 | peak |

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

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 the channels have been tested, only the worst data was recorded in the report.

9. AC POWER LINE CONDUCTED EMISSIONS

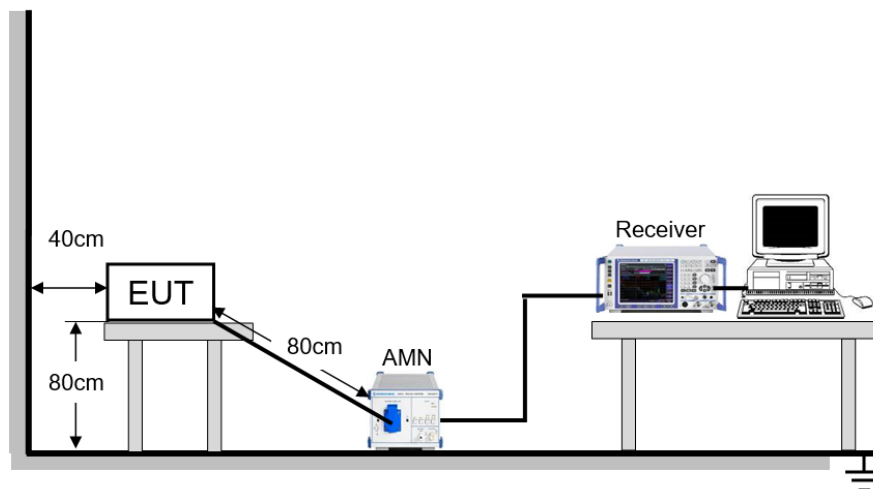
LIMITS

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8

| 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

Refer to ANSI C63.10-2013 clause 6.2.

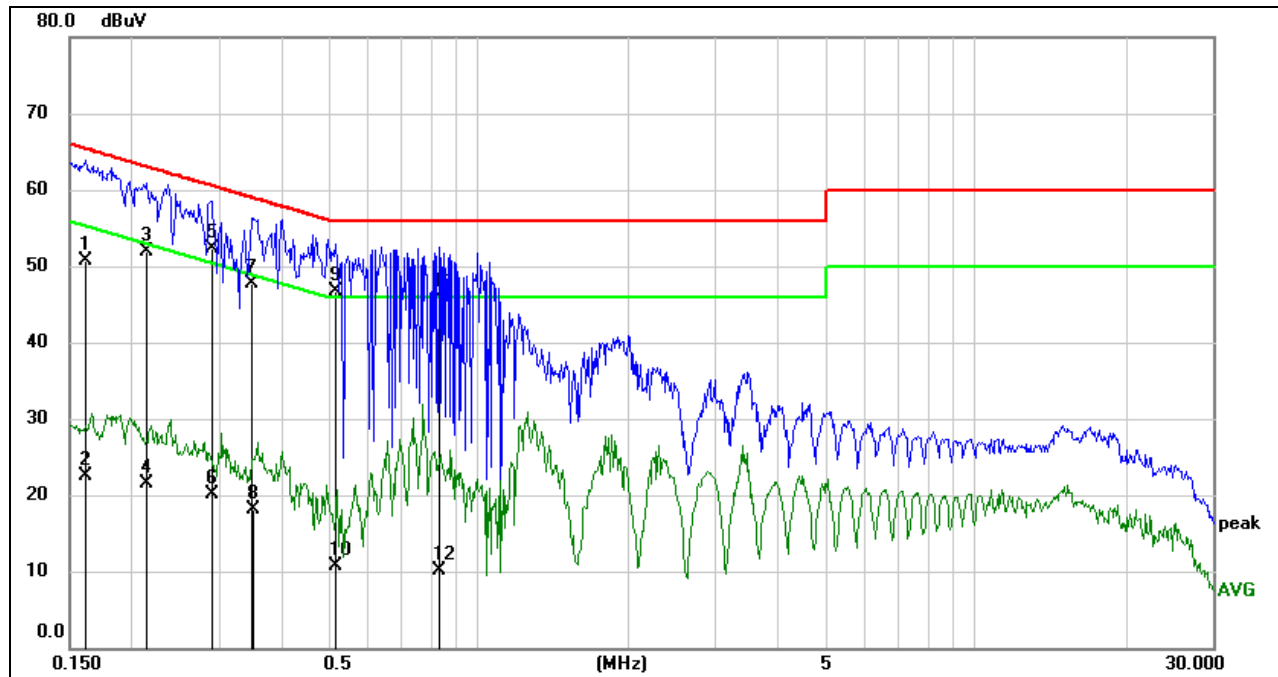


The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

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 | 20.3 °C | Relative Humidity | 58.7 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V, 60 Hz |

