

TEST REPORT

Report Number: 104716705MPK-002

Project Numbers: G104716705

Report Issue Date: July 28, 2021

**Testing performed on
Flare Bracelet
Model Number: FJ6002MSCSP**

**FCC ID: 2A2D9-FJ6002MSCSP
IC: 27430-FJ6002MSCSP**

to

**FCC Part 15 Subpart C (15.247)
ISED RSS-247 Issue 2**

For

Flare Jewelry, Inc.

Test Performed by:

Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Test Authorized by:

Flare Jewelry, Inc.
110 Chauncy Street
Boston, MA 02111 USA

Prepared by:



Amar Kacel

Date: July 28, 2021

Reviewed by:



Krishna K Vemuri

Date: July 28, 2021

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Report No. 104716705MPK-002

Equipment Under Test:	Flare Bracelet
Model Number:	FJ6002MSCSP
Applicant:	Flare Jewelry, Inc.
Contact:	Sara Dickhaus de Zarraga
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Applicable Regulation:	FCC Part 15 Subpart C (15.247) ISED RSS-247 Issue 2
Date of Test:	July 1, 2021 to July 13, 2021

We attest to the accuracy of this report:



Amar Kacel
Staff Engineer



Krishna K Vemuri
EMC Manager

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1.0 Summary of Tests

Test	Reference FCC	Reference Industry Canada	Result
RF Output Power	15.247(b)(3)	RSS-247, 5.4.d)	Complies
6 dB Bandwidth	15.247(a)(2)	RSS-247, 5.2.a)	Complies
Power Density	15.247(e)	RSS-247, 5.2.b)	Complies
Out of Band Antenna Conducted Emission	15.247(d)	RSS-247, 5.5	Complies
Transmitter Radiated Emissions	15.247(d), 15.209, 15.205	RSS-247, 5.5	Complies
AC Line Conducted Emission	15.207	RSS-GEN	Not Applicable – Bluetooth is powered by a non-rechargeable battery.
Antenna Requirement	15.203	RSS-GEN	Complies (Internal Antenna)

EUT receive date: July 1, 2021**EUT receive condition:** The pre-production version of the EUT was received in good condition with no apparent damage. As declared by the Applicant, it is identical to the production units.**Test start date:** July 1, 2021**Test completion date:** July 13, 2021

The test results in this report pertain only to the item tested.

2.0 General Information

2.1 Product Description

Flare Jewelry, Inc. supplied the following description of the EUT:

Flare bracelet is a battery-operated wearable bracelet with a secret button that, when depressed, sends out an emergency distress signal via Bluetooth which will alert a contact, or initiate a fake call, to call your cell phone to assist the wearer from an uncomfortable or dangerous situation. Bluetooth connectivity allows the Flare bracelet to be connected to an app which can initiate a call or send a distress signal to a preprogramed contact. Bluetooth is powered by a non-rechargeable battery.

For more information, refer to the following product specification, declared by the manufacturer.

Information about the 2.4 GHz radio is presented below:

Applicant	Flare Jewelry, Inc.
Model No.	FJ6002MSCSP
FCC Identifier	2A2D9-FJ6002MSCSP
IC Identifier	27430-FJ6002MSCSP
Type of transmission	Digital Transmission System (DTS)
Rated RF Output	-4.08 dBm
Antenna(s) & Gain	Internal Antenna, Gain: -3.7 dBi
Frequency Range	2402 – 2480 MHz
Type of modulation/data rate	GFSK/1Mbit/s
Number of Channel(s)	40
Applicant Name & Address	Flare Jewelry, Inc. 110 Chauncy Street Boston, MA 02111 USA

2.2 Related Submittal(s) Grants

None.

2.3 Test Facility

The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

2.4 Test Methodology

Antenna conducted measurements were performed according to the FCC documents "Guidance for Performing Compliance Measurement on Digital Transmission Systems (DTS) Operating under §15.247" (KDB 558074 D01 DTS Meas Guidance v05r02), and RSS-247 Issue 2, RSS-GEN Issue 5.

Radiated emissions and AC mains conducted emissions measurements were performed according to the procedures in ANSI C63.10: 2013. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Data Sheet" of this report.

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn't take into account the measurement uncertainty.

Estimated Measurement Uncertainty

Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 2.5 GHz	> 2.5 GHz
RF Power and Power Density – antenna conducted	-	0.7 dB	-
Unwanted emissions – antenna conducted	1.1 dB	1.3 dB	1.9 dB
Bandwidth – antenna conducted	-	30 Hz	-

Measurement	Expanded Uncertainty (k=2)			
	0.15 MHz – 30MHz	30 – 200 MHz	200 MHz – 1 GHz	1 GHz – 18 GHz
Radiated emissions	-	4.7	4.6	5.1 dB
AC mains conducted emissions	2.1 dB	-	-	-

3.0 System Test Configuration

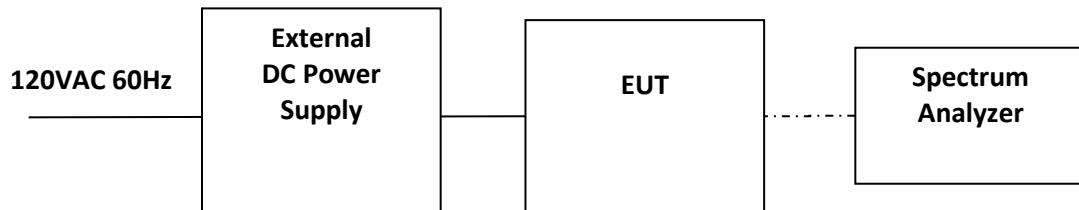
3.1 Support Equipment

Support Equipment		
Description	Manufacturer	Model
DC Power Supply	Exetech	D30030012
Laptop	Dell	Latitude 5400

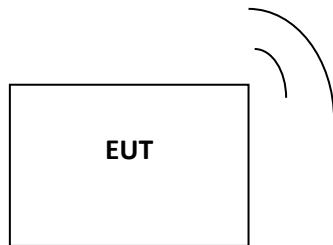
3.2 Block Diagram of Test Setup

Equipment Under Test			
Description	Manufacturer	Model	Serial Number/ID
Radiated Sample	Flare Jewelry, Inc.	FJ6002MSCSP	flare-001
Conducted Sample	Flare Jewelry, Inc.	FJ6002MSCSP	flare-002

Antenna was removed and co-axial connector with a cable was installed for Conducted Measurements.



Radiated Measurements SETUP



*Note: Bluetooth operates in battery mode only. The distress button was preprogrammed to switch between channels. Laptop was used for programming. DC Power Supply was used for conducted measurements only. New battery was used for radiated measurements.

S = Shielded
U = Unshielded

F = With Ferrite
m = Length in Meters

EUT Photos



3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table. The EUT was configured to continuously transmit. The highest clock frequency used in the EUT is 2.48 GHz.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was provided by Flare Jewelry, Inc.

3.5 Mode of Operation during Test

Mode of operation during testing, the distress button was preprogramed to switch between channels. During the transmitter tests, the transmitter was setup to transmit maximum communication and RF power levels.

EUT was placed into transmit mode at the lowest (2402MHz) middle (2440MHz), and highest (2480MHz) channels.

3.6 Modifications Required for Compliance

No modifications were made by the manufacturer or Intertek to the EUT in order to bring the EUT into compliance.

3.7 Additions, Deviations and Exclusions from Standards

No additions, deviations or exclusions from the standard were made.

4.0 Measurement Results

4.1 6-dB Bandwidth and 99% Occupied Bandwidth
FCC Rule: 15.247(a)(2); RSS-247, 5.2.a) and RSS-GEN;

4.1.1 Requirement

The minimum 6-dB bandwidth shall be at least 500 kHz

4.1.2 Procedure

A spectrum analyzer was connected to the antenna port of the transmitter.

For FCC 6dB Channel Bandwidth the Procedure described in the FCC Publication KDB 558074 D01 Meas Guidance v05r02 was used to determine the DTS occupied bandwidth. Section 11.8.1 Option 1 of ANSI 63.10 was used.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

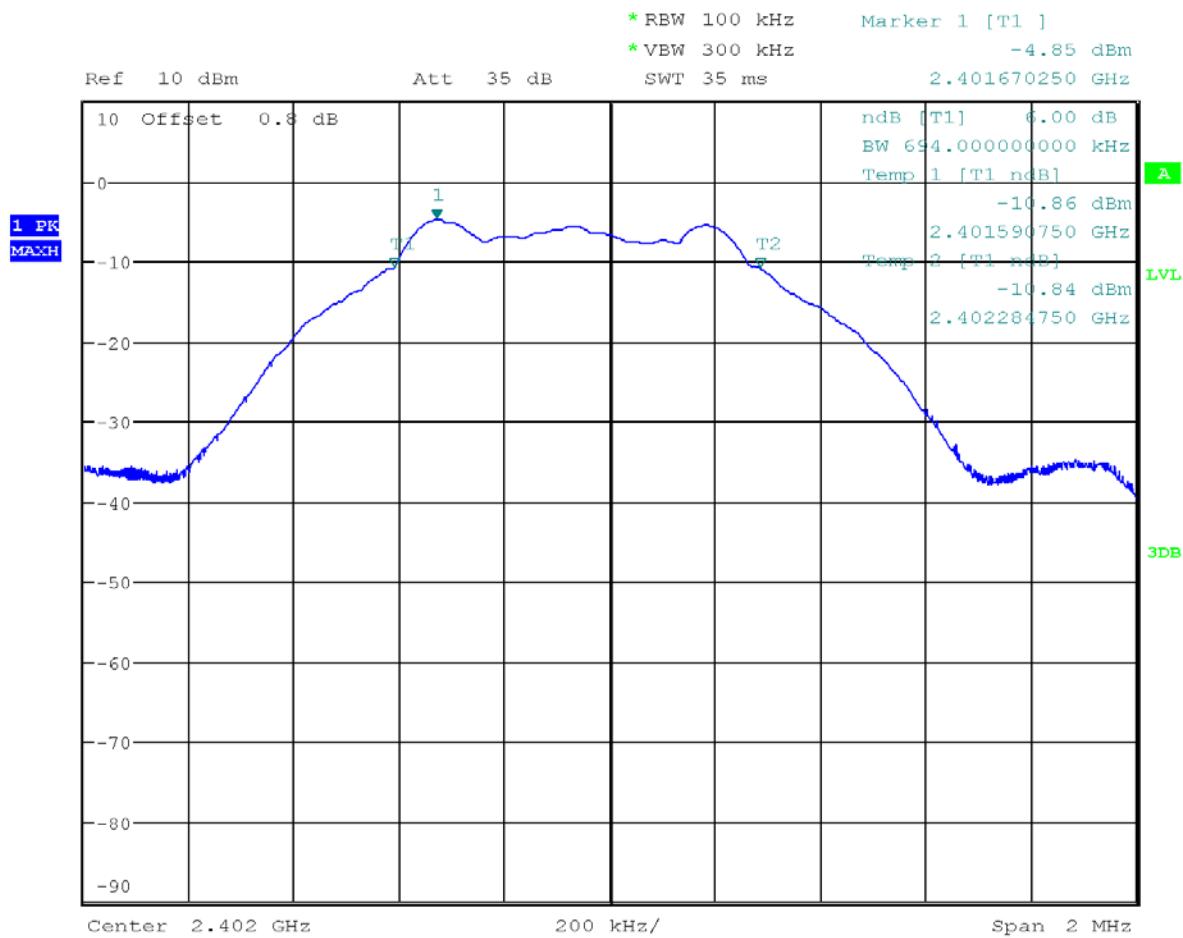
For 99% power bandwidth measurement, the bandwidth was determined by using the built-in 99% occupied bandwidth function of the spectrum analyzer. The resolution bandwidth is set to 1% of the selected span as is without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

4.1.3 Test Result

Frequency (MHz)	6-dB bandwidth FCC 15.247 & RSS-GEN, kHz	Occupied bandwidth, RSS-GEN, MHz	Plot
2402	694.00	--	1.1
	--	1.034	1.4
2440	709.75	--	1.2
	--	1.040	1.5
2480	739.25	--	1.3
	--	1.053	1.6

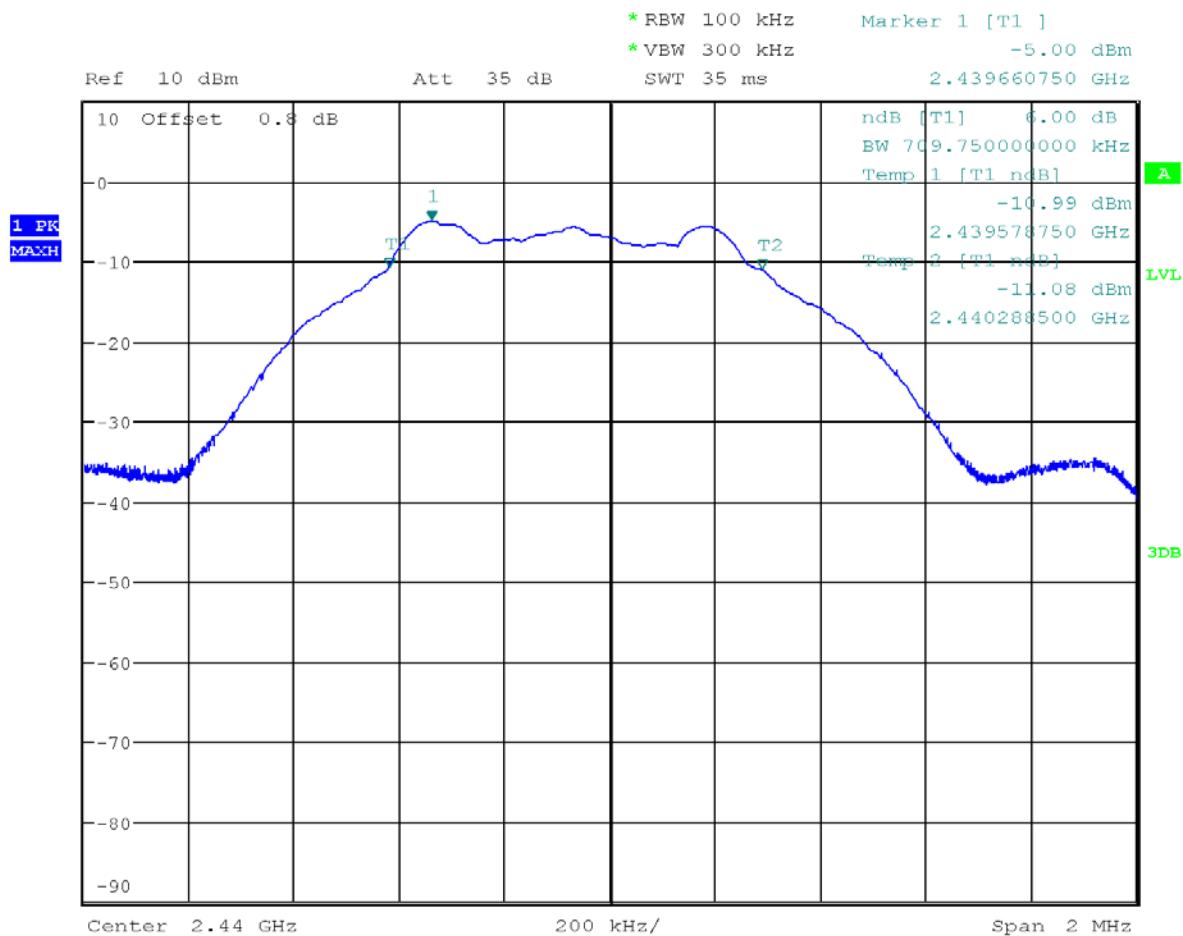
Tested By	Test Date	Results
Amar Kacel	July 13, 2021	Complies

