EMC Test Report

Project Number:	**4659833**	**Quotation Number:**	**04192019TH-1.3**
Report Number:	**4659833EMC01**	**Revision Level:**	**0**
Client:	**KCI USA, Inc.**		

Equipment Under Test:	**ActiV.A.C. Therapy System**
Model Name:	**ActiVAC RTM**
Model Number:	**60511**
Contains FCC ID:	**2AHDZ-ACTIVAC4G**

FCC Rule Parts:	**Part 2, Part 24(E), Part 27**
Industry Canada:	**RSS-GEN, Issue 5, Amendment 1, March 2019**
	RSS-130, Issue 2, February 2019
	RSS-133, Issue 6, Amendment 1, January 2018
	RSS-139, Issue 3, July 2015
Applicable Standards:	**ANSI C63.26: 2015**

Report issued on:	**24 November 2020**
Test Result:	**Compliant**

Tested by: _____
Martin Taylor, Project Engineer

Reviewed by: _____
Jeremy Pickens, RF Lab Manager

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Table of Contents

1 Summary of Test Results

Reference Sections		Test Description	Test Condition	Test Result
FCC	IC			
2.1046	RSS-GEN (6.12)	Conducted Output Power	Conducted	(see Note 1)
24.232(d) 27.50(d)(5)	RSS-130 (4.6.1) RSS-133 (6.4) RSS-139 (6.5)	Peak-to-Average Ratio		(see Note 1)
2.1049 24.238(b) 27.53(h)(3)	RSS-GEN (6.7) RSS-133 (2.3)	Occupied Bandwidth Emission Bandwidth		(see Note 1)
2.1051 24.238 27.53(g) 27.53(h)	RSS-130 (4.7) RSS-133 (6.5) RSS-139 (6.6)	Band Edge / Conducted Spurious Emissions		(see Note 1)
27.50(c)(10)	RSS-130 (4.6.3)	Effective Radiated Power	Radiated	(see Note 1)
24.232(c) 27.50(d)(4)	RSS-133 (6.4) RSS-139 (6.5)	Effective Isotropic Radiated Power		(see Note 1)
2.1053 24.238 27.53(g) 27.53(h)	RSS-GEN (6.13) RSS-130 (4.7) RSS-133 (6.5) RSS-139 (6.6)	Radiated Spurious Emissions		Compliant
2.1055 24.235 27.54	RSS-GEN (6.11) RSS-130 (4.5) RSS-133 (6.3) RSS-139 (6.4)	Frequency Stability	Conducted	(see Note 1)

Note 1: A Class 2 Permissive Change is sought for authorization of portable use for certified module with FCC ID: 2AHDZ-ACTIVAC4G. Only SAR and RSE testing are required. SAR test results are documented in a separate test report.

1.1 *Modifications Required to Compliance*

None

2 General Information

2.1 *Client Information*

Name:	KCI USA, Inc.
Address:	6203 Farinon Drive Building 5
City, State, Zip, Country:	San Antonio, TX 78249 USA

2.2 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA
Accrediting Body:	A2LA
Type of lab:	Testing Laboratory
Certificate Number:	3212.01

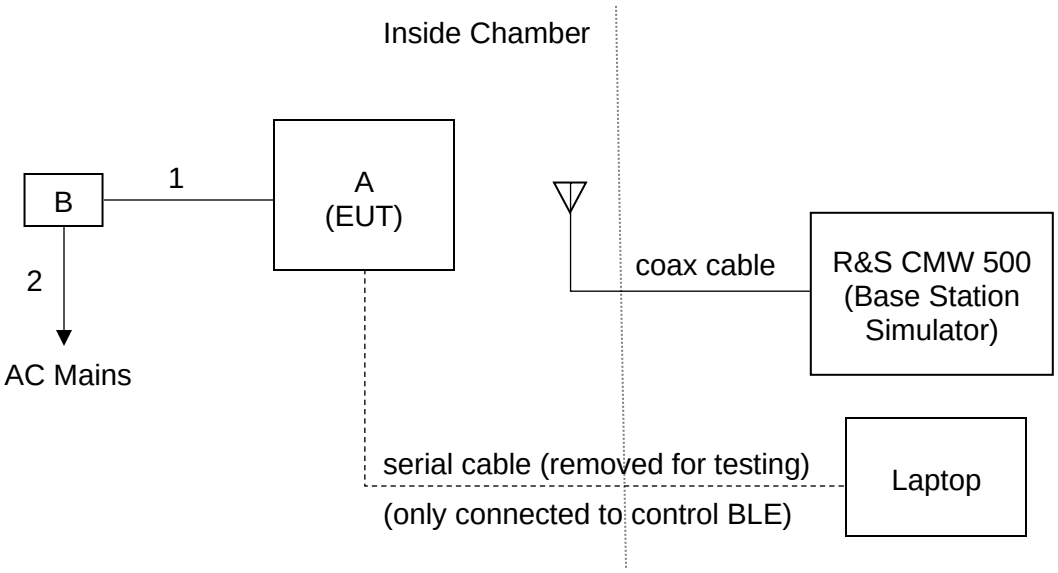
2.3 *General Information of EUT*

Equipment Under Test:	ActiV.A.C. Therapy System
Model Name:	ActiVAC RTM
Model Number:	60511
Sample ID Number:	5581
IMEI Number:	353081090318463 (LTE RSE sample) 353081091825482 (LTE/BLE RSE sample)
Contains FCC ID:	2AHDZ-ACTIVAC4G
Tx Frequency Range:	1850 – 1910 MHz (LTE Band 2) 1710 – 1755 MHz (LTE Band 4) 699 – 716 MHz (LTE Band 12)
Radio Technology:	LTE Cat M1 (eMTC)
Channel Bandwidth tested:	15 MHz (Band 2), 1.4MHz (Band 4), 5MHz (Band 12)
RB allocation:	1 RB allocated, RB start = 0
FCC Classification:	PCS Licensed Transmitter (PCB)
Rated Voltage:	100-240Vac, 50-60Hz
Test Voltage:	120Vac, 60Hz
Sample Received Date:	03 August 2020 (LTE RSE sample) 28 September 2020 (LTE/BLE RSE sample)
Dates of testing:	01-15 October 2020

2.4 *Operating Modes and Conditions*

The EUT was tested with normal operating firmware, but with a Rohde & Schwarz test SIM installed. The EUT had an internal battery pack and was connected to the AC Mains using the supplied AC wall adapter. The EUT was powered on by holding down the power button for a moment after which the cellular modem connected with the R&S CMW 500 Wideband Radio Communication Tester (CMW). The CMW was used to control the EUT to operate with maximum transmit (uplink) power in LTE Bands 2, 4 & 12.
Simultaneous transmission testing was also performed with LTE transmit signals (as described above) and Bluetooth Low Energy (BLE) transmit signals enabled using software utilities and a serial communication cable.

2.5 *EUT Connection Block Diagram*



2.6 *System Configurations*

Device Reference	Manufacturer	Description	Model Number	Serial Number
A	KCI USA, Inc.	ActiV.A.C. Therapy System (EUT)	60511	Not labeled
B	ICCNexergy	AC Power Adapter	MWA040012B	0128042

2.7 *Cable List*

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	DC Power	AC Power Adapter	EUT	3.0	No	No
2	AC Power	AC Mains	AC Power Adapter	2.0	No	No

3 Radiated Spurious Emissions

3.1 *Test Result*

Test Description	Basic Standards		Test Result
Radiated Spurious Emissions	FCC 2.1053 FCC 24.238(a) FCC 27.53(g) FCC 27.53(h)	RSS-GEN (6.13) RSS-130 (4.7) RSS-133 (6.5) RSS-139 (6.6)	Compliant

3.2 *Test Method*

The radiated power emanating from the EUT of the band edge (out-of-band) and spurious band emissions are measured by means of a calibrated spectrum analyzer. The spectrum is investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. The power of any emissions outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) measured in watts by at least 43 + 10 log (P) dB.

The EUT was tested in three orthogonal orientations and the worst-case results were reported.

The measurement was oriented in both vertical and horizontal polarizations.

A radio link was established between the EUT and a Radio Communications Tester. The output power of the EUT was set to maximum by using the maximum power setting on the Radio Communications Tester.

The measurements were performed at the low, middle and high channels of each band tested.

Measurements were also performed with both the cellular (LTE) and Bluetooth LE radios transmitting simultaneously at maximum power. The closest signals in frequency were used for this test, which were LTE Band 2 and BLE channel 0.

3.3 *Test Site*

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions	30-1000 MHz	1-18 GHz	18-20 GHz	Simultaneous Tx
Temperature:	21.5 °C	23 °C	22 °C	23.4 °C
Relative Humidity:	44.4 %	50 %	47.9 %	49.5 %
Atmospheric Pressure:	98.2 kPa	98 kPa	97.98 kPa	97.72 kPa

3.4 *Test Equipment*

30-1000 MHz

Test End Date: 5-Oct-2020 Tester: PV, MT

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079689	30-Oct-2018	30-Oct-2020
Attenuator, 6dB	BW-N6-W5+	Mini-Circuits	18031	3-Sep-2020	3-Sep-2021
RF Cable Nm to Nm, 0.01-18GHz	90-195-354	TELEDYNE STORM MICROWAVE	20120	2-Mar-2020	2-Mar-2021
RF Cable Nm to Nf, 0.01-18GHz	90-213-118	TELEDYNE STORM MICROWAVE	20117	2-Mar-2020	2-Mar-2021
RF Cable Nm to Nm, 0.01-18GHz	90-195-118	TELEDYNE STORM MICROWAVE	20125	2-Mar-2020	2-Mar-2021
RF CABLE	SUCOFLEX 100	Huber & Suhner	B108523	3-Sep-2020	3-Sep-2021
LOW NOISE AMPLIFIER	ZKL-2+	Mini-Circuits	B079800	25-Sep-2020	25-Sep-2021
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	7-May-2020	7-May-2021
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	17-Jan-2020	17-Jan-2022

1-18 GHz

Test End Date: 8-Oct-2020 Tester: PV

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS Lindgren	B079699	15-Jul-2022
RF Cable Nm to Nm, 0.01-18GHz	90-195-354	TELEDYNE STORM MICROWAVE	20120	2-Mar-2021
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	3-Dec-2020
RF CABLE	104PE	HUBER & SUHNER	B079793	3-Sep-2021
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	6-Apr-2021
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	17-Jan-2022
FILTER, BAND REJECT, 1880MHz	BRC50720	MICRO-TRONICS	B079784	8-Sep-2021
FILTER, BAND REJECT, 1750MHz	BRC50719	MICRO-TRONICS	B079785	8-Sep-2021

18-20GHz

Test End Date: 8-Oct-2020 Tester: ZH

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, HORN (SMALL)	LB-180400-20-C-KF	A-INFO	15007	6-Apr-2022
RF Cable SMA to SMA, 0.01-40GHz	084-0505-138	TELEDYNE STORM MICROWAVE	20110	6-Mar-2021
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	3-Dec-2020
RF Cable SMA to SMA, 0.01-40GHz	084-0505-020	TELEDYNE STORM MICROWAVE	20105	6-Mar-2021
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	6-Apr-2021
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	17-Jan-2022
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	9-Nov-2020

Simultaneous Tx

Test End Date: 15-Oct-2020 Tester: ZH

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS Lindgren	B079699	15-Jul-2022
RF Cable Nm to Nm, 0.01-18GHz	90-195-354	TELEDYNE STORM MICROWAVE	20120	2-Mar-2021
RF CABLE	104PE	HUBER & SUHNER	B079793	3-Sep-2021
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	6-Apr-2021
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	3-Dec-2020
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	17-Jan-2022
ATTENUATOR, 10DB	BW-N10W20+	Mini-Circuits	17023	3-Sep-2021
ATTENUATOR, 10DB (TS8997)	10DB	ROHDE & SCHWARZ	B095594	8-Sep-2021

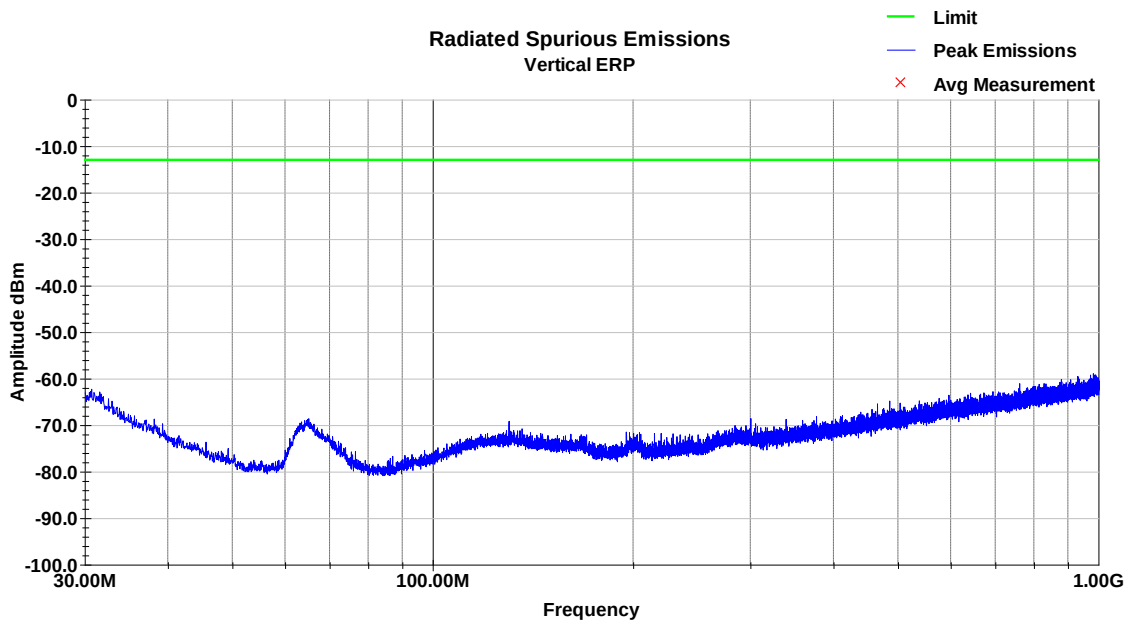
- Unless otherwise noted, equipment is on a 1-year calibration cycle.
- The antennas and the CMW 500 are on 2-year calibration cycles.

3.5 *Test Data 30-1000MHz*

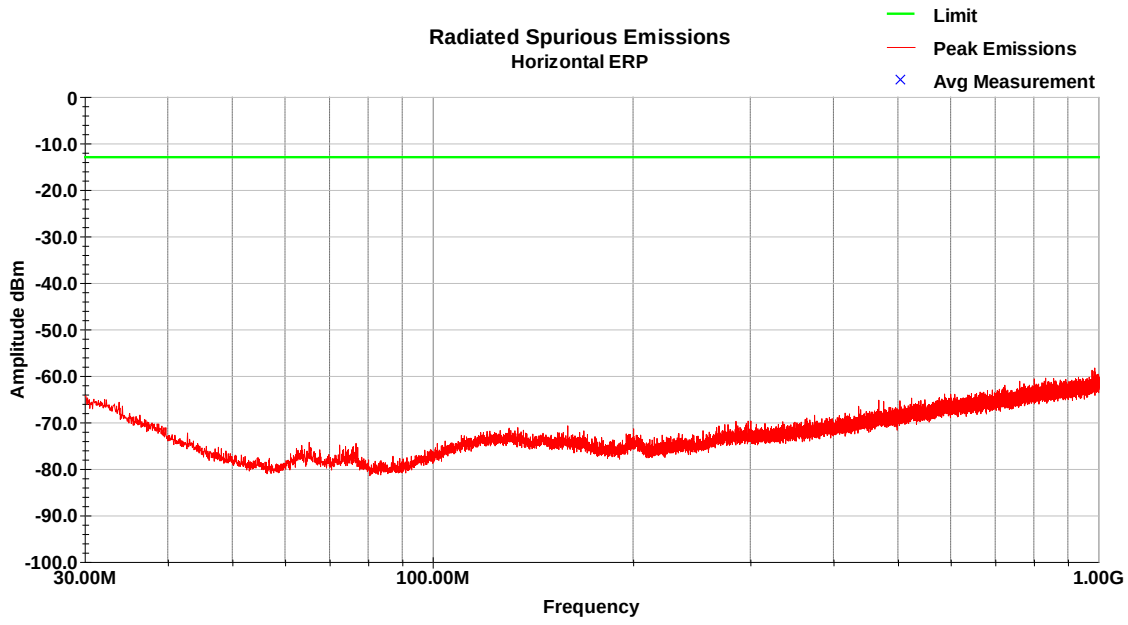
LTE Band 2, QPSK modulation, 15MHz Bandwidth

Low Channel (1857.5MHz)

Vertical Plot (30-1000MHz)



