COMPLIANCE WORLDWIDE INC.
TEST REPORT 116-19

In Accordance with the Requirements of

FCC TITLE 47 CFR Part 15.519, Subpart F
Technical Requirements for Handheld UWB Systems

ISED RSS-220, Issue 1 (March 2009) + Amendment 1 (July 2018)
Devices Using Ultra-Wideband (UWB) Technology

Issued to

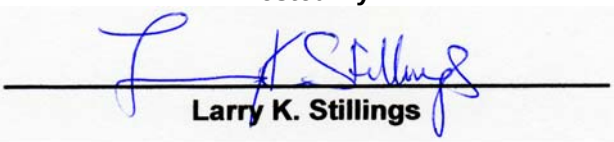
STATSports Group Ltd
1st Floor Drumalane Mill, The Quays
Newry, Co Down, BT35 8QS

For the
Apex Pod
Model: Apex 300

FCC ID: 2APHS-APX300

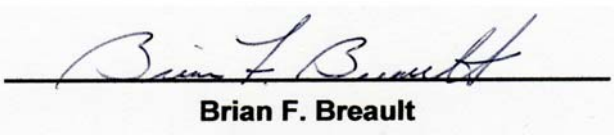
Report Issued on May 7, 2019

Tested By



Larry K. Stillings

Reviewed By



Brian F. Breault

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1. Scope

This test report certifies that the STATSports Group Apex Pod as tested, meets the FCC Part 15, Subpart F and ISED RSS-220 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

2. Product Details

2.1. Manufacturer:	STATSports Group Ltd
2.2. Model Numbers:	Apex 300
2.3. Serial Numbers:	A81F98437BEE
2.4. Description:	The STATSports Apex POD is a wearable performance monitoring device.
2.5. Power Source:	Rechargable Battery 3.6V
2.6. Hardware Revision:	Rev B
2.7. Software Revision:	Apex 4.02
2.8. Modulation Type:	Pulse Modulation, Frequency Hopping
2.9. Operating Frequencies:	4.493 GHz (Channel 3), 6.49 GHz (Channel 5) Center Frequency Nominal (500 MHz BW)
2.10. EMC Modifications:	None

3. Product Configuration

3.1 Operational Characteristics & Software

Hardware Setup:

Using the embedded custom firmware, the channel may be configured for a continuous transmission. The device supports two PRFs 16M & 64M

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Volts	Freq (Hz)	Description/Function
STATSports	Apex 300	A81F98437BEE	3.6	DC	Wearable Performance

3.3. EUT Cables/Transducers

Cable Type	Length	Shield	From	To
None				

3.4. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
Dell	Inspirion E1505	5573349937	120	60	Laptop for Configuration

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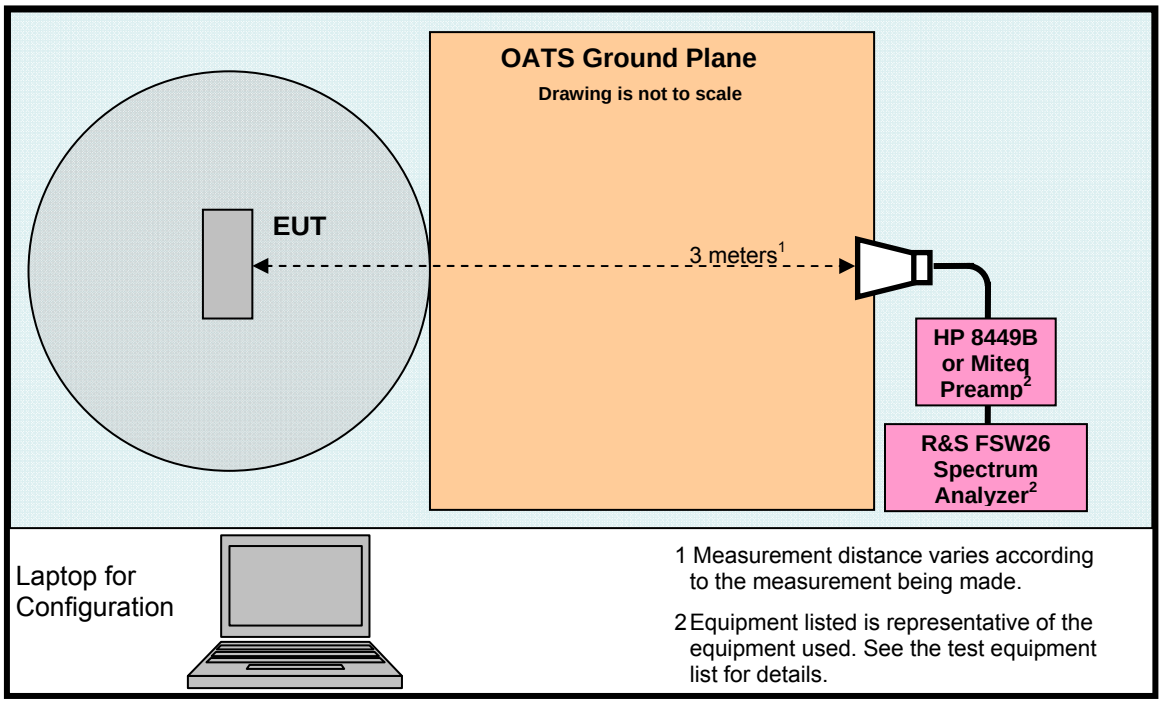
3. Product Configuration (cont.)

3.5. Test Setup Diagram



3.6. EUT Orientation Diagram

In addition, the measurements were performed with the device in three orthogonal positions in accordance with ANSI C63.10-2013, sections 5.10.1, 6.4.6 and Annex H. The three orthogonal axes were defined as follows:

	X-Axis	Y-Axis	Z-Axis
X Axis	Horizontal on edge	Front of unit is facing the antenna at 0º	
Y Axis	Upright on edge	Edge of unit is facing the antenna at 0º	
Z Axis	Flat on table	Front of the unit is facing the antenna at 0º	

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4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Receiver 9 kHz to 7 GHz	Rohde & Schwarz	ESR7	101156	9/10/2020	2 Years
Spectrum Analyzer 9 kHz to 40 GHz	Rohde & Schwarz	FSV40	100899	9/10/2020	2 Years
Spectrum Analyzer 10 Hz to 40 GHz	Rohde & Schwarz	FSVR40	100909	5/3/2019	2 Years
Spectrum Analyzer 3 Hz to 26.5 GHz	Rohde & Schwarz	FSW26	102044	9/13/2020	2 Years
Biconilog Antenna 30 MHz to 2 GHz	Sunol Sciences	JB1	A050913	6/3/2019	3 Years
Loop Antenna 9 kHz to 30 MHz	EMCO	6512	9309-1139	10/26/2019	3 Years
Preamplifier 100 MHz to 7 GHz	Miteq	AFS3-00100200-10-15P-4	988773	4/17/2020	2 Years
Preamplifier 100 MHz to 18 GHz	Miteq	AMF-7D-00101800-30-10P	1953081	4/16/2019	1 Year
Preamplifier 2 to 12 GHz	JCA	JCA48-4111B1	7087S	4/17/2019	1 Year
Preamplifier 1 to 26.5 GHz	Hewlett Packard	8449B	3008A01323	9/11/2020	2 Years
Preamplifier 18 to 40 GHz	Miteq	JSD42-21004200-40-5P	649199/649219	11/1/2019	1 Year
Horn Antenna 1 to 18 GHz	ETS-Lindgren	3117	00143292	2/22/2019	3 Years
Horn Antenna 18-40 GHz	Com Power	AH-840	101032	10/9/2020	2 Years
High Pass Filter 8 to 18 GHz	Micro-Tronics	HPM50107	G036	7/20/2019	1 Year
2.4 GHz Band Pass Filter	Micro-Tronics	BRM50702	150	1/23/2019	1 Year
Barometer	Control Company	4195	Cal ID# 236	4/3/2020	2 Years

[1] ESR7 Firmware revision: V3.36, SP2 Date installed: 11/02/2017 Previous V3.36, installed 05/16/2017.
[2] FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016 Previous V2.30 SP1, installed 10/22/2014.
[3] FSVR40 Firmware revision: V2.23 SP1, Date installed: 08/19/2016 Previous V2.23, installed 10/20/2014.
[4] FSW26 Firmware revision: V2.80, Date installed: 10/28/2017 Previous V2.61, installed 04/04/2017.

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4. Measurements Parameters (continued)

4.2. Measurement & Equipment Setup

Test Dates:	4/27/2018, 4/30/2018, 5/16/2018, 2/6/2019, 2/7/2019
Test Engineers:	Larry Stillings
Normal Site Temperature (15 – 35°C):	21.6
Relative Humidity (20 -75%RH):	35
Frequency Range:	10 kHz to 40 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	200 Hz – 30 kHz to 150 kHz 9 kHz – 150 kHz to 30 MHz 120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	300 Hz – 30 kHz to 150 kHz 30 kHz – 150 kHz to 30 MHz 300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, Quasi-Peak & Average

4.3. Measurement Procedure

Test measurements were made in accordance FCC Parts 15.209, 15.519 Subpart F, ISED RSS-220 requirements.

The test methods used to generate the data is this test report is in accordance with ANSI C63.10:2013, American National Standard for Testing Unlicensed Wireless Devices.

4.4. Measurement Uncertainty

The following uncertainties are expressed for an expansion/coverage factor of K=2.

RF Frequency (out of band)	$\pm$ 1x10^{-8}
Radiated Emission of Transmitter to 100 GHz	$\pm$ 4.55 dB
Radiated Emission of Receiver	$\pm$ 4.55 dB
Temperature	$\pm$ 0.91^{o} C
Humidity	$\pm$ 5%

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5. Measurements Summary

Test Requirement	FCC Rule Requirement	ISED Rule Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-220 5.1 (b)	6.1	Compliant	The antenna is a pcb surface mount type
Operational Requirements	15.519 (a) (1)	RSS-220	6.2	Compliant	
UWB Bandwidth	15.503 (a) (d) 15.519 (b)	RSS-220 2 RSS-220 5.1	6.3	Compliant	
Radiated Emissions below 960 MHz	15.209	RSS-220 3.4	6.4	Compliant	
Radiated Emissions above 960 MHz	15.519 © 15.521 (d)		6.5	Compliant	
Radiated Emissions in GPS Bands	15.519 (d)	RSS-220 5.3.1 (e)	6.6	Compliant	
RMS Emissions of UWB Transmission in a 1 MHz Bandwidth	15.519 © 15.521 (d)	RSS-220 5.3.1 (d)	6.7	Compliant	
Peak Emissions in a 50 MHz Bandwidth	15.519 (e) 15.521 (g)	RSS-220 5.3.1 (g)	6.8	Compliant	
Conducted Emissions	15.207	RSS-GEN	6.9 6.10	Compliant	Via USB Charger
99% Emission Bandwidth	N/A	RSS-GEN	6.11	Compliant	
Radio Frequency Exposure	FCC OET Bulletin 65	RSS-102, Issue 5	6.12	Compliant	

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6. Measurement Data

6.1. Antenna Requirement (15.203, RSS-220 5.1(b))

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply

Result: The antenna utilized by the device under test is a pcb surface mount type.

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6. Measurement Data (continued)

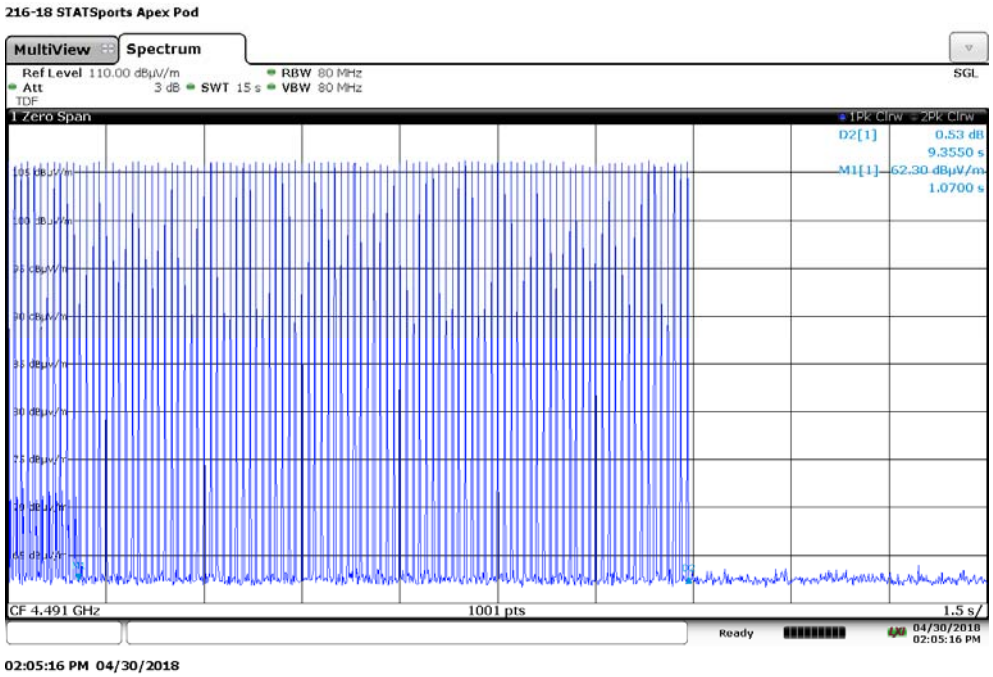
6.2. Operational Requirements of the Device under Test (15.519 (a) (1))

Requirement: UWB device operating under the provisions of this section must be hand held, i.e., they are relatively small device that are primarily hand held while being operated and do not employ a fixed infrastructure. UWB devices operating under the provisions of this section may operate indoors or outdoors.

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

Result: Compliant

6.2.1 Plot of 10 Second Shutoff



Note: Marker 1 is when the anchor (support equipment) stops transmitting, Marker D2 shows the EUT shutting off after 9.355 Seconds.

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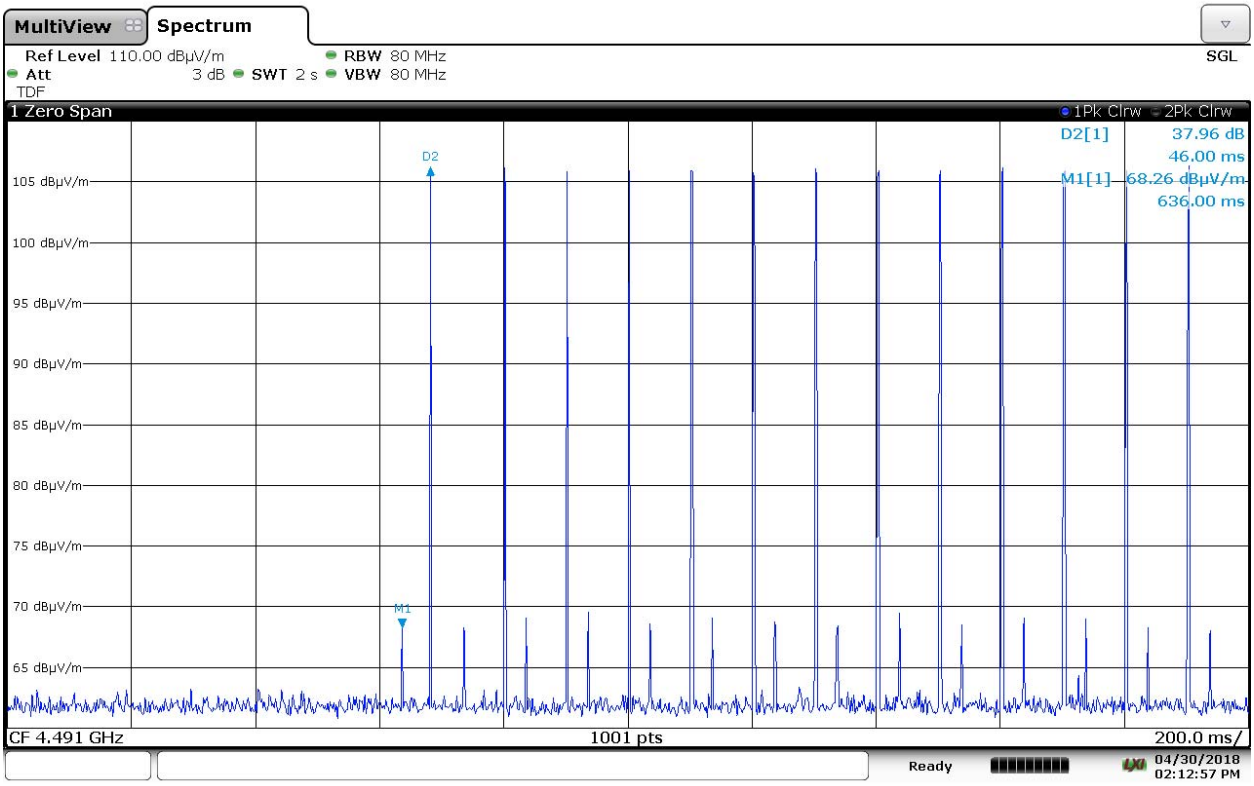
6. Measurement Data (continued)

6.2. Operational Requirements of the Device under Test (15.519 (a) (1))

6.2.2 Plot of Re-established communications

216-18 STATSports Apex Pod



02:12:57 PM 04/30/2018

Note: Marker 1 is with anchor (support equipment) turned back on to establish communications, Marker D2 shows EUT re-establishing communication after 46 milliseconds.

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6. Measurement Data (continued)

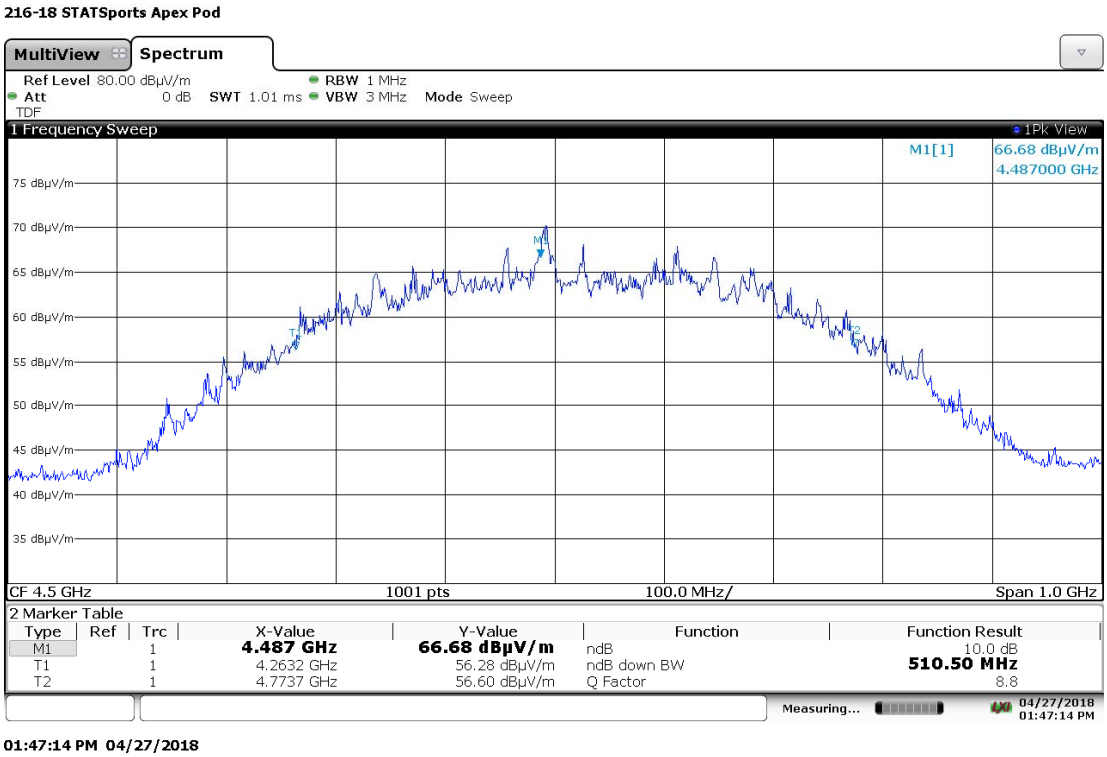
6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b))

Requirement: The UWB bandwidth of a device operating under the provisions of this section shall be contained between 3,100 MHz and 10,600 MHz and at any point in time, and has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

6.3.1. Measurement Data – Values in GHz

		CH3
f_M	The highest emission peak	4.487
f_L	10 dB below the highest peak	4.2632
f_H	10 dB above the highest peak	4.7737
f_C	Calculated: $(f_H + f_L) / 2$	4.5185
Bandwidth	Calculated: $(f_H - f_L)$	0.5105
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.1130

6.3.2. Measurement Plot of 10 dB frequencies (Channel 3, 64M PRF)



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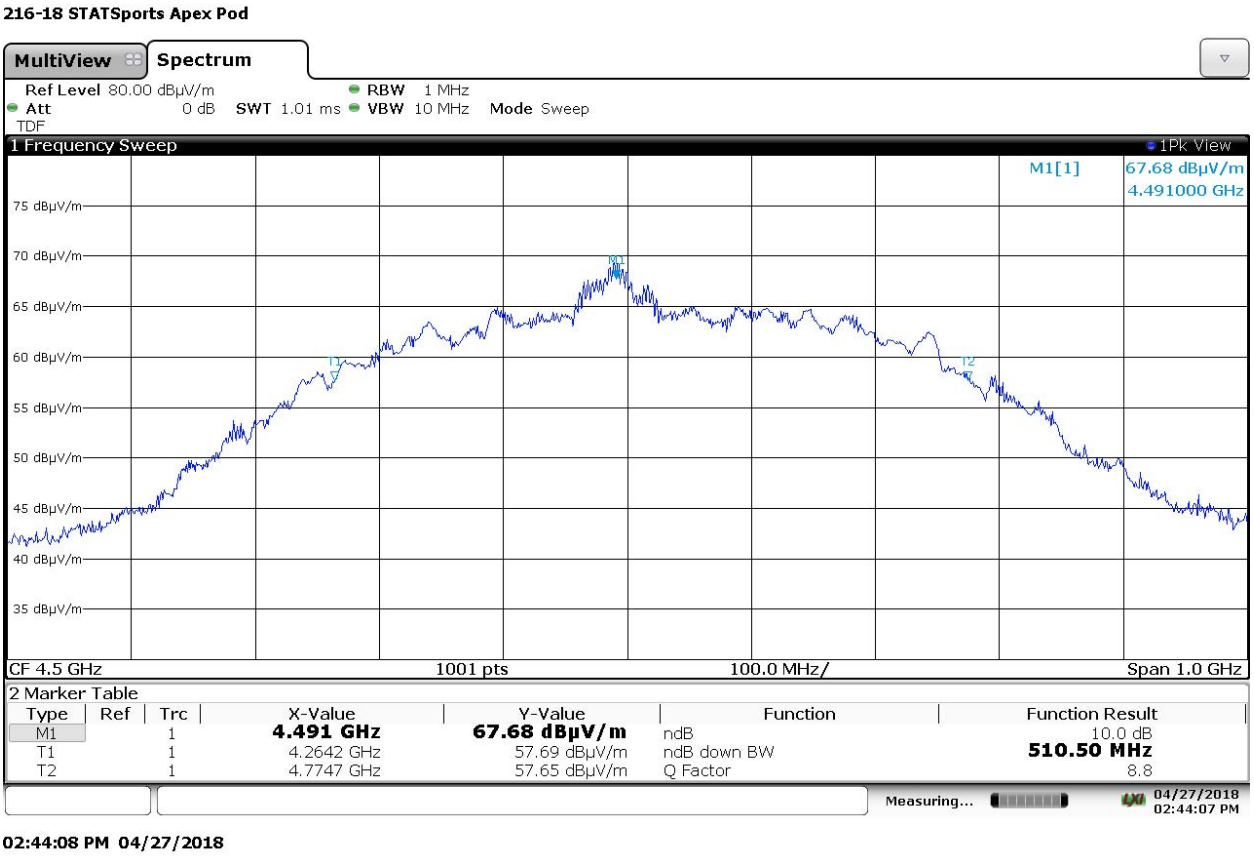
6. Measurement Data (continued)

