# FCC PART 15.247

# TEST REPORT

For

## Chongqing Jinou Science & Technology Development Co., Ltd.

D1-802, Overseas Students Pioneer Park No.71 Kecheng Rd, Jiulongpo District, Chongqing, China

## FCC ID: SI8BLES-06

| **Report Type:** | **Product Name:** |
|---|---|
| Original Report | BLE5.0 Serial Adapter |

| | |
|---|---|
| **Report Number:** | RSC210531001-0B |
| **Date of Report Issue:** | 2021-07-21 |
| **Reviewed By:** | Sula Huang |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Chengdu)<br>No.5040, Huilongwan Plaza, No. 1, Shawan Road,<br>Jinniu District, Chengdu, Sichuan, China<br>Tel: +86-28-65525123<br>Fax: +86-28-65525125<br>www.baclcorp.com |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| Applicant | Chongqing Jinou Science & Technology Development Co., Ltd. |
| Product | BLE5.0 Serial Adapter |
| Tested Model | BLES-06 |
| FCC ID | SI8BLES-06 |
| Radio Mode* | Bluetooth LE |
| Frequency* | 2402-2480MHz |
| RF Output Power* | 3.08dBm |
| Modulation Type* | GFSK |
| Voltage | DC 6V |
| Measure approximately | 99 mm (L) x 34 mm (W) x 17 mm (H) |
| Sample serial number | 210531001/02 (assigned by the BACL, Chengdu) |
| Sample/EUT Status | The test sample was in good condition and received: 2021-05-31 |

Note: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

## Objective

This report is prepared on behalf of **Chongqing Jinou Science & Technology Development Co., Ltd.**in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

## Related Submittal(s)/Grant(s)

None

## Measurement Uncertainty

| Item | | | Uncertainty |
|---|---|---|---|
| Conducted emission | | | 2.48 dB |
| Radiated Emission | 30MHz-200MHz | H | 4.31 dB |
| | | V | 4.57 dB |
| | 200MHz-1GHz | H | 4.68 dB |
| | | V | 5.78 dB |
| | 1GHz-6GHz | | 4.56 dB |
| | 6GHz-18GHz | | 4.57 dB |
| | 18GHz-40GHz | | 5.44 dB |
| RF output power, conducted | | | ±0.61dB |
| Occupied Bandwidth | | | ±5% |
| Power Spectrum Density, conducted | | | ±2.5dB |
| Spurious emissions, conducted | | | ±2.5dB |
| Humidity | | | ±5% |
| Temperature | | | ±1℃ |
| Voltage(AC,<10kHz) | | | ±1% |

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the corresponding inclusion factor K when the inclusion probability is about 95%.

## Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. KDB558074 D01 DTS Meas Guidance v05r02.

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

# SYSTEM TEST CONFIGURATION

## Description of Test Configuration*

The system was configured in testing mode, which was provided by manufacturer.

For Bluetooth LE mode, 40 channels are provided for testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| 0 | 2402 | 20 | 2442 |
| 1 | 2404 | … | … |
| … | … | … | … |
| … | … | … | … |
| .. | … | 38 | 2478 |
| 19 | 2440 | 39 | 2480 |

EUT was tested with channel 0, 19 and 39.

## Equipment Modifications

No modification was made to the EUT tested.

## EUT Exercise Software*

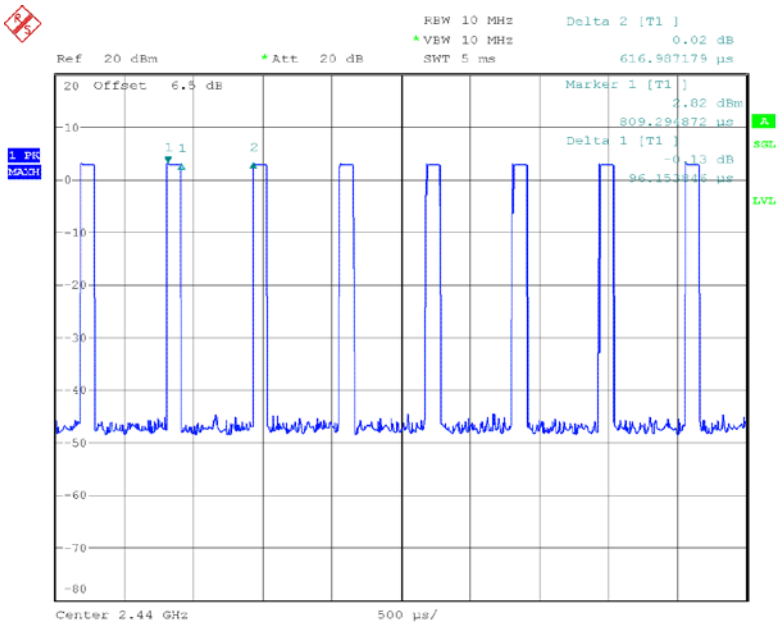
The software "**nrfgo Studio**" was used for testing, which was provided by applicant. The setting by the software as following table:

| Test Mode | Test Software | Nrfgo Studio | | |
|---|---|---|---|---|
| LE 1M | Test Frequency | 2402MHz | 2440MHz | 2480MHz |
| | Data Rate | Default | Default | Default |
| | Power Level | B0 0B | B0 0B | B0 0B |
| LE 2M | Test Frequency | 2402MHz | 2440MHz | 2480MHz |
| | Data Rate | Default | Default | Default |
| | Power Level | B0 0B | B0 0B | B0 0B |

Duty Cycle information is below:

| Mode | $T_{on}$ | $T_p$ | Duty Cycle |
|---|---|---|---|
| | (ms) | (ms) | (%) |
| LE 1M | 0.096 | 0.617 | 15.56 |
| LE 2M | 0.064 | 0.625 | 10.24 |

## LE 1M

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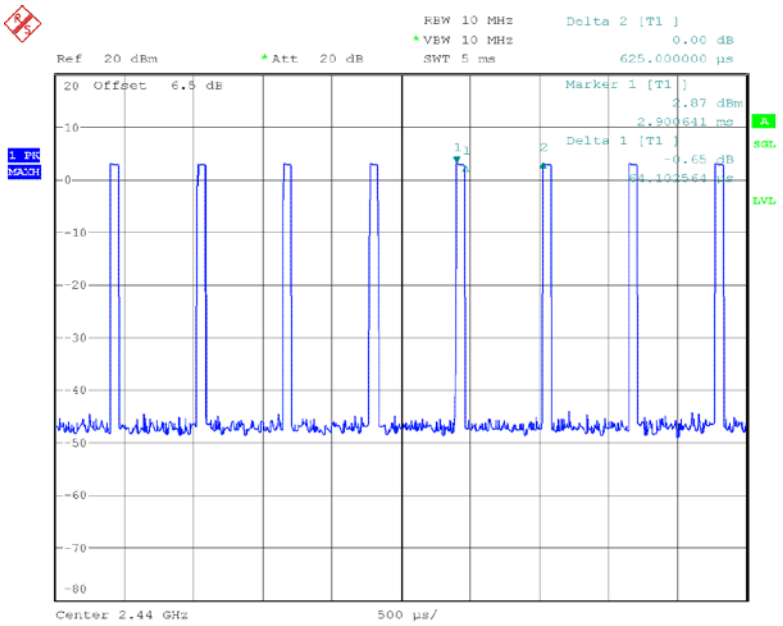
## LE 2M




Date: 7.JUL.2021 19:09:58

## Support Test Devices Description

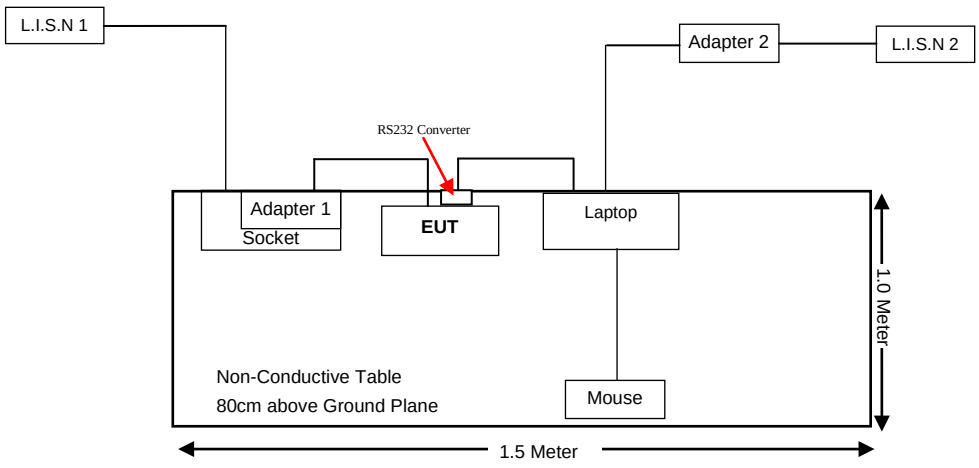
| Manufacturer | Device Name | Model | Serial Number |
|---|---|---|---|
| DELL | Mouse | MOJUUO | 002B6M6 |
| DELL | Laptop | PP01L | 3F438A01 |
| DELL | Adapter 2 | ADP-90FB REV.B | Unknown |
| Yue Wei | Adapter 1 | YW-506 | Unknown |
| JINOU | RS232 Converter (female to female) | Unknown | Unknown |

## Support Test Cable Description

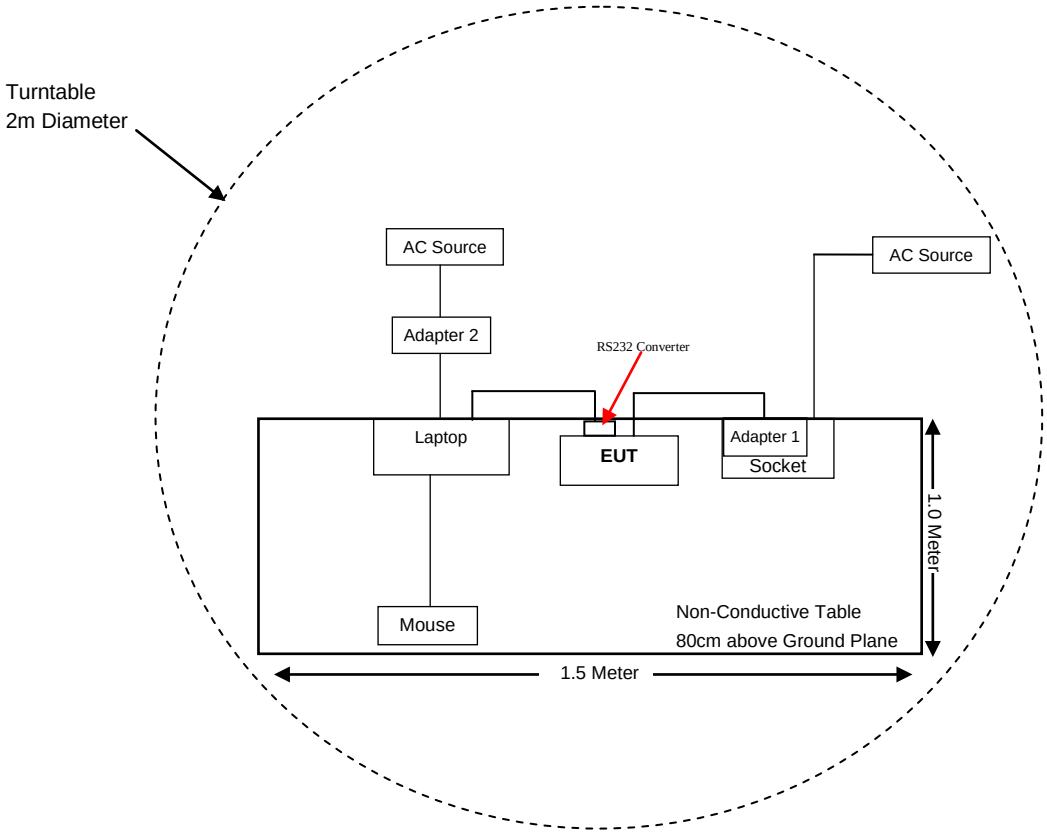
| Cable Description | Length (m) | From / Port | To |
|---|---|---|---|
| Shielding USB to Serial Cable | 1.8 | Laptop | EUT |
| Adapter DC power cable | 2.0 | EUT | Adapter1 |
| Unshielded Mouse Cable | 1.4 | Laptop | Mouse |
| Unshielded DC Power Cable | 1.75 | Adapter 2 | Laptop |

## Block Diagram of Test Setup

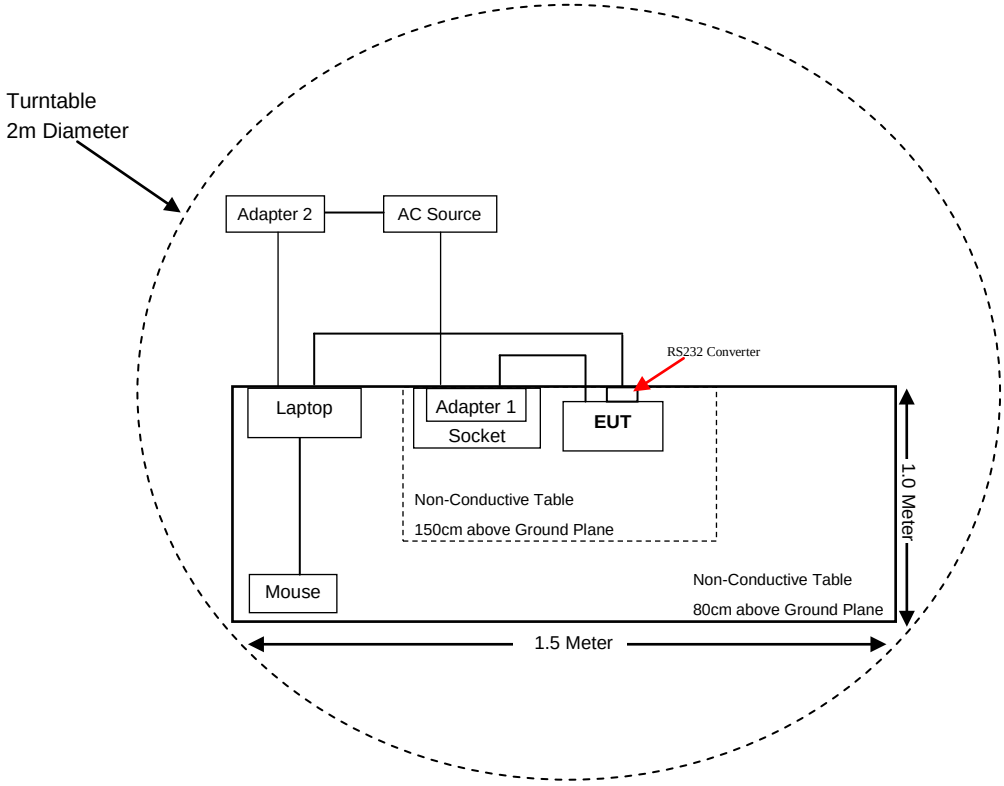
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| FCC §15.247 & §1.1310 & §2.1091 | Maximum Permissible exposure (MPE) | Compliant |
| §15.203 | Antenna Requirement | Compliant |
| §15.207 (a) | AC Line Conducted Emissions | Compliant |
| §15.205, §15.209, §15.247(d) | Spurious Emissions | Compliant |
| §15.247 (a)(2) | 6 dB Emission Bandwidth | Compliant |
| §15.247(b)(3) | Maximum conducted output power | Compliant |
| §15.247(d) | 100 kHz Bandwidth of Frequency Band Edge | Compliant |
| §15.247(e) | Power Spectral Density | Compliant |

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

# TEST EQUIPMENTS LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Conducted Emission | | | | | |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100028 | 2021-04-12 | 2022-04-11 |
| ROHDE&SCHWARZ | L.I.S.N. | ENV216 | 3560.6550.16 | 2021-01-13 | 2022-01-12 |
| EMCO | L.I.S.N. | 3810/2BR | 9509-1102 | 2021-01-13 | 2022-01-12 |
| HP | RF Limiter | 11947A | 3107A01270 | 2020-08-13 | 2021-08-12 |
| Unknown | Conducted Cable | L-E-003 | 000003 | 2020-08-04 | 2021-08-03 |
| Rohde & Schwarz | EMC32 | EMC32 | V 8.52.0 | NCR | NCR |
| Radiated Emission | | | | | |
| EMCT | Semi-Anechoic Chamber | 966 | 001 | 2020-07-24 | 2025-07-23 |
| SONOMA INSTRUMENT | Pre-Amplifier | 310 N | 186684 | 2020-08-10 | 2021-08-09 |
| SUNOL SCIENCES | Broadband Antenna | JB3 | A121808 | 2019-12-10 | 2022-12-09 |
| Rohde & Schwarz | EMI Test Receiver | ESR3 | 102456 | 2021-04-12 | 2022-04-11 |
| INMET | Attenuator | 18N-6dB | 000186 | 2019-12-10 | 2022-12-09 |
| Unknown | RF Cable (Below 1GHz) | L-E-005 | 000005 | 2020-09-04 | 2021-09-03 |
| Unknown | RF Cable (Below 1GHz) | T-E128 | 000128 | 2020-10-16 | 2021-10-15 |
| UTIFLEX | RF Cable (Below 1GHz) | T-E237 | 233522-001 | 2020-07-17 | 2021-07-16 |
| Rohde & Schwarz | Spectrum Analyzer | FSU26 | 200835 | 2021-04-12 | 2022-04-11 |
| EMCO | Horn Antenna | 3115 | 2192 | 2019-09-25 | 2021-09-24 |
| Mini-circuits | Pre-Amplifier | ZVA-183-S+ | 771001215 | 2020-09-20 | 2021-09-19 |
| MICRO-TRONICS | 2.4GHz Notch Filter | BRM50702 | G396 | 2021-05-19 | 2022-05-18 |
| SUHNER+HUBER | RF Cable (Above 1GHz) | SUCOFLEX 104PE | 93533/4PE | 2021-05-16 | 2022-05-15 |
| IW-MICROWAVE | RF Cable (Above 1GHz) | SPS-2301 | 111503 | 2020-08-31 | 2021-08-30 |
| EM Electronics | Pre-Amplifier | EM18G40 | 060725 | 2020-07-23 | 2021-07-22 |
| A.H. Systems, Inc | Horn Antenna | SAS-574 | 510 | 2019-09-02 | 2021-09-01 |
| HUBER+SUHNER | RF Cable (Above 18GHz) | T-E222 | 2551/2 | 2020-07-18 | 2021-07-17 |
| FORIDA RF Labs | RF Cable (Above 18GHz) | T-E210 | 1042 | 2020-07-18 | 2021-07-17 |
| Rohde & Schwarz | EMC32 | EMC32 | V9.10.00 | NCR | NCR |

