# CFR 47 FCC PART 15 SUBPART C

## CERTIFICATION TEST REPORT

*For*

**AXON M, AXON N, AXON Q, AXON L**

**MODEL NUMBER: Larg pro 01-C, Lure2, Larg pro 03, Lure3**

**FCC ID: 2AYDRSVT01**

**REPORT NUMBER: 4789624390-2**

**ISSUE DATE: December 11, 2020**

*Prepared for*

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**The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.**

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V0 | 12/11/2020 | Initial Issue | |


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| Summary of Test Results | | | |
|---|---|---|---|
| **Clause** | **Test Items** | **FCC Rules** | **Test Results** |
| 1 | 6dB Bandwidth and 99% Occupied Bandwidth | FCC Part 15.247 (a) (2) | Pass |
| 2 | Peak Conducted Output Power | FCC Part 15.247 (b) (3) | Pass |
| 3 | Power Spectral Density | FCC Part 15.247 (e) | Pass |
| 4 | Conducted Bandedge and Spurious Emission | FCC Part 15.247 (d) | Pass |
| 5 | Radiated Bandedge and Spurious Emission | FCC Part 15.247 (d)<br>FCC Part 15.209<br>FCC Part 15.205 | Pass |
| 6 | Conducted Emission Test for AC Power Port | FCC Part 15.207 | Pass |
| 7 | Antenna Requirement | FCC Part 15.203 | Pass |

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >when <Accuracy Method> decision rule is applied.


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# 1. ATTESTATION OF TEST RESULTS

**Applicant Information**

| | |
|---|---|
| Company Name: | Shenzhen VapeEZ Technology LTD |
| Address: | 4-5F Block E, 71-6 Xintian Ave, Xintian Conmunity, Fuhai Street Bao'an District, Shenzhen, China |

**Manufacturer Information**

| | |
|---|---|
| Company Name: | Shenzhen VapeEZ Technology LTD |
| Address: | 4-5F Block E, 71-6 Xintian Ave, Xintian Conmunity, Fuhai Street Bao'an District, Shenzhen, China |

**EUT Information**

| | |
|---|---|
| EUT Name: | AXON M, AXON N, AXON Q, AXON L |
| Model: | Larg pro 01-C |
| Serial Model: | Lure2, Larg pro 03, Lure3 |
| Model difference: | Please refer to clause 5.1. Description of EUT |
| Brand: | AXON |
| Sample Received Date: | December 03, 2020 |
| Sample Status: | Normal |
| Sample ID: | 3506041 |
| Date of Tested: | December 08, 2020~ December 18, 2020 |

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

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## 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.

## 3. FACILITIES AND ACCREDITATION

| | |
|---|---|
| Accreditation Certificate | **A2LA (Certificate No.: 4102.01)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.<br>**FCC (FCC Designation No.: CN1187)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules<br>**ISED (Company No.: 21320)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED.<br>The Company Number is 21320.<br>**VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)**<br>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.<br>Facility Name:<br>Chamber D, the VCCI registration No. is G-20019 and R-20004<br>Shielding Room B , the VCCI registration No. is C-20012 and T-20011 |

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.


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# 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) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2. | |


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# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

| | | | |
|---|---|---|---|
| EUT Name | AXON M, AXON N, AXON Q, AXON L | | |
| Description of EUT | The device is E-cigarette | | |
| Model Name | Larg pro 01-C | | |
| Series Model | Lure2, Larg pro 03, Lure3 | | |
| Model difference | Larg pro 03, Lure2, Lure3 have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with Larg pro 01-C. The difference lies only the model number, and, Larg pro 01-C is an open and repeatable oil filling structure, while Larg pro 03 is a disposable oil core separation structure, which is not repeatable oil filling. The two models are different in shape of enclosure.<br>Both Lure2 and Lure3 are refillable cigarettes that can be refilled and replaceable pod. Two models are different in shape of enclosure. | | |
| Technology | *Bluetooth* - Low Energy | | |
| Transmit Frequency Range | 2402 MHz ~ 2480 MHz | | |
| Modulation | GFSK | | |
| Data Rate | LE | 1 Mbps | |
| Supply Voltage | USB Type-C | | DC 5V 500mA |
| | Battery | | DC 3.2 - 4.2 V |

Note, all models have been evaluated, only the data for the worst case model was recorded in this report.

## 5.2. CHANNEL LIST

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


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## 5.3. MAXIMUM PEAK OUTPUT POWER

| Test Mode | Frequency (MHz) | Channel Number | Maximum Peak Output Power (dBm) | Maximum EIRP (dBm) |
|---|---|---|---|---|
| LE 1M | 2402 ~ 2480 | 0-39[40] | 2.42 | -16.58 |

## 5.4. TEST CHANNEL CONFIGURATION

| Test Mode | Test Channel | Frequency |
|---|---|---|
| LE 1M | CH 0(Low Channel), CH 19(MID Channel), CH 39(High Channel) | 2402 MHz, 2440 MHz, 2480 MHz |

## 5.5. THE WORSE CASE POWER SETTING PARAMETER

| The Worse Case Power Setting Parameter under 2402 ~ 2480MHz Band | | | | |
|---|---|---|---|---|
| Test Software Version | | FCC TestTool | | |
| Test Mode | Transmit Antenna Number | Test Software Setting Value | | |
| | | CH 0 | CH 19 | CH 39 |
| LE 1M | 1 | Default | Default | Default |

## 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

| Antenna | Frequency (MHz) | Antenna Type | MAX Antenna Gain (dBi) |
|---|---|---|---|
| 1 | 2402-2480 | Chip | -19 |

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

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


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## 5.7. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Item | Equipment | Brand Name | Model Name | P/N |
|---|---|---|---|---|
| 1 | Laptop | Lenovo | TP00094A | / |
| 2 | UART | / | / | / |
| 3 | Adapter | SAMSUNG | EP-TA200 | / |

Note: The PC was provided by the customer.

**I/O CABLES**

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|---|---|---|---|---|---|
| 1 | USB | TYPE C | / | 1.0 | / |

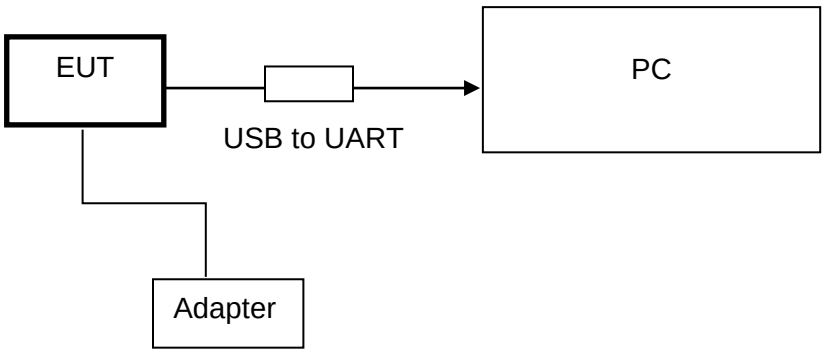
**ACCESSORIES**

| 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**




Note, after setting the EUT to engineering mode, the Laptop was removed from the test table.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# 6. MEASURING INSTRUMENT AND SOFTWARE USED

| Conducted Emissions | | | | | | |
|---|---|---|---|---|---|---|
| Instrument | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| ☑ | EMI Test Receiver | R&S | ESR3 | 101961 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | Two-Line V-Network | R&S | ENV216 | 101983 | Nov.11, 2020 | Nov.11, 2021 |
| Software | | | | | | |
| Used | Description | | Manufacturer | Name | Version | |
| ☑ | 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. |
| ☑ | MXE EMI Receiver | KESIGHT | N9038A | MY56400036 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | Hybrid Log Periodic Antenna | TDK | HLP-3003C | 130960 | Sep.17, 2018 | Sep.17, 2021 |
| ☑ | Preamplifier | HP | 8447D | 2944A09099 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | EMI Measurement Receiver | R&S | ESR26 | 101377 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | Horn Antenna | TDK | HRN-0118 | 130939 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | High Gain Horn Antenna | Schwarzbeck | BBHA-9170 | 691 | Aug.11, 2018 | Aug.11, 2021 |
| ☑ | Preamplifier | TDK | PA-02-0118 | TRS-305-00066 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | Preamplifier | TDK | PA-02-2 | TRS-307-00003 | Nov.11, 2020 | Nov.11, 2021 |
| ☑ | Loop antenna | Schwarzbeck | 1519B | 00008 | Jan.07, 2019 | Jan.07, 2022 |
| ☑ | High Pass Filter | Wi | WHKX10-2700-3000-18000-40SS | 23 | Nov.11, 2020 | Nov.11, 2021 |
| Software | | | | | | |
| Used | Description | | Manufacturer | Name | Version | |
| ☑ | Test Software for Radiated disturbance | | Farad | EZ-EMC | Ver. UL-3A1 | |
| Other instruments | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| ☑ | Spectrum Analyzer | Keysight | N9030A | MY55410512 | Nov.20, 2020 | Nov.20, 2021 |
| ☑ | Power Meter | Keysight | N1911A | MY55416024 | Nov.20, 2020 | Nov.20, 2021 |
| ☑ | Power Sensor | Keysight | U2021XA | MY5100022 | Nov.20, 2020 | Nov.20, 2021 |


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# 7. ANTENNA PORT TEST RESULTS

## 7.1. ON TIME AND DUTY CYCLE

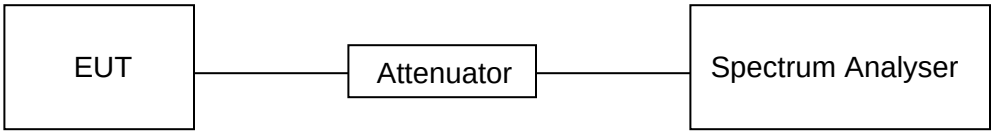
**LIMITS**

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 | 25.1 °C | Relative Humidity | 48.1 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 5 V |

**RESULTS**

Please refer to appendix G.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## 7.2. 6 dB DTS BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

**LIMITS**

| CFR 47FCC Part15 (15.247) Subpart C | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(a)(2) | 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**

Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth.

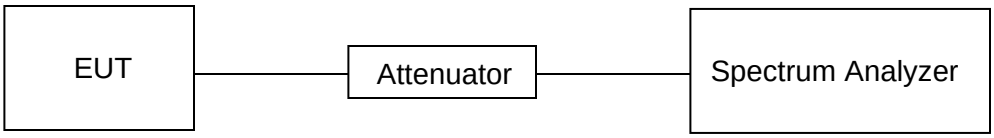
Connect the EUT to the spectrum analyser and use the following settings:

| | |
|---|---|
| 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<br>For 99 % Occupied Bandwidth: Between 1.5 times and 5.0 times the OBW |
| Detector | Peak |
| RBW | For 6 dB Bandwidth: 100 kHz<br>For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth |
| VBW | For 6 dB Bandwidth: ≥3 × RBW<br>For 99 % Occupied Bandwidth: ≥3 × 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**





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**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 25.1 °C | Relative Humidity | 48.1 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 5 V |

**RESULTS**

Please refer to appendix A & B.


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## 7.3. CONDUCTED OUTPUT POWER

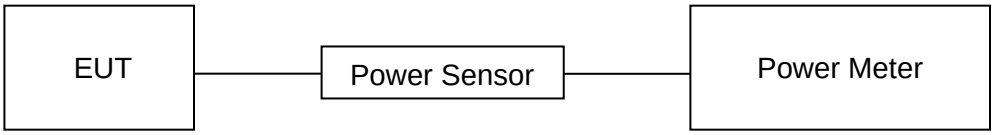
**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(b)(3) | Peak 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 | 25.1 °C | Relative Humidity | 48.1 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 5 V |

**RESULTS**

Please refer to appendix C.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## 7.4. POWER SPECTRAL DENSITY

**LIMITS**

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

**TEST PROCEDURE**

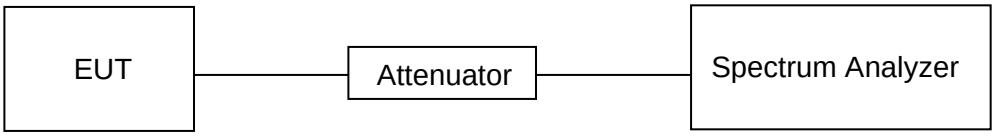
Refer to ANSI C63.10-2013 clause 11.10.

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 kHz ≤ RBW ≤ 100 kHz |
| VBW | ≥3 × RBW |
| Span | 1.5 x DTS bandwidth |
| Trace | Max hold |
| Sweep time | Auto couple |

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 25.1 °C | Relative Humidity | 48.1 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 5 V |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**RESULTS**

Please refer to appendix D.


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## 7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

**LIMITS**

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

**TEST PROCEDURE**

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

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 | ≥3 × 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 | ≥3 × RBW |
| measurement points | ≥span/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**


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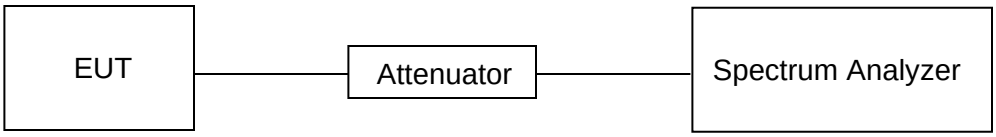


**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 25.1 °C | Relative Humidity | 48.1 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 5 V |

**RESULTS**

Please refer to appendix E & F.


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# 8. RADIATED TEST RESULTS

**LIMITS**

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

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 |


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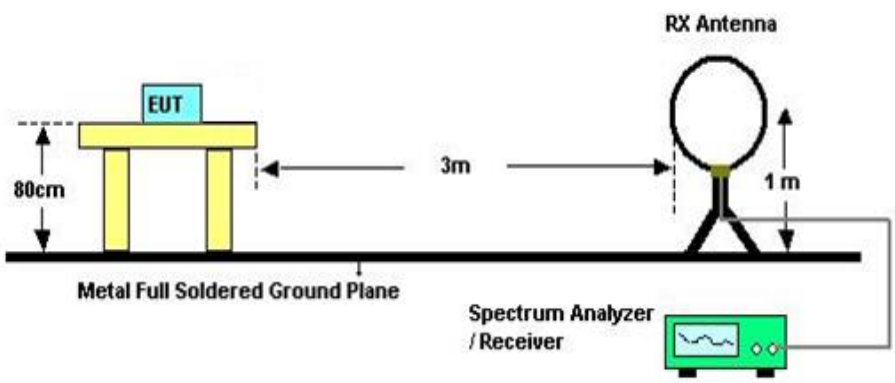
FCC Restricted bands of operation refer to FCC §15.205 (a):

| 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: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 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.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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. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field 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 site based on KDB 414788.


