

Report on the Testing of the

Trividia Health Inc.

True Metrix Air - MR2-PCB-820

FCC ID: 2ADDB-AIR-02

In accordance with:

FCC 47 CFR Part 15.247

FCC 47 CFR Part 15.207

ISED RSS-247 Issue 2, February 2017

Prepared for: Trividia Health Inc.
2400 NW 55th Court
Ft. Lauderdale, FL 33309



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NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Sean Sellergren	Sr. EMC Engineer	Authorized Signatory	24 June 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.



A2LA Cert. No. 2955.11

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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	24 June 2021

1.2 Introduction

Applicant	Trividia Health Inc.
Manufacturer	Trividia Health Inc.
Applicant's Email Address	SLeone@trividiahealth.com
Model Number(s)	True Metrix Air - MR2-PCB-820
Serial Number(s)	Conducted sample: a00004266 Radiated sample: a00001150
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15.247 FCC 47 CFR Part 15.207 ISED RSS-247 Issue 2, February 2017
Order Number	72168609
Date of Receipt of EUT	25 MAY 2021
Start of Test	01 JUN 2021
Finish of Test	04 JUN 2021
Related Document(s)	KDB 558074 D01 ANSI C63.10 2013



1.3 Scope of Testing

To perform certification testing to confirm that the wireless device(s) meet the requirements of the applicable standards and guidance documents (KDB 558074 D01).

1.4 Summary of Results

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

Table 1.4-1 – 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	15.247(d)	RSS-GEN	Radiated Spurious Emissions	A2LA	ANSI C63.10:2013
2.8	15.205	RSS-GEN	Radiated Restricted Bands of Emissions	A2LA	ANSI C63.10:2013

**Table 1.4-2 – Test Accreditation**

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



1.5 Product Information

1.5.1 Technical Description

The Equipment Under Test (EUT): Blood Glucose meter (uses Texas Instruments CC2640R2FRSMR).

Table 1.5-1 – Wireless Module Technical Information

Detail	Description
FCC ID	2ADDB-AIR-02
Transceiver Model #	True Metrix Air – MR2-PCB-820
Operating Frequency	2402 – 2480 MHz
Modulation Format	GFSK
Antenna Type / Gain:	PCB Trace/Integral; +5.3 dBi Gain

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

**Table 1.5-2 – Cable Descriptions**

Cable/Port	Description
Cable/Port1	n/a

Table 1.5-3 – Support Equipment Descriptions

Make/Model	Description
Trividia	Programming Cradle
Lenovo Thinkpad PC	Lab laptop PC (used for controlling device)

1.5.2 Modes of Operation

The tested mode of operation was:

Low Channel / Mode	2402 MHz / 1 Mbps
Mid Channel / Mode	2440 MHz / 1 Mbps
High Channel / Mode	2480 MHz / 1 Mbps

1.6 Deviations from the Standard

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

1.7 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 1.7-1 – Modification Record

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

1.8 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



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
PCB Trace	Integral	5.3 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

01 JUN 2021

2.2.4 Test Method

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 15.247 Meas Guidance. 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

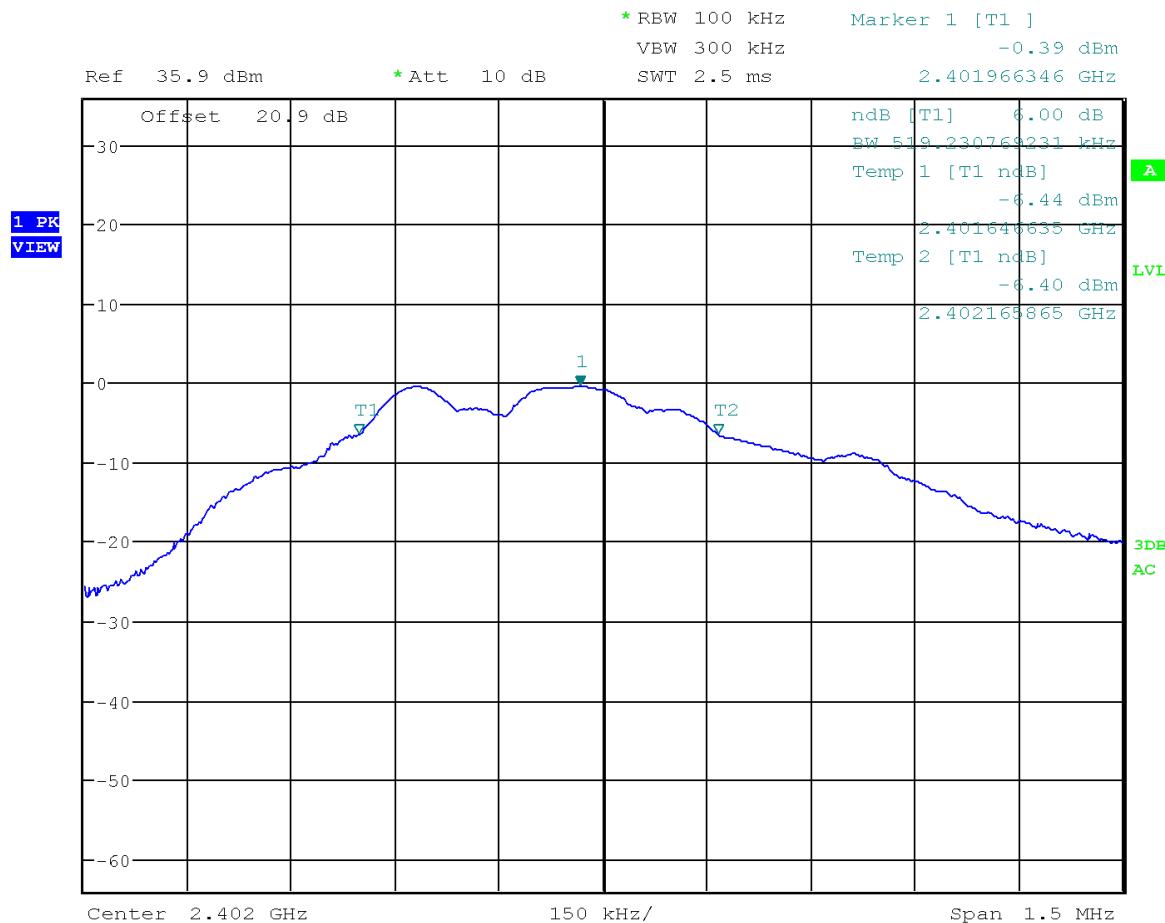
Table 2.2-1 – 6dB / 99% Bandwidth Results

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
2402	0.51923	1.066
2440	0.53125	1.066
2480	0.53125	1.050

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

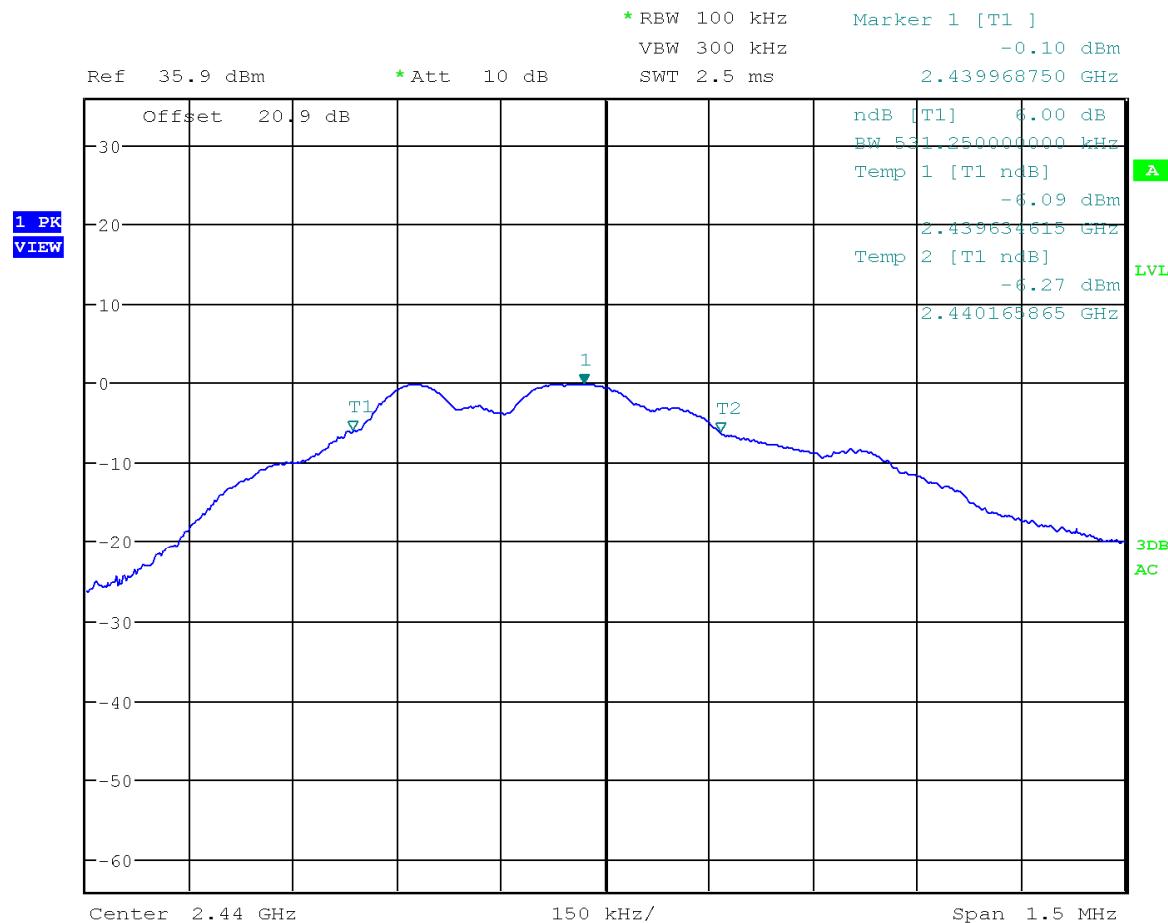
Test Result: Pass

See data below for detailed results.



