

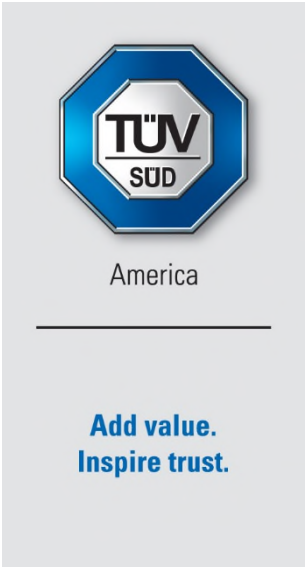
Report on the Testing of the

DexCom Inc.
Falcon Receiver (+8dB)

FCC ID: PH26403
IC: 9290A-26403
HVIN: MT26403-3

In accordance with:
FCC 47 CFR Part 15.247
FCC 47 CFR Part 15.107
ISED RSS-247 Issue 2, February 2017

Prepared for: DexCom Inc.
6340 Sequence Dr.
San Diego, CA 92121



COMMERCIAL-IN-CONFIDENCE

Document Number: NC72162700.4 | Issue: 1

SIGNATURE

| NAME | JOB TITLE | RESPONSIBLE FOR | ISSUE DATE |
|---------------|--------------------------|----------------------|----------------|
| Franklin Rose | Sr. RF Wireless Engineer | Authorized Signatory | 31 August 2021 |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD America, Inc. document control rules.

| | |
|--|---|
| FCC Accreditation Designation Number US1148 New Brighton, MN Test Laboratory | Innovation, Science, and Economic Development Canada Accreditation Site Number 4512A New Brighton, MN Test Laboratory |
|--|---|

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with the standards listed above and the tests shown in Table 1.3.1 of this report.



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Contents

| | | |
|----------|--|-----------|
| 1 | Report Summary | 3 |
| 1.1 | Report Modification Record..... | 3 |
| 1.2 | Introduction..... | 3 |
| 1.3 | Summary of Results | 4 |
| 1.4 | Product Information | 5 |
| 1.5 | Deviations from the Standard..... | 6 |
| 1.6 | EUT Modification Record | 6 |
| 1.7 | Test Location | 6 |
| 2 | Test Details | 7 |
| 2.1 | Antenna Requirements..... | 7 |
| 2.2 | 6dB / 99% Bandwidth | 8 |
| 2.3 | Peak Conducted Output Power..... | 17 |
| 2.4 | Power Spectral Density | 23 |
| 2.5 | Conducted Spurious Emissions | 29 |
| 2.6 | Conducted Band-Edge | 34 |
| 2.7 | Conducted Emissions..... | 38 |
| 2.8 | Radiated Spurious Emissions | 53 |
| 2.9 | Radiated Band-Edge | 74 |
| 3 | Accreditation, Disclaimers and Copyright..... | 82 |



1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Table 1.1-1 – Modification Record

| Issue | Description of Change | Date of Issue |
|-------|-----------------------|----------------|
| 1 | First Issue | 31 August 2021 |

1.2 Introduction

| | |
|-------------------------------|---|
| Manufacturer | DexCom Inc. |
| Applicant’s Email Address | Andrew.Burton@dexcom.com |
| Model Number(s) | MT26404-X |
| Serial Number(s) | RE F1 SN: PG049G07FA00001233 |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | FCC 47 CFR Part 15.247 FCC 47 CFR Part 15 Subpart B ISED RSS-247 Issue 2, February 2017 |
| Order Number | 72162700 |
| Date of Receipt of EUT | 15 June 2021 |
| Start of Test | 15 June 2021 |
| Finish of Test | 19 June 2021 |
| Related Document(s) | N/A |

Note: The report applies to all localized versions of the receiver whose model number is MT26404-X, where the X is a single- or double-digit alphanumeric identifier used to identify the localized / translated version of the user interface. All versions of the MT26404-X devices have identical hardware configuration and wireless radio performance.



1.3 Summary of Results

A summary of the tests carried out in accordance with the specifications shown below.

Table 1.3-1 – Summary of Results

| Section | Specification Clause | | Test Description | Accreditation | Base Standard |
|---------|----------------------|----------------|--|---------------|-----------------------|
| 2.1 | 15.203 | RSS-GEN | Antenna Requirements | A2LA | FCC Sub Part C 15.203 |
| 2.2 | 15.247(b)(2) | RSS-247 (5.2a) | 6dB / 99% Bandwidth | A2LA | ANSI C63.10:2013 |
| 2.3 | 15.247(b)(3) | RSS-247 (5.4d) | Peak Conducted Output Power | A2LA | ANSI C63.10:2013 |
| 2.4 | 15.247(e) | RSS-247 (5.2b) | Power Spectral Density | A2LA | ANSI C63.10:2013 |
| 2.5 | 15.247(d) | RSS-247 (5.5) | Conducted Spurious Emissions | A2LA | ANSI C63.10:2013 |
| 2.6 | 15.247(d) | RSS-247 (5.5) | Conducted Band-Edge | A2LA | ANSI C63.10:2013 |
| 2.7 | 15.207 | RSS-GEN | Conducted Emissions 15.207 | A2LA | ANSI C63.10:2013 |
| 2.8 | 15.247(d) | RSS-GEN | Radiated Spurious Emissions | A2LA | ANSI C63.10:2013 |
| 2.9 | 15.205 | RSS-GEN | Radiated Restricted Bands of Emissions | A2LA | ANSI C63.10:2013 |

Table 1.3-2 – Test Accreditation

| Test Name | Name of Tester(s) | Results / Comments |
|--|-------------------|--------------------|
| Antenna Requirements | Sean Sellergren | Pass |
| 6dB / 99% Bandwidth | Sean Sellergren | Pass |
| Peak Conducted Output Power | Sean Sellergren | Pass |
| Power Spectral Density | Sean Sellergren | Pass |
| Conducted Spurious Emissions | Sean Sellergren | Pass |
| Conducted Band-Edge | Sean Sellergren | Pass |
| Conducted Emissions 15.207 | Sean Sellergren | Pass |
| Radiated Spurious Emissions | Sean Sellergren | Pass |
| Radiated Restricted Bands of Emissions | Sean Sellergren | Pass |



1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT): Bluetooth Low Energy (BLE) used inside a DexCom Falcon Receiver used to monitor glucose levels.

Table 1.4-1 – Wireless Module Technical Information

| Detail | Description |
|-----------------------------|--|
| FCC ID# | PH26403 |
| Transceiver Model # | MT26404-X |
| IC ID | 9290A-26403 |
| HVIN | MT26403-3 |
| Transmit Frequency | 2402MHz – 2480MHz |
| Receiver Frequency | 2402MHz – 2480MHz |
| Antenna Type / Description: | Manufacture: Texas Instruments Model: AN043 Type: Planar Inverted F Gain: 2 dBi |

A full description and detailed product specification details are available from the manufacturer.



Table 1.4-2 – Cable Descriptions

| Cable/Port | Description |
|------------|-----------------------|
| Micro-USB | Battery charging port |
| | |

Table 1.4-3 – Support Equipment Descriptions

| Make/Model | Description |
|------------|-------------|
| N/A | N/A |
| | |

1.4.2 Modes of Operation

The tested mode of operation was:

The EUT was modified by Dexcom Inc. with special firmware in order to properly modify the radio channels and transmission states for testing. The EUT was also set to a power level of 8dBm for all testing. For all antenna conducted testing the EUT was modified by Dexcom Inc. to include a short antenna connection to allow direct instrumentational measurements.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

Table 1.6-1 – Modification Record

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|--------------------|---|------------------------|--------------------------|
| 0 | Initial State | | |

1.7 Test Location

TÜV SÜD conducted the following tests at our New Brighton, MN Test Laboratory.
Office address:

TÜV SÜD America
141 14th Street NW
New Brighton, MN 55112 USA

TÜV SÜD America Inc
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2 Test Details

2.1 Antenna Requirements

2.1.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, 15.203
 RSS-GEN Issue 5

2.1.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.1.3 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Note: Above statement is taken from FCC Part 15 Subpart C §15.203

Table 2.1-1 – Antenna Used In EUT

| Antenna Type | Connection Type | Antenna Gain |
|-------------------|-----------------|--------------|
| Planar Inverted F | USB Dongle | 2 dBi |



2.2 6dB / 99% Bandwidth

2.2.1 Specification Reference

FCC 47 CFR Part 15.247(a)(2)
RSS-247 5.2(a)

2.2.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.2.3 Date of Test

16 June 2021

2.2.4 Test Method

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 15.247 Meas Guidance v05r02. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz and the Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold using a peak detector. The marker-delta function of the spectrum analyzer was utilized to determine the 6dB bandwidth of the emission.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth value. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The RBW to 1-5% of the occupied bandwidth and the VBW set to ≥ 3 times the RBW.

2.2.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.



2.2.6 Test Results

Table 2.2-1 – 6dB / 99% Bandwidth Results – F1 Unit

| Frequency (MHz) | 6dB Bandwidth (kHz) | 99% Bandwidth (MHz) |
|-----------------|---------------------|---------------------|
| 2402 | 708.33 | 1.064 |
| 2440 | 727.56 | 1.064 |
| 2480 | 804.48 | 1.060 |

Test Summary: The EUT was set to 8dBm and modulation active during testing. The EUT operated as intended before, during, and after testing.

Test Result: Pass

See data below for detailed results.



2.2.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
Test Area: CSAC1

Table 2.2-2 – Conducted Emissions Test Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|-----------------|------------------------|-------------|----------|----------|------------|------------|
| NBLE02001 | Pasternack | Attenuator, 10 dB | 18N20W-10dB | 2001 | G | 11/06/2020 | 11/06/2021 |
| DEMC3002 | Rohde & Schwarz | Receiver, 20 Hz-40 GHz | ESU40 | 100346 | G | 05/14/2021 | 05/14/2022 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.3 Peak Conducted Output Power

2.3.1 Specification Reference

FCC 47 CFR Part 15.247(b)(3)
RSS-247 5.2(d)

2.3.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.3.3 Date of Test

16 June 2021

2.3.4 Test Method

The maximum peak conducted output power was measured in accordance with the FCC KDB 558074 D01 15.247 Meas Guidance v05r02 utilizing the $RBW \geq DTS$ Bandwidth method. The RF output of the EUT was directly connected to the input of the spectrum analyzer along with a suitable external attenuator.

Maximum conducted output limit is equal to 1 Watt (30dBm).

2.3.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.



2.3.6 Test Results

Table 2.3-1 – Peak Conducted Output Power Results

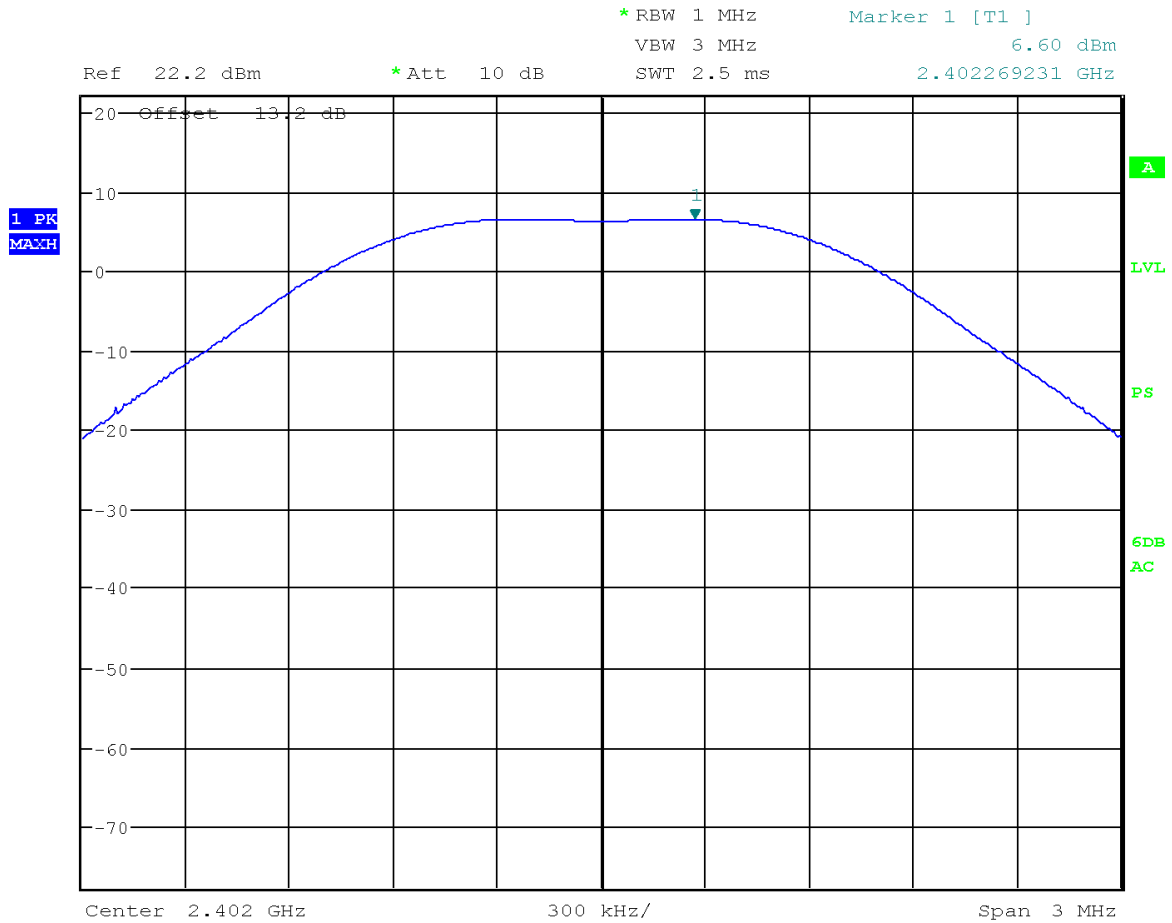
| Frequency (MHz) | Measured Output Power (dBm) |
|-----------------|-----------------------------|
| 2402 | 6.60 |
| 2440 | 6.51 |
| 2480 | 6.32 |

Note: Measured Output Power includes correction offset for external attenuator and cable.

Test Summary: The EUT was set to 8dBm and modulation active during testing. The EUT operated as intended before, during, and after testing.

Test Result: Pass

See data below for detailed results.