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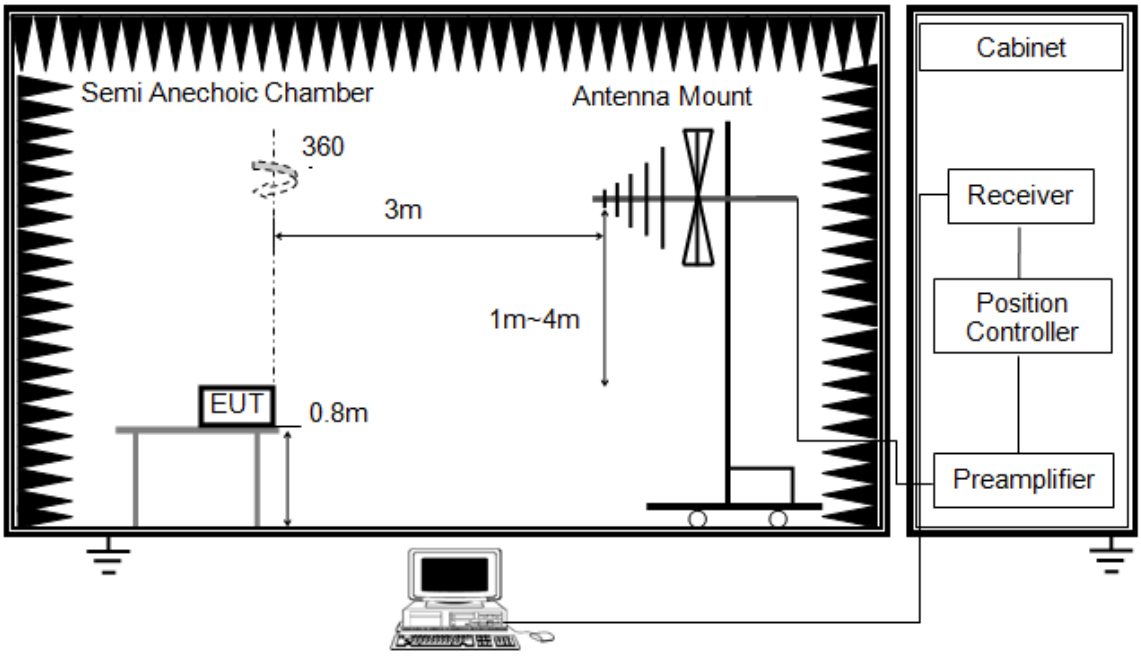
Below 1 GHz and above 30 MHz




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.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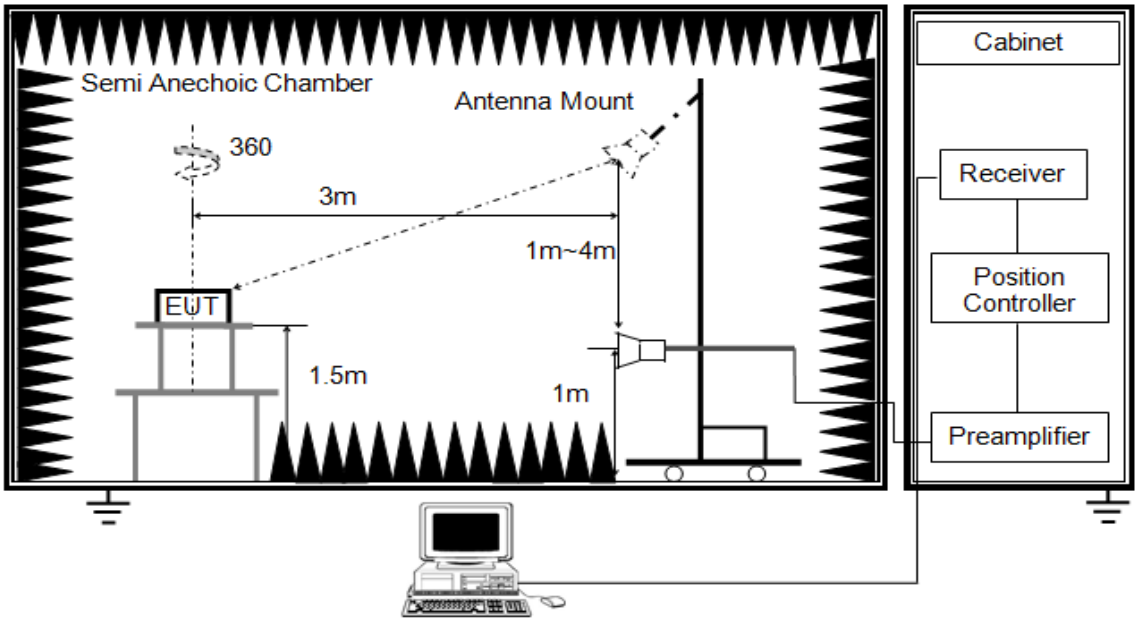
Above 1GHz




The setting of the spectrum analyser

| | |
|---|---|
| RBW | 1 MHz |
| VBW | PEAK: 3 MHz<br>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.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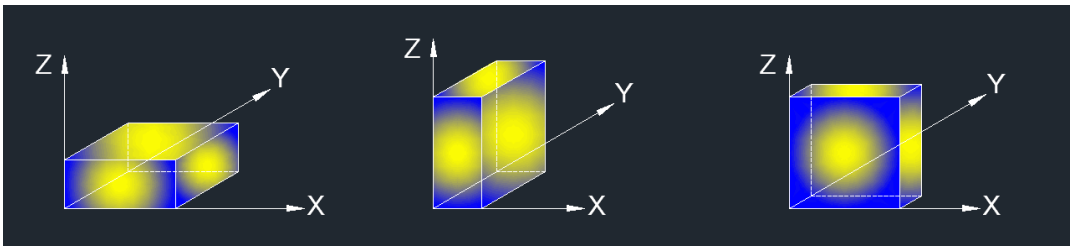
X axis, Y axis, Z axis positions:




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 | 63 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120V/60Hz |

**RESULTS**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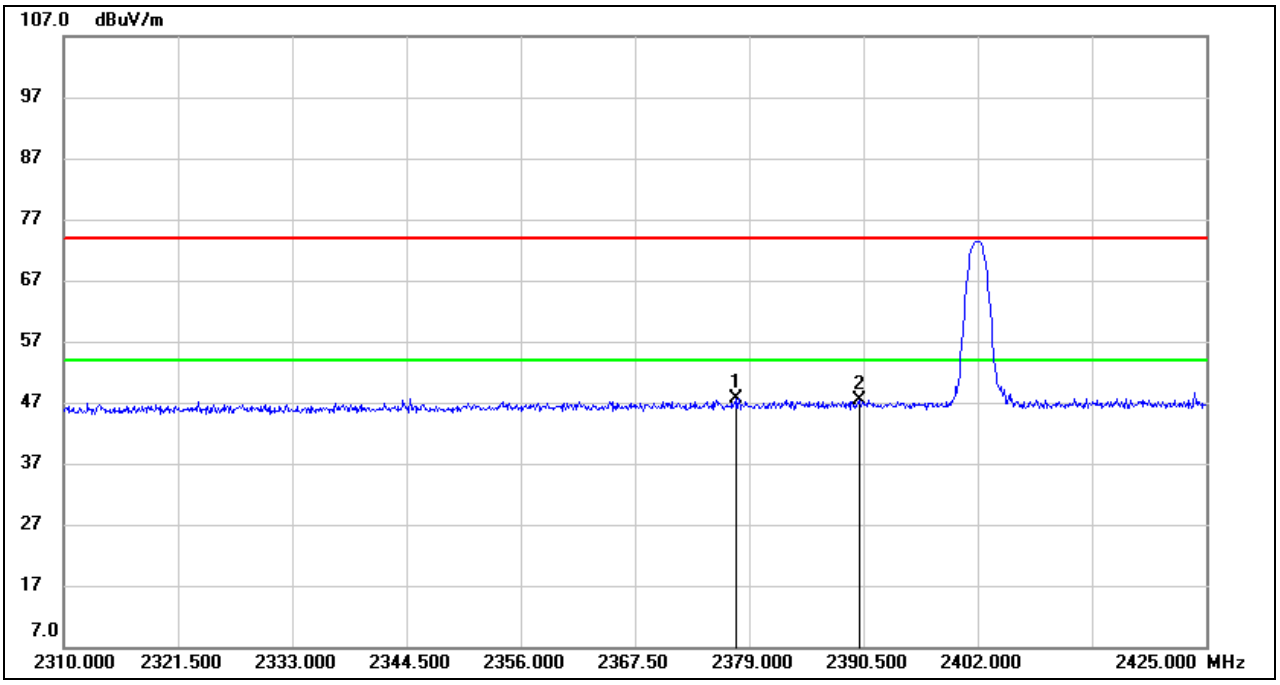
## 8.1. RESTRICTED BANDEDGE

### 8.1.1. LE 1M MODE

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




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2377.620 | 36.07 | 11.51 | 47.58 | 74.00 | -26.42 | peak |
| 2 | 2390.000 | 35.77 | 11.59 | 47.36 | 74.00 | -26.64 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.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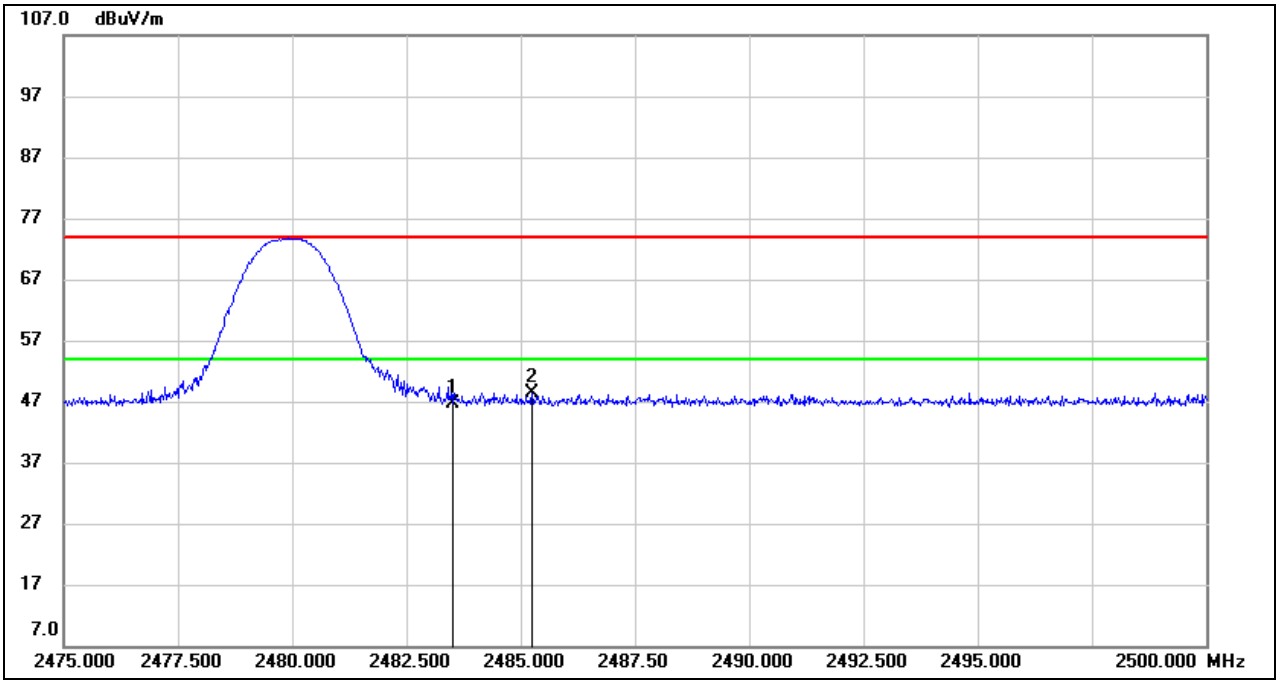
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

**PEAK**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 34.72 | 11.97 | 46.69 | 74.00 | -27.31 | peak |
| 2 | 2485.250 | 36.47 | 11.98 | 48.45 | 74.00 | -25.55 | peak |

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

Note: All the polarities (Vertical and horizontal) had been tested, only the worst data was recorded in the report.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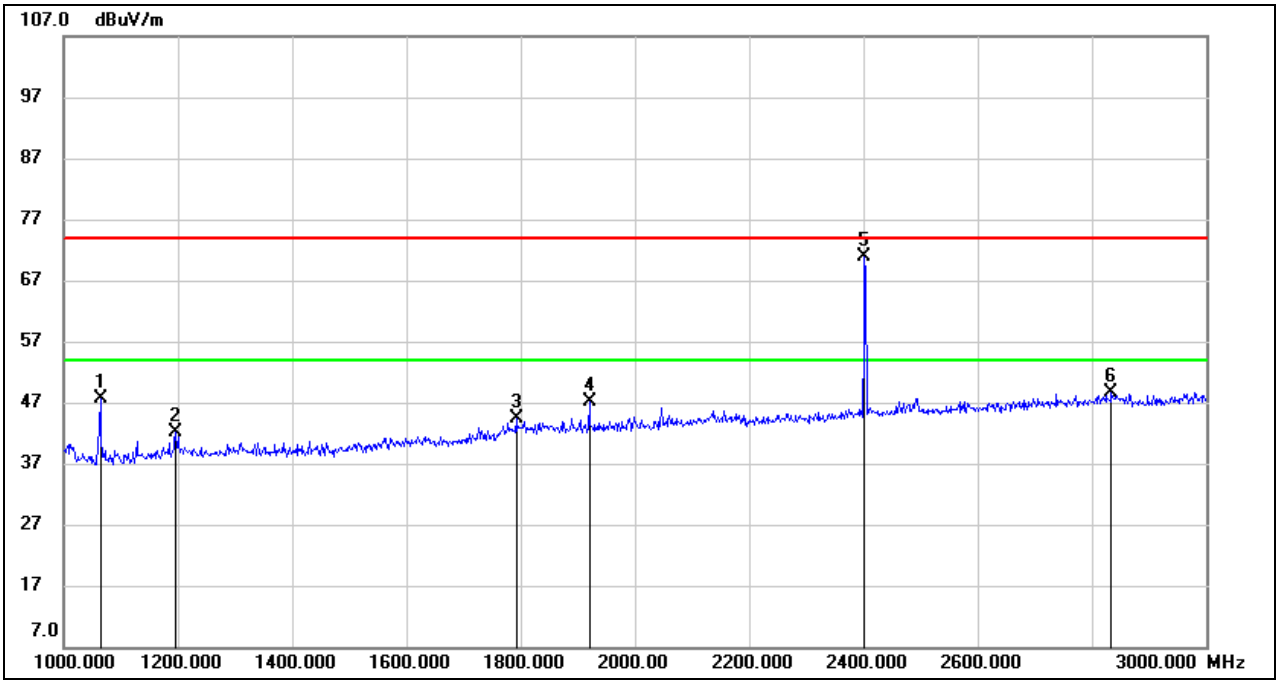
## 8.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz)