Plot 1.1



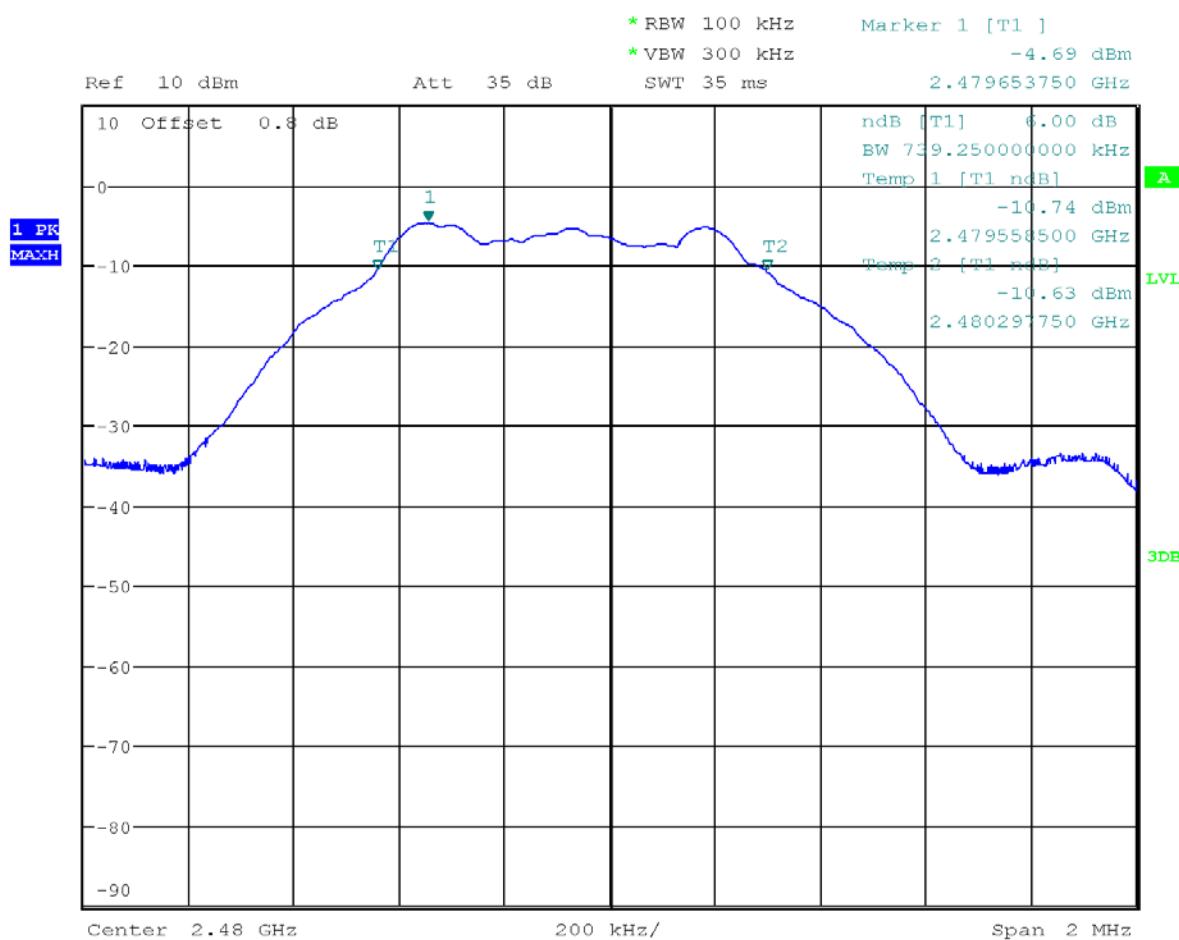
Date: 13.JUL.2021 12:24:33

Plot 1.2



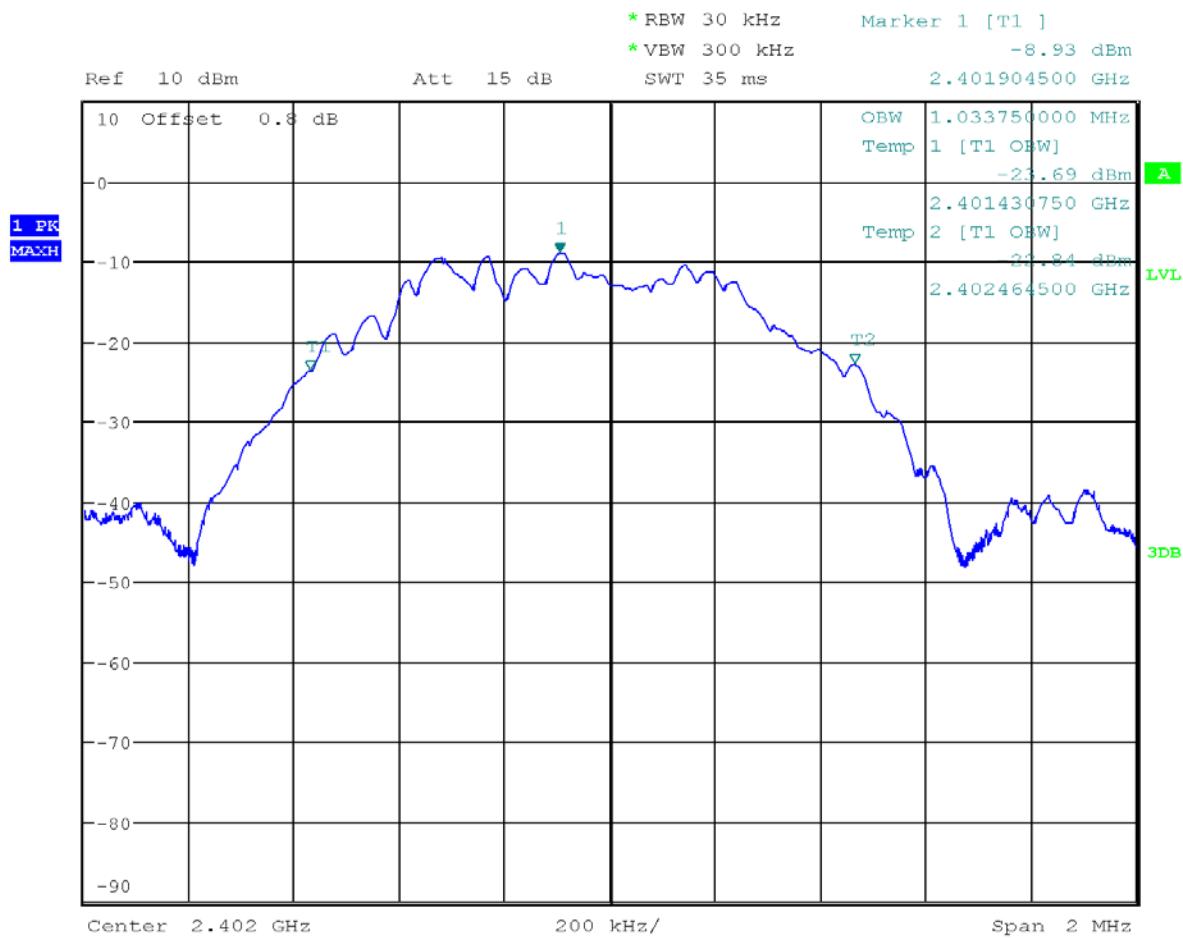
Date: 13.JUL.2021 12:29:03

Plot 1.3



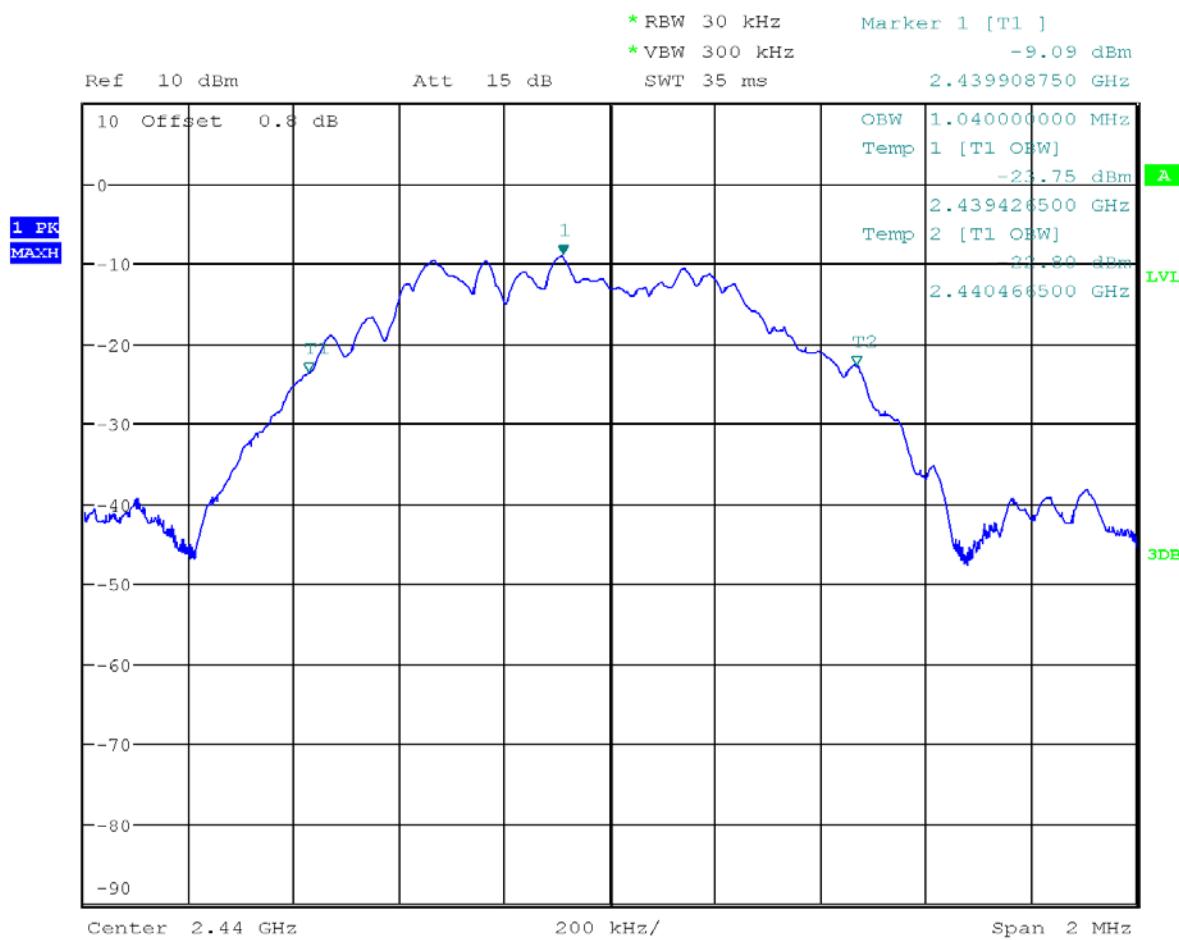
Date: 13.JUL.2021 12:03:47

Plot 1.4



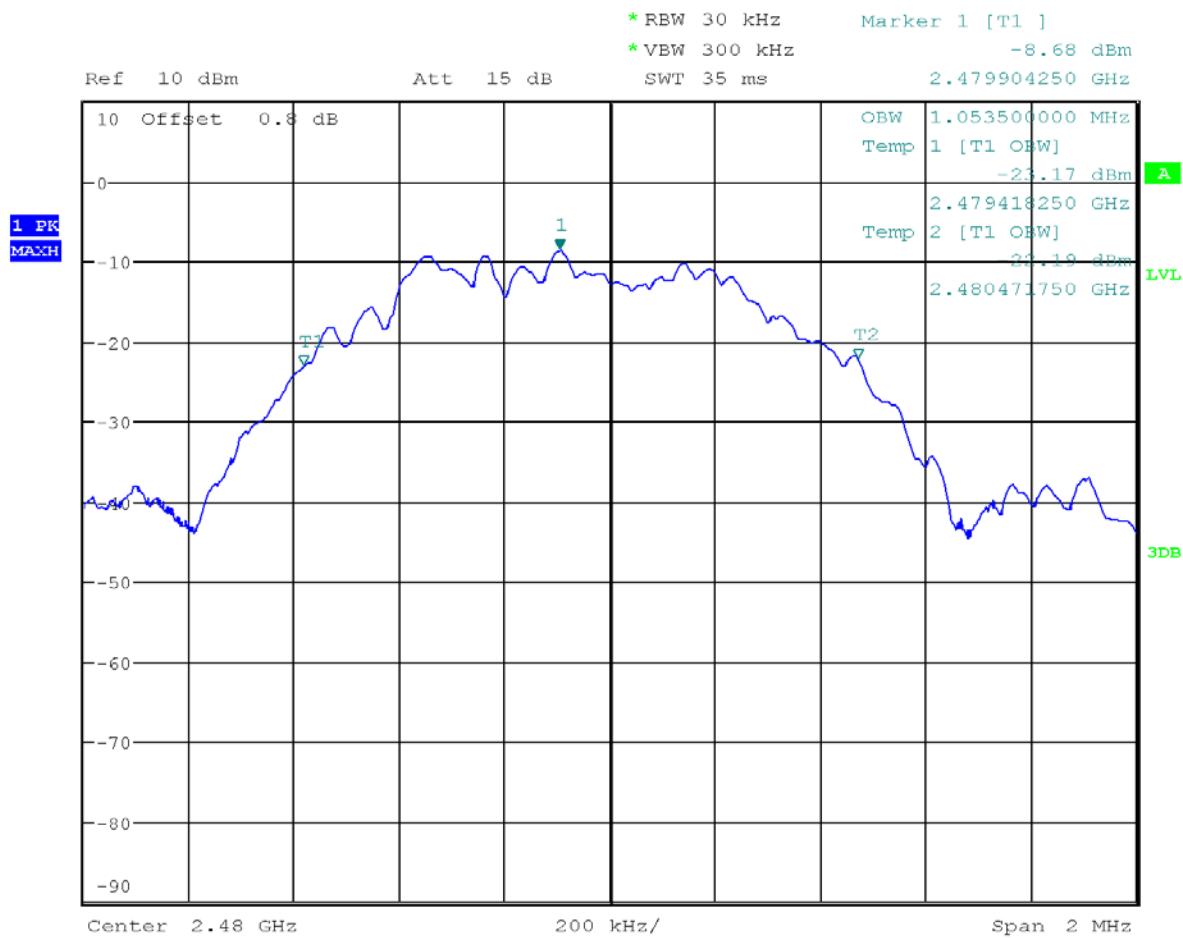
Date: 13.JUL.2021 14:38:07

Plot 1.5



Date: 13.JUL.2021 12:34:31

Plot 1.6



Date: 13.JUL.2021 14:33:32

Results

Complies

4.2 Maximum Peak Conducted Output Power at Antenna Terminals
FCC Rule: 15.247(b)(3); RSS-247, 5.4.d);

4.2.1 Requirement

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt or 30 dBm.
For antennas with gains greater than 6 dBi, transmitter output level must be decreased appropriately, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2.2 Procedure

The procedure described in FCC Publication KDB 558074 D01 Meas Guidance v05r02 was used. Specifically, section 11.9.1.1 RBW \geq DTS bandwidth in ANSI 63.10.

1. Set the RBW \geq DTS Bandwidth
2. Set the VBW \geq 3 x RBW
3. Set the span \geq 3 x RBW
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max Hold
7. Allow trace to fully stabilize
8. Use peak marker function to determine the peak amplitude level.

A spectrum analyzer was connected to the antenna port of the transmitter.

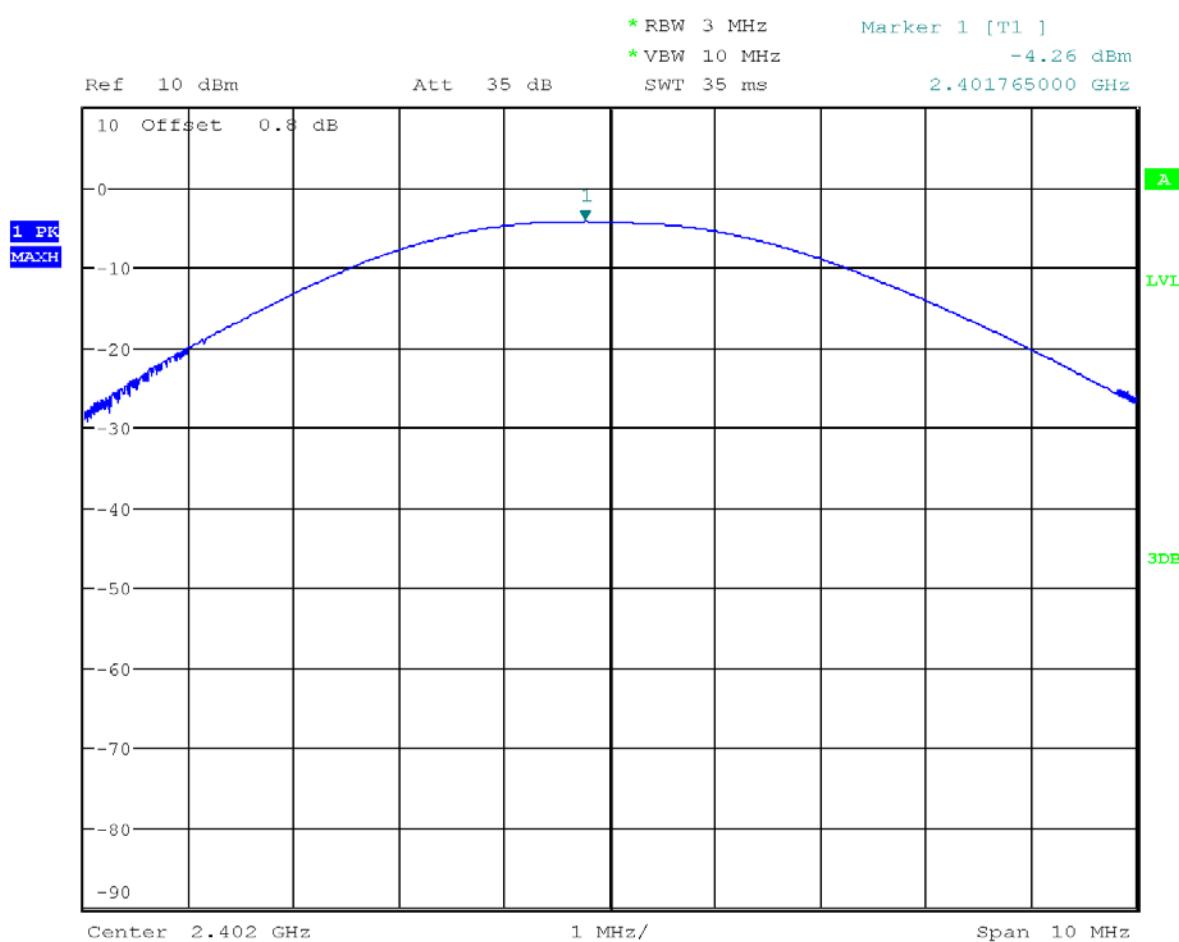
4.2.3 Test Result

Refer to the following plots 2.1 – 2.3 for the test details.

Frequency	Conducted Power (peak)		Plot	
	MHz	dBm		
2402		-4.26	0.375	2.1
2442		-4.39	0.364	2.2
2480		-4.08	0.391	2.3

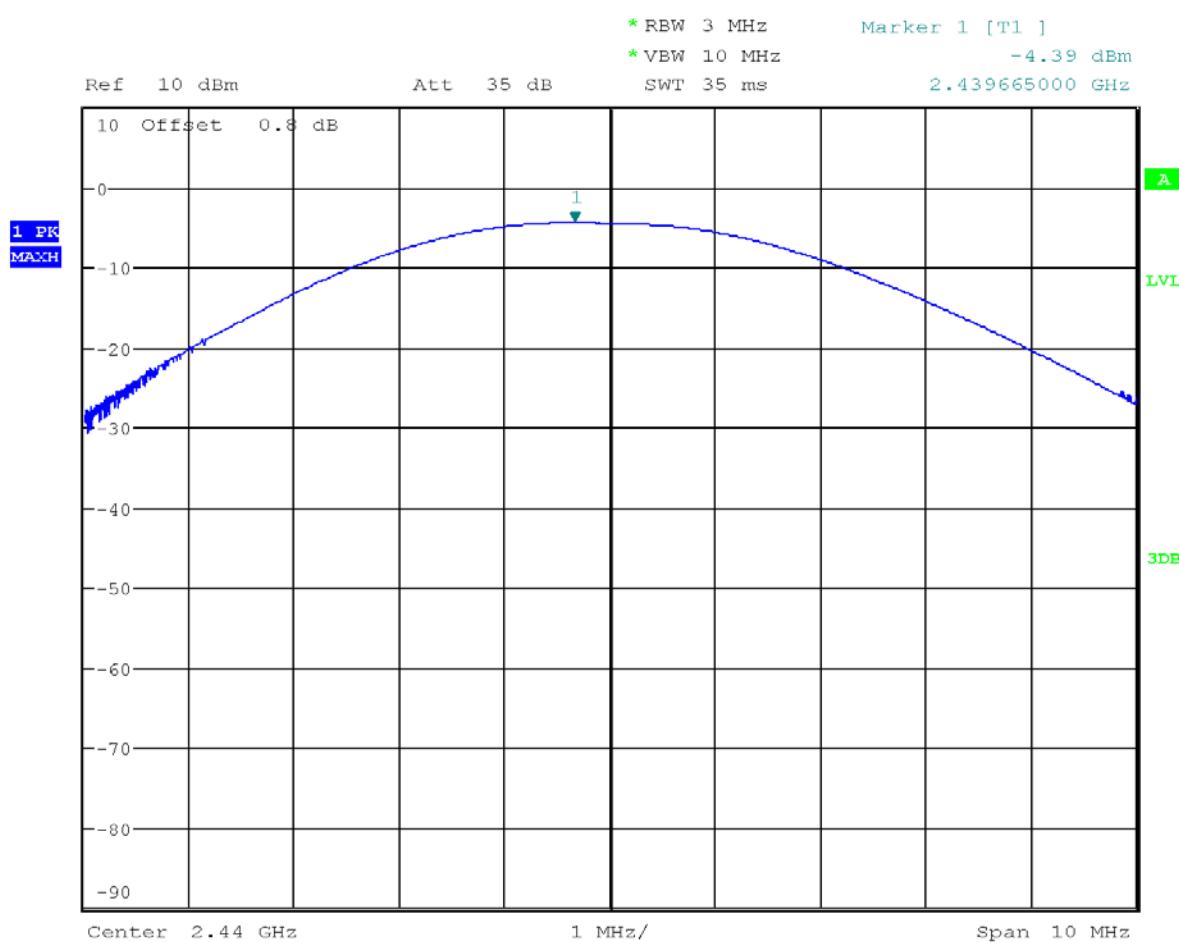
Tested By	Test Date	Results
Amar Kacel	July 13, 2021	Complies

Plot 2. 1



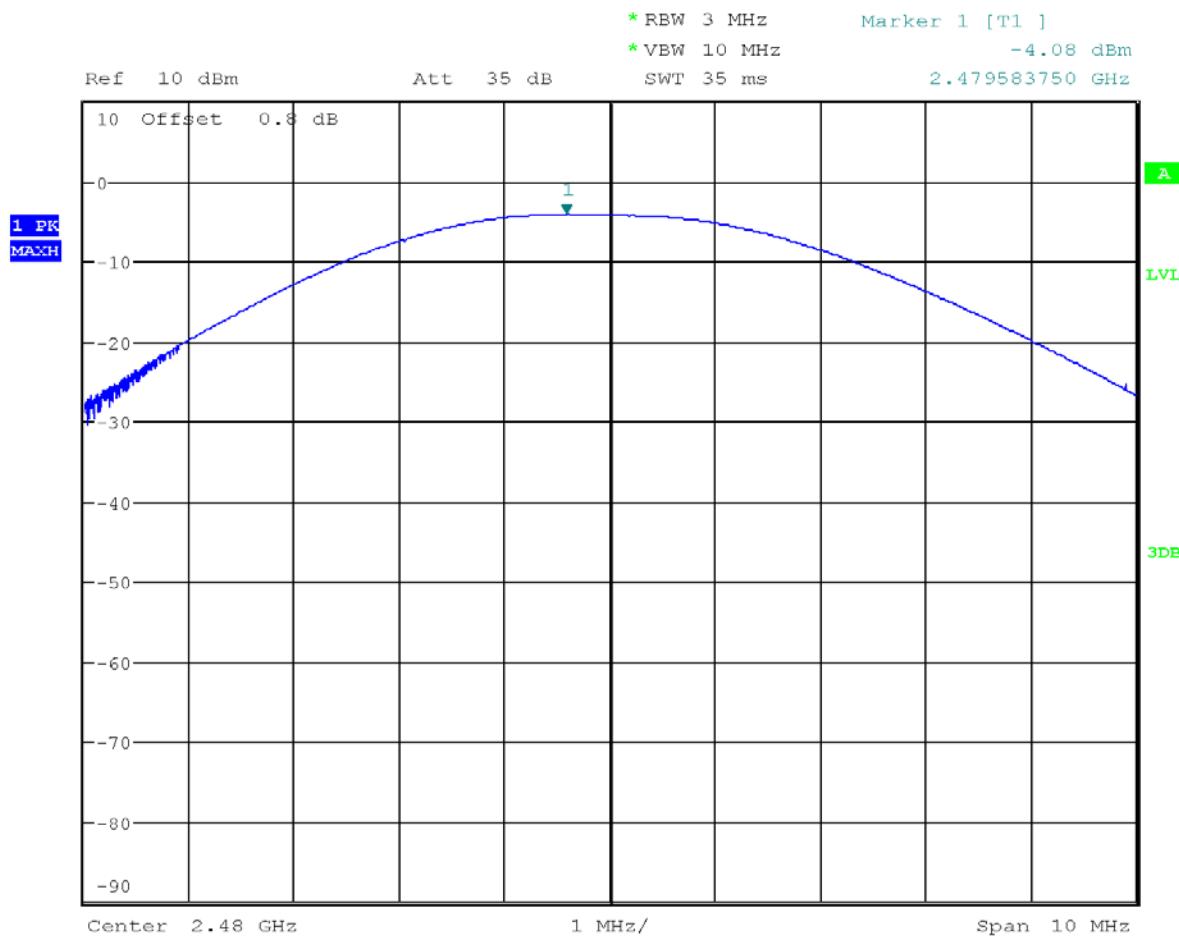
Date: 13.JUL.2021 11:32:15

Plot 2.2



Date: 13.JUL.2021 11:35:42

Plot 2.3



Date: 13.JUL.2021 11:37:19

Results**Complies**

4.3 Maximum Power Spectral Density
FCC: 15.247 (e); RSS-247, 5.2.b);

4.3.1 Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna should not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2 Procedure

A spectrum analyzer was connected to the antenna port of the transmitter.