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| RF Conducted Test | | | | | |
| Rohde & Schwarz | Spectrum Analyzer | FSU26 | 100113 | 2021-04-12 | 2022-04-11 |
| Mini-circuits | 6dB Attenuator | BW-S6W5+ | 00433 | 2020-09-10 | 2021-09-09 |
| Unknown | RF Coaxial Cable | SMA-IPEX | Unknown | Each Time | |

# FCC §15.247 & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE

## Applicable Standard

According to subpart 15.247 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) Limits for General Population/Uncontrolled Exposure | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Electric Field Strength (V/m)** | **Magnetic Field Strength (A/m)** | **Power Density ($mW/cm^2$)** | **Averaging Time (minutes)** |
| 0.3–1.34 | 614 | 1.63 | ※(100) | 30 |
| 1.34–30 | 824/f | 2.19/f | ※($180/f^2$) | 30 |
| 30–300 | 27.5 | 0.073 | 0.2 | 30 |
| 300–1500 | / | / | f/1500 | 30 |
| 1500–100,000 | / | / | 1.0 | 30 |

f = frequency in MHz; ※ = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Per 447498 D01 General RF Exposure Guidance v06**,** simultaneous transmission MPE test exclusion applies when the sum of the MPE for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.
**Calculated Formulary:**

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:
S = power density (in appropriate units, e.g. $mW/cm^2$);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

| **Mode** | **Frequency Range (MHz)** | **Antenna Gain** | | **Tune-up Conducted Power** | | **Evaluation Distance (cm)** | **Power Density ($mW/cm^2$)** | **MPE Limit ($mW/cm^2$)** |
|---|---|---|---|---|---|---|---|---|
| | | **(dBi)** | **(numeric)** | **(dBm)** | **(mW)** | | | |
| BLE | 2402-2480 | 2.0 | 1.58 | 3.5 | 2.24 | 20 | 0.0007 | 1.0 |

Result: The device meets RF exposure evaluation at ⩾20cm distance.

# FCC §15.203 - ANTENNA REQUIREMENT

## Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

## Antenna Information*

The EUT has one external antenna and the maximum antenna gain is 2.0dBi, which fulfill the requirement of this section. Please refer to the EUT photos.

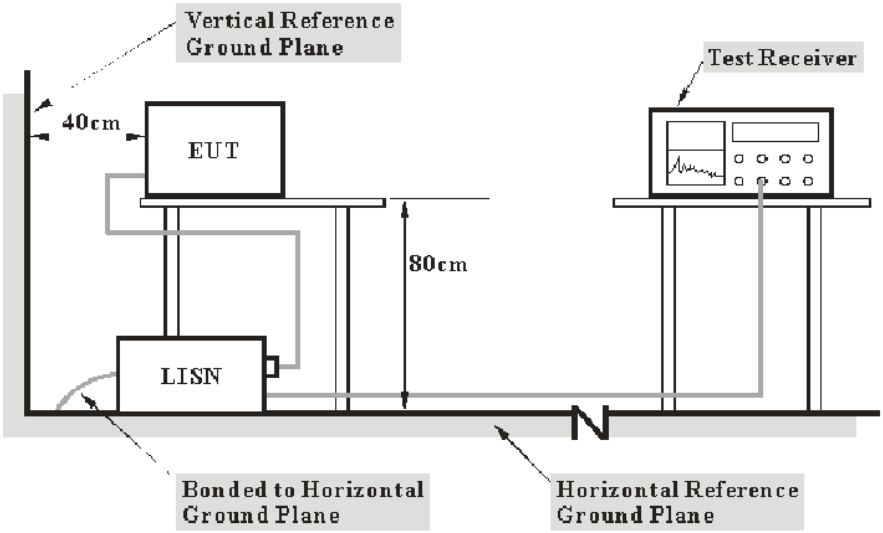
**Result:** Compliance

# FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

## Applicable Standard

FCC§15.207

## EUT Setup




Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|---|---|
| 150 kHz – 30 MHz | 9 kHz |

## Test Procedure

During the conducted emission test, the adapter was connected to the first L.I.S.N.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
$V_C$ (cord. Reading): corrected voltage amplitude
$V_R$: reading voltage amplitude
$A_c$: attenuation caused by cable loss
VDF: voltage division factor of AMN
$C_f$: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

## Test Data

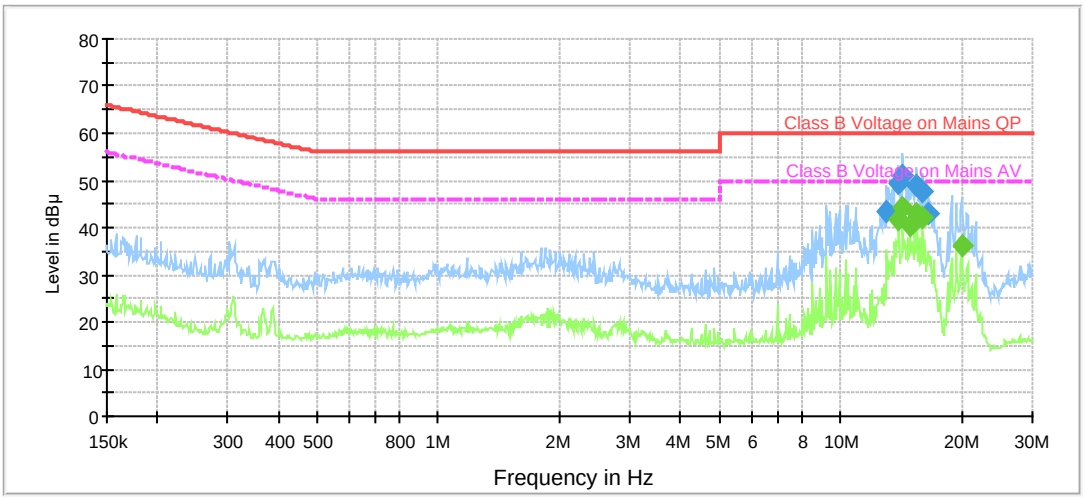
### Test Environment Conditions

| | |
|---|---|
| Temperature: | 19 °C |
| Relative Humidity: | 52 % |
| ATM Pressure: | 95.9 kPa |

The testing was performed by Even Wu on 2021-07-05.

Test Mode: Transmitting (LE 2M_Middle Channel)-Worst C**ase**

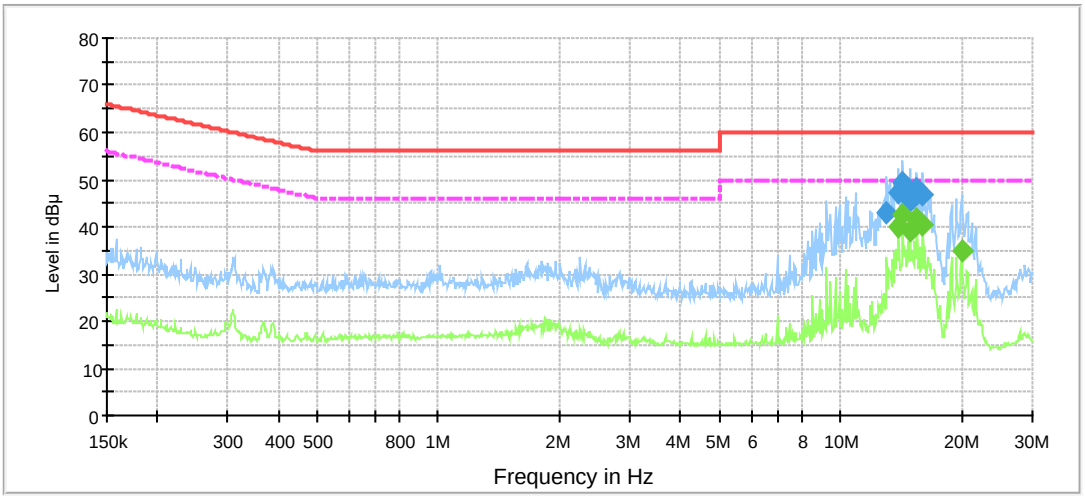
**AC120V/60Hz, Line:**




| Frequency (MHz) | QuasiPeak (dB µ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dB µ V) |
|---|---|---|---|---|---|---|---|
| 13.023173 | 43.2 | 2000.0 | 9.000 | L1 | 19.6 | 16.8 | 60.0 |
| 13.965024 | 49.3 | 2000.0 | 9.000 | L1 | 19.6 | 10.7 | 60.0 |
| 14.317658 | 50.9 | 2000.0 | 9.000 | L1 | 19.6 | 9.1 | 60.0 |
| 15.507043 | 48.9 | 2000.0 | 9.000 | L1 | 19.6 | 11.1 | 60.0 |
| 15.978108 | 47.8 | 2000.0 | 9.000 | L1 | 19.6 | 12.2 | 60.0 |
| 16.463483 | 42.8 | 2000.0 | 9.000 | L1 | 19.6 | 17.2 | 60.0 |

| Frequency (MHz) | Average (dB µ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dB µ V) |
|---|---|---|---|---|---|---|---|
| 13.965024 | 41.8 | 2000.0 | 9.000 | L1 | 19.6 | 8.2 | 50.0 |
| 14.317658 | 44.4 | 2000.0 | 9.000 | L1 | 19.6 | 5.6 | 50.0 |
| 14.900488 | 40.5 | 2000.0 | 9.000 | L1 | 19.6 | 9.5 | 50.0 |
| 15.507043 | 42.9 | 2000.0 | 9.000 | L1 | 19.6 | 7.1 | 50.0 |
| 15.978108 | 42.0 | 2000.0 | 9.000 | L1 | 19.6 | 8.0 | 50.0 |
| 19.998533 | 36.0 | 2000.0 | 9.000 | L1 | 19.6 | 14.0 | 50.0 |

**AC120V/60Hz, Neutral:**




| Frequency (MHz) | QuasiPeak (dB µ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dB µ V) |
|---|---|---|---|---|---|---|---|
| 13.023173 | 43.2 | 2000.0 | 9.000 | N | 19.6 | 16.8 | 60.0 |
| 13.965024 | 47.4 | 2000.0 | 9.000 | N | 19.6 | 12.6 | 60.0 |
| 14.317658 | 49.4 | 2000.0 | 9.000 | N | 19.6 | 10.6 | 60.0 |
| 14.900488 | 45.7 | 2000.0 | 9.000 | N | 19.6 | 14.3 | 60.0 |
| 15.507043 | 47.9 | 2000.0 | 9.000 | N | 19.6 | 12.1 | 60.0 |
| 15.978108 | 46.7 | 2000.0 | 9.000 | N | 19.6 | 13.3 | 60.0 |

| Frequency (MHz) | Average (dB µ V) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dB µ V) |
|---|---|---|---|---|---|---|---|
| 13.965024 | 40.2 | 2000.0 | 9.000 | N | 19.6 | 9.8 | 50.0 |
| 14.317658 | 42.6 | 2000.0 | 9.000 | N | 19.6 | 7.4 | 50.0 |
| 14.900488 | 39.2 | 2000.0 | 9.000 | N | 19.6 | 10.8 | 50.0 |
| 15.507043 | 41.6 | 2000.0 | 9.000 | N | 19.6 | 8.4 | 50.0 |
| 15.978108 | 40.6 | 2000.0 | 9.000 | N | 19.6 | 9.4 | 50.0 |
| 19.998533 | 34.7 | 2000.0 | 9.000 | N | 19.6 | 15.3 | 50.0 |

**Note:**

1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
   The corrected factor has been input into the transducer of the test software.
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

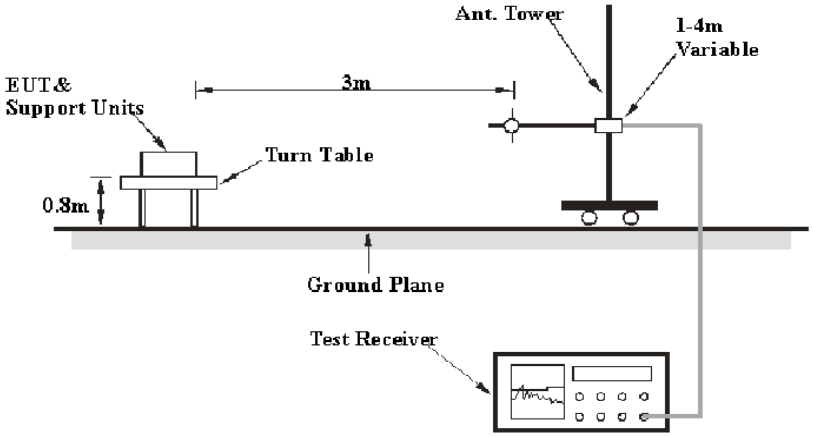
# FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

## Applicable Standard

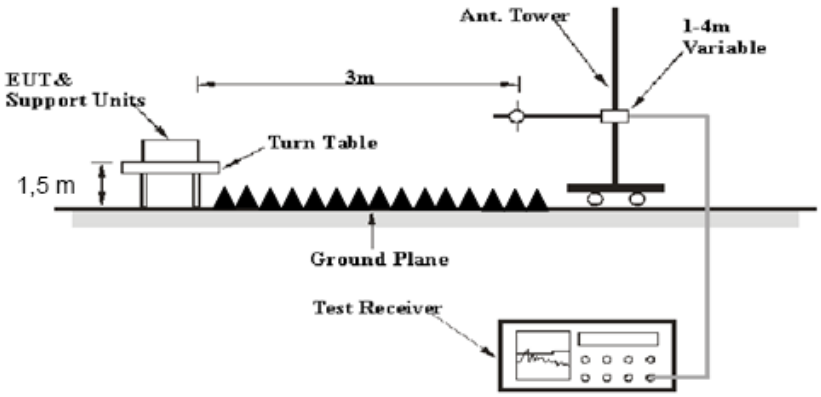
FCC §15.247 (d); §15.209; §15.205;

## EUT Setup

**Below 1GHz:**




**Above 1GHz:**




The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

| Frequency Range | RBW | Video B/W | Detector |
|---|---|---|---|
| 30 MHz – 1000 MHz | 120 kHz | 300 kHz | QP |
| Above 1 GHz | 1MHz | 3 MHz | PK |
| | 1MHz | 3 MHz | AV |

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

or

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

## Test Data

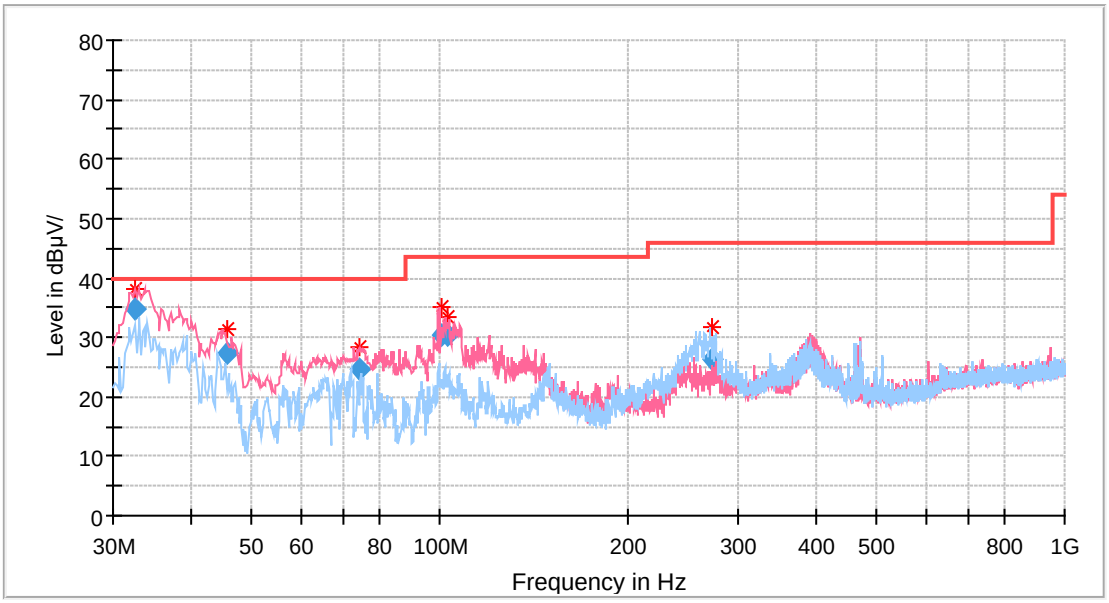
### Test Environment Conditions

| | |
|---|---|
| Temperature: | 28 °C |
| Relative Humidity: | 53 % |
| ATM Pressure: | 95.2 kPa |

The testing was performed by Even Wu on 2021-07-07.