6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

6.3.3. Measurement Data – Values in GHz

		CH3
f_M	The highest emission peak	4.491
f_L	10 dB below the highest peak	4.2642
f_H	10 dB above the highest peak	4.7747
f_C	Calculated: $(f_H + f_L) / 2$	4.5195
Bandwidth	Calculated: $(f_H - f_L)$	0.5105
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.1130

6.3.4. Measurement Plot of 10 dB frequencies (Channel 3, 16M PRF)



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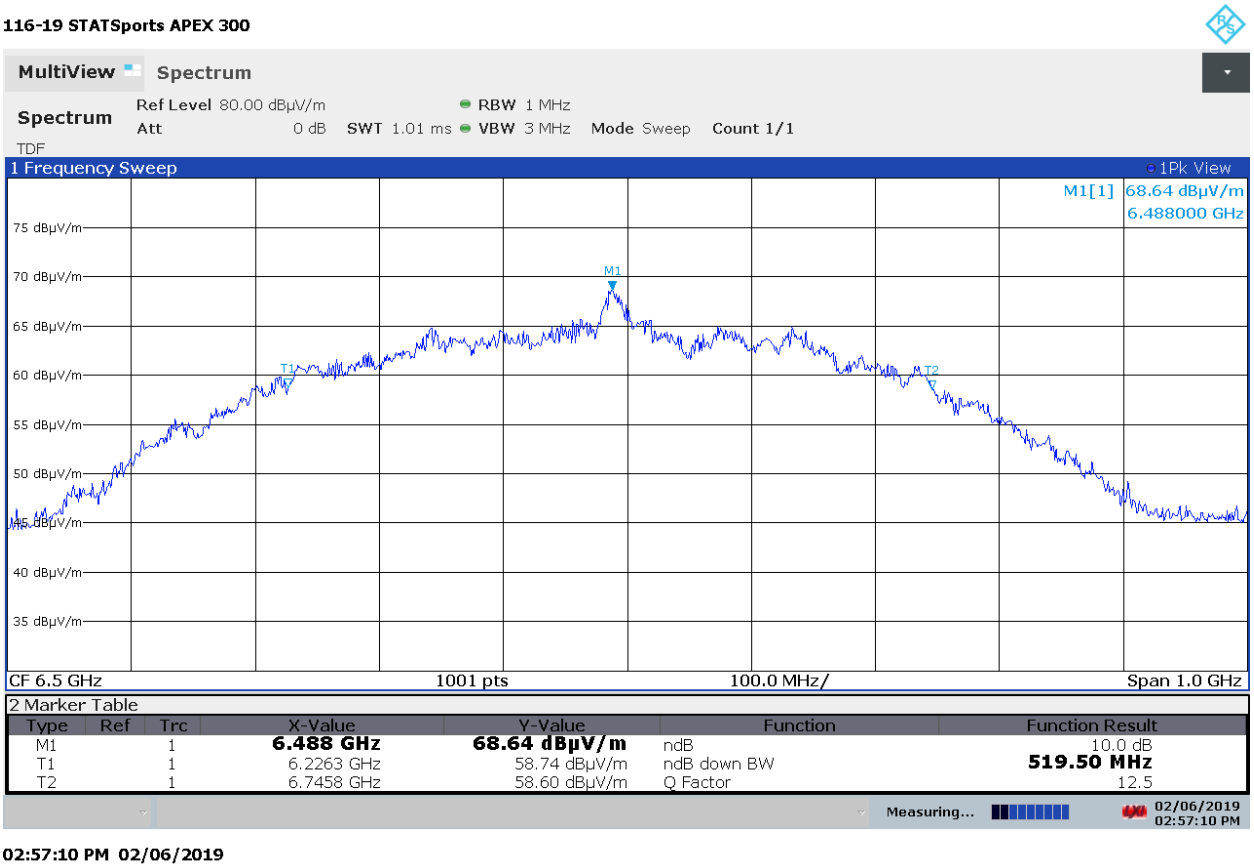
6. Measurement Data (continued)

6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

6.3.5. Measurement Data – Values in GHz

		CH5
f_M	The highest emission peak	6.488
f_L	10 dB below the highest peak	6.2263
f_H	10 dB above the highest peak	6.7458
f_C	Calculated: $(f_H + f_L) / 2$	6.4861
Bandwidth	Calculated: $(f_H - f_L)$	0.5195
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.0801

6.3.6. Measurement Plot of 10 dB frequencies (Channel 5, 16M PRF)



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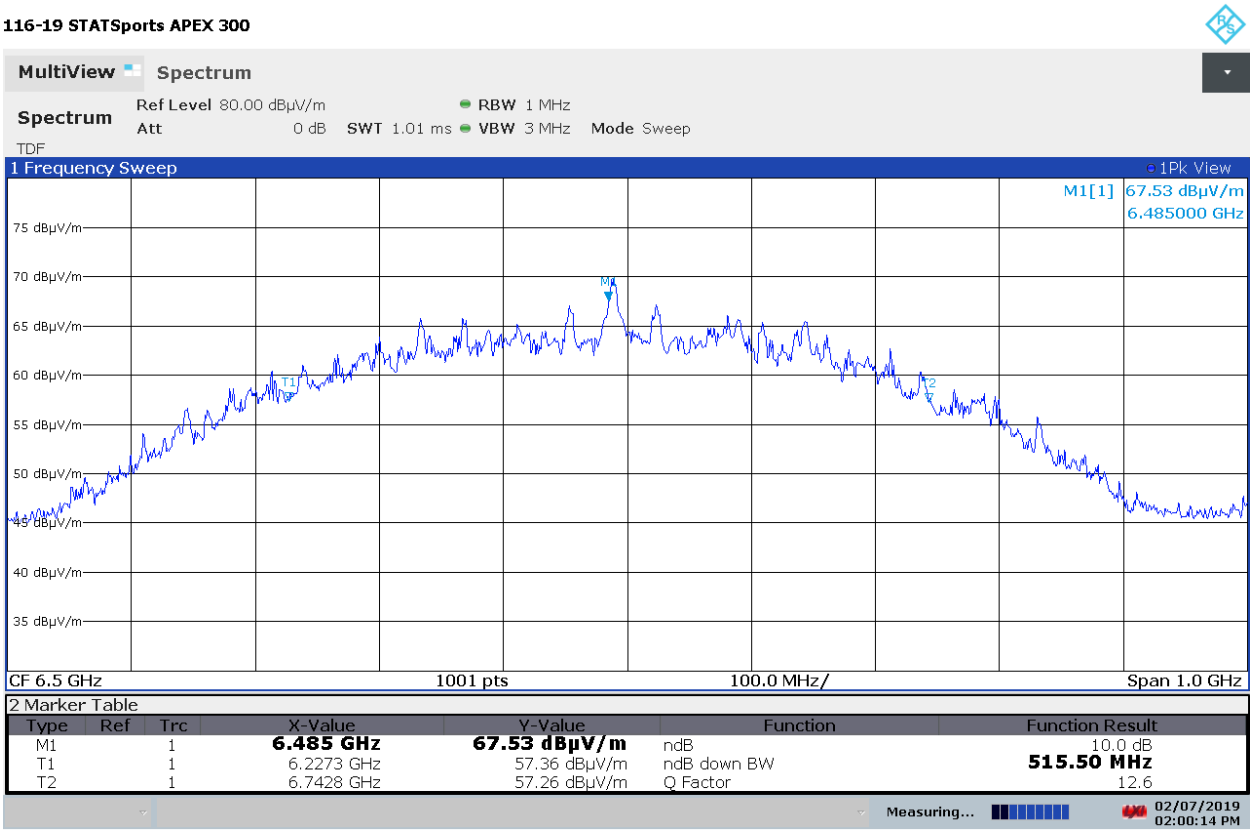
6. Measurement Data (continued)

6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

6.3.7. Measurement Data – Values in GHz

		CH5
f_M	The highest emission peak	6.485
f_L	10 dB below the highest peak	6.2273
f_H	10 dB above the highest peak	6.7428
f_C	Calculated: $(f_H + f_L) / 2$	6.4851
Bandwidth	Calculated: $(f_H - f_L)$	0.5155
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.0795

6.3.8. Measurement Plot of 10 dB frequencies (Channel 5, 64M PRF)



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6. Measurement Data (continued)

6.4. Spurious Radiated Emissions below 960 MHz (15.519 (c), 15.209)

Requirement: The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in Section 15.209.

Radiated Emissions Field Strength Limits at 3 Meters (Section 15.209, RSS-220)

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
0.009 to 0.490	2,400/F (F in kHz)	128.5 to 93.8
0.490 to 1.705	24,000/F (F in kHz)	73.8 to 63
1.705 - 30	30	69.5
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46

Test Notes: Refer to Section 4.1 for the test equipment used.

Frequency Range:	30 kHz to 960 MHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	200 Hz – 30 kHz to 150 kHz 9 kHz – 150 kHz to 30 MHz 120 kHz - 30 MHz to 960 MHz
EMI Receiver Avg Bandwidth (minimum):	300 Hz – 30 kHz to 150 kHz 30 kHz – 150 kHz to 30 MHz 300 kHz - 30 MHz to 960 MHz
Detector Function:	Peak, Quasi-Peak & Average

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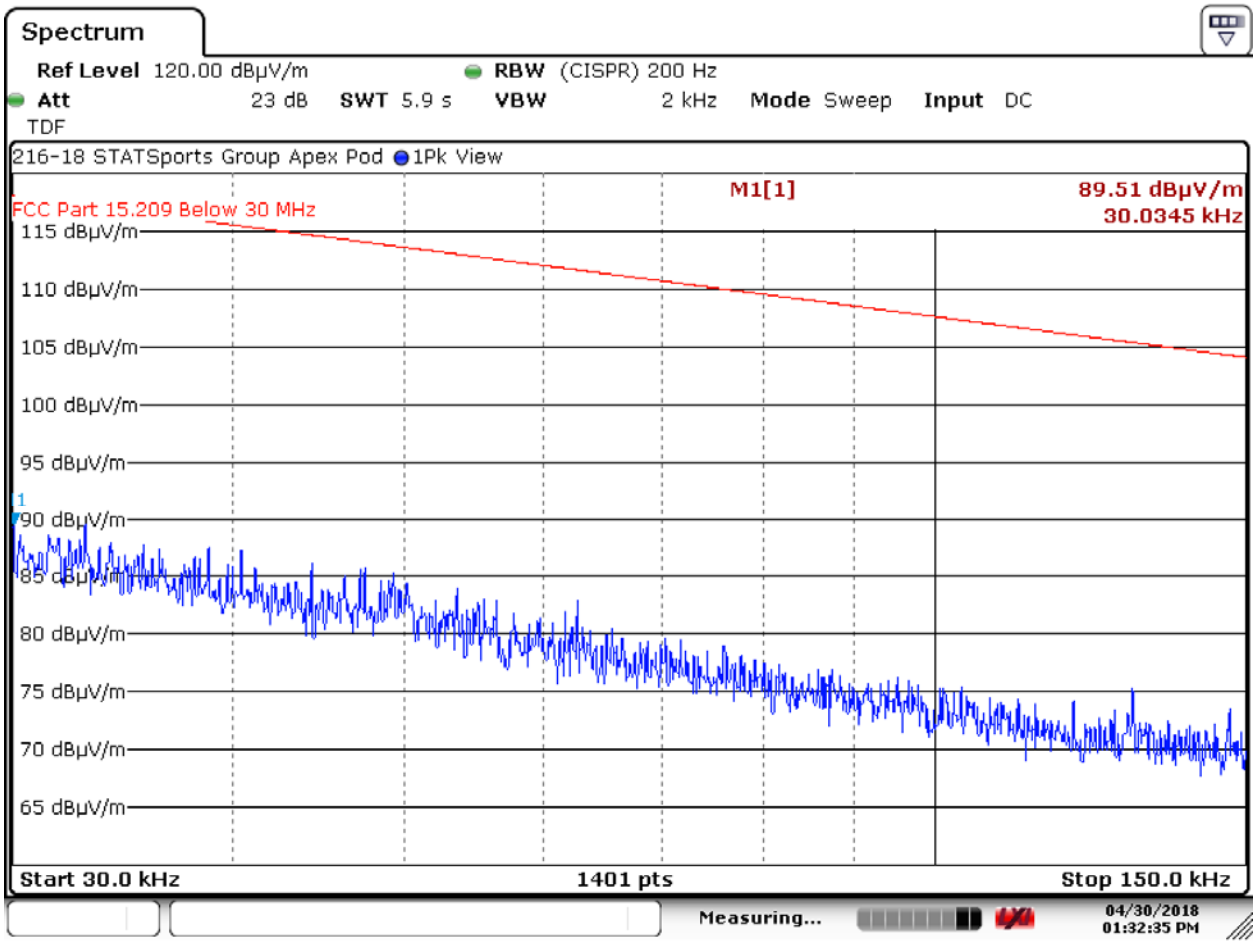
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209, continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.1 Parallel Measurement Antenna – 30 to 150 kHz – Channel 3



Date: 30.APR.2018 13:32:34

Note: All other axes and PRF were noise floor

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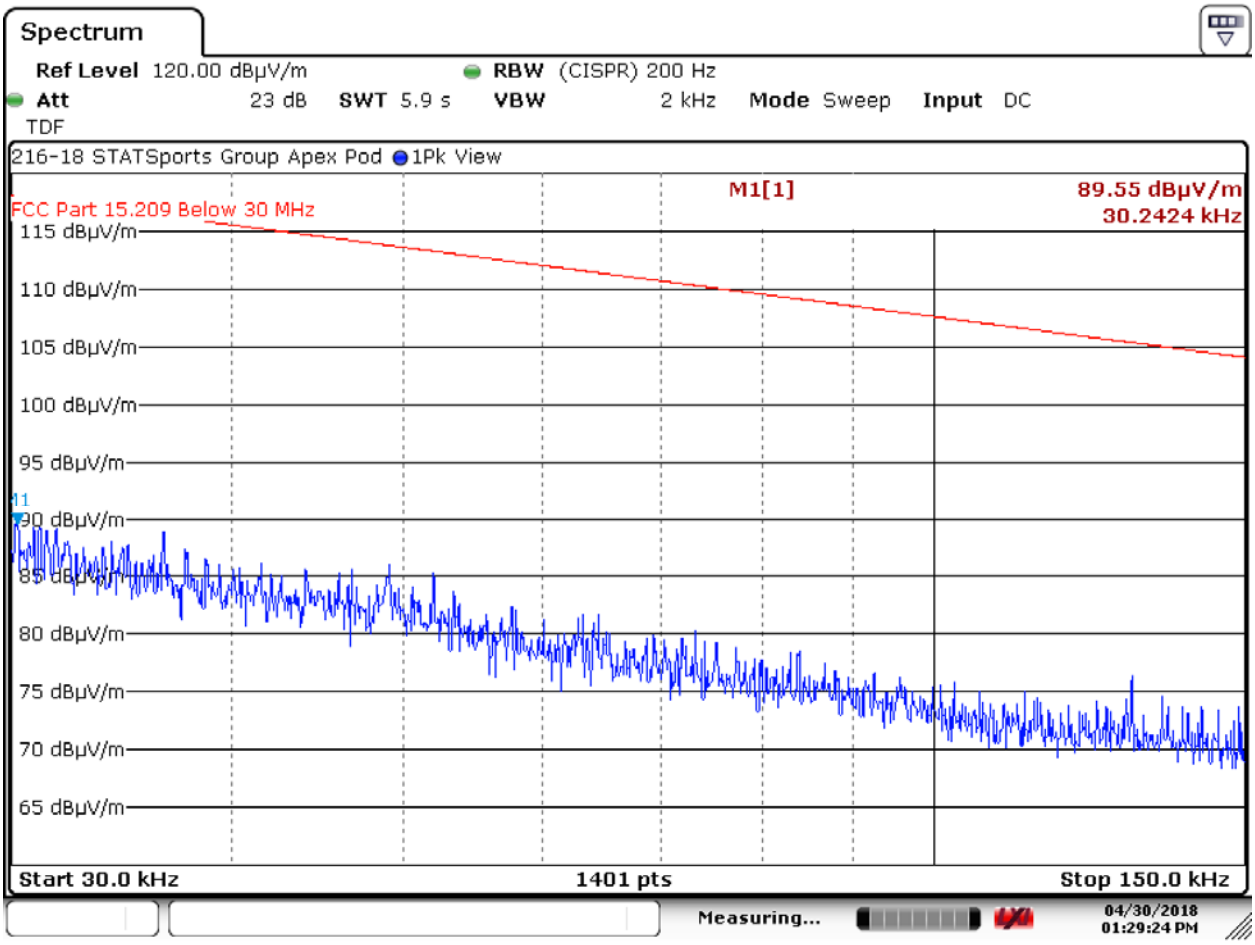
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.2 Perpendicular Measurement Antenna – 30 to 150 kHz – Channel 3



Date: 30.APR.2018 13:29:22

Note: All other axes and PRF were noise floor

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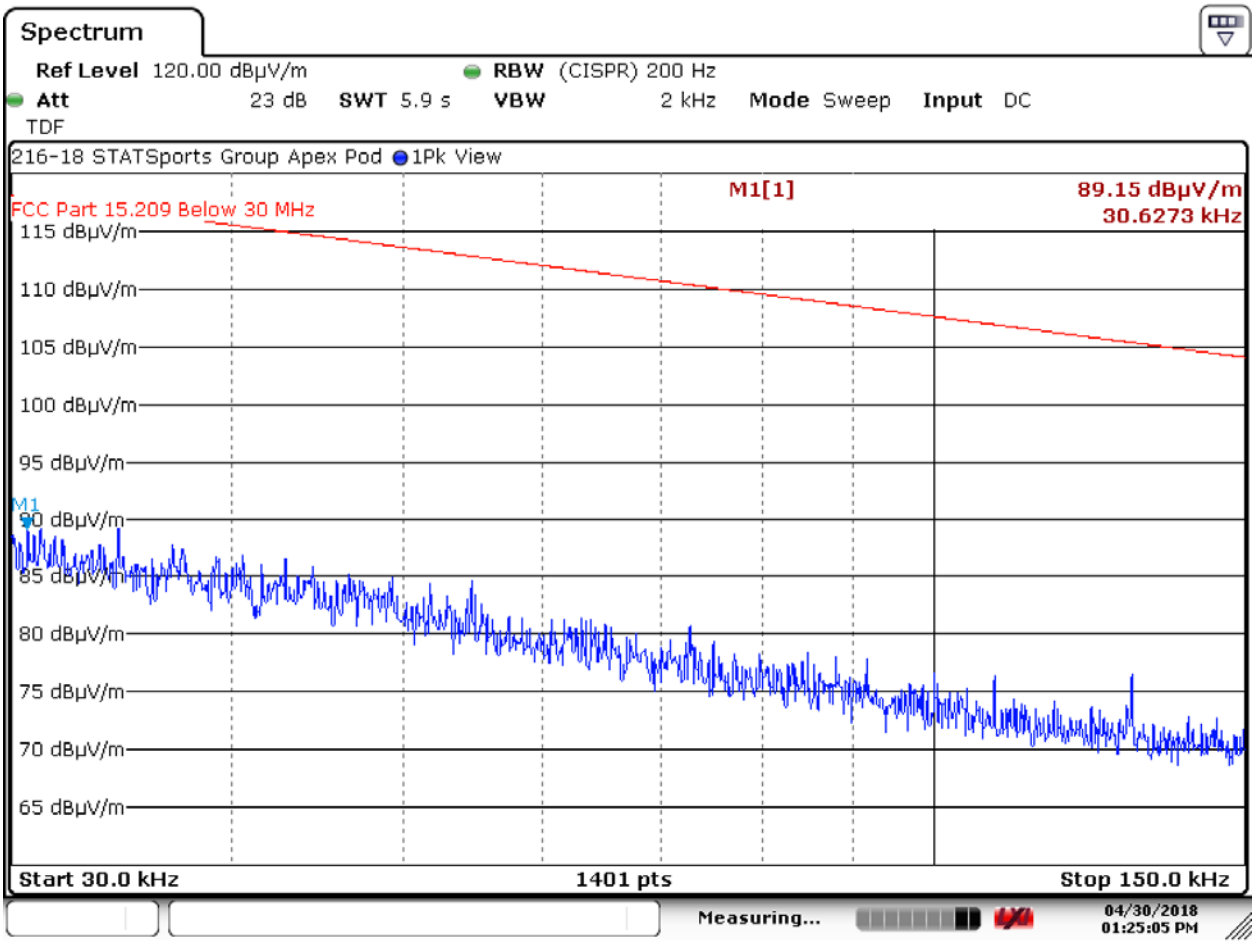
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.3 Ground Parallel Measurement Antenna – 30 to 150 kHz – Channel 3



Date: 30.APR.2018 13:25:03

Note: All other axes and PRF were noise floor

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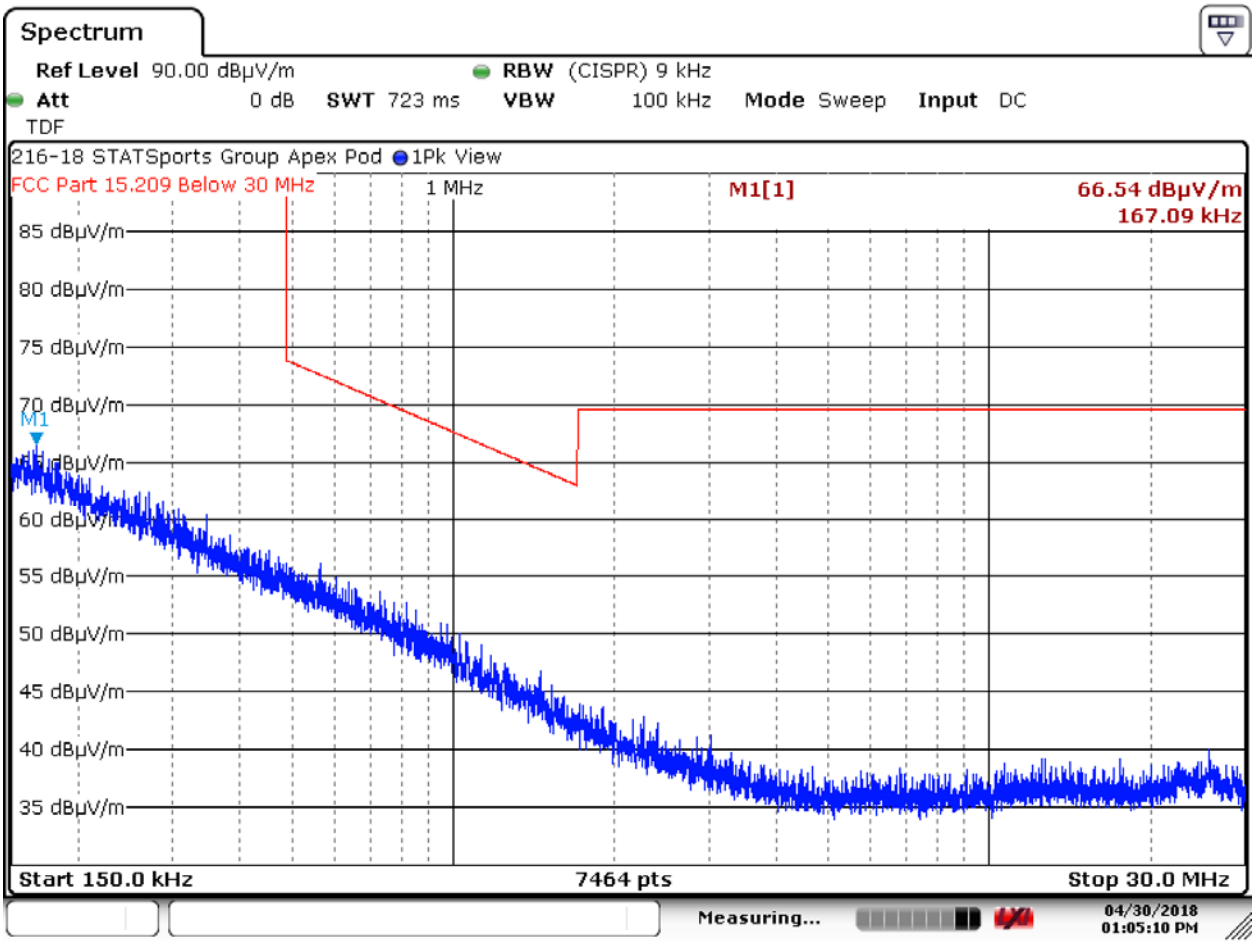
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.4 Parallel Measurement Antenna – 150 kHz to 30 MHz – Channel 3