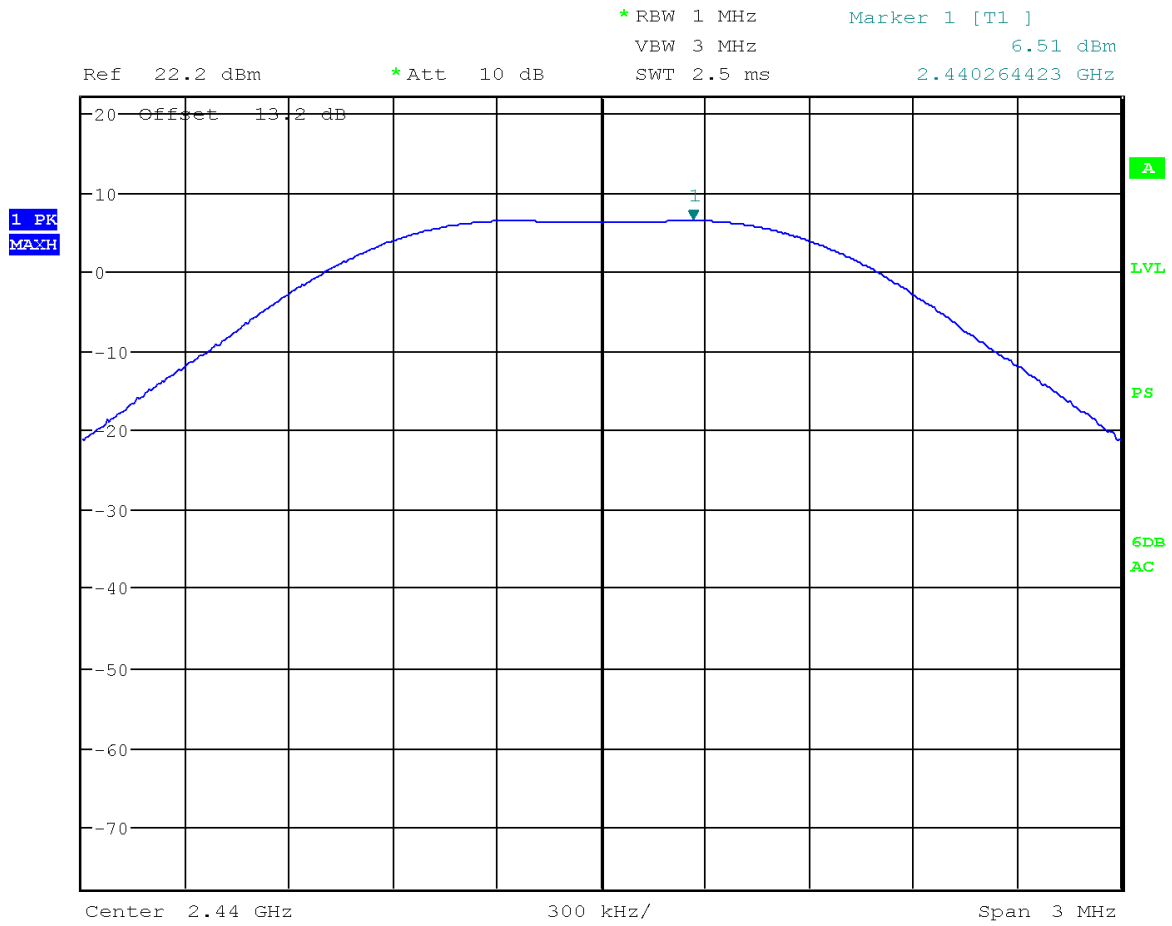


Date: 16.JUN.2021 14:46:06

Figure 2.3-1 – Peak Conducted Output Power – Low Channel

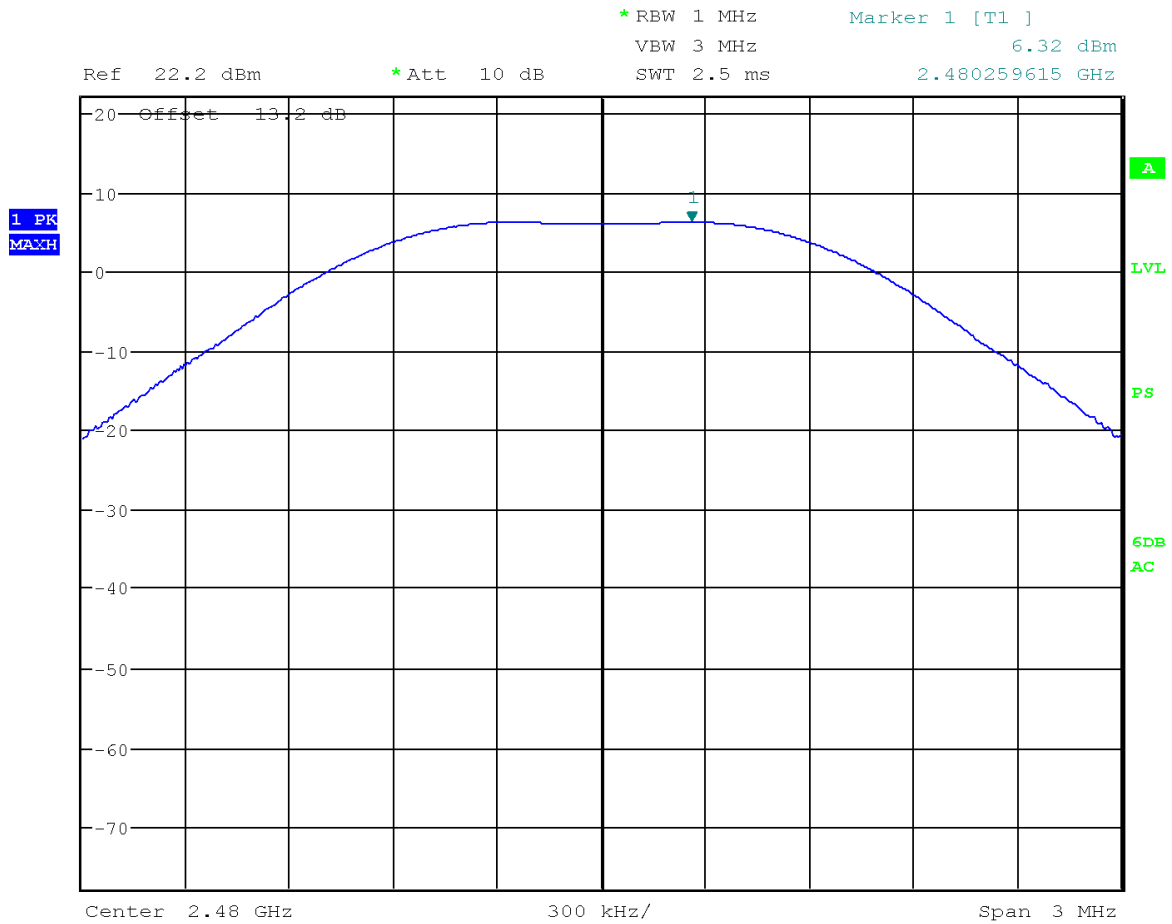
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New Brighton, MN 55112

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Date: 16.JUN.2021 14:44:40

Figure 2.3-2 – Peak Conducted Output Power – Middle Channel



Date: 16.JUN.2021 14:43:35

Figure 2.3-3 – Peak Conducted Output Power – High Channel



2.3.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: CSAC1

Table 2.3-2 – Conducted Emissions Test Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|-----------------|------------------------|-------------|----------|----------|------------|------------|
| NBLE02001 | Pasternack | Attenuator, 10 dB | 18N20W-10dB | 2001 | G | 11/06/2020 | 11/06/2021 |
| DEMC3002 | Rohde & Schwarz | Receiver, 20 Hz-40 GHz | ESU40 | 100346 | G | 05/14/2021 | 05/14/2022 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.4 Power Spectral Density

2.4.1 Specification Reference

FCC 47 CFR Part 15.247(e)
RSS-247 5.2(b)

2.4.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.4.3 Date of Test

16 June 2021

2.4.4 Test Method

The maximum peak conducted output power was measured in accordance with the FCC KDB 558074 D01 15.247 Meas Guidance v05r02 utilizing the PKPSD (peak PSD) method. The RF output of the EUT was directly connected to the input of the spectrum analyzer along with a suitable external attenuator. The RBW of the spectrum analyzer was set to 50kHz and the VBW was set to ≥ 3 times the RBW. The spectrum analyzer was set to max hold using the peak detector.

Power Spectral Density limit is equal to 8dBm.

2.4.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.



2.4.6 Test Results

Table 2.4-1 – Peak Conducted Output Power Results

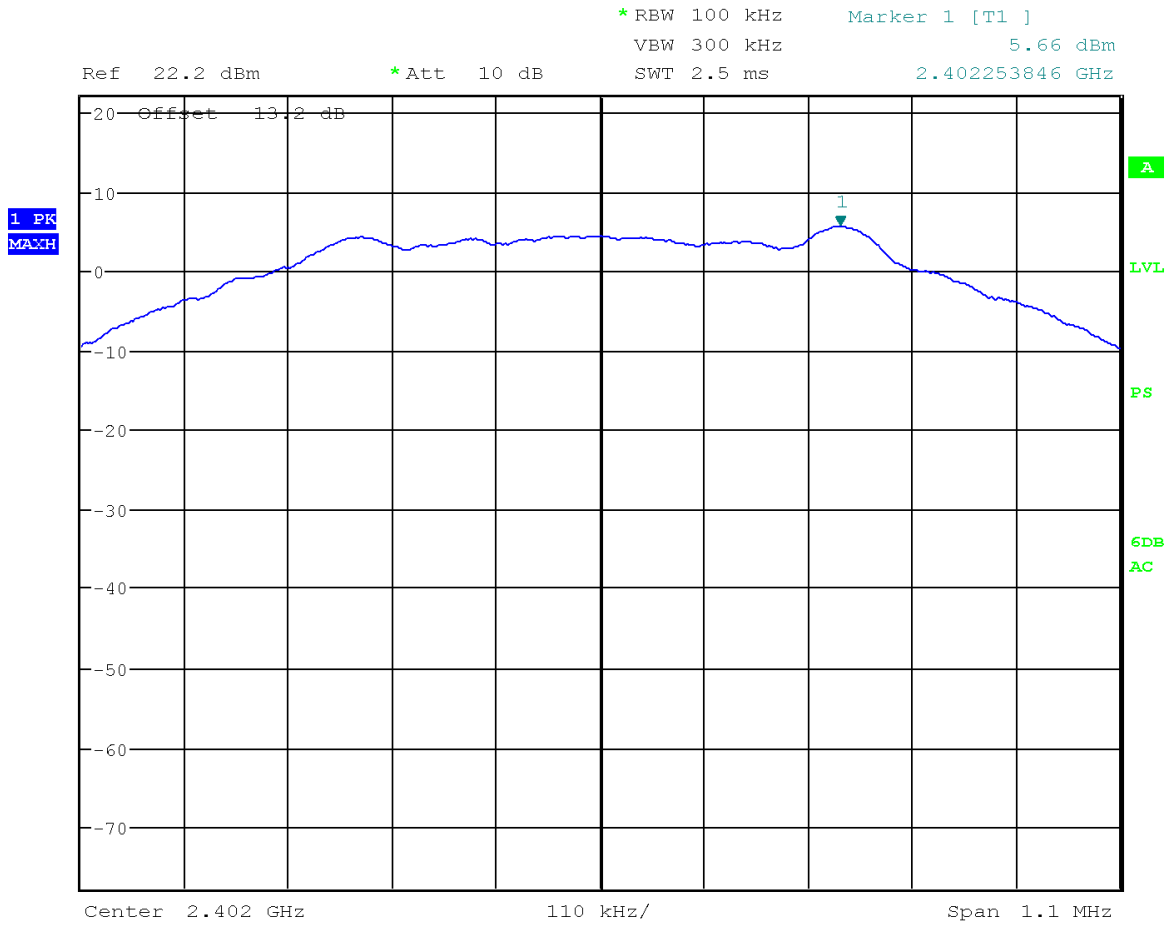
| Frequency (MHz) | Measured PSD Level (dBm) |
|-----------------|--------------------------|
| 2402 | 5.66 |
| 2440 | 5.18 |
| 2480 | 5.20 |

Note: Measured PSD Level includes correction offset for external attenuator and cable.

Test Summary: The EUT was set to 8dBm and modulation active during testing. The EUT operated as intended before, during, and after testing.

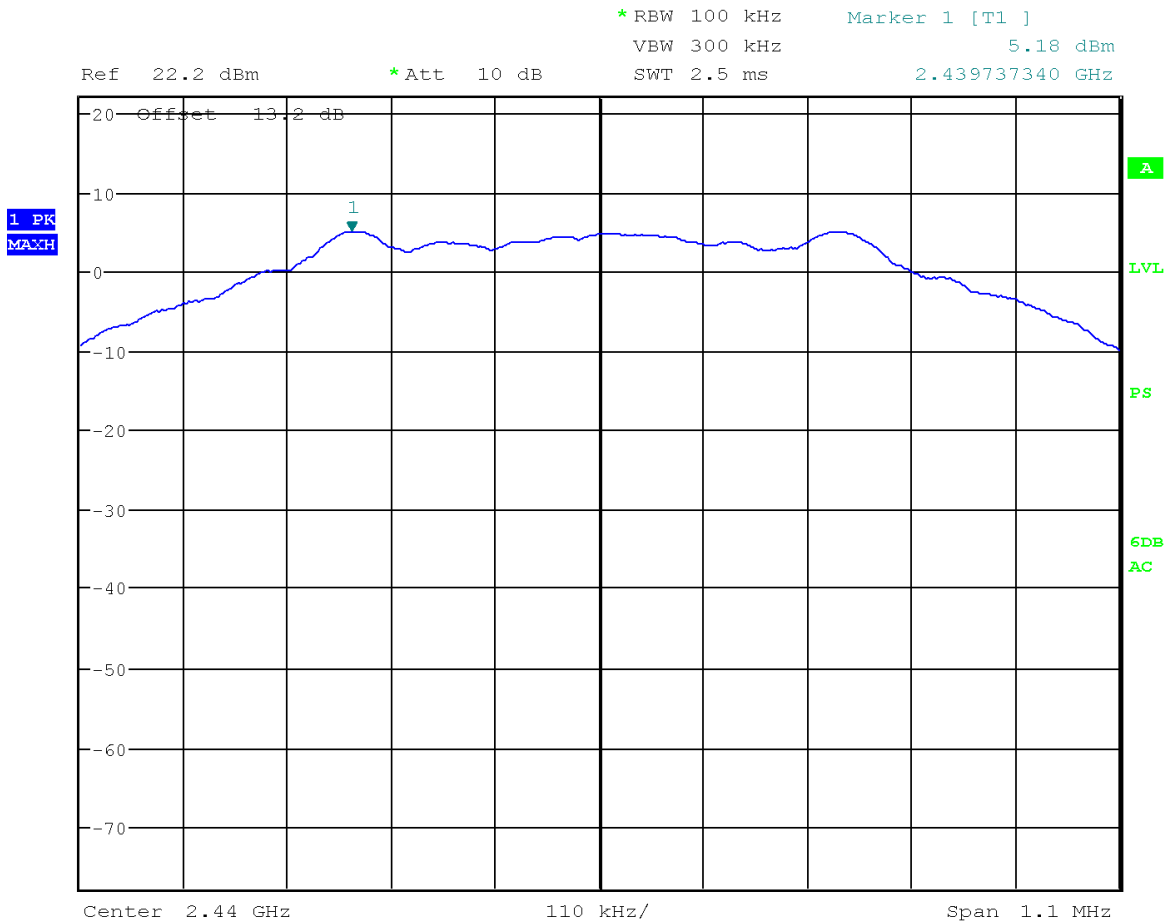
Test Result: Pass

See data below for detailed results.



Date: 16.JUN.2021 14:56:03

Figure 2.4-1 – Peak Conducted Output Power – Low Channel

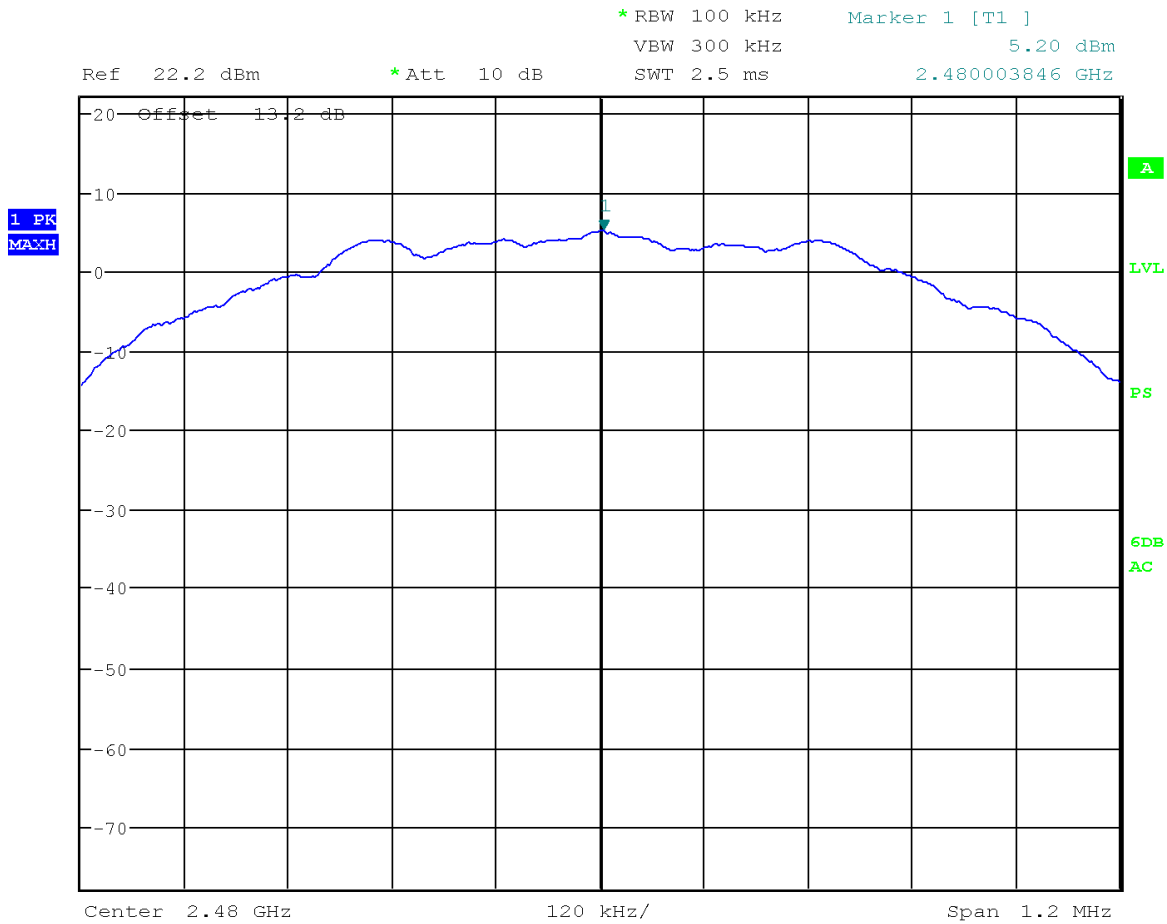


Date: 16.JUN.2021 14:57:03

Figure 2.4-2 – Peak Conducted Output Power – Middle Channel

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141 14th Street NW
New Brighton, MN 55112

Phone: 651-631-2487
www.tuv-sud-america.com



Date: 16.JUN.2021 14:58:28

Figure 2.4-3 – Peak Conducted Output Power – High Channel



2.4.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: CSAC1

Table 2.4-2 – Conducted Emissions Test Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|-----------------|------------------------|-------------|----------|----------|------------|------------|
| NBLE02001 | Pasternack | Attenuator, 10 dB | 18N20W-10dB | 2001 | G | 11/06/2020 | 11/06/2021 |
| DEMC3002 | Rohde & Schwarz | Receiver, 20 Hz-40 GHz | ESU40 | 100346 | G | 05/14/2021 | 05/14/2022 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.5 Conducted Spurious Emissions

2.5.1 Specification Reference

FCC 47 CFR Part 15.247(d)
RSS-247 5.2(5.5)

2.5.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.5.3 Date of Test

16 June 2021

2.5.4 Test Method

The maximum peak conducted output power was measured in accordance with the FCC KDB 558074 D01 15.247 Meas Guidance v05r02. The RF output of the EUT was directly connected to the input of the spectrum analyzer along with a suitable external attenuator. The RBW of the spectrum analyzer was set to 100kHz and the VBW was set to ≥ 3 times the RBW. The spectrum analyzer span was set to cover the entire frequency range of 30MHz to 25GHz (5 times the highest intentional radiator) and the trace was set to max hold using the peak detector.

