COMPLIANCE WORLDWIDE INC.
TEST REPORT 538-15

In Accordance with the Requirements of

Federal Communications Commission 47 CFR Part 15.519, Subpart F
Technical Requirements for Hand Held UWB Systems

Issued to

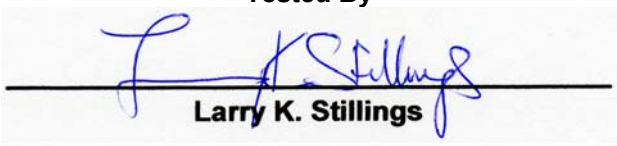
Wiser Systems, Inc.
1017 Main Campus Drive, Suite 2300
Raleigh, NC 27606 USA
919-833-8253

For the
Wiser USB Dongle
Model Number: USBV1.0

FCC ID: 2AGZM-A01116

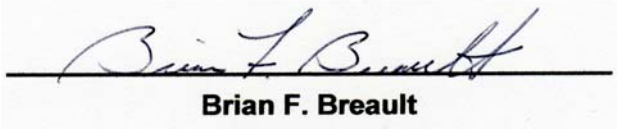
Report Issued on April 5, 2016

Tested By



Larry K. Stillings

Reviewed By



Brian F. Breault

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1. Scope

This test report certifies that the Wiser Systems USB Dongle as tested, meets the FCC Part 15, Subpart F 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:	Wiser Systems
2.2. Model Number:	Wiser USB Dongle
2.3. Serial Number:	Pre production prototype
2.4. Description:	Wireless Tracking and Real Time Location System
2.5. Power Source:	5 VDC via USB, External Battery or USB to AC Adapter
2.6. Hardware Revision:	N/A
2.7. Software Revision:	N/A
2.8. Modulation Type:	Pulse Modulation, Frequency Hopping
2.9. Operating Frequency:	3.993 GHz Center Frequency Nominal (Channel 2 – 500 MHz BW, Channel 4 – 900 MHz BW)
2.10. EMC Modifications:	None

3. Product Configuration

3.1 Operational Characteristics & Software

Hardware Setup:

Connect the Wiser USB Dongle to a remotely located laptop computer via USB.

Using the software tool configure the USB dongle to transmit on Channel 2 (64k PRF) or Channel 4 (16k or 64k PRF) using the appropriate data rate (110 kbps, 6.8 Mbps or 6.8 Mbps smart transmit).

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Volts	Freq (Hz)	Description/Function
Wiser	USBV1.0	Pre production	5	DC	USB Dongle

3.3. Support Equipment

Manufacturer	Model/Part #	Serial Number
Dell Computer	XPS L321X	41647808737
Dell Computer	45W-AC Adapter	

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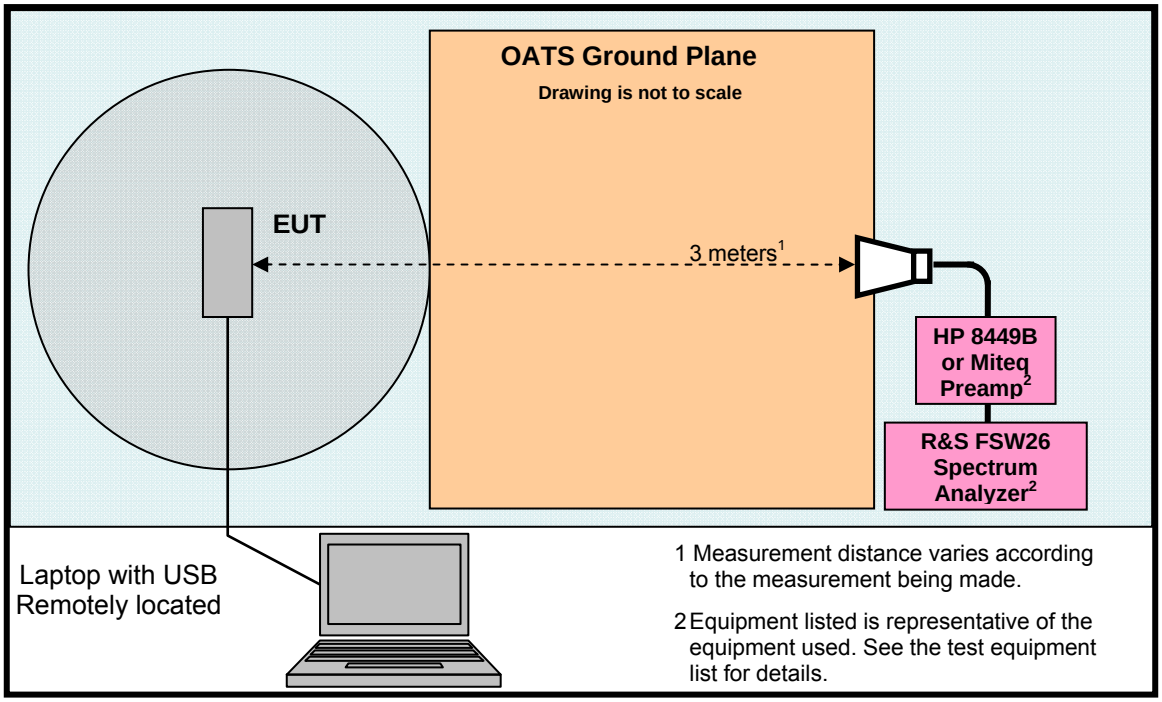
3. Product Configuration (cont.)

3.4. Test Setup Diagram



Note: An Apple Charger was used for the conducted emissions configuration.

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4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Cal Interval
Spectrum Analyzer 10 Hz to 40 GHz	Rohde & Schwarz	FSVR40	100909	7/23/2017	2 yr
Spectrum Analyzer 9 kHz to 40 GHz	Rohde & Schwarz	FSV40	100899	7/23/2017	2 yr
EMI Receiver 9 kHz to 7 GHz	Rohde & Schwarz	ESR7	101156	7/23/2017	2 yr
Spectrum Analyzer 3 Hz to 26.5 GHz	Rohde & Schwarz	FSW26	102044	6/1/2016	1 yr
Bilog Antenna 30 to 2000 MHz	Sunol Sciences	JB1	A050913	5/15/2016	3 yr
Loop Antenna 9 kHz to 30 MHz	EMCO	6512	9309-1139	9/23/2016	2 yr
Preamplifier 100 MHz to 7 GHz	Miteq	AFS3-00100200-10-15P-4	988773	4/3/2016	1 yr
Preamplifier 100 MHz to 18 GHz	Miteq	AMF-7D-00101800-30-10P	1953081	10/15/2016	1 yr
Preamplifier 1 to 26.5 GHz	Hewlett Packard	8449B	3008A01323	7/22/2017	2 yr
Preamplifier 18 to 40 GHz	Avantek	AWT-40039	FM22038832	11/25/2015	1 yr
Horn Antenna 1 to 18 GHz	ETS-Lindgren	3117	00143292	1/14/2016	3 yr
Horn Antenna 700 MHz to 18 GHz	Electro-Metrics	RGA 50/60	2813	7/15/2016	2 yr
Horn Antenna 18-40 GHz	Com Power	AH-840	03075	9/24/2016	2 yr
Barometer	Control Company	4195	Cal ID# 236	10/8/2017	2 yr

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4. Measurements Parameters (continued)

4.2. Measurement & Equipment Setup

Test Dates:	11/13/2015, 11/14/2015, 11/20/2015, 11/22/2015
Test Engineers:	Brian Breault, Larry Stillings
Normal Site Temperature (15 - 35°C):	21.6
Relative Humidity (20 -75%RH):	35
Frequency Range:	32 kHz to 40 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	200 Hz – 32 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 – 32 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.

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	Test Report Section	Result	Comment
Antenna Requirement	15.203	6.1	Compliant	The antenna is housed within a sealed enclosure with the intentional radiator.
Operational Requirements	15.519 (a)	6.2	Compliant	
UWB Bandwidth	15.503 (a) (d) 15.519 (b)	6.3	Compliant	
Spurious Radiated Emissions	15.519 (c) 15.209	6.4	Compliant	
Radiated Emissions in GPS Bands	15.519 (d) 15.209			
Peak Emissions in a 50 MHz Bandwidth	15.519 (e)	6.5	Compliant	
Conducted Emissions	15.207	6.6 6.7	N/A	Apple Charger
Radio Frequency Exposure	FCC OET Bulletin 65	6.8	Compliant	

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6. Measurement Data

6.1. Antenna Requirement (15.203)

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 an internal, non user replaceable unit.

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

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.

Result: Compliant

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6. Measurement Data (continued)

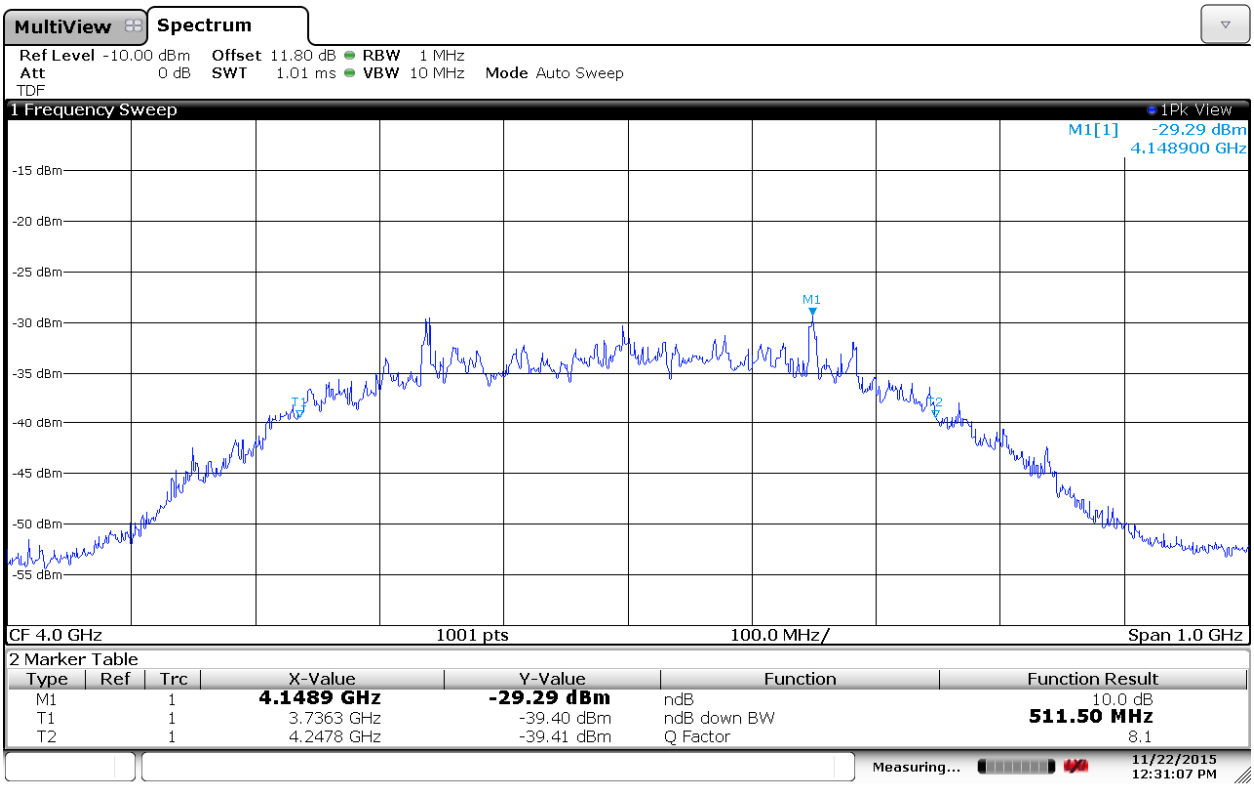
6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b))

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

f_M	The highest emission peak	4.1489
f_L	10 dB below the highest peak	3.7363
f_H	10 dB above the highest peak	4.2478
f_C	Calculated: $(f_H + f_L) / 2$	3.9921
Bandwidth	Calculated: $(f_H - f_L)$	0.5115
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.1281

6.3.2. Measurement Plot of 10 dB frequencies (Channel 2, 6.8 MBPS, 64k PRF)



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6. Measurement Data (continued)

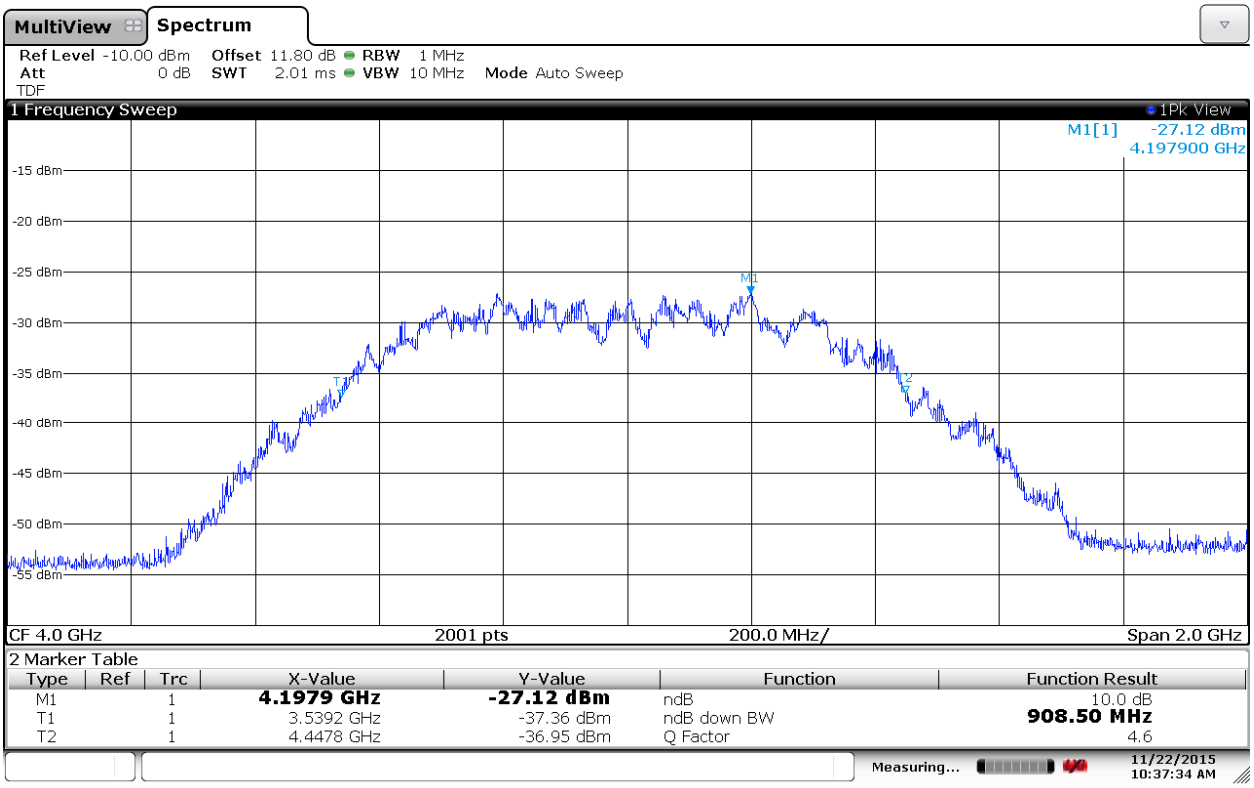
6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b))

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.

