



**Technical Report to the FCC and ISED Regarding  
Gentex Corporation - Homelink® VI**

**Model: FDMHL6A  
FCC ID: NZLFDMHL6A  
ISED: 4112A-FDMHL6A**

**Emission Designator: 1M055L1D  
12/8/2025**

A report concerning approval for Gentex Corporation Homelink® model FDMHL6A  
Please issue grant immediately upon review.

Measurements Made by:

**Bolay  
Pacheco**  Digitally signed by  
Bolay Pacheco  
Date: 2025.12.15  
10:04:50 -05'00'

Bolay Pacheco  
Laboratory Validation Engineer III  
Gentex Corporation

Report Prepared

**Patricia  
Szeszulski**  Digitally signed by  
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Jason Vargo  
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## Test Report Revision

| REV<br>Number | Date      | Author              | Description     |
|---------------|-----------|---------------------|-----------------|
| 1.0           | 12/8/2025 | Patricia Szeszulski | Initial Release |
|               |           |                     |                 |
|               |           |                     |                 |
|               |           |                     |                 |

Results relate only to the items tested as received.

Compliance has been evaluated based on the Lab Manual section 7.6.2. The decision rule used regarding measurement uncertainty was to determine results solely on whether the measured values met the defined acceptance criteria without factoring in measurement uncertainty values.

Lab Project ID#: EMC2025-15019      Test ID: Test-128197, 128200  
FCC Report Form for 15.247 Bluetooth LE – 3m  
Revision: 11/14/2025      Approved By: Jason Vargo  
Uncontrolled copy if printed unless stamped as a Lab Controlled Document

Model: FDMHL6A  
Date: 12/8/2025  
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## **1. General Information**

### **1.1. Product Description**

The Gentex Corporation HomeLink® HLVI Universal Garage Door Opener is a low-power transceiver OEM device that is installed into the automotive rearview mirror. The installation is provided by trained technicians during the course of the manufacture of the automobile. It is powered by the 12 Volt system of the automobile.

This Universal Garage Door Opener has the capability to

1. Learn the frequency and bit code format of the user's existing garage door remote control devices
2. Transmit and receive frequency hopping spread spectrum in the 902 to 928 MHz band using an internal antenna as per Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15.247
3. Transmit and receive frequency digital transmission system in the 2402 to 2480MHz band using an internal antenna as per Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15.247.

The unit is designed for the periodic operation of a control signal, which typically activates a garage door opener receiver.

The unit is supplied to the automobile manufacturer without harness. For testing purposes, a typical assembly and 2-conductor cable harness were used to power to the unit.

The three-button HomeLink® unit replaces up to three hand-held transmitters. In addition to the typical operation of the garage door, the unit will learn the radio frequency codes of other transmitter types to activate entry door locks, estate gates, security systems, and home or office lighting.

The antenna system is an integral part of the unit. It cannot be altered nor replaced by the user. The service of this system is only available from the Automobile Manufacturer's Dealerships and Gentex Corporation.

### **1.2. Related Grants**

This device will have functionality that is covered under 47 CFR 15.247, 15.231, and 15B and ISSED RSS-247, and 210. The device will have an FCC ID # of NZLFDMHL6A and an ISSED ID # of 4112A-FDMHL6A under both rule parts. Separate reports were submitted for functionality covered under other rule parts.

### **1.3. Test Methodology**

Radiated Emissions testing was performed according to ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024. The power source for this product is a 12V automotive vehicle battery.

Conducted measurements were performed using a power supply.

Measurements were performed per FCC OET KDB 558074.

The unit is supplied to the automobile manufacturer without harness. For testing purposes, a 2-conductor cable harness was used to interface to the unit. The unit ground is provided through the negative terminal of the harness.

## 1.4. Test Facility

The 3-meter semi-anechoic chamber where these measurements were taken, is located on the grounds of Gentex Corporation's Corporate Labs, in the city of Zeeland, county of Ottawa, state of Michigan, United States of America.

For radiated measurements above 1 GHz, RF absorbing material is placed between the antenna and EUT in accordance with ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024 Section 5.5 and chamber manufacturer's instructions.

The 3m chamber has been added to our A2LA scope of accreditation on 05/20/2016 and includes accreditation to ANSI C63.4:2014, ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024. The report filed with ISED, dated February 11, 2015, was accepted via a letter dated February 11, 2015. Our 3m chamber is registered with the ISED under Site# 4112A-2 and FCC under registration number 357351.

Corporate Mailing/Shipping Address

Gentex Corporation  
600 N. Centennial Street  
Zeeland, MI 49464

Site Address

Gentex Corporation  
380 Riley Street  
Zeeland, MI 49423

## 1.5. Accreditation

The Gentex Corporate EMC Lab is accredited to ISO/IEC 17025 by the American Association for Laboratory Accreditation (A2LA). Our laboratory scope and accreditation certificate #[2529.01](#) are available from their web site [www.a2la.org](http://www.a2la.org). Our scope of accreditation covers ANSI C63.4:2014, ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024, and Radiated Emissions at 3m, FCC 47 CFR Part 15, ISED RSS-210, and ISED RSS-247.

## 2. Product Labeling

### 2.1. Identifiers

The FCC Identifier assigned is FCC ID: NZLFDMHL6A. The ISED certification number is 4112A-FDMHL6A. These identifiers will be labeled on the product housing.

The label will be placed on the exterior of the HL housing using laser etching that will permanently affix the label.

Because of the small size of the device and because the installation is inside a portion of the automobile, the following statements will appear in the user's manual. Refer to attachment "Users Manual.pdf" for the entire text of the user's manual.

"This device complies with FCC rules Part 15 and with ISED RSS-247. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference,
- (2) This device must accept any interference that may be received including interference that may cause undesired operation.

WARNING: The transmitter has been tested and complies with FCC and ISED rules. Changes or modifications not expressly approved by the party responsible for the compliance could void the user's authority to operate the device."

The term “ISED:” before the certification/registration number only signifies that ISED technical specifications were met.

ISED: 4112A-FDMHL6A

FCC ID: NZLFDMHL6A

MODEL: FDMHL6A

## **2.2. Label Drawing and Location on Product**

The label drawing and location of the label on the assembly is included in the “Label Location.pdf” attachment.

## **3. Test Configuration**

Radiated Emission measurements presented in the report were made in accordance with ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024. The EUT was placed on a 1 x 1.5m non-metallic table elevated 80cm above a conducting ground plane for measurements below 1GHz and elevated to 1.5m for measurements above 1GHz. The harness was run down the edge of the test table to a power supply beneath the turntable

For radiated measurements above 1 GHz, RF absorbing material is placed between the antenna and EUT in accordance with ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024 Section 5.5 and chamber manufacturer’s instructions.

For conducted measurements, a non-metallic table approximately 80cm x 90cm, 85cm above the floor was used.

## **4. Powerline Conducted Emissions Measurements**

Powerline Conducted Measurements are not required for this product as the part is powered via 12V battery.

## 5. Emissions Data

**5.1. Date(s) Tested:** 12/1/2025-12/9/2025

**5.2. Test Method Deviations:** None

**5.3. Temperature and Humidity conditions**

|             | Measured Value | Unit  |
|-------------|----------------|-------|
| Temperature | 21.6-22.9      | °C    |
| Humidity    | 30.3-48        | %R.H. |

## 5.4. Summary of Results (Part 15.247)

| Measurement                         |              | Margin (dB) | Frequency (MHz) |
|-------------------------------------|--------------|-------------|-----------------|
| Worst Case Spurious Emission        | 52.23 dBuV/m | 1.77        | 9608 MHz        |
| Maximum Peak Conducted Output Power | 4.3 dBm      | 25.7        | -               |
| Minimum 6dB Bandwidth               | 695 kHz      | 195 kHz     | -               |
| Maximum 99% bandwidth               | 1055 kHz     | -           | -               |
| Maximum Power Spectral Density      | 1.03 dBm     | 6.97        | -               |

- **DTS (6dB) Bandwidth:** Per FCC 15.247(a)(2) and RSS-247 paragraph 5.2 (a), the minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.

- **Band Edge Measurement Requirement:** Per section 15.247(d), 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).

- **Measurement Uncertainty:** The standard uncertainty of measurement has been determined in accordance with the ISO Guide to the Expression of Uncertainty in Measurements. The estimation of measurement uncertainty reported is the expanded uncertainty for a coverage factor of  $k=2.26$  and confidence interval of approximately 95%.