Date: 30.APR.2018 13:05:09

Note: All other axes and PRF were noise floor

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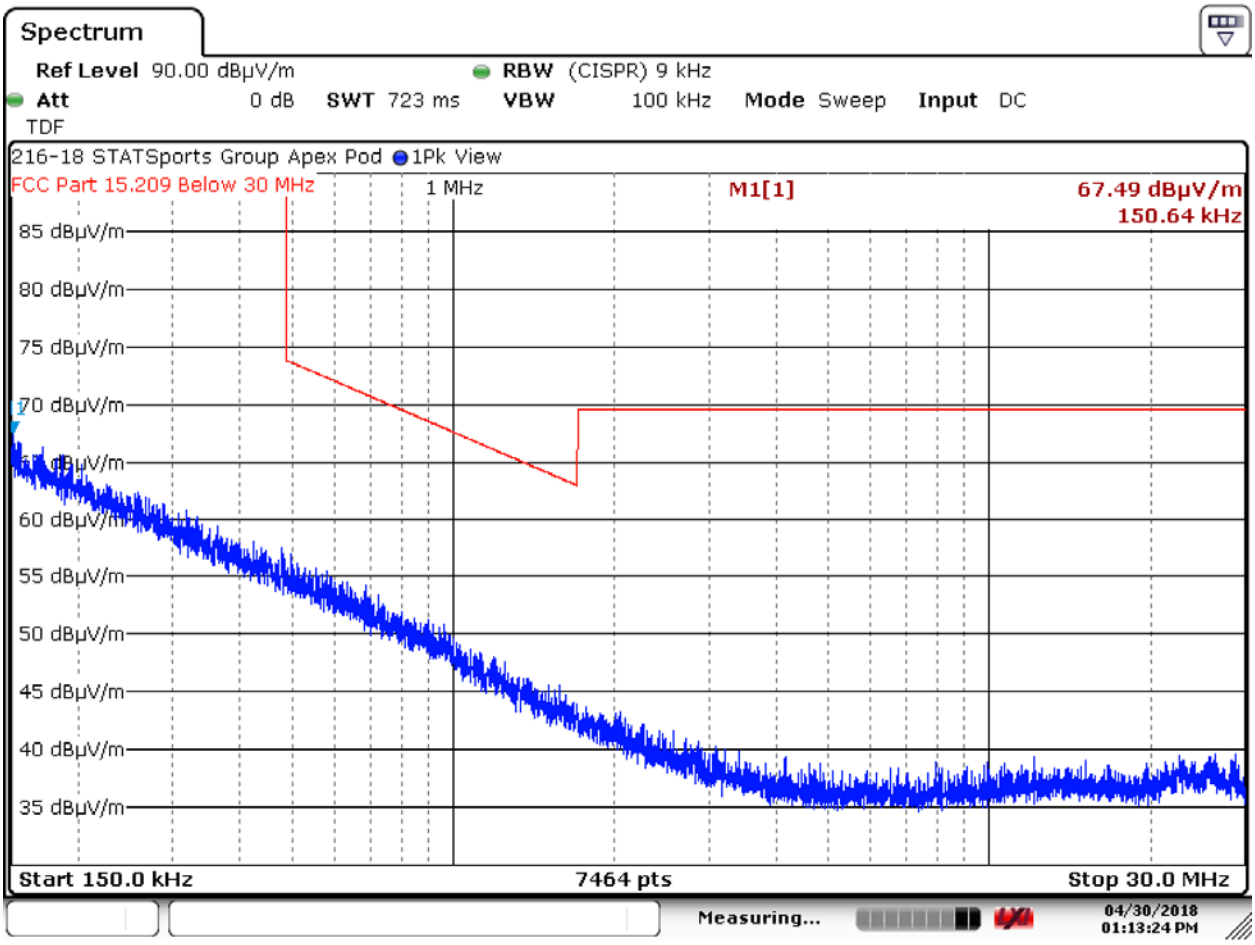
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.5 Perpendicular Measurement Antenna – 150 kHz to 30 MHz – Channel 3



Date: 30.APR.2018 13:13:22

Note: All other axes and PRF were noise floor

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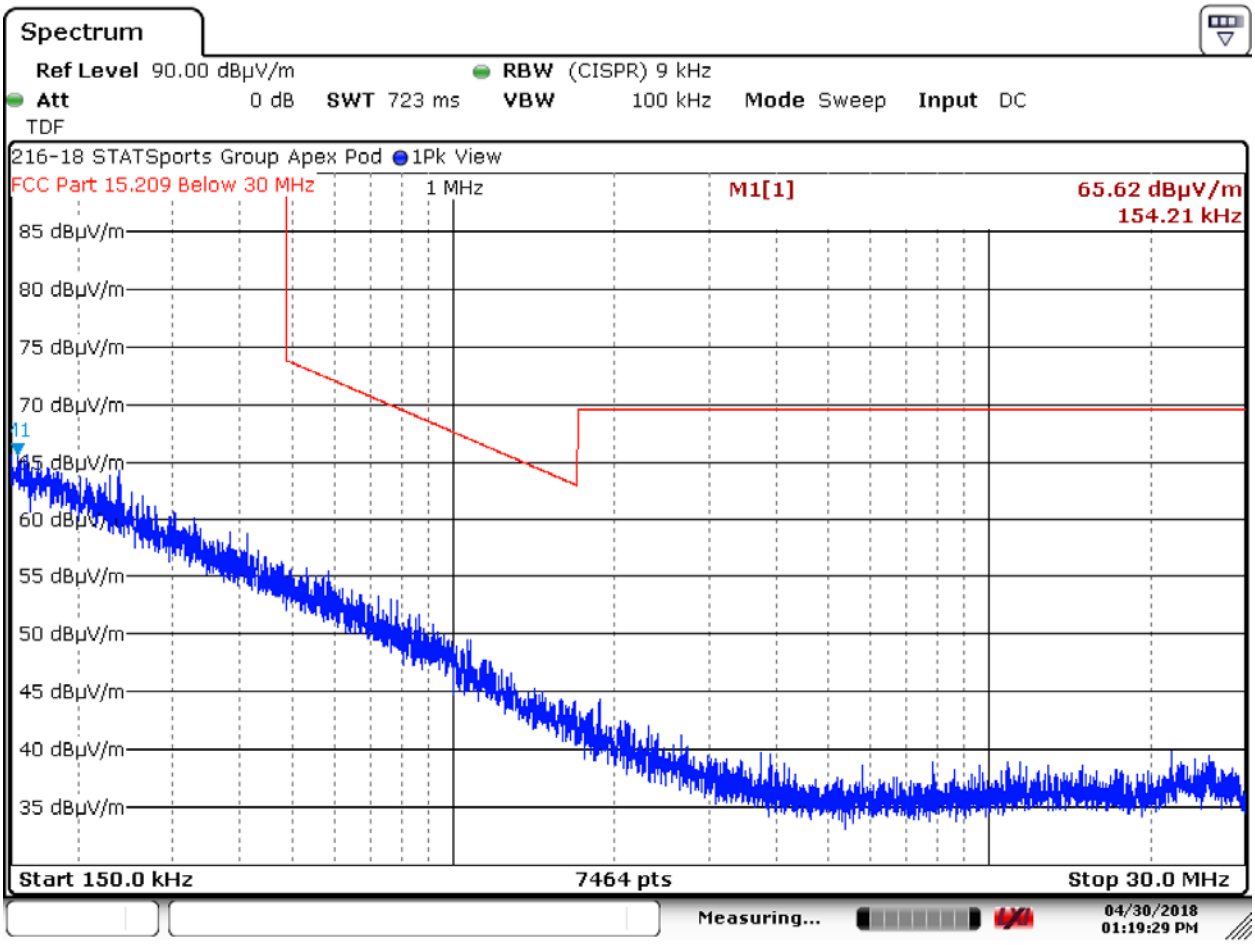
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.6 Ground Parallel Measurement Antenna – 150 kHz to 30 MHz – Channel 3



Note: All other axes and PRF were noise floor

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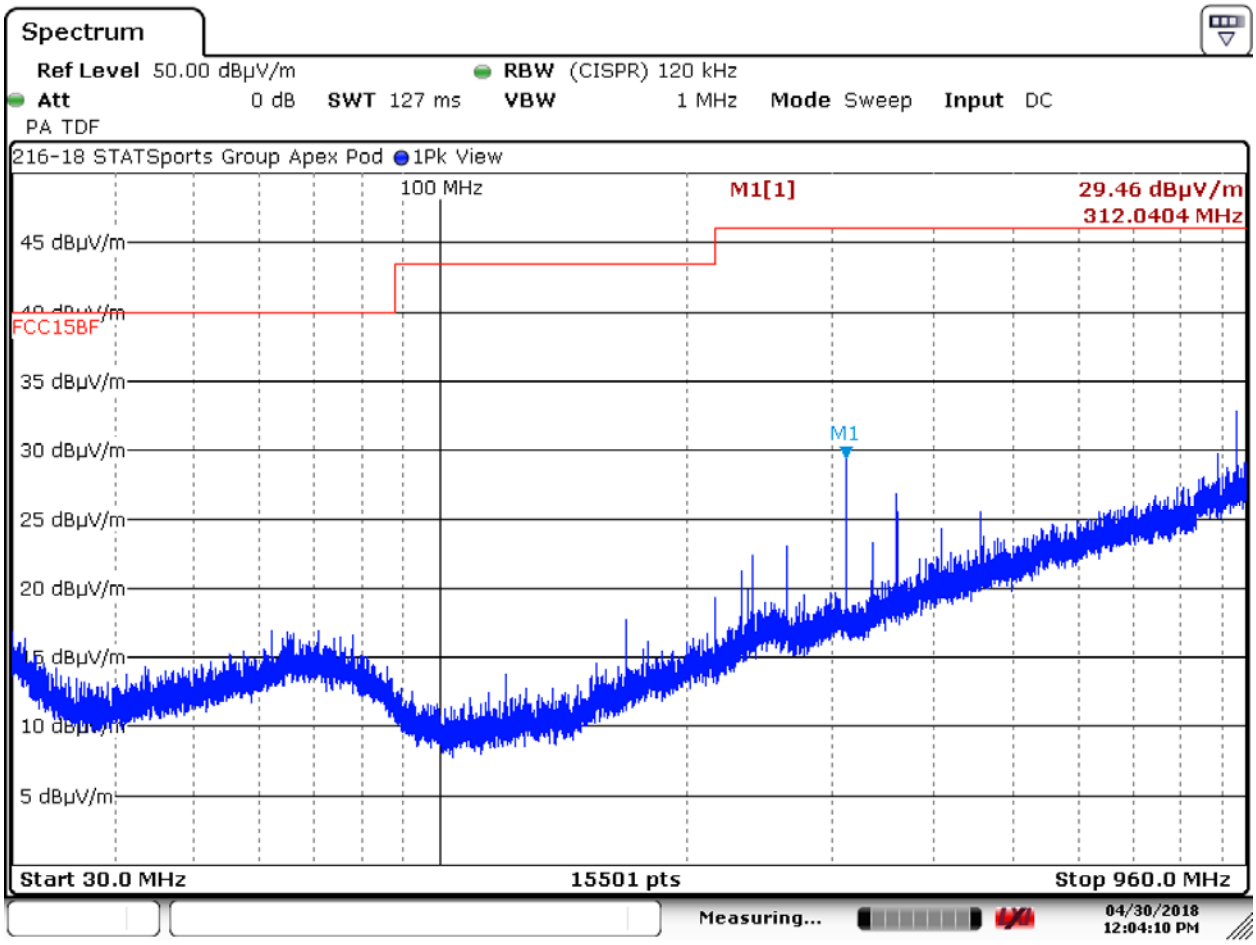
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.7 Horizontal Polarity – 30 to 960 MHz – Channel 3 – X Axis 16M PRF



Date: 30.APR.2018 12:04:08

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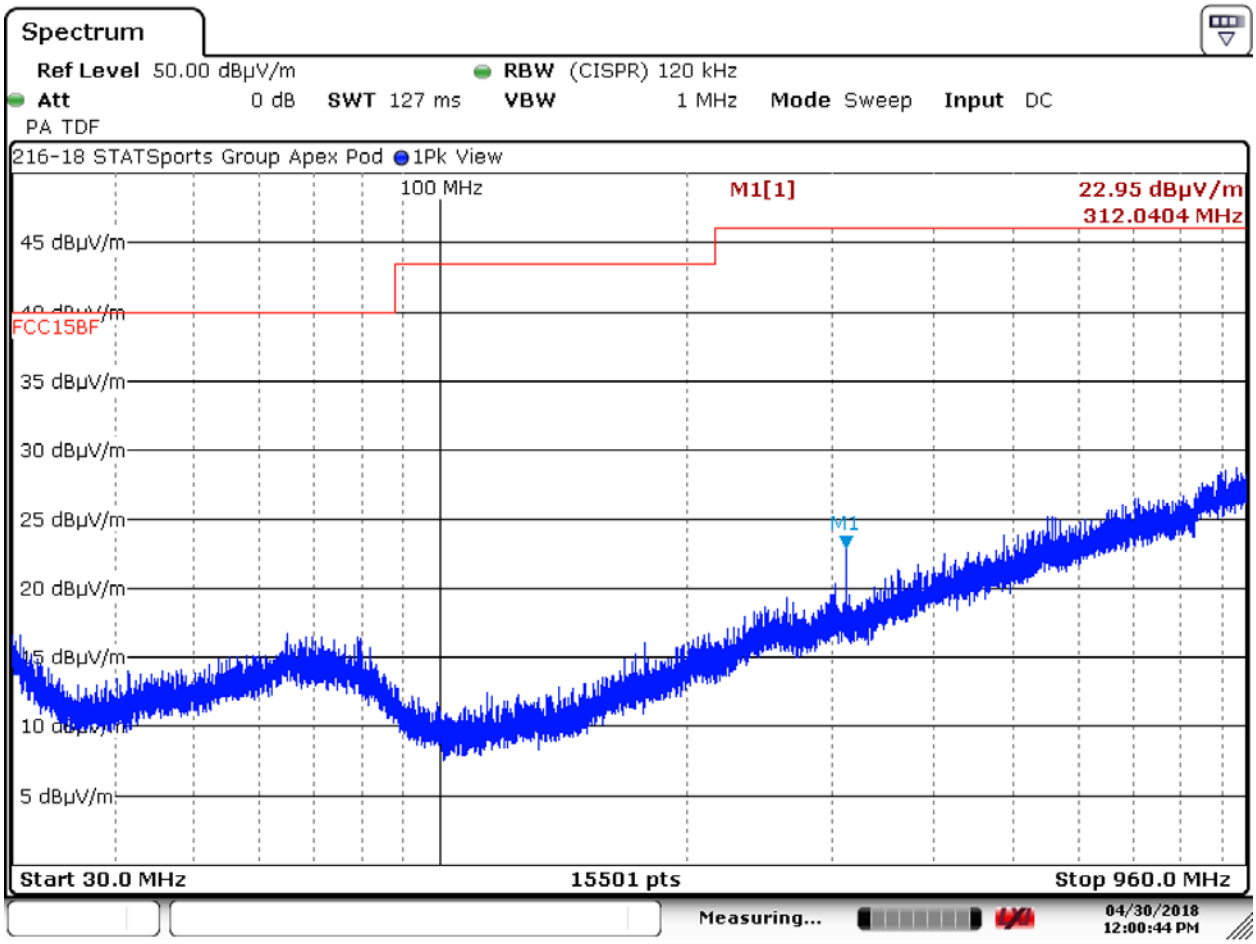
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.8 Vertical Polarity – 30 to 960 MHz – Channel 3 - X Axis 16M PRF



Date: 30.APR.2018 12:00:42

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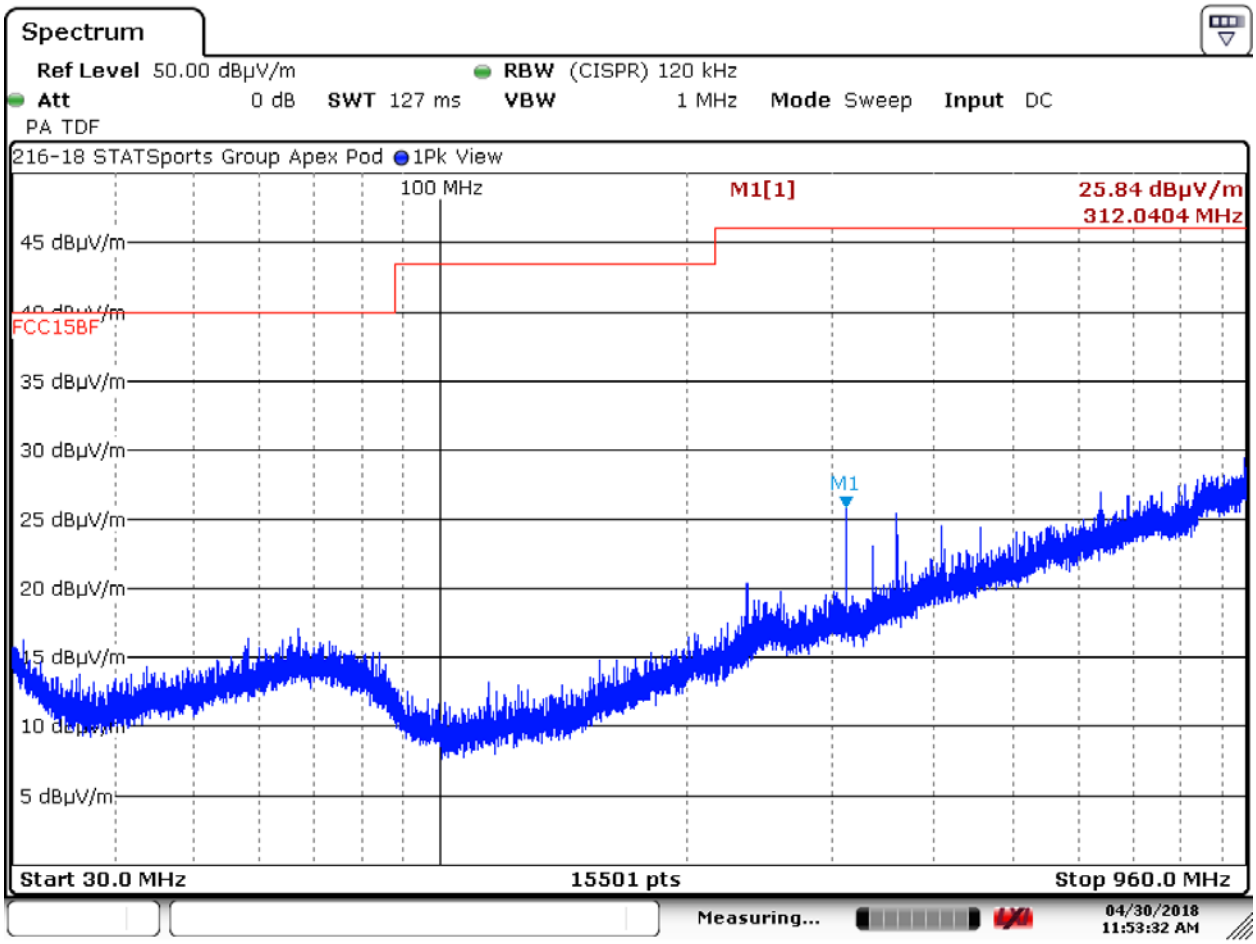
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.9 Horizontal Polarity – 30 to 960 MHz – Channel 3 – Y Axis – 16M PRF



Date: 30.APR.2018 11:53:30

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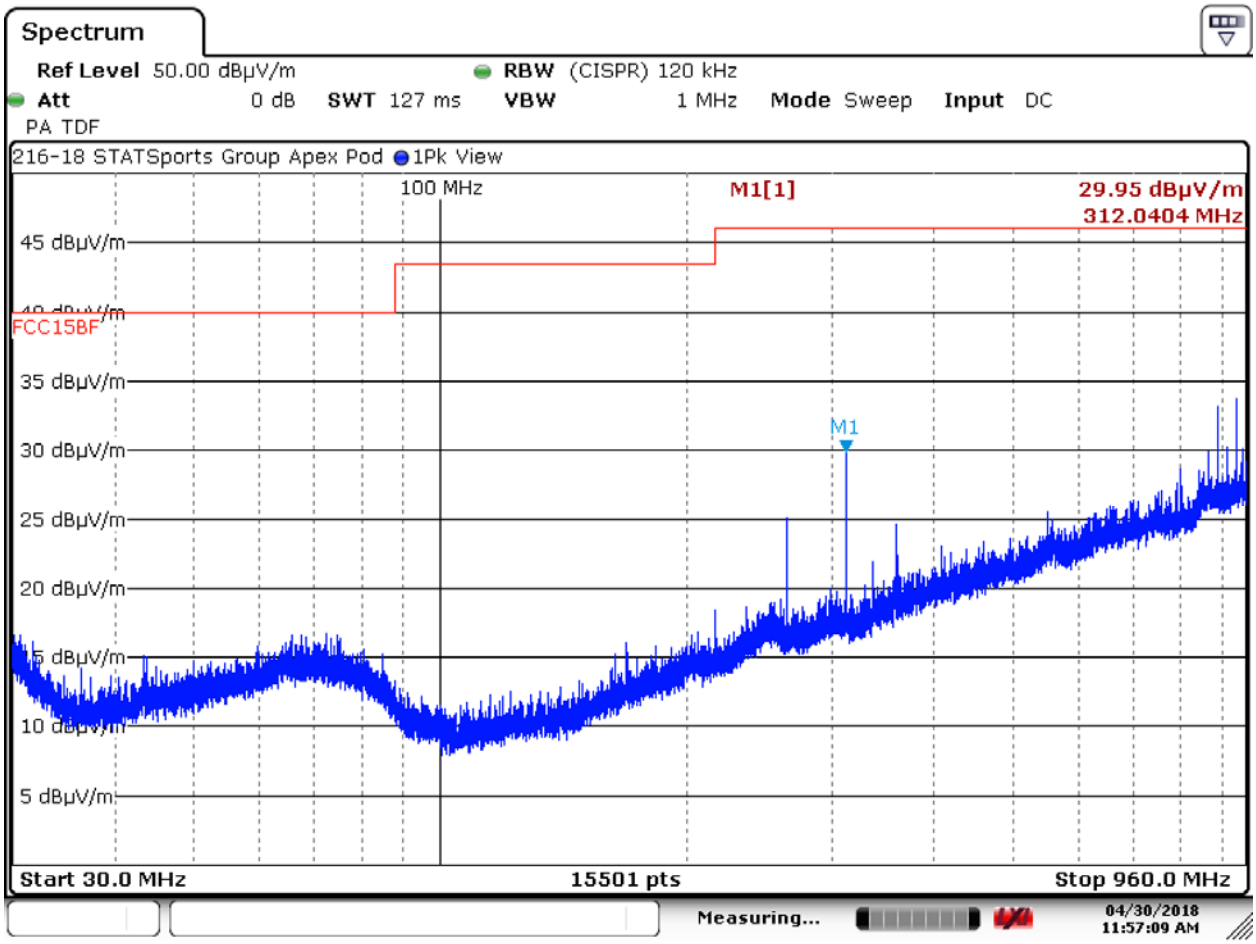
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.10 Vertical Polarity – 30 to 960 MHz – Channel 3 – Y Axis 16M PRF