Test Mode: Transmitting

30 MHz to 1 GHz: LE 2M_Middle Channel-Worst Case

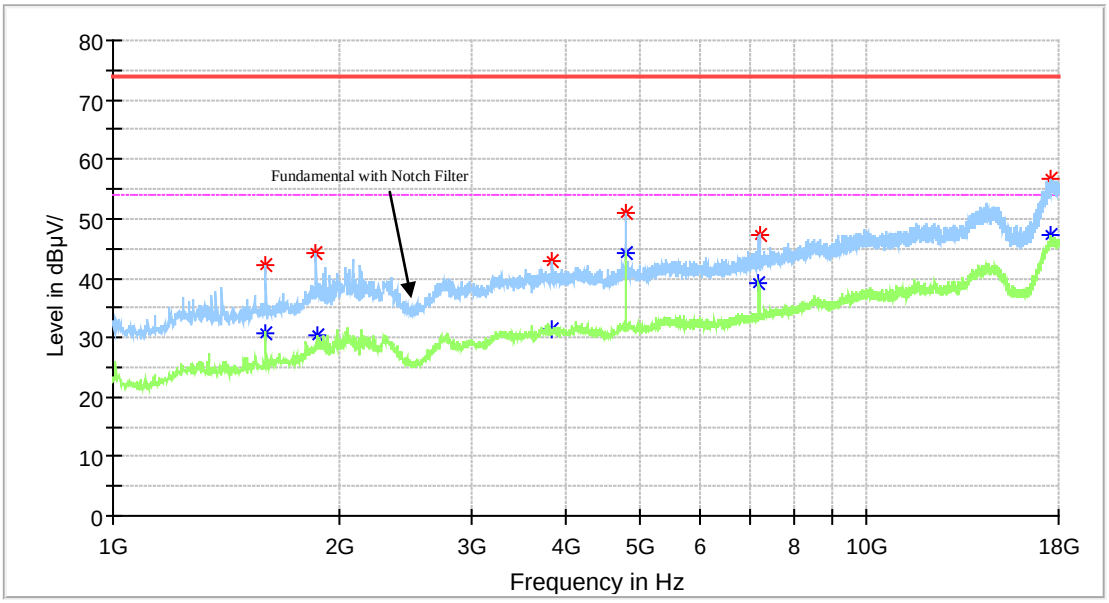



| Frequency (MHz) | QuasiPeak (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 32.453000 | 34.93 | 40.00 | 5.07 | 1000.0 | 120.000 | 103.0 | V | 123.0 | -6.2 |
| 45.573250 | 27.41 | 40.00 | 12.59 | 1000.0 | 120.000 | 106.0 | V | 130.0 | -14.9 |
| 74.247625 | 24.56 | 40.00 | 15.44 | 1000.0 | 120.000 | 102.0 | V | 37.0 | -17.0 |
| 100.939125 | 30.48 | 43.50 | 13.02 | 1000.0 | 120.000 | 106.0 | V | 266.0 | -14.9 |
| 102.748125 | 30.45 | 43.50 | 13.05 | 1000.0 | 120.000 | 174.0 | V | 252.0 | -14.4 |
| 272.411875 | 26.46 | 46.00 | 19.54 | 1000.0 | 120.000 | 124.0 | H | 17.0 | -11.3 |

## 1 GHz to 18 GHz:

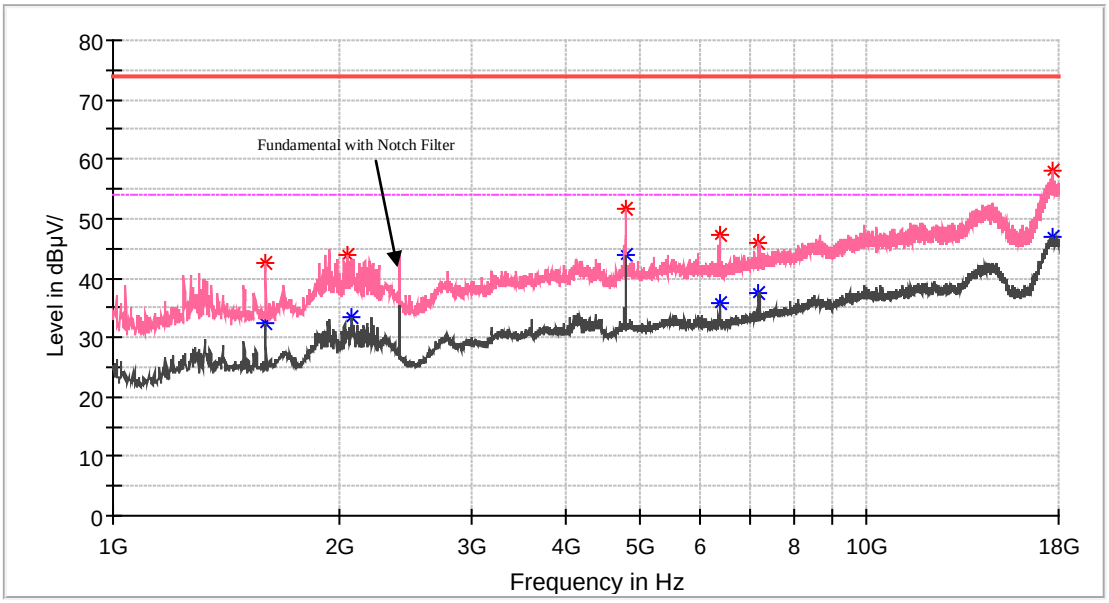
### LE 1M Mode:

2402 MHz (Horizontal)



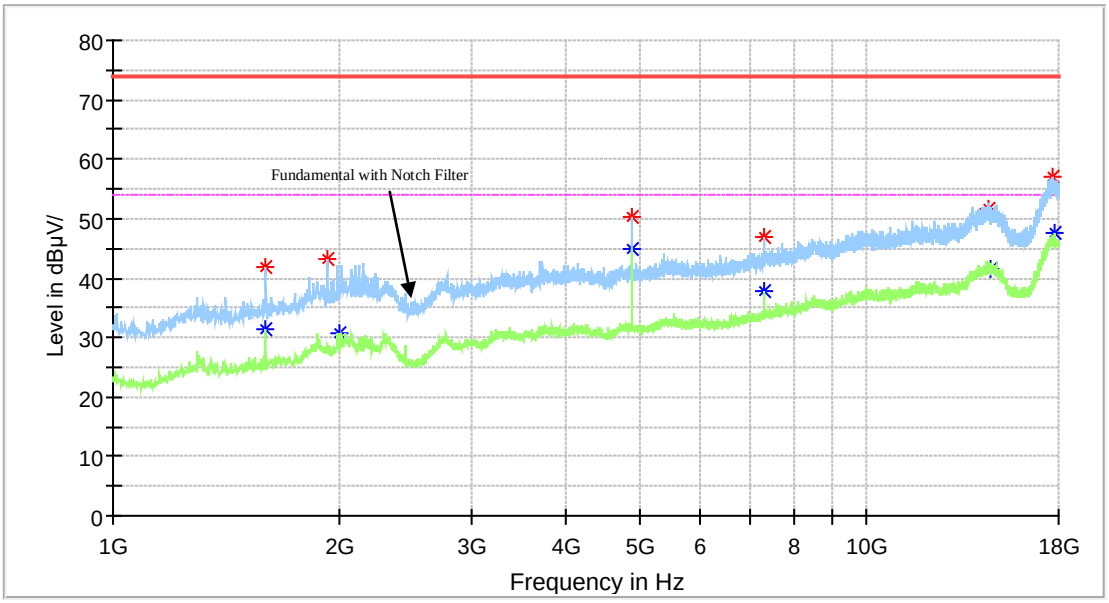

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | --- | 30.84 | 54.00 | 23.16 | 150.0 | H | 70.0 | 2.4 |
| 1593.300000 | 42.33 | --- | 74.00 | 31.67 | 200.0 | H | 76.0 | 2.4 |
| 1860.200000 | 44.16 | --- | 74.00 | 29.84 | 150.0 | H | 0.0 | 4.8 |
| 1865.300000 | --- | 30.35 | 54.00 | 23.65 | 150.0 | H | 152.0 | 4.8 |
| 3825.400000 | 42.76 | --- | 74.00 | 31.24 | 150.0 | H | 327.0 | 10.4 |
| 3827.100000 | --- | 31.52 | 54.00 | 22.48 | 150.0 | H | 192.0 | 10.4 |
| 4802.900000 | --- | 44.36 | 54.00 | 9.64 | 150.0 | H | 358.0 | 11.8 |
| 4804.600000 | 51.11 | --- | 74.00 | 22.89 | 150.0 | H | 353.0 | 11.8 |
| 7205.000000 | --- | 39.28 | 54.00 | 14.72 | 200.0 | H | 329.0 | 15.1 |
| 7206.700000 | 47.25 | --- | 74.00 | 26.75 | 200.0 | H | 329.0 | 15.1 |
| 17575.000000 | --- | 47.27 | 54.00 | 6.73 | 150.0 | H | 353.0 | 29.4 |
| 17585.200000 | 56.61 | --- | 74.00 | 17.39 | 200.0 | H | 113.0 | 29.4 |

2402 MHz (Vertical)



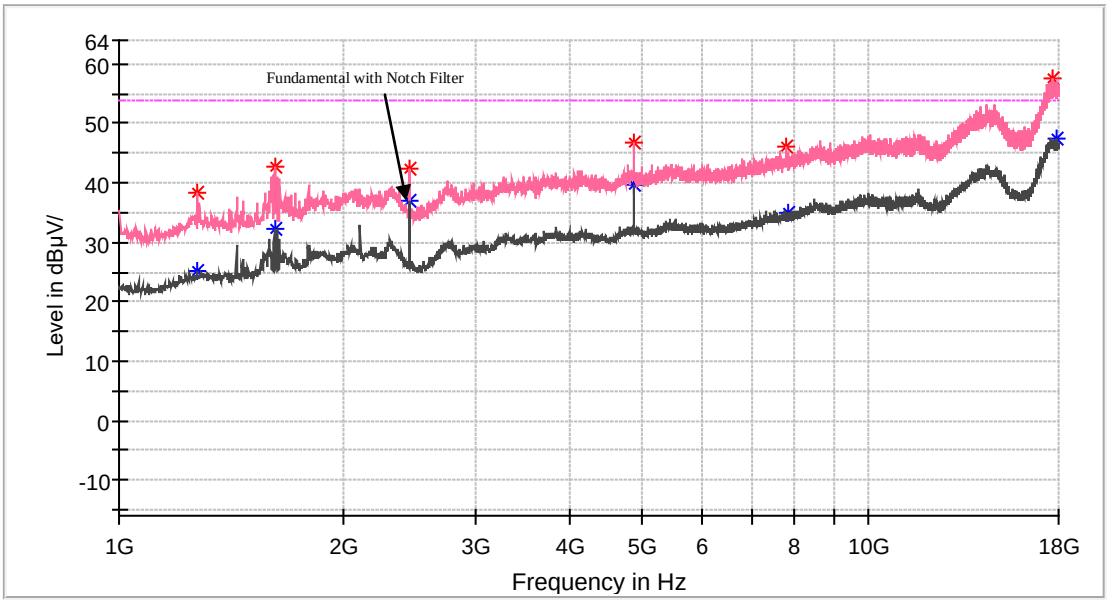

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | --- | 32.42 | 54.00 | 21.58 | 150.0 | V | 135.0 | 2.4 |
| 1595.000000 | 42.65 | --- | 74.00 | 31.35 | 150.0 | V | 135.0 | 2.4 |
| 2050.600000 | 43.81 | --- | 74.00 | 30.19 | 200.0 | V | 93.0 | 5.9 |
| 2077.800000 | --- | 33.29 | 54.00 | 20.71 | 150.0 | V | 126.0 | 5.9 |
| 4802.900000 | --- | 43.81 | 54.00 | 10.19 | 150.0 | V | 314.0 | 11.8 |
| 4802.900000 | 51.69 | --- | 74.00 | 22.31 | 150.0 | V | 314.0 | 11.8 |
| 6382.200000 | 47.14 | --- | 74.00 | 26.86 | 150.0 | V | 154.0 | 13.6 |
| 6385.600000 | --- | 35.93 | 54.00 | 18.07 | 150.0 | V | 154.0 | 13.6 |
| 7205.000000 | --- | 37.50 | 54.00 | 16.50 | 150.0 | V | 323.0 | 15.1 |
| 7205.000000 | 45.88 | --- | 74.00 | 28.12 | 150.0 | V | 323.0 | 15.1 |
| 17626.000000 | --- | 46.90 | 54.00 | 7.10 | 150.0 | V | 0.0 | 29.4 |
| 17687.200000 | 58.11 | --- | 74.00 | 15.89 | 150.0 | V | 135.0 | 29.4 |

2440 MHz (Horizontal)



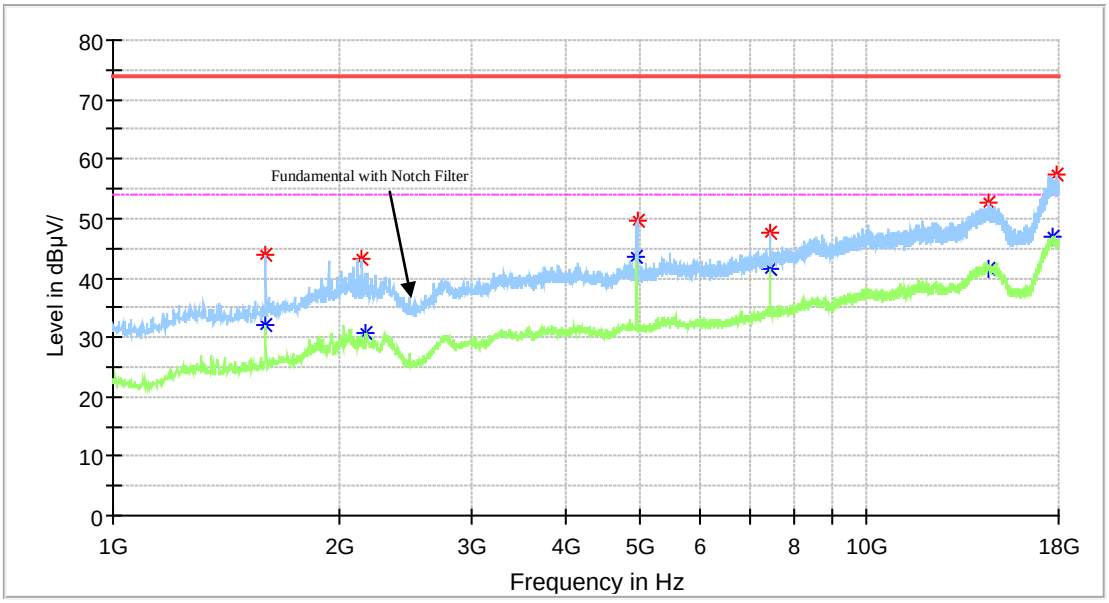

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1595.000000 | --- | 31.41 | 54.00 | 22.59 | 200.0 | H | 72.0 | 2.4 |
| 1595.000000 | 41.89 | --- | 74.00 | 32.11 | 150.0 | H | 80.0 | 2.4 |
| 1926.500000 | 43.30 | --- | 74.00 | 30.70 | 150.0 | H | 162.0 | 5.3 |
| 1999.600000 | --- | 30.88 | 54.00 | 23.12 | 150.0 | H | 51.0 | 5.9 |
| 4879.400000 | --- | 44.93 | 54.00 | 9.07 | 200.0 | H | 310.0 | 12.0 |
| 4879.400000 | 50.13 | --- | 74.00 | 23.87 | 200.0 | H | 310.0 | 12.0 |
| 7318.900000 | --- | 37.76 | 54.00 | 16.24 | 150.0 | H | 60.0 | 15.4 |
| 7318.900000 | 46.99 | --- | 74.00 | 27.01 | 150.0 | H | 60.0 | 15.4 |
| 14567.700000 | 51.59 | --- | 74.00 | 22.41 | 150.0 | H | 0.0 | 25.0 |
| 14594.900000 | --- | 41.40 | 54.00 | 12.60 | 150.0 | H | 315.0 | 24.9 |
| 17671.900000 | 57.01 | --- | 74.00 | 16.99 | 150.0 | H | 126.0 | 29.4 |
| 17775.600000 | --- | 47.49 | 54.00 | 6.51 | 200.0 | H | 7.0 | 29.4 |

2440 MHz (Vertical)



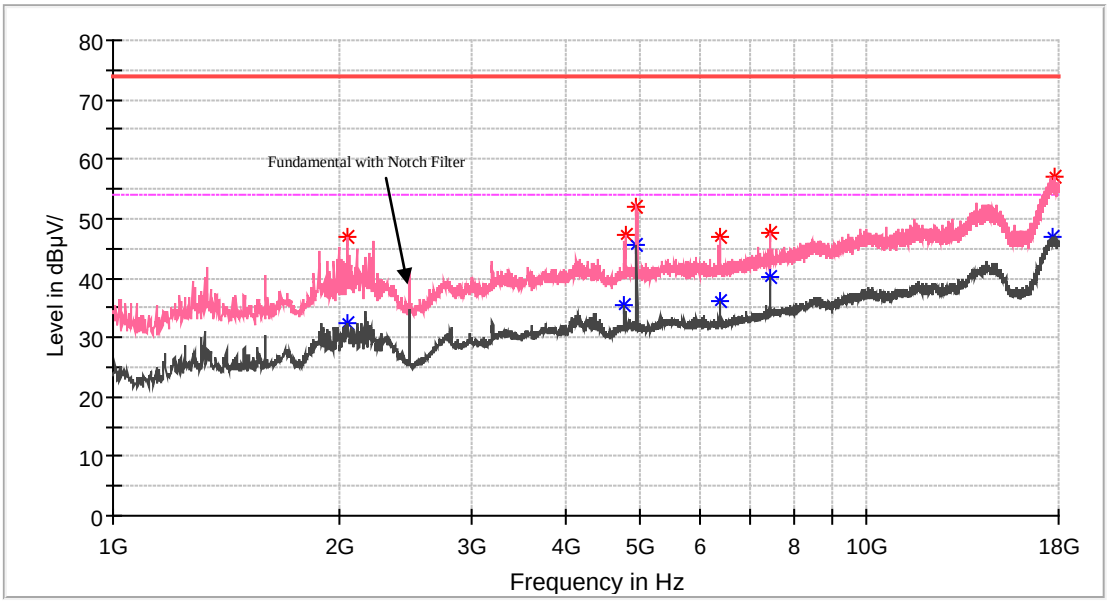

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 1272.000000 | 38.20 | --- | 74.00 | 35.80 | 150.0 | V | 254.0 | 0.8 |
| 1272.000000 | --- | 25.31 | 54.00 | 28.69 | 150.0 | V | 254.0 | 0.8 |
| 1613.700000 | --- | 32.18 | 54.00 | 21.82 | 150.0 | V | 232.0 | 2.6 |
| 1613.700000 | 42.70 | --- | 74.00 | 31.30 | 150.0 | V | 232.0 | 2.6 |
| 2439.900000 | 42.35 | --- | 74.00 | 31.65 | 200.0 | V | 3.0 | 5.8 |
| 2439.900000 | --- | 37.10 | 54.00 | 16.90 | 200.0 | V | 3.0 | 5.8 |
| 4879.400000 | 46.70 | --- | 74.00 | 27.30 | 150.0 | V | 152.0 | 12.0 |
| 4879.400000 | --- | 39.72 | 54.00 | 14.28 | 150.0 | V | 152.0 | 12.0 |
| 7786.400000 | 46.10 | --- | 74.00 | 27.90 | 200.0 | V | 124.0 | 16.2 |
| 7811.900000 | --- | 35.11 | 54.00 | 18.89 | 200.0 | V | 80.0 | 16.2 |
| 17653.200000 | 57.74 | --- | 74.00 | 16.26 | 150.0 | V | 342.0 | 29.4 |
| 17930.300000 | --- | 47.42 | 54.00 | 6.58 | 150.0 | V | 116.0 | 29.4 |