Expanded Uncertainty  $U_{(k=2.26)}$  is as follows:

- Radiated Emissions – Bicon (30-250 MHz): 4.1 dB
- Radiated Emissions – LPA (250-1000 MHz): 5.0 dB
- Radiated Emissions – DRWG (26.5 GHz): 4.2 dB
- Conducted Emissions: 1.04 dB
- Frequency: 0.007 ppm

## 5.5. Test Equipment Setup and Procedure

### 5.5.1. Sample(s) Used for Measurements

|               |                                      |
|---------------|--------------------------------------|
| Sample ID(s): | 905-7120-160986-1, 905-7120-160984-1 |
|---------------|--------------------------------------|

### 5.5.2. Test Equipment

#### Radiated Test Equipment

| Equipment Used |                        |                                                     |                        |                   |               |           |
|----------------|------------------------|-----------------------------------------------------|------------------------|-------------------|---------------|-----------|
| ID / Serial #  | Manufacturer           | Description                                         | Type                   | Cal / PM Due Date | Last Cal Date | Interval  |
| 6595           | Rohde & Schwarz        | ESR26                                               | EMI Receiver           | 2/19/2026         | 11/19/2024    | 1 year    |
| CF GCL         | Megaphase / Pasternack | CBL 94, CBL 96, CBL 158, AT26, Port N3              | Cable and Feedthroughs | 8/31/2026         | 8/31/2025     | 1 year    |
| H6192          | EMCO                   | 3148 Log Periodic RX                                | Antenna                | 05/13/2027        | 5/13/2024     | 3 year    |
| 8893           | Com-Power              | AHA-118 Double Ridged Waveguide Horn                | Antenna                | 04/22/2027        | 4/22/2024     | 3 year    |
| Tower 2        | ETS-Lindgren           | 2171B Boresight Tower                               | Antenna Positioner     | VBV               | N/A           | VBV       |
| S/N: PJ2246    | Lindgren               | 3M Chamber                                          | Shielded Enclosure     | 12/31/2025        | 7/23/2025     | Quarterly |
| H4554          | Fluke                  | 87                                                  | Multimeter             | 01/29/2026        | 1/29/2025     | 1 year    |
| SW30           | Gentex                 | 3m Chamber Software                                 | Software               | 3/31/2026         | 3/31/2025     | 1 year    |
| SW48           | Gentex                 | Gentex Emissions Measurement Software               | Software               | 3/31/2026         | 3/31/2025     | 1 year    |
| Absorber 1     | ETS-Lindgren           | EHP-12PCL                                           | Absorber Material      | VBV               | N/A           | VBV       |
| SW44           | Gentex                 | HomeLink Diagnostic Application                     | Software               | 3/31/2026         | 3/31/2025     | 1 year    |
| 7362           | Omega                  | iBTHX-W Virtual                                     | Chart Recorder         | 03/31/2026        | 3/31/2025     | 1 year    |
| 6539           | Stanley                | Tape Measure                                        | Measurement Tool       | 06/19/2026        | 6/19/2023     | 3 year    |
| 7691           | A.H. Systems Inc.      | SAS-571 Double Ridged Guide Horn                    | Antenna                | 7/5/2026          | 7/5/2023      | 3 year    |
| 7257           | ETS-Lindgren           | 3116C Double Ridged Waveguide Horn                  | Antenna                | 6/27/2028         | 6/27/2025     | 3 year    |
| S/N:419726     | AIM-TTI                | PL303-P                                             | Power Supply           | VBV               | N/A           | VBV       |
| S/N:2053240    | Miteq                  | AMF-4D-00501800-24-10P, 30 dB                       | Preamplifier           | 12/31/2025        | 12/17/2024    | 1 year    |
| CBL 147        | Megaphase              | EMC2-S1S1-96                                        | Cable                  | 10/31/2026        | 10/14/2025    | 1 year    |
| S/N:2069595    | Miteq                  | AMF-4F-18002650-20-10P, 30 dB                       | Preamplifier           | 10/31/2026        | 10/14/2025    | 1 year    |
| FLT009         | Mini-Circuits          | ZHFG-K4000+, 4500 MHz High Pass Filter, DC - 18 GHz | Filter                 | 1/31/2026         | 1/21/2025     | 1 year    |
| CBL 149        | Megaphase              | GC19-S1S1-72                                        | Cable                  | 10/31/2026        | 10/14/2025    | 1 year    |
| CBL 146        | Megaphase              | EMC2-S1S1-72                                        | Cable                  | 10/31/2026        | 10/14/2025    | 1 year    |
| H6187          | EMCO                   | 3110B Biconical RX                                  | Antenna                | 05/13/2027        | 5/13/2024     | 3 year    |
| CBL 143        | MegaPhase              | GC29-N1N1-192                                       | Cable                  | 4/30/2026         | 4/6/2025      | 1 year    |
| CBL 174        | MegaPhase              | GC12-S1S1-360                                       | Cable                  | 4/30/2026         | 4/6/2025      | 1 year    |
| S/N:273123     | Sonoma Instrument Co.  | 310N, 32dB                                          | Preamplifier           | 12/31/2025        | 12/16/2024    | 1 year    |
| H6193          | EMCO                   | 3148 Log Periodic TX                                | Antenna                | 05/13/2027        | 5/13/2024     | 3 year    |

## Conducted Test Equipment

| Equipment Used |                 |                                                     |                |                   |               |          |
|----------------|-----------------|-----------------------------------------------------|----------------|-------------------|---------------|----------|
| ID / Serial #  | Manufacturer    | Description                                         | Type           | Cal / PM Due Date | Last Cal Date | Interval |
| 6595           | Rohde & Schwarz | ESR26                                               | EMI Receiver   | 2/19/2026         | 11/19/2024    | 1 year   |
| H4554          | Fluke           | 87                                                  | Multimeter     | 01/29/2026        | 1/29/2025     | 1 year   |
| SW48           | Gentex          | Gentex Emissions Measurement Software               | Software       | 3/31/2026         | 3/31/2025     | 1 year   |
| SW44           | Gentex          | HomeLink Diagnostic Application                     | Software       | 3/31/2026         | 3/31/2025     | 1 year   |
| 7362           | Omega           | iBTHX-W Virtual                                     | Chart Recorder | 03/31/2026        | 3/31/2025     | 1 year   |
| CBL 149        | Megaphase       | GC19-S1S1-72                                        | Cable          | 10/31/2026        | 10/14/2025    | 1 year   |
| FLT009         | Mini-Circuits   | ZHFG-K4000+, 4500 MHz High Pass Filter, DC - 18 GHz | Filter         | 1/31/2026         | 1/21/2025     | 1 year   |
| CBL 119        | MegaPhase       | KB18-N1S1-36                                        | Cable          | 4/30/2026         | 4/6/2025      | 1 year   |
| AT55           | Pasternack      | PE7094-10, 10 dB, DC to 18 GHz, 2W                  | Attenuator     | 1/31/2026         | 1/16/2025     | 1 year   |
| AT56           | Pasternack      | PE7094-10, 10 dB, DC to 18 GHz, 2W                  | Attenuator     | 1/31/2026         | 1/16/2025     | 1 year   |
| PS-27 (PCT)    | BK Precision    | 1692                                                | Power Supply   | VBU               | N/A           | VBU      |

### 5.5.3. Test Equipment Setup and Procedure

EMI Receiver Settings Emissions:

Detector Function : Peak  
Resolution Bandwidth :100kHz (below 1GHz)  
:1MHz (above 1GHz)  
Video Bandwidth: :300kHz (below 1GHz)  
:3MHz (above 1GHz)

EMI Receiver (in Spectrum Analyzer mode) Settings Occupied Bandwidth:

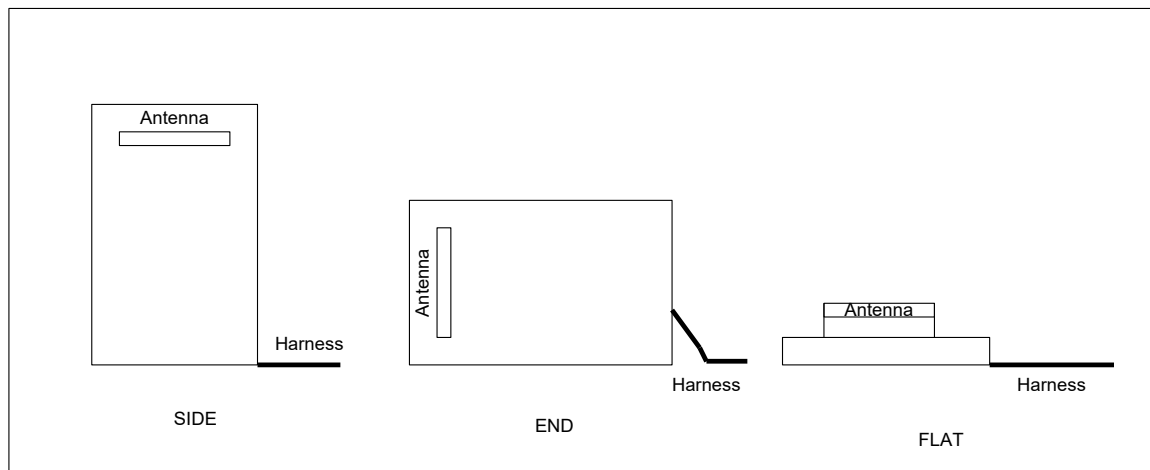
Detector : Peak  
Resolution Bandwidth :1 MHz (to determine peak level)  
:10 kHz (to determine occupied bandwidth)  
Video Bandwidth :3 MHz (to determine peak level)  
:30 kHz (to determine occupied bandwidth)

Spectrum Analyzer Settings for Conducted measurements:

Detector Function : Peak  
Resolution Bandwidth :120kHz (below 1GHz)  
:1MHz (above 1GHz)  
Video Bandwidth: :300kHz (below 1GHz)  
:3MHz (above 1GHz)

For the testing, the EUT was placed at the center of a non-conducting table 80cm above the ground plane pursuant to ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024 for stand-alone equipment. The 2-conductor harness was routed down the edge of the test table to a power supply beneath the turntable.

Equipment is placed in one of the three orthogonal orientations, End, side, and flat. These orientations are described below in figure 6.2.3.