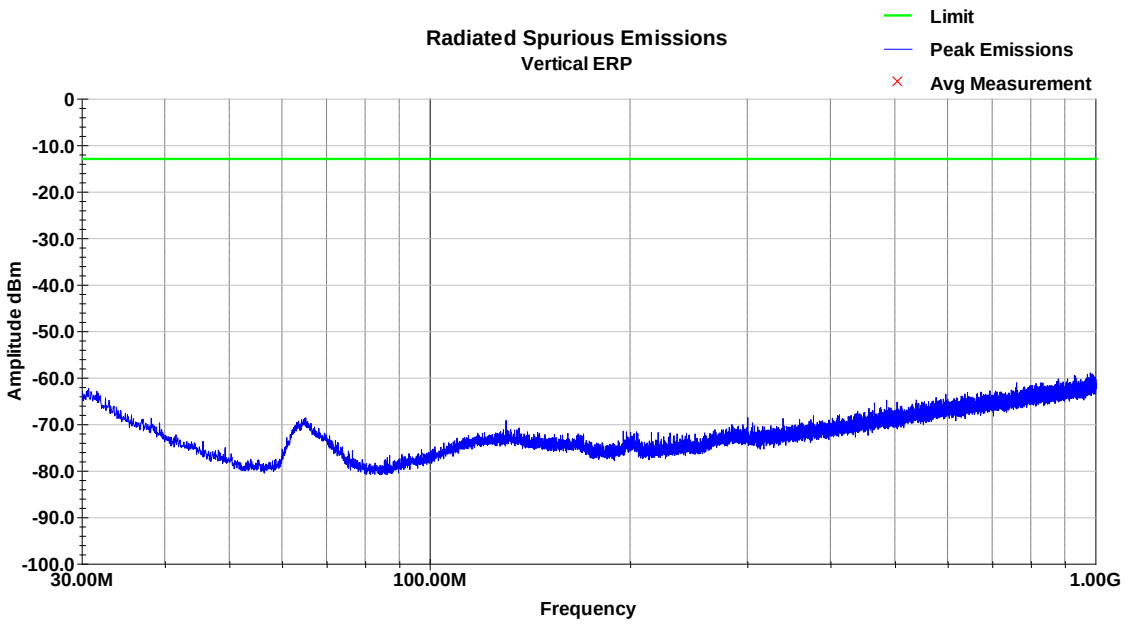
Horizontal Plot (30-1000MHz)



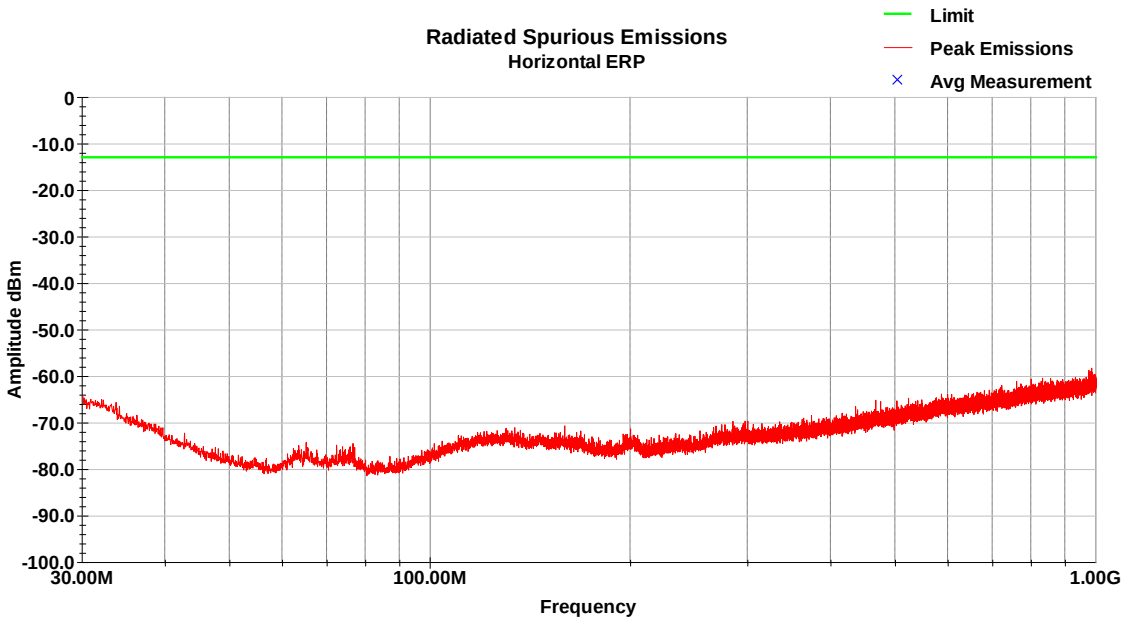
LTE Band 2, QPSK modulation, 15MHz Bandwidth

Mid Channel (1880MHz)

Vertical Plot (30-1000MHz)



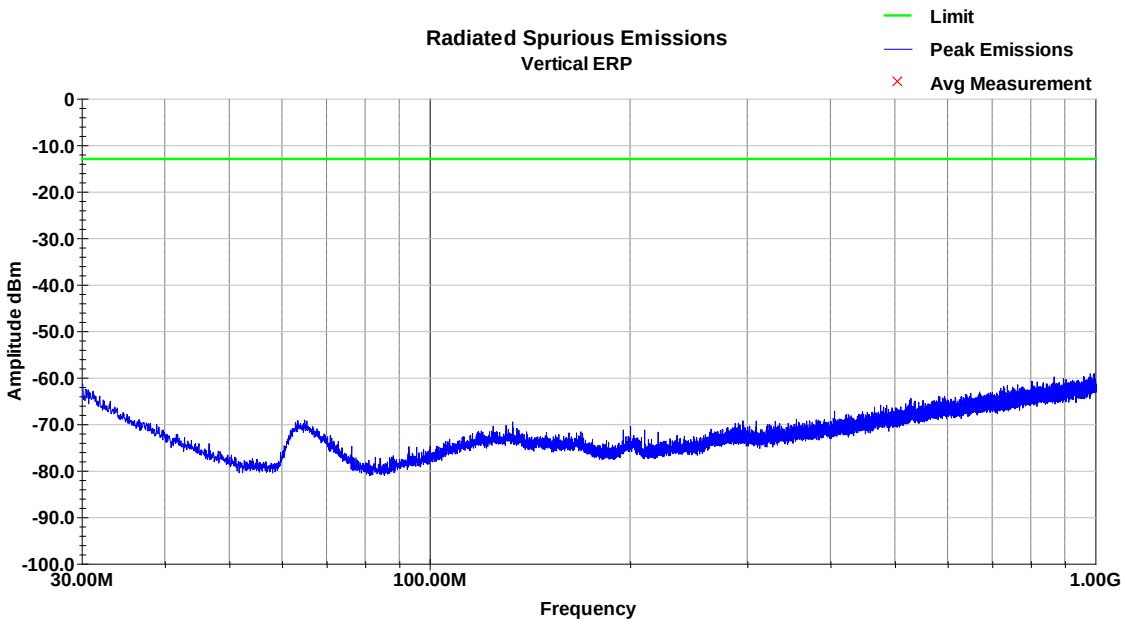
Horizontal Plot (30-1000MHz)



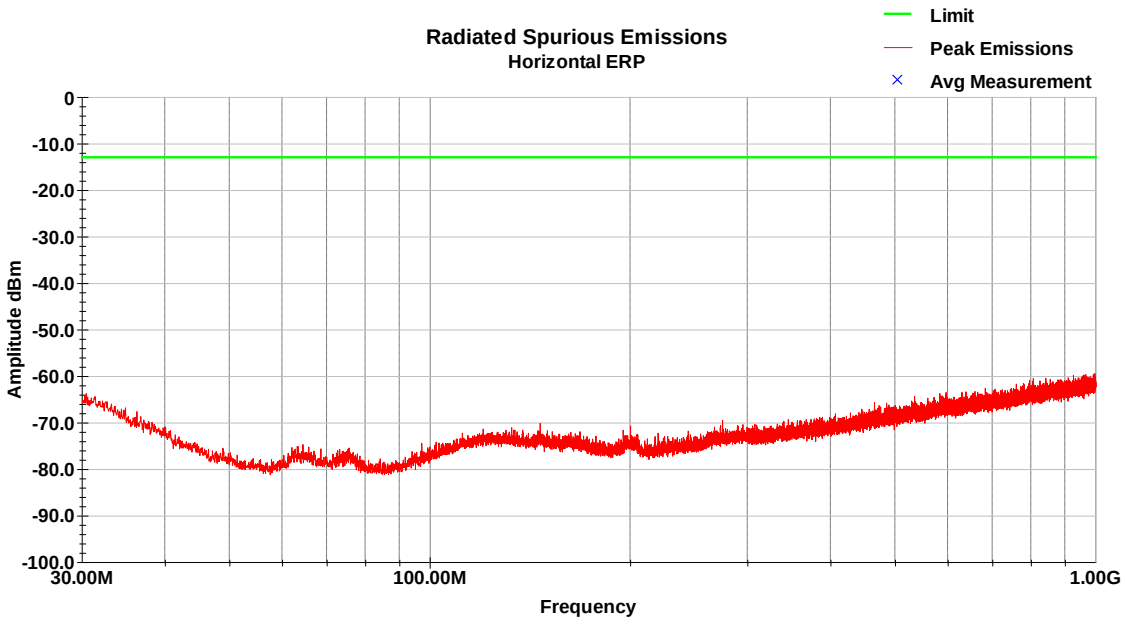
LTE Band 2, QPSK modulation, 15MHz Bandwidth

High Channel (1902.5MHz)

Vertical Plot (30-1000MHz)



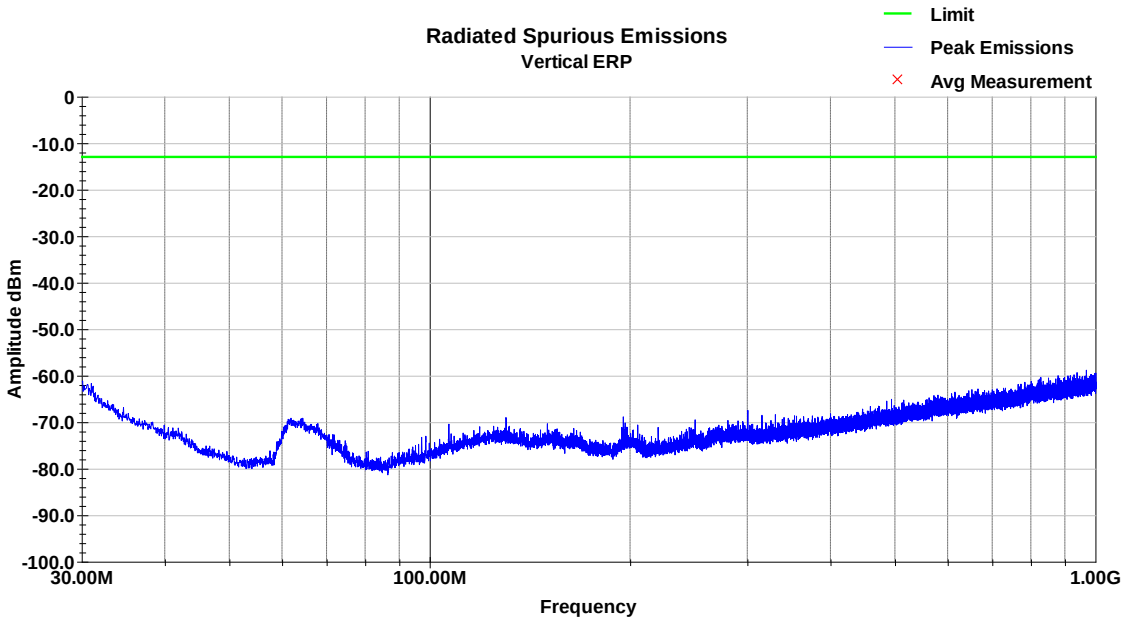
Horizontal Plot (30-1000MHz)



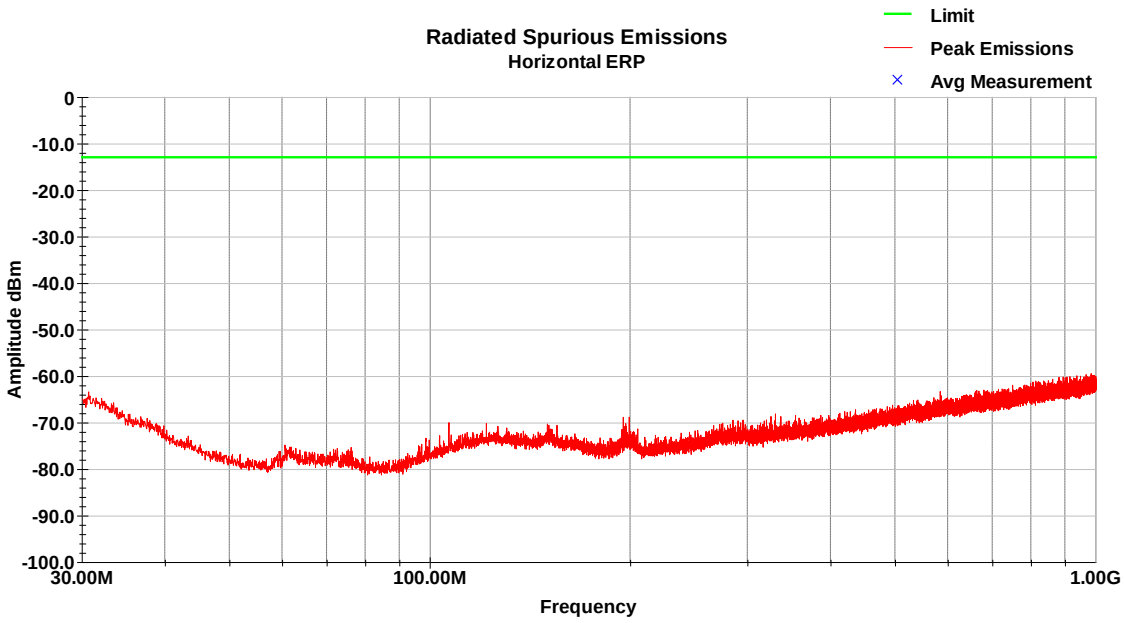
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

Low channel (1710.7MHz)

Vertical Plot (30-1000MHz)



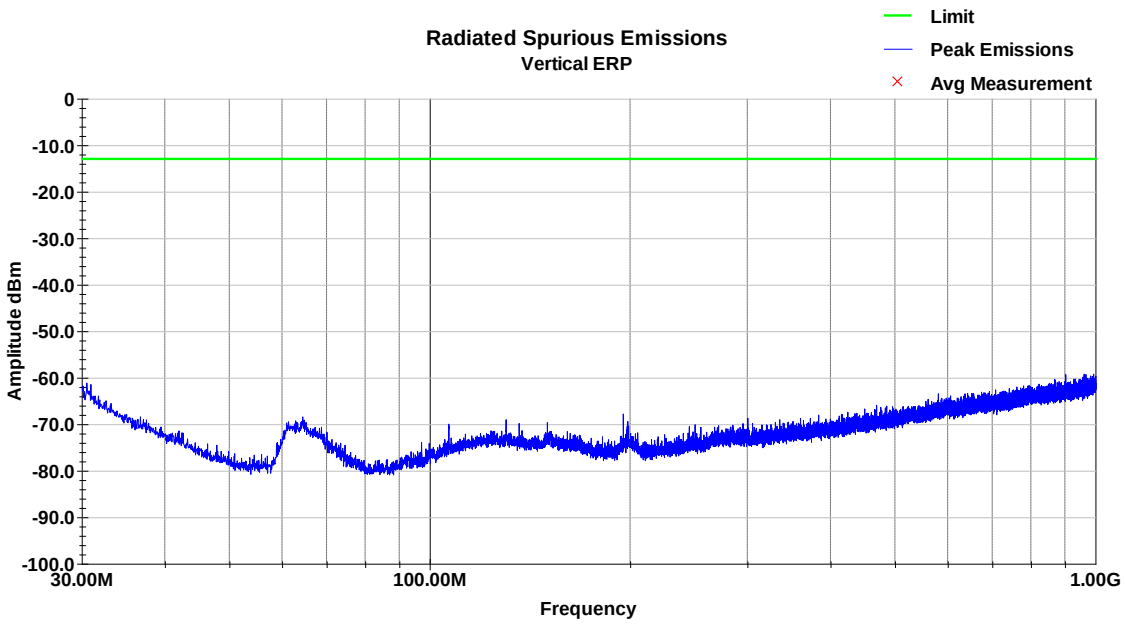
Horizontal Plot (30-1000MHz)



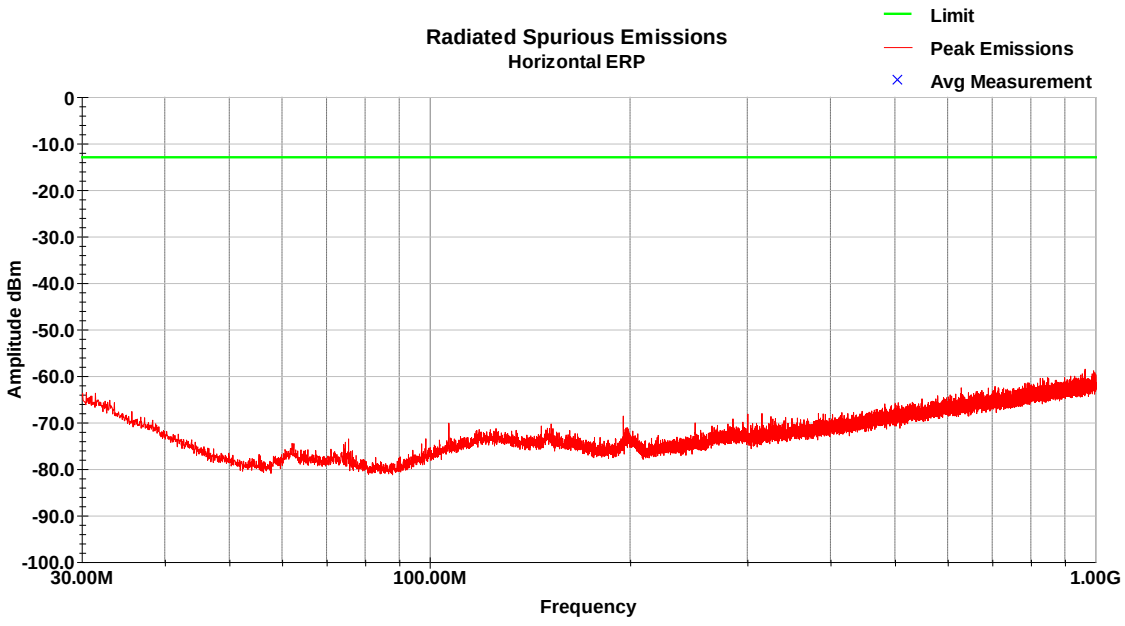
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