### 8.2.1. LE 1M MODE

**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 | 1064.000 | 42.35 | 5.30 | 47.65 | 74.00 | -26.35 | peak |
| 2 | 1196.000 | 35.70 | 6.45 | 42.15 | 74.00 | -31.85 | peak |
| 3 | 1792.000 | 34.94 | 9.52 | 44.46 | 74.00 | -29.54 | peak |
| 4 | 1920.000 | 37.40 | 9.84 | 47.24 | 74.00 | -26.76 | peak |
| 5 | 2402.000 | 59.31 | 11.66 | 70.97 | / | / | fundamental |
| 6 | 2834.000 | 35.43 | 13.32 | 48.75 | 74.00 | -25.25 | 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 modes and channels have been tested, only the worst data was recorded in the report.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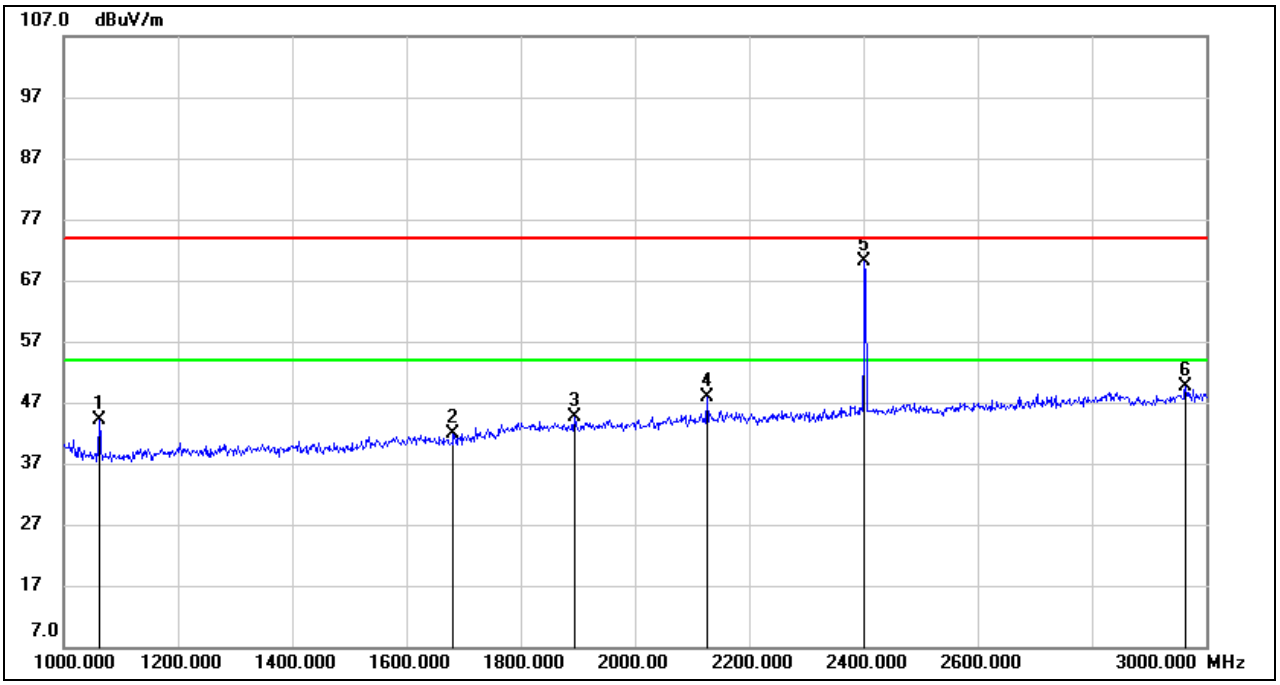
**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1062.000 | 38.81 | 5.29 | 44.10 | 74.00 | -29.90 | peak |
| 2 | 1682.000 | 33.93 | 8.07 | 42.00 | 74.00 | -32.00 | peak |
| 3 | 1894.000 | 34.88 | 9.79 | 44.67 | 74.00 | -29.33 | peak |
| 4 | 2126.000 | 37.13 | 10.84 | 47.97 | 74.00 | -26.03 | peak |
| 5 | 2402.000 | 58.48 | 11.66 | 70.14 | / | / | fundamental |
| 6 | 2964.000 | 35.68 | 13.87 | 49.55 | 74.00 | -24.45 | 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.

Note: All the modes and channels have been tested, only the worst data was recorded in the report.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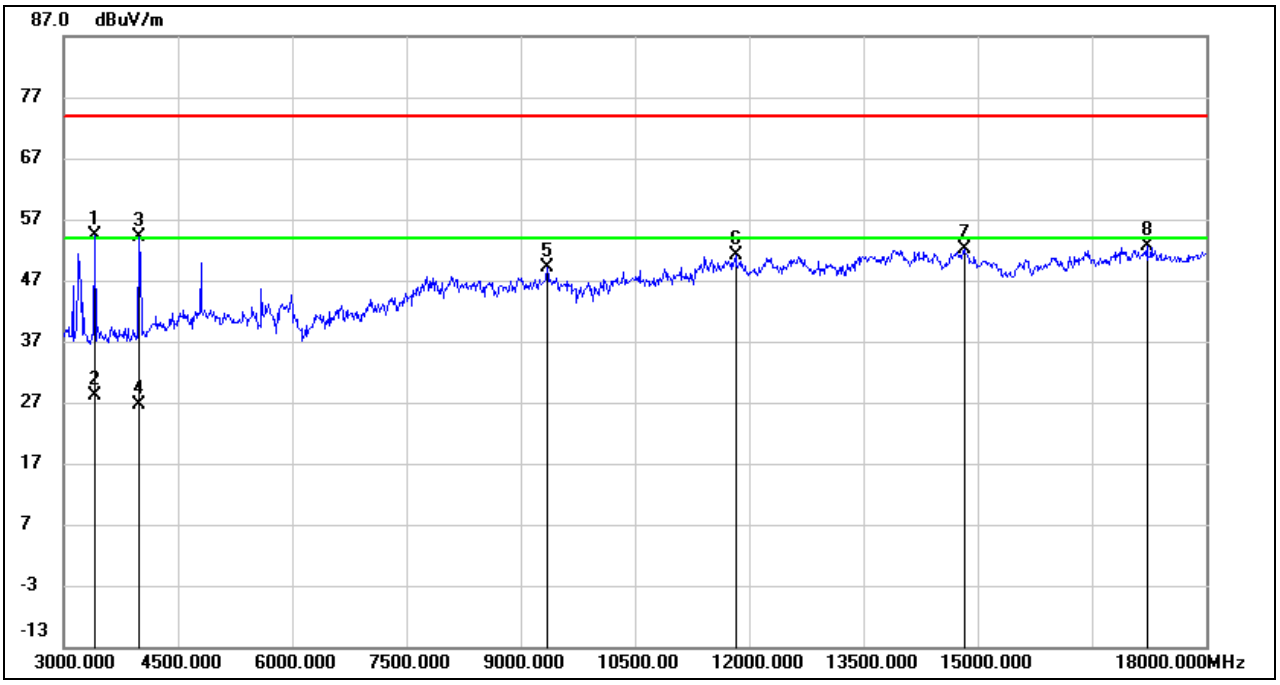
## 8.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz)

