

## CLASS II PERMISSIVE CHANGE TEST REPORT

**Report Number: 104011429MPK-011****Project Number: G104011429****Issue Date: August 15, 2019****Testing performed on the  
Sevena Breast Pump****Model: 07A****FCC ID: 2AHRJ-07A****to****FCC Part 15 Subpart C (15.247)  
Industry Canada RSS-247 Issue 2****For****Exploramed NC7, Inc.**

Test Performed by:

Intertek

1365 Adams Court

Menlo Park, CA 94025 USA

Test Authorized by:

Exploramed NC7, Inc.

1975 W El Camino Real #306

Mountain View, CA 94040 USA

Prepared by:



Aaron Chang

**Date:** August 15, 2019

Reviewed by:



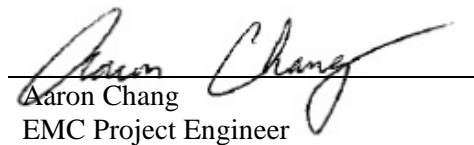
Krishna Vemuri

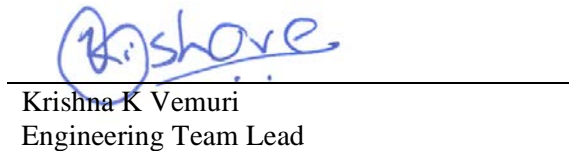
**Date:** August 15, 2019

*This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. This report must not be used to claim product endorsement by A2LA, NIST nor any other agency of the U.S. Government.*

Report No. 104011429MPK-011	
<b>Equipment Under Test:</b>	Sevena Breast Pump
<b>Trade Name:</b>	Exploramed NC7, Inc.
<b>Model Number:</b>	07A
<b>Serial Number:</b>	PWADE 150046 (Radiated) PWBD2 150021 (Conducted)
<b>Applicant:</b>	Exploramed NC7, Inc.
<b>Contact:</b>	John Chang
<b>Address:</b>	Exploramed NC7, Inc. 1975 W El Camino Real #306 Mountain View, CA 94040
<b>Country:</b>	USA
<b>Tel. Number:</b>	(650) 575-3465
<b>Email:</b>	jchang@willowpump.com
<b>Applicable Regulation:</b>	FCC Part 15 Subpart C (15.247) Industry Canada RSS-247 Issue 2
<b>Test Site Location:</b>	ITS – Site 1 1365 Adams Drive Menlo Park, CA 94025
<b>Date(s) of Test:</b>	August 7-12, 2019

*We attest to the accuracy of this report:*

  
 Aaron Chang  
 EMC Project Engineer

  
 Krishna K Vemuri  
 Engineering Team Lead

## TABLE OF CONTENTS

<b>1.0</b>	<b>Summary of Tests .....</b>	<b>4</b>
<b>2.0</b>	<b>General Description .....</b>	<b>5</b>
2.1	Product Description .....	5
2.2	Related Submittal(s) Grants .....	6
2.3	Test Methodology .....	6
2.4	Test Facility .....	6
<b>3.0</b>	<b>System Test Configuration.....</b>	<b>7</b>
3.1	Support Equipment and description .....	7
3.2	Block Diagram of Test Setup.....	7
3.3	Justification .....	8
3.4	Software Exercise Program.....	8
3.5	Mode of Operation during test.....	8
3.6	Modifications required for Compliance.....	8
3.7	Additions, deviations and exclusions from standards.....	8
<b>4.0</b>	<b>Measurement Results.....</b>	<b>9</b>
4.1	Maximum Peak Conducted Output Power at Antenna Terminals .....	9
4.2	Transmitter Radiated Emissions .....	19
<b>5.0</b>	<b>List of test equipment .....</b>	<b>40</b>
<b>6.0</b>	<b>Document History .....</b>	<b>41</b>

## 1.0 Summary of Tests

TEST	REFERENCE FCC 15.247	REFERENCE RSS-247	RESULTS
RF Output Power	15.247(b)(3)	RSS-247, 5.4.4	Complies
Transmitter Radiated Emissions	15.247(d), 15.209, 15.205	RSS-247, 5.5	Complies
Antenna Requirement	15.203	RSS-GEN	Complies <sup>1</sup>

<sup>1</sup> EUT utilizes an internal Antenna.

## 2.0 General Description

### 2.1 Product Description

Exploramed NC7, Inc. supplied the following description of the EUT:

As described by the manufacturer, the Exploramed NC7 Breast Pump is intended to express milk from lactating women in order to collect milk from their breasts. The device is intended for a single user.

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

Overview of the EUT	
<b>Applicant name &amp; address:</b>	Exploramed NC7, Inc. 1975 W El Camino Real #306 Mountain View, CA 94040 USA
<b>Contact info / Email:</b>	John Chang / jchang@willowpump.com
<b>Model:</b>	07A
<b>FCC Identifier:</b>	2AHRJ-07A
<b>Operating Frequency:</b>	2402 - 2480 MHz
<b>Number of Channels:</b>	40
<b>Type of Modulation/Data rate:</b>	GFSK / 1Mbps
<b>Antenna Type:</b>	Ceramic Chip Antenna, 1.7 dBi peak gain

**EUT receive date:** August 7, 2019

**EUT receive condition:** 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:** August 7, 2019

**Test completion date:** August 12, 2019

## 2.2 Related Submittal(s) Grants

None

## 2.3 Test Methodology

Antenna conducted measurements were performed according to the FCC documents “Guidance for Performing Compliance Measurement on Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System devices Operating under §15.247” (KDB 558074 D01 Meas Guidance v05r02), RSS-247 Issue 2, ANSI C63.10: 2013 and 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.

## 2.4 Test Facility

The radiated emission test site and conducted measurement facility used to collect the data is 10m semi-anechoic chamber located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada (Site # 2042L-1).

### 3.0 System Test Configuration

#### 3.1 Support Equipment and description

Support Equipment			
Description	Manufacturer	Model #	Serial Number
Laptop*	HP	EliteBook 2540p	CND027234S

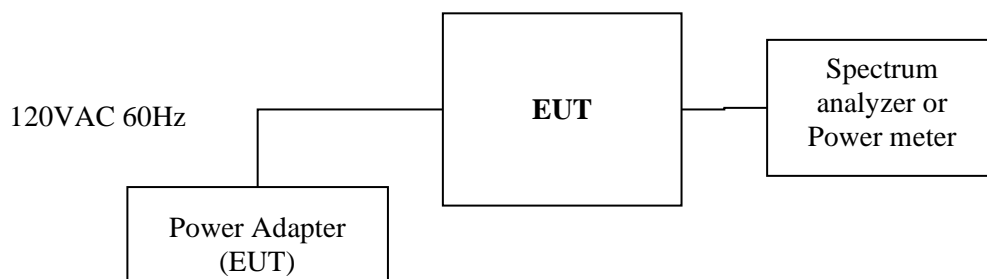
\*Only used to configure channels on EUT.

#### 3.2 Block Diagram of Test Setup

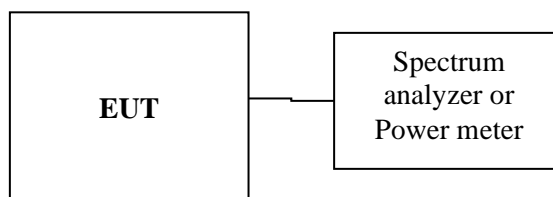
Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Sevena Breast Pump	Exploramed NC7, Inc.	07A	PWADE 150046 (Radiated) PWBD2 150021 (Conducted)
Power Supply Adapter	Delta	MDS-030AAC05	22HW84A01RD
Alternative Power Supply	Delta	MEF-010A05B	07TW78N0008

AC Mode:

Antenna was removed and co-axial connector with a cable was installed for Conducted Measurements.  
500hm load was used for Radiated Measurements.



Battery Mode:



<b>S</b> = Shielded	<b>F</b> = With Ferrite
<b>U</b> = Unshielded	<b>m</b> = Length in Meters

### 3.3 Justification

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

Class II permissive change testing was performed due to the following changes 1) PCB layout 2) addition of alternative power supply adapter.

### 3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was provided by Exploramed NC7, Inc.

### 3.5 Mode of Operation during test

During transmitter testing, the transmitter was setup to transmit at maximum RF power on low, middle and high frequencies/channels.

### 3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance.

### 3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.



## 4.0 Measurement Results

### 4.1 Maximum Peak Conducted Output Power at Antenna Terminals

FCC Rule: 15.247(b)(3); RSS-247 A8.4;

#### 4.1.1 Requirements

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.

#### 4.1.2 Procedure

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

1. Set the RBW  $\geq$  DTS bandwidth.
2. Set VBW  $\geq$  [3 x RBW].
3. Set span  $\geq$  [3 x RBW].
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

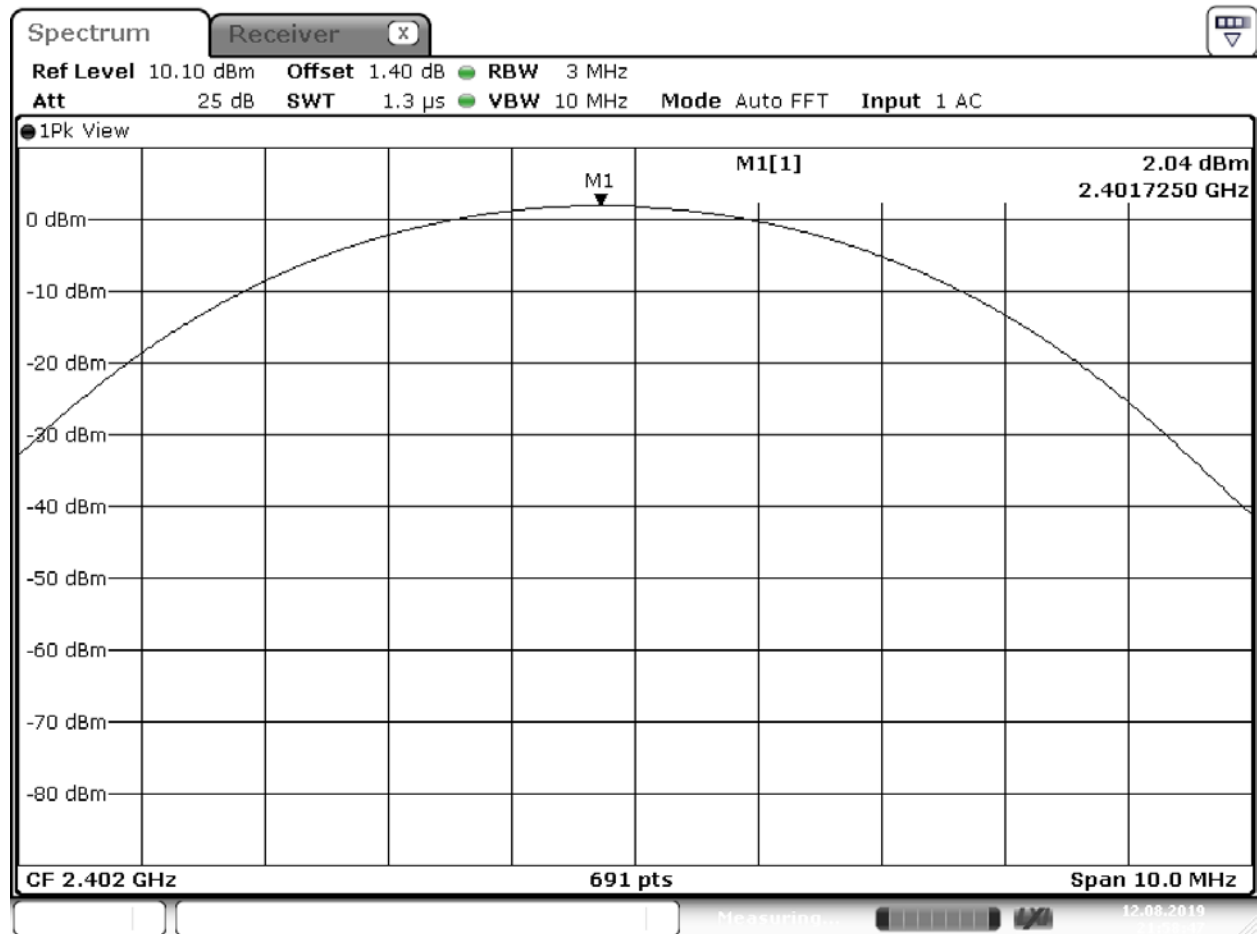
A spectrum analyzer was connected to the antenna port of the transmitter.

