TEST REPORT

Report Number: 104449567MPK-001
Project Numbers: G104449567, G104274802
Report Issue Date: October 27, 2020

Testing performed on
MOBILE-READY CONTACTLESS PROXIMITY CARD READER
Model Number: PB 3500

FCC ID: T8I-CONEKT4
IC: 6504A-CONEKT4
to

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

For

Farpointe Data, Inc.

Test Performed by:	Test Authorized by:
Intertek	Farpointe Data, Inc.
1365 Adams Court	2195 Zanker Road
Menlo Park, CA 94025 USA	San Jose, CA 95131 USA

Prepared by: _____ **Date:** October 27, 2020
Anderson Soungpanya

Reviewed by: _____ **Date:** October 27, 2020
Krishna K Vemuri

Report No. 104449567MPK-001	
Equipment Under Test:	MOBILE-READY CONTACTLESS PROXIMITY CARD READER
Model Number:	PB 3500
Applicant:	Farpointe Data, Inc.
Contact:	Kirk Bierach
Address:	Farpointe Data, Inc. 2195 Zanker Road San Jose, CA 95131
Country:	USA
Tel. Number:	(408) 731-8700
Email:	kirk.bierach@farpointedata.com
Applicable Regulation:	FCC Part 15 Subpart C (15.247) Industry Canada RSS-247 Issue 2
Date of Test:	September 11, 2018, May 7, 2020 & October 5 – 23, 2020

We attest to the accuracy of this report:

Anderson Soungpanya
Project Engineer

Krishna K Vemuri
EMC Manager

TABLE OF CONTENTS

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: March 15, 2020

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: March 15, 2020

Test completion date: October 23, 2020

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:

CONTACTLESS PROXIMITY CARD READER.

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.	PB 3500
FCC Identifier	T8I-CONEKT4
IC Identifier	6504A-CONEKT4
Type of transmission	Digital Transmission System (DTS)
Rated RF Output	1.97 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

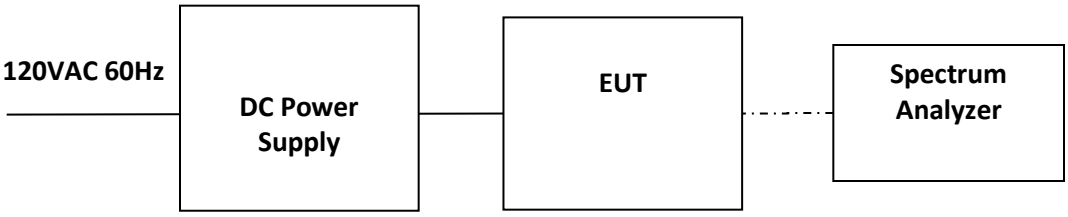
3.1 Support Equipment

Support Equipment		
Description	**Manufacturer**	**Model**
DC Power Supply	Exetech	D30030012

3.2 Block Diagram of Test Setup

Equipment Under Test			
Description	**Manufacturer**	**Model**	**Serial Number**
Radiated Sample of MOBILE-READY CONTACTLESS PROXIMITY CARD READERs	Farpointe Data, Inc.	PB 3500	24010002

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



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

EUT Photo


Farpointe Data, Inc.
Model:PB-3500
20410002
+8 to14 VDC, 0.04 to 0.195A
Reference to installation manual
Outdoor use or equivalent

3.3 Justification

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

BLE transmitter is identical to certification, FCC ID: T8I-CONEKT3 and IC: 6504A-CONEKT3. Antenna port Conducted Test data in section 4.1, 4.3, 4.4 were borrowed from original report, 104274802MPK-001. Radiated Emissions were remeasured to show 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) ≥ 3 x 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.

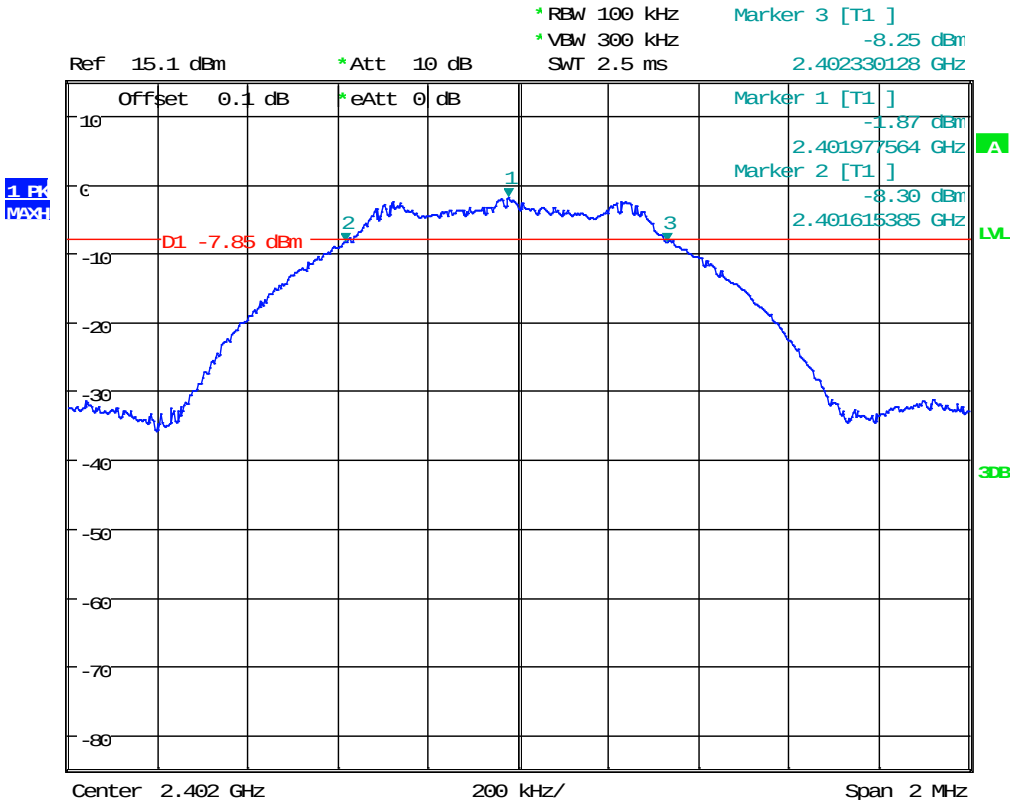
For 99% power bandwidth measurement, the bandwidth was determined by using the built-in 99% occupied bandwidth function of the spectrum analyzer. The resolution bandwidth is set to 1% of the selected span as is without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

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
	--	1.069	1.4
2440	705.128	--	1.2
	--	1.054	1.5
2480	714.743	--	1.3
	--	1.737	1.6

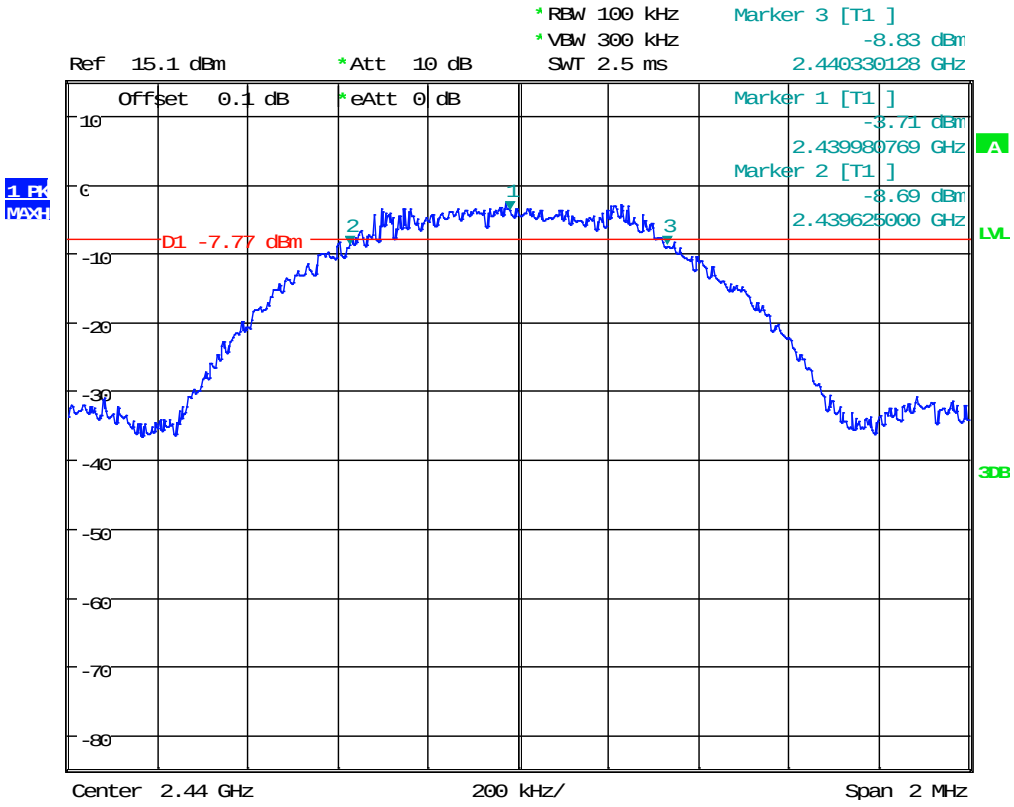
Tested By	Test Date	Results
Aaron Chang	September 11, 2018	Complies