Mid channel (1732.5MHz)

Vertical Plot (30-1000MHz)



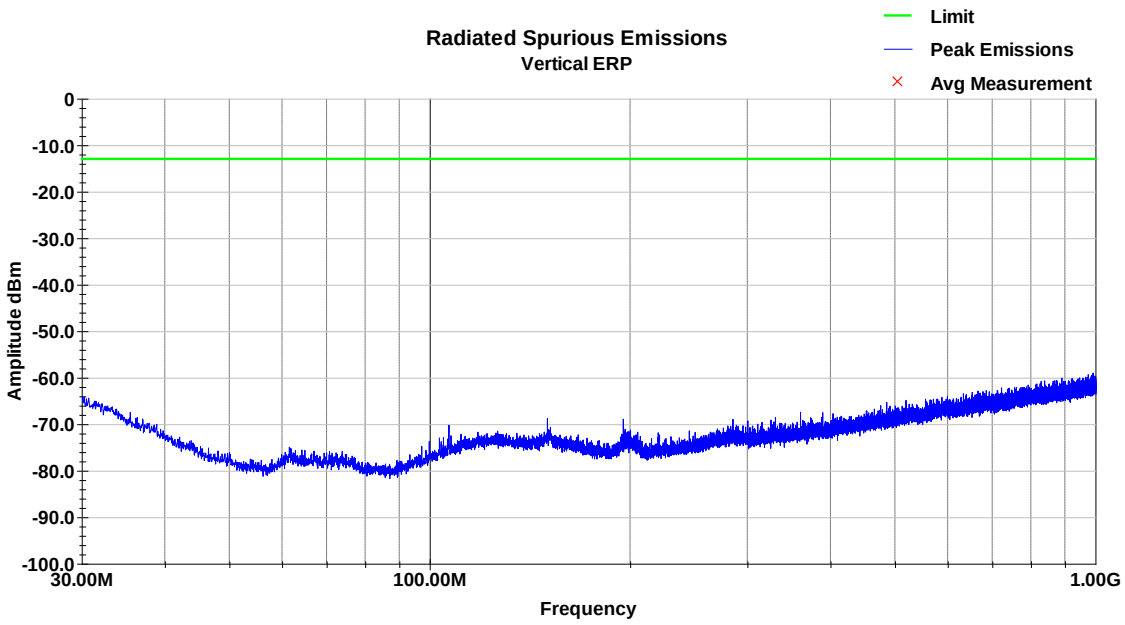
Horizontal Plot (30-1000MHz)



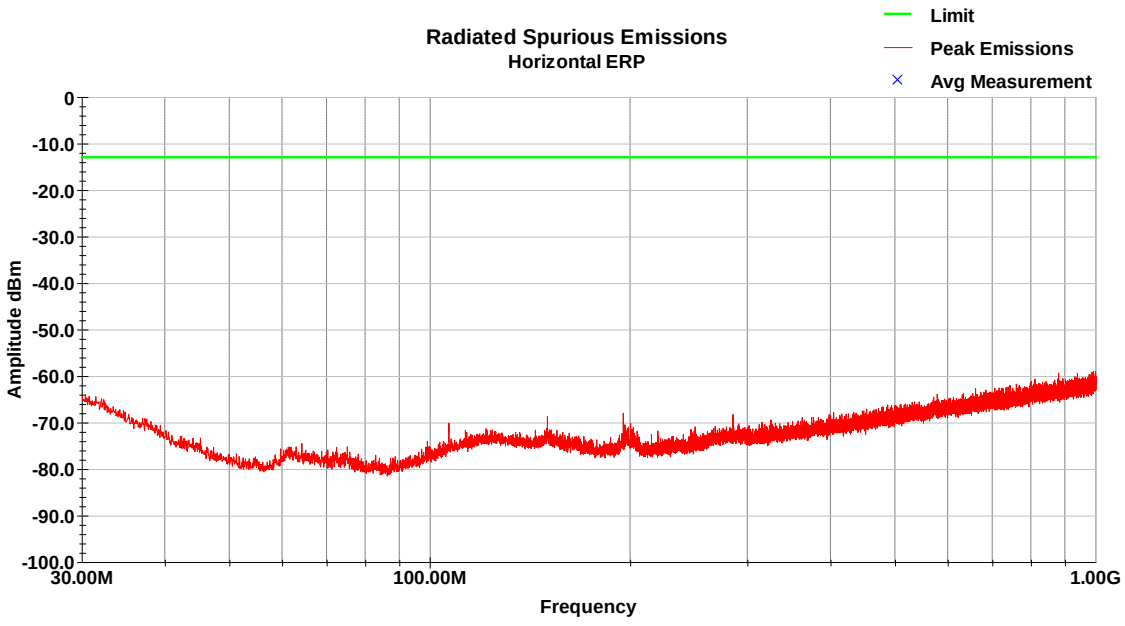
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

High channel (1754.3MHz)

Vertical Plot (30-1000MHz)



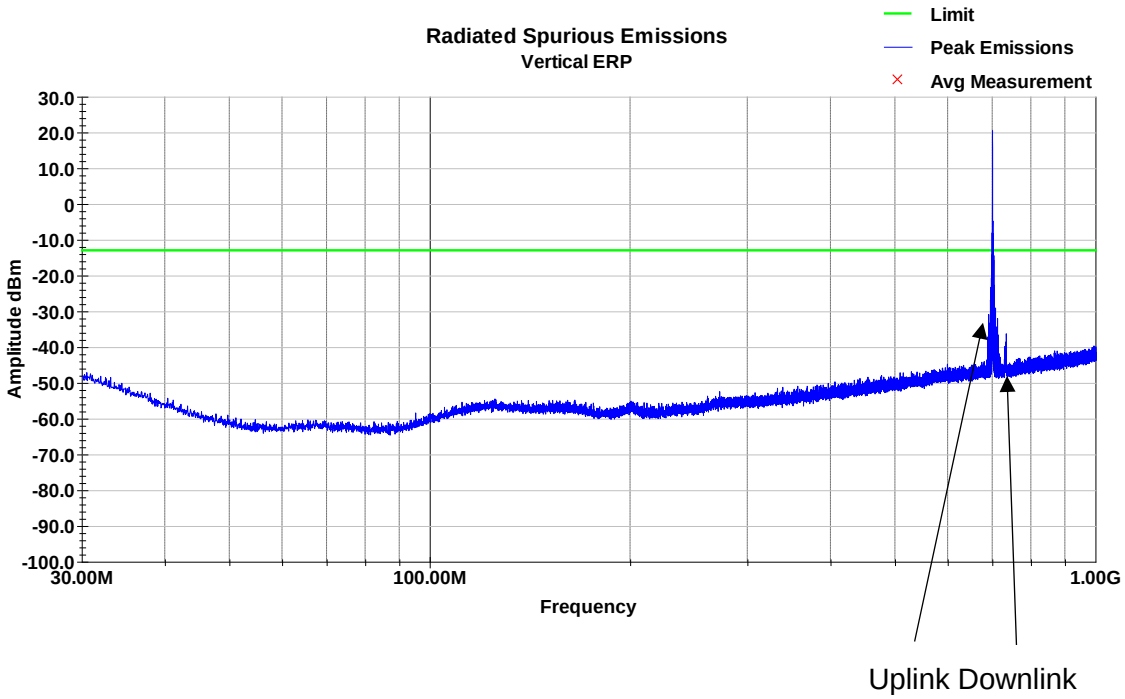
Horizontal Plot (30-1000MHz)



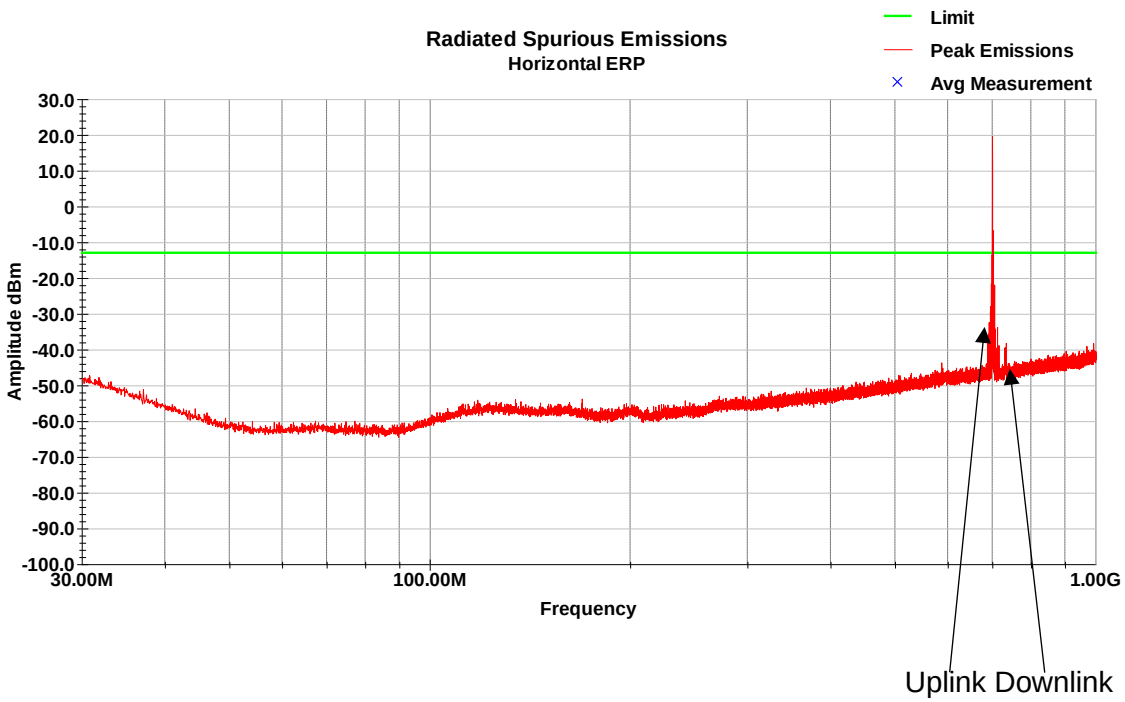
LTE Band 12, QPSK modulation, 5MHz

Low channel (701.5MHz)

Vertical Plot (30-1000MHz)



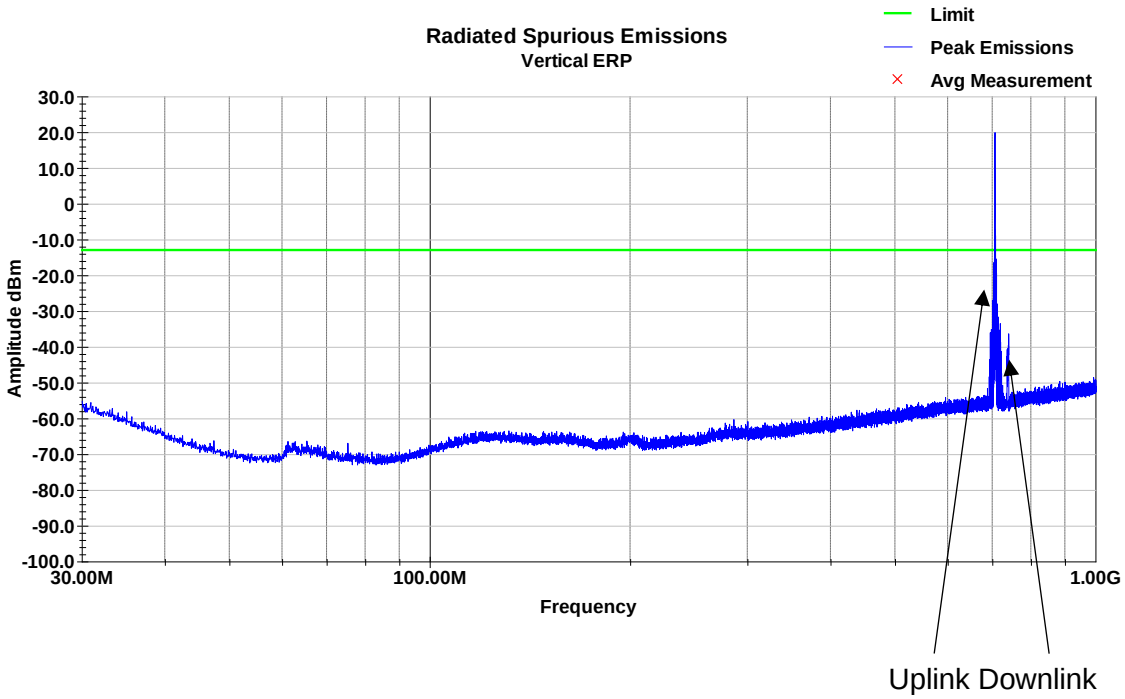
Horizontal Plot (30-1000MHz)



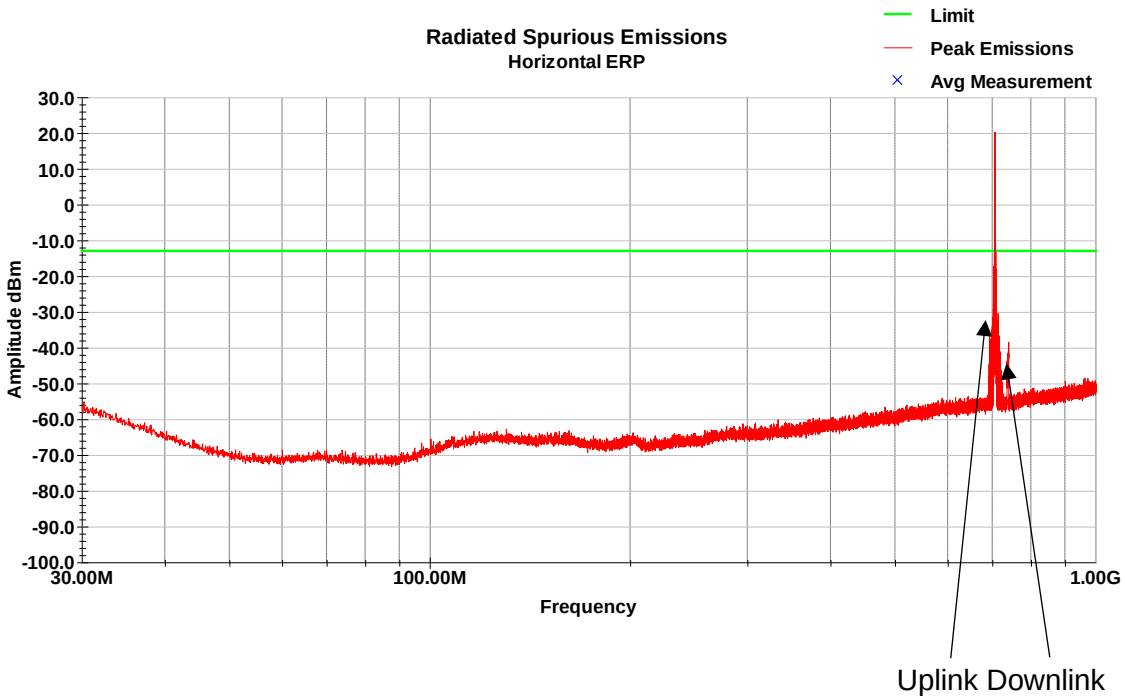
LTE Band 12, QPSK modulation, 5MHz

Mid channel (707.5MHz)

Vertical Plot (30-1000MHz)



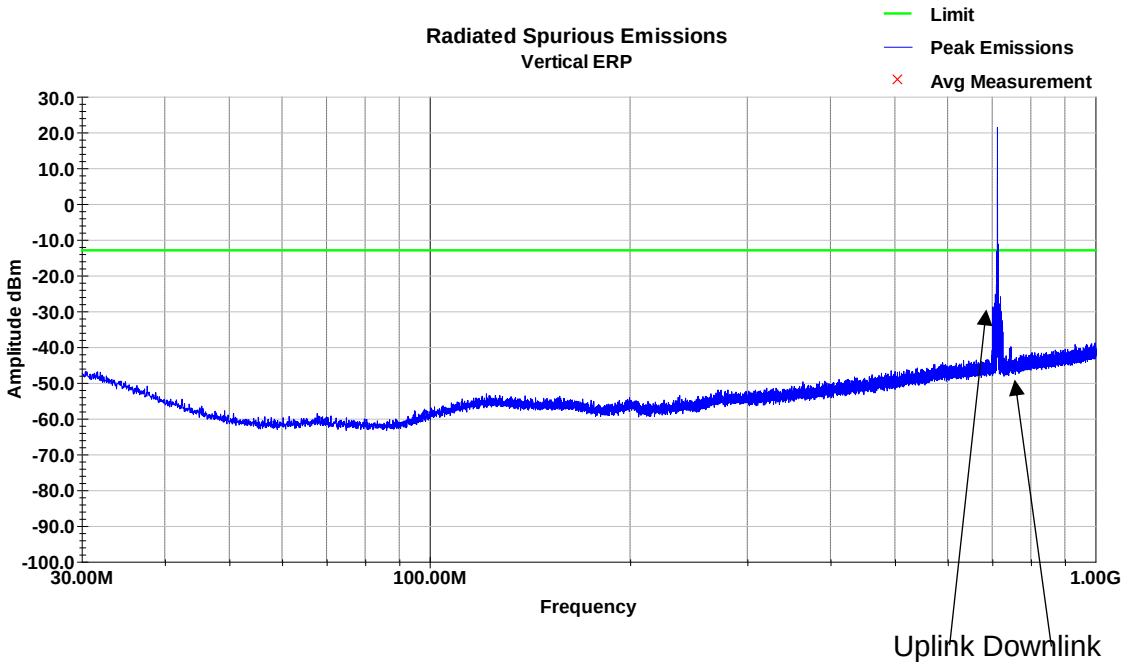
Horizontal Plot (30-1000MHz)