2480 MHz (Horizontal)




| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 1591.600000 | 43.78 | --- | 74.00 | 30.22 | 150.0 | H | 200.0 | 2.4 |
| 1593.300000 | --- | 32.09 | 54.00 | 21.91 | 150.0 | H | 200.0 | 2.4 |
| 2142.400000 | 43.36 | --- | 74.00 | 30.64 | 200.0 | H | 45.0 | 5.9 |
| 2166.200000 | --- | 30.74 | 54.00 | 23.26 | 150.0 | H | 272.0 | 5.9 |
| 4959.300000 | --- | 43.68 | 54.00 | 10.32 | 200.0 | H | 0.0 | 12.2 |
| 4961.000000 | 49.51 | --- | 74.00 | 24.49 | 200.0 | H | 0.0 | 12.2 |
| 7439.600000 | --- | 41.49 | 54.00 | 12.51 | 200.0 | H | 319.0 | 15.7 |
| 7439.600000 | 47.58 | --- | 74.00 | 26.42 | 200.0 | H | 319.0 | 15.7 |
| 14484.400000 | --- | 41.52 | 54.00 | 12.48 | 150.0 | H | 172.0 | 25.0 |
| 14498.000000 | 52.76 | --- | 74.00 | 21.24 | 150.0 | H | 235.0 | 25.0 |
| 17716.100000 | --- | 46.97 | 54.00 | 7.03 | 150.0 | H | 293.0 | 29.4 |
| 17921.800000 | 57.39 | --- | 74.00 | 16.61 | 200.0 | H | 99.0 | 29.4 |

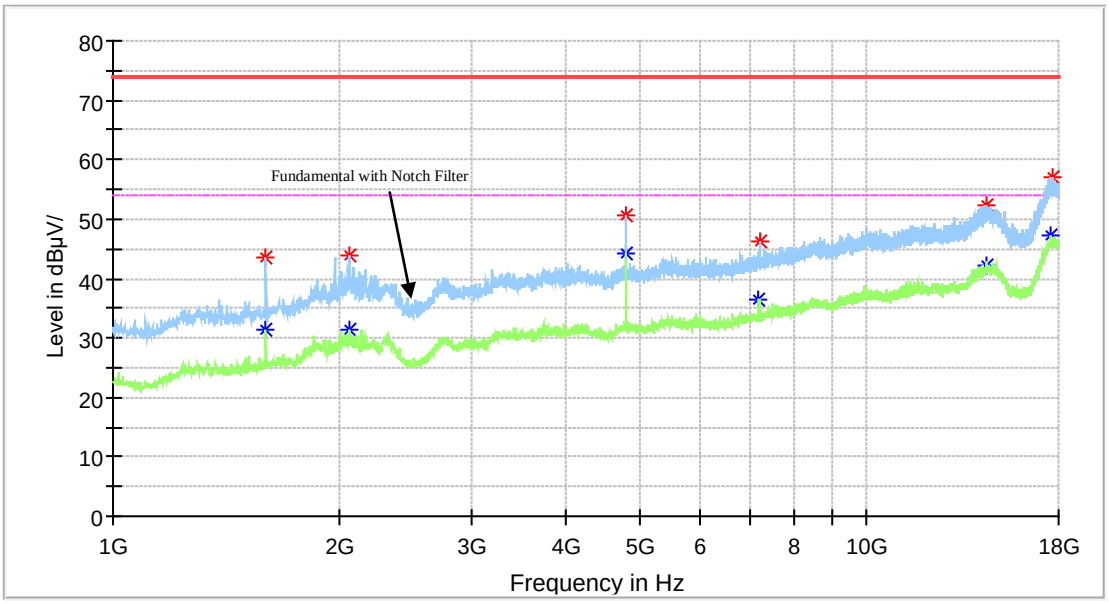
2480 MHz (Vertical)




| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|
| 2045.500000 | --- | 32.32 | 54.00 | 21.68 | 150.0 | V | 164.0 | 5.9 |
| 2048.900000 | 46.78 | --- | 74.00 | 27.22 | 150.0 | V | 126.0 | 5.9 |
| 4779.100000 | --- | 35.42 | 54.00 | 18.58 | 150.0 | V | 135.0 | 11.7 |
| 4782.500000 | 47.38 | --- | 74.00 | 26.62 | 150.0 | V | 145.0 | 11.7 |
| 4959.300000 | --- | 45.66 | 54.00 | 8.34 | 150.0 | V | 343.0 | 12.2 |
| 4959.300000 | 51.87 | --- | 74.00 | 22.13 | 150.0 | V | 343.0 | 12.2 |
| 6377.100000 | 46.97 | --- | 74.00 | 27.03 | 150.0 | V | 155.0 | 13.5 |
| 6385.600000 | --- | 35.97 | 54.00 | 18.03 | 150.0 | V | 155.0 | 13.6 |
| 7439.600000 | --- | 40.24 | 54.00 | 13.76 | 200.0 | V | 215.0 | 15.7 |
| 7439.600000 | 47.76 | --- | 74.00 | 26.24 | 200.0 | V | 215.0 | 15.7 |
| 17716.100000 | --- | 47.08 | 54.00 | 6.92 | 200.0 | V | 2.0 | 29.4 |
| 17775.600000 | 57.10 | --- | 74.00 | 16.90 | 150.0 | V | 343.0 | 29.4 |

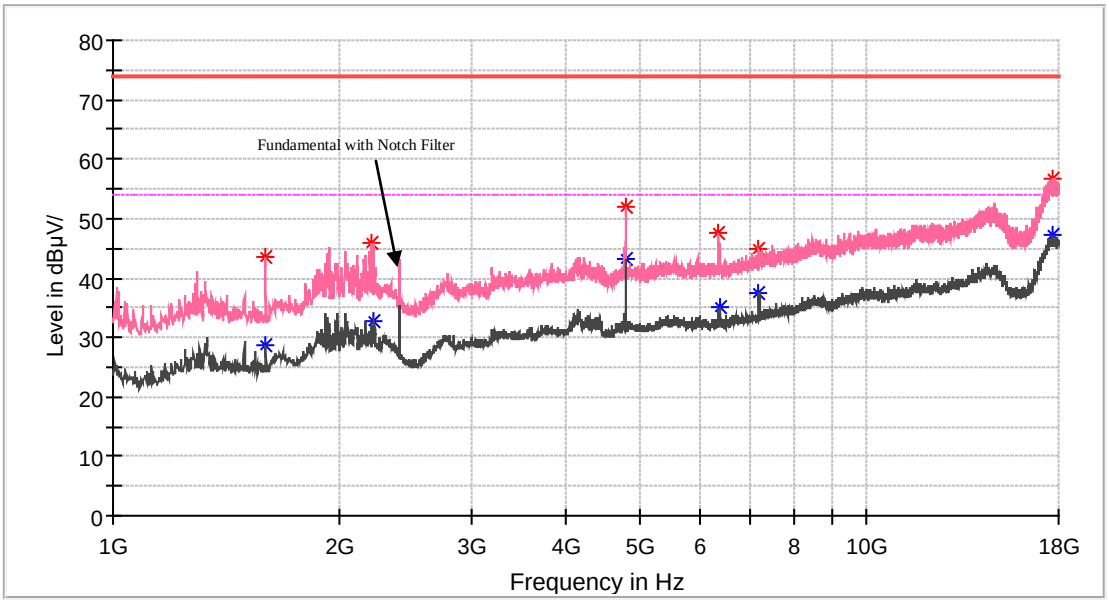
**LE 2M Mode:**

2402 MHz (Horizontal)



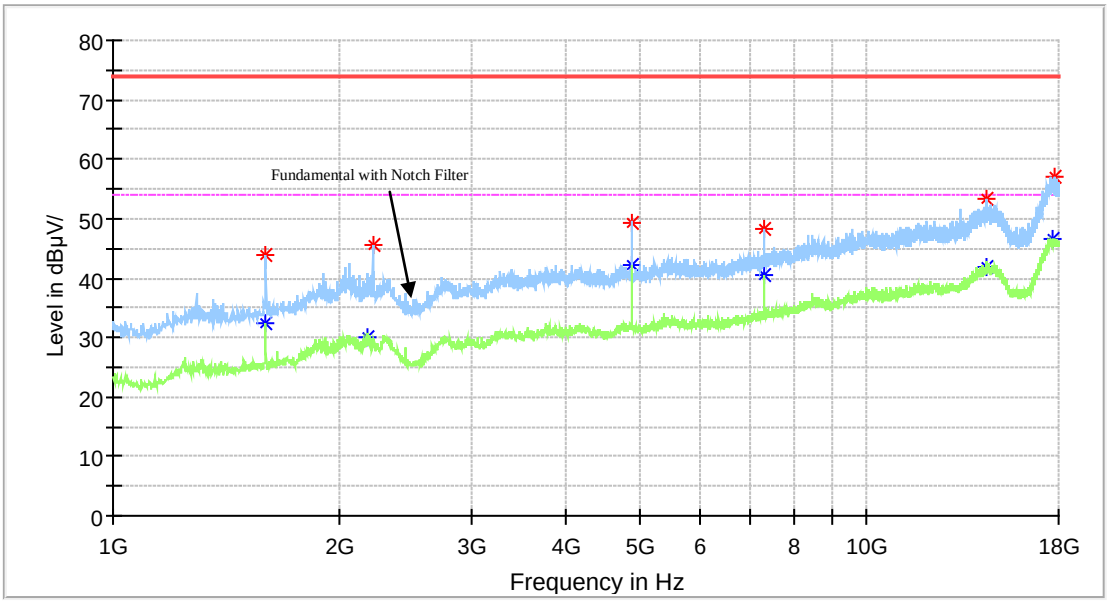

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | --- | 31.41 | 54.00 | 22.59 | 150.0 | H | 69.0 | 2.4 |
| 1593.300000 | 43.55 | --- | 74.00 | 30.45 | 200.0 | H | 74.0 | 2.4 |
| 2055.700000 | --- | 31.44 | 54.00 | 22.56 | 150.0 | H | 98.0 | 5.9 |
| 2057.400000 | 43.95 | --- | 74.00 | 30.05 | 150.0 | H | 107.0 | 5.9 |
| 4802.900000 | --- | 44.13 | 54.00 | 9.87 | 150.0 | H | 297.0 | 11.8 |
| 4802.900000 | 50.57 | --- | 74.00 | 23.43 | 150.0 | H | 297.0 | 11.8 |
| 7205.000000 | --- | 36.62 | 54.00 | 17.38 | 150.0 | H | 0.0 | 15.1 |
| 7208.400000 | 46.28 | --- | 74.00 | 27.72 | 150.0 | H | 323.0 | 15.1 |
| 14474.200000 | 52.30 | --- | 74.00 | 21.70 | 200.0 | H | 263.0 | 25.0 |
| 14477.600000 | --- | 42.35 | 54.00 | 11.65 | 200.0 | H | 27.0 | 25.0 |
| 17558.000000 | --- | 47.20 | 54.00 | 6.80 | 150.0 | H | 234.0 | 29.4 |
| 17644.700000 | 57.20 | --- | 74.00 | 16.80 | 200.0 | H | 0.0 | 29.4 |

2402 MHz (Vertical)



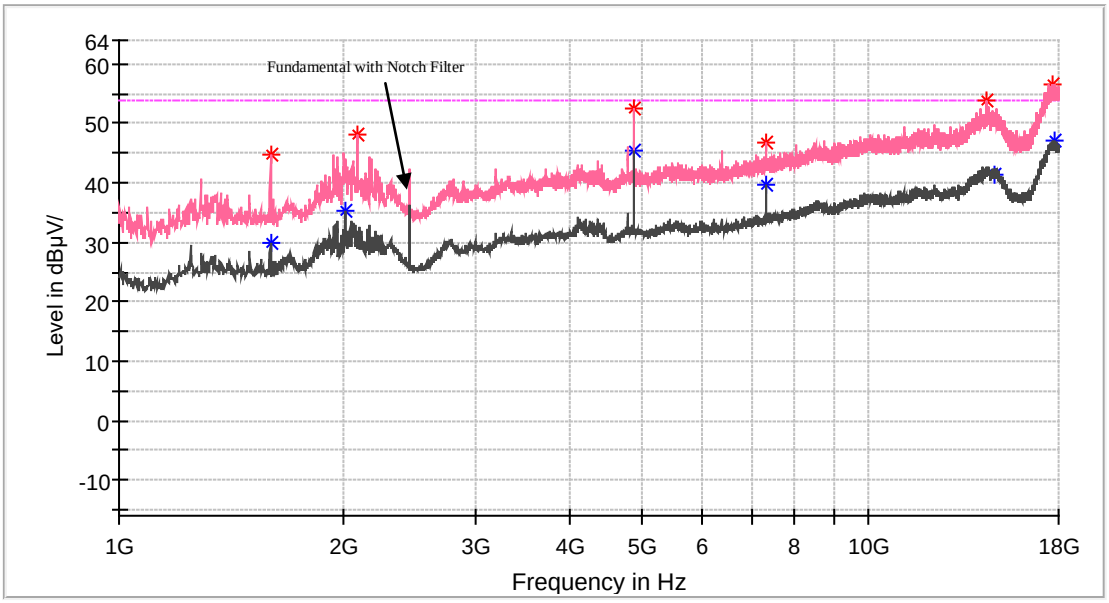

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | --- | 28.83 | 54.00 | 25.17 | 150.0 | V | 145.0 | 2.4 |
| 1593.300000 | 43.47 | --- | 74.00 | 30.53 | 150.0 | V | 145.0 | 2.4 |
| 2205.300000 | 46.05 | --- | 74.00 | 27.95 | 150.0 | V | 118.0 | 5.8 |
| 2222.300000 | --- | 32.84 | 54.00 | 21.16 | 150.0 | V | 136.0 | 5.8 |
| 4802.900000 | --- | 43.06 | 54.00 | 10.94 | 200.0 | V | 23.0 | 11.8 |
| 4804.600000 | 51.97 | --- | 74.00 | 22.03 | 150.0 | V | 2.0 | 11.8 |
| 6373.700000 | 47.71 | --- | 74.00 | 26.29 | 150.0 | V | 145.0 | 13.5 |
| 6385.600000 | --- | 35.12 | 54.00 | 18.88 | 150.0 | V | 154.0 | 13.6 |
| 7205.000000 | --- | 37.63 | 54.00 | 16.37 | 200.0 | V | 0.0 | 15.1 |
| 7205.000000 | 44.87 | --- | 74.00 | 29.13 | 200.0 | V | 0.0 | 15.1 |
| 17668.500000 | 56.72 | --- | 74.00 | 17.28 | 150.0 | V | 344.0 | 29.4 |
| 17671.900000 | --- | 47.28 | 54.00 | 6.72 | 150.0 | V | 313.0 | 29.4 |