The limit used for the entire frequency range is 20 dBc (20 dB lower than the maximum in-band peak PSD level, which was determined in Section 2.4 of this report).

2.5.5 Environmental Conditions

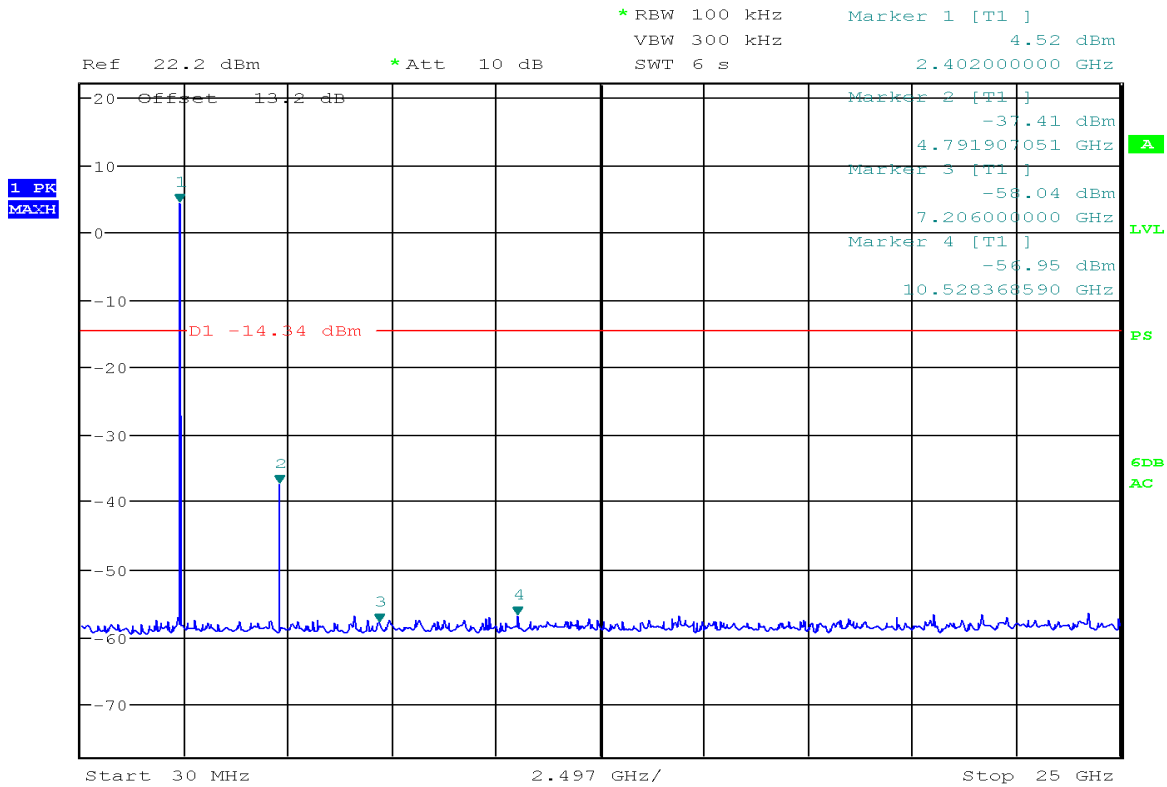
The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.5.6 Test Results

Test Summary: The EUT was set to 8dBm and modulation active during testing. The EUT operated as intended before, during, and after testing.

Test Result: Pass

See data below for detailed results.



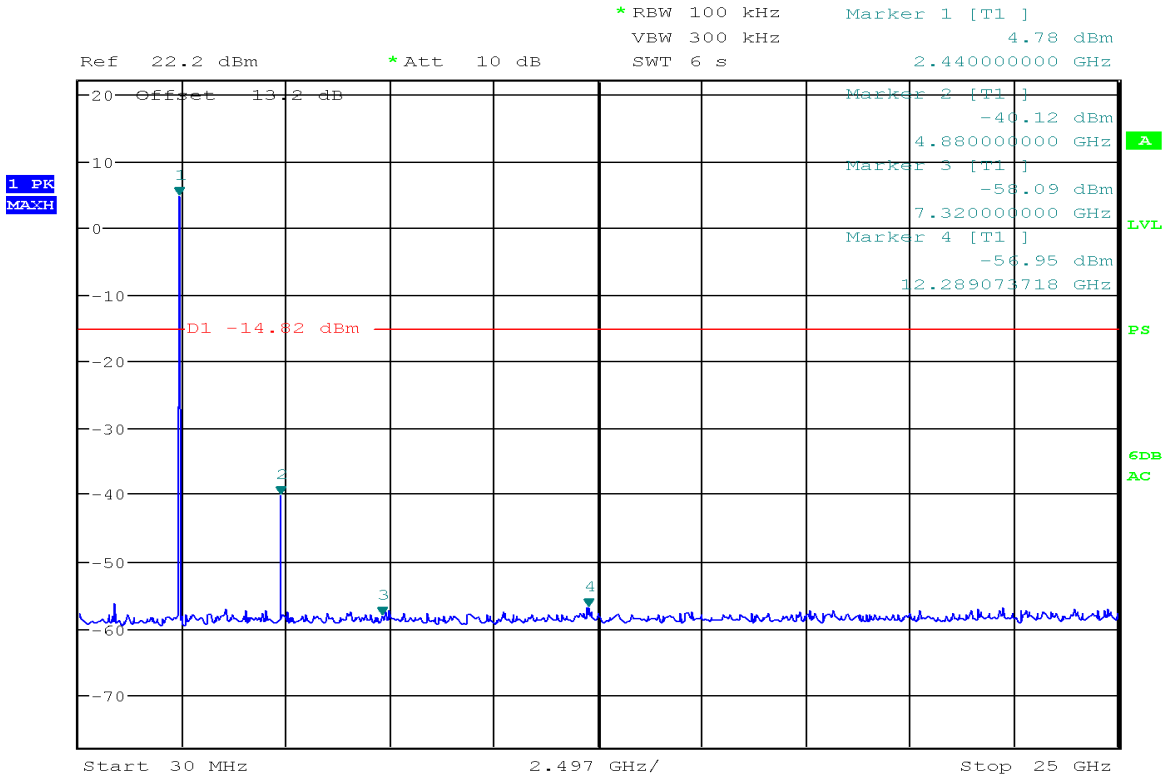
Date: 16.JUN.2021 15:15:42

Figure 2.5-1 – Conducted Spurious Emissions 30 MHz – 25GHz – Low Channel

Table 2.5-1 – Conducted Spurious Emissions 30 MHz – 25GHz Results

| Frequency (MHz) | Measured Level (dBm) | 20 dBc Limit (dBm) | Margin (dBm) |
|-----------------|----------------------|--------------------|--------------|
| 4791.90 | -37.41 | -14.34 | -23.07 |
| 7206.00 | -58.04 | -14.34 | -43.7 |
| 10528.63 | -56.95 | -14.34 | -42.61 |

Note: 20dBc limit is based on PSD value measured in Section 2.4 of this report.



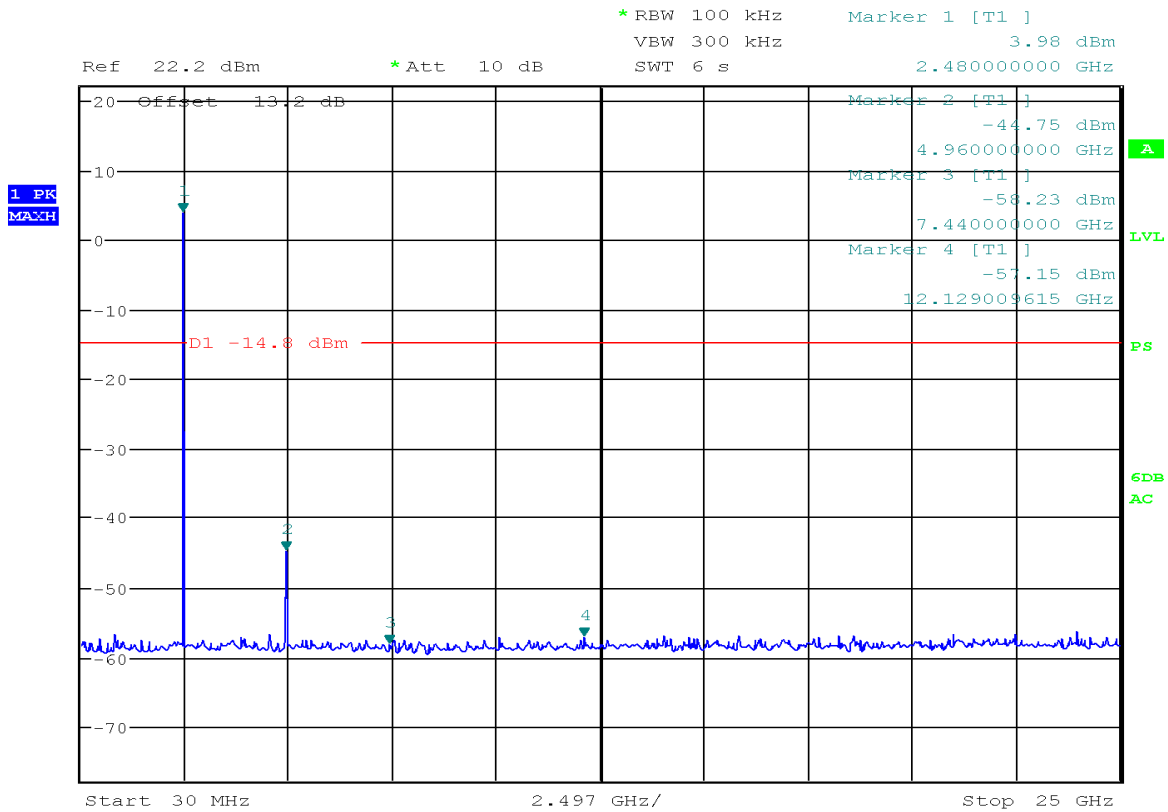
Date: 16.JUN.2021 15:18:29

Figure 2.5-2 – Conducted Spurious Emissions 30 MHz – 25GHz – Middle Channel

Table 2.5-2 – Conducted Spurious Emissions 30 MHz – 25GHz Results

| Frequency (MHz) | Measured Level (dBm) | 20 dBc Limit (dBm) | Margin (dBm) |
|-----------------|----------------------|--------------------|--------------|
| 4880.00 | -40.12 | -14.82 | -25.30 |
| 7320.00 | -58.09 | -14.82 | -43.27 |
| 12289.07 | -56.95 | -14.82 | -42.13 |

Note: 20dBc limit is based on PSD value measured in Section 2.4 of this report.



Date: 16.JUN.2021 15:22:18

Figure 2.5-3 – Conducted Spurious Emissions 30 MHz – 25GHz – High Channel

Table 2.5-3 – Conducted Spurious Emissions 30 MHz – 25GHz Results

| Frequency (MHz) | Measured Level (dBm) | 20 dBc Limit (dBm) | Margin (dBm) |
|-----------------|----------------------|--------------------|--------------|
| 4960.00 | -44.75 | -14.8 | -26.95 |
| 7440.00 | -58.23 | -14.8 | -43.43 |
| 12129.00 | -57.15 | -14.8 | -42.35 |

Note: 20dBc limit is based on PSD value measured in Section 2.4 of this report.



2.5.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: CSAC1

Table 2.5-4 – Conducted Emissions Test Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|-----------------|------------------------|-------------|----------|----------|------------|------------|
| NBLE02001 | Pasternack | Attenuator, 10 dB | 18N20W-10dB | 2001 | G | 11/06/2020 | 11/06/2021 |
| DEMC3002 | Rohde & Schwarz | Receiver, 20 Hz-40 GHz | ESU40 | 100346 | G | 05/14/2021 | 05/14/2022 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.6 Conducted Band-Edge

2.6.1 Specification Reference

FCC 47 CFR Part 15.247(d)
RSS-247 5.2(5.5)

2.6.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.6.3 Date of Test

16 June 2021

2.6.4 Test Method

The maximum peak conducted output power was measured in accordance with the FCC KDB 558074 D01 15.247 Meas Guidance v05r02. The RF output of the EUT was directly connected to the input of the spectrum analyzer along with a suitable external attenuator. The RBW of the spectrum analyzer was set to 100kHz and the VBW was set to ≥ 3 times the RBW. The spectrum analyzer to max hold using the peak detector and then again using an average detector.

The limit used for the 2400 – 2483.5 MHz band-edges is 20 dBc (20 dB lower than the maximum in-band peak PSD level, which was determined in Section 2.4 of this report).

2.6.5 Environmental Conditions

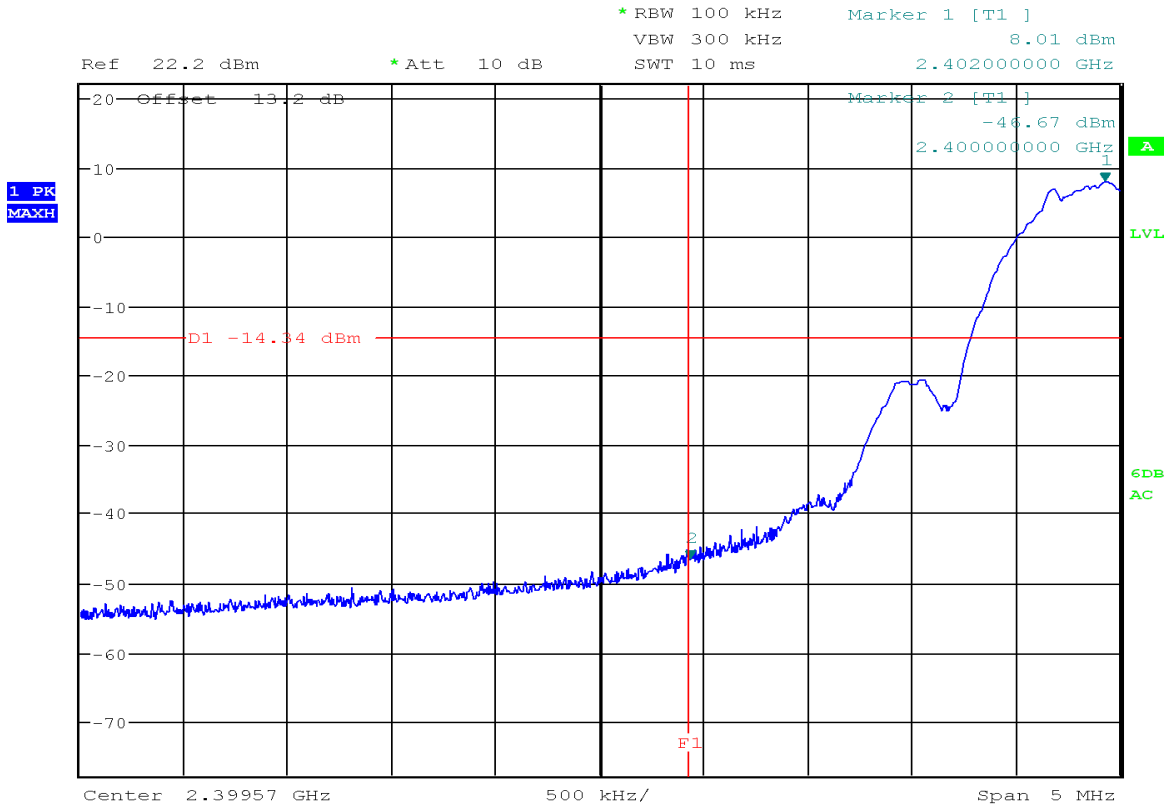
The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.6.6 Test Results

Test Summary: The EUT was set to 8dBm and modulation active during testing. The EUT operated as intended before, during, and after testing.