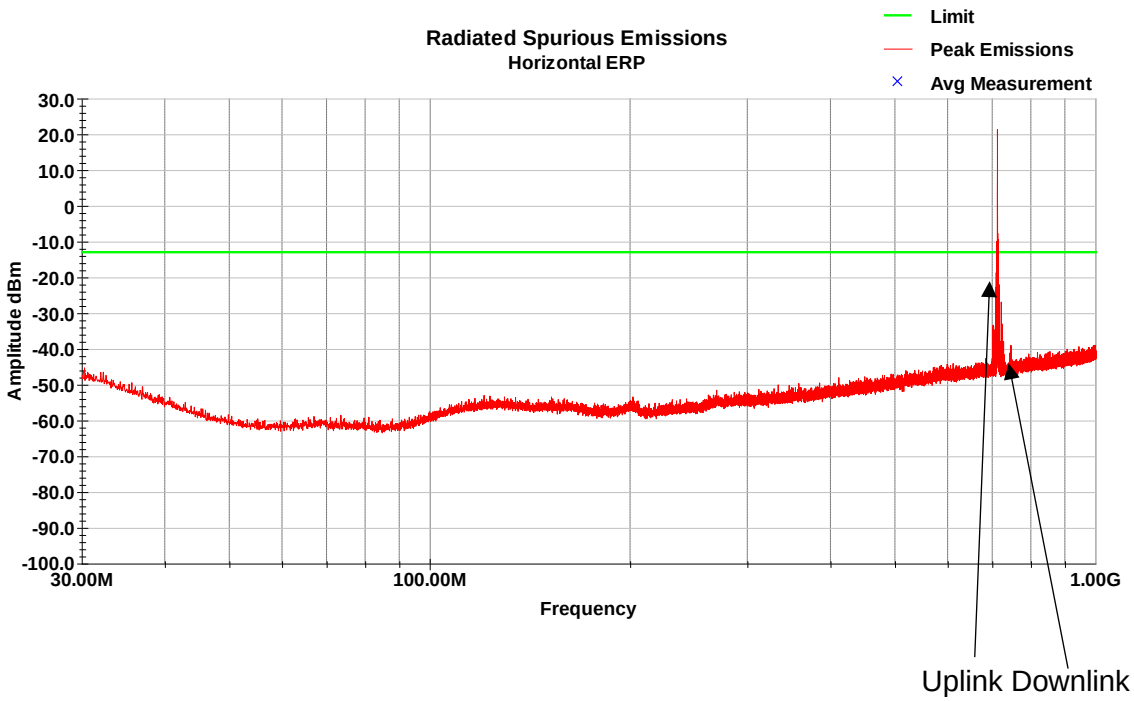
LTE Band 12, QPSK modulation, 5MHz

High channel (713.5MHz)

Vertical Plot (30-1000MHz)



Horizontal Plot (30-1000MHz)

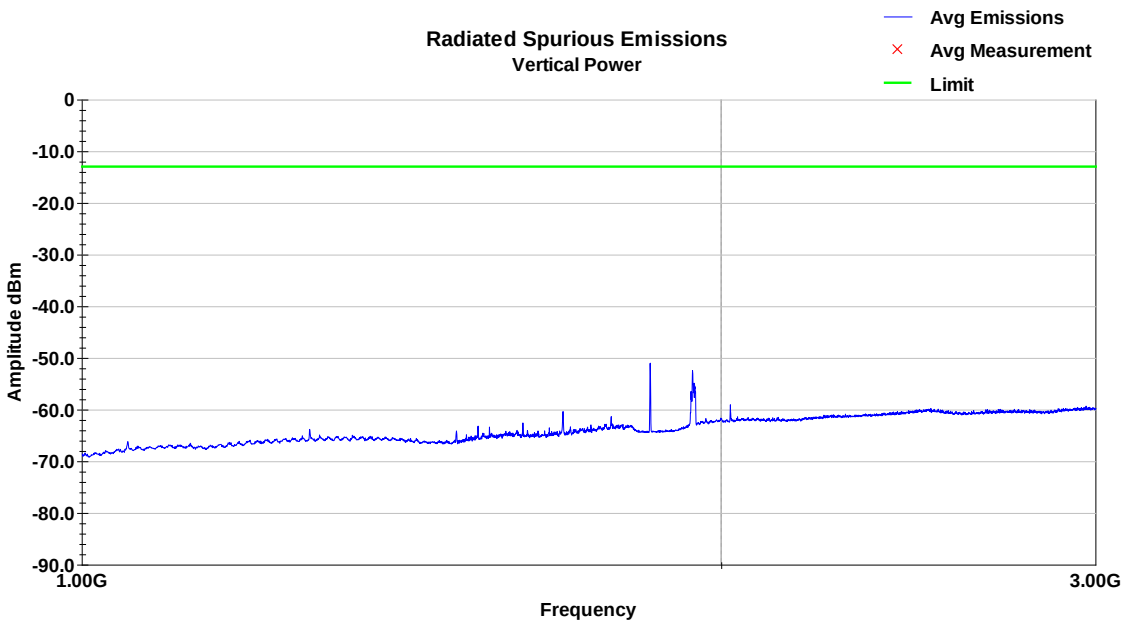


3.6 *Test Data Above 1GHz*

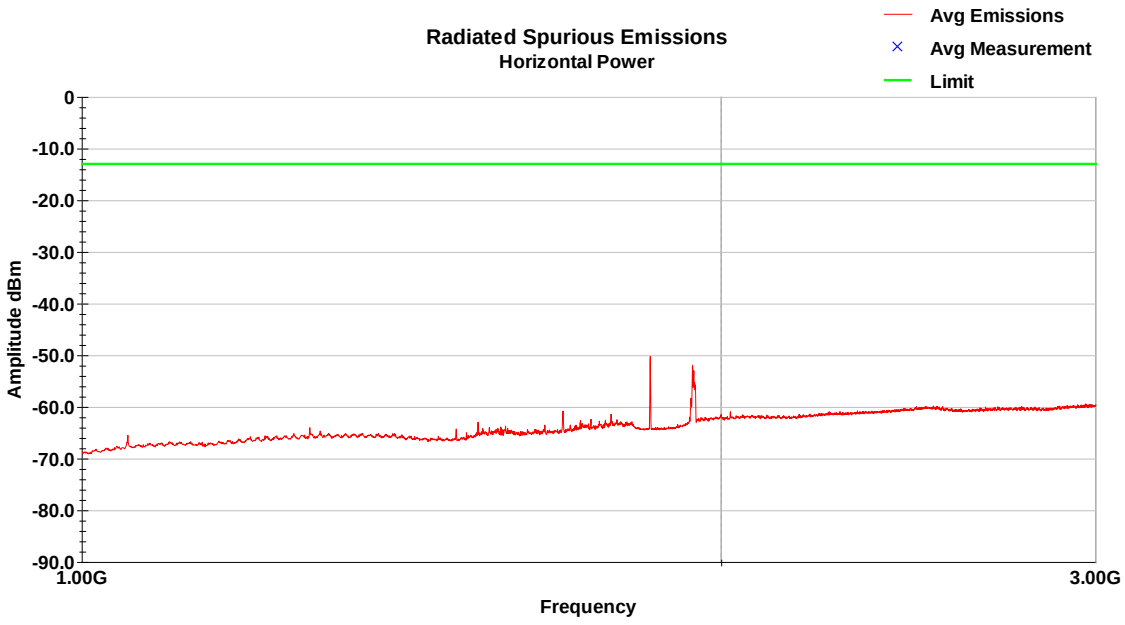
LTE Band 2, QPSK modulation, 15MHz Bandwidth

Low Channel (1857.5MHz)

Vertical Plot (1-3GHz)



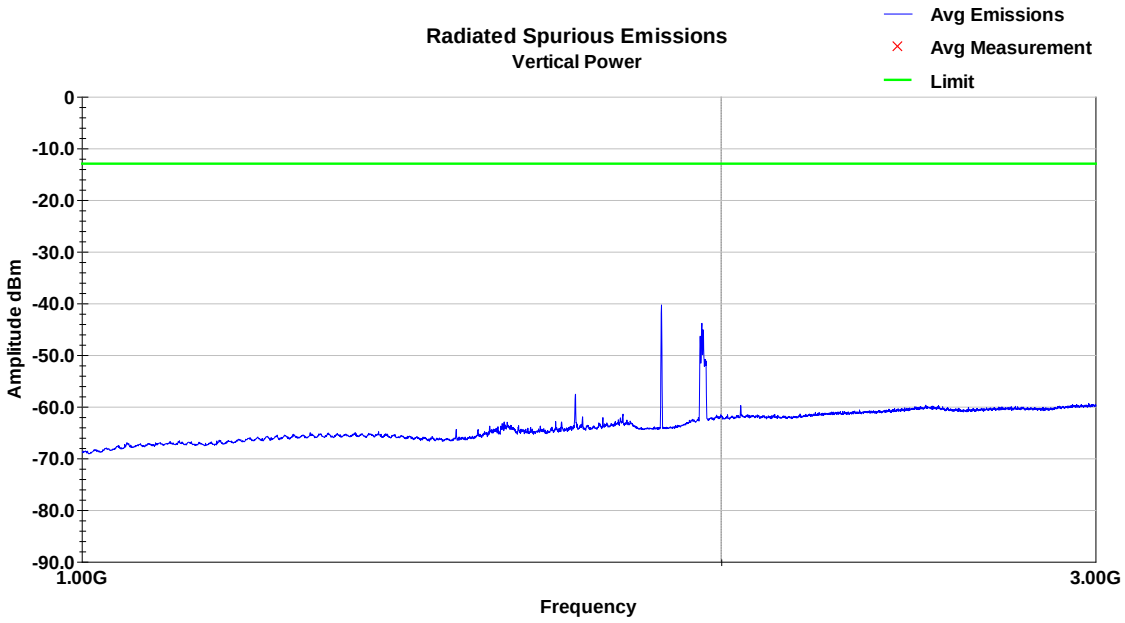
Horizontal Plot (1-3GHz)



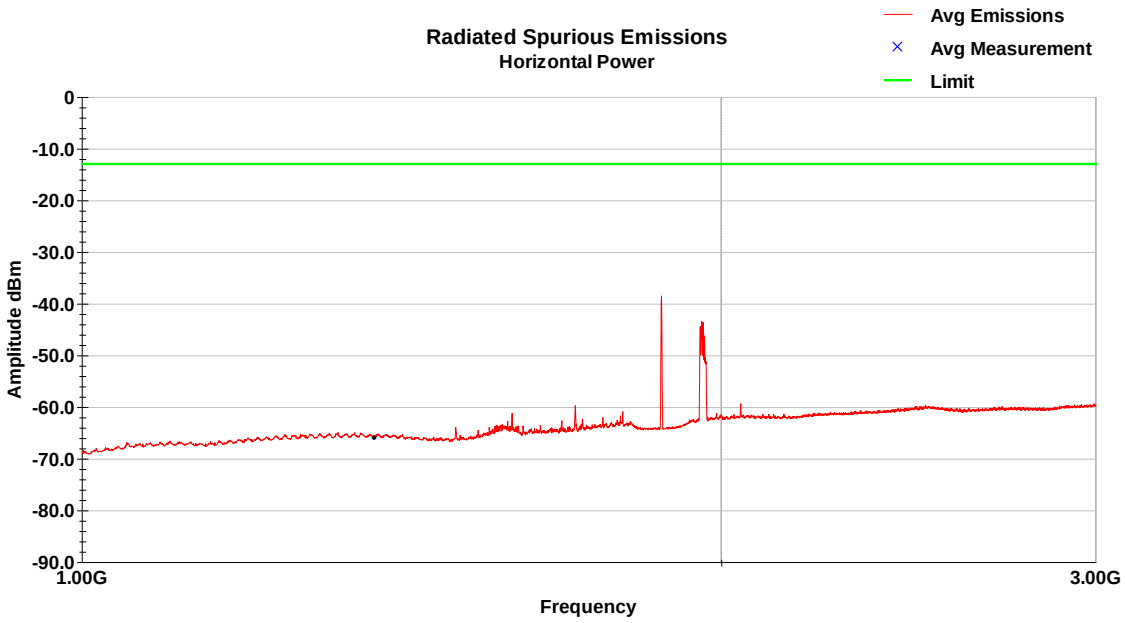
LTE Band 2, QPSK modulation, 15MHz Bandwidth

Mid Channel (1880 MHz)

Vertical Plot (1-3GHz)



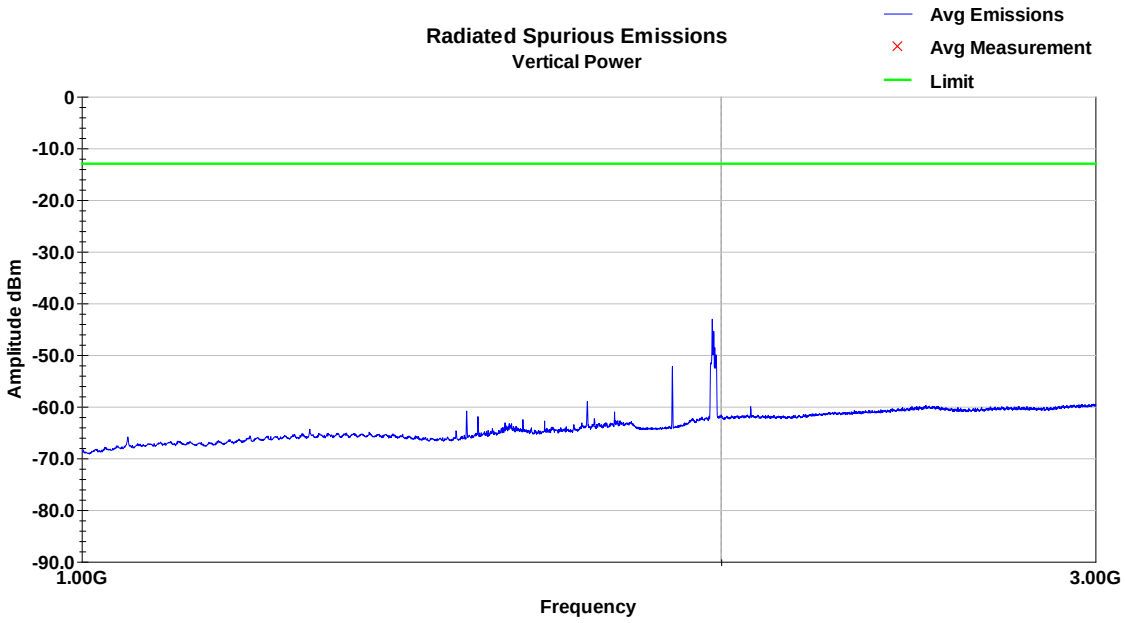
Horizontal Plot (1-3GHz)



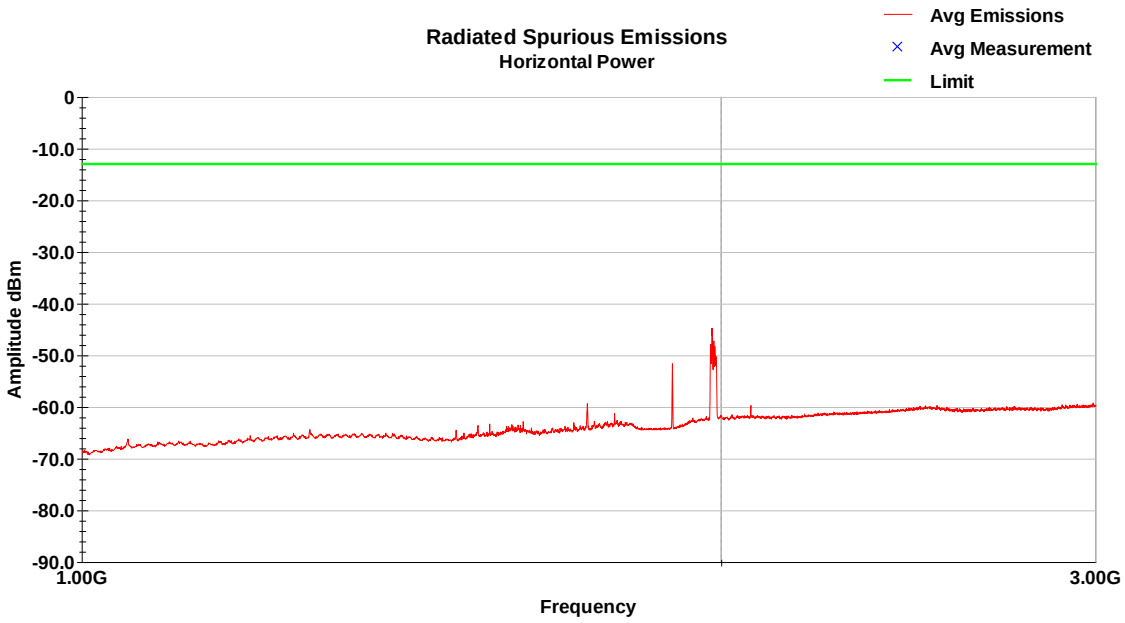
LTE Band 2, QPSK modulation, 15MHz Bandwidth