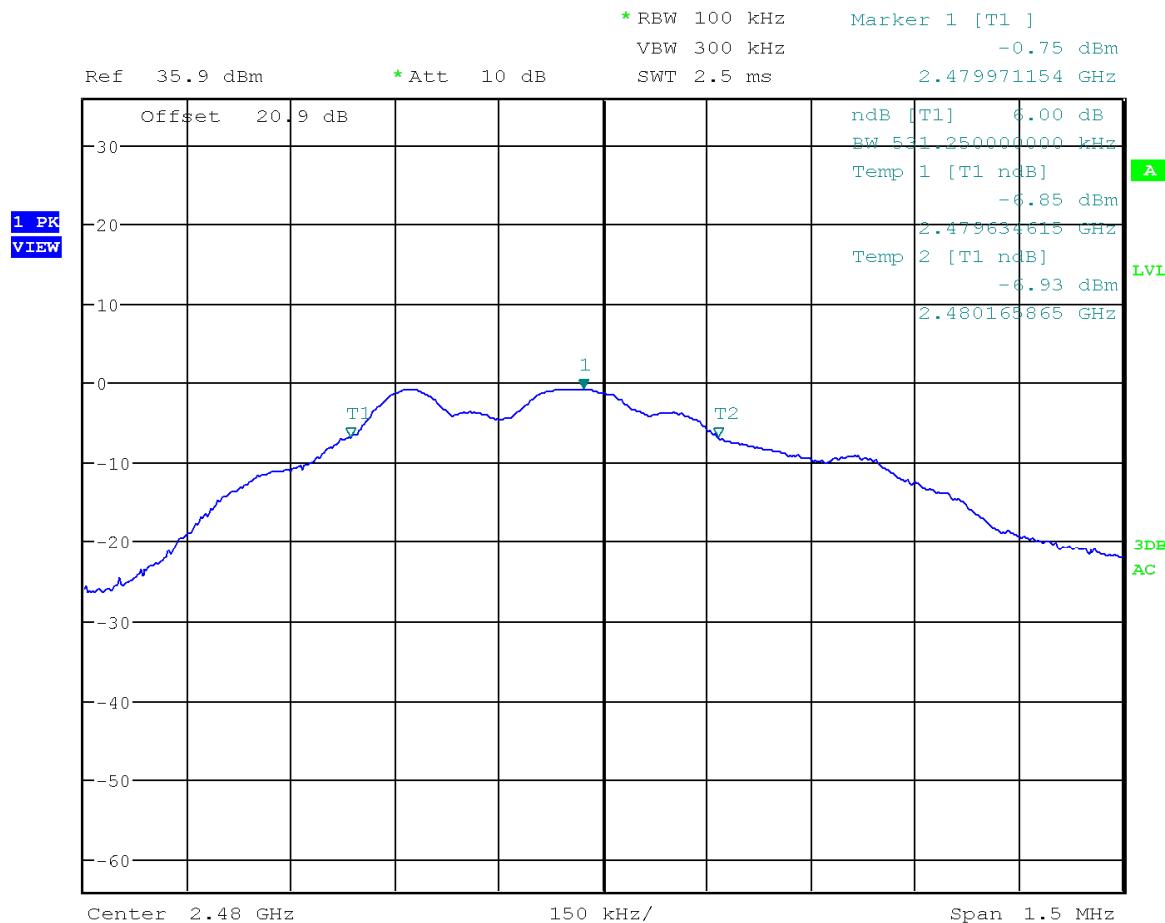
Date: 1.JUN.2021 10:11:38

Figure 2-1 – 6dB Bandwidth – Low Channel



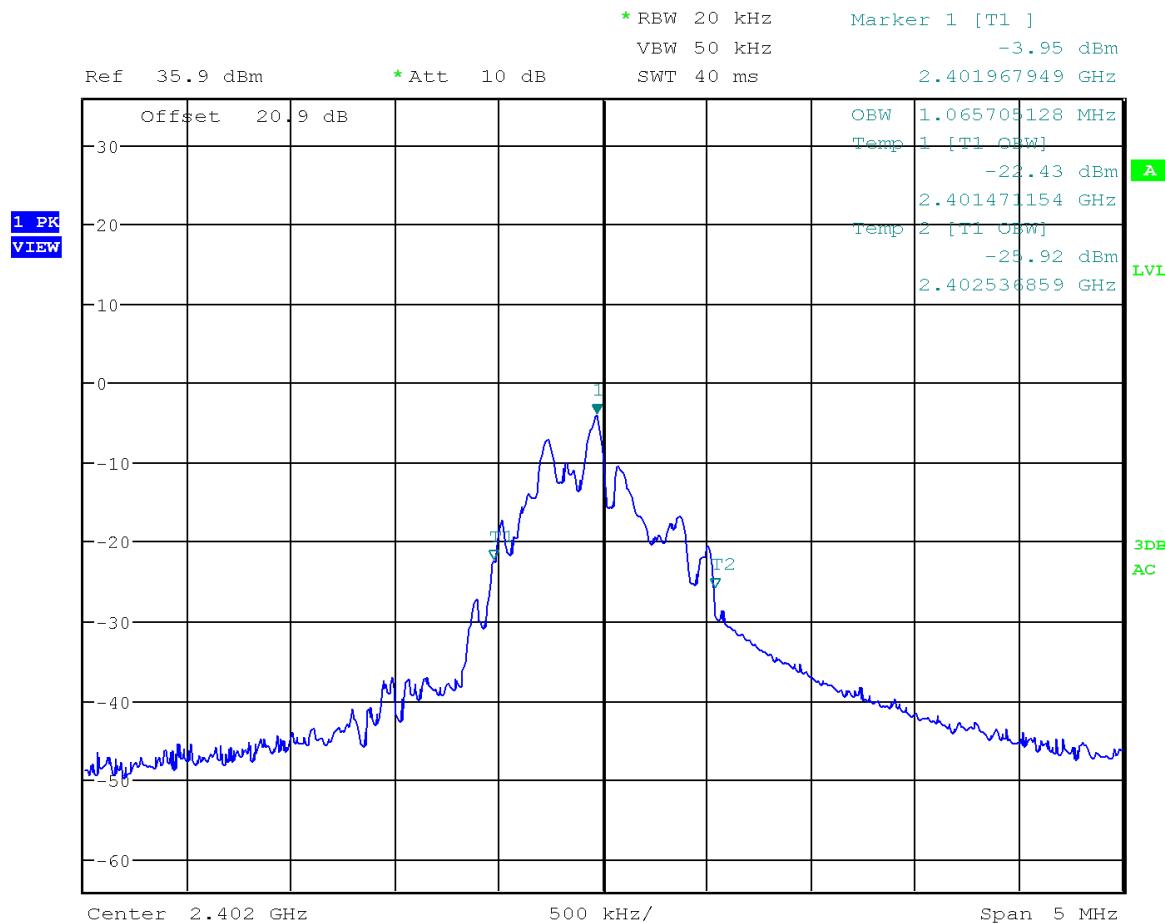
Date: 1.JUN.2021 10:08:44

Figure 2-2 – 6dB Bandwidth – Middle Channel



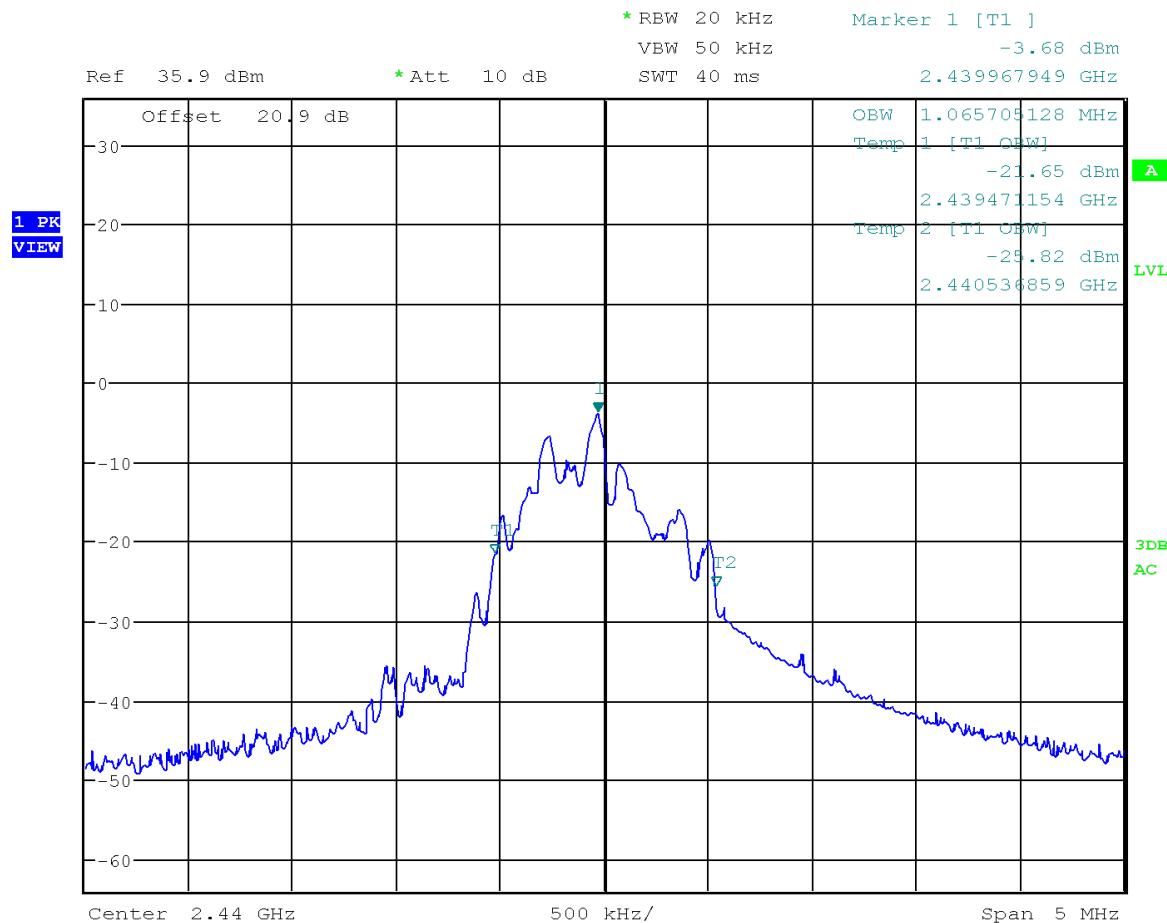
Date: 1.JUN.2021 10:17:49

Figure 2-3 – 6dB Bandwidth – High Channel



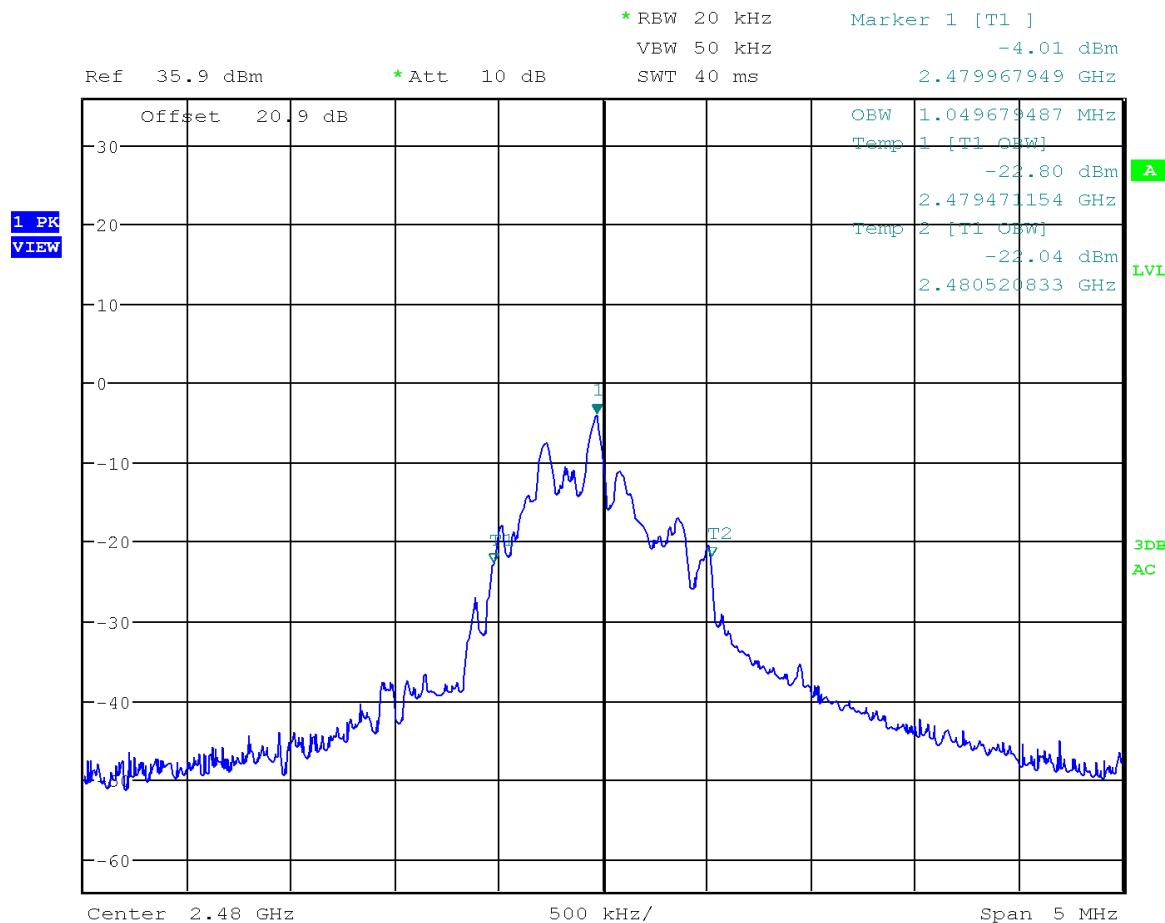
Date: 1.JUN.2021 10:12:41

Figure 2-4 – 99% Bandwidth – Low Channel



Date: 1.JUN.2021 10:01:18

Figure 2-5 – 99% Bandwidth – Middle Channel



Date: 1.JUN.2021 10:18:24

Figure 2-6 – 99% Bandwidth – High Channel



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
WRLE10998	Rohde & Schwarz	Receiver, 20 Hz-26.5 GHz	ESU 26	100379	G	05/21/2020	11/20/2021
WRLE11398	Meca	Attenuator, 20dB	603-20-1F18	11398	B	11/02/2020	11/02/2021

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

01 JUN 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 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)	Correction Factor (dB)	Final Output Power (dBm)
2402	20.9	0.14
2440	20.9	0.39
2480	20.9	-0.29

Note: Peak level calculation: Final Peak level = analyzer level + correction factor.

Frequency (MHz)	Correction Factor (dB)	Radiated Output Power (dBuV)	Radiated Output Power ERP (dBm)	Measured Antenna Gain (dB)
2402	3.47	96.26	2.35	2.21

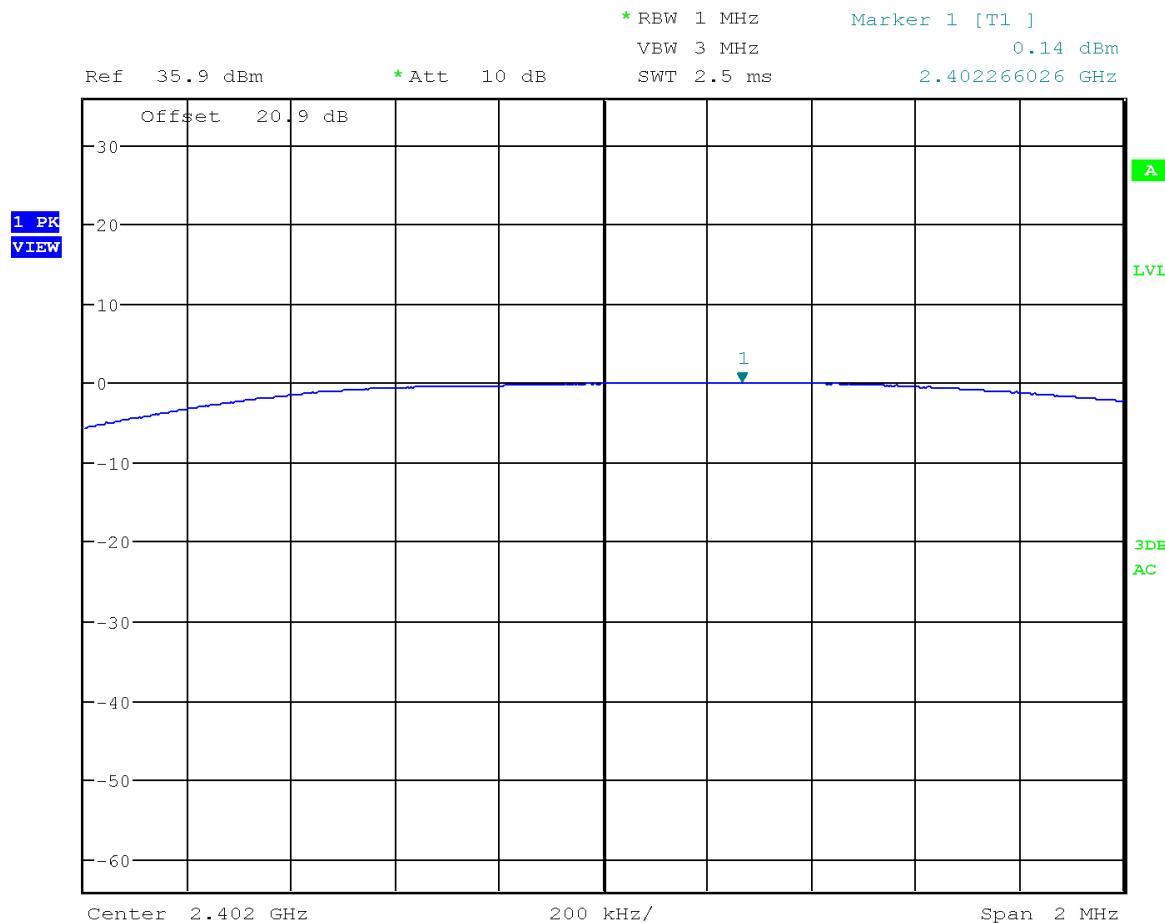
Note: Radiated power was pre-scanned at all 3 channels. The worst-case Radiated was 2402 MHz.

Note: Radiated power calculation: Final Peak level = (analyzer level (dBuV/m) + correction factor) converted to ERP (dBm) at 3m measurement distance.

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

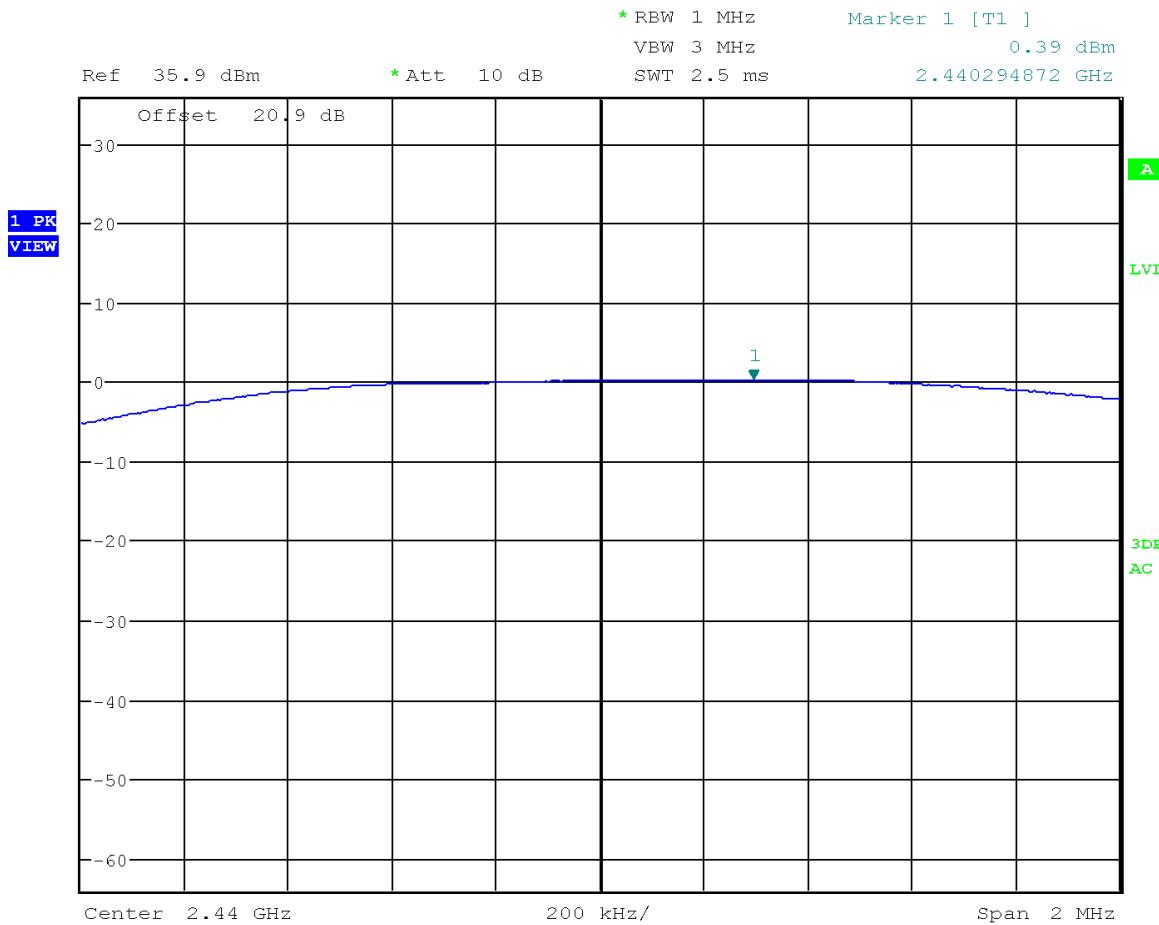
Test Result: Pass

See data below for detailed results.