Test Result: Pass

See data below for detailed results.



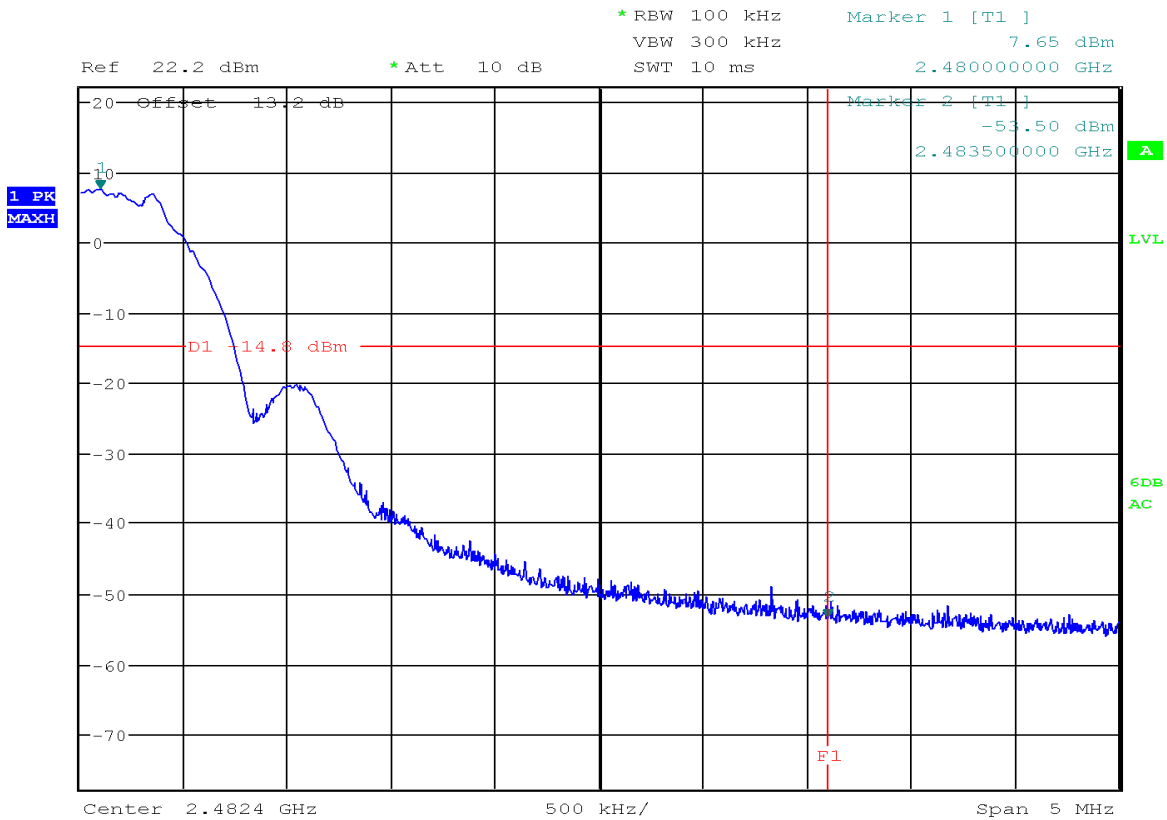
Date: 16.JUN.2021 16:41:04

Figure 2.6-1 – Conducted Band-Edge – Low Channel

Table 2.6-1 – Conducted Band-Edge Results

| Frequency (MHz) | Measured Level (dBm) | 20 dBc Limit (dBm) | Margin (dBm) |
|-----------------|----------------------|--------------------|--------------|
| 2400 | -46.67 | -14.34 | -32.23 |

Note: 20dBc limit is based on PSD value measured in Section 2.4 of this report.



Date: 16.JUN.2021 16:47:31

Figure 2.6-2 – Conducted Band-Edge – High Channel

Table 2.6-2 – Conducted Band-Edge Results

| Frequency (MHz) | Measured Level (dBm) | 20 dBc Limit (dBm) | Margin (dBm) |
|-----------------|----------------------|--------------------|--------------|
| 2483.5 | -53.50 | -14.8 | -38.7 |

Note: 20dBc limit is based on PSD value measured in Section 2.4 of this report.



2.6.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: CSAC1

Table 2.6-3 – Conducted Emissions Test Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|-----------------|------------------------|-------------|----------|----------|------------|------------|
| NBLE02001 | Pasternack | Attenuator, 10 dB | 18N20W-10dB | 2001 | G | 11/06/2020 | 11/06/2021 |
| DEMC3002 | Rohde & Schwarz | Receiver, 20 Hz-40 GHz | ESU40 | 100346 | G | 05/14/2021 | 05/14/2022 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.7 Conducted Emissions

2.7.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, 15.207
RSS-GEN Issue 5

2.7.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.7.3 Date of Test

18 June 2021

2.7.4 Test Method

The EUT was placed on a non-conductive table 0.8 m above a reference ground plane and 0.4 m away from a vertical coupling plane.

All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted emissions measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.

The EUT was tested with each transmitter operating in the worst-case channel and mode as determined in the original FCC report. Transmitters were tested individually.

The EUT was assessed against the limits of FCC 15.207.

2.7.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.7.6 Additional Observations

Measurements were performed using BAT-EMC (v3.18) automated software. The reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.



2.7.7 Sample Computation (Conducted Emission)

| | | |
|--|------------------|-------|
| Measuring equipment raw measurement (dB μ V) @ 150 kHz | | 30.0 |
| Correction Factor (dB) | TEMC00002 - LISN | 0.03 |
| | Cable 1 | 10.50 |
| | | |
| Reported Quasi-peak Final Measurement (dB μ V) @ 150 kHz | | 40.53 |

2.7.8 Test Results

Test Summary: EUT operated as intended before, during, and after testing.

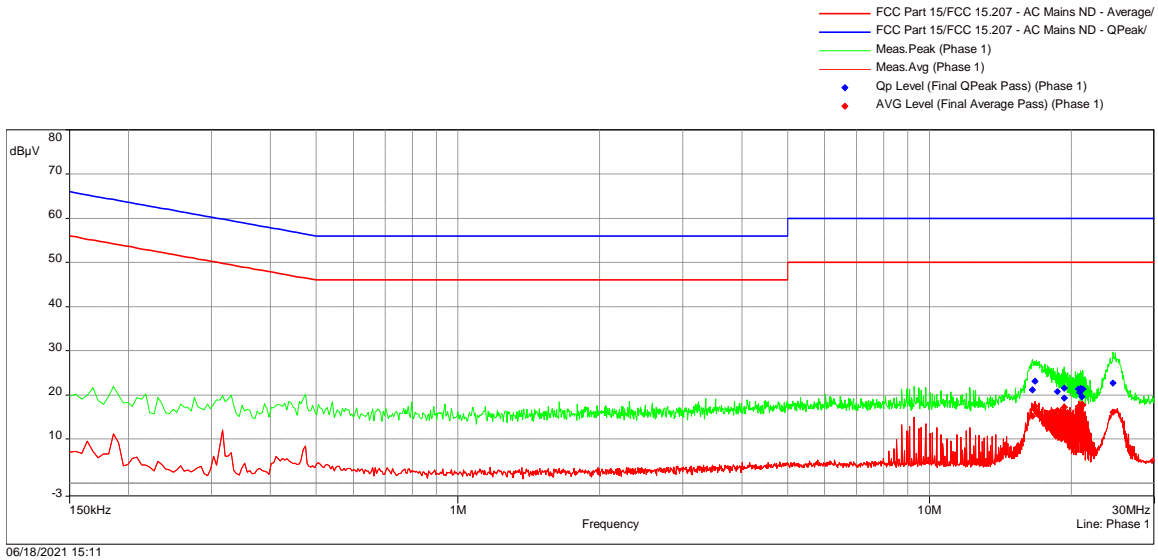
Test Result: Pass

See data below for detailed results.



BLE Low Ch 2402MHz - L1

| Frequency Range | Line Tested | RBW | Step Size | Sweep Time |
|-----------------|-------------|------|-----------|-------------|
| 150kHz- 30MHz | L1 | 9kHz | 4.5kHz | 5000 ms/MHz |



Limit:
FCC 15.207 - AC Mains

Line Tested:
L1

Test Results:
Pass

Test Notes: BLE Low CH 2402MHz

Figure 2.7-1 – Graphical Results – AC Mains L1 Plot – Low Channel



Table 2.7-1 – AC Mains L1 Plot – Low Channel

| Frequency | Average (dBuV) | Average Limit (dBuV) | Average Margin (dB) | QPeak (dBuV) | QPeak Limit (dBuV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 16.5255MHz | 15.14 | 50.00 | -34.86 | 21.08 | 60.00 | -38.92 | Pass |
| 16.7325MHz | 17.40 | 50.00 | -32.60 | 23.07 | 60.00 | -36.93 | Pass |
| 18.672MHz | 16.40 | 50.00 | -33.60 | 20.76 | 60.00 | -39.24 | Pass |
| 19.32MHz | 17.23 | 50.00 | -32.77 | 21.48 | 60.00 | -38.52 | Pass |
| 19.3245MHz | 14.01 | 50.00 | -35.99 | 19.29 | 60.00 | -40.71 | Pass |
| 20.724MHz | 17.33 | 50.00 | -32.67 | 21.29 | 60.00 | -38.71 | Pass |
| 20.832MHz | 16.56 | 50.00 | -33.44 | 20.58 | 60.00 | -39.42 | Pass |
| 20.94MHz | 16.97 | 50.00 | -33.03 | 21.43 | 60.00 | -38.57 | Pass |
| 21.048MHz | 14.74 | 50.00 | -35.26 | 19.55 | 60.00 | -40.45 | Pass |
| 21.1515MHz | 17.68 | 50.00 | -32.32 | 21.29 | 60.00 | -38.71 | Pass |
| 24.5265MHz | 16.08 | 50.00 | -33.92 | 22.71 | 60.00 | -37.29 | Pass |

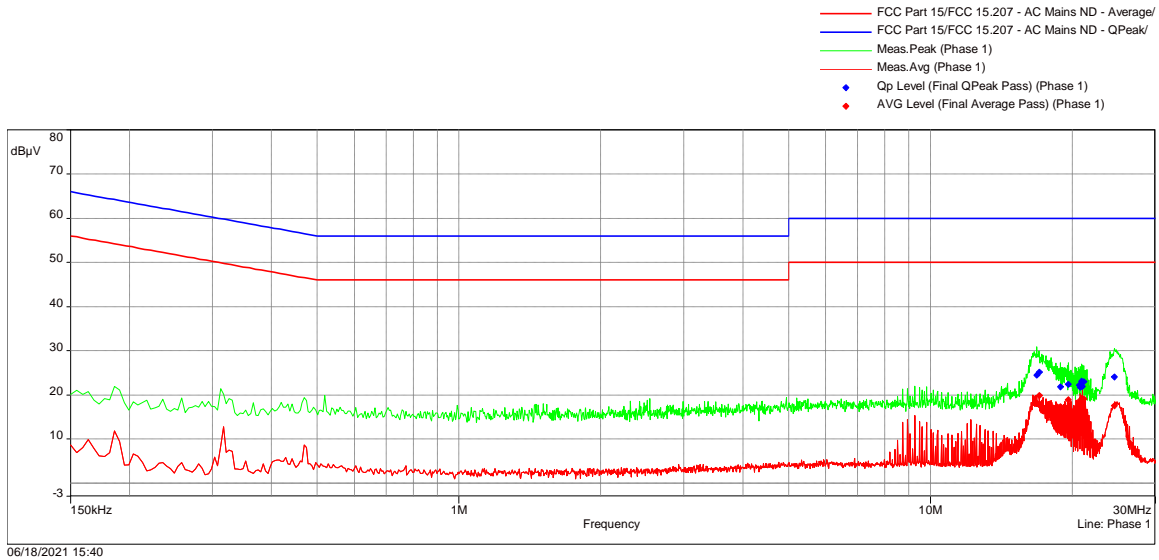
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BLE Low Channel 2402MHz - L2

| Frequency Range | Line Tested | RBW | Step Size | Sweep Time |
|-----------------|-------------|------|-----------|-------------|
| 150kHz- 30MHz | L2 | 9kHz | 4.5kHz | 5000 ms/MHz |



Limit:
FCC 15.207 - AC Mains

Line Tested:
L2

Test Results:
Pass

Test Notes: BLE Low CH 2402MHz

Figure 2.7-2 – Graphical Results – AC Mains L2 Plot – Low Channel



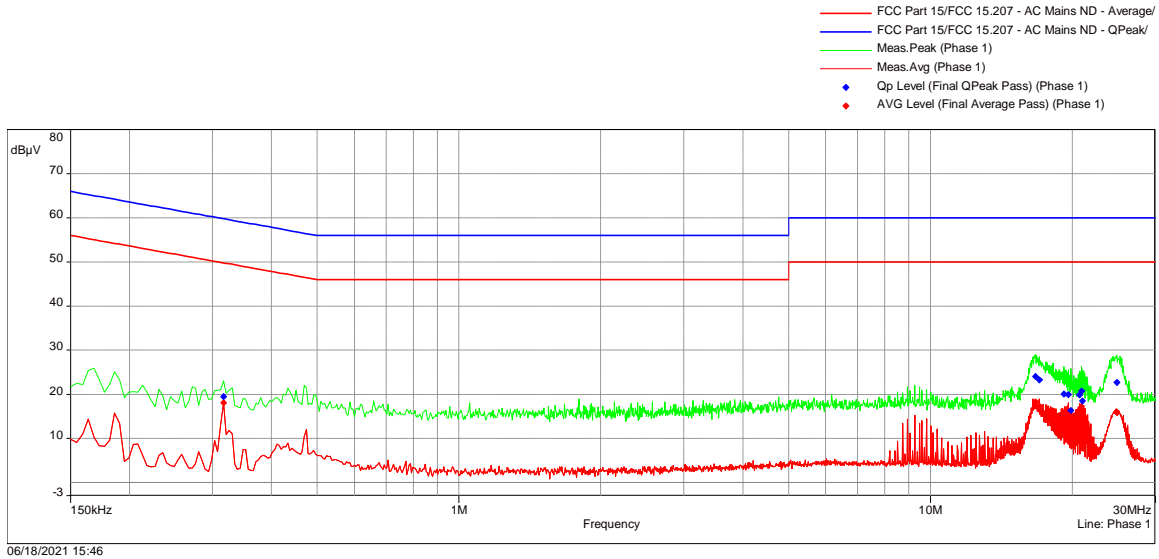
Table 2.7-2 – AC Mains L2 Plot – Low Channel

| Frequency | Average (dBuV) | Average Limit (dBuV) | Average Margin (dB) | QPeak (dBuV) | QPeak Limit (dBuV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 16.818MHz | 18.14 | 50.00 | -31.86 | 24.41 | 60.00 | -35.59 | Pass |
| 17.0385MHz | 19.83 | 50.00 | -30.17 | 25.12 | 60.00 | -34.88 | Pass |
| 18.87MHz | 17.30 | 50.00 | -32.70 | 21.78 | 60.00 | -38.22 | Pass |
| 19.626MHz | 18.87 | 50.00 | -31.13 | 22.42 | 60.00 | -37.58 | Pass |
| 20.706MHz | 18.54 | 50.00 | -31.46 | 22.18 | 60.00 | -37.82 | Pass |
| 20.814MHz | 17.83 | 50.00 | -32.17 | 21.70 | 60.00 | -38.30 | Pass |
| 20.922MHz | 18.65 | 50.00 | -31.35 | 23.03 | 60.00 | -36.97 | Pass |
| 21.03MHz | 17.84 | 50.00 | -32.16 | 21.94 | 60.00 | -38.06 | Pass |
| 21.138MHz | 19.04 | 50.00 | -30.96 | 22.97 | 60.00 | -37.03 | Pass |
| 24.54MHz | 17.51 | 50.00 | -32.49 | 24.05 | 60.00 | -35.95 | Pass |



BLE Mid Ch 2440MHz - L1

| Frequency Range | Line Tested | RBW | Step Size | Sweep Time |
|-----------------|-------------|------|-----------|-------------|
| 150kHz- 30MHz | L1 | 9kHz | 4.5kHz | 5000 ms/MHz |