High Channel (1902.5 MHz)

Vertical Plot (1-3GHz)



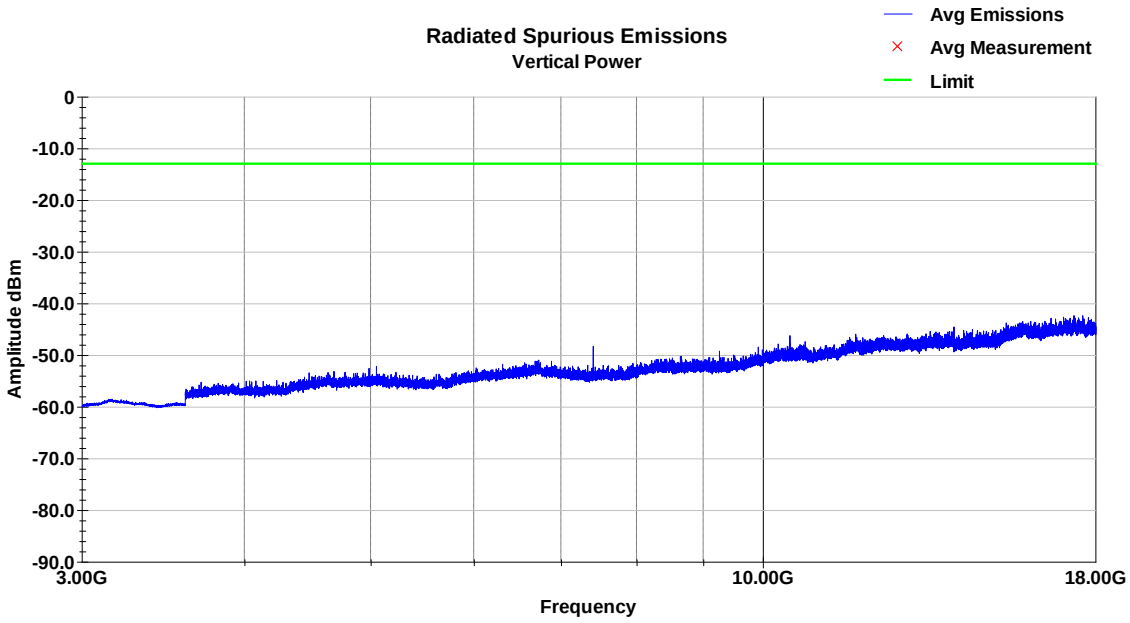
Horizontal Plot (1-3GHz)



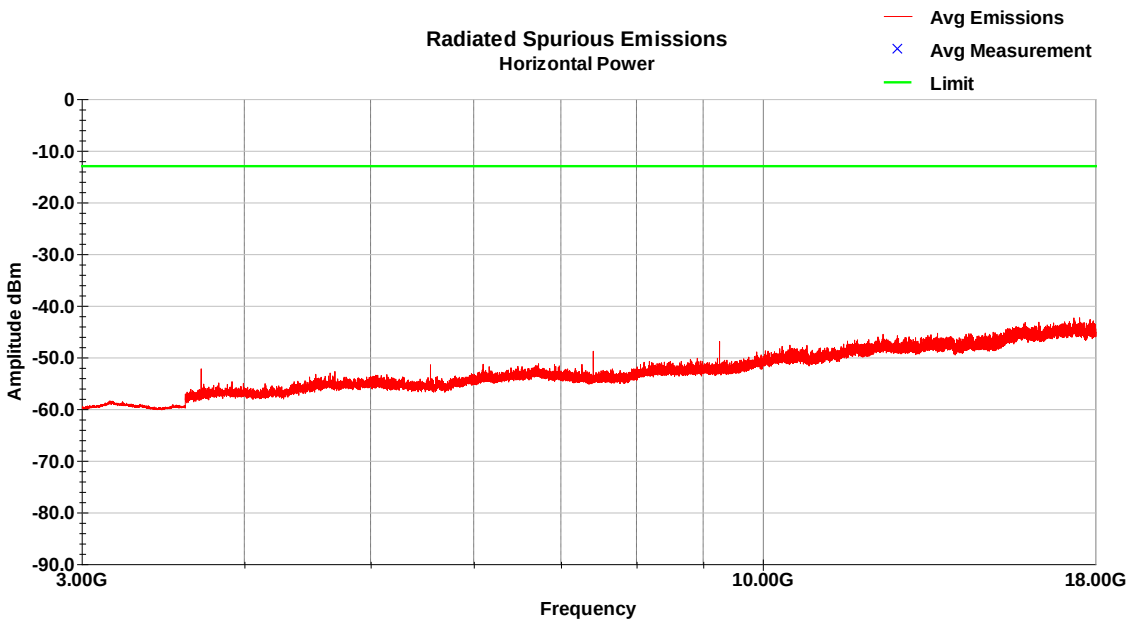
LTE Band 2, QPSK modulation, 15MHz Bandwidth

Low Channel (1857.5 MHz)

Vertical Plot (3-18GHz)



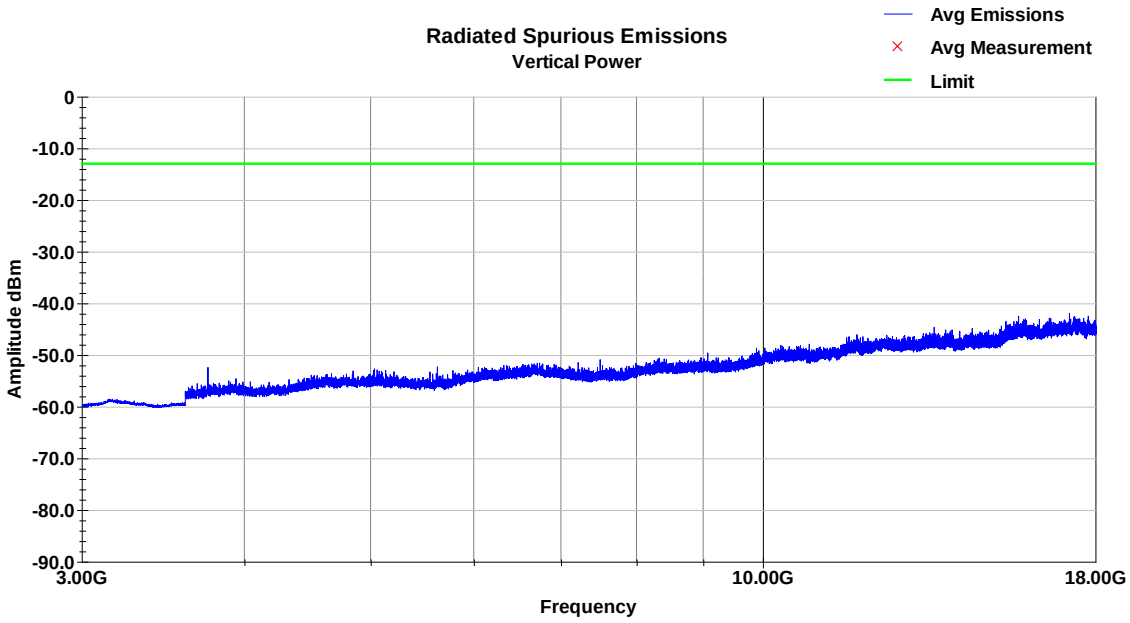
Horizontal Plot (3-18GHz)



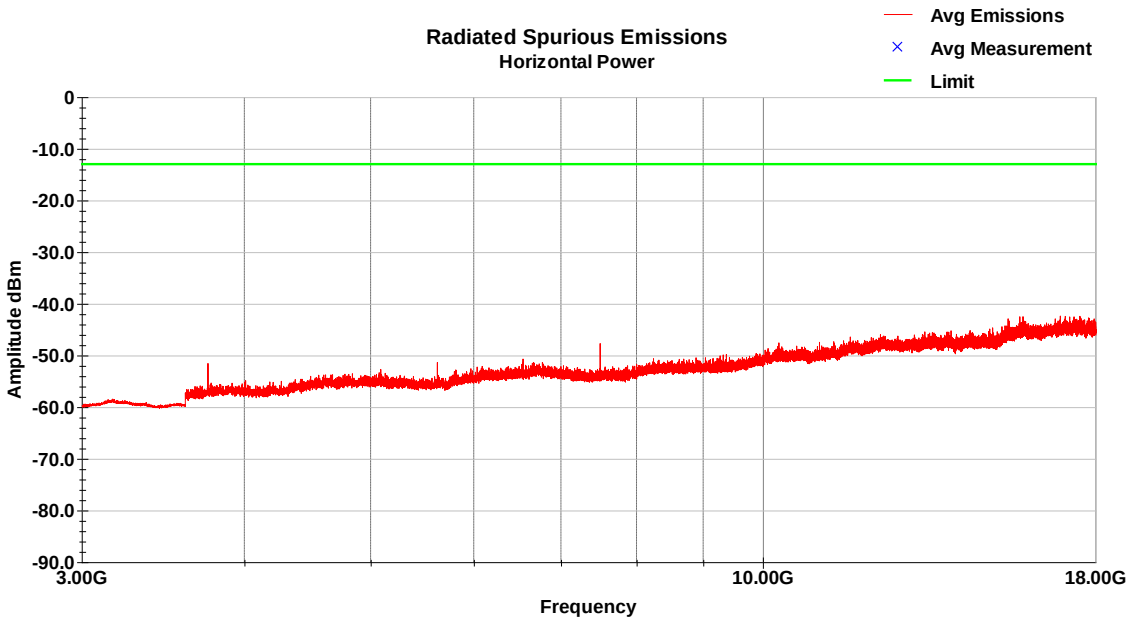
LTE Band 2, QPSK modulation, 15MHz Bandwidth

Mid Channel (1880 MHz)

Vertical Plot (3-18GHz)



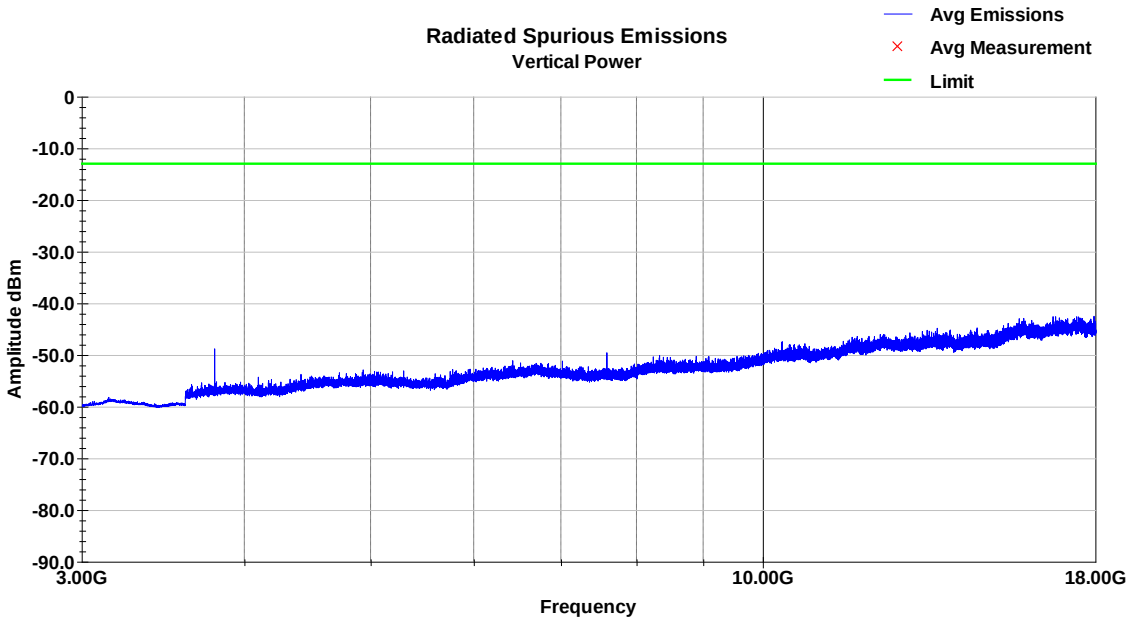
Horizontal Plot (3-18GHz)



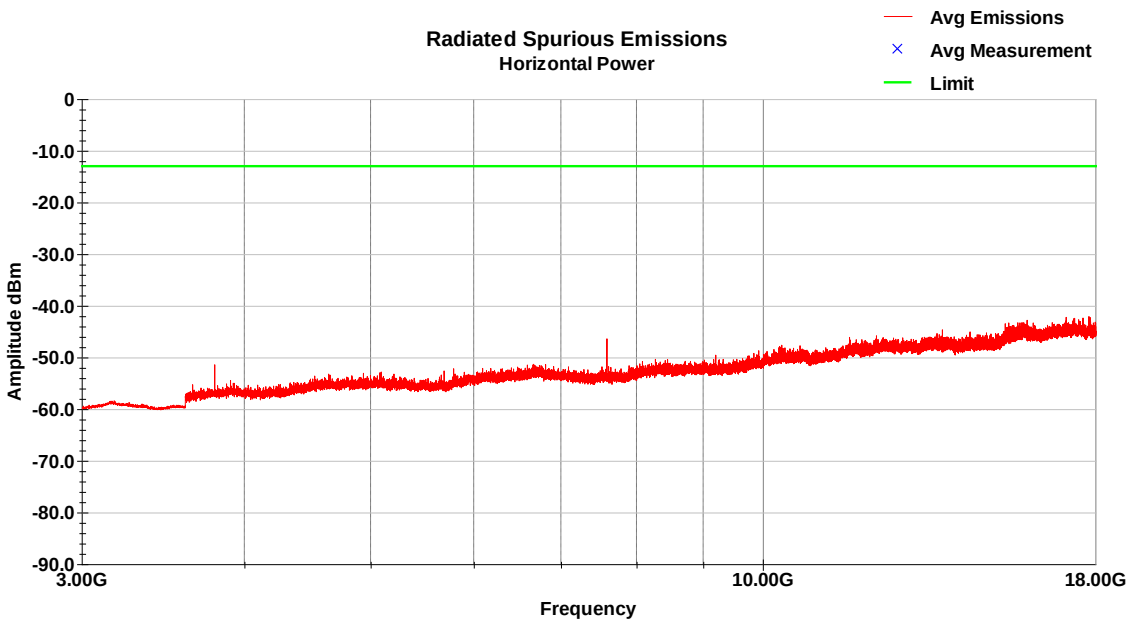
LTE Band 2, QPSK modulation, 15MHz Bandwidth

High Channel (1902.5 MHz)

Vertical Plot (3-18GHz)



Horizontal Plot (3-18GHz)

