

COMPLIANCE WORLDWIDE INC. TEST REPORT 265-16R1

In Accordance with the Requirements of
Federal Communications Commission 47 CFR Part 15.517, Subpart F
Technical Requirements for Indoor UWB Systems

Issued to

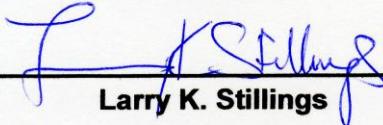
Secure Care Products, LLC
39 Chenell Drive
Concord, NH 03301
(603) 233 0745

For the
ENVisionIT®
Indoor Node

FCC ID: KNK-INDOORNODE2

Report Issued on November 8, 2016
Revision R1 Issued on January 23, 2017

Tested By



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Reviewed By



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1. Scope

This test report certifies that the Secure Care Patient ENVisionIT Indoor Node 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. Revision R1 adds additional measurements in Section 6.6

2. Product Details

2.1. Manufacturer:	Secure Care Products, LLC
2.2. Model Number:	A03490900-2
2.3. Serial Number:	Pre-production unit
2.4. Description:	ENVisionIT® RTLS Indoor node is an anchor mounted on a wall or ceiling used to determine patient, employee, and asset locations within a building.
2.5. Power Source:	12 VDC via External Wall Adapter (Solytech Enterprise Corp Model AD2412CW)
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)
2.10. EMC Modifications:	None

3. Product Configuration

3.1 Operational Characteristics & Software

Hardware Setup:

Connect the Indoor Node to the laptop via its USB/Cheetah adapter.

Using the decaranging software configure the device to transmit on Channel 2 using a 64M PRF with a data rate of 110 kbps in continuous frame mode.

Remove the USB/Cheetah adapter from the Low cost node.

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Volts	Freq (Hz)	Description/Function
Secure Care	A03490900-2	Pre production	12.0	DC	Indoor Node
Gainspan	GS2011MIE	FCC ID: YOPGS2011MIE			2.4 GHz WiFi Module

3.3. Support Equipment

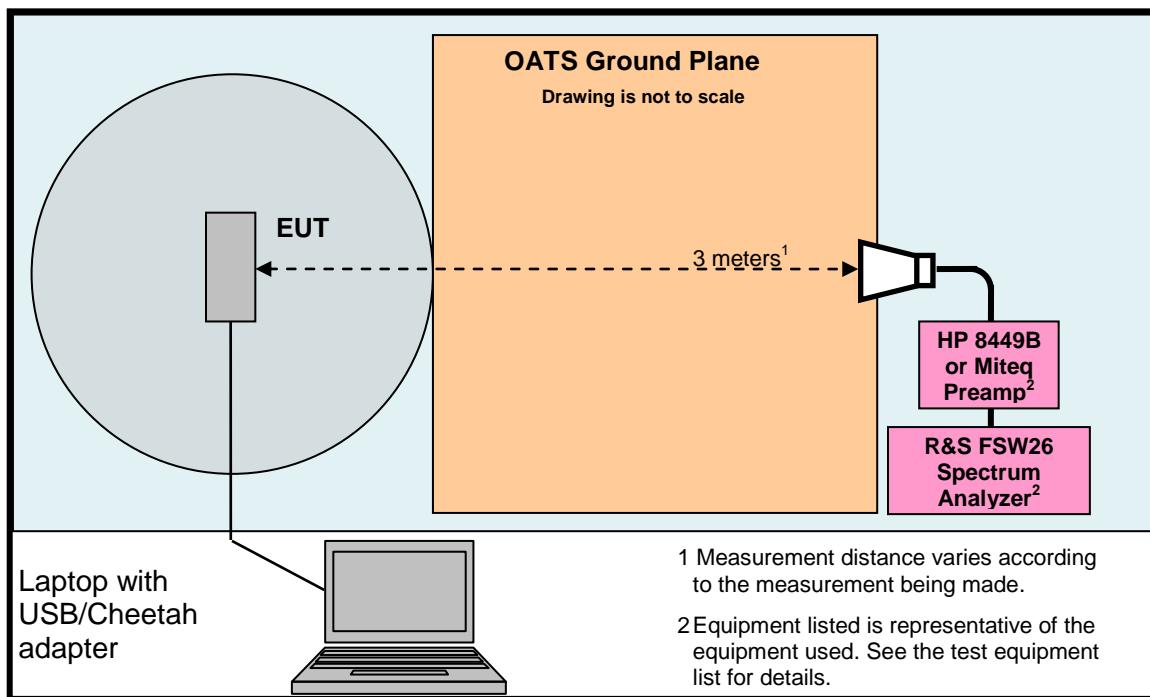
Device	Manufacturer	Model	Serial No.
Laptop with USB Cheetah SPI	Lenovo ThinkPad	T500	L3-B0371

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3. Product Configuration (cont.)

3.4. Test Setup Diagram



Cable Type	Shield	Length	From	To
Power Cable	No	2M	Low Cost Node	12 VDC Adapter / 120V 60 Hz
Ethernet Cable	No	2M	Node	Un-terminated

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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	7/23/2017	2 Years
Spectrum Analyzer 9 kHz to 40 GHz	Rohde & Schwarz	FSV40	100899	7/23/2017	2 Years
Spectrum Analyzer 10 Hz to 40 GHz	Rohde & Schwarz	FSVR40	100909	7/23/2017	2 Years
Spectrum Analyzer 3 Hz to 26.5 GHz	Rohde & Schwarz	FSW26	102044	6/1/2017	1 Year
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences	JB1	A050913	6/3/2018	2 Years
Loop Antenna 9 kHz to 30 MHz	EMCO	6512	9309-1139	6/26/2018	2 Years
Preamplifier 100 MHz to 7 GHz	Miteq	AFS3-00100200-10-15P-4	988773	6/2/2017	1 Year
Preamplifier 100 MHz to 18 GHz	Miteq	AMF-7D-00101800-30-10P	1953081	6/1/2017	1 Year
Preamplifier 1 to 26.5 GHz	Hewlett Packard	8449B	3008A01323	7/22/2017	2 Years
Preamplifier 18 to 40 GHz	Avantek	AWT-40039	FM22038832	6/2/2017	1 Year
Horn Antenna 1 to 18 GHz	ETS-Lindgren	3117	00143292	2/22/2019	3 Years
Horn Antenna 18 to 40 GHz	Com Power	AH-840	101032	2/24/2018	2 Years
High Pass Filter 8 to 18 GHz	Micro-Tronics	HPM50107	G036	5/15/2017	1 Year
Barometer	Control Company	4195	Cal ID# 236	10/8/2017	2 Years