2440 MHz (Horizontal)



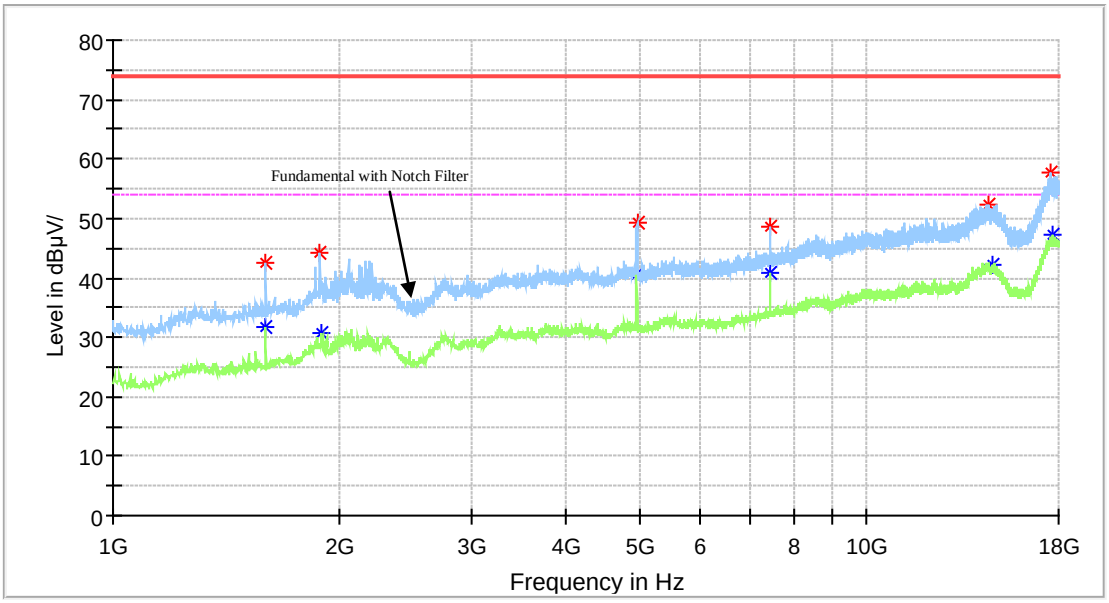

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1591.600000 | 43.95 | --- | 74.00 | 30.05 | 150.0 | H | 221.0 | 2.4 |
| 1595.000000 | --- | 32.51 | 54.00 | 21.49 | 200.0 | H | 81.0 | 2.4 |
| 2171.300000 | --- | 30.20 | 54.00 | 23.80 | 200.0 | H | 0.0 | 5.9 |
| 2210.400000 | 45.50 | --- | 74.00 | 28.50 | 200.0 | H | 98.0 | 5.8 |
| 4879.400000 | --- | 42.30 | 54.00 | 11.70 | 150.0 | H | 358.0 | 12.0 |
| 4881.100000 | 49.42 | --- | 74.00 | 24.58 | 150.0 | H | 2.0 | 12.0 |
| 7318.900000 | --- | 40.62 | 54.00 | 13.38 | 200.0 | H | 339.0 | 15.4 |
| 7318.900000 | 48.19 | --- | 74.00 | 25.81 | 200.0 | H | 339.0 | 15.4 |
| 14475.900000 | --- | 41.96 | 54.00 | 12.04 | 200.0 | H | 90.0 | 25.0 |
| 14481.000000 | 53.34 | --- | 74.00 | 20.66 | 200.0 | H | 0.0 | 25.0 |
| 17648.100000 | --- | 46.74 | 54.00 | 7.26 | 150.0 | H | 247.0 | 29.4 |
| 17738.200000 | 57.09 | --- | 74.00 | 16.91 | 150.0 | H | 337.0 | 29.4 |

2440 MHz (Vertical)



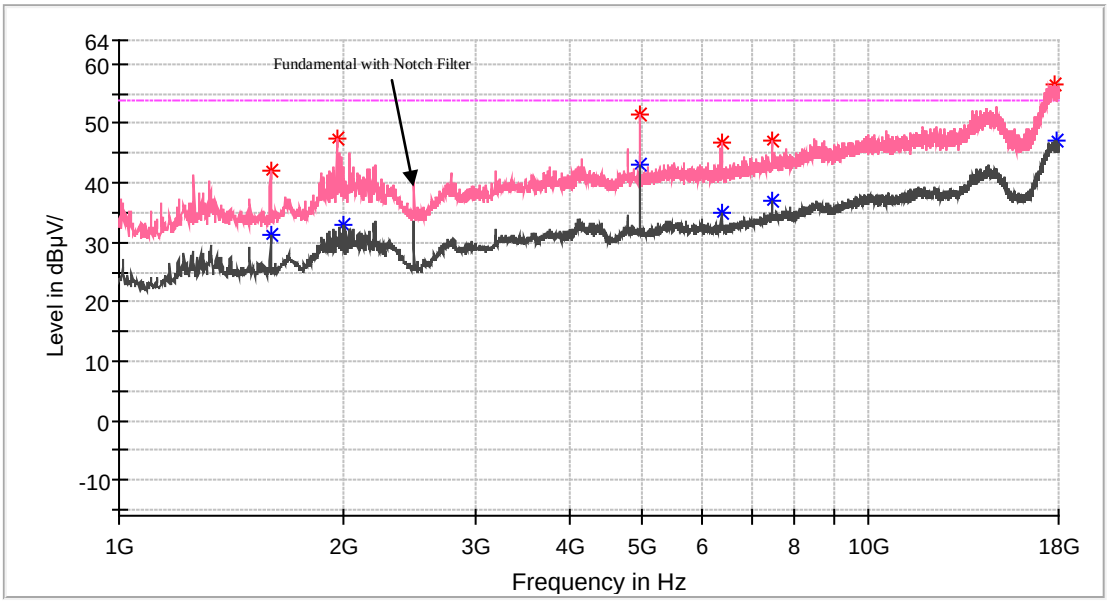

| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | 44.93 | --- | 74.00 | 29.07 | 200.0 | V | 45.0 | 2.4 |
| 1595.000000 | --- | 30.05 | 54.00 | 23.95 | 200.0 | V | 144.0 | 2.4 |
| 2009.800000 | --- | 35.16 | 54.00 | 18.84 | 150.0 | V | 157.0 | 5.9 |
| 2082.900000 | 48.01 | --- | 74.00 | 25.99 | 150.0 | V | 129.0 | 5.9 |
| 4879.400000 | --- | 45.45 | 54.00 | 8.55 | 150.0 | V | 358.0 | 12.0 |
| 4879.400000 | 52.58 | --- | 74.00 | 21.42 | 150.0 | V | 358.0 | 12.0 |
| 7318.900000 | 46.68 | --- | 74.00 | 27.32 | 150.0 | V | 326.0 | 15.4 |
| 7320.600000 | --- | 39.54 | 54.00 | 14.46 | 150.0 | V | 0.0 | 15.4 |
| 14447.000000 | 53.99 | --- | 74.00 | 20.01 | 200.0 | V | 54.0 | 25.0 |
| 14810.800000 | --- | 41.43 | 54.00 | 12.57 | 150.0 | V | 0.0 | 24.8 |
| 17719.500000 | 56.70 | --- | 74.00 | 17.30 | 150.0 | V | 345.0 | 29.4 |
| 17813.000000 | --- | 47.07 | 54.00 | 6.93 | 150.0 | V | 202.0 | 29.4 |

2480 MHz (Horizontal)




| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | 42.64 | --- | 74.00 | 31.36 | 150.0 | H | 98.0 | 2.4 |
| 1595.000000 | --- | 31.72 | 54.00 | 22.28 | 150.0 | H | 60.0 | 2.4 |
| 1884.000000 | 44.24 | --- | 74.00 | 29.76 | 150.0 | H | 154.0 | 5.0 |
| 1887.400000 | --- | 30.80 | 54.00 | 23.20 | 150.0 | H | 346.0 | 5.0 |
| 4959.300000 | --- | 40.53 | 54.00 | 13.47 | 200.0 | H | 350.0 | 12.2 |
| 4961.000000 | 49.22 | --- | 74.00 | 24.78 | 200.0 | H | 350.0 | 12.2 |
| 7439.600000 | --- | 40.82 | 54.00 | 13.18 | 150.0 | H | 328.0 | 15.7 |
| 7439.600000 | 48.64 | --- | 74.00 | 25.36 | 150.0 | H | 328.0 | 15.7 |
| 14499.700000 | 52.19 | --- | 74.00 | 21.81 | 150.0 | H | 358.0 | 25.0 |
| 14664.600000 | --- | 42.30 | 54.00 | 11.70 | 150.0 | H | 293.0 | 24.9 |
| 17512.100000 | 57.80 | --- | 74.00 | 16.20 | 200.0 | H | 0.0 | 29.4 |
| 17711.000000 | --- | 47.18 | 54.00 | 6.82 | 200.0 | H | 216.0 | 29.4 |

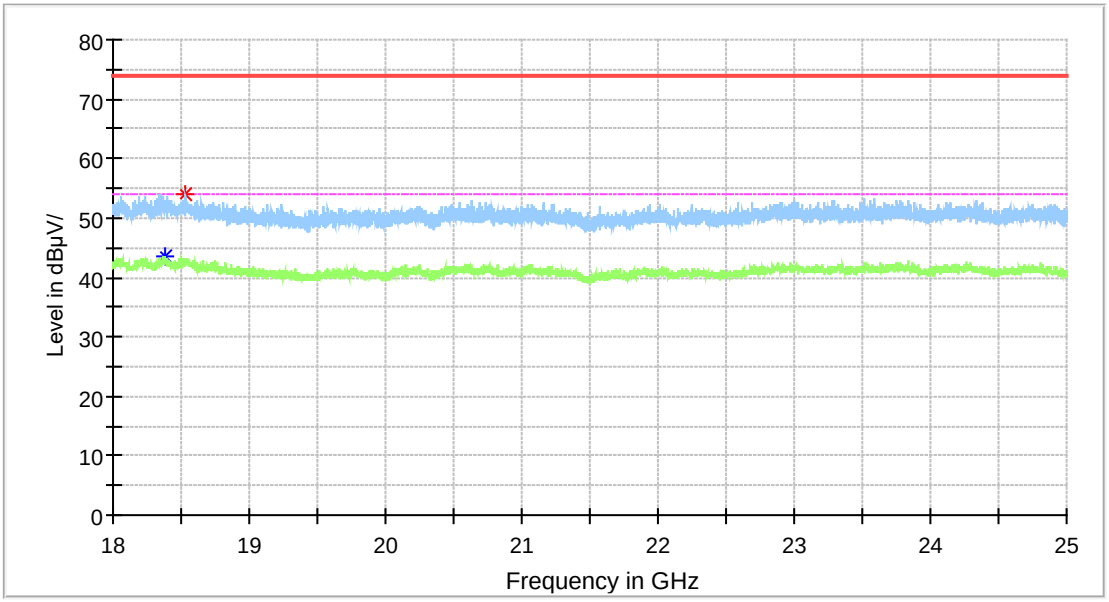
2480 MHz (Vertical)




| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 1593.300000 | 42.16 | --- | 74.00 | 31.84 | 200.0 | V | 188.0 | 2.4 |
| 1595.000000 | --- | 31.12 | 54.00 | 22.88 | 150.0 | V | 144.0 | 2.4 |
| 1952.000000 | 47.55 | --- | 74.00 | 26.45 | 150.0 | V | 153.0 | 5.5 |
| 1991.100000 | --- | 33.00 | 54.00 | 21.00 | 150.0 | V | 161.0 | 5.8 |
| 4959.300000 | --- | 42.98 | 54.00 | 11.02 | 200.0 | V | 6.0 | 12.2 |
| 4959.300000 | 51.38 | --- | 74.00 | 22.62 | 150.0 | V | 31.0 | 12.2 |
| 6373.700000 | --- | 35.11 | 54.00 | 18.89 | 150.0 | V | 153.0 | 13.5 |
| 6382.200000 | 46.63 | --- | 74.00 | 27.37 | 150.0 | V | 153.0 | 13.6 |
| 7439.600000 | --- | 36.85 | 54.00 | 17.15 | 200.0 | V | 14.0 | 15.7 |
| 7441.300000 | 47.08 | --- | 74.00 | 26.92 | 150.0 | V | 357.0 | 15.7 |
| 17787.500000 | 56.61 | --- | 74.00 | 17.39 | 200.0 | V | 14.0 | 29.4 |
| 17913.300000 | --- | 46.99 | 54.00 | 7.01 | 200.0 | V | 50.0 | 29.4 |

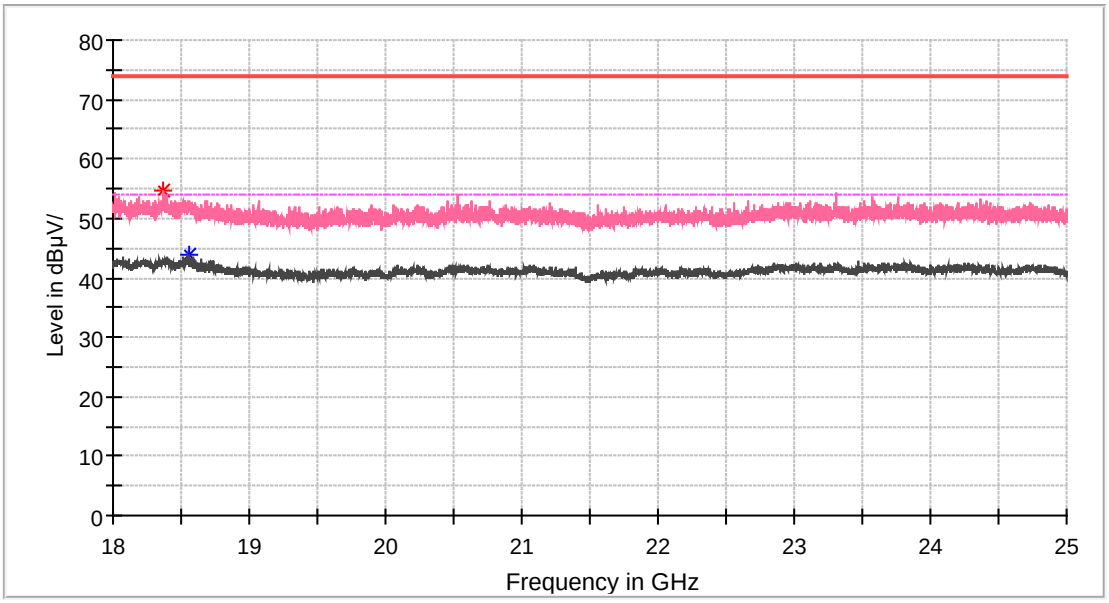
## 18 GHz to 25 GHz: LE 2M_Middle Channel-Worst Case

Horizontal




| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 18382.200000 | --- | 43.56 | 54.00 | 10.44 | 100.0 | H | 0.0 | 8.2 |
| 18529.900000 | 54.01 | --- | 74.00 | 19.99 | 100.0 | H | 348.0 | 8.3 |

Vertical

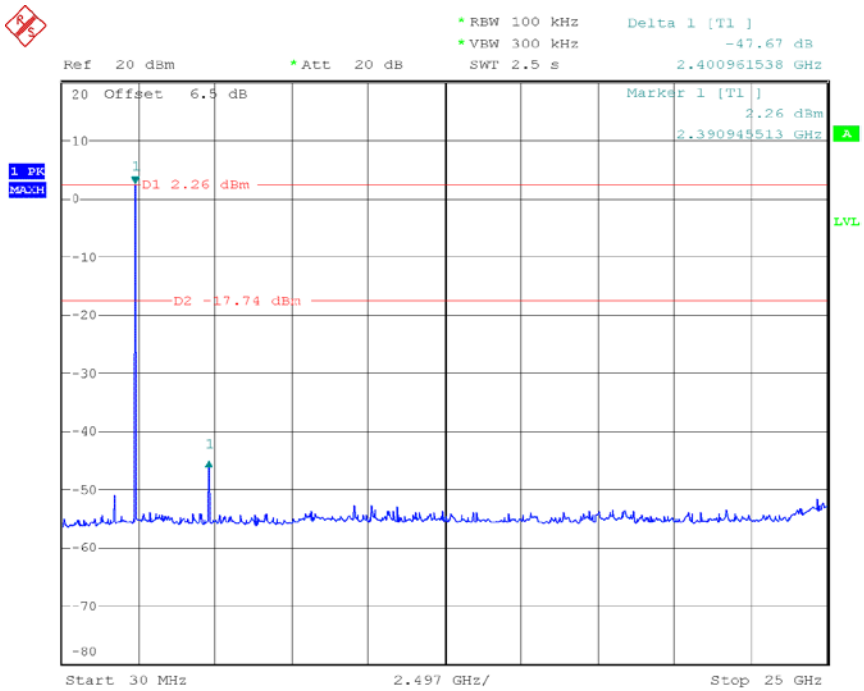



| Frequency (MHz) | MaxPeak (dB µ V/m) | Average (dB µ V/m) | Limit (dB µ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|
| 18373.800000 | 54.60 | --- | 74.00 | 19.40 | 100.0 | V | 272.0 | 8.2 |
| 18562.100000 | --- | 43.75 | 54.00 | 10.25 | 100.0 | V | 5.0 | 8.2 |

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor or Antenna factor (RX) + Cable Loss
Margin = Limit- Corr. Amplitude

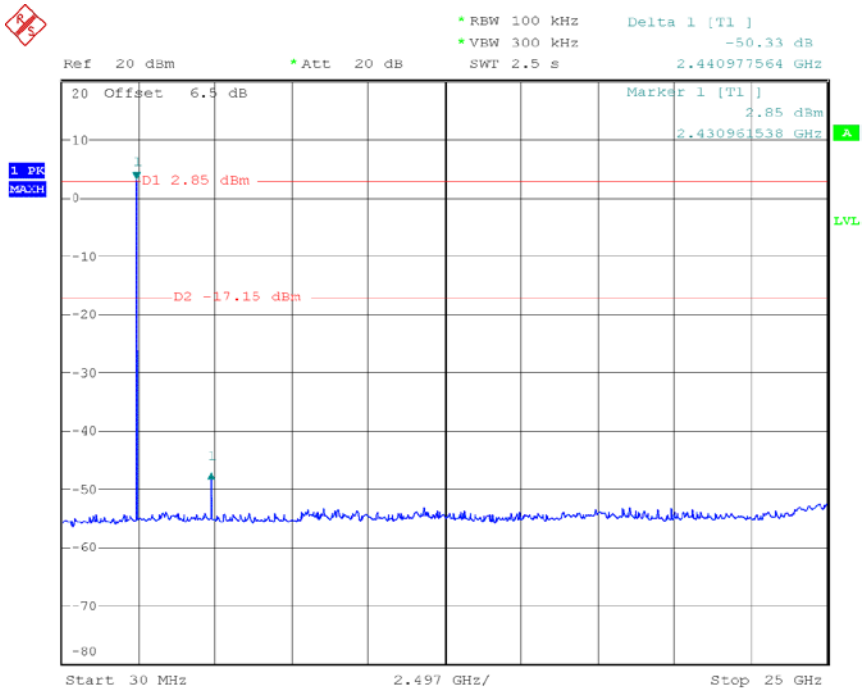
## Conducted Spurious Emission At Antenna Port:

### LE 1M: Low Channel



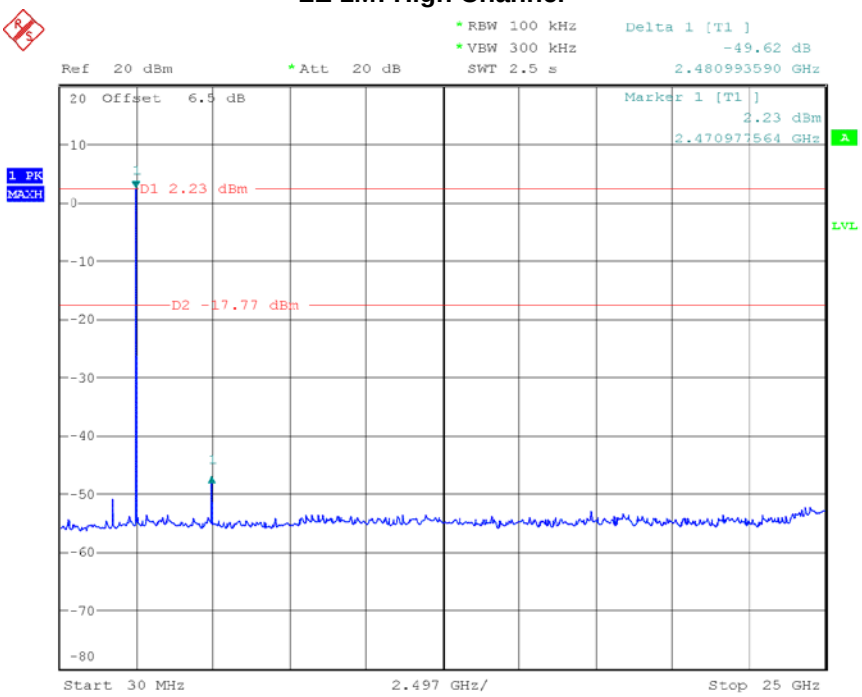

Date: 7.JUL.2021 17:12:42

### LE 1M: Middle Channel



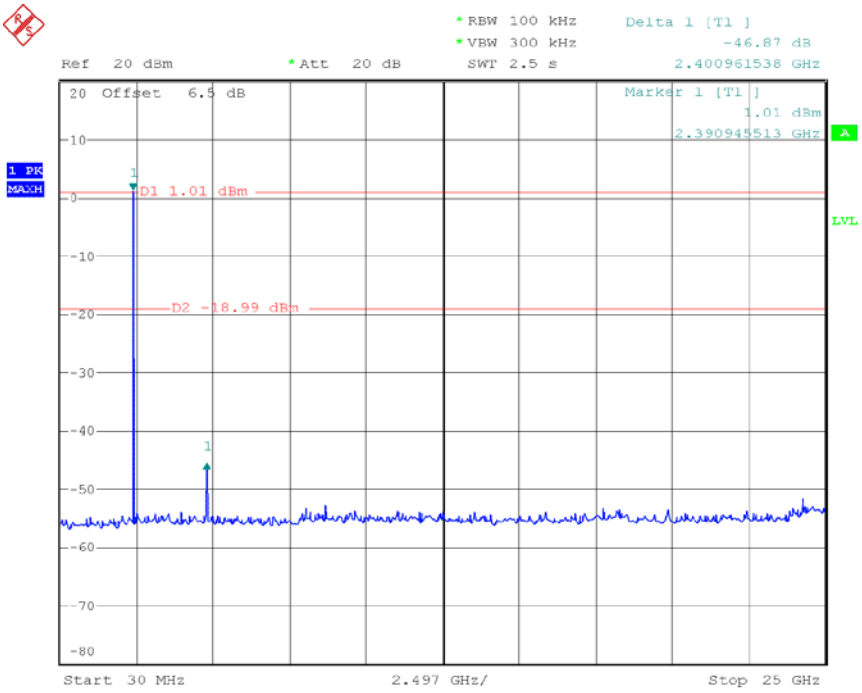

Date: 7.JUL.2021 16:56:36

**LE 1M: High Channel**



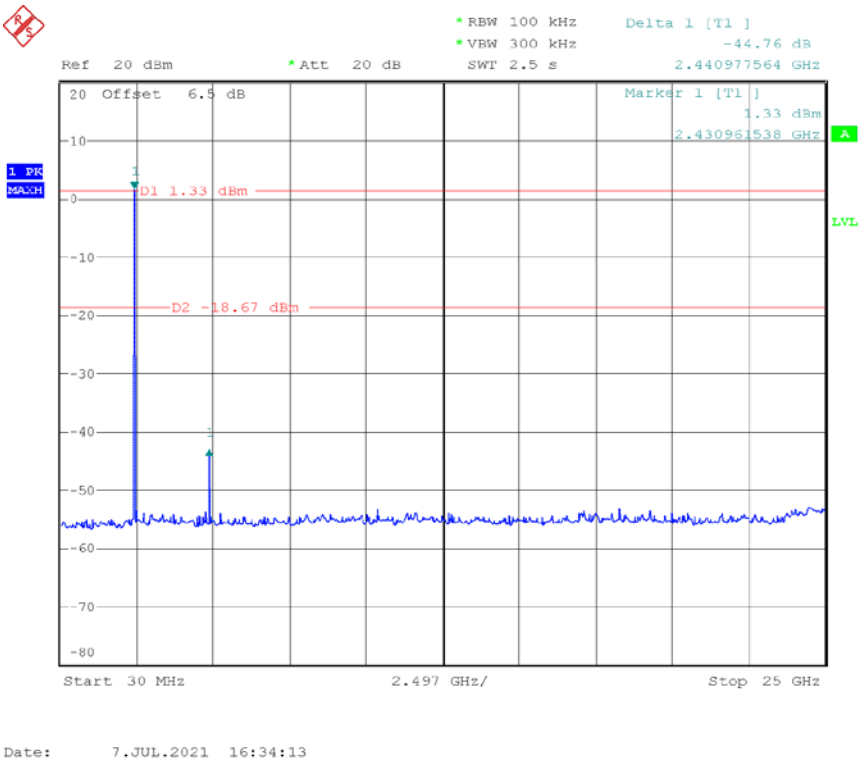

Date: 7.JUL.2021 17:08:02

**LE 2M: Low Channel**

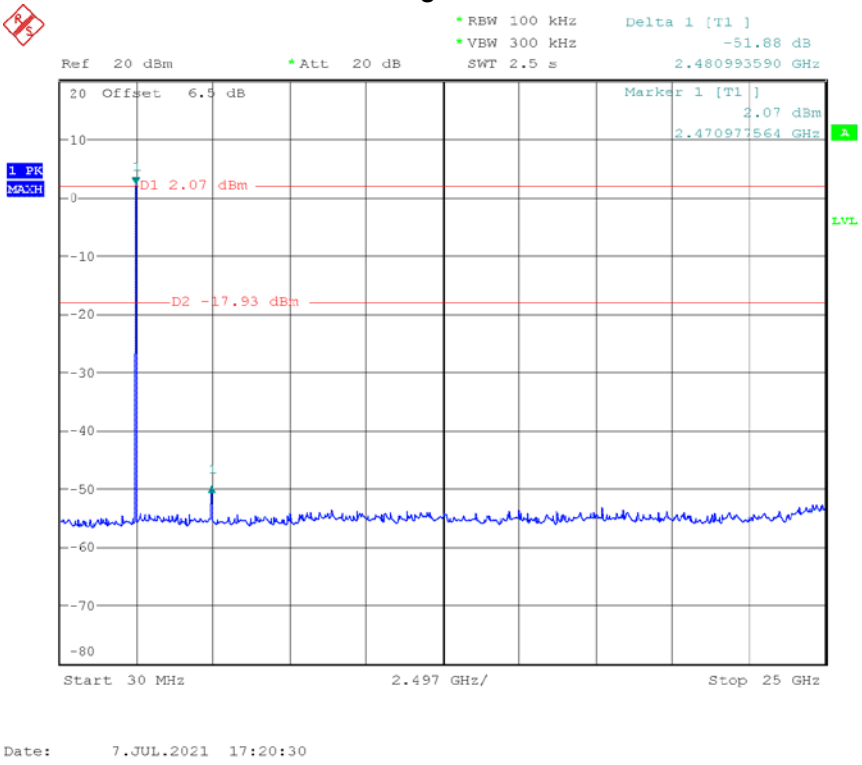



Date: 7.JUL.2021 16:29:45

**LE 2M: Middle Channel**




**LE 2M: High Channel**



## Band Edge Emission:

### LE 1M Mode

| Frequency | Receiver | | Rx Antenna | | Cable loss | Amplifier Gain | Corrected Amplitude | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Measurement | Polar | Factor | | | | | |
| MHz | dBμV | PK/AV | H/V | dB(1/m) | dB | dB | dBμV/m | dBμV/m | dB |
| Frequency: 2402 MHz | | | | | | | | | |
| 2402 | 67.81 | PK | V | 29.14 | 3.02 | 0.00 | 99.97 | N/A | N/A |
| 2402 | 66.76 | AV | V | 29.14 | 3.02 | 0.00 | 98.92 | N/A | N/A |
| 2390 | 28.66 | PK | V | 29.15 | 3.01 | 0.00 | 60.82 | 74.00 | 13.18 |
| 2390 | 17.08 | AV | V | 29.15 | 3.01 | 0.00 | 49.24 | 54.00 | 4.76 |
| Frequency: 2480 MHz | | | | | | | | | |
| 2480 | 68.11 | PK | V | 29.03 | 3.07 | 0.00 | 100.21 | N/A | N/A |
| 2480 | 67.12 | AV | V | 29.03 | 3.07 | 0.00 | 99.22 | N/A | N/A |
| 2483.5 | 36.62 | PK | V | 29.02 | 3.07 | 0.00 | 68.71 | 74.00 | 5.29 |
| 2483.5 | 21.38 | AV | V | 29.02 | 3.07 | 0.00 | 53.47 | 54.00 | 0.53 |

### LE 2M Mode

| Frequency | Receiver | | Rx Antenna | | Cable loss | Amplifier Gain | Corrected Amplitude | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Measurement | Polar | Factor | | | | | |
| MHz | dBμV | PK/AV | H/V | dB(1/m) | dB | dB | dBμV/m | dBμV/m | dB |
| Frequency: 2402 MHz | | | | | | | | | |
| 2402 | 67.87 | PK | V | 29.14 | 3.02 | 0.00 | 100.03 | N/A | N/A |
| 2402 | 66.04 | AV | V | 29.14 | 3.02 | 0.00 | 98.20 | N/A | N/A |
| 2390 | 28.52 | PK | V | 29.15 | 3.01 | 0.00 | 60.68 | 74.00 | 13.32 |
| 2390 | 17.86 | AV | V | 29.15 | 3.01 | 0.00 | 50.02 | 54.00 | 3.98 |
| Frequency: 2480 MHz | | | | | | | | | |
| 2480 | 68.11 | PK | V | 29.03 | 3.07 | 0.00 | 100.21 | N/A | N/A |
| 2480 | 66.23 | AV | V | 29.03 | 3.07 | 0.00 | 98.33 | N/A | N/A |
| 2483.5 | 36.58 | PK | V | 29.02 | 3.07 | 0.00 | 68.67 | 74.00 | 5.33 |
| 2483.5 | 21.62 | AV | V | 29.02 | 3.07 | 0.00 | 53.71 | 54.00 | 0.29 |

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor or Antenna factor (RX) + Cable Loss
Margin = Limit- Corr. Amplitude

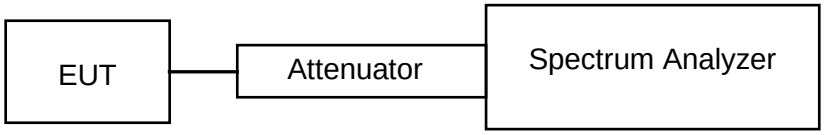
# FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

## Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

## Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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 Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27 °C |
| **Relative Humidity:** | 58 % |
| **ATM Pressure:** | 95.5 kPa |

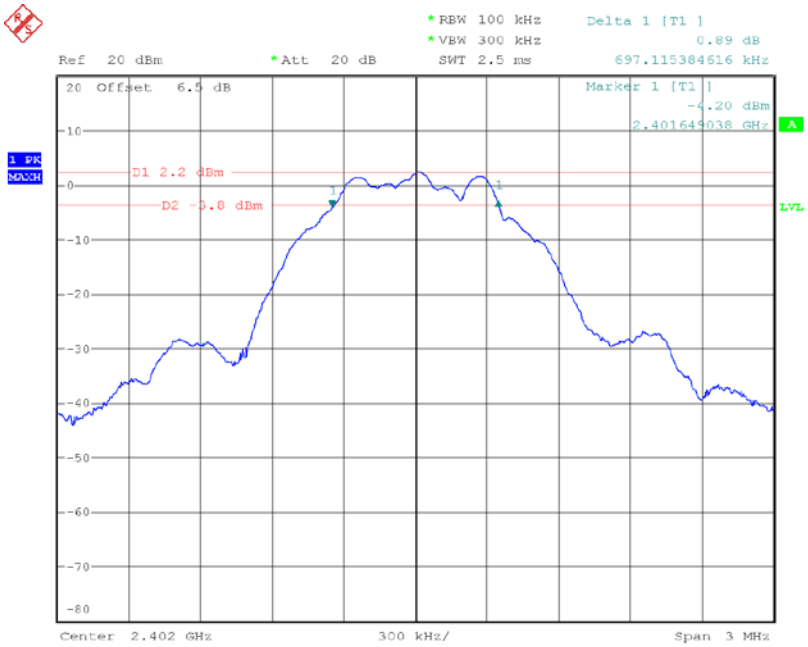
The testing was performed by Even Wu on 2021-07-07.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots.

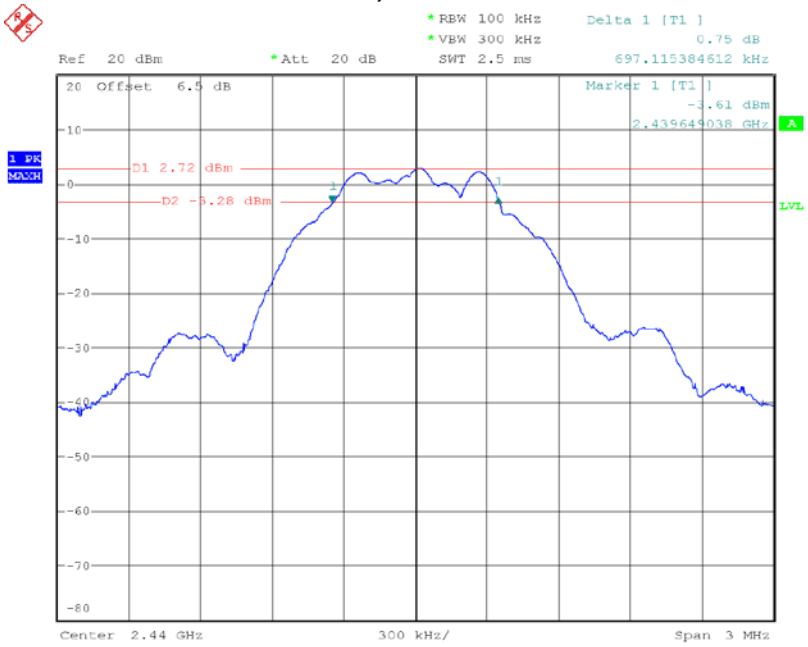
| Mode | Channel | Frequency (MHz) | 6 dB Emission Bandwidth (MHz) | Limit (MHz) |
|---|---|---|---|---|
| LE 1M | Low | 2402 | 0.697 | ≥0.50 |
| | Middle | 2440 | 0.697 | |
| | High | 2480 | 0.697 | |
| LE 2M | Low | 2402 | 1.199 | |
| | Middle | 2440 | 1.199 | |
| | High | 2480 | 1.199 | |