#### 4.1.3 Test Results

	Frequency, MHz	Conducted Power (peak), dBm	Conducted Power (peak), mW	Plot
Battery	2402	2.04	1.600	2.1
	2440	2.06	1.607	2.2
	2480	1.92	1.556	2.3
Power Supply	2402	2.02	1.592	2.4
	2440	2.06	1.607	2.5
	2480	1.91	1.552	2.6
Alternative Power Supply	2402	1.97	1.574	2.7
	2440	2.03	1.596	2.8
	2480	1.89	1.545	2.0

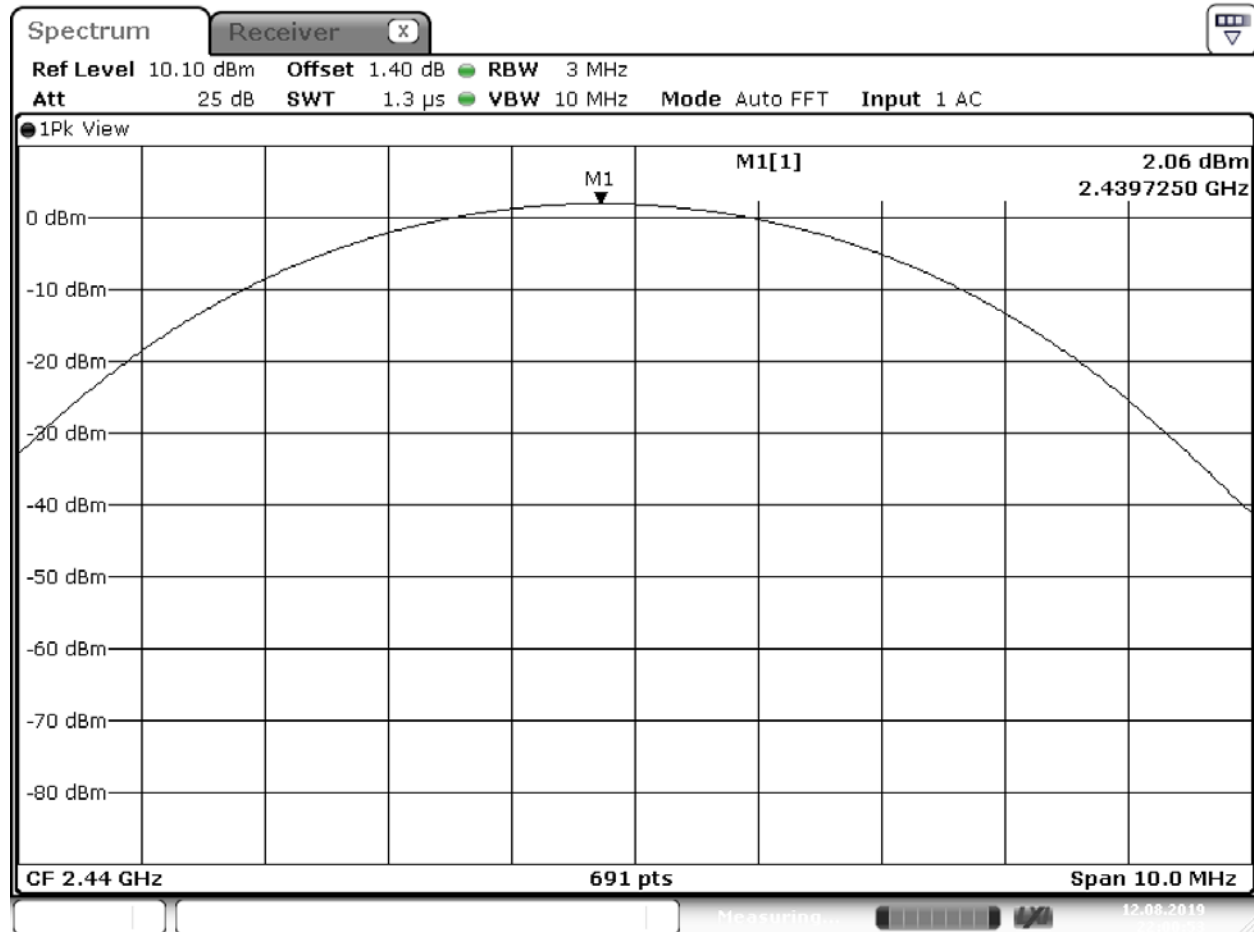
<b>Results</b>	Complies
<b>Test date:</b>	August 12, 2019