Plot 1. 1



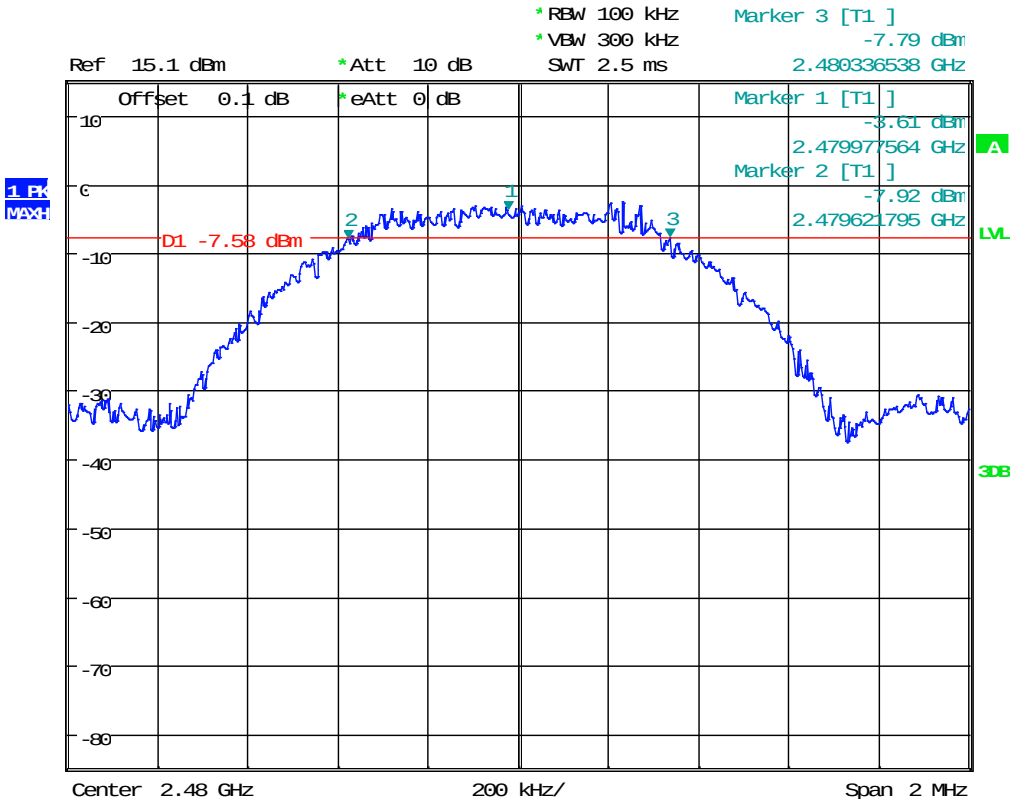
Date: 11.SEP.2018 11:18:32

Plot 1. 2



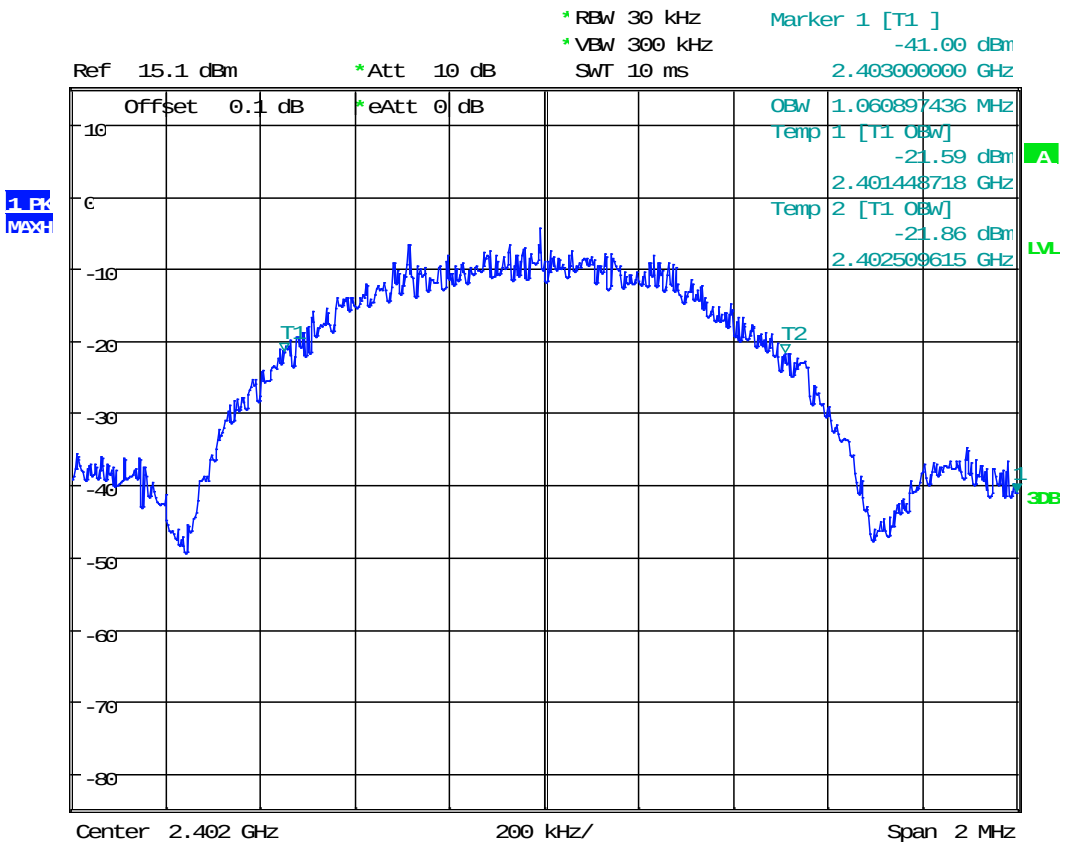
Date: 11.SEP.2018 11:23:11

Plot 1. 3



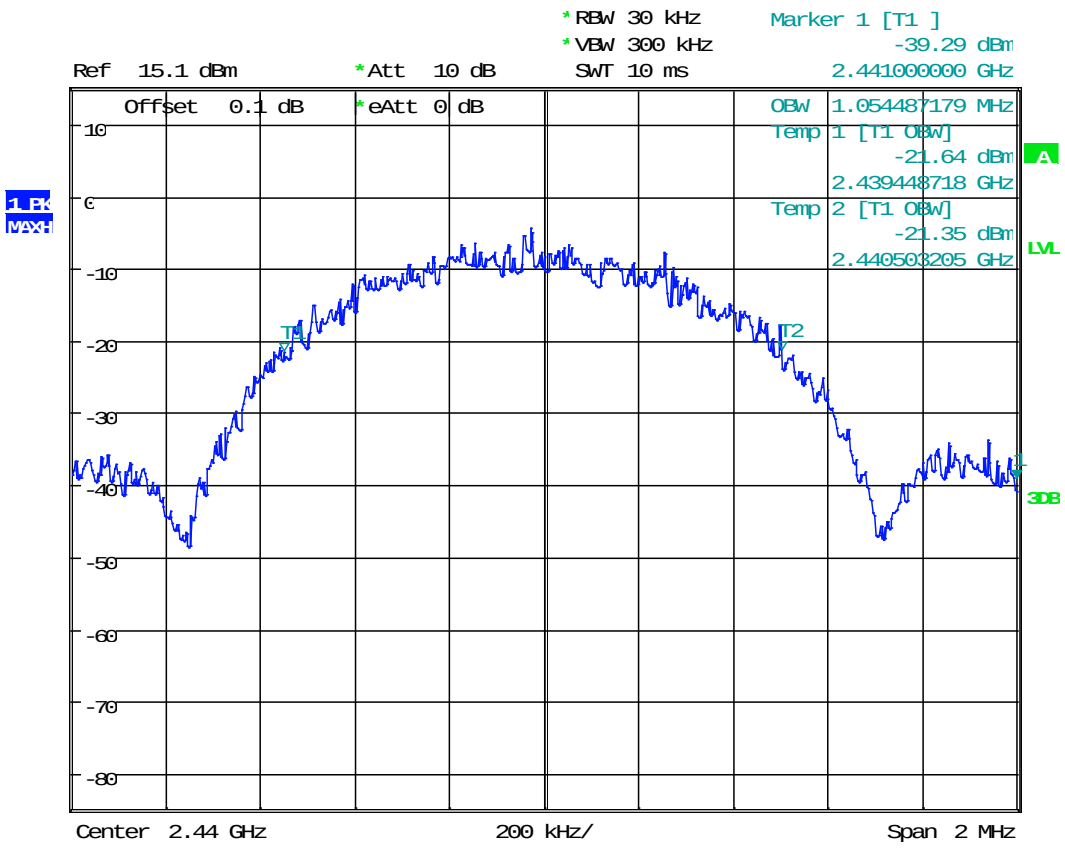
Date: 11.SEP.2018 11:25:58

Plot 1. 4



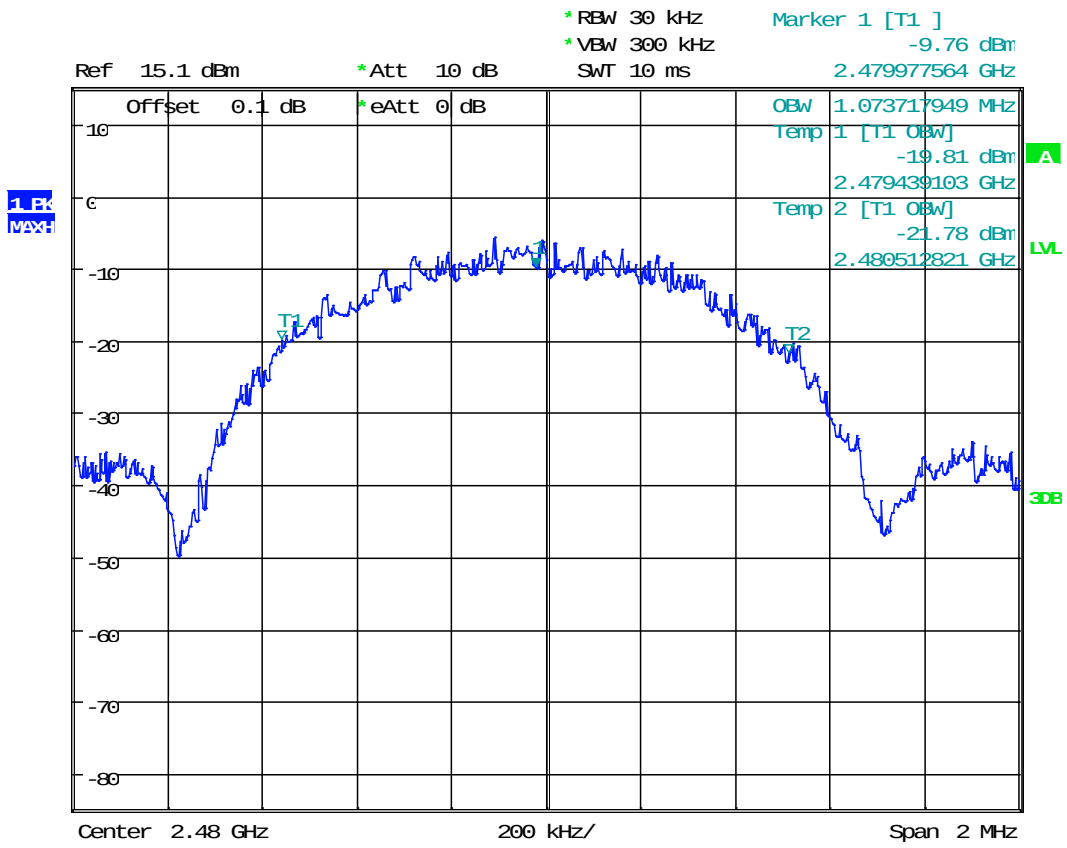
Date: 11.SEP.2018 11:34:26

Plot 1.5



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

Plot 1.6



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

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 ≥ DTS bandwidth in ANSI 63.10.

1. Set the RBW ≥ DTS Bandwidth
2. Set the VBW ≥ 3 x RBW
3. Set the span ≥ 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.

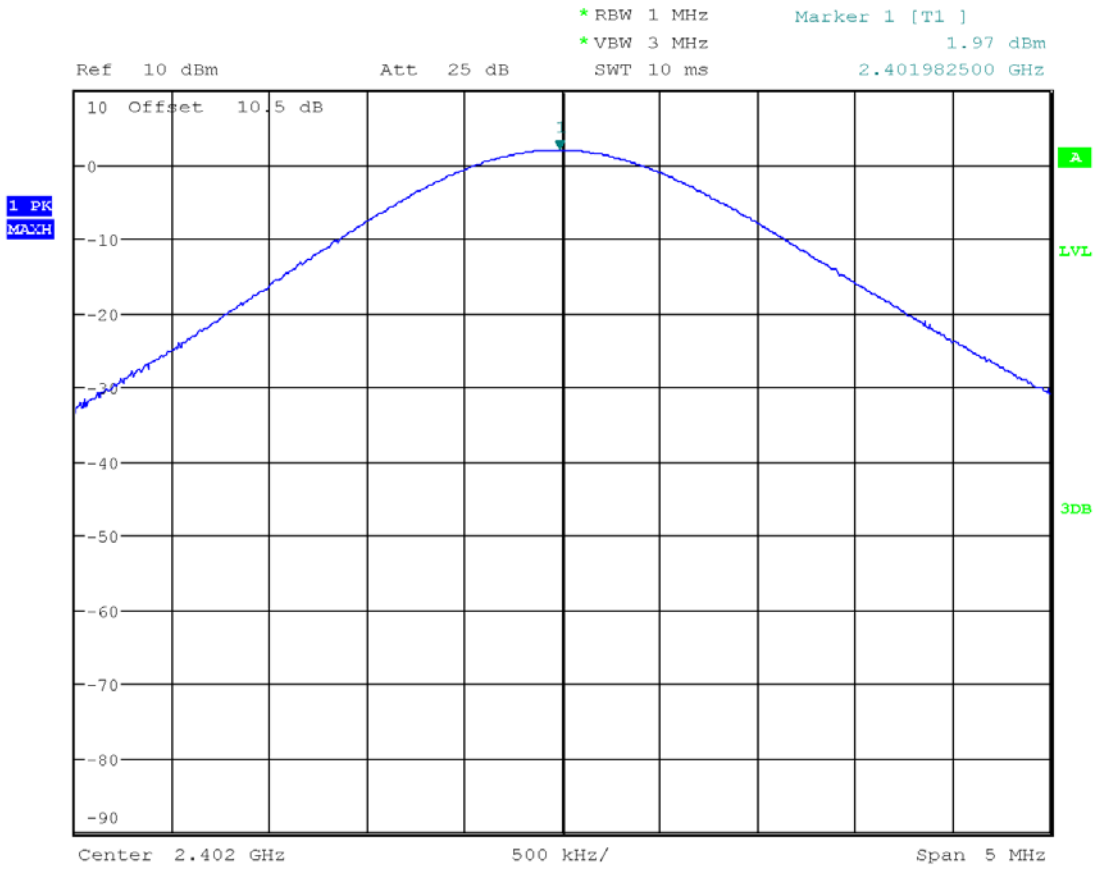
4.2.3 Test Result

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

Frequency	Conducted Power (peak)		Plot
MHz	dBm	mW	
2402	1.97	1.574	2.1
2442	1.88	1.542	2.2
2480	1.75	1.496	2.3

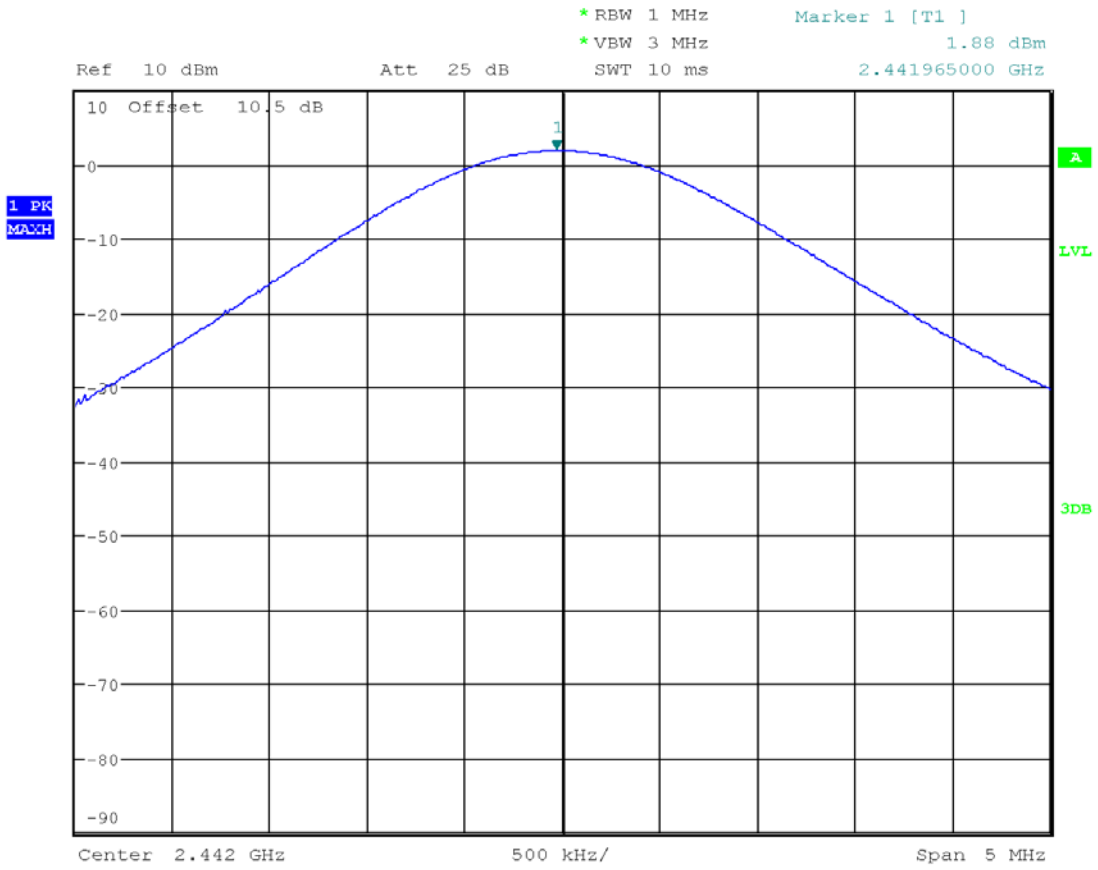
Tested By	Test Date	Results
Anderson Soungpanya	October 23, 2020	Complies

Plot 2. 1



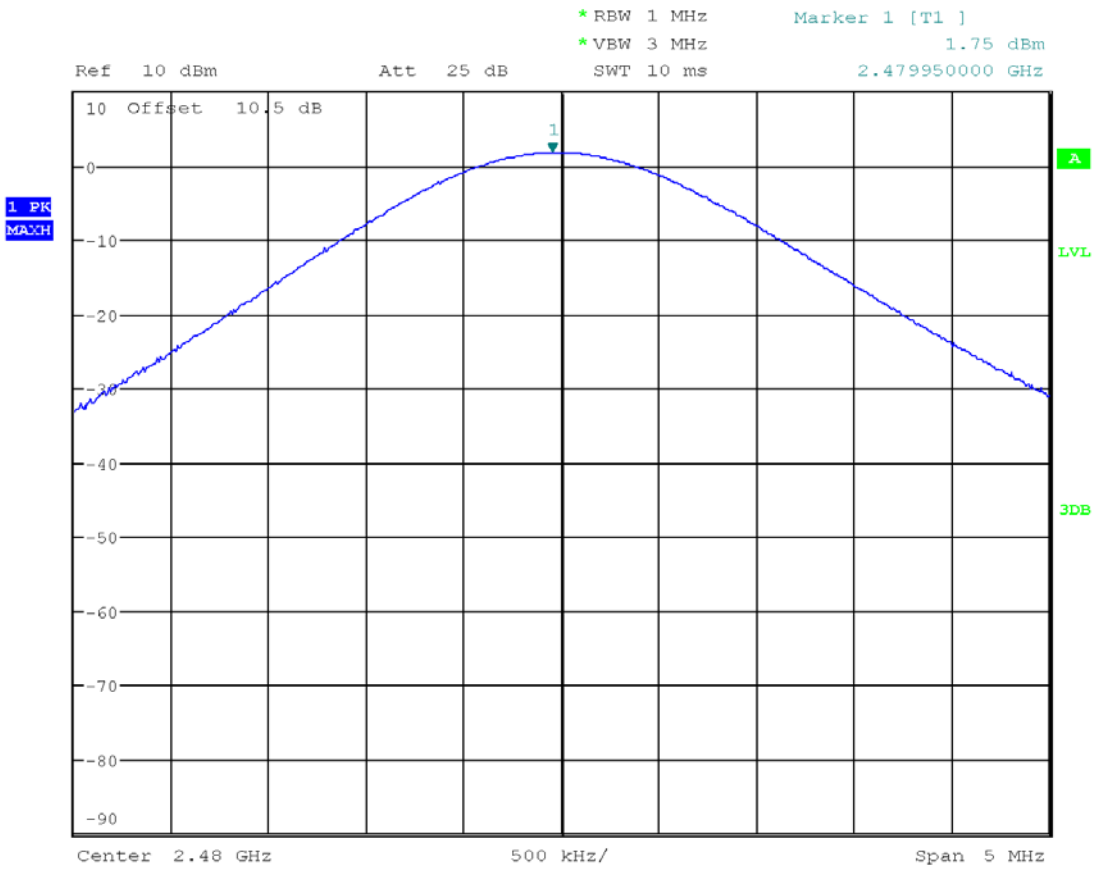
Date: 23.OCT.2020 08:58:40

Plot 2. 2



Date: 23.OCT.2020 08:57:50

Plot 2. 3



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 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x 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.