### 8.3.1. LE 1M MODE

**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 | 3405.000 | 58.23 | -3.93 | 54.30 | 74.00 | -19.70 | peak |
| 2 | 3405.000 | 32.16 | -3.93 | 28.23 | 54.00 | -25.77 | AVG |
| 3 | 3990.000 | 56.64 | -2.51 | 54.13 | 74.00 | -19.87 | peak |
| 4 | 3990.000 | 29.17 | -2.51 | 26.66 | 54.00 | -27.34 | AVG |
| 5 | 9345.000 | 38.39 | 10.66 | 49.05 | 74.00 | -24.95 | peak |
| 6 | 11820.000 | 35.72 | 15.29 | 51.01 | 74.00 | -22.99 | peak |
| 7 | 14820.000 | 33.52 | 18.53 | 52.05 | 74.00 | -21.95 | peak |
| 8 | 17220.000 | 29.72 | 22.81 | 52.53 | 74.00 | -21.47 | 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.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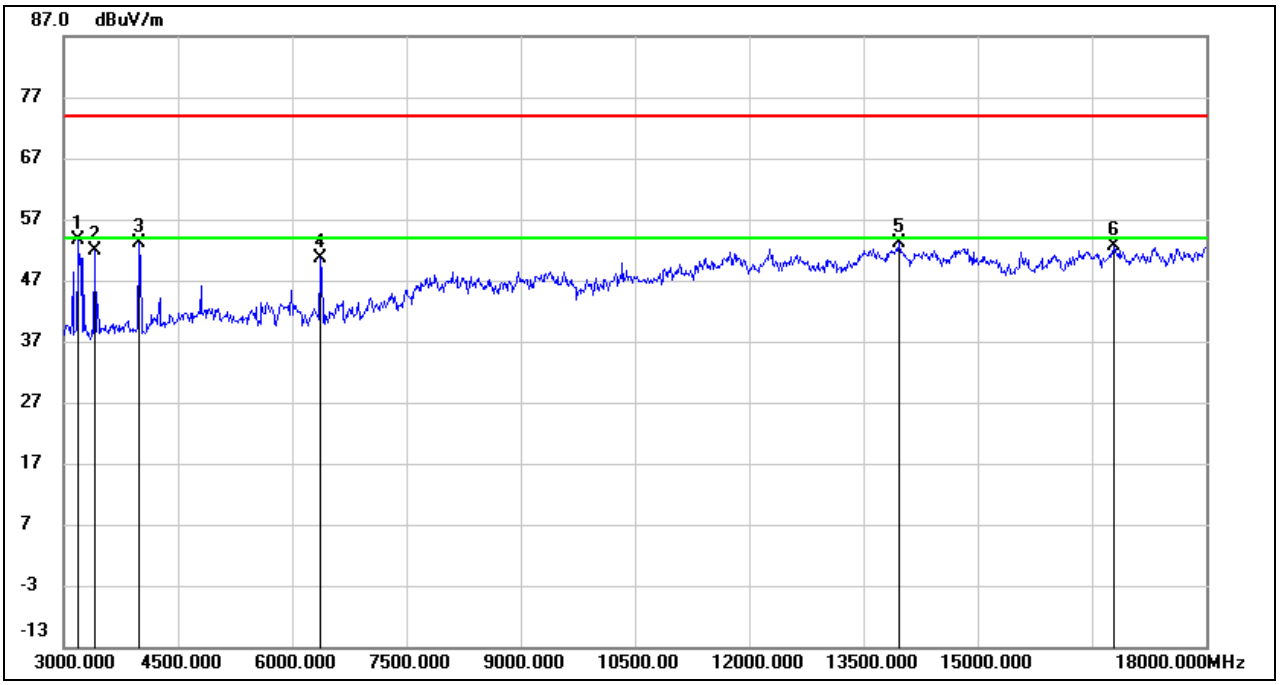
## HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 3195.000 | 57.55 | -3.91 | 53.64 | 74.00 | -20.36 | peak |
| 2 | 3405.000 | 55.86 | -3.93 | 51.93 | 74.00 | -22.07 | peak |
| 3 | 3990.000 | 55.56 | -2.51 | 53.05 | 74.00 | -20.95 | peak |
| 4 | 6375.000 | 45.74 | 4.77 | 50.51 | 74.00 | -23.49 | peak |
| 5 | 13965.000 | 34.58 | 18.66 | 53.24 | 74.00 | -20.76 | peak |
| 6 | 16785.000 | 31.57 | 21.01 | 52.58 | 74.00 | -21.42 | 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 High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.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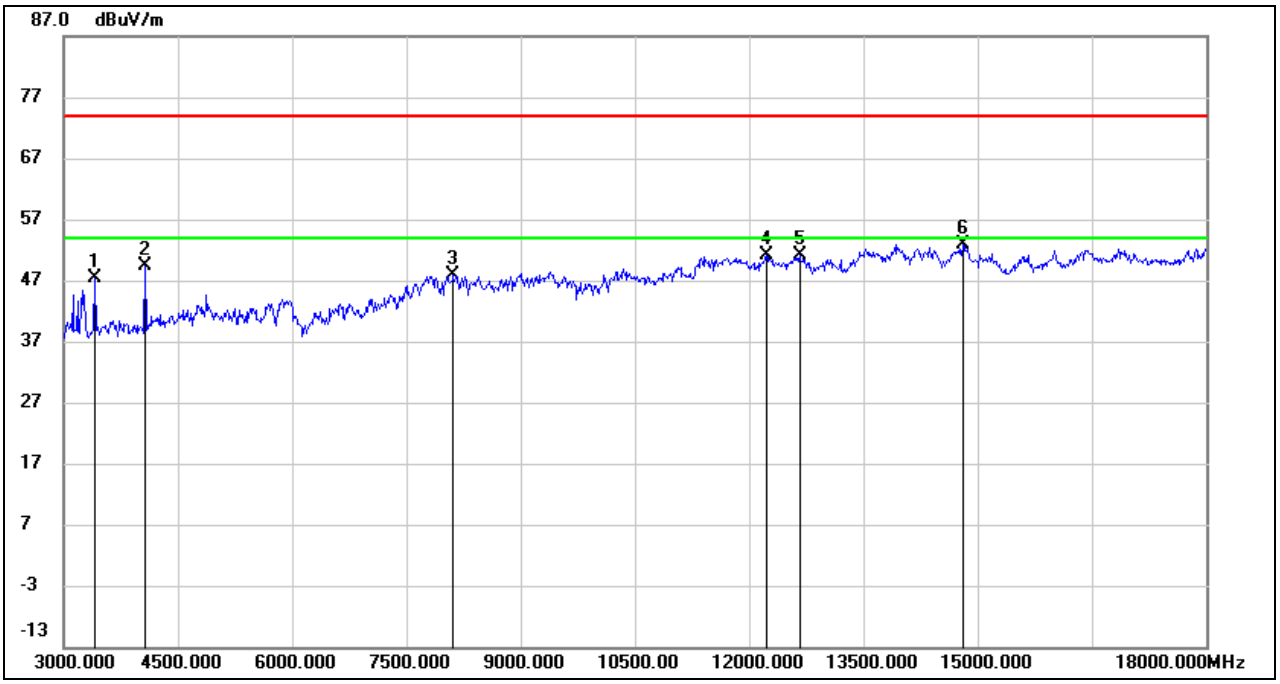
**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 3405.000 | 51.27 | -3.93 | 47.34 | 74.00 | -26.66 | peak |
| 2 | 4065.000 | 51.77 | -2.40 | 49.37 | 74.00 | -24.63 | peak |
| 3 | 8115.000 | 37.86 | 10.13 | 47.99 | 74.00 | -26.01 | peak |
| 4 | 12225.000 | 35.03 | 15.99 | 51.02 | 74.00 | -22.98 | peak |
| 5 | 12660.000 | 35.46 | 15.69 | 51.15 | 74.00 | -22.85 | peak |
| 6 | 14805.000 | 34.28 | 18.63 | 52.91 | 74.00 | -21.09 | 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. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.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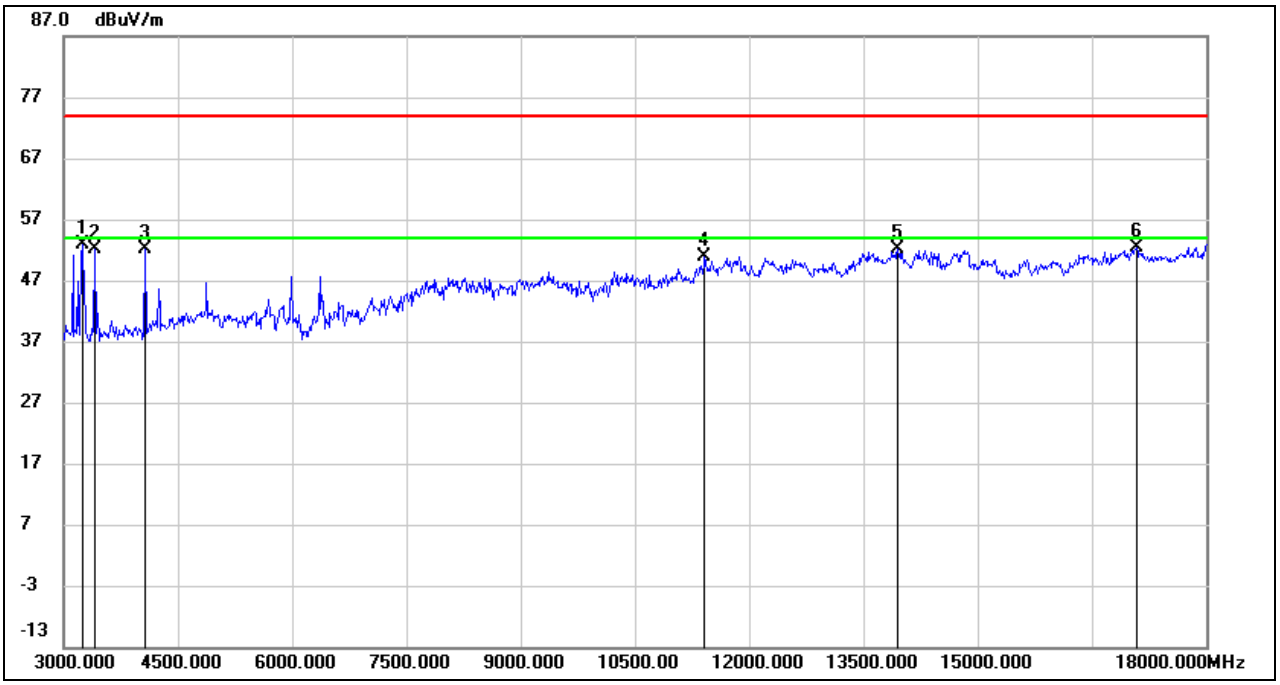
**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 3240.000 | 56.71 | -3.82 | 52.89 | 74.00 | -21.11 | peak |
| 2 | 3405.000 | 55.99 | -3.93 | 52.06 | 74.00 | -21.94 | peak |
| 3 | 4065.000 | 54.64 | -2.40 | 52.24 | 74.00 | -21.76 | peak |
| 4 | 11415.000 | 36.23 | 14.74 | 50.97 | 74.00 | -23.03 | peak |
| 5 | 13950.000 | 33.43 | 18.62 | 52.05 | 74.00 | -21.95 | peak |
| 6 | 17085.000 | 30.08 | 22.36 | 52.44 | 74.00 | -21.56 | 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 High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.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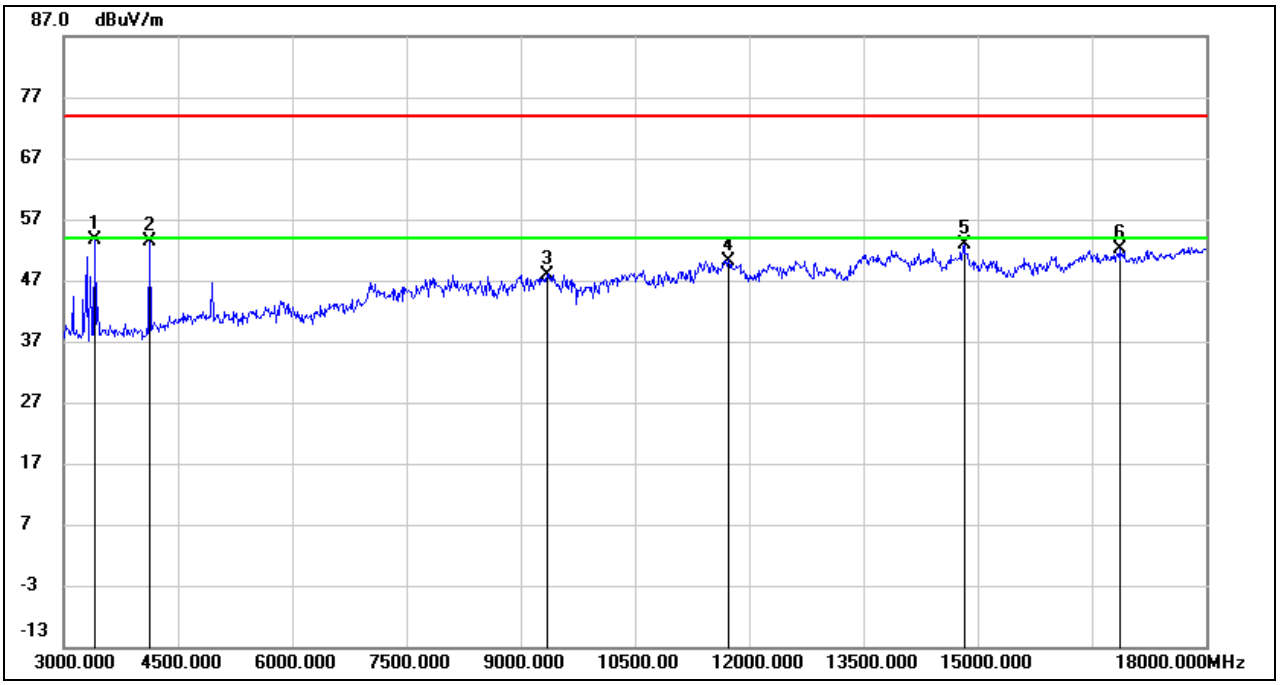
**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 3405.000 | 57.55 | -3.93 | 53.62 | 74.00 | -20.38 | peak |
| 2 | 4125.000 | 55.34 | -2.04 | 53.30 | 74.00 | -20.70 | peak |
| 3 | 9345.000 | 37.27 | 10.66 | 47.93 | 74.00 | -26.07 | peak |
| 4 | 11730.000 | 34.93 | 15.32 | 50.25 | 74.00 | -23.75 | peak |
| 5 | 14820.000 | 34.29 | 18.53 | 52.82 | 74.00 | -21.18 | peak |
| 6 | 16860.000 | 30.46 | 21.66 | 52.12 | 74.00 | -21.88 | 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.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.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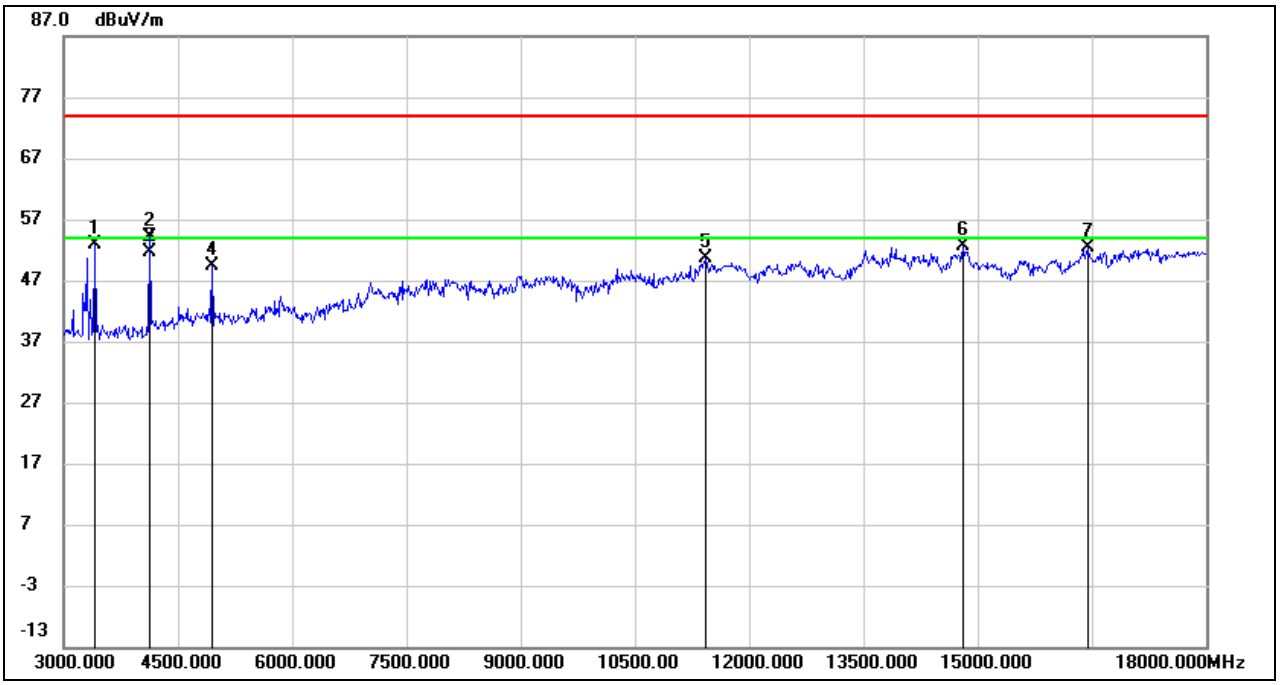
**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 3405.000 | 56.73 | -3.93 | 52.80 | 74.00 | -21.20 | peak |
| 2 | 4125.000 | 56.23 | -2.04 | 54.19 | 74.00 | -19.81 | peak |
| 3 | 4125.000 | 53.77 | -2.04 | 51.73 | 54.00 | -2.27 | AVG |
| 4 | 4950.000 | 47.70 | 1.71 | 49.41 | 74.00 | -24.59 | peak |
| 5 | 11430.000 | 35.89 | 14.72 | 50.61 | 74.00 | -23.39 | peak |
| 6 | 14805.000 | 34.03 | 18.63 | 52.66 | 74.00 | -21.34 | peak |
| 7 | 16455.000 | 32.25 | 20.02 | 52.27 | 74.00 | -21.73 | 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. 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.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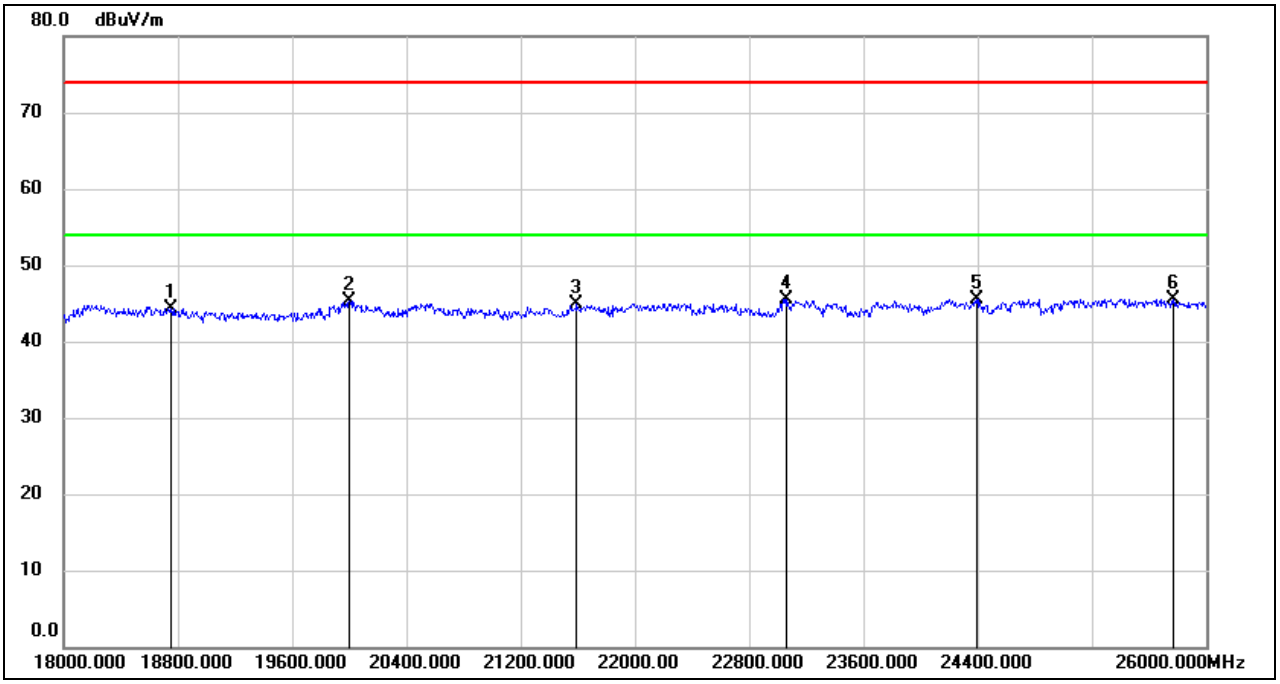
## 8.4. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