**Figure 6.2.3 EUT Orthogonal Orientations**

While in the prescribed orientation, the vertical antenna positioner sweeps in elevation from 1 to 4m in height until the operator finds the peak. The 3m turntable is then rotated through 360 degrees until a peak is found. The table is stopped at the peak location and the peak in elevation re-verified. Procedure is repeated for applicable orientations/measurement antenna polarizations. Radiated testing was performed in the in-vehicle position only.

## **5.6. Measured Data – See Appendix A**

# **6. Formulas and Sample Calculations**

## **6.1. Calculation of ISED Limits from RSS-247 and 47 CFR Part 15.247**

The Peak Tx Spurious Emissions limit for the fundamental is given by:

Limit dBuV/m =  $1W \text{ ERP} = 127.38 \text{ dBuV/m}$ , which is the fundamental limit.

The Rx Spurious Emissions limit for the fundamental is given by:

Limit dBuV/m =  $20 * \log(200 \mu\text{V/m}) = 46.0 \text{ dBuV/m}$

The Rx Spurious Emissions limit for the harmonics is given by:

Limit dBuV/m =  $20 * \log(500 \mu\text{V/m}) = 54.0 \text{ dBuV/m}$

## 7. Power Targets

| Frequency<br>(MHz) | Memory Map<br>Value<br>(decimal) |
|--------------------|----------------------------------|
| 2402-2480          | 80                               |

## Appendix A

### 1. Radiated Measurements

#### 1. TX Measurements

**Measurement Settings:**

Measurement Frequency: Below 1GHz

Span: 500kHz or greater

RBW: 100/120kHz

VBW: 300kHz or 3 x RBW

Sweep Time: 25ms

Attenuation: Auto

Measurement Frequency: Above 1GHz

Span: 500kHz or greater

RBW: 1MHz

VBW: 3MHz or 3 x RBW

Sweep Time: 25ms

Attenuation: Auto

This measurement is a radiated measurement performed with a receiver. Prior to measurement the EUT is placed into a continuous transmit mode with 100% duty cycle via a communications board attached to the EUT.

**i. DUT Transmitting at 2402MHz (Fundamental)**

**Peak/Average Measurement - 2402MHz**

| Frequency (MHz) | Orientation (Flat/End/Side) | Measurement Polarization (H/V) | Peak Measurement (dBuV/m) | Peak Limit (dBuV/m) | Margin (dB)  | Average Measurement (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) |
|-----------------|-----------------------------|--------------------------------|---------------------------|---------------------|--------------|------------------------------|------------------------|-------------|
| 2402            | Side                        | H                              | 99.03                     | 127.3               | 28.27        | 98.22                        | -                      | -           |
| 4804            | Side                        | V                              | 49.02                     | 74.0                | 24.98        | 36.28                        | 54.0                   | 17.72       |
| 7206            | Side                        | V                              | 54.31                     | 74.0                | 19.69        | 42.16                        | 54.0                   | 11.84       |
| 9608            | Side                        | V                              | 60.47                     | 74.0                | <b>13.53</b> | 52.23                        | 54.0                   | <b>1.77</b> |
| 12010           | Side                        | V                              | 52.16                     | 74.0                | 21.84        | 39.79                        | 54.0                   | 14.21       |
| 14412           | Side                        | V                              | 54.06                     | 74.0                | 19.94        | 41.18                        | 54.0                   | 12.82       |
| 16814           | Side                        | H                              | 54.05                     | 74.0                | 19.95        | 41.5                         | 54.0                   | 12.50       |
| 19216           | Side                        | H                              | 61.7                      | 74.0                | 12.30        | 45.7                         | 54.0                   | 8.30        |
| 21618           | Side                        | H                              | 61.072                    | 74.0                | 12.93        | 46.2                         | 54.0                   | 7.80        |
| 24020           | Side                        | H                              | 64.5                      | 74.0                | 9.50         | 47.72                        | 54.0                   | 6.28        |

## ii. DUT Transmitting at 2440MHz (Fundamental)

**Peak/Average Measurement - 2440MHz**

| Frequency (MHz) | Orientation (Flat/End/Side) | Measurement Polarization (H/V) | Peak Measurement (dBuV/m) | Peak Limit (dBuV/m) | Margin (dB)  | Average Measurement (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) |
|-----------------|-----------------------------|--------------------------------|---------------------------|---------------------|--------------|------------------------------|------------------------|-------------|
| 2440            | Side                        | H                              | 98.71                     | 127.3               | 28.59        | 97.91                        | -                      | -           |
| 4880            | Side                        | H                              | 49.04                     | 74.0                | 24.96        | 37.05                        | 54.0                   | 16.95       |
| 7320            | Side                        | H                              | 53.5                      | 74.0                | 20.50        | 41.05                        | 54.0                   | 12.95       |
| 9760            | Side                        | V                              | 58.2                      | 74.0                | <b>15.80</b> | 49.46                        | 54.0                   | <b>4.54</b> |
| 12200           | Side                        | H                              | 57.49                     | 74.0                | 16.51        | 38.94                        | 54.0                   | 15.06       |
| 14640           | Side                        | V                              | 52.81                     | 74.0                | 21.19        | 40.35                        | 54.0                   | 13.65       |
| 17080           | Side                        | V                              | 54.08                     | 74.0                | 19.92        | 41.68                        | 54.0                   | 12.32       |
| 19520           | Side                        | H                              | 62.06                     | 74.0                | 11.94        | 44.82                        | 54.0                   | 9.18        |
| 21960           | Side                        | H                              | 61.14                     | 74.0                | 12.86        | 44.3                         | 54.0                   | 9.70        |
| 24400           | Side                        | H                              | 64.5                      | 74.0                | 9.50         | 47.94                        | 54.0                   | 6.06        |

## iii. DUT Transmitting at 2480MHz (Fundamental)

**Peak/Average Measurement - 2480MHz**

| Frequency (MHz) | Orientation (Flat/End/Side) | Measurement Polarization (H/V) | Peak Measurement (dBuV/m) | Peak Limit (dBuV/m) | Margin (dB)  | Average Measurement (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) |
|-----------------|-----------------------------|--------------------------------|---------------------------|---------------------|--------------|------------------------------|------------------------|-------------|
| 2480            | Side                        | H                              | 98.5                      | 127.3               | 28.80        | 97.72                        | -                      | -           |
| 4960            | Side                        | H                              | 49.05                     | 74.0                | 24.95        | 36.57                        | 54.0                   | 17.43       |
| 7440            | Side                        | V                              | 54.1                      | 74.0                | 19.90        | 41.7                         | 54.0                   | 12.30       |
| 9920            | Side                        | V                              | 59.2                      | 74.0                | <b>14.80</b> | 50.55                        | 54.0                   | <b>3.45</b> |
| 12400           | Side                        | H                              | 51.39                     | 74.0                | 22.61        | 38.95                        | 54.0                   | 15.05       |
| 14880           | Side                        | V                              | 54.02                     | 74.0                | 19.98        | 41.38                        | 54.0                   | 12.62       |
| 17360           | Side                        | H                              | 54.17                     | 74.0                | 19.83        | 41.56                        | 54.0                   | 12.44       |
| 19840           | Side                        | H                              | 63.16                     | 74.0                | 10.84        | 47.04                        | 54.0                   | 6.96        |
| 22320           | Side                        | H                              | 60.43                     | 74.0                | 13.57        | 45.5                         | 54.0                   | 8.50        |
| 24800           | Side                        | H                              | 66.78                     | 74.0                | 7.22         | 47.87                        | 54.0                   | 6.13        |

## 2. TX Spurious Emissions

Measurements described in this section were taken according to ANSI C63.10:2020+Cor.1-2023 and ANSI C63.10a:2024. on the Gentex Corporation 3m test table. Pre-Scan measurements were taken with the transmitter on to identify which emissions to maximize during the final measurement. Maximized data can be found in the table below. No significant emissions were identified in the region from 1000MHz to 25000MHz . Harmonics measurement data can be found in section 1 above.

\* Measurements include Cable corrections and Antenna Factors

Measurement Settings:

Measurement Frequency: Below 1GHz

Span: 500kHz or greater

RBW: 100/120kHz      VBW: 300kHz or 3 x RBW

Sweep Time: 25ms

Attenuation: Auto

Measurement Frequency: Above 1GHz

Span: 500kHz or greater

RBW: 1MHz      VBW: 3MHz or 3 x RBW

Sweep Time: 25ms

Attenuation: Auto

| Test Mode | Detector   | Frequency (MHz) |       | Worst-Case Orientation | Antenna Polarization | Frequencies (MHz) | Emission (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------|------------|-----------------|-------|------------------------|----------------------|-------------------|-------------------|----------------|-------------|
|           |            | Start           | Stop  |                        |                      |                   |                   |                |             |
| TX        | Quasi-Peak | 30              | 88    | Side                   | H                    | 63.48             | 30.4              | 40             | -9.6        |
| TX        | Quasi-Peak | 30              | 88    | Side                   | V                    | 70.86             | 20.23             | 40             | -19.77      |
| TX        | Quasi-Peak | 30              | 88    | Side                   | V                    | 74.58             | 21.34             | 40             | -18.66      |
| TX        | Quasi-Peak | 216             | 1000  | Side                   | H                    | 250.88            | 21.98             | 46             | -24.02      |
| TX        | Quasi-Peak | 216             | 1000  | Side                   | V                    | 500               | 30.49             | 46             | -15.51      |
| TX        | Quasi-Peak | 216             | 1000  | Side                   | V                    | 880               | 28.94             | 46             | -17.06      |
| TX        | Peak       | 1000            | 26000 | Side                   | V                    | 1550              | 43.35             | 54             | -10.65      |
| TX        | Average    | 1000            | 26000 | Side                   | V                    | 1550              | 24.88             | 54             | -29.12      |