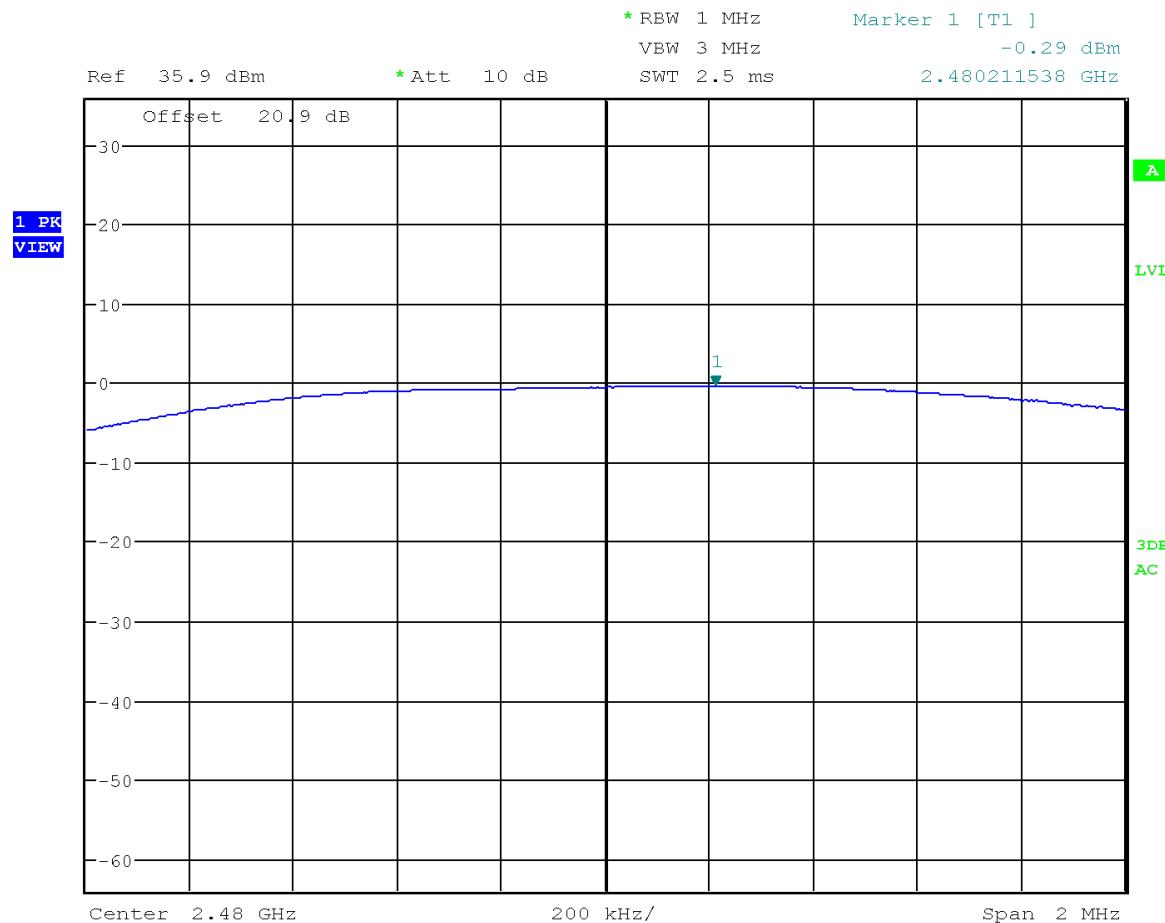
Date: 1.JUN.2021 10:13:48

Figure 2-7 – Peak Conducted Output Power – Low Channel



Date: 1.JUN.2021 10:15:44

Figure 2-8 – Peak Conducted Output Power – Middle Channel



Date: 1.JUN.2021 10:16:40

Figure 2-9 – Peak Conducted Output Power – High Channel

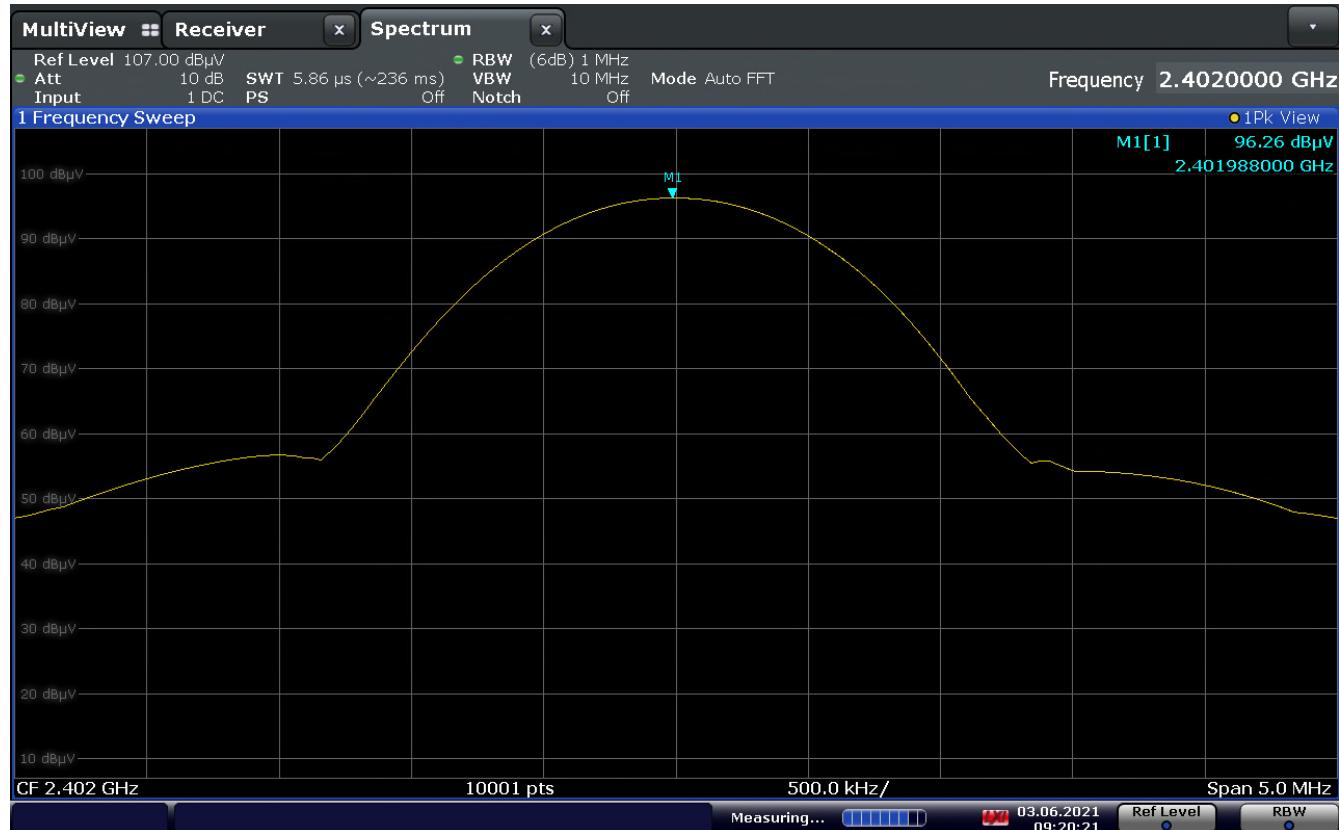


Figure 2-10 – Peak Radiated Output Power – Low Channel



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
WRLE10998	Rohde & Schwarz	Receiver, 20 Hz-26.5 GHz	ESU 26	100379	G	05/21/2020	11/20/2021
WRLE11398	Meca	Attenuator, 20dB	603-20-1F18	11398	B	11/02/2020	11/02/2021
Device #	Manufacturer	Description	Model	Serial #	Cal Code	Cal Date	Cal Due
NBLE10985	Agilent Technologies	Pre Amplifier, 0.1-1300 MHz	8447D	2443A04180	B	04/07/2021	04/07/2022
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
NBLE11630	ETS-Lindgren	Antenna, 1-18 GHz	3117	00218816	G	09/04/2020	09/04/2022
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.



2.4 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

01 JUN 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 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 – F1 Unit

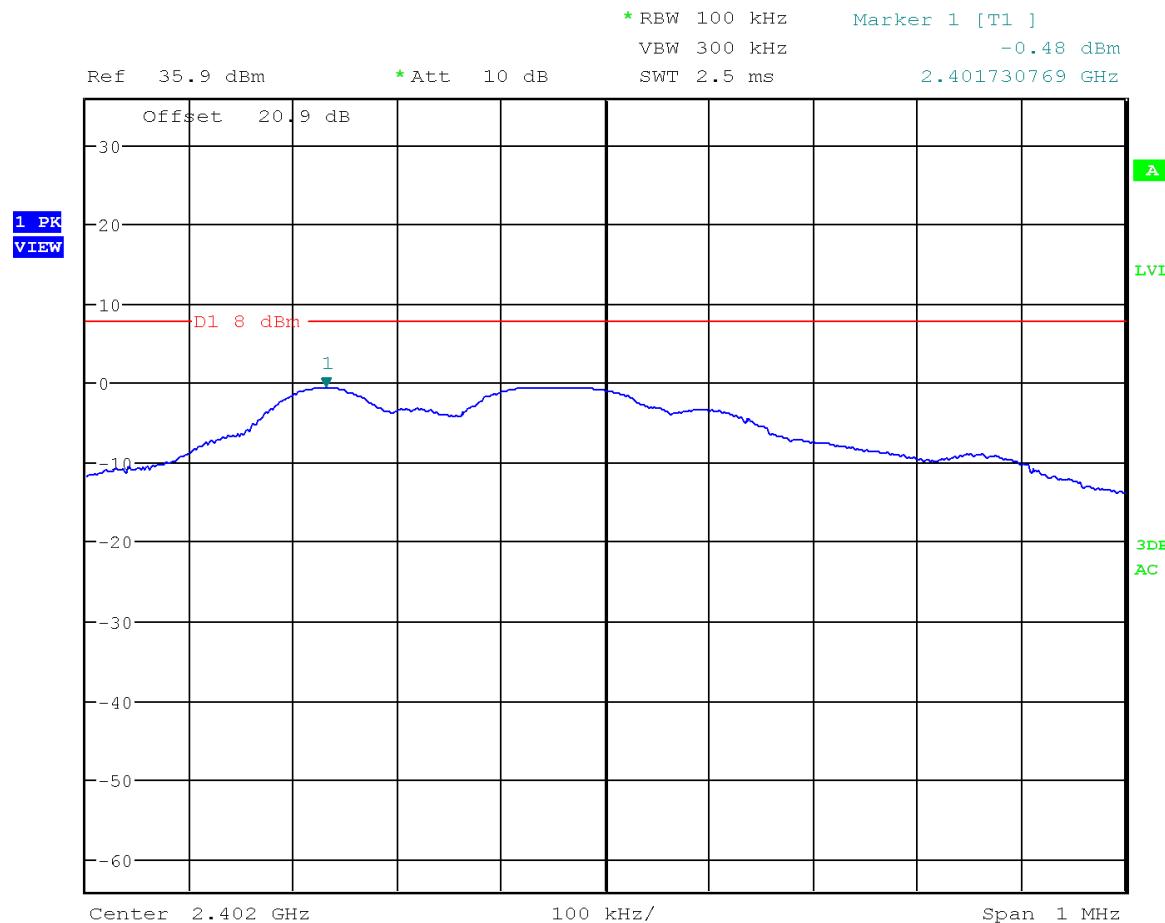
Frequency (MHz)	Correction Factor (dB)	Final PSD Level (dBm)
2402	20.9	-0.48
2440	20.9	-0.15
2480	20.9	-0.72

Note: Peak level calculation: Final Peak level = analyzer level + correction factor.

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

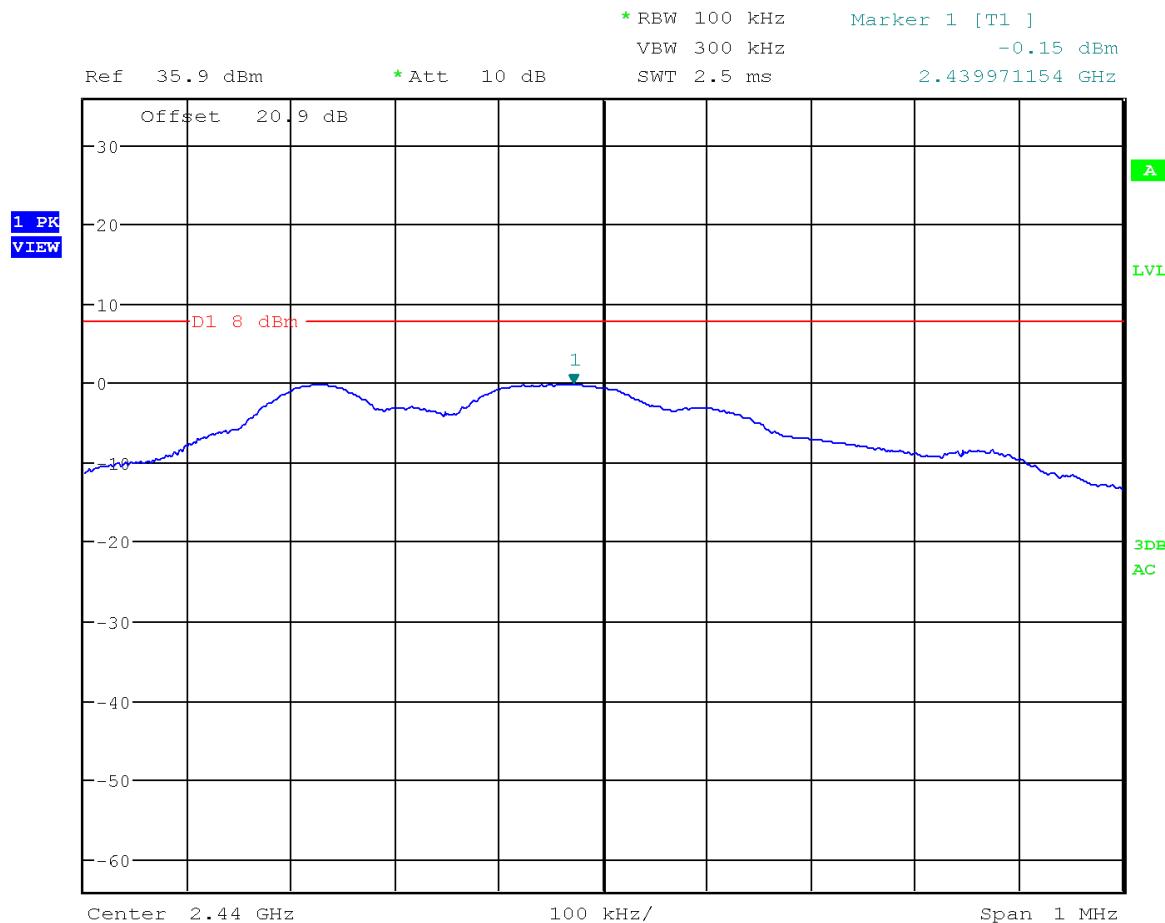
Test Result: Pass

See data below for detailed results.