Limit:
FCC 15.207 - AC Mains

Line Tested:
L1

Test Results:
Pass

Test Notes: BLE Mid CH 2440MHz

Figure 2.7-3 – Graphical Results – AC Mains L1 Plot – Mid Channel



Table 2.7-3 – AC Mains L1 Plot – Mid Channel

| Frequency | Average (dBuV) | Average Limit (dBuV) | Average Margin (dB) | QPeak (dBuV) | QPeak Limit (dBuV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 316.5kHz | 18.12 | 49.80 | -31.68 | 19.49 | 59.80 | -40.30 | Pass |
| 16.71MHz | 18.26 | 50.00 | -31.74 | 24.08 | 60.00 | -35.92 | Pass |
| 17.034MHz | 17.29 | 50.00 | -32.71 | 23.30 | 60.00 | -36.70 | Pass |
| 19.1895MHz | 15.19 | 50.00 | -34.81 | 20.03 | 60.00 | -39.97 | Pass |
| 19.6215MHz | 15.01 | 50.00 | -34.99 | 20.00 | 60.00 | -40.00 | Pass |
| 19.842MHz | 10.64 | 50.00 | -39.36 | 16.30 | 60.00 | -43.70 | Pass |
| 20.7015MHz | 14.79 | 50.00 | -35.21 | 19.82 | 60.00 | -40.18 | Pass |
| 20.9175MHz | 15.82 | 50.00 | -34.18 | 20.76 | 60.00 | -39.24 | Pass |
| 21.0255MHz | 13.43 | 50.00 | -36.57 | 18.50 | 60.00 | -41.50 | Pass |
| 24.864MHz | 15.90 | 50.00 | -34.10 | 22.67 | 60.00 | -37.33 | Pass |

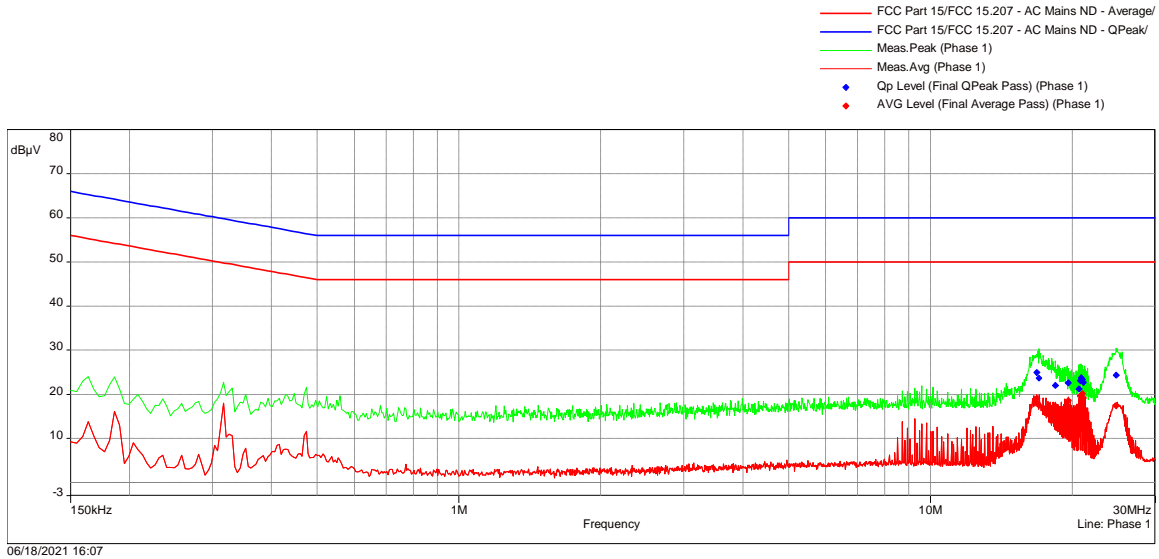
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BLE Mid Ch 2440MHz - L2

| Frequency Range | Line Tested | RBW | Step Size | Sweep Time |
|-----------------|-------------|------|-----------|-------------|
| 150kHz- 30MHz | L2 | 9kHz | 4.5kHz | 5000 ms/MHz |



Limit:
FCC 15.207 - AC Mains

Line Tested:
L2

Test Results:
Pass

Test Notes: BLE Mid CH 2440MHz

Figure 2.7-4 – Graphical Results – AC Mains L2 Plot – Mid Channel



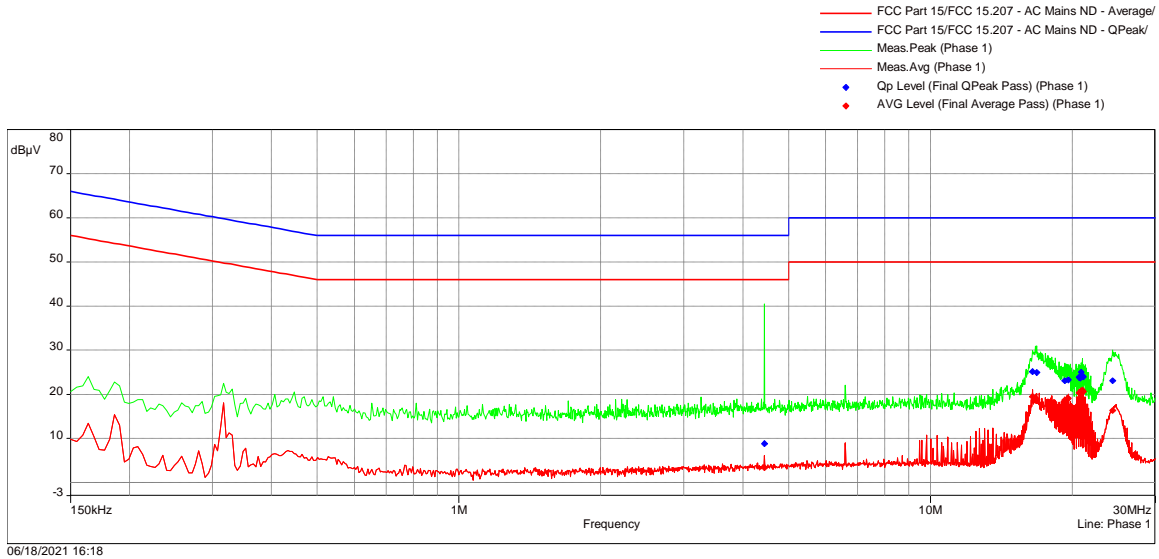
Table 2.7-4 – AC Mains L2 Plot – Mid Channel

| Frequency | Average (dBuV) | Average Limit (dBuV) | Average Margin (dB) | QPeak (dBuV) | QPeak Limit (dBuV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 16.8045MHz | 19.06 | 50.00 | -30.94 | 24.94 | 60.00 | -35.06 | Pass |
| 16.9845MHz | 17.47 | 50.00 | -32.53 | 23.70 | 60.00 | -36.30 | Pass |
| 18.4245MHz | 17.32 | 50.00 | -32.68 | 22.05 | 60.00 | -37.95 | Pass |
| 19.608MHz | 18.57 | 50.00 | -31.43 | 22.54 | 60.00 | -37.46 | Pass |
| 20.688MHz | 16.61 | 50.00 | -33.39 | 21.24 | 60.00 | -38.76 | Pass |
| 20.7915MHz | 19.69 | 50.00 | -30.31 | 23.08 | 60.00 | -36.92 | Pass |
| 20.8995MHz | 19.00 | 50.00 | -31.00 | 23.72 | 60.00 | -36.28 | Pass |
| 21.0075MHz | 20.17 | 50.00 | -29.83 | 23.40 | 60.00 | -36.60 | Pass |
| 21.1155MHz | 19.17 | 50.00 | -30.83 | 22.64 | 60.00 | -37.36 | Pass |
| 24.792MHz | 17.38 | 50.00 | -32.62 | 24.32 | 60.00 | -35.68 | Pass |



BLE High Ch 2480MHz - L1

| Frequency Range | Line Tested | RBW | Step Size | Sweep Time |
|-----------------|-------------|------|-----------|-------------|
| 150kHz- 30MHz | L1 | 9kHz | 4.5kHz | 5000 ms/MHz |



Limit:
FCC 15.207 - AC Mains

Line Tested:
L1

Test Results:
Pass

Test Notes: BLE High CH 2480MHz

Figure 2.7-5 – Graphical Results – AC Mains L1 Plot – High Channel



Table 2.7-5 – AC Mains L1 Plot – High Channel

| Frequency | Average (dBuV) | Average Limit (dBuV) | Average Margin (dB) | QPeak (dBuV) | QPeak Limit (dBuV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 4.443MHz | 3.33 | 46.00 | -42.67 | 8.83 | 56.00 | -47.17 | Pass |
| 16.4805MHz | 19.49 | 50.00 | -30.51 | 25.12 | 60.00 | -34.88 | Pass |
| 16.8045MHz | 18.92 | 50.00 | -31.08 | 24.92 | 60.00 | -35.08 | Pass |
| 19.2795MHz | 18.64 | 50.00 | -31.36 | 23.10 | 60.00 | -36.90 | Pass |
| 19.6035MHz | 19.09 | 50.00 | -30.91 | 23.27 | 60.00 | -36.73 | Pass |
| 20.679MHz | 20.36 | 50.00 | -29.64 | 23.88 | 60.00 | -36.12 | Pass |
| 20.787MHz | 20.37 | 50.00 | -29.63 | 23.71 | 60.00 | -36.29 | Pass |
| 20.895MHz | 20.87 | 50.00 | -29.13 | 25.02 | 60.00 | -34.98 | Pass |
| 21.003MHz | 20.98 | 50.00 | -29.02 | 24.20 | 60.00 | -35.80 | Pass |
| 21.111MHz | 20.63 | 50.00 | -29.37 | 23.99 | 60.00 | -36.01 | Pass |
| 24.342MHz | 16.38 | 50.00 | -33.62 | 23.05 | 60.00 | -36.95 | Pass |

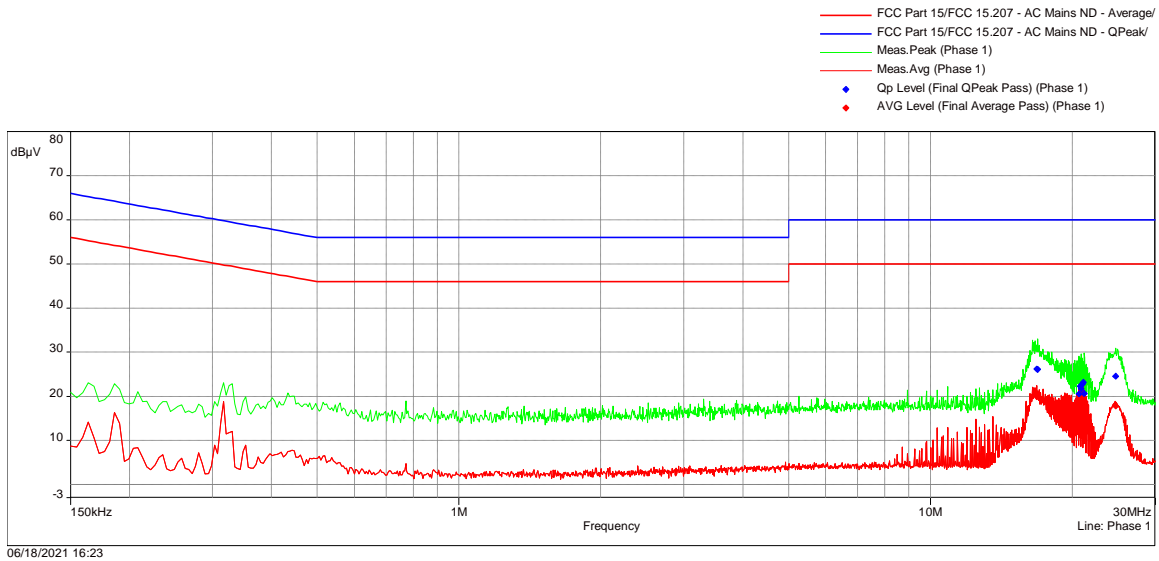
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BLE High Ch 2480MHz - L2

| Frequency Range | Line Tested | RBW | Step Size | Sweep Time |
|-----------------|-------------|------|-----------|-------------|
| 150kHz- 30MHz | L2 | 9kHz | 4.5kHz | 5000 ms/MHz |



Limit:
FCC 15.207 - AC Mains

Line Tested:
L2

Test Results:
Pass

Test Notes: BLE High CH 2480MHz

Figure 2.7-6 – Graphical Results – AC Mains L2 Plot – High Channel



Table 2.7-6 – AC Mains L2 Plot – High Channel

| Frequency | Average (dBuV) | Average Limit (dBuV) | Average Margin (dB) | QPeak (dBuV) | QPeak Limit (dBuV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 16.8MHz | 19.98 | 50.00 | -30.02 | 26.19 | 60.00 | -33.81 | Pass |
| 16.8765MHz | 20.17 | 50.00 | -29.83 | 26.08 | 60.00 | -33.92 | Pass |
| 20.679MHz | 15.29 | 50.00 | -34.71 | 20.53 | 60.00 | -39.47 | Pass |
| 20.787MHz | 17.20 | 50.00 | -32.80 | 22.27 | 60.00 | -37.73 | Pass |
| 20.895MHz | 16.67 | 50.00 | -33.33 | 21.70 | 60.00 | -38.30 | Pass |
| 21.003MHz | 18.08 | 50.00 | -31.92 | 22.79 | 60.00 | -37.21 | Pass |
| 21.111MHz | 18.68 | 50.00 | -31.32 | 23.14 | 60.00 | -36.86 | Pass |
| 21.219MHz | 15.66 | 50.00 | -34.34 | 20.69 | 60.00 | -39.31 | Pass |
| 24.72MHz | 17.77 | 50.00 | -32.23 | 24.55 | 60.00 | -35.45 | Pass |



2.7.9 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: GRP2

Table 2.7-7 – Conducted Emissions Test Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|----------------------|-------------------|---------------------|----------|----------|------------|------------|
| NBLE10459 | Weinschel | Attenuator, 20dB | 34-20-34 | BP1557 | B | 11/15/2020 | 11/15/2021 |
| WRLE10945 | Fischer Custom Comm. | LISN | FCC-LISN-50-25-2-10 | 120309 | G | 08/08/2019 | 08/08/2021 |
| WRLE10946 | Fischer Custom Comm. | LISN | FCC-LISN-50-25-2-10 | 120310 | G | 10/21/2020 | 10/21/2022 |
| NBLE11592 | Rohde & Schwarz | EMI Test Receiver | ESR7 | 101771 | G | 02/22/2021 | 02/22/2022 |

Cal Code G = Calibration performed by an accredited outside source.
 Cal Code B = Calibration verification performed internally.
 Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.8 Radiated Spurious Emissions

2.8.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, 15.247
RSS-GEN Issue 5

2.8.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.8.3 Date of Test

18 June 2021

2.8.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive table 0.8 m above a reference ground plane for 30-1000 MHz and 1.5m above the ground plane for above 1 GHz.

For 30-1000 MHz a pre-scan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m distance.

For above 1 GHz a pre-scan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using peak and average detectors; measurements were taken at a 3m distance.

For all frequency ranges the final readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification. For below 1 GHz final measurements were taken with a quasi-peak detector and above 1 GHz final measurements were re-measured with peak and average detectors.

The EUT was assessed against the limits specified in FCC 47 CFR Part 15C §15.209.

2.8.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.



2.8.6 Additional Observations

The highest frequency to which the DUT was measured in accordance with §15.33(a)(1).

Automated measurements used BAT-EMC (v3.18) software. Measurements from 30-1000 MHz were done at a 3m distance. Measurements above 1 GHz were done at a 3m distance. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

2.8.7 Sample Computation (Radiated Emissions)

| | | |
|---|---------------------|-------|
| Measuring equipment raw measurement (dBµV) @ 30 MHz | | 20.0 |
| Correction Factor (dB) | Cable 2 | 0.24 |
| | TEMCO0011 (antenna) | 18.70 |
| | | |
| | | |
| Reported Quasi-peak Final Measurement (dBµV/m) @ 30 MHz | | 38.94 |

2.8.8 Test Results

Test Summary: The EUT was pre-screened at 3 orthogonal axis to determine worst-case orientation. Final measurements as shown in this report were performed on only the identified worst-case configuration. Measurements between 1-18 GHz were taken with a 2.4 GHz notch filter in front of the pre-amp to prevent overloading.