### 3. Restricted Band-Edge Measurement

**Measurement Settings:**

RBW: 1MHz

VBW: 3x RBW

Sweep time: No faster than Coupled (auto) time

Detector: Peak and Average

Trace: Max Hold

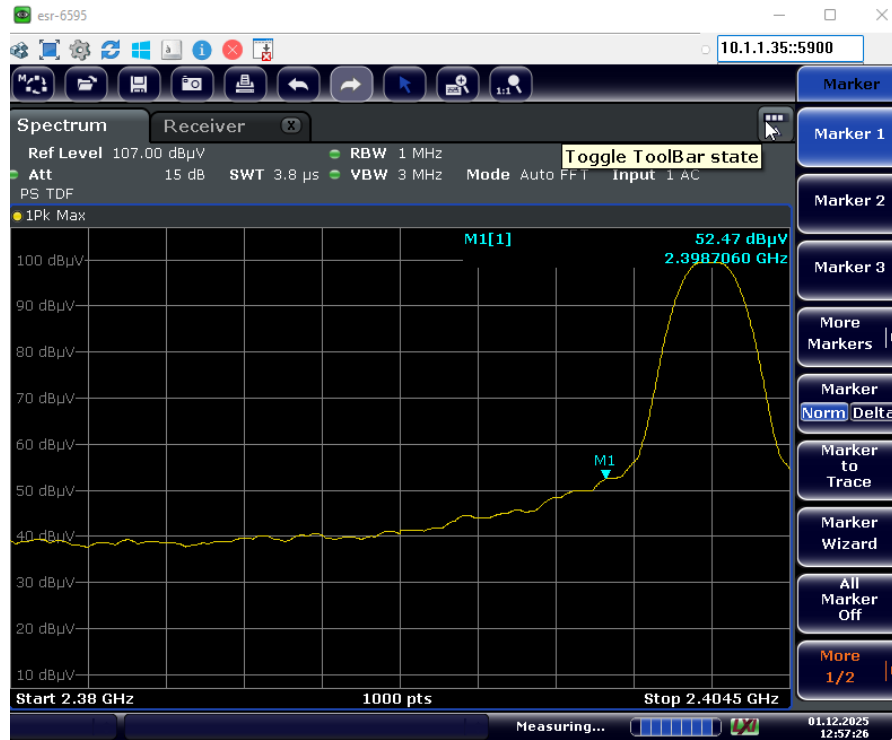
Per section 15.205 only spurious emissions are permitted in the frequency bands 2310-2390MHz and 2483.5-2500MHz and shall not exceed the limits shown in 15.209.

This measurement is a conducted measurement performed with a receiver. Prior to measurement the EUT is placed into a continuous transmit mode via a communications board attached to the EUT.

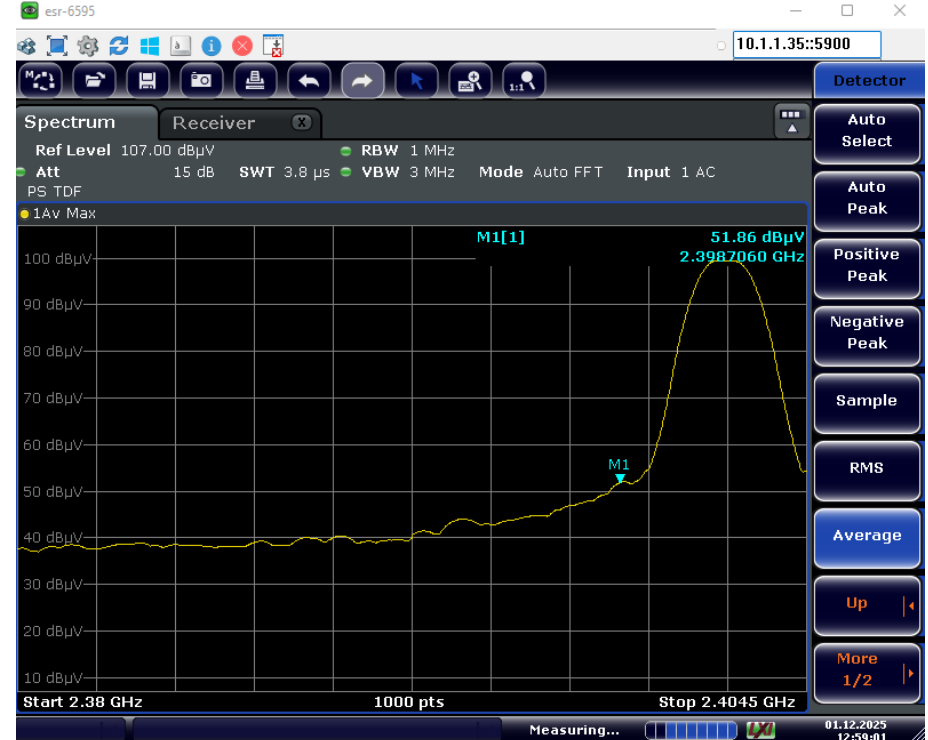
The restricted band edge measurement was performed with the transmitter set separately at 2402MHz and 2480MHz. For each of the measurements the emissions were below the limit

| Measurement Frequency | Antenna Polarization | Measurement (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----------------------|----------------------|----------------------|----------------|-------------|----------|
| 2400                  | Horizontal           | 52.47                | 74             | 21.53       | Peak     |
| 2400                  | Horizontal           | 51.86                | 54             | 2.14        | Average  |
| 2400                  | Vertical             | 52.17                | 74             | 21.83       | Peak     |
| 2400                  | Vertical             | 50.28                | 54             | 3.72        | Average  |
| 2483.5                | Horizontal           | 50.12                | 74             | 23.88       | Peak     |
| 2483.5                | Horizontal           | 50.05                | 54             | 3.95        | Average  |
| 2483.5                | Vertical             | 46.01                | 74             | 27.99       | Peak     |
| 2483.5                | Vertical             | 46.44                | 54             | 7.56        | Average  |