### 8.4.1. LE 1M MODE

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 18752.000 | 49.70 | -5.42 | 44.28 | 74.00 | -29.72 | peak |
| 2 | 20000.000 | 50.81 | -5.45 | 45.36 | 74.00 | -28.64 | peak |
| 3 | 21592.000 | 49.43 | -4.55 | 44.88 | 74.00 | -29.12 | peak |
| 4 | 23064.000 | 48.99 | -3.42 | 45.57 | 74.00 | -28.43 | peak |
| 5 | 24392.000 | 48.04 | -2.54 | 45.50 | 74.00 | -28.50 | peak |
| 6 | 25768.000 | 46.14 | -0.64 | 45.50 | 74.00 | -28.50 | 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 modes and channels have been tested, only the worst data was recorded in the report.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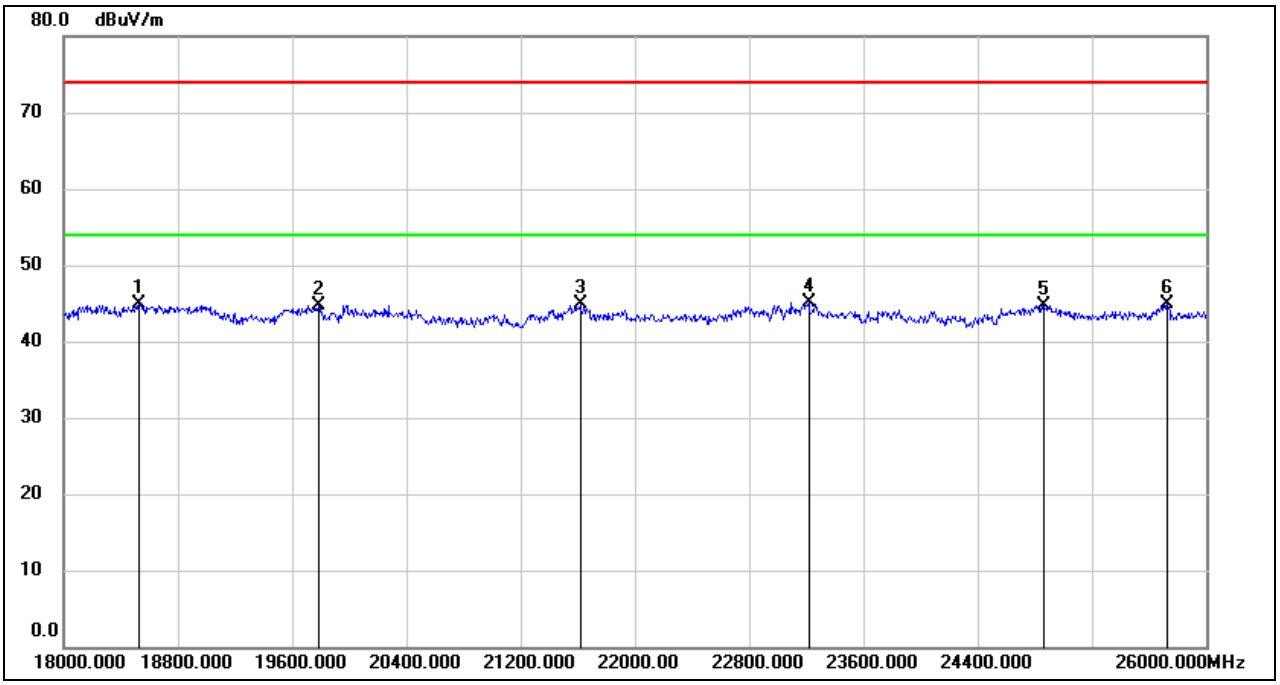
**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**




| 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 | 21616.000 | 49.38 | -4.53 | 44.85 | 74.00 | -29.15 | peak |
| 4 | 23216.000 | 48.51 | -3.38 | 45.13 | 74.00 | -28.87 | peak |
| 5 | 24864.000 | 47.03 | -2.23 | 44.80 | 74.00 | -29.20 | peak |
| 6 | 25728.000 | 45.61 | -0.72 | 44.89 | 74.00 | -29.11 | 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 modes and channels have been tested, only the worst data was recorded in the report.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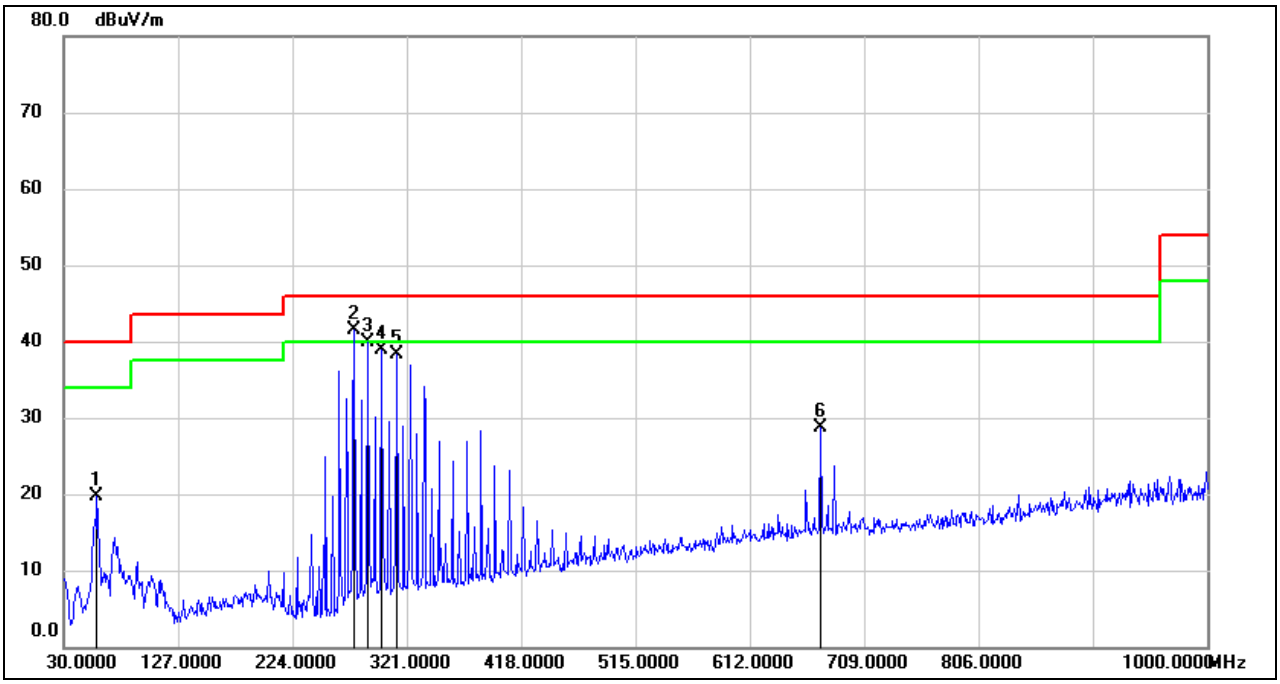
## 8.5. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

### 8.5.1. LE 1M MODE

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 58.1300 | 40.32 | -20.55 | 19.77 | 40.00 | -20.23 | QP |
| 2 | 276.3800 | 58.60 | -17.06 | 41.54 | 46.00 | -4.46 | QP |
| 3 | 288.0200 | 55.95 | -16.06 | 39.89 | 46.00 | -6.11 | QP |
| 4 | 299.6600 | 54.23 | -15.31 | 38.92 | 46.00 | -7.08 | QP |
| 5 | 312.2700 | 53.33 | -15.01 | 38.32 | 46.00 | -7.68 | QP |
| 6 | 672.1400 | 37.36 | -8.64 | 28.72 | 46.00 | -17.28 | 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 modes and channels have been tested, only the worst data was recorded in the report.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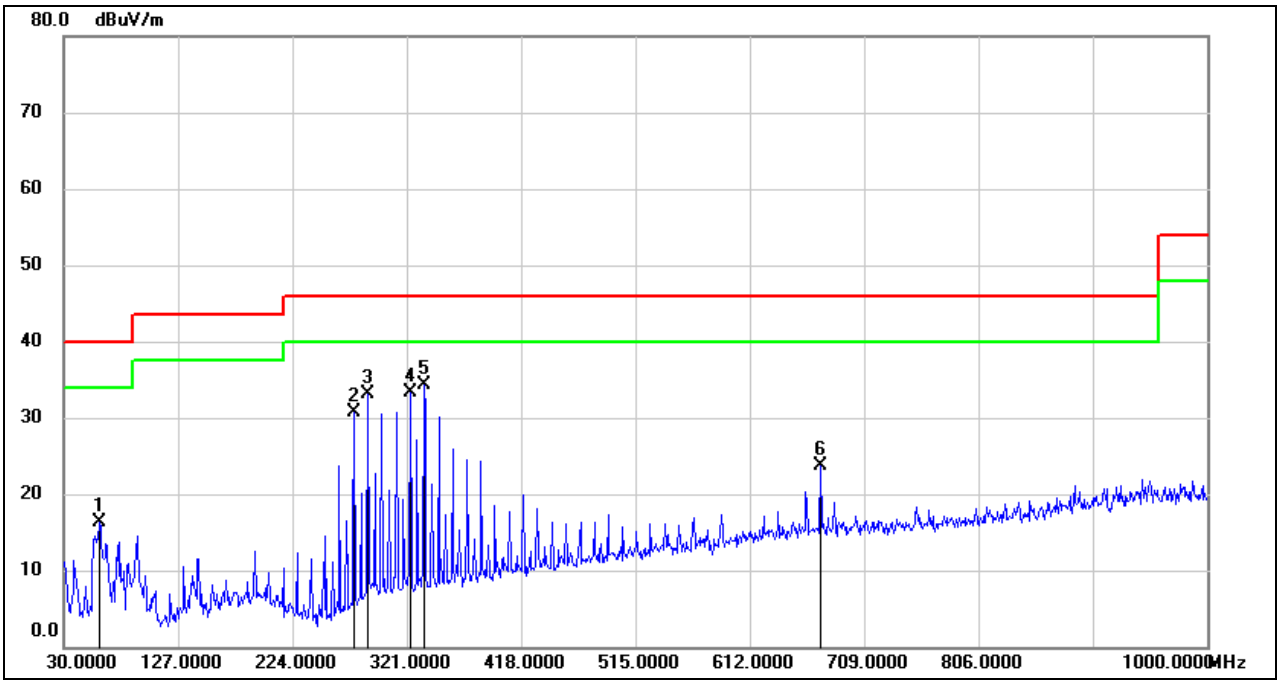
**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 60.0700 | 36.88 | -20.49 | 16.39 | 40.00 | -23.61 | QP |
| 2 | 276.3800 | 47.75 | -17.06 | 30.69 | 46.00 | -15.31 | QP |
| 3 | 288.0200 | 49.19 | -16.06 | 33.13 | 46.00 | -12.87 | QP |
| 4 | 323.9100 | 47.98 | -14.74 | 33.24 | 46.00 | -12.76 | QP |
| 5 | 335.5500 | 48.75 | -14.54 | 34.21 | 46.00 | -11.79 | QP |
| 6 | 672.1400 | 32.28 | -8.64 | 23.64 | 46.00 | -22.36 | 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 modes and channels have been tested, only the worst data was recorded in the report.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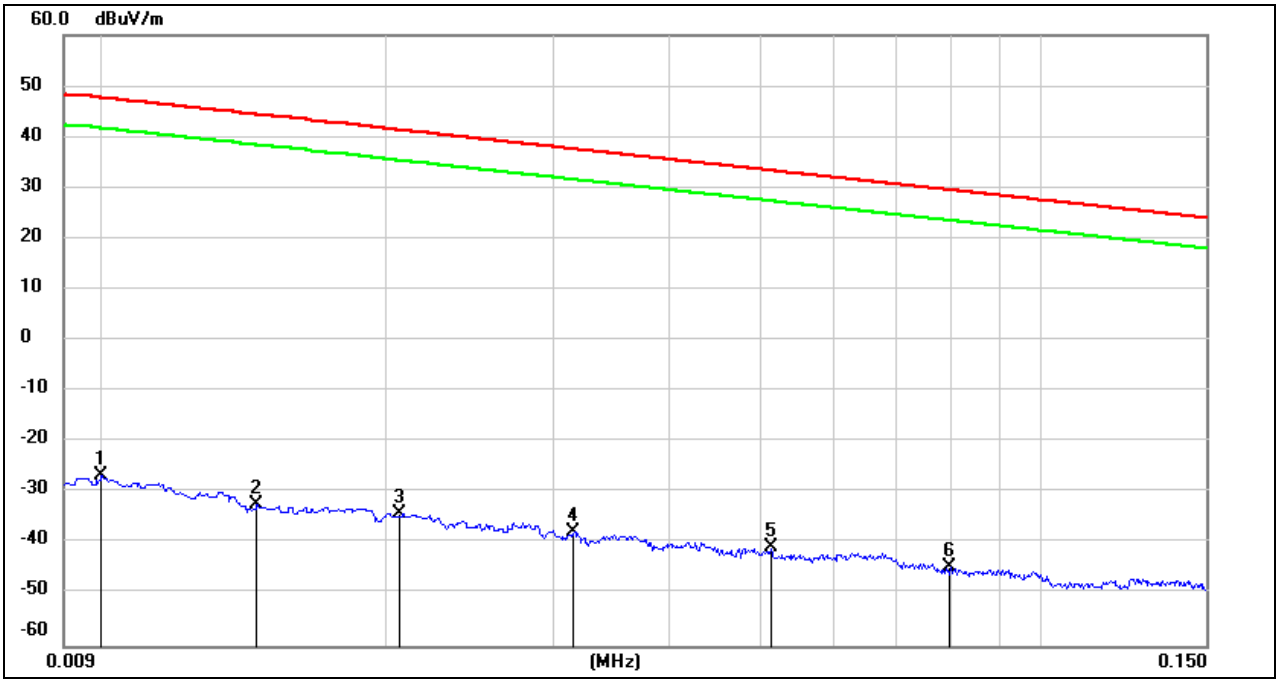
## 8.6. SPURIOUS EMISSIONS BELOW 30 MHz

### 8.6.1. LE 1M MODE

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

**9 kHz~ 150 kHz**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.0100 | 74.72 | -101.40 | -26.68 | 47.60 | -74.28 | peak |
| 2 | 0.0145 | 69.05 | -101.38 | -32.33 | 44.37 | -76.70 | peak |
| 3 | 0.0206 | 67.42 | -101.35 | -33.93 | 41.32 | -75.25 | peak |
| 4 | 0.0316 | 63.74 | -101.40 | -37.66 | 37.61 | -75.27 | peak |
| 5 | 0.0514 | 60.68 | -101.48 | -40.80 | 33.38 | -74.18 | peak |
| 6 | 0.0796 | 57.03 | -101.63 | -44.60 | 29.58 | -74.18 | peak |