Plot 2.1



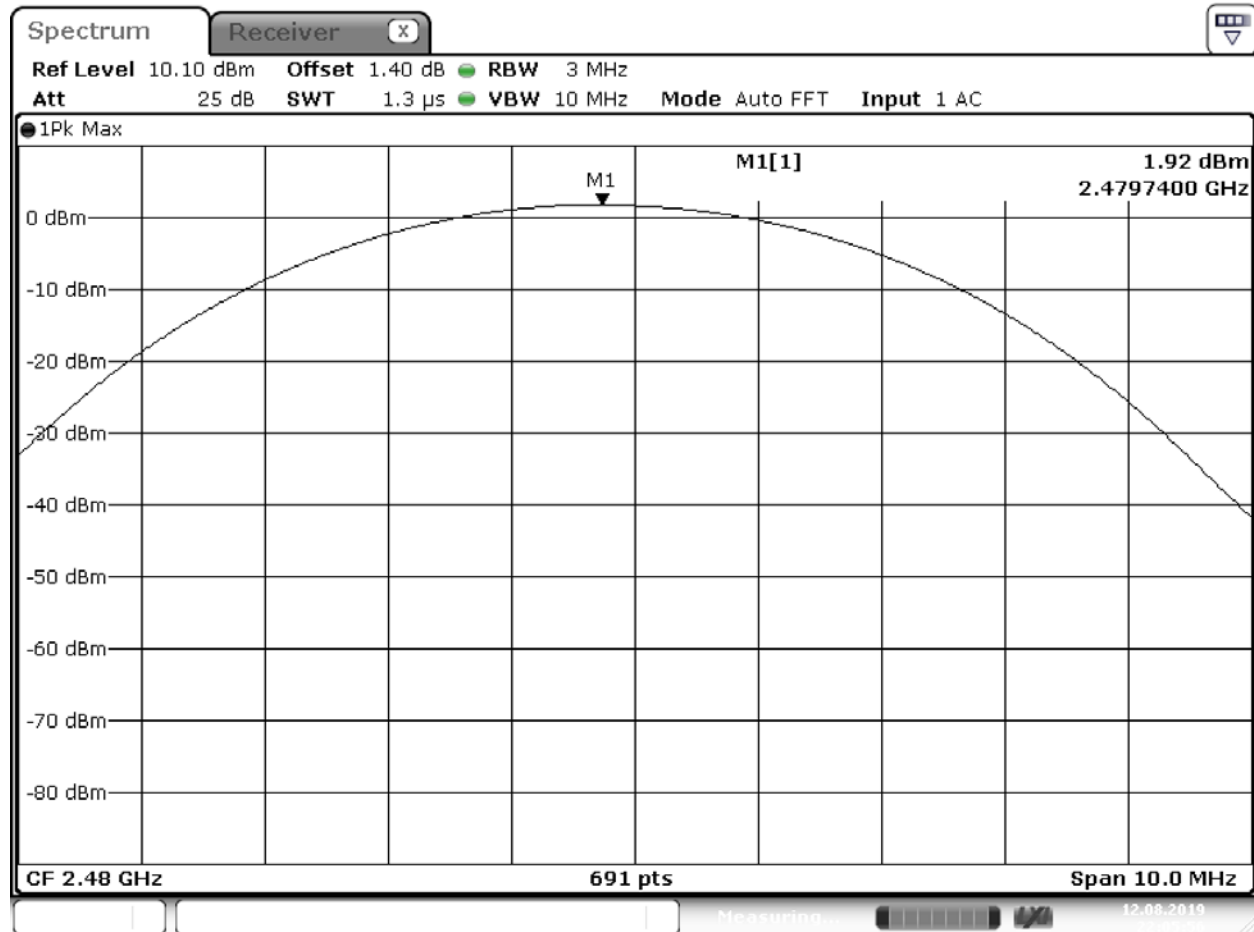
Date: 12.AUG.2019 21:58:47

Plot 2.2



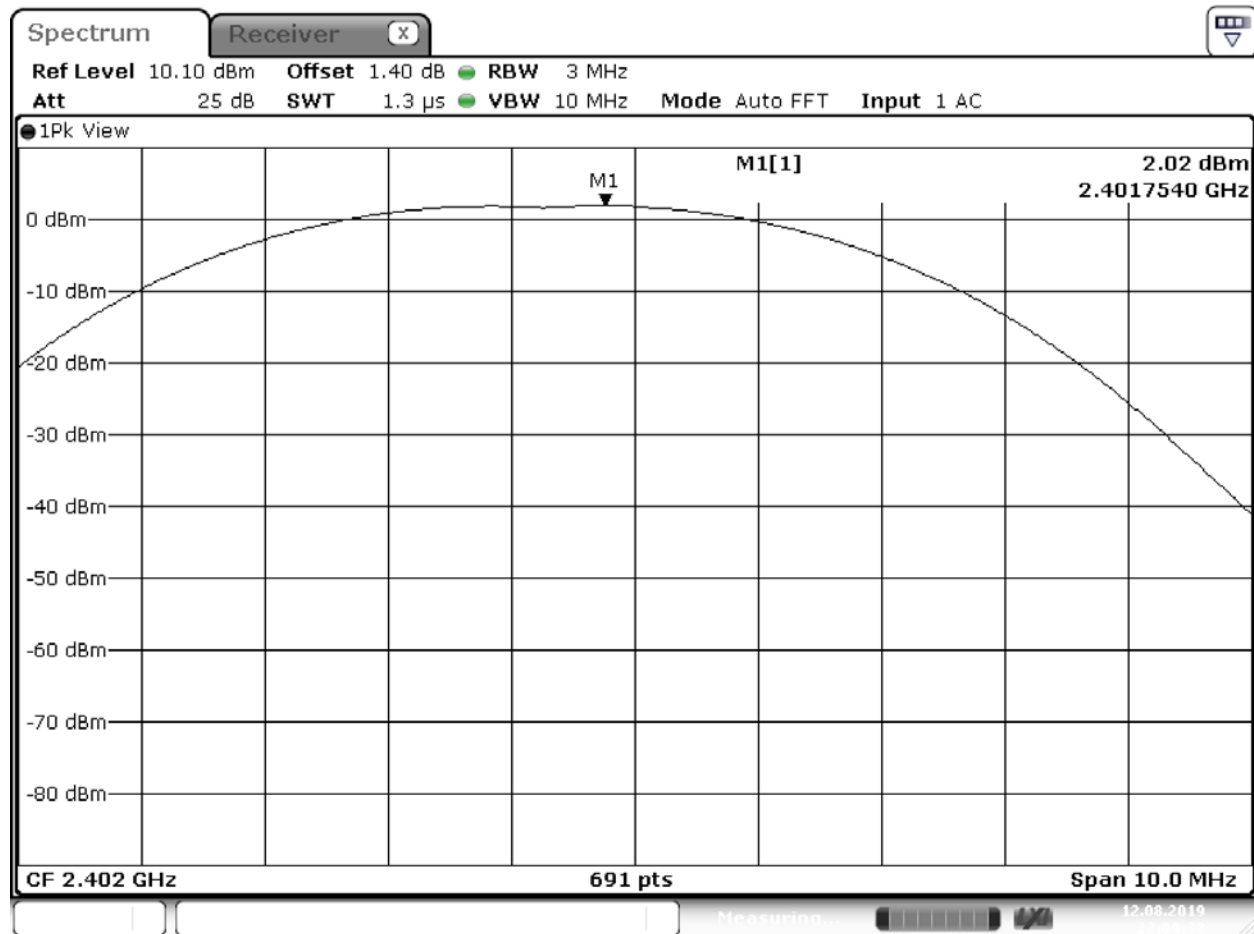
Date: 12.AUG.2019 22:00:53

Plot 2.3



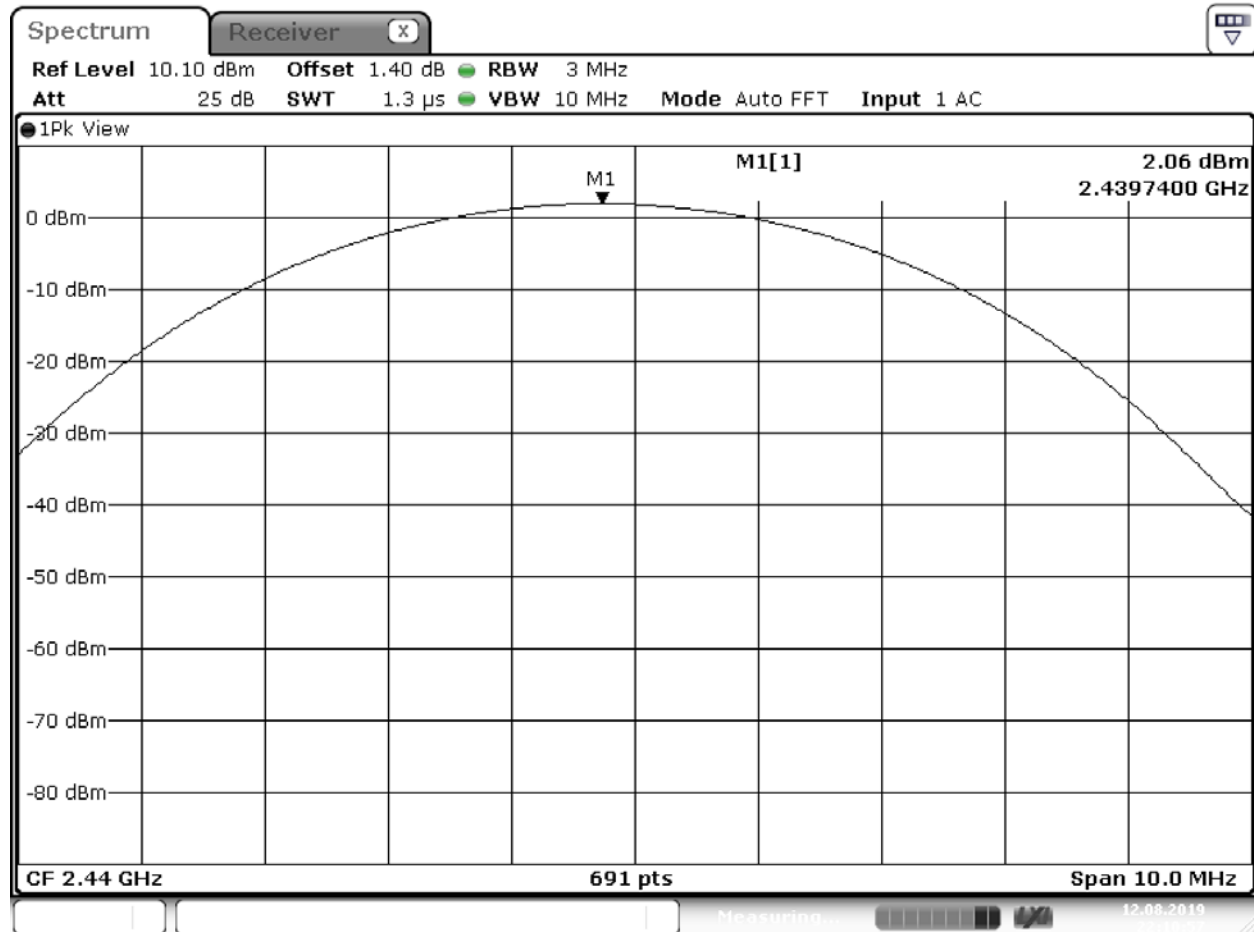
Date: 12.AUG.2019 22:05:56

Plot 2.4



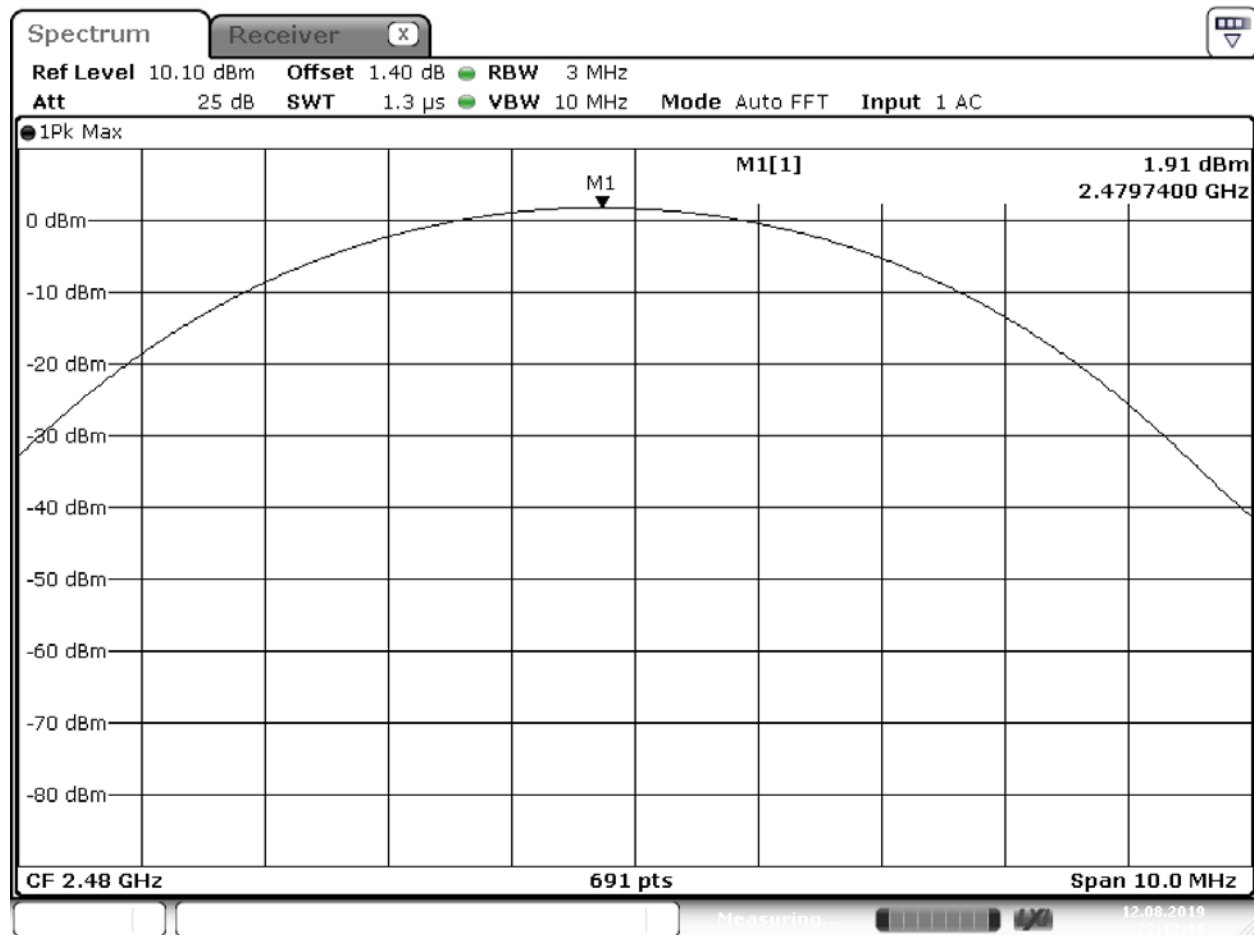
Date: 12.AUG.2019 22:09:38

Plot 2.5



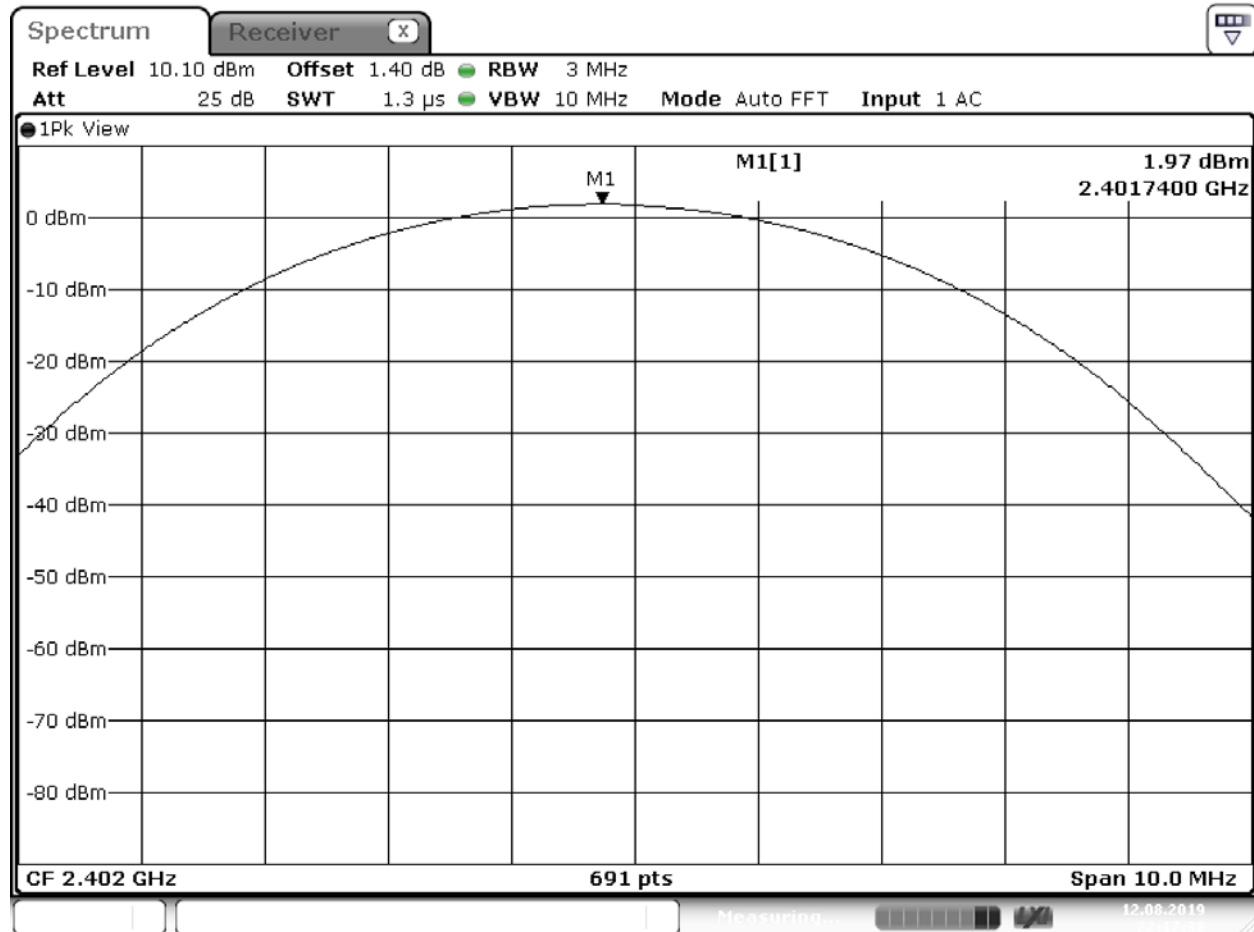
Date: 12.AUG.2019 22:10:57

Plot 2.6



Date: 12.AUG.2019 22:12:11

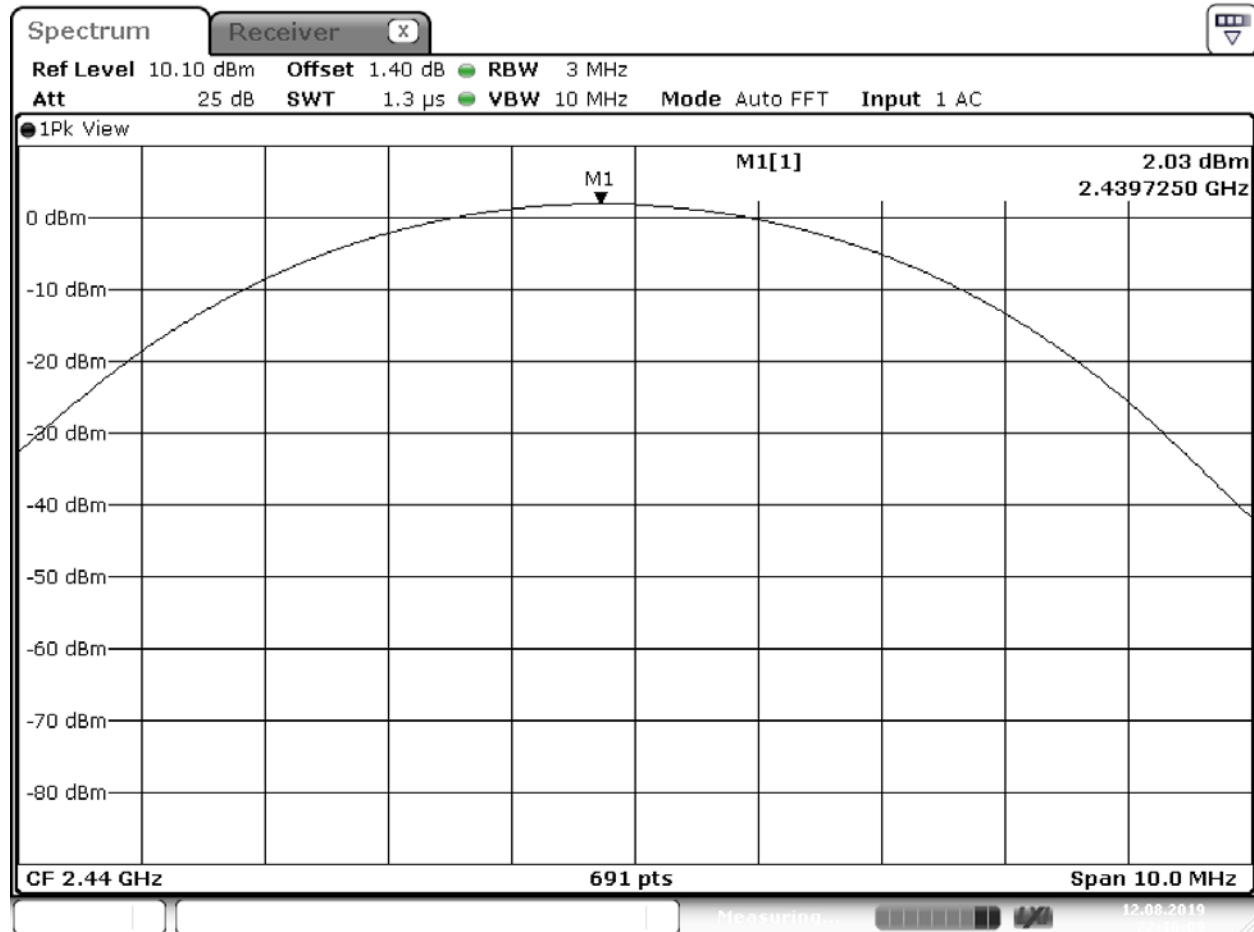
Plot 2.7



Date: 12.AUG.2019 22:17:38

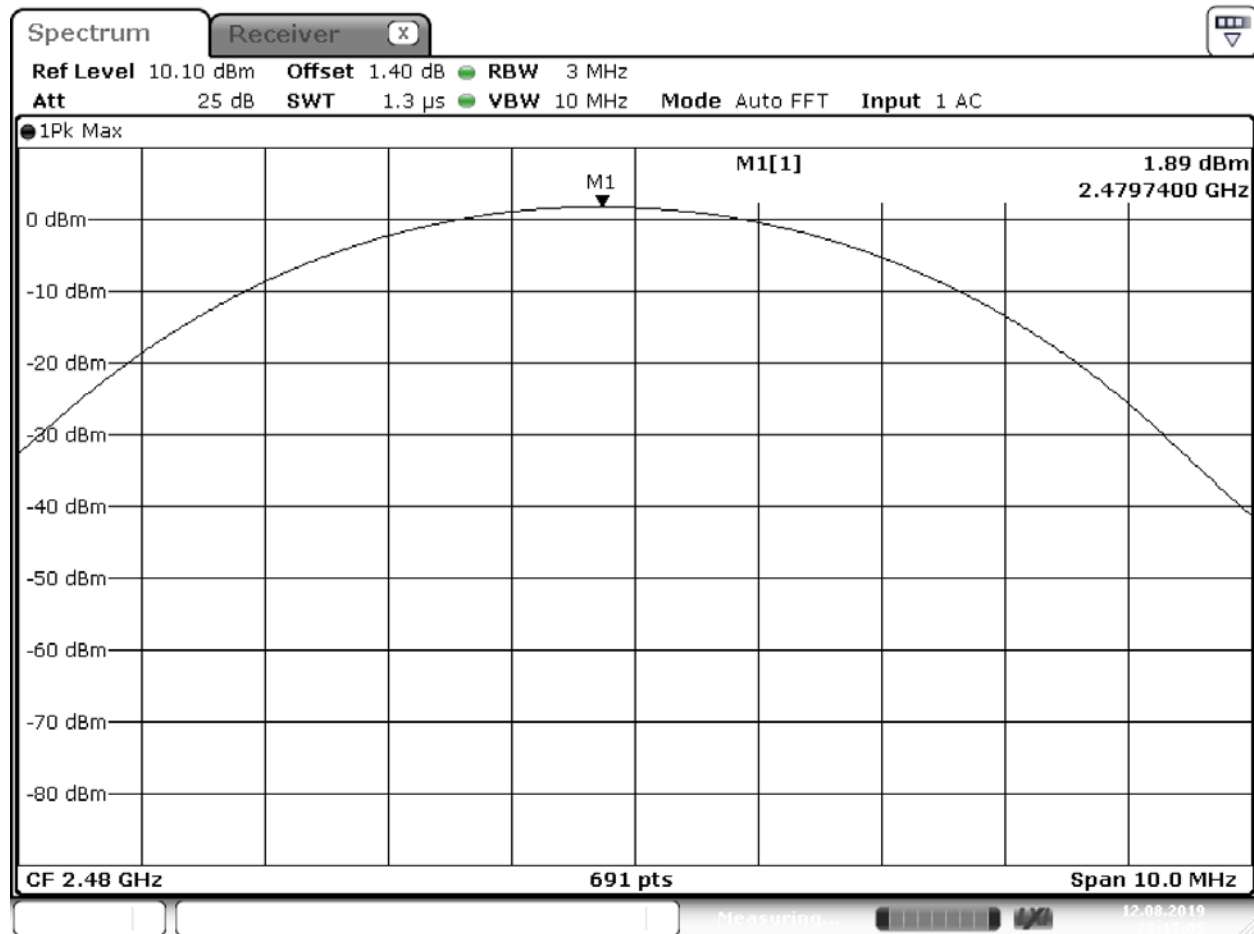


Plot 2.8



Date: 12.AUG.2019 22:16:09

Plot 2.9



Date: 12.AUG.2019 22:15:05

## 4.2 Transmitter Radiated Emissions

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

### 4.2.1 Requirements

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.