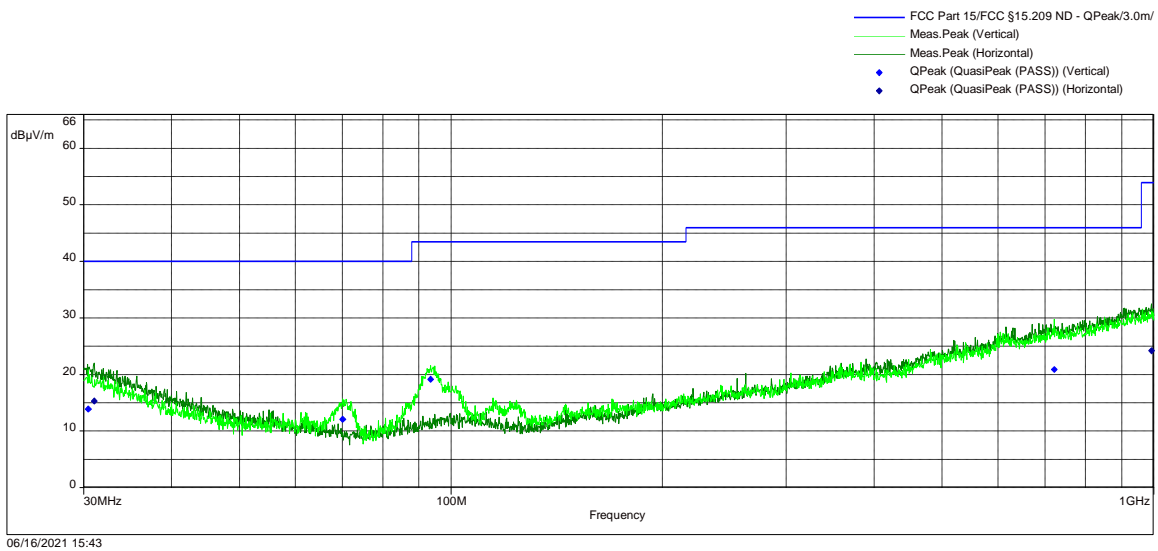
Test Result: Pass

See data below for detailed results.



Spurious Emissions 30M-1GHz - low Ch - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|--------|-----------|------------|
| 30MHz- 1GHz | Vertical | 3m | 100kHz | 18001Pts | Auto |
| 30MHz- 1GHz | Horizontal | 3m | 100kHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis Low Channel 2402MHz

Figure 2.8-1 – RE Spurious Emissions 30-1000 MHz – Low Channel



Table 2.8-1 – RE Spurious Emissions 30-1000 MHz – Low Channel

| Frequency | QP Level (dBuV/m) | QP Limit (dBuV/m) | Margin (dB) | Azimuth (°) | Height (m) | Polarity | Result |
|--------------|-------------------|-------------------|-------------|-------------|------------|------------|--------|
| 30.483237MHz | 13.83 | 40.00 | -26.17 | 131.00 | 3.93 | Vertical | Pass |
| 31.058227MHz | 15.32 | 40.00 | -24.68 | 229.00 | 3.65 | Horizontal | Pass |
| 70.129434MHz | 12.09 | 40.00 | -27.91 | 214.00 | 1.24 | Vertical | Pass |
| 93.581677MHz | 19.15 | 43.50 | -24.35 | 198.00 | 1.09 | Vertical | Pass |
| 721.56861MHz | 20.87 | 46.00 | -25.13 | 208.00 | 1.22 | Vertical | Pass |
| 993.55517MHz | 24.20 | 53.97 | -29.77 | 198.00 | 2.34 | Horizontal | Pass |

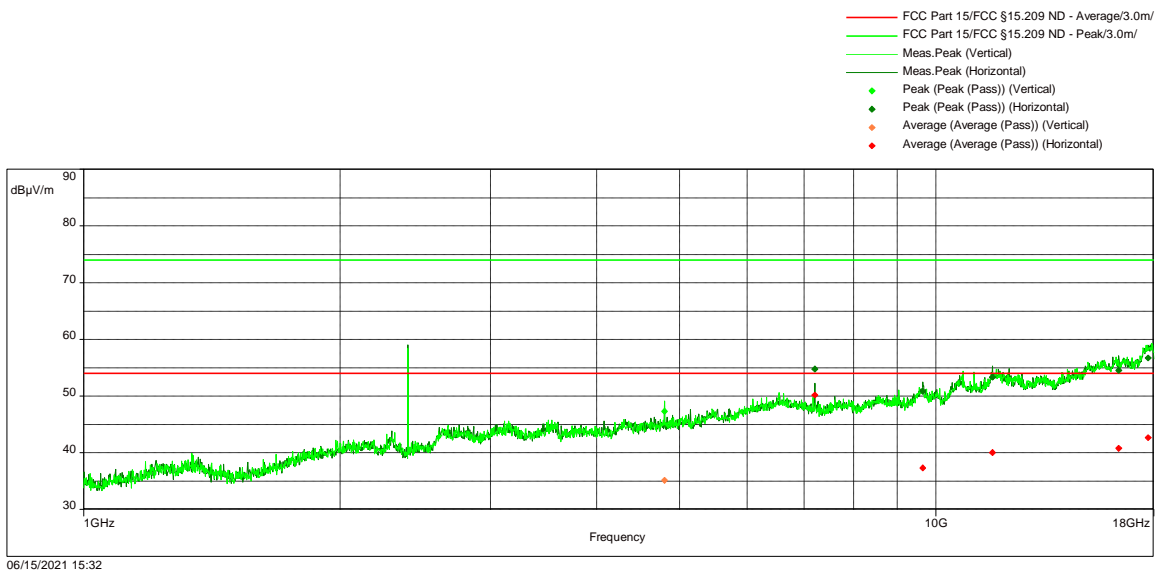
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Spurious Emissions 1 - 18GHz - Low Ch - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|------|-----------|------------|
| 1GHz- 18GHz | Vertical | 3m | 1MHz | 18001Pts | Auto |
| 1GHz- 18GHz | Horizontal | 3m | 1MHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis Low Channel 2402MHz

Figure 2.8-2 – RE Spurious Emissions 1-18 GHz – Low Channel



Table 2.8-2 – RE Spurious Emissions 1-18 GHz – Low Channel

| Frequency | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Azimuth (°) | Height (m) | Polarity | Peak Result | Average Result |
|--------------|---------------------|---------------------|------------------|------------------------|------------------------|---------------------|-------------|------------|------------|-------------|----------------|
| 4.8032778GHz | 47.29 | 74.00 | -26.71 | 35.14 | 54.00 | -18.86 | 19.00 | 1.00 | Vertical | Pass | Pass |
| 7.2059444GHz | 54.72 | 74.00 | -19.28 | 50.14 | 54.00 | -3.86 | 129.00 | 1.17 | Horizontal | Pass | Pass |
| 9.6454444GHz | 50.84 | 74.00 | -23.16 | 37.30 | 54.00 | -16.70 | 136.00 | 3.67 | Horizontal | Pass | Pass |
| 11.644833GHz | 53.28 | 74.00 | -20.72 | 40.04 | 54.00 | -13.96 | 246.00 | 3.35 | Horizontal | Pass | Pass |
| 16.384056GHz | 54.53 | 74.00 | -19.47 | 40.74 | 54.00 | -13.26 | 203.00 | 2.42 | Horizontal | Pass | Pass |
| 17.728944GHz | 56.71 | 74.00 | -17.29 | 42.64 | 54.00 | 11.36 | 17.00 | 2.03 | Horizontal | Pass | Pass |

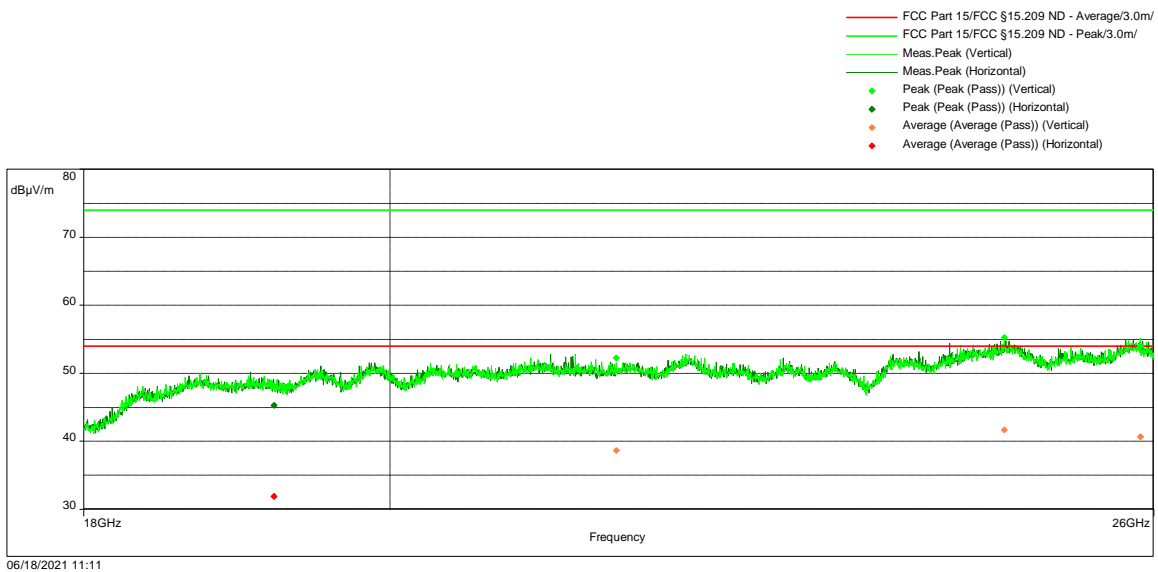
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Spurious Emissions 18 - 26GHz - Low CH - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|------|-----------|------------|
| 18GHz- 26GHz | Vertical | 3m | 1MHz | 18001Pts | Auto |
| 18GHz- 26GHz | Horizontal | 3m | 1MHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis Low Channel 2402MHz

Figure 2.8-3 – RE Spurious Emissions 18-26 GHz – Low Channel



Table 2.8-3 – RE Spurious Emissions 18-26 GHz – Low Channel

| Frequency | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Azimuth (°) | Height (m) | Polarity | Peak Result | Average Result |
|--------------|---------------------|---------------------|------------------|------------------------|------------------------|---------------------|-------------|------------|------------|-------------|----------------|
| 19.216GHz | 45.28 | 74.00 | -28.72 | 31.88 | 54.00 | -22.12 | 164.00 | 3.17 | Horizontal | Pass | Pass |
| 21.614667GHz | 52.27 | 74.00 | -21.73 | 38.65 | 54.00 | -15.35 | 328.00 | 1.24 | Vertical | Pass | Pass |
| 24.7GHz | 55.24 | 74.00 | -18.76 | 41.66 | 54.00 | -12.34 | 0.00 | 3.58 | Vertical | Pass | Pass |
| 25.882667GHz | 54.00 | 74.00 | -20.00 | 40.63 | 54.00 | -13.37 | 240.00 | 3.17 | Vertical | Pass | Pass |

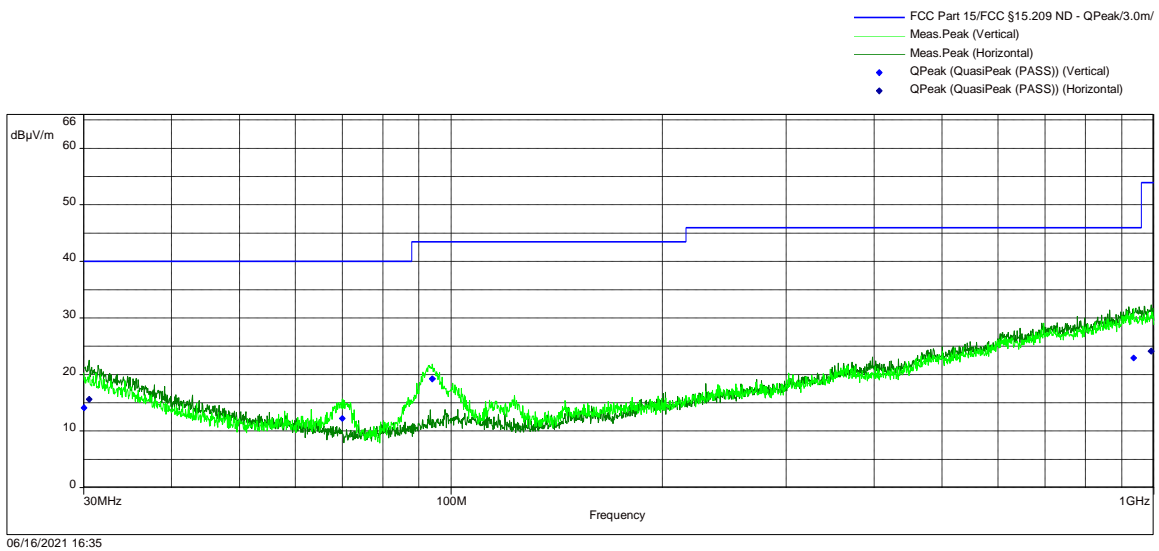
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Spurious Emissions 30M-1GHz - Mid Ch - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|--------|-----------|------------|
| 30MHz- 1GHz | Vertical | 3m | 100kHz | 18001Pts | Auto |
| 30MHz- 1GHz | Horizontal | 3m | 100kHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis Mid Channel 2440MHz

Figure 2.8-4 – RE Spurious Emissions 30-1000 MHz – Mid Channel



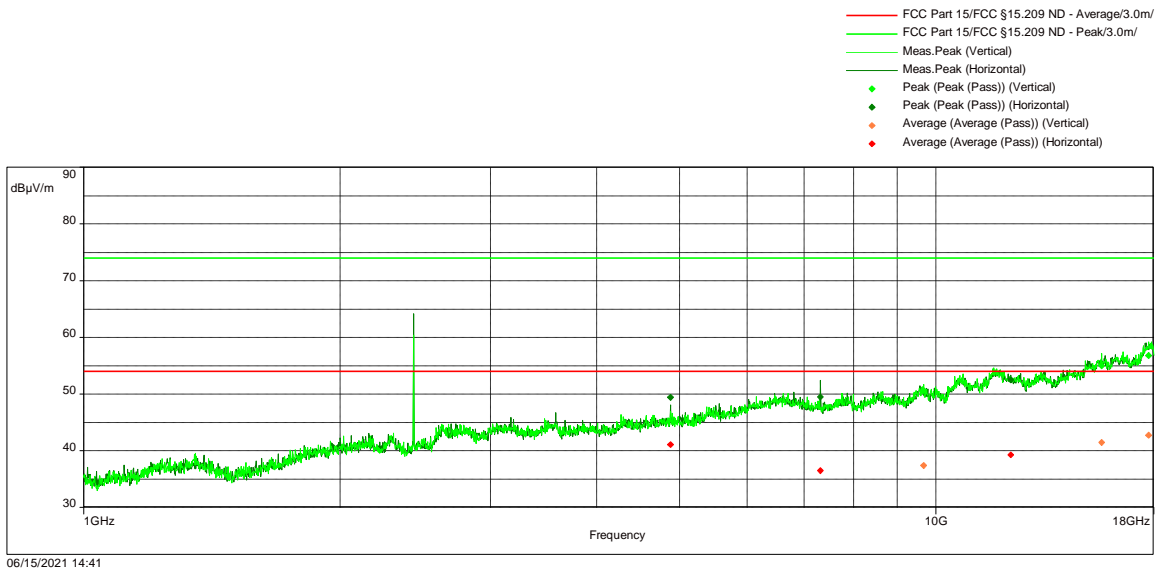
Table 2.8-4 – RE Spurious Emissions 30-1000 MHz – Mid Channel

| Frequency | QP Level (dBuV/m) | QP Limit (dBuV/m) | Margin (dB) | Azimuth (°) | Height (m) | Polarity | Result |
|--------------|-------------------|-------------------|-------------|-------------|------------|------------|--------|
| 30.058333MHz | 14.11 | 40.00 | -25.89 | 203.00 | 3.62 | Vertical | Pass |
| 30.547863MHz | 15.61 | 40.00 | -24.39 | 353.00 | 1.83 | Horizontal | Pass |
| 69.999338MHz | 12.24 | 40.00 | -27.76 | 198.00 | 1.13 | Vertical | Pass |
| 94.133066MHz | 19.20 | 43.50 | -24.30 | 199.00 | 1.00 | Vertical | Pass |
| 935.9911MHz | 22.90 | 46.00 | -23.10 | 271.00 | 3.47 | Vertical | Pass |
| 991.44257MHz | 24.09 | 53.97 | -29.88 | 33.00 | 2.07 | Horizontal | Pass |



Spurious Emissions 1 - 18GHz - Mid Ch - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|------|-----------|------------|
| 1GHz- 18GHz | Vertical | 3m | 1MHz | 18001Pts | Auto |
| 1GHz- 18GHz | Horizontal | 3m | 1MHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis Mid Channel 2440MHz