The procedure described in FCC Publication KDB 558074 D01 Meas Guidance v05r02, specifically section 11.10.2 Method PKPSD (peak PSD) of ANSI 63.10.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the *DTS bandwidth*.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

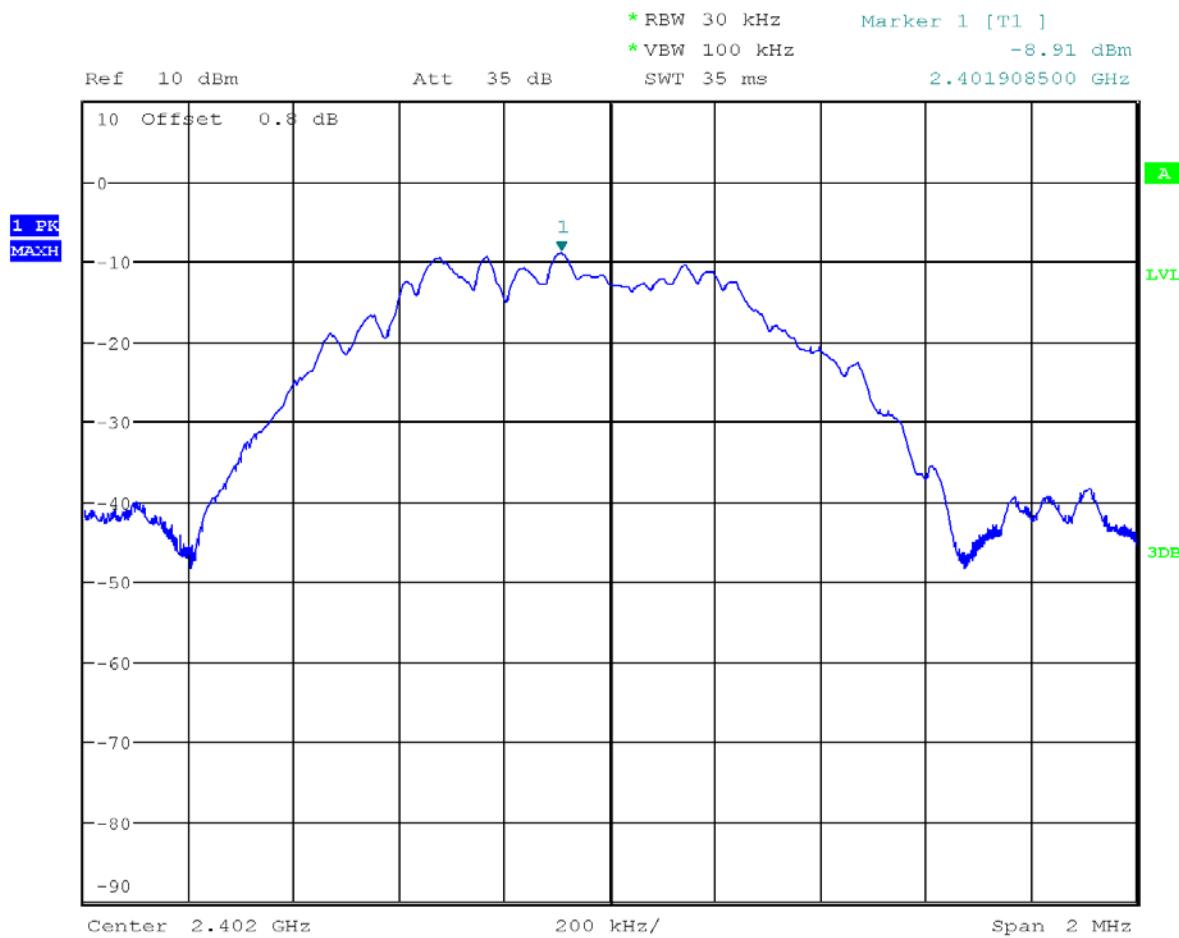
4.3.3 Test Result

Refer to the following plots for the test result

Frequency, MHz	Maximum Power Spectral Density, dBm	Maximum Power Spectral Density Limit, dBm	Margin, dB	Plot
2402	-8.91	8.0	-16.91	3.1
2440	-9.08	8.0	-17.08	3.2
2480	-8.78	8.0	-16.78	3.3

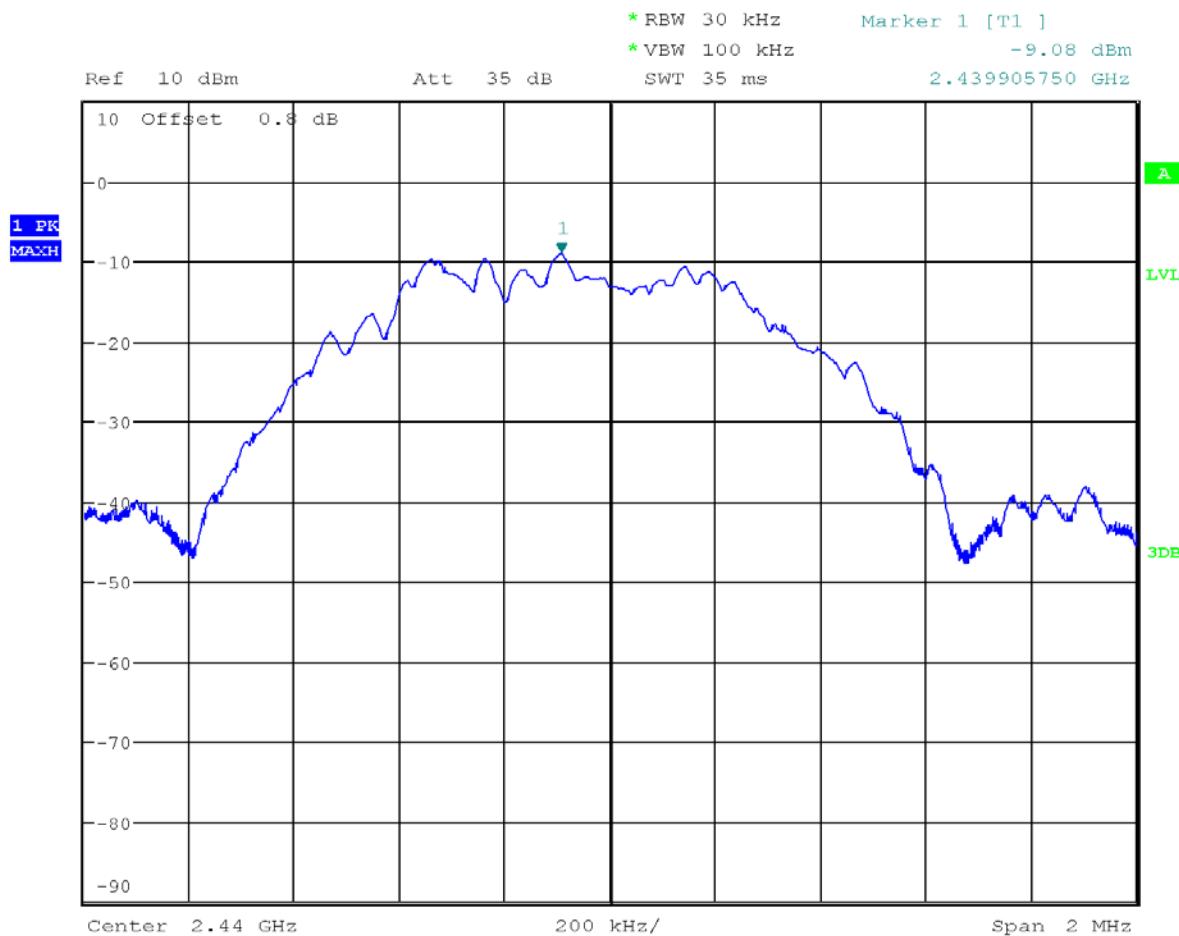
Tested By	Test Date	Results
Amar Kacel	July 13, 2021	Complies

Plot 3.1



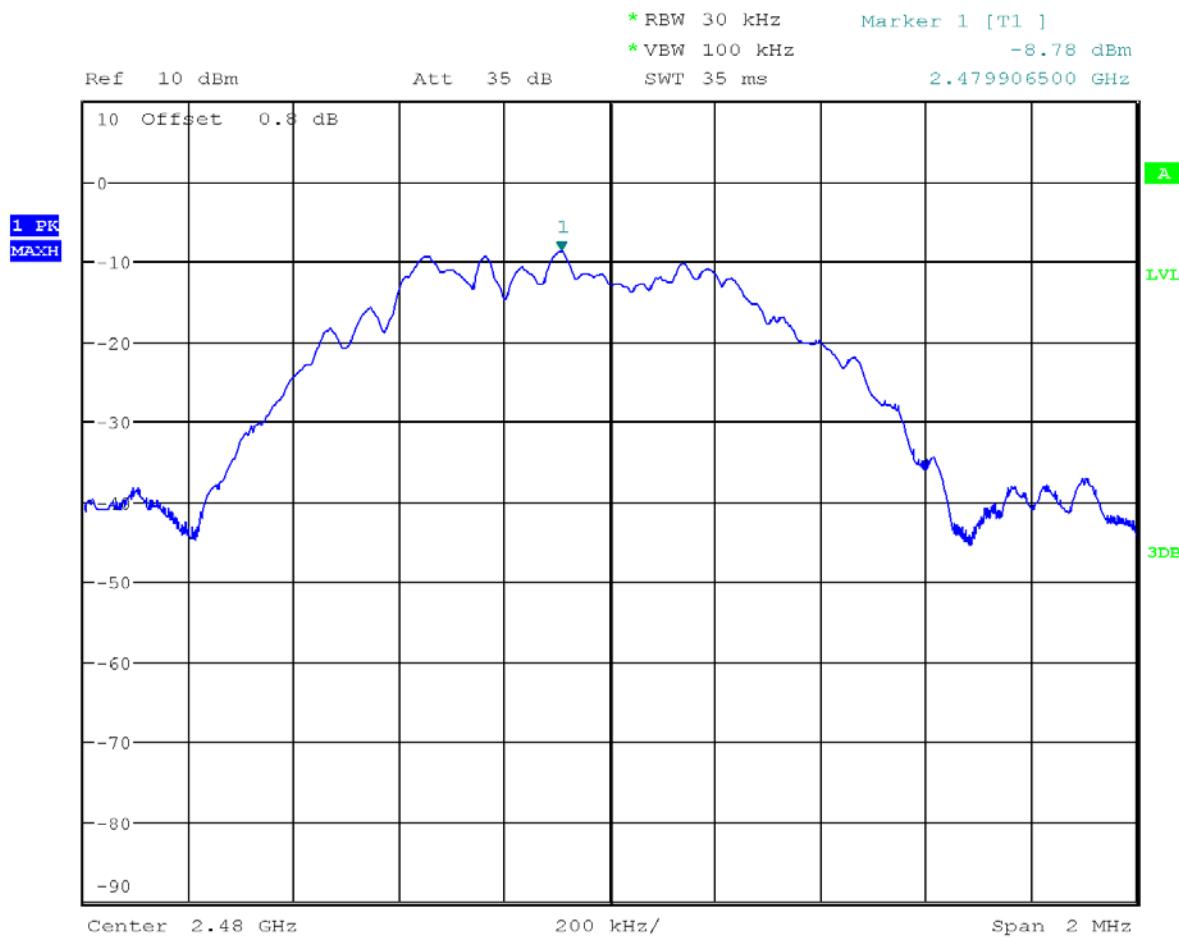
Date: 13.JUL.2021 14:41:39

Plot 3.2



Date: 13.JUL.2021 14:44:18

Plot 3.3



Date: 13.JUL.2021 14:50:53

Results**Complies**

4.4 Out of Band Antenna Conducted Emission
FCC: 15.247(d); RSS-247, 5.5;

4.4.1 Requirement

In any 100 kHz bandwidth outside the EUT pass-band, the RF power shall be below the maximum in-band 100 kHz emissions by at least 20 dB (if peak power of in-band emission is measured) or 30 dB (if average power of in-band emission is measured).

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

4.4.2 Procedure

The procedure described in FCC Publication KDB 558074 D01 Meas Guidance v05r02, specifically section 11.11 DTS Emissions in non-restricted frequency bands of ANSI 63.10.

A spectrum analyzer was connected to the antenna port of the transmitter.

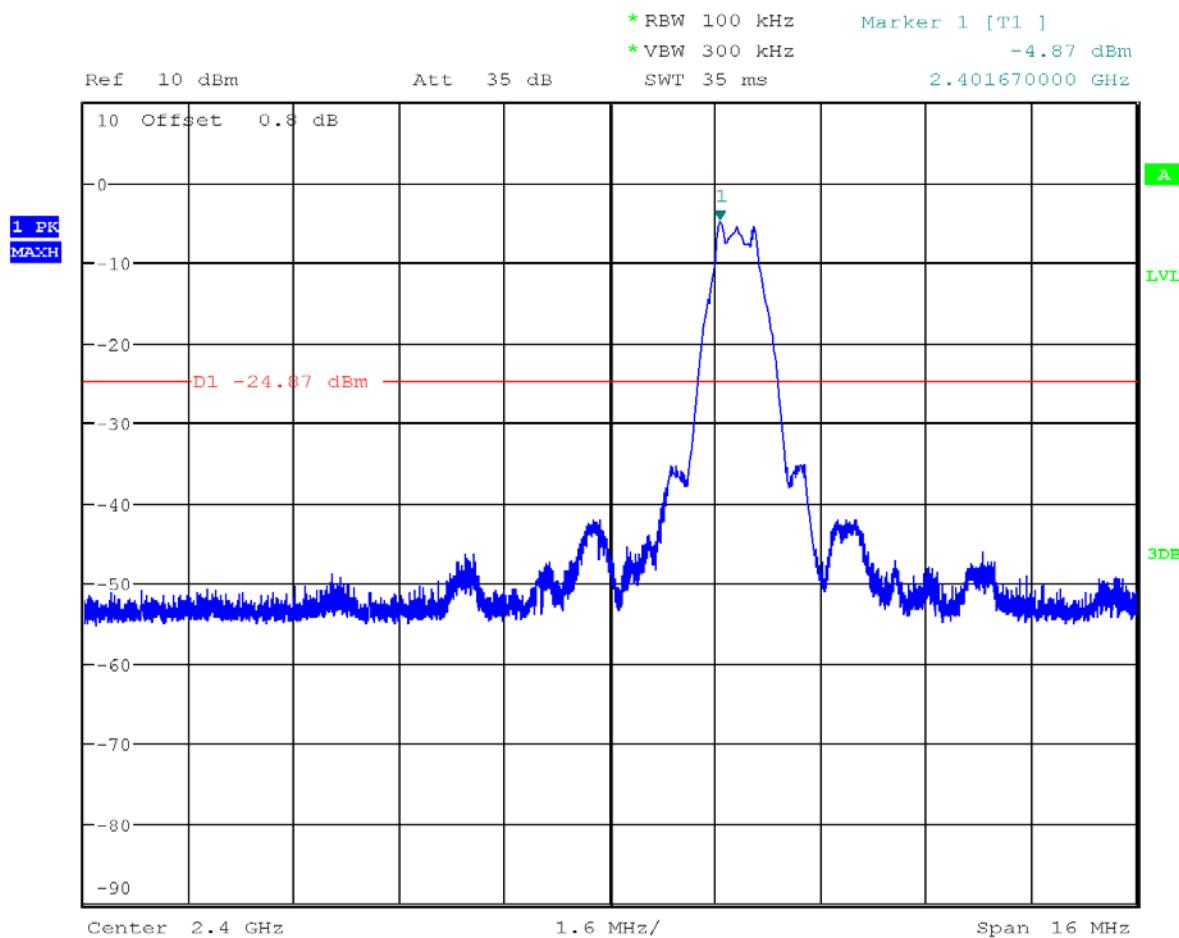
1. Set the RBW = 100 kHz.
2. Set the VBW $\geq 3 \times$ RBW.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

The unwanted emissions were measured from 30 MHz to 25 GHz. Plots below are corrected for cable loss and then compared to the limits.

4.4.3 Test Result

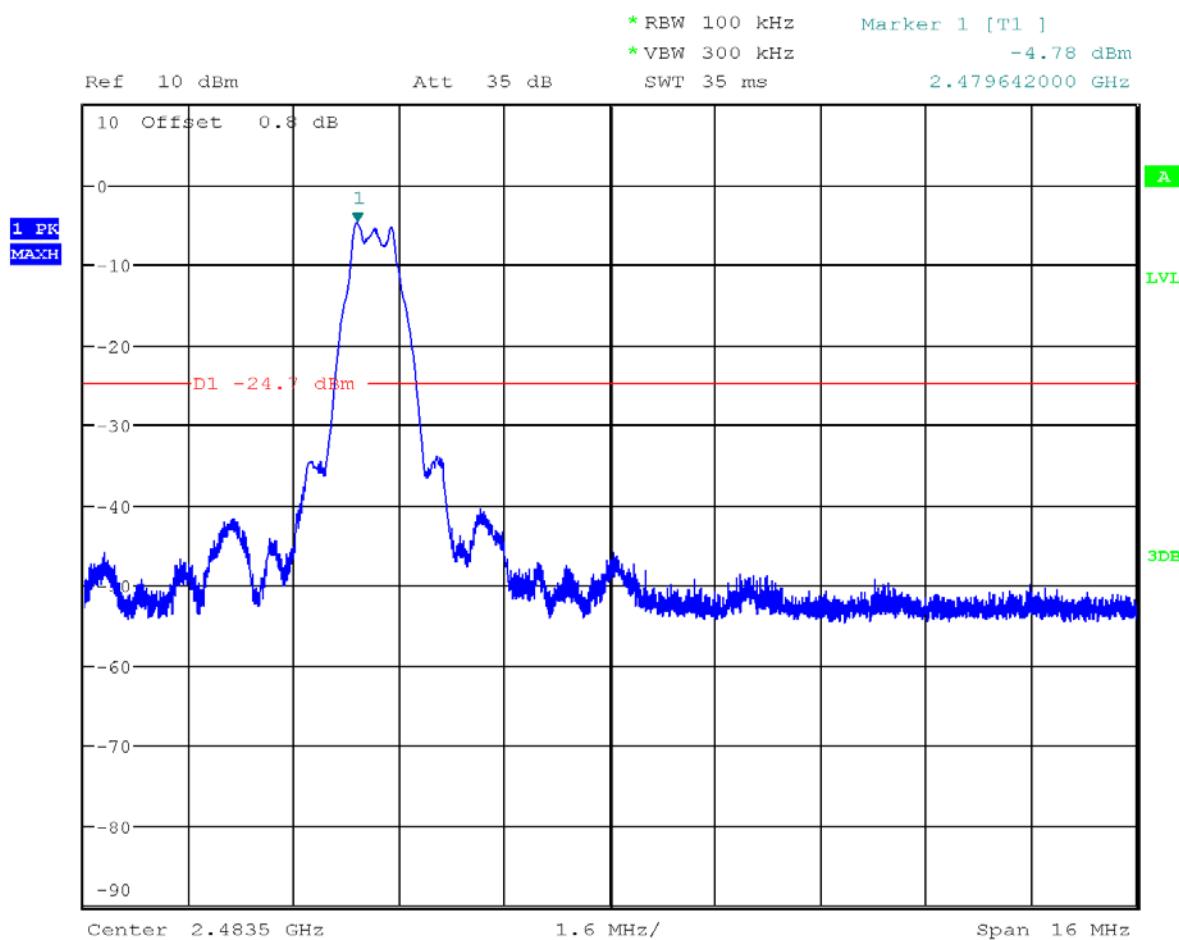
Refer to the following plots 4.1 – 4.5 for unwanted conducted emissions. The plot shows -20dB attenuation limit line.