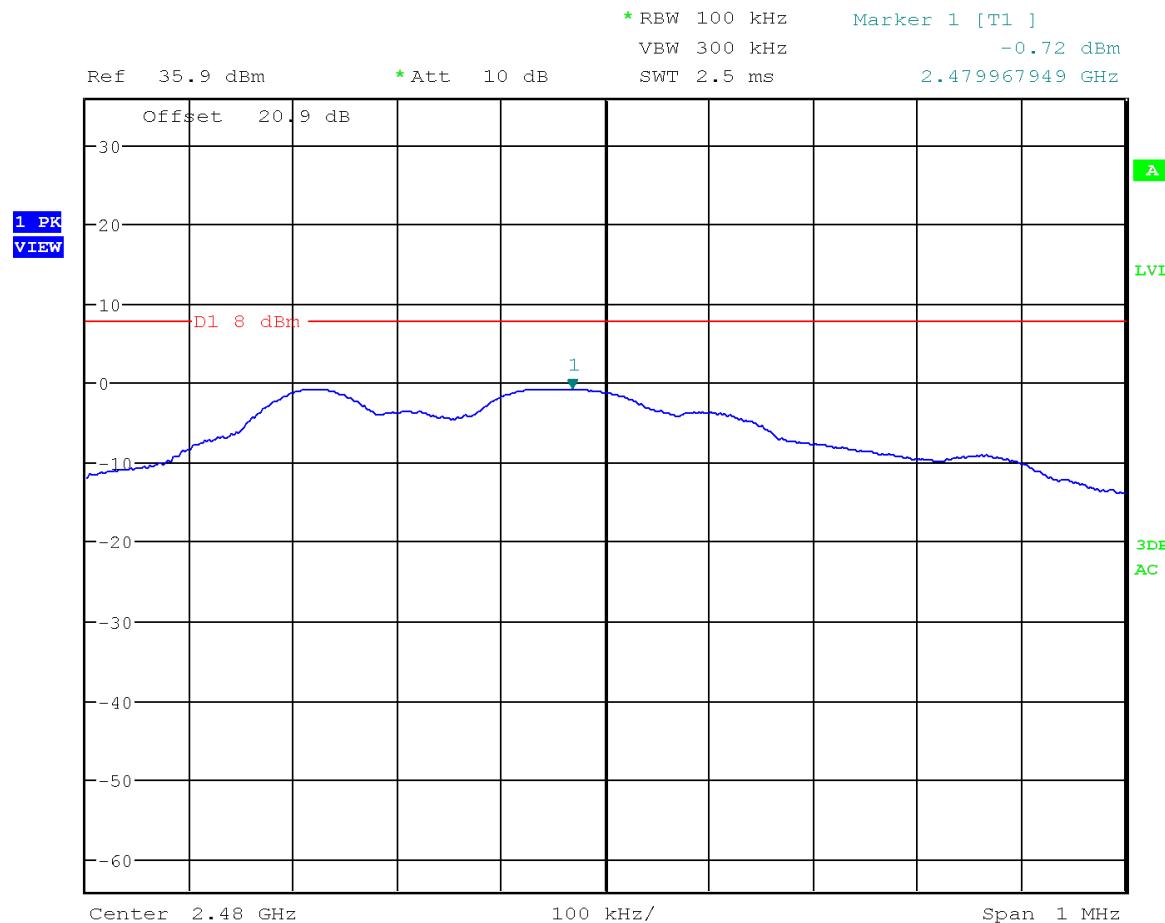
Date: 1.JUN.2021 10:29:15

Figure 2-11 – Peak Conducted Output Power – Low Channel



Date: 1.JUN.2021 10:28:15

Figure 2-12 – Peak Conducted Output Power – Middle Channel



Date: 1.JUN.2021 10:24:44

Figure 2-13 – 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
WRLE10998	Rohde & Schwarz	Receiver, 20 Hz-26.5 GHz	ESU 26	100379	G	05/21/2020	11/20/2021
WRLE11398	Meca	Attenuator, 20dB	603-20-1F18	11398	B	11/02/2020	11/02/2021

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

02 JUN 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. 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 (10 times the highest intentional radiator) broken up into subranges 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

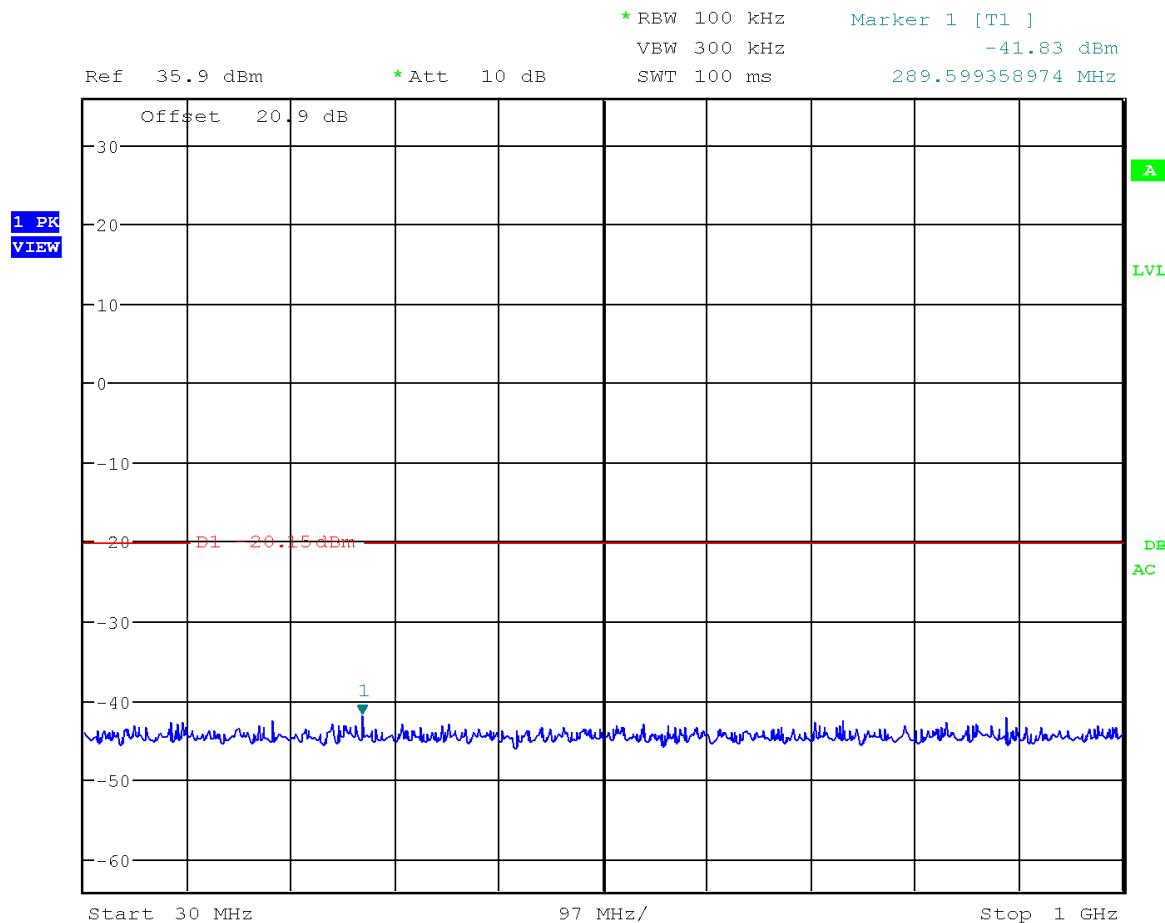
The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.5.6 Test Results

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

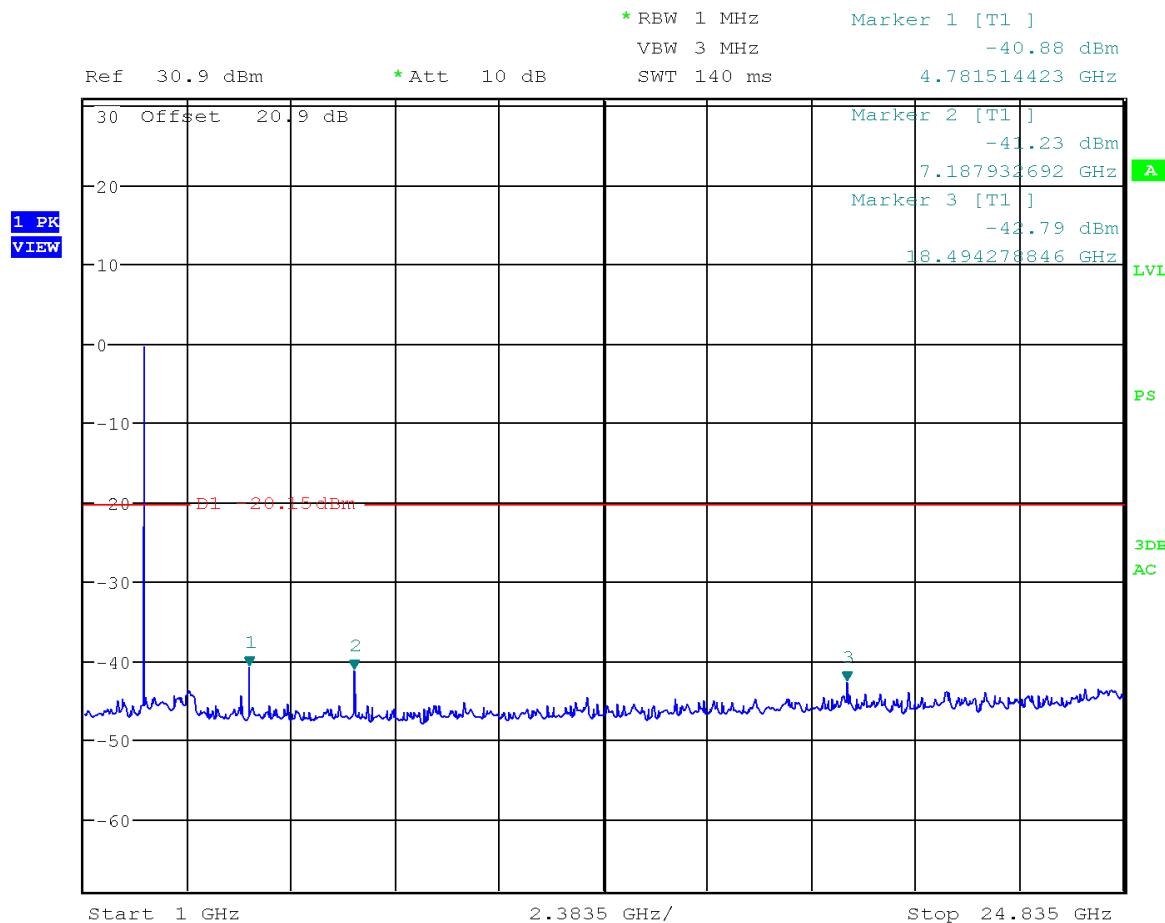
Test Result: Pass

See data below for detailed results.