6.3.3. Measurement Data – Values in GHz

f_M	The highest emission peak	4.1979
f_L	10 dB below the highest peak	3.5392
f_H	10 dB above the highest peak	4.4478
f_C	Calculated: $(f_H + f_L) / 2$	3.9935
Bandwidth	Calculated: $(f_H - f_L)$	0.9086
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.2275

6.3.4. Measurement Plot of 10 dB frequencies (Channel 4, 6.8 MBPS, 64k PRF)



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6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (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. 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:

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

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

Radiated Emissions Field Strength Limits at 3 Meters (Section 15.209)

Frequency (MHz)	Field Strength (dBµV/m)
0.009 to 0.490	128.5 to 93.8
0.490 to 1.705	73.8 to 63
1.705 - 30	69.5
30 - 88	40
88 - 216	43.5
216 - 960	46
960 - 40,000	54

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

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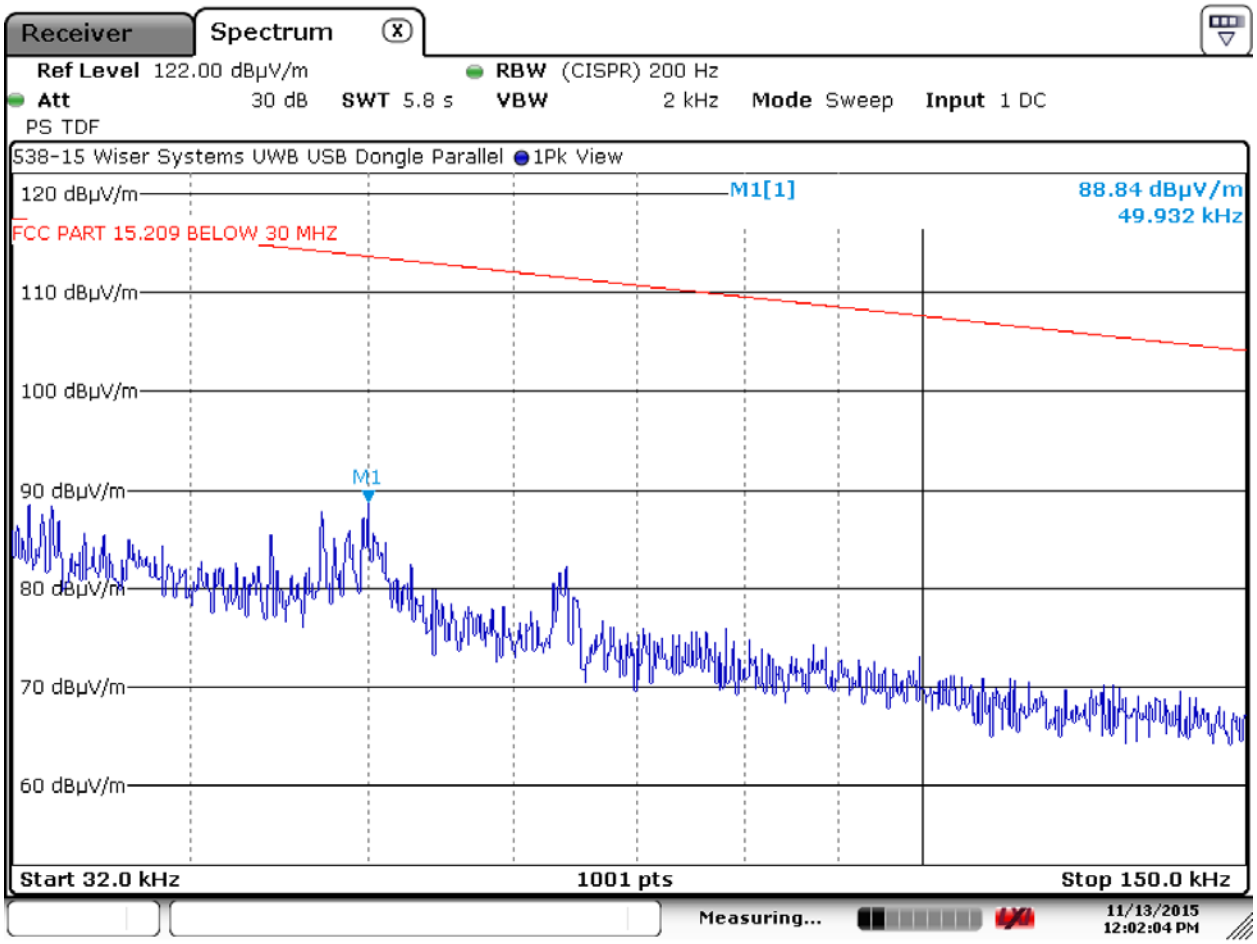
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.519 (c), 15.209)

6.4.1. 32 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. Worst case EUT configuration, Channel 4, 110 kbps, 16k PRF.

6.4.1.1 Parallel Measurement Antenna – 32 to 150 kHz



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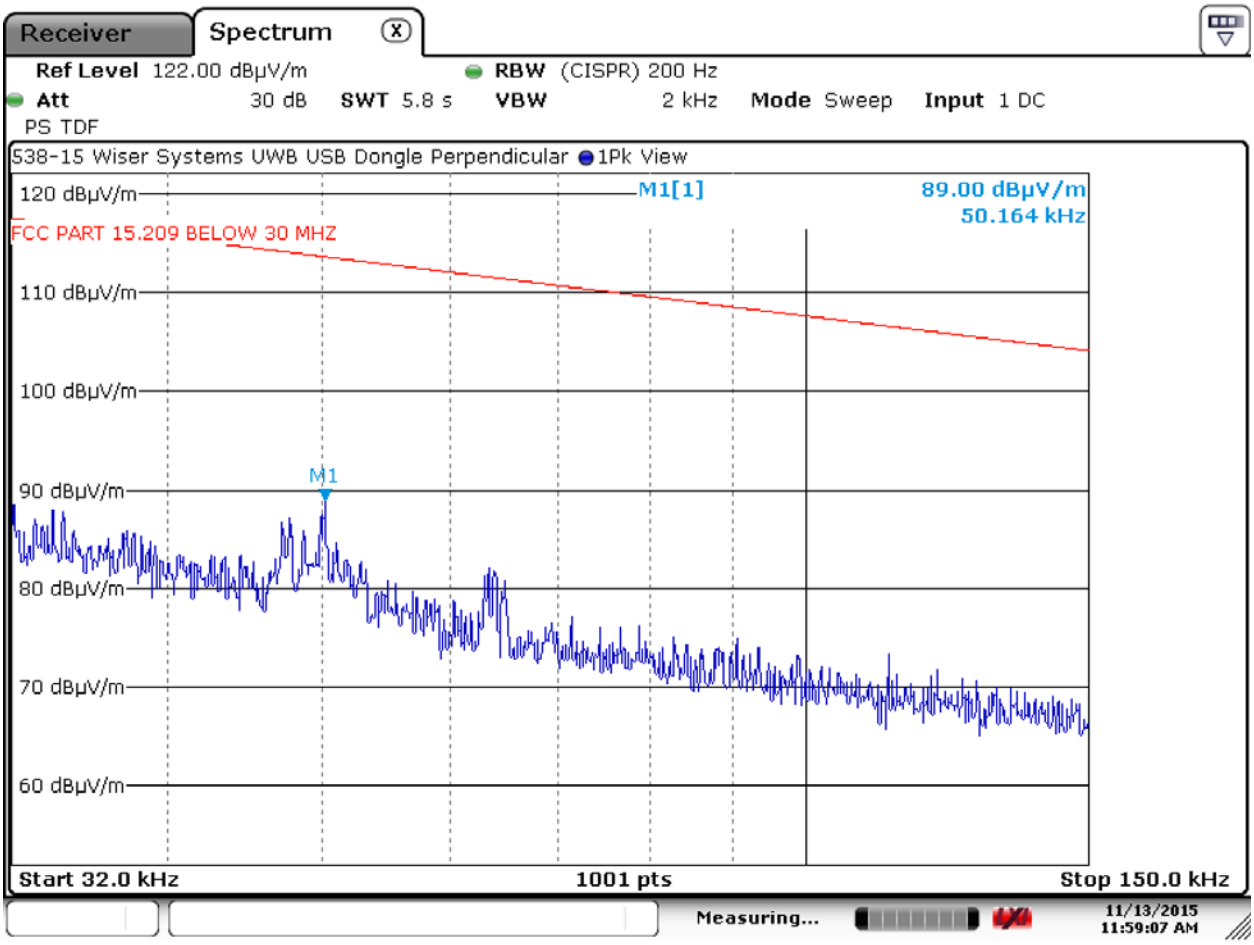
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.519 (c), 15.209)

6.4.1. 32 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 – 32 to 150 kHz



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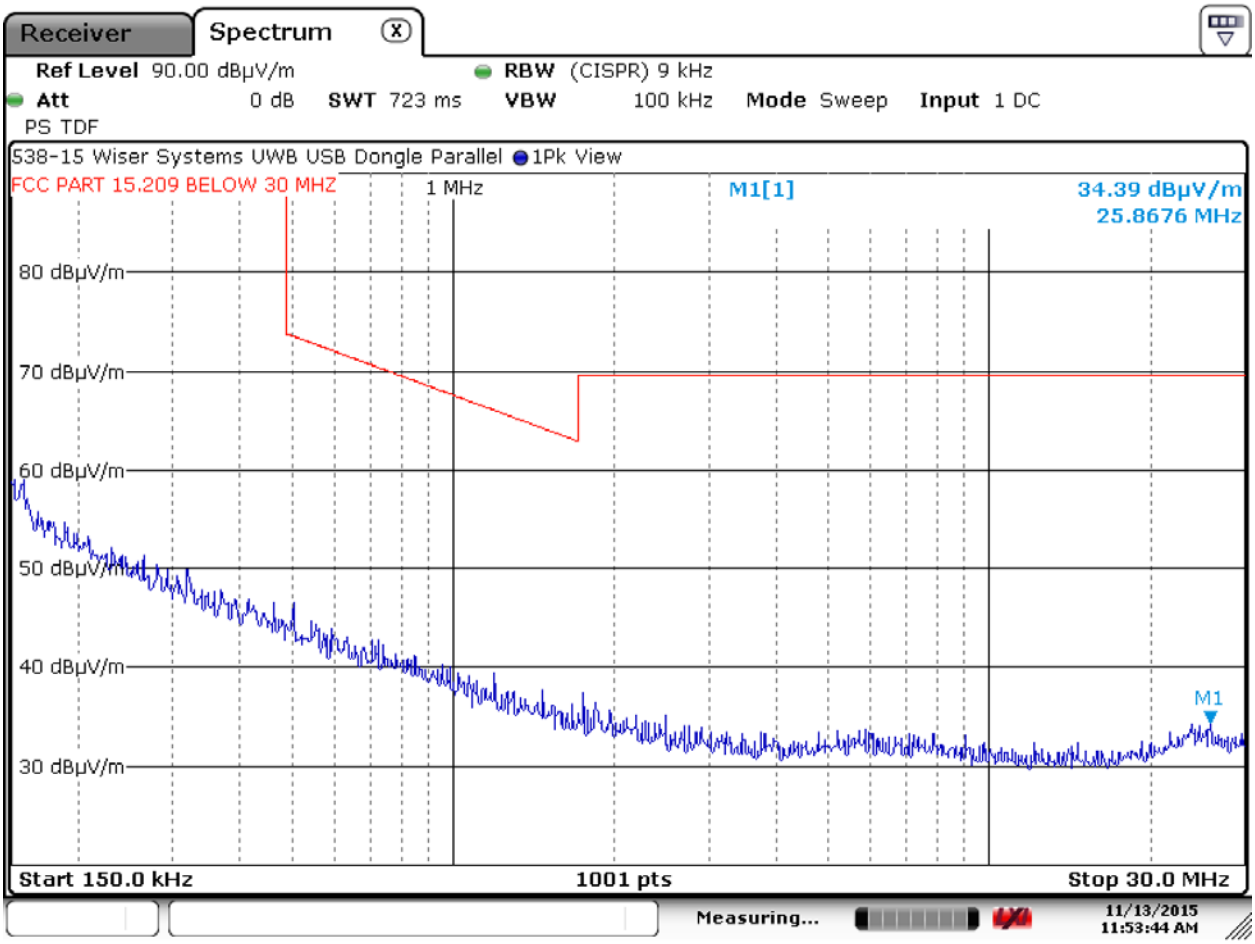
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.519 (c), 15.209)

6.4.1. 32 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 Parallel Measurement Antenna – 150 kHz to 30 MHz



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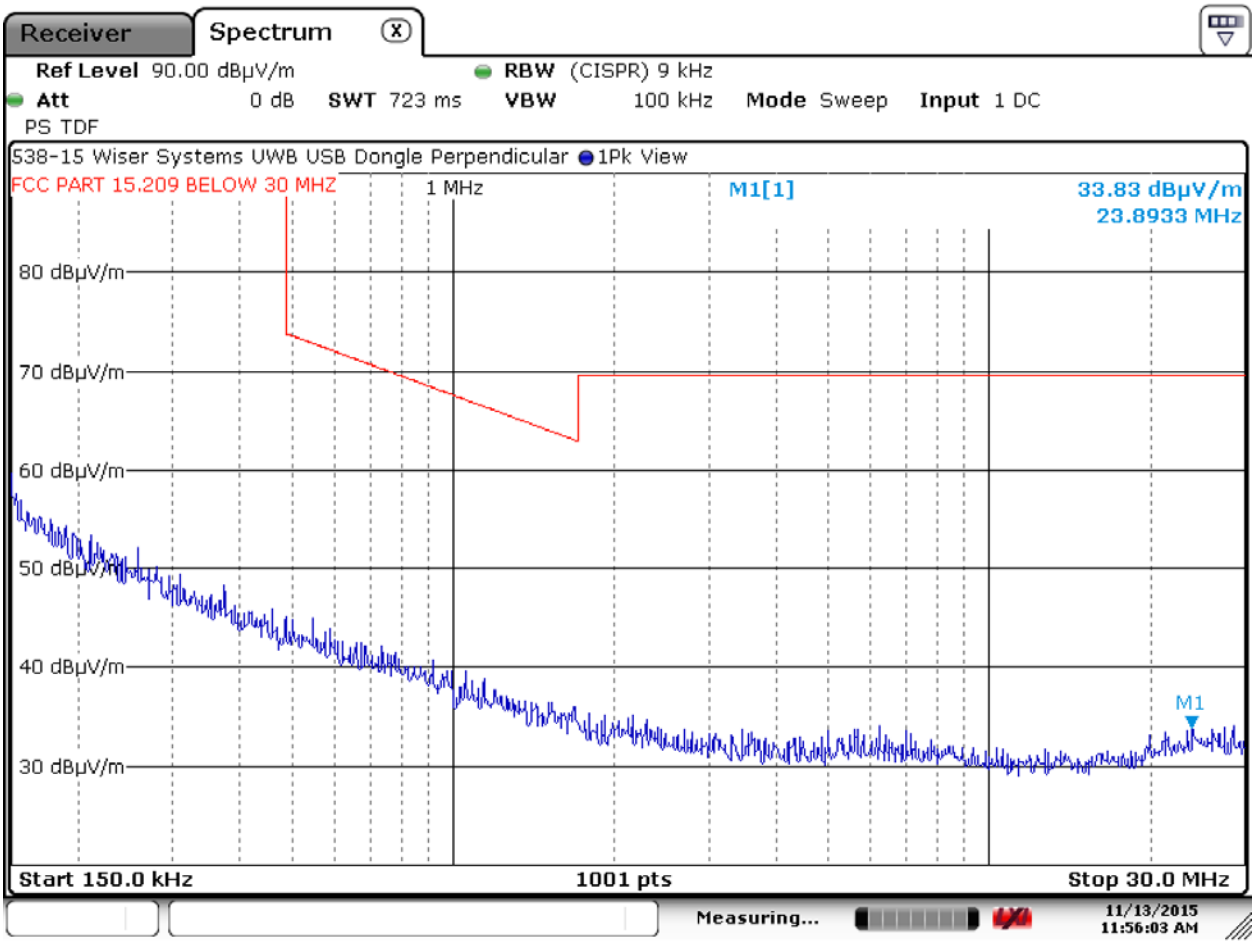
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.519 (c), 15.209)

6.4.1. 32 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 Perpendicular Measurement Antenna – 150 kHz to 30 MHz