Tested By	Test Date	Results
Amar Kacel	July 13, 2021	Complies

Tx @ Low Channel, 2402 MHz Band Edge
Plot 4.1

Date: 13.JUL.2021 11:27:40

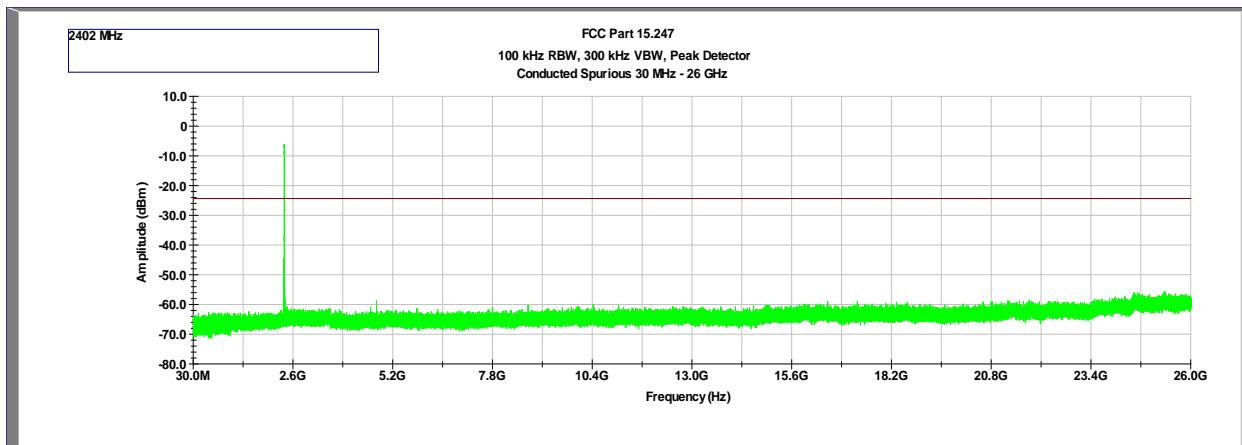
Tx @ High Channel, 2480 MHz Band Edge
Plot 4.2



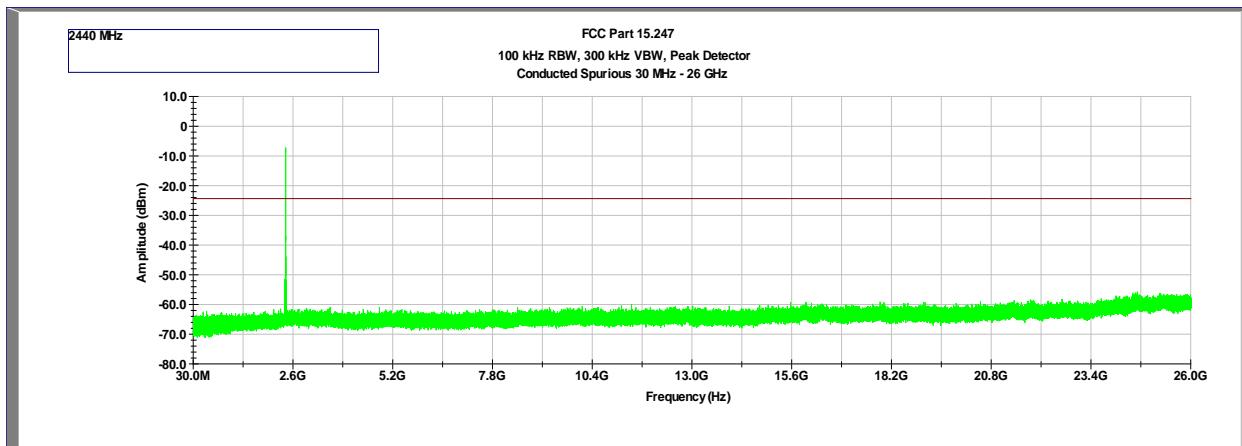
Date: 13.JUL.2021 11:24:36

Results	Complies
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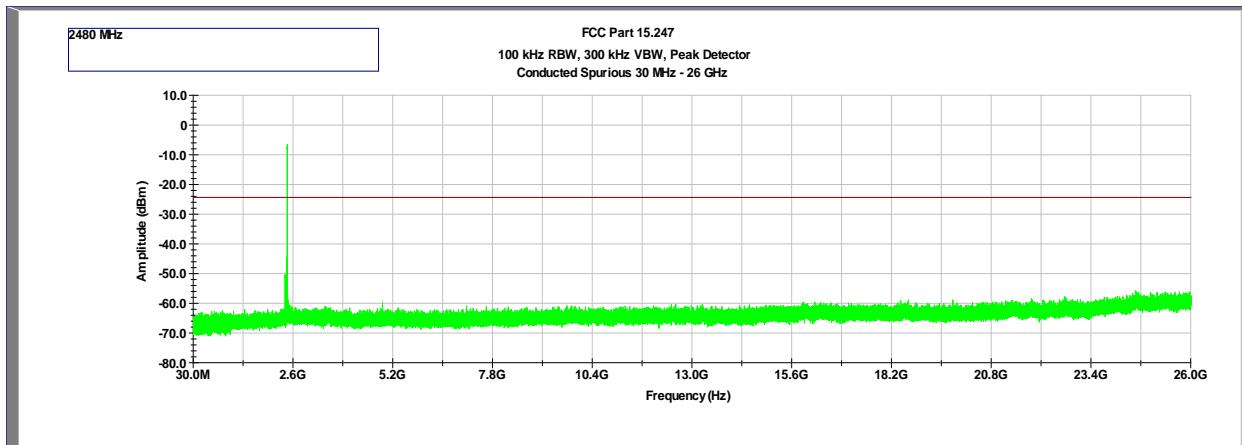
Tx @ Low Channel, 2402 MHz
30MHz -26GHz Conducted Spurious
Plot 4.3



Tx @ Mid Channel, 2440 MHz
30MHz -26GHz Conducted Spurious
Plot 4.4



Tx @ High Channel, 2480 MHz
30MHz -26GHz Conducted Spurious
Plot 4.5



Results

Complies

4.5 Transmitter Radiated Emissions

FCC Rules: 15.247(d), 15.209, 15.205; RSS-247, 5.5;

4.5.1 Requirement

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

For out of band radiated emissions (except for frequencies in restricted bands), in any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.5.2 Procedure

Radiated emission measurements were performed from 9 kHz to 26.5 GHz according to the procedure described in ANSI C63.10: 2013. Spectrum Analyzer Resolution Bandwidth is 200Hz or greater for frequencies 9kHz to 30MHz, 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz. Above 1000 MHz Peak and Average measurements were performed.

The EUT is placed on a plastic turntable that is 80 cm in height for below 1000MHz and 1.5m in height for above 1GHz. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at 3 meters for frequencies above 1 GHz and at 10 meters for frequencies below 1 GHz.

Measurements made from 1 GHz to 18GHz had a 2.4-2.5GHz notch filter in place. A preamp was used from 9kHz to 26.5GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average limits for 1GHz – 26.5GHz.

Correlation measurements were performed below 30MHz between 10m ALSE and Open Field site according to FCC KDB 414788 D01 Radiated Test Site v01r01 section 2. All readings were within the acceptable tolerance.

Radiated measurements were performed on the X, Y and Z orientation of the EUT. Data is presented with the worst-case configuration (the configuration which resulted in the highest emission levels).

4.5.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB(μ V); AF = Antenna Factor in dB(1/m)

CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

RA = 52.0 dB(μ V)

AF = 7.4 dB(1/m)

CF = 1.6 dB

AG = 29.0 dB

FS = 52.0+7.4+1.6-29.0 = 32 dB(μ V/m).

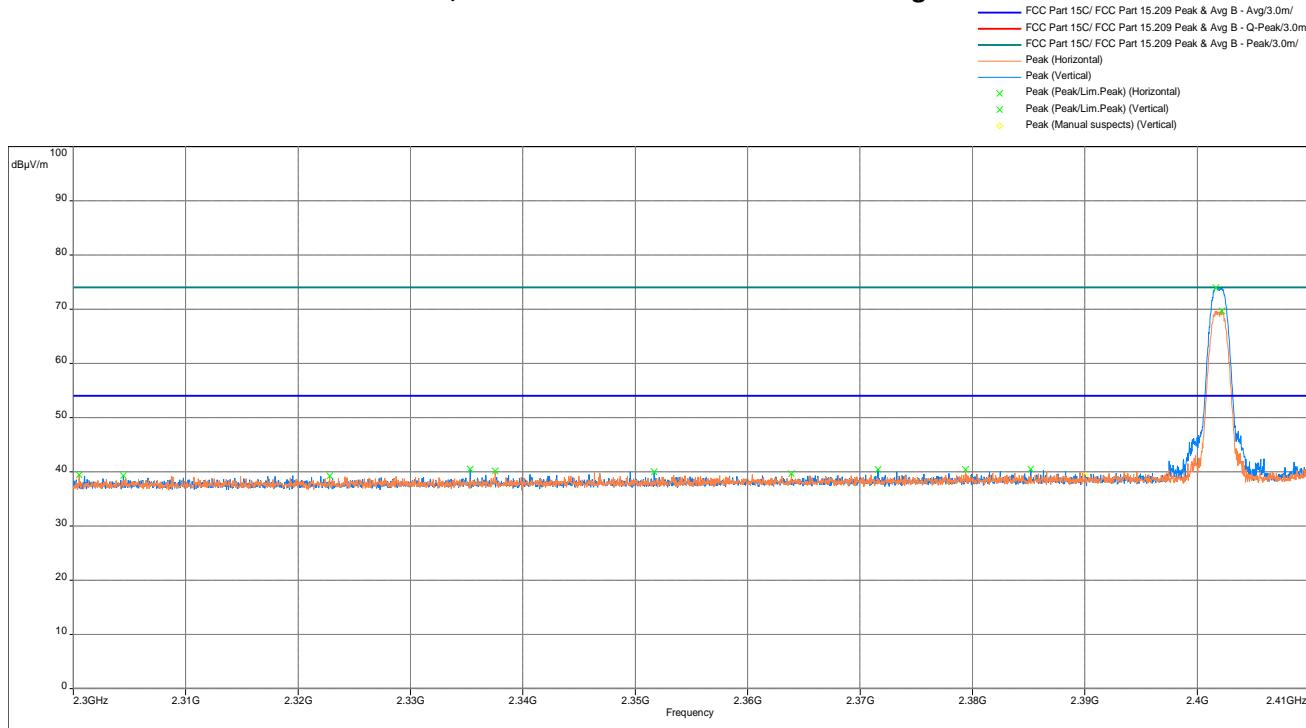
Level in μ V/m = Common Antilogarithm [(32 dB μ V/m)/20] = 39.8 μ V/m.

4.5.4 Test Results

All testing in this section were performed by radiated measurements.

Tested By	Test Date	Results
Amar Kacel	July 2, 2021 to July 8, 2021	Complies

Test Results: 15.209/15.205 Radiated Restricted Band Emissions

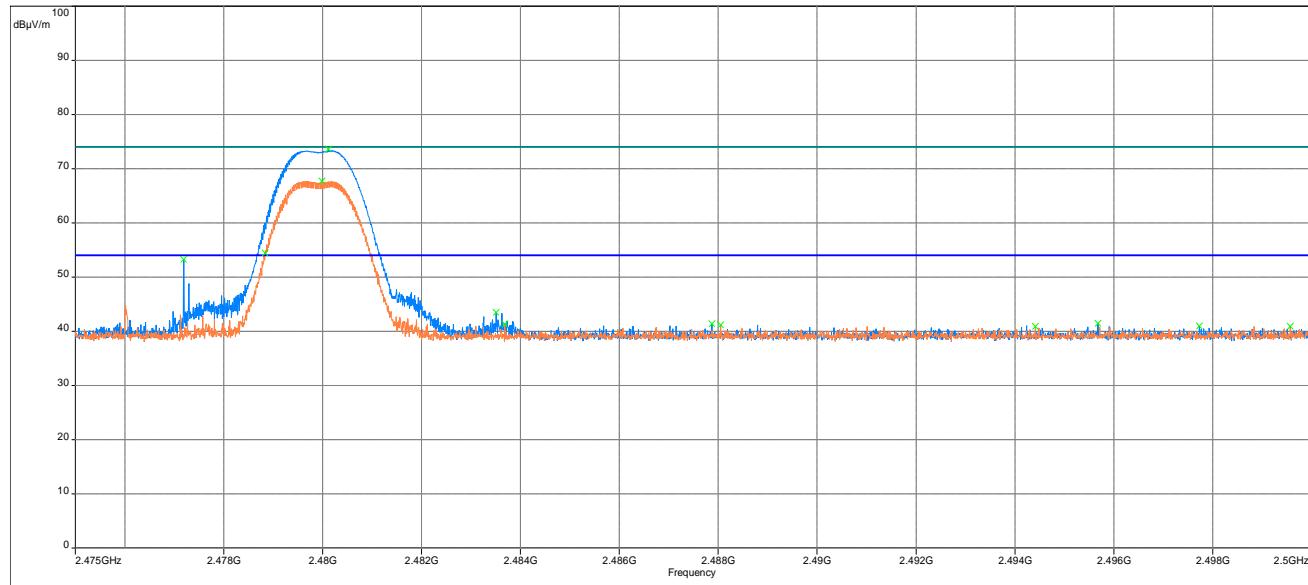
 Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
 2310–2390 MHz, Peak Scan with Peak Limit and Average Limit


Model: ; Client: ; Comments: ; Test Date: 07/06/2021 07:43

Freq. MHz	Peak@3m dB(μV/m)	Avg Limit dB(μV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
2390.064	39.31	54.0	-14.69	1.01	30	Vertical	-11.69

**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Peak Limit and Average Limit**

FCC Part 15C/ FCC Part 15.209 Peak & Avg B - Avg/3.0m/
 FCC Part 15C/ FCC Part 15.209 Peak & Avg B - Q-Peak/3.0m/
 FCC Part 15C/ FCC Part 15.209 Peak & Avg B - Peak/3.0m/
 Peak (Horizontal)
 Peak (Vertical)
 Peak (Peak/Lim.Peak) (Horizontal)
 Peak (Peak/Lim.Peak) (Vertical)



Model: ; Client: ; Comments: ; Test Date: 07/06/2021 07:30

Freq. MHz	Peak@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
2483.546	42.17	54	-11.83	1.99	323.25	Vertical	-10.62

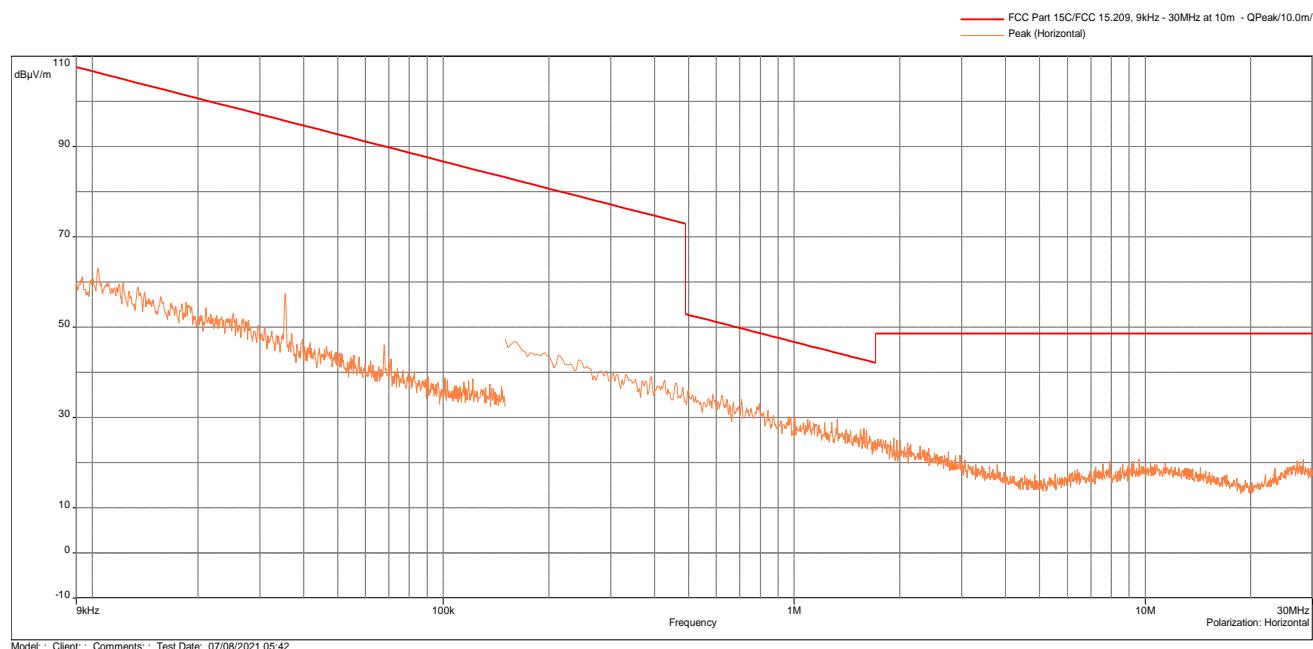
Results

Complies

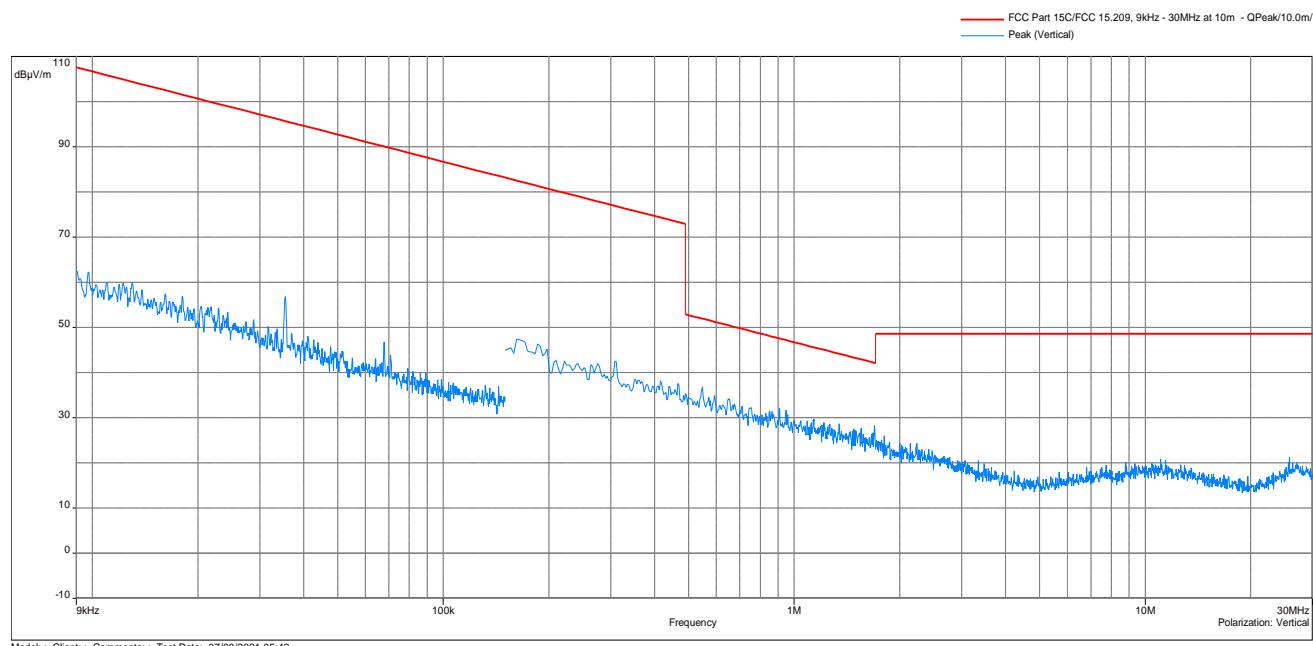
Out-of-Band Radiated Spurious Emissions

Test Results: 15.209 Radiated Spurious Emissions Low Channel, Tx at 2402MHz

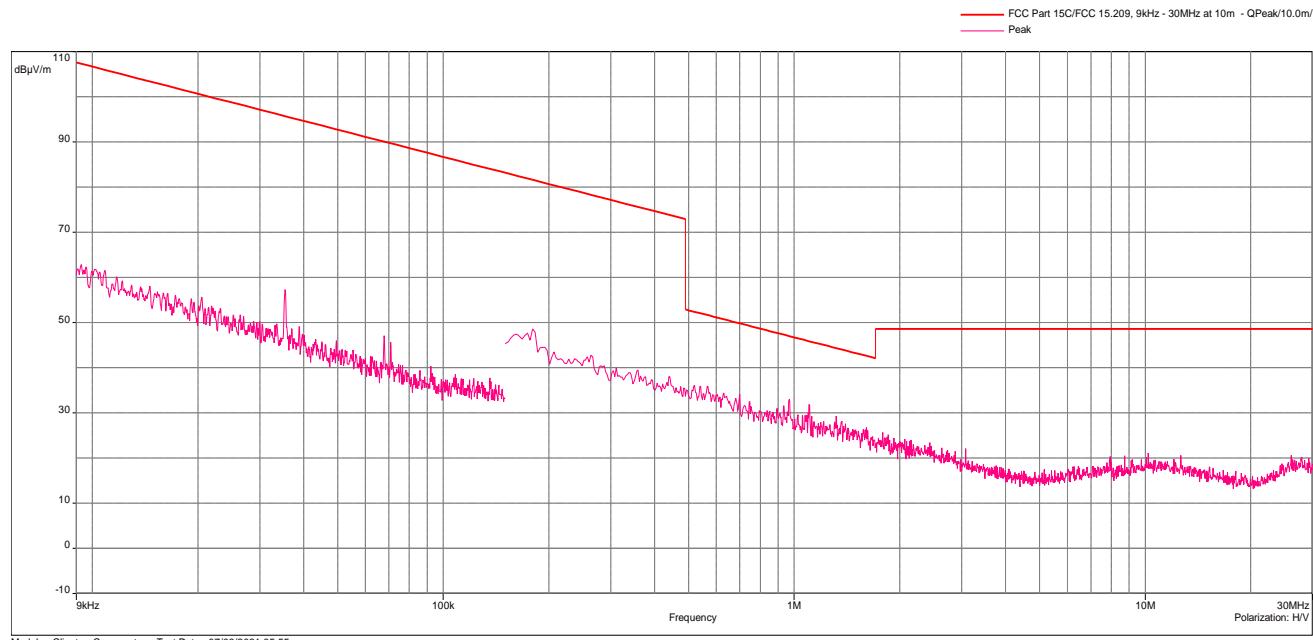
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