¹ ESR7 Firmware revision: V2.28,SP1 Date installed: 9/2/2016 Previous V2.26, installed 8/15/2014.
² FSV40 Firmware revision: V2.30 SP4, Date installed: 5/4/2016 Previous V2.30 SP1, installed 10/22/2014.
³ FSVR40 Firmware revision: V2.23, Date installed: 10/20/2014 Previous V1.63 SP1, installed 8/28/2013.
⁴ FSW26 Firmware revision: V2.50, Date installed: 9/12/2016 Previous V2.40, installed 5/4/2016.

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4. Measurements Parameters (continued)

4.2. Measurement & Equipment Setup

Test Dates:	5/24/2016, 6/24/2016, 7/20/2016, 7/25/2016, 9/29/2016, 11/7/2016, 11/8/2016, 1/23/2017
Test Engineers:	Brian Breault, 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, 15.517 Subpart F.

The test methods used to generate the data in 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)	$\pm 1 \times 10^{-8}$
Radiated Emission of Transmitter to 100 GHz	± 4.55 dB
Radiated Emission of Receiver	± 4.55 dB
Temperature	$\pm 0.91^\circ$ 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 RP-SMA Connector
Operational Requirements	15.517 (a)	6.2	Compliant	
UWB Bandwidth	15.503 (a) (d) 15.517 (b)	6.3	Compliant	
Radiated Emissions below 960 MHz	15.517 (c) 15.209	6.4	Compliant	
Radiated Emissions above 960 MHz	15.517 (c) 15.521 (d)	6.5	Compliant	
Radiated Emissions in GPS Bands	15.517 (d)	6.6	Compliant	
RMS Power of UWB in a 1 MHz Bandwidth	15.517 (c) 15.521 (d)	6.7	Complaint	
Peak Emissions in a 50 MHz Bandwidth	15.517 (e) 15.521 (g)	6.8	Compliant	
Conducted Emissions	15.207	6.9 6.10	Compliant	
Radio Frequency Exposure	FCC OET Bulletin 65	6.11	Compliant	

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 contains a reverse polarity sma connector.

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6. Measurement Data (continued)

6.2. Operational Requirements of the Device under Test (15.517 (a))

Requirement: (1) Indoor UWB devices, by the nature of their design, must be capable of operation only indoors. The necessity to operate with a fixed indoor infrastructure, e.g., a transmitter that must be connected to the AC power lines, may be considered sufficient to demonstrate this.

Result: Compliant, the EUT uses an external wall adapter.

(2) The emissions from the equipment operated under this section shall not be intentional directed outside of the building in which the equipment is located, such as through a window or a doorway, to perform an outside function, such as the detection of persons about to enter a building.

(3) The use of outdoor mounted antennas, e.g. antennas mounted on the outside of a building or on a telephone pole, or any other outdoors infrastructure is prohibited.

Result: Compliant, the EUT is designed to be wall or ceiling mounted with a permanently attached antenna.

(4) Field disturbance sensors installed inside of metal or underground storage tanks are considered to operate indoors provided the emissions are directed towards the ground.

Result: Not Applicable, Compliant.

(5) A communications system shall transmit only when the intentional radiator is sending information to an associated receiver.

Result: Compliant, the EUT transmits time-stamp information to associated receivers (nodes).

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6. Measurement Data (continued)

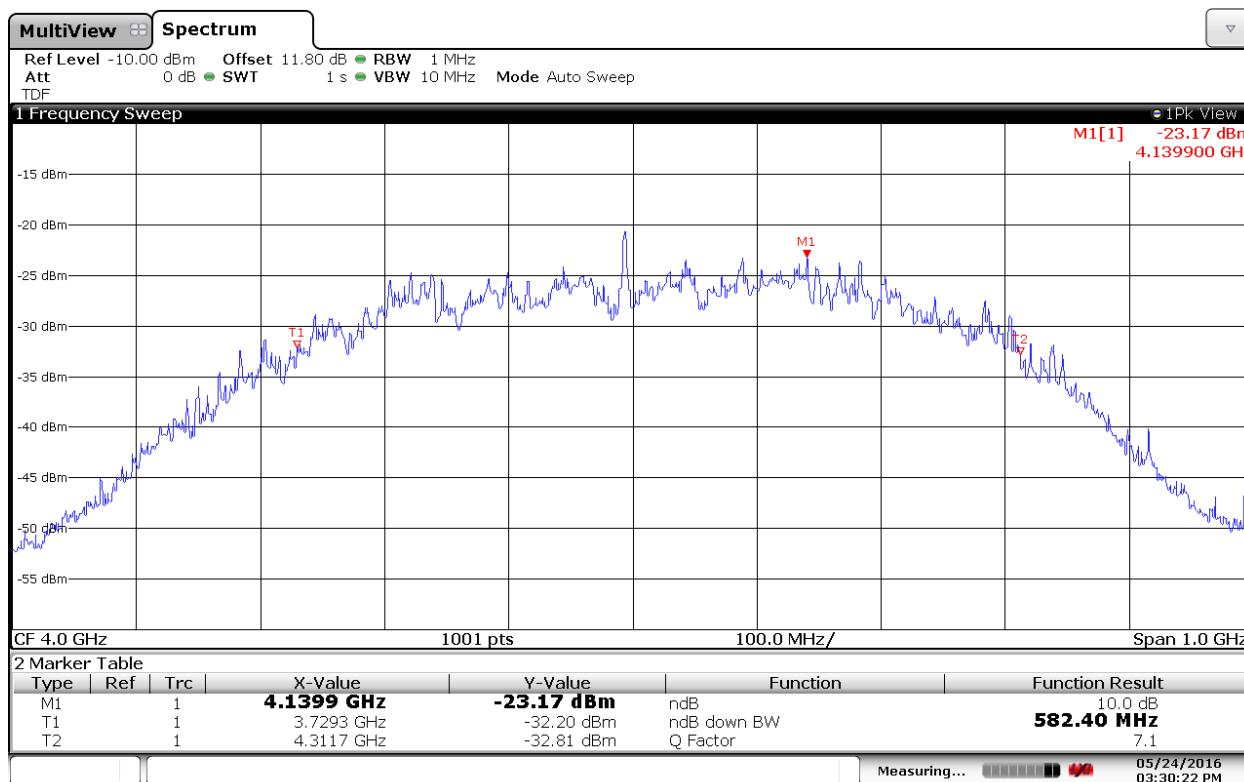
6.3. UWB Bandwidth (15.503 (a) (d), 15.517 (b))