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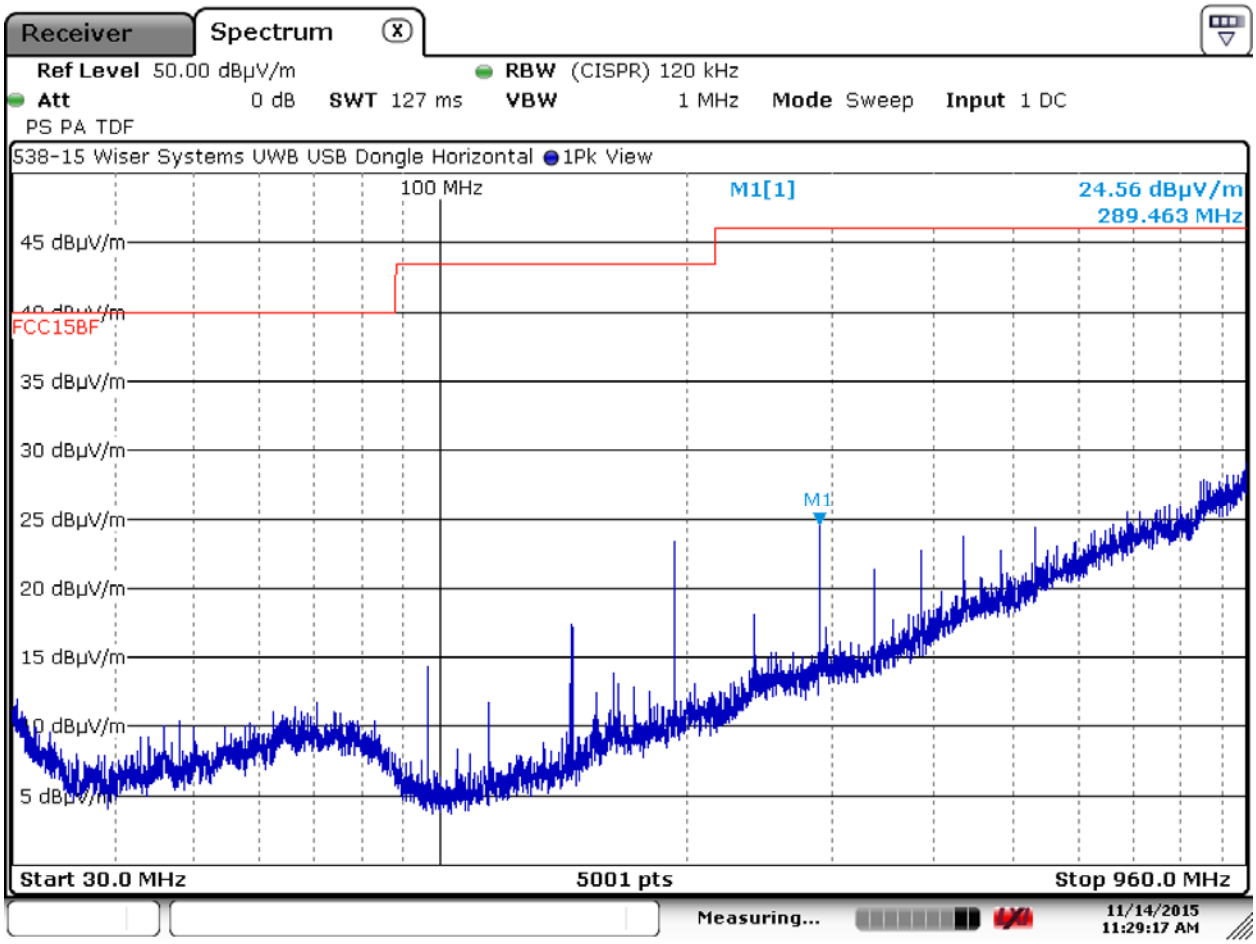
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.519 (c), 15.209)

6.4.1. 32 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 Horizontal Polarity – 30 to 960 MHz



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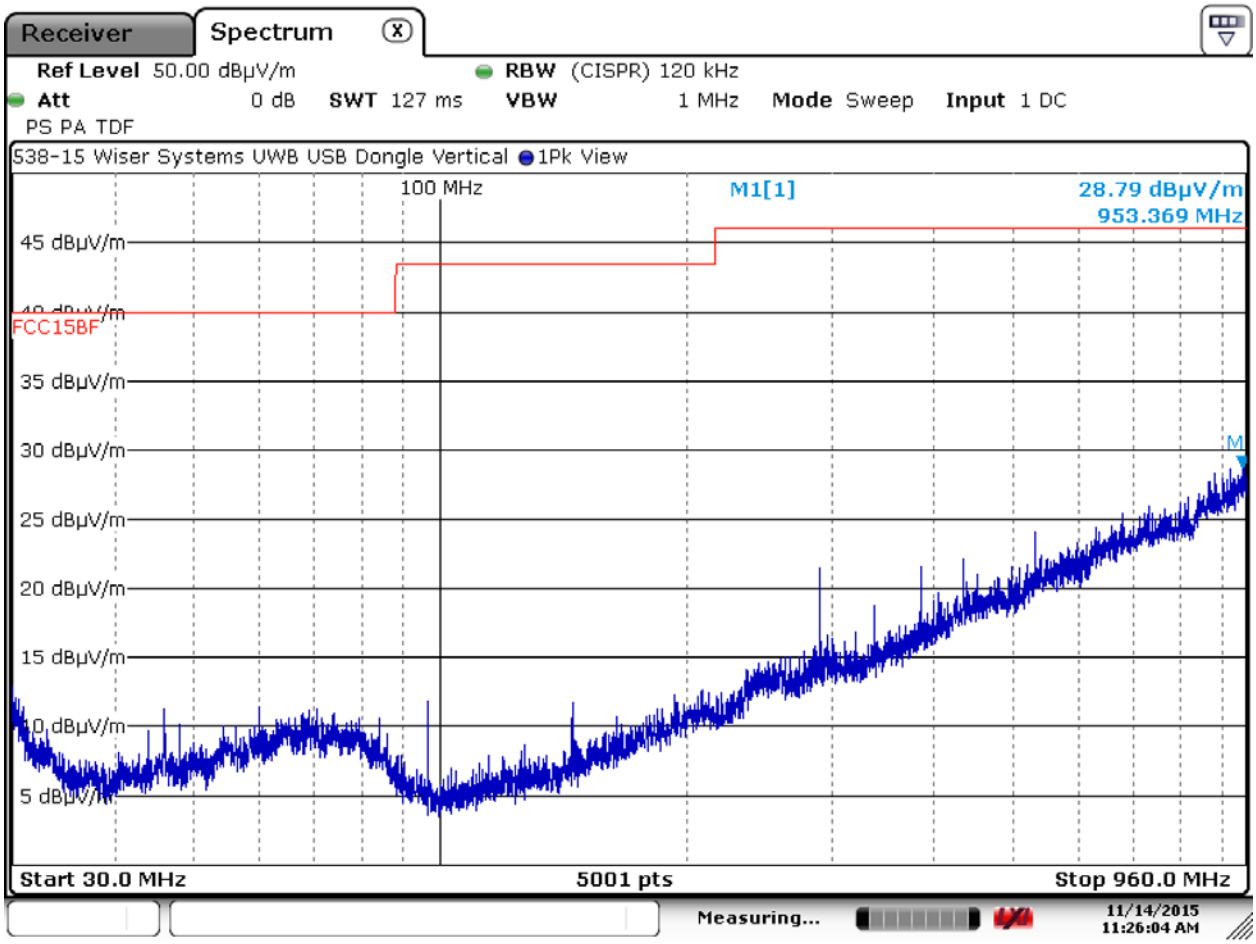
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.519 (c), 15.209)

6.4.1. 32 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 Vertical Polarity – 30 to 960 MHz



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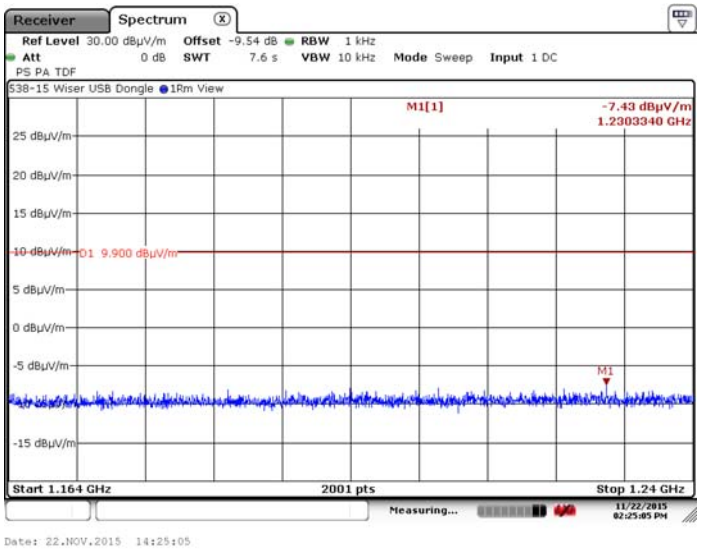
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions in GPS Bands (15.519 (d), 15.209)

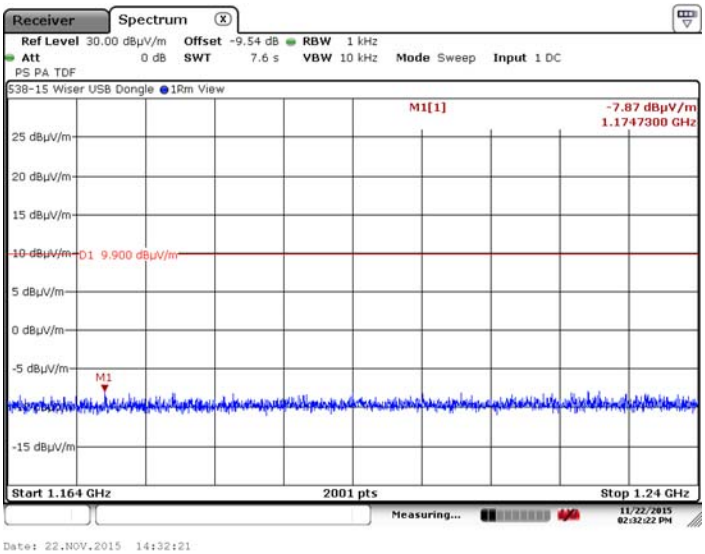
6.4.2 1164 to 1240 MHz & 1559 to 1610 MHz

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 Meters using a 9.54 dB distance offset and the -85.3 dBm limit was converted to a field strength limit of 9.9 dBuV/m.

6.4.2.1 Horizontal Measurement Polarity 1164 to 1240 MHz



6.4.2.2 Vertical Measurement Polarity 1164 to 1240 MHz



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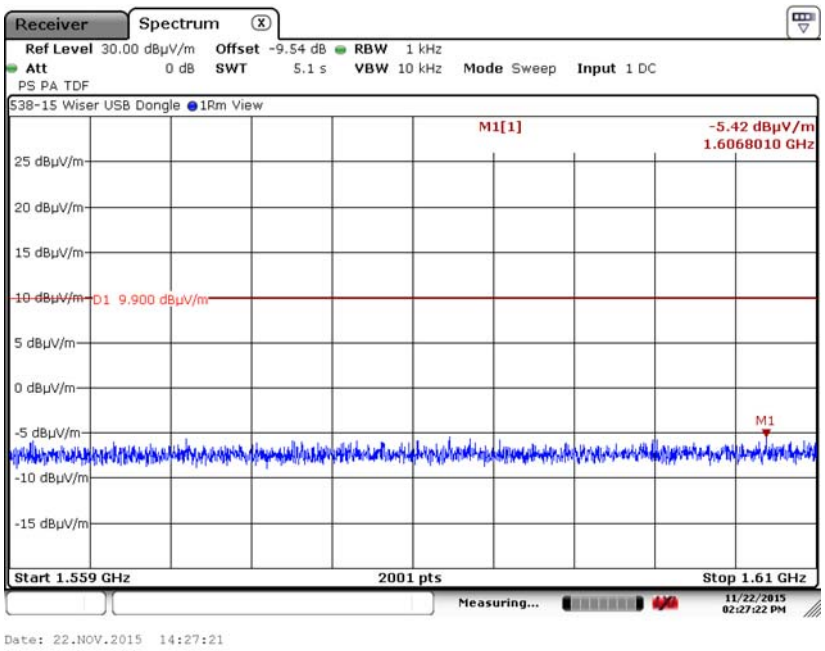
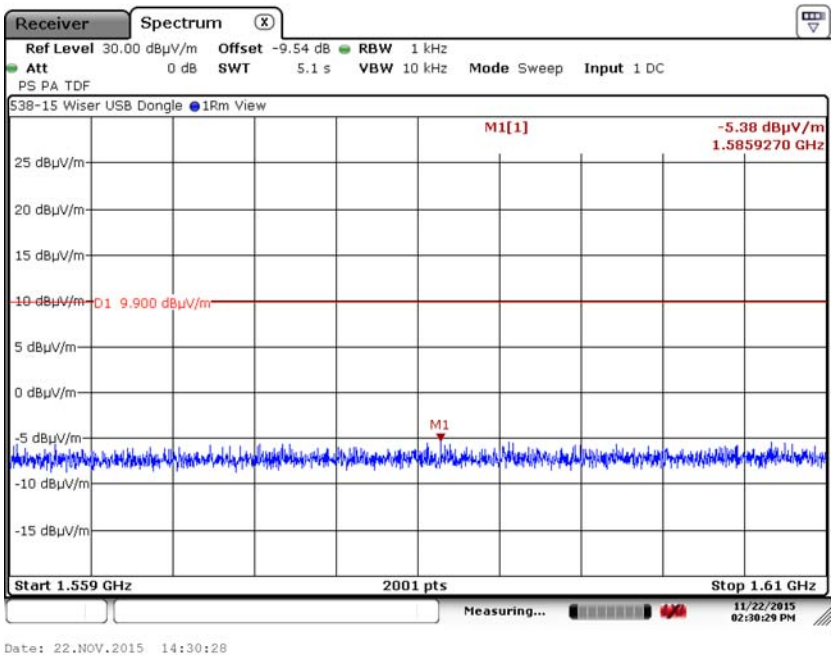
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions in GPS Bands (15.519 (d), 15.209)

6.4.2.3 Horizontal Measurement Polarity 1559 to 1610 MHz



6.4.2.4 Vertical Measurement Polarity 1559 to 1610 MHz



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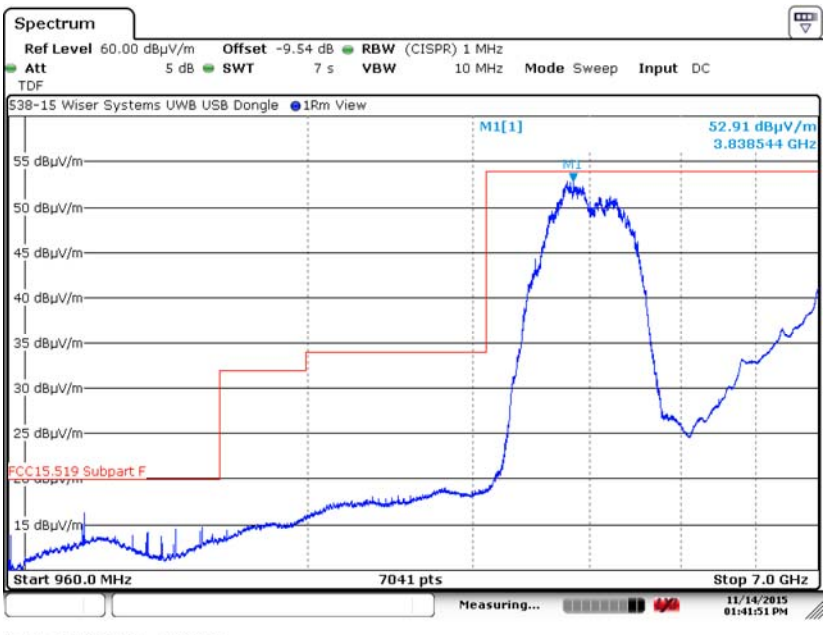
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.3. 960 MHz to 7 GHz Horizontal at 1 Meter