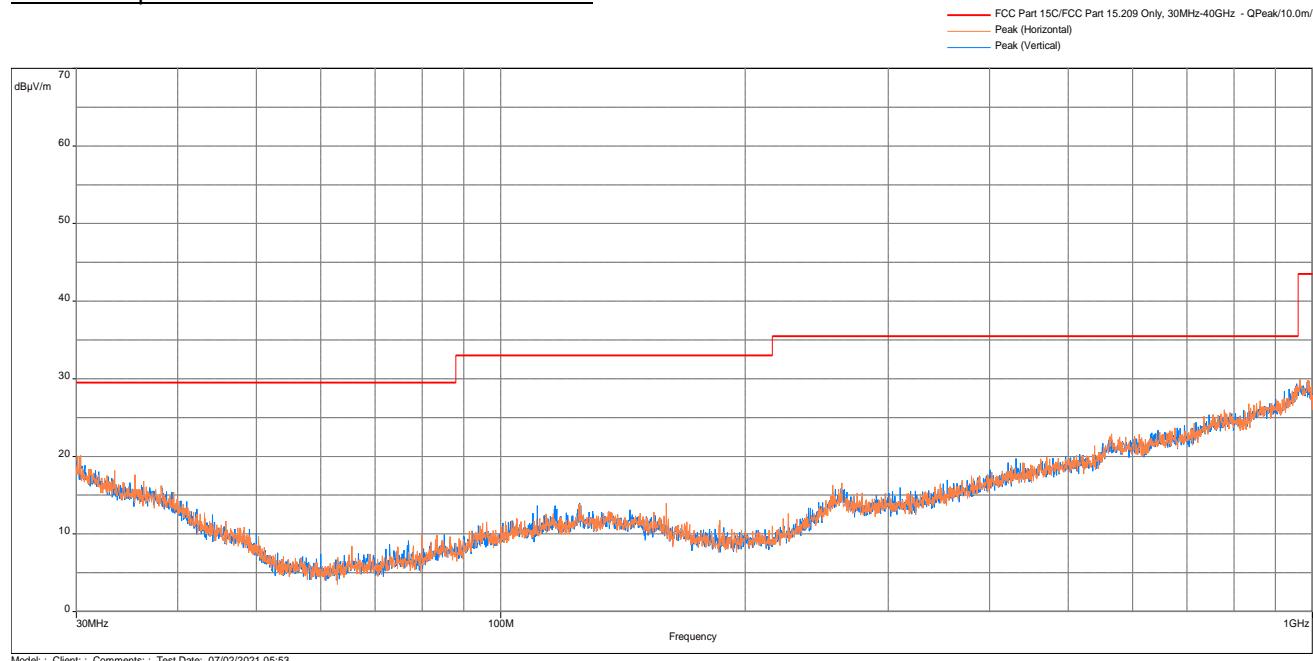
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization

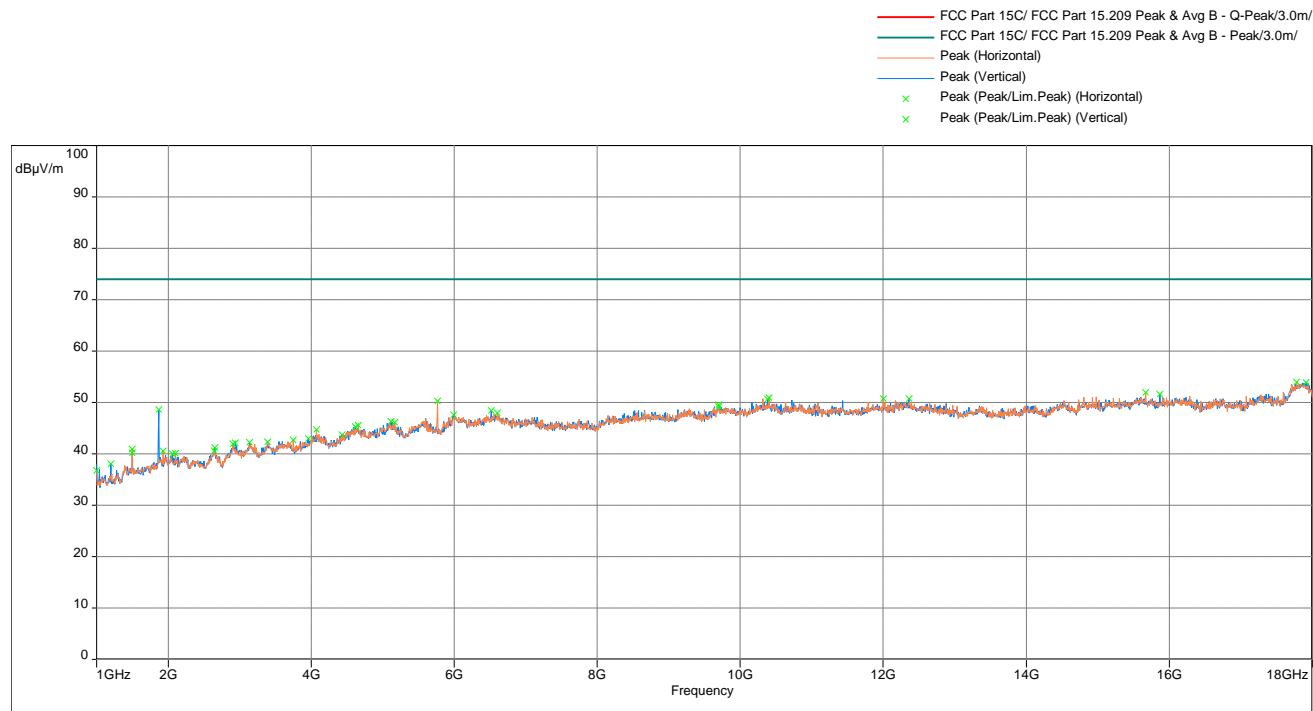


Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization

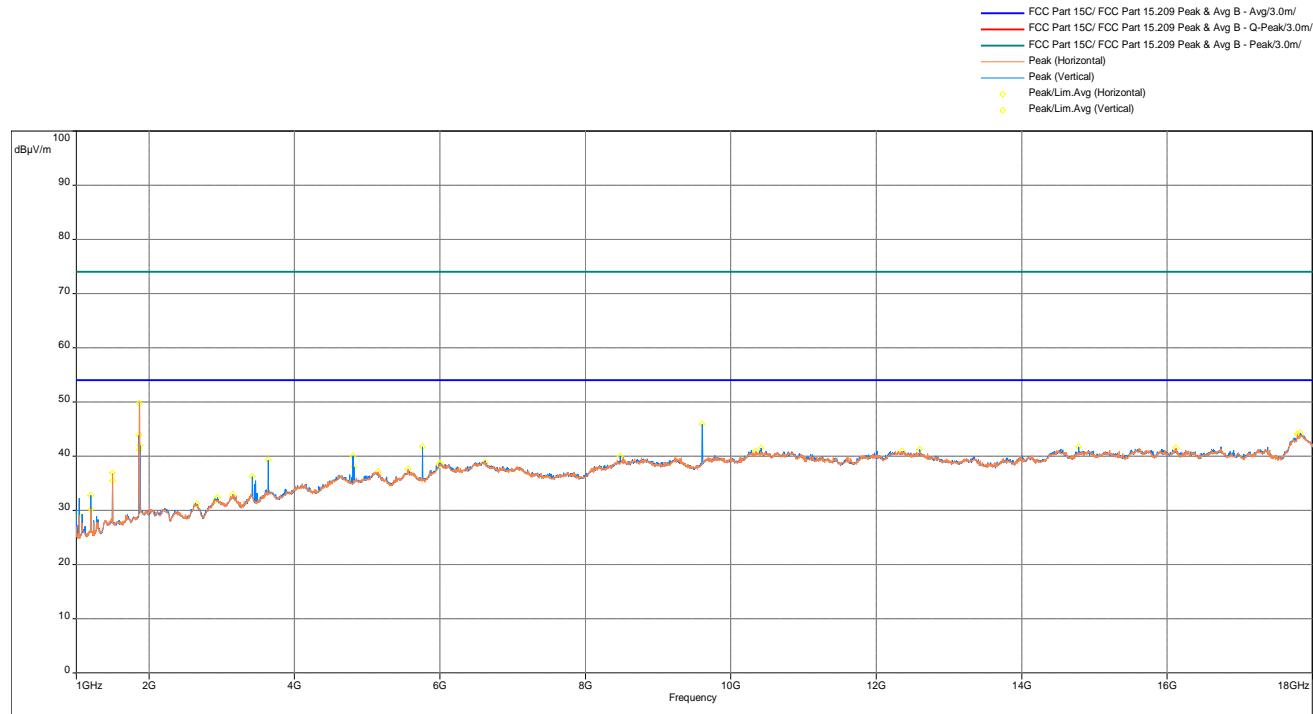


Radiated Spurious Emissions 30 MHz - 1000 MHz



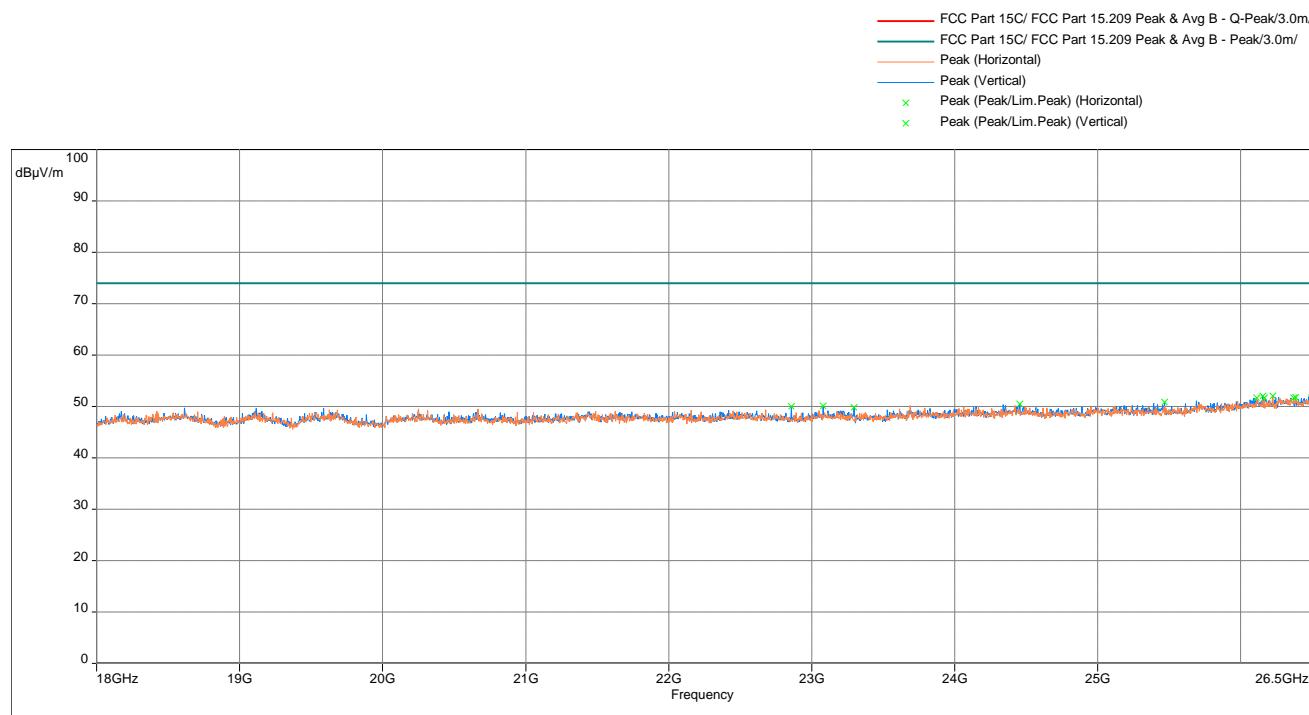
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Peak Limit.


Model: ; Client: ; Comments: ; Test Date: 07/06/2021 06:38

Radiated Spurious Emissions 1000 - 18000 MHz, Average Scan vs Peak & Average Limit.


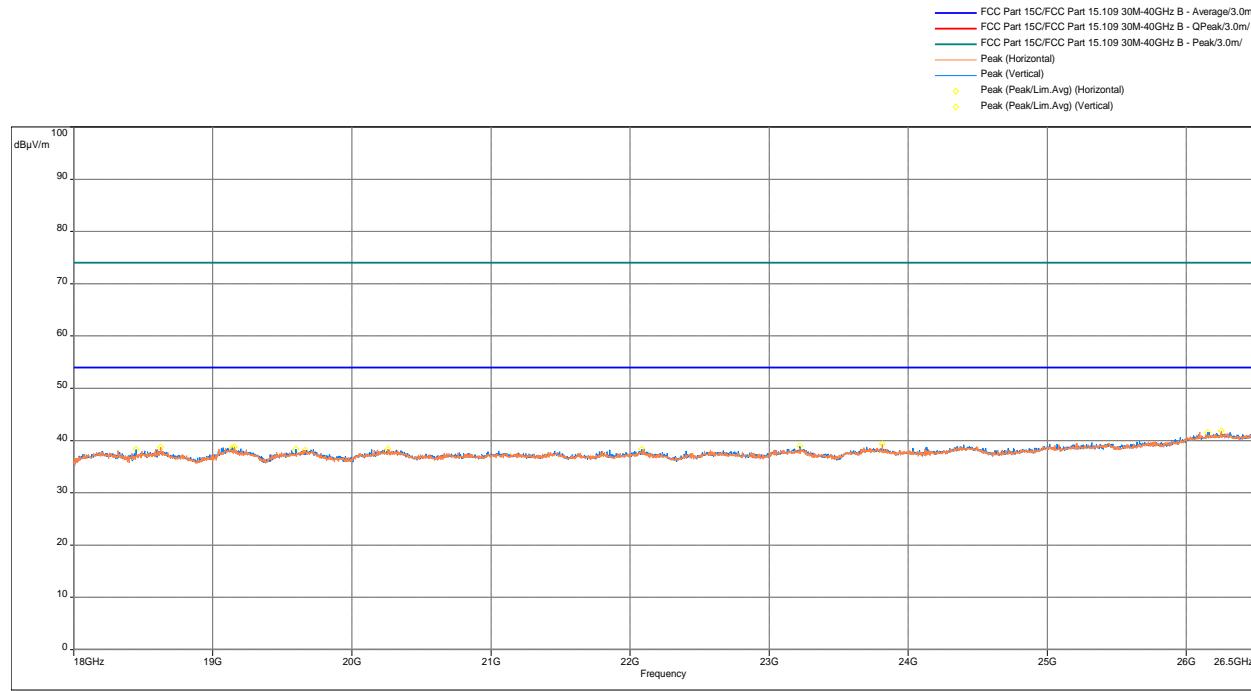
Model: ; Client: ; Comments: ; Test Date: 07/06/2021 05:53

Radiated Spurious Emissions 18 – 26.5 GHz, Peak Scan vs Peak Limit.



Model: ; Client: ; Comments: ; Test Date: 07/06/2021 08:48

Radiated Spurious Emissions 18 – 26.5 GHz, Average Scan vs Average & Peak Limit.



Model: ; Client: ; Comments: ; Test Date: 02/23/2021 18:08

Test Results: 15.209 Radiated Spurious Emissions Low Channel, Tx at 2402MHz

Frequency (MHz)	QPeak@ 10m (dB μ V/m)	Lim. QPeak @10m (dB μ V/m)	Margin (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
940.248	29.97	35.5	-5.53	1.01	119.5	Horizontal	2.92
959.939	29.69	35.5	-5.81	2.01	42.75	Horizontal	4.09
948.1697	29.23	35.5	-6.27	2	0	Vertical	3.46
30.776	19.7	29.5	-9.8	3	18.25	Vertical	-8.79
30.32333	19.59	29.5	-9.91	1.01	57.75	Horizontal	-8.57
39.63533	15.22	29.5	-14.28	2	57.5	Vertical	-13.28

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Peak @3m (dB μ V/m)	Lim. Peak @3m (dB μ V/m)	Margin dB	Height (m)	Angle (°)	Comment	Correction (dB)
15672.13	51.95	74	-22.05	2.01	0	Horizontal	5.11
15868.77	51.55	74	-22.45	1.01	289	Vertical	4.63
10406.1	50.96	74	-23.04	2.01	121.5	Horizontal	2.04
12000.7	50.78	74	-23.22	2.01	347.5	Horizontal	2.17
12362.8	50.71	74	-23.29	1.99	353.5	Vertical	2.51
10384.57	50.7	74	-23.3	1.01	156.5	Vertical	2.02
5766.233	50.27	74	-23.73	3.01	133.25	Horizontal	-3.91
9700.6	49.52	74	-24.48	1.01	354.5	Vertical	1.29
4660.667	45.53	74	-28.47	3.01	300.75	Horizontal	-4.23
4617.6	45.28	74	-28.72	2.99	0	Vertical	-4.24