### 4.2.2 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 1000 MHz and 1.5m in height for above 1 GHz. 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 meter for frequencies 1 to 25 GHz and at 10 meters for frequencies below 1 GHz.

A preamp was used from 30 – 1000 MHz and 1-25 GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average limits for 1GHz – 25GHz.

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

#### 4.2.3 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  $dB(\mu V/m)$

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

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

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

$RA = 52.0\text{ dB}(\mu V)$

$AF = 7.4\text{ dB}(1/m)$

$CF = 1.6\text{ dB}$

$AG = 29.0\text{ dB}$

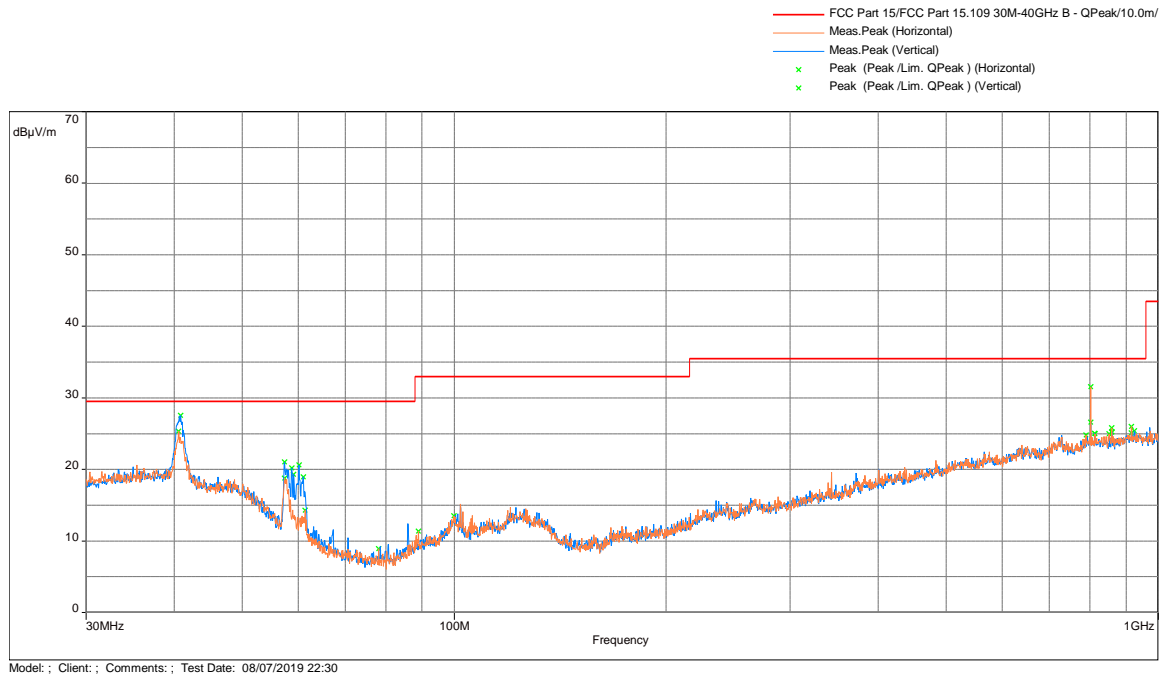
$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32\text{ dB}(\mu V/m)$ .