Date: 30.APR.2018 11:57:07

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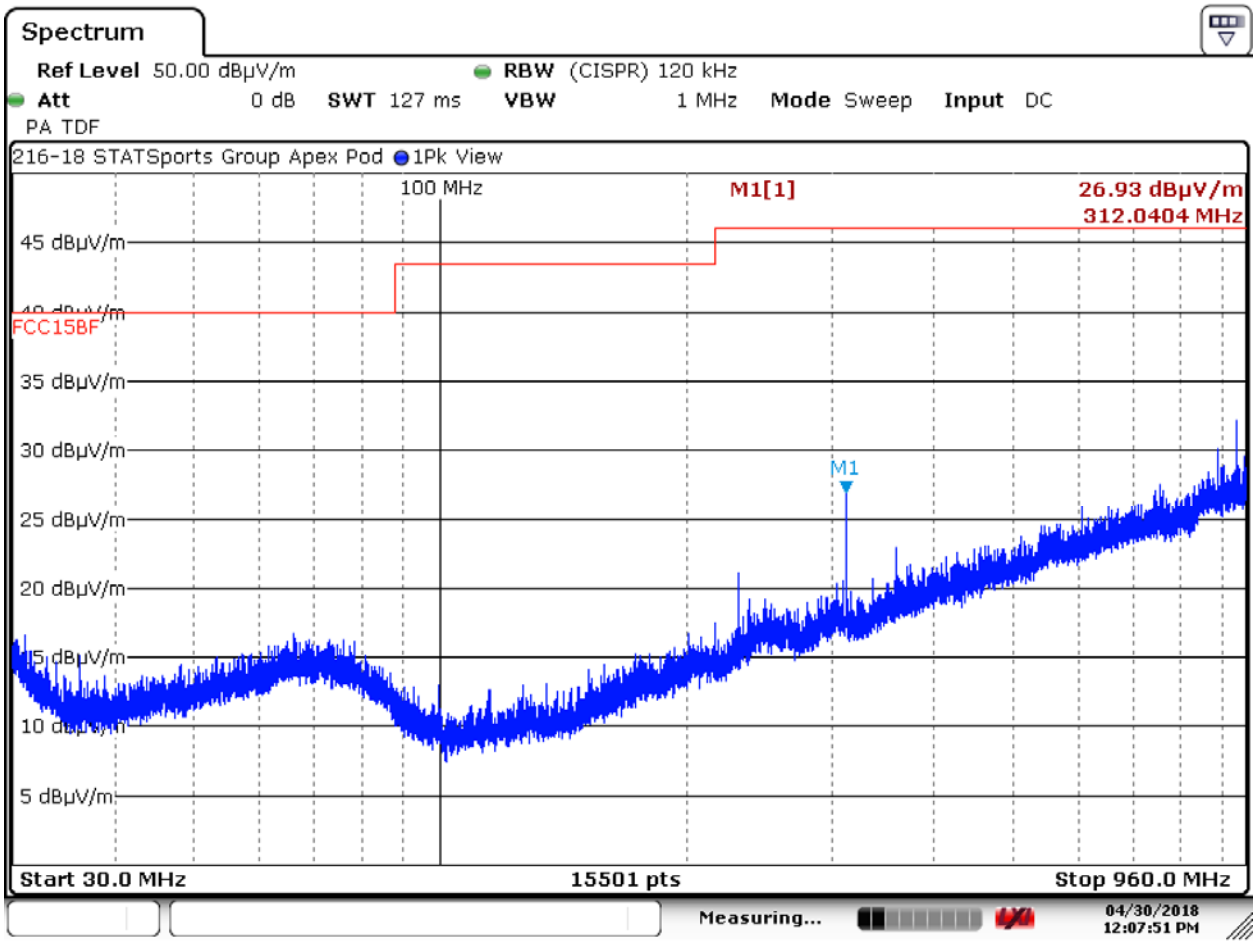
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.11 Horizontal Polarity – 30 to 960 MHz – Channel 3 – Z Axis 16M PRF



Date: 30.APR.2018 12:07:49

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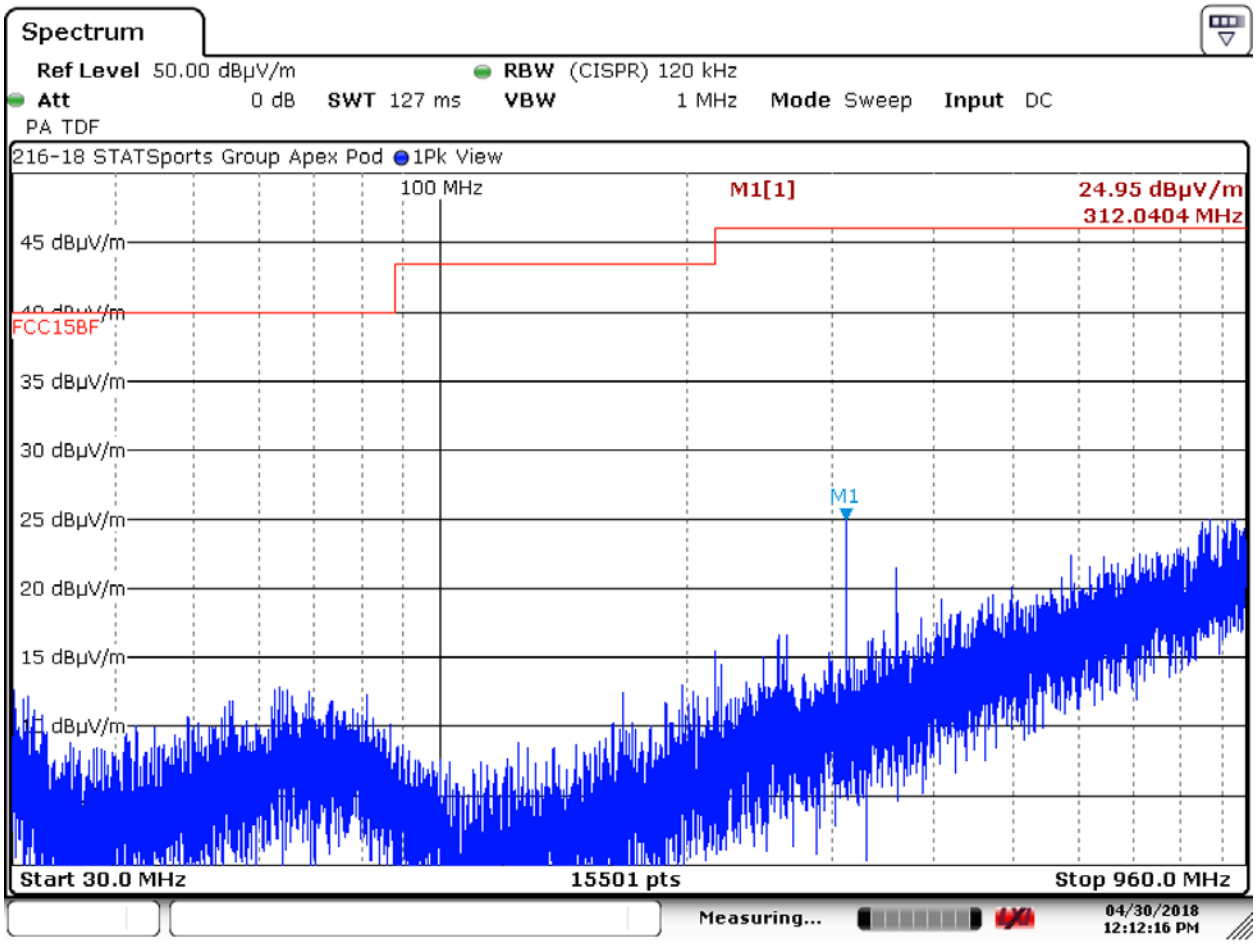
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.12 Vertical Polarity – 30 to 960 MHz – Channel 3 – Z Axis 16M PRF



Date: 30.APR.2018 12:12:14

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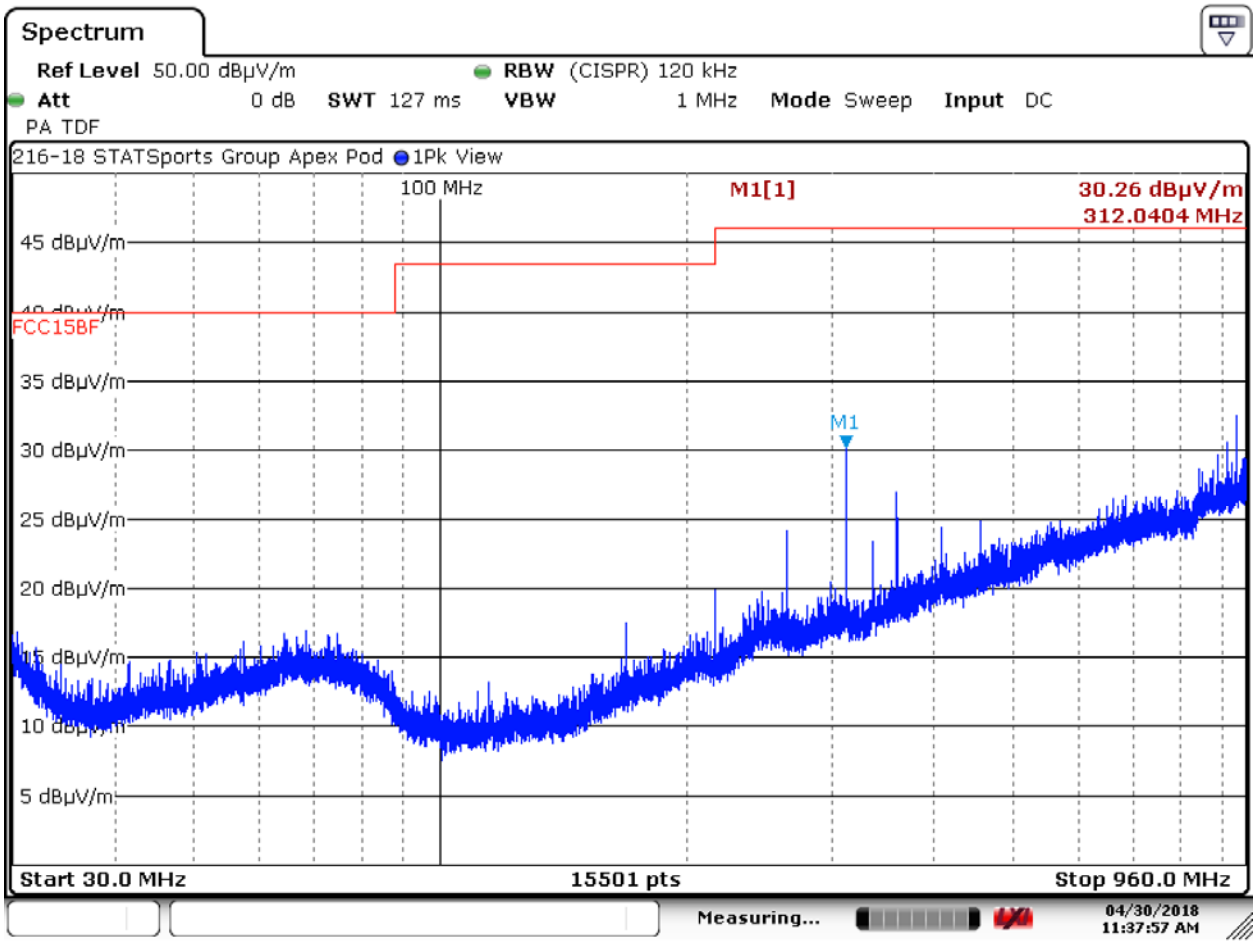
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.13 Horizontal Polarity – 30 to 960 MHz – Channel 3 – X Axis 64M PRF



Date: 30.APR.2018 11:37:55

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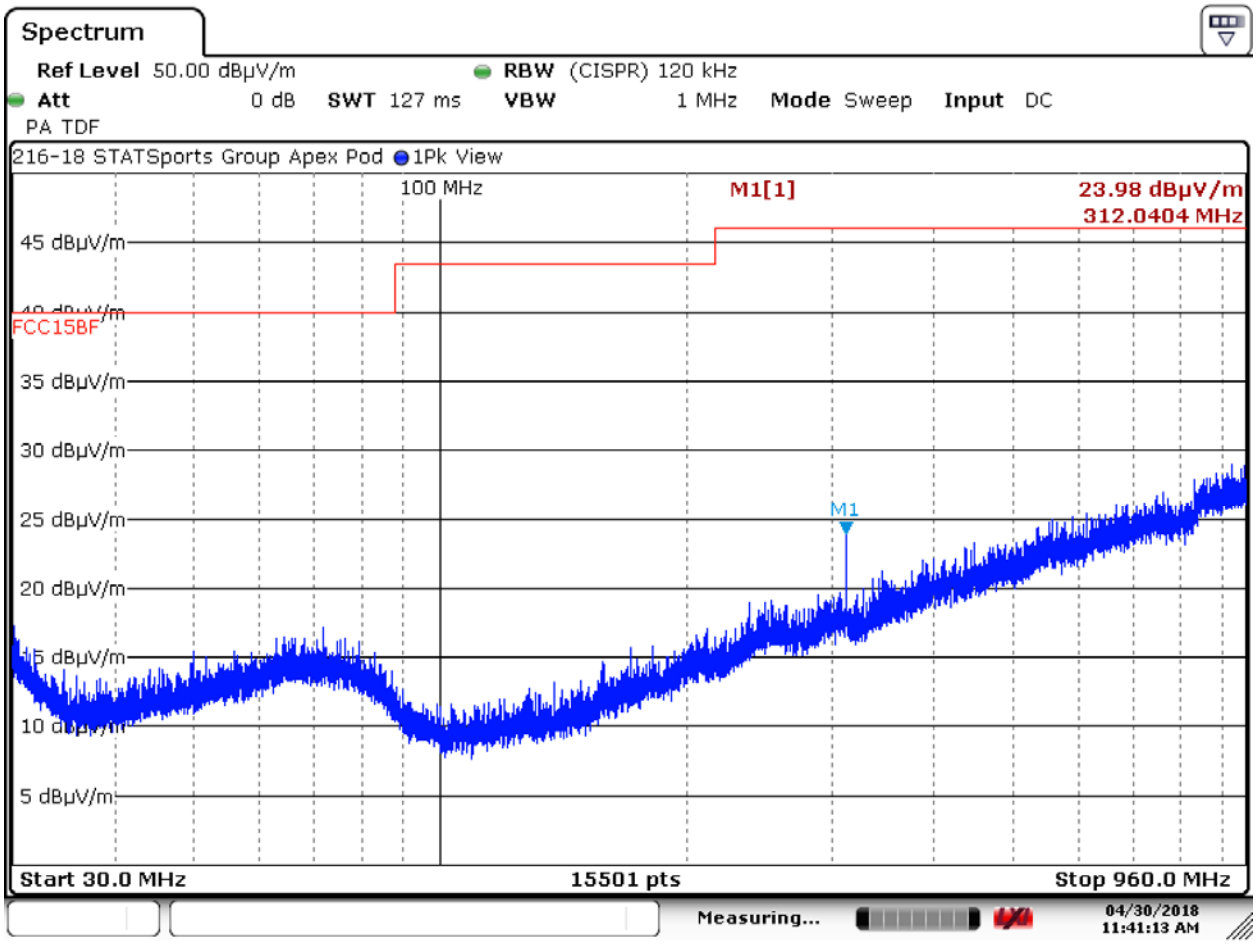
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.14 Vertical Polarity – 30 to 960 MHz – Channel 3 – X Axis 64M PRF



Date: 30.APR.2018 11:41:11

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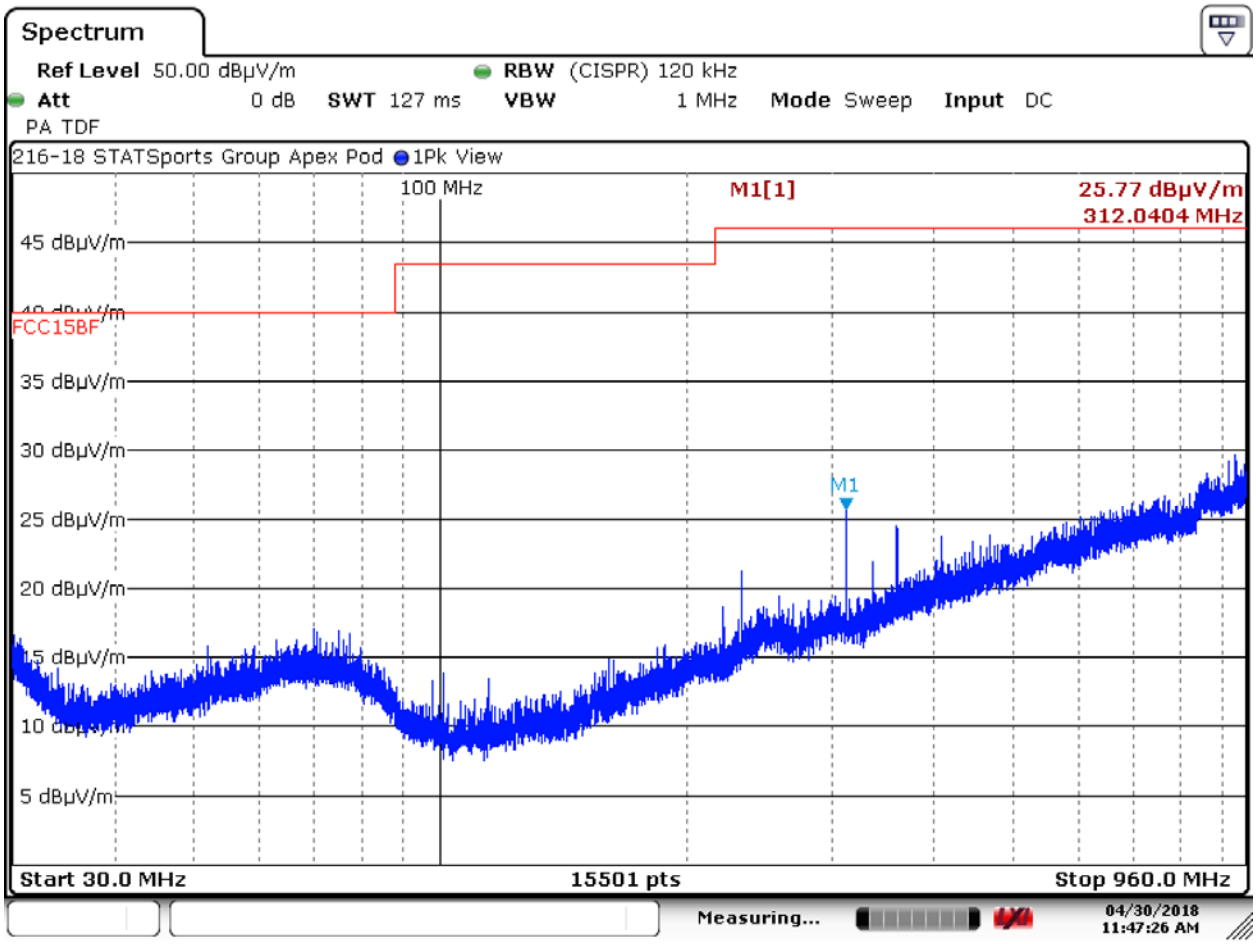
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.15 Horizontal Polarity – 30 to 960 MHz – Channel 3 – Y Axis – 64M PRF



Date: 30.APR.2018 11:47:25

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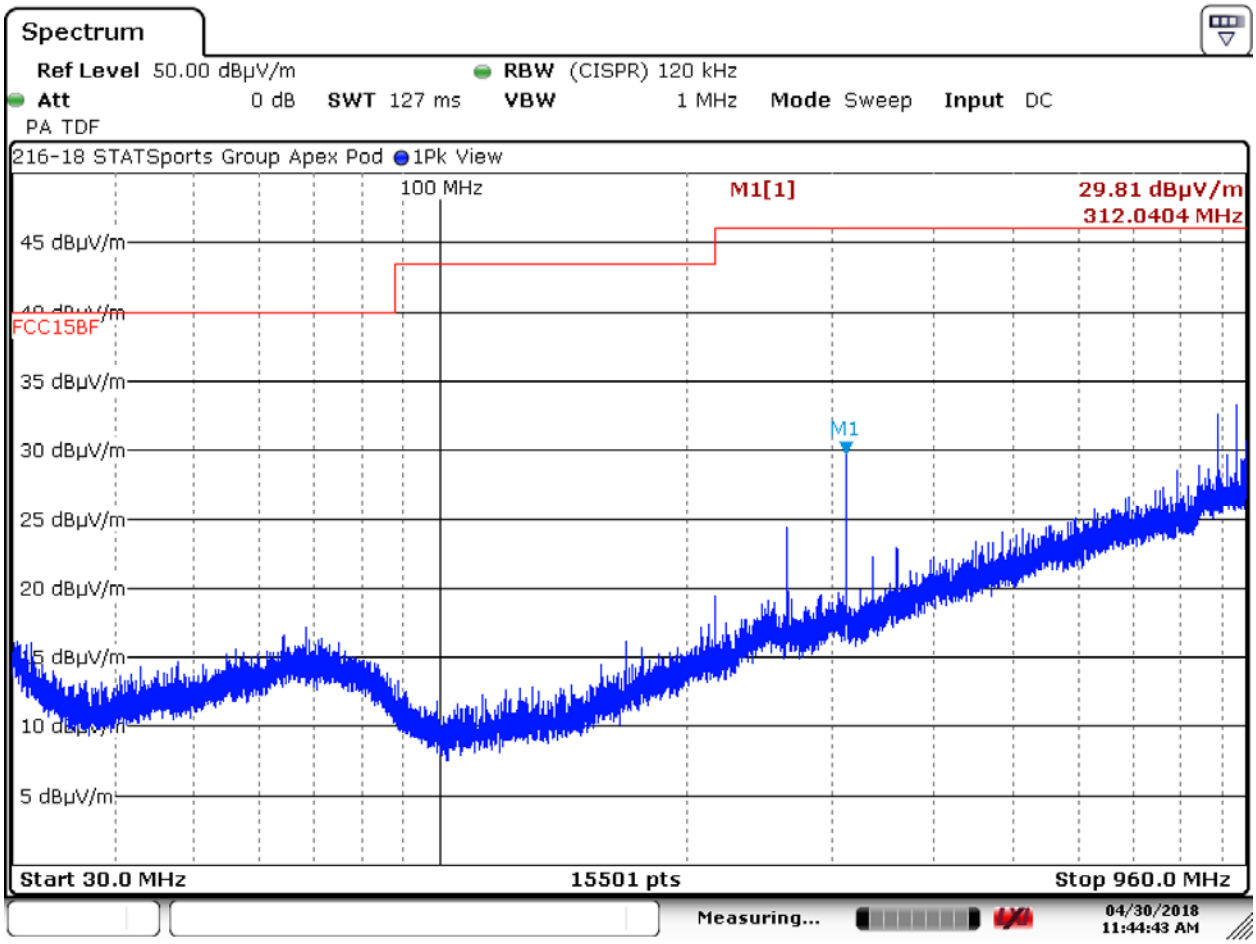
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.16 Vertical Polarity – 30 to 960 MHz – Channel 3 – Y Axis 64M PRF