**RESULTS****9.1. Thread Mode****LINE L RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)**

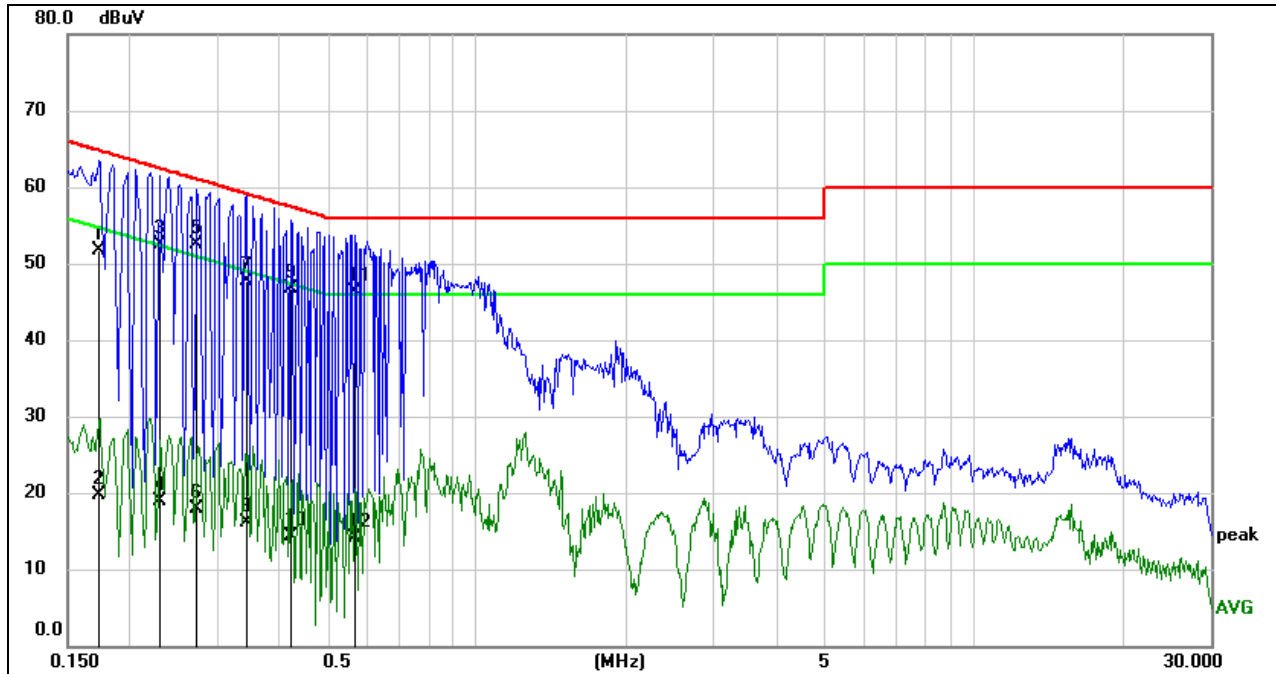
| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-----------------|------------------|-----------------|----------------|--------|
| 1 | 0.1620 | 51.26 | -0.50 | 50.76 | 65.36 | -14.60 | QP |
| 2 | 0.1620 | 23.06 | -0.50 | 22.56 | 55.36 | -32.80 | AVG |
| 3 | 0.2139 | 52.49 | -0.50 | 51.99 | 63.05 | -11.06 | QP |
| 4 | 0.2139 | 22.08 | -0.50 | 21.58 | 53.05 | -31.47 | AVG |
| 5 | 0.2900 | 52.74 | -0.50 | 52.24 | 60.52 | -8.28 | QP |
| 6 | 0.2900 | 20.54 | -0.50 | 20.04 | 50.52 | -30.48 | AVG |
| 7 | 0.3500 | 48.24 | -0.50 | 47.74 | 58.96 | -11.22 | QP |
| 8 | 0.3518 | 18.59 | -0.50 | 18.09 | 48.92 | -30.83 | AVG |
| 9 | 0.5180 | 47.25 | -0.50 | 46.75 | 56.00 | -9.25 | QP |
| 10 | 0.5180 | 11.23 | -0.50 | 10.73 | 46.00 | -35.27 | AVG |
| 11 | 0.8336 | 46.28 | -0.40 | 45.88 | 56.00 | -10.12 | QP |
| 12 | 0.8336 | 10.59 | -0.40 | 10.19 | 46.00 | -35.81 | AVG |

Note: 1. Result = Reading + Correct Factor.

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

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

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

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|-----|--------------------|-------------------|-----------------|------------------|-----------------|----------------|--------|
| 1 | 0.1737 | 52.18 | -0.50 | 51.68 | 64.78 | -13.10 | QP |
| 2 | 0.1737 | 20.18 | -0.50 | 19.68 | 54.78 | -35.10 | AVG |
| 3 | 0.2300 | 53.06 | -0.50 | 52.56 | 62.45 | -9.89 | QP |
| 4 | 0.2300 | 19.41 | -0.50 | 18.91 | 52.45 | -33.54 | AVG |
| 5 | 0.2740 | 52.99 | -0.50 | 52.49 | 61.00 | -8.51 | QP |
| 6 | 0.2740 | 18.32 | -0.50 | 17.82 | 51.00 | -33.18 | AVG |
| 7 | 0.3457 | 48.26 | -0.50 | 47.76 | 59.07 | -11.31 | QP |
| 8 | 0.3457 | 16.55 | -0.50 | 16.05 | 49.07 | -33.02 | AVG |
| 9 | 0.4218 | 47.23 | -0.50 | 46.73 | 57.41 | -10.68 | QP |
| 10 | 0.4218 | 14.85 | -0.50 | 14.35 | 47.41 | -33.06 | AVG |
| 11 | 0.5700 | 46.85 | -0.50 | 46.35 | 56.00 | -9.65 | QP |
| 12 | 0.5700 | 14.56 | -0.50 | 14.06 | 46.00 | -31.94 | AVG |

Note: 1. Result = Reading + Correct Factor.