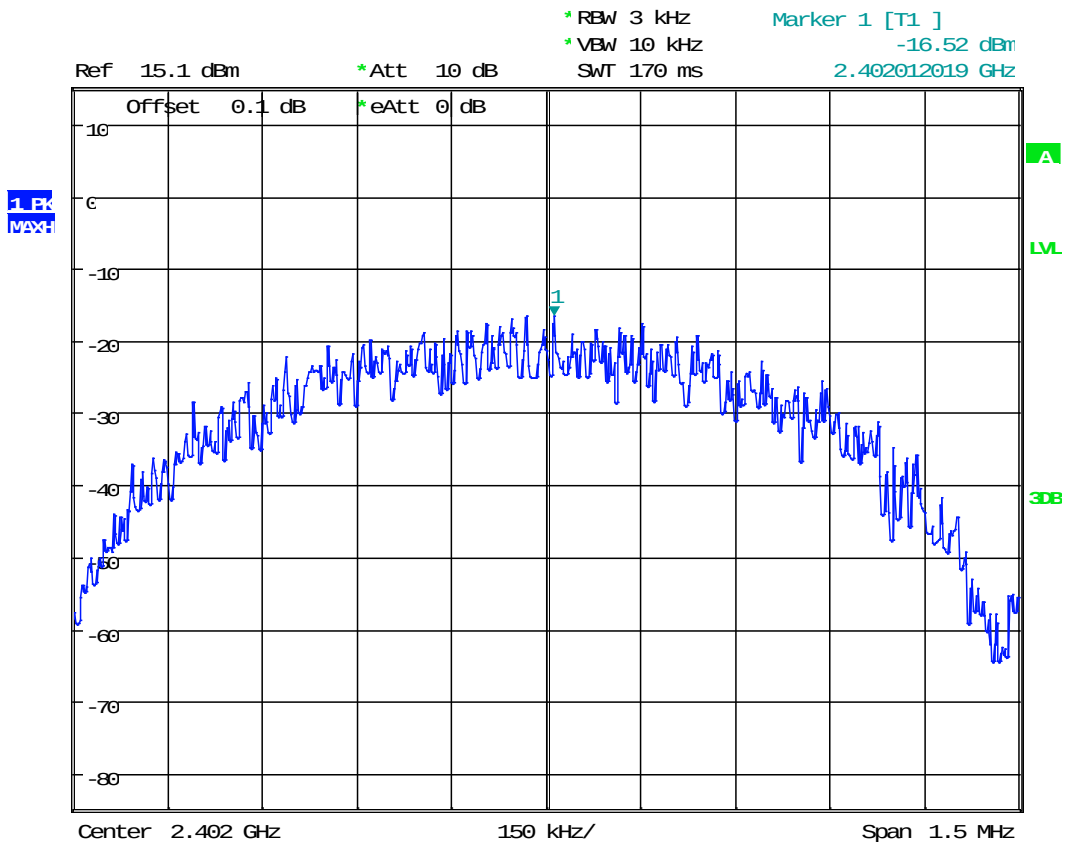
4.3.3 Test Result

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

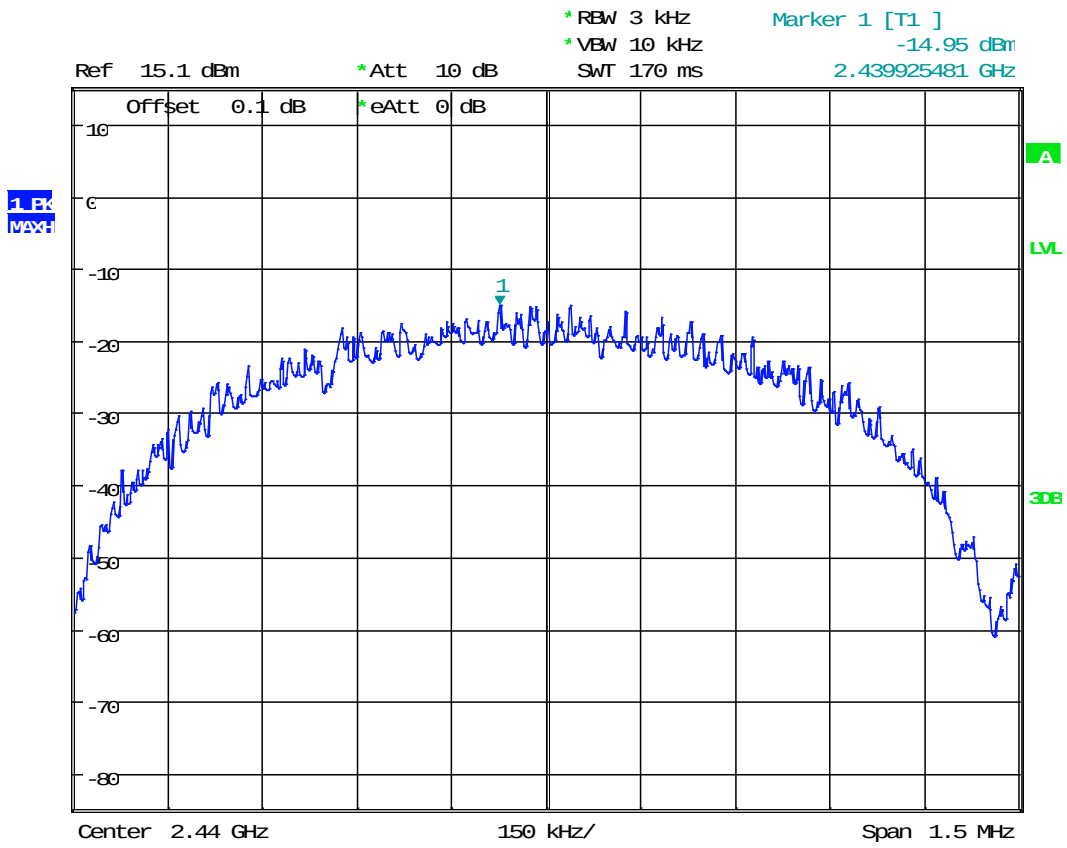
Tested By	Test Date	Results
Aaron Chang	September 11, 2018	Complies

Plot 3. 1



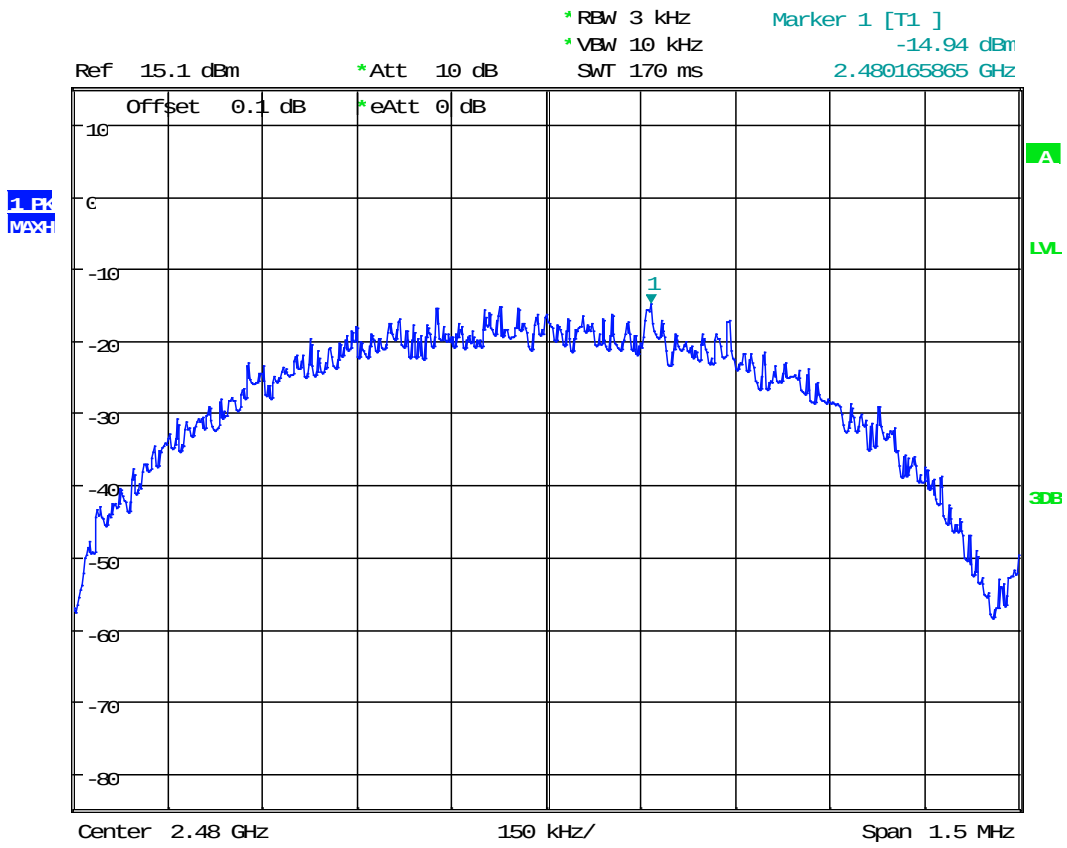
Date: 11.SEP.2018 11:39:49

Plot 3. 2



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

Plot 3. 3



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

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 ≥ 3 x 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.

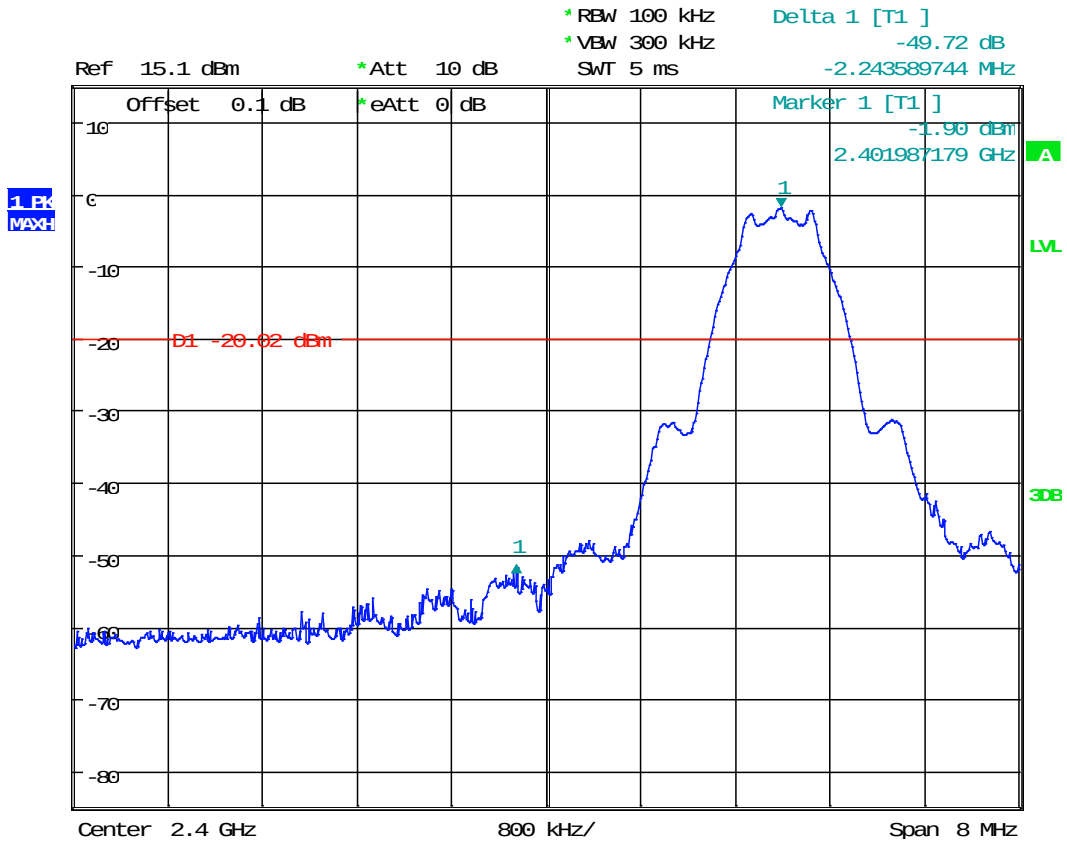
The unwanted emissions were measured from 30 MHz to 25 GHz. Plots below are corrected for cable loss and then compared to the limits.

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.