6.4.4. 960 MHz to 7 GHz Vertical at 1 Meter



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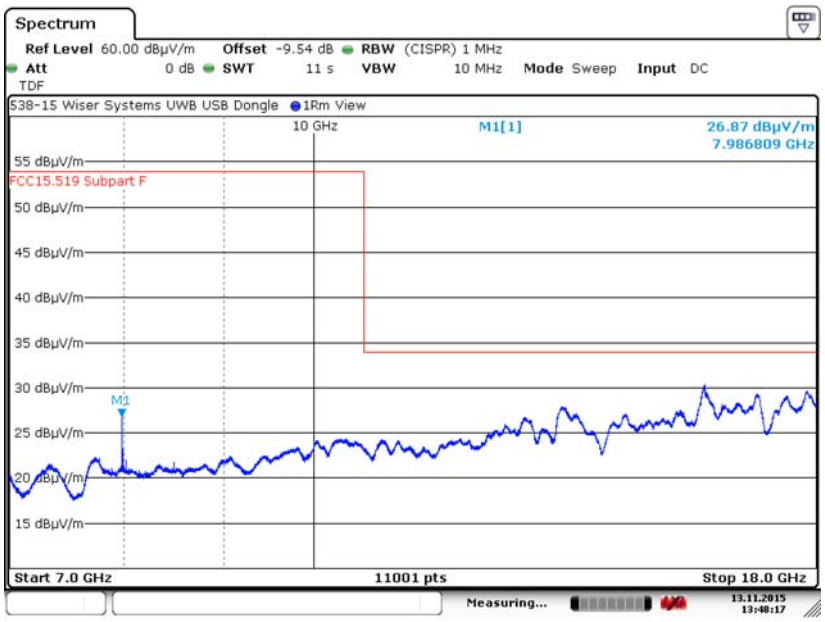
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.5. 7 to 18 GHz Horizontal at 1 Meter



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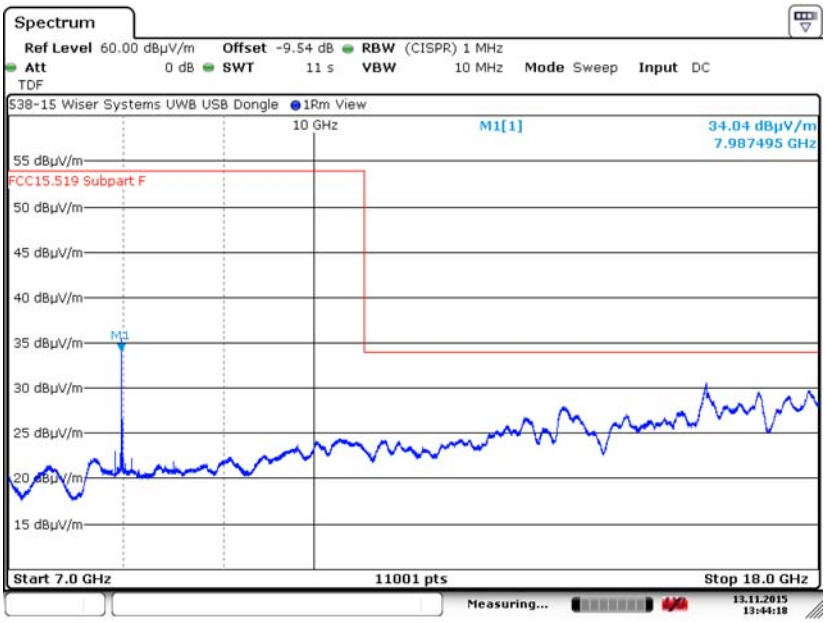
6.4.6. 7 to 18 GHz Vertical at 1 Meter



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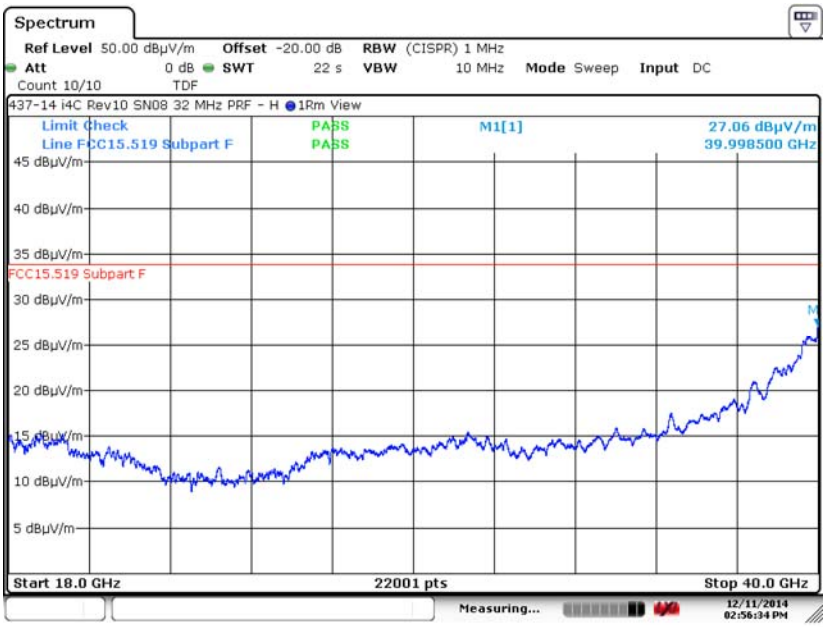
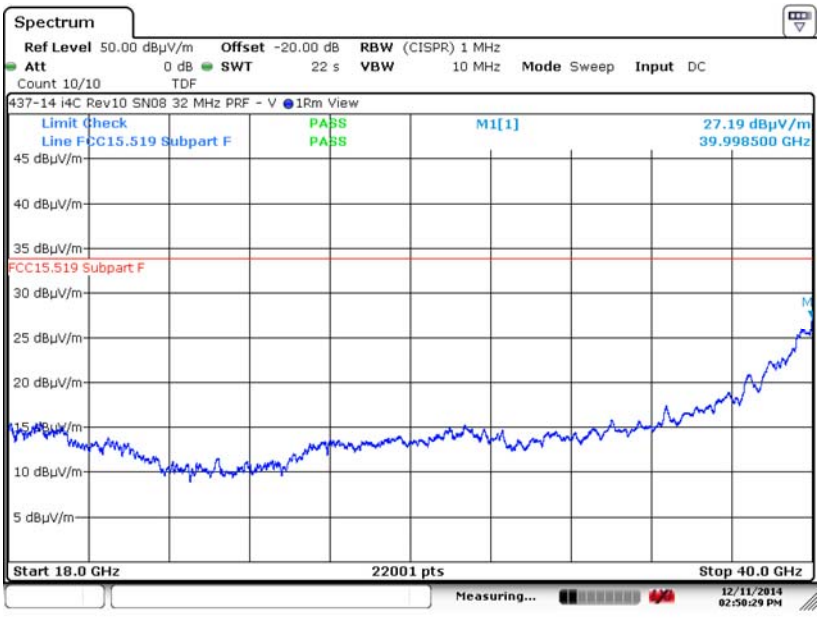
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.7. 18 to 40 GHz Horizontal at 0.3 Meter



6.4.8. 18 to 40 GHz Vertical at 0.3 Meter



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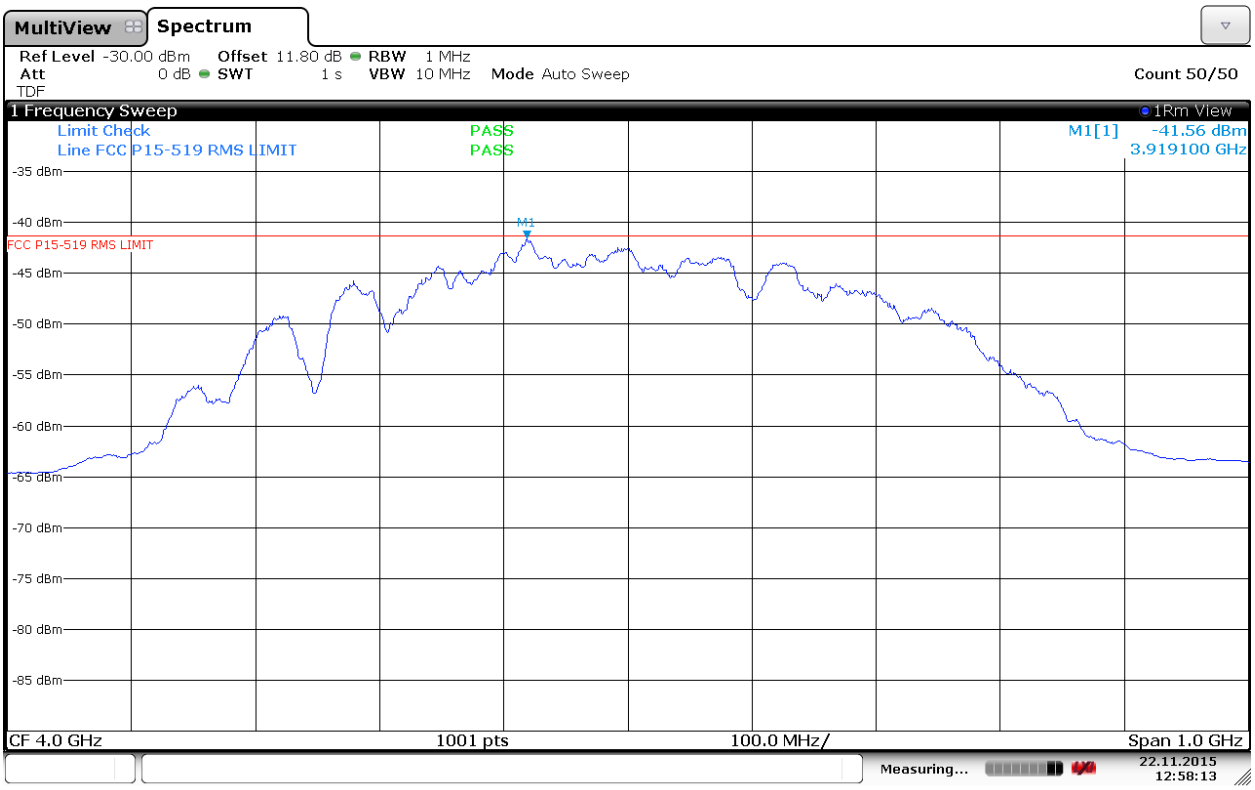
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.9. Plot of RMS Power at 3 Meters (Channel 2, 110 kbps, 64k PRF)

Highest emission GHz:	3.9191
Measured value adjusted for 3 Meter distance in dBm RMS	-41.46
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.16



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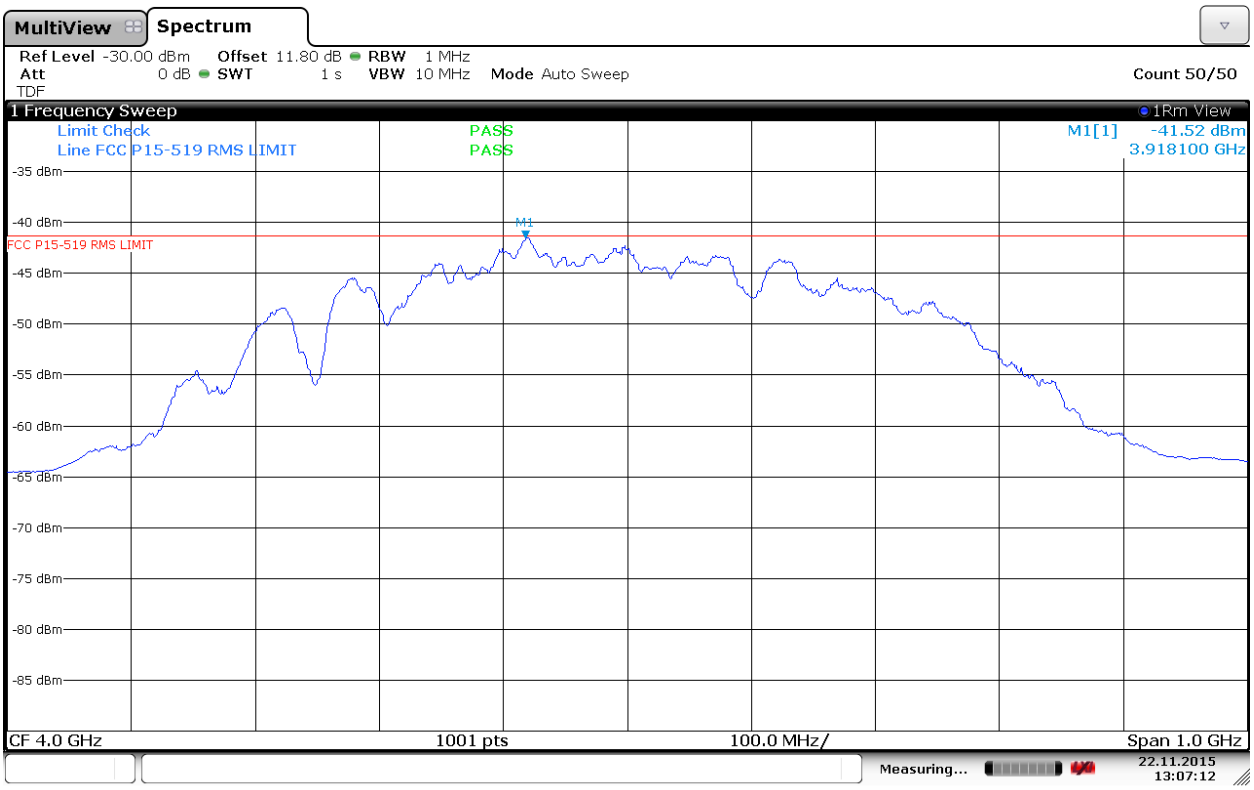
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.10. Plot of RMS Power at 3 Meters (Channel 2, 6.8 MBPS, 64k PRF)

Highest emission GHz:	3.9181
Measured value adjusted for 3 Meter distance in dBm RMS	-41.52
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.22



Date: 22.NOV.2015 13:07:12

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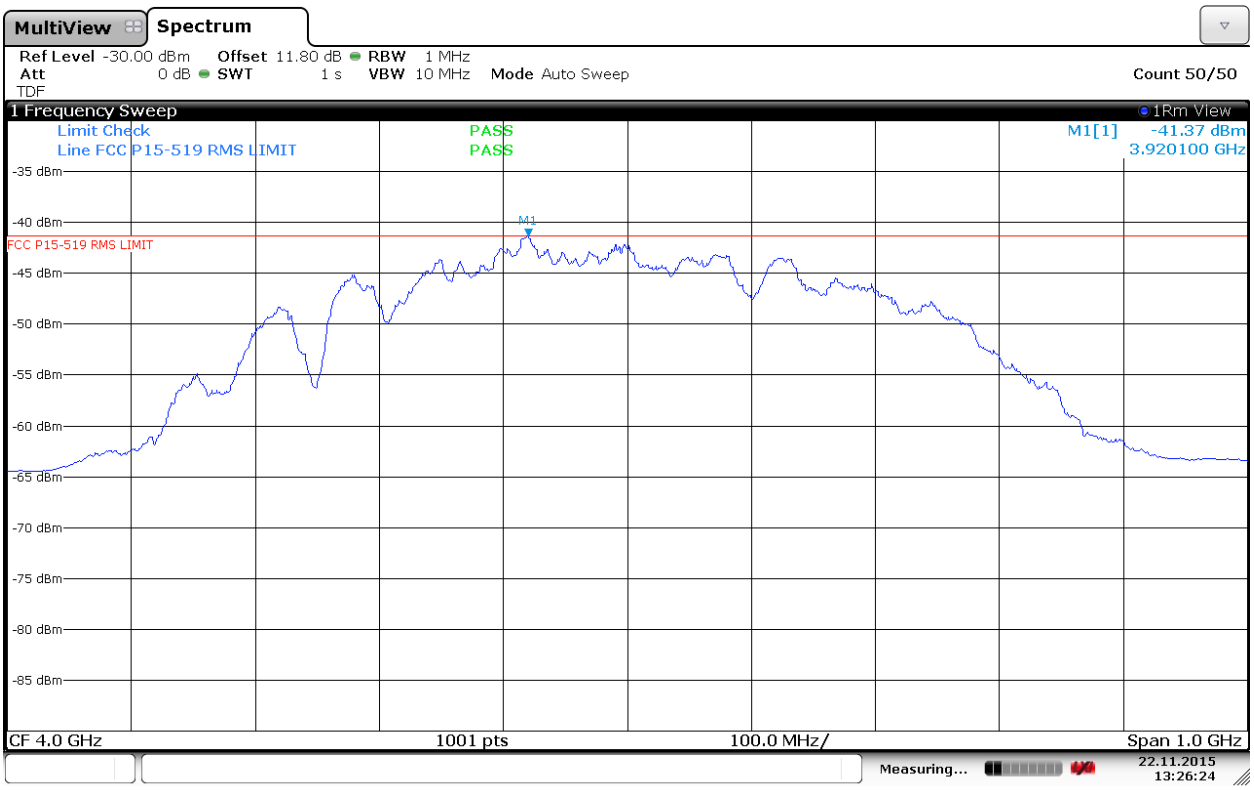
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.11. Plot of RMS Power at 3 Meters (Channel 2, 6.8 MBPS Smart Tx, 64k PRF)