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	4.1399
f_L	10 dB below the highest peak	3.7293
f_H	10 dB above the highest peak	4.3117
f_C	Calculated: $(f_H + f_L) / 2$	4.0205
Bandwidth	Calculated: $(f_H - f_L)$	0.5824
Fractional BW	Calculated: $2*(f_H - f_L) / (f_H + f_L)$	0.1449

6.3.2. Measurement Plot of 10 dB frequencies (Channel 2, 110 kbps, 64M PRF)



03:30:22 PM 05/24/2016

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6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (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)

Frequency (MHz)	Field Strength (dB μ V/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.

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 (minimum):	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

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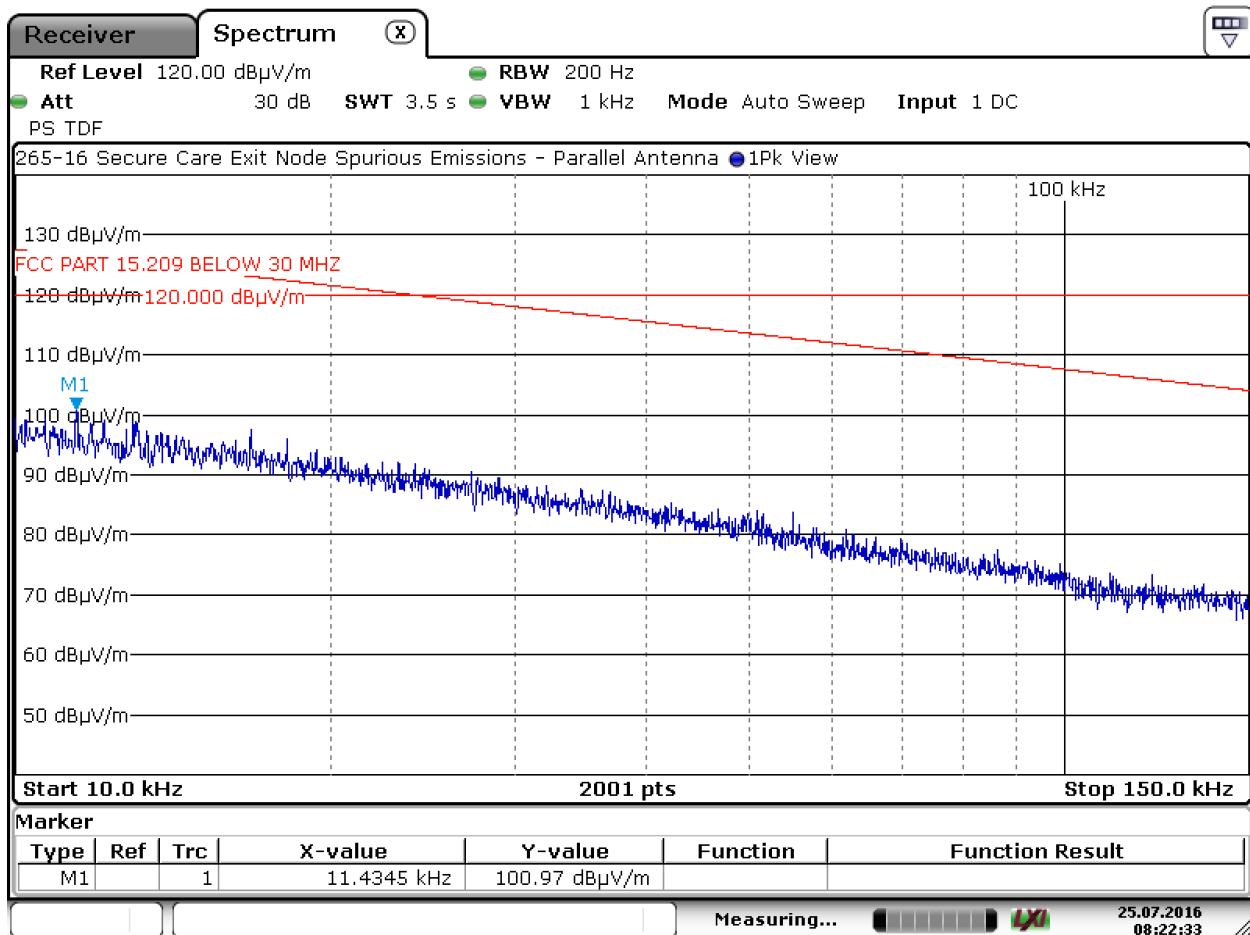
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (c), 15.209)

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 30 MHz on our 3 Meter OATS.