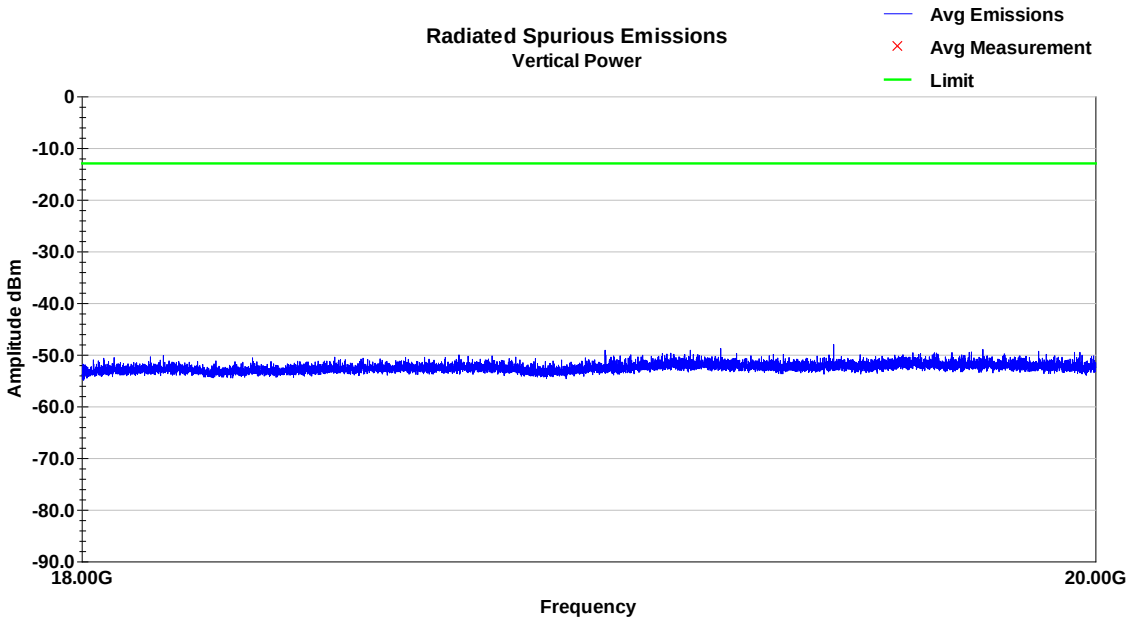


LTE Band 2, QPSK modulation, 15MHz Bandwidth

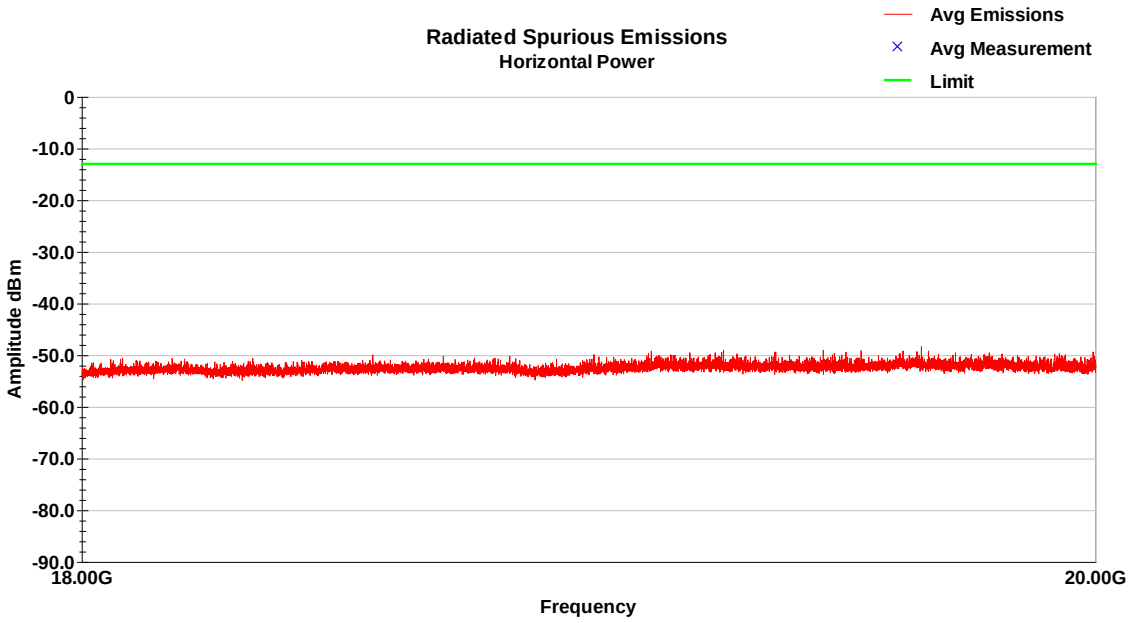
Low Channel (1857.5 MHz)

Note: Mid and High Channel Plots look similar

Vertical Plot (18-20GHz)



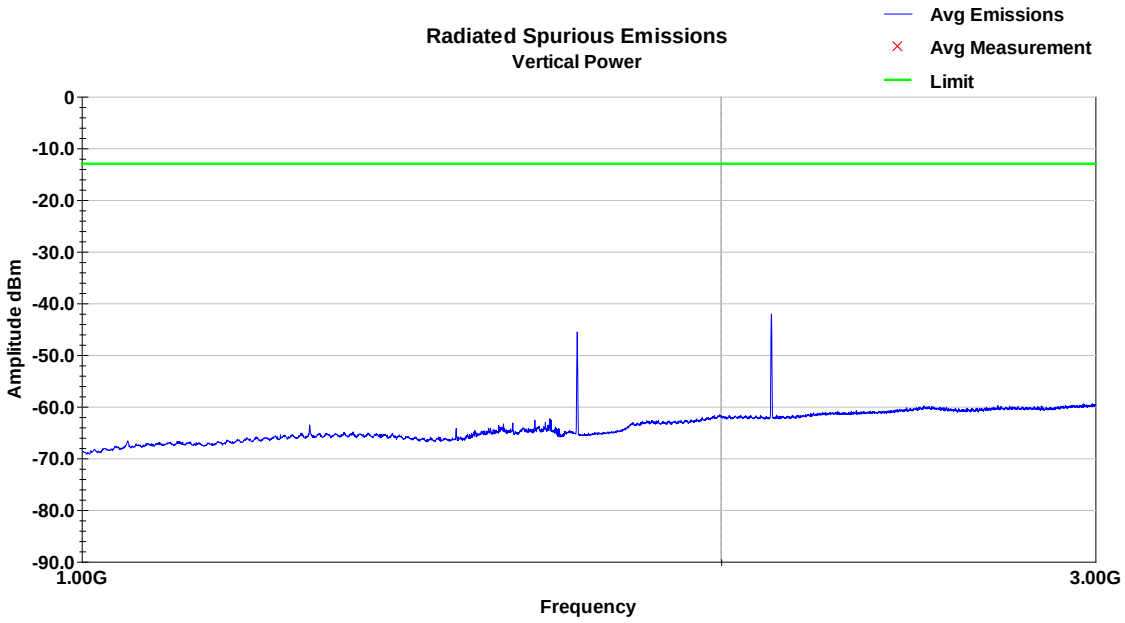
Horizontal Plot (18-20GHz)



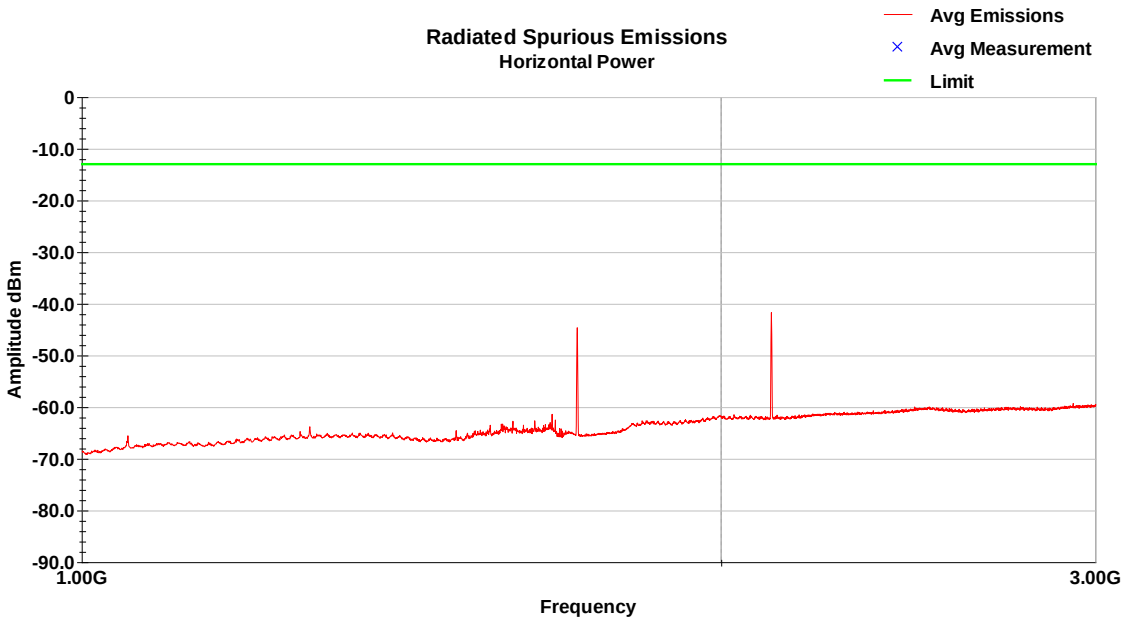
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

Low Channel (1710.7 MHz)

Vertical Plot (1-3GHz)



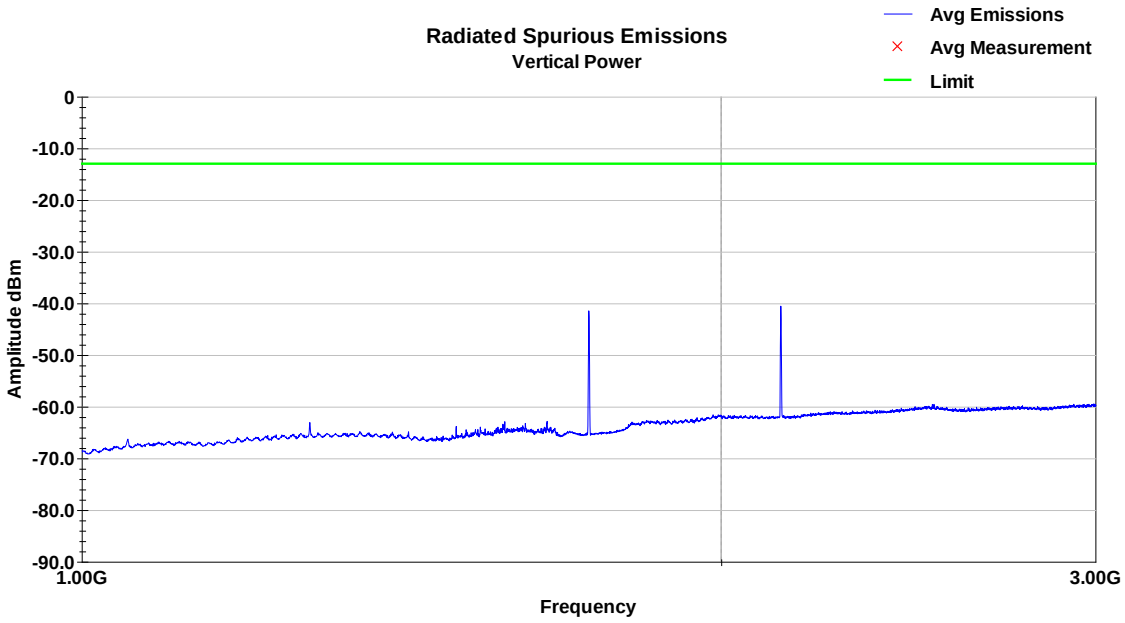
Horizontal Plot (1-3GHz)



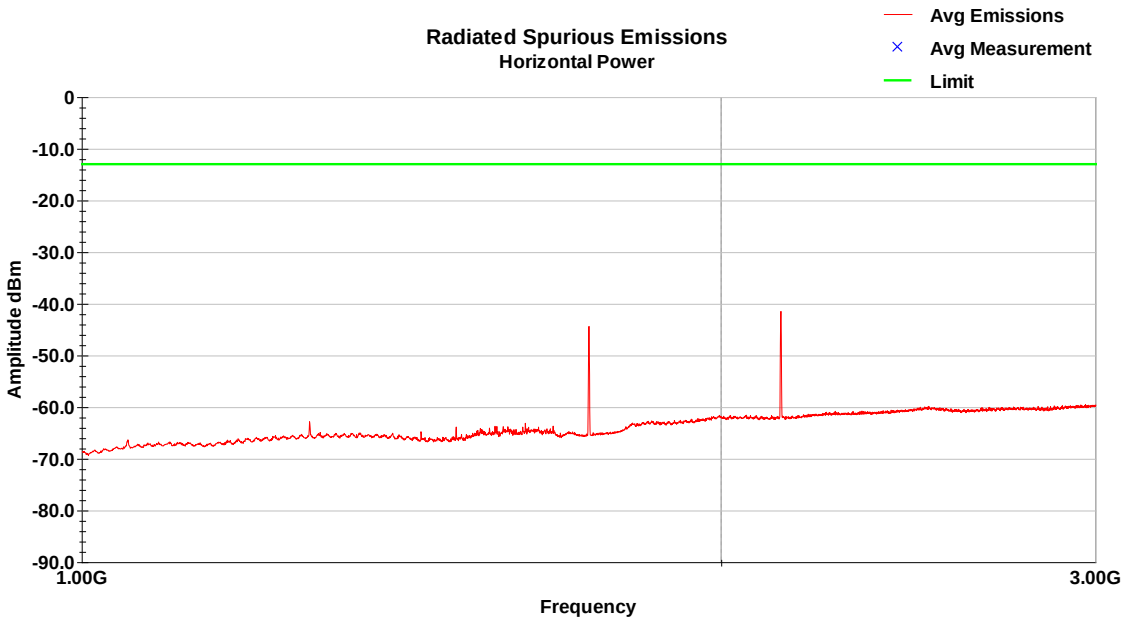
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

Mid Channel (1732.5 MHz)

Vertical Plot (1-3GHz)



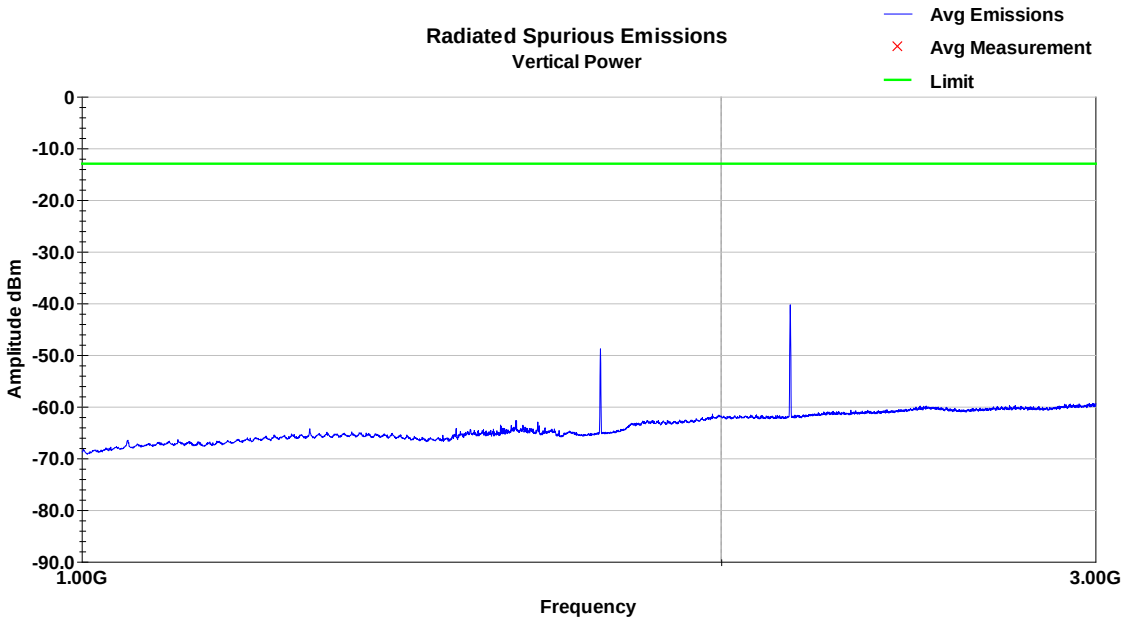
Horizontal Plot (1-3GHz)



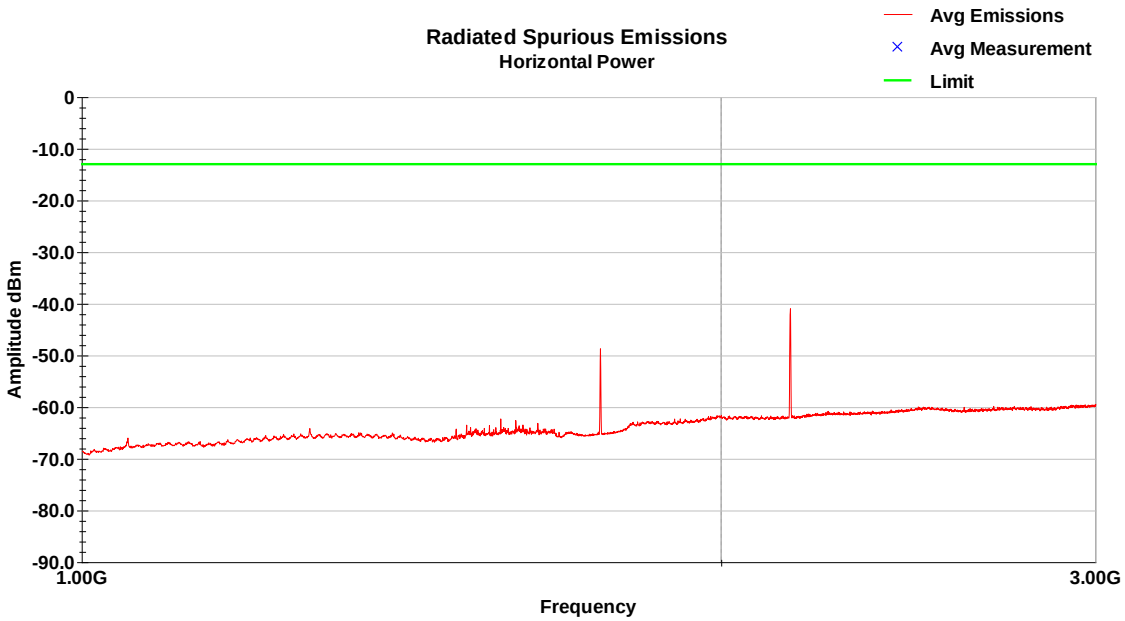
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

High Channel (1754.3 MHz)

Vertical Plot (1-3GHz)