Highest emission GHz:	3.9201
Measured value adjusted for 3 Meter distance in dBm RMS	-41.37
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.07



Date: 22.NOV.2015 13:26:24

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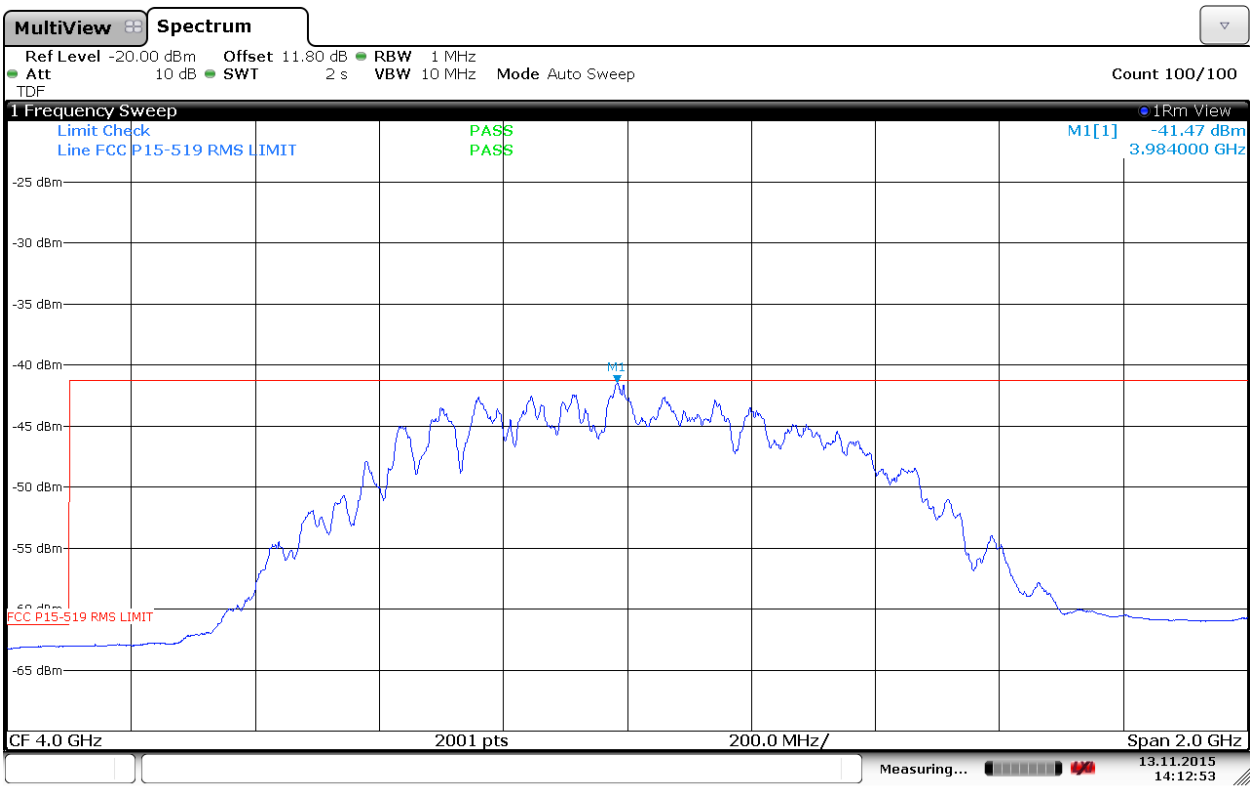
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.12. Plot of RMS Power at 3 Meters (Channel 4, 110 kbps, 16k PRF)

Highest emission GHz:	3.984
Measured value adjusted for 3 Meter distance in dBm RMS	-41.47
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.17



Date: 13.NOV.2015 14:12:53

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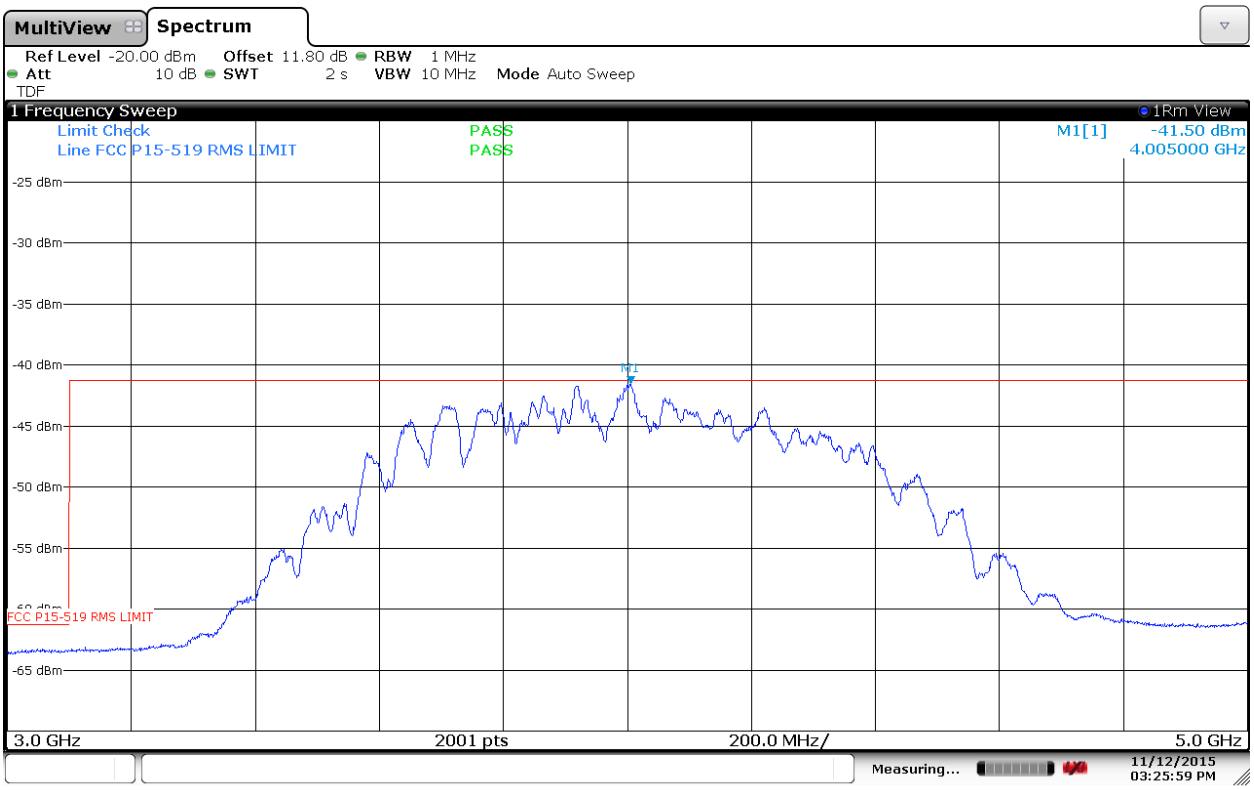
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.13. Plot of RMS Power at 3 Meters (Channel 4, 6.8 MBPS, 16k PRF)

Highest emission GHz:	4.005
Measured value adjusted for 3 Meter distance in dBm RMS	-41.50
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.20



Date: 12.NOV.2015 15:25:59

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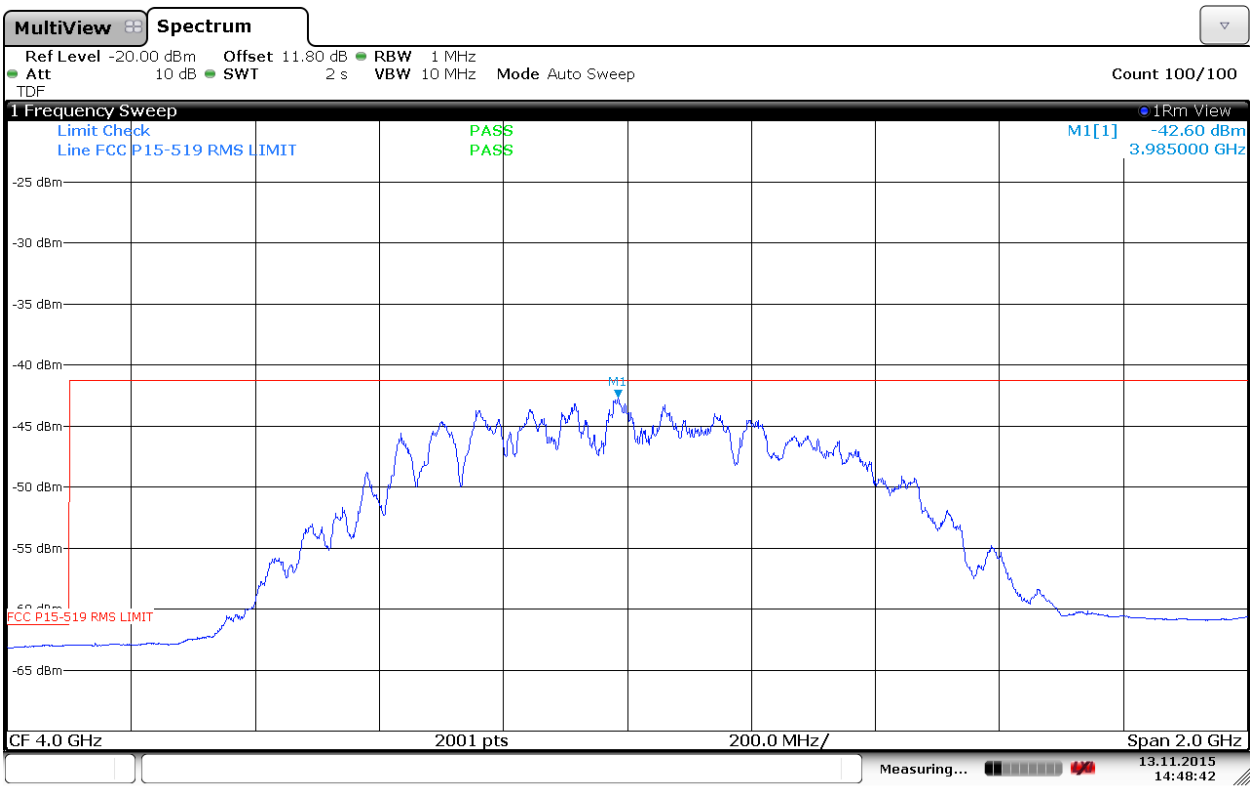
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.14. Plot of RMS Power at 3 Meters (Channel 4, 6.8 MBPS Smart TX, 16k PRF)

Highest emission GHz:	3.985
Measured value adjusted for 3 Meter distance in dBm RMS	-42.60
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	1.30



Date: 13.NOV.2015 14:48:41

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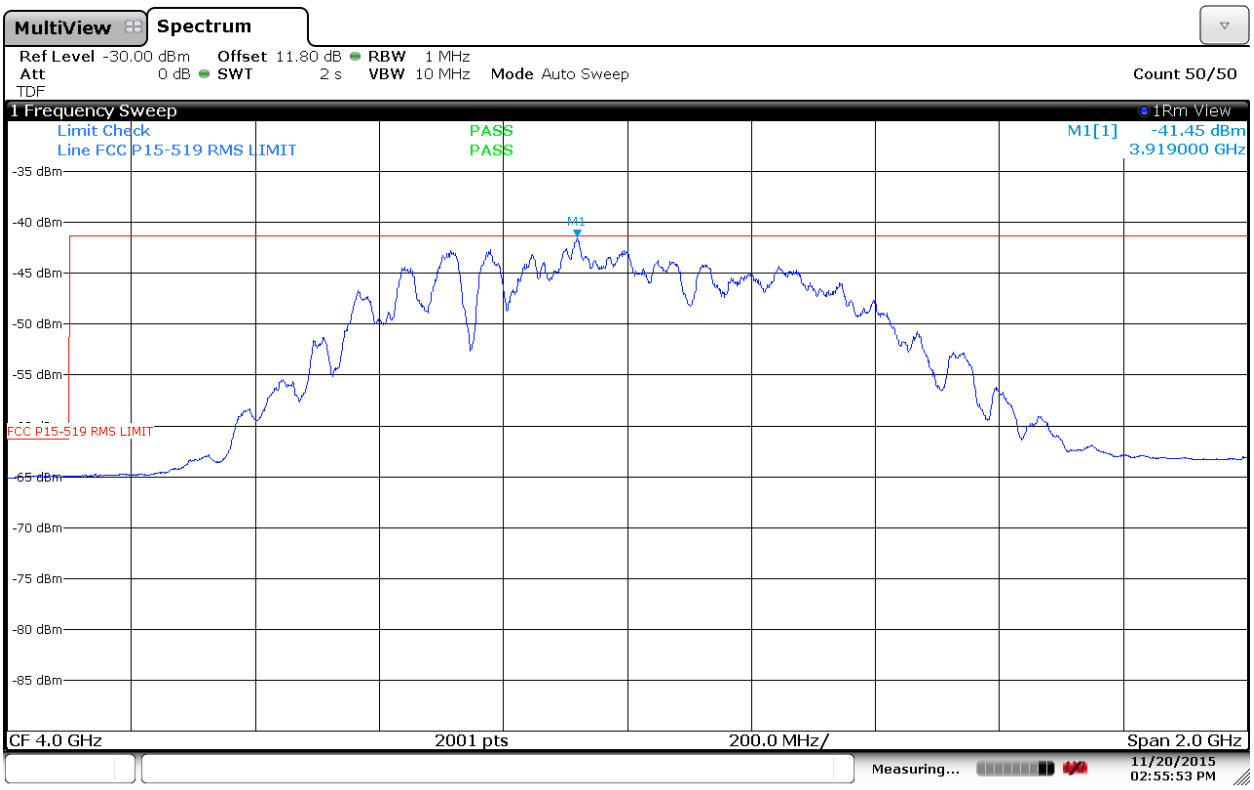
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.15. Plot of RMS Power at 3 Meters (Channel 4, 110 kbps, 64k PRF)

Highest emission GHz:	3.919
Measured value adjusted for 3 Meter distance in dBm RMS	-41.45
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.15