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

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the channels have been tested, only the worst data was recorded in the report.



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.

RESULTS

Complies



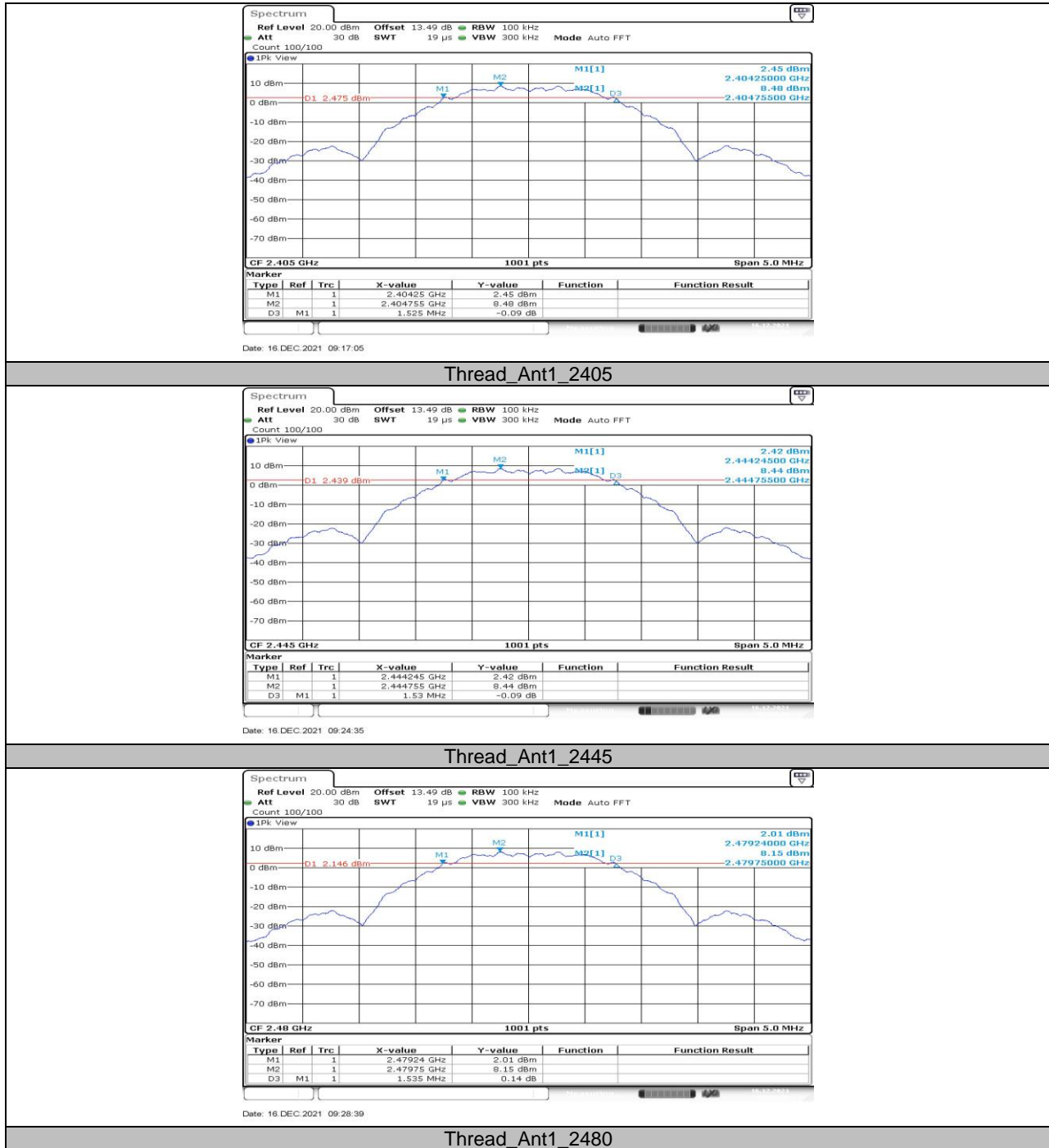
11. APPENDIX

11.1. Appendix A: DTS Bandwidth

11.1.1. Test Result

| Test Mode | Antenna | Channel | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|-----------|---------|---------|-----------------|----------|----------|------------|---------|
| Thread | Ant1 | 2405 | 1.525 | 2404.250 | 2405.775 | 0.5 | PASS |
| | | 2445 | 1.530 | 2444.245 | 2445.775 | 0.5 | PASS |
| | | 2480 | 1.535 | 2479.240 | 2480.775 | 0.5 | PASS |