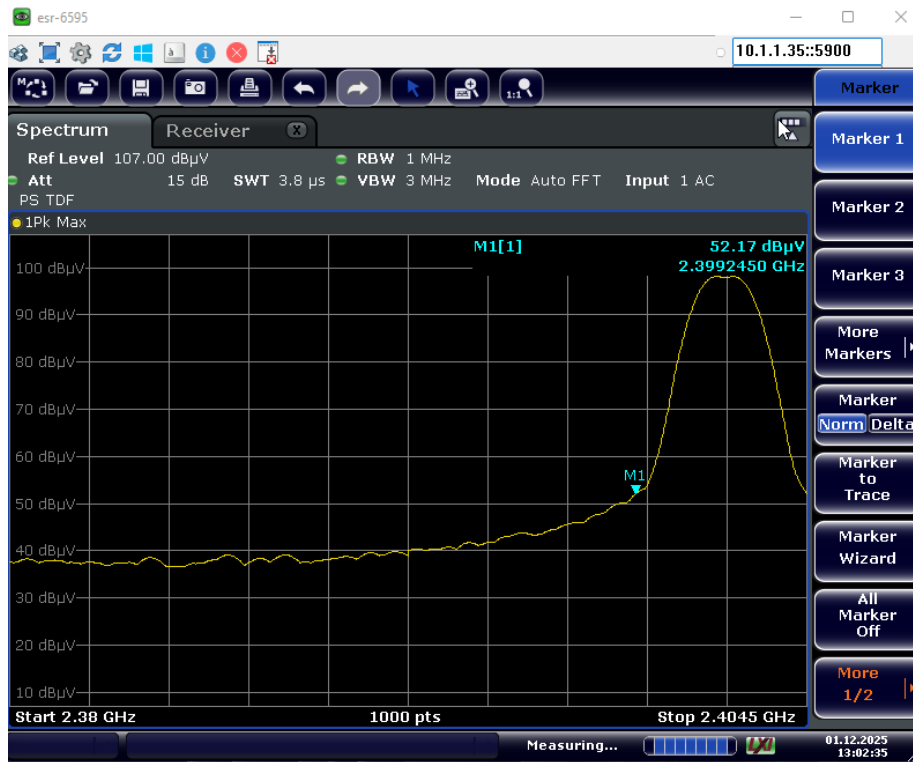
## 2402 MHz Peak Horizontal



## 2402 MHz Average Horizontal



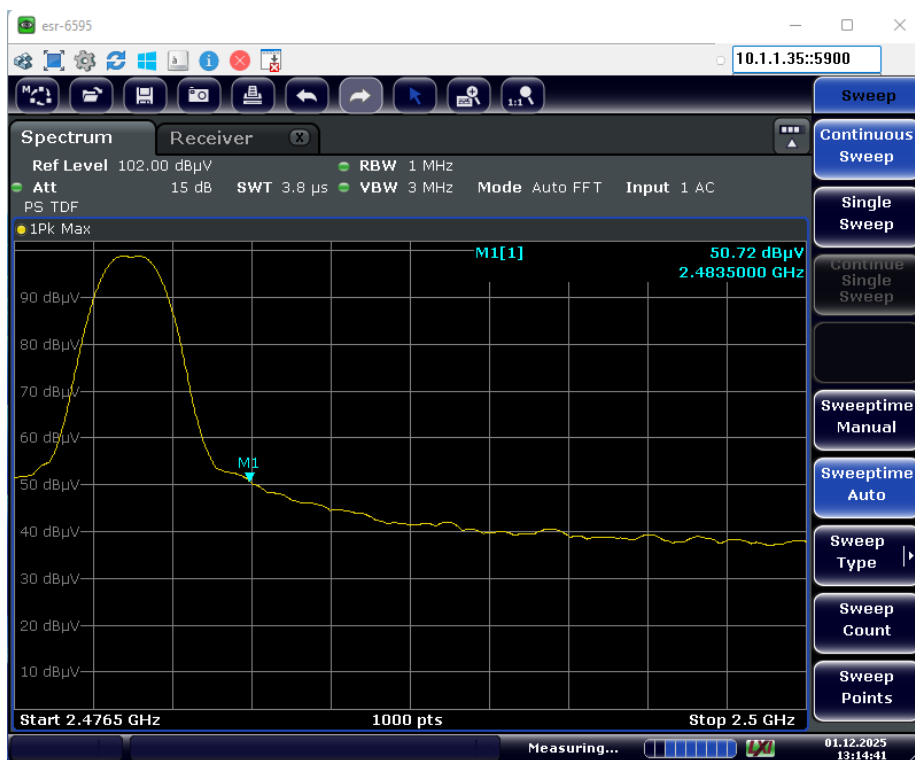
## 2402 MHz Peak Vertical



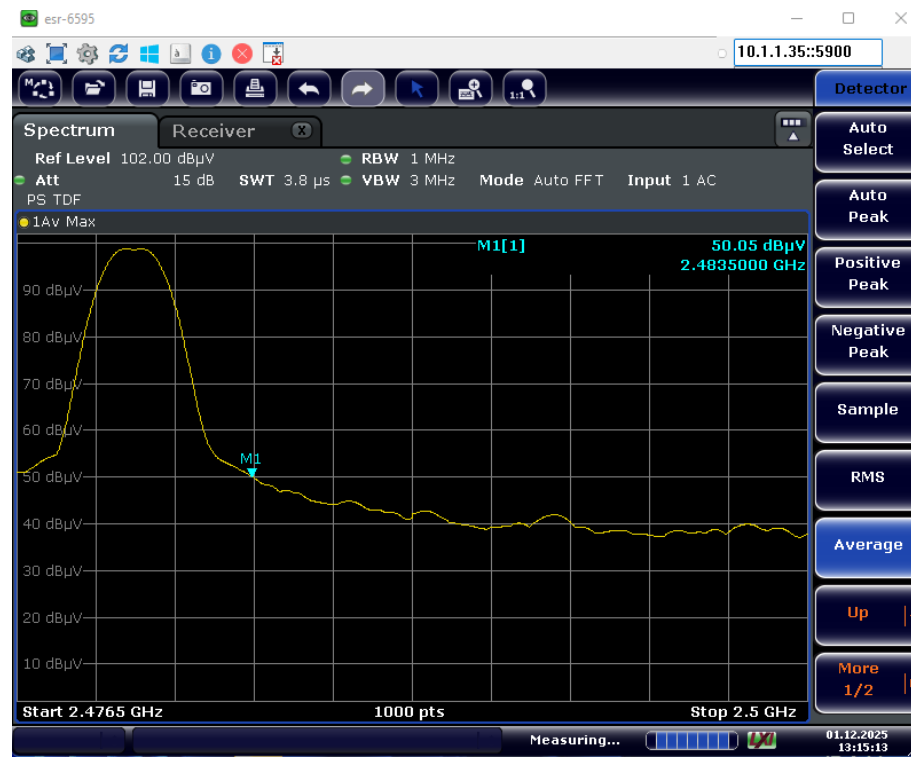
## 2402 MHz Average Vertical



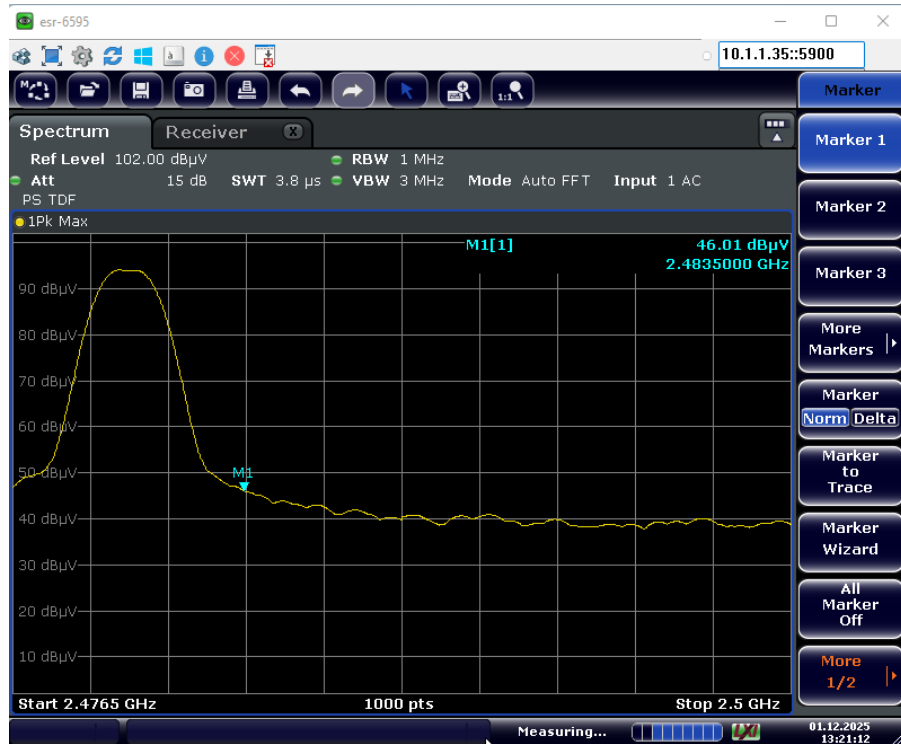
## 2480 MHz Peak Horizontal



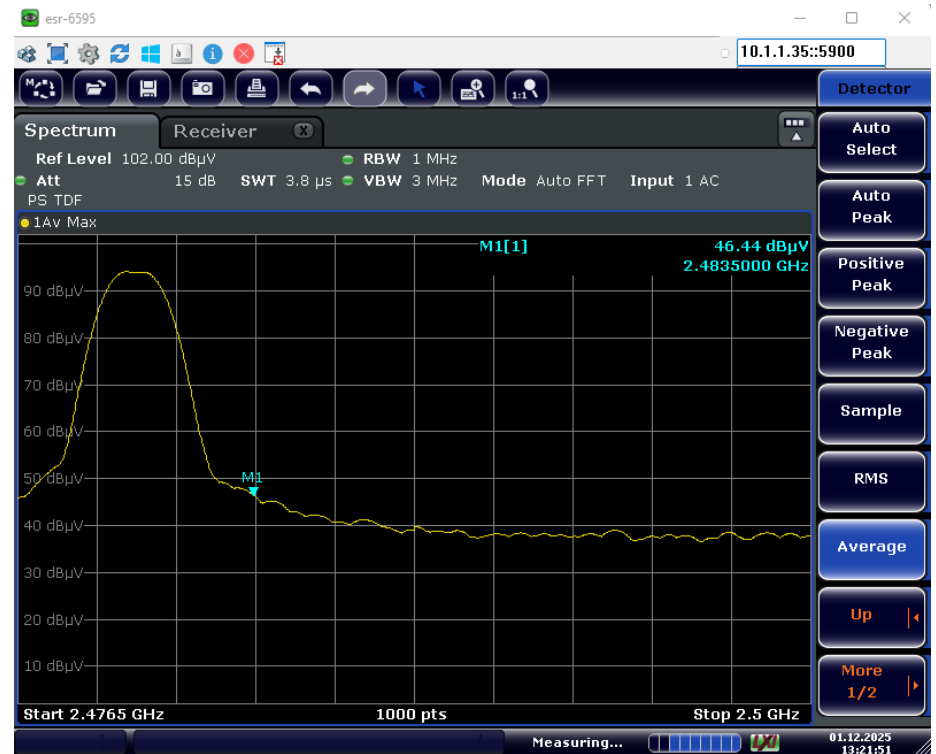
## 2480 MHz Average Horizontal



## 2480 MHz Peak Vertical



## 2480 MHz Average Vertical



## 4. Conducted Emissions

### 1. 99% Bandwidth

**Measurement Settings:**

Frequency Span: 2-5 times the OBW

RBW: 1 to 5% of the OBW without going below 10kHz

VBW: 3 times the RBW

Detector: Peak

Trace Max Hold

This Measurements is a conducted measurement. Prior to the measurement the EUT is placed into a continuous transmit mode via a communications board attached to the EUT.