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

#### 4.2.4 Test Result

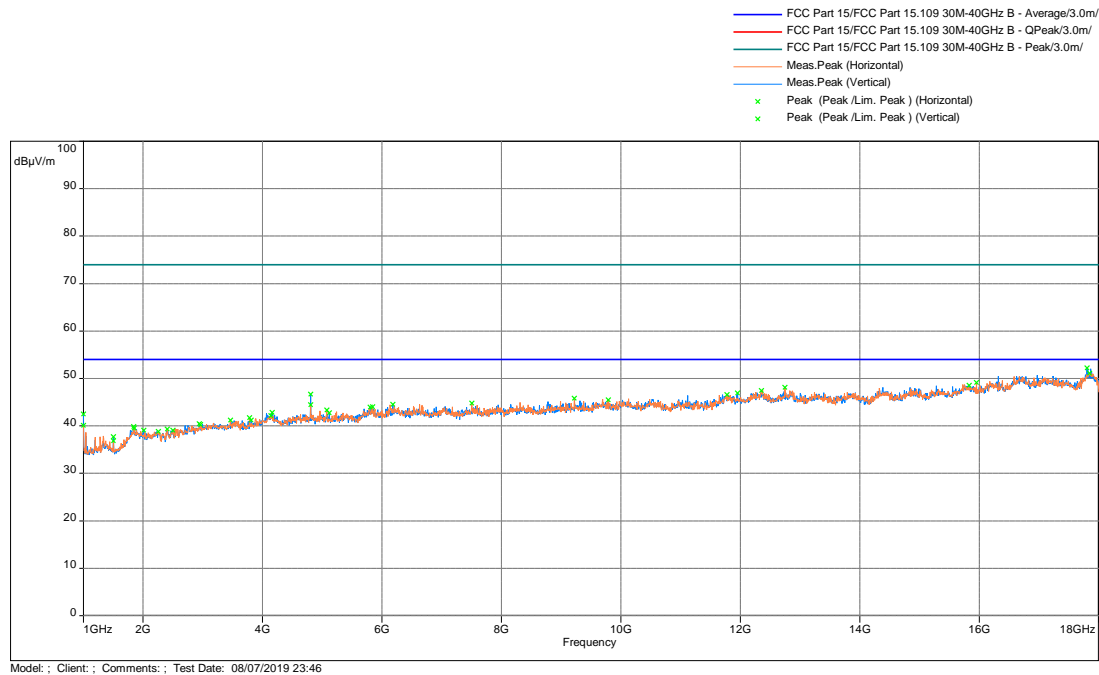
The data below shows the significant emission frequencies, the limit and the margin of compliance.  
Note: Measurements were performed at vertical and horizontal orientations of EUT.

#### 15.209 Radiated Spurious Emissions Battery Mode Low Channel



Frequency (MHz)	QPeak@10m dB(µV/m)	Lim. QPeak dB(µV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.896	27.54	29.5	-1.96	2.5	9.75	Vertical	-6.65

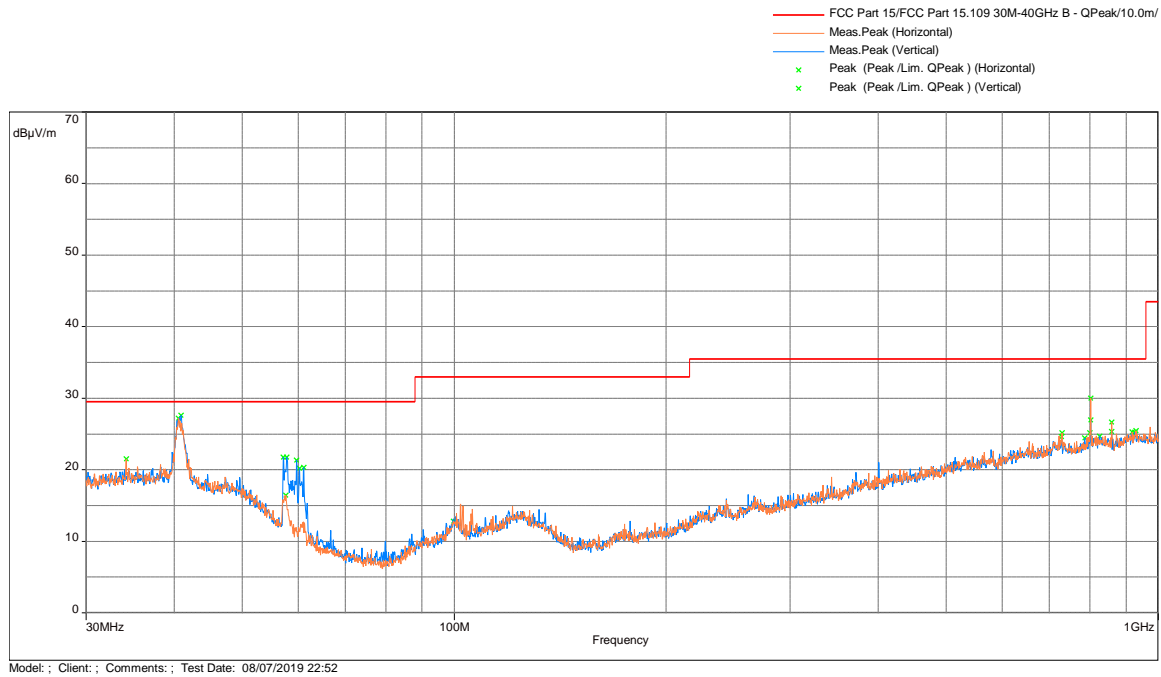
### Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit



Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4803.467	46.69	54	-7.31	1.49	22	Vertical	-8.83

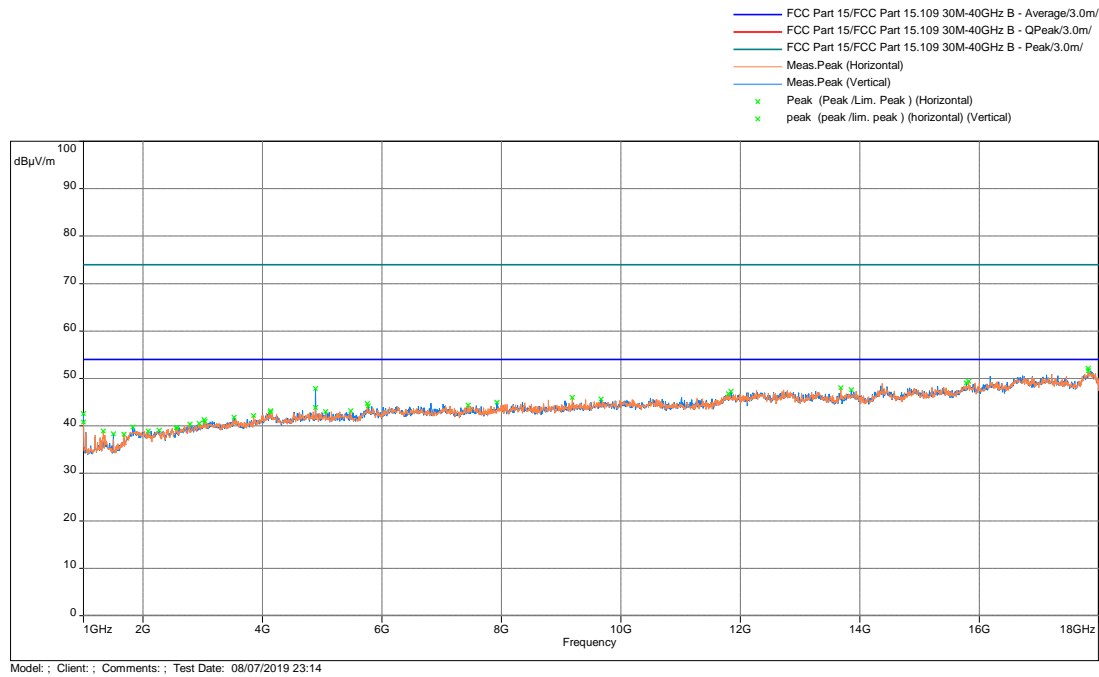
\*Note: No significant emissions were found between 18-25 GHz

**15.209 Radiated Spurious Emissions Battery Mode Mid Channel**



Frequency (MHz)	QPeak@10m dB(µV/m)	Lim. QPeak dB(µV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.929	27.62	29.5	-1.88	2.48	195.75	Vertical	-6.64

## Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit

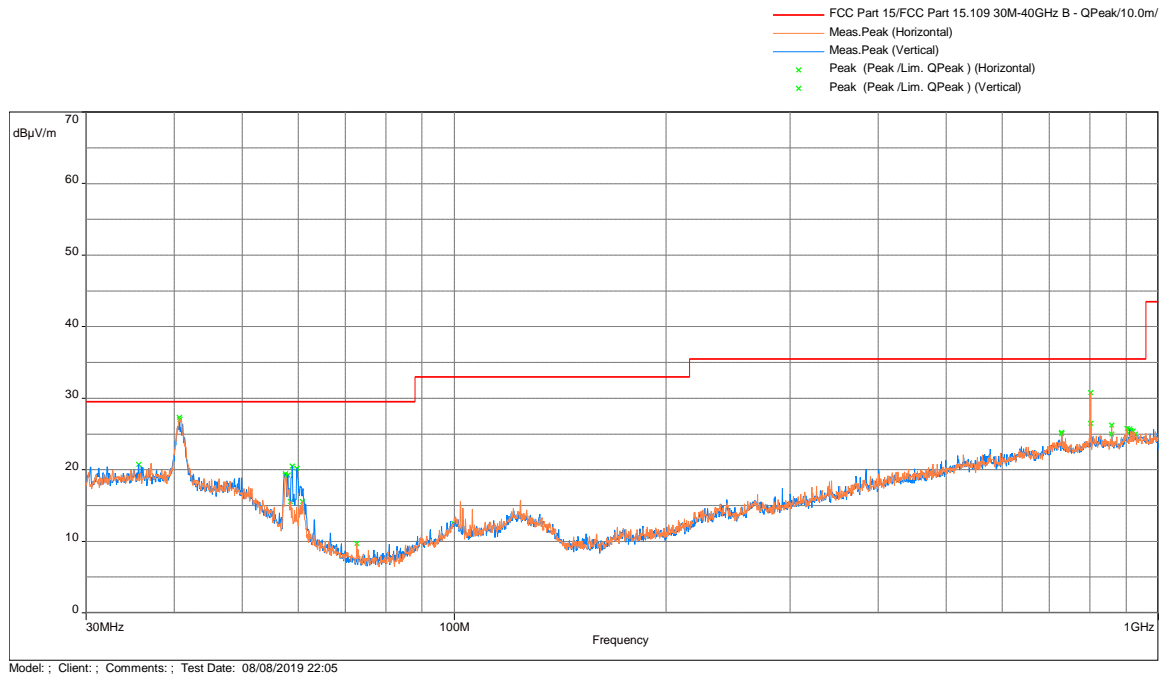


Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4880.367	47.87	54	-6.13	1.99	251	Vertical	-9.15

\*Note: No significant emissions were found between 18-25 GHz

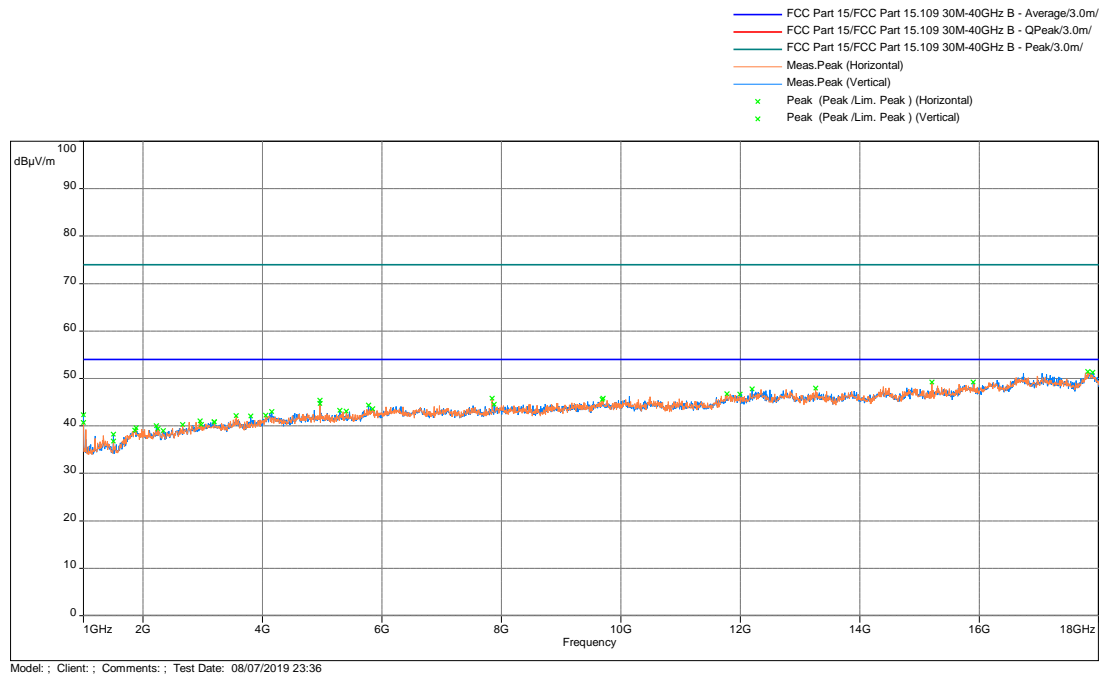


### 15.209 Radiated Spurious Emissions Battery Mode High Channel



Frequency (MHz)	QPeak@10m dB(µV/m)	Lim. QPeak dB(µV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.702	27.27	29.5	-2.23	2.48	95	Horizontal	-6.68