Date: 20.NOV.2015 14:55:54

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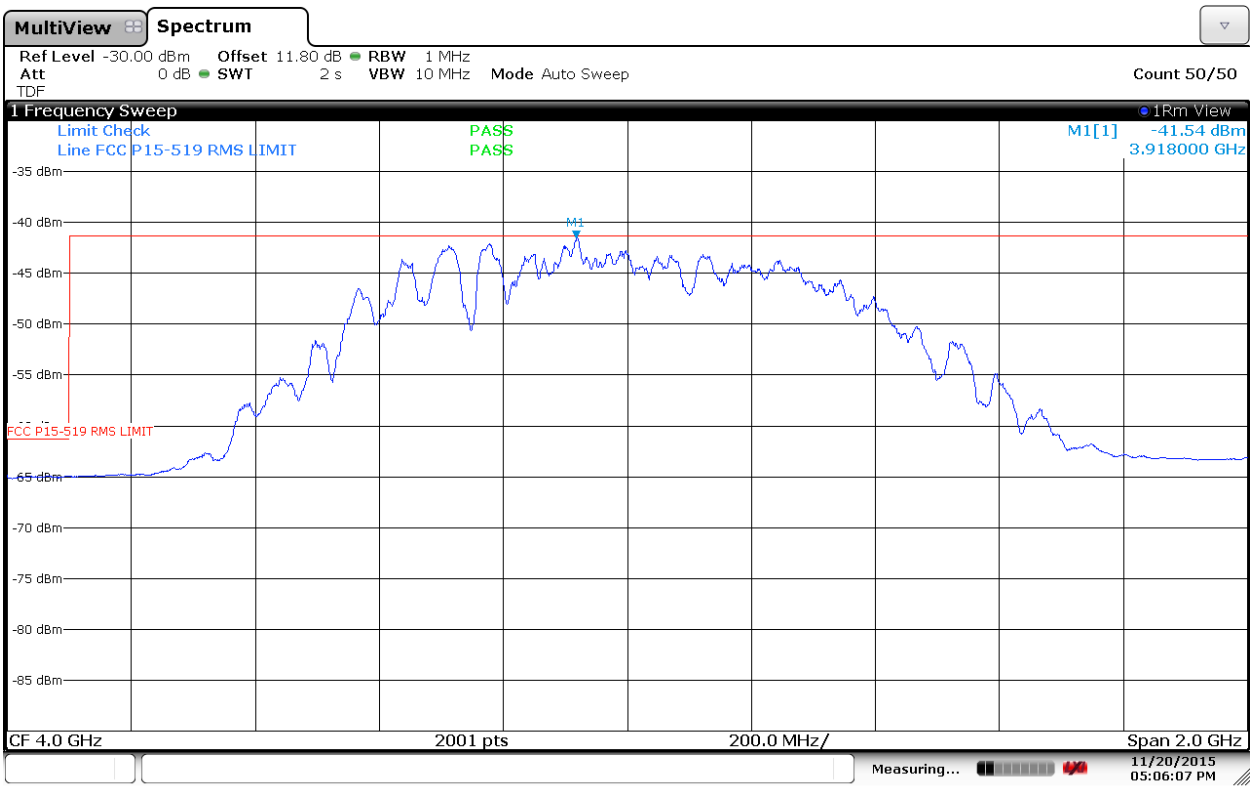
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.16. Plot of RMS Power at 3 Meters (Channel 4, 6.8 MBPS, 64k PRF)

Highest emission GHz:	3.918
Measured value adjusted for 3 Meter distance in dBm RMS	-41.54
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.24



Date: 20.NOV.2015 17:06:07

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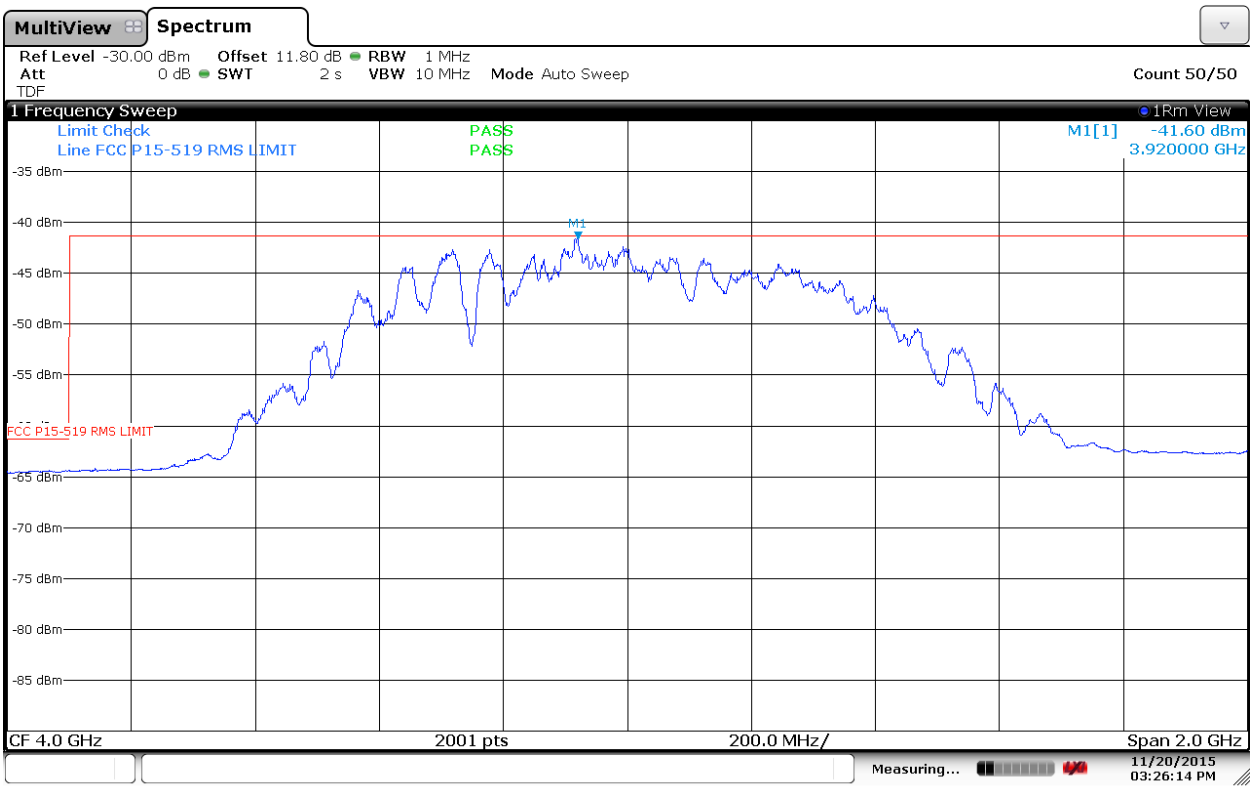
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.515 (d), 15.209)

6.4.17. Plot of RMS Power at 3 Meters (Channel 4, 6.8 MBPS Smart Tx, 64k PRF)

Highest emission GHz:	3.920
Measured value adjusted for 3 Meter distance in dBm RMS	-41.60
Limit in a 1 MHz RBW RMS	-41.30
Margin dB:	0.30



Date: 20.NOV.2015 15:26:14

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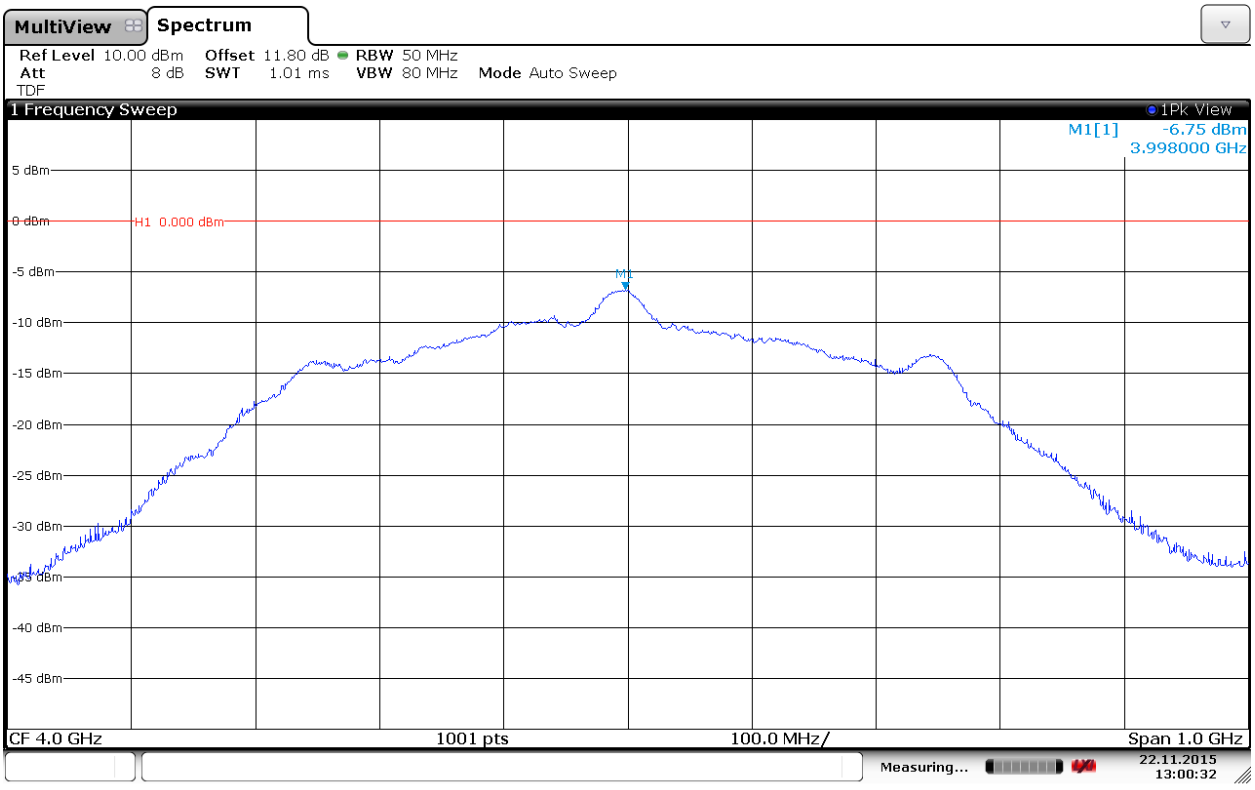
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e))

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.998
Measured value adjusted for 3 Meter distance in dBm EIRP	-6.75
Margin dB:	6.75

6.5.1 Plot of Peak Power at 3 Meters (Channel 2, 110 kbps, 64k PRF)



Date: 22.NOV.2015 13:00:32

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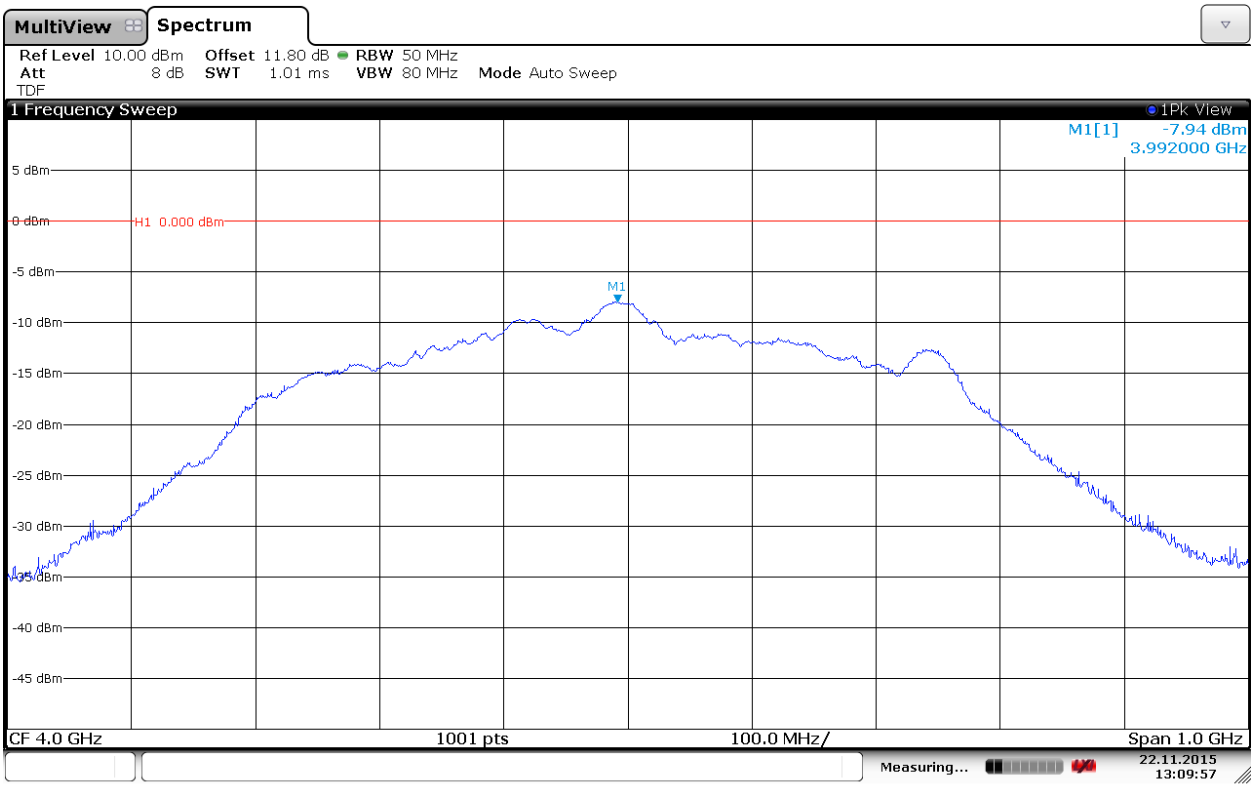
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.992
Measured value adjusted for 3 Meter distance in dBm EIRP	-7.94
Margin dB:	7.94

6.5.2 Plot of Peak Power at 3 Meters (Channel 2, 6.8 MBPS, 64k PRF)



Date: 22.NOV.2015 13:09:57

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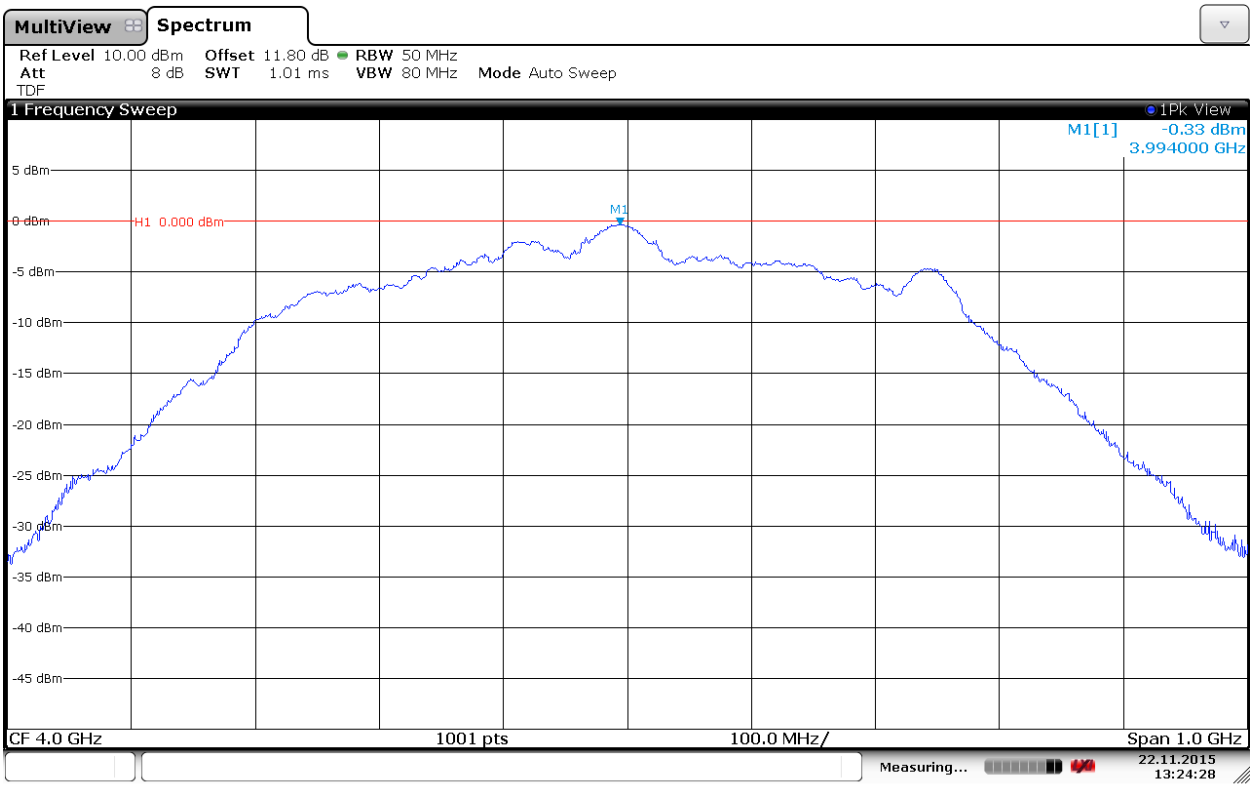
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.994
Measured value adjusted for 3 Meter distance in dBm EIRP	-0.33
Margin dB:	0.33

