

TEST REPORT

Report Number: 104775092MPK-005

Project Number: G104775092

Issue Date: October 14, 2021

Testing performed on
SRD™ Access Control Reader
Model: SRD

FCC ID: T8I-SRD001

IC: 6504A-SRD001

to

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

For

Farpointe Data, Inc.

Test Performed by:
Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Test Authorized by:
Farpointe Data, Inc.
2195 Zanker Road
San Jose, CA 95131 USA

Prepared by:



Amar Kacel

Date: October 14, 2021

Reviewed by:



Krishna K Vemuri

Date: October 14, 2021

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Report No. 104775092MPK-005	
Equipment Under Test:	SRD™ Access Control Reader
Model Number:	SRD
Applicant:	Farpointe Data, Inc.
Contact:	Kirk Bierach
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Email:	kirk.bierach@farpointedata.com
Applicable Regulation:	FCC Part 15 Subpart C (15.247) ISED RSS-247 Issue 2
Date of Test:	September 11, 2018, May 7, 2020 & September 08, 2021 to October 1, 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	Complies
Antenna Requirement	15.203	RSS-GEN	Complies (Internal Antenna)

EUT receive date: September 11, 2018, May 7, 2020, and September 08, 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: September 11, 2018, May 7, 2020, and September 08, 2021

Test completion date: October 1, 2021

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

2.0 General Information

2.1 Product Description

Farpointe Data, Inc. supplied the following description of the EUT:

SRD™ Mobile-ready contactless smartcard reader and keypad with OSDP support.

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

Information about the 2.4 GHz radio is presented below:

Applicant	Farpointe Data, Inc.
Model No.	SRD
FCC Identifier	T8I-SRD001
IC Identifier	6504A-SRD001
Type of transmission	Digital Transmission System (DTS)
Rated RF Output	1.74 dBm
Antenna(s) & Gain	Internal Antenna, Gain: 2.1 dBi
Frequency Range	2402 – 2480 MHz
Type of modulation/data rate	GFSK / 1Mbit/s
Number of Channel(s)	40
Applicant Name & Address	Farpointe Data, Inc. 2195 Zanker Road San Jose, CA 95131 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	Serial Number
DC Power Supply	Extech	EP-3003	D30030012

3.2 Block Diagram of Test Setup

Equipment Under Test			
Description	Manufacturer		Serial Number
SRD Access Control Reader	Farpointe Data, Inc.	SRD	SN001
SRD Access Control Reader	Farpointe Data, Inc.	SRD	SN002

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



S = Shielded	F = With Ferrite
U = Unshielded	m = Length in Meters

EUT Photo



3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table.

BLE circuitry and PCB are identical to original certification, T8I-CONEKT2. Antenna port Conducted Test data in section 4.1, 4.2, 4.3 and 4.4 were borrowed from original report, 104274811MPK-002. Radiated Emissions were remeasured to check for compliance.

3.4 Software Exercise Program

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

3.5 Mode of Operation during Test

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 (2442MHz), 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.

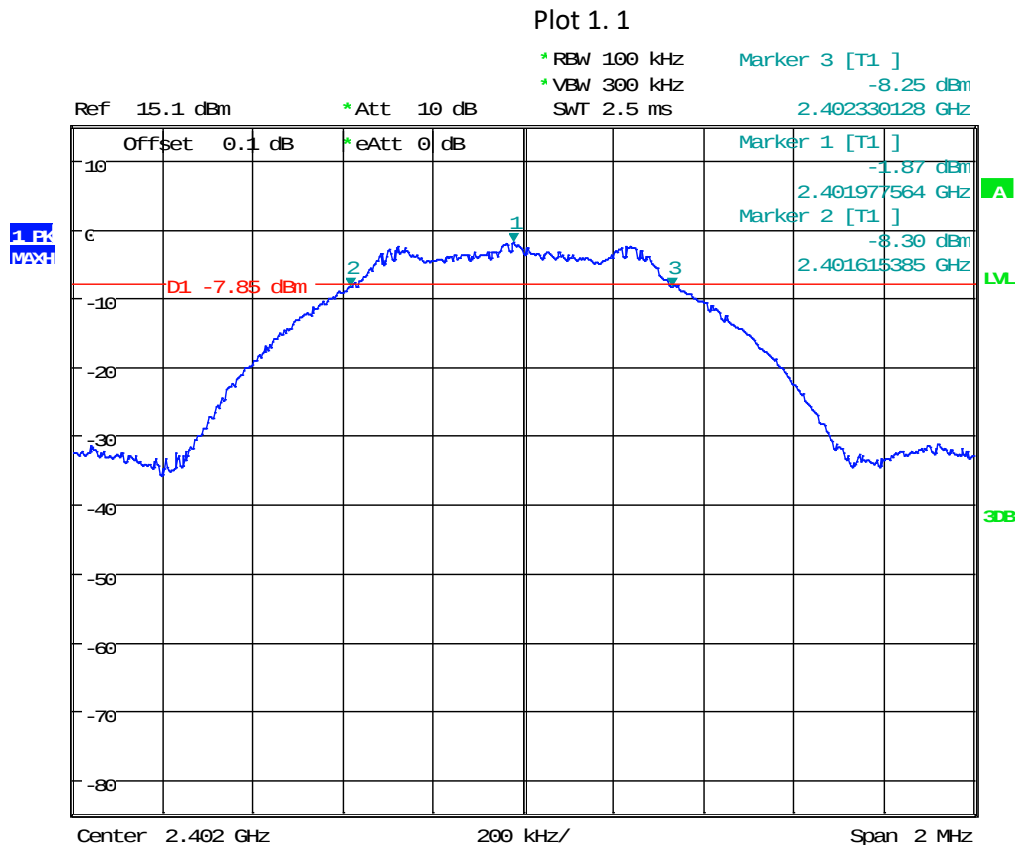
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude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

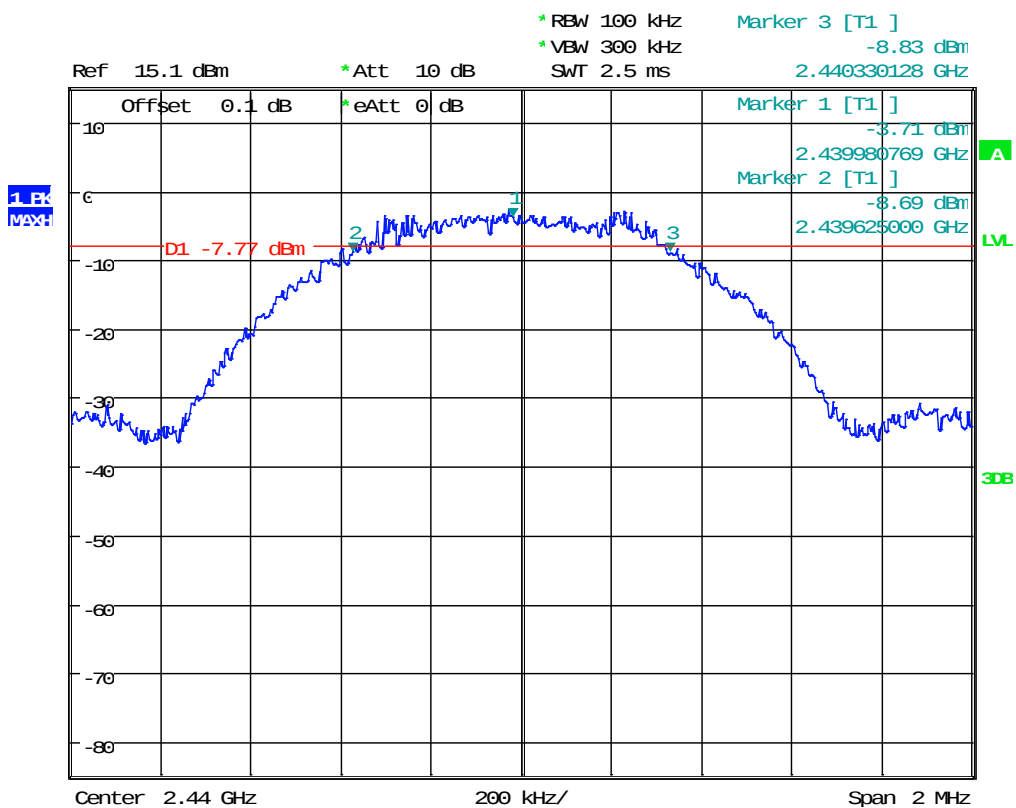
Frequency (MHz)	6-dB bandwidth FCC 15.247 & RSS-GEN, kHz	Occupied bandwidth, RSS-GEN, MHz	Plot
2402	714.743	--	1.1
	--	1.061	1.4
2440	705.128	--	1.2
	--	1.054	1.5
2480	714.743	--	1.3
	--	1.074	1.6

Date of Test:	September 11, 2018
Results	Complies



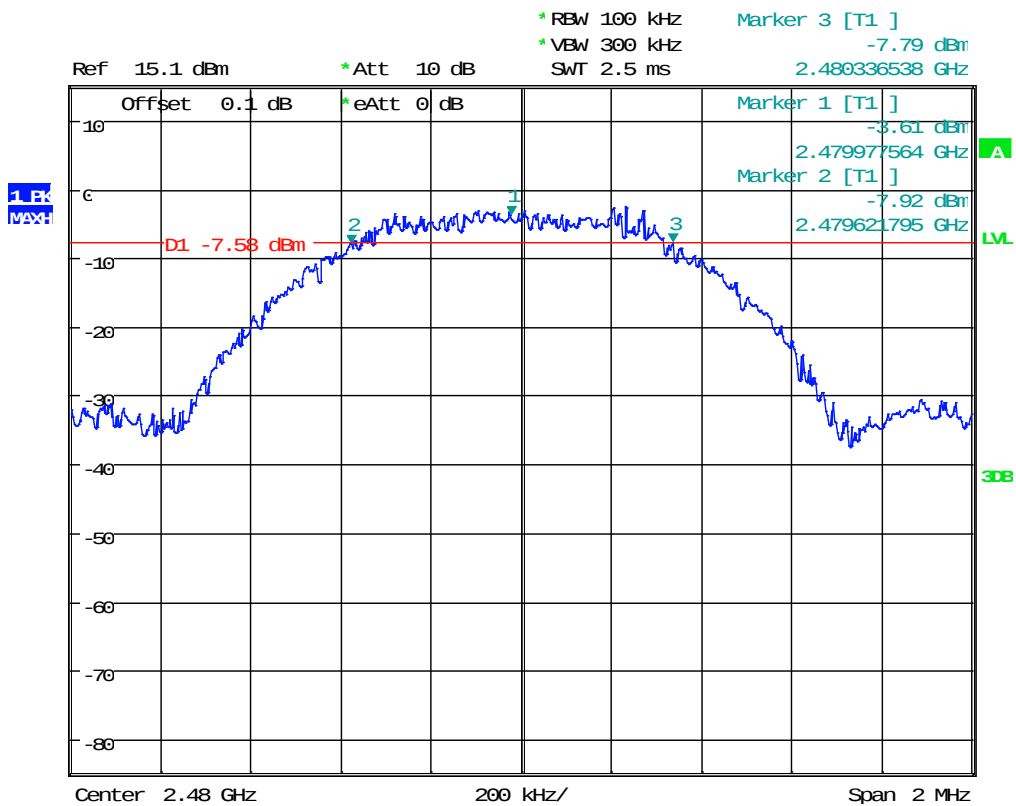
Date: 11.SEP.2018 11:18:32

Plot 1.2



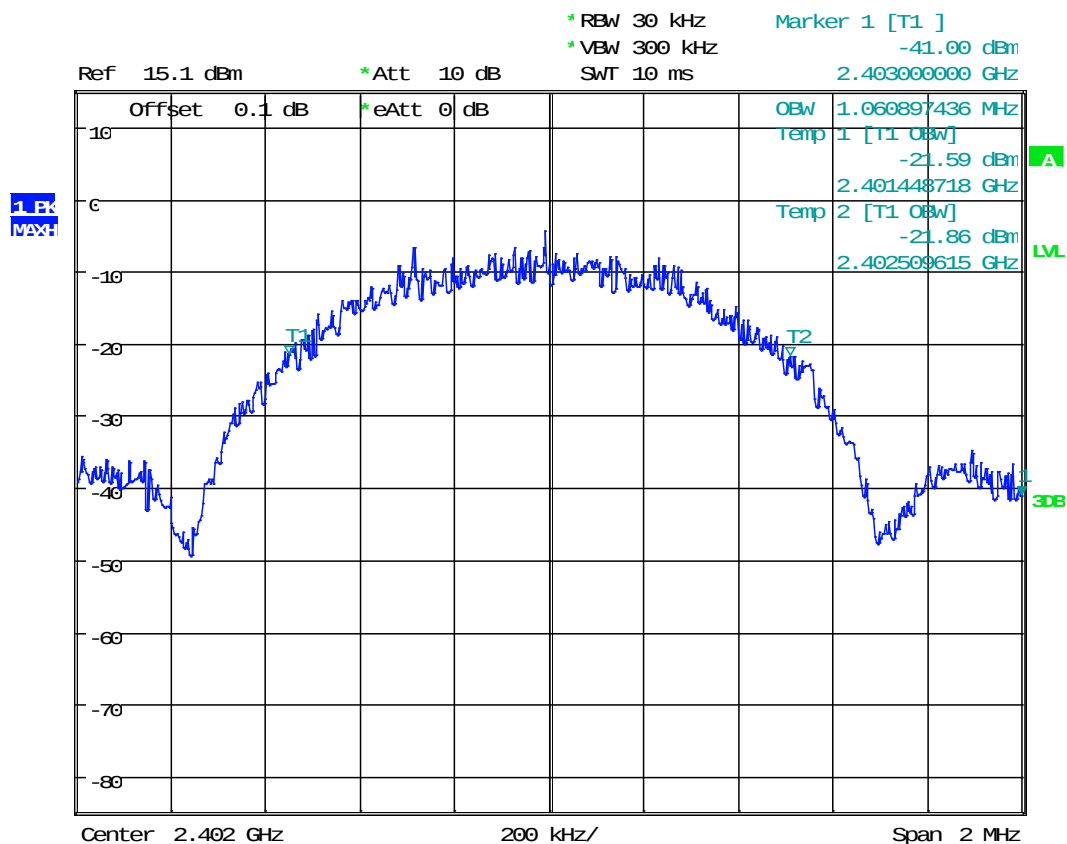
Date: 11.SEP.2018 11:23:11

Plot 1.3



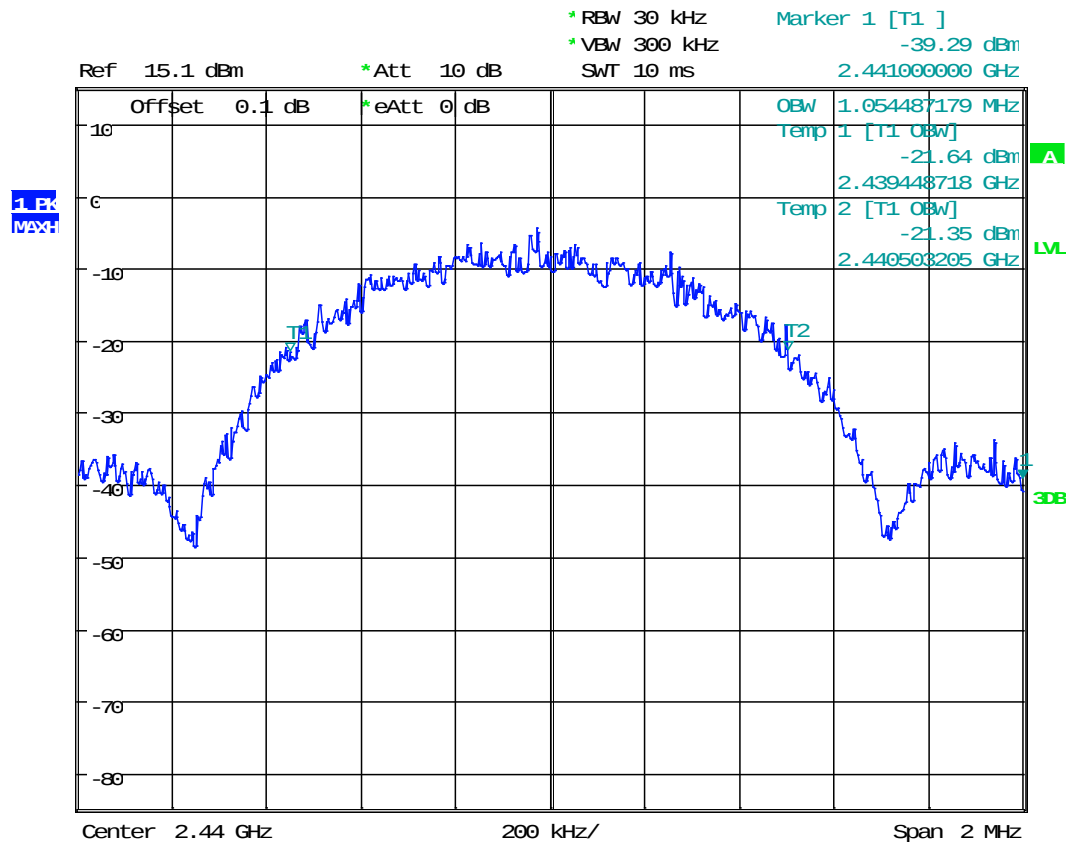
Date: 11.SEP.2018 11:25:58

Plot 1. 4



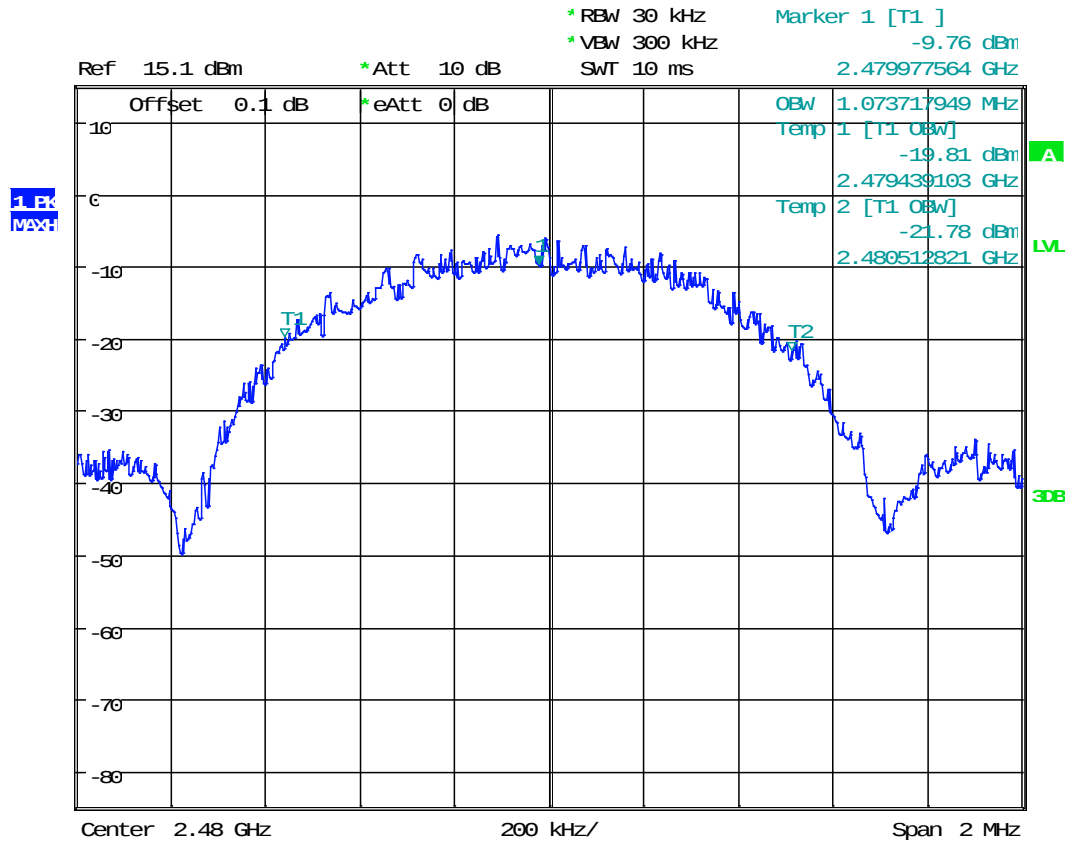
Date: 11.SEP.2018 11:34:26

Plot 1.5



Date: 11.SEP.2018 11:33:18

Plot 1.6



Date: 11.SEP.2018 11:31:24

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 $\geq 3 \times$ RBW
3. Set the span $\geq 3 \times$ 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.

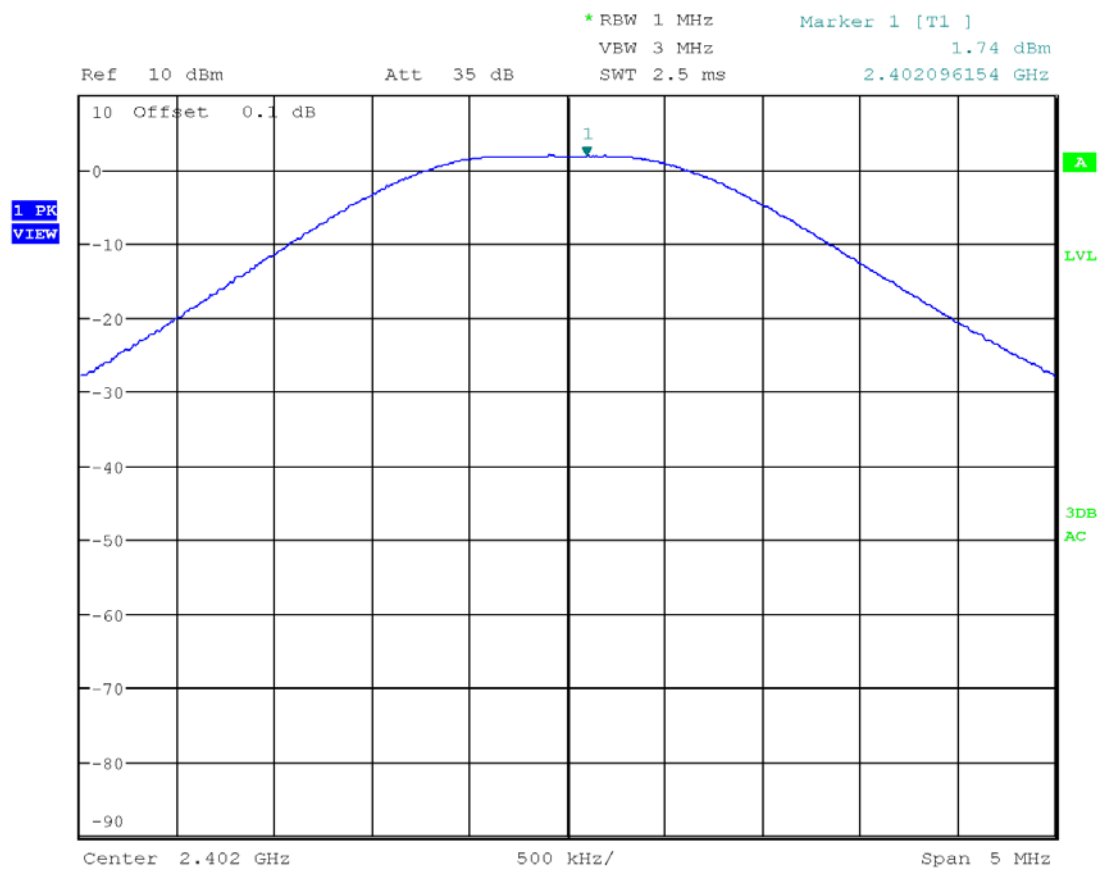
4.2.3 Test Result

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

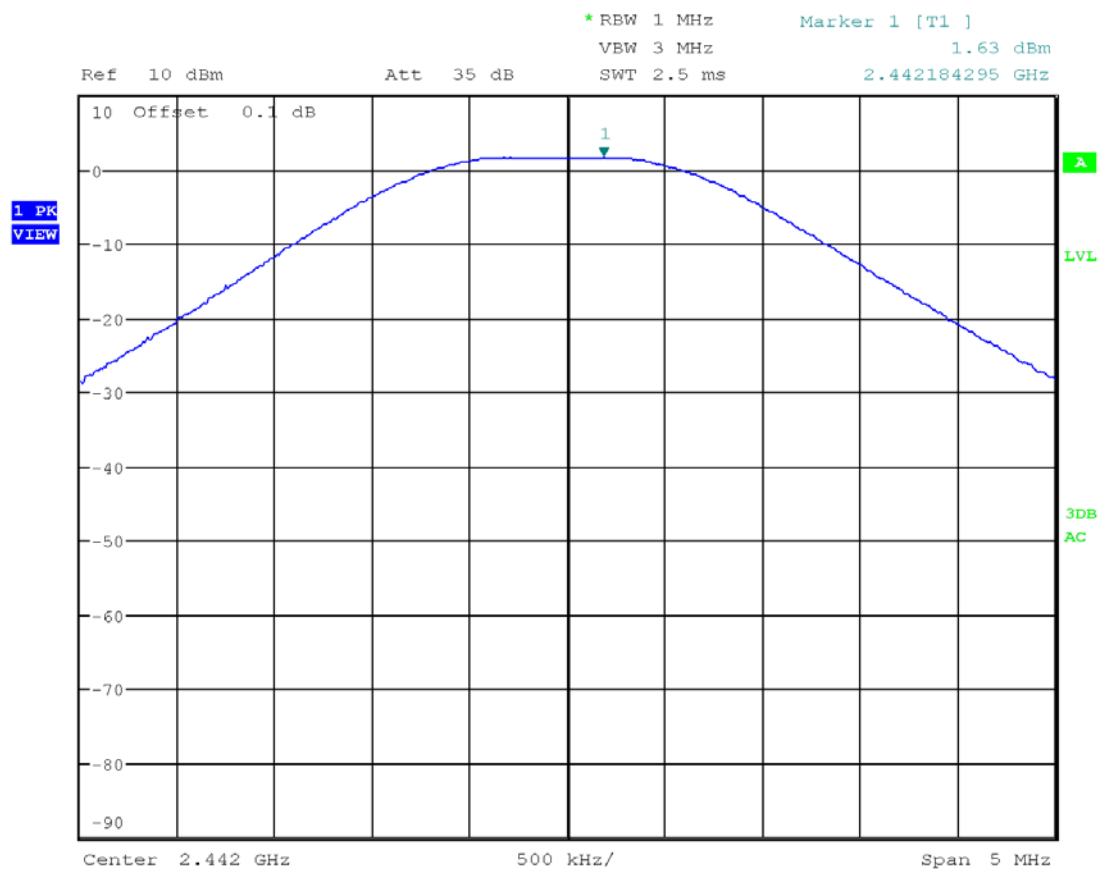
Frequency	Conducted Power (peak)		Plot
	dBm	mW	
2402	1.74	1.493	2.1
2442	1.63	1.455	2.2
2480	1.65	1.462	2.3

Tested By	Test Date
Aaron Chang	May 7, 2020

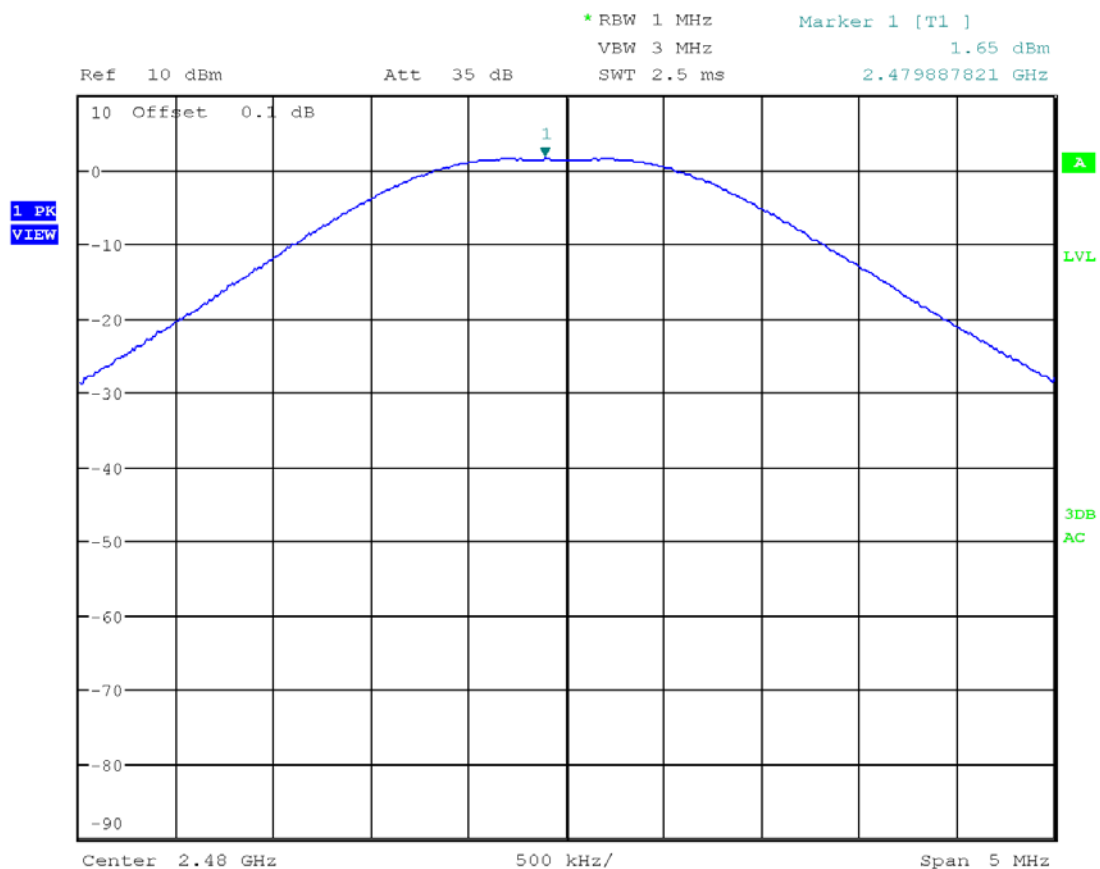
Plot 2. 1



Plot 2. 2



Plot 2.3



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.

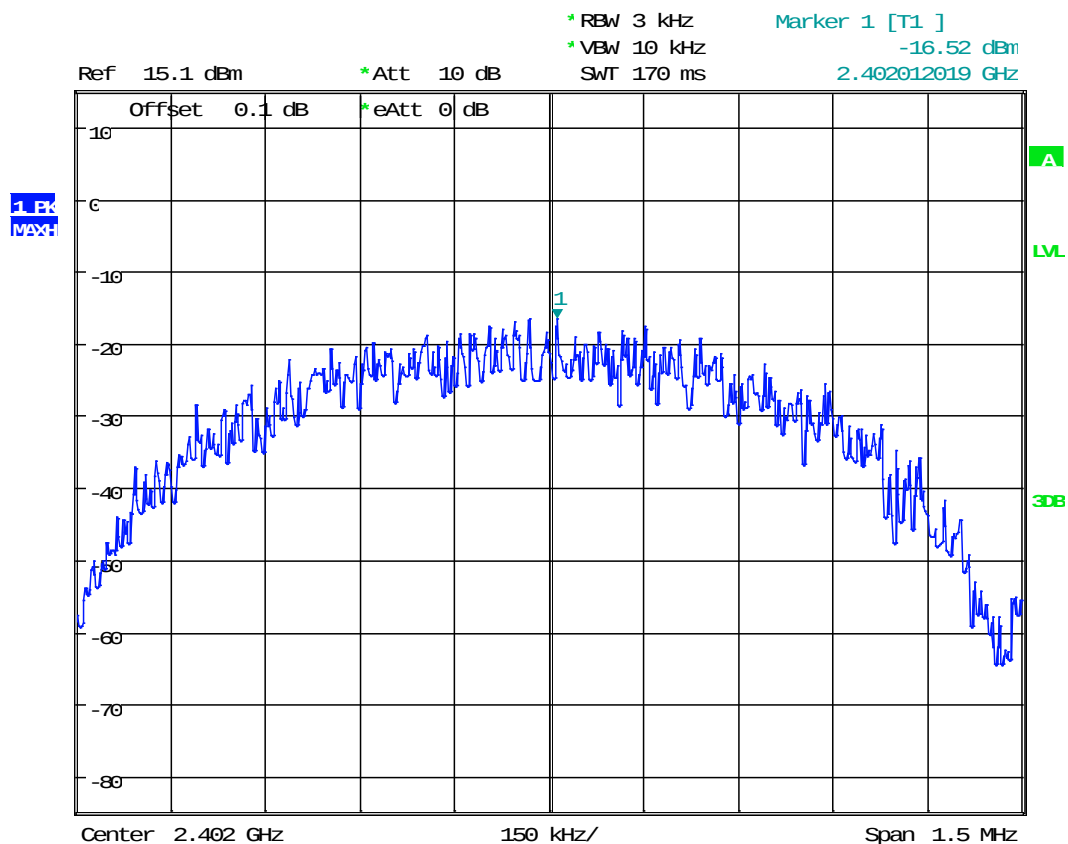
4.3.3 Test Result

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	-16.52	8.0	-24.52	3.1
2440	-14.95	8.0	-22.95	3.2
2480	-14.94	8.0	-22.94	3.3

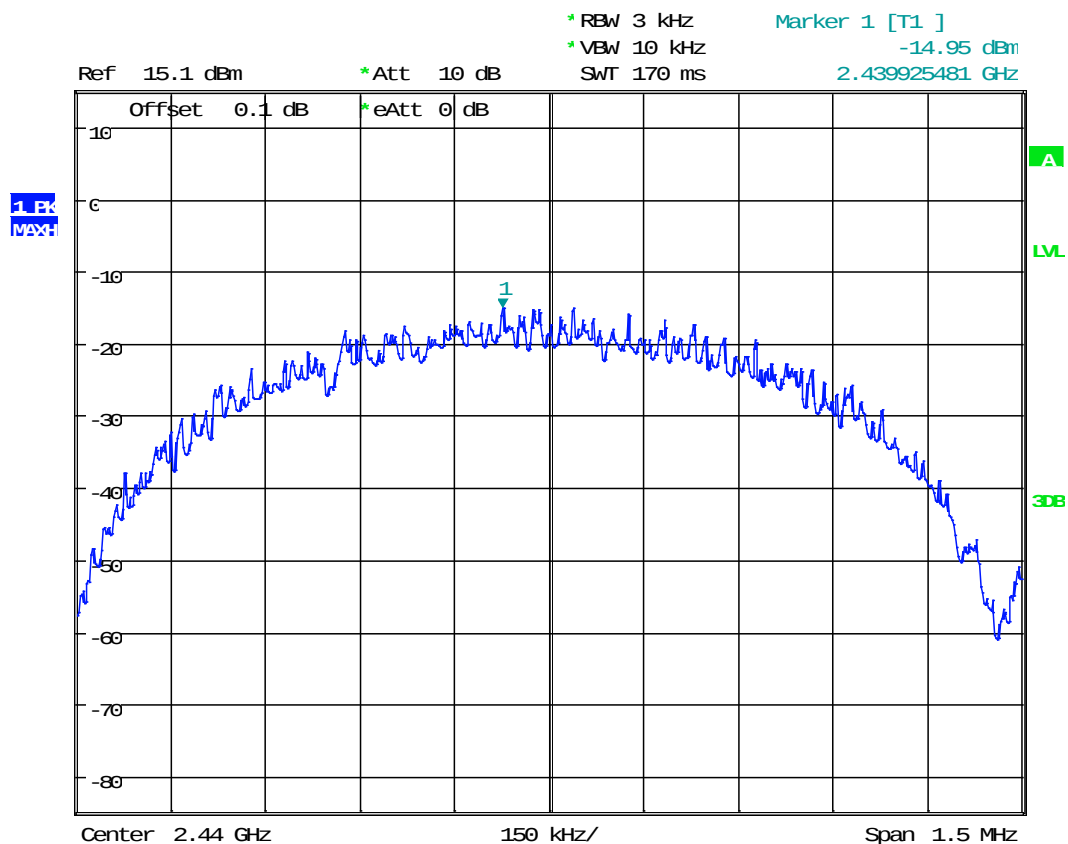
Date of Test:	September 11, 2018
Results:	Complies

Plot 3.1



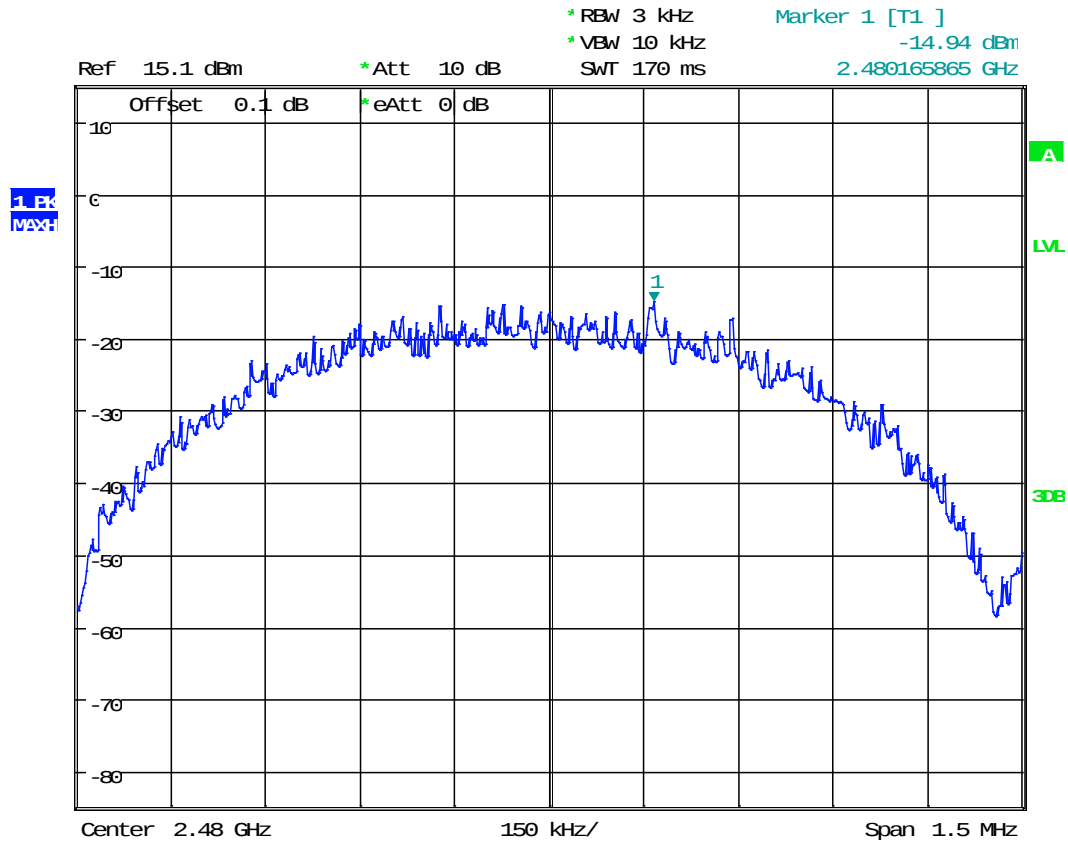
Date: 11.SEP.2018 11:39:49

Plot 3.2



Date: 11.SEP.2018 11:44:51

Plot 3.3



Date: 11.SEP.2018 11:43:38

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.

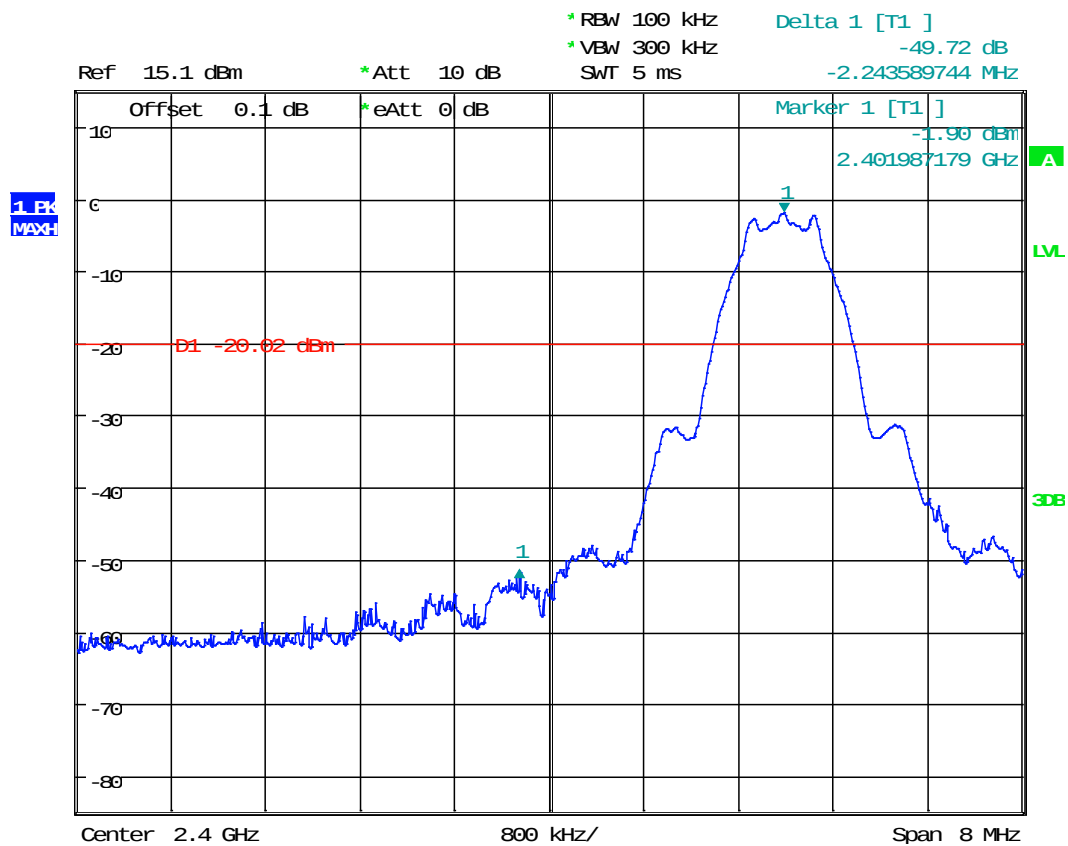
The unwanted emissions were measured from 30 MHz to 25 GHz. Plots below are corrected for cable loss and then compared to the limits.

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.

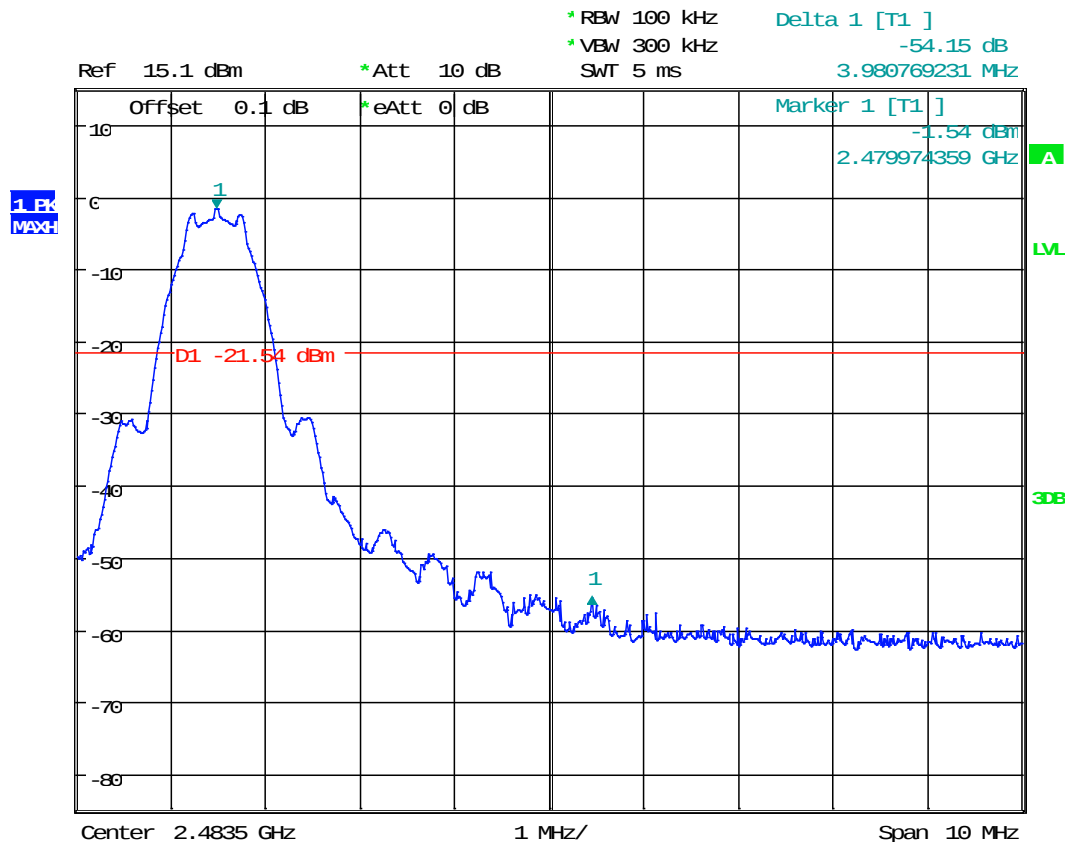
Date of Test:	September 11, 2018
Results	Complies

Tx @ Low Channel, 2400 MHz Band Edge
Plot 4.1



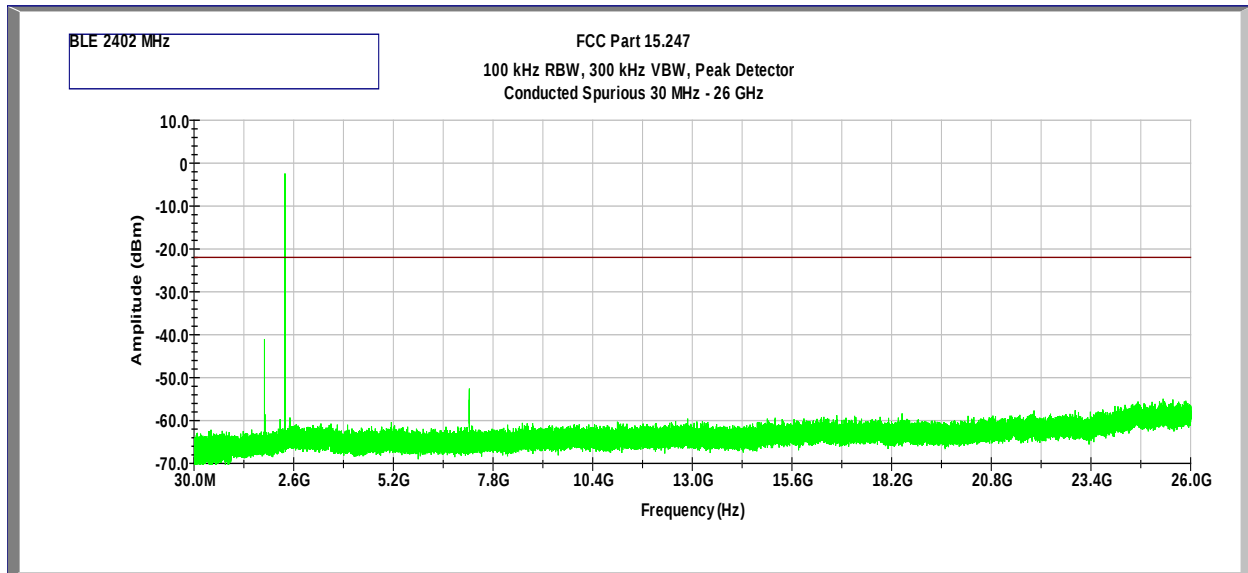
Date: 11.SEP.2018 12:03:42

Tx @ High Channel, 2483.5 MHz Band Edge
Plot 4.2

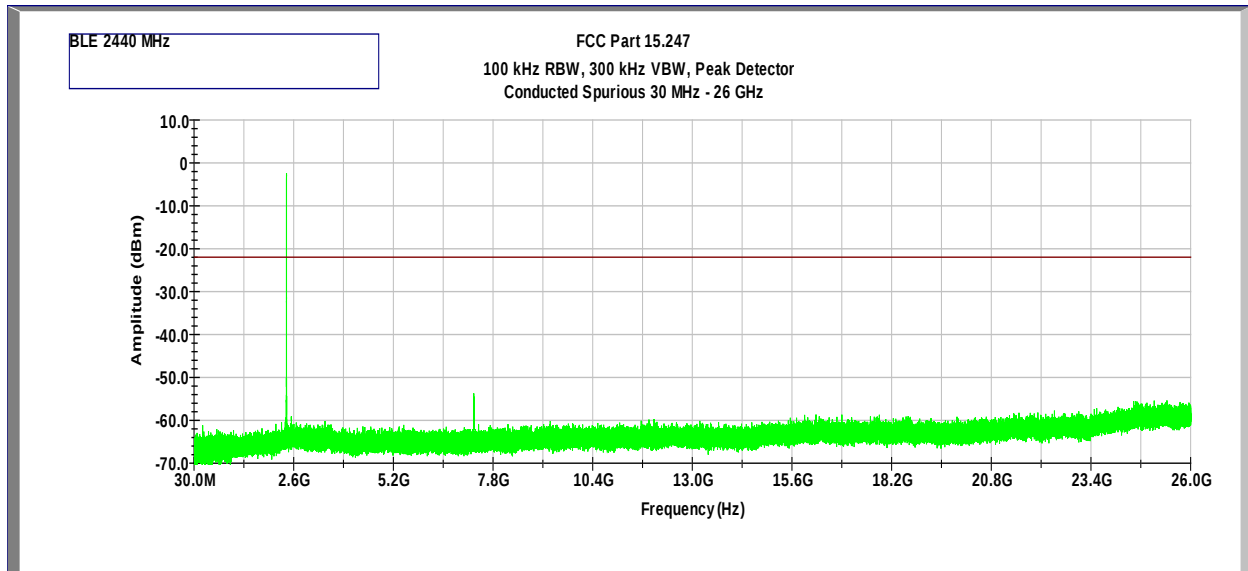


Date: 11.SEP.2018 12:06:10

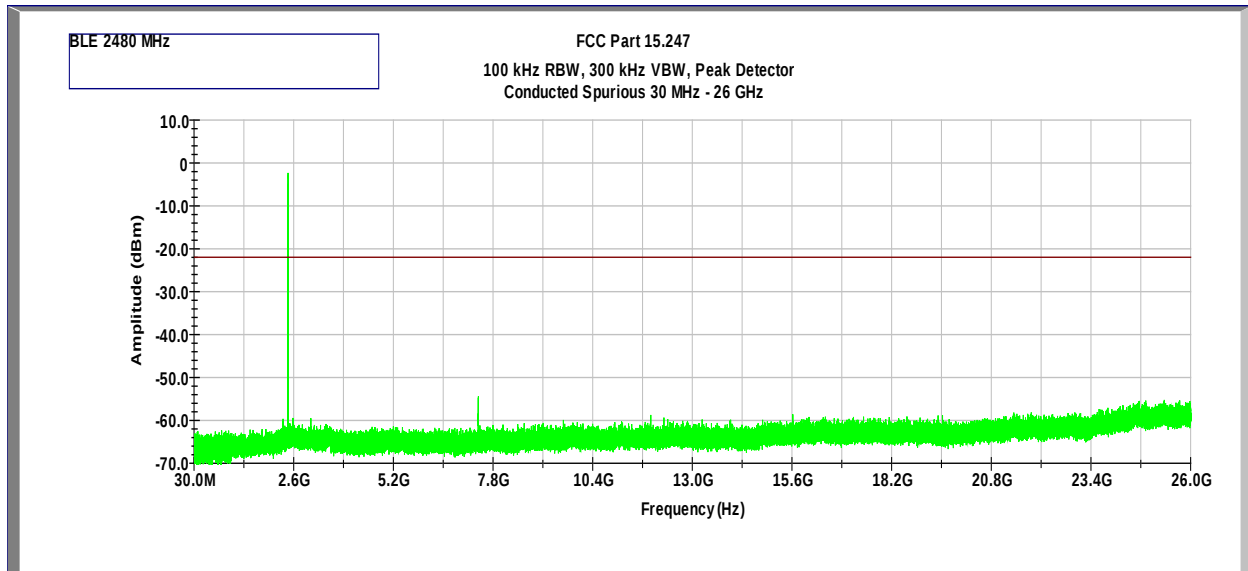
Tx @ Low Channel, 2402 MHz
30MHz -26GHz Conducted Spurious
Plot 4.3



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



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



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 30MHz to 26GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average limits for 1GHz – 26GHz.

Data is presented with the worst-case configuration (the configuration which resulted in the highest emission levels).

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.

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

$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32 \text{ dB}(\mu\text{V/m})$.

Level in μ V/m = Common Antilogarithm $[(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$.

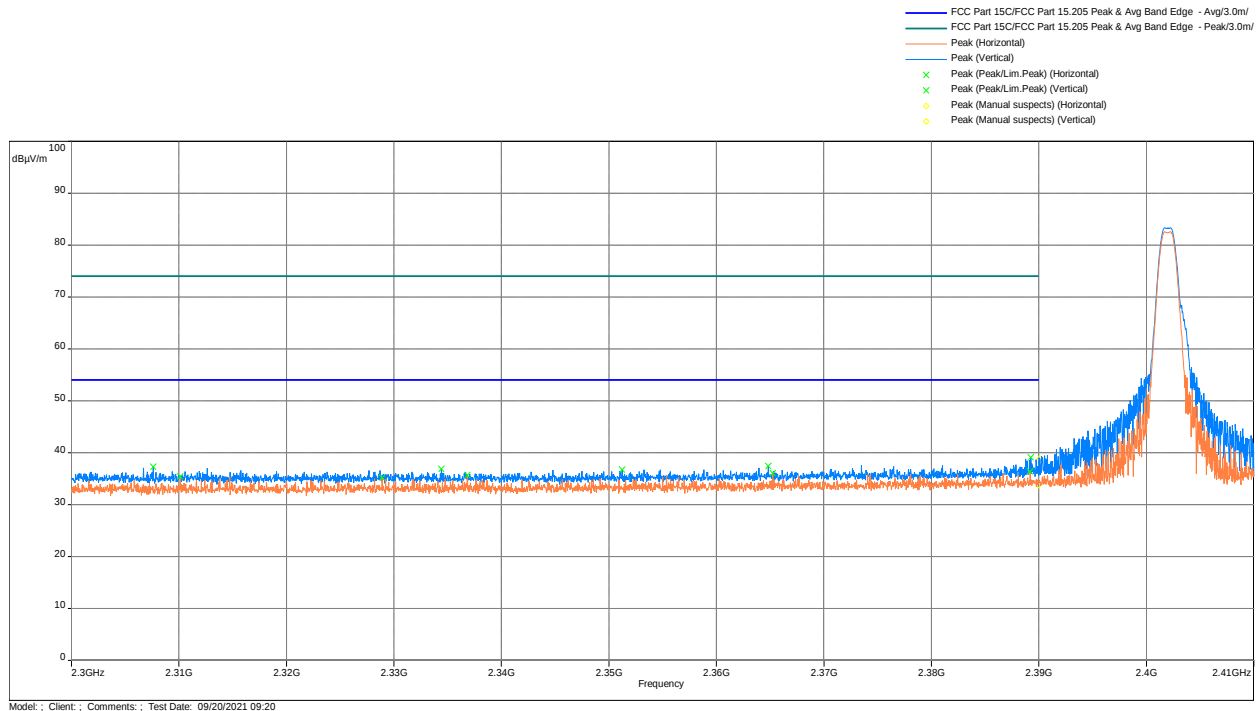
4.5.4 Test Results

All testing in this section were performed by radiated measurements.

Tested By	Test Date
Amar Kacel	September 08, 2021 to October 01, 2021

Test Results: 15.209/15.205 Radiated Restricted Band Emissions

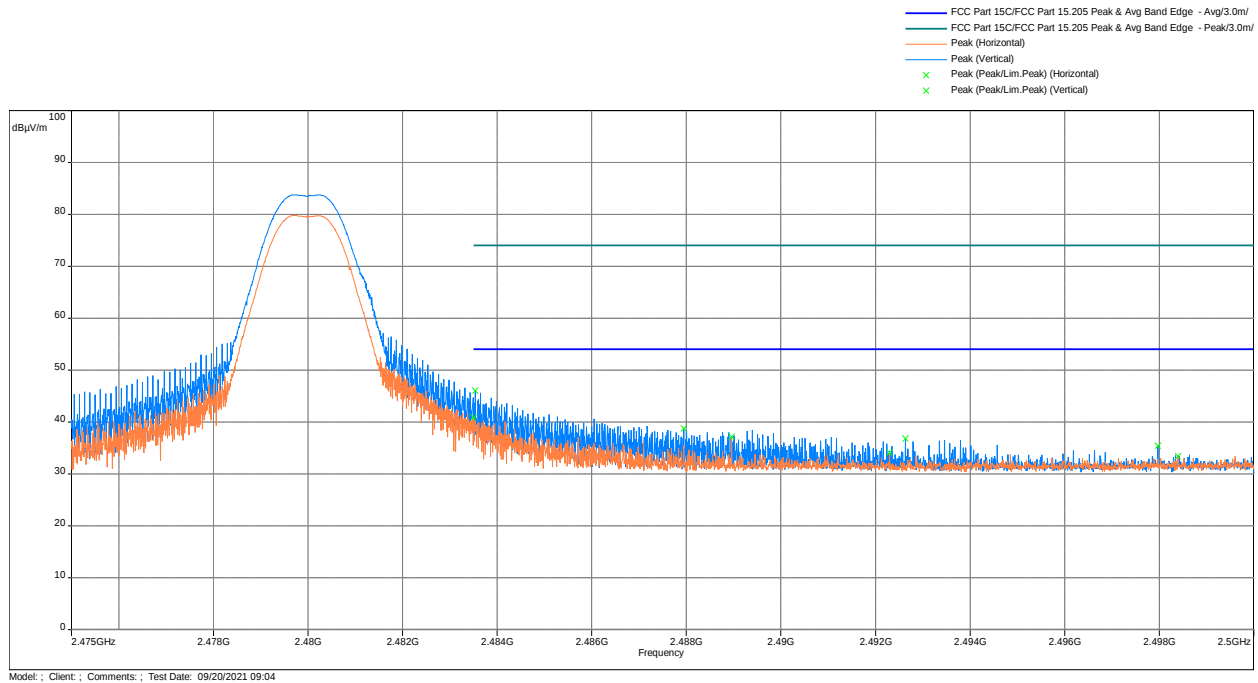
Out-of-Band Radiated spurious emissions at the Band-edge @3m distance 2310–2390 MHz, Peak Scan with Peak and Average Limit



Frequency	Corrected Amplitude	Peak Limit	Margin	Height	Angle	Detector	Polarity	Correction
GHz	dBμV/m	dBμV/m	dB	m	deg			
2389.976	33.78	74	-40.22	1.01	78.75	Peak	Horizontal	-11.77
2390.086	38.89	74	-35.11	2.99	355.25	Peak	Vertical	-11.77

Frequency	Corrected Amplitude	Average Limit	Margin	Height	Angle	Detector	Polarity	Correction
GHz	dBμV/m	dBμV/m	dB	m	deg			
2389.976	33.78	54	-20.22	1.01	78.75	Peak	Horizontal	-11.77
2390.086	38.89	54	-15.11	2.99	355.25	Peak	Vertical	-11.77

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



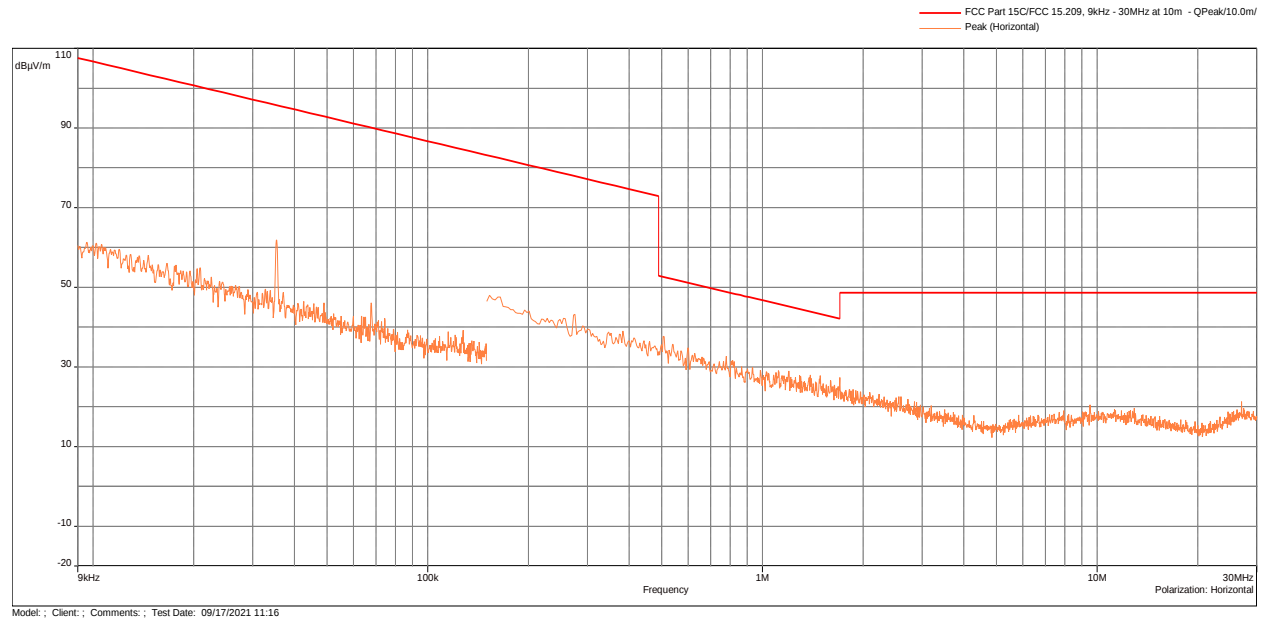
Frequency	Corrected Amplitude	Peak Limit	Margin	Height	Angle	Detector	Polarity	Correction
GHz	dBμV/m	dBμV/m	dB	m	deg			
2483.501	40.87	74	-33.13	3.01	56.25	Peak	Horizontal	-10.68
2483.539	46.03	74	-27.97	1.99	327.25	Peak	Vertical	-10.68

Frequency	Corrected Amplitude	Average Limit	Margin	Height	Angle	Detector	Polarity	Correction
GHz	dBμV/m	dBμV/m	dB	m	deg			
2483.501	40.87	54	-13.13	3.01	56.25	Peak	Horizontal	-10.68
2483.539	46.03	54	-7.97	1.99	327.25	Peak	Vertical	-10.68

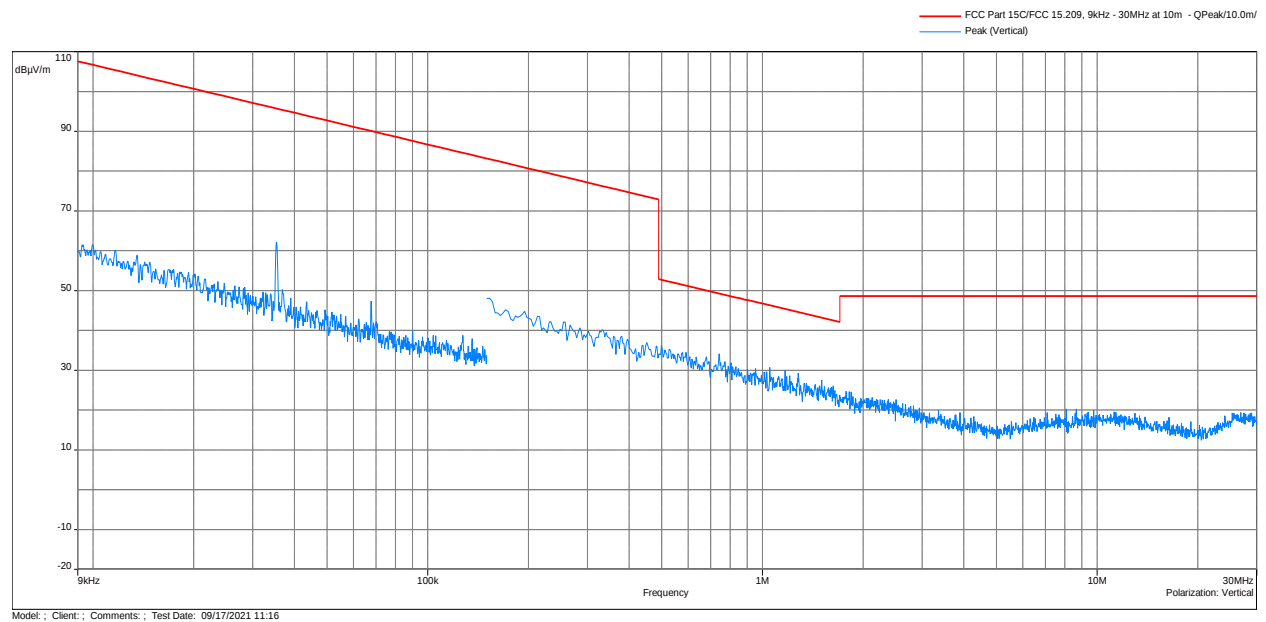
Out-of-Band Radiated Spurious Emissions

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

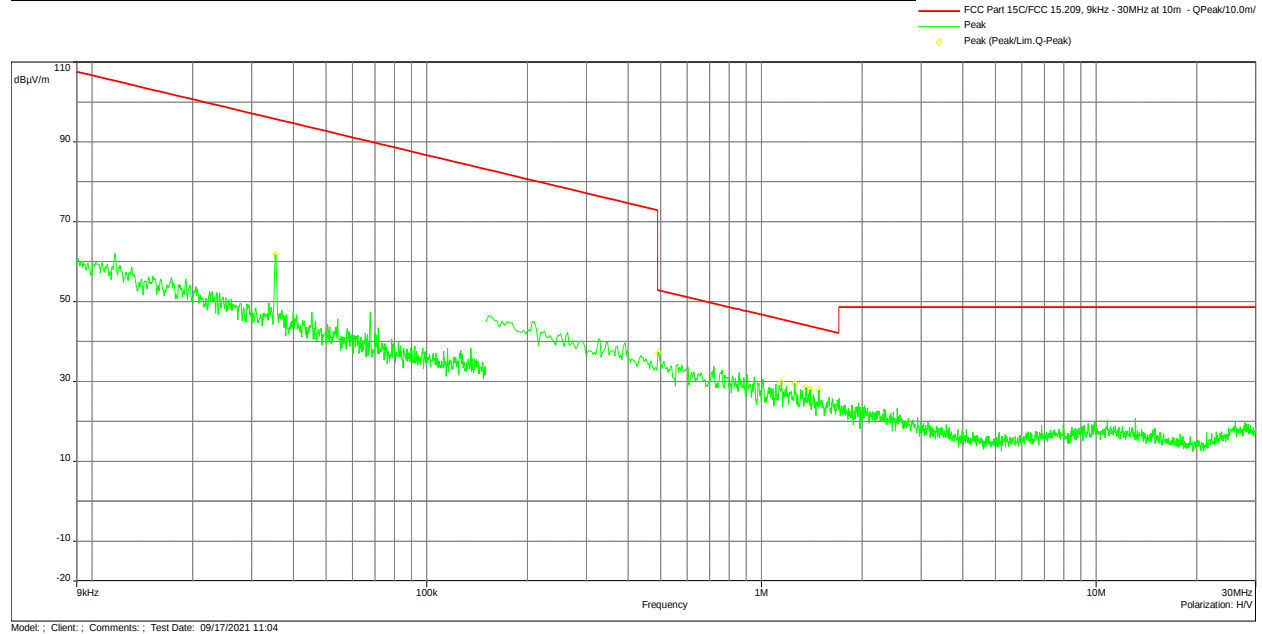
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



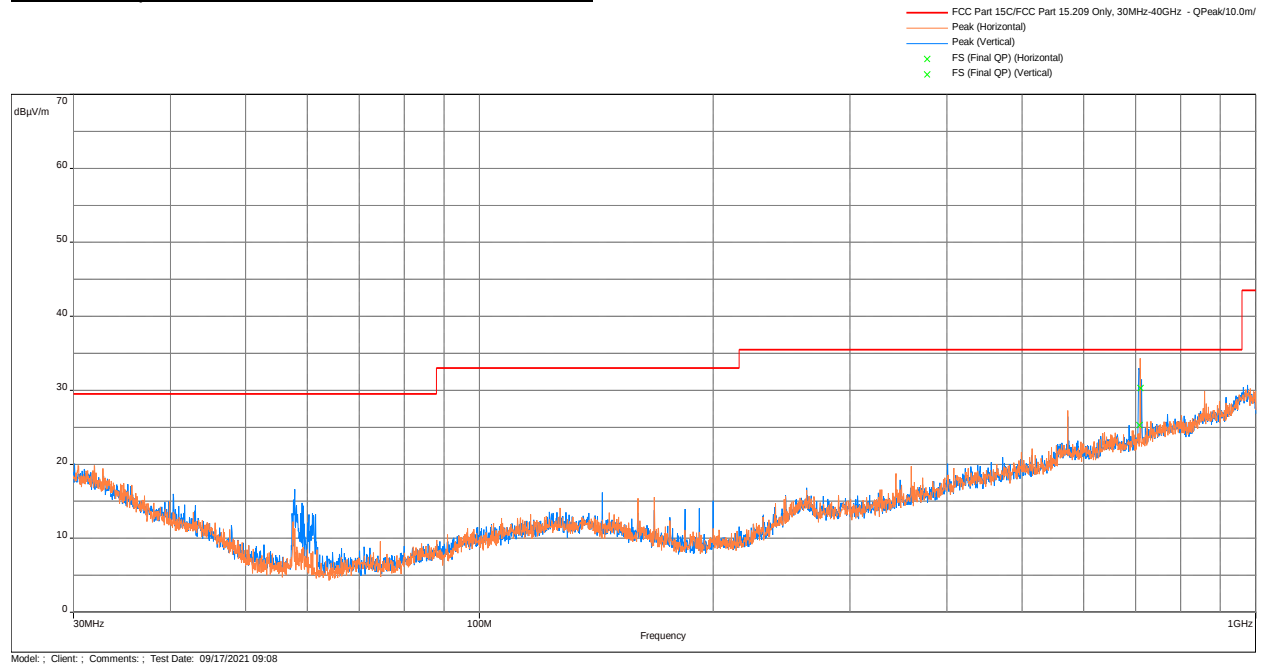
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



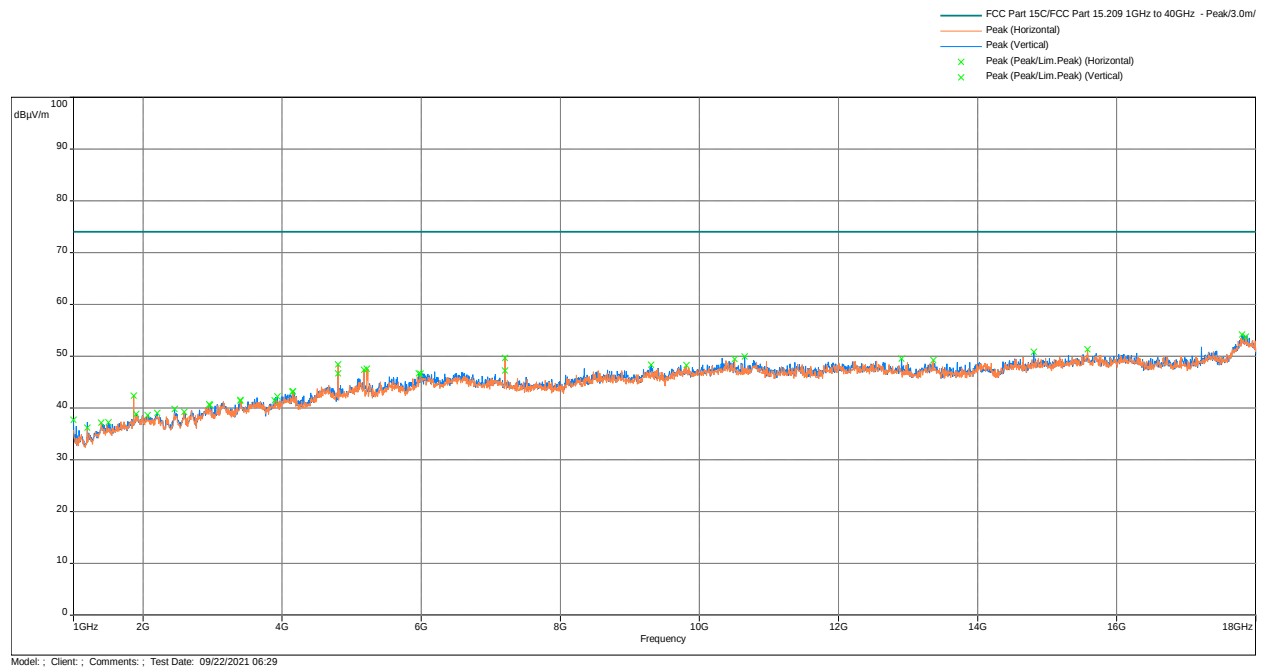
Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



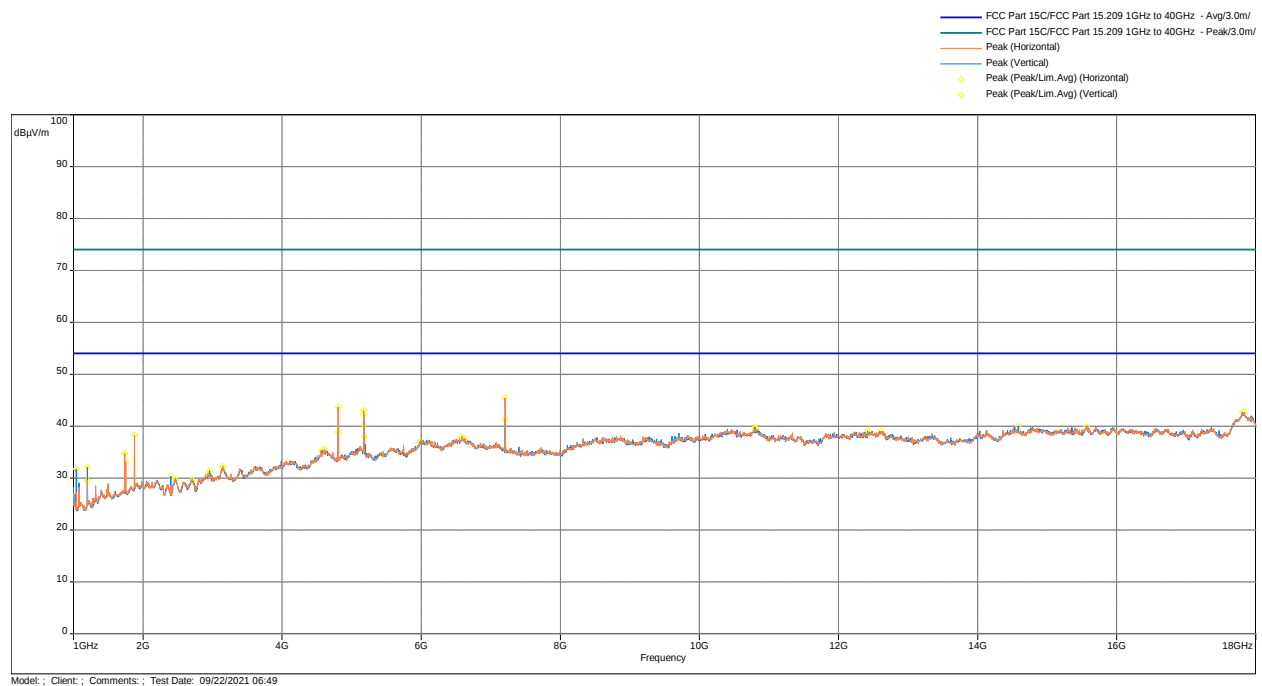
Radiated Spurious Emissions 30 MHz - 1000 MHz



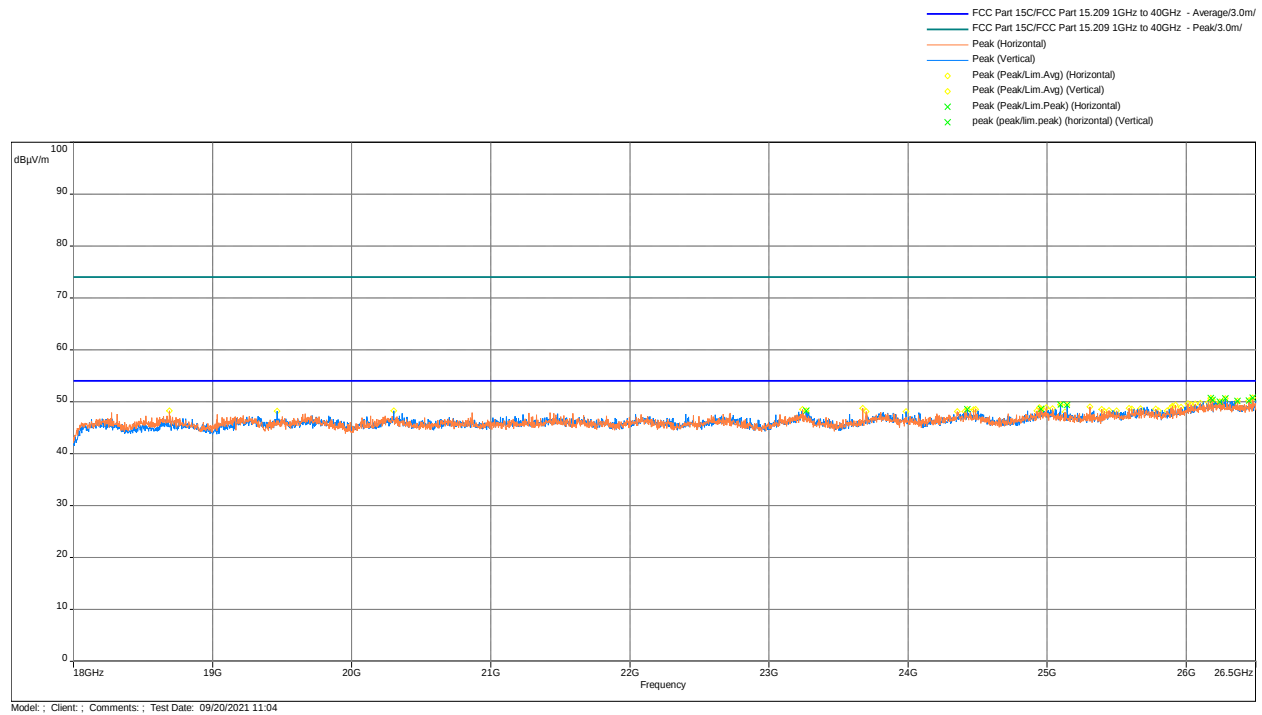
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Peak Limit



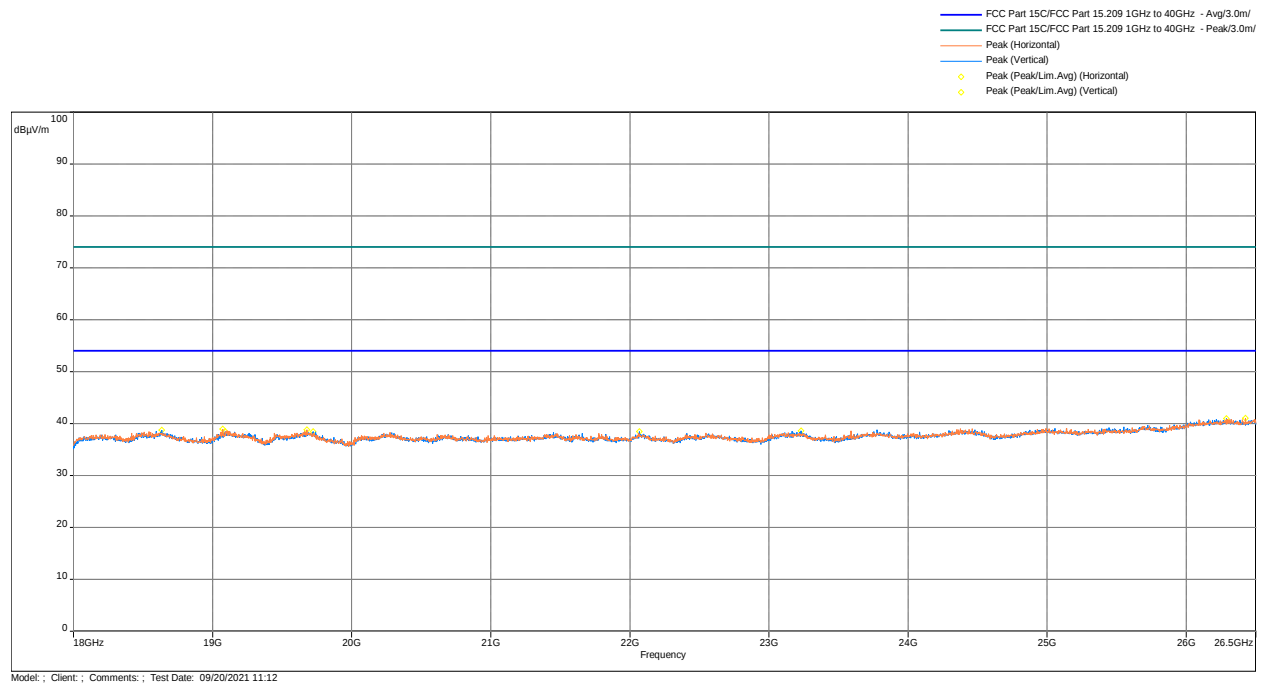
Radiated Spurious Emissions 1000 - 18000 MHz, Average Scan vs Peak Limit & Average Limit



Radiated Spurious Emissions 18 - 26 GHz, Peak Scan vs Peak & Average Limit



Radiated Spurious Emissions 18 - 26 GHz, Average Scan vs Peak & Average Limit



Freq. MHz	QP FS@10m dB(μV/m)	Limit dB(μV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
710.1609	30.3	35.5	-5.2	3.05	55.25	Horizontal	-2.77
708.1312	25.27	35.5	-10.23	1.12	157	Vertical	-2.87
859.1237	29.88	35.5	-5.62	1	13.25	Horizontal	0.98
959.454	29.69	35.5	-5.81	2	359.75	Vertical	4.08
952.276	29.41	35.5	-6.09	3	206.5	Horizontal	3.69
30.097	20.07	29.5	-9.43	2	359.75	Vertical	-8.46

Frequency GHz	FS@3m dBμV/m	Limit dBμV/m	Margin dB	Height m	Angle deg	Detector	Polarity	Correction
7205.000	45.48	54	-8.52	1.99	291.25	Average	Horizontal	-2.48
4804.033	43.77	54	-10.23	1.99	0.25	Average	Horizontal	-5.38
5172.933	43.08	54	-10.92	1.01	199.75	Average	Horizontal	-3.86

Frequency GHz	FS@3m dBμV/m	Limit dBμV/m	Margin dB	Height m	Angle deg	Detector	Polarity	Correction
17802.23	54.19	74	-19.81	1.01	289.25	Peak	Vertical	9.61
17857.2	53.73	74	-20.27	1.01	304.5	Peak	Horizontal	9.23
15582.6	51.35	74	-22.65	3.99	57.75	Peak	Horizontal	4.78

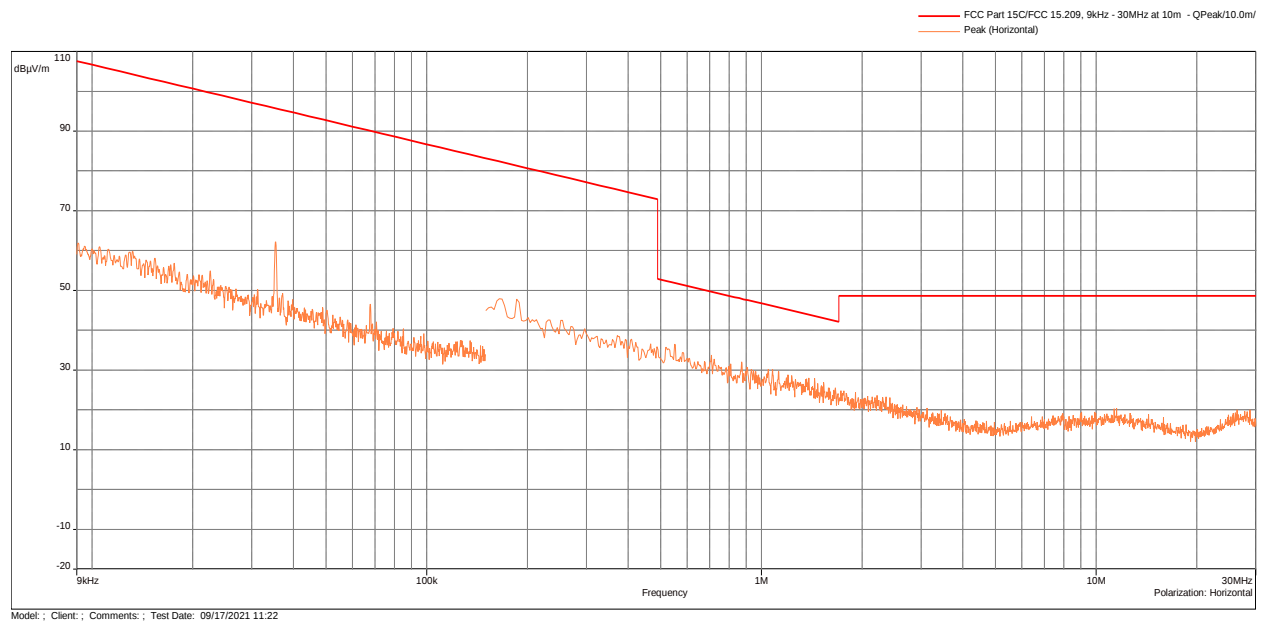
Note: FS = RA + Correction

Correction = AF + CF – Preamp

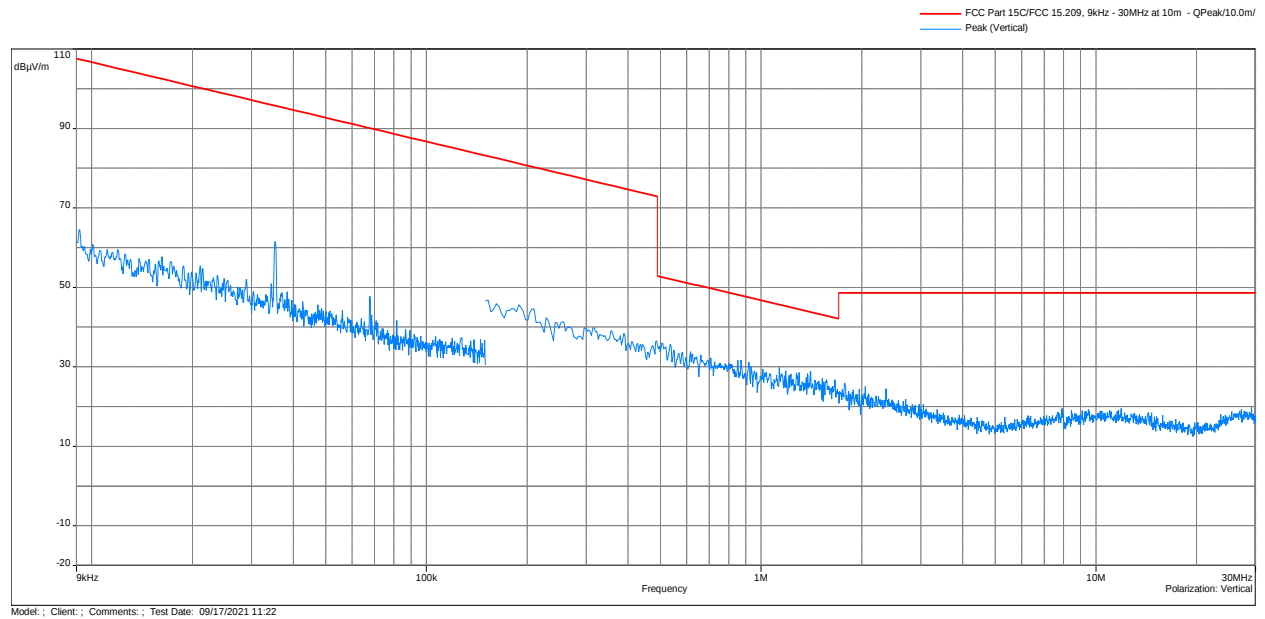
Results	Complies
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Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 2442 MHz

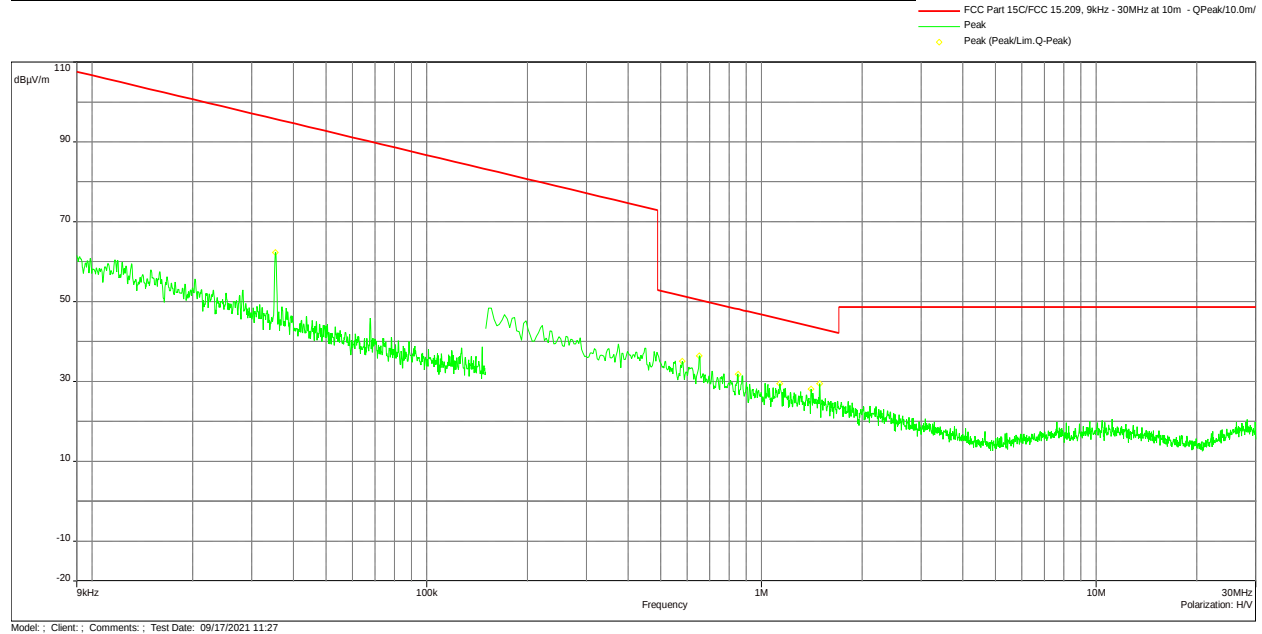
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



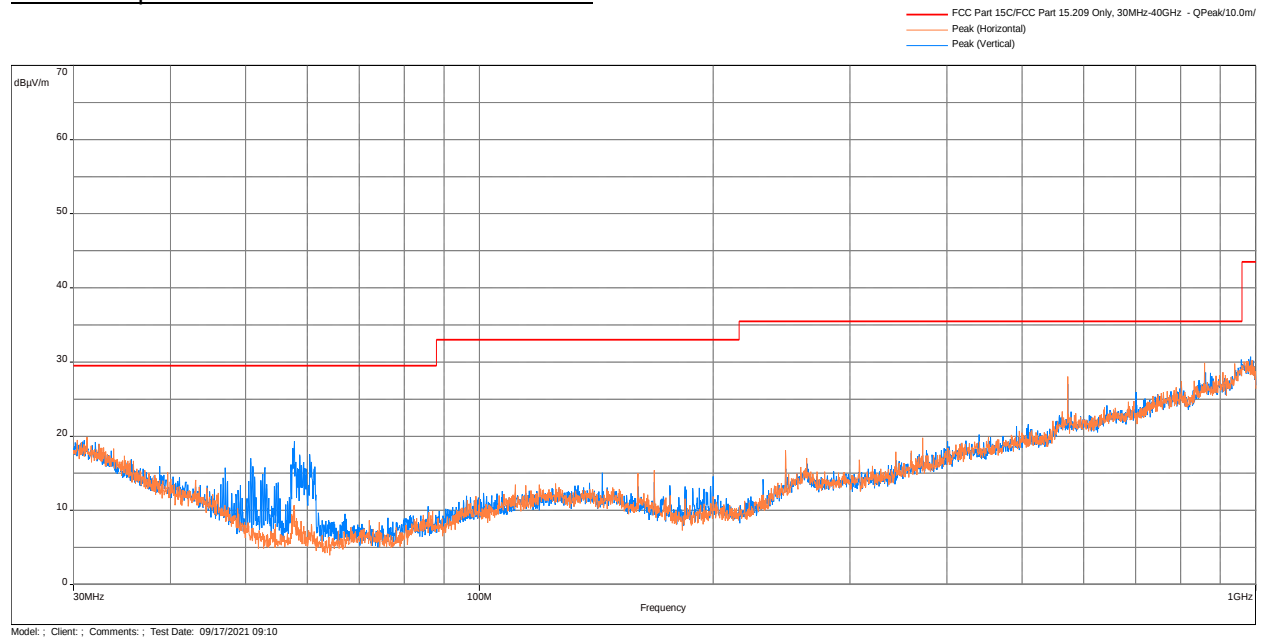
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



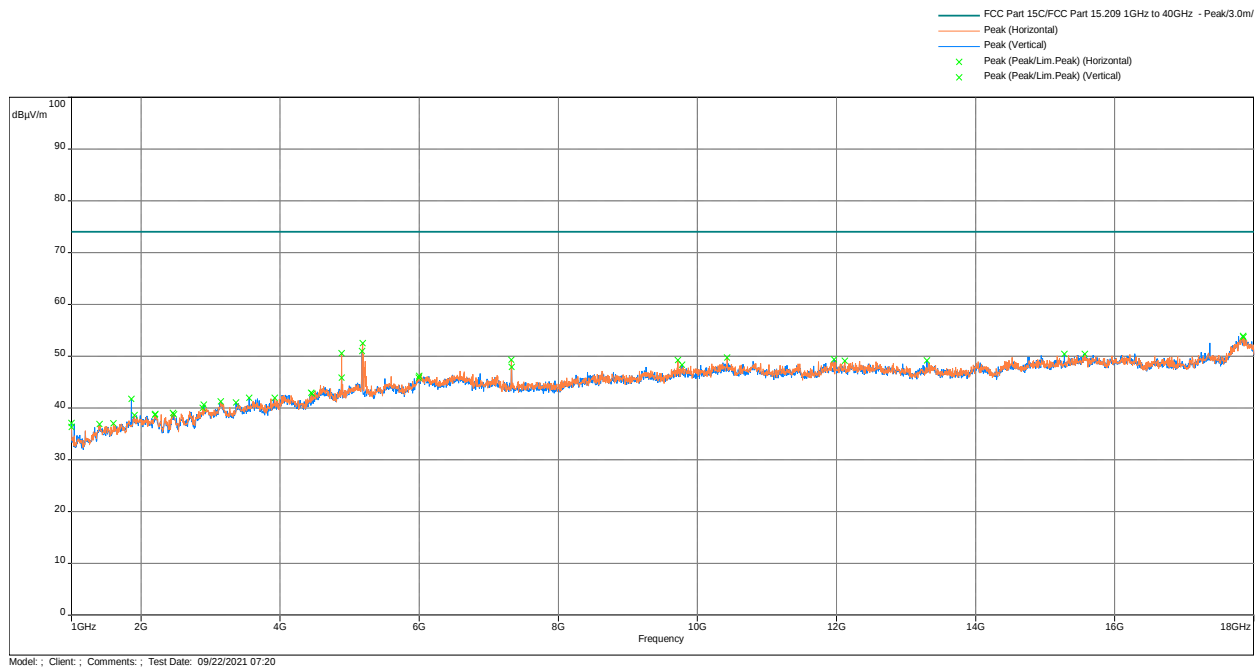
Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



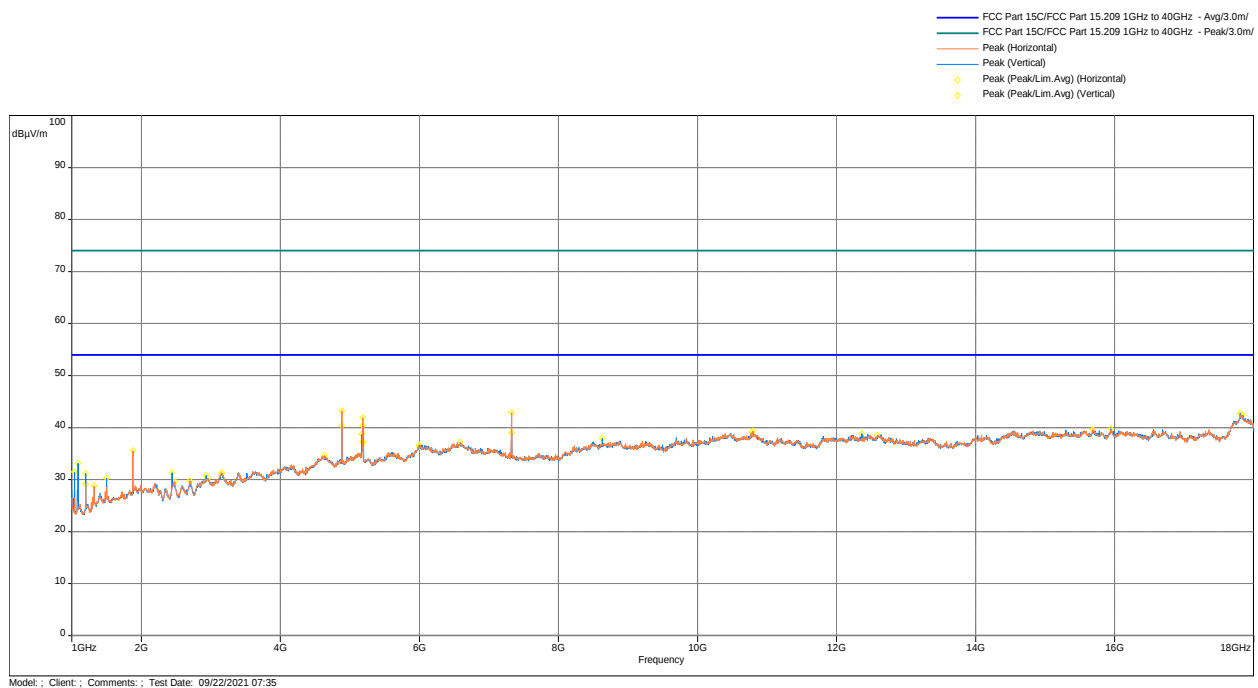
Radiated Spurious Emissions 30 MHz - 1000 MHz



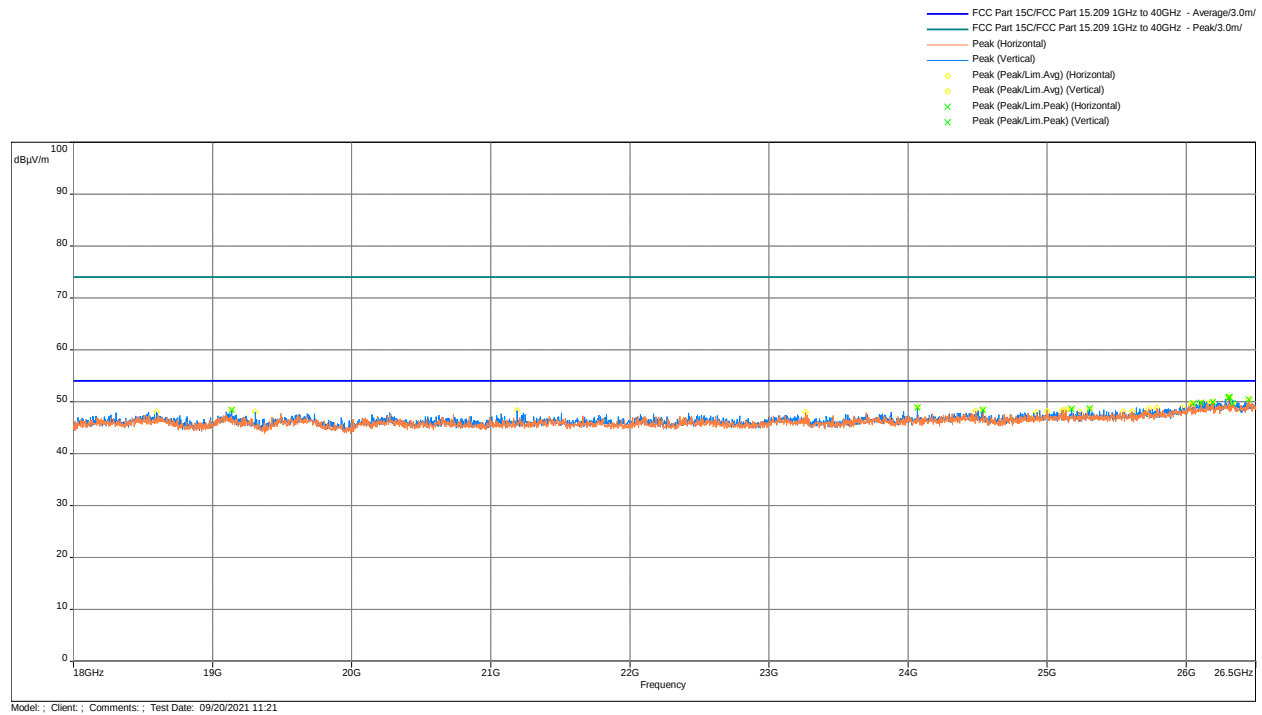
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Peak Limit



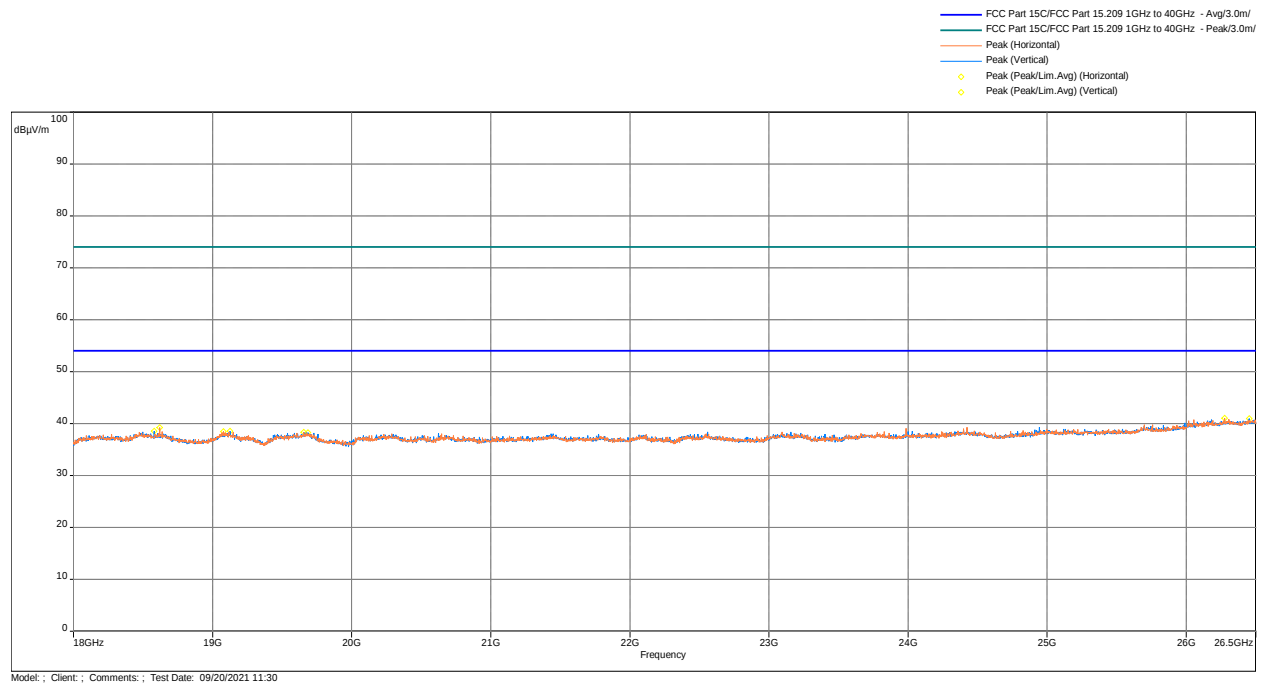
Radiated Spurious Emissions 1000 - 18000 MHz, Average Scan vs Peak Limit & Average Limit



Radiated Spurious Emissions 18 - 26 GHz, Peak Scan vs Peak & Average Limit



Radiated Spurious Emissions 18 - 26 GHz, Average Scan vs Peak & Average Limit



Freq. MHz	QP FS@10m dB(μV/m)	Limit dB(μV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
957.546	30.34	35.5	-5.16	4	347.25	Vertical	3.95
859.091	29.89	35.5	-5.61	1	49.5	Horizontal	0.98
938.922	29.81	35.5	-5.69	1.99	153.5	Horizontal	2.79
31.229	19.87	29.5	-9.63	3	233.75	Horizontal	-9.01
30.970	19.45	29.5	-10.05	4	268.25	Vertical	-8.88
57.774	19.33	29.5	-10.17	4	251	Vertical	-21.3

Frequency GHz	FS@3m dBμV/m	Limit dBμV/m	Margin dB	Height m	Angle deg	Detector	Polarity	Correction
4883.933	43.22	54	-10.78	1.99	0	Average	Horizontal	-5.03
7326.833	42.89	54	-11.11	1.01	200	Average	Horizontal	-2.34
17805.63	42.86	54	-11.14	1.01	0	Average	Vertical	9.58

Frequency GHz	FS@3m dBμV/m	Limit dBμV/m	Margin dB	Height m	Angle deg	Detector	Polarity	Correction
17847	53.92	74	-20.08	2.01	217.25	Peak	Vertical	9.28
17852.1	53.7	74	-20.3	1.01	65.75	Peak	Horizontal	9.25
5187.667	52.5	74	-21.5	1.99	216.75	Peak	Horizontal	-4.03

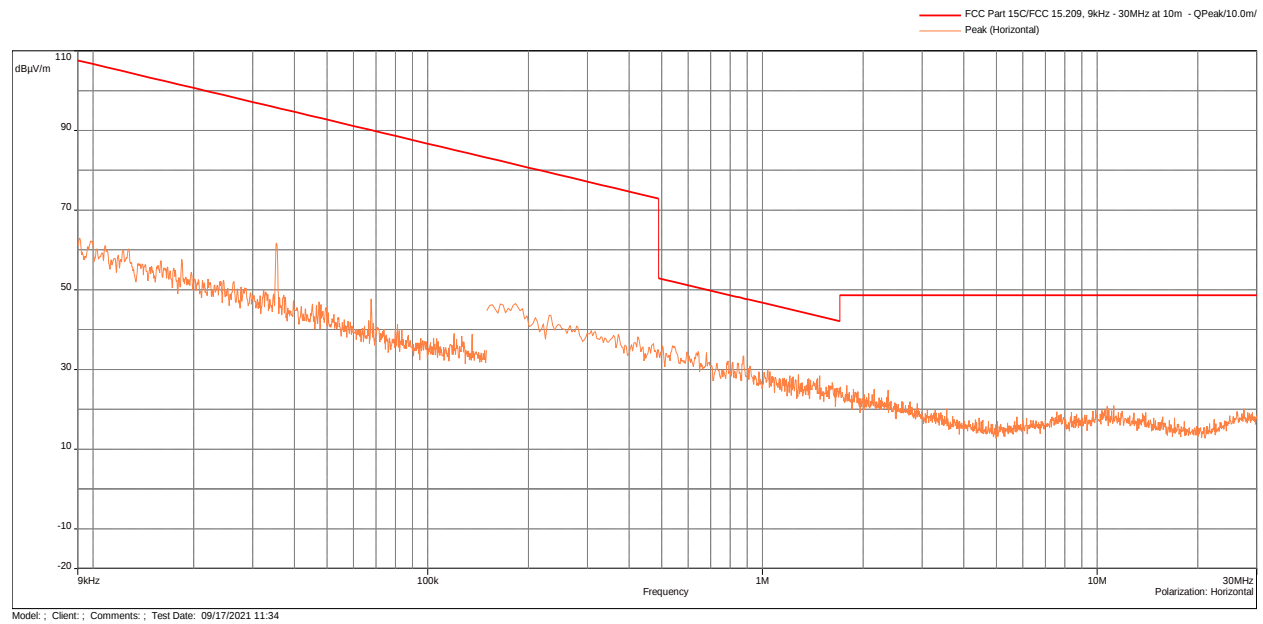
Note: FS = RA + Correction

Correction = AF + CF – Preamp

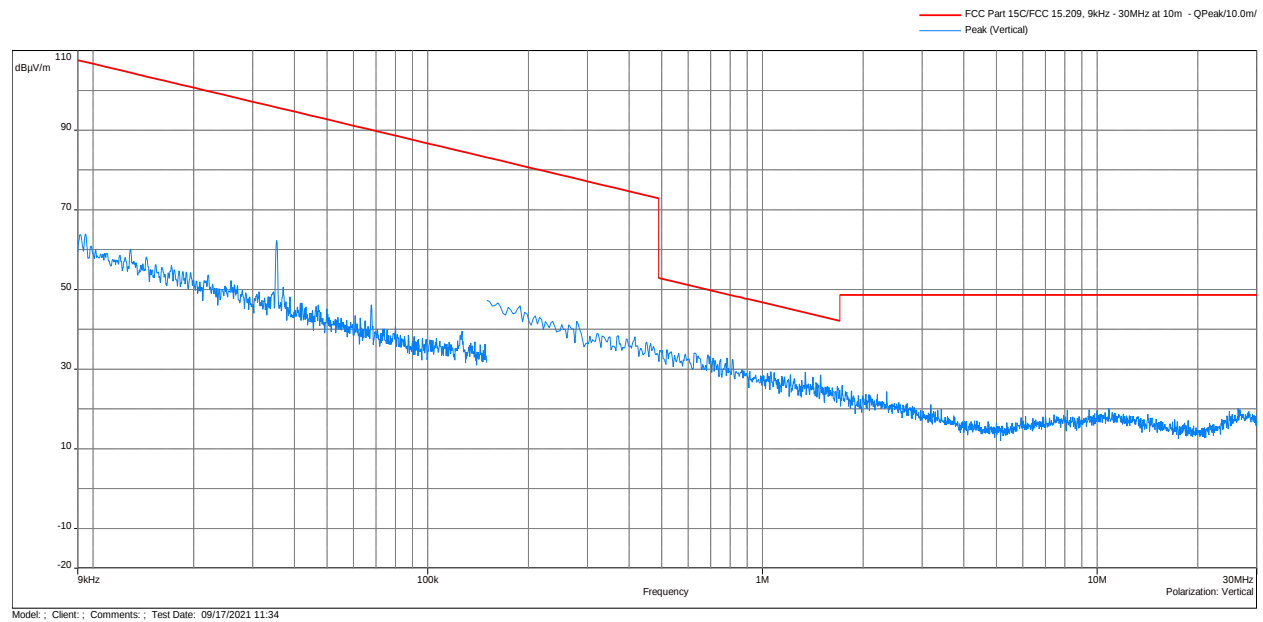
Results	Complies
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Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz

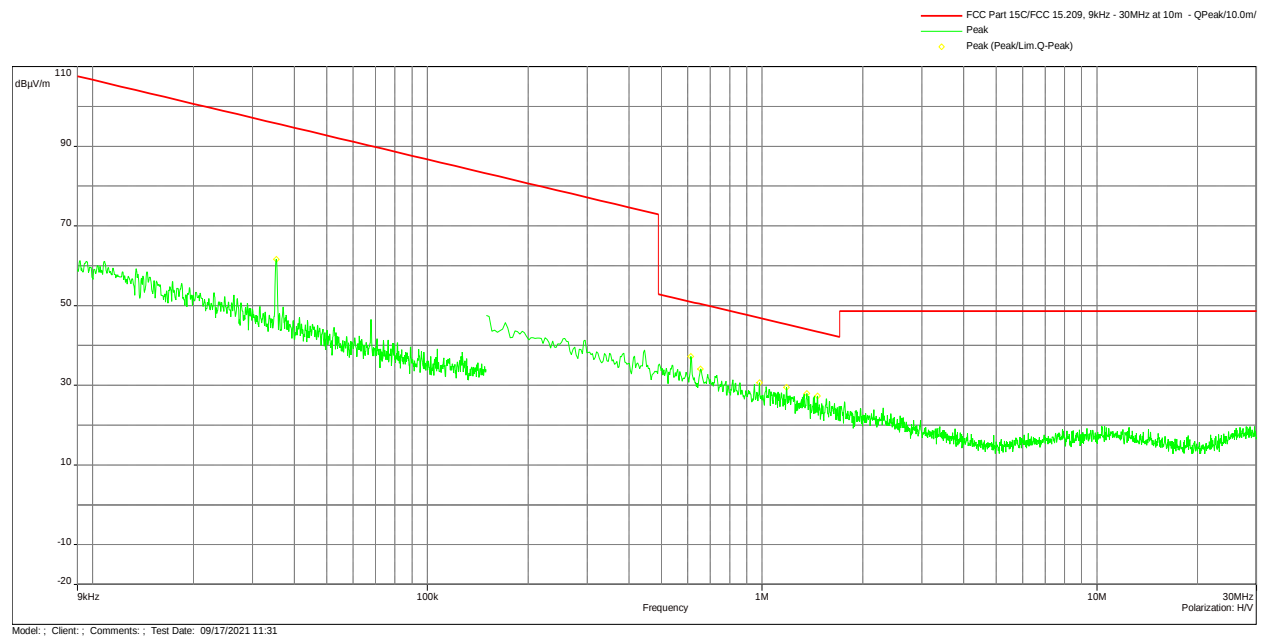
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



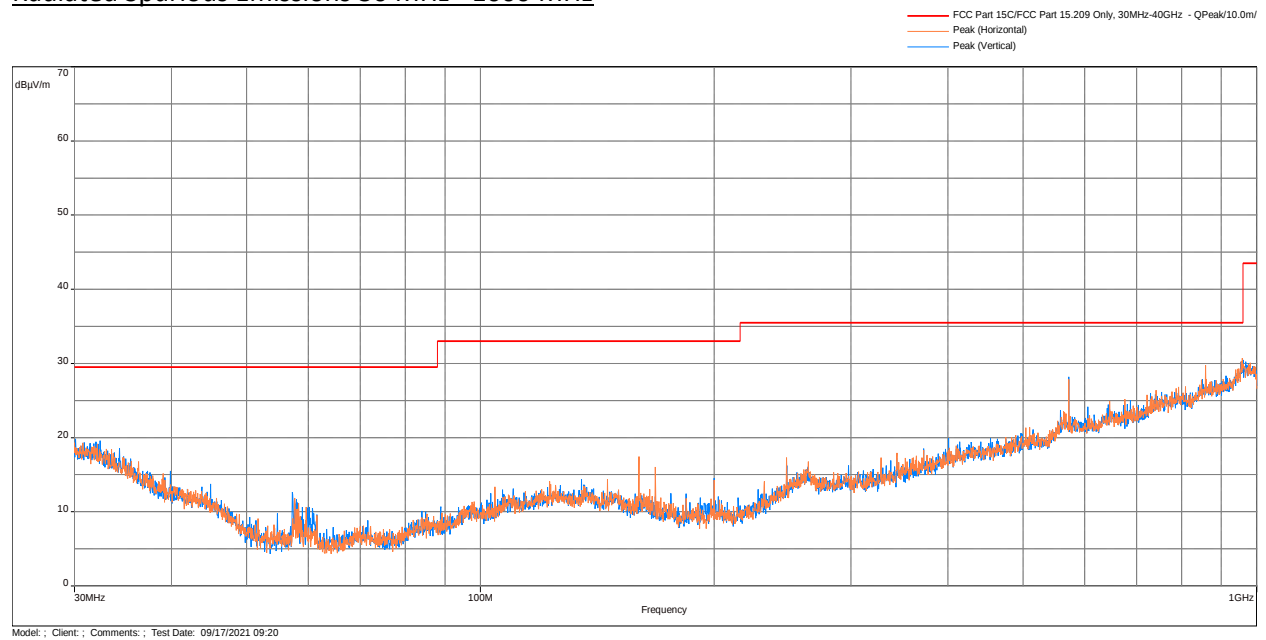
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



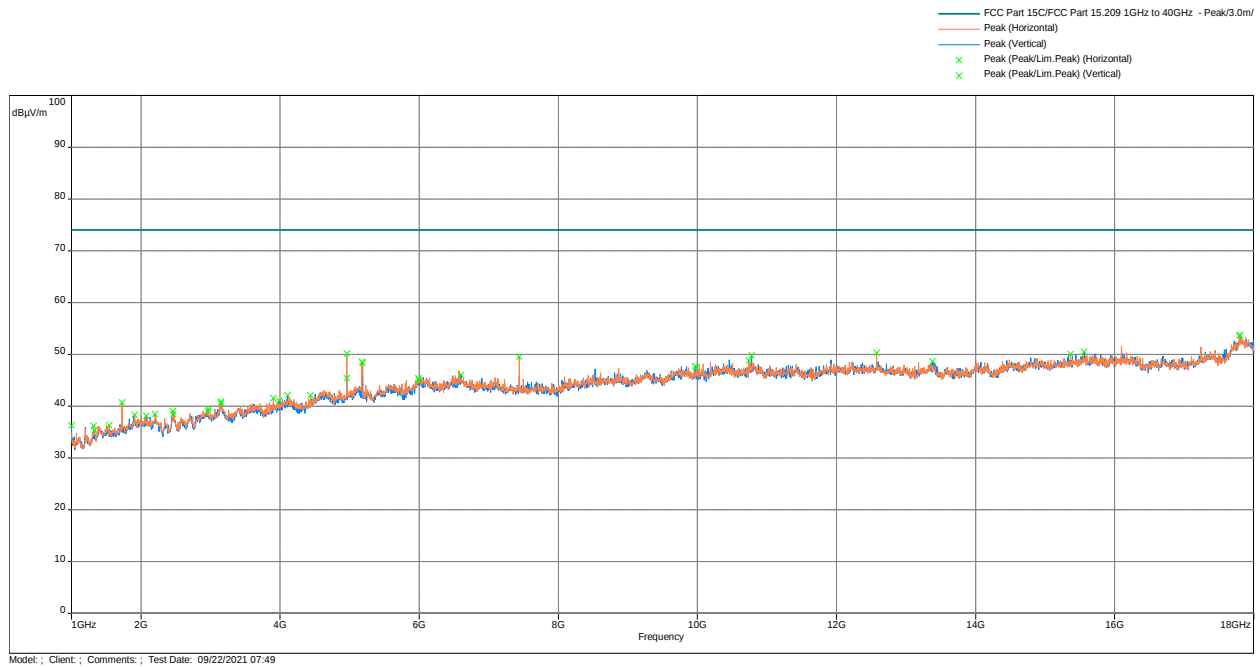
Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



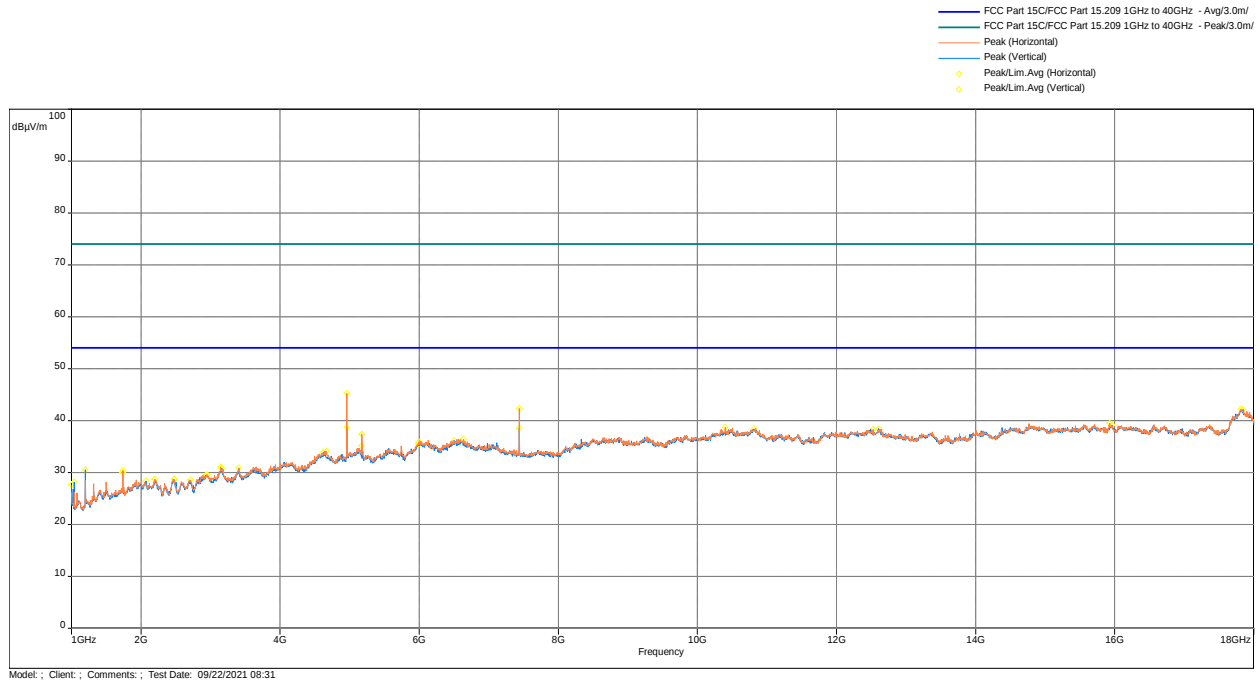
Radiated Spurious Emissions 30 MHz - 1000 MHz



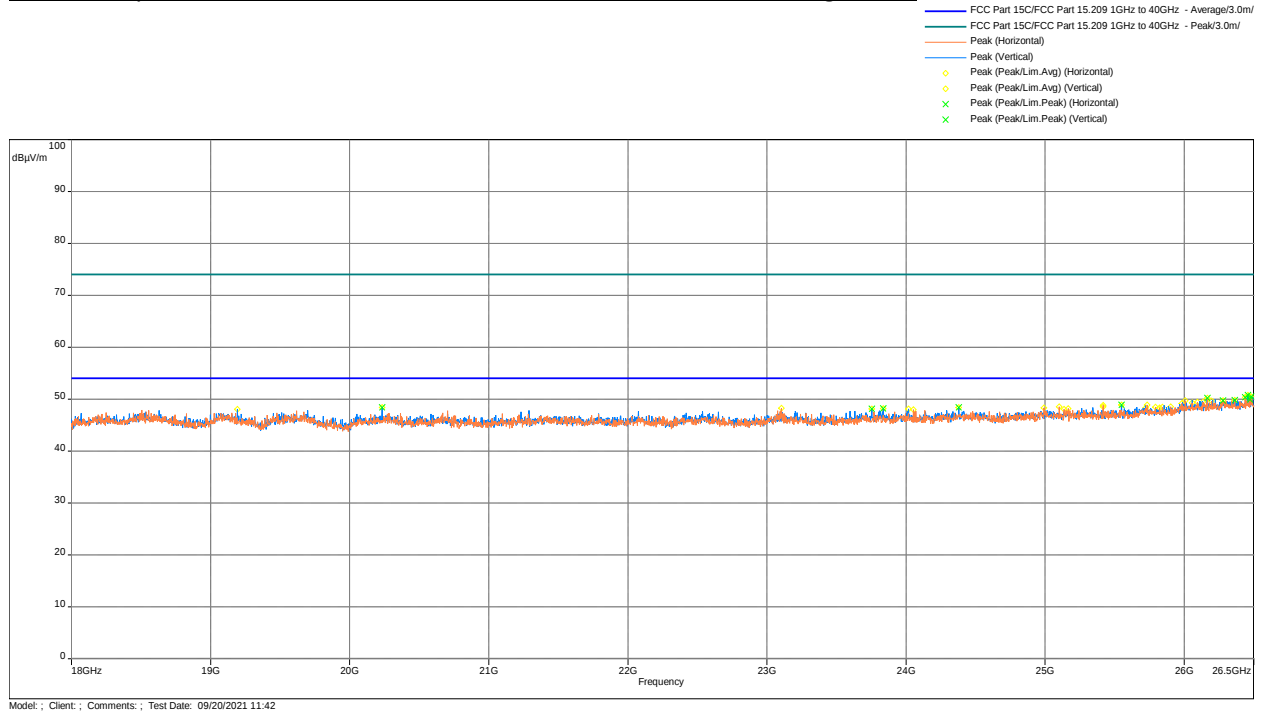
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Peak Limit



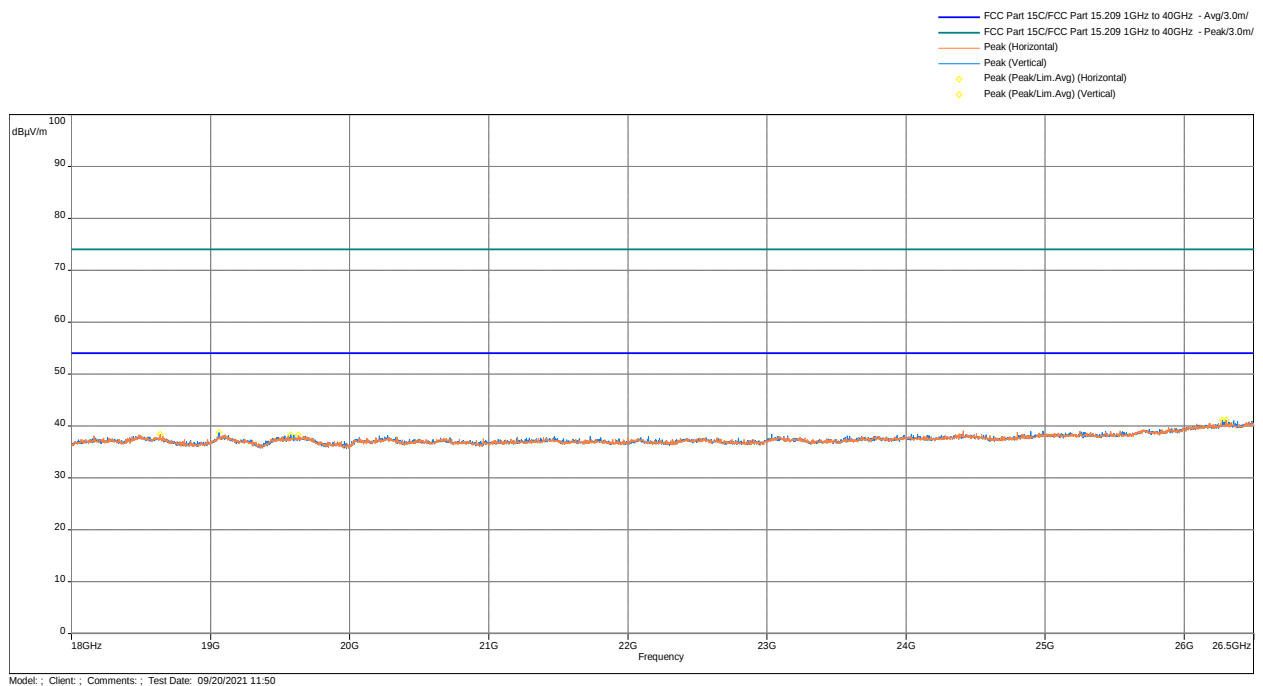
Radiated Spurious Emissions 1000 - 18000 MHz, Average Scan vs Peak Limit & Average Limit



Radiated Spurious Emissions 18 - 26 GHz, Peak Scan vs Peak & Average Limit



Radiated Spurious Emissions 18 - 26 GHz, Average Scan vs Peak & Average Limit



Freq. MHz	QP FS@10m dB(μV/m)	Limit dB(μV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
957.676	30.74	35.5	-4.76	0.99	145.5	Horizontal	3.95
959.745	30.48	35.5	-5.02	2	101.75	Vertical	4.09
859.124	29.73	35.5	-5.77	2	92	Horizontal	0.98
30.097	19.84	29.5	-9.66	3	250.5	Vertical	-8.46
30.000	19.33	29.5	-10.17	2	205.75	Horizontal	-8.42
44.906	13.75	29.5	-15.75	1	198.5	Vertical	-16.14

Frequency GHz	FS@3m dBμV/m	Limit dBμV/m	Margin dB	Height m	Angle deg	Detector	Polarity	Correction
4959.867	45.27	54	-8.73	2.01	333.25	Average	Horizontal	-4.53
7439.033	42.34	54	-11.66	2.01	115.25	Average	Horizontal	-2.09
17816.4	42.23	54	-11.77	2.99	156.25	Average	Horizontal	9.52

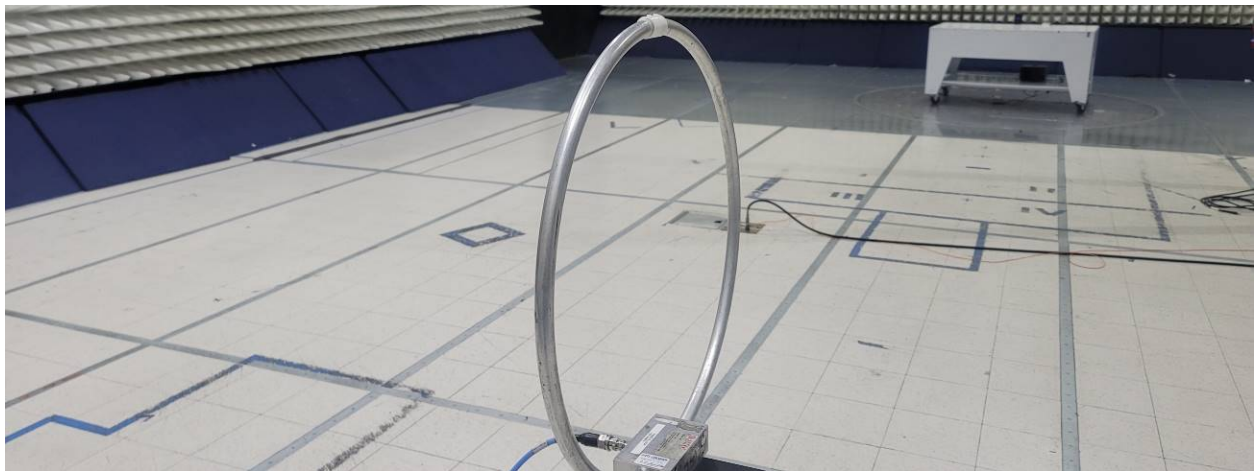
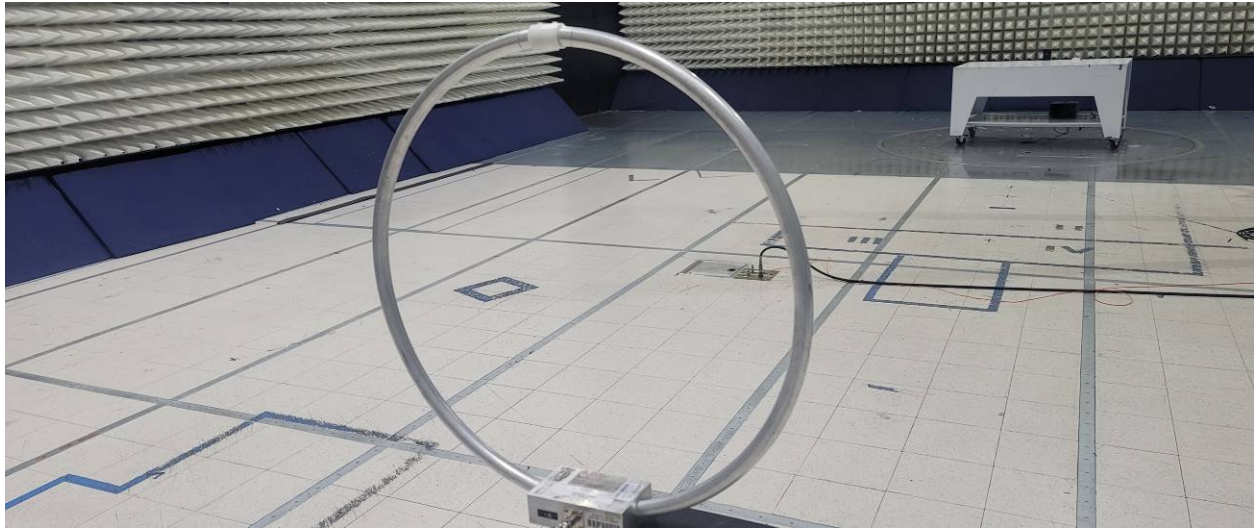
Frequency GHz	FS@3m dBμV/m	Limit dBμV/m	Margin dB	Height m	Angle deg	Detector	Polarity	Correction
17798.83	53.7	74	-20.3	3.99	157.25	Peak	Vertical	9.6
4960.433	50.13	74	-23.87	2.01	334.75	Peak	Horizontal	-4.52

Note: FS = RA + Correction
Correction = AF + CF – Preamp

Results	Complies
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4.2.5 Test Setup Configuration

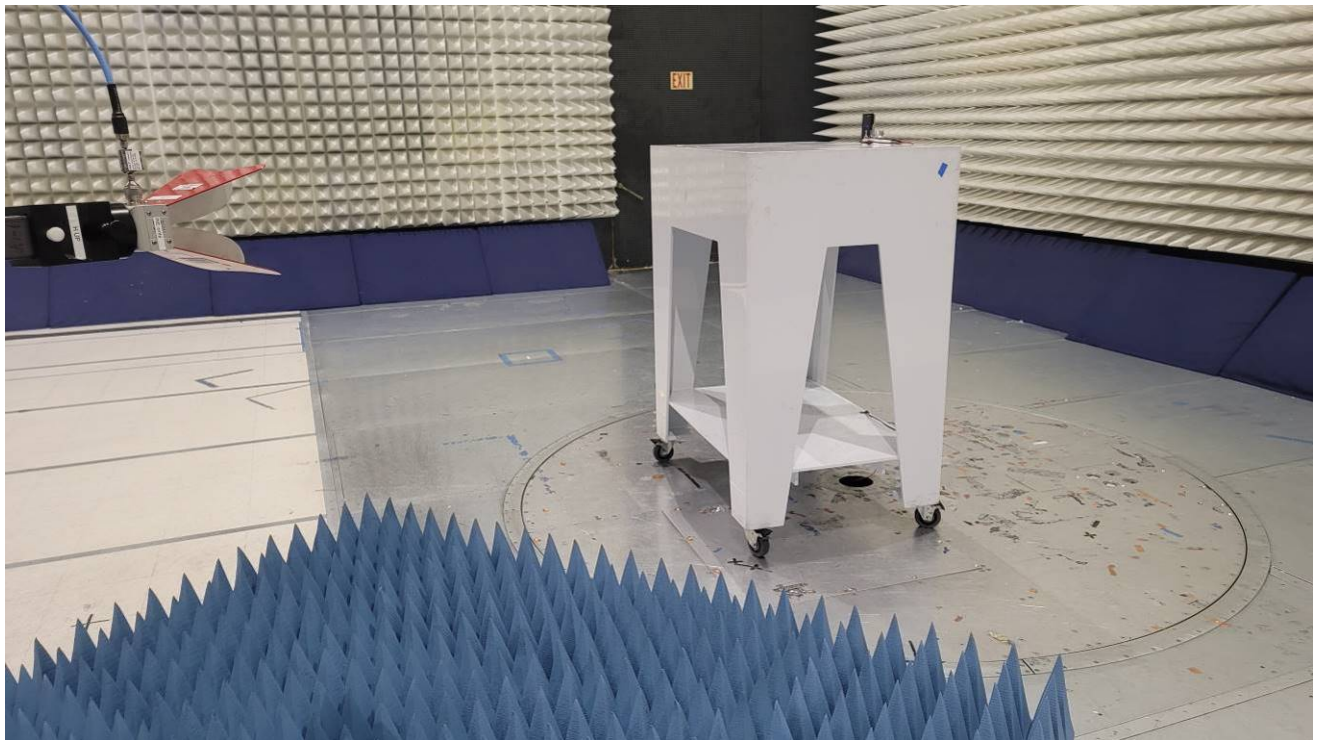
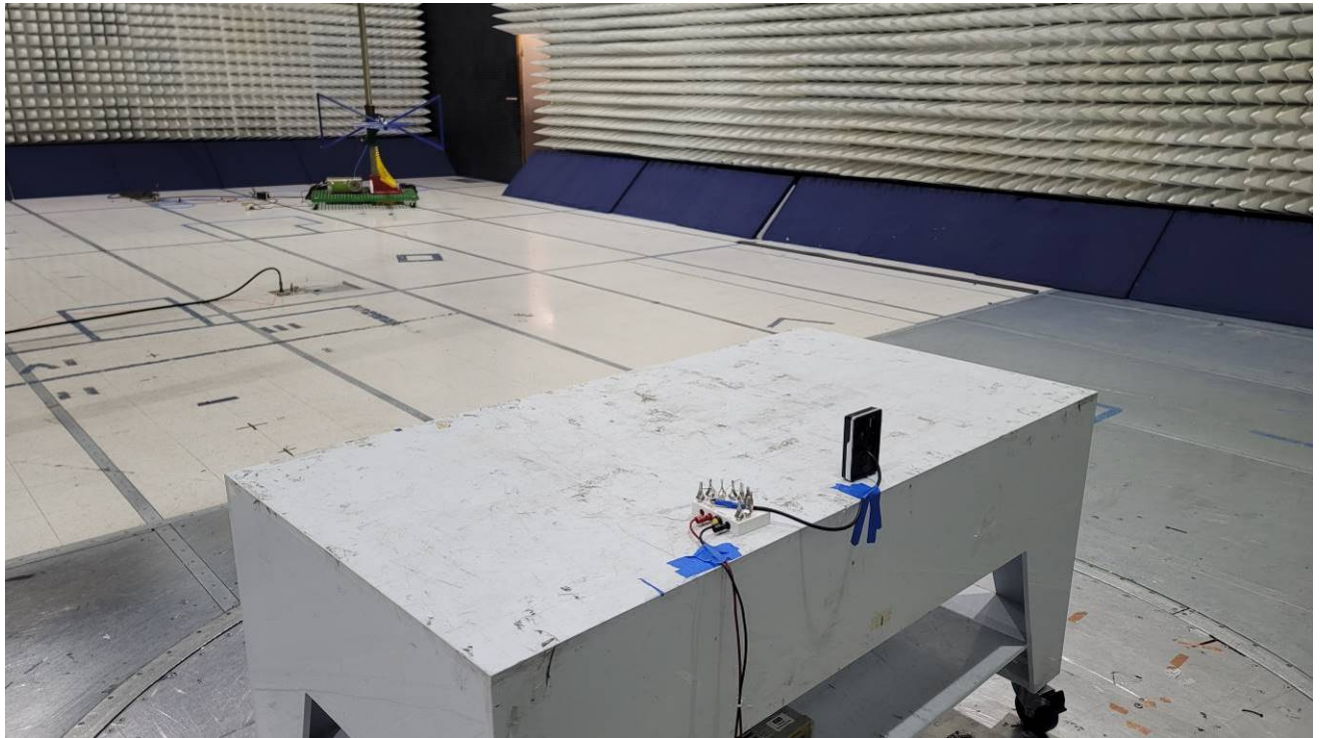
The following photographs show the testing configurations used.



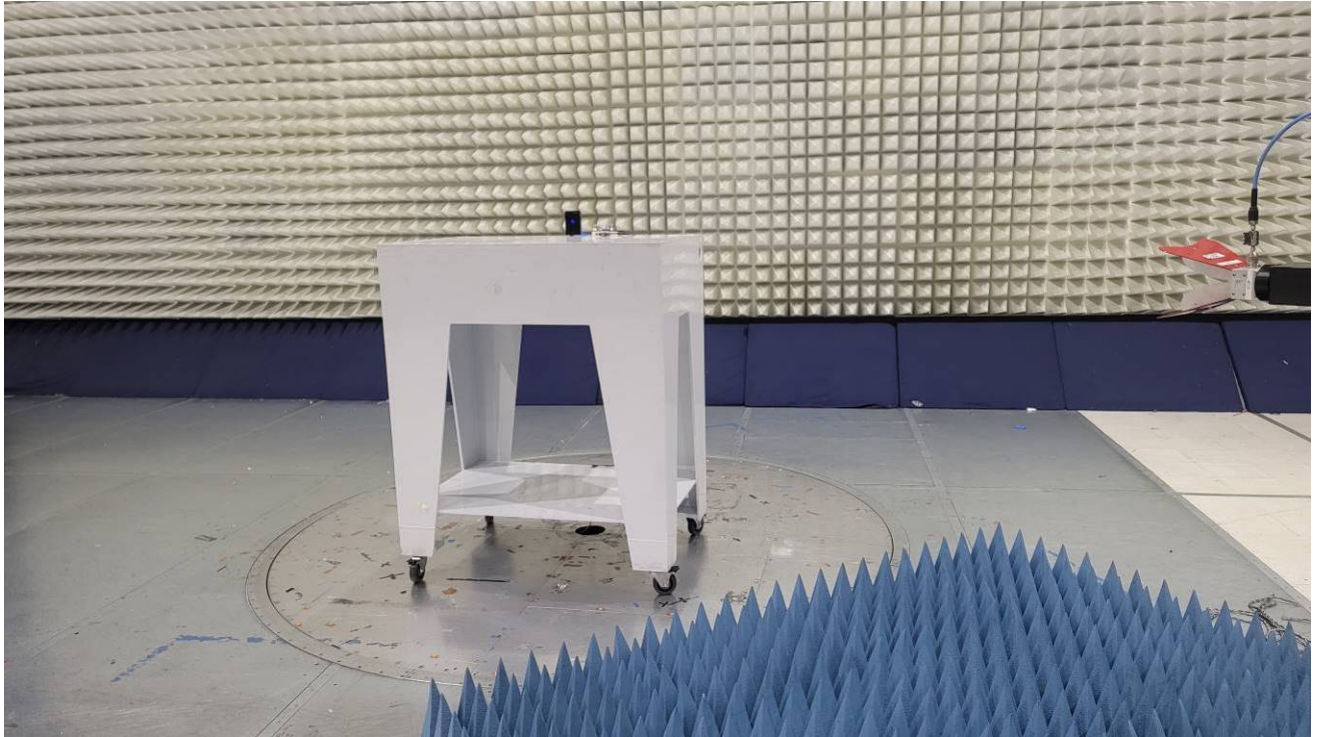
4.2.5 Test Setup Configuration (Continued)



4.2.5 Test Setup Configuration (Continued)



4.2.5 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(μ V)		Class A Limit dB(μ V)	
	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.

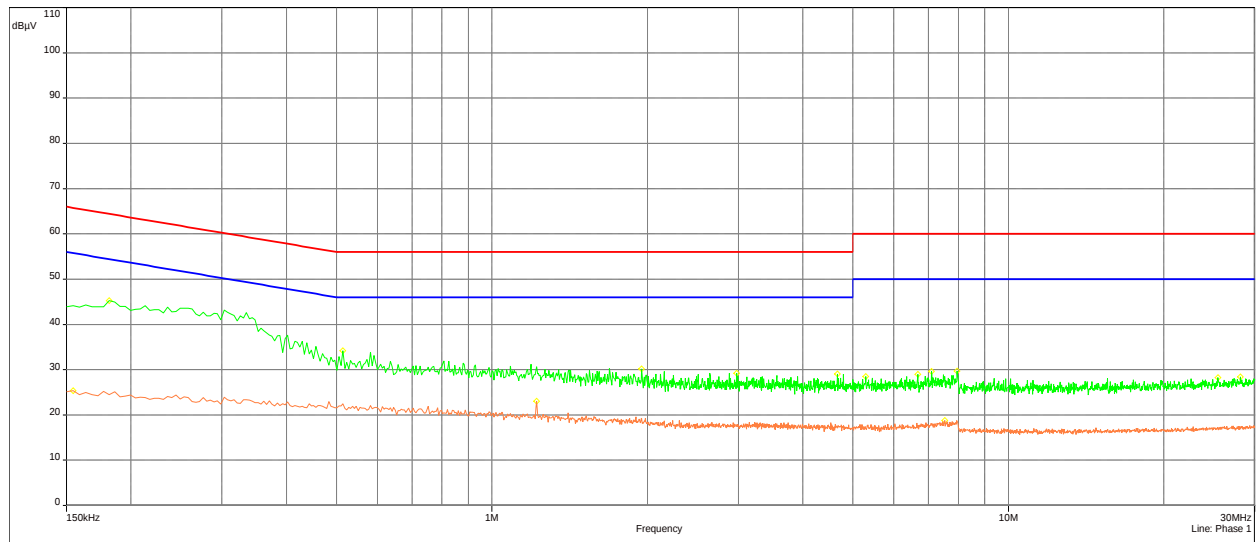
Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.10-2013.

4.6.3 Test Result

15.207, 120VAC 60Hz with BLE Transmitter On

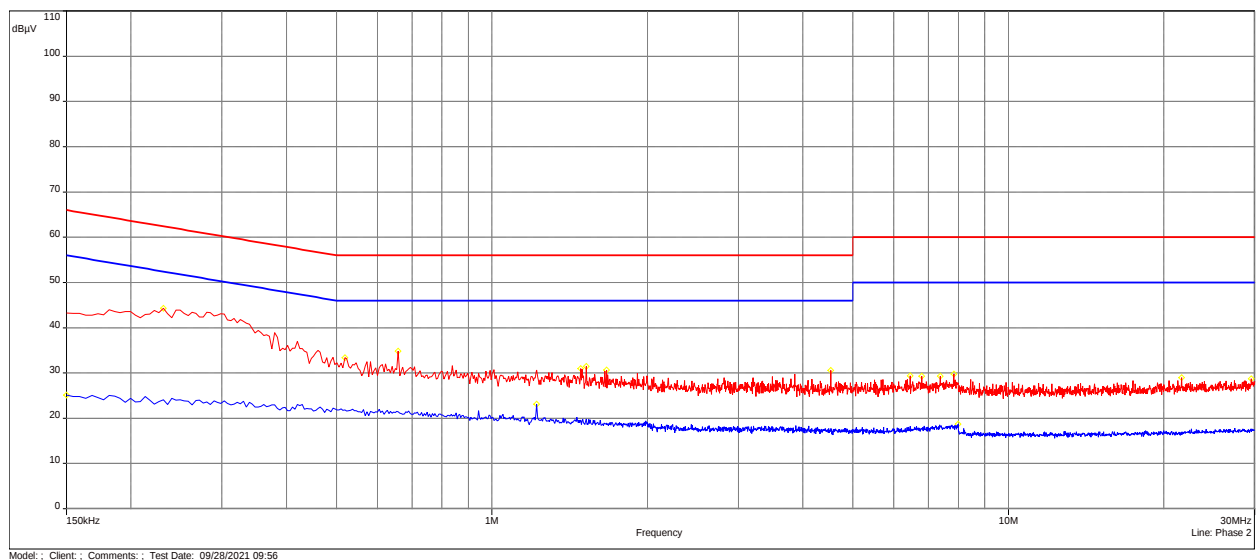
Phase 1

Sub-range 1
Frequencies: 150 kHz - 30 MHz (Mode: Lin - Step: 4.5 kHz)
Settings: RBW: 9kHz, VBW: 30kHz, Sweep time: 2e+03 ms/MHz, Attenuation: 10 dB, Sweep count 3, Preamp: Off, LN Preamp: Off, Preselector: On
Line: Phase 1



Phase 2

Sub-range 2
Frequencies: 150 kHz - 30 MHz (Mode: Lin - Step: 4.5 kHz)
Settings: RBW: 9kHz, VBW: 30kHz, Sweep time: 2e+03 ms/MHz, Attenuation: 10 dB, Sweep count 3, Preamp: Off, LN Preamp: Off, Preselector: On
Line: Phase 2



4.6.3 Test Result (Continued)

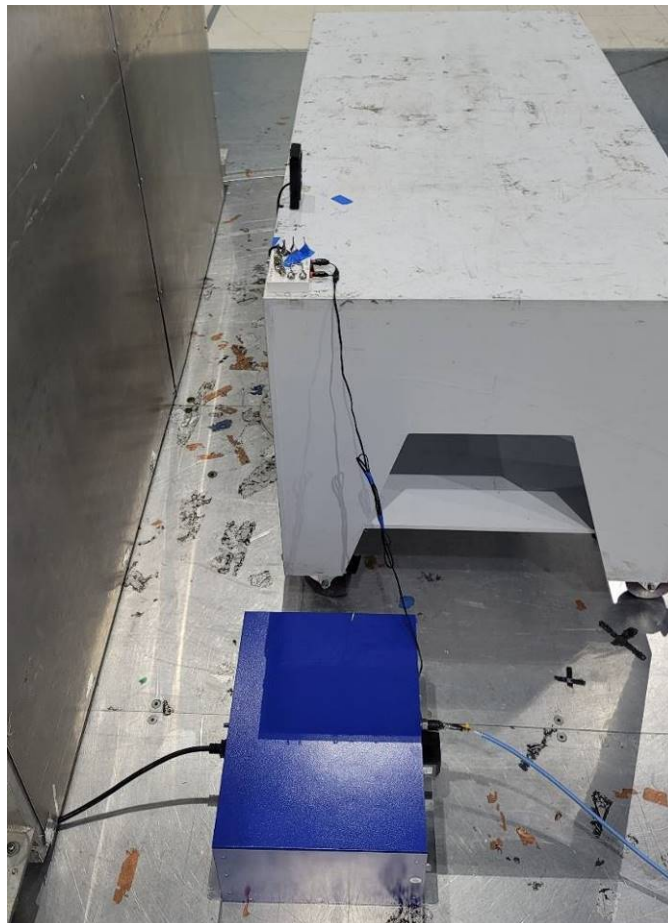
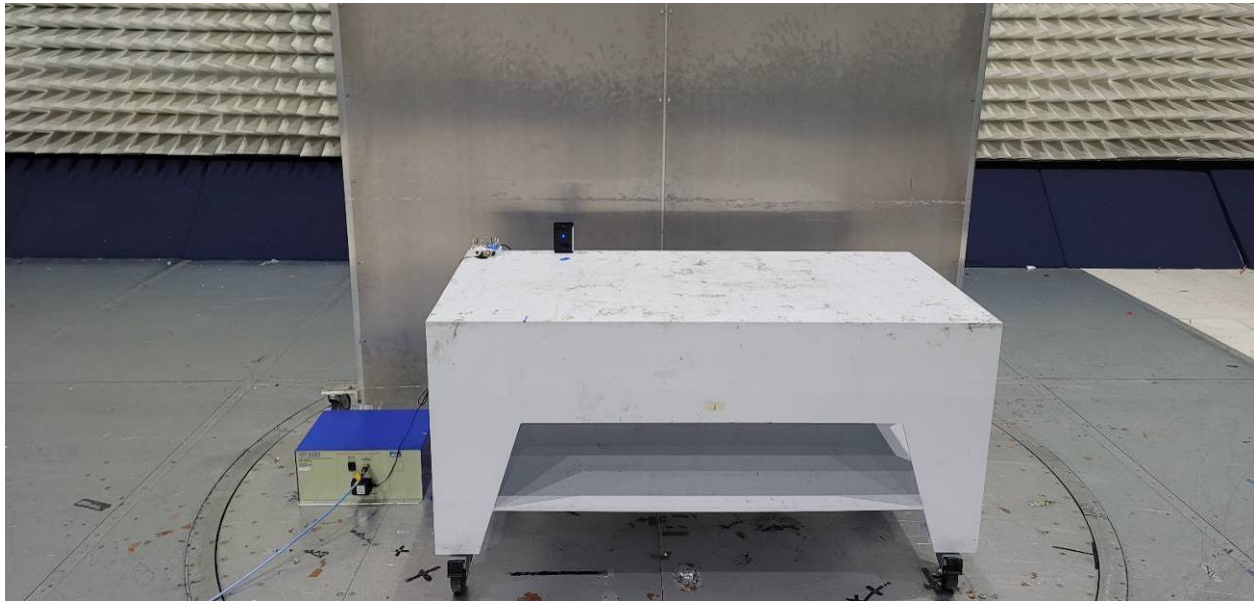
QPeak					
Frequency (MHz)	QPeak (dBμV)	Lim. QPeak (dBμV)	QPeak Margin (dBμV)	Line	Correction (dB)
0.231	44.26	62.41	-18.15	Phase 2	20.89
0.1815	45.24	64.42	-19.18	Phase 1	21.07
0.6585	34.84	56	-21.16	Phase 2	20.66
0.5145	34.16	56	-21.84	Phase 1	20.68
0.519	33.41	56	-22.59	Phase 2	20.68
1.5225	31.48	56	-24.52	Phase 2	20.71
1.4865	31.01	56	-24.99	Phase 2	20.69
1.6665	30.69	56	-25.31	Phase 2	20.7
4.533	30.54	56	-25.46	Phase 2	20.82
1.95	30.21	56	-25.79	Phase 1	20.7

Average					
Frequency (MHz)	Average (dBμV)	Lim. Average (dBμV)	QPeak Margin (dBμV)	Line	Correction (dB)
1.221	23.09	46	-22.91	Phase 2	20.68
1.221	23.01	46	-22.99	Phase 1	20.67
0.1545	25.34	55.75	-30.41	Phase 1	21.17
0.15	25.1	56	-30.9	Phase 2	21.21
7.539	18.81	50	-31.19	Phase 1	20.93
7.9935	18.74	50	-31.26	Phase 2	20.95

Results	Complies
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4.6.4 Test Configuration Photographs

The following photographs show the testing configurations used.



5.0 List of Test Equipment

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

Equipment list used September 11, 2018, for Antenna port Conducted Test data in section 4.1, 4.3 and 4.4

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
Spectrum Analyzer	Rohde and Schwarz	FSU	ITS 00913	12	01/24/2019

Equipment list used May 7, 2020, for Antenna port Conducted Test data in section 4.2

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	11/07/2020

Equipment List used under this project from September 08, 2021, to October 01, 2021

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
EMI Test Receiver 40GHz	Rohde & Schwarz	ESU40	ITS 00961	12	03/09/2022
9kHz - 30MHz Passive Loop Antenna	EMCO	6512	ITS 001598	12	06/21/2022
1-18GHz Horn Antenna Red	ETS Lindgren	3117-PA	ITS 01636	12	12/17/2021
NOTCH FILTER	MICRO-TRONICS	BRC50702	ITS 01166	12	06/29/2022
Bilog Antenna 30MHz - 1GHz	Teseq	CBL 6111D	ITS 01058	12	11/12/2021
9kHz-1GHz Pre-amplifier	Sonoma Instrument	310N	ITS 01714	12	11/13/2021
10kHz - 1GHz 3 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01465	12	09/14/2022
10kHz - 1GHz 15 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01470	12	09/14/2022
1-18GHz RF CABLE	TRU Corp.	TRU Core 300	ITS 01330	12	06/29/2022
1-40GHz RF Cable (SMA type)	MEGAPHASE	EMC1-K1K1-236	ITS 01903	12	03/03/2022
Spectrum Analyzer 20hz-26.5ghz	Rohde & Schwarz	FSU	ITS 00913	12	05/24/2022
10kHz-1GHz 2 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01339	12	09/14/2022
10kHz-1GHz 11 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01335	12	09/14/2022
10kHz-1GHz 6 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01333	12	04/28/2022
150kHz to 30MHz LISN	Com-Power	LIN-115A	ITS 01283	12	05/22/2022

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.17.0.10	Farpointe_3-17-2020.bpp
BAT-EMC	Nexio	3.20.0.23	Intertek Emissions Template.bpp
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 / G104775092	AK	KV	October 14, 2021	Original document