Date: 30.APR.2018 11:44:41

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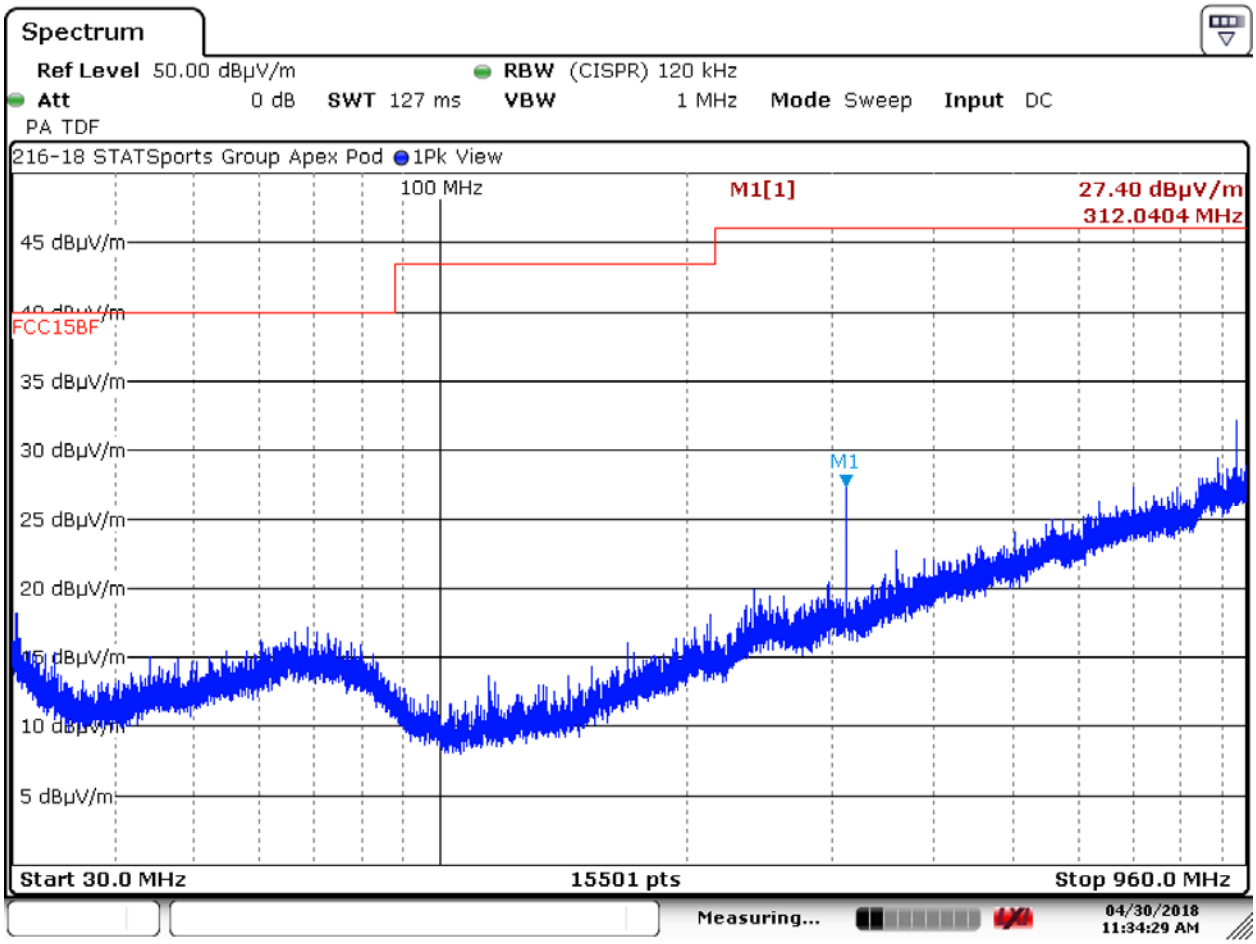
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.17 Horizontal Polarity – 30 to 960 MHz – Channel 3 – Z Axis 64M PRF



Date: 30.APR.2018 11:34:27

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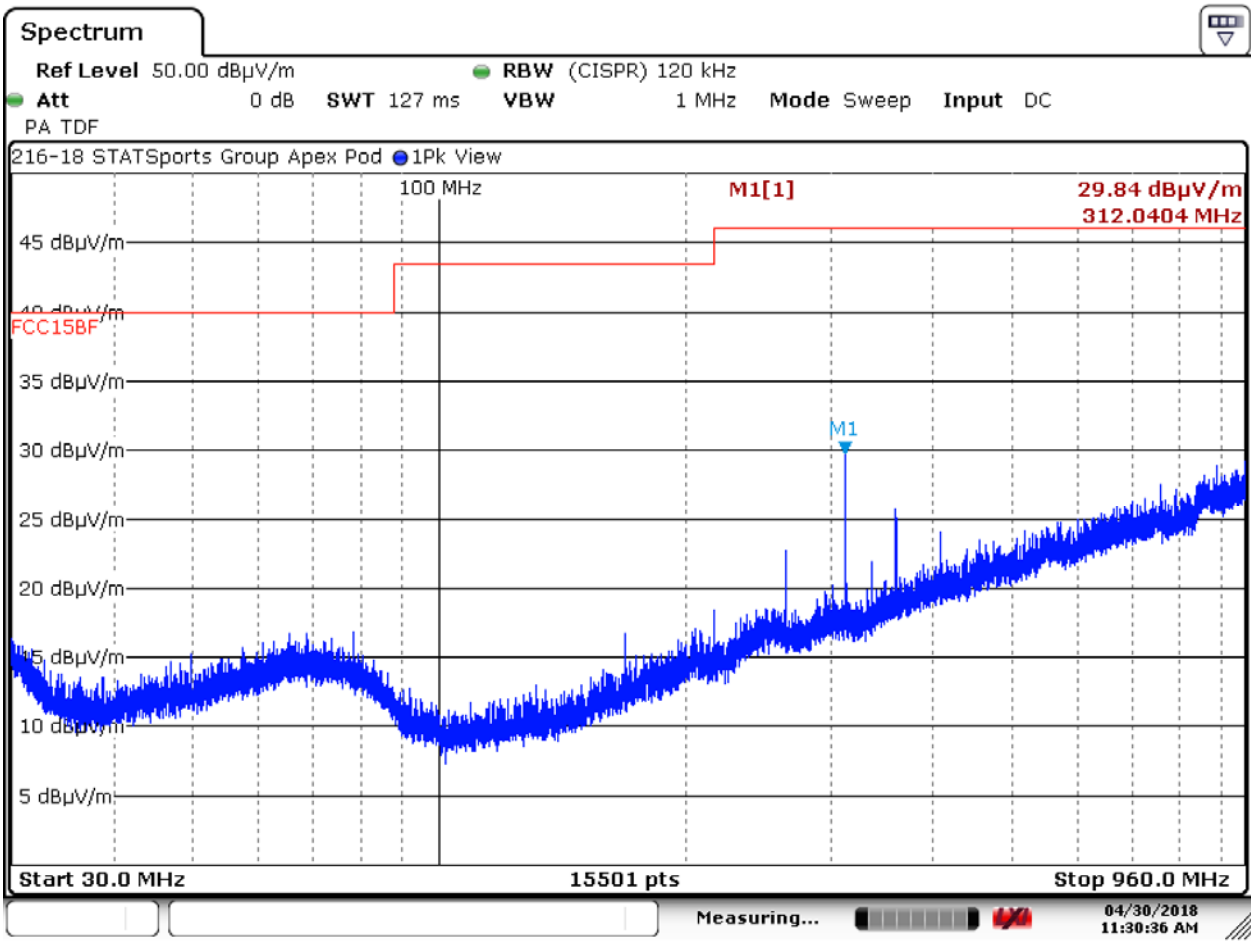
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.209 continued)

6.4.1. 10 kHz to 960 MHz, measured at 3 Meters

The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.18 Vertical Polarity – 30 to 960 MHz – Channel 3 – Z Axis 64M PRF



Date: 30.APR.2018 11:30:34

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6. Measurement Data (continued)

6.5. Spurious Radiated Emissions above 960 MHz (15.519 (c), 15.521 (d))

Requirement: The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time.

The EIRP in terms of dBm, can be converted to a field strength, in dBµV/m at 3 Meters by adding 95.2.

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
960 - 1610	-75.3	19.9
1610 - 1990	-63.3	31.9
1990 - 3100	-61.3	33.9
3100 - 10600	-41.3	53.9
Above 10600	-61.3	33.9

Frequency Range:	960 MHz to 40 GHz
Measurement Distance:	1 Meter and 0.3 Meter
EMI Receiver IF Bandwidth:	1 MHz
EMI Receiver Avg Bandwidth	10 MHz
Detector Function:	RMS 1 mS Average as defined in 15.521(d)

Notes: Measurements made from 960 MHz to 18 GHz were made in a semi-anechoic chamber at 1 Meter using a -9.54 dB distance offset was programmed into the spectrum analyzer.

Measurements made from 8 to 18 GHz were done with the aid of a High Pass Filter before the low noise amplifier.

Measurements made from 18 to 40 GHz were done at 0.3 meters and a -20.00 dB distance offset was programmed into the spectrum analyzer.

Plots in 6.5.13 and 6.5.14 shows the range of 960 to 8000 MHz with digital signals with No UWB Transmission.

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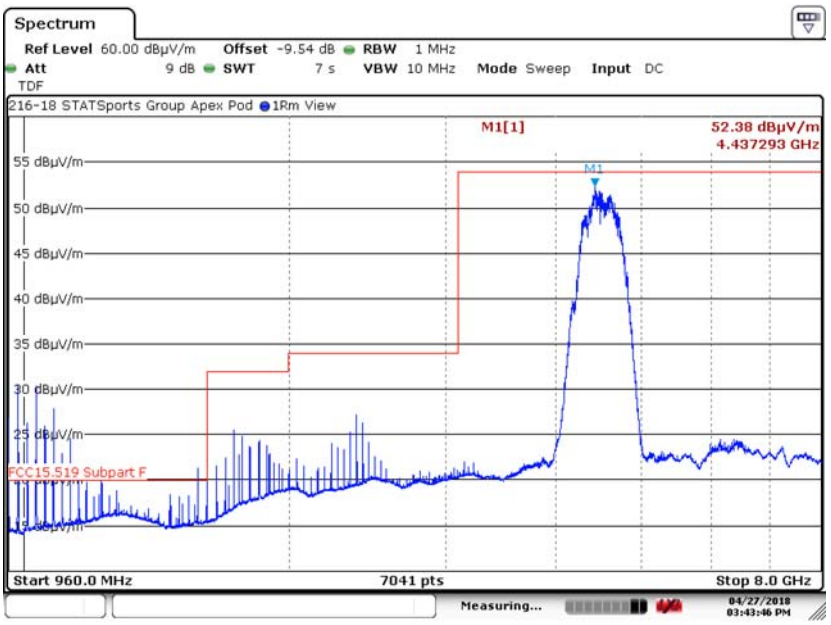
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.1. 960 MHz to 8 GHz Horizontal at 1 Meter, -9.54 dB offset in analyzer CH3 16M



Date: 27.APR.2018 15:43:44

6.5.2. 960 MHz to 8 GHz Vertical at 1 Meter, -9.54 dB offset in analyzer CH3 16M

Date: 27.APR.2018 15:49:46

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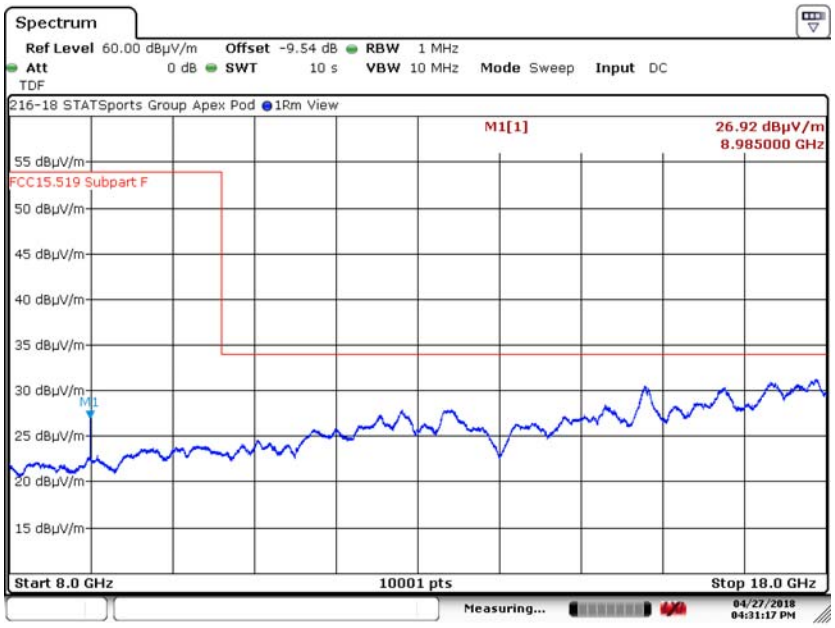
6. Measurement Data (continued)

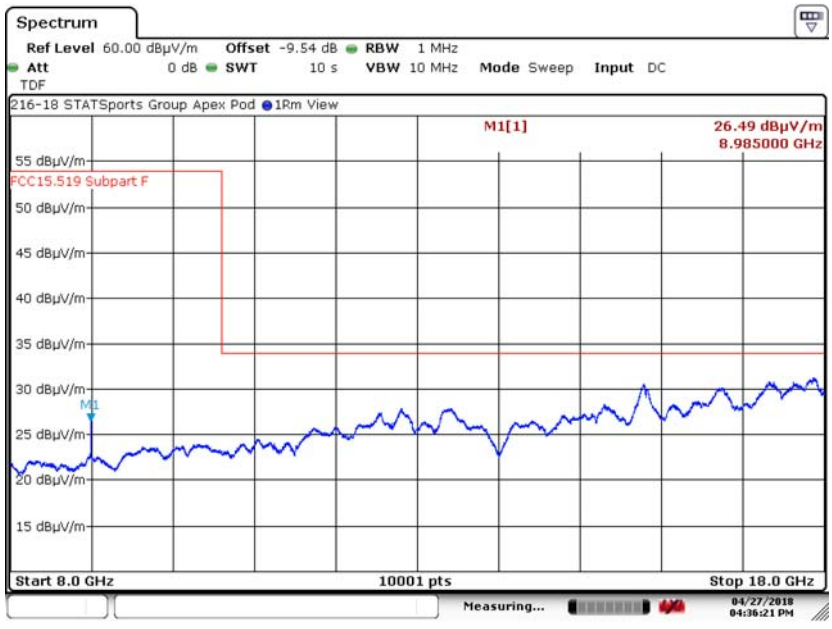
6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.3. 8 to 18 GHz Horizontal at 1 Meter, -9.54 dB offset in analyzer CH3 16M



Date: 27.APR.2018 16:31:15

6.5.4. 8 to 18 GHz Vertical at 1 Meter, -9.54 dB offset in analyzer CH3 16M



Date: 27.APR.2018 16:36:19

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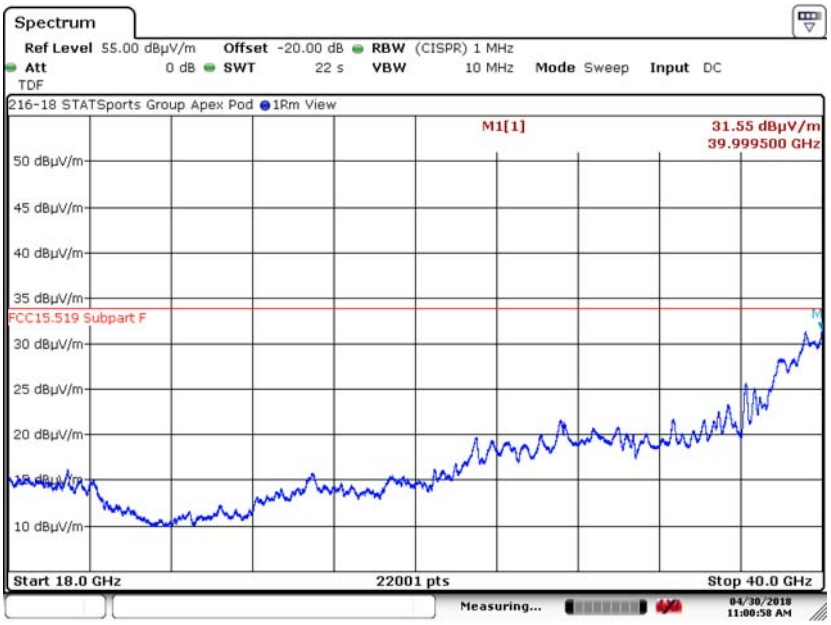
6. Measurement Data (continued)

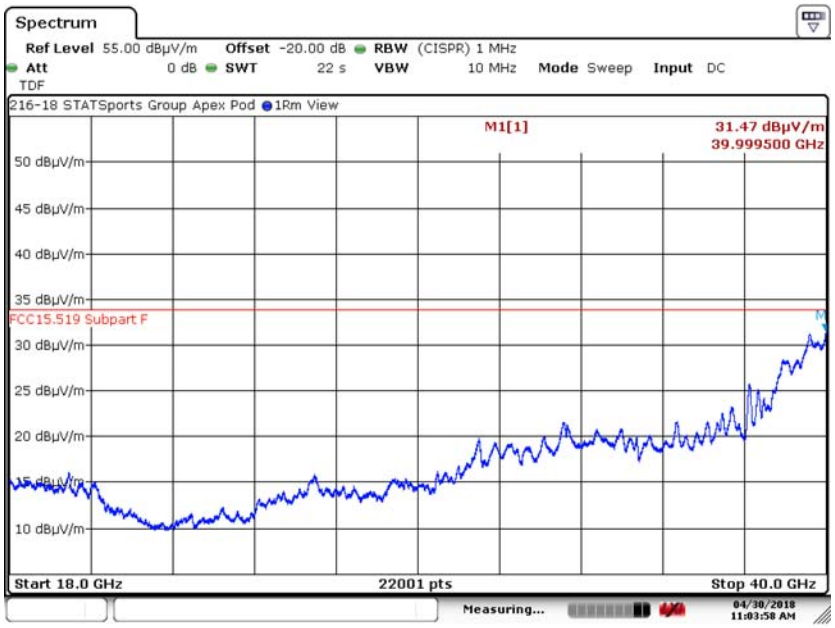
6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.5. 18 to 40 GHz Horizontal at 0.3 Meter, -20.00 dB offset in analyzer CH3 16M



Date: 30.APR.2018 11:00:56

6.5.6. 18 to 40 GHz Vertical at 0.3 Meter, -20.00 dB offset in analyzer CH3 16M



Date: 30.APR.2018 11:03:56

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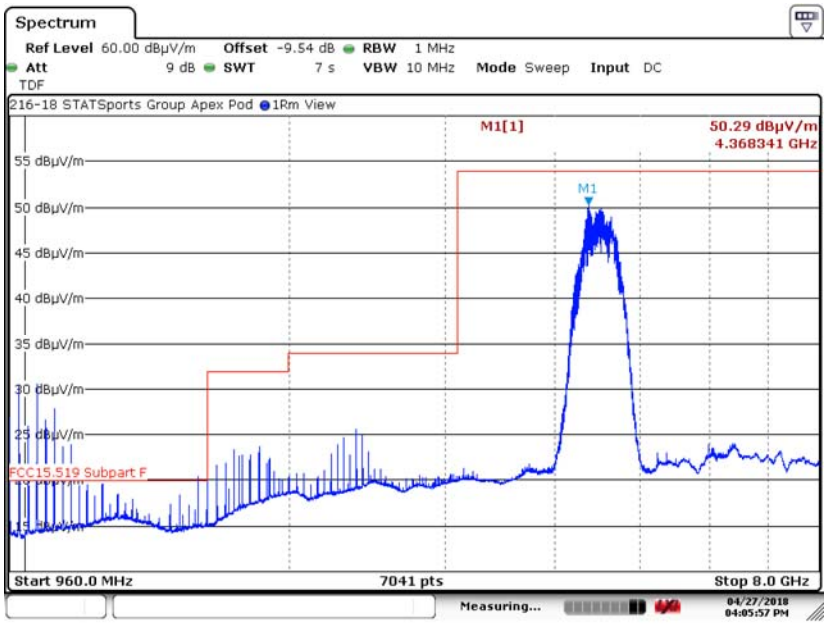
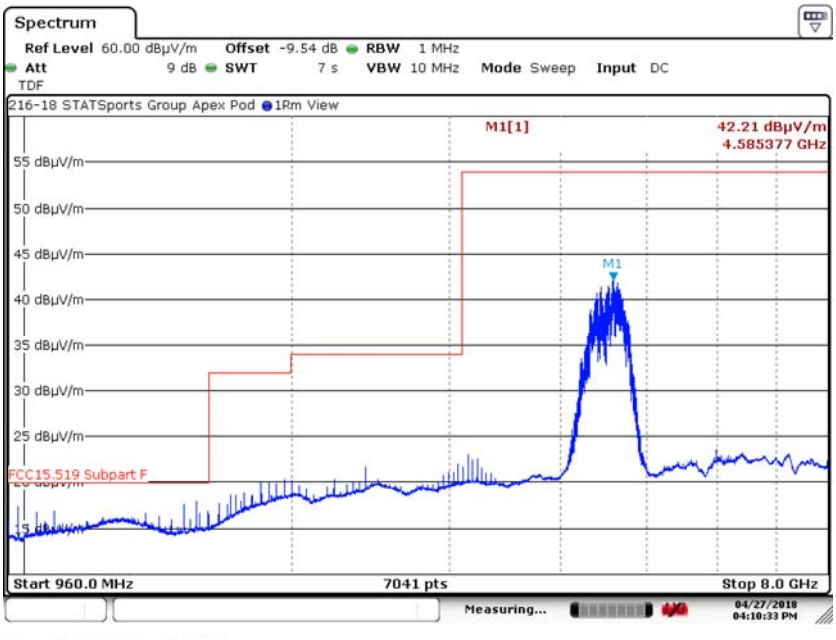
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.7. 960 MHz to 8 GHz Horizontal at 1 Meter, -9.54 dB offset in analyzer CH3 64M



6.5.8. 960 MHz to 8 GHz Vertical at 1 Meter, -9.54 dB offset in analyzer CH3 64M



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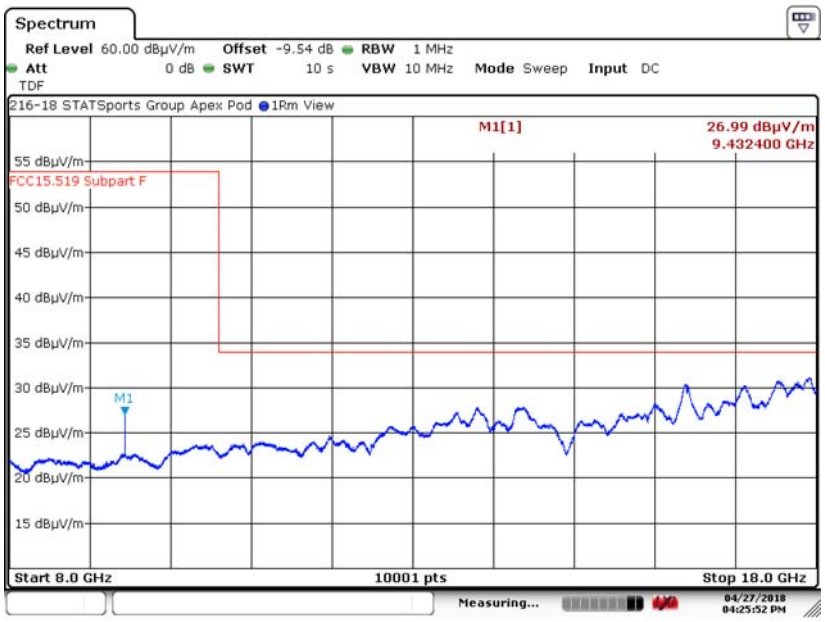
6. Measurement Data (continued)