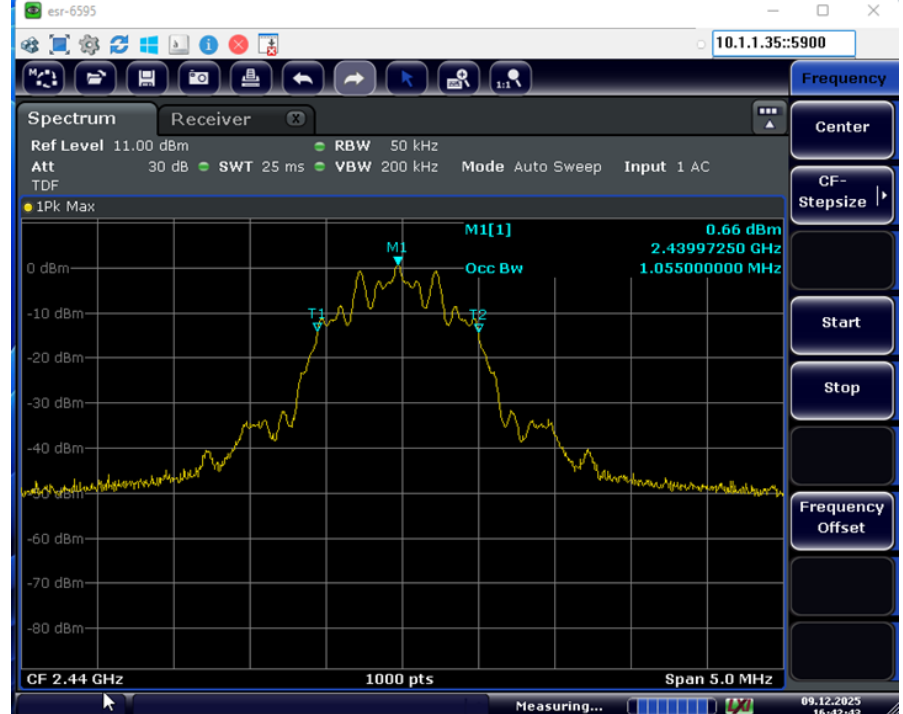
In the measurement of the 99% bandwidth, the transmit frequency was set to the low, middle, and high channels of operation. This measurement is taken for information only.

| Channel | 99%<br>BW<br>(kHz) |
|---------|--------------------|
| Low     | 1055               |
| Mid     | 1055               |
| High    | 1050               |

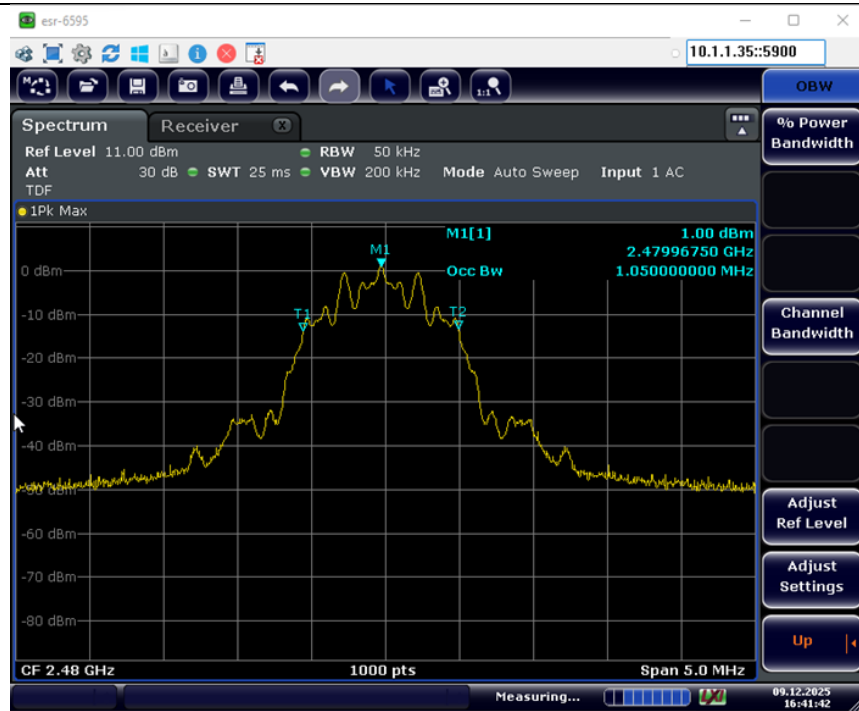
## 2402 MHz



## 2440 MHz



## 2480 MHz



## 2. 6dB Bandwidth

### Measurement Settings:

RBW: in the range of 1 to 5% of the OBW but not less than 100kHz

VBW: Equal to or greater than 3 times the RBW

Span: Greater than the DTS bandwidth

Sweep time: No faster than the coupled (auto) time

Detector: Peak

Trace mode: Max Hold

**6dB Bandwidth Requirement:** Per 15.247(a)(2), systems using digital modulation may operate in the 2400-2483.5 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz

This measurement is a conducted measurement performed with the receiver per test method ANSI C63.10 section 11.8. Prior to measurement the EUT is placed into a continuous transmit mode via a communication board attached to the EUT.

In the measurement of the 6dB bandwidth, the transmit frequency was set to low, middle, and high channels of operation.

| Channel # | Frequency (MHz) | 6dB Bandwidth (kHz) | Limit (kHz) | Results |
|-----------|-----------------|---------------------|-------------|---------|
| 0         | 2402            | 705                 | >500        | Pass    |
| 19        | 2440            | 695                 | >500        | Pass    |
| 39        | 2480            | 695                 | >500        | Pass    |

## 2402 MHz



## 2440 MHz



**2480 MHz**



### 3. Peak Output Power

**Measurement Settings:**

RBW: Greater than the worst case DTS occupied bandwidth

VBW: Equal to or greater than 3 times the RBW

Span: Equal to or greater than 3 times the RBW

Sweep time no faster than coupled (auto) time

Detector: Peak

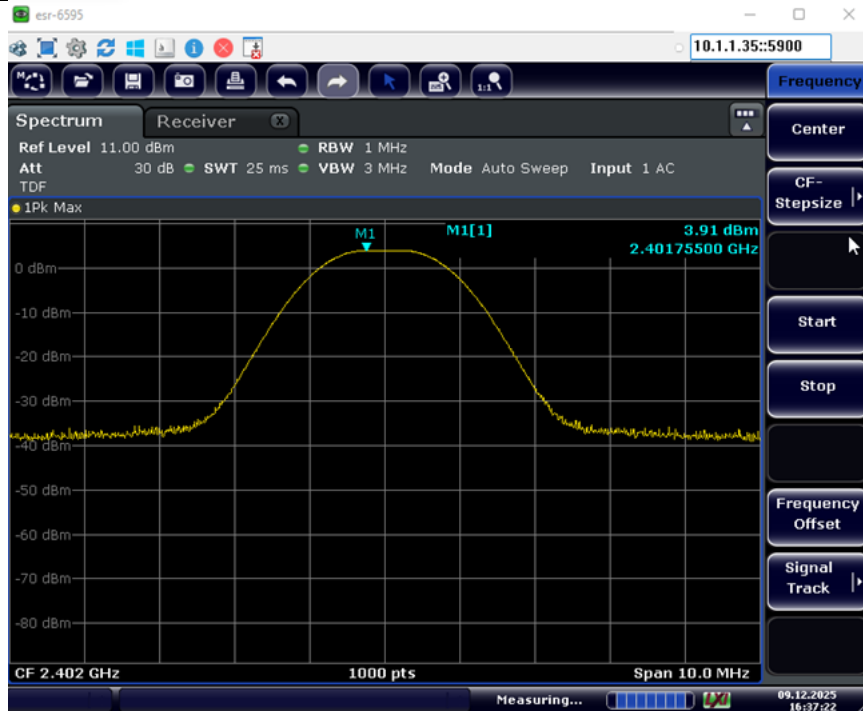
**Peak Output Power Requirement:** Per 15.247(b)(3) The maximum Peak Conducted Output Power of the intentional radiator shall not exceed the 1W (30dBm) for systems using digital modulation in the 2400-2483.5MHz

This measurement is a conducted measurement performed with the receiver per test method ANSI C63.10 section 11.9. Prior to measurement the EUT is placed into a continuous transmit mode via a communications board attached to the EUT.

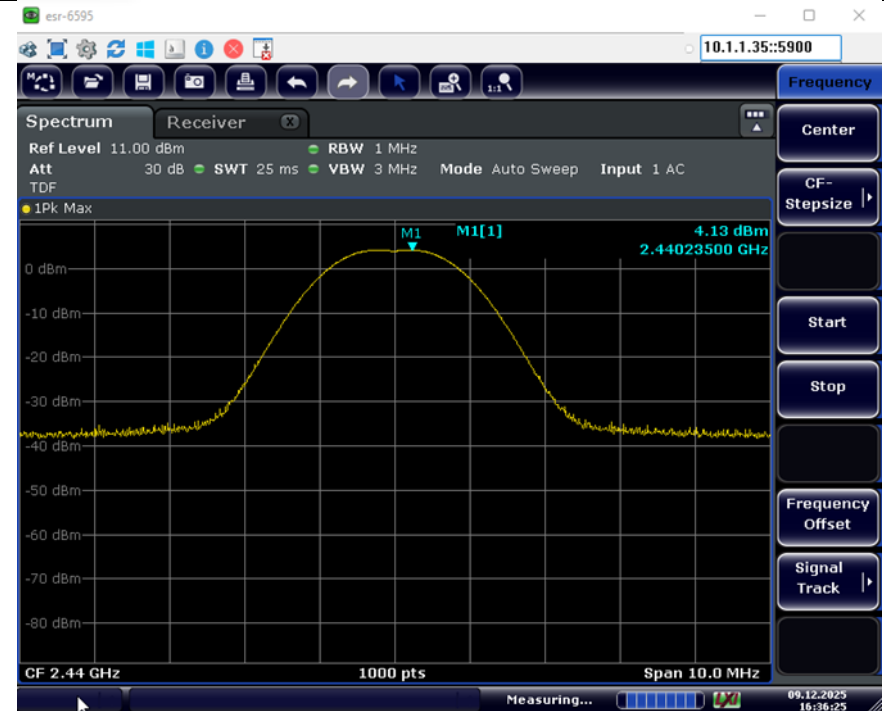
In the measurement of the Peak Output Power, the transmit frequency was set to low, middle, and high channels of operation.