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

Note: All the modes and channels have been tested, only the worst data was recorded in the report.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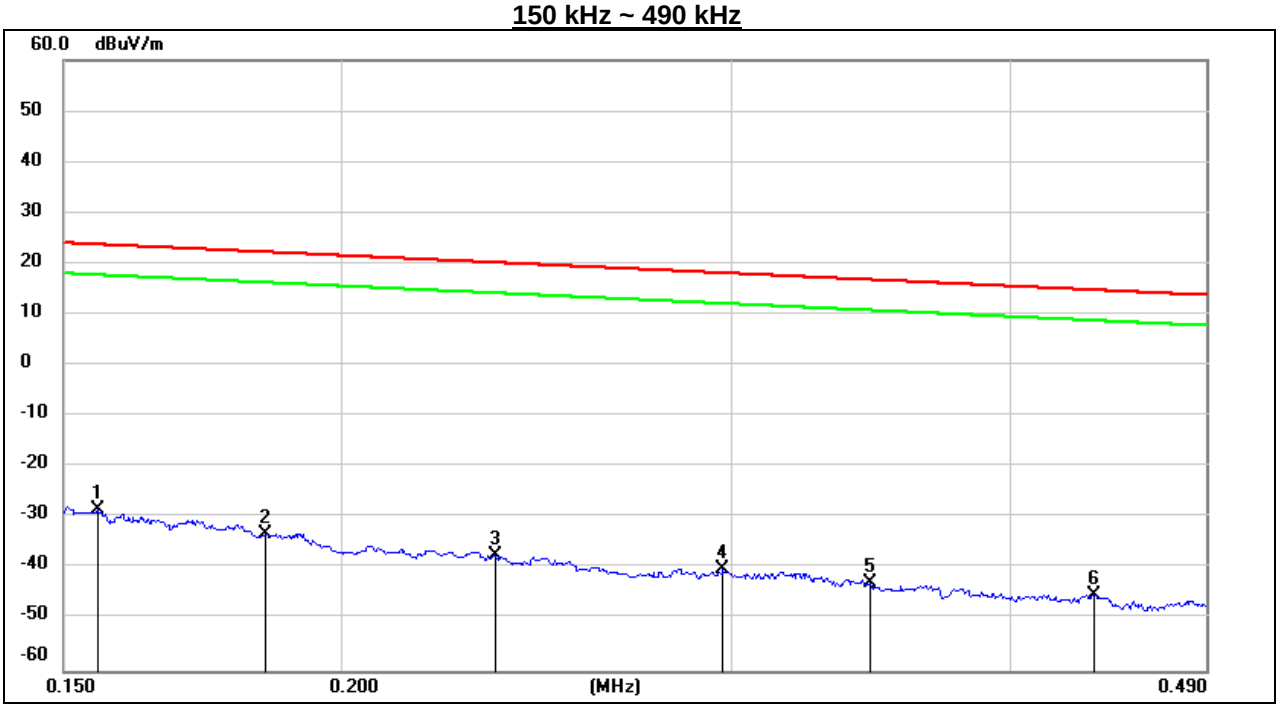
**150 kHz ~ 490 kHz**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.1554 | 73.27 | -101.65 | -28.38 | 23.77 | -52.15 | peak |
| 2 | 0.1847 | 68.61 | -101.70 | -33.09 | 22.28 | -55.37 | peak |
| 3 | 0.2346 | 64.35 | -101.77 | -37.42 | 20.19 | -57.61 | peak |
| 4 | 0.2972 | 61.66 | -101.85 | -40.19 | 18.14 | -58.33 | peak |
| 5 | 0.3462 | 59.24 | -101.90 | -42.66 | 16.81 | -59.47 | peak |
| 6 | 0.4364 | 56.86 | -101.99 | -45.13 | 14.80 | -59.93 | peak |

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

Note: All the modes and channels have been tested, only the worst data was recorded in the report.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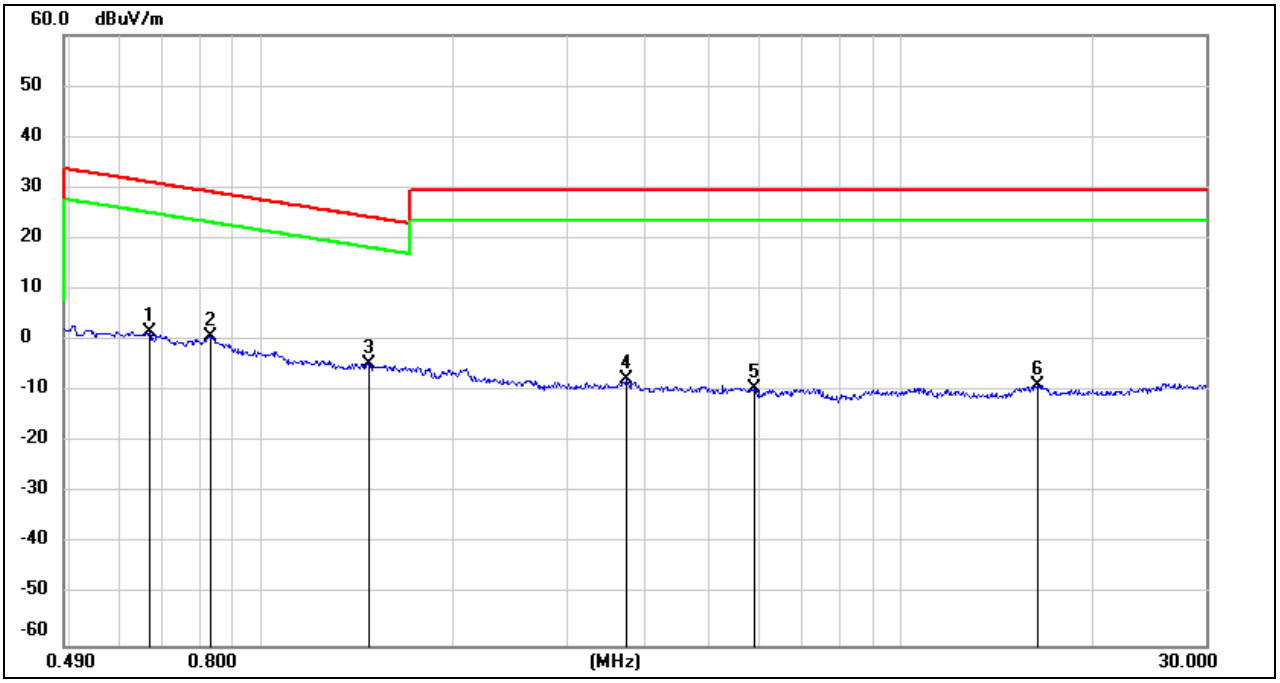
**490 kHz ~ 30 MHz**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.6671 | 63.75 | -62.10 | 1.65 | 31.12 | -29.47 | peak |
| 2 | 0.8296 | 62.94 | -62.17 | 0.77 | 29.23 | -28.46 | peak |
| 3 | 1.4700 | 57.39 | -62.05 | -4.66 | 24.26 | -28.92 | peak |
| 4 | 3.7100 | 53.70 | -61.41 | -7.71 | 29.54 | -37.25 | peak |
| 5 | 5.9198 | 51.93 | -61.36 | -9.43 | 29.54 | -38.97 | peak |
| 6 | 16.3959 | 52.17 | -60.96 | -8.79 | 29.54 | -38.33 | peak |

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

Note: All the modes and channels have been tested, only the worst data was recorded in the report.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# 9. AC POWER LINE CONDUCTED EMISSIONS

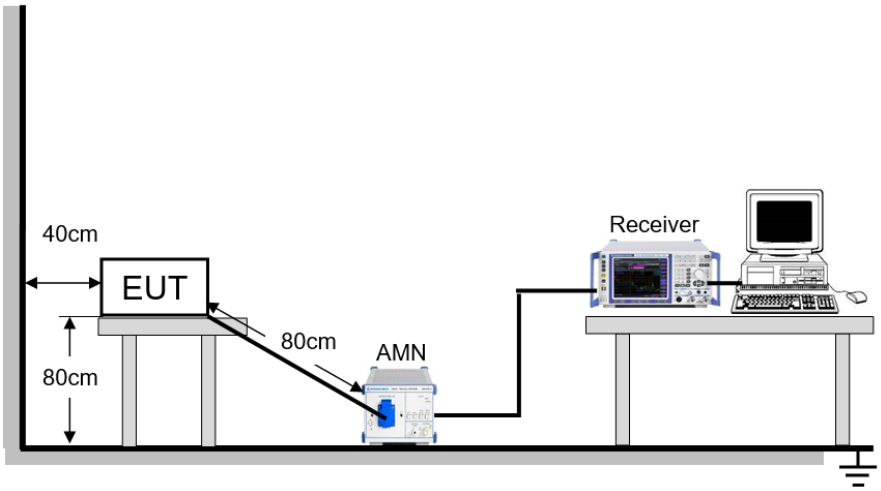
**LIMITS**

Please refer to CFR 47 FCC §15.207 (a) .

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

**TEST SETUP AND PROCEDURE**

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 | 23.5 °C | Relative Humidity | 61.4 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120V/60Hz |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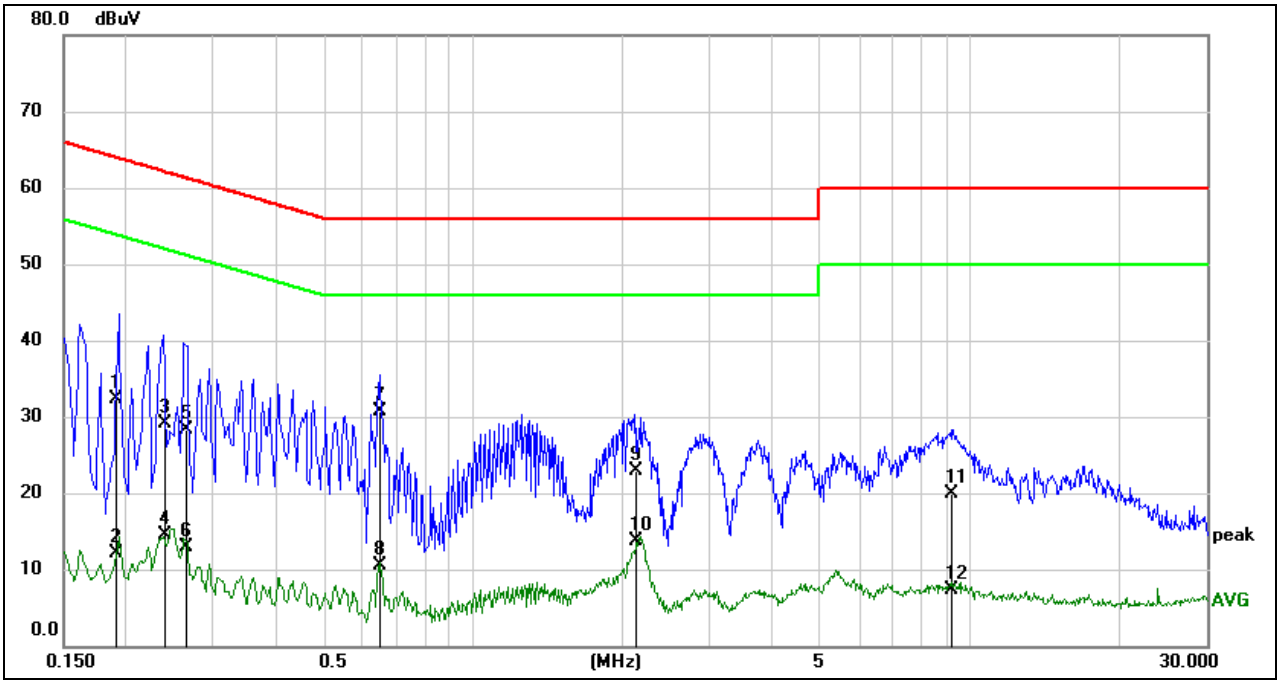
**RESULTS**