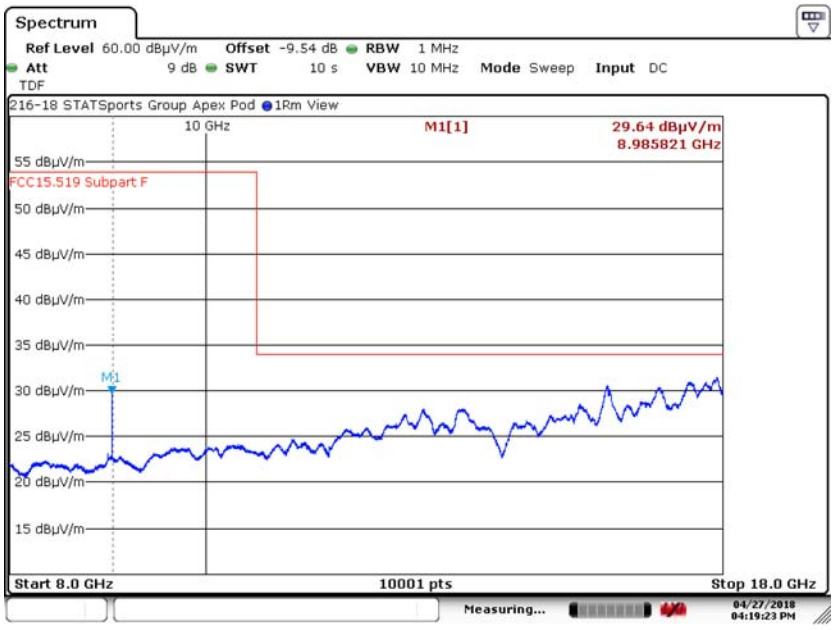
6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.9. 8 to 18 GHz Horizontal at 1 Meter, -9.54 dB offset in analyzer CH3 64M



Date: 27.APR.2018 16:25:50

6.5.10. 8 to 18 GHz Vertical at 1 Meter, -9.54 dB offset in analyzer CH3 64M



Date: 27.APR.2018 16:19:21

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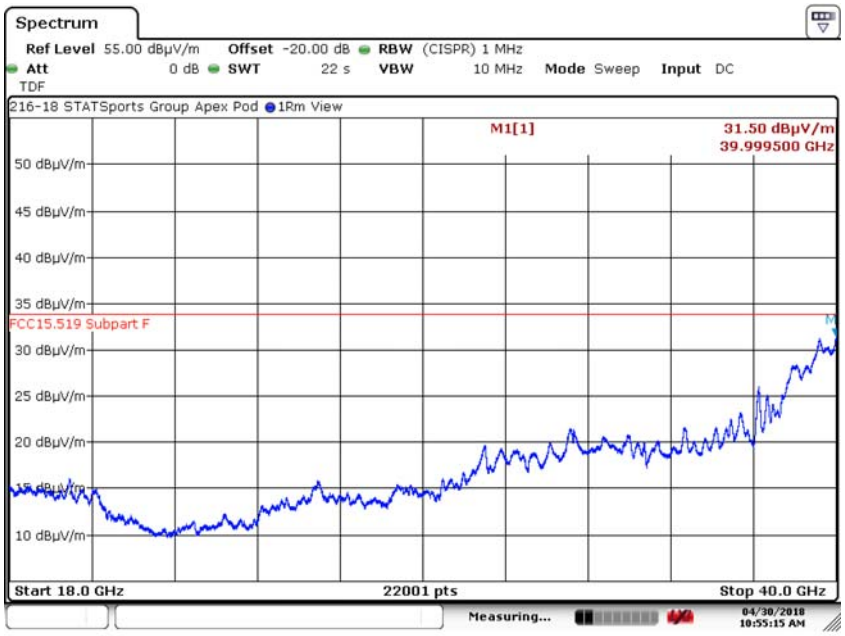
6. Measurement Data (continued)

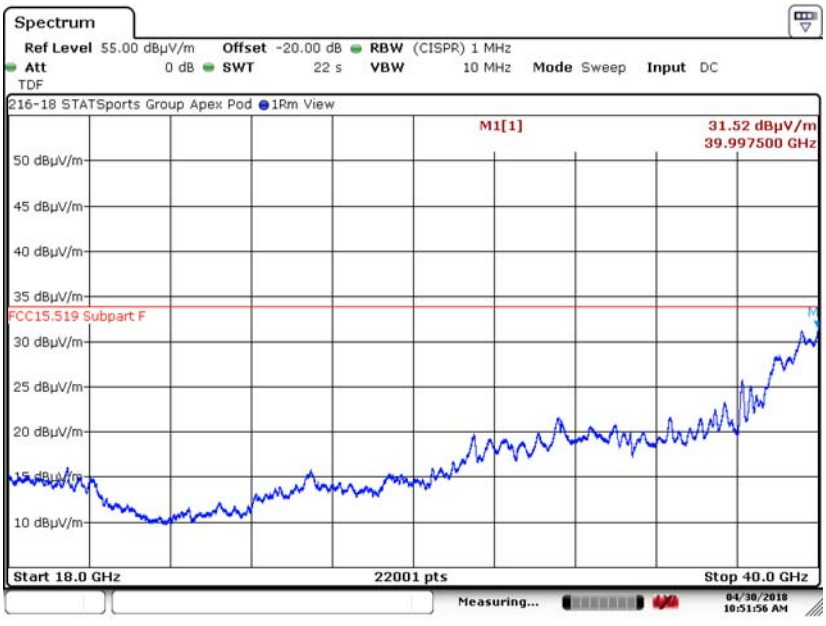
6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.11. 18 to 40 GHz Horizontal at 0.3 Meter, -20.00 dB offset in analyzer CH3 64M



Date: 30.APR.2018 10:55:13

6.5.12. 18 to 40 GHz Vertical at 0.3 Meter, -20.00 dB offset in analyzer CH3 64M



Date: 30.APR.2018 10:51:54

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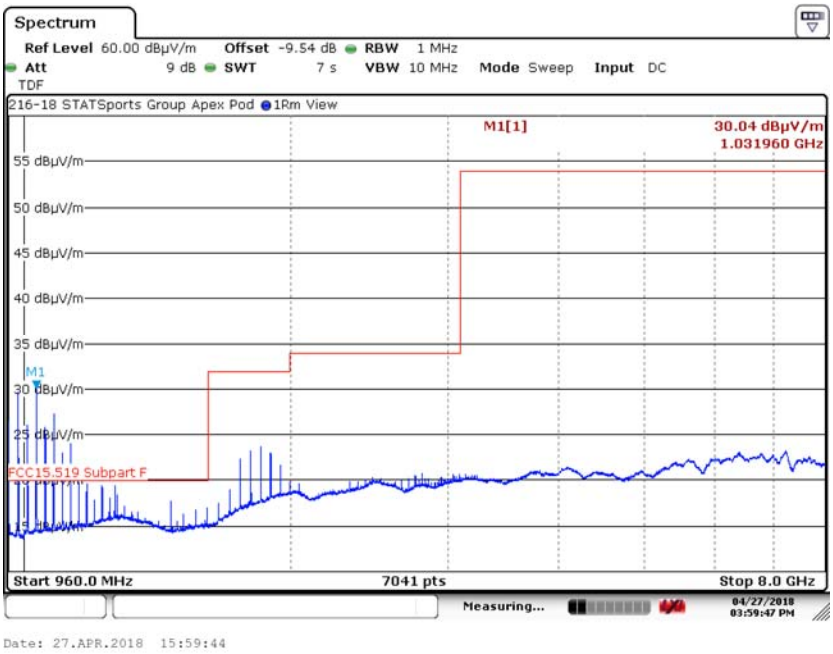
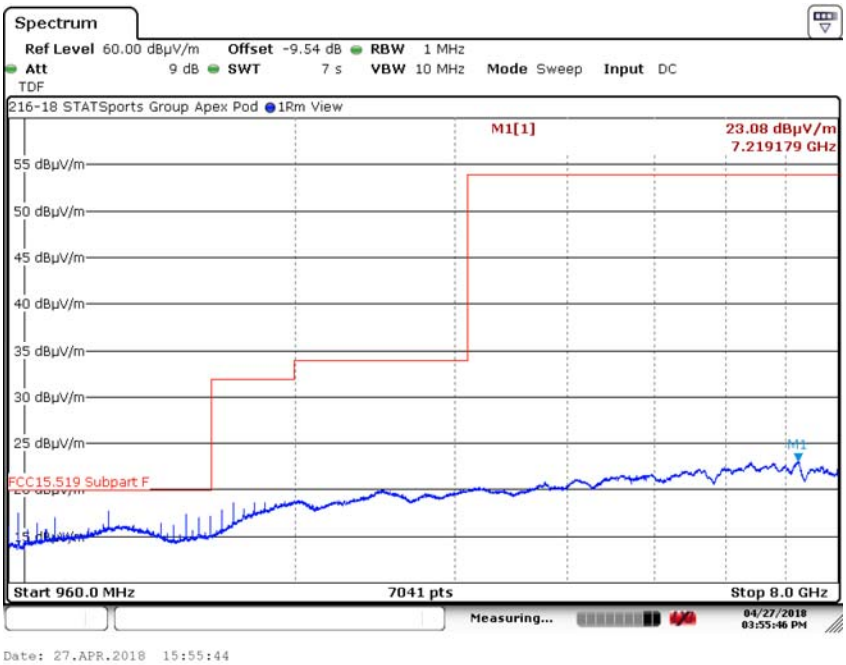
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions (15.519 (c) continued)

6.5.13. 960 MHz to 8 GHz Horizontal at 1 Meter, -9.54 dB offset in analyzer No Tx



6.5.14. 960 MHz to 8 GHz Vertical at 1 Meter, -9.54 dB offset in analyzer No Tx



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6. Measurement Data (continued)

6.6. Spurious Radiated Emissions in GPS Bands (15.519 (d))

Requirement: In addition to the radiated emission limits specified in the table in paragraph (d) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
1164 - 1240	-85.3	9.9
1559 - 1610	-85.3	9.9

6.6.1. Measurement & Equipment Setup

EMI Receiver IF Bandwidth: 1 kHz

EMI Receiver Avg Bandwidth: 10 kHz

Detector Functions: RMS Average

6.6.2. 1164 to 1240 MHz & 1559 to 1610 MHz

There were no broadband emissions related to the UWB transmitter. Measured signals were narrowband and related to the microprocessor / clocks and do not fall under the requirements of this section. Measurements were made at 1.0 Meter with a -9.54 dB distance correction factor. The -85.3 dBm limit was converted to a field strength limit of 9.9 dBuV/m using a factor of 95.2.

Note: Worst case data of all channels and axis.

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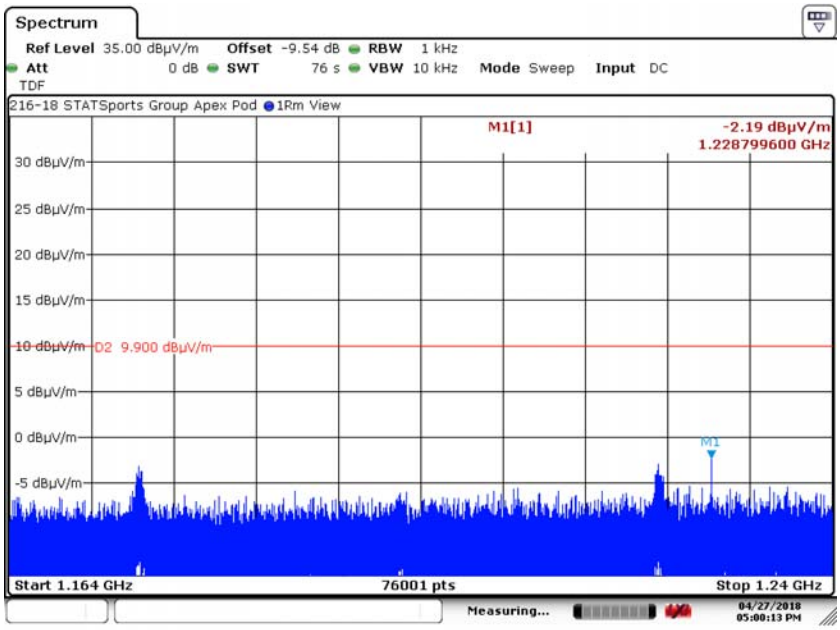
6. Measurement Data (continued)

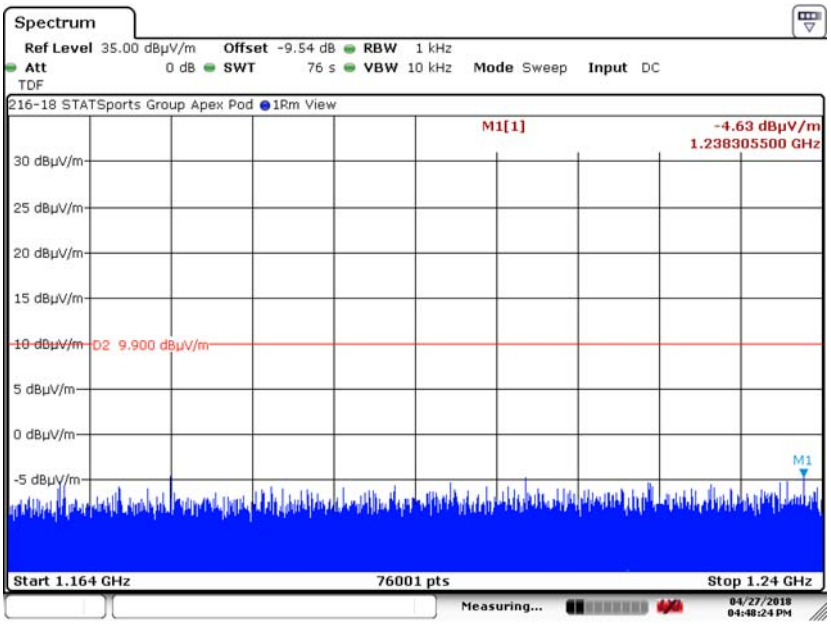
6.6. Spurious Radiated Emissions in GPS Bands (15.519 (d) continued)

6.6.3.1 Horizontal Measurement Polarity 1164 to 1240 MHz, 16M PRF



Date: 27.APR.2018 17:00:11

6.6.3.2 Vertical Measurement Polarity 1164 to 1240 MHz, 16M PRF



Date: 27.APR.2018 16:48:22

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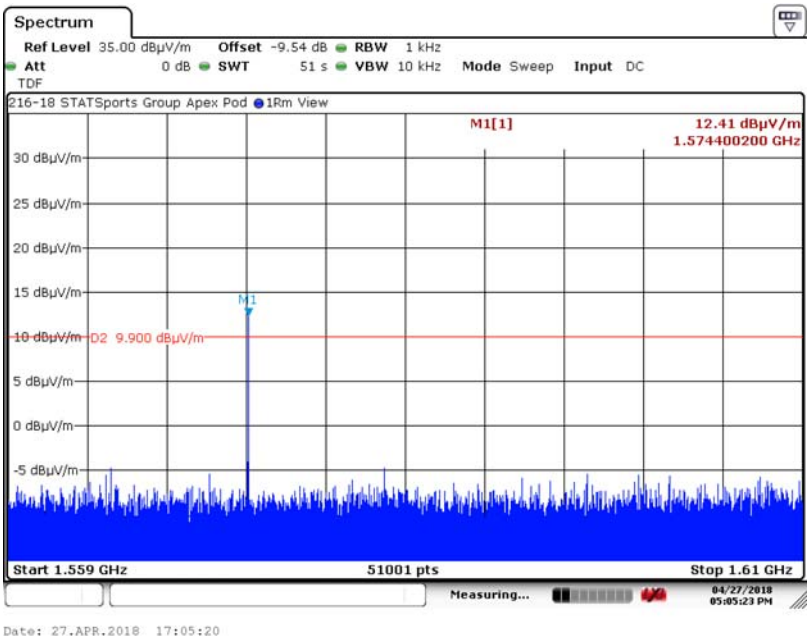
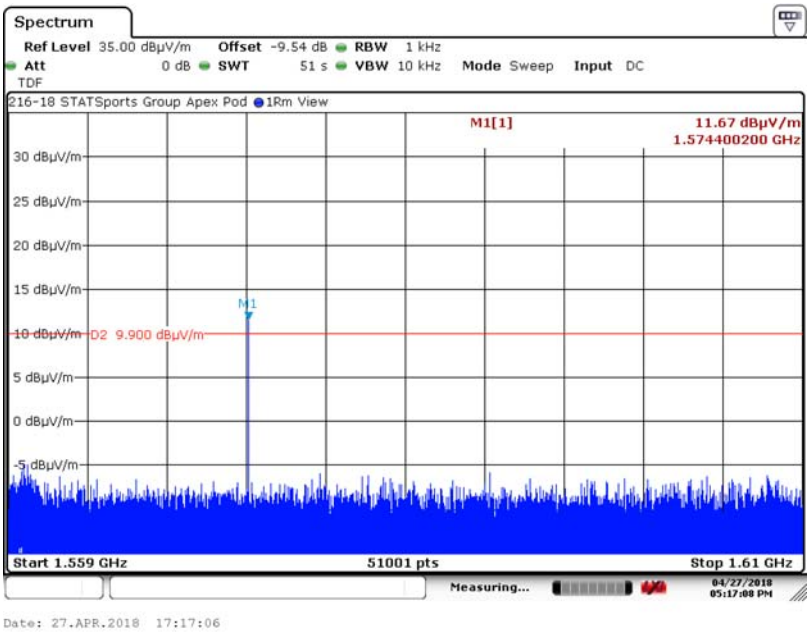
6. Measurement Data (continued)

6.6. Spurious Radiated Emissions in GPS Bands (15.519 (d) continued)

6.6.3.3 Horizontal Measurement Polarity 1559 to 1610 MHz, 16M PRF



6.6.3.4 Vertical Measurement Polarity 1559 to 1610 MHz, 16M PRF



Note: NB Signals are related to digital circuitry as seen in 6.5.13 and 6.5.14

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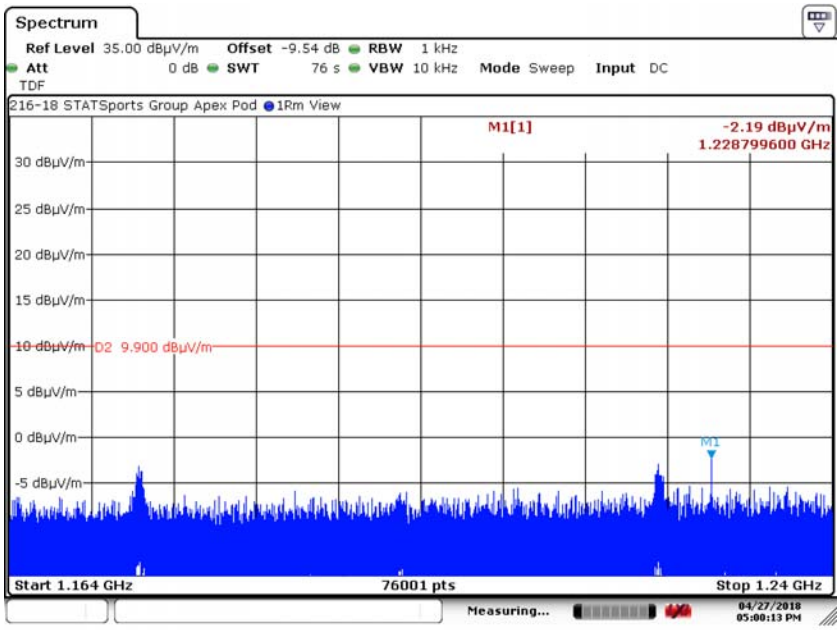
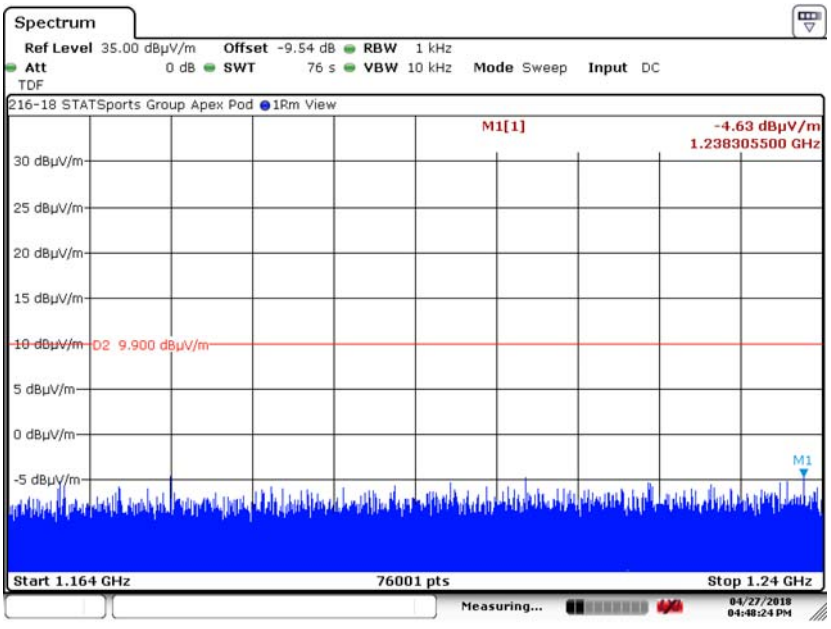
6. Measurement Data (continued)

6.6. Spurious Radiated Emissions in GPS Bands (15.519 (d) continued)

6.6.3.5 Horizontal Measurement Polarity 1164 to 1240 MHz, 64M PRF



6.6.3.6 Vertical Measurement Polarity 1164 to 1240 MHz, 64M PRF



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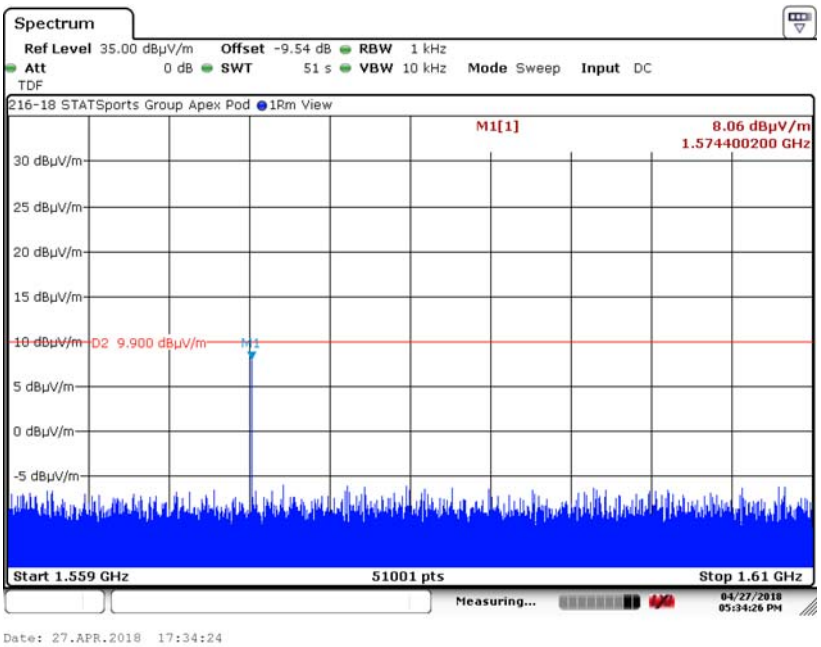
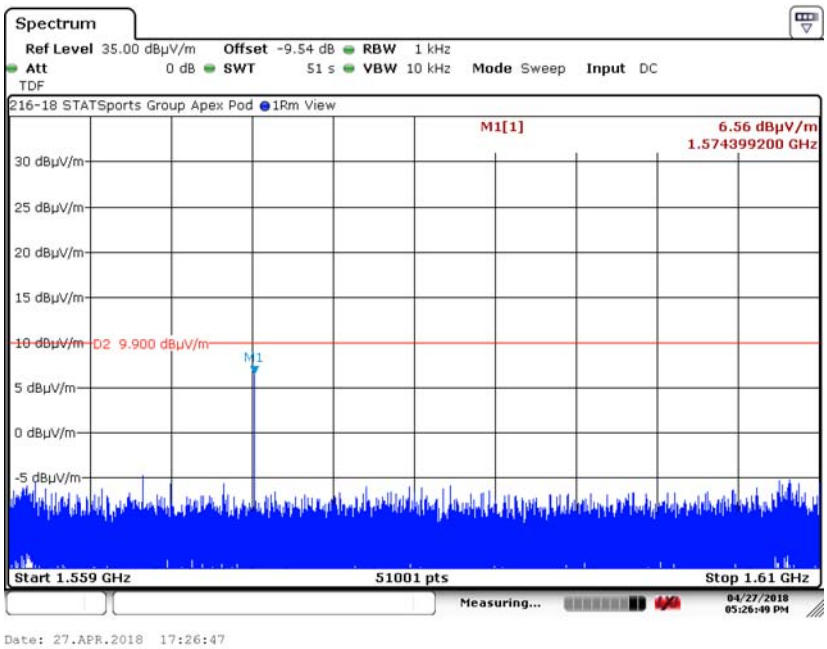
6. Measurement Data (continued)

6.6. Spurious Radiated Emissions in GPS Bands (15.519 (d) continued)

6.6.3.7 Horizontal Measurement Polarity 1559 to 1610 MHz, 64M PRF



6.6.3.8 Vertical Measurement Polarity 1559 to 1610 MHz, 64M PRF



Note: NB Signals are related to digital circuitry as seen in 6.5.13 and 6.5.14

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6. Measurement Data (continued)

6.7. Radiated Emissions of UWB Transmission (15.519 (c), 15.521 (d))

Requirement: The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time.