6.4.1.1 Parallel Measurement Antenna – 10 to 150 kHz



Date: 25.JUL.2016 08:22:34

Test Number: 265-16R1
Issue Date: 1/23/2017

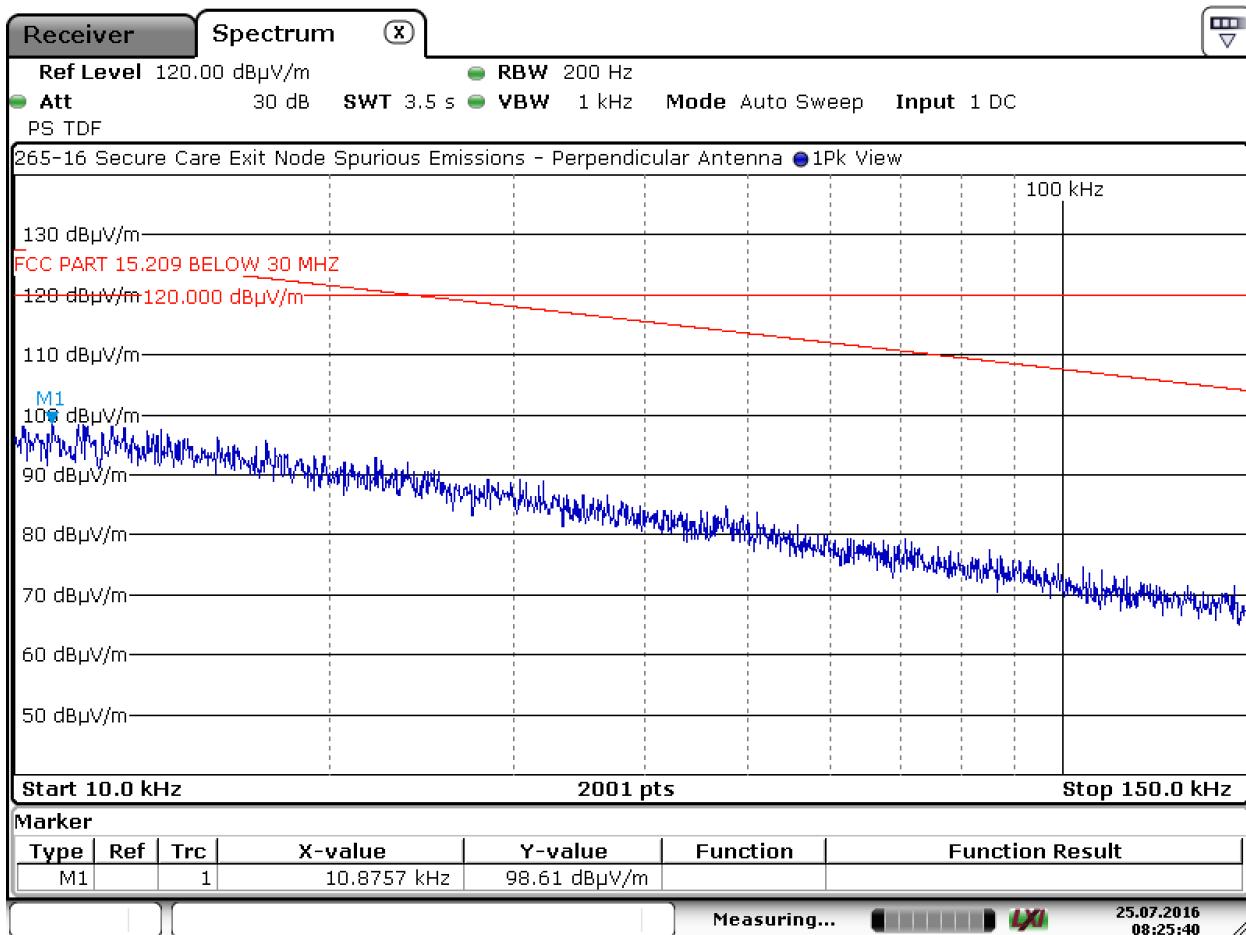
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (c), 15.209)

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 30 MHz on our 3 Meter OATS.

6.4.1.2 Perpendicular Measurement Antenna – 10 to 150 kHz



Date: 25.JUL.2016 08:25:41

Test Number: 265-16R1
Issue Date: 1/23/2017

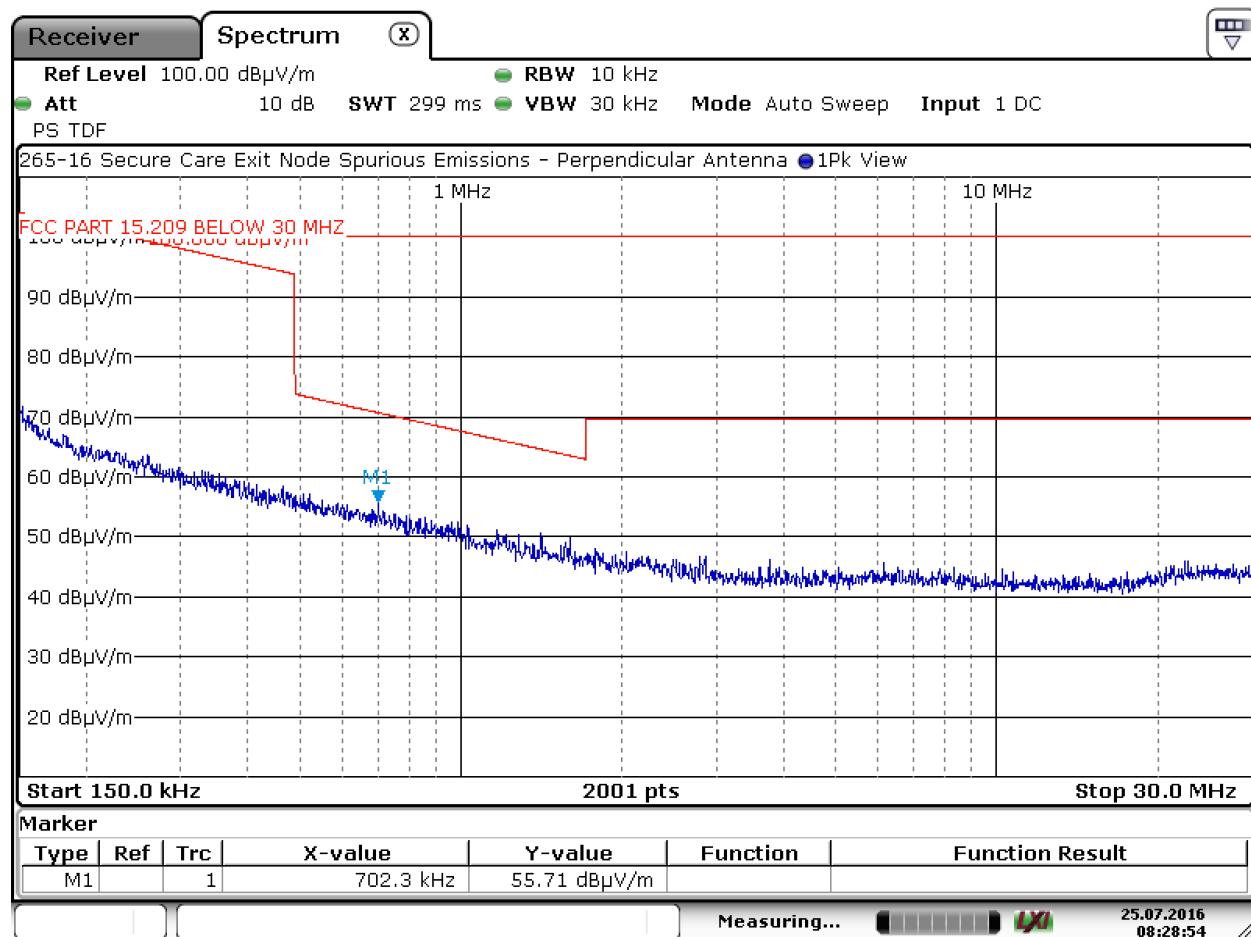
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (c), 15.209)