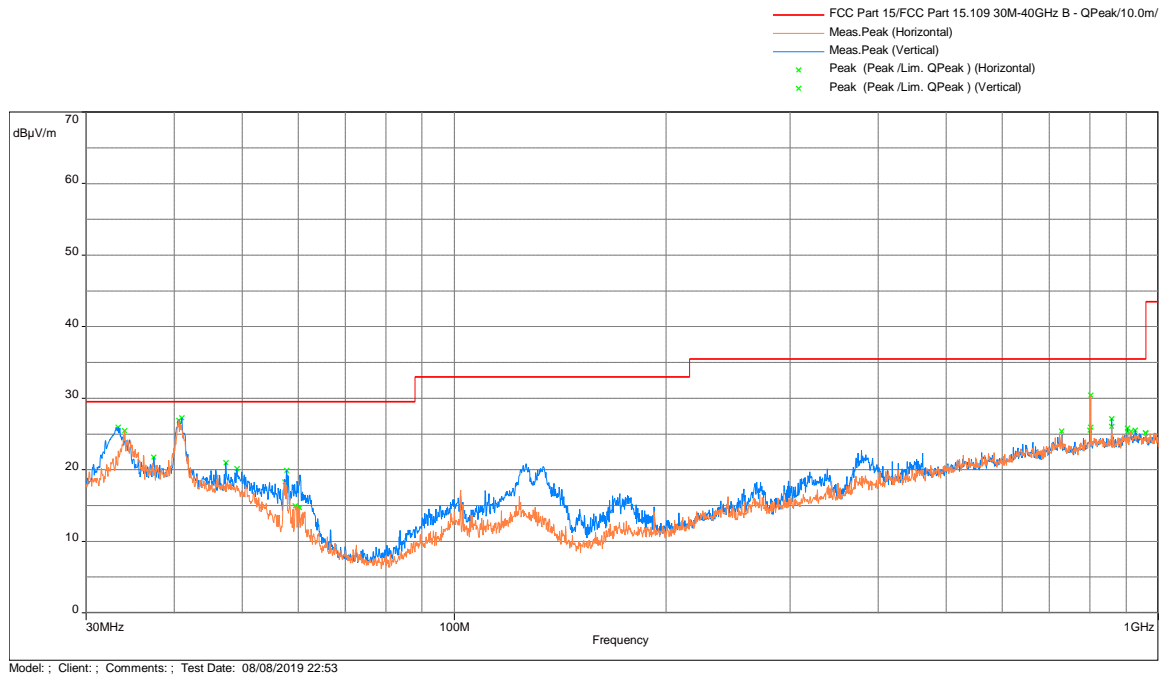
## Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit



Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4959.3	45.41	54	-8.59	1.01	242.75	Vertical	-9

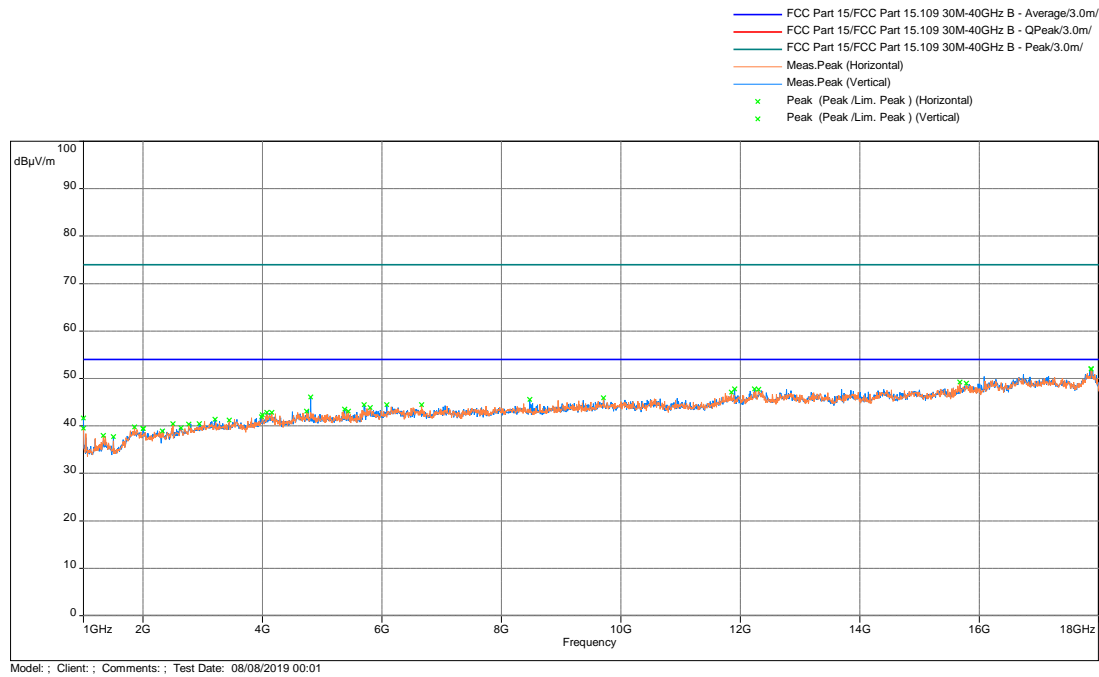
\*Note: No significant emissions were found between 18-25 GHz

### 15.209 Radiated Spurious Emissions Original Power Supply Low Channel



Frequency (MHz)	QPeak@10m dB(µV/m)	Lim. QPeak dB(µV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
41.026	27.26	29.5	-2.24	2.5	109.25	Vertical	-6.63

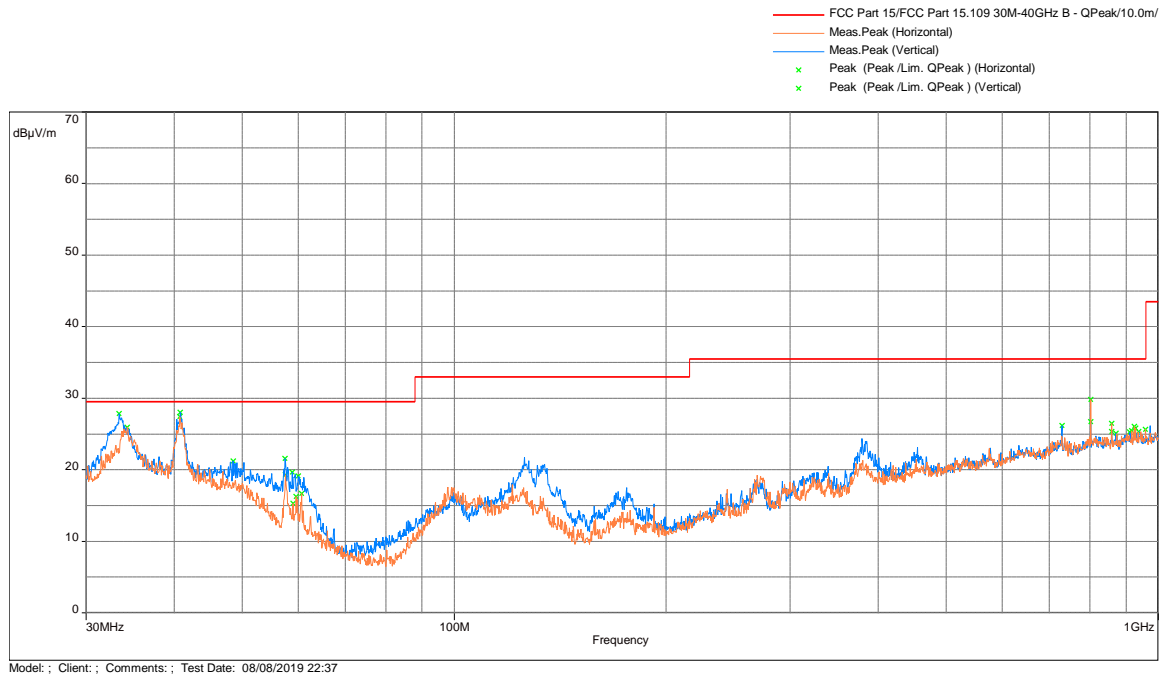
### Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit



Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4803.467	46.08	54	-7.92	1.99	235	Vertical	-8.83

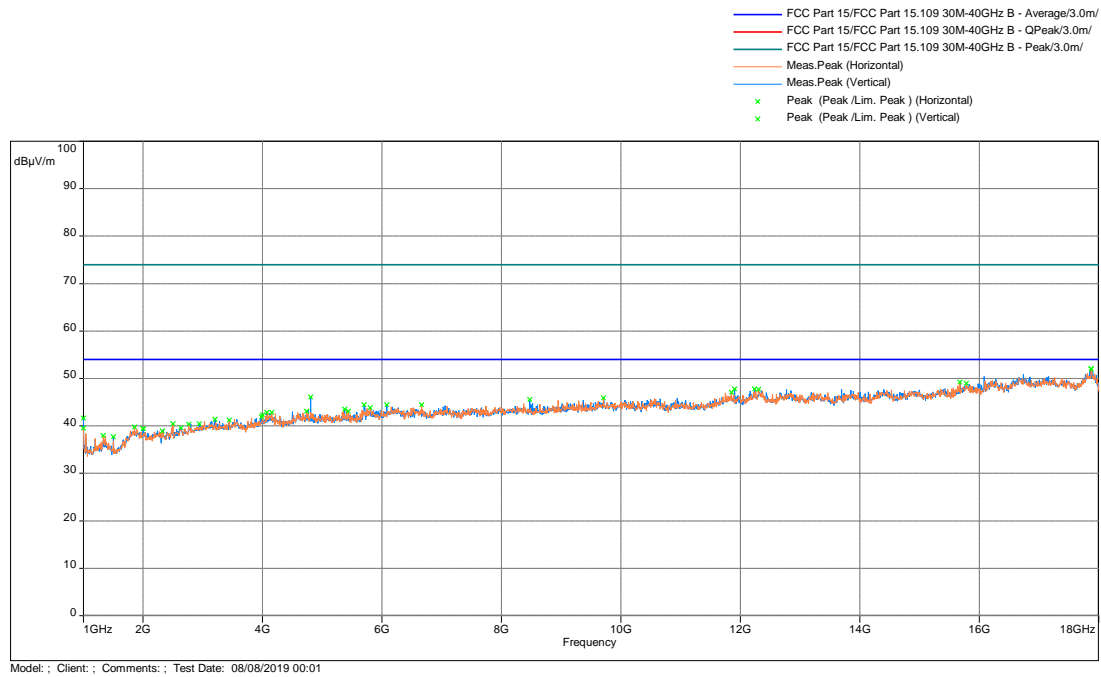
\*Note: No significant emissions were found between 18-25 GHz

### 15.209 Radiated Spurious Emissions Original Power Supply Mid Channel



Frequency (MHz)	QPeak@10m dB(µV/m)	Lim. QPeak dB(µV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.915	23.38	29.5	-6.12	340.25	3.17	Vertical	-6.64