The EIRP in terms of dBm, can be converted to a field strength, in dBµV/m at 3 Meters by adding 95.2.

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
3100 - 10600	-41.3	53.9

Frequency Range:	4 to 5 GHz, 6 to 7 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	1 MHz
EMI Receiver Avg Bandwidth	10 MHz
Detector Function:	RMS 1 mS Average as defined in 15.521(d)

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6. Measurement Data (continued)

6.7. Spurious Radiated Emissions (15.519 (c), 15.521(d))

6.7.1. Plot of RMS Power at 3 Meters (Channel 3, 16M PRF)

Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
4.6249	53.79	53.90	-0.11	H	100	34	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3
EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
4.6249	-41.41	-41.30	-0.11	H	100	34	Compliant

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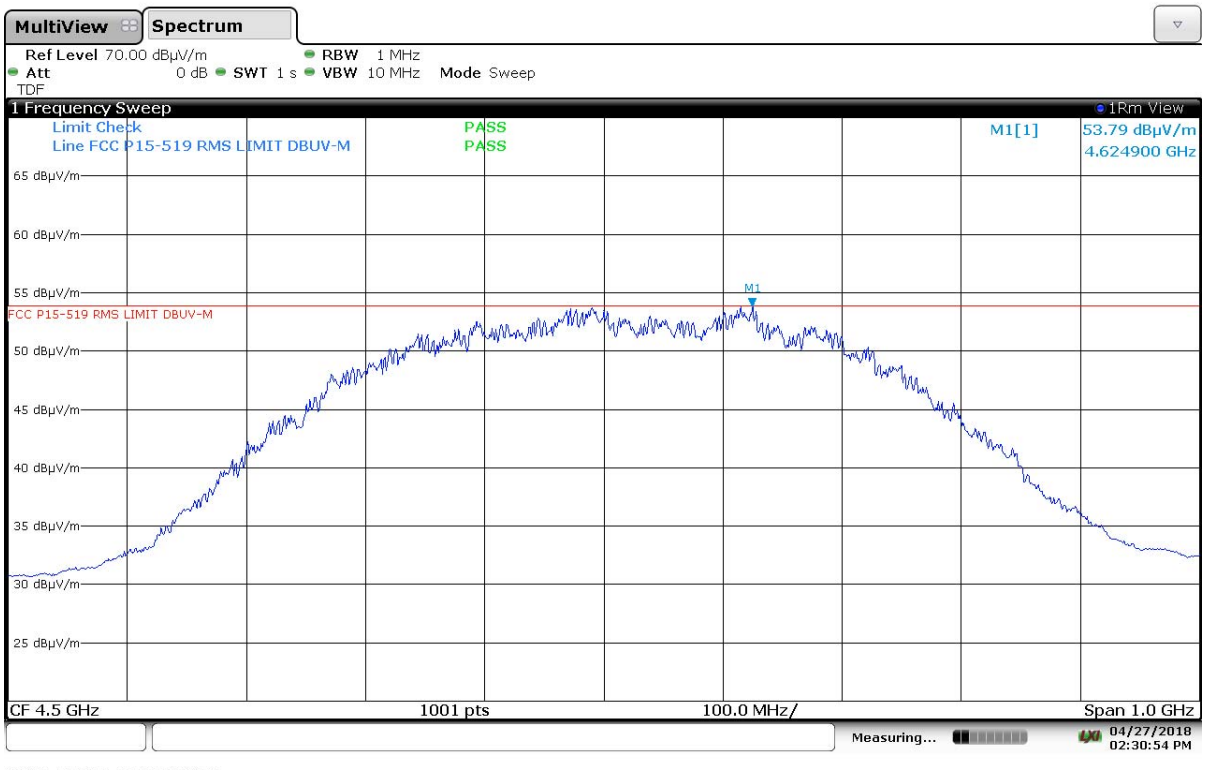

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6. Measurement Data (continued)

6.7. Spurious Radiated Emissions (15.519 (c), 15.521(d)) continued

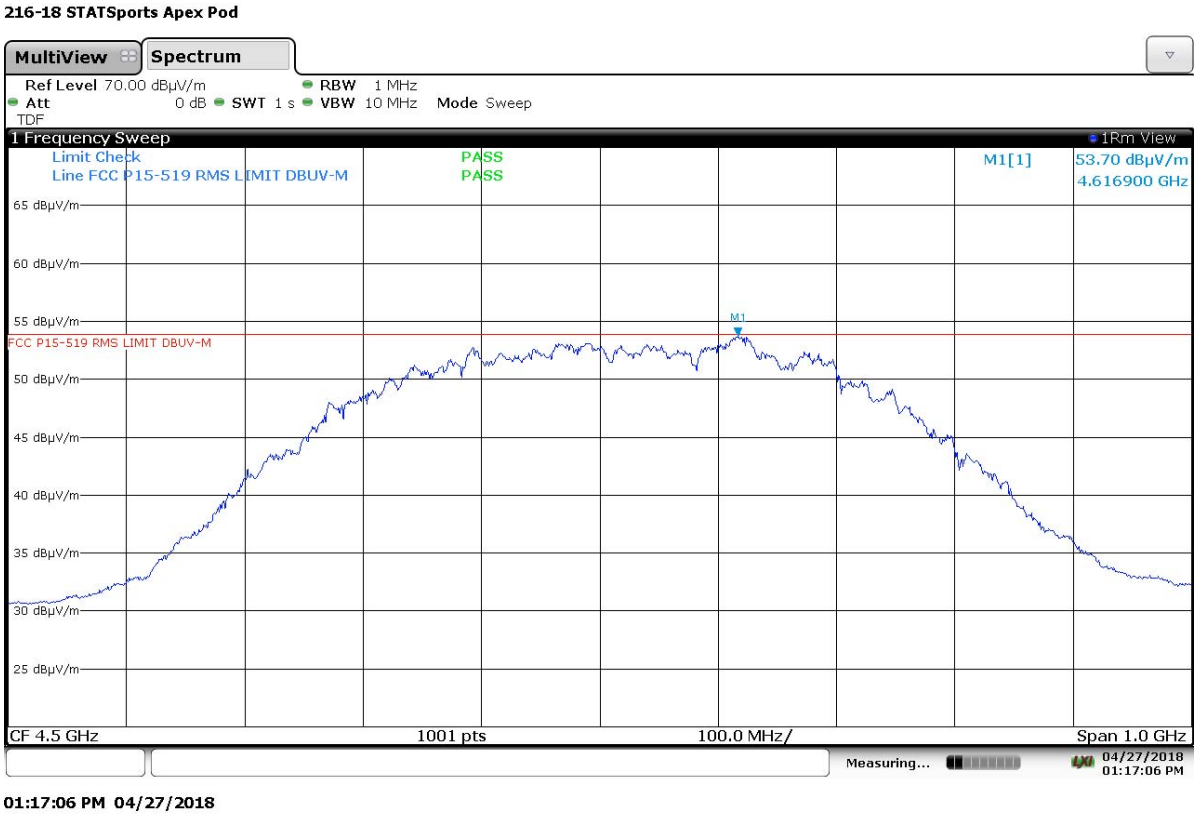
6.7.2. Plot of RMS Power at 3 Meters (Channel 3, 64M PRF)

Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
4.6169	53.70	53.90	-0.20	H	100	34	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3
EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
4.6169	-41.50	-41.30	-0.20	H	100	34	Compliant



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6. Measurement Data (continued)

6.7. Spurious Radiated Emissions (15.519 (c), 15.521(d) RSS-220 5.3.1(d))

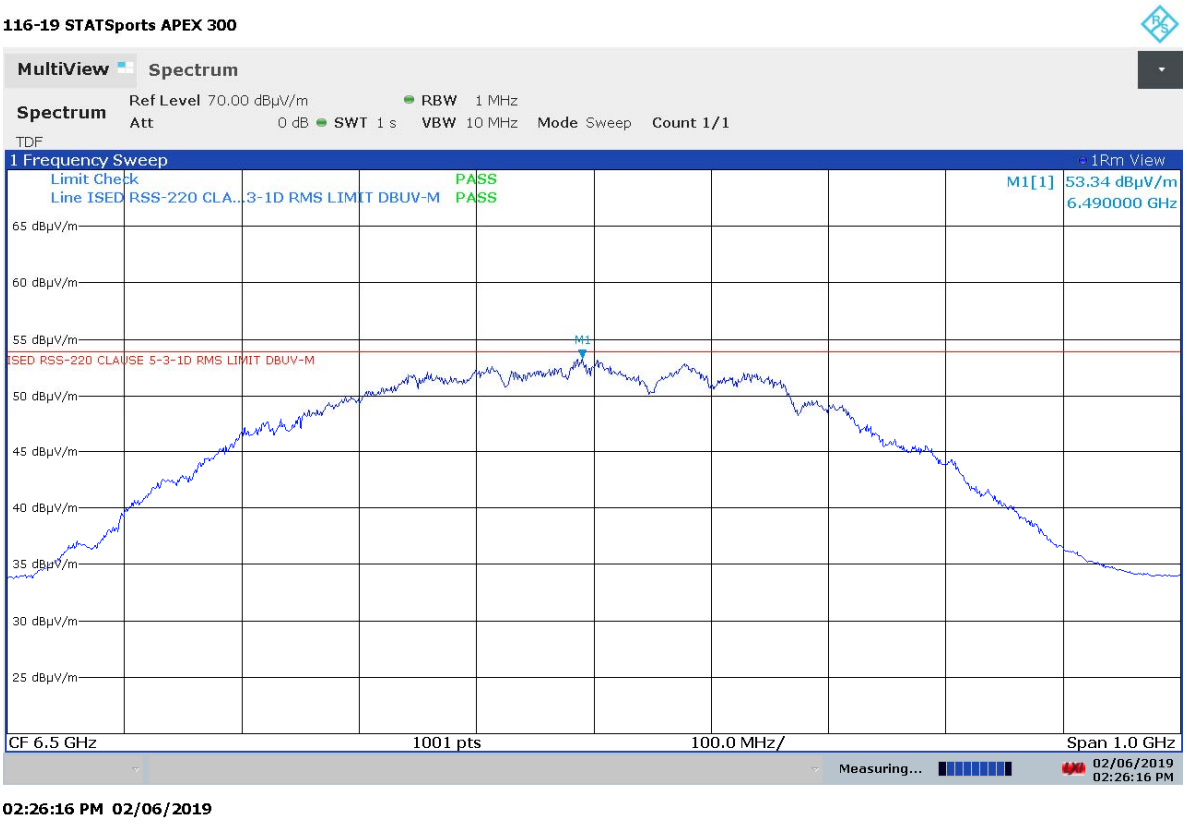
6.7.3. Plot of RMS Power at 3 Meters (Channel 5, 16M PRF)

Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
6.490	53.34	53.90	-0.56	H	100	250	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3
EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.490	-41.96	-41.30	-0.56	H	100	250	Compliant



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6. Measurement Data (continued)

6.7. Spurious Radiated Emissions (15.519 (c), 15.521(d), RSS-220 5.3.1(d)) continued

6.7.4. Plot of RMS Power at 3 Meters (Channel 5, 64M PRF)

Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
6.490	53.04	53.90	-0.81	H	100	250	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3
EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.490	-42.11	-41.30	-0.81	H	100	250	Compliant

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6. Measurement Data (continued)

6.8. Peak Emissions in a 50 MHz Bandwidth (15.519 (e), 15.521 (g))

Requirement: There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP.

The EIRP in terms of dBm, can be converted to a field strength, in dBµV/m at 3 Meters by adding 95.2. As used in this subpart, EIRP refers to the highest signal strength measured in any direction and at any frequency from the UWB device.

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
3100 - 10600	0	95.2

Frequency Range:	4 to 5 GHz, 6 to 7 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	50 MHz
EMI Receiver Avg Bandwidth	80 MHz
Detector Function:	Peak, Max Held

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6. Measurement Data (continued)

6.8. Peak Emissions in a 50 MHz Bandwidth (15.519 (e), 15.521 (g) continued)

6.8.1 Plot of Peak Power at 3 Meters (Channel 3, 16M PRF)

Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
4.492	93.80	95.20	-1.40	H	100	34	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3

EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
4.492	-1.40	0.00	-1.40	H	100	34	Compliant

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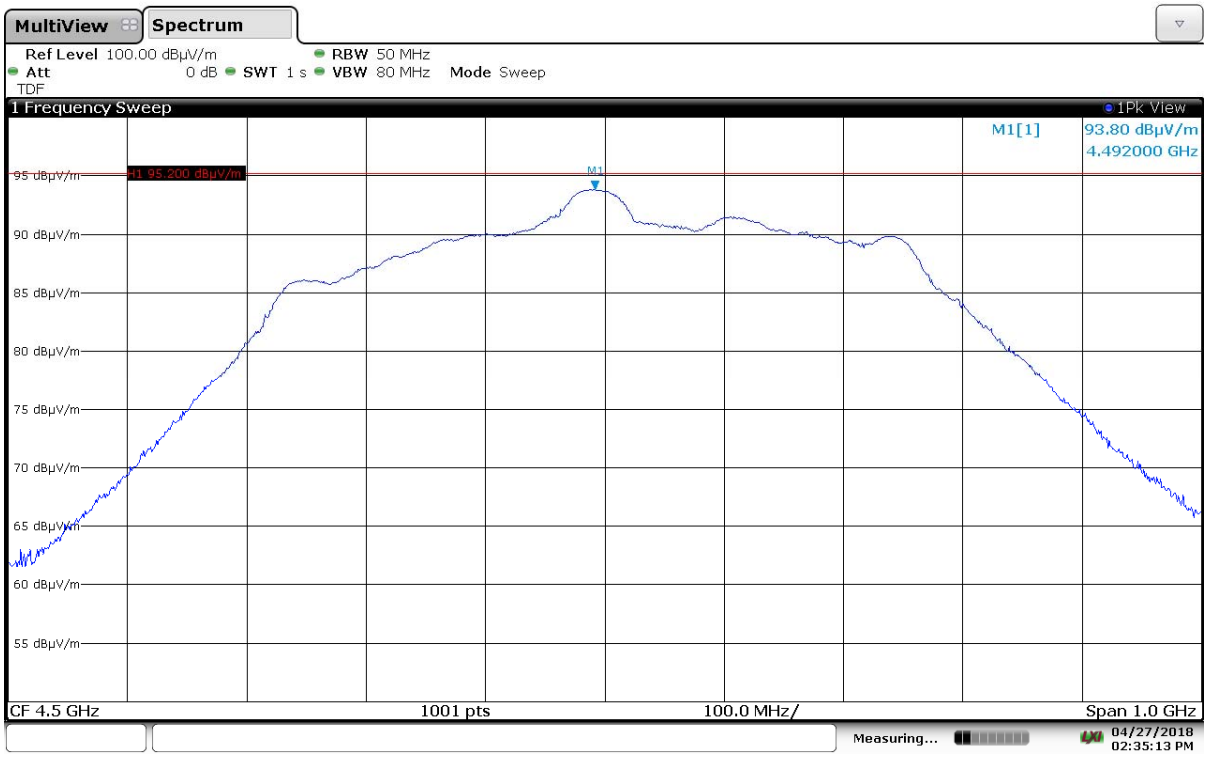

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6. Measurement Data (continued)

6.8. Peak Emissions in a 50 MHz Bandwidth (15.519 (e), 15.521 (g) continued)

6.8.2 Plot of Peak Power at 3 Meters (Channel 3, 64M PRF)

Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
4.488	89.03	95.20	-5.99	H	100	34	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3

EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
4.488	-5.99	0.00	-5.99	H	100	34	Compliant

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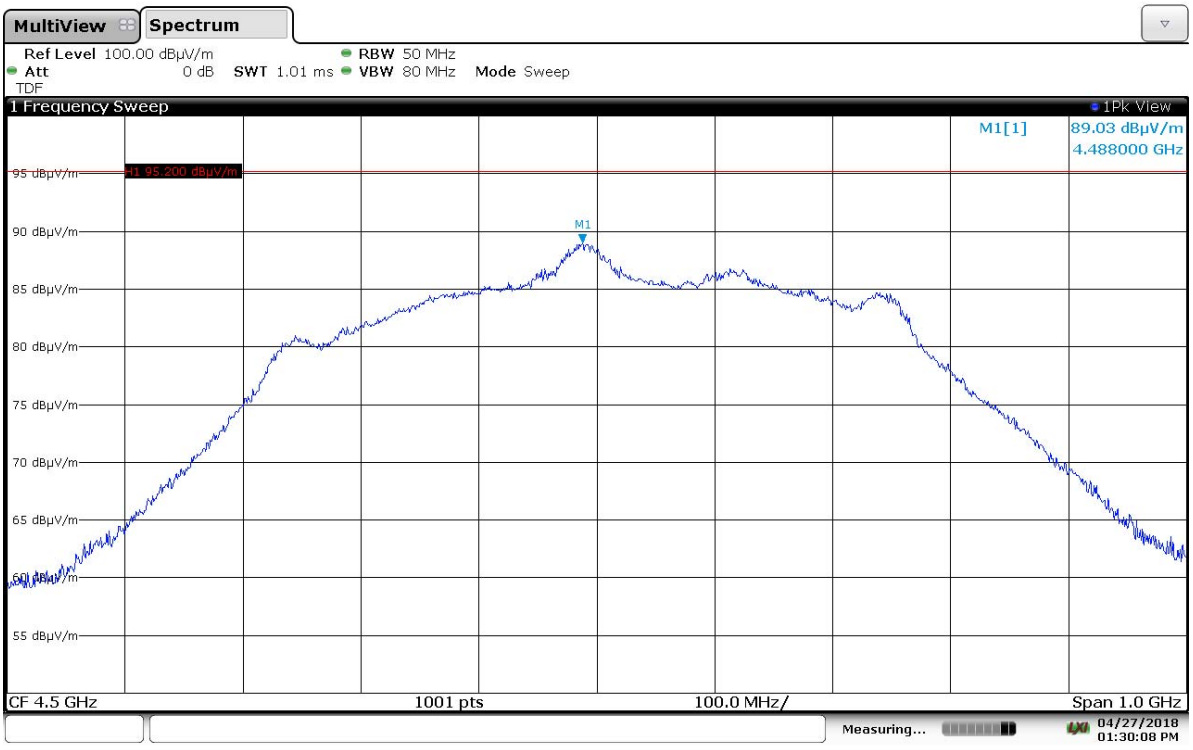

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6. Measurement Data (continued)

6.8. Peak Emissions in a 50 MHz Bandwidth (15.519 (e), 15.521 (g) RSS-220 cont)

6.8.3 Plot of Peak Power at 3 Meters (Channel 5, 16M PRF)

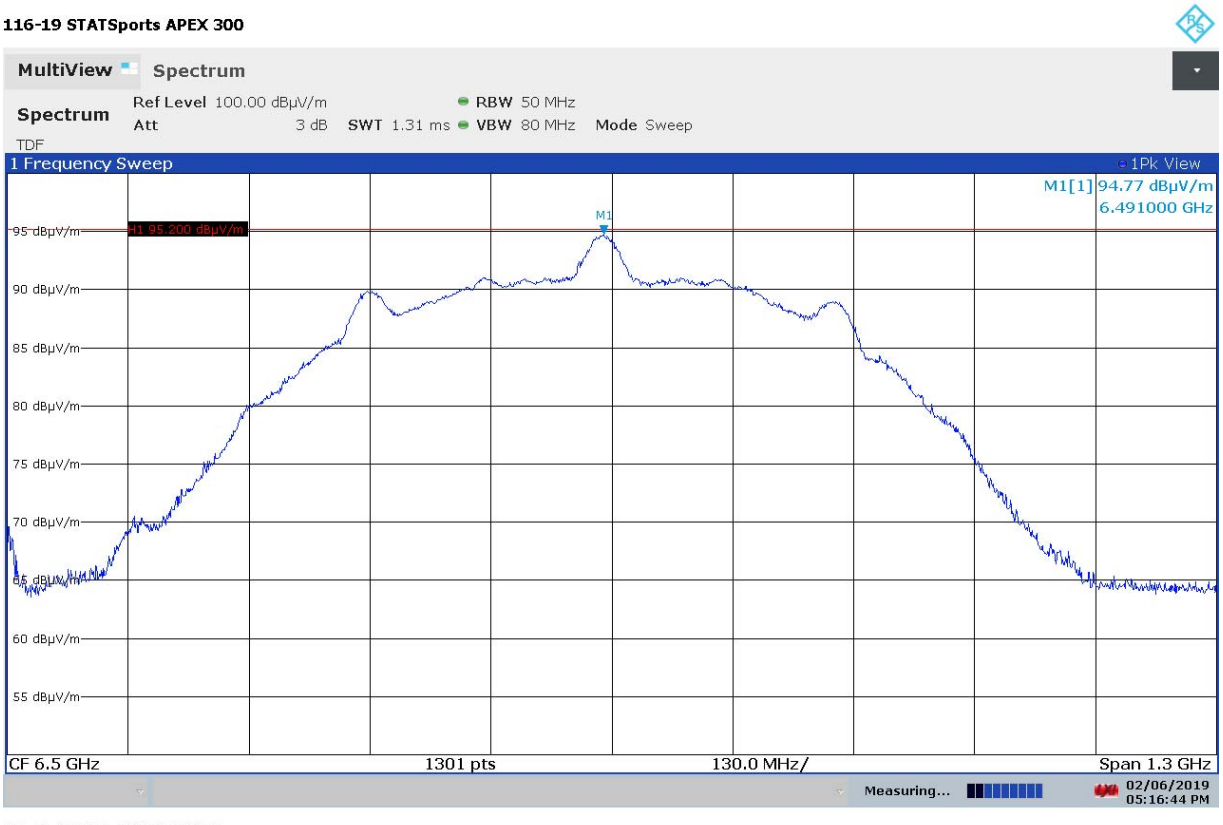
Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
6.491	94.77	95.20	-0.47	H	100	250	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3

EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.491	-0.47	0.00	-0.47	H	100	250	Compliant



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6. Measurement Data (continued)