Date: 2.JUN.2021 08:13:52

Figure 2-14 – Conducted Spurious Emissions 30 MHz – 1 GHz – Low Channel



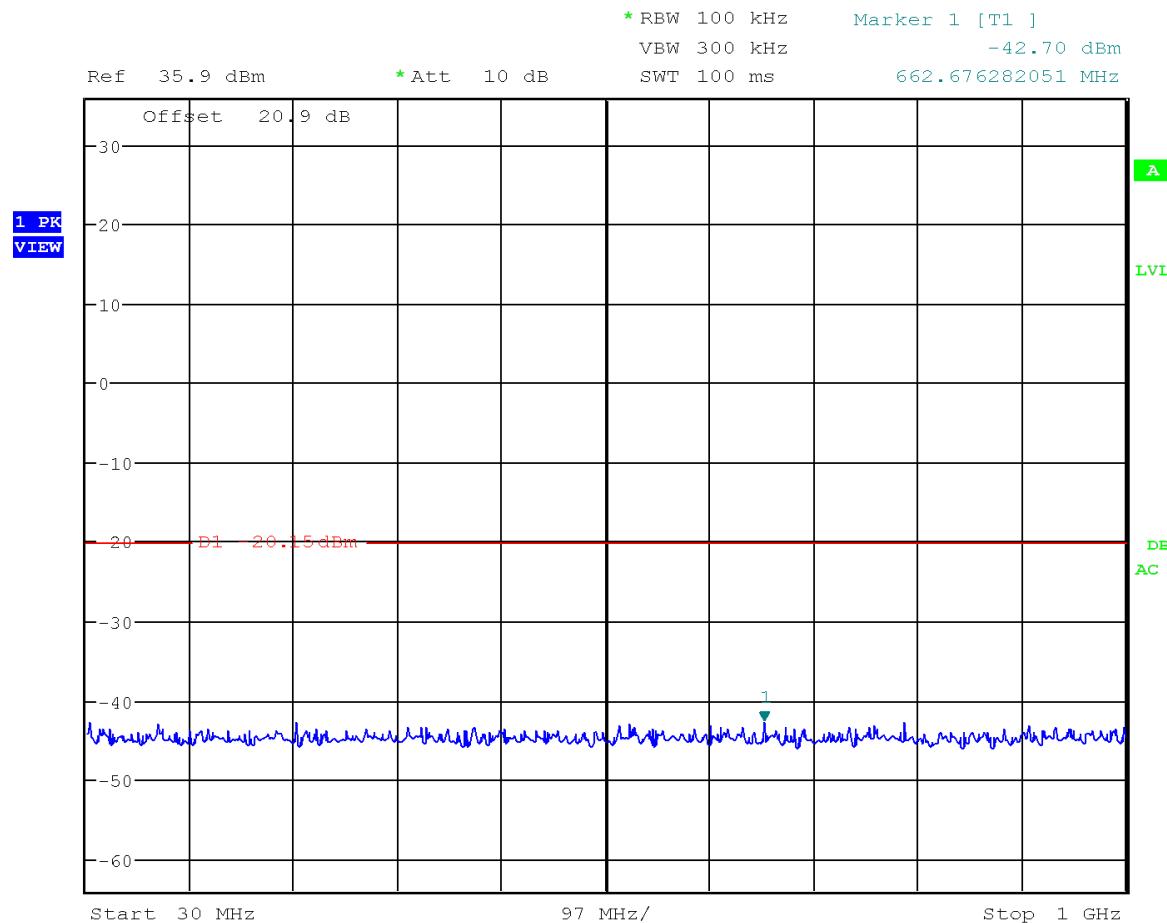
Date: 2.JUN.2021 08:19:01

Figure 2-15 – Conducted Spurious Emissions 1 GHz – 25GHz – Low Channel

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

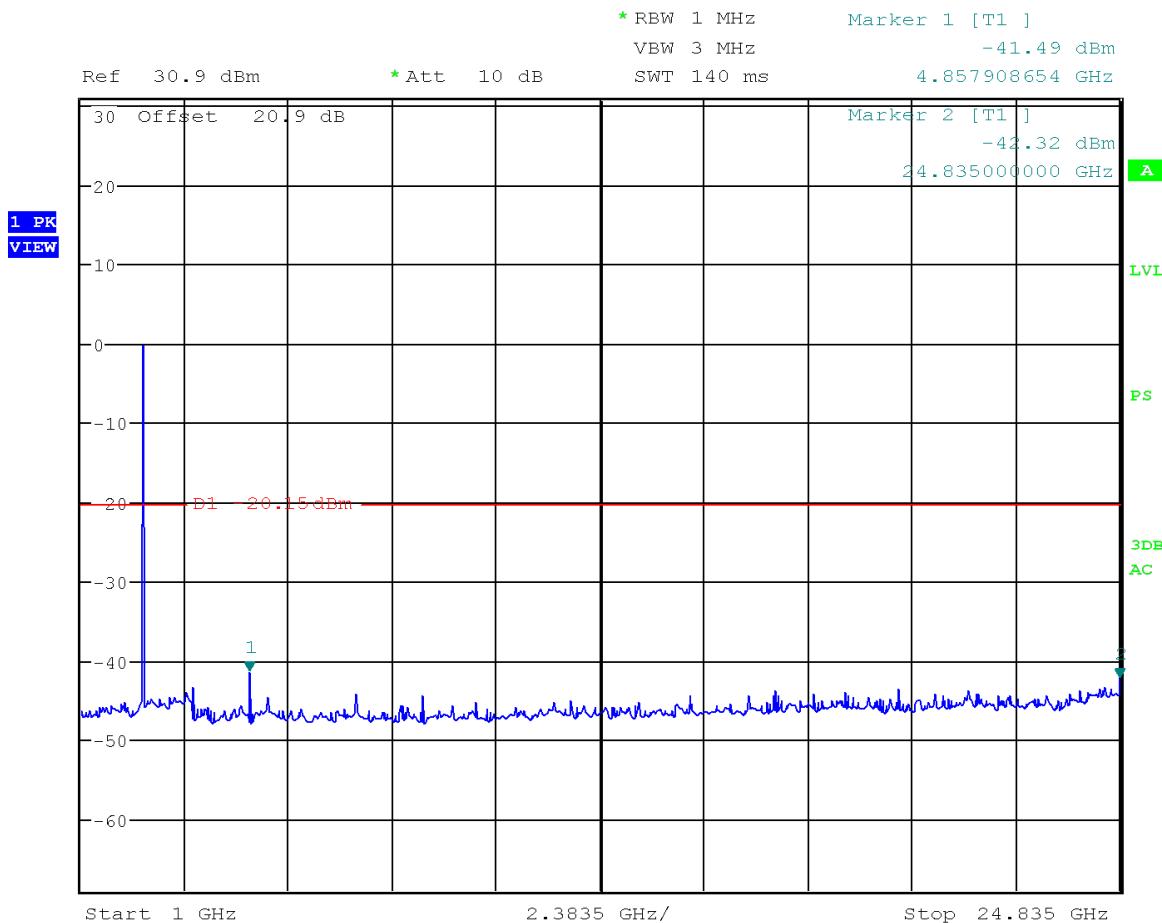
Marker / Plot	Frequency (MHz)	Measured Level (dBm)	20 dBc Limit (dBm)	Margin (dBm)
1 / 1	289.6	-41.83	-20.15	-21.68
1 / 2	4781.5	-40.88	-20.15	-20.73
2 / 2	7187.9	-41.23	-20.15	-21.08
3 / 2	18494.3	-42.79	-20.15	-22.64

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



Date: 2.JUN.2021 08:14:33

Figure 2-16 – Conducted Spurious Emissions 30 MHz – 1 GHz – Middle Channel



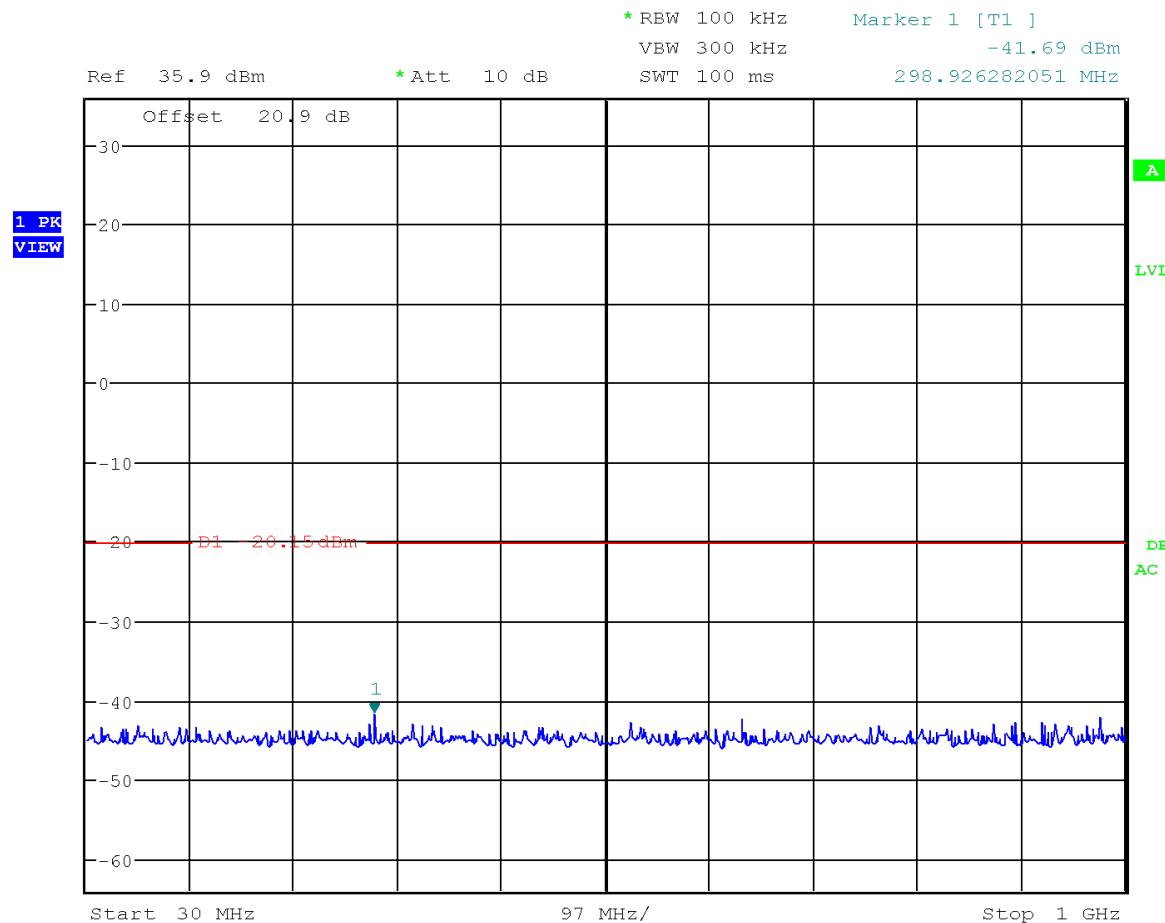
Date: 2.JUN.2021 08:18:10

Figure 2-17 – Conducted Spurious Emissions 1 GHz – 25GHz – Middle Channel

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

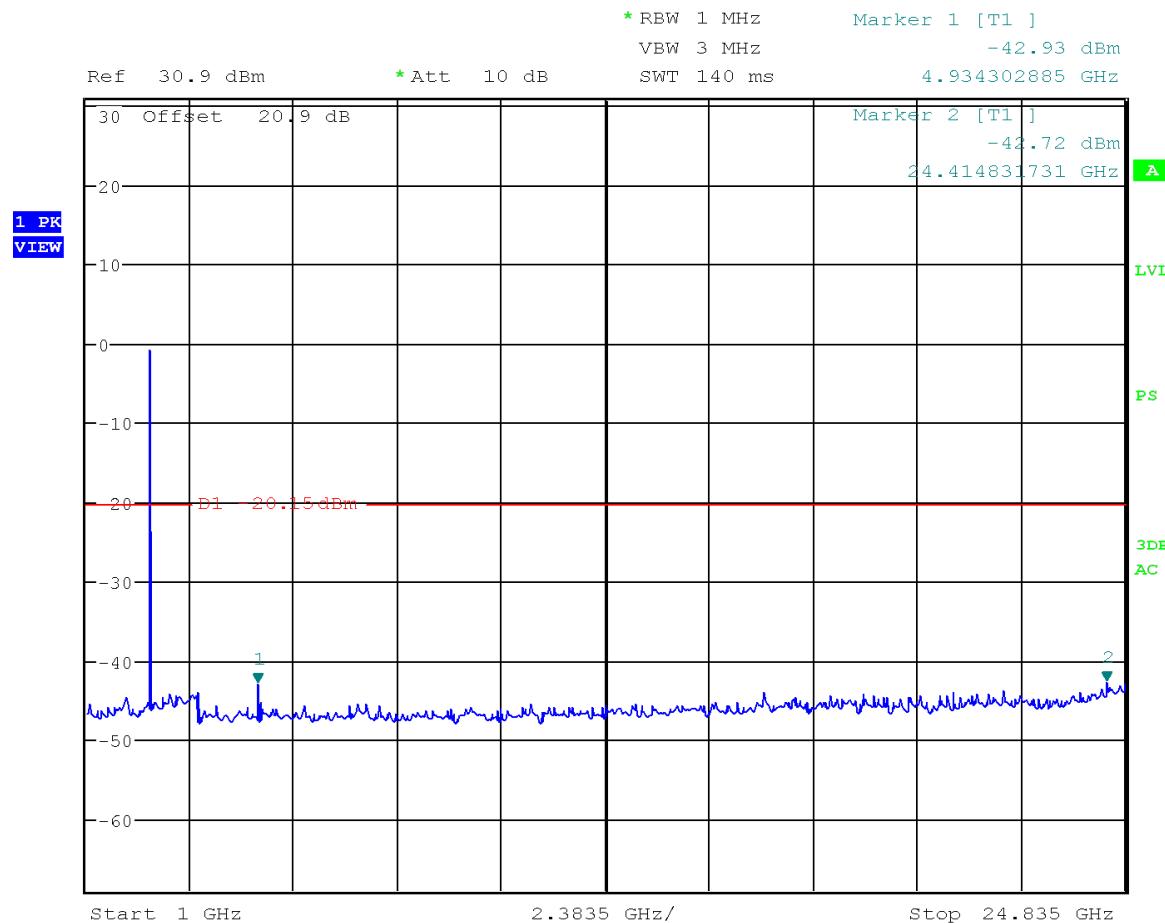
Marker / Plot	Frequency (MHz)	Measured Level (dBm)	20 dBc Limit (dBm)	Margin (dBm)
1 / 1	662.7	-42.70	-20.15	-22.55
1 / 2	4857.9	-41.49	-20.15	-21.34
2 / 2	24835.0	-42.32	-20.15	-22.17

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



Date: 2.JUN.2021 08:15:43

Figure 2-18 – Conducted Spurious Emissions 30 MHz – 1 GHz – High Channel



Date: 2.JUN.2021 08:17:05

Figure 2-19 – Conducted Spurious Emissions 1 GHz – 25GHz – High Channel

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

Marker / Plot	Frequency (MHz)	Measured Level (dBm)	20 dBc Limit (dBm)	Margin (dBm)
1 / 1	298.9	-41.69	-20.15	-21.54
1 / 2	4934.3	-42.93	-20.15	-22.78
2 / 2	24414.8	-42.72	-20.15	-22.57

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
WRLE10998	Rohde & Schwarz	Receiver, 20 Hz-26.5 GHz	ESU 26	100379	G	05/21/2020	11/20/2021
WRLE11398	Meca	Attenuator, 20dB	603-20-1F18	11398	B	11/02/2020	11/02/2021

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

02 JUN 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. 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

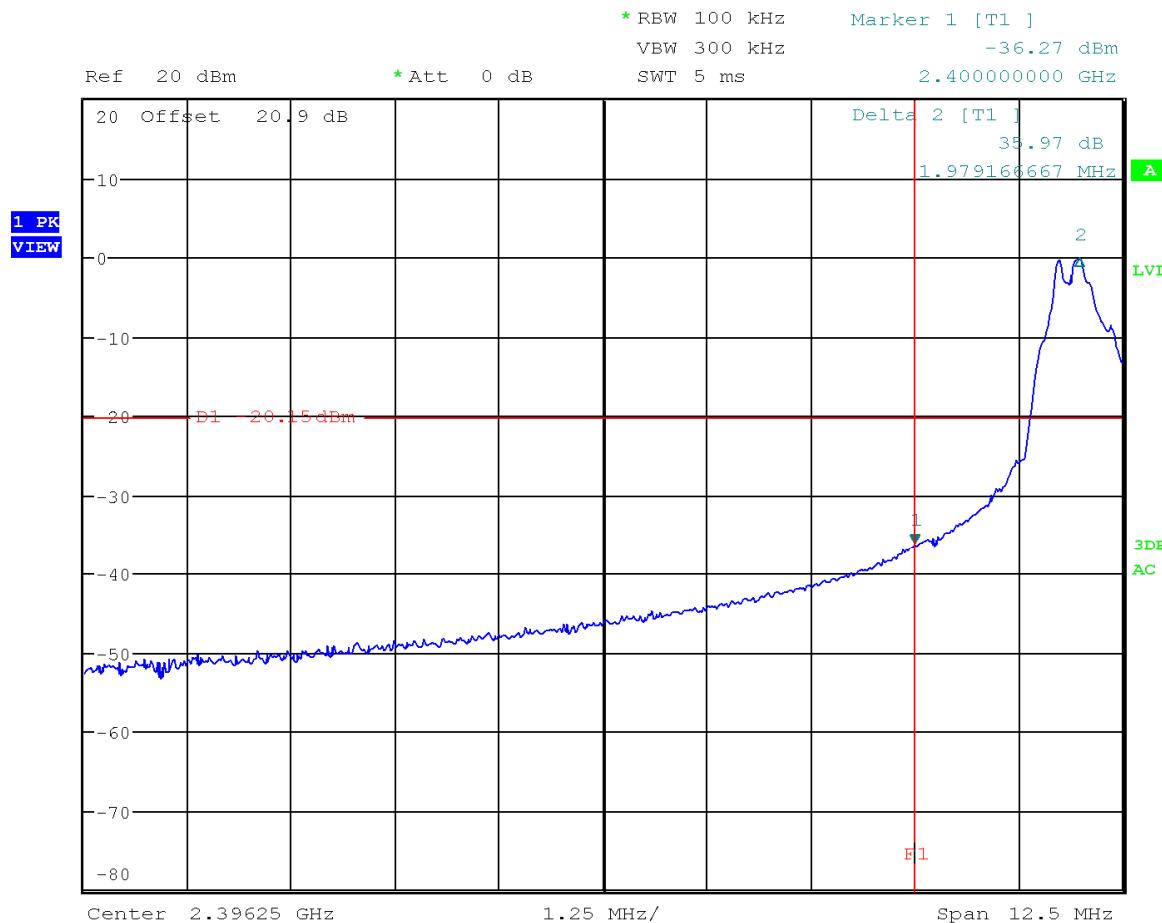
The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.6.6 Test Results

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

Test Result: Pass

See data below for detailed results.