| Channel # | Frequency (MHz) | Power Output (dBm) | Limit (dBm) | Margin (dB) |
|-----------|-----------------|--------------------|-------------|-------------|
| 0         | 2402            | 3.91               | 30          | 26.09       |
| 19        | 2440            | 4.13               | 30          | 25.87       |
| 39        | 2480            | 4.3                | 30          | 25.7        |

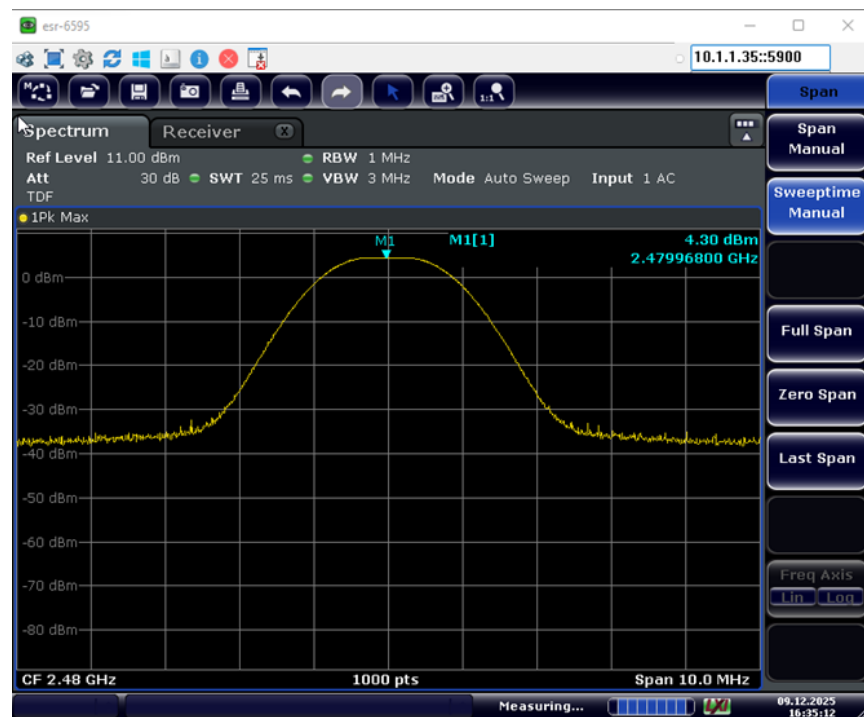
**2402 MHz**



**2440 MHz**



2480 MHz



#### 4. Power Spectral Density

**Measurement Settings:**

Span: Greater than 1.5 times the DTS bandwidth

RBW: set to between 3kHz and 100kHz

VBW: Equal to or greater than 3 times the RBW

Sweep time: No faster than the coupled (auto) time

Detector: Peak

Trace mode: Max hold

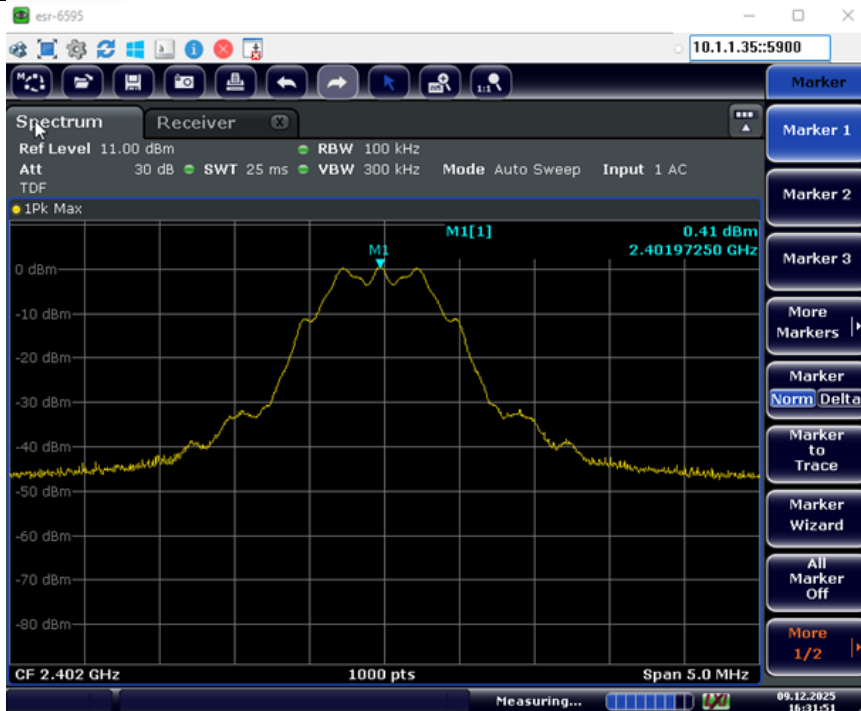
**Power Spectral Density requirement:** Per 15.247(e) for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. The same method of determining the conducted output power shall be used to determine the power spectral density.

This measurement is a conducted measurement performed with the receiver per test method ANSI C63.10 section 11.10. Prior to measurement the EUT is placed into a continuous transmit mode via communications board attached to the EUT.

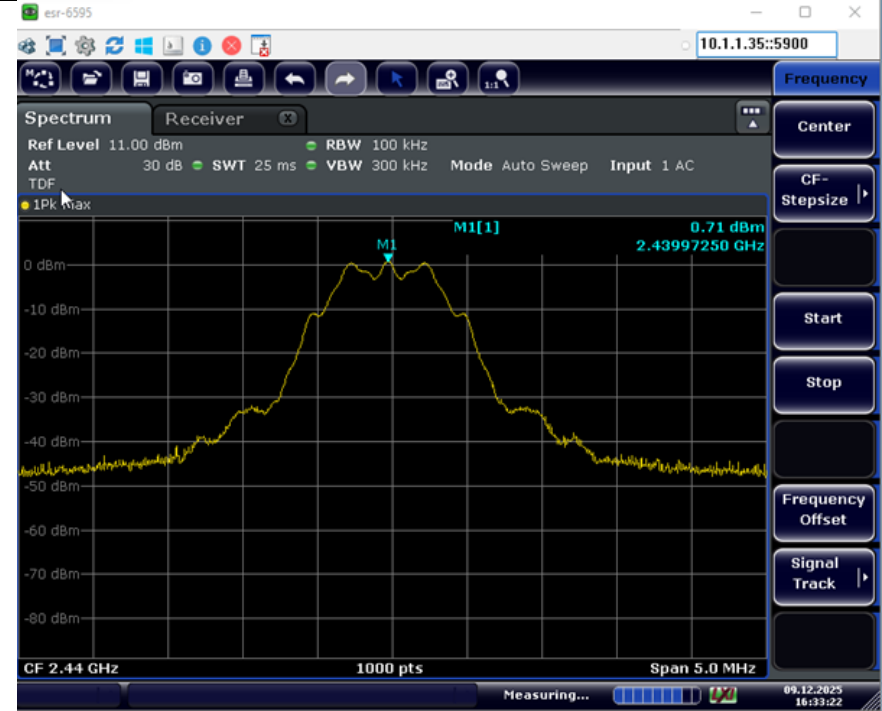
In the measurement of the power spectral density, the transmit frequency was set to low, middle, and high channels of operation.

| Channel # | Frequency (MHz) | Measurement PPSD (dBm) | Limit (dBm) | Margin (dB) |
|-----------|-----------------|------------------------|-------------|-------------|
| 0         | 2402            | 0.41                   | 8           | 7.59        |
| 19        | 2440            | 0.71                   | 8           | 7.29        |
| 39        | 2480            | 1.03                   | 8           | 6.97        |

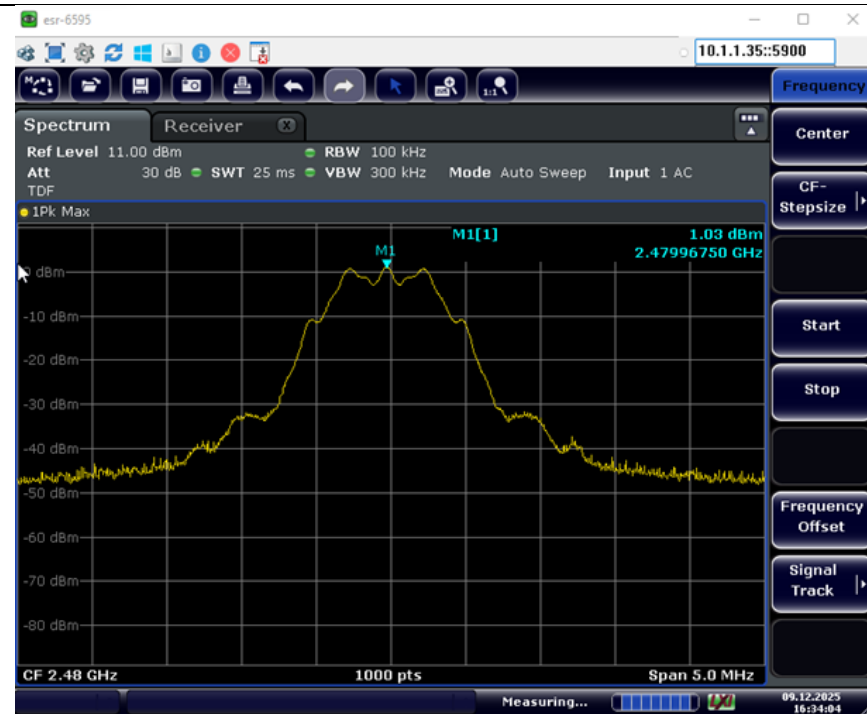
**2402 MHz**



**2440MHz**



**2480 MHz**



## 5. Conducted Emissions Sweep – 30MHz to 25GHz

Sweep 1: Peak - 100 kHz

Segment: 1

Start Frequency: 30 MHz

End Frequency: 1000 MHz

Band: Band 1

Detector: Peak

Sweep Mode: FFT

Attenuator: 5 dB

Pre-Amp: On

Max Hold Trace Mode: Off

Bandwidth Filter: EMI (6dB)