11.1.2. Test Graphs



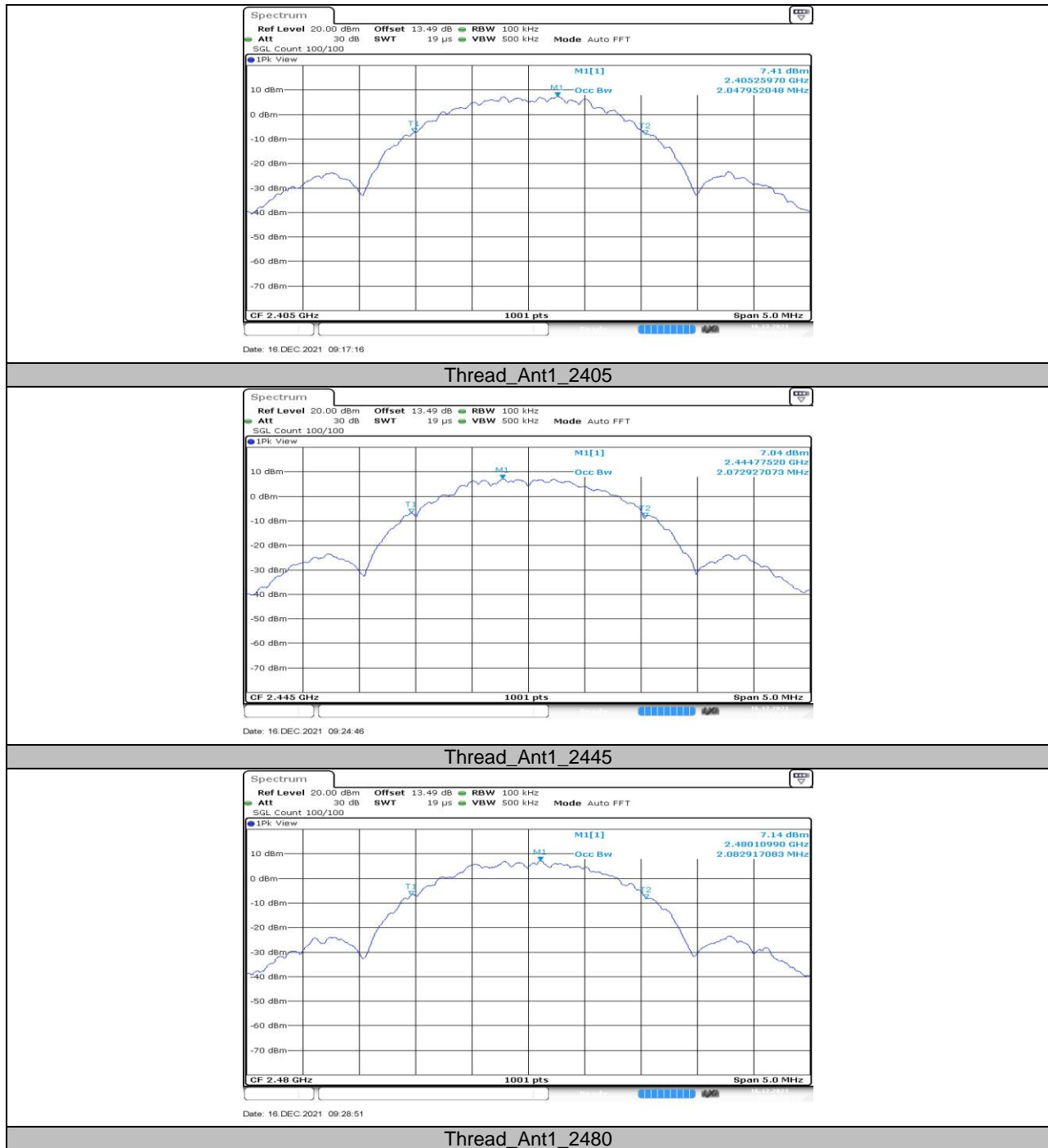


11.2. Appendix B: Occupied Channel Bandwidth

11.2.1. Test Result

| Test Mode | Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Verdict |
|-----------|---------|---------|-----------|----------|----------|---------|
| Thread | Ant1 | 2405 | 2.048 | 2403.986 | 2406.034 | PASS |
| | | 2445 | 2.073 | 2443.966 | 2446.039 | PASS |
| | | 2480 | 2.083 | 2478.961 | 2481.044 | PASS |

11.2.2. Test Graphs





11.3. Appendix C: Maximum conducted output power

11.3.1. Test Result

| Test Mode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|---------|-------------|------------|---------|
| Thread | Ant1 | 2405 | 11.09 | ≤30 | PASS |
| | | 2445 | 11.15 | ≤30 | PASS |
| | | 2480 | 10.96 | ≤30 | PASS |