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 30 MHz on our 3 Meter OATS.

6.4.1.3 Parallel Measurement Antenna – 150 kHz to 30 MHz



Date: 25.JUL.2016 08:28:55

Test Number: 265-16R1
Issue Date: 1/23/2017

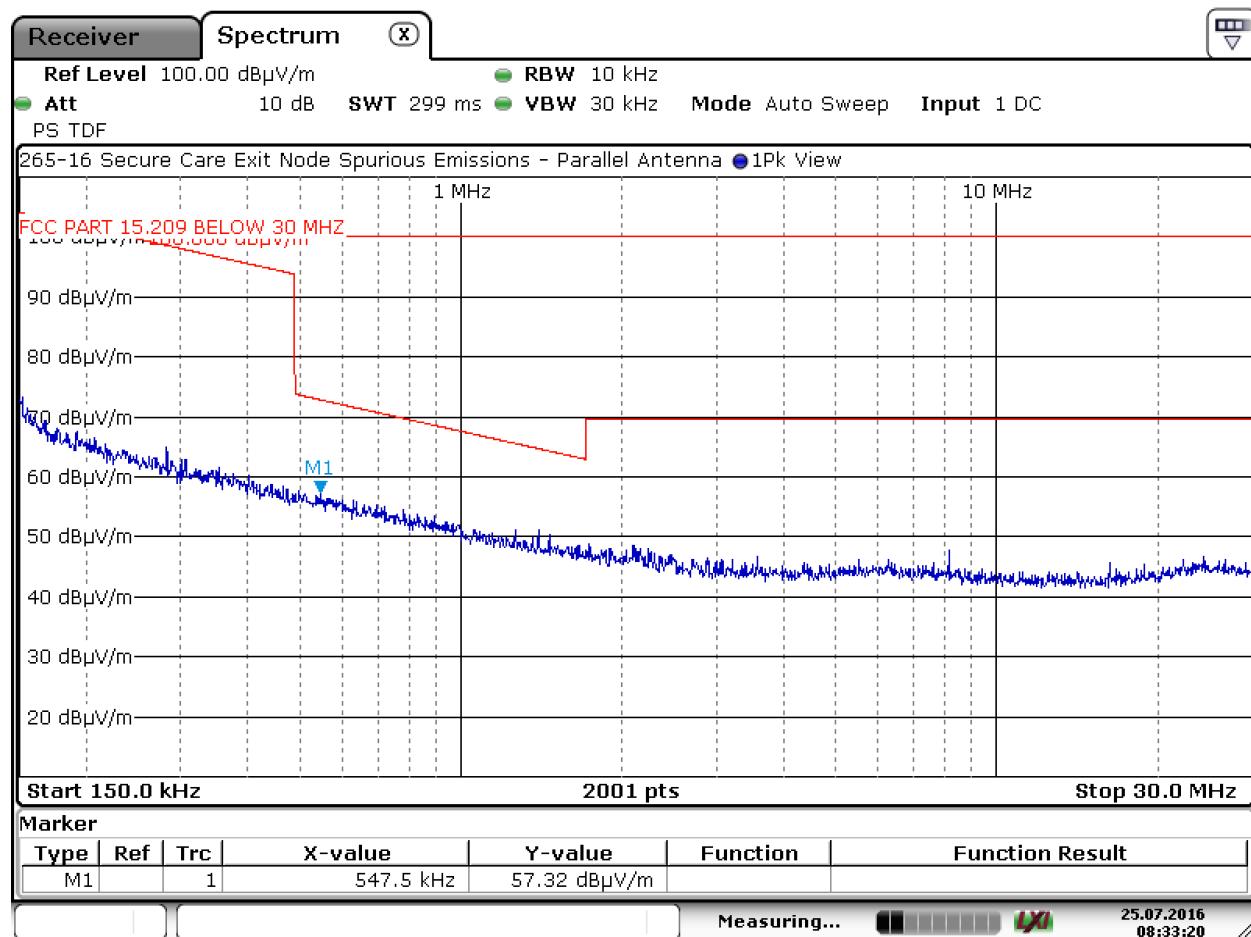
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (c), 15.209)

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 Perpendicular Measurement Antenna – 150 kHz to 30 MHz