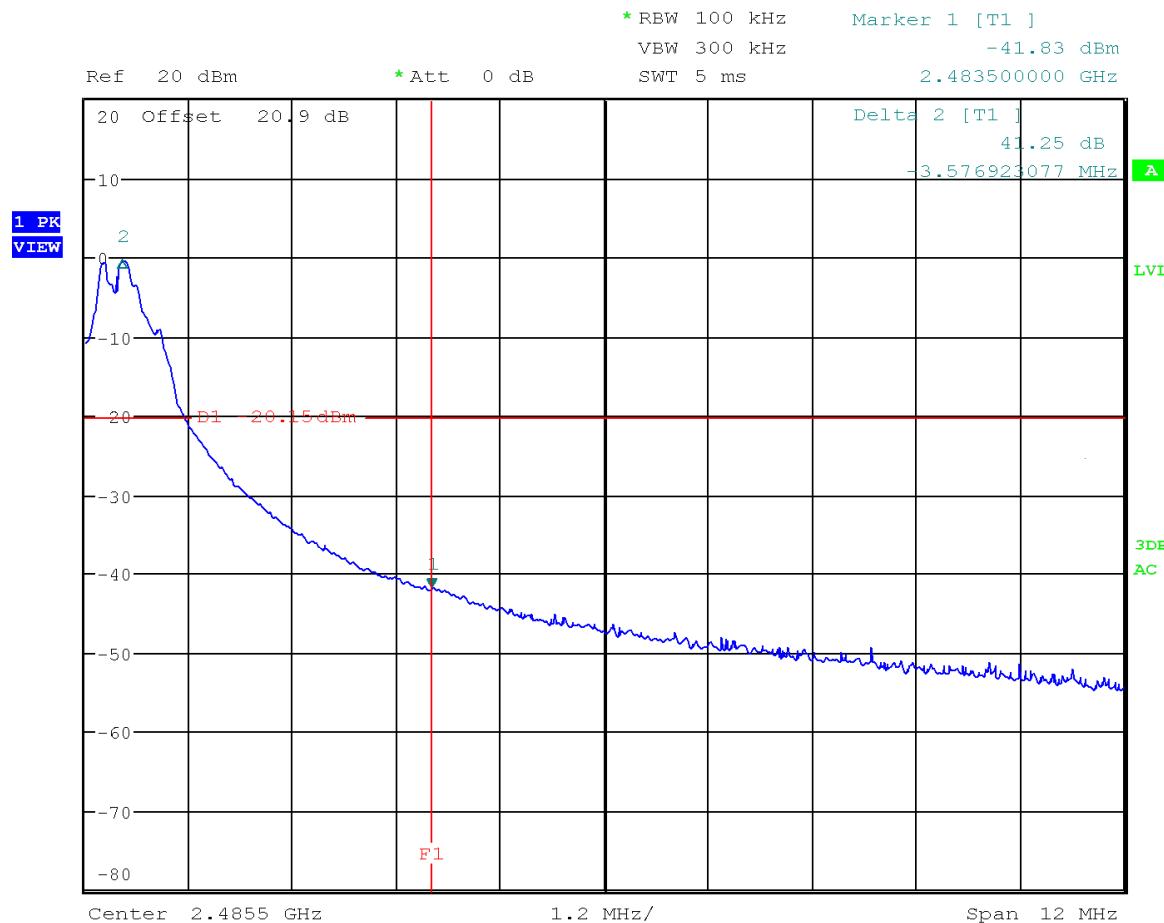
Date: 2.JUN.2021 08:22:57

Figure 2-20 – 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	-36.27	-20.15	-16.12

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



Date: 2.JUN.2021 08:27:55

Figure 2-21 – 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	-41.83	-20.15	-21.68

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
WRLE10998	Rohde & Schwarz	Receiver, 20 Hz-26.5 GHz	ESU 26	100379	G	05/21/2020	11/20/2021
WRLE11398	Meca	Attenuator, 20dB	603-20-1F18	11398	B	11/02/2020	11/02/2021

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 Radiated Spurious Emissions

2.7.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, 15.247
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

06 JUN 2021 – 16 JUN 2021

2.7.4 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.

2.7.5 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

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 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.

2.7.7 Sample Computation (Radiated Emissions)

Measuring equipment raw measurement (dB μ V) @ 30 MHz	20.0
Cable 2	0.24
TEMC00011 (antenna)	18.70
Reported Quasi-peak Final Measurement (dB μ V/m) @ 30 MHz	38.94

2.7.8 Test Results

Test Summary: Measurements between 1-18 GHz were taken with a 2.4 GHz notch filter in front of the pre-amp to prevent overloading. EUT operated as intended before, during, and after testing.

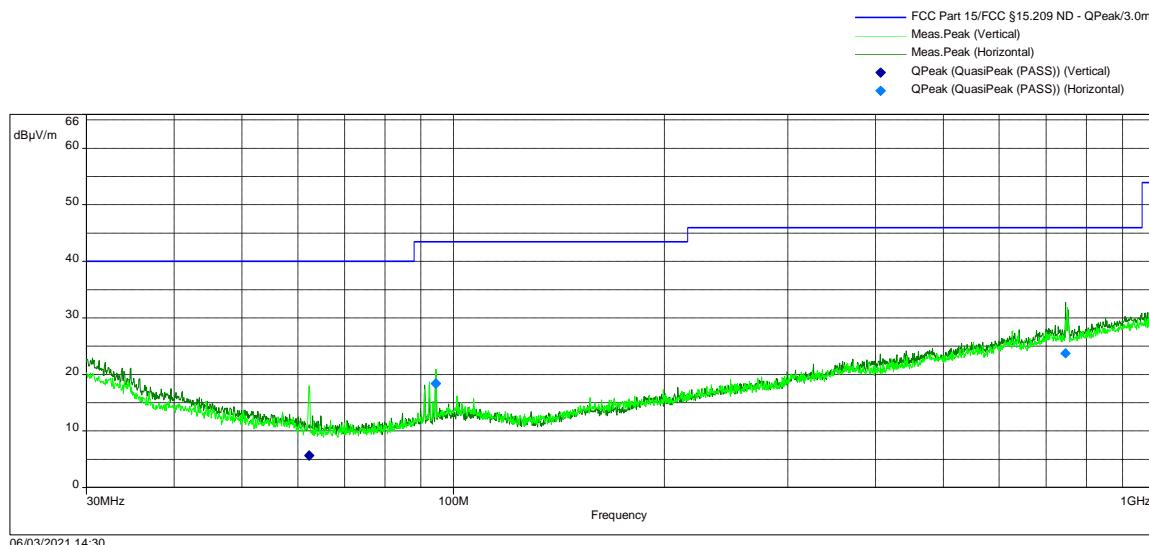
Test Result: Pass

See data below for detailed results.



Spurious Emissions 30M-1GHz, Low Channel 2402 MHz

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

Figure 2-22 – RE Spurious Emissions 30-1000 MHz – Low Channel



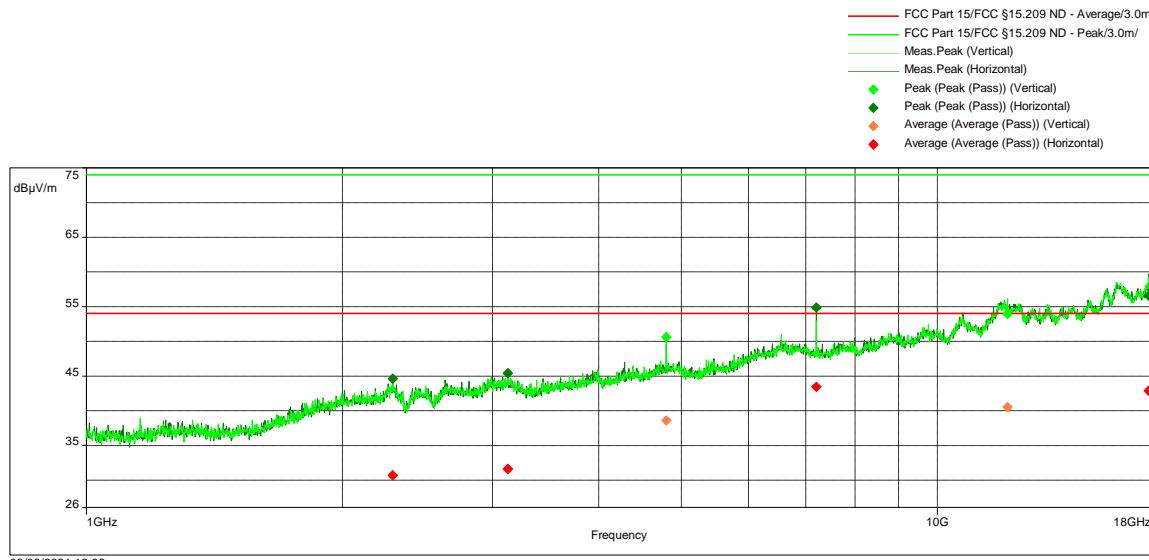
Table 2.7-1 – RE Spurious Emissions 30-1000 MHz – Low Channel

Frequency	Quasi-Peak Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Quasi-Peak Margin (dB)	Azimuth (°)	Height (m)	Polarity	Quasi-Peak Result
62.322835MHz	5.67	40.00	-34.33	64.00	2.97	Vertical	PASS
94.500427MHz	18.41	43.50	-25.09	57.00	3.25	Horizontal	PASS
746.35812MHz	23.74	46.00	-22.26	123.00	2.84	Horizontal	PASS



Spurious Emissions 1 - 18GHz, 2402 MHz

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

Figure 2-23 – RE Spurious Emissions 1-18 GHz – Low Channel



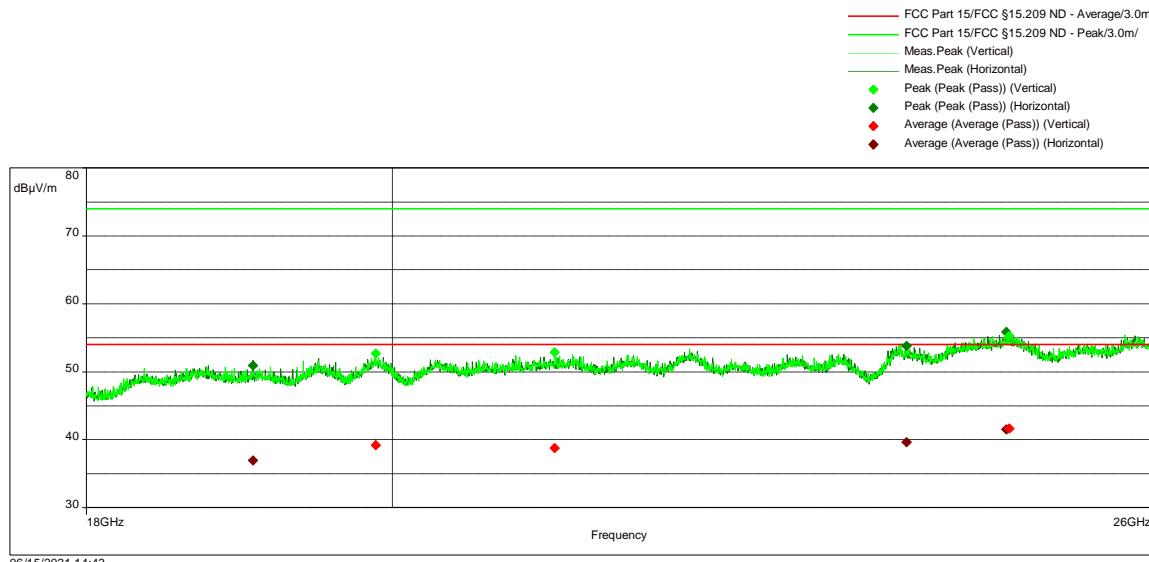
Table 2.7-2 – RE Spurious Emissions 1-18 GHz – Low Channel

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
2.292GHz	44.60	74.00	-29.40	30.65	54.00	-23.35	211.00	2.16	Horizontal	PASS	PASS
3.1278333GHz	45.42	74.00	-28.58	31.60	54.00	-22.40	318.00	3.93	Horizontal	PASS	PASS
4.8032778GHz	50.65	74.00	-23.35	38.58	54.00	-15.42	189.00	3.51	Vertical	PASS	PASS
7.205GHz	54.86	74.00	-19.14	43.45	54.00	-10.55	325.00	2.36	Horizontal	PASS	PASS
12.093444GHz	53.92	74.00	-20.08	40.51	54.00	-13.49	164.00	3.98	Vertical	PASS	PASS
17.705333GHz	56.61	74.00	-17.39	42.90	54.00	-11.10	127.00	4.00	Horizontal	PASS	PASS



Spurious Emissions 18 - 26GHz, 2402 MHz

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

Figure 2-24 – RE Spurious Emissions 18-26 GHz – Low Channel

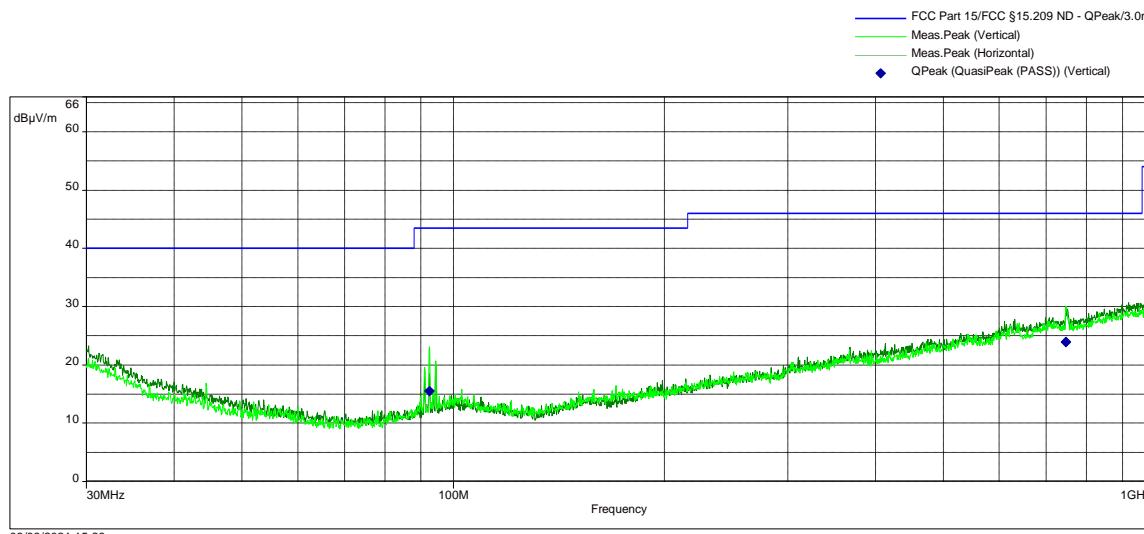
**Table 2.7-3 – RE Spurious Emissions 18-26 GHz – Low Channel**

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
19.063556GHz	50.92	74.00	-23.08	36.98	54.00	-17.02	303.00	1.54	Horizontal	PASS	PASS
19.884GHz	52.70	74.00	-21.30	39.22	54.00	-14.78	233.00	1.22	Vertical	PASS	PASS
21.148444GHz	52.89	74.00	-21.11	38.80	54.00	-15.20	244.00	3.07	Vertical	PASS	PASS
23.871111GHz	53.83	74.00	-20.17	39.67	54.00	-14.33	9.00	3.27	Horizontal	PASS	PASS
24.707111GHz	55.87	74.00	-18.13	41.56	54.00	-12.44	299.00	1.95	Horizontal	PASS	PASS
24.730667GHz	55.25	74.00	-18.75	41.65	54.00	-12.35	244.00	2.92	Vertical	PASS	PASS