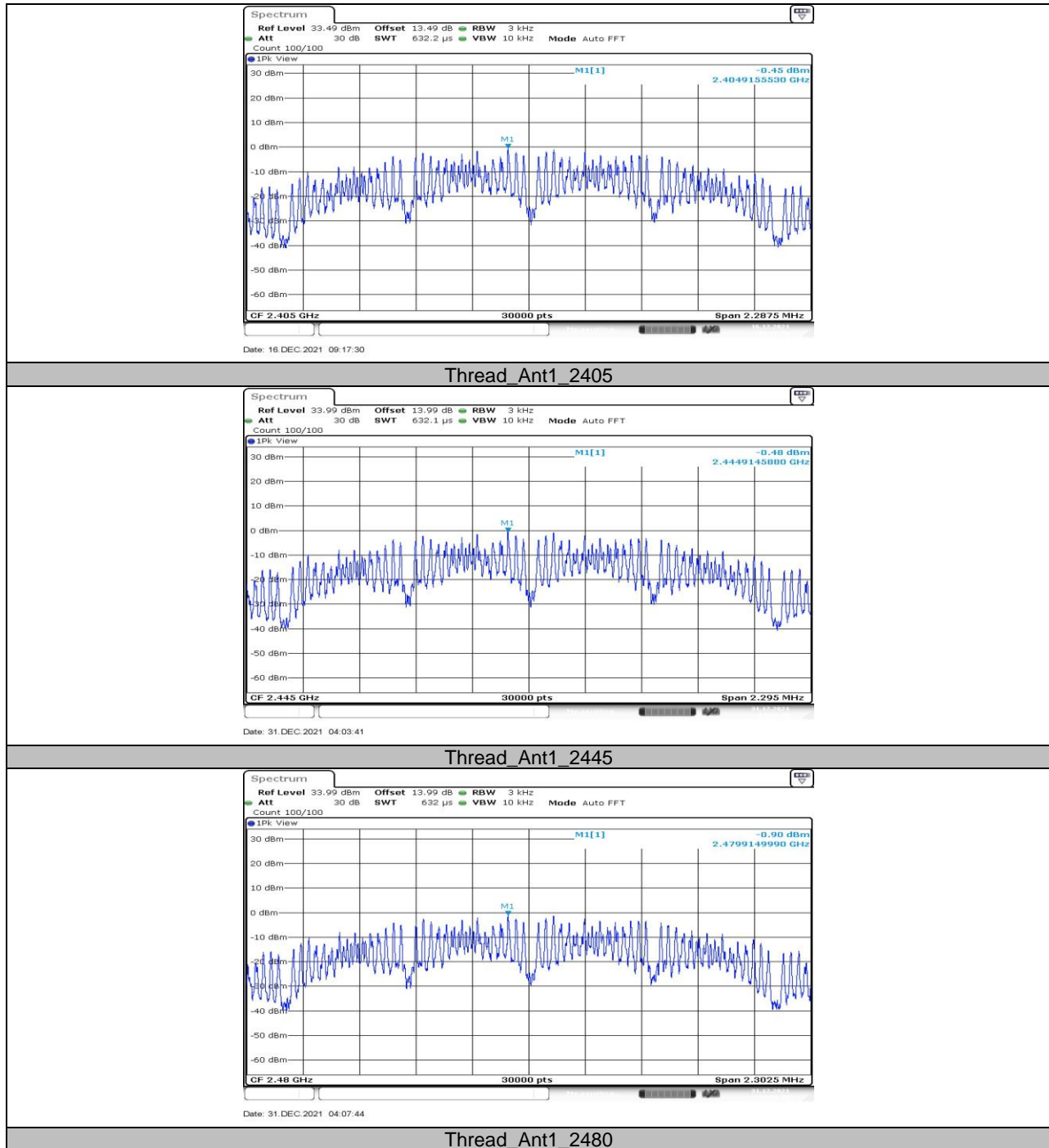


11.4. Appendix D: Maximum power spectral density

11.4.1. Test Result

| Test Mode | Antenna | Channel | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|-----------|---------|---------|------------------|-----------------|---------|
| Thread | Ant1 | 2405 | -0.45 | ≤8 | PASS |
| | | 2445 | -0.48 | ≤8 | PASS |
| | | 2480 | -0.9 | ≤8 | PASS |

11.4.2. Test Graphs





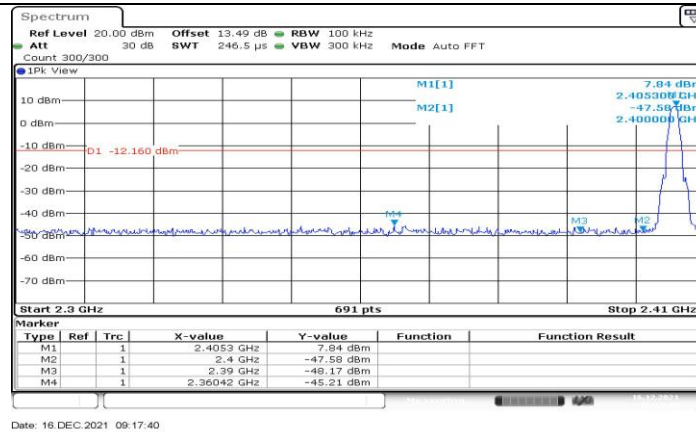
11.5. Appendix E: Band edge measurements