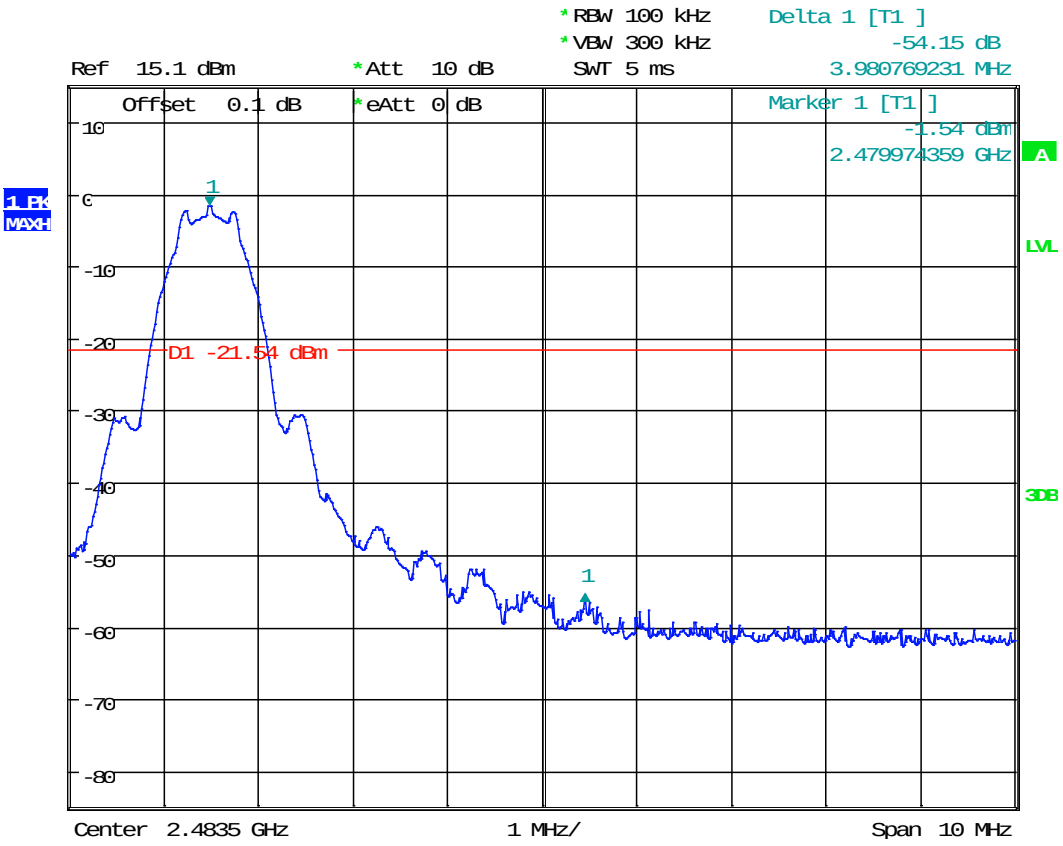
Tested By	Test Date	Results
Aaron Chang	September 11, 2018	Complies

Tx @ Low Channel, 2400 MHz Band Edge
Plot 4.1



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

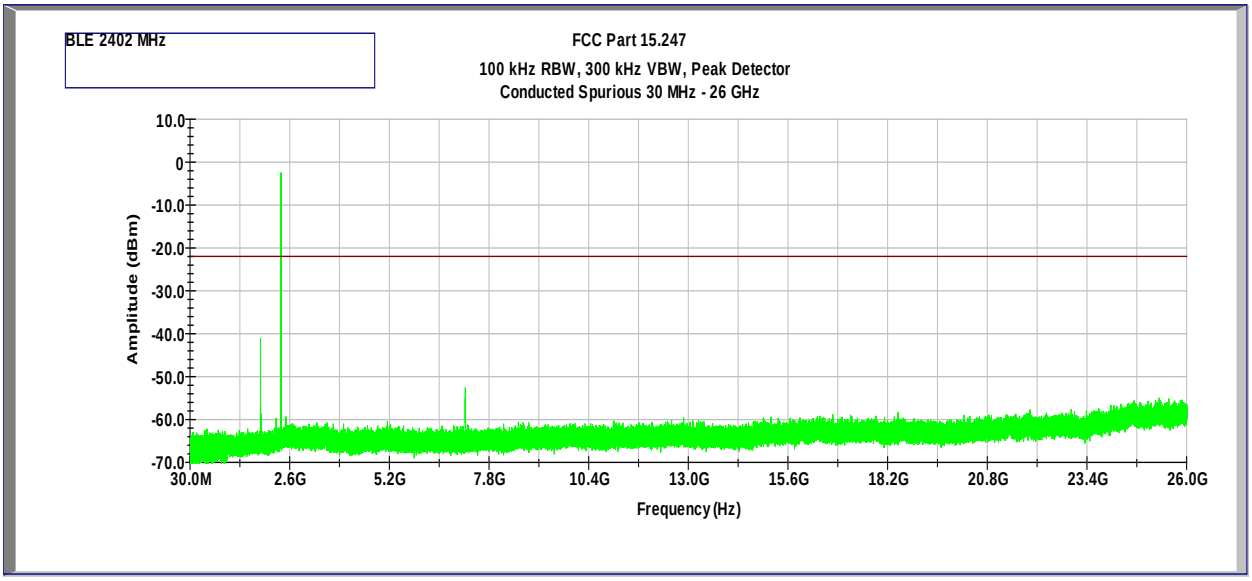
Tx @ High Channel, 2483.5 MHz Band Edge
Plot 4.2



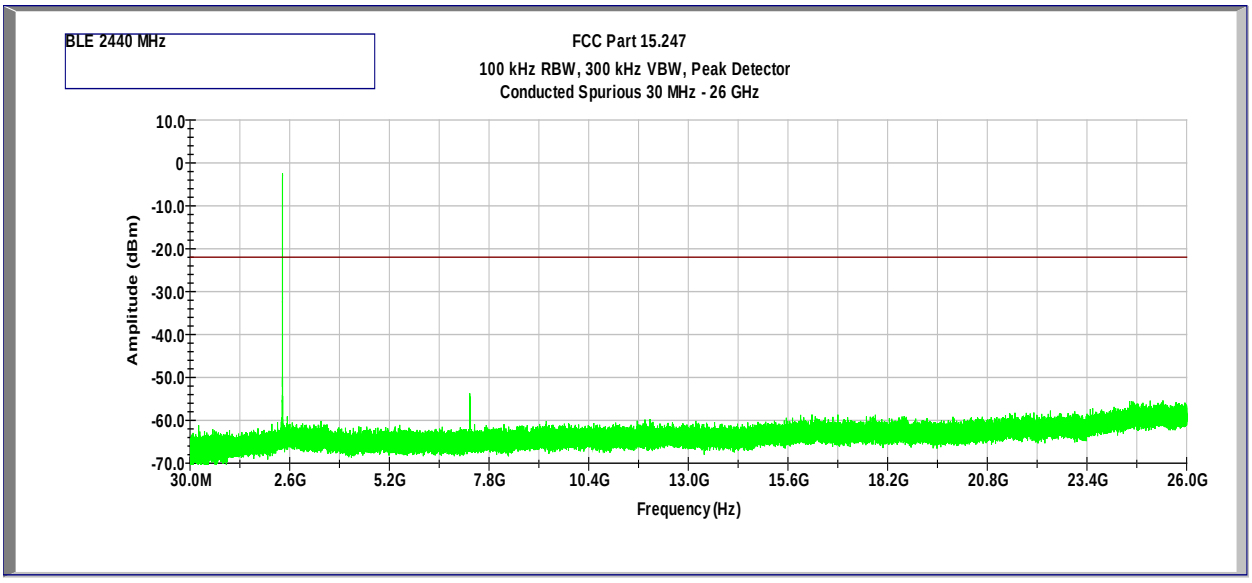
Date: 11.SEP.2018 12:06:10

Results	Complies

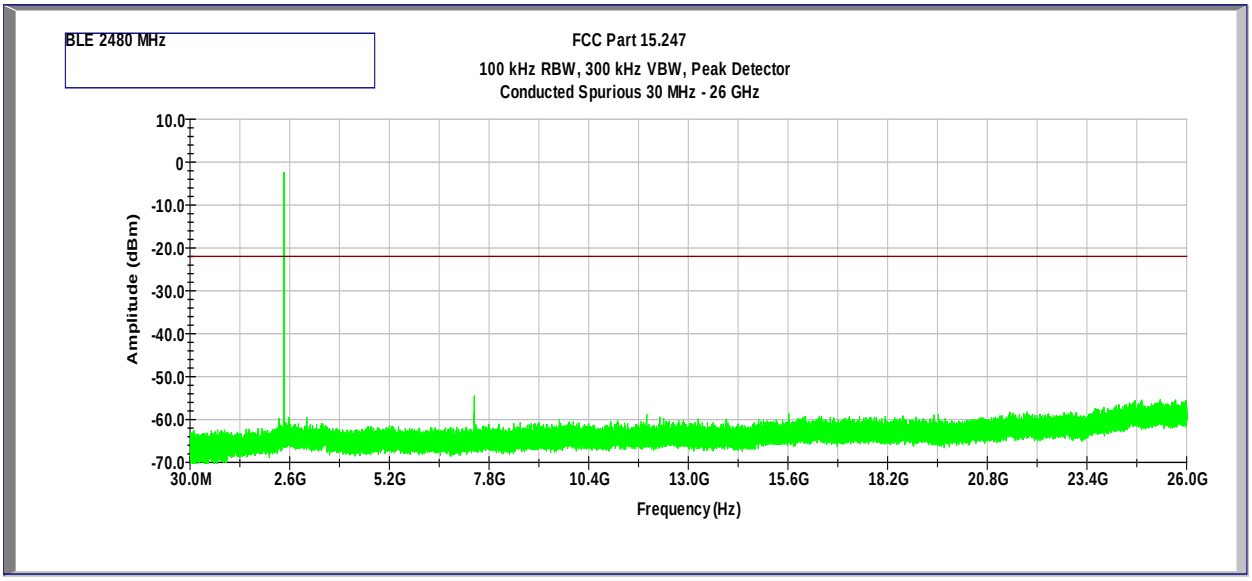
Tx @ Low Channel, 2402 MHz
30MHz -26GHz Conducted Spurious
Plot 4.3



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 30 MHz to 25 GHz according to the procedure described in ANSI C63.10: 2013. Spectrum Analyzer Resolution Bandwidth is 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).

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(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV); 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(μV) 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(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.
RA = 52.0 dB(μV)
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(μV/m).
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m.

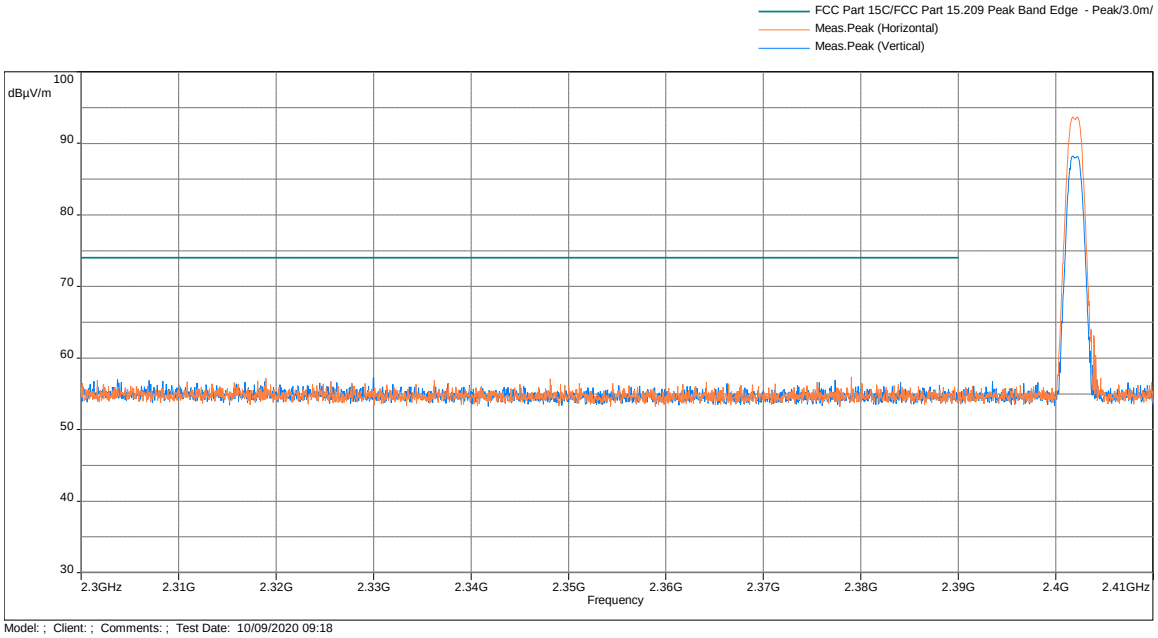
4.5.4 Test Results

All testing in this section were performed by radiated measurements.

Tested By	Test Date	Results
Anderson Soungpanya	October 6 – 9, 2020	Complies

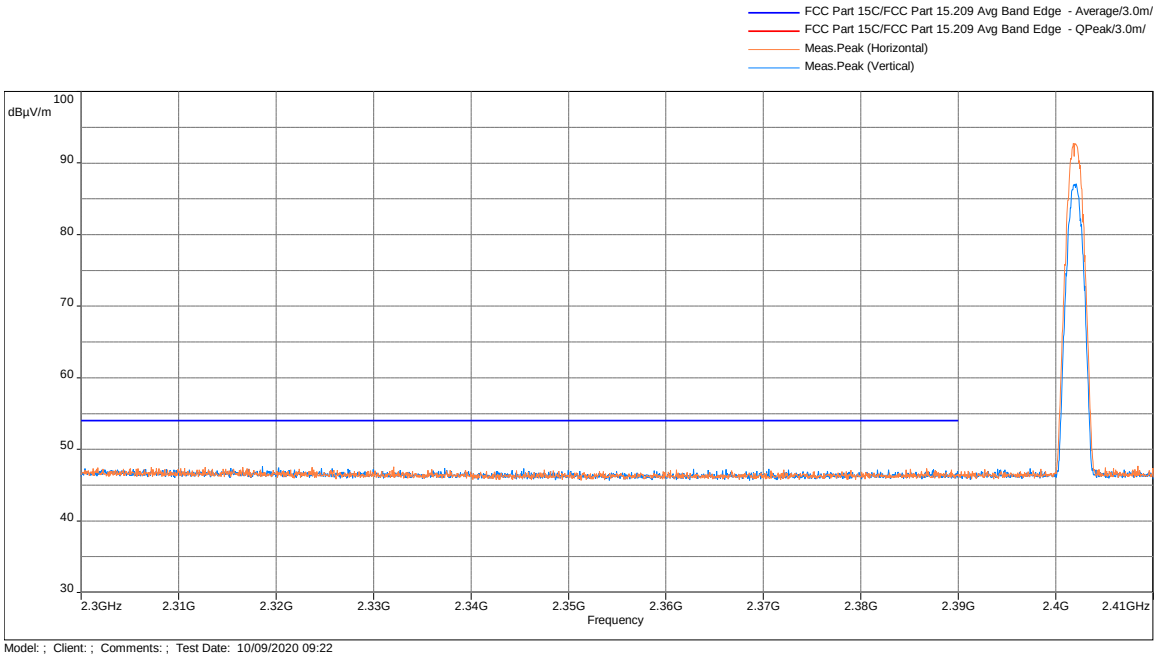
Test Results: 15.209/15.205 Radiated Restricted Band Emissions

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 09:18

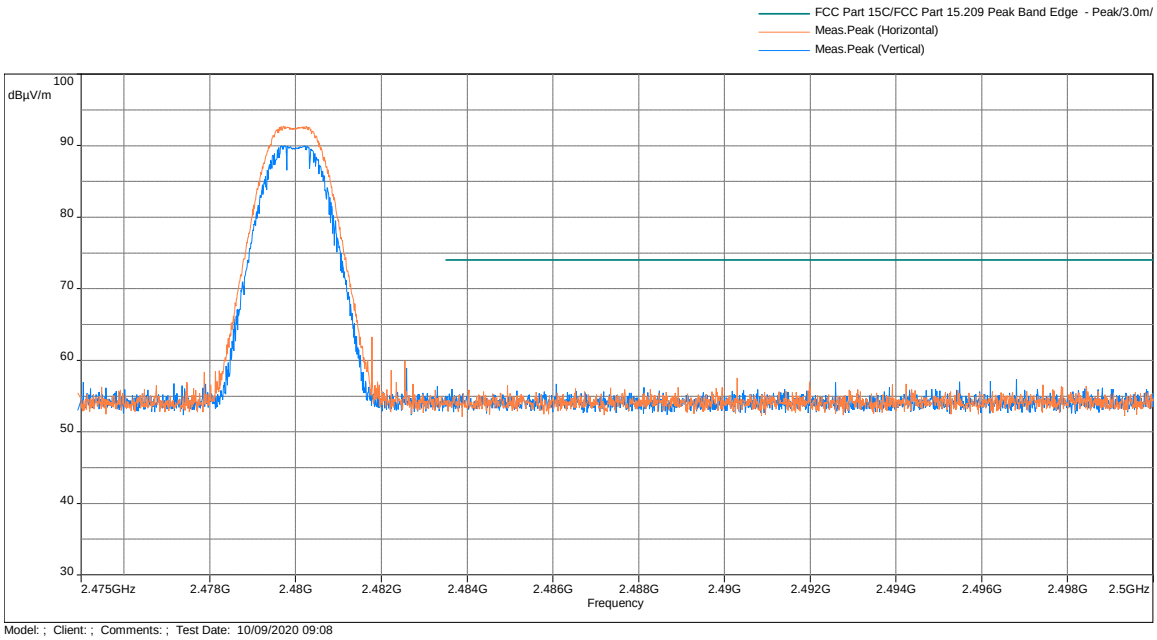
Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Average Scan with Average Limit