6.5.3 Plot of Peak Power at 3 Meters (Channel 2, 6.8 MBPS Smart Tx, 64k PRF)



Date: 22.NOV.2015 13:24:28

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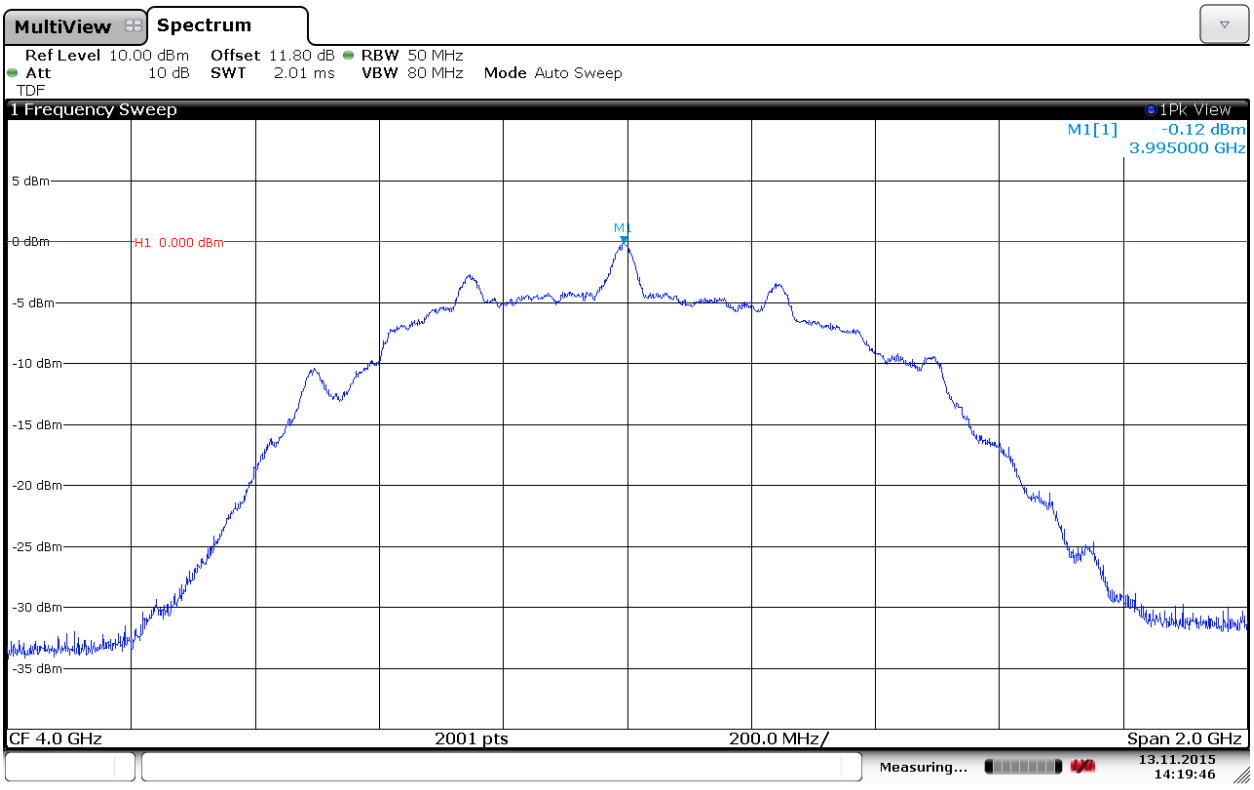
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.995
Measured value adjusted for 3 Meter distance in dBm EIRP	-0.12
Margin dB:	0.12

6.5.4 Plot of Peak Power at 3 Meters (Channel 4, 110 kbps, 16k PRF)



Date: 13.NOV.2015 14:19:45

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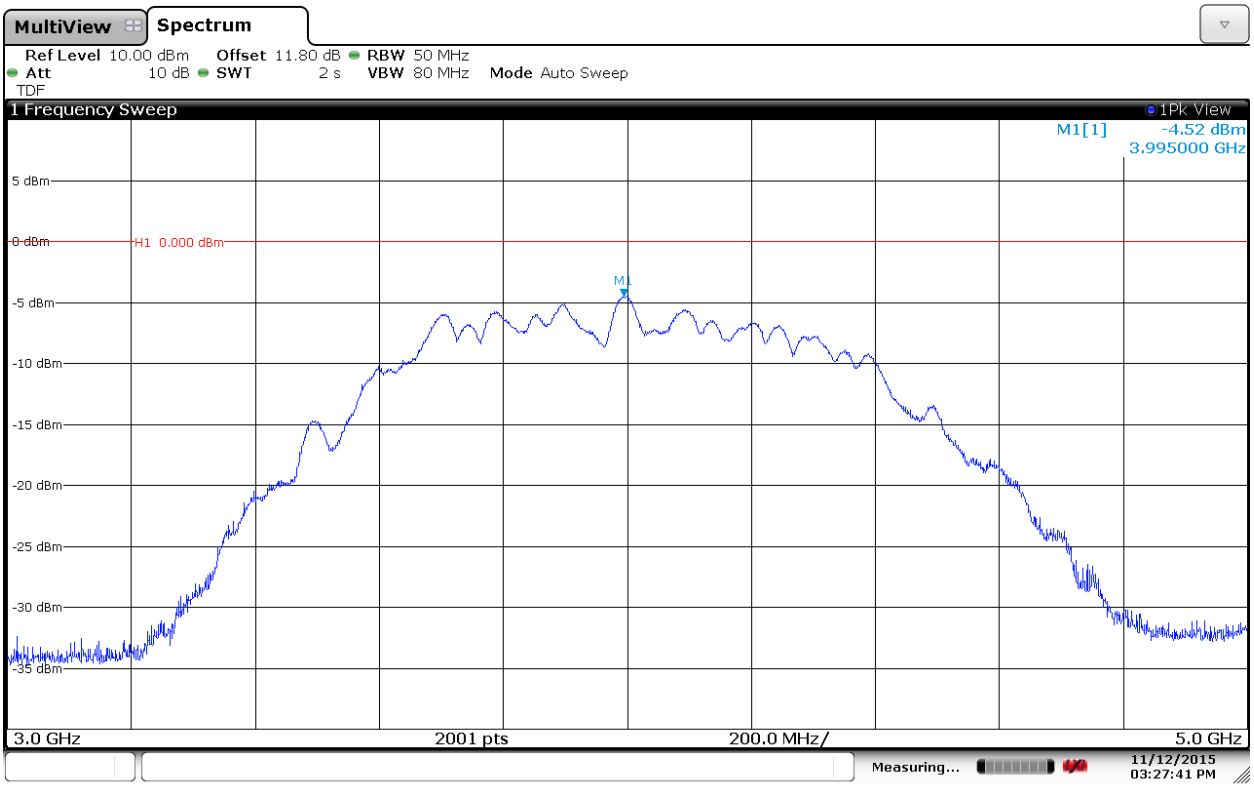
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.995
Measured value adjusted for 3 Meter distance in dBm EIRP	-4.52
Margin dB:	4.52

6.5.5 Plot of Peak Power at 3 Meters (Channel 4, 6.8 MBPS, 16k PRF)



Date: 12.NOV.2015 15:27:41

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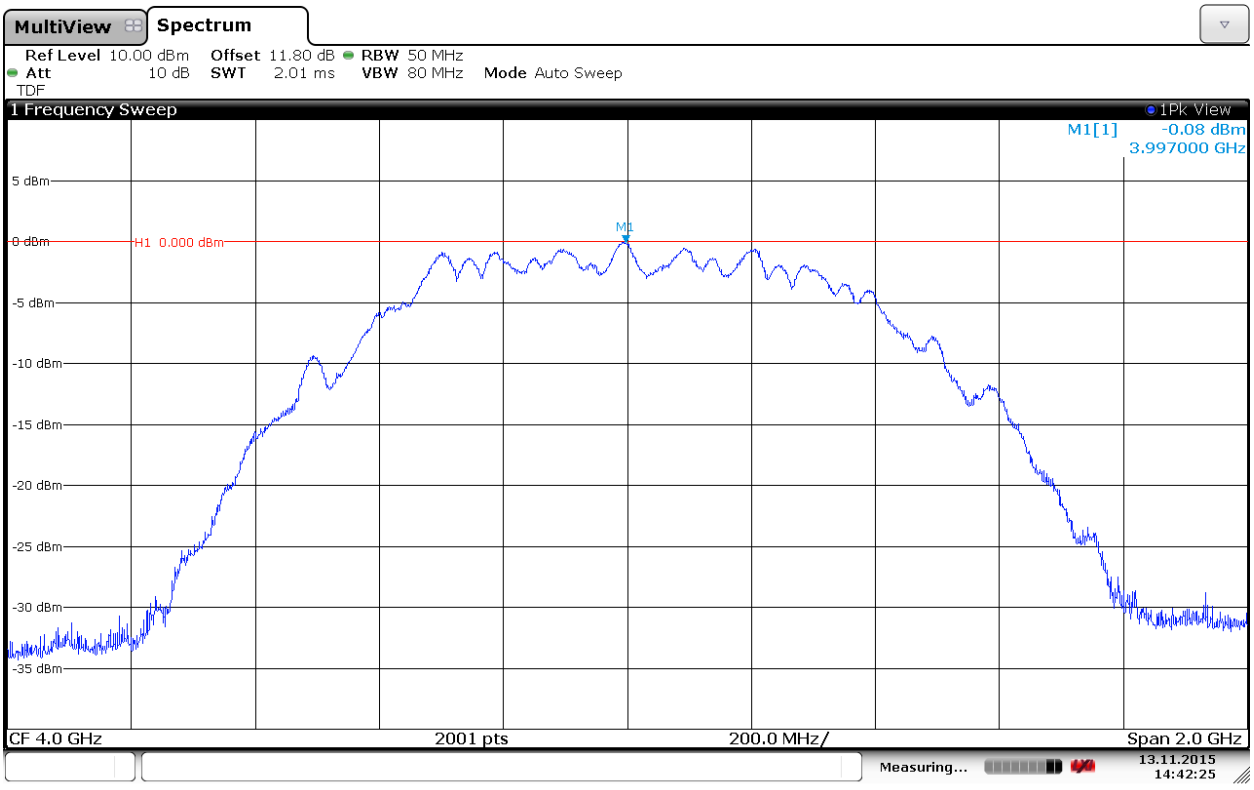
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.997
Measured value adjusted for 3 Meter distance in dBm EIRP	-0.08
Margin dB:	0.08

6.5.6 Plot of Peak Power at 3 Meters (Channel 4, 6.8 MBPS Smart Tx, 16k PRF)



Date: 13.NOV.2015 14:42:24

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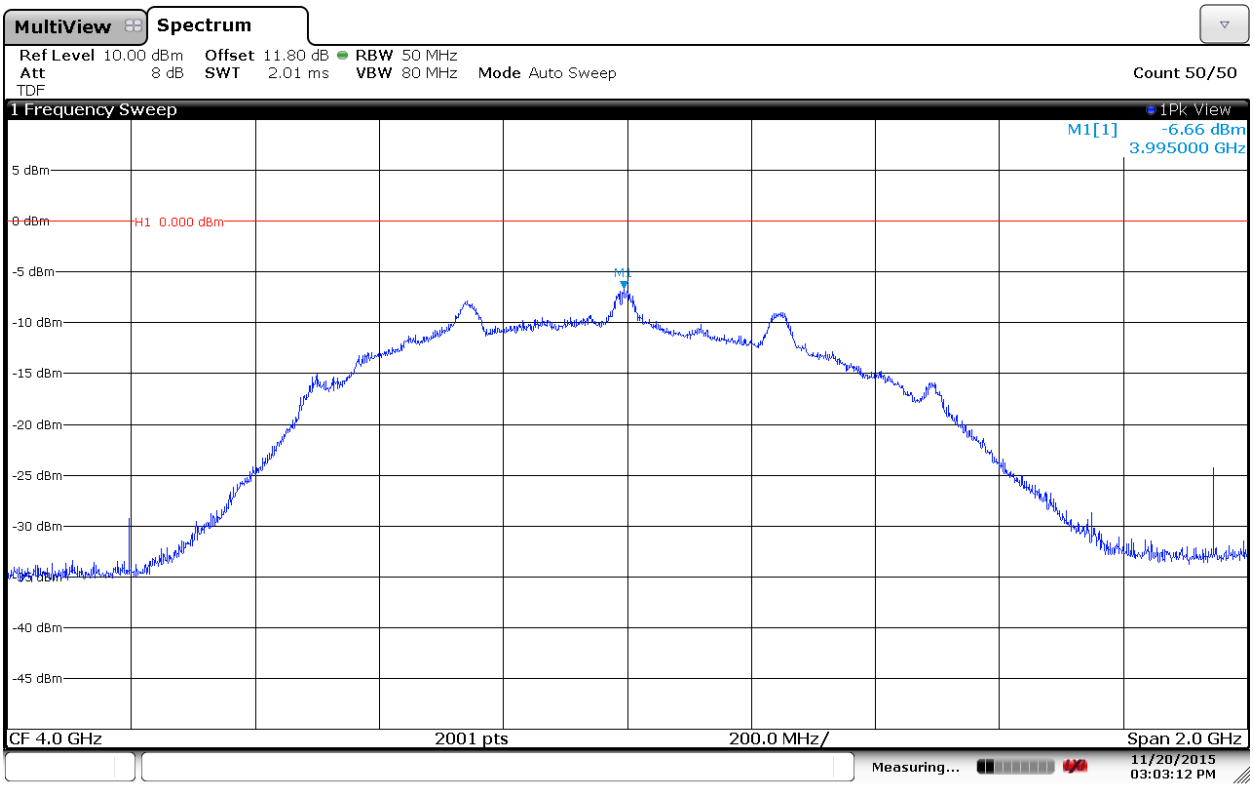
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.995
Measured value adjusted for 3 Meter distance in dBm EIRP	-6.66
Margin dB:	6.66