Figure 2.8-5 – RE Spurious Emissions 1-18 GHz – Mid Channel



Table 2.8-5 – RE Spurious Emissions 1-18 GHz – Mid Channel

| Frequency | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Azimuth (°) | Height (m) | Polarity | Peak Result | Average Result |
|--------------|---------------------|---------------------|------------------|------------------------|------------------------|---------------------|-------------|------------|------------|-------------|----------------|
| 4.8797778GHz | 49.43 | 74.00 | -24.57 | 41.08 | 54.00 | -12.92 | 217.00 | 1.48 | Horizontal | Pass | Pass |
| 7.3192778GHz | 49.50 | 74.00 | -24.50 | 36.46 | 54.00 | -17.54 | 114.00 | 3.33 | Horizontal | Pass | Pass |
| 9.6652778GHz | 50.62 | 74.00 | -23.38 | 37.36 | 54.00 | -16.64 | 330.00 | 2.02 | Vertical | Pass | Pass |
| 12.232278GHz | 52.52 | 74.00 | -21.48 | 39.25 | 54.00 | -14.75 | 212.00 | 3.31 | Horizontal | Pass | Pass |
| 15.634167GHz | 54.93 | 74.00 | -19.07 | 41.45 | 54.00 | -12.55 | 44.00 | 1.83 | Vertical | Pass | Pass |
| 17.756333GHz | 56.75 | 74.00 | -17.25 | 42.68 | 54.00 | -11.32 | 309.00 | 1.20 | Vertical | Pass | Pass |

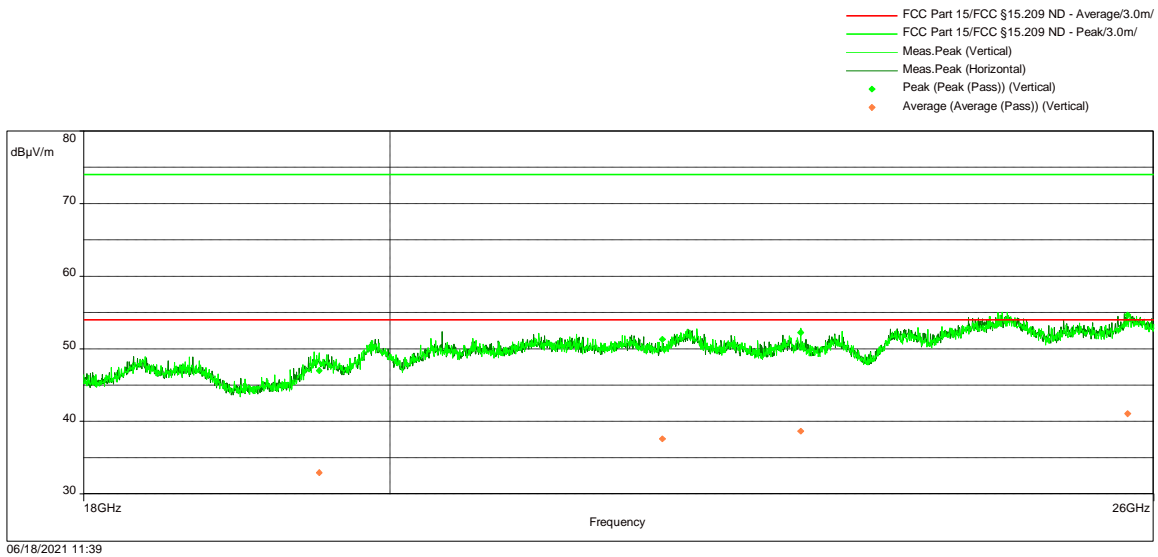
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Spurious Emissions 18 - 26GHz - Mid CH - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|------|-----------|------------|
| 18GHz- 26GHz | Vertical | 3m | 1MHz | 18001Pts | Auto |
| 18GHz- 26GHz | Horizontal | 3m | 1MHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis Mid Channel 2440MHz

Figure 2.8-6 – RE Spurious Emissions 18-26 GHz – Mid Channel



Table 2.8-6 – RE Spurious Emissions 18-26 GHz – Mid Channel

| Frequency | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Azimuth (°) | Height (m) | Polarity | Peak Result | Average Result |
|--------------|---------------------|---------------------|------------------|------------------------|------------------------|---------------------|-------------|------------|----------|-------------|----------------|
| 19.516889GHz | 46.98 | 74.00 | -27.02 | 32.96 | 54.00 | -21.04 | 204.00 | 3.27 | Vertical | Pass | Pass |
| 21.960889GHz | 51.28 | 74.00 | -22.72 | 37.61 | 54.00 | -16.39 | 24.00 | 3.02 | Vertical | Pass | Pass |
| 23.028889GHz | 52.22 | 74.00 | -21.78 | 38.63 | 54.00 | -15.37 | 306.00 | 1.95 | Vertical | Pass | Pass |
| 25.767556GHz | 54.67 | 74.00 | -19.33 | 41.04 | 54.00 | -12.96 | 90.00 | 2.41 | Vertical | Pass | Pass |

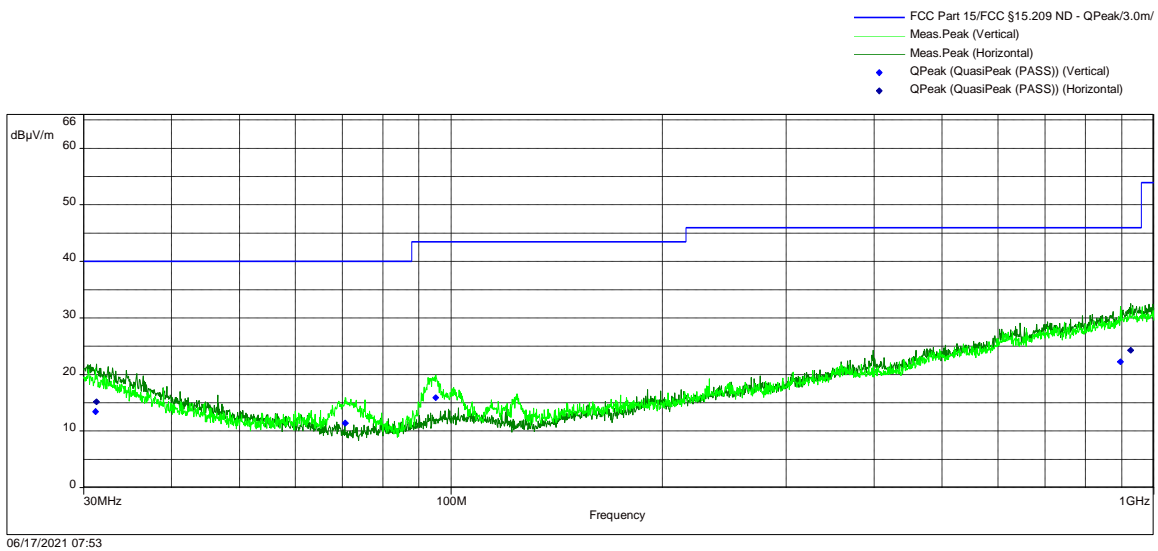
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Spurious Emissions 30M-1GHz - High Ch - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|--------|-----------|------------|
| 30MHz- 1GHz | Vertical | 3m | 100kHz | 18001Pts | Auto |
| 30MHz- 1GHz | Horizontal | 3m | 100kHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis High Channel 2480MHz

Figure 2.8-7 – RE Spurious Emissions 30-1000 MHz – High Channel



Table 2.8-7 – RE Spurious Emissions 30-1000 MHz – High Channel

| Frequency | QP Level (dBuV/m) | QP Limit (dBuV/m) | Margin (dB) | Azimuth (°) | Height (m) | Polarity | Result |
|--------------|-------------------|-------------------|-------------|-------------|------------|------------|--------|
| 31.199659MHz | 13.43 | 40.00 | -26.57 | 95.00 | 1.05 | Vertical | Pass |
| 31.279711MHz | 15.18 | 40.00 | -24.82 | 261.00 | 1.72 | Horizontal | Pass |
| 70.735513MHz | 11.39 | 40.00 | -28.61 | 240.00 | 1.29 | Vertical | Pass |
| 95.08015MHz | 15.93 | 43.50 | -27.57 | 210.00 | 1.09 | Vertical | Pass |
| 896.45636MHz | 22.23 | 46.00 | -23.77 | 58.00 | 2.36 | Vertical | Pass |
| 927.60751MHz | 24.28 | 46.00 | -21.72 | 251.00 | 1.13 | Horizontal | Pass |

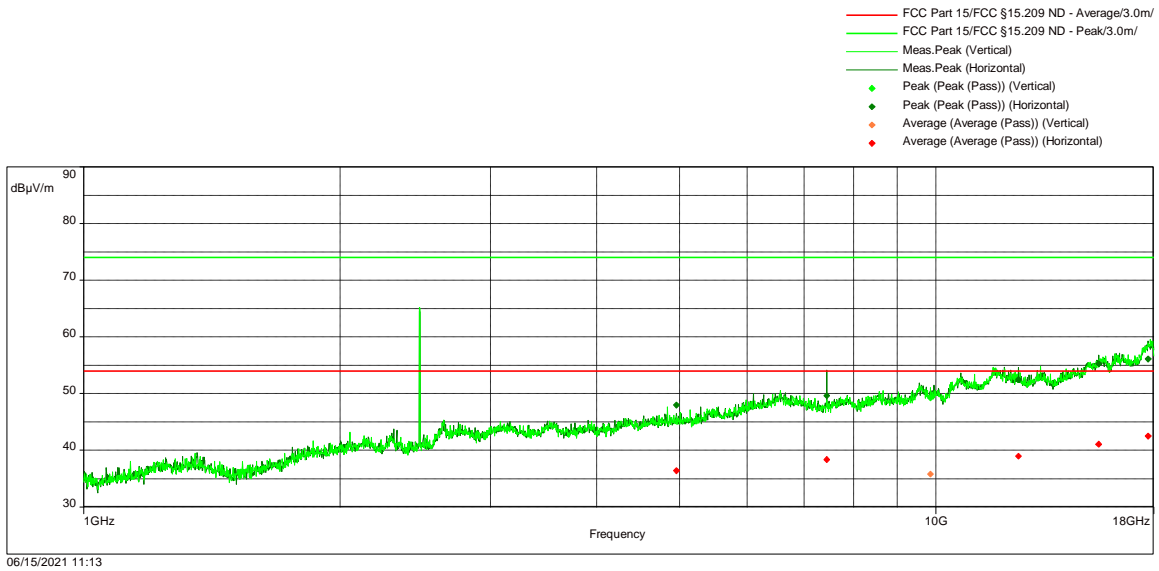
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Spurious Emissions 1 - 18GHz - High Ch - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|------|-----------|------------|
| 1GHz- 18GHz | Vertical | 3m | 1MHz | 18001Pts | Auto |
| 1GHz- 18GHz | Horizontal | 3m | 1MHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis High Channel 2480MHz

Figure 2.8-8 – RE Spurious Emissions 1-18 GHz – High Channel



Table 2.8-8 – RE Spurious Emissions 1-18 GHz – High Channel

| Frequency | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Azimuth (°) | Height (m) | Polarity | Peak Result | Average Result |
|--------------|---------------------|---------------------|------------------|------------------------|------------------------|---------------------|-------------|------------|------------|-------------|----------------|
| 4.9600556GHz | 47.97 | 74.00 | -26.03 | 36.41 | 54.00 | -17.59 | 19.00 | 3.35 | Horizontal | Pass | Pass |
| 7.4392222GHz | 49.61 | 74.00 | -24.39 | 38.32 | 54.00 | -15.68 | 123.00 | 1.63 | Horizontal | Pass | Pass |
| 9.8485GHz | 49.23 | 74.00 | -24.77 | 35.81 | 54.00 | -18.19 | 5.00 | 2.69 | Vertical | Pass | Pass |
| 12.493889GHz | 52.46 | 74.00 | -21.54 | 38.97 | 54.00 | -15.03 | 316.00 | 1.17 | Horizontal | Pass | Pass |
| 15.515167GHz | 55.25 | 74.00 | -18.75 | 41.04 | 54.00 | -12.96 | 217.00 | 1.94 | Horizontal | Pass | Pass |
| 17.740278GHz | 56.08 | 74.00 | -17.92 | 42.46 | 54.00 | -11.54 | 334.00 | 1.40 | Horizontal | Pass | Pass |

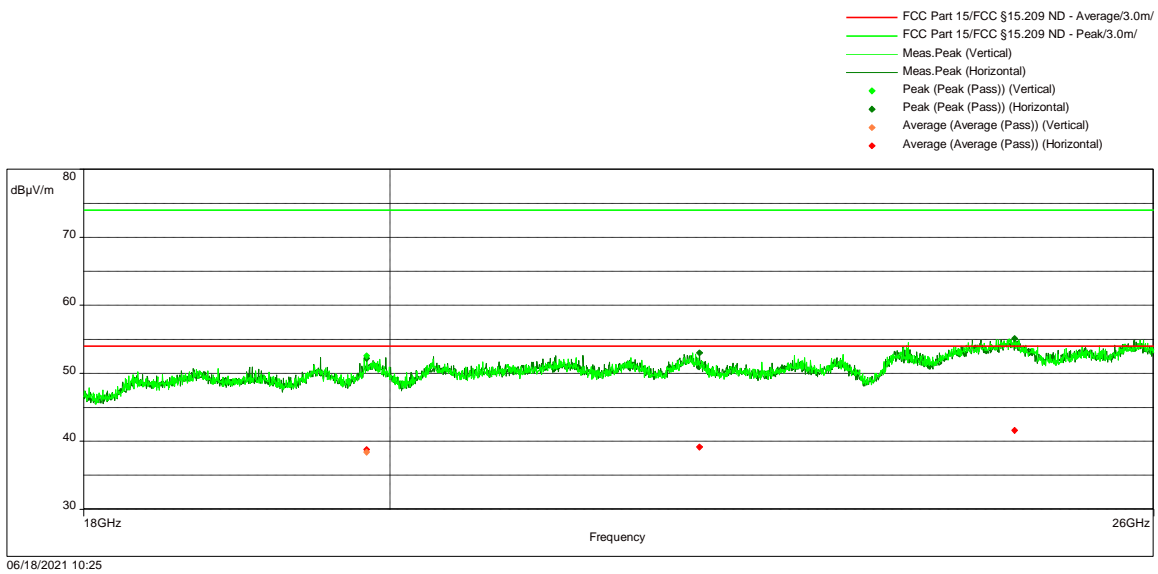
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Spurious Emissions 18 - 26GHz - High CH - Y axis

| Frequency Range | Polarity | Antenna Distance | RBW | Step Size | Sweep Time |
|-----------------|------------|------------------|------|-----------|------------|
| 18GHz- 26GHz | Vertical | 3m | 1MHz | 18001Pts | Auto |
| 18GHz- 26GHz | Horizontal | 3m | 1MHz | 18001Pts | Auto |



Limit:
FCC §15.209

Test Results:
Pass

Test Notes: Y-axis High Channel 2480MHz

Figure 2.8-9 – RE Spurious Emissions 18-26 GHz – High Channel



Table 2.8-9 – RE Spurious Emissions 18-26 GHz – High Channel

| Frequency | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Azimuth (°) | Height (m) | Polarity | Peak Result | Average Result |
|--------------|---------------------|---------------------|------------------|------------------------|------------------------|---------------------|-------------|------------|------------|-------------|----------------|
| 19.837778GHz | 52.19 | 74.00 | -21.81 | 38.80 | 54.00 | -15.20 | 200.00 | 1.70 | Horizontal | Pass | Pass |
| 19.837778GHz | 52.58 | 74.00 | -24.42 | 38.42 | 54.00 | -15.58 | 218.00 | 1.49 | Vertical | Pass | Pass |
| 22.244444GHz | 52.99 | 74.00 | -21.01 | 39.17 | 54.00 | -14.83 | 97.00 | 2.61 | Horizontal | Pass | Pass |
| 24.785333GHz | 55.15 | 74.00 | -18.85 | 41.57 | 54.00 | -12.43 | 204.00 | 2.15 | Horizontal | Pass | Pass |

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2.8.9 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: STS

Table 2.8-10 – Radiated Emissions Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|--------------------|------------------------------|------------|---------------|----------|------------|------------|
| NBLE11460 | ETS-Lindgren | Antenna, Horn 1-18 GHz | 3117 | 155005 | G | 02/17/2021 | 02/17/2023 |
| WRLE02668 | Hewlett-Packard | Preamplifier, 0.1-1300 MHz | 8447D | 1937A02209 | B | 11/10/2020 | 11/10/2021 |
| WRLE11519 | Com-Power Corp. | Preamp, 500 MHz-18 GHz | PAM-118A | 18040002 | B | 01/08/2021 | 01/08/2022 |
| NBLE11555 | Rohde & Schwarz | Receiver, 2 Hz-44 GHz | ESW44 | 101537 | G | 12/31/2020 | 12/31/2021 |
| NBLE11578 | ETS-Lindgren | Antenna, BiConiLog | 3142C | 00079889 | G | 09/14/2020 | 09/14/2022 |
| NBLE11689 | ATM | Antenna, DRG 18-40 GHz | 180-442-KF | 102040 | G | 06/02/2021 | 06/02/2023 |
| NBLE11688 | Rohde & Schwarz | Preamp, 18-40 GHz | TRS-PR1840 | 10006 | G | 06/10/2021 | 06/10/2023 |
| NBLE11699 | Microwave Circuits | Notch Filter, 2.4-2.4837 GHz | N0324415 | 502922 DC1947 | B | 01/19/2021 | 01/19/2022 |

Cal Code G = Calibration performed by an accredited outside source.
 Cal Code B = Calibration verification performed internally.
 Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.9 Radiated Band-Edge

2.9.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, 15.247
RSS-GEN Issue 5

2.9.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.9.3 Date of Test

15 June 2021

2.9.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive table 1.5 m above a reference ground plane. Measurements were taken at a 3m distance. The fundamental signal was maximized while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector. Band-edge measurements were made with the device in its maximized position using a peak and average detector as described in ANSI C63.10.