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 09:22

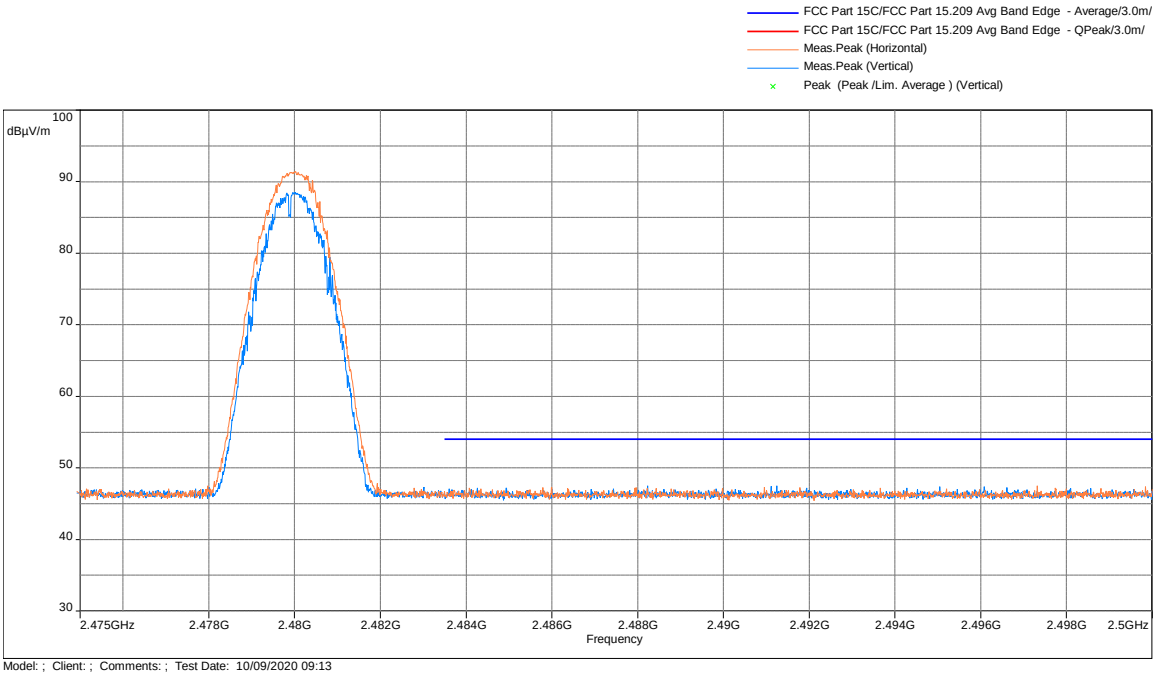
Results	Complies

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 09:08

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



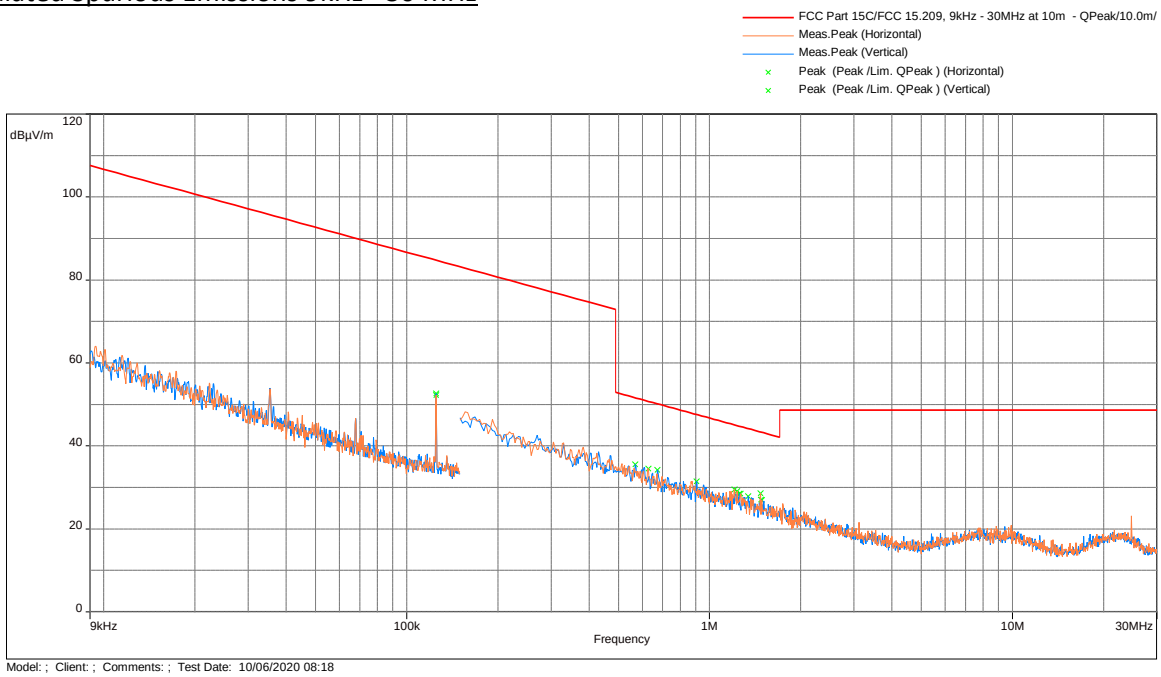
Model: ; Client: ; Comments: ; Test Date: 10/09/2020 09:13

Results	Complies

Out-of-Band Radiated Spurious Emissions

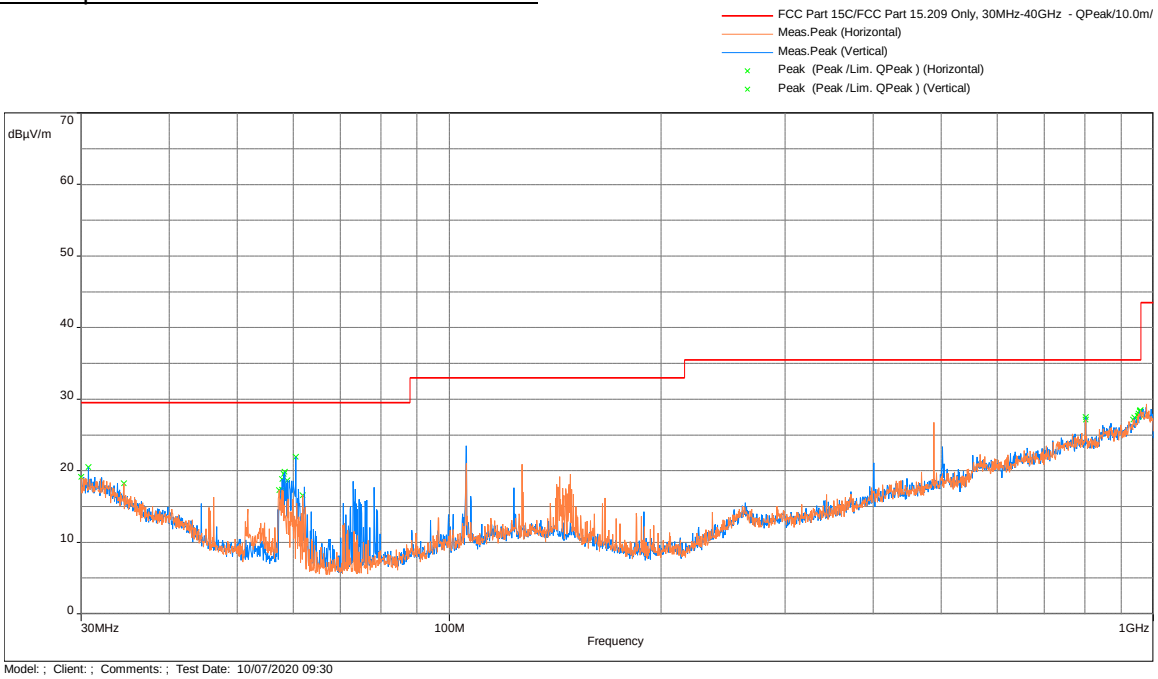
Test Results: 15.209 Radiated Spurious Emissions Low Channel, Tx at 2402MHz

Radiated Spurious Emissions 9kHz - 30 MHz



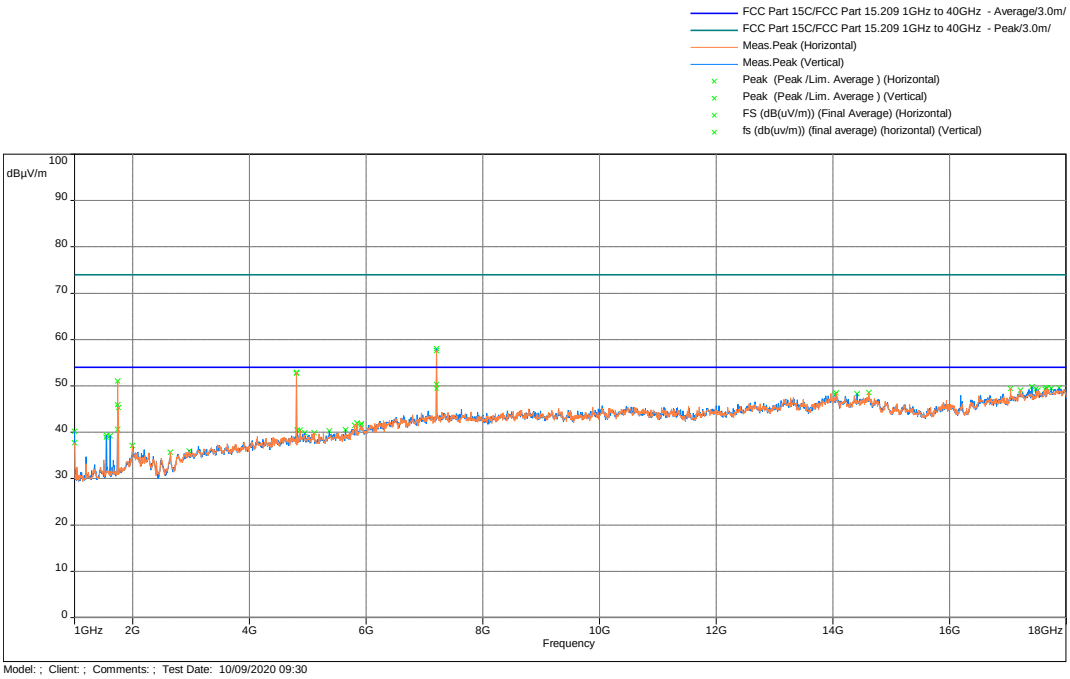
Model: ; Client: ; Comments: ; Test Date: 10/06/2020 08:18

Radiated Spurious Emissions 30 MHz - 1000 MHz



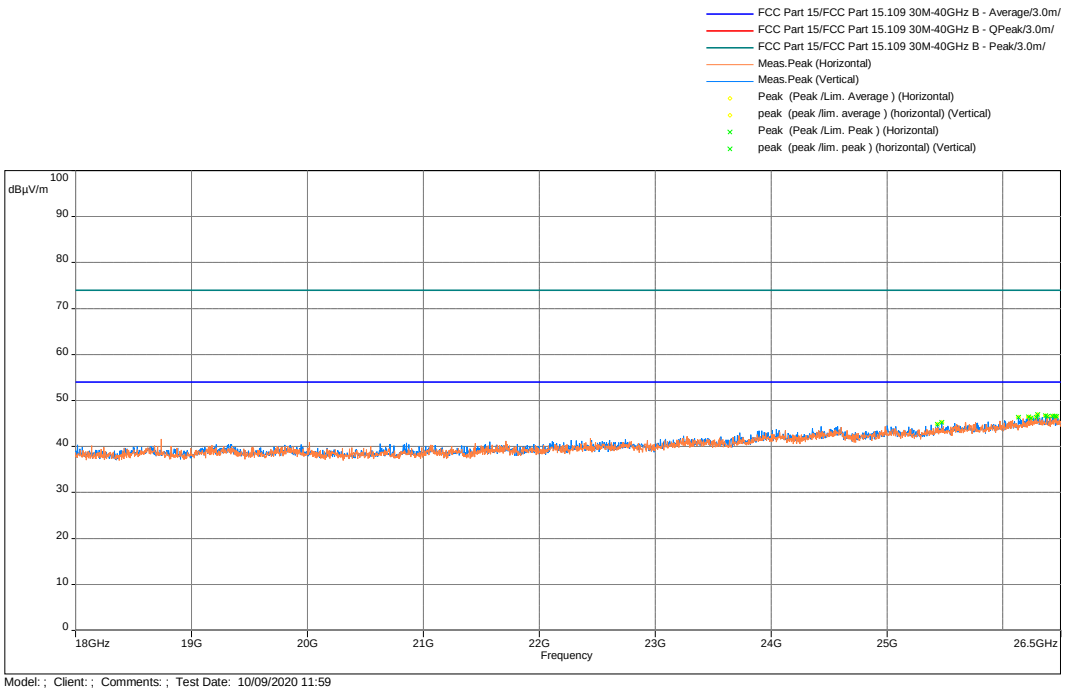
Model: ; Client: ; Comments: ; Test Date: 10/07/2020 09:30