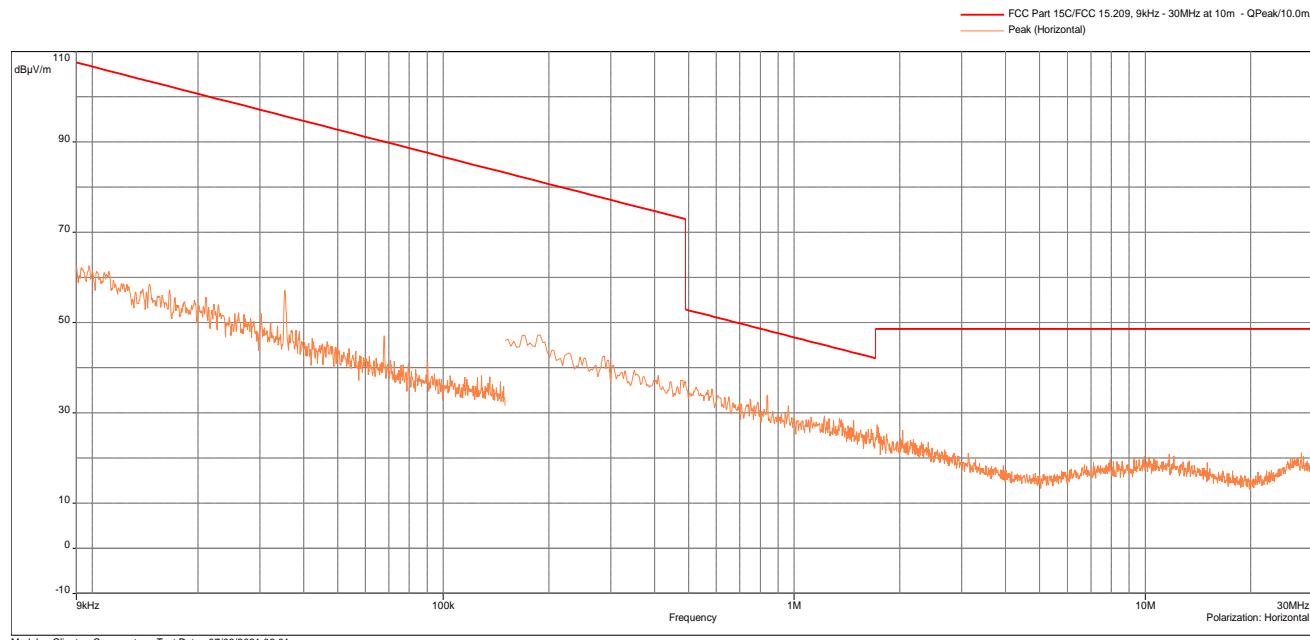
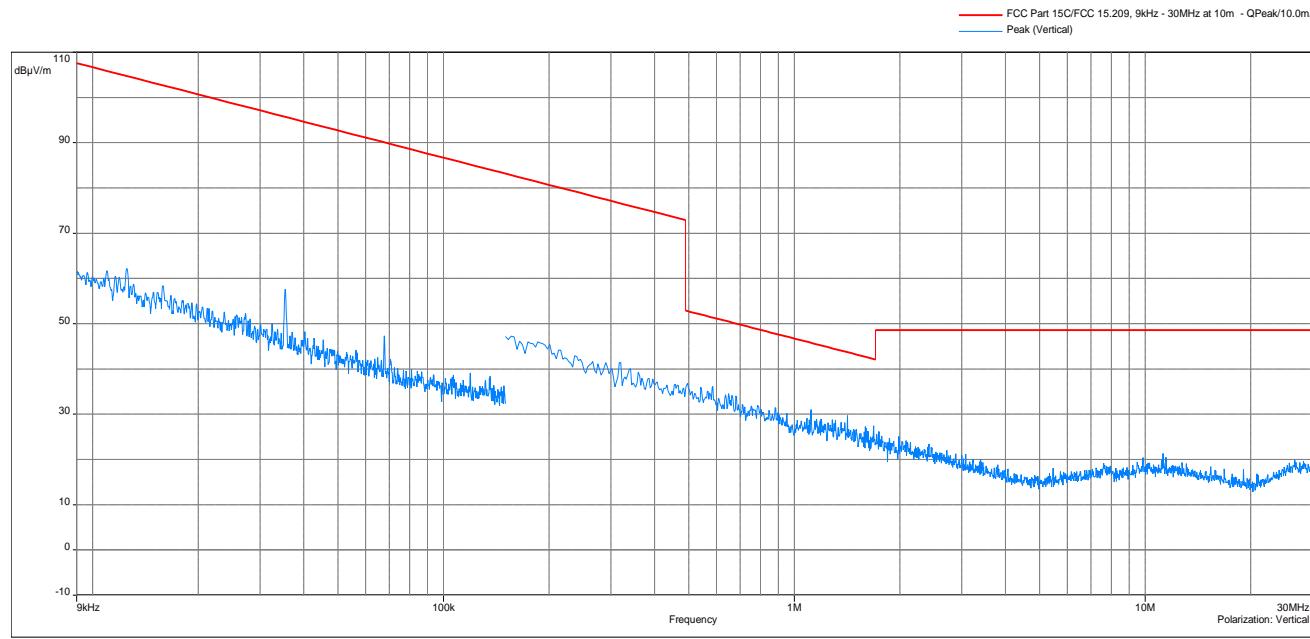
Note: Correction = AF + CF - Preamp

Frequency (MHz)	Ave @3m (dB μ V/m)	Lim. Ave @3m (dB μ V/m)	Margin dB	Height (m)	Angle (°)	Comment	Correction (dB)
1868.70	49.8	54	-4.20	2.99	78.75	Horizontal	-12.73
9607.10	45.88	54	-8.12	3.01	43	Vertical	1.14
17831.70	44.34	54	-9.66	3.99	188	Vertical	10.49
17789.77	44.12	54	-9.88	1.99	348	Horizontal	10.51
1860.77	43.87	54	-10.13	3.99	274.5	Vertical	-12.83
1877.77	42.04	54	-11.96	1.01	217.5	Vertical	-12.62

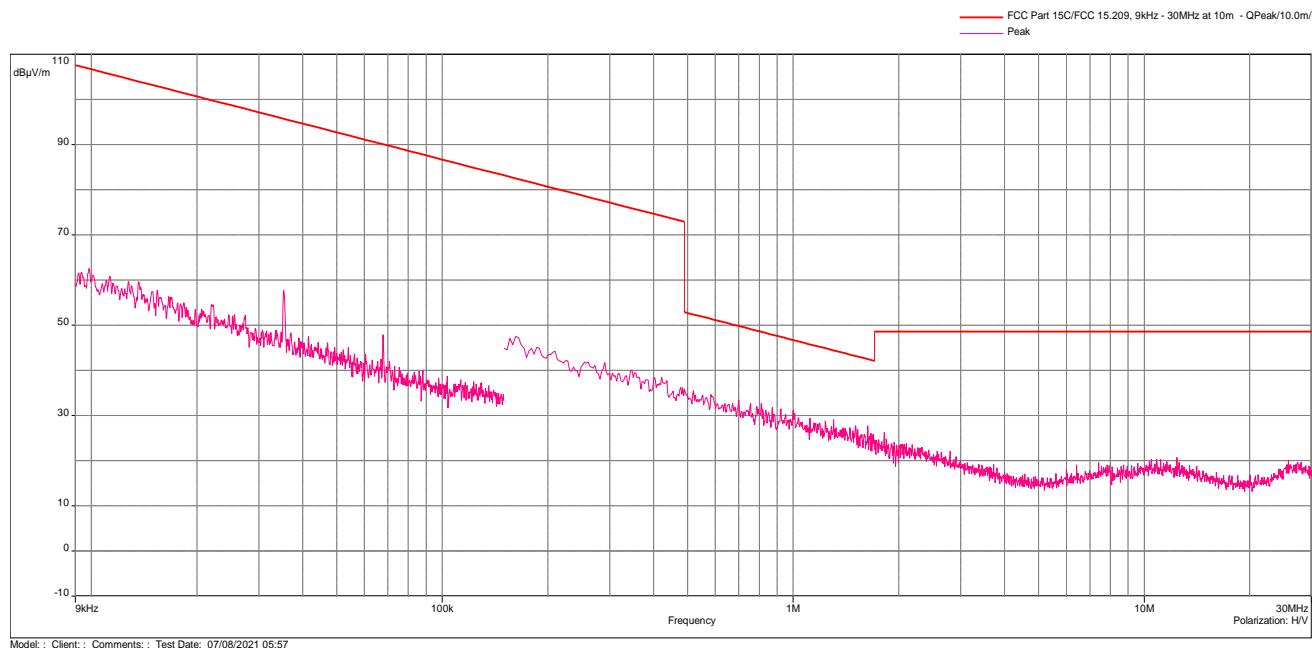
Note: Correction = AF + CF - Preamp

Results	Complies
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Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 2440 MHz

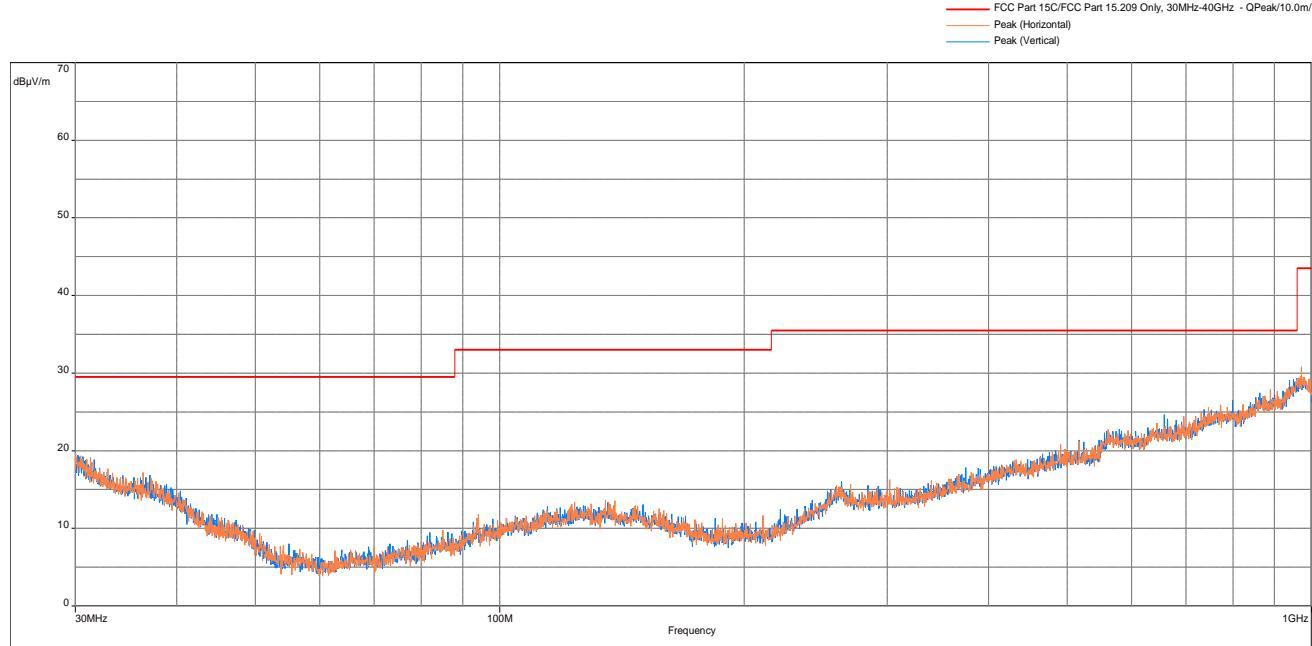
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization

Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization


Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



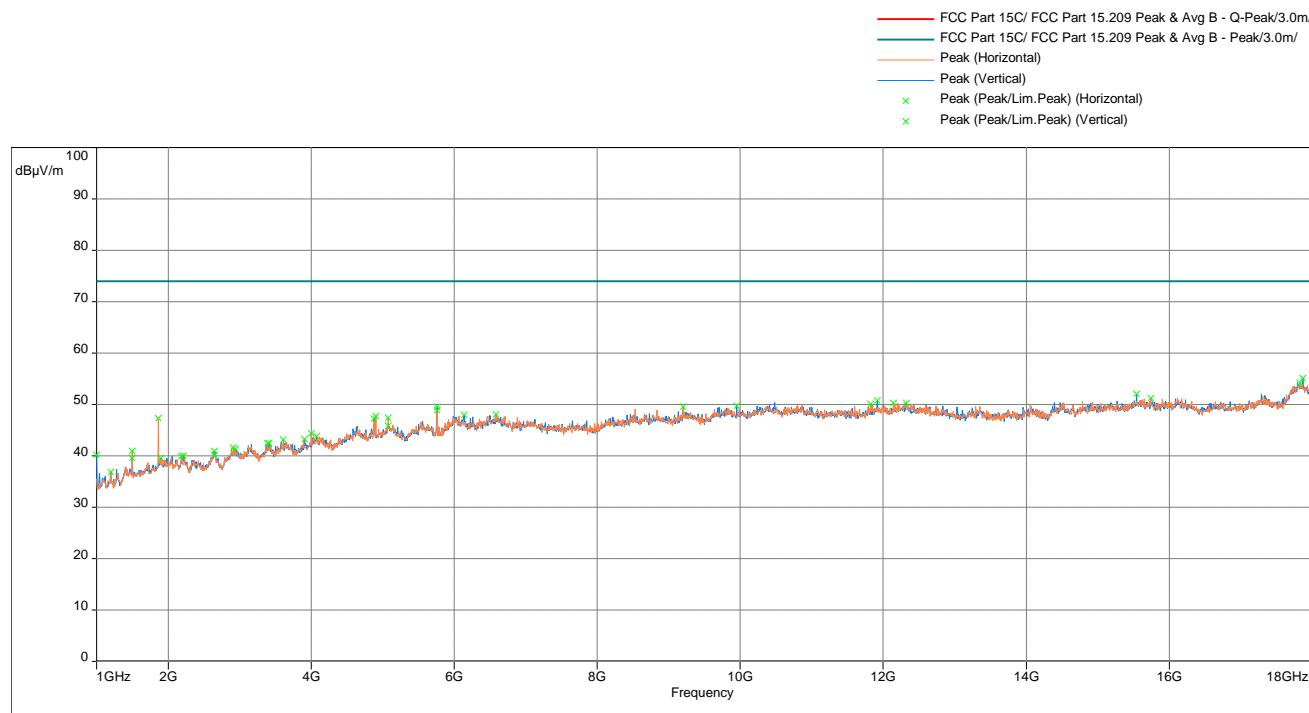
Model: ; Client: ; Comments: ; Test Date: 07/08/2021 05:57

Radiated Spurious Emissions 30 MHz - 1000 MHz



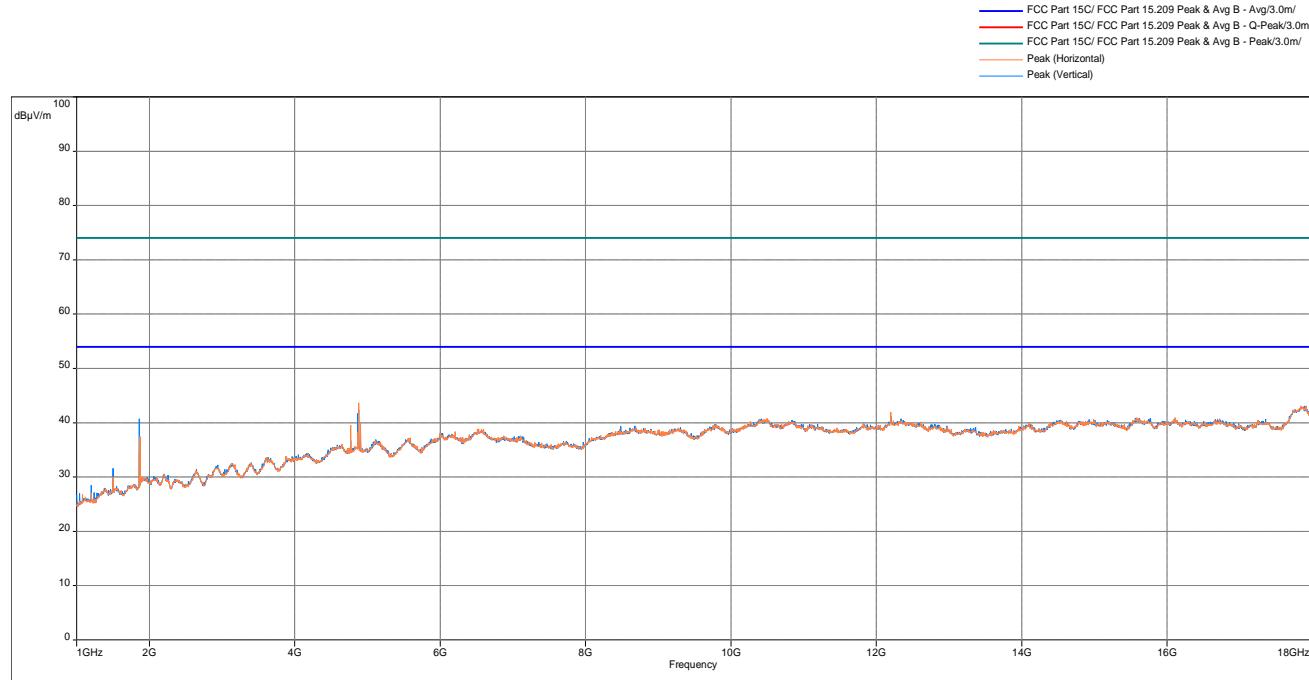
Model: ; Client: ; Comments: ; Test Date: 07/02/2021 06:09

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Peak Limit.



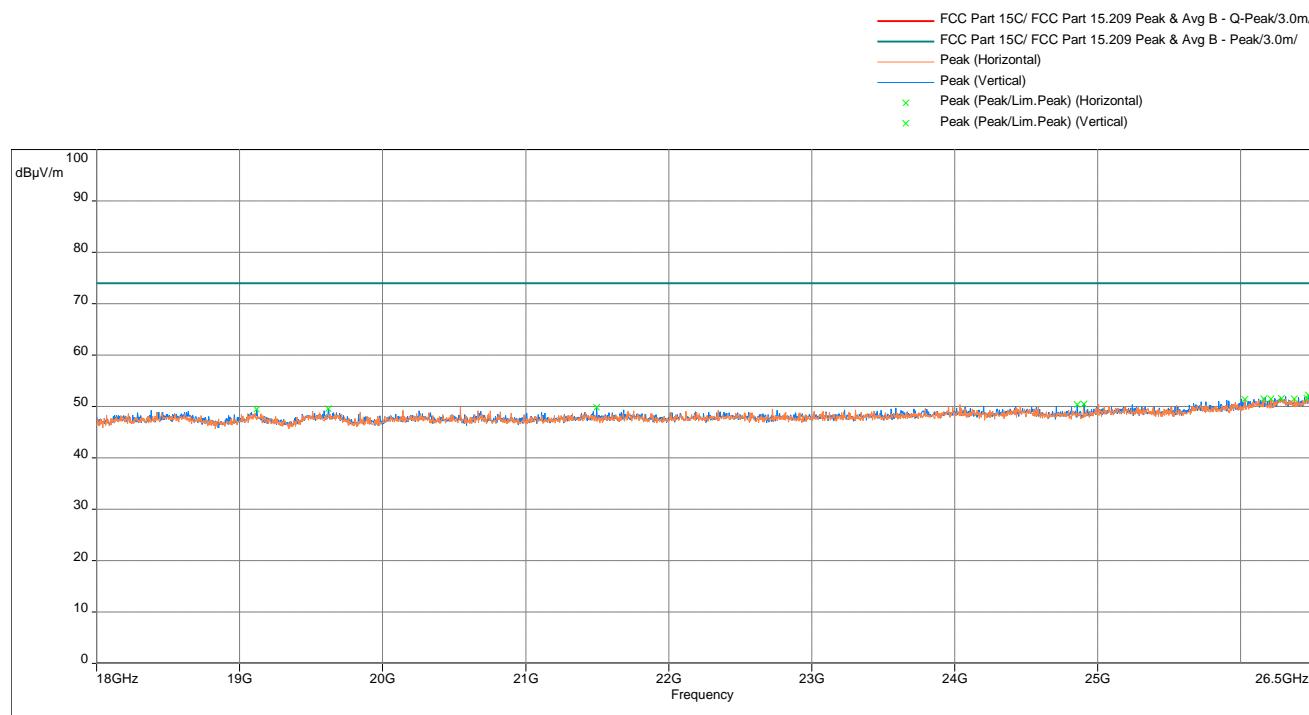
Model: ; Client: ; Comments: ; Test Date: 07/06/2021 07:15

Radiated Spurious Emissions 1000 - 18000 MHz, Average Scan vs Peak & Average Limit.



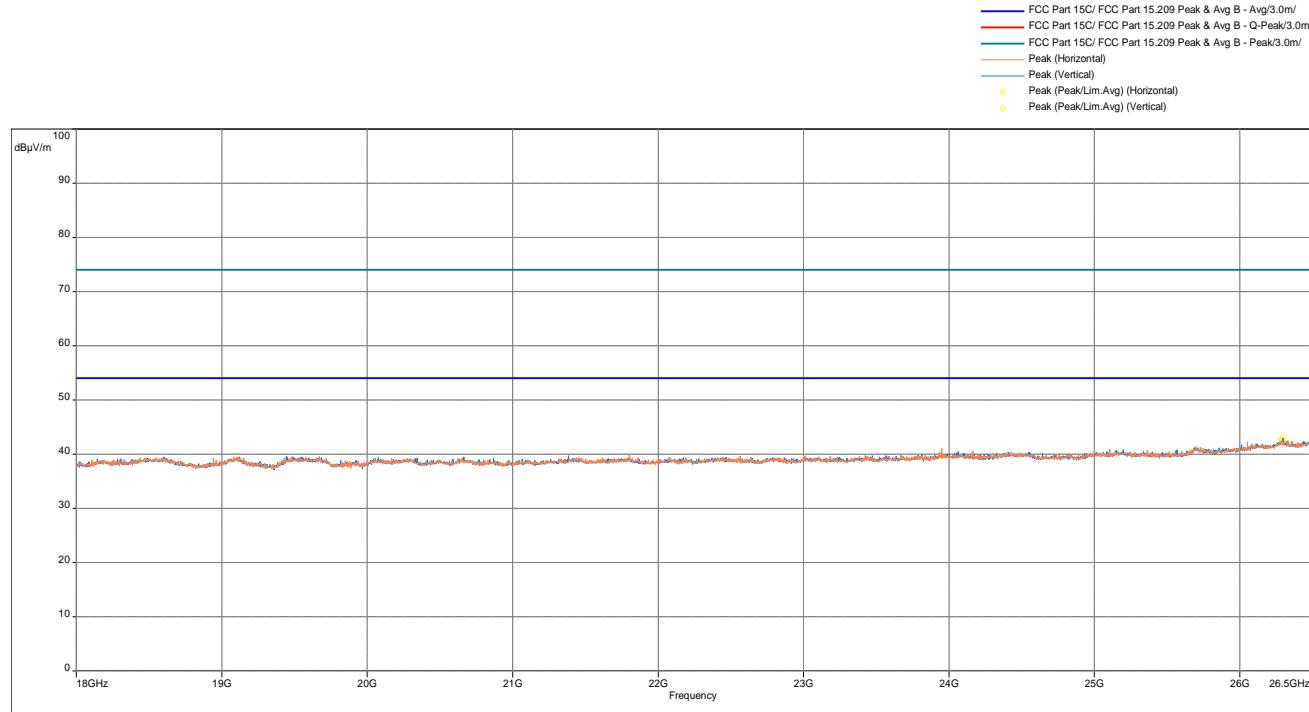
Model: ; Client: ; Comments: ; Test Date: 07/07/2021 07:42

Radiated Spurious Emissions 18 – 26.5 GHz, Peak Scan vs Peak Limit.