Spurious Emissions 30M-1GHz, Mid Channel 2440 MHz

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

Figure 2-25 – RE Spurious Emissions 30-1000 MHz – Mid Channel



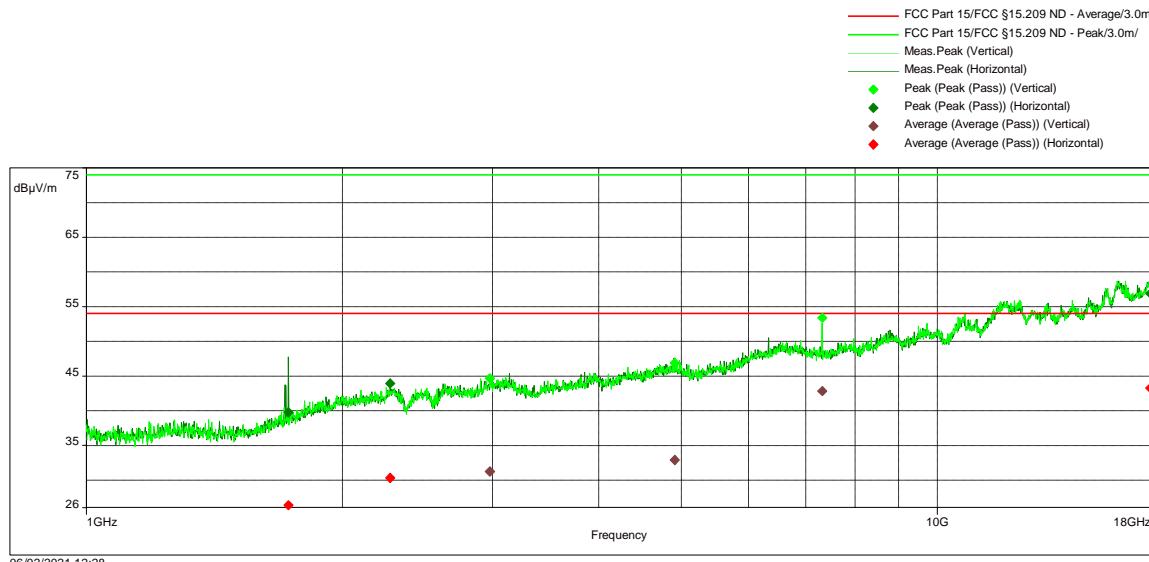
Table 2.7-4 – RE Spurious Emissions 30-1000 MHz – Mid Channel

Frequency	Quasi-Peak Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Quasi-Peak Margin (dB)	Azimuth (°)	Height (m)	Polarity	Quasi-Peak Result
92.496585MHz	15.49	43.50	-28.01	20.00	3.64	Vertical	PASS
747.9458MHz	23.94	46.00	-22.06	20.00	2.16	Vertical	PASS



Spurious Emissions 1 - 18GHz, 2440 MHz

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

Figure 2-26 – RE Spurious Emissions 1-18 GHz – Mid Channel



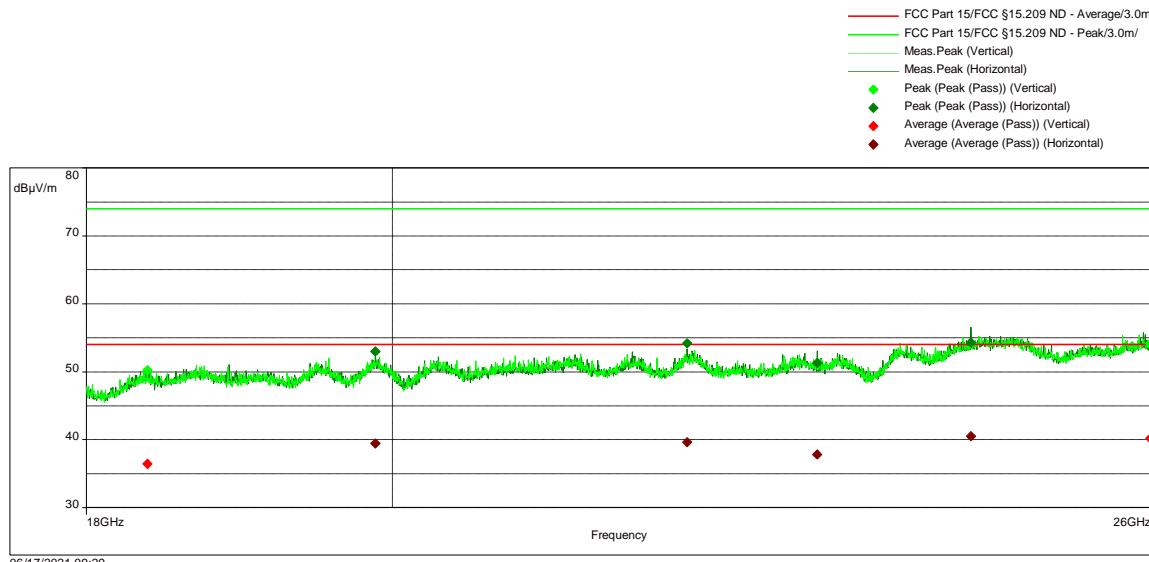
Table 2.7-5 – RE Spurious Emissions 1-18 GHz – Mid Channel

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
1.7281667GHz	39.77	74.00	-34.23	26.36	54.00	-27.64	112.00	2.51	Horizontal	PASS	PASS
2.275GHz	43.93	74.00	-30.07	30.32	54.00	-23.68	86.00	2.26	Horizontal	PASS	PASS
2.9795556GHz	44.66	74.00	-29.34	31.21	54.00	-22.79	189.00	3.02	Vertical	PASS	PASS
4.9137778GHz	46.85	74.00	-27.15	32.86	54.00	-21.14	252.00	2.10	Vertical	PASS	PASS
7.3202222GHz	53.36	74.00	-20.64	42.80	54.00	-11.20	347.00	1.00	Vertical	PASS	PASS
17.784667GHz	56.86	74.00	-17.14	43.27	54.00	-10.73	359.00	1.00	Horizontal	PASS	PASS



Spurious Emissions 18 - 26GHz, Mid Channel 2440 MHz

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

Figure 2-27 – RE Spurious Emissions 18-26 GHz – Mid Channel



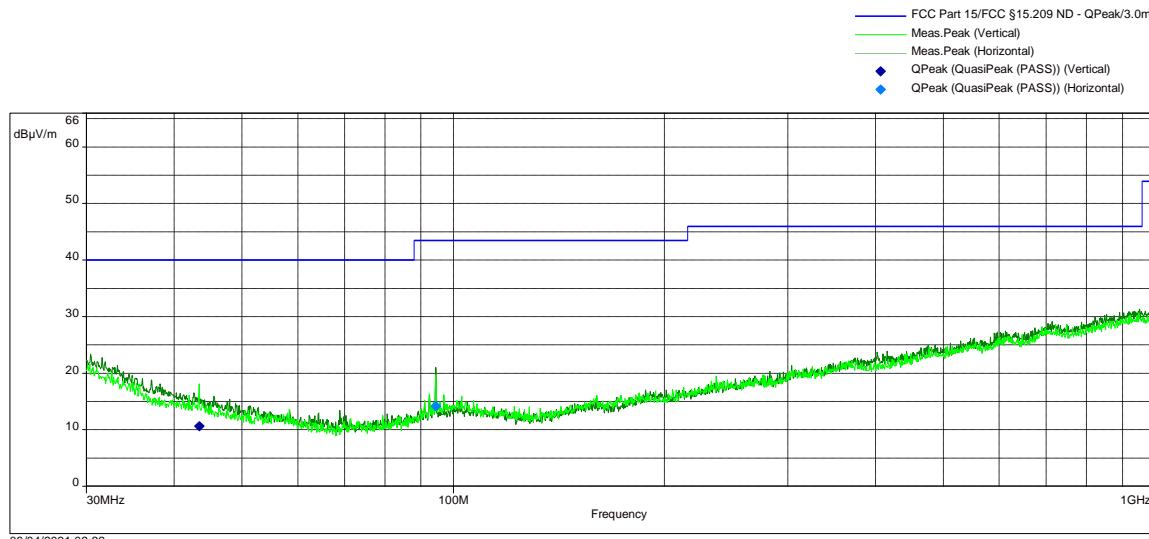
Table 2.7-6 – RE Spurious Emissions 18-26 GHz – Mid Channel

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
18.381333GHz	50.27	74.00	-23.73	36.47	54.00	-17.53	182.00	1.24	Vertical	PASS	PASS
19.882222GHz	53.00	74.00	-21.00	39.48	54.00	-14.52	72.00	1.60	Horizontal	PASS	PASS
22.135556GHz	54.22	74.00	-19.78	39.65	54.00	-14.35	0.00	2.82	Horizontal	PASS	PASS
23.147556GHz	51.29	74.00	-22.71	37.82	54.00	-16.18	285.00	3.32	Horizontal	PASS	PASS
24.405778GHz	54.33	74.00	-19.67	40.54	54.00	-13.46	354.00	2.87	Horizontal	PASS	PASS
25.963556GHz	54.14	74.00	-19.86	40.22	54.00	-13.78	178.00	3.43	Vertical	PASS	PASS



Spurious Emissions 30M-1GHz, High Channel 2480 MHz

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

Figure 2-28 – RE Spurious Emissions 30-1000 MHz – High Channel

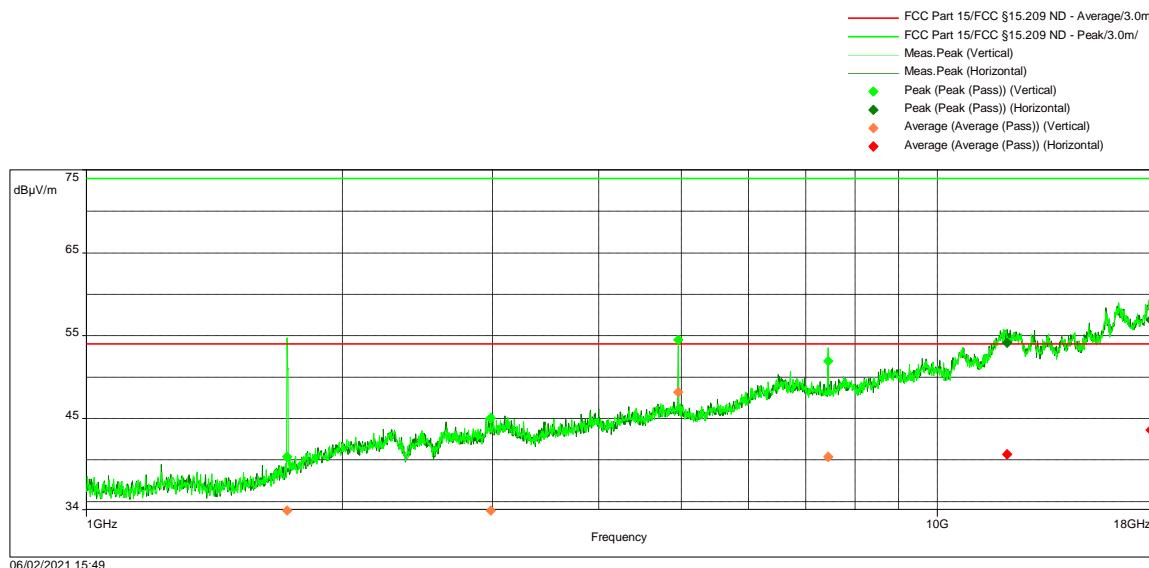
**Table 2.7-7 – RE Spurious Emissions 30-1000 MHz – High Channel**

Frequency	Quasi-Peak Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Quasi-Peak Margin (dB)	Azimuth (°)	Height (m)	Polarity	Quasi-Peak Result
43.497613MHz	10.63	40.00	-29.37	226.00	3.63	Vertical	PASS
94.479431MHz	14.17	43.50	-29.33	149.00	3.71	Horizontal	PASS
997.27425MHz	24.08	53.97	-29.89	42.00	2.10	Horizontal	PASS



Spurious Emissions 1 - 18GHz, High Channel 2480 MHz

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

Figure 2-29 – RE Spurious Emissions 1-18 GHz – High Channel



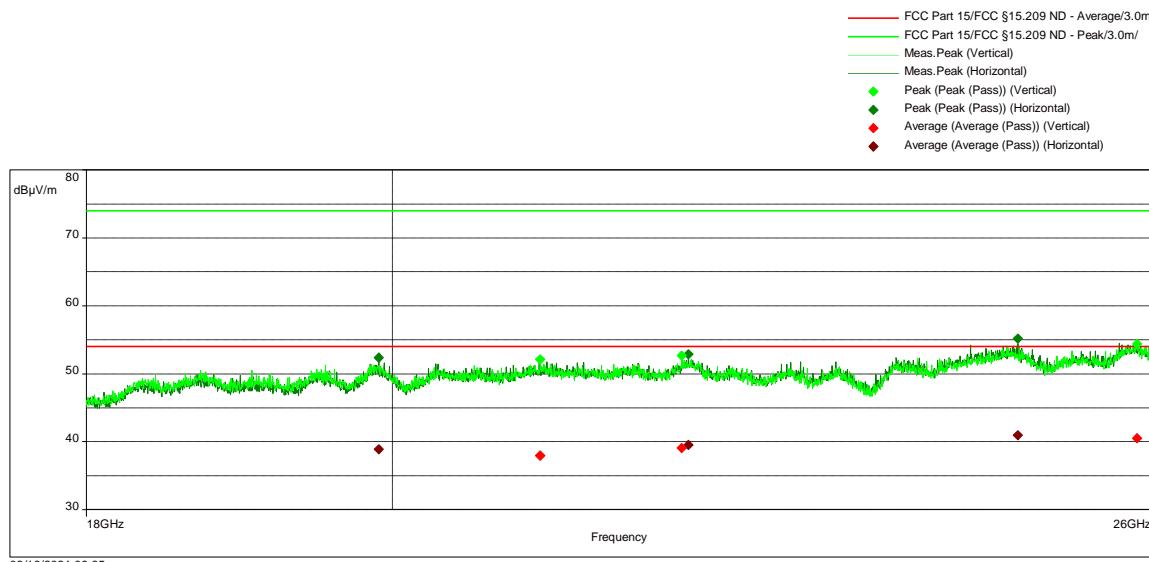
Table 2.7-8 – RE Spurious Emissions 1-18 GHz – High Channel

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
1.7206111GHz	40.37	74.00	-33.63	26.49	54.00	-27.51	13.00	3.66	Vertical	PASS	PASS
2.9880556GHz	45.06	74.00	-28.94	31.55	54.00	-22.45	6.00	1.85	Vertical	PASS	PASS
4.9600556GHz	54.49	74.00	-19.51	48.21	54.00	-5.79	218.00	2.00	Vertical	PASS	PASS
7.4401667GHz	51.93	74.00	-22.07	40.39	54.00	-13.61	281.00	1.44	Vertical	PASS	PASS
12.083056GHz	54.13	74.00	-19.87	40.69	54.00	-13.31	68.00	3.46	Horizontal	PASS	PASS
17.822444GHz	56.92	74.00	-17.08	43.60	54.00	-10.40	218.00	2.66	Horizontal	PASS	PASS



Spurious Emissions 18 - 26GHz, High Channel 2480 MHz

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

Figure 2-30 – RE Spurious Emissions 18-26 GHz – High Channel



Table 2.7-9 – 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
19.905778GHz	52.37	74.00	-21.63	38.87	54.00	-15.13	46.00	2.26	Horizontal	PASS	PASS
21.044444GHz	52.10	74.00	-21.90	37.99	54.00	-16.01	174.00	1.00	Vertical	PASS	PASS
22.093333GHz	52.70	74.00	-21.30	39.08	54.00	-14.92	94.00	2.56	Vertical	PASS	PASS
22.146222GHz	52.85	74.00	-21.15	39.56	54.00	-14.44	307.00	2.00	Horizontal	PASS	PASS
24.803111GHz	55.19	74.00	-18.81	40.96	54.00	-13.04	127.00	2.46	Horizontal	PASS	PASS
25.843556GHz	54.41	74.00	-19.59	40.54	54.00	-13.46	182.00	3.27	Vertical	PASS	PASS



2.7.9 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.

Test Area: 3mSAC

Table 2.7-10 – Radiated Emissions Equipment List

Device #	Manufacturer	Description	Model	Serial #	Cal Code	Cal Date	Cal Due
NBLE10985	Agilent Technologies	Pre Amplifier, 0.1-1300 MHz	8447D	2443A04180	B	04/07/2021	04/07/2022
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
NBLE11630	ETS-Lindgren	Antenna, 1-18 GHz	3117	00218816	G	09/04/2020	09/04/2022
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.