## LE 1M mode, Low Channel



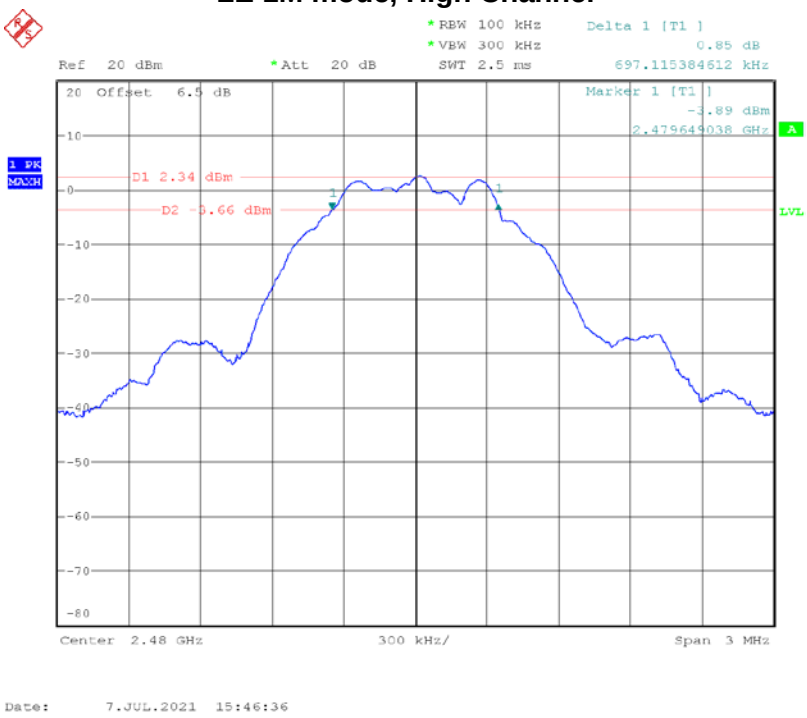

Date: 7.JUL.2021 15:50:26

## LE 1M mode, Middle Channel

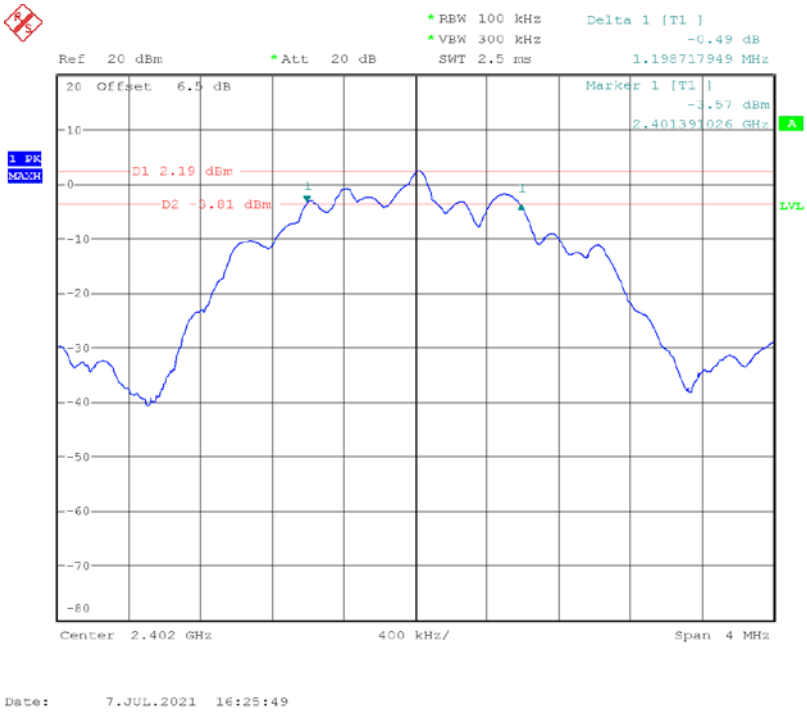



Date: 7.JUL.2021 15:55:14

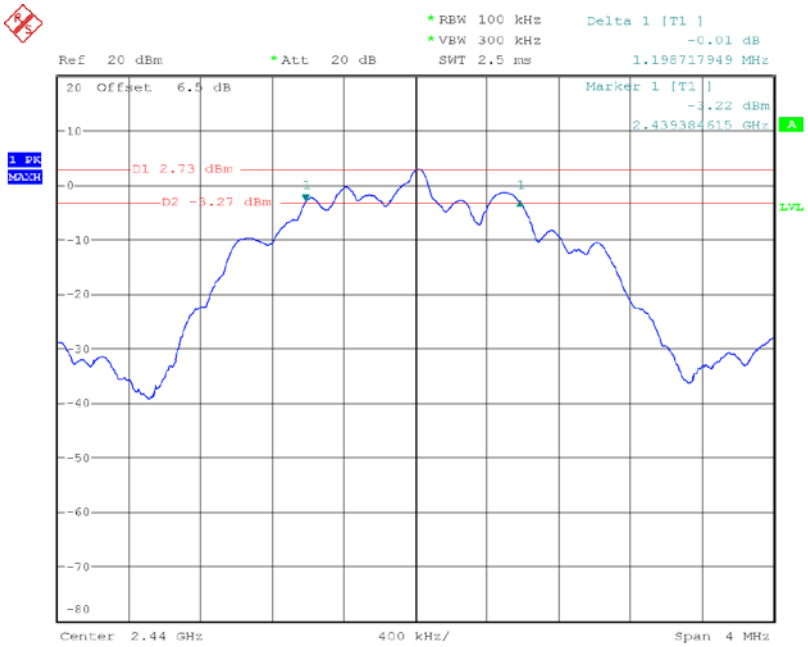
## LE 1M mode, High Channel




## LE 2M mode, Low Channel

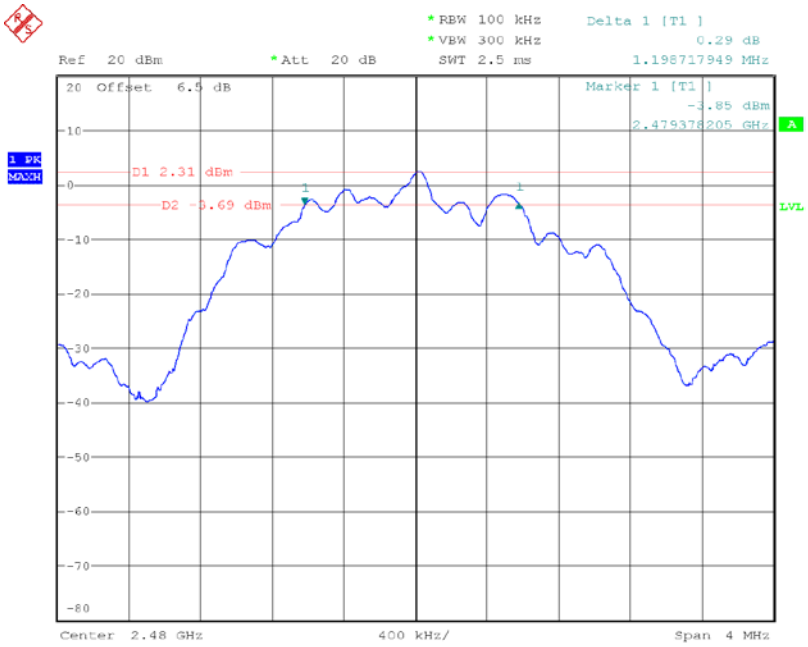


## LE 2M mode, Middle Channel




Date: 7.JUL.2021 16:22:30

## LE 2M mode, High Channel




Date: 7.JUL.2021 16:18:46

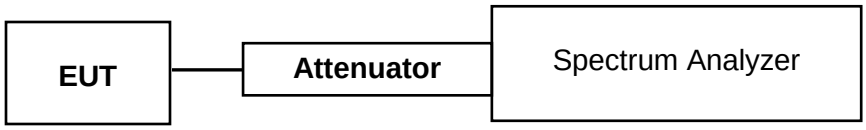
# FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

## Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

## Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.




4.RBW ⩾ DTS bandwidth
The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:
a) Set the RBW ⩾ DTS bandwidth.
b) Set VBW ⩾ [3 × RBW].
c) Set span ⩾ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27 °C |
| **Relative Humidity:** | 58 % |
| **ATM Pressure:** | 95.5 kPa |

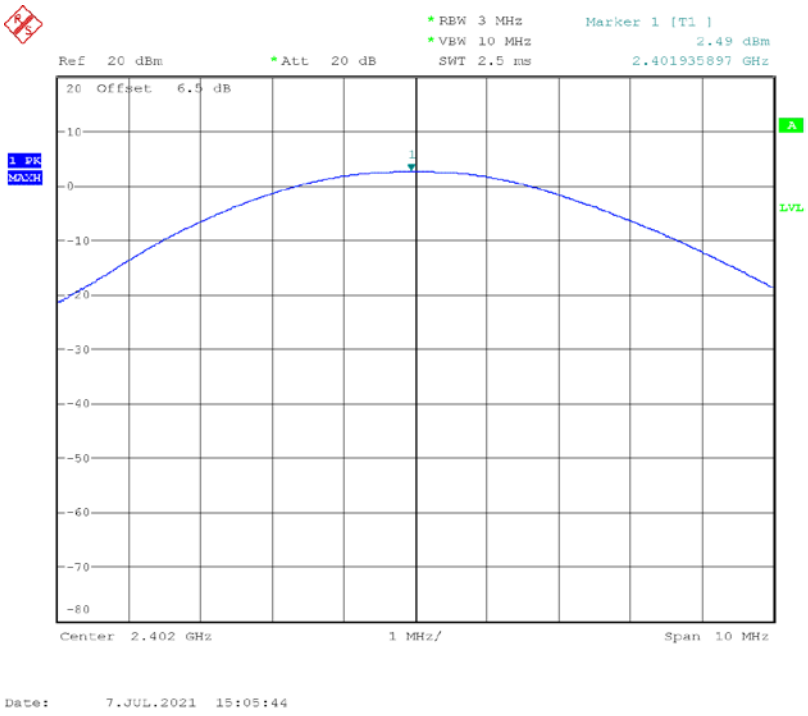
The testing was performed by Even Wu on 2021-07-07.

Test Mode: Transmitting

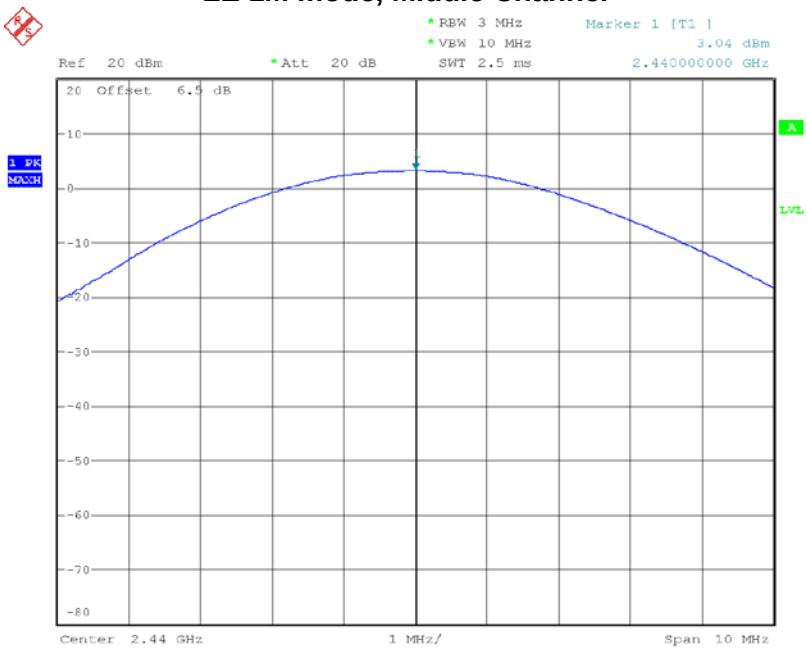
Test Result: Compliance. Please refer to the following table and plots.

| Mode | Channel | Frequency (MHz) | Max Peak Conducted Output Power (dBm) | Limit (dBm) |
|---|---|---|---|---|
| LE 1M | Low | 2402 | 2.49 | 30 |
| | Middle | 2440 | 3.04 | |
| | High | 2480 | 2.62 | |
| LE 2M | Low | 2402 | 2.57 | |
| | Middle | 2440 | 3.08 | |
| | High | 2480 | 2.70 | |

### LE 1M mode, Low Channel

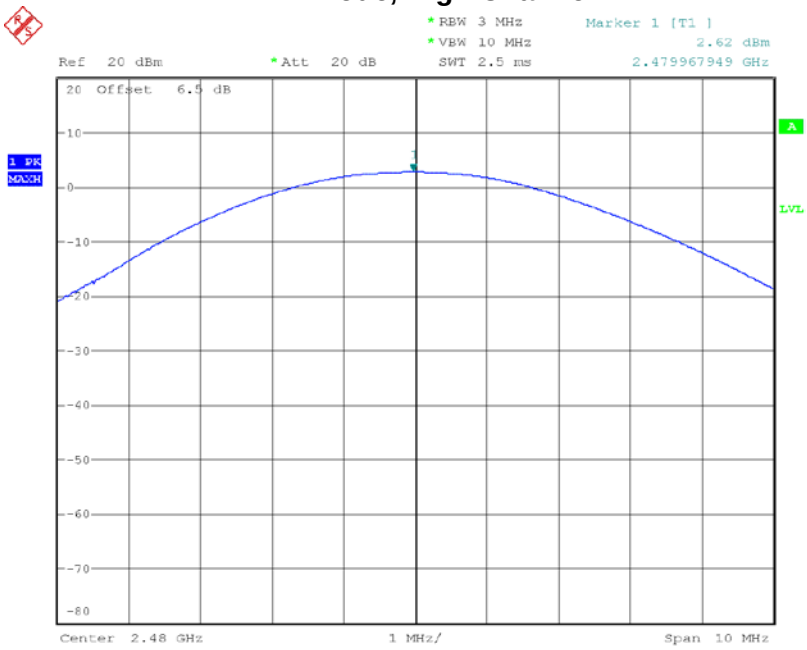


**LE 1M mode, Middle Channel**



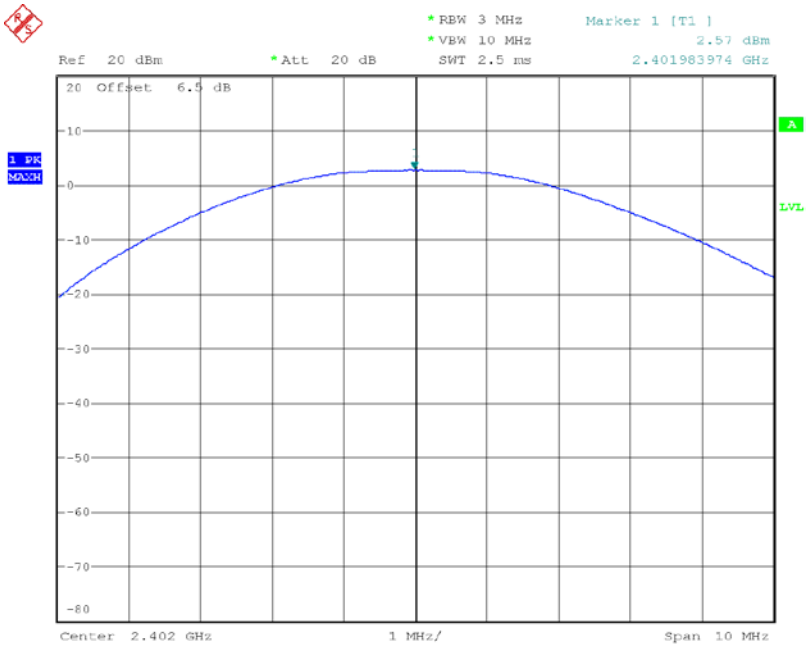

Date: 7.JUL.2021 15:08:01

**LE 1M mode, High Channel**



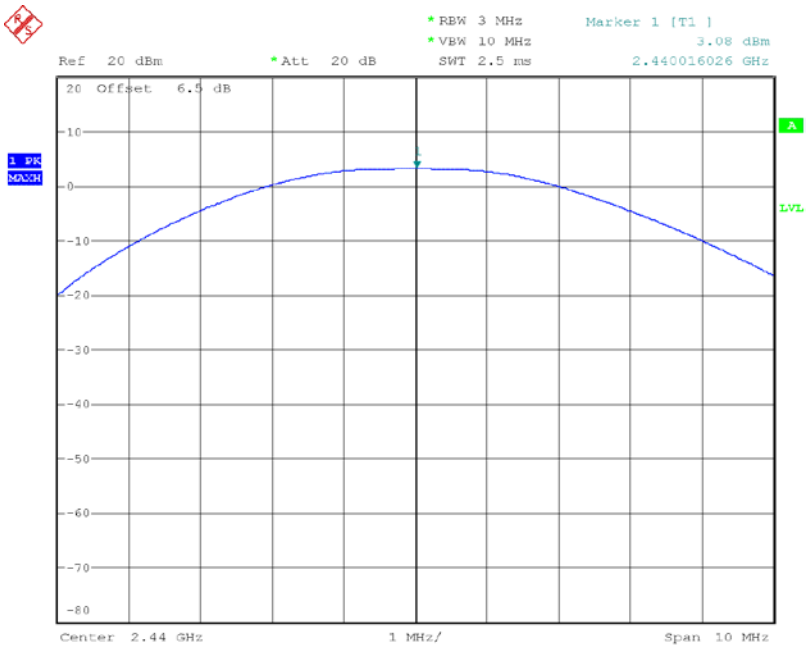

Date: 7.JUL.2021 15:10:08

## LE 2M mode, Low Channel



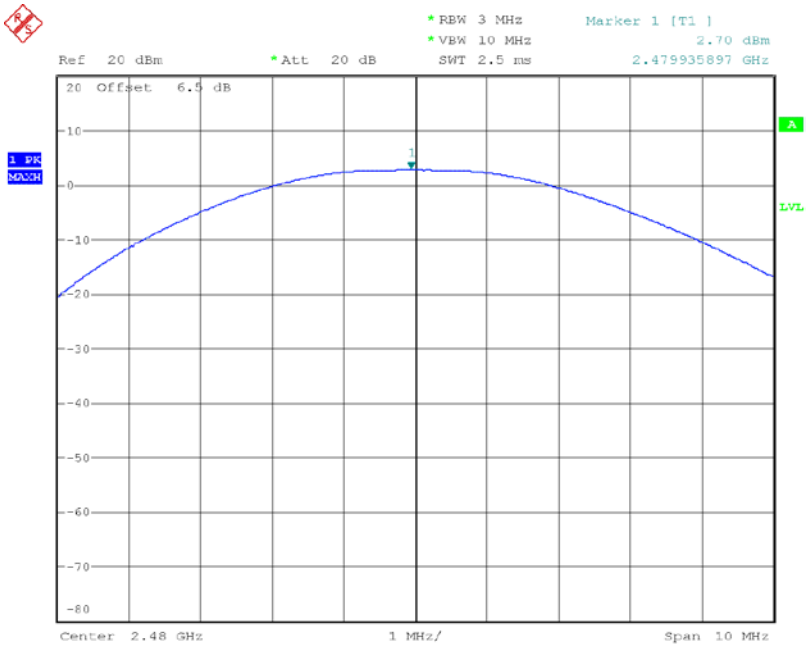

Date: 7.JUL.2021 14:55:17

## LE 2M mode, Middle Channel




Date: 7.JUL.2021 14:59:05

## LE 2M mode, High Channel



# FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

## Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

## Test Data

### Environmental Conditions

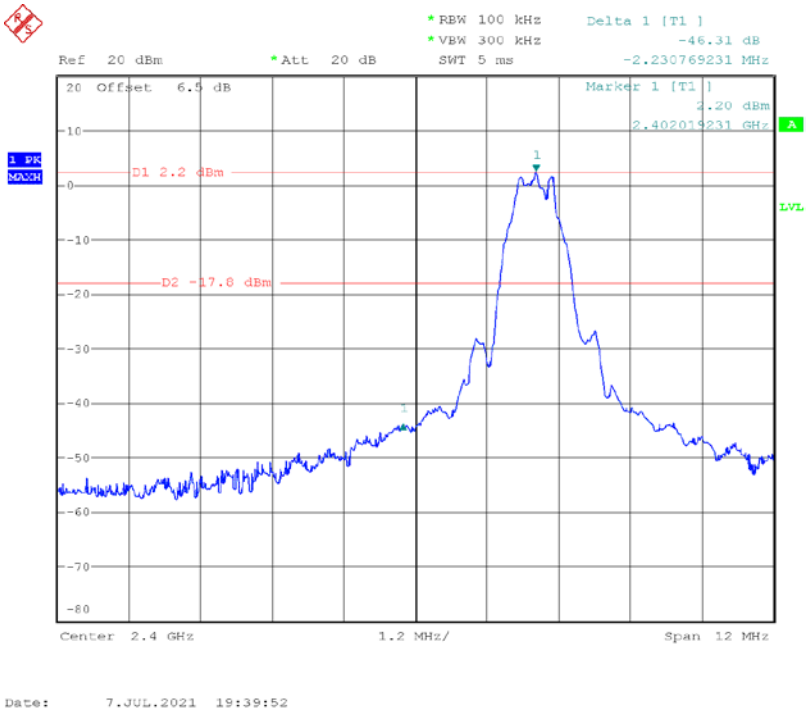
| | |
|---|---|
| **Temperature:** | 27 °C |
| **Relative Humidity:** | 58 % |
| **ATM Pressure:** | 95.5 kPa |

The testing was performed by Even Wu on 2021-07-07.