## 9.1. LE 1M MODE

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




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.1913 | 22.73 | 9.59 | 32.32 | 63.98 | -31.66 | QP |
| 2 | 0.1913 | 2.46 | 9.59 | 12.05 | 53.98 | -41.93 | AVG |
| 3 | 0.2401 | 19.58 | 9.59 | 29.17 | 62.09 | -32.92 | QP |
| 4 | 0.2401 | 4.93 | 9.59 | 14.52 | 52.09 | -37.57 | AVG |
| 5 | 0.2654 | 18.77 | 9.59 | 28.36 | 61.26 | -32.90 | QP |
| 6 | 0.2654 | 3.30 | 9.59 | 12.89 | 51.26 | -38.37 | AVG |
| 7 | 0.6490 | 21.10 | 9.60 | 30.70 | 56.00 | -25.30 | QP |
| 8 | 0.6490 | 0.88 | 9.60 | 10.48 | 46.00 | -35.52 | AVG |
| 9 | 2.1385 | 13.20 | 9.63 | 22.83 | 56.00 | -33.17 | QP |
| 10 | 2.1385 | 4.04 | 9.63 | 13.67 | 46.00 | -32.33 | AVG |
| 11 | 9.2249 | 10.31 | 9.62 | 19.93 | 60.00 | -40.07 | QP |
| 12 | 9.2249 | -2.37 | 9.62 | 7.25 | 50.00 | -42.75 | 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.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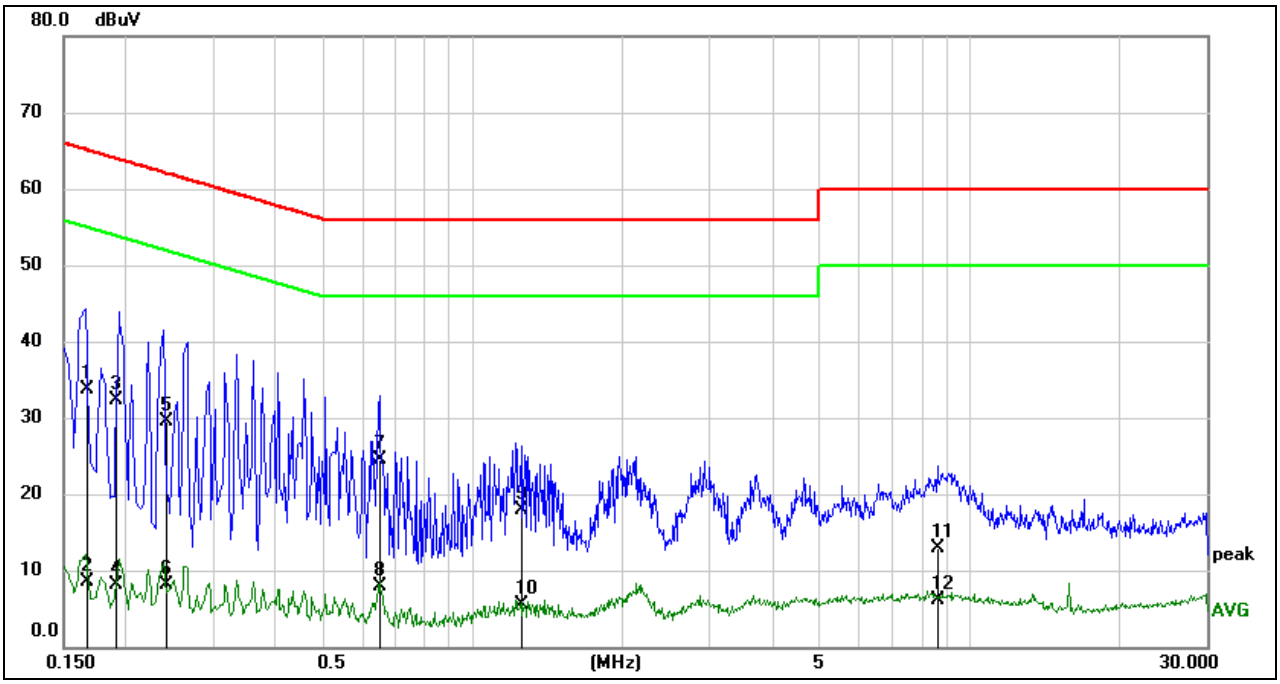
**LINE L RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.1669 | 24.18 | 9.59 | 33.77 | 65.11 | -31.34 | QP |
| 2 | 0.1669 | -1.09 | 9.59 | 8.50 | 55.11 | -46.61 | AVG |
| 3 | 0.1912 | 22.62 | 9.59 | 32.21 | 63.98 | -31.77 | QP |
| 4 | 0.1912 | -1.53 | 9.59 | 8.06 | 53.98 | -45.92 | AVG |
| 5 | 0.2420 | 19.86 | 9.59 | 29.45 | 62.03 | -32.58 | QP |
| 6 | 0.2420 | -1.50 | 9.59 | 8.09 | 52.03 | -43.94 | AVG |
| 7 | 0.6492 | 14.88 | 9.60 | 24.48 | 56.00 | -31.52 | QP |
| 8 | 0.6492 | -1.60 | 9.60 | 8.00 | 46.00 | -38.00 | AVG |
| 9 | 1.2492 | 8.31 | 9.61 | 17.92 | 56.00 | -38.08 | QP |
| 10 | 1.2492 | -4.03 | 9.61 | 5.58 | 46.00 | -40.42 | AVG |
| 11 | 8.6224 | 3.38 | 9.61 | 12.99 | 60.00 | -47.01 | QP |
| 12 | 8.6224 | -3.50 | 9.61 | 6.11 | 50.00 | -43.89 | 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 modes and channels have been tested, only the worst data was recorded in the report.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# 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


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# 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 |
|---|---|---|---|---|---|---|---|
| LE 1M | Ant1 | 2402 | 0.708 | 2401.529 | 2402.237 | 0.5 | PASS |
| | | 2440 | 0.711 | 2439.532 | 2440.243 | 0.5 | PASS |
| | | 2480 | 0.723 | 2479.517 | 2480.240 | 0.5 | PASS |


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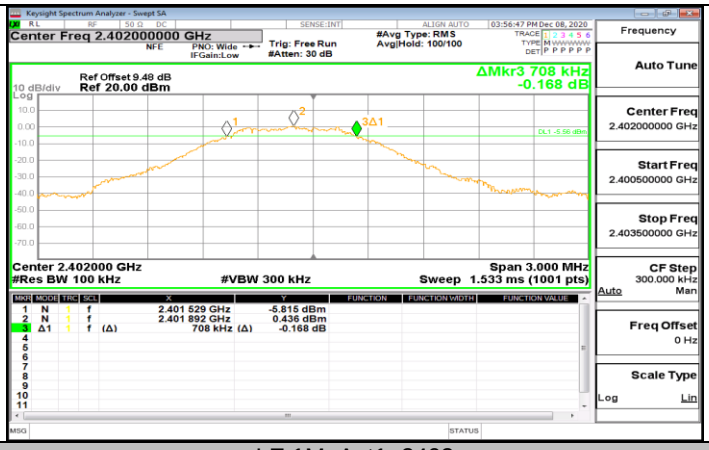
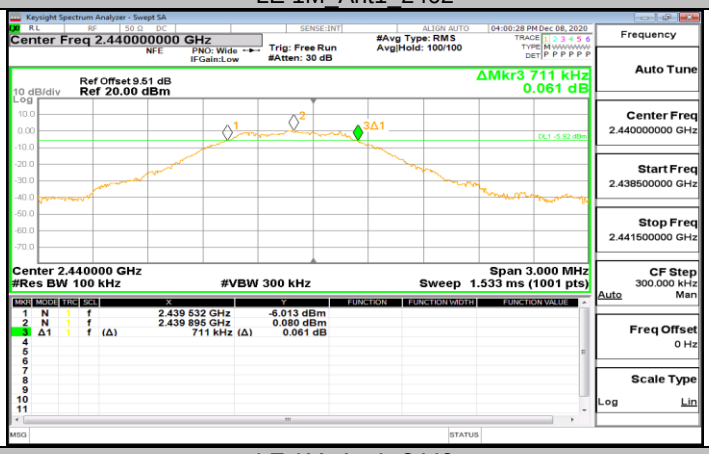
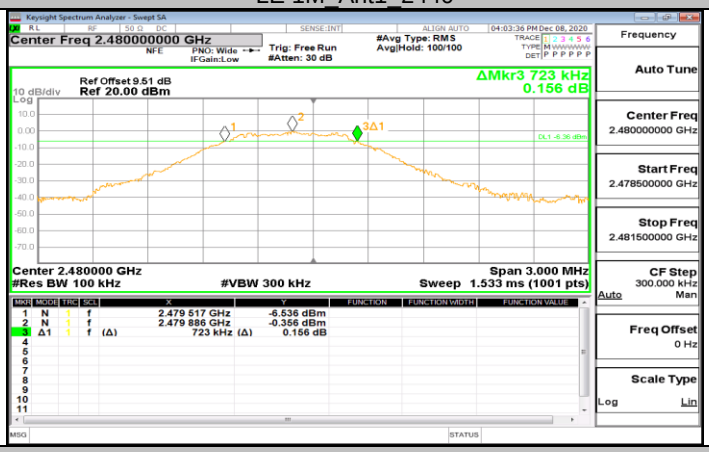
### 11.1.2. Test Graphs




LE 1M_Ant1_2402




LE 1M_Ant1_2440




LE 1M_Ant1_2480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## 11.2. Appendix B: Occupied Channel Bandwidth

### 11.2.1. Test Result

| Test Mode | Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Verdict |
|---|---|---|---|---|---|---|
| LE 1M | Ant1 | 2402 | 1.0924 | 2401.345 | 2402.437 | PASS |
| | | 2440 | 1.1010 | 2439.336 | 2440.437 | PASS |
| | | 2480 | 1.1013 | 2479.329 | 2480.430 | PASS |


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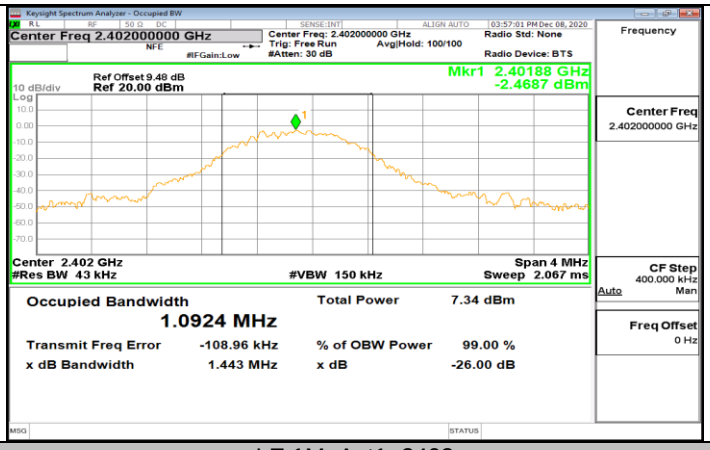
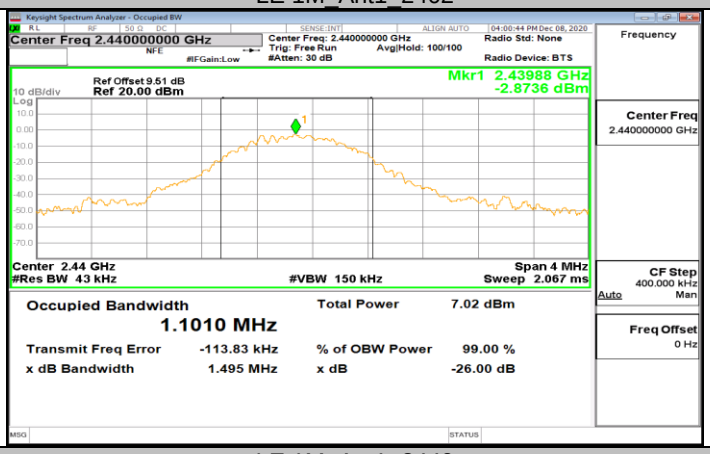
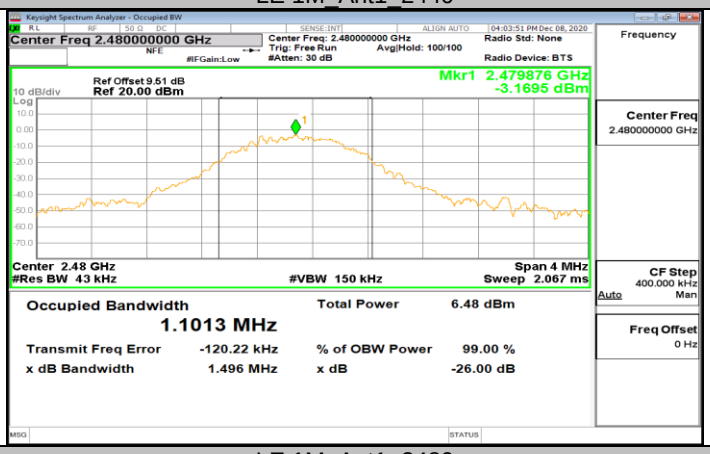
### 11.2.2. Test Graphs




LE 1M_Ant1_2402




LE 1M_Ant1_2440




LE 1M_Ant1_2480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## 11.3. Appendix C: Maximum PEAK conducted output power

### 11.3.1. Test Result

| Test Mode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|
| LE 1M | Ant1 | 2402 | 2.42 | <=30 | PASS |
| | | 2440 | 2.14 | <=30 | PASS |
| | | 2480 | 1.69 | <=30 | PASS |


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## 11.4. Appendix D: Maximum power spectral density

### 11.4.1. Test Result

| Test Mode | Antenna | Channel | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| LE 1M | Ant1 | 2402 | -16.15 | <=8 | PASS |
| | | 2440 | -16.48 | <=8 | PASS |
| | | 2480 | -16.85 | <=8 | PASS |


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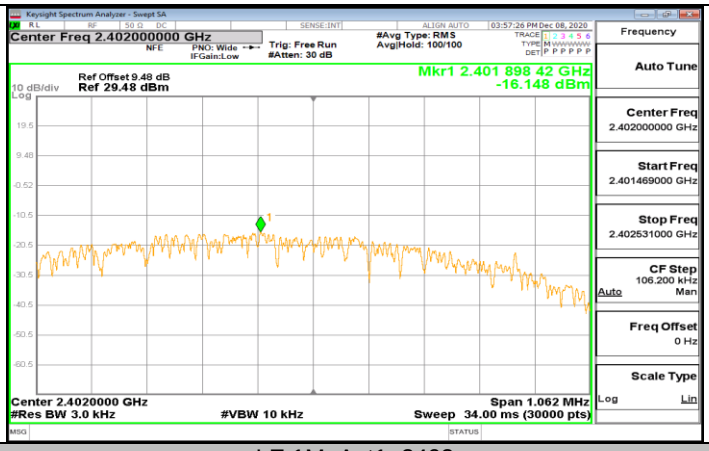
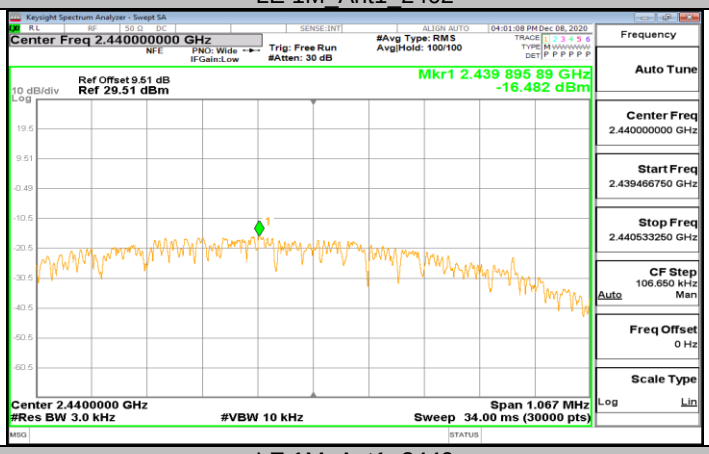
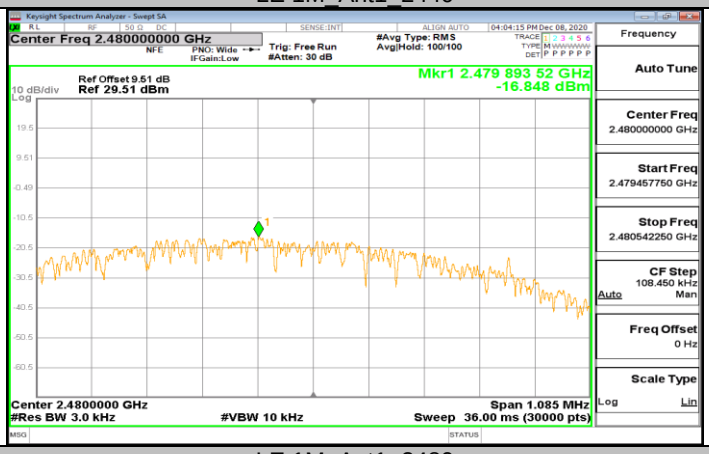
### 11.4.2. Test Graphs