Date: 25.JUL.2016 08:33:21

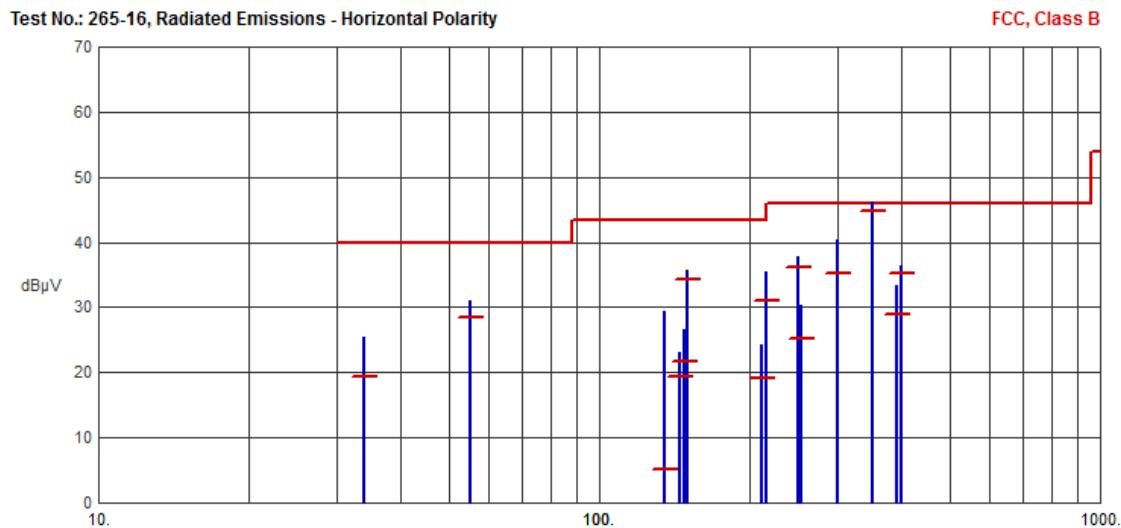
Test Number: 265-16R1
Issue Date: 1/23/2017

6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (c), 15.209)

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

6.4.1.5 Horizontal Polarity – 30 to 960 MHz



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
34.0169	25.46	19.27	40.00	-20.73	N/A	N/A	
55.0769	31.03	28.44	40.00	-11.56	N/A	N/A	
135.1758	29.35	5.15	43.50	-38.35	N/A	N/A	
145.2334	23.00	19.30	43.50	-24.20	N/A	N/A	
148.2582	26.70	21.80	43.50	-21.70	N/A	N/A	
150.0045	35.60	34.38	43.50	-9.12	N/A	N/A	
210.2782	24.30	19.02	43.50	-24.48	N/A	N/A	
215.2989	35.52	31.10	43.50	-12.40	N/A	N/A	
249.9989	37.76	36.13	46.00	-9.87	N/A	N/A	
252.3391	30.32	25.30	46.00	-20.70	N/A	N/A	
299.9946	40.35	35.21	46.00	-10.79	N/A	N/A	
349.9922	46.20	44.70	46.00	-1.30	N/A	N/A	
392.3398	33.40	28.92	46.00	-17.08	N/A	N/A	
399.9901	36.48	35.17	46.00	-10.83	N/A	N/A	

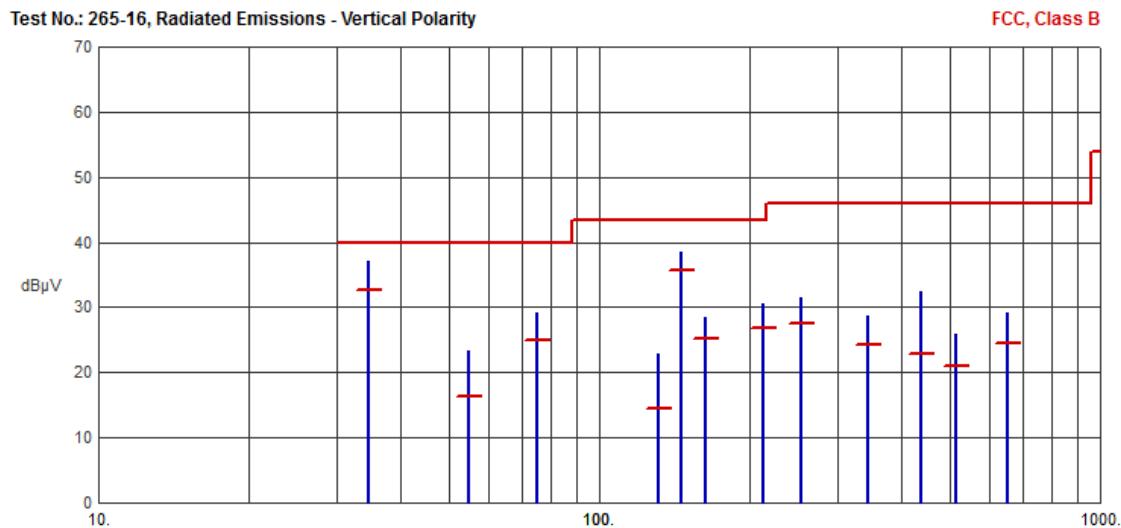
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6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.517 (c), 15.209)

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

6.4.1.6 Vertical Polarity – 30 to 960 MHz



Frequency (MHz)	Pk Amp (dB μ V/m)	QP Amp (dB μ V/m)	QP Limit (dB μ V/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
34.5715	37.15	32.60	40.00	-7.40	N/A	N/A	
55.0633	23.43	16.22	40.00	-23.78	N/A	N/A	
75.0661	29.25	24.86	40.00	-15.14	N/A	N/A	
131.1196	22.92	14.39	43.50	-29.11	N/A	N/A	
146.1202	38.55	35.70	43.50	-7.80	N/A	N/A	
163.1837	28.40	25.16	43.50	-18.34	N/A	N/A	
212.1649	30.56	26.78	43.50	-16.72	N/A	N/A	
252.2762	31.49	27.50	46.00	-18.50	N/A	N/A	
343.2910	28.70	24.36	46.00	-21.64	N/A	N/A	
439.3234	32.36	22.79	46.00	-23.21	N/A	N/A	
516.5730	25.96	21.05	46.00	-24.95	N/A	N/A	
655.2090	29.24	24.47	46.00	-21.53	N/A	N/A	

Test Number: 265-16R1**Issue Date: 1/23/2017****6. Measurement Data (continued)****6.5. Spurious Radiated Emissions above 960 MHz (15.517 (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.