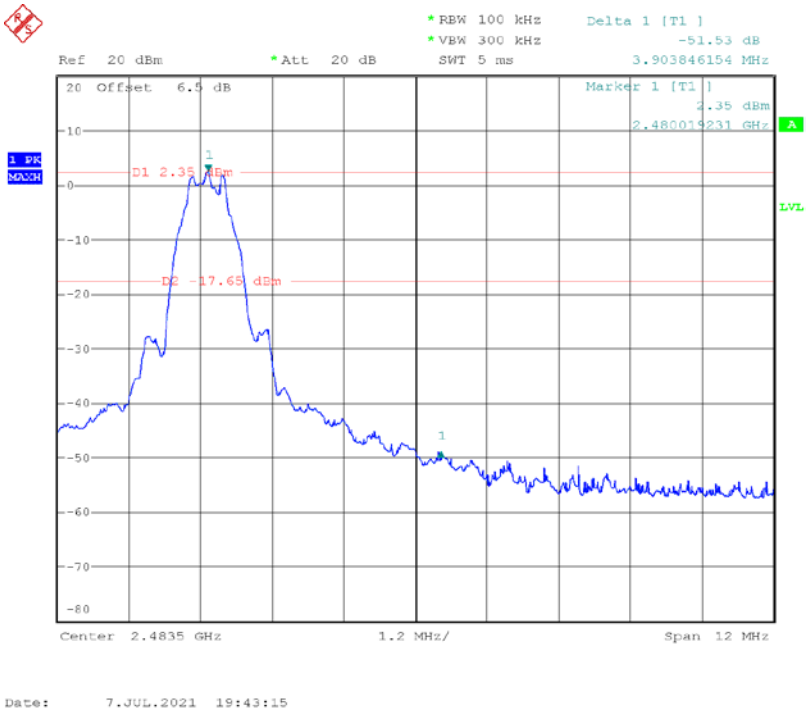
Test mode: Transmitting

Test Result: Compliance. Please refer to following plots.

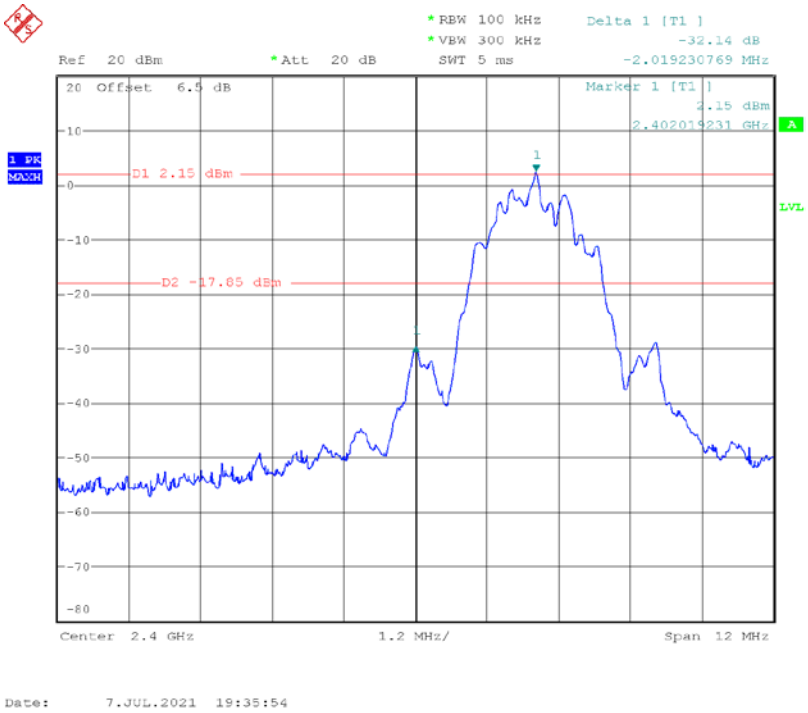
## LE 1M: Band Edge, Left Side



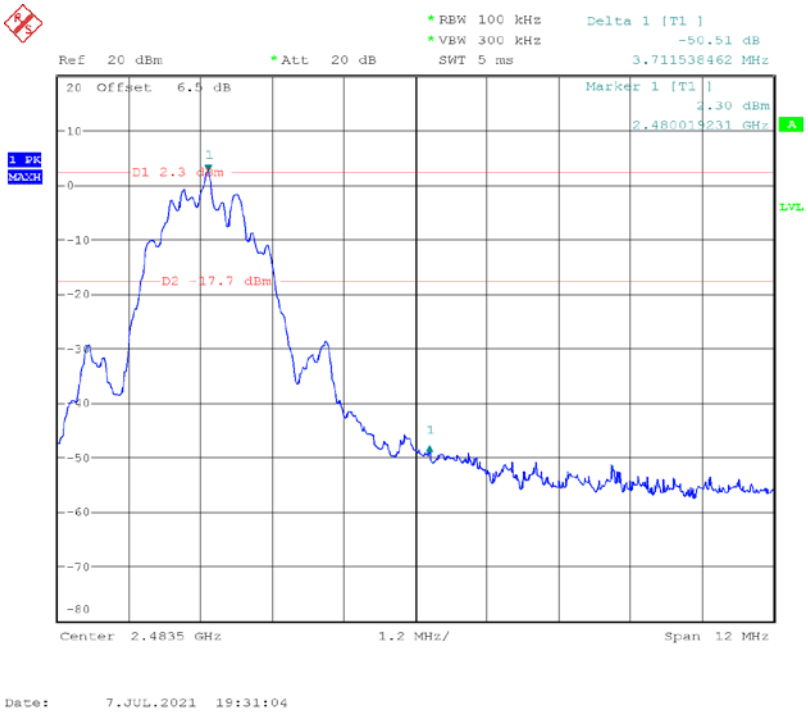

## LE 1M: Band Edge, Right Side



## LE 2M: Band Edge, Left Side




## LE 2M: Band Edge, Right Side



# FCC §15.247(e) - POWER SPECTRAL DENSITY

## Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27 °C |
| **Relative Humidity:** | 58 % |
| **ATM Pressure:** | 95.5 kPa |

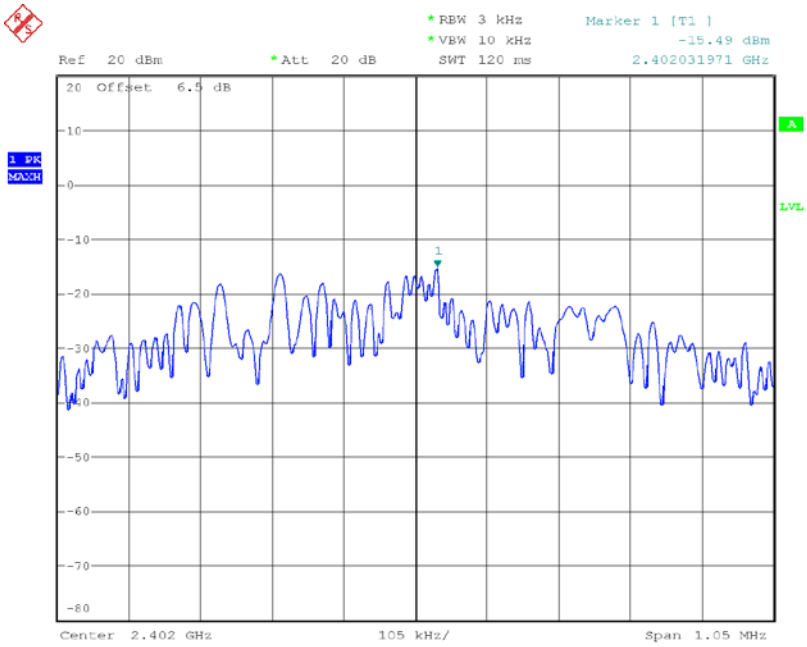
The testing was performed by Even Wu on 2021-07-07.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots

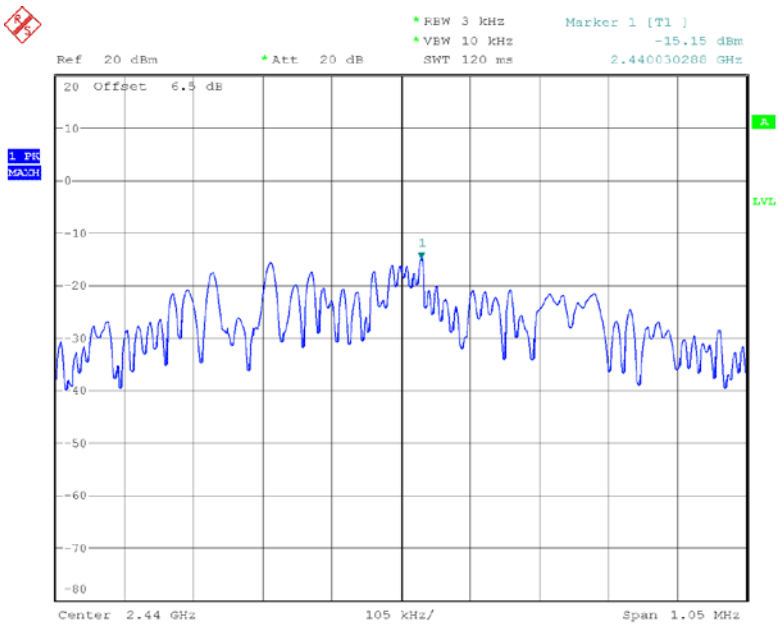
| Mode | Channel | Frequency (MHz) | Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) |
|---|---|---|---|---|
| LE 1M | Low | 2402 | -15.49 | ≤8 |
| | Middle | 2440 | -15.15 | |
| | High | 2480 | -15.38 | |
| LE 2M | Low | 2402 | -17.72 | |
| | Middle | 2440 | -17.20 | |
| | High | 2480 | -17.64 | |

## LE 1M: Low Channel



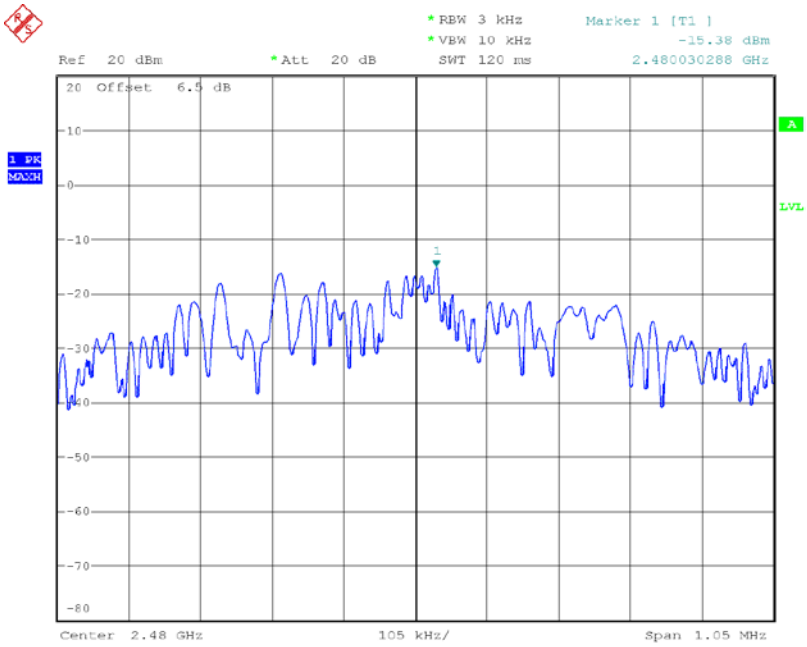

Date: 7.JUL.2021 19:19:31

## LE 1M: Middle Channel




Date: 7.JUL.2021 19:17:22

## LE 1M: High Channel

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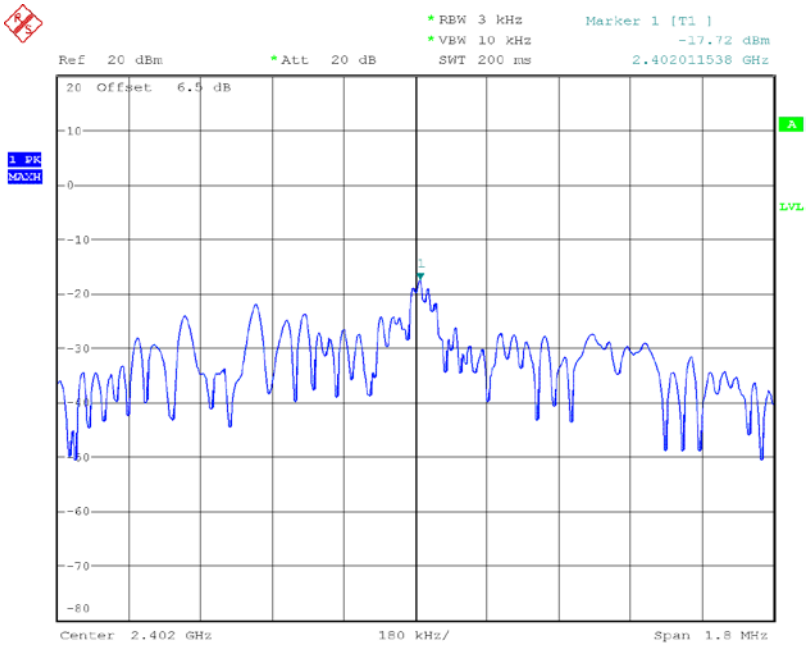
## LE 2M: Low Channel

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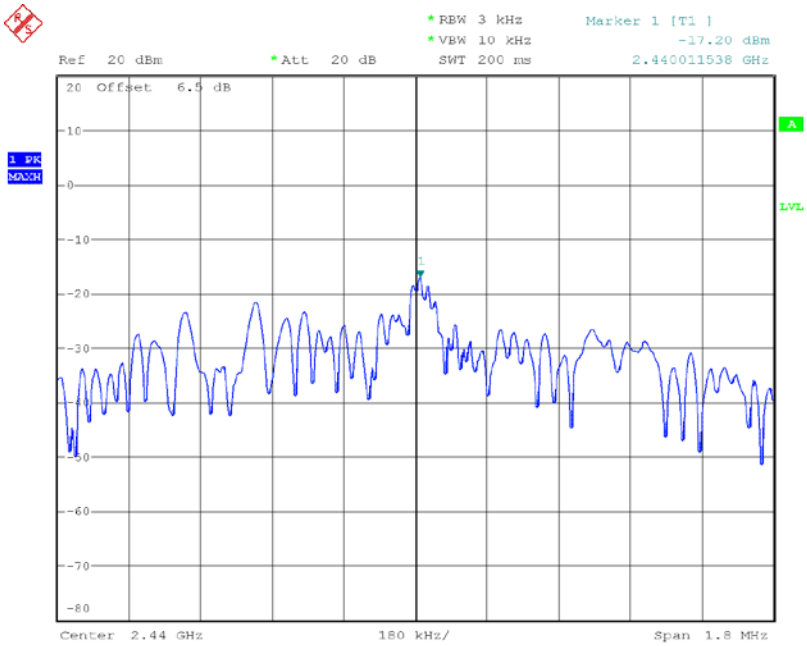
## LE 2M: Middle Channel

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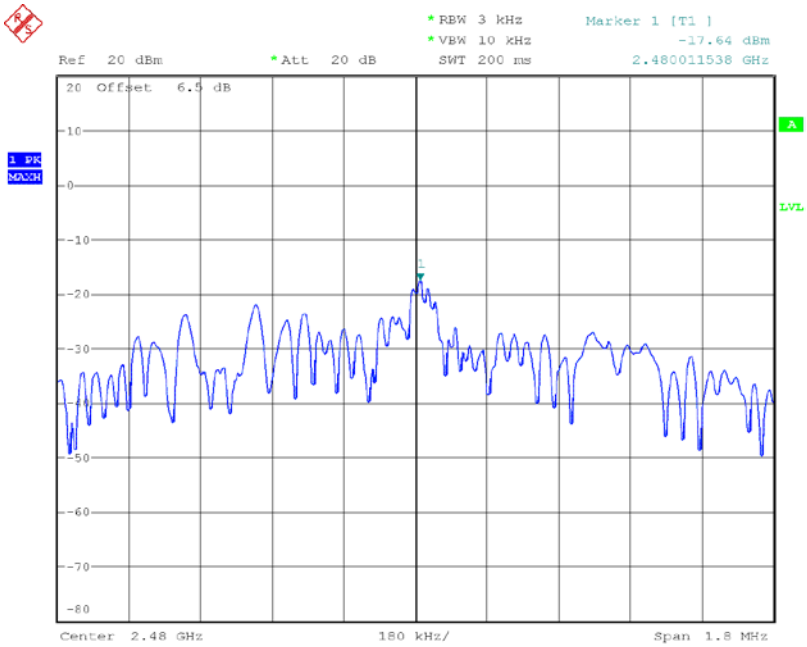
## LE 2M: High Channel

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## END OF REPORT