6.8. Peak Emissions in a 50 MHz Bandwidth (15.519 (e), 15.521 (g). RSS-220 cont)

6.8.4 Plot of Peak Power at 3 Meters (Channel 5, 64M PRF)

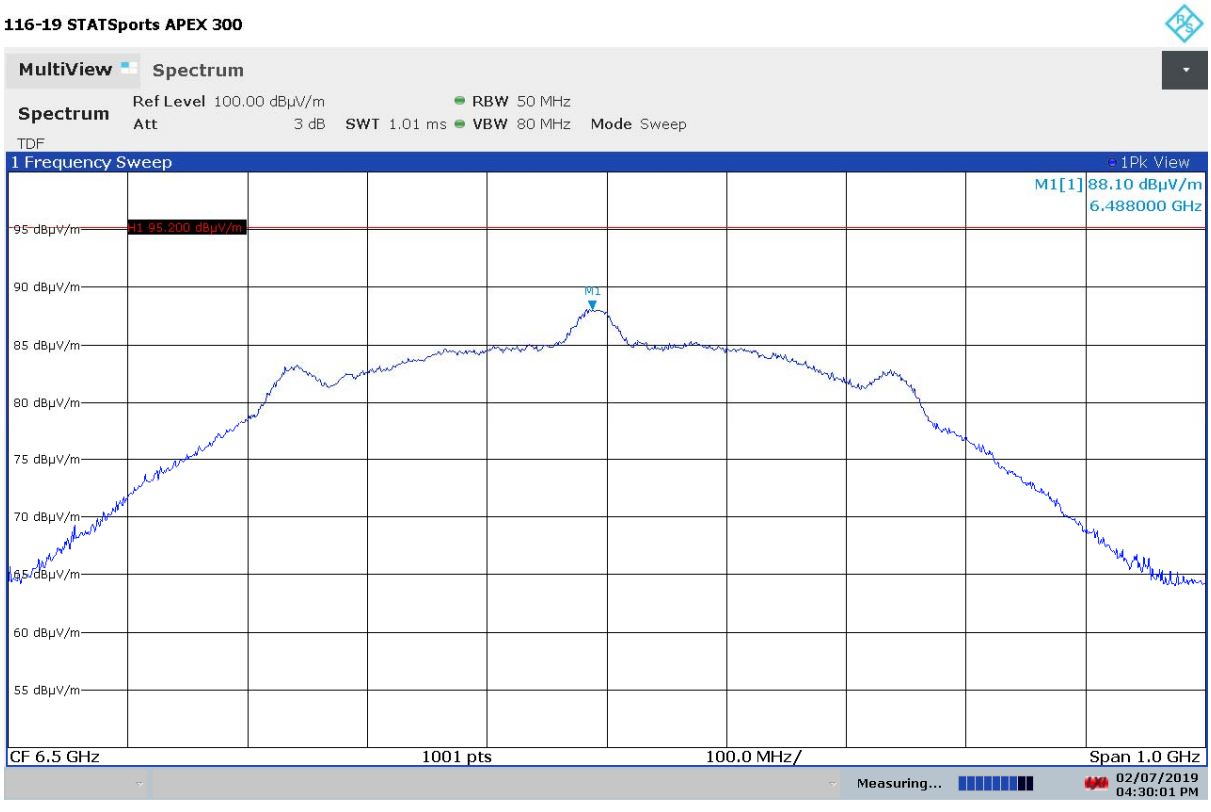
Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
6.488	88.10	95.20	-7.10	H	100	250	Compliant

Notes: [1] Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

Equation (22) from ANSI C63.10-2013, EIRP = E_{meas} + 20 log (d_{meas}) – 104.7; d_{meas} = 3

EIRP (dBm) = E_{meas} (dBµV/m) – 95.2

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.488	-7.10	0.00	-7.10	H	100	250	Compliant



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6. Measurement Data (continued)

6.9 Conducted Emissions Test Setup

6.9.1. Regulatory Limit: FCC Part 15, Class B, IC RSS-GEN

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50
* Decreases with the logarithm of the frequency.		

6.9.2 Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	3330A00115	12/4/2018
RF Filter Section	Hewlett Packard	85460A	3325A00121	12/4/2018
LISN	EMCO	3825/2	9109-1860	11/17/2018
Manufacturer	**Software Description**		**Title/Model #**	**Rev.**
Compliance Worldwide	Test Report Generation Software		Test Report Generator	1.0

6.9.3. Measurement & Equipment Setup

Test Date:	05/16/2018
Test Engineer:	Brian Breault
Site Temperature (°C):	21.4
Relative Humidity (%RH):	31
Frequency Range:	0.15 MHz to 30 MHz
EMI Receiver IF Bandwidth:	9 kHz
EMI Receiver Avg Bandwidth:	30 kHz
Detector Functions:	Peak, Quasi-Peak. & Average

6.9.4. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2014, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

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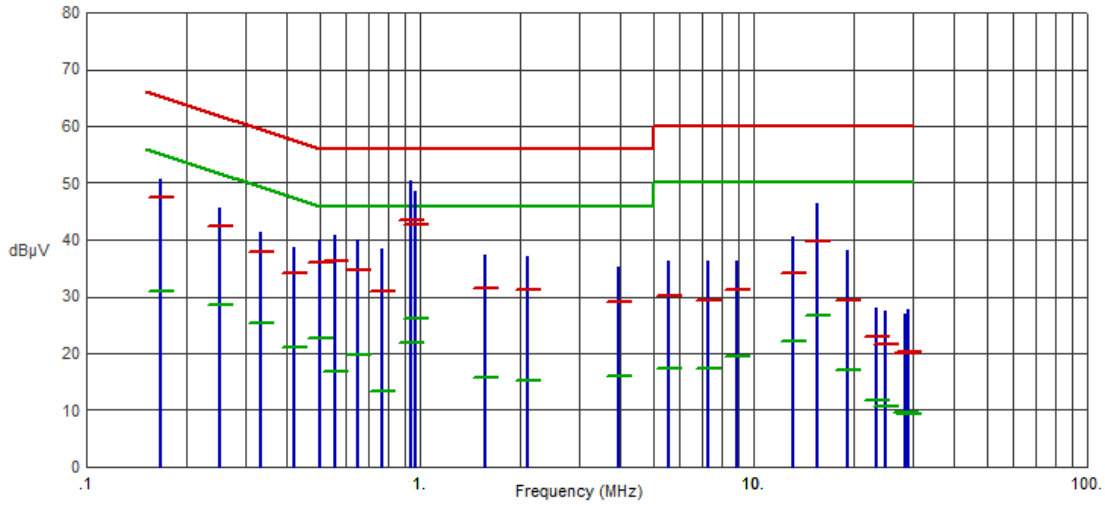
6. Measurement Data (continued)

6.10 Conducted Emissions Test Results

6.10.1. 120 Volts, 60 Hz Phase

Test No.: 216-18, 120 Volts, 60 Hz Phase FCC Part 15.207



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1672	50.60	47.51	65.10	-17.59	31.00	55.10	-24.10	
.2500	45.73	42.42	61.76	-19.34	28.56	51.76	-23.20	
.3336	41.21	37.97	59.36	-21.39	25.37	49.36	-23.99	
.4188	38.55	34.20	57.47	-23.27	21.12	47.47	-26.35	
.5030	39.89	35.98	56.00	-20.02	22.77	46.00	-23.23	
.5584	40.85	36.19	56.00	-19.81	16.71	46.00	-29.29	
.6494	40.02	34.70	56.00	-21.30	19.83	46.00	-26.17	
.7715	38.51	30.81	56.00	-25.19	13.41	46.00	-32.59	
.9388	50.29	43.45	56.00	-12.55	21.77	46.00	-24.23	
.9722	48.43	42.59	56.00	-13.41	26.26	46.00	-19.74	
1.5719	37.36	31.58	56.00	-24.42	15.74	46.00	-30.26	
2.1126	37.18	31.18	56.00	-24.82	15.09	46.00	-30.91	
3.9418	35.26	29.10	56.00	-26.90	16.08	46.00	-29.92	
5.5892	36.32	30.21	60.00	-29.79	17.21	50.00	-32.79	
7.3012	36.29	29.33	60.00	-30.67	17.33	50.00	-32.67	
8.9331	36.33	31.16	60.00	-28.84	19.41	50.00	-30.59	
13.0931	40.64	34.10	60.00	-25.90	22.23	50.00	-27.77	
15.5793	46.39	39.82	60.00	-20.18	26.68	50.00	-23.32	
19.0725	38.09	29.40	60.00	-30.60	16.98	50.00	-33.02	
23.3012	28.05	22.84	60.00	-37.16	11.80	50.00	-38.20	
24.9604	27.36	21.73	60.00	-38.27	10.55	50.00	-39.45	
28.4891	26.82	19.99	60.00	-40.01	9.54	50.00	-40.46	
28.9819	27.64	20.28	60.00	-39.72	9.24	50.00	-40.76	

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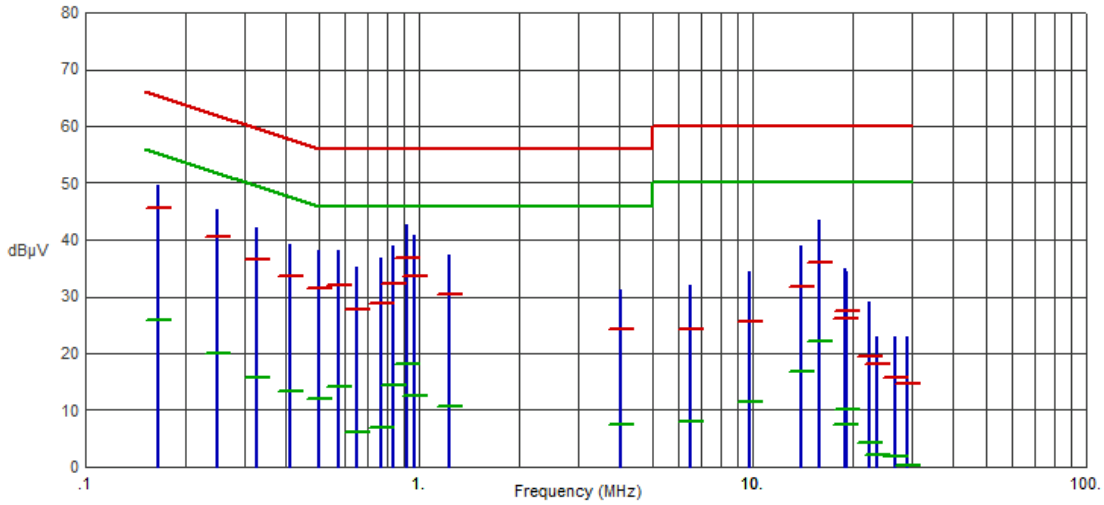
6. Measurement Data (continued)

6.10. Conducted Emissions Test Results (continued)

6.10.2. 120 Volts, 60 Hz Neutral

Test No.: 216-18, 120 Volts, 60 Hz Neutral FCC Part 15.207



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1646	49.62	45.63	65.23	-19.60	25.95	55.23	-29.28	
.2498	45.32	40.55	61.76	-21.21	20.09	51.76	-31.67	
.3251	42.06	36.50	59.58	-23.08	15.80	49.58	-33.78	
.4095	39.13	33.51	57.66	-24.15	13.46	47.66	-34.20	
.5029	38.13	31.58	56.00	-24.42	12.00	46.00	-34.00	
.5768	38.12	32.03	56.00	-23.97	14.17	46.00	-31.83	
.6497	35.12	27.80	56.00	-28.20	6.19	46.00	-39.81	
.7694	36.75	28.70	56.00	-27.30	6.83	46.00	-39.17	
.8362	38.89	32.37	56.00	-23.63	14.43	46.00	-31.57	
.9174	42.65	36.67	56.00	-19.33	18.14	46.00	-27.86	
.9688	40.79	33.49	56.00	-22.51	12.57	46.00	-33.43	
1.2322	37.29	30.29	56.00	-25.71	10.68	46.00	-35.32	
4.0098	31.24	24.19	56.00	-31.81	7.42	46.00	-38.58	
6.4871	31.95	24.32	60.00	-35.68	7.94	50.00	-42.06	
9.7802	34.39	25.56	60.00	-34.44	11.39	50.00	-38.61	
13.9409	39.06	31.80	60.00	-28.20	16.81	50.00	-33.19	
15.7900	43.58	36.02	60.00	-23.98	22.17	50.00	-27.83	
18.9293	34.92	26.25	60.00	-33.75	7.49	50.00	-42.51	
19.1473	34.36	27.55	60.00	-32.45	10.12	50.00	-39.88	
22.4609	29.11	19.57	60.00	-40.43	4.18	50.00	-45.82	
23.4779	22.85	18.11	60.00	-41.89	2.10	50.00	-47.90	
26.8578	23.01	15.65	60.00	-44.35	1.87	50.00	-48.13	
29.0274	22.81	14.62	60.00	-45.38	0.15	50.00	-49.85	

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6. Measurement Data (continued)

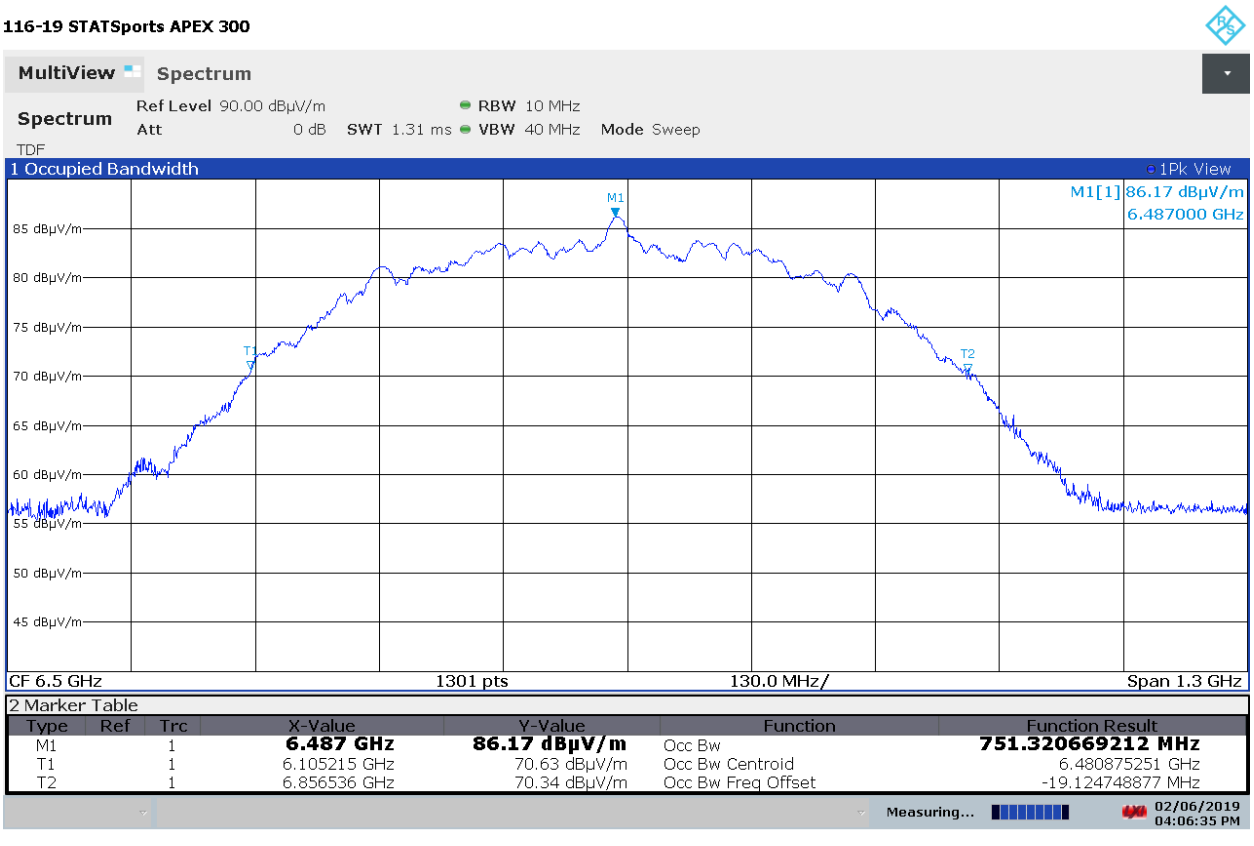
6.11. 99% Emission Bandwidth (RSS-GEN 6.7)

Requirement: The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs RSS-Gen, Section 6.7.

Test Note: The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.

6.11.1 Plot of 99% Emission Bandwidth (Channel 5, 16M PRF)



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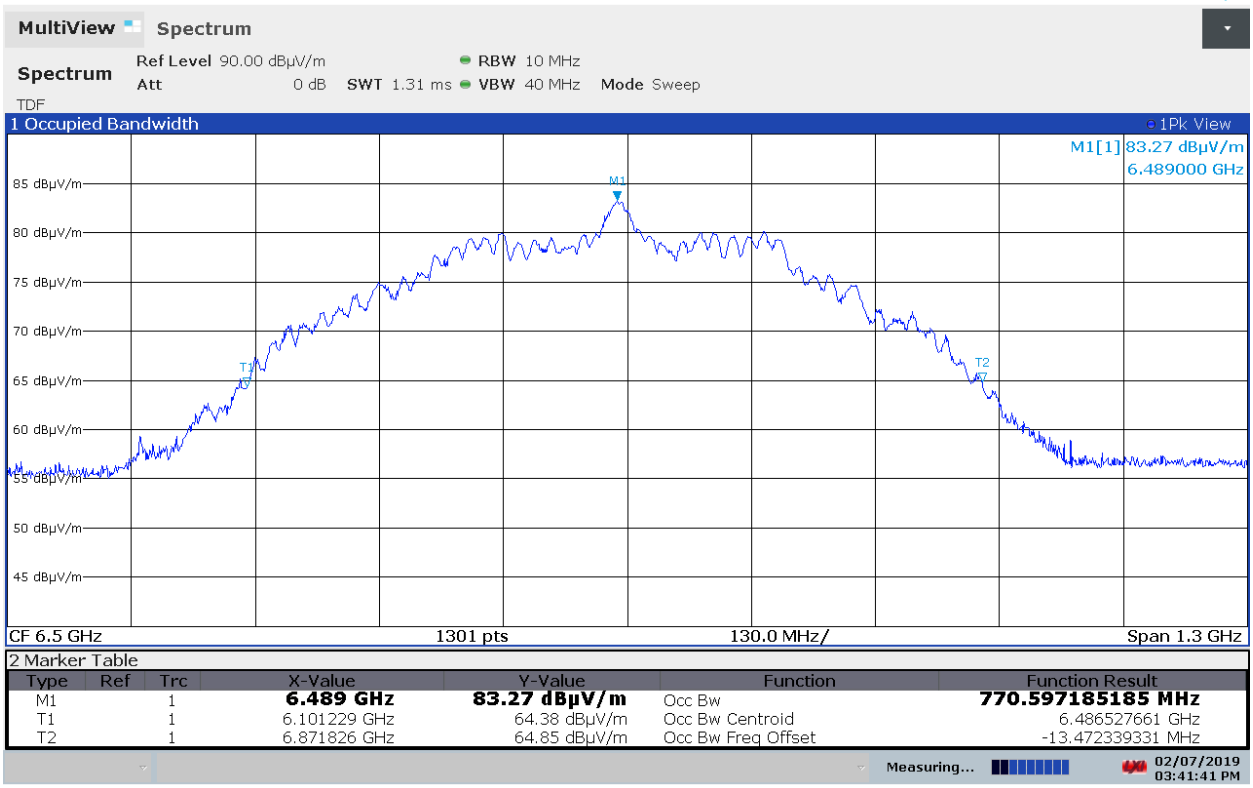
6. Measurement Data (continued)

6.11. 99% Emission Bandwidth (RSS-GEN 6.7 continued)

6.11.2 Plot of 99% Emission Bandwidth (Channel 5, 64M PRF)

116-19 STATSports APEX 300



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6. Measurement Data (continued)

6.12. Public Exposure to Radio Frequency Energy Levels (1.1307 (b)(1))

6.12.1. SAR Test Exclusion Calculation

Requirement: Portable devices as defined in § 2.1093 of this chapter operating under Part 15 are subject to radio frequency radiation exposure requirements as specified in §§ 1.1307(b) and 2.1093 of this chapter.

For a 1-g SAR, the test exclusion result must be ≤ 3.0.

Test Notes: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by the following formula:

$$\text{SAR Test Exclusion} = \frac{P_{MAX}}{d_{MIN}} \times \sqrt{f_{(GHz)}} \quad (1)$$

P_{MAX}	mW	Maximum power of channel, including tune-up tolerance
d_{MIN}	mm	Minimum test separation distance, mm (≤ 50 mm)
$f_{(GHz)}$	GHz	$f_{(GHz)}$ is the RF channel transmit frequency in GHz (>100 MHz and <6 GHz)

(1) FCC OET 447498 - Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

Result: The device under test meets the exclusion requirement detailed in FCC OET 447498.

Channel:		**3, 16M**	**3, 64M**	
Input:	P_{MAX}	0.7196	0.2400	mW
	d_{MIN}	5.000	5.000	mm
	$f_{(GHz)}$	4.492	4.488	GHz
Test Exclusion:		**0.305**	**0.102**	
Limit Exemption:		**3.000**	**3.000**	

[1] Taken from the peak data in Section 6.5 of this test report (converted to mW).

Notes:

The device does not exceed the test limit exemption and therefore a routine SAR Evaluation is not required.

The UWB and BLE radios do not transmit simultaneously.

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6. Measurement Data (continued)

6.12.2 RF Exposure for devices that operate above 6 GHz (1.1310, 2.1093, RSS-102)

Requirement: Per 1.1310 (d)(3) At operating frequencies above 6 GHz the MPE limits shall be used in all cases to evaluate the environmental impact of human exposure to RF radiation as specified in 1.1307(b). Portable devices as defined in § 2.1093 of this chapter operating under Part 15 are subject to radio frequency radiation exposure requirements as specified in §§ 1.1307(b) and 2.1093 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

RSS-102: Devices operating above 6 GHz regardless of the separation distance shall undergo an RF Exposure Evaluation.

Center Frequency (GHz)	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		FCC Limit (mW/cm^2)	ISED Limit (W/m^2)
				(mW/cm^2)	(W/m^2)		
	(1)	(2)	(3)	(4)		(5)	(6)
6.491	5	-0.47	0.0	0.0028566	0.0285660	1	10
6.488	5	-7.01	0.0	0.0006337	0.0063365	1	10

$$PD = \frac{OP + AG}{(4 \times \pi \times d^2)}$$

1. Reference CFR 2.1093(b): For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 5 centimeters of the body of the user.
2. Section 6.8 of this test report. This is Max Held Peak Power measurement data, time averaged power is lower due to ~1% Duty cycle of the device in normal operation.
3. Data supplied by the client. (Included in Field Strength measurements)
4. Power density is calculated from field strength measurement and antenna gain.
5. Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.
6. Reference ISED RSS-102 Section 4 Table 4 RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Note: BLE and UWB Radios do not transmit simultaneously.

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7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Industry Canada standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025:2005 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1)** and VCCI (Member number 3168) under registration number A-0274.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 11, KN 13, KN 14-1, KN 22, KN 32, KN 61000-6-3, KN 61000-6-4.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5 meter ground plane and a 2.4 x 2.4 meter vertical wall.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.

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8. Test Images

8.1. Spurious and Harmonic Emissions – 10 kHz to 1 GHz Front

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8. Test Images

8.2. Spurious and Harmonic Emissions – 10 kHz to 30 MHz Rear

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8. Test Images

8.3. Spurious and Harmonic Emissions – 30 MHz to 1 GHz Rear

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8. Test Images

8.4. Spurious and Harmonic Emissions – 1 to 18 GHz Front

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8. Test Images

8.5. Spurious and Harmonic Emissions – 1 to 18 GHz Rear

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8. Test Images

8.6. Spurious and Harmonic Emissions – 18 to 40 GHz Side View

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8. Test Images

8.7. Conducted Emissions (Front View)

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8. Test Images

8.8. Conducted Emissions (Rear View)

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