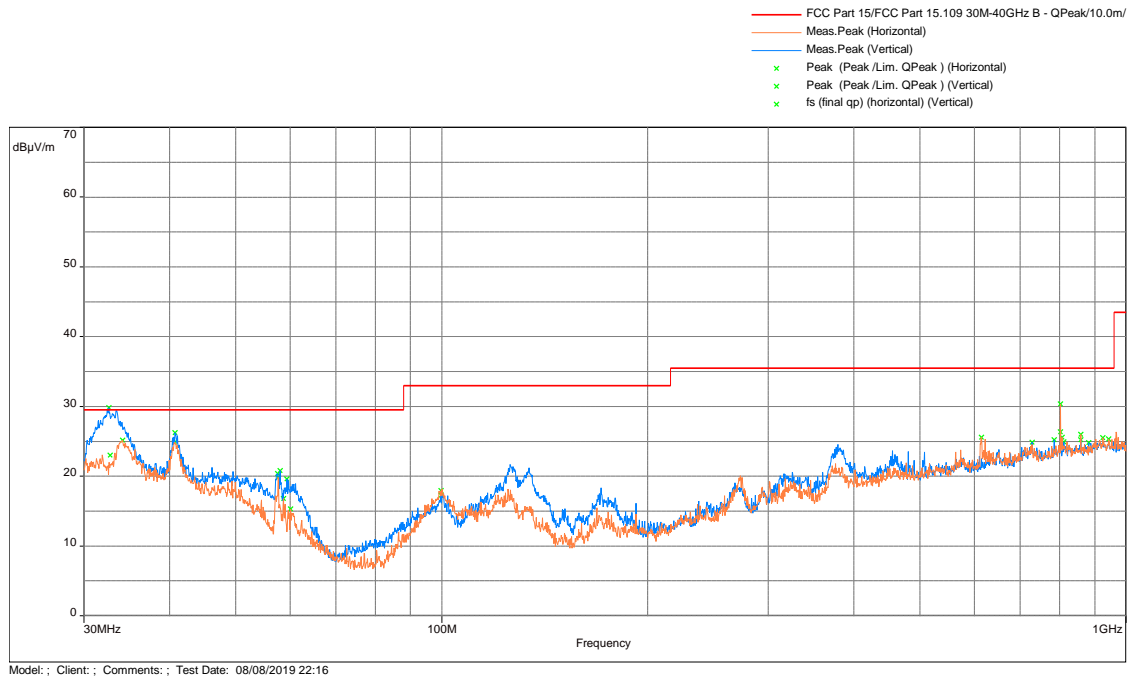
### Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit



Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4880.367	47.57	54	-6.43	1.99	251	Vertical	-9.15

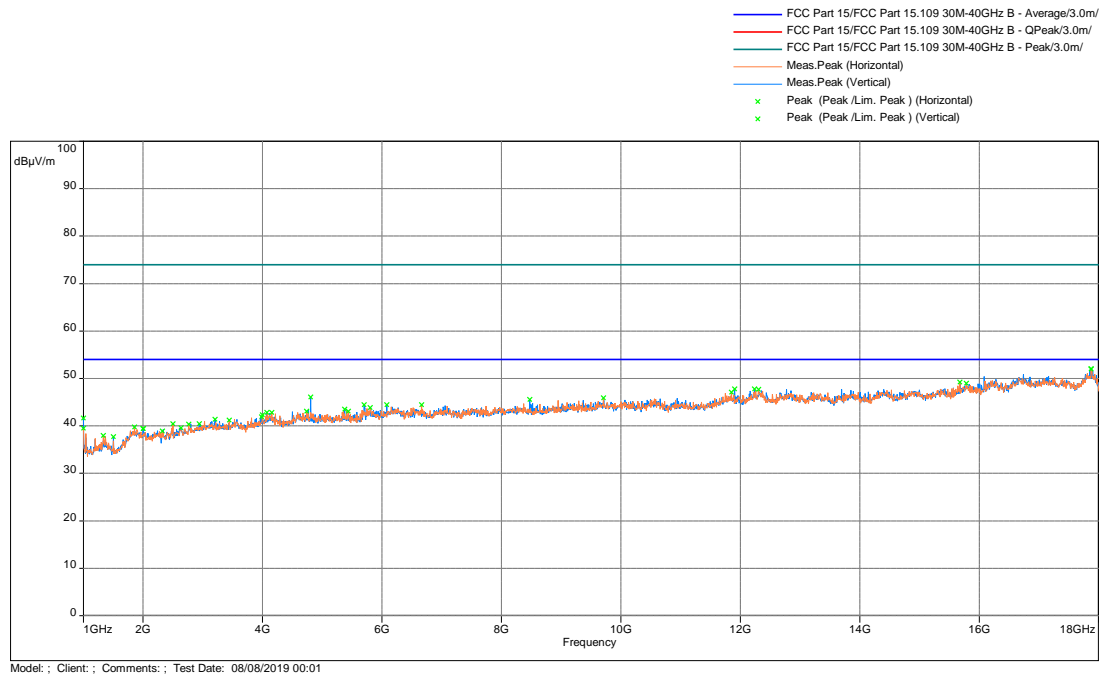
\*Note: No significant emissions were found between 18-25 GHz

### 15.209 Radiated Spurious Emissions Original Power Supply High Channel



Frequency (MHz)	QPeak@10m dB(μV/m)	Lim. QPeak dB(μV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
32.733	22.98	29.5	-6.52	163.75	2.11	Vertical	-6.15

### Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit

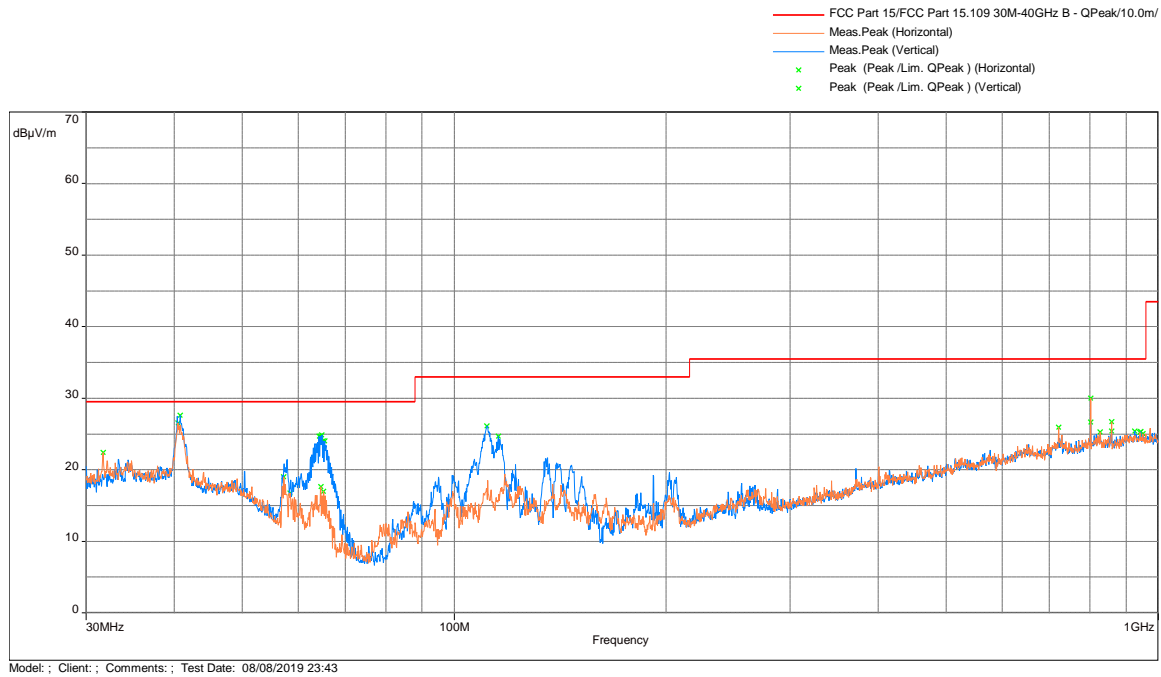


Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4959.3	47.83	54	-6.17	1.99	242.5	Vertical	-9

\*Note: No significant emissions were found between 18-25 GHz

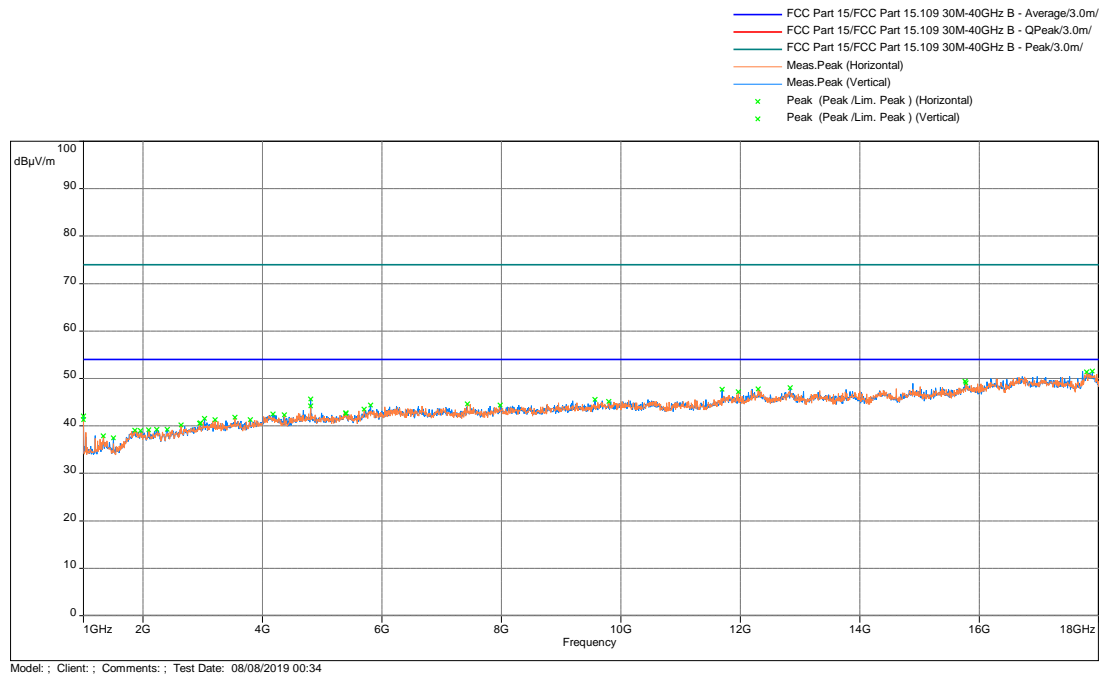


# 15.209 Radiated Spurious Emissions Alternative Power Supply Low Channel



Frequency (MHz)	QPeak@10m dB(μV/m)	Lim. QPeak dB(μV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.799	27.6	29.5	-1.9	2.49	351	Vertical	-6.66

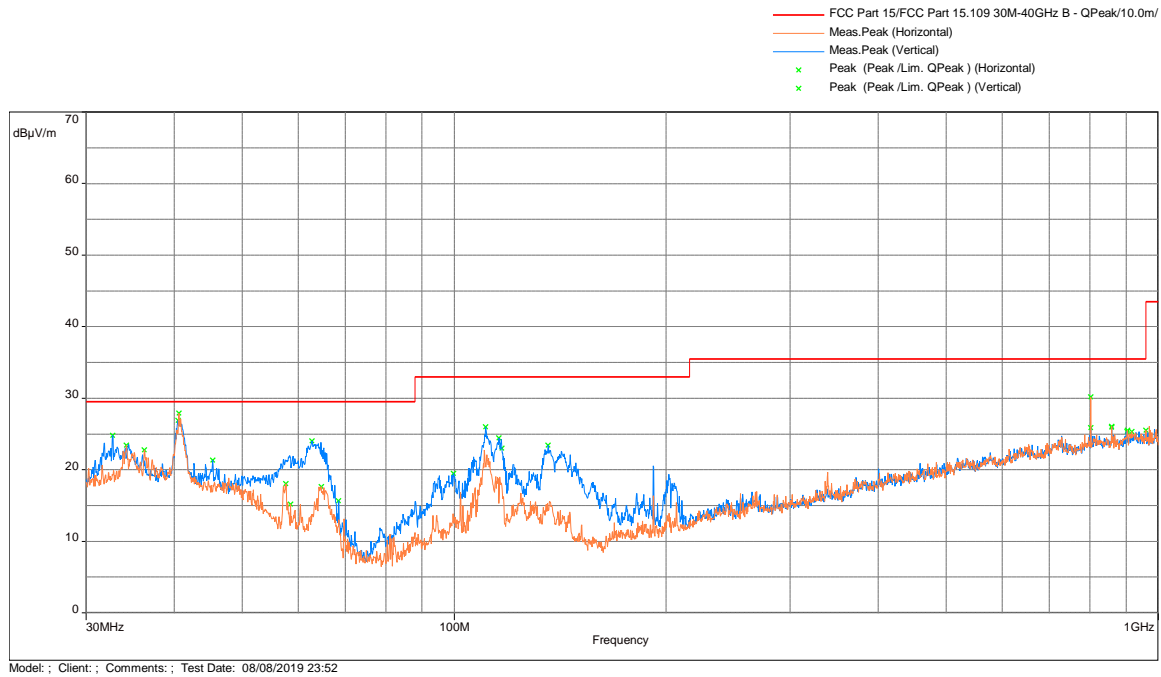
## Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit



Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4802.9	45.65	54	-8.35	1.49	13	Vertical	-8.83

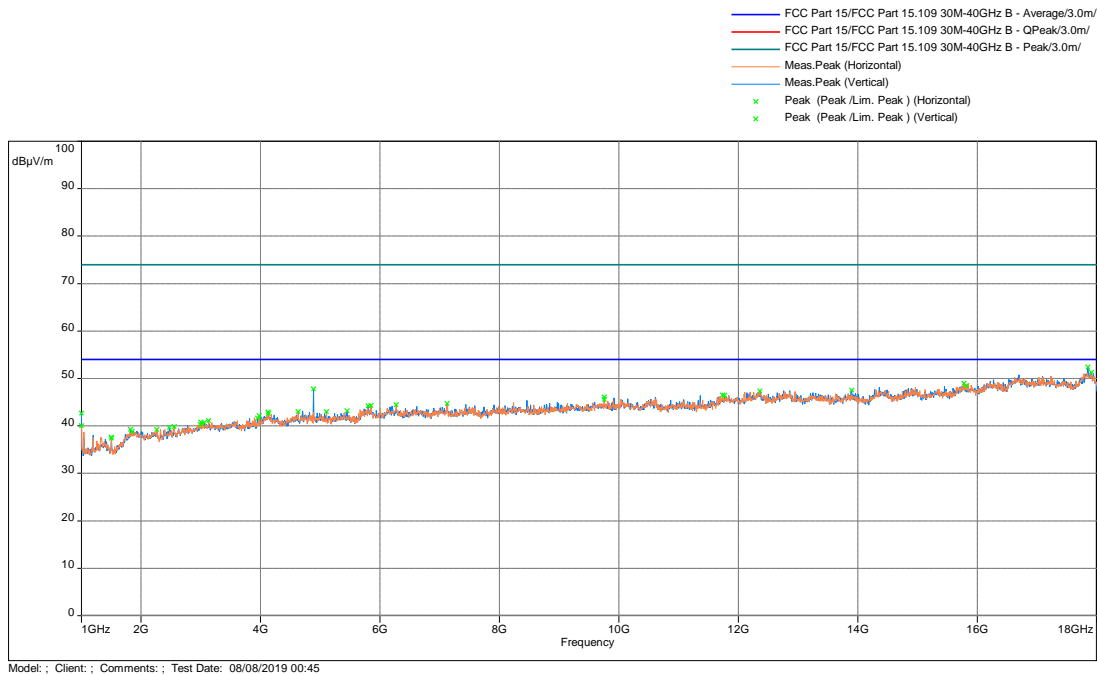
\*Note: No significant emissions were found between 18-25 GHz

## 15.209 Radiated Spurious Emissions Alternative Power Supply Mid Channel



Frequency (MHz)	QPeak@10m dB(μV/m)	Lim. QPeak dB(μV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.638	27.92	29.5	-1.58	2.48	0.5	Horizontal	-6.68

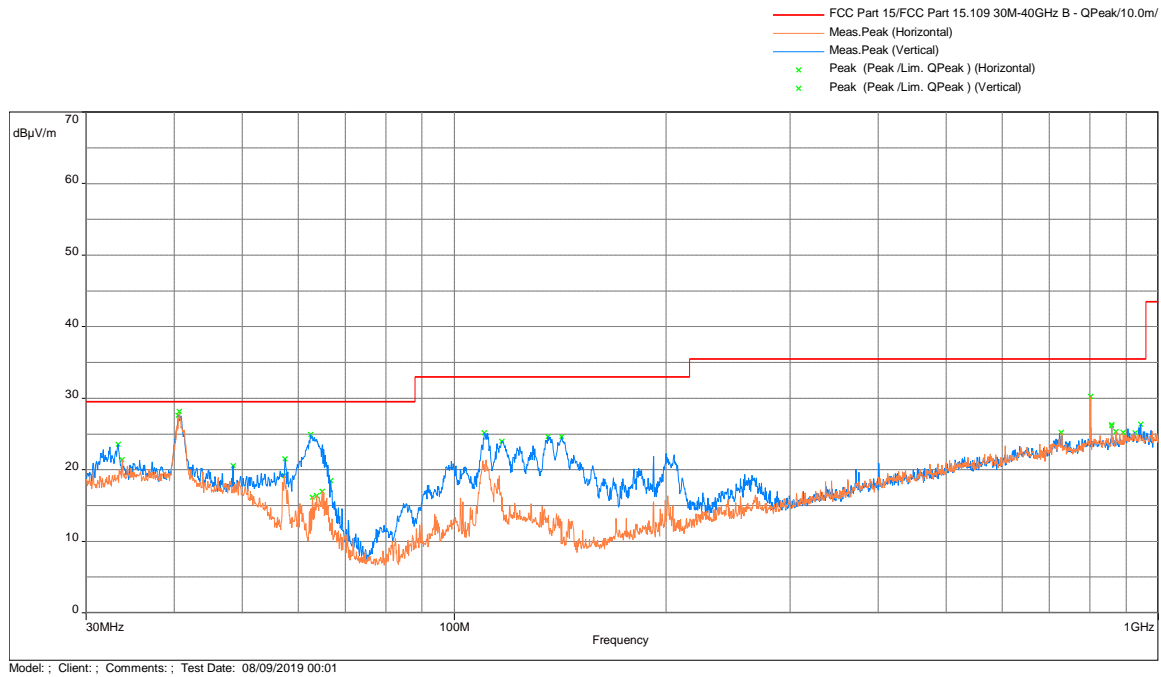
***Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit***



Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4880.367	47.81	54	-6.19	1.99	243	Vertical	-9.15

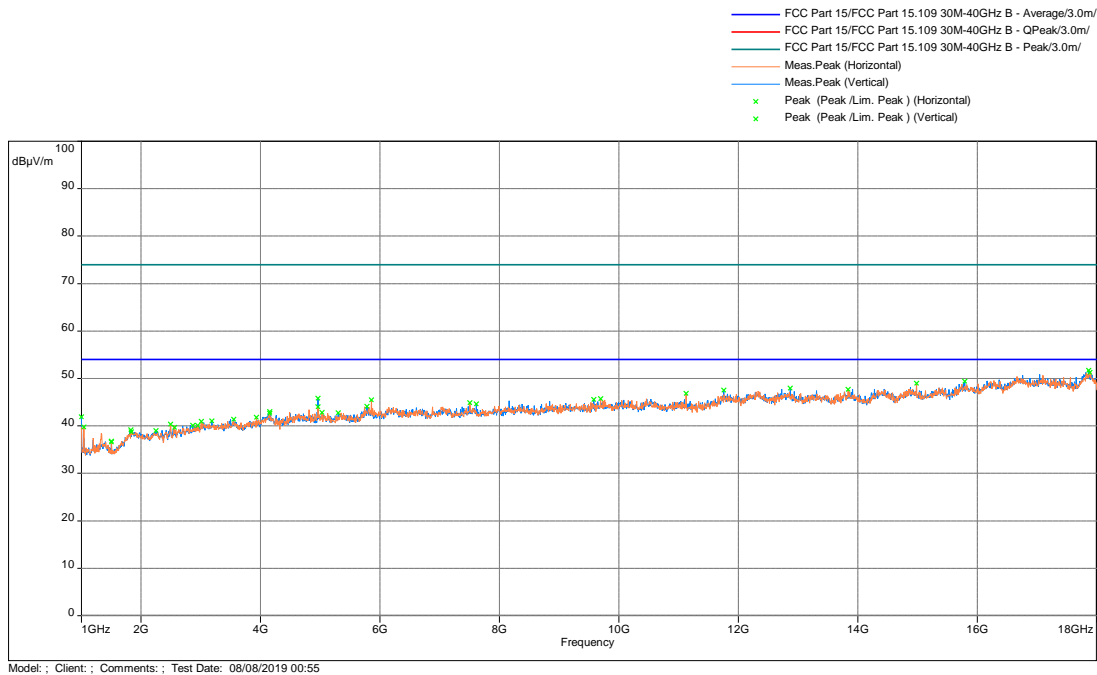
\*Note: No significant emissions were found between 18-25 GHz

## 15.209 Radiated Spurious Emissions Alternative Power Supply High Channel



Frequency (MHz)	QPeak@10m dB(μV/m)	Lim. QPeak dB(μV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
40.702	28.11	29.5	-1.39	2.52	87.5	Horizontal	-6.68

### Radiated Spurious Emissions 1 - 18 GHz, Peak Scan vs Avg Limit



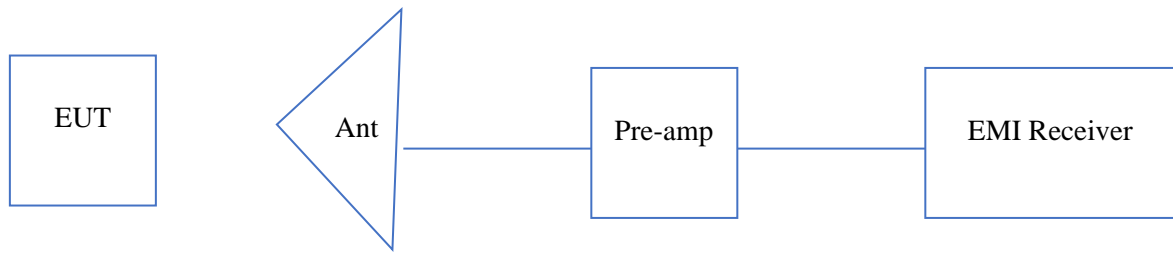
Frequency (MHz)	Peak@3m dB(μV/m)	Lim. Avg dB(μV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)
4959.3	45.81	54	-8.19	1.49	251	Vertical	-9

\*Note: No significant emissions were found between 18-25 GHz

Results	Complies
Test date:	August 8-9, 2019

#### 4.1.5 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	Manufacturer	Model/Type	Serial No.	Calibration Interval	Cal Due
EMI Receiver	Rohde and Schwarz	ESR	ITS 01607	12	10/24/19
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	10/26/19
BI-Log Antenna	Antenna Research	LPB-2513	ITS 00355	12	04/24/20
Pre-Amplifier	Sonoma Instrument	310	ITS 00942	12	03/15/20
Active Horn Antenna	ETS Lindgren	3117-PA	ITS 01636	12	01/17/20
Pyramidal Horn Antenna	EMCO	3160-09	ITS 00571	#	#
Pre-Amplifier	Miteq	TTA1840-35-S-M	ITS 01393	12	02/08/20
Notch Filter	Micro-Tronics	BRM50702	ITS 01166	12	05/14/20
RF Cable	TRU Corporation	TRU CORE 300	ITS 01330	12	05/09/20
RF Cable	TRU Corporation	TRU CORE 300	ITS 00465	12	08/16/19
RF Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	08/16/19

\* Calibration performed by ITS prior to the test. # Calibration not required

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.16.0.64	Willow 8-07-2019.bat



**6.0 Document History**

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G104011429	AC	KV	August 15, 2019	Original document

***END OF REPORT***