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 09:30

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 11:59

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

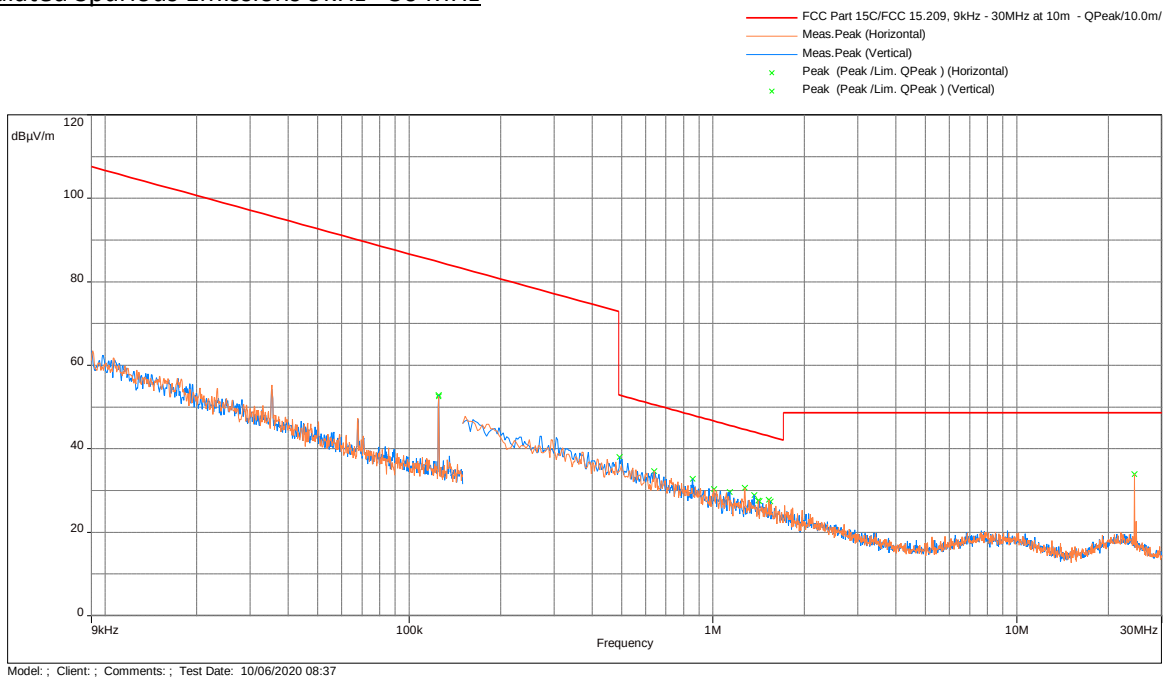
Freq. MHz	Peak FS@10m dB(uV/m)	Limit@10m dB(µV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
58.388	19.82	29.5	-9.68	4	7	Vertical	-21.80
60.522	21.90	29.5	-7.60	4	359	Vertical	-21.95

Freq.	Avg FS@3m	Avg Limit@3m	Margin	Angle	Height	Polarity	Correction
MHz	dBµV/m	dBµV/m	dB	deg	m		
7205.305	49.40	54	-4.6	128	3.08	Horizontal	-0.3
7205.304	50.37	54	-3.63	358	2.81	Vertical	-0.3
4803.467	39.44	54	-14.56	133	2.52	Horizontal	-6.06
4803.467	38.16	54	-15.84	289	2.11	Vertical	-6.06

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

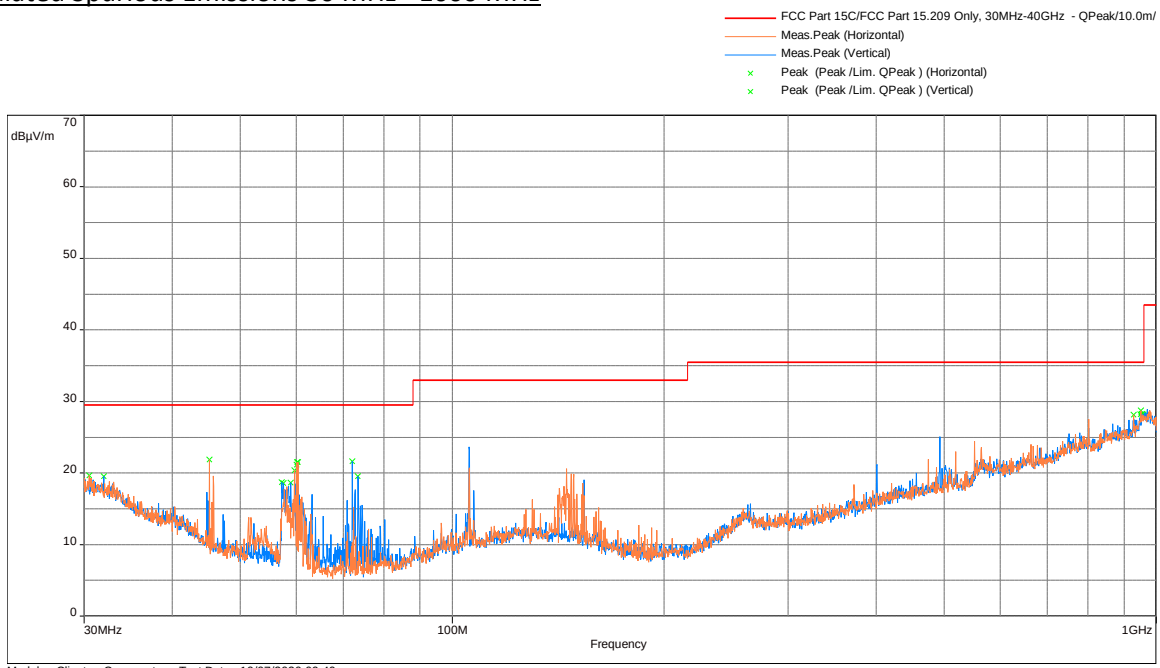
Results	Complies

Radiated Spurious Emissions 9kHz - 30 MHz



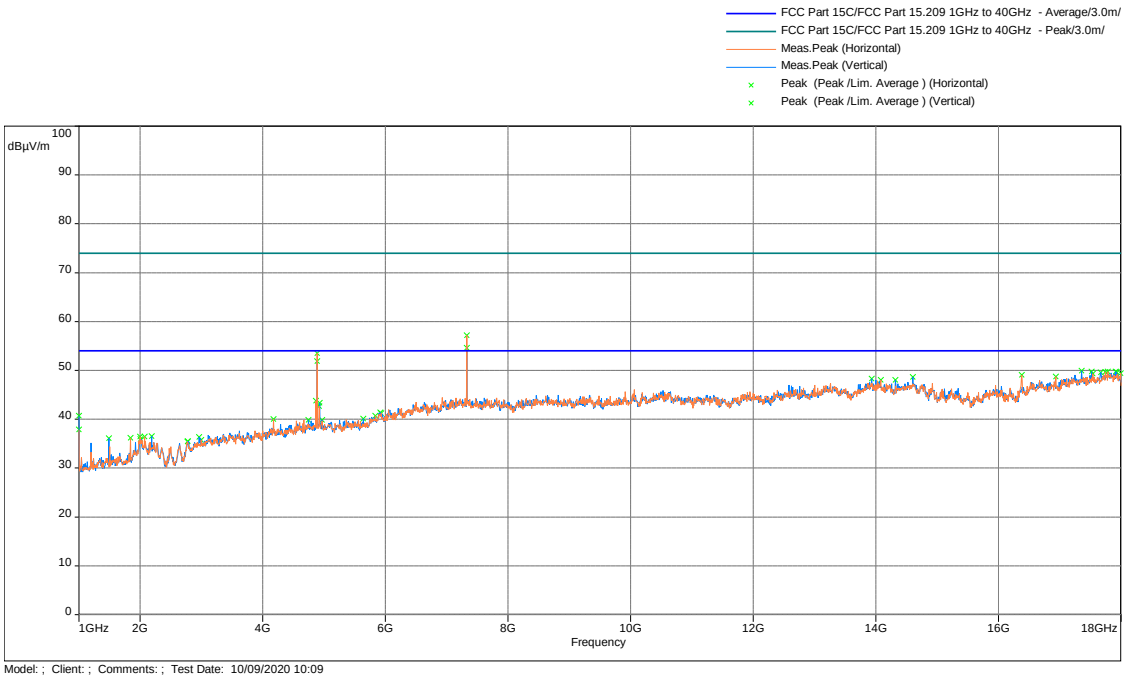
Model: ; Client: ; Comments: ; Test Date: 10/06/2020 08:37

Radiated Spurious Emissions 30 MHz - 1000 MHz



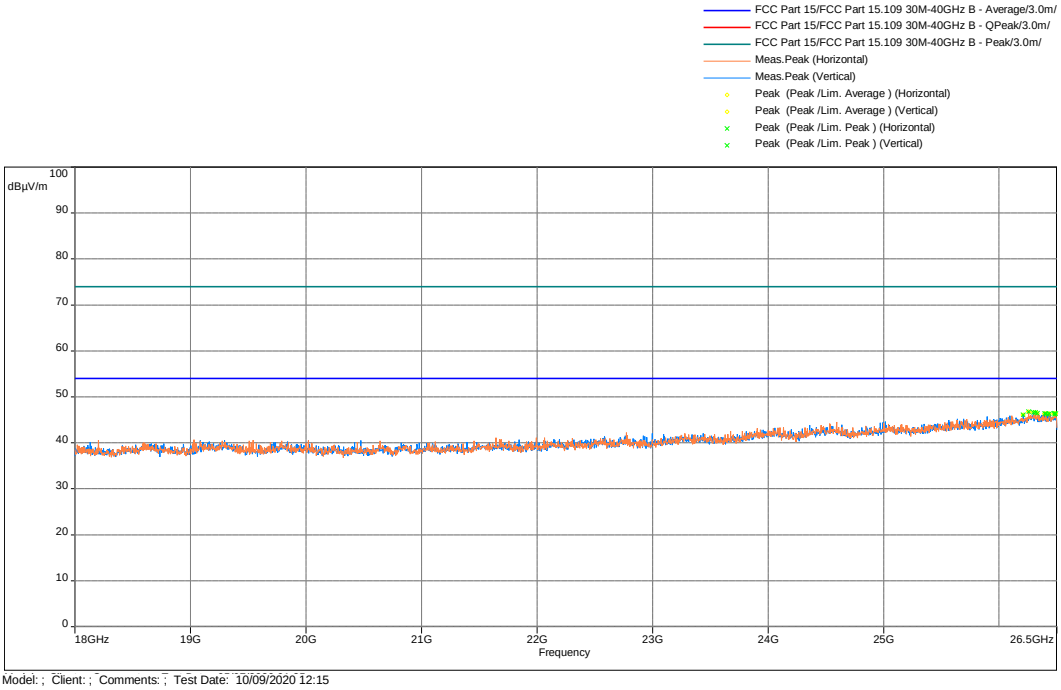
Model: ; Client: ; Comments: ; Test Date: 10/07/2020 09:49

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 10:09

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 12:15

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

Freq. MHz	Peak FS@10m dB(uV/m)	Limit @10m dB(µV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
60.39333	21.5	29.5	-8	1.98	214	Horizontal	-21.95
72.13033	21.62	29.5	-7.88	3.98	224.25	Vertical	-20.76

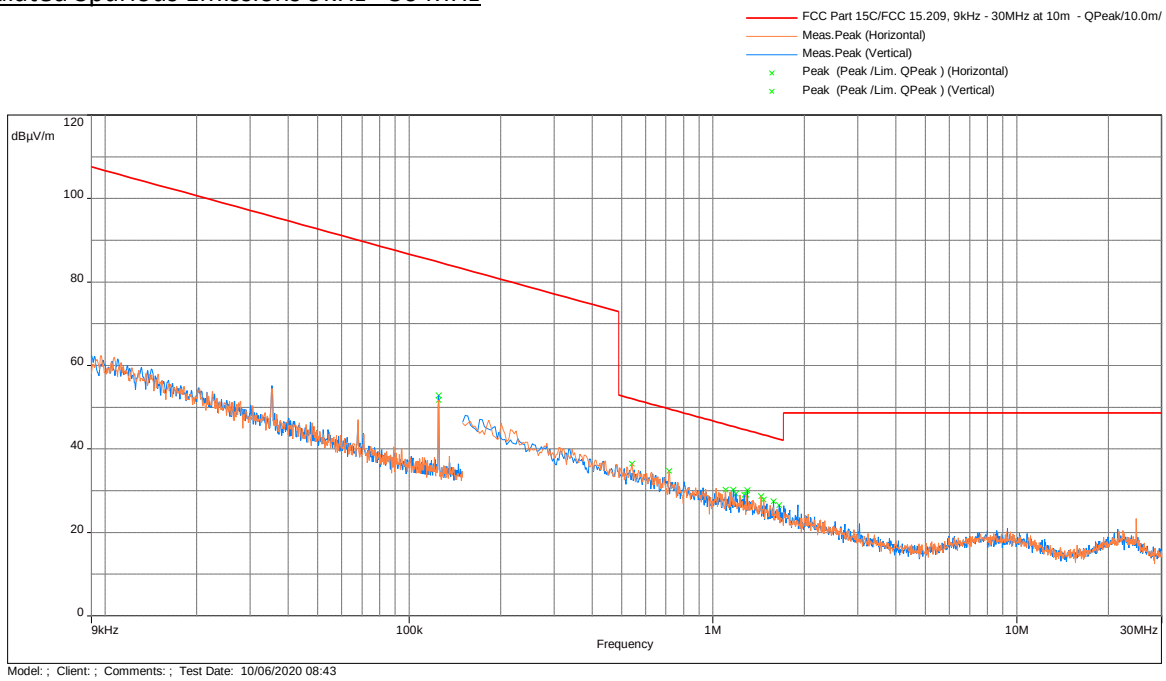
Freq.	Avg FS@3m	Avg Limit@3m	Margin	Angle	Height	Polarity	Correction
MHz	dBµV/m	dBµV/m	dB	deg	m		
7326.833	48.35	54	-5.65	86	3.41	Horizontal	0.05
7326.833	49.57	54	-4.43	179	2.44	Vertical	0.05
4883.367	38.97	54	-15.03	57	1.95	Horizontal	-5.84
4883.367	38.26	54	-15.74	215	2.57	Vertical	-5.84

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

Results	Complies

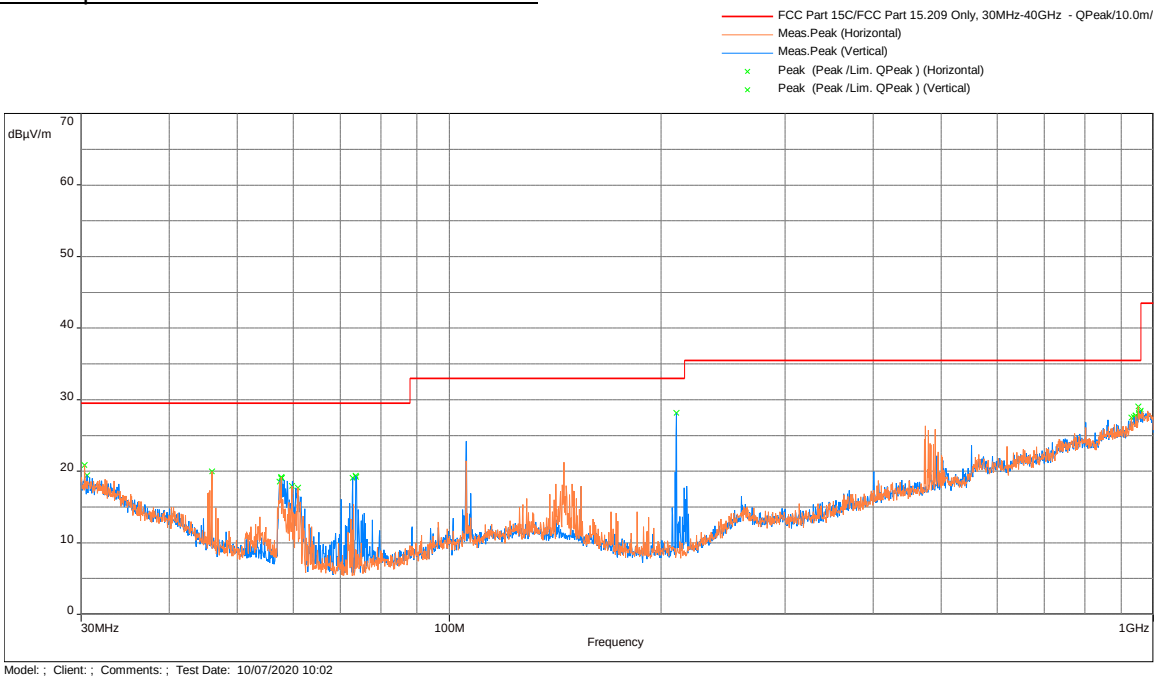
Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz

Radiated Spurious Emissions 9kHz - 30 MHz



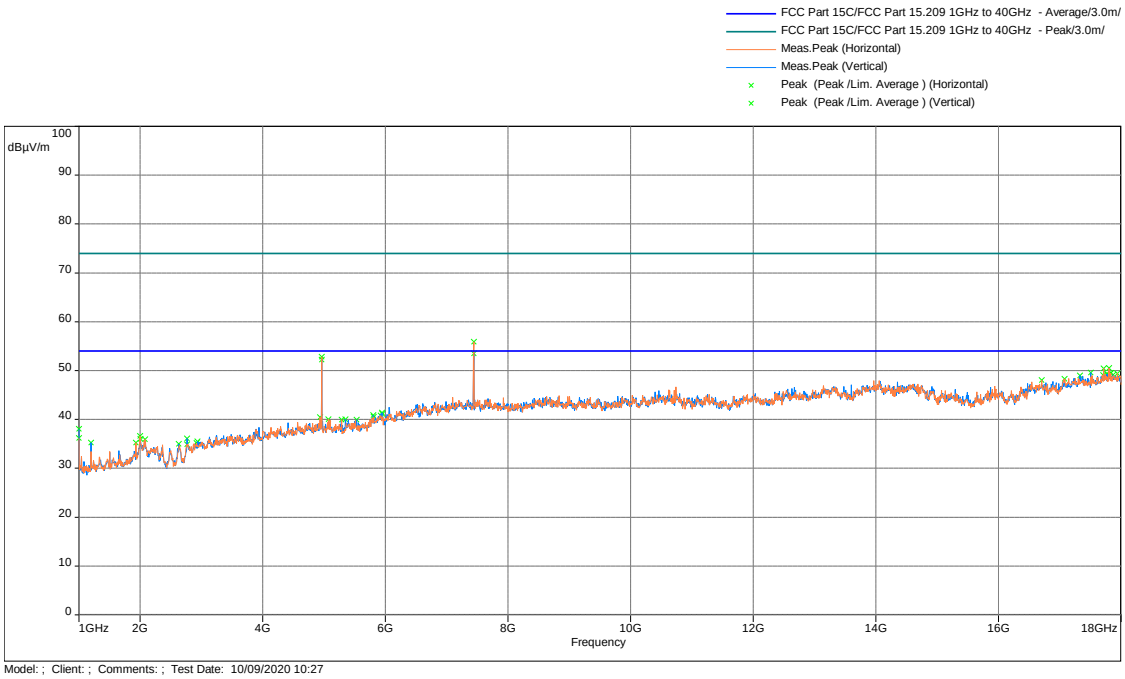
Model: ; Client: ; Comments: ; Test Date: 10/06/2020 08:43

Radiated Spurious Emissions 30 MHz - 1000 MHz



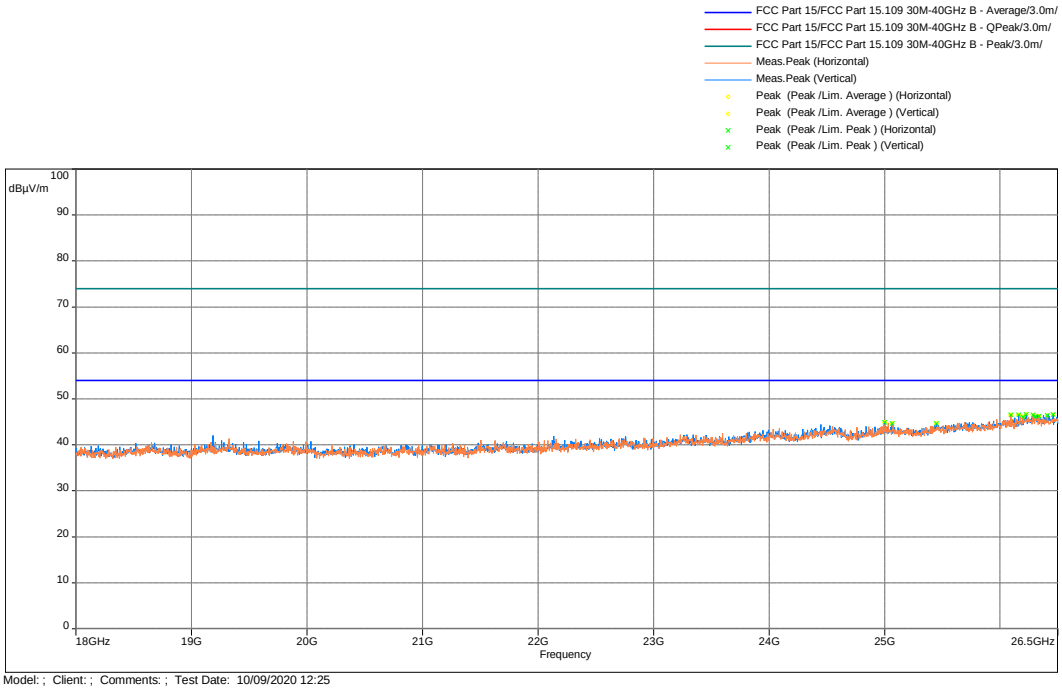
Model: ; Client: ; Comments: ; Test Date: 10/07/2020 10:02

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 10:27

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



Model: ; Client: ; Comments: ; Test Date: 10/09/2020 12:25

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

Freq. MHz	QP FS@10m dB(uV/m)	Limit @10m dB(µV/m)	Margin dB	Height m	Azimuth deg	Polarity	Correction dB
30.32333	20.86	29.5	-8.64	2.98	42.5	Horizontal	-8.89
210.0967	28.13	33	-4.87	1.02	0	Vertical	-17.57

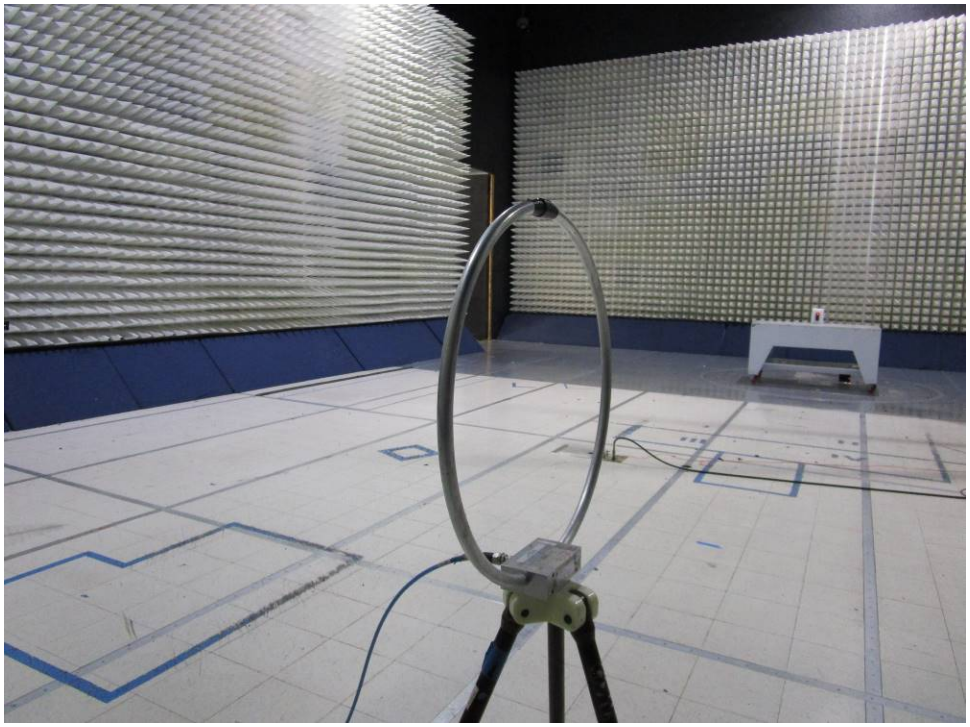
Freq.	Avg FS@3m	Avg Limit@3m	Margin	Angle	Height	Polarity	Correction
MHz	dBµV/m	dBµV/m	dB	deg	m		
7440.733	48.37	54	-5.63	153	2.98	Horizontal	0.07
7440.733	49.59	54	-4.41	64	3.11	Vertical	0.07
4960.433	39.14	54	-14.86	156	2.94	Horizontal	-5.67
4960.433	38.43	54	-15.57	138	2.72	Vertical	-5.67

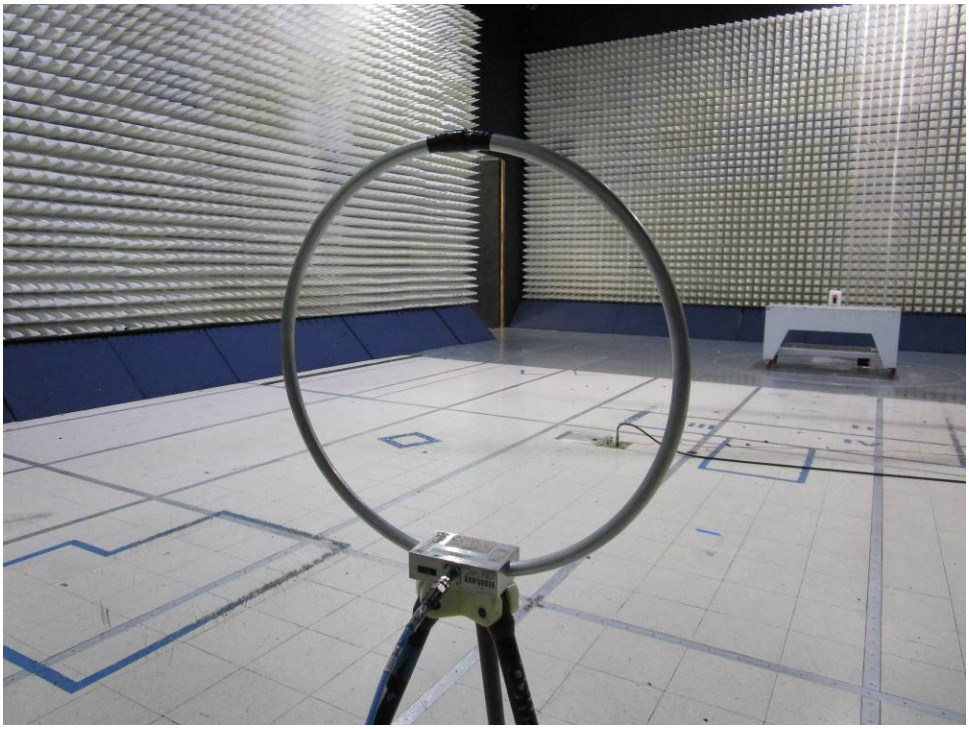
Note: FS = RA + Correction Correction = AF + CF – Preamp

Results	Complies

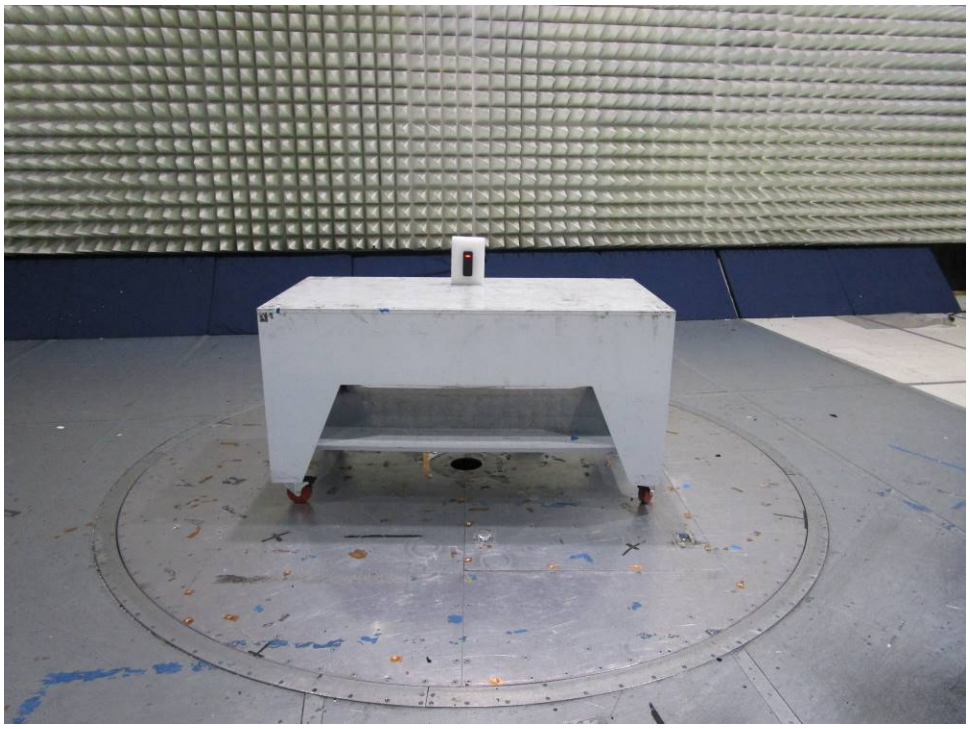
4.2.5 Test Setup Configuration

The following photographs show the testing configurations used.

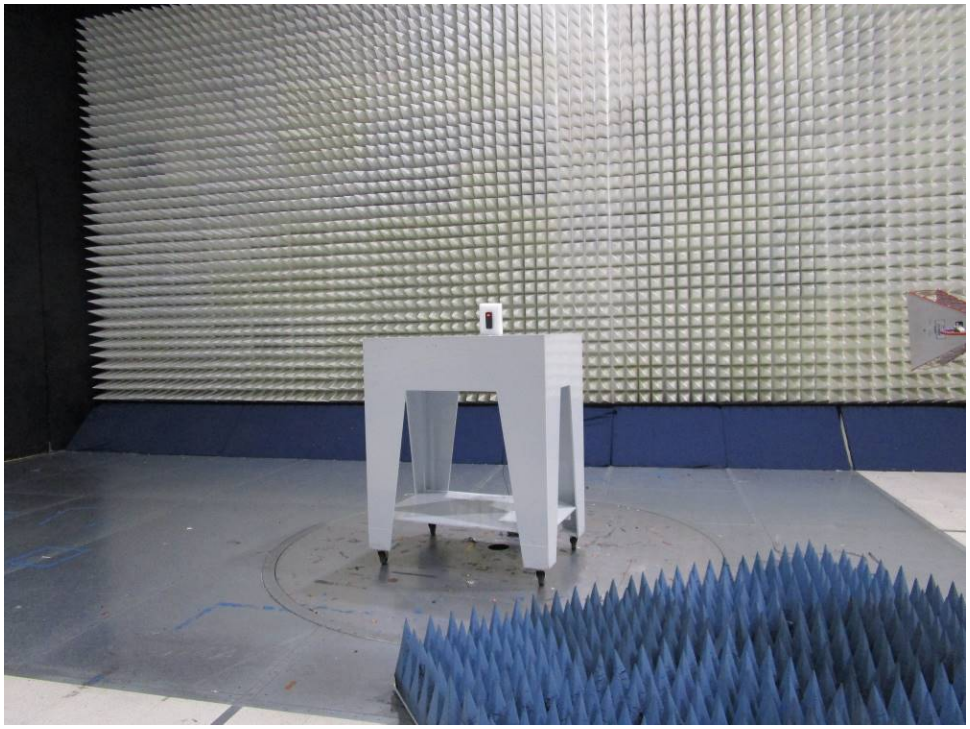




4.5.8 Test Setup Configuration (Continued)



4.5.8 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.