11.5.1. Test Result

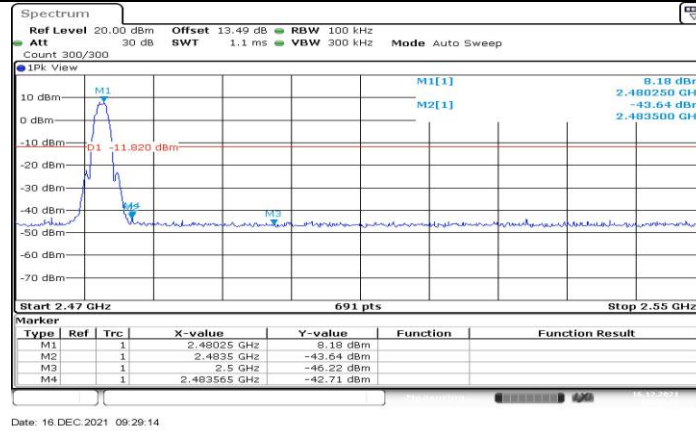
| Test Mode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|--------|---------|---------------|-------------|---------------|---------|
| Thread | Ant1 | Low | 2405 | 7.84 | -45.21 | ≤ -12.16 | PASS |
| | | High | 2480 | 8.18 | -42.71 | ≤ -11.82 | PASS |