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dB μ V/m)
960 - 1610	-75.3	19.9
1610 - 1990	-53.3	41.9
1990 - 3100	-51.3	43.9
3100 - 10600	-41.3	53.9
Above 10600	-51.3	43.9

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.

Narrowband emissions at 50 MHz intervals are from the processor and Ethernet circuitry and fall under 15.209 requirements as demonstrated in the 6.5.1 to 6.5.4 plots with the UWB transmission turned on and disabled.

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.

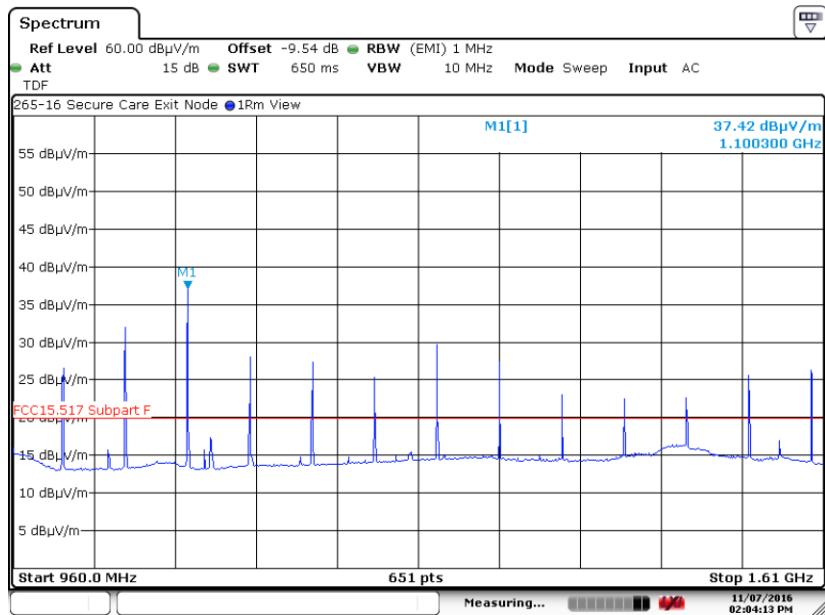
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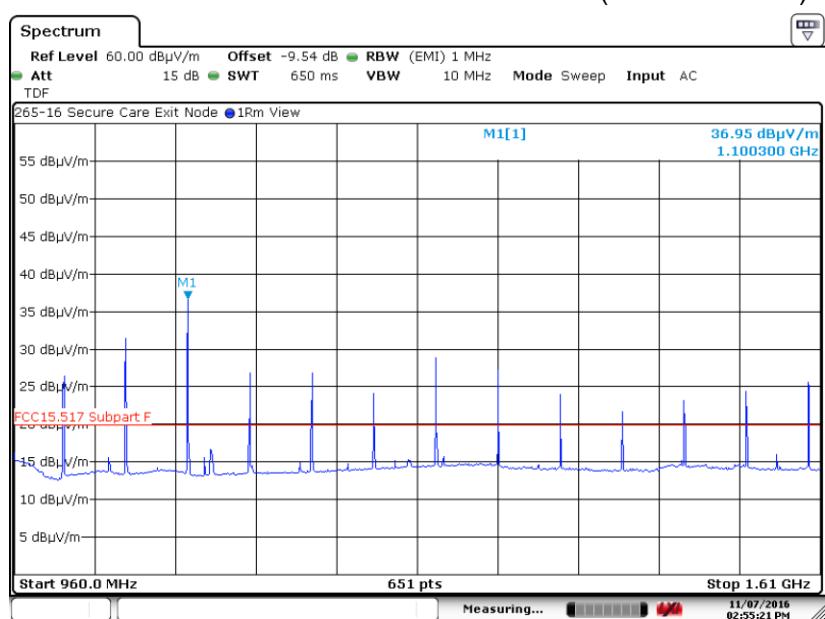
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions (15.517 (c))

6.5.1. 960 MHz to 1610 MHz Horizontal at 1 Meter



6.5.2. 960 MHz to 1610 MHz Horizontal at 1 Meter (UWB Disabled)



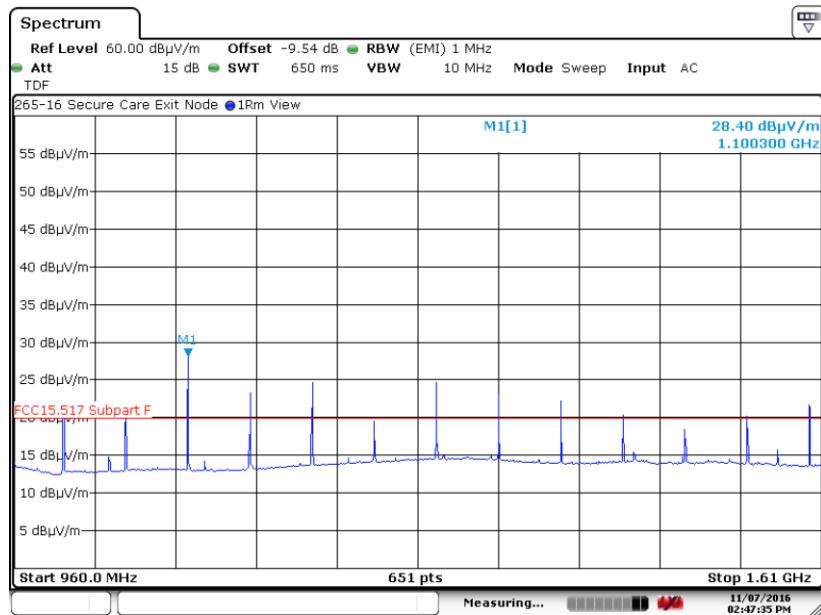
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6. Measurement Data (continued)