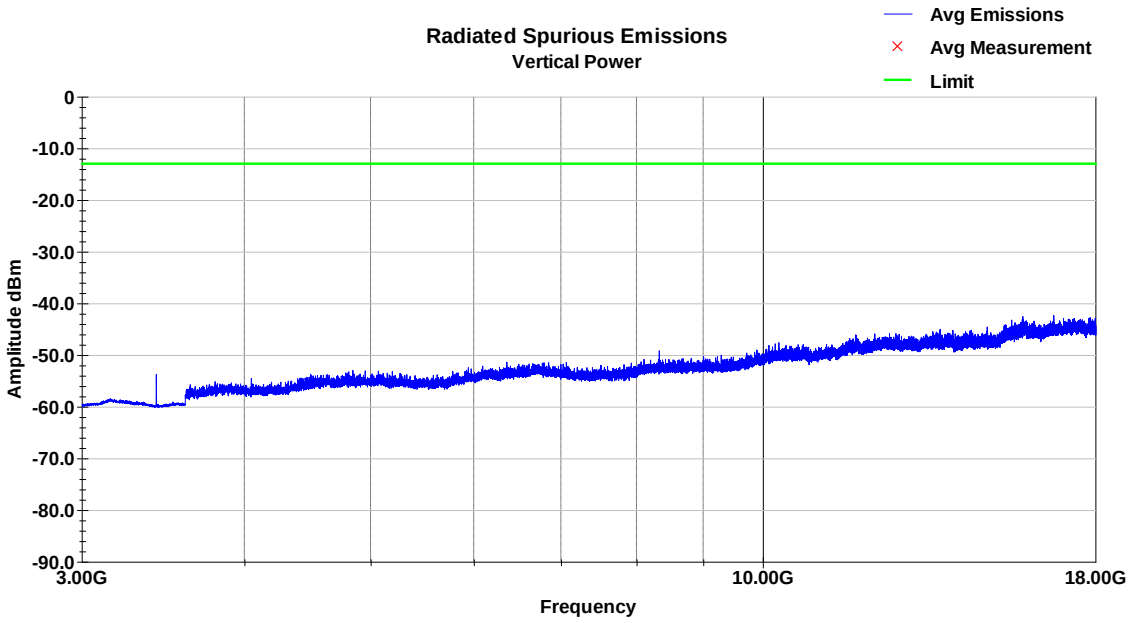
Horizontal Plot (1-3GHz)



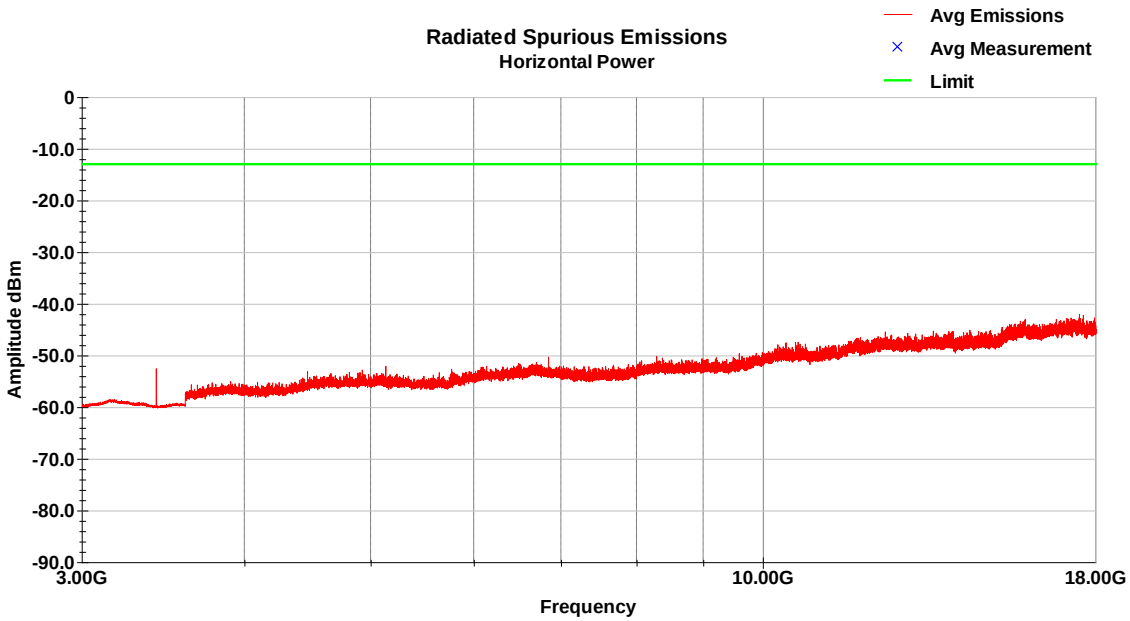
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

Low Channel (1710.7 MHz)

Vertical Plot (3-18GHz)



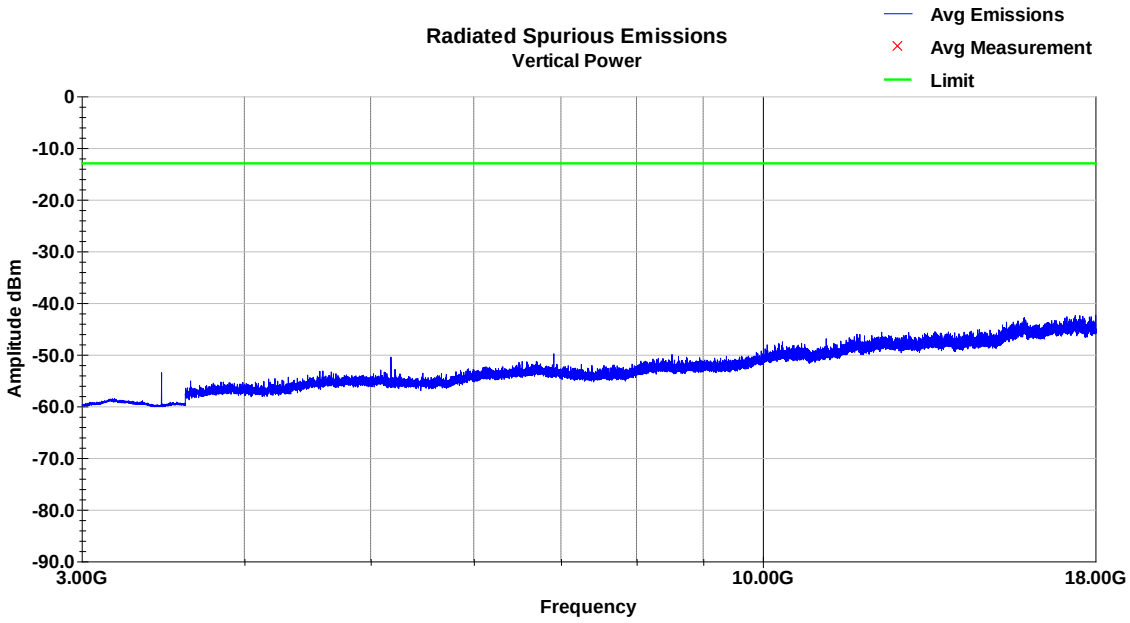
Horizontal Plot Low (3-18GHz)



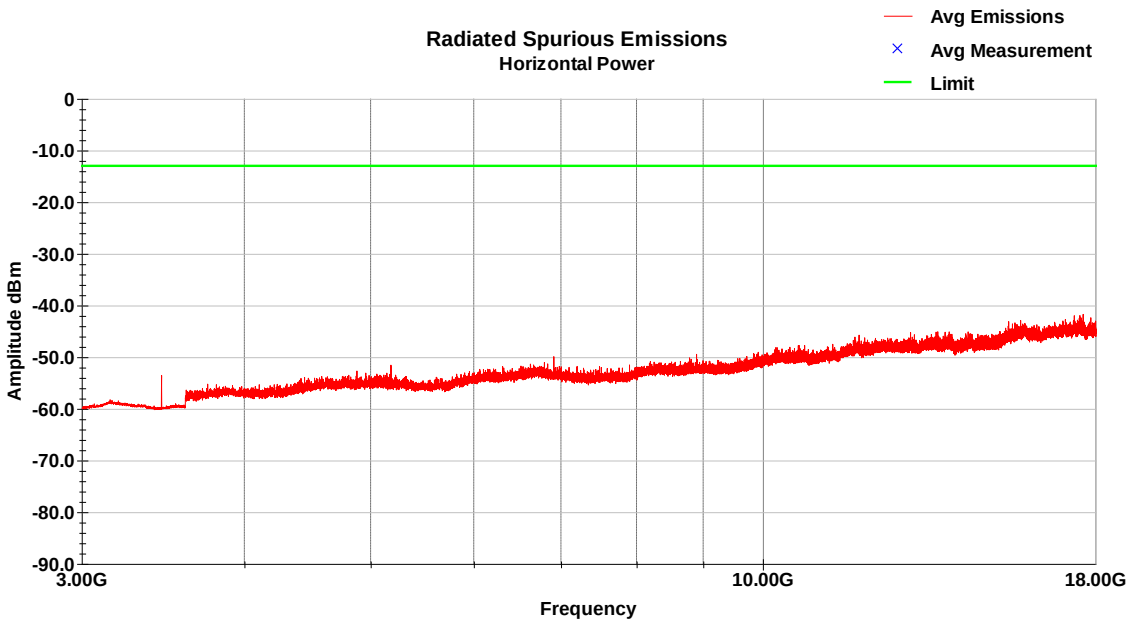
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

Mid Channel (1732.5 MHz)

Vertical Plot (3-18GHz)



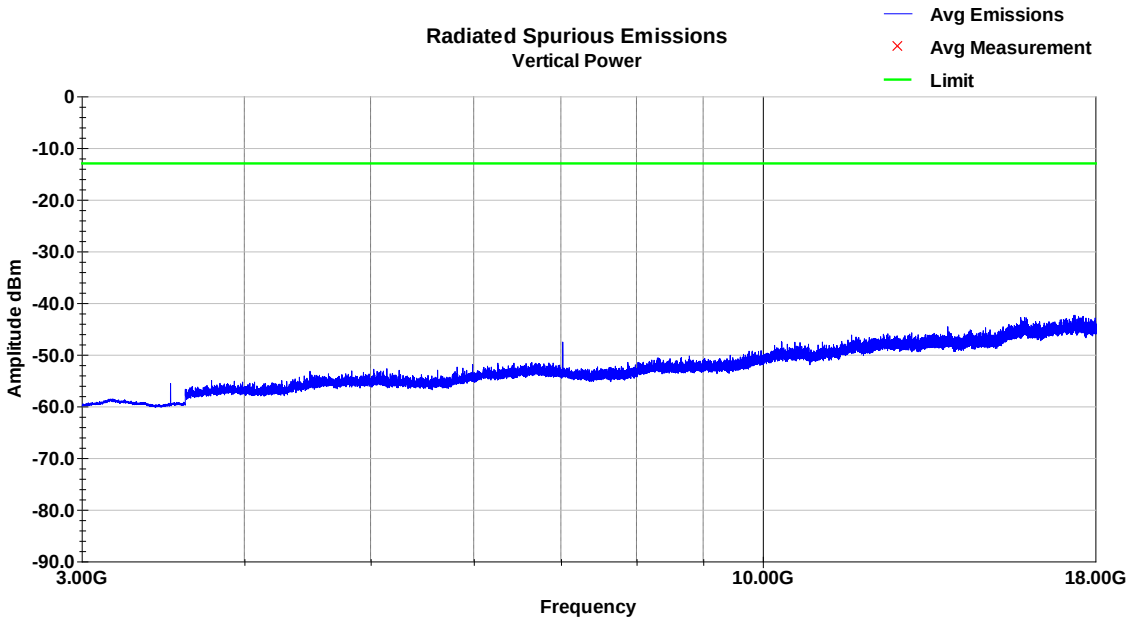
Horizontal Plot Mid (3-18GHz)



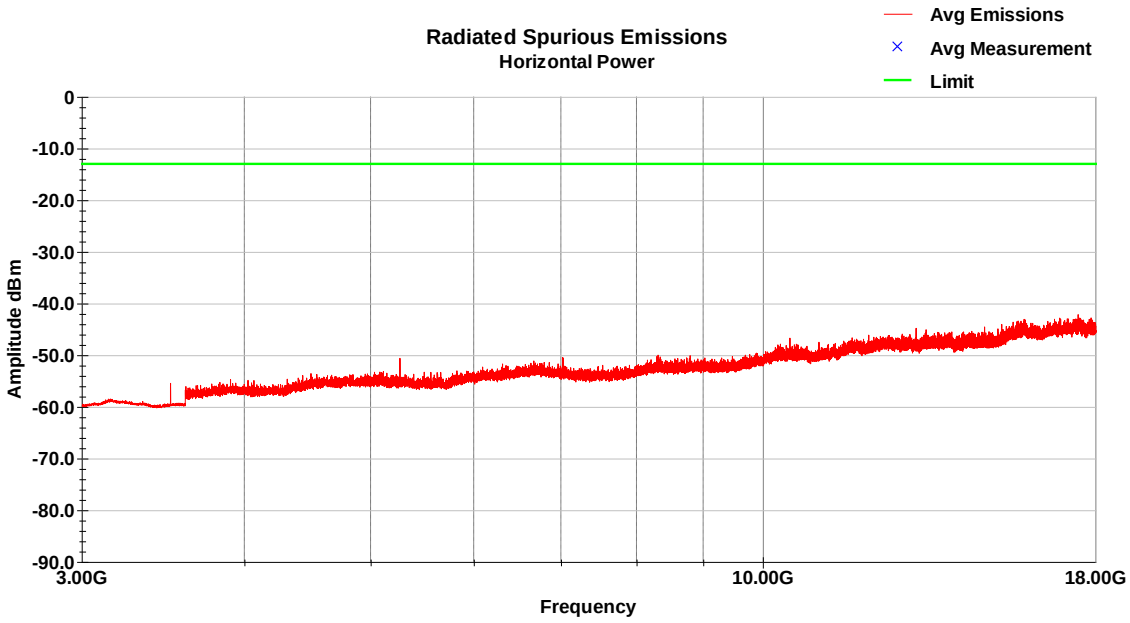
LTE Band 4, QPSK modulation, 1.4MHz Bandwidth

High Channel (1754.3 MHz)

Vertical Plot (3-18GHz)



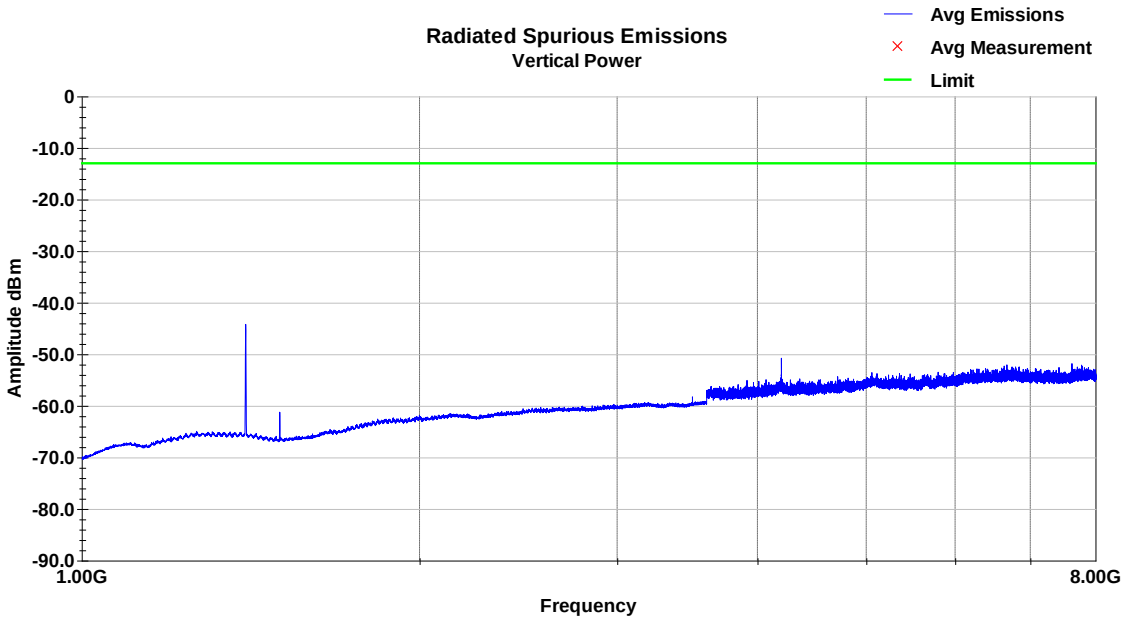
Horizontal Plot High (3-18GHz)



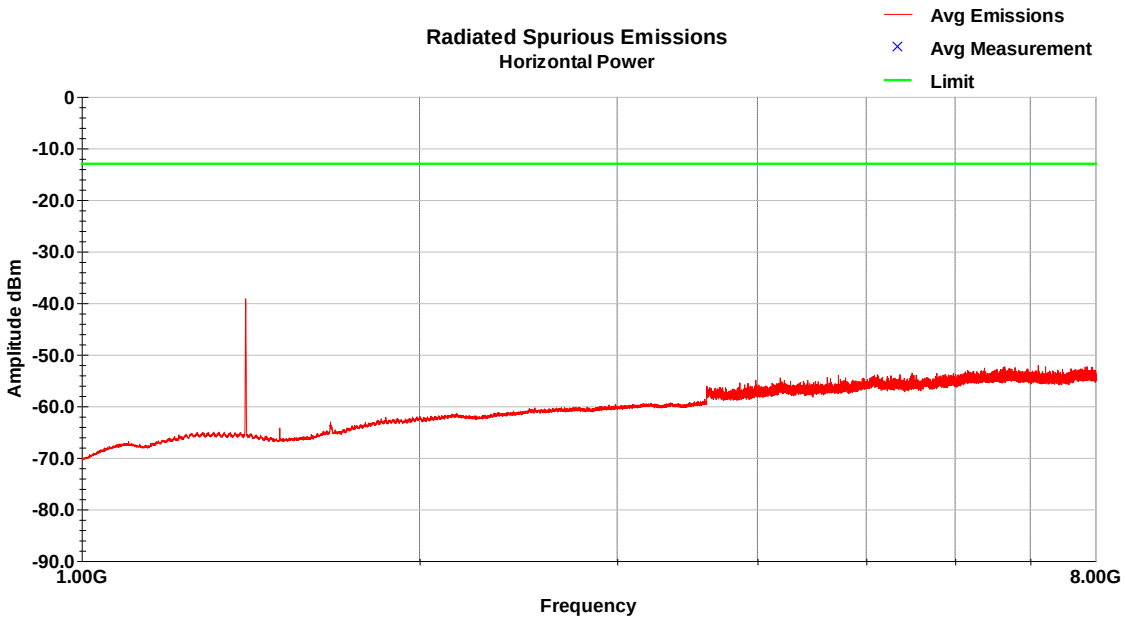
LTE Band 12, QPSK modulation, 5MHz Bandwidth