The EUT was assessed against the limits specified in FCC 47 CFR Part 15C §15.209.

2.9.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

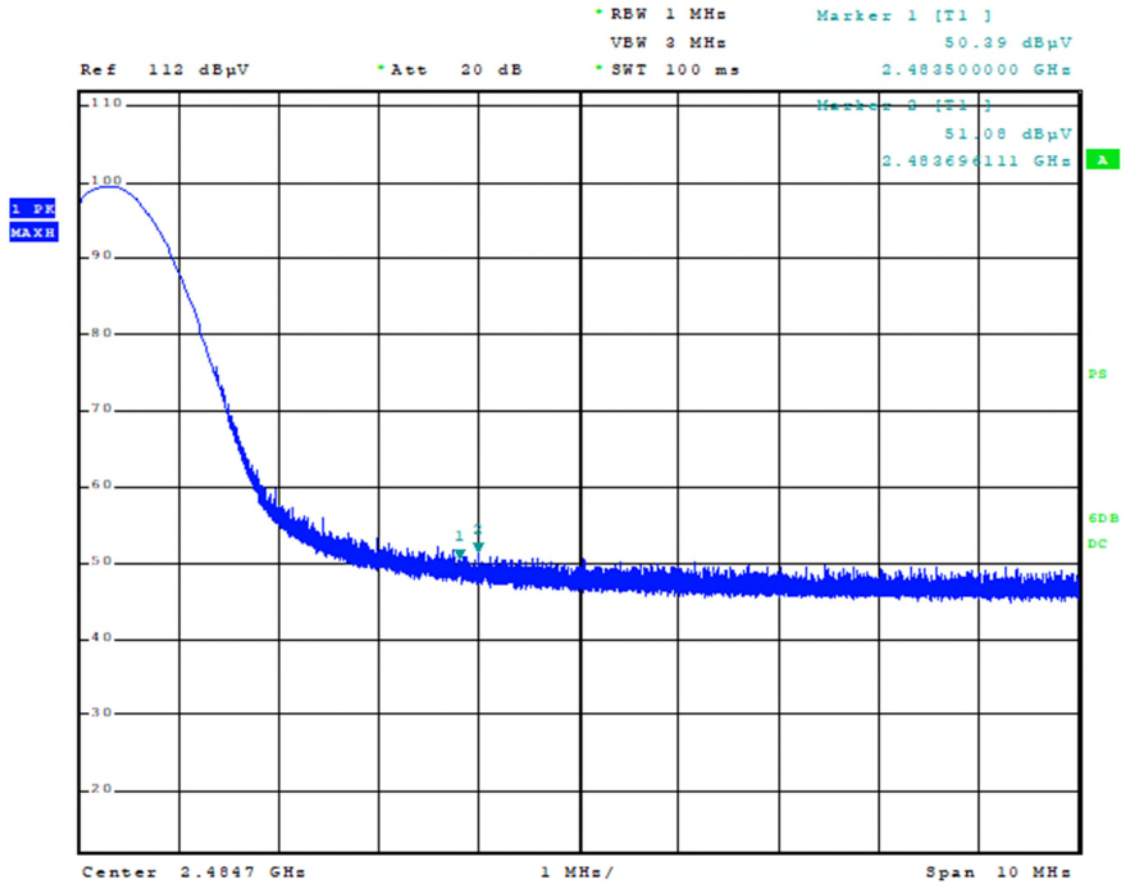
2.9.6 Test Results

Test Summary: EUT operated as intended before, during, and after testing.

.

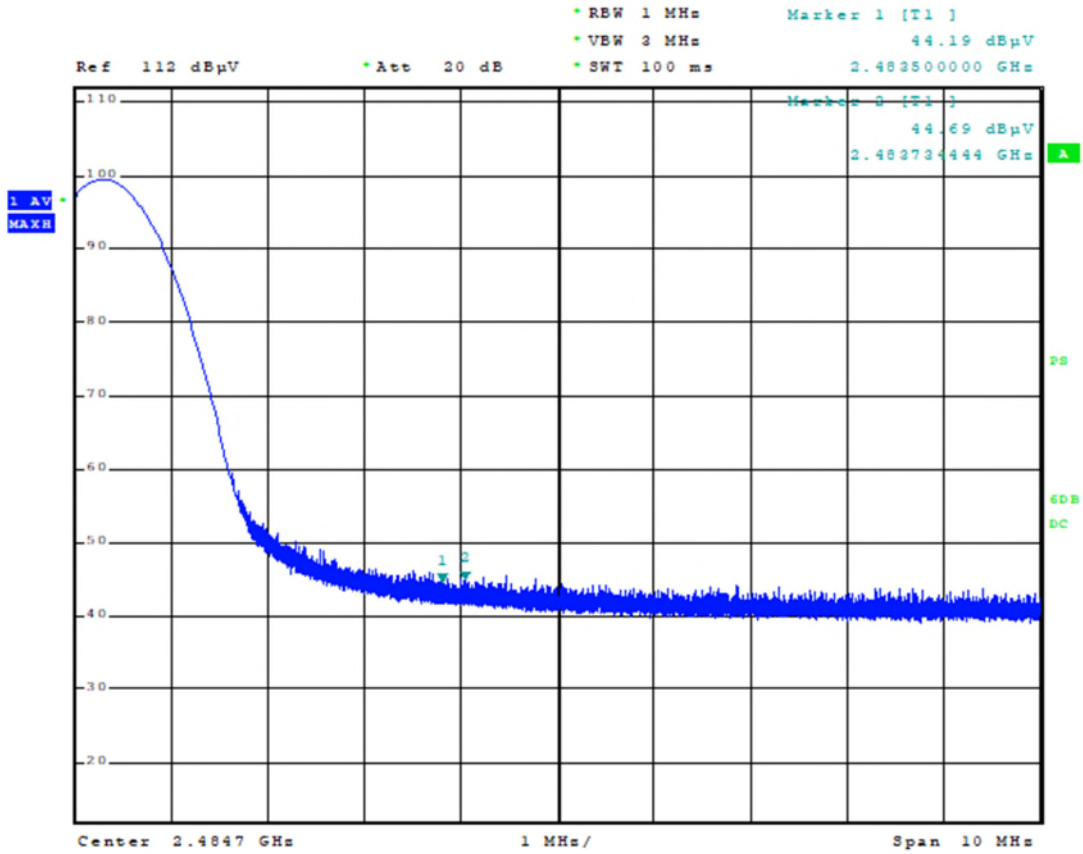
Test Result: Pass

See data below for detailed results.



Date: 15.JUN.2021 14:55:18

Figure 2.9-1 – Band-Edge, High Channel – Peak



Date: 15.JUN.2021 14:57:16

Figure 2.9-2 – Band-Edge, High Channel – Average



Table 2.9-1 – Restricted Band Edge – High Channel – Peak

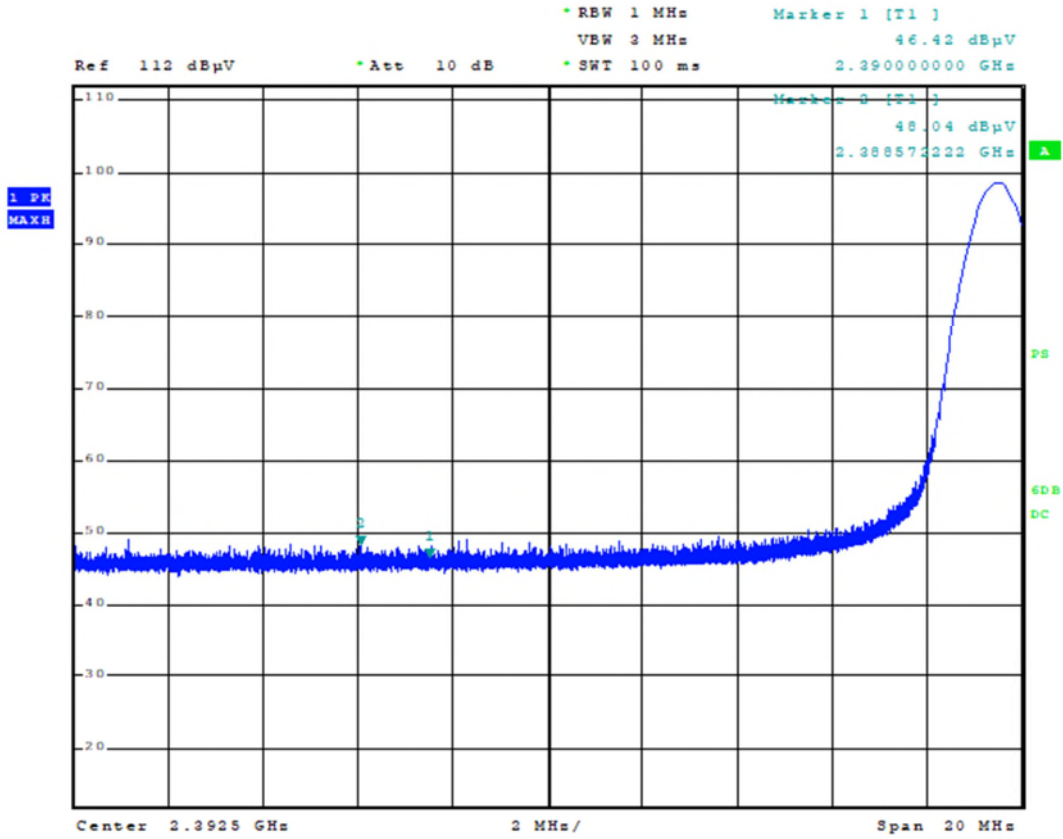
| Frequency (MHz) | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Correction Factor (dB) | Peak Result |
|-----------------|---------------------|---------------------|------------------|------------------------|-------------|
| 2483.5 | 55.86 | 74.00 | -18.14 | 5.47 | Pass |
| 2484.69 | 56.58 | 74.00 | -17.42 | 5.50 | Pass |

Note: Peak level calculation: Final Peak level = analyzer level + correction factor.
 Margin Calculation: Peak Margin = Peak Level – Peak Limit.

Table 2.9-2 – Restricted Band Edge – High Channel – Average

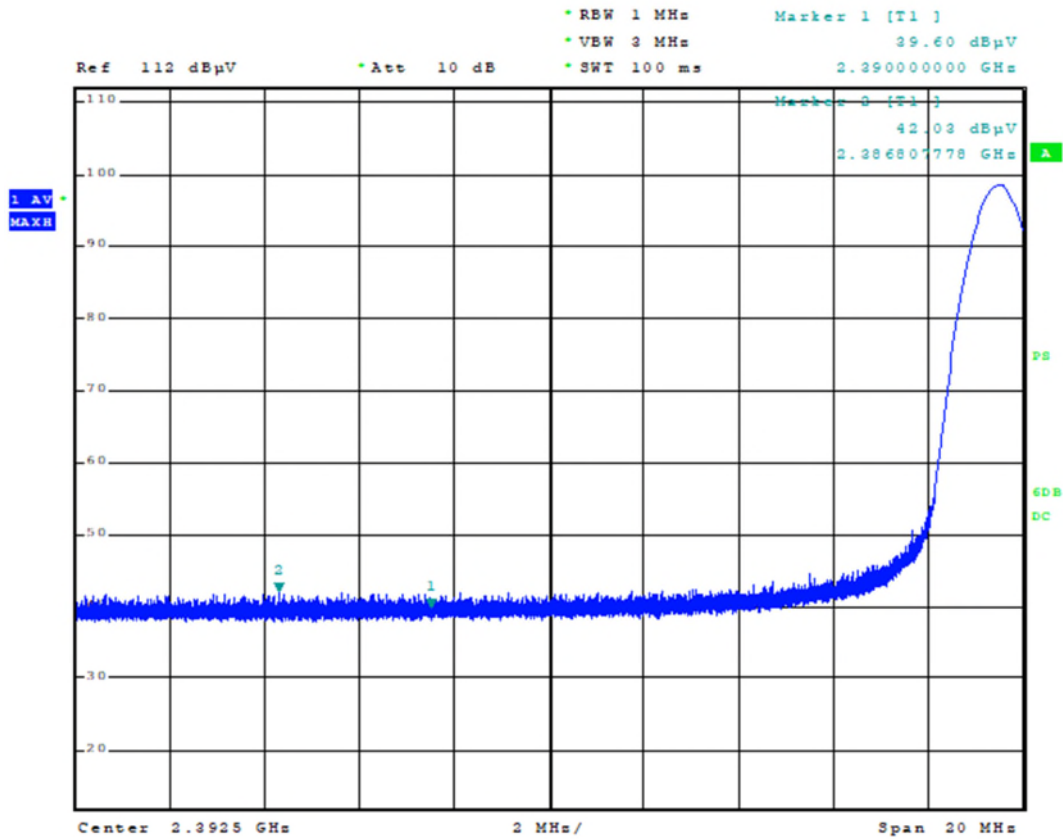
| Frequency (MHz) | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Correction Factor (dB) | Average Result |
|-----------------|------------------------|------------------------|---------------------|------------------------|----------------|
| 2483.5 | 49.66 | 54.00 | -4.34 | 5.47 | Pass |
| 2487.34 | 50.19 | 54.00 | -3.81 | 5.50 | Pass |

Note: Peak level calculation: Final Average level = analyzer level + correction factor.
 Margin Calculation: Average Margin = Average Level – Average Limit.



Date: 15.JUN.2021 14:39:05

Figure 2.9-3 – Band-edge, Low Channel – Peak



Date: 15.JUN.2021 14:43:45

Figure 2.9-4 – Band-edge, Low Channel – Average



Table 2.9-3 – Restricted Band Edge – Low Channel – Peak

| Frequency (MHz) | Peak Level (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) | Correction Factor (dB) | Peak Result |
|-----------------|---------------------|---------------------|------------------|------------------------|-------------|
| 2390 | 51.88 | 74.00 | -22.12 | 5.46 | Pass |
| 2388.57 | 53.51 | 74.00 | -20.49 | 5.47 | Pass |

Note: Peak level calculation: Final Peak level = analyzer level + correction factor.
 Margin Calculation: Peak Margin = Peak Level – Peak Limit.

Table 2.9-4 – Restricted Band Edge – Low Channel – Average

| Frequency | Average Level (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) | Correction Factor (dB) | Average Result |
|-----------|------------------------|------------------------|---------------------|------------------------|----------------|
| 2390 MHz | 45.06 | 54.00 | -8.94 | 5.46 | Pass |
| 2386.80 | 47.50 | 54.00 | -6.50 | 5.48 | Pass |

Note: Peak level calculation: Final Average level = analyzer level + correction factor.
 Margin Calculation: Average Margin = Average Level – Average Limit.



2.9.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.
 Test Area: STS

Table 2.9-5 – Restricted Band Edge Equipment List

| Device # | Manufacturer | Description | Model | Serial # | Cal Code | Cal Date | Cal Due |
|-----------|-----------------|--------------------------|-------------|----------|----------|------------|------------|
| WRLE11519 | Com-Power Corp. | Preamp, 500 MHz-18 GHz | PAM-118A | 18040002 | B | 01/08/2021 | 01/08/2022 |
| WRLE10998 | Rohde & Schwarz | Receiver, 20 Hz-26.5 GHz | ESU 26 | 100379 | G | 05/21/2020 | 11/20/2021 |
| NBLE02001 | Pasternack | Attenuator, 10 dB | 18N20W-10dB | 2001 | G | 11/06/2020 | 11/06/2021 |
| NBLE11460 | ETS-Lindgren | Antenna, Horn 1-18 GHz | 3117 | 155005 | G | 02/17/2021 | 02/17/2023 |

Cal Code G = Calibration performed by an accredited outside source.
 Cal Code B = Calibration verification performed internally.
 Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



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The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. This test system has a measurement uncertainty of ± 3.30 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. This test system for 30 MHz-1000 MHz has a measurement uncertainty of ± 5.88 dB and above 1 GHz a measurement uncertainty of ± 4.47 dB. The measurement uncertainty values for conducted and radiated emissions meet the requirements as expressed in CISPR 16-4-2. The equipment comprising the test systems is calibrated on an annual basis.

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated to meet test method standard requirements and/or manufacturer's specifications