2.8 Radiated Band-Edge

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

03 JUN 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 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.

2.8.5 Environmental Conditions

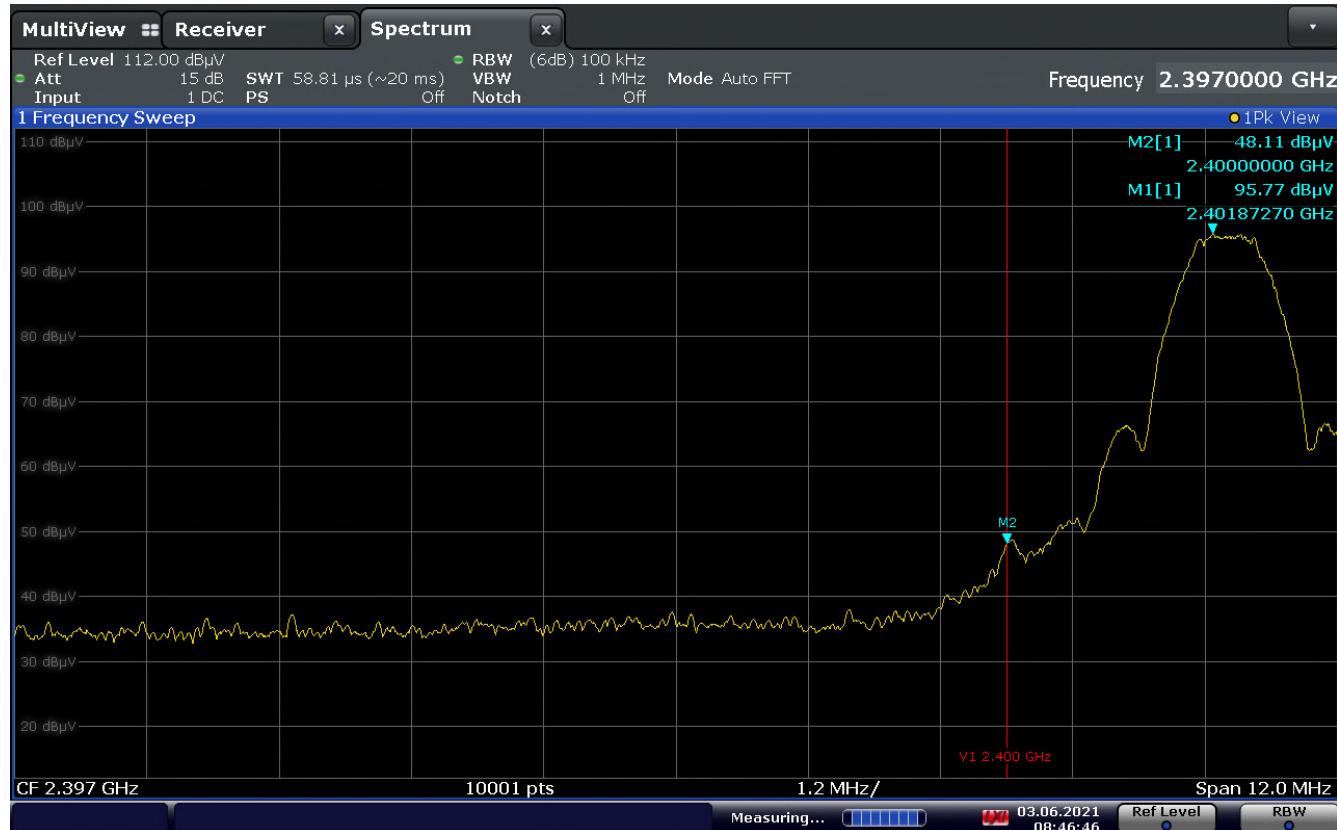
The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.8.6 Test Results

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

Test Result: Pass

See data below for detailed results.



08:46:48 03.06.2021

Note: Peak complies with Average Limit. No Average Data was taken.

Figure 2-31 – Band-Edge, Low Channel – Peak

Table 2.8-1 – Restricted Band Edge – Low Channel – Peak

Frequency (MHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Strictest Margin (dB)	Correction Factor (dB)	Result
2390	45.00	74.00	54.00	-9.00	-3.47	Pass

Note: Peak level calculation: Final Peak level = analyzer level + correction factor.

Note: Margin Calculation: Peak Margin = Peak Level – Peak Limit.



08:30:27 03.06.2021

Note: Peak complies with Average Limit. No Average Data was taken.

Figure 2-32 – Band-edge, High Channel – Peak

Table 2.8-2 – Restricted Band Edge – High Channel – Peak

Frequency (MHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Strictest Margin (dB)	Correction Factor (dB)	Result
2483.5	32.19	74.00	54.00	-21.81	-3.54	Pass
2483.5	33.22	74.00	54.00	-20.78	-3.54	Pass

Note: Peak level calculation: Final Peak level = analyzer level + correction factor.

Note: Margin Calculation: Peak Margin = Peak Level – Peak Limit.



2.8.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.

Test Area: 3mSAC

Table 2.8-3 – Restricted Band Edge Equipment List

Device #	Manufacturer	Description	Model	Serial #	Cal Code	Cal Date	Cal Due
NBLE10985	Agilent Technologies	Pre Amplifier, 0.1-1300 MHz	8447D	2443A04180	B	04/07/2021	04/07/2022
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
NBLE11630	ETS-Lindgren	Antenna, 1-18 GHz	3117	00218816	G	09/04/2020	09/04/2022
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.



3 Diagram of Test Setups

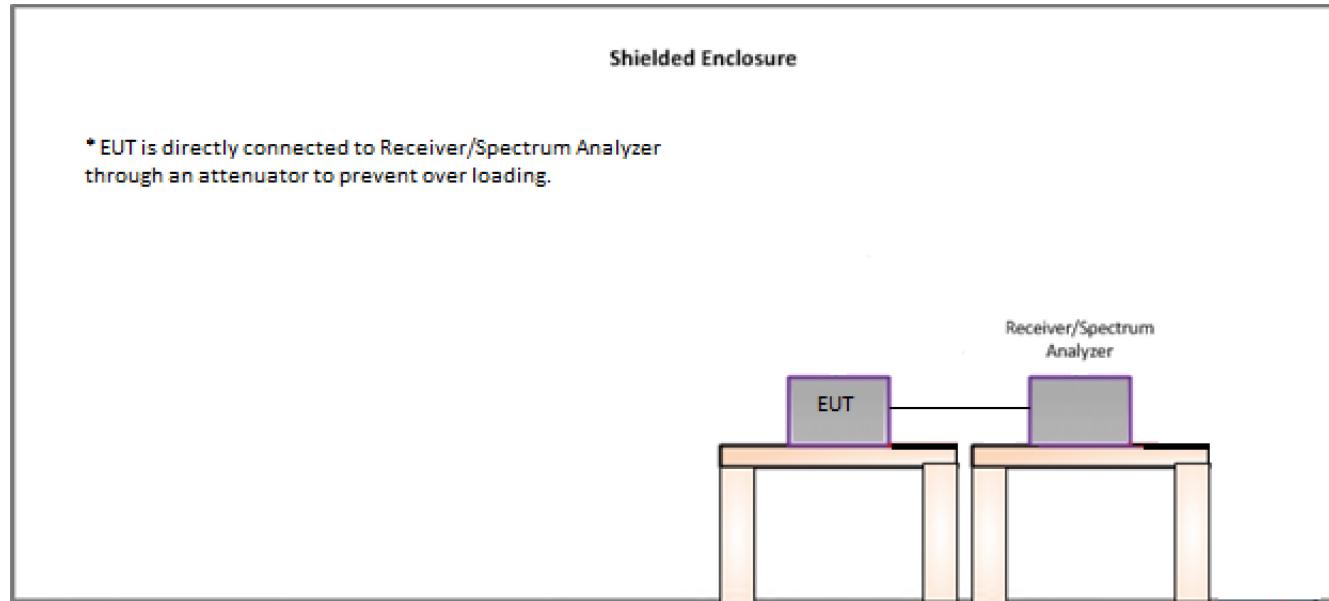


Figure 3-1 – Conducted Test Setup

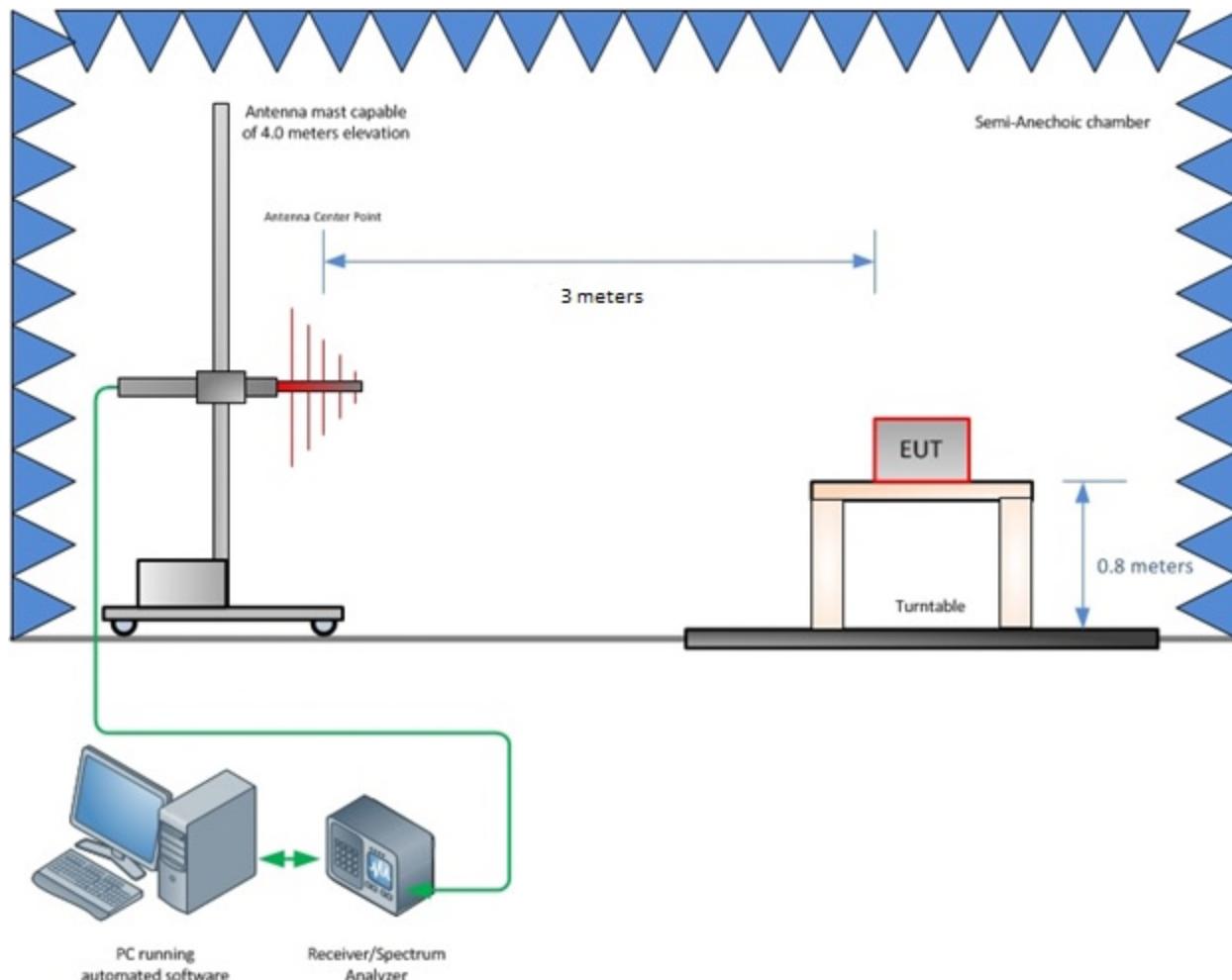


Figure 3-2 – Radiated Emissions Test Setup up to 1 GHz

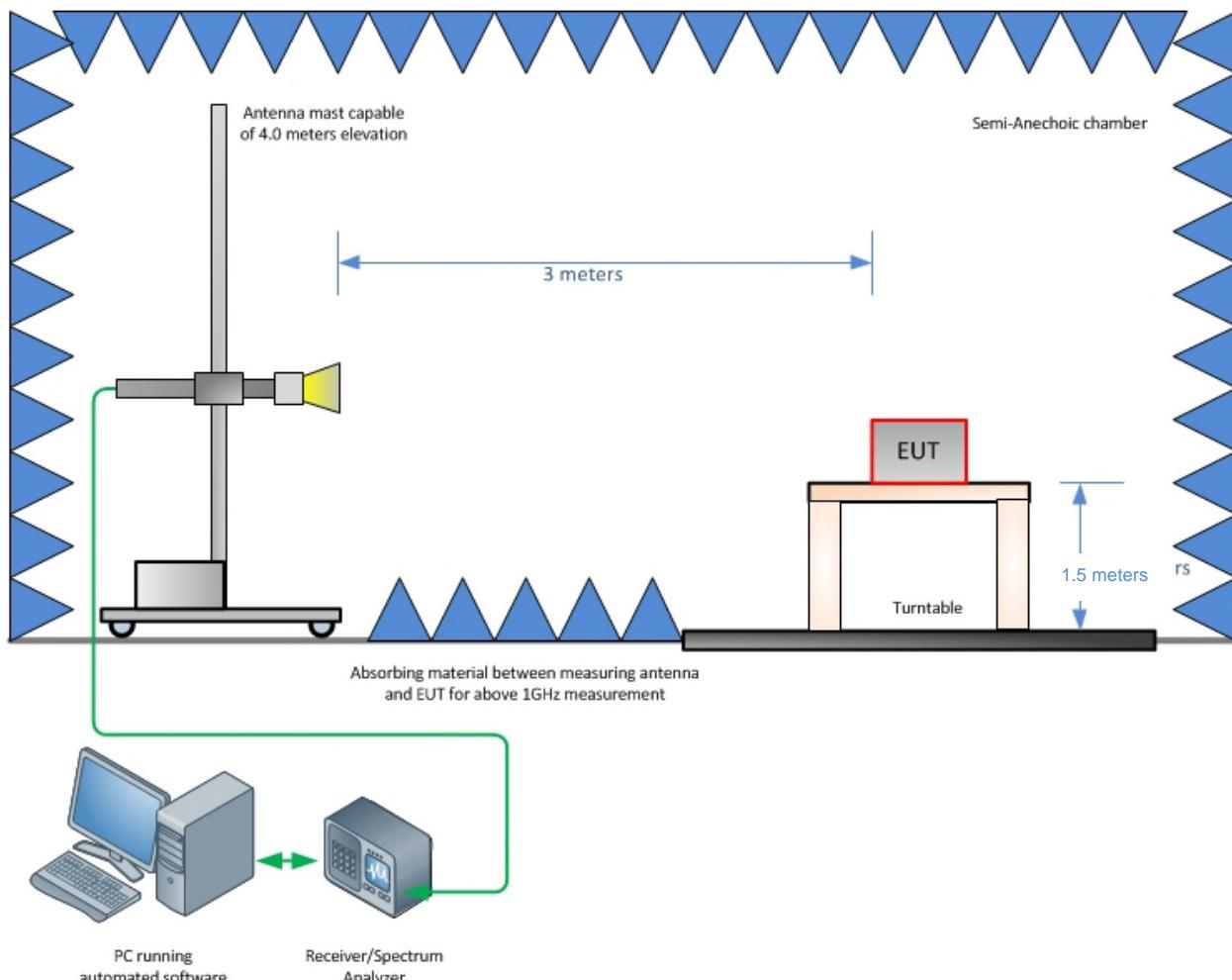


Figure 3-3 – Radiated Emissions Test Setup above 1 GHz



4 Accreditation, Disclaimers and Copyright

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STATEMENT OF MEASUREMENT UNCERTAINTY – Emissions

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