Model: ; Client: ; Comments: ; Test Date: 07/07/2021 06:23

Radiated Spurious Emissions 18 – 26.5 GHz, Average Scan vs Average & Peak Limit.



Model: ; Client: ; Comments: ; Test Date: 07/07/2021 06:54

Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 2440 MHz

Frequency (MHz)	QPeak@ 10m (dB μ V/m)	Lim. QPeak @10m (dB μ V/m)	Margin (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
950.3037	29.21	35.5	-6.29	4	50.75	Vertical	3.06
959.2277	29.19	35.5	-6.31	4	0.25	Horizontal	3.62
30.03233	19.7	29.5	-9.8	0.99	268.5	Horizontal	-8.51
30.22633	19.45	29.5	-10.05	2	40.5	Vertical	-8.6
36.36967	17.19	29.5	-12.31	3	345.25	Horizontal	-11.68
37.081	16.85	29.5	-12.65	4	119.75	Vertical	-12.03
44.80867	11.8	29.5	-17.7	3.01	224	Vertical	-16.18
85.096	9.76	29.5	-19.74	2	66.5	Horizontal	-18.76

Note: Correction = AF + CF – Preamp

Frequency (MHz)	Peak @3m (dB μ V/m)	Lim. Peak @3m (dB μ V/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
15540.10	52.07	74	-21.93	3.99	186.75	Vertical	4.88
15739.57	51.24	74	-22.76	3.01	248	Horizontal	4.97
11914.57	50.75	74	-23.25	1.99	229.75	Vertical	2.3
12140.67	50.3	74	-23.7	2.01	104	Horizontal	2.4
12324.83	50.26	74	-23.74	3.99	229.5	Vertical	2.61
11826.17	50.14	74	-23.86	2.01	59.5	Horizontal	2.07
9954.467	49.76	74	-24.24	1.01	112.5	Vertical	1.33
5760.00	49.58	74	-24.42	1.01	200.25	Vertical	-3.9
9200.80	49.52	74	-24.48	3.99	24.5	Horizontal	-0.5

Note: Correction = AF + CF - Preamp

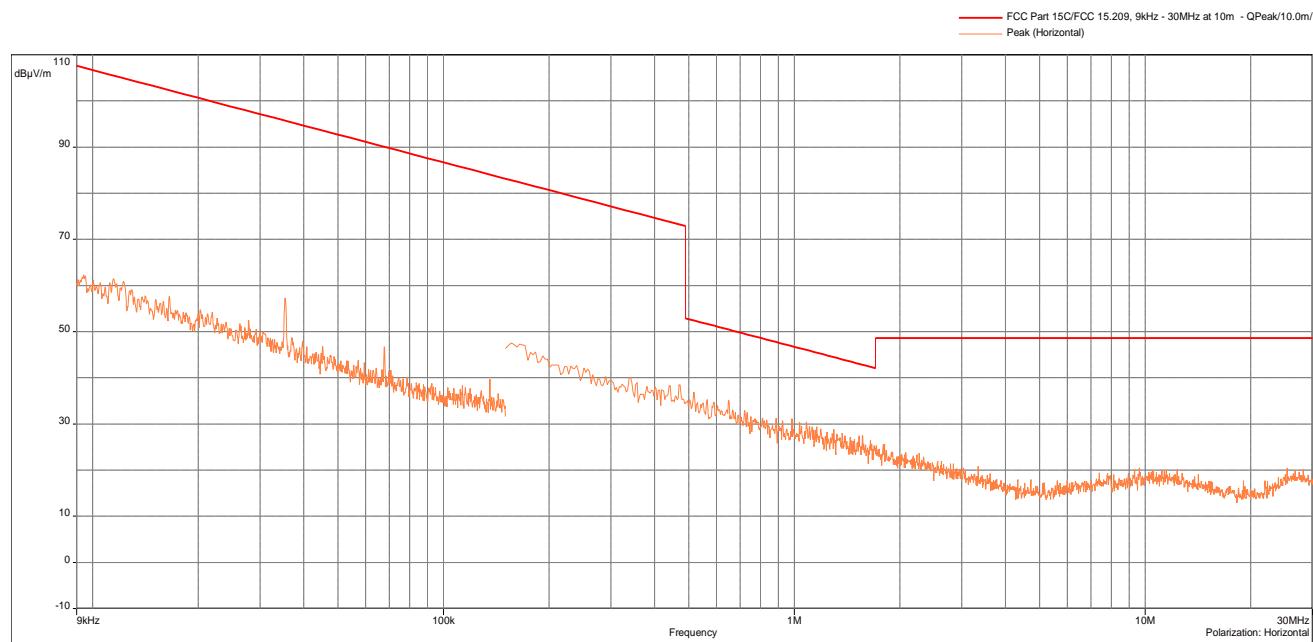
Frequency (MHz)	Ave @3m (dB μ V/m)	Lim. Ave @3m (dB μ V/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
4879.40	43.68	54	-10.32	2.01	254	Horizontal	-4.97
17896.87	43.1	54	-10.90	2.99	254	Vertical	9.32
17908.77	43.09	54	-10.91	3.01	216.75	Horizontal	9.21
4879.40	42.39	54	-11.61	1.99	326	Vertical	-4.97
12200.73	42.02	54	-11.98	2.01	14.5	Horizontal	2.62
4869.20	41.76	54	-12.24	1.99	283	Vertical	-4.97
12199.03	41.23	54	-12.77	2.99	319.25	Vertical	2.61
10496.20	40.84	54	-13.16	1.01	194.5	Horizontal	1.64

Note: Correction = AF + CF - Preamp

Results	Complies
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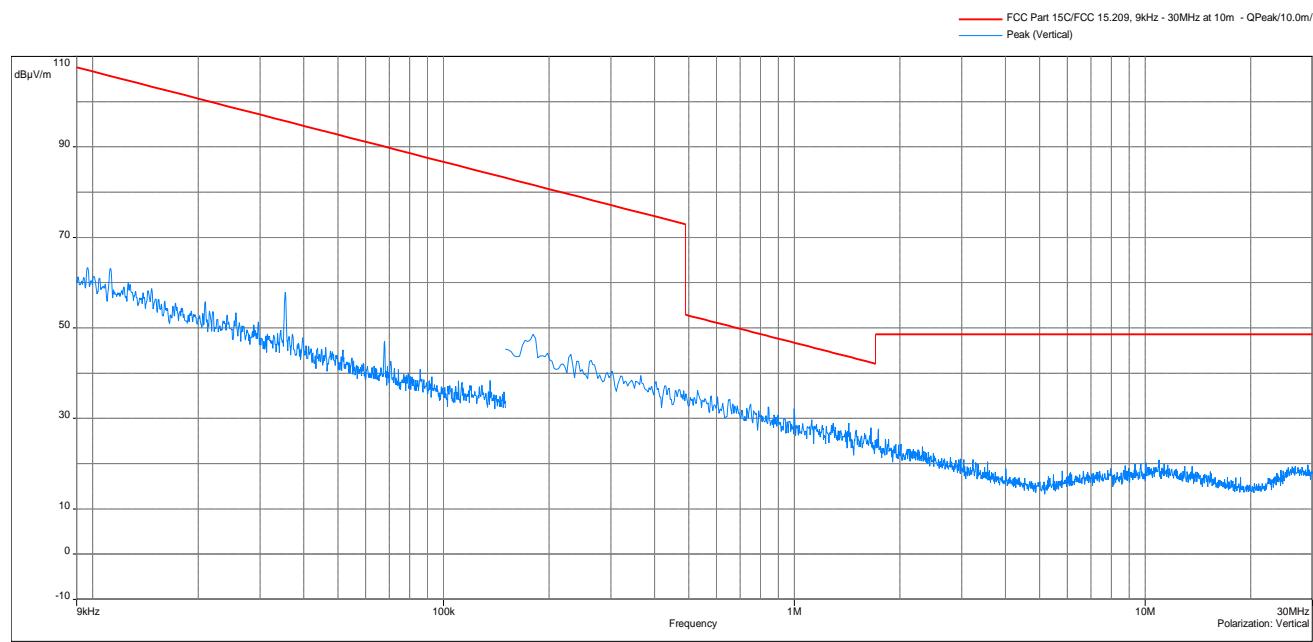
Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz

Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



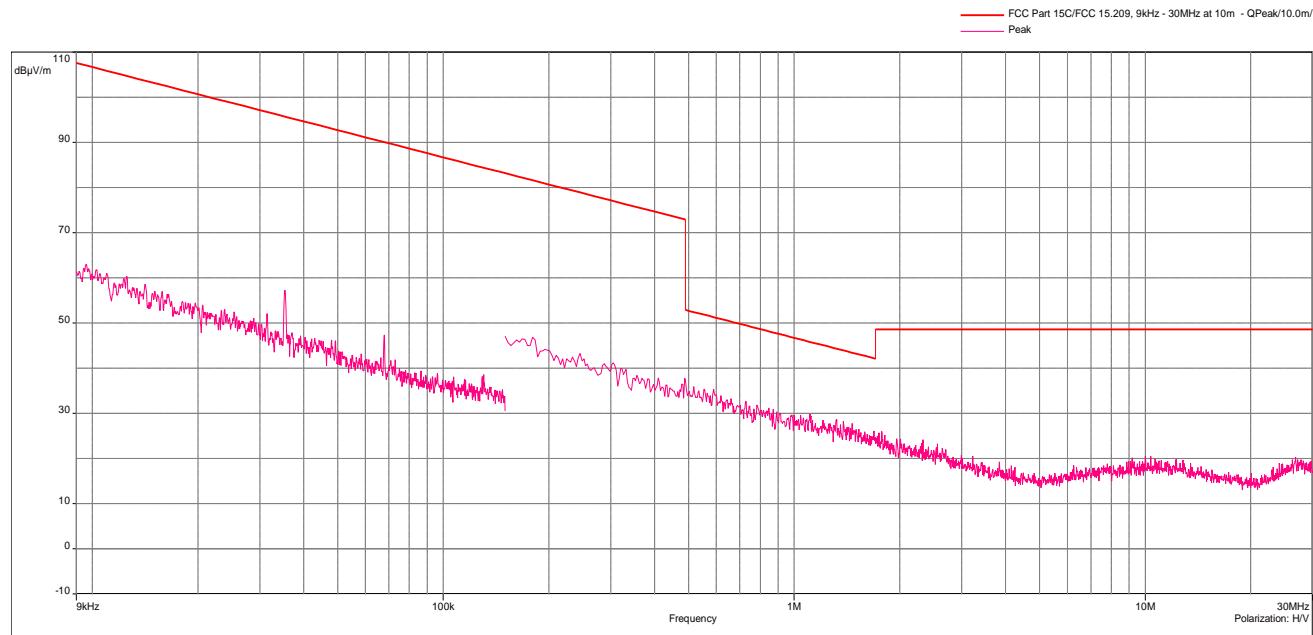
Model: ; Client: ; Comments: ; Test Date: 07/08/2021 06:14

Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



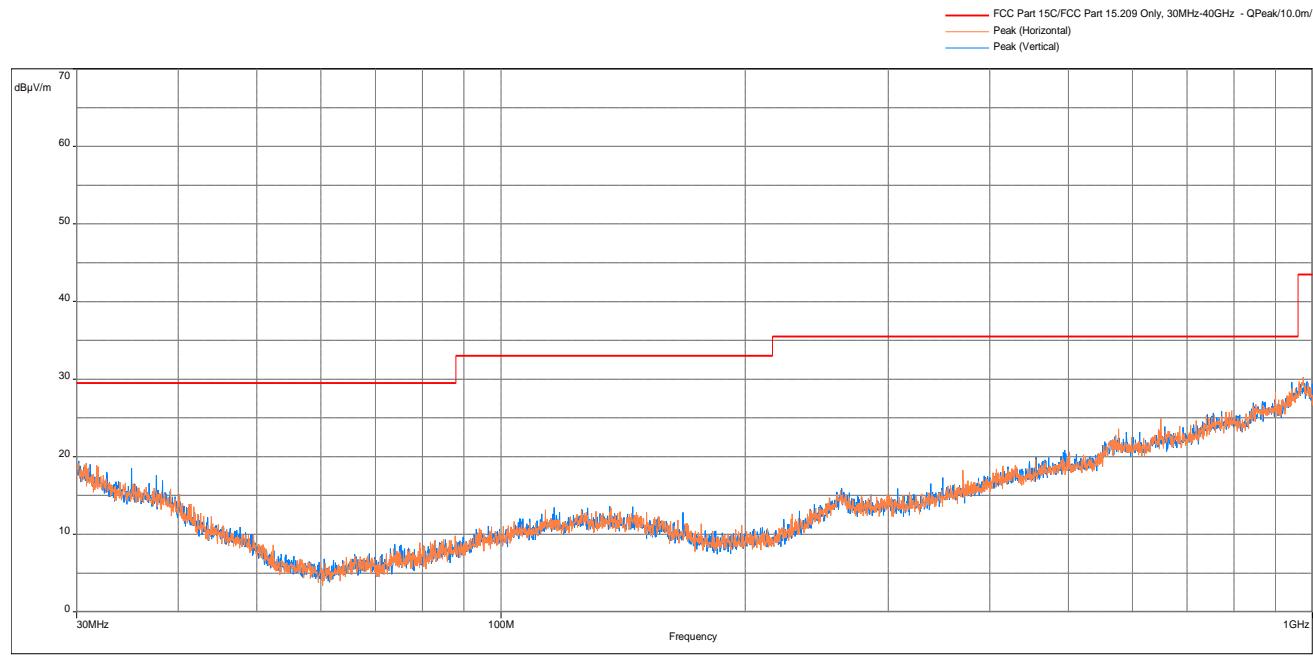
Model: ; Client: ; Comments: ; Test Date: 07/08/2021 06:14

Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization

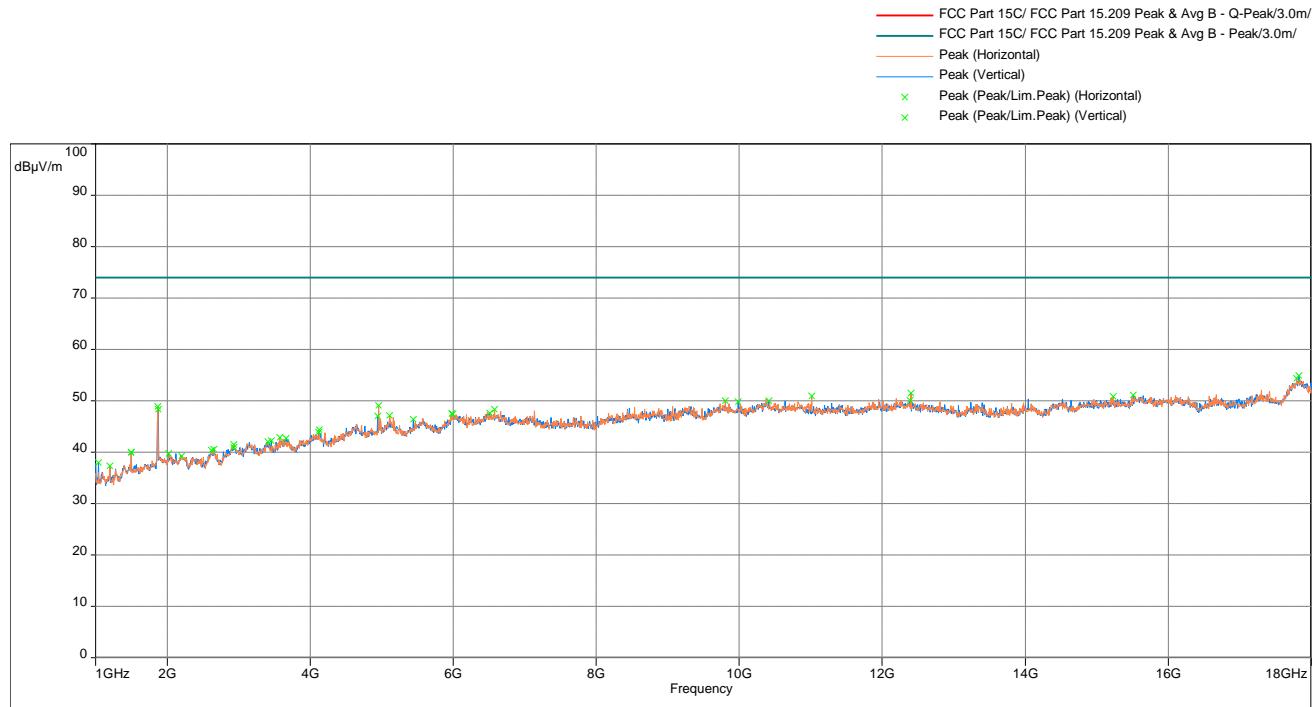
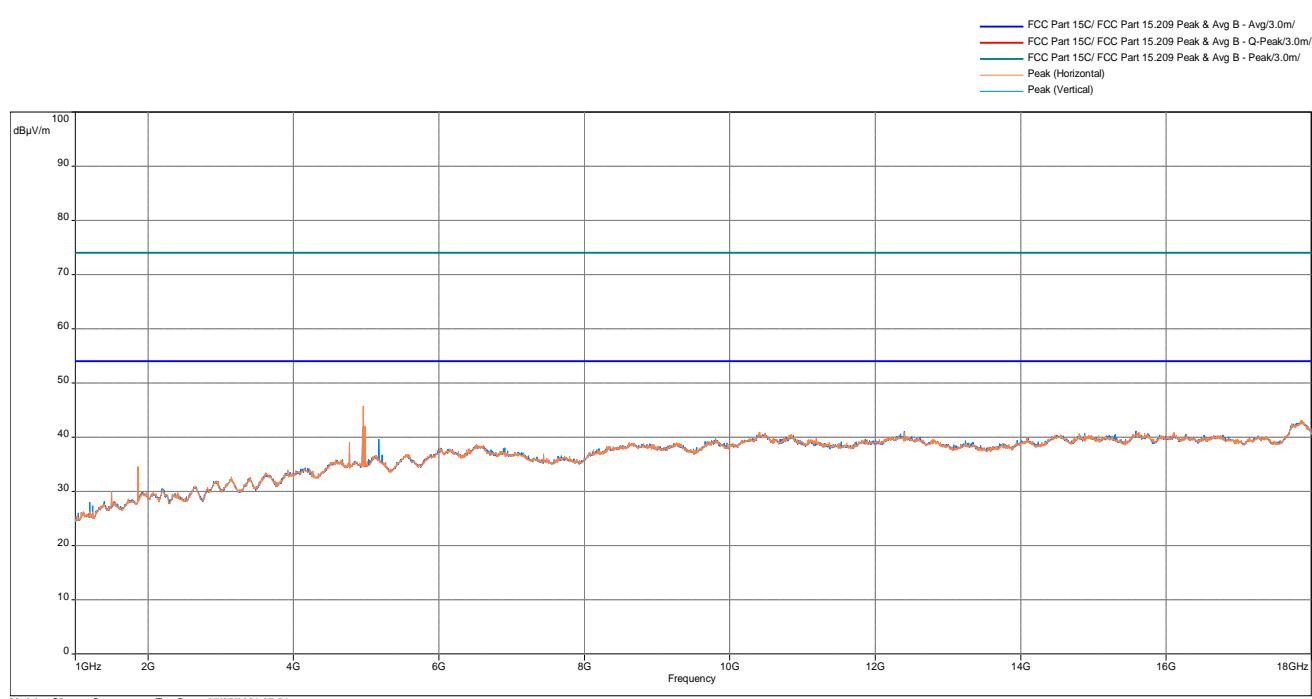