RBW: 100 kHz

Step Size: AUTO (25 kHz)

Dwell Time: 10ms

Notch Filter (2.4 - 2.5 GHz): Disabled

Notch Filter (5.725 - 5.875 GHz): Disabled

Sweep 1: Peak - 100 kHz

Segment: 2

Start Frequency: 1000 MHz

End Frequency: 4000 MHz

Band: Band 2

Detector: Peak

Sweep Mode: FFT

Attenuator: 10 dB

Pre-Amp: On

Max Hold Trace Mode: Off

Bandwidth Filter: EMI (6dB)

RBW: 100 kHz

Step Size: AUTO (25 kHz)

Dwell Time: 10ms

Notch Filter (2.4 - 2.5 GHz): Disabled

Notch Filter (5.725 - 5.875 GHz): Disabled

Sweep 1: Peak - 100 kHz

Segment: 3

Start Frequency: 4000 MHz

End Frequency: 18000 MHz

Band: Band 3

Detector: Peak

Sweep Mode: FFT

Attenuator: 5 dB

Pre-Amp: On

Max Hold Trace Mode: Off

Bandwidth Filter: EMI (6dB)

RBW: 100 kHz

Step Size: AUTO (25 kHz)

Dwell Time: 10ms

Notch Filter (2.4 - 2.5 GHz): Disabled

Notch Filter (5.725 - 5.875 GHz): Disabled

Sweep 1: Peak - 100 kHz

Segment: 4

Start Frequency: 18000 MHz

End Frequency: 26000 MHz

Band: Band 4

Detector: Peak

Sweep Mode: FFT

Attenuator: 5 dB

Pre-Amp: On

Max Hold Trace Mode: Off

Bandwidth Filter: EMI (6dB)

RBW: 100 kHz

Step Size: AUTO (25 kHz)

Dwell Time: 10ms

Notch Filter (2.4 - 2.5 GHz): Disabled

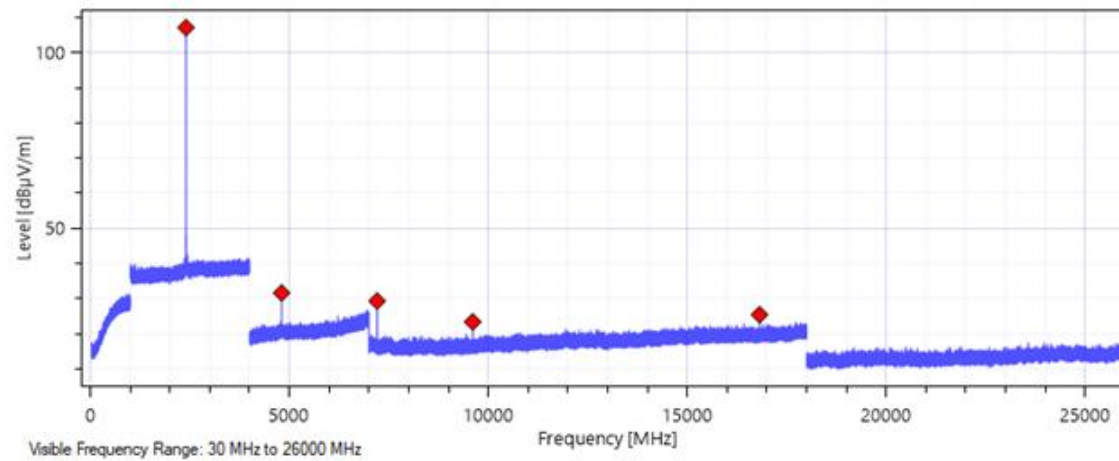
Notch Filter (5.725 - 5.875 GHz): Disabled

Per section 15.247(d), 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).

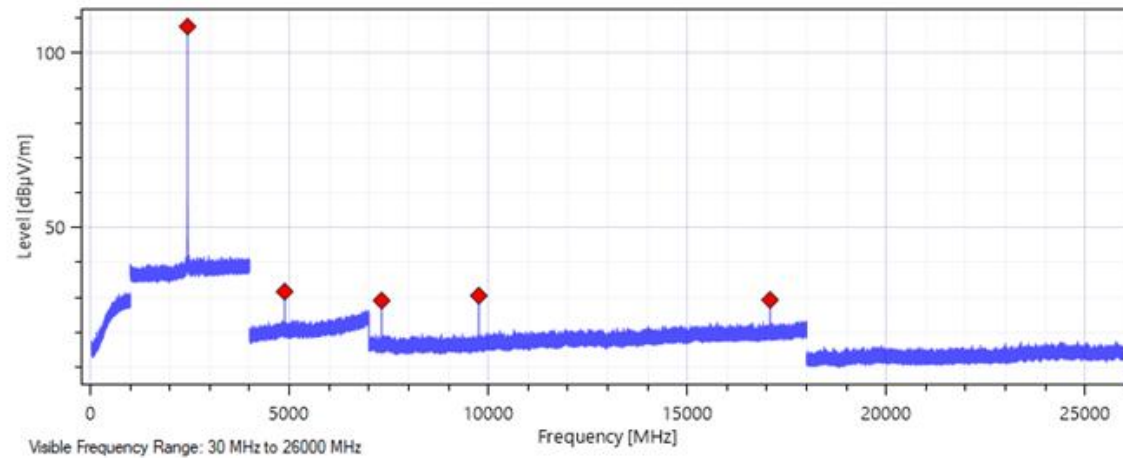
This measurement is a conducted measurement performed with a receiver. Prior to measurement the EUT is placed into a continuous transmit mode via a communications board attached to the EUT.

The band edge measurement was performed with the transmitter set separately at the low, mid, and high channel of operation. For each of the measurements the emissions were greater than 20dB below the peak of the signal.

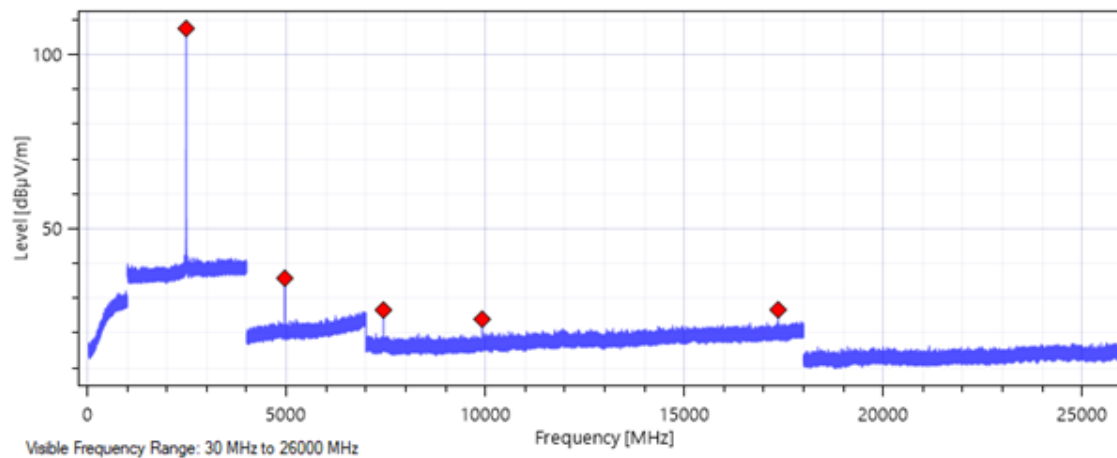
| Channel | Worst-Case Delta (dB) | Limit (dB) | Margin |
|---------|-----------------------|------------|--------|
| Low     | 75.582                | 20         | 55.6   |
| Mid     | 76.026                |            | 56.0   |
| High    | 71.813                |            | 51.8   |



| Frequency (MHz) | Level (dBμV/m) |
|-----------------|----------------|
| 2,402           | 107.242        |
| 4,804.45        | 31.65          |
| 7,205.15        | 29.357         |
| 9,606.875       | 23.421         |
| 16,815.55       | 25.45          |



| Frequency (MHz) | Level (dBμV/m) |
|-----------------|----------------|
| 2,440           | 107.692        |
| 4,880.45        | 31.666         |
| 7,319.175       | 29.11          |
| 9,760.875       | 30.515         |
| 17,081.525      | 29.285         |
| 4,880.45        | 31.666         |



| Frequency (MHz) | Level (dBμV/m) |
|-----------------|----------------|
| 2,480           | 107.606        |
| 4,959.45        | 35.793         |
| 7,440.65        | 26.653         |
| 9,919.125       | 24.014         |
| 17,358.025      | 26.729         |