11.5.2. Test Graphs



Thread_Ant1_Low_2405



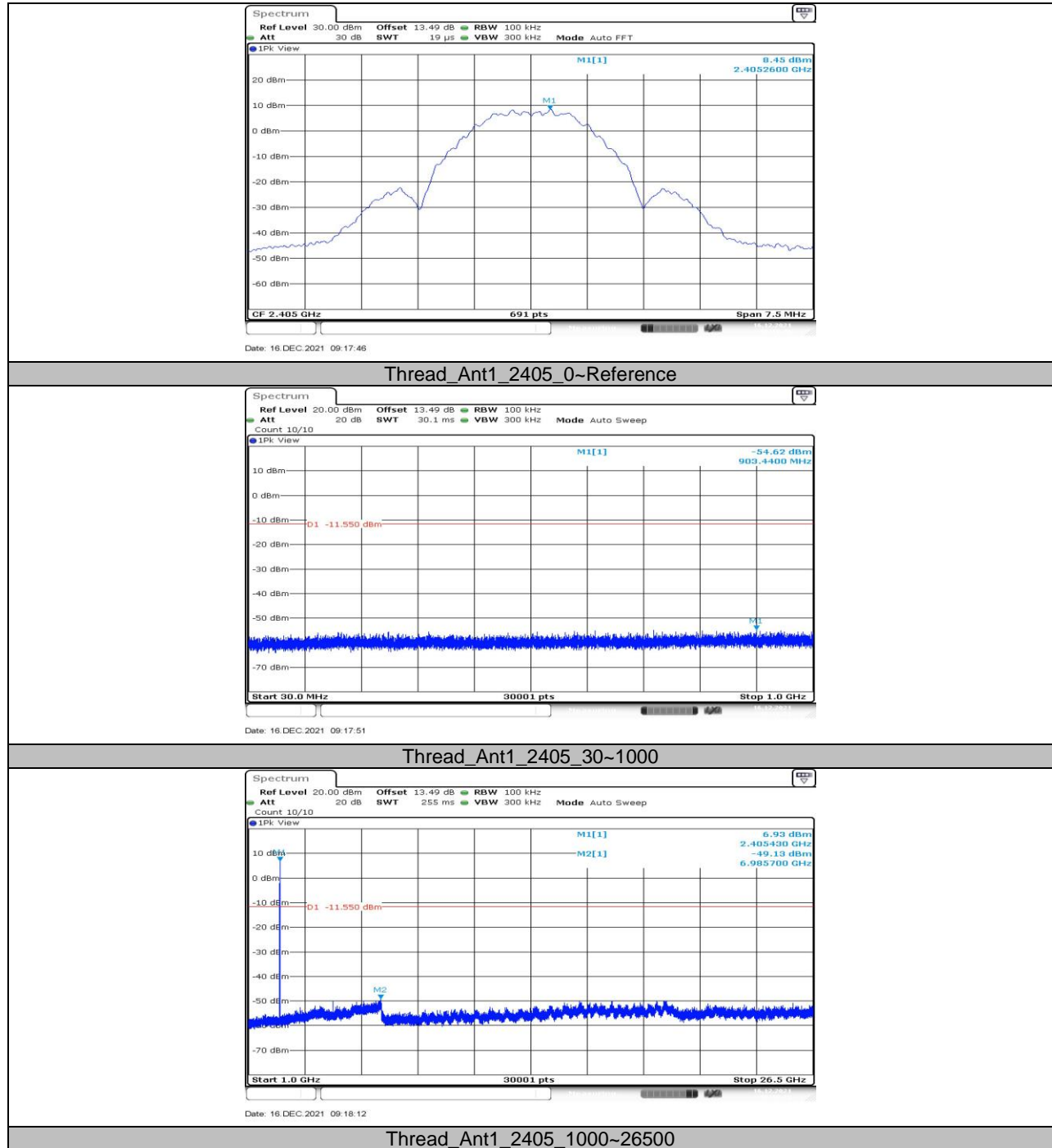
Thread_Ant1_High_2480

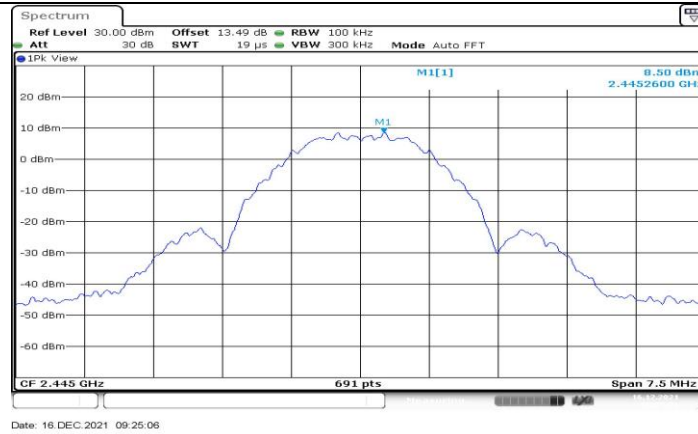
11.6. Appendix F: Conducted Spurious Emission

11.6.1. Test Result

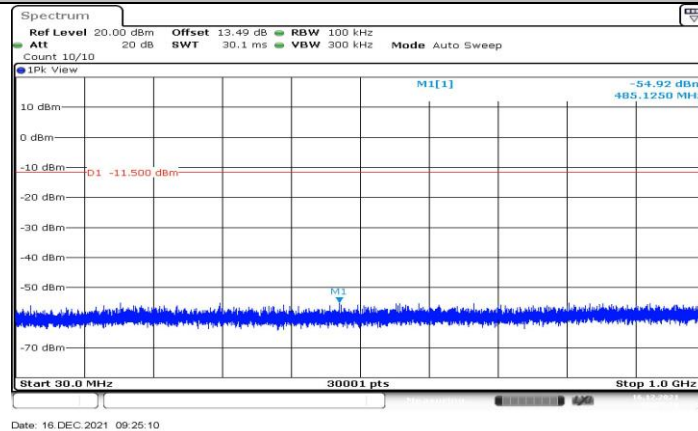
| Test Mode | Antenna | Channel | FreqRange [MHz] | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|---------|--------------------|-------------|---------------|---------|
| Thread | Ant1 | 2405 | Reference | 8.45 | --- | PASS |
| | | | 30~1000 | -54.62 | ≤ -11.55 | PASS |
| | | | 1000~26500 | -49.13 | ≤ -11.55 | PASS |
| | | 2445 | Reference | 8.50 | --- | PASS |
| | | | 30~1000 | -54.92 | ≤ -11.5 | PASS |
| | | | 1000~26500 | -49.42 | ≤ -11.5 | PASS |
| | | 2480 | Reference | 8.15 | --- | PASS |
| | | | 30~1000 | -54.51 | ≤ -11.85 | PASS |
| | | | 1000~26500 | -48.85 | ≤ -11.85 | PASS |