Low Channel (701.5 MHz)

Vertical Plot (1-8GHz)



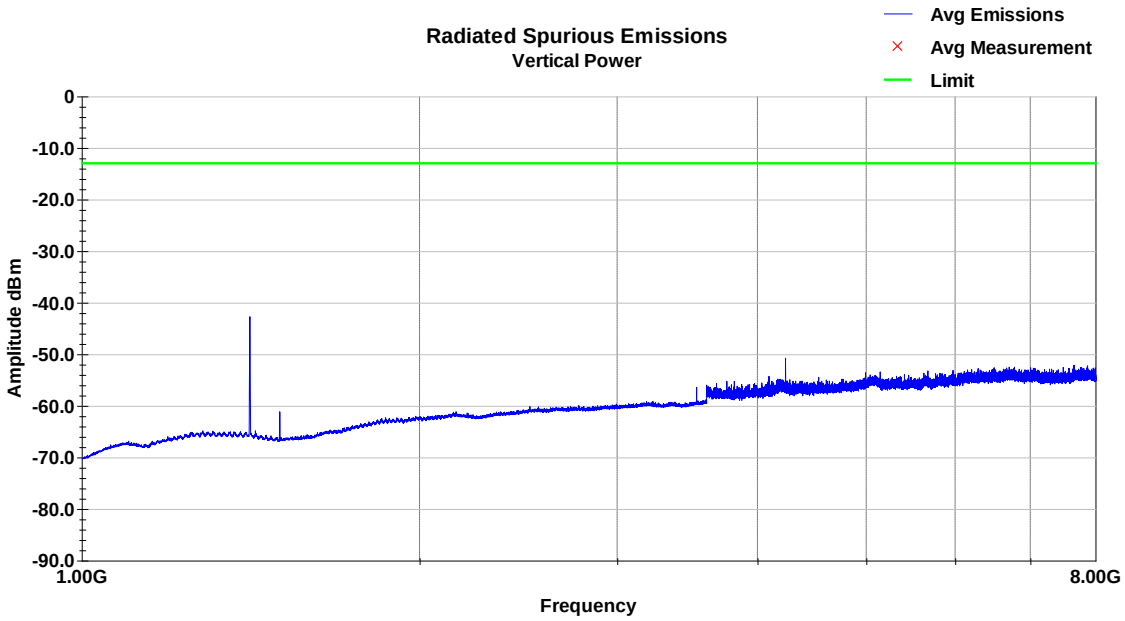
Horizontal Plot Low (1-10GHz)



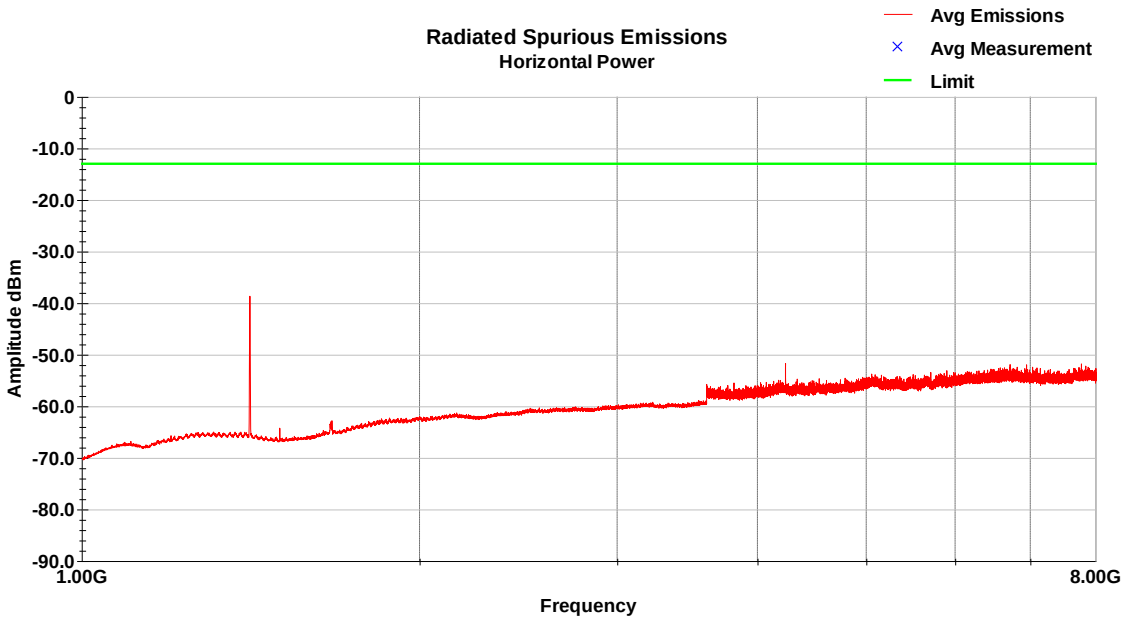
LTE Band 12, QPSK modulation, 5MHz Bandwidth

Mid Channel (707.5 MHz)

Vertical Plot (1-8GHz)



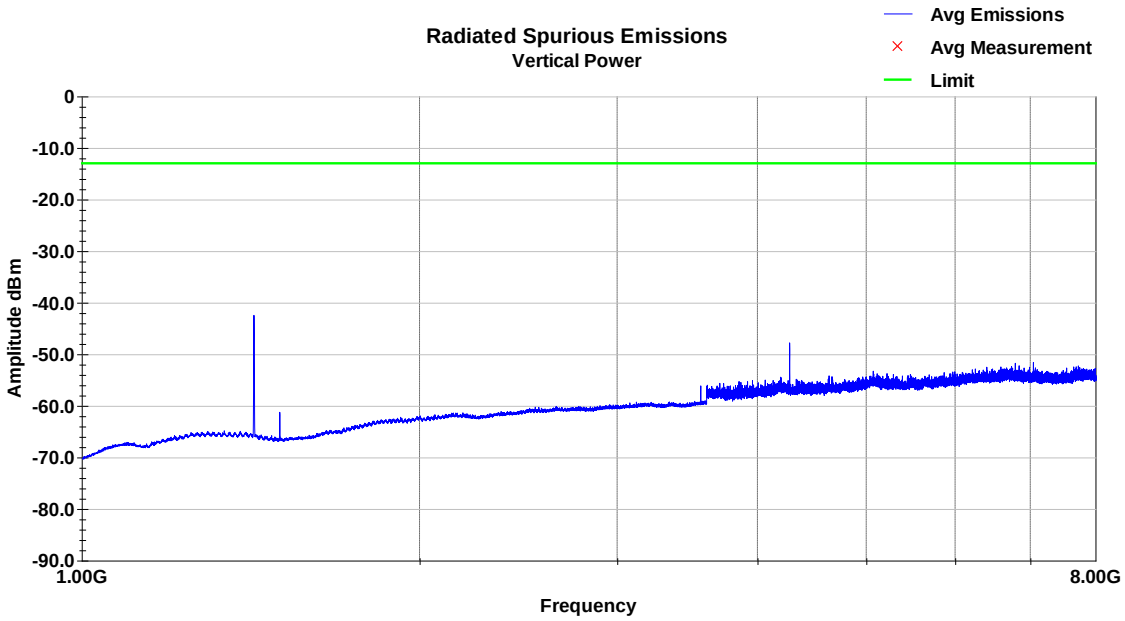
Horizontal Plot Mid (1-10GHz)



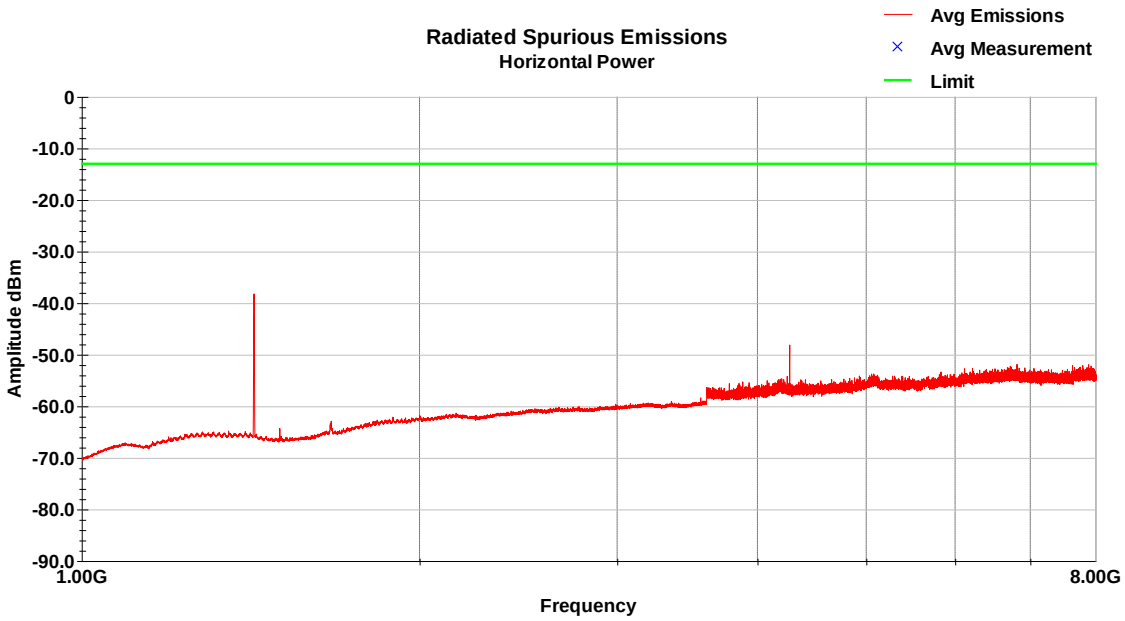
LTE Band 12, QPSK modulation, 5MHz Bandwidth

High Channel (713.5 MHz)

Vertical Plot (1-8GHz)



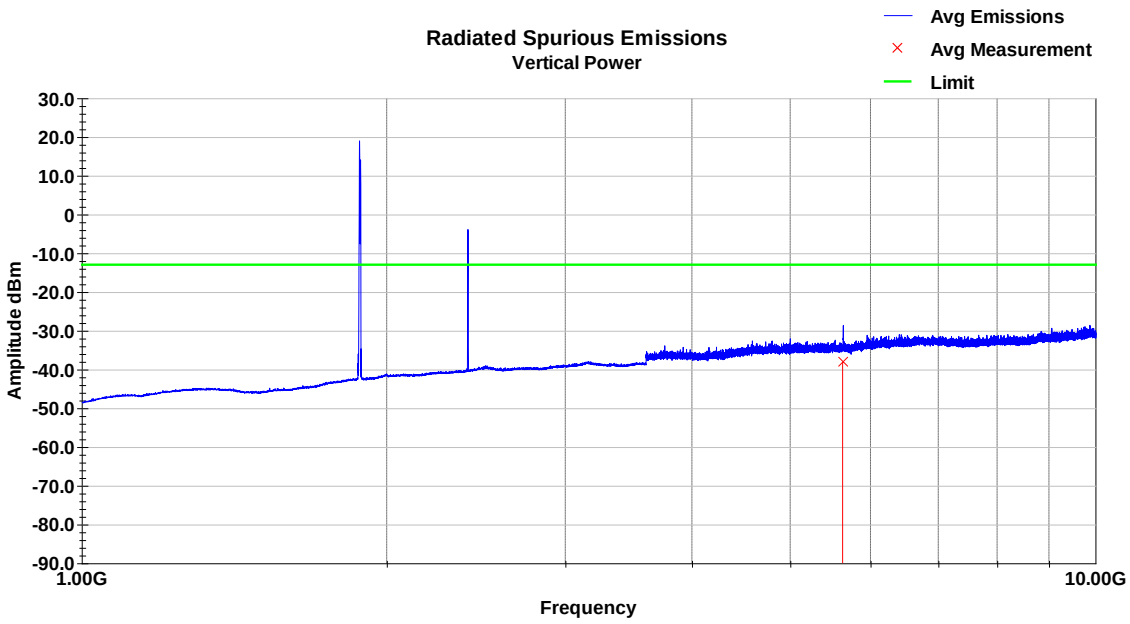
Horizontal Plot High (1-10GHz)



3.7 *Test Data – LTE and BLE Simultaneous Transmission*

LTE Band 2, QPSK modulation, 15MHz Bandwidth, Mid Channel (1880MHz), # of RB = 1 and Bluetooth LE Low Channel (2402MHz)

Vertical Plot (1-10GHz)

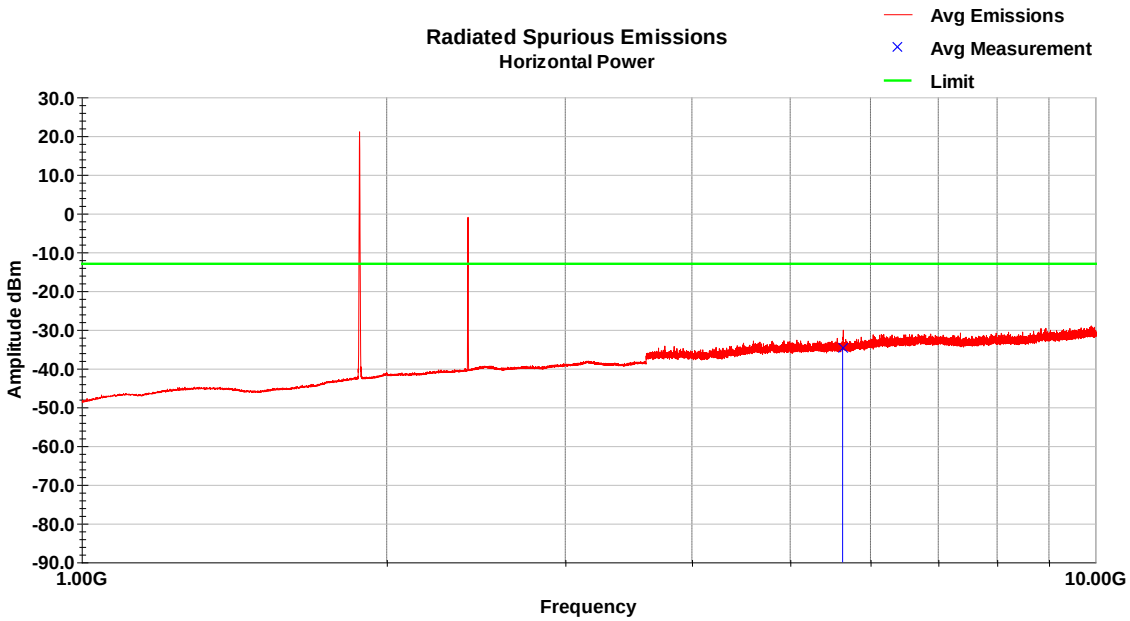


Vertical Data (1-10GHz)

Frequency MHz	Raw Avg dBm	Polarity V/H	Azimuth degrees	Height cm	AF dB/m	Loss dB	Amp dB	Avg Value dBm	Limit dBm	Margin dB
5632.68	-63.4	V	17.0	150.0	34.6	25.5	34.7	-38.0	-13.0	-25.0
Avg Value = Raw Avg + AF + CL - Amp										
Margin = Avg Value - Limit										

LTE Band 2, QPSK modulation, 15MHz Bandwidth, Mid Channel (1880MHz), # of RB = 1 and Bluetooth LE Low Channel (2402MHz)

Horizontal Plot (1-10GHz)



Horizontal Data (1-10GHz)

Frequency MHz	Raw Avg dBm	Polarity V/H	Azimuth degrees	Height cm	AF dB/m	Loss dB	Amp dB	Avg Value dBm	Limit dBm	Margin dB
5633.40	-60.0	H	25.0	150.0	34.6	25.5	34.7	-34.6	-13.0	-21.6
Avg Value = Raw Avg + AF + CL - Amp										
Margin = Avg Value - Limit										

4 Measurement Uncertainty

The measurement uncertainty figures are calculated in accordance with TR 100 028-1 [2] and correspond to an expansion factor (coverage factor) k = 2 (which provides confidence levels of 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

	Expanded Uncertainty for Normal k factor equal to 2	
Parameter	Required	Laboratory Actual
Radio Frequency	±1 x 10-5	±9.8 x 10-8
total RF power, conducted	±1.5 dB	±1.2 dB
RF power density, conducted	±3 dB	±0.7 dB
spurious emissions, conducted	±3 dB	±2.1 dB
all emissions, radiated	±6 dB	±4.8 dB
temperature	±1°C	±0.5°C
humidity	±5 %	±3.5%
DC and low frequency voltages	±3 %	±0.4%

5 Revision History

Revision Level	Description of changes	Revision Date
Draft	--	27 October 2020
0	Initial release	24 November 2020