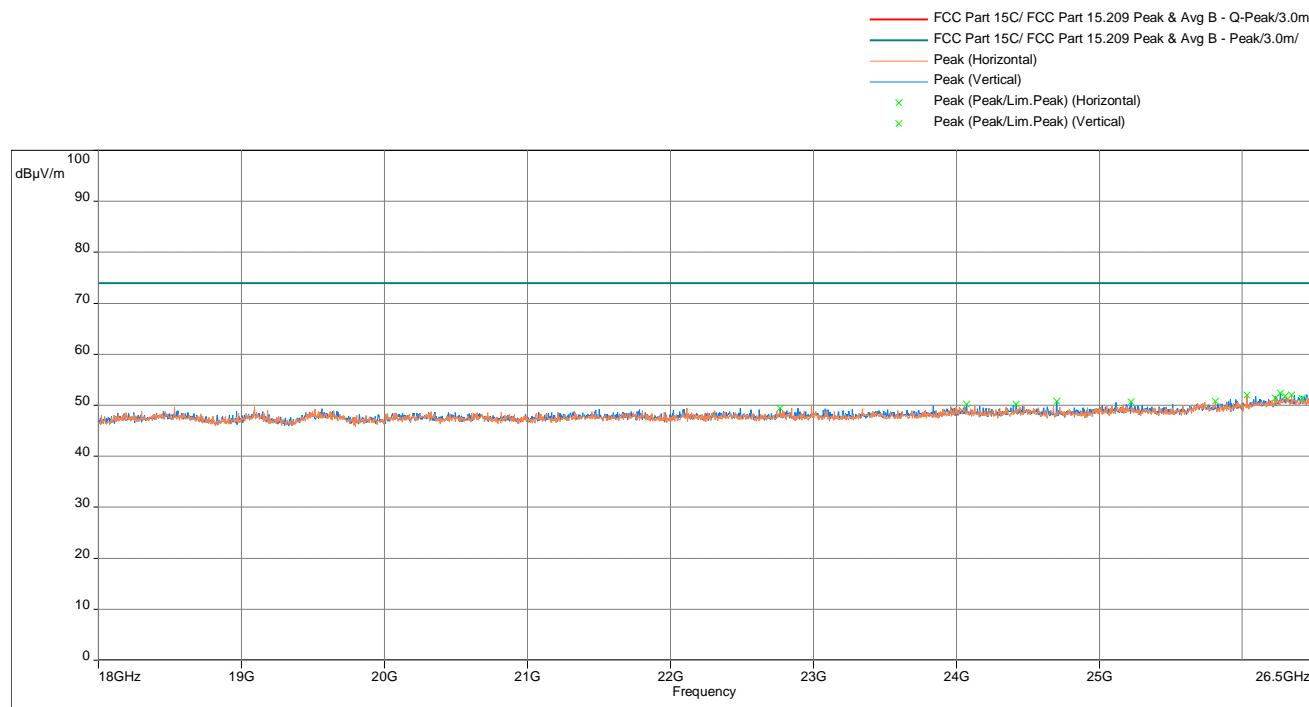
Model: ; Client: ; Comments: ; Test Date: 07/08/2021 06:16

Radiated Spurious Emissions 30 MHz - 1000 MHz

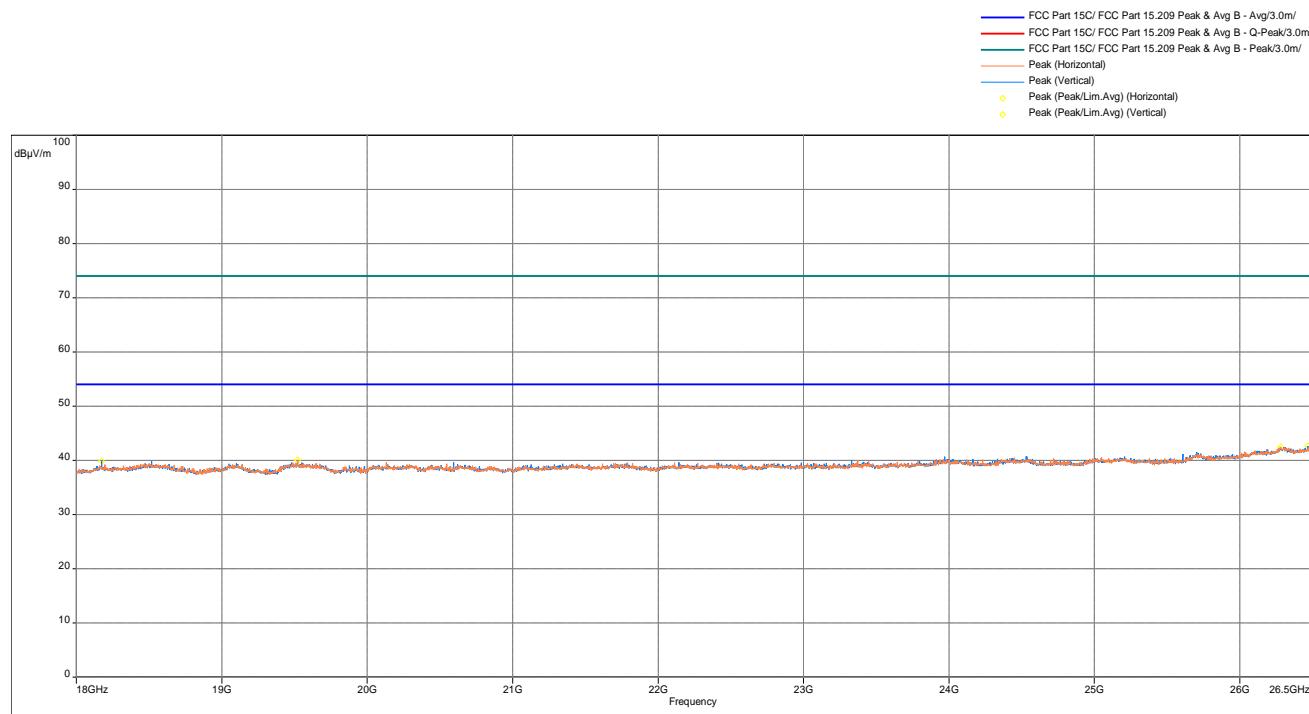


Model: ; Client: ; Comments: ; Test Date: 07/02/2021 06:18

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Peak Limit.

Radiated Spurious Emissions 1000 - 18000 MHz, Average Scan vs Peak & Average Limit.


Radiated Spurious Emissions 18 – 26.5 GHz, Peak Scan vs Peak Limit.


Model: ; Client: ; Comments: ; Test Date: 07/07/2021 06:24

Radiated Spurious Emissions 18 – 26.5 GHz, Average Scan vs Average & Peak Limit.


Model: ; Client: ; Comments: ; Test Date: 07/07/2021 06:36

Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz

Frequency (MHz)	QPeak@ 10m (dB μ V/m)	Lim. QPeak @10m (dB μ V/m)	Margin (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
955.61	28.91	35.5	-6.59	2.00	240	Vertical	3.34
952.47	28.8	35.5	-6.7	2.00	345.25	Horizontal	3.17
30.19	19.45	29.5	-10.05	2.00	0.25	Vertical	-8.59
30.81	19.15	29.5	-10.35	0.98	67.25	Horizontal	-8.89
36.85	16.57	29.5	-12.93	4.00	223.75	Vertical	-11.91
40.18	15.18	29.5	-14.32	3.00	163	Horizontal	-13.64
87.78	9.8	29.5	-19.7	0.98	251.25	Horizontal	-18.39
85.39	9.34	29.5	-20.16	3.02	267.75	Vertical	-18.73

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Peak @3m (dB μ V/m)	Lim. Peak @3m (dB μ V/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
12400.77	51.47	74	-22.53	2.01	280.75	Horizontal	2.42
15509.5	51.1	74	-22.9	3.99	133.25	Vertical	4.66
11012.43	50.94	74	-23.06	3.99	112.5	Horizontal	0.97
15228.43	50.86	74	-23.14	2.01	165.75	Horizontal	3.79
12388.87	50.14	74	-23.86	2.99	86.5	Vertical	2.44
10414.03	50.03	74	-23.97	1.99	124.75	Vertical	2
9803.167	49.98	74	-24.02	3.01	335.75	Horizontal	1.41
9983.367	49.81	74	-24.19	1.01	183.25	Vertical	1.4

Note: Correction = AF + CF - Preamp

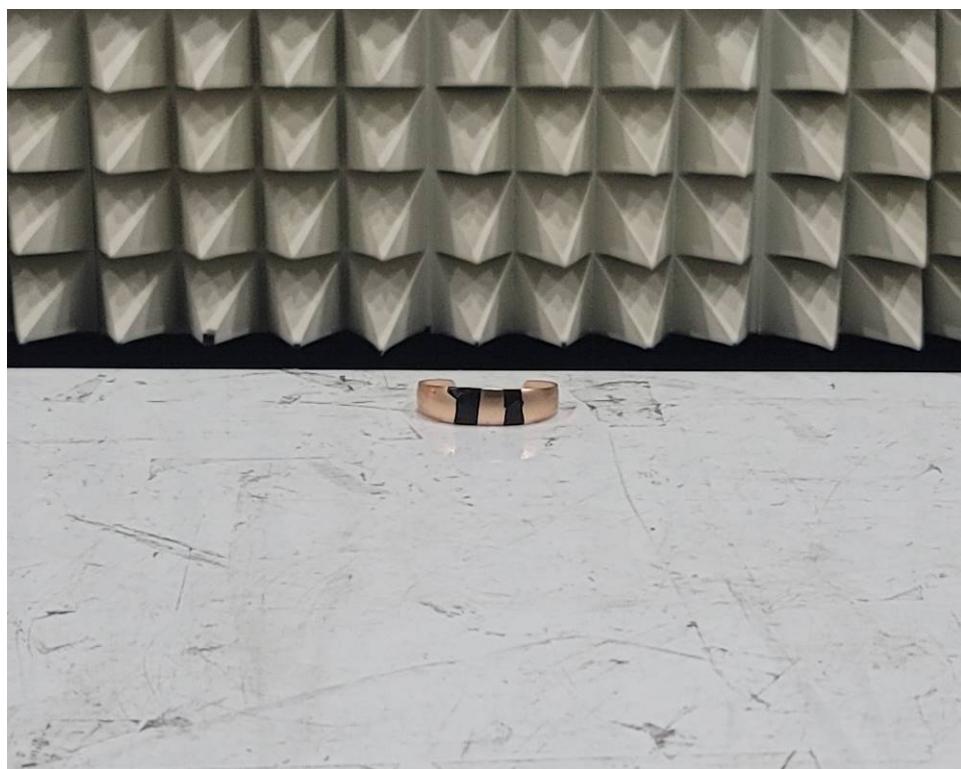
Frequency (MHz)	Ave @3m (dB μ V/m)	Lim. Ave @3m (dB μ V/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
4959.30	45.78	54	-8.22	2.01	320.5	Horizontal	-4.58
17866.27	43.18	54	-10.82	2.01	0	Horizontal	9.48
17843.60	42.95	54	-11.05	3.99	173.25	Vertical	9.59
4981.967	42.12	54	-11.88	3.99	298.25	Horizontal	-4.48
4946.833	41.8	54	-12.2	2.01	254.75	Horizontal	-4.65
15586.57	41.21	54	-12.79	2.99	144.25	Vertical	5.13
12398.50	41.1	54	-12.9	1.01	320	Vertical	2.42
4959.30	41.09	54	-12.91	1.99	41.25	Vertical	-4.58
15625.67	40.96	54	-13.04	2.01	57.25	Horizontal	5.16

Note: Correction = AF + CF - Preamp

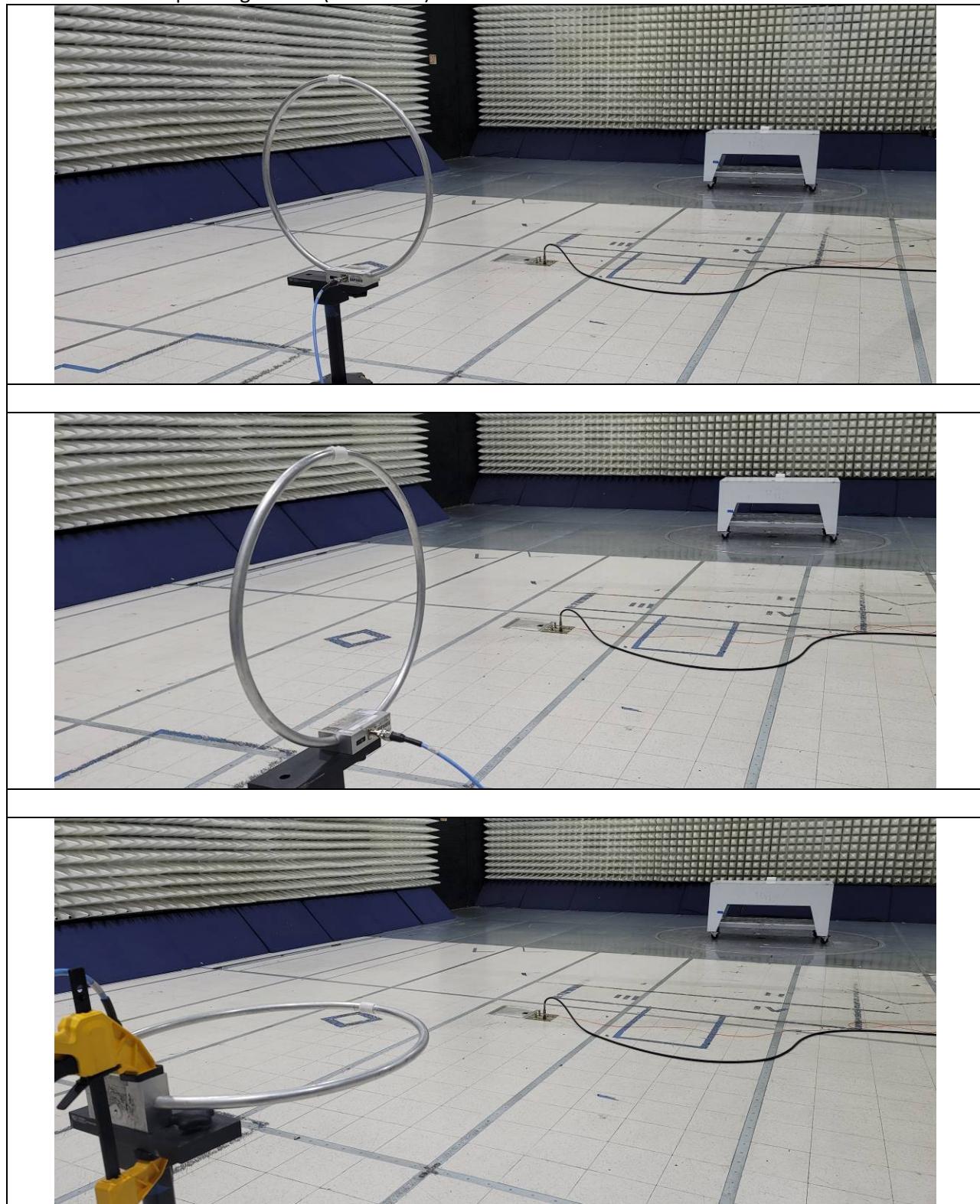
Results	Complies
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4.5.5 Test Setup Configuration

The following photographs show the testing configurations used.



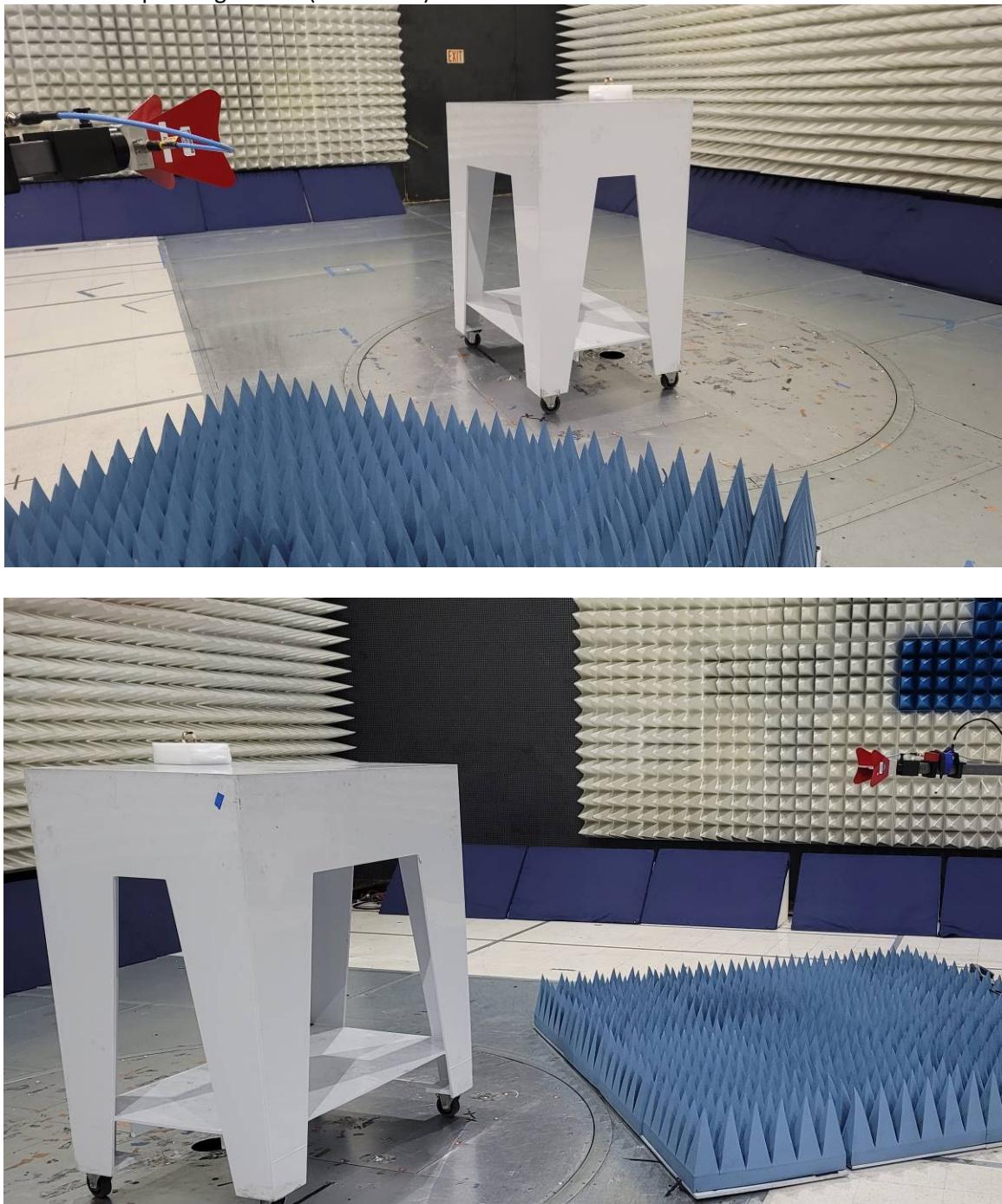
4.5.5 Test Setup Configuration (Continued)



4.5.5 Test Setup Configuration (Continued)



4.5.5 Test Setup Configuration (Continued)



4.6 AC Line Conducted Emission

FCC: 15.207; RSS-GEN;

4.6.1 Requirement

Frequency Band MHz	Class B Limit dB(µV)		Class A Limit dB(µV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *	79	66
0.50-5.00	56	46	73	60
5.00-30.00	60	50	73	60

*Note: *Decreases linearly with the logarithm of the frequency. At the transition frequency the lower limit applies.*

4.6.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.10-2013.

4.6.3 Test Result

Not applicable. The EUT is battery powered only.

5.0 List of Test Equipment

Measurement equipment used for compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
Spectrum Analyzer 20hz-26.5ghz	Rohde & Schwarz	FSU	ITS 00913	12	05/24/22
EMI Test Receiver 40GHz	Rohde & Schwarz	ESU40	ITS 00961	12	03/09/22
1-18GHz Small Horn Antenna with Preamp	ETS Lindgren	3117-PA	ITS 01365	12	04/20/22
18-40GHz Preamp	uComp Nordic	MCNS-50-18004000335P	ITS01799	12	03/19/22
10kHz - 30MHz Passive Loop Antenna	EMCO	6512	ITS 001598	12	06/21/22
NOTCH FILTER	MICRO-TRONICS	BCR50702	ITS 01166	12	06/29/22
RF Cable	TRU Corp.	TRU Core 300	ITS 01336	12	07/07/22
RF Cable	TRU Corp.	TRU Core 300	ITS 01465	12	09/01/21
RF Cable	TRU Corp.	TRU Core 300	ITS 01467	12	09/01/21
RF Cable	TRU Corp.	TRU Core 300	ITS 01470	12	09/01/21
9kHz-1GHz Pre-amplifier	Sonoma Instrument	310N	ITS 01714	12	11/13/21
Bilog Antenna 30-1000MHz	Teseq	CBL6111D	ITS 01505	12	03/22/22
1-40GHz RF Cable	MEGA PHASE	EMC1-K1K1-236	ITS 01543	12	12/02/21
18 - 26.5GHz Horn Antenn	CMT	3160-09	ITS 00571	#	#
Radio Frequency Shielded System	Panashield	10 Meter Chamber	ITS 00984	36	07/29/23

No Calibration required

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.20.0.14	ESU and ESR Intertek Emissions Template
RS Commander	Rohde Schwarz	1.6.4	Not Applicable (Screen grabber)

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0 / G104716705	AK	KV	July 28, 2021	Original document

END OF REPORT