11.6.2. Test Graphs

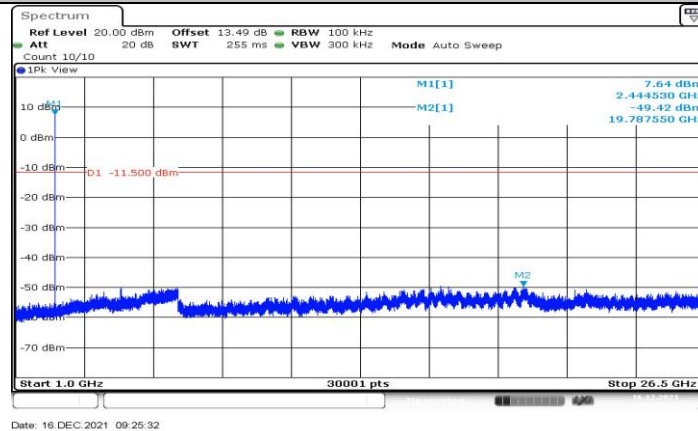




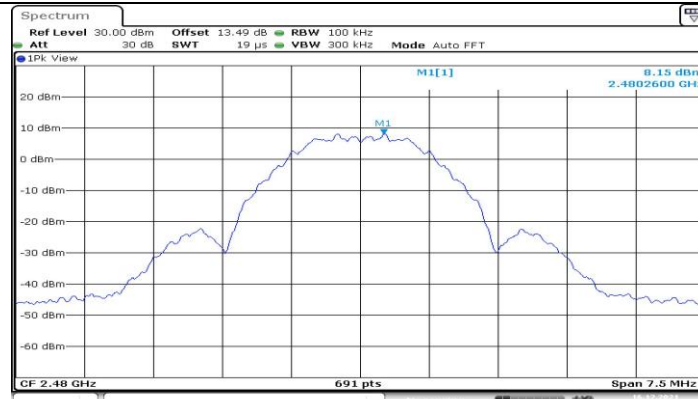
Thread_Ant1_2445_0~Reference



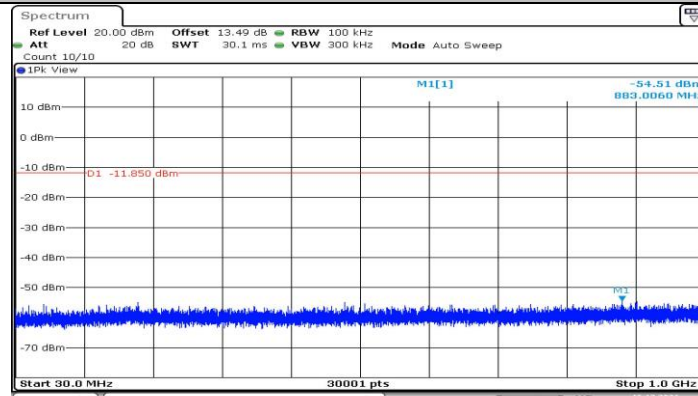
Thread_Ant1_2445_30~1000



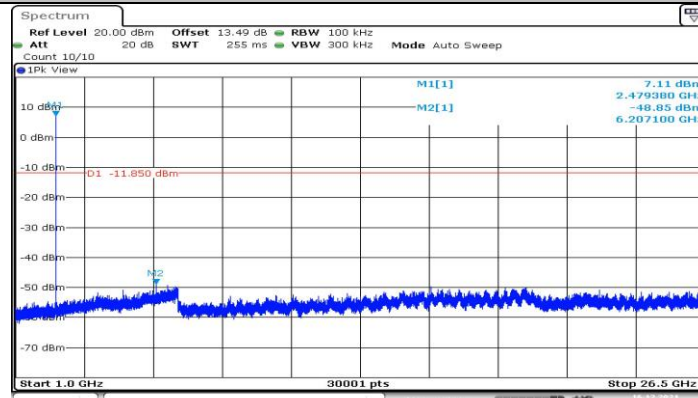
Thread_Ant1_2445_1000~26500



Thread_Ant1_2480_0~Reference



Thread_Ant1_2480_30~1000



Thread_Ant1_2480_1000~26500



11.7. Appendix G: Duty Cycle

11.7.1. Test Result

| Test 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_1M | 50.00 | 50.00 | 1.0000 | 100.00 | 0.00 | 0.02 | 0.01 |

Note:

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

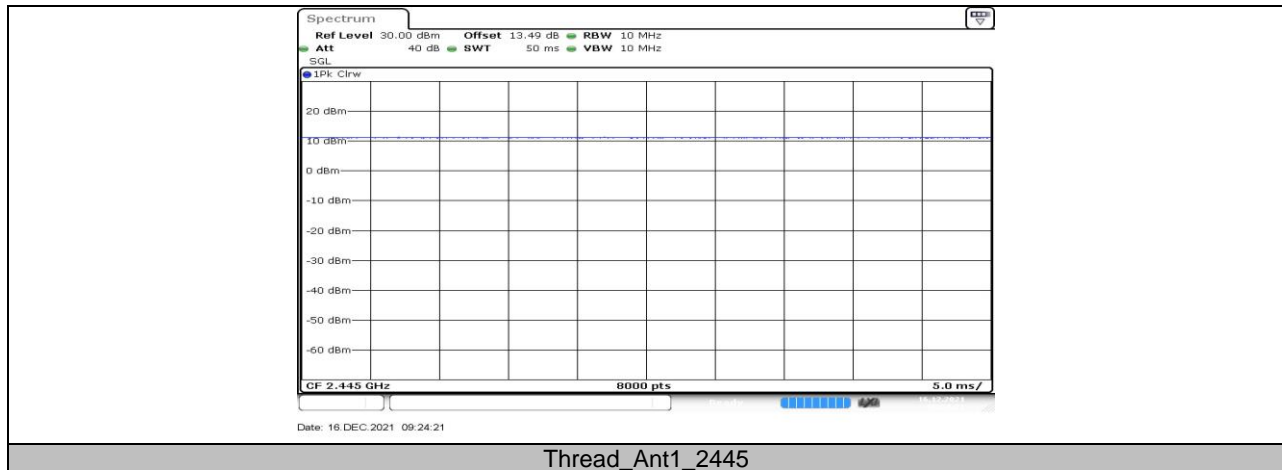
Where: x is Duty Cycle (Linear)

Where: T is On Time

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



11.7.2. Test Graphs



END OF REPORT