6.5.7 Plot of Peak Power at 3 Meters (Channel 4, 110 kbps, 64k PRF)



Date: 20.NOV.2015 15:03:11

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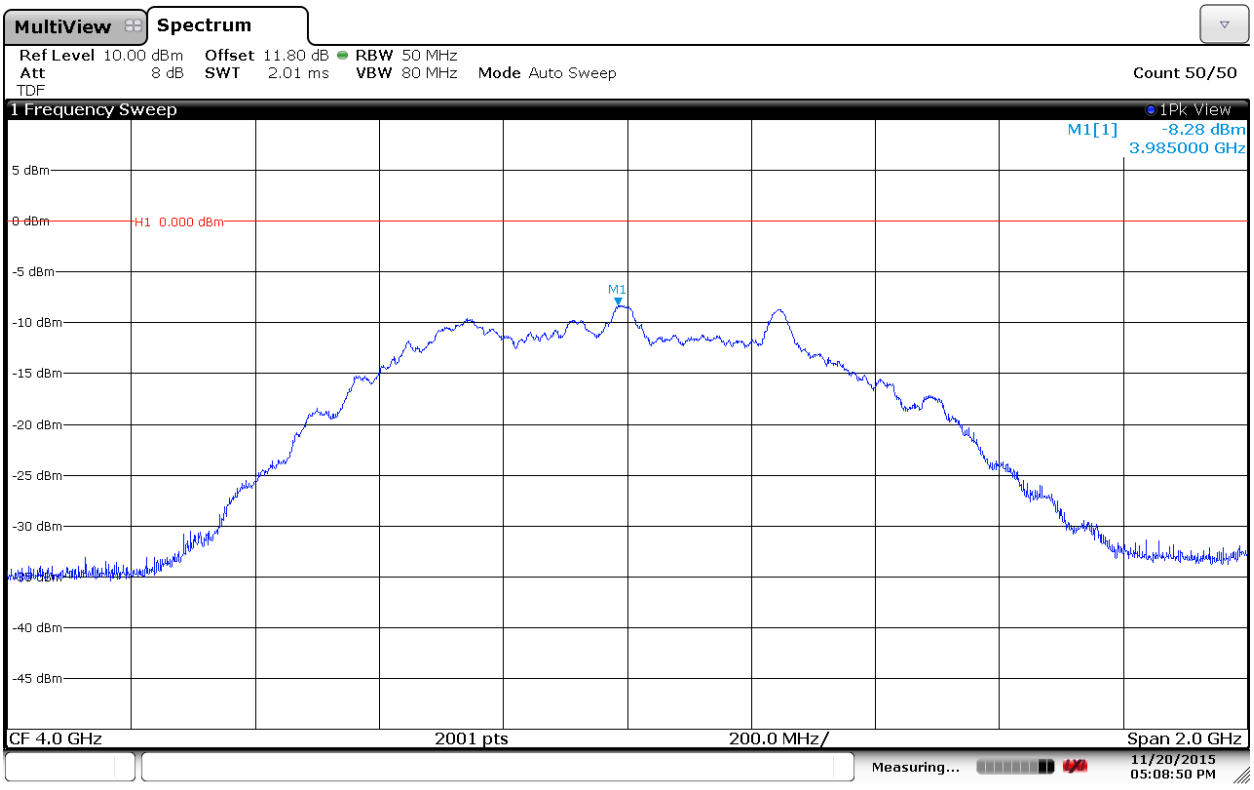
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.985
Measured value adjusted for 3 Meter distance in dBm EIRP	-8.28
Margin dB:	8.28

6.5.8 Plot of Peak Power at 3 Meters (Channel 4, 6.8MBPS, 64k PRF)



Date: 20.NOV.2015 17:08:50

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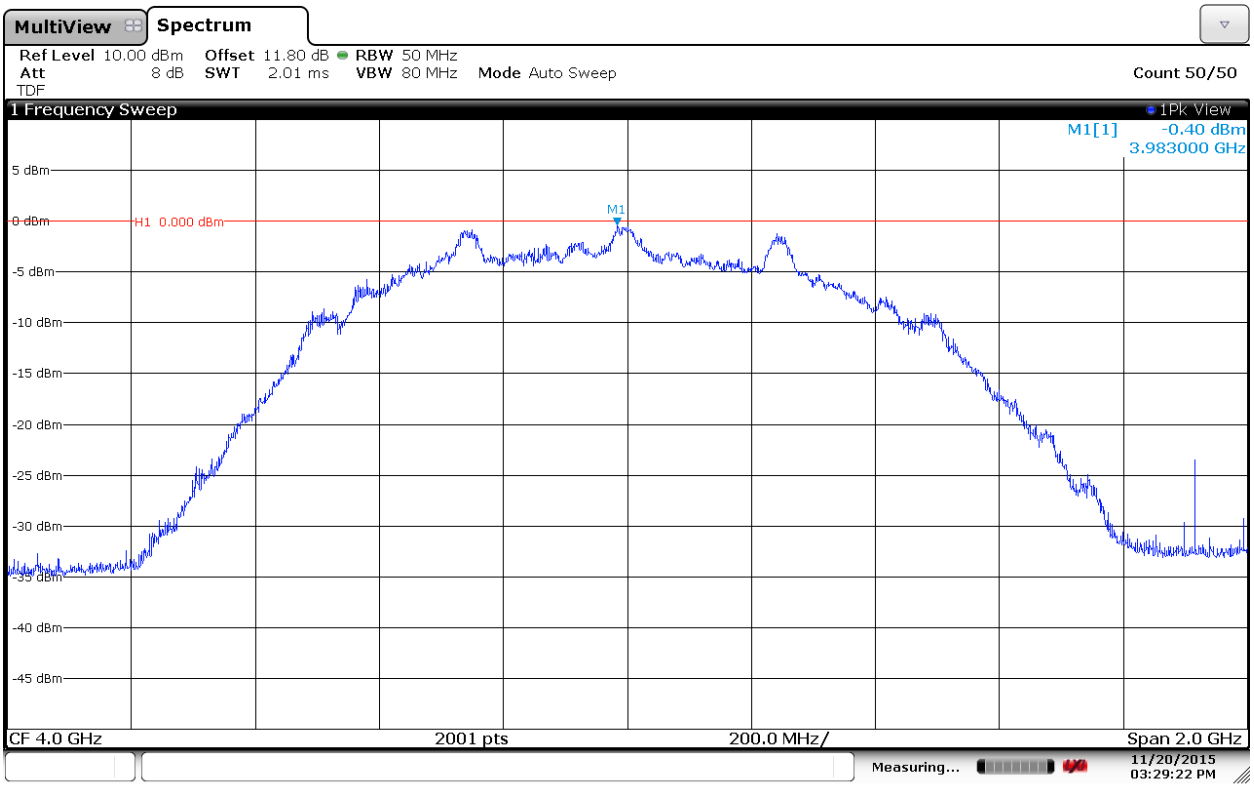
6. Measurement Data (continued)

6.5. Peak Emissions in a 50 MHz Bandwidth (15.519 (e)) cont.

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. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521.

Highest emission peak (f_M) GHz:	3.983
Measured value adjusted for 3 Meter distance in dBm EIRP	-0.40
Margin dB:	0.40

6.5.9 Plot of Peak Power at 3 Meters (Channel 4, 6.8MBPS Smart Tx, 64k PRF)



Date: 20.NOV.2015 15:29:22

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6. Measurement Data (continued)

6.6 Conducted Emissions Test Setup

6.6.1. Regulatory Limit: FCC Part 15, Class B

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.		

6.6.2 Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	3330A00115	6/2/2016
RF Filter Section	Hewlett Packard	85460A	3325A00121	6/2/2016
LISN	EMCO	3825/2	9109-1860	7/21/2016
Manufacturer	**Software Description**		**Title/Model #**	**Rev.**
Compliance Worldwide	Test Report Generation Software		Test Report Generator	1.0

6.6.3. Measurement & Equipment Setup

Test Date:	04/04/2016
Test Engineer:	Brian Breault
Site Temperature (°C):	22
Relative Humidity (%RH):	35
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

6.6.4. 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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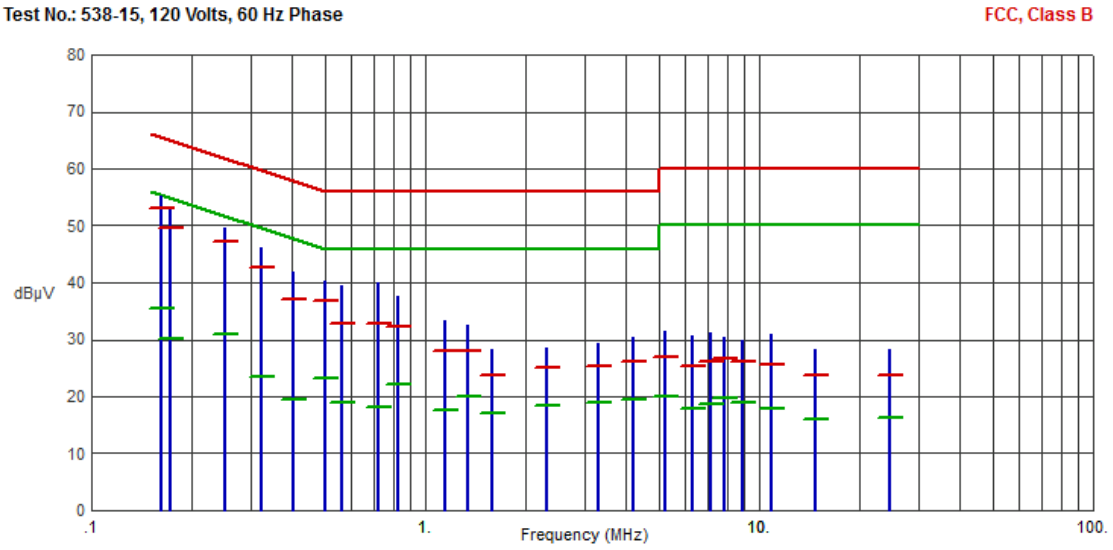
6. Measurement Data (continued)

6.7 Conducted Emissions Test Results

6.7.1 120 Volts, 60 Hz Phase



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1626	55.31	53.11	65.33	-12.22	35.40	55.33	-19.93	
.1732	53.17	49.67	64.81	-15.14	30.06	54.81	-24.75	
.2524	49.60	47.33	61.68	-14.35	30.99	51.68	-20.69	
.3246	46.12	42.60	59.59	-16.99	23.47	49.59	-26.12	
.4019	41.82	37.16	57.81	-20.65	19.47	47.81	-28.34	
.5034	40.22	36.77	56.00	-19.23	23.16	46.00	-22.84	
.5646	39.47	32.70	56.00	-23.30	18.91	46.00	-27.09	
.7260	39.95	32.69	56.00	-23.31	18.11	46.00	-27.89	
.8265	37.57	32.38	56.00	-23.62	22.22	46.00	-23.78	
1.1486	33.41	28.04	56.00	-27.96	17.49	46.00	-28.51	
1.3393	32.58	28.04	56.00	-27.96	20.08	46.00	-25.92	
1.5798	28.19	23.72	56.00	-32.28	17.01	46.00	-28.99	
2.3147	28.53	24.94	56.00	-31.06	18.32	46.00	-27.68	
3.2853	29.44	25.21	56.00	-30.79	18.95	46.00	-27.05	
4.1799	30.31	26.14	56.00	-29.86	19.57	46.00	-26.43	
5.2164	31.54	27.01	60.00	-32.99	20.04	50.00	-29.96	
6.2982	30.58	25.43	60.00	-34.57	17.99	50.00	-32.01	
7.1902	31.15	26.08	60.00	-33.92	18.64	50.00	-31.36	
7.8295	30.36	26.74	60.00	-33.26	19.72	50.00	-30.28	
8.9017	29.75	26.08	60.00	-33.92	18.97	50.00	-31.03	
10.8327	30.82	25.53	60.00	-34.47	17.94	50.00	-32.06	
14.6624	28.15	23.62	60.00	-36.38	16.12	50.00	-33.88	
24.6403	28.16	23.70	60.00	-36.30	16.21	50.00	-33.79	

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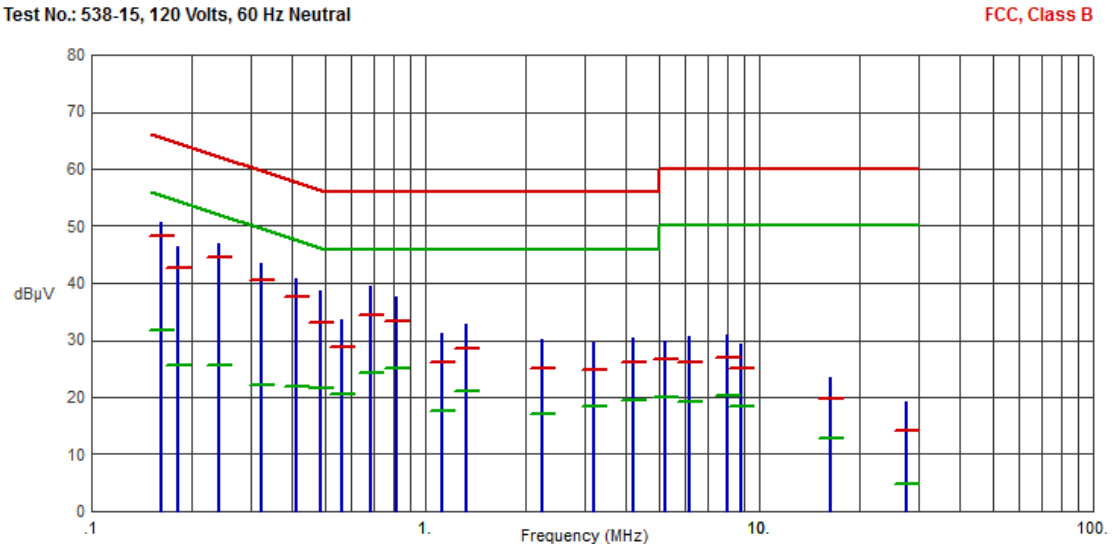
6. Measurement Data (continued)

6.7. Conducted Emissions Test Results (continued)

6.7.2. 120 Volts, 60 Hz Neutral



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1621	50.68	48.38	65.36	-16.98	31.61	55.36	-23.75	
.1809	46.48	42.59	64.44	-21.85	25.55	54.44	-28.89	
.2420	46.99	44.44	62.03	-17.59	25.73	52.03	-26.30	
.3223	43.51	40.44	59.65	-19.21	22.21	49.65	-27.44	
.4110	40.70	37.55	57.63	-20.08	21.75	47.63	-25.88	
.4858	38.62	33.18	56.24	-23.06	21.53	46.24	-24.71	
.5651	33.64	28.90	56.00	-27.10	20.58	46.00	-25.42	
.6852	39.55	34.44	56.00	-21.56	24.32	46.00	-21.68	
.8220	37.68	33.23	56.00	-22.77	25.00	46.00	-21.00	
1.1169	31.08	26.16	56.00	-29.84	17.51	46.00	-28.49	
1.3224	32.92	28.61	56.00	-27.39	21.17	46.00	-24.83	
2.2468	30.07	25.04	56.00	-30.96	17.07	46.00	-28.93	
3.1976	29.51	24.84	56.00	-31.16	18.50	46.00	-27.50	
4.2016	30.35	26.06	56.00	-29.94	19.50	46.00	-26.50	
5.2218	29.79	26.69	60.00	-33.31	19.97	50.00	-30.03	
6.1504	30.55	26.26	60.00	-33.74	19.14	50.00	-30.86	
8.0021	30.99	26.82	60.00	-33.18	20.23	50.00	-29.77	
8.8140	29.25	25.18	60.00	-34.82	18.41	50.00	-31.59	
16.3036	23.34	19.80	60.00	-40.20	12.84	50.00	-37.16	
27.7110	19.23	14.10	60.00	-45.90	4.79	50.00	-45.21	

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6. Measurement Data (continued)

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

6.8.1. 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 2	Channel 4	Channel 4	
Input:	P_{MAX}	0.9207	0.9663	0.9060	mW
	d_{MIN}	5.00	5.00	5.00	mm
	$f_{(GHz)}$	3.994	3.995	3.983	GHz
Test Exclusion:		**0.37**	**0.39**	**0.36**	
Limit Exemption:		**3.00**	**3.00**	**3.00**	

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

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

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7. Test Images

7.1. Spurious and Harmonic Emissions – 32 kHz to 1 GHz Front

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7. Test Images

7.2. Spurious and Harmonic Emissions – 32 kHz to 30 MHz Rear

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7. Test Images

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

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7. Test Images

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

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7. Test Images

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

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7. Test Images

7.6. Conducted Emissions (Front)

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7. Test Images

7.7. Conducted Emissions (Rear)

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8. 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 Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023A-1)**.

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 required by EN 55022.

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

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