LE 1M_Ant1_2402




LE 1M_Ant1_2440




LE 1M_Ant1_2480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## 11.5. Appendix E: Band edge measurements

### 11.5.1. Test Result

| Test Mode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| LE 1M | Ant1 | Low | 2402 | 0.51 | -43.58 | <=-19.49 | PASS |
| | | High | 2480 | -0.32 | -48.45 | <=-20.32 | PASS |


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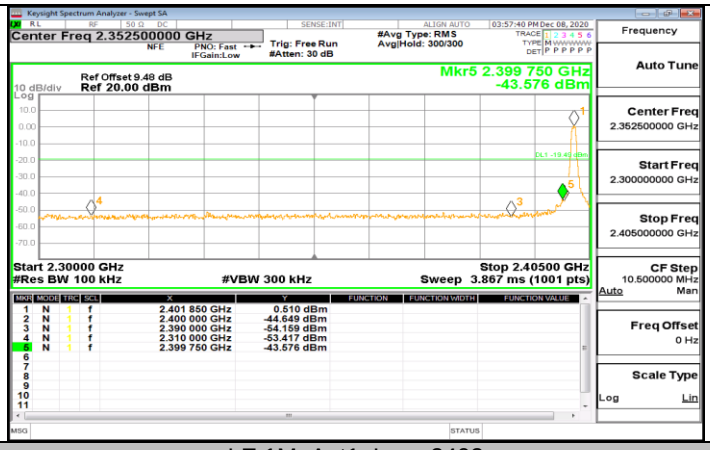
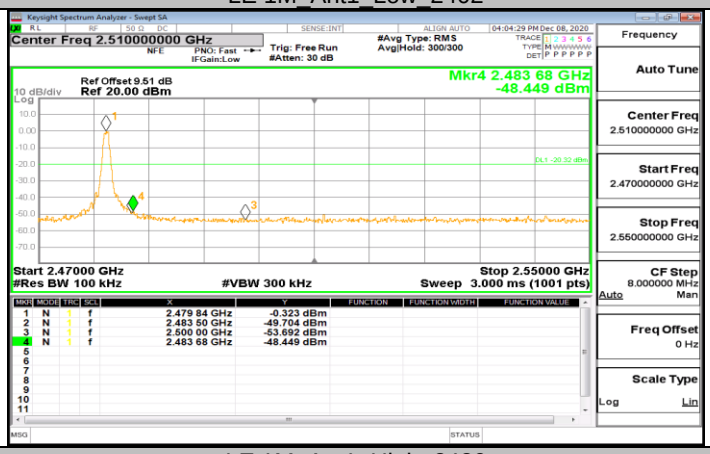
### 11.5.2. Test Graphs




LE 1M_Ant1_Low_2402




LE 1M_Ant1_High_2480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## 11.6. Appendix F: Conducted Spurious Emission

### 11.6.1. Test Result

| Test Mode | Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| LE 1M | Ant1 | 2402 | Reference | 0.42 | 0.42 | --- | PASS |
| | | | 30~1000 | 0.42 | -40.09 | <=-19.58 | PASS |
| | | | 1000~26500 | 0.42 | -35.94 | <=-19.58 | PASS |
| | | 2440 | Reference | 0.16 | 0.16 | --- | PASS |
| | | | 30~1000 | 0.16 | -39.67 | <=-19.84 | PASS |
| | | | 1000~26500 | 0.16 | -38.04 | <=-19.84 | PASS |
| | | 2480 | Reference | -0.28 | -0.28 | --- | PASS |
| | | | 30~1000 | -0.28 | -39.97 | <=-20.28 | PASS |
| | | | 1000~26500 | -0.28 | -40.41 | <=-20.28 | PASS |


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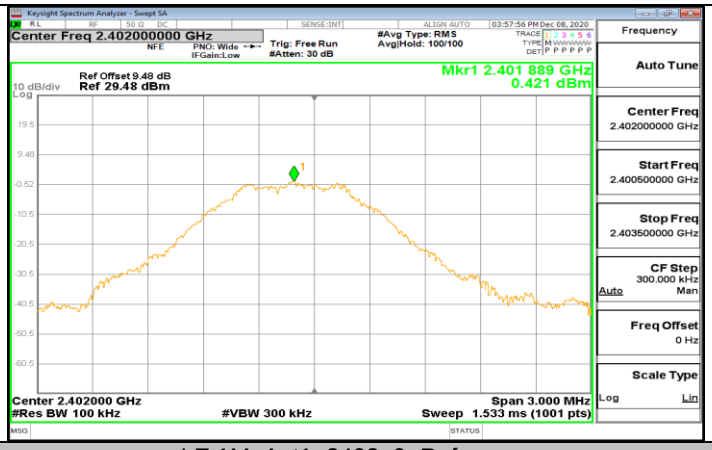
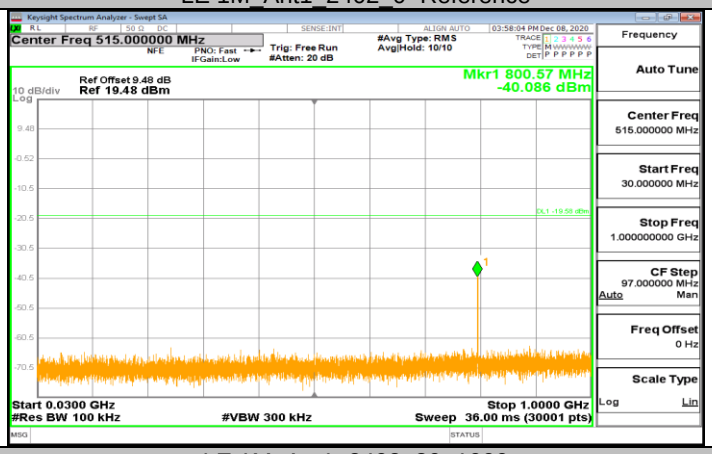
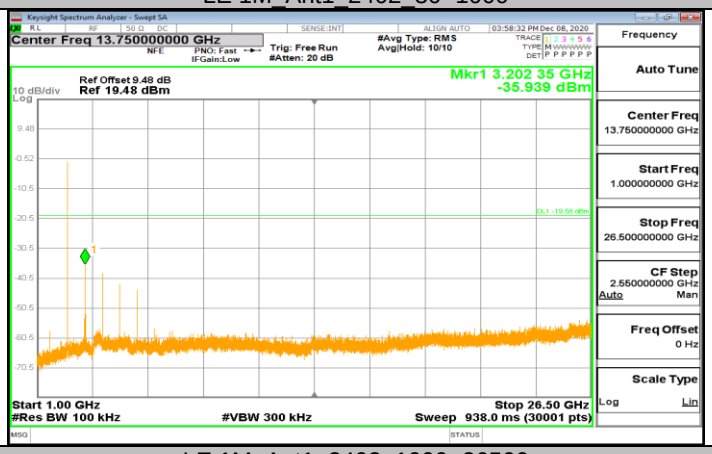
### 11.6.2. Test Graphs




LE 1M_Ant1_2402_0~Reference




LE 1M_Ant1_2402_30~1000




LE 1M_Ant1_2402_1000~26500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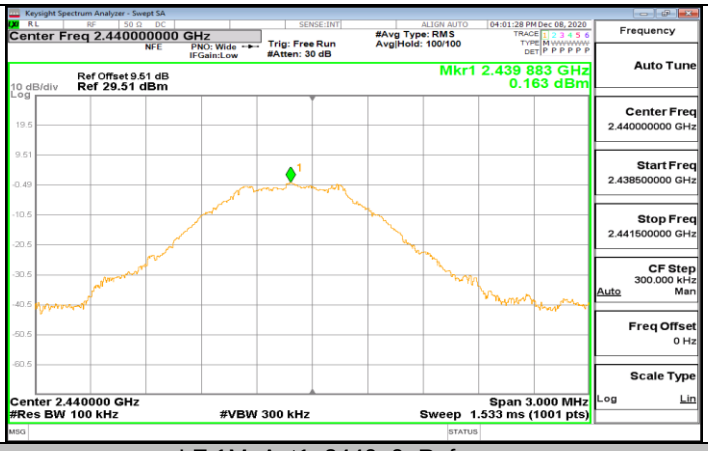
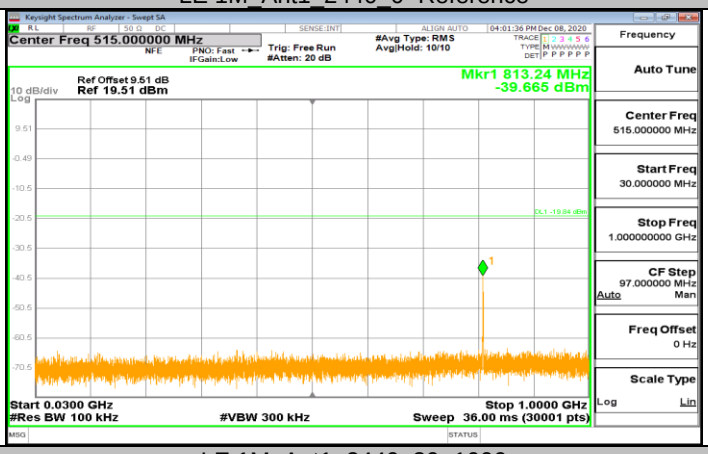
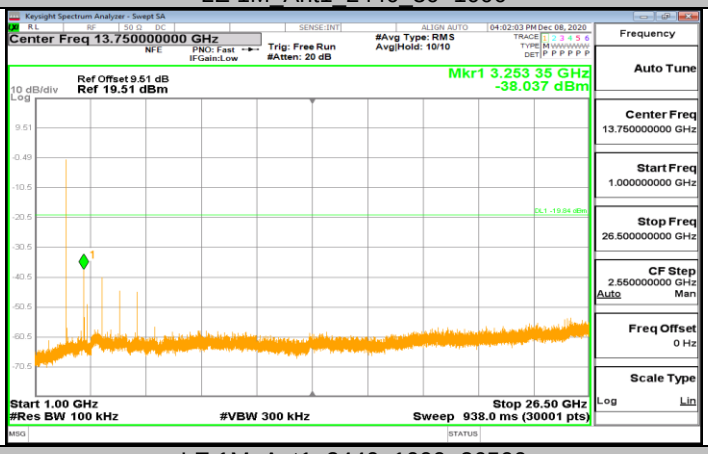



LE 1M_Ant1_2440_0~Reference




LE 1M_Ant1_2440_30~1000




LE 1M_Ant1_2440_1000~26500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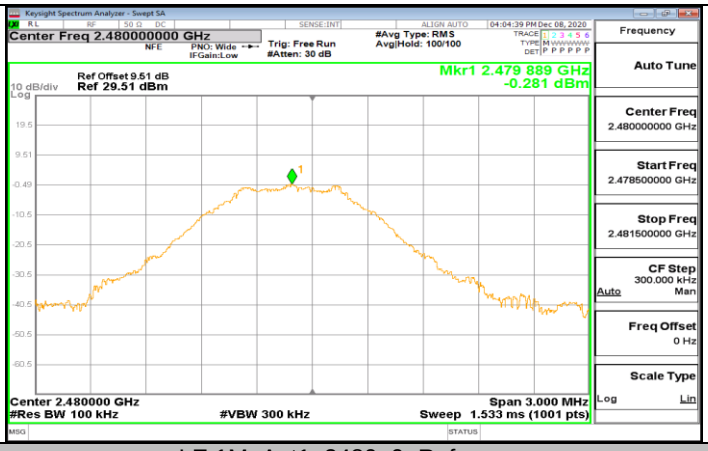
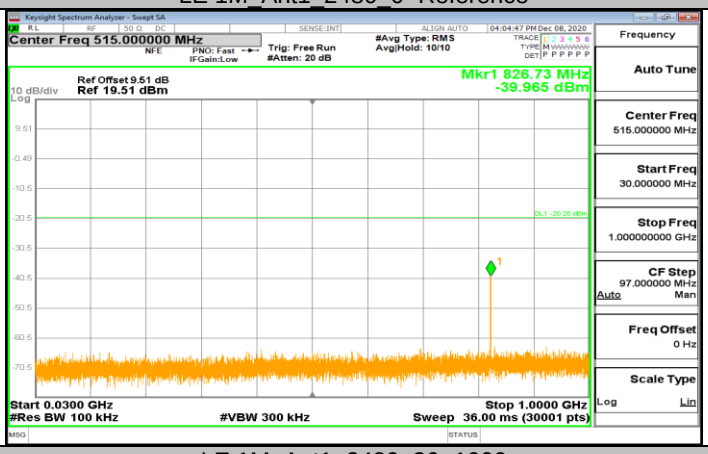
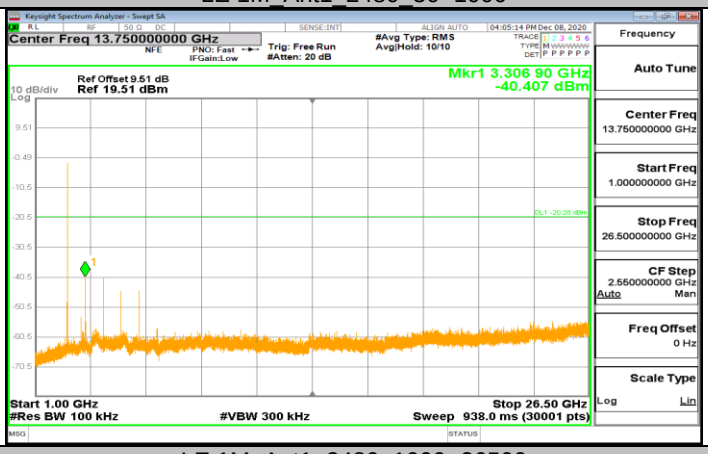



LE 1M_Ant1_2480_0~Reference




LE 1M_Ant1_2480_30~1000




LE 1M_Ant1_2480_1000~26500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## 11.7. Appendix G: Duty Cycle

### 11.7.1. Test Result

| 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) |
|---|---|---|---|---|---|---|---|
| LE 1M | 0.43 | 0.57 | 0.7544 | 75.44 | 1.22 | 2.33 | 3 |

Note:
Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.


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### 11.7.2. Test Graphs

LE 1M_Ant1_2440

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