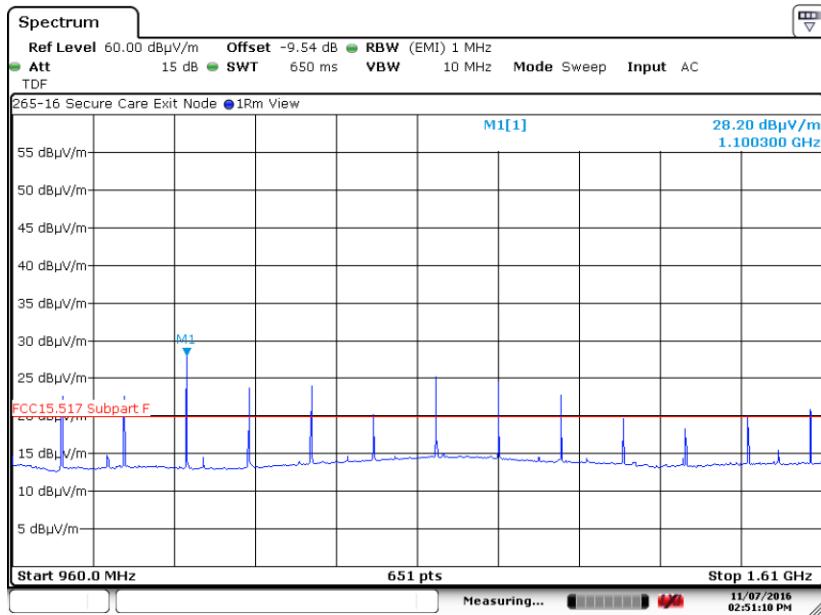
6.5. Spurious Radiated Emissions (15.517 (c))

6.5.3. 960 MHz to 1610 MHz Vertical at 1 Meter



Date: 7.NOV.2016 14:47:33

6.5.4. 960 MHz to 1610 MHz Vertical at 1 Meter (UWB Disabled)



Date: 7.NOV.2016 14:51:08

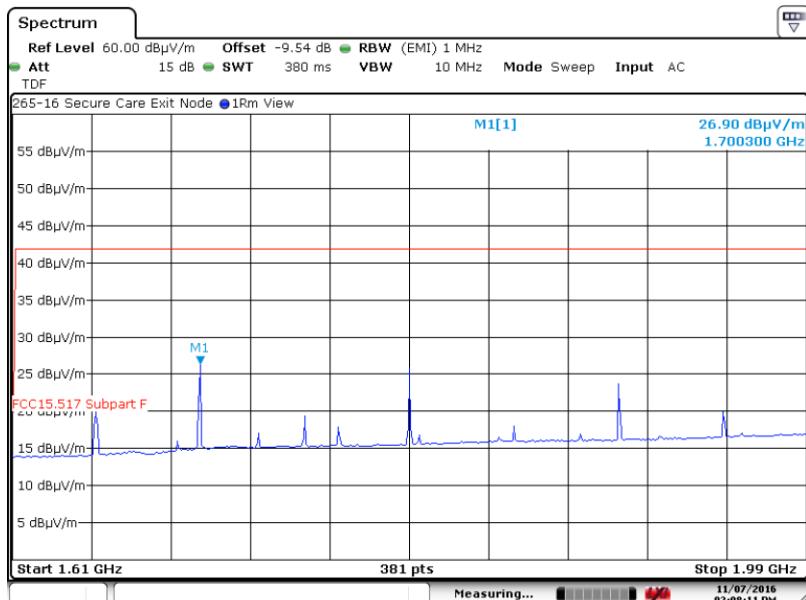
Test Number: 265-16R1

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6. Measurement Data (continued)

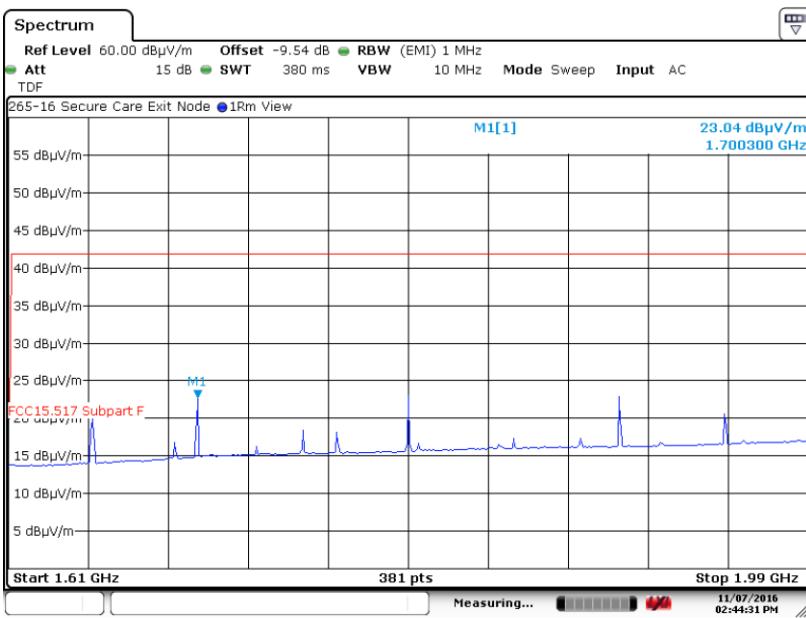
6.5. Spurious Radiated Emissions (15.517 (c))

6.5.5. 1610 MHz to 1990 MHz Horizontal at 1 Meter



Date: 7.NOV.2016 14:08:09

6.5.6. 1610 MHz to 1990 MHz Vertical at 1 Meter



Date: 7.NOV.2016 14:44:29

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