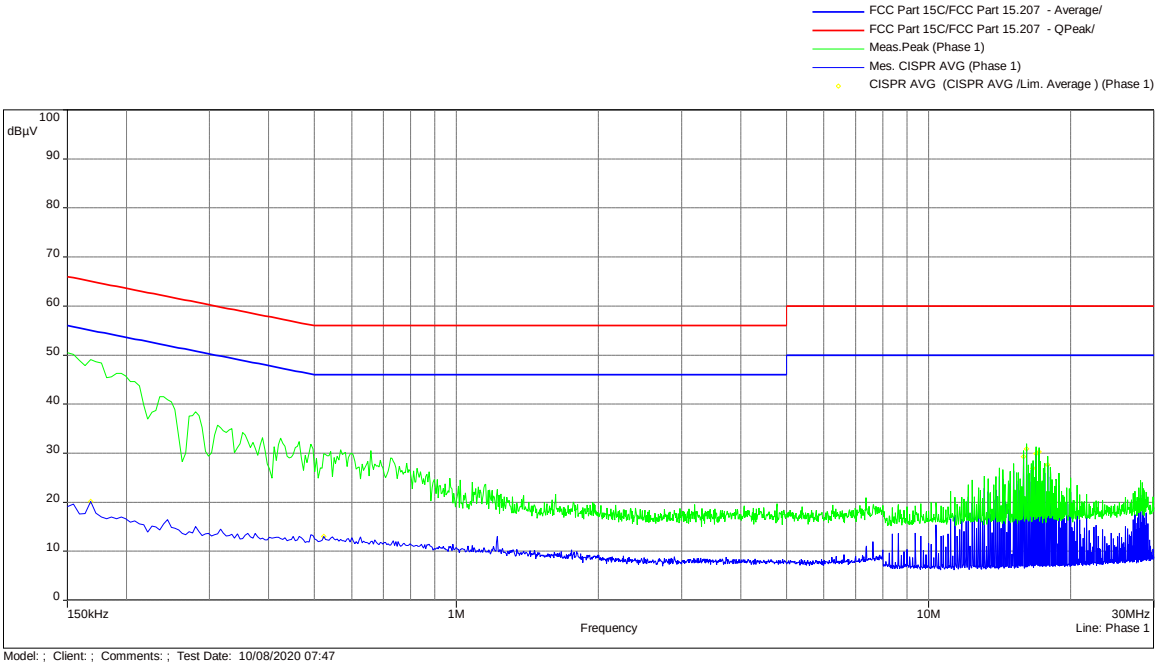
Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.10-2013.

Tested By	Test Date	Results
Anderson Soungpanya	October 8, 2020	Complies

4.6.3 Test Result

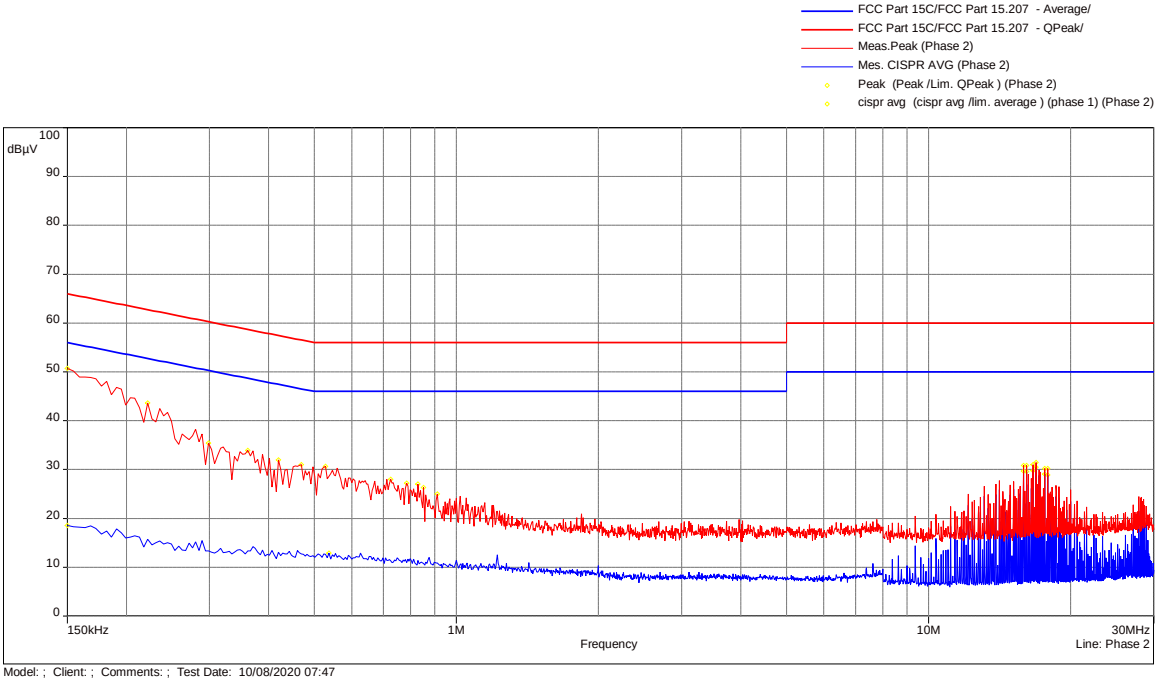
15.207, 120VAC 60Hz with BLE Transmitter On

Phase 1



Model: ; Client: ; Comments: ; Test Date: 10/08/2020 07:47

Phase 2



Model: ; Client: ; Comments: ; Test Date: 10/08/2020 07:47

Quasi Peak Table

Frequency (MHz)	Peak (dBµV)	Lim. QPeak (dBµV)	Peak-Lim (dB)	Comment	Correction (dB)
0.15	50.47	66	-15.53	Phase 1	10.97
0.15	50.74	66	-15.26	Phase 2	10.98
0.222	43.68	62.74	-19.07	Phase 2	10.97
0.2355	41.55	62.25	-20.7	Phase 1	10.97
0.2805	38.41	60.8	-22.39	Phase 1	10.97
0.2985	35.39	60.28	-24.89	Phase 2	10.97
0.312	35.67	59.92	-24.24	Phase 1	10.97
0.3615	33.9	58.69	-24.79	Phase 2	10.97
0.42	32.02	57.45	-25.43	Phase 2	10.97
0.4245	33.03	57.36	-24.33	Phase 1	10.98
0.4695	31.04	56.52	-25.49	Phase 2	10.97
0.492	31.89	56.13	-24.25	Phase 1	10.98
0.5055	28.93	56	-27.07	Phase 1	10.98
0.528	30.66	56	-25.34	Phase 2	10.98
0.5415	30.31	56	-25.69	Phase 1	10.99
0.5685	30.7	56	-25.3	Phase 1	11
0.6585	30.5	56	-25.5	Phase 1	11.03
0.726	29.04	56	-26.96	Phase 1	11.03
0.726	28.05	56	-27.95	Phase 2	11.02
0.7845	27.21	56	-28.79	Phase 2	11
0.825	26.92	56	-29.08	Phase 1	11
0.8295	27.03	56	-28.97	Phase 2	11
0.852	26.3	56	-29.7	Phase 2	11
0.9105	25.02	56	-30.98	Phase 2	11.01
15.873	30.49	60	-29.51	Phase 1	11.3
15.873	30.8	60	-29.2	Phase 2	11.3
16.125	30.86	60	-29.14	Phase 2	11.32
16.125	31.98	60	-28.02	Phase 1	11.32
16.6245	28.47	60	-31.53	Phase 1	11.38
16.6245	30.97	60	-29.03	Phase 2	11.38
16.8765	31.42	60	-28.58	Phase 2	11.41
16.8765	31.28	60	-28.72	Phase 1	11.41
17.124	31.18	60	-28.82	Phase 1	11.43
17.6235	30.26	60	-29.74	Phase 2	11.44
17.8755	29.39	60	-30.61	Phase 1	11.46
17.8755	30.19	60	-29.81	Phase 2	11.45

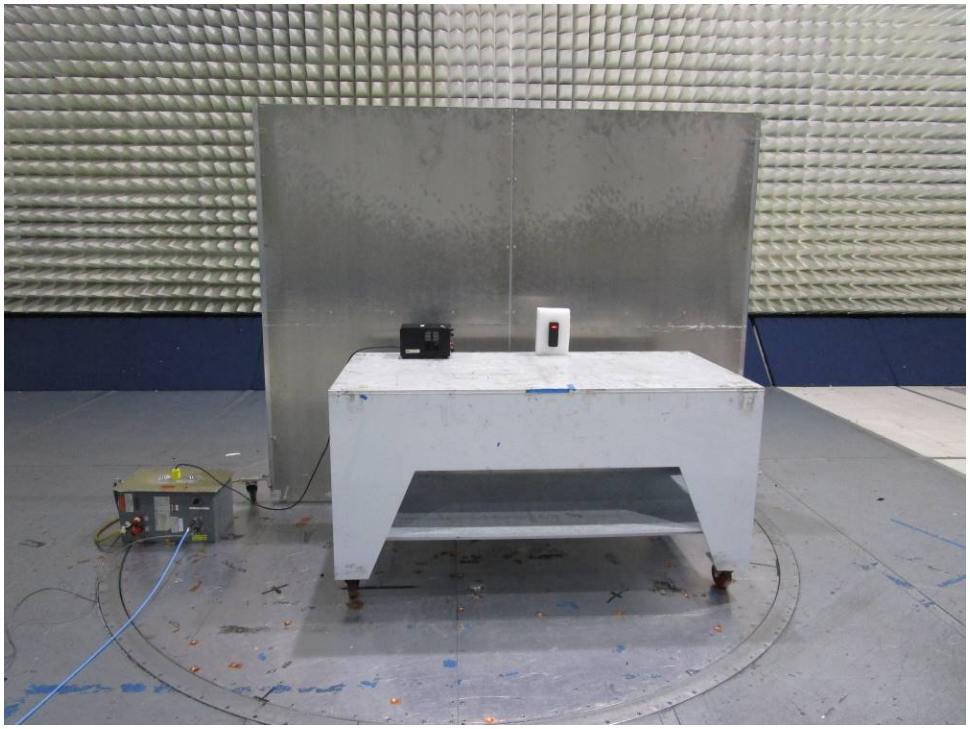
Average Table

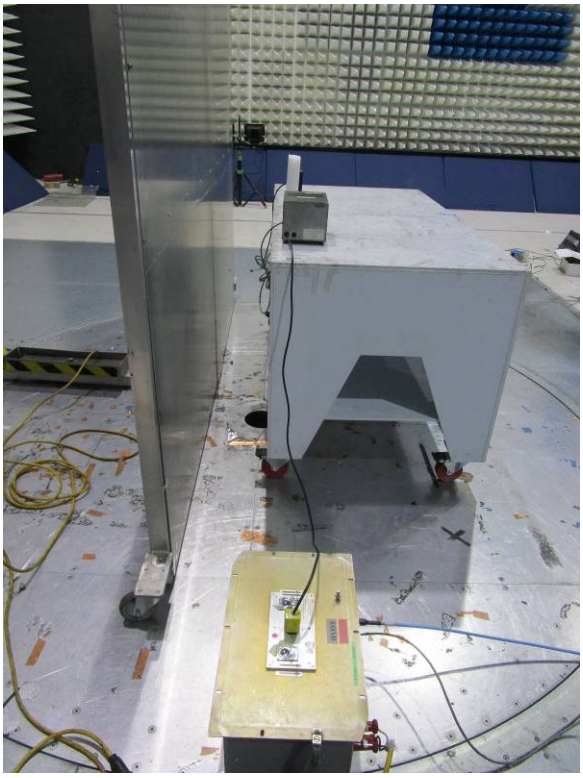
Frequency (MHz)	CISPR AVG (dBµV)	Lim. Average (dBµV)	CISPR AVG-Lim (dB)	Comment	Correction (dB)
0.15	18.55	56	-37.45	Phase 2	10.98
0.168	20.15	55.06	-34.91	Phase 1	10.97
0.5235	13.06	46	-32.94	Phase 1	10.99
0.537	12.88	46	-33.12	Phase 2	10.99
15.873	29.32	50	-20.68	Phase 1	11.3
15.873	29.67	50	-20.33	Phase 2	11.3
16.125	30.85	50	-19.15	Phase 1	11.32
16.125	29.56	50	-20.44	Phase 2	11.32
16.6245	26.88	50	-23.12	Phase 1	11.38
16.6245	29.74	50	-20.26	Phase 2	11.38
16.8765	29.92	50	-20.08	Phase 1	11.41
16.8765	30.51	50	-19.49	Phase 2	11.41
17.124	30.27	50	-19.73	Phase 1	11.43
17.6235	29.09	50	-20.91	Phase 2	11.44
17.8755	28.89	50	-21.11	Phase 2	11.45
17.8755	27.6	50	-22.4	Phase 1	11.46

Results	**Complies**

4.6.4 Test Configuration Photographs

The following photographs show the testing configurations used.





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
EMI Receiver	Rohde and Schwarz	ESR7	ITS 01607	12	10/23/20
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	11/07/20
Pre-Amplifier (18-40GHz)	Miteq	TTA1840-35-S-M	ITS 01393	12	03/02/21
1-18GHz Preamplifier	uComp Nordic	MCN-40-001018002510P	ITS 01817	12	04/16/21
Horn Antenna	ETS-Lindgren	3115	ITS 00982	12	04/21/21
Pyramidal Horn Antenna	EMCO	3160-09	ITS 00571	#	#
Loop Antenna	EMCO	6512	ITS 01598	12	10/22/20
BI-Log Antenna	Teseq	CBL611D	ITS 01058	12	10/19/20
Pre-Amplifier	Sonoma Instrument	310N	ITS 01493	12	02/07/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01462	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01465	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01342	12	09/01/21
Notch Filter	MICRO-TRONICS	BRM50702	ITS 01166	12	06/11/21
RF Cable	Mega Phase	EMC1-K1K1-236	ITS 01537	12	04/17/21
RF Cable	Mega Phase	TM40-K1K1-19	ITS 01155	12	04/17/21

No Calibration required

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.19.1.19	Farpointe_G104449567.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 / G104449567	AS	KV	October 27, 2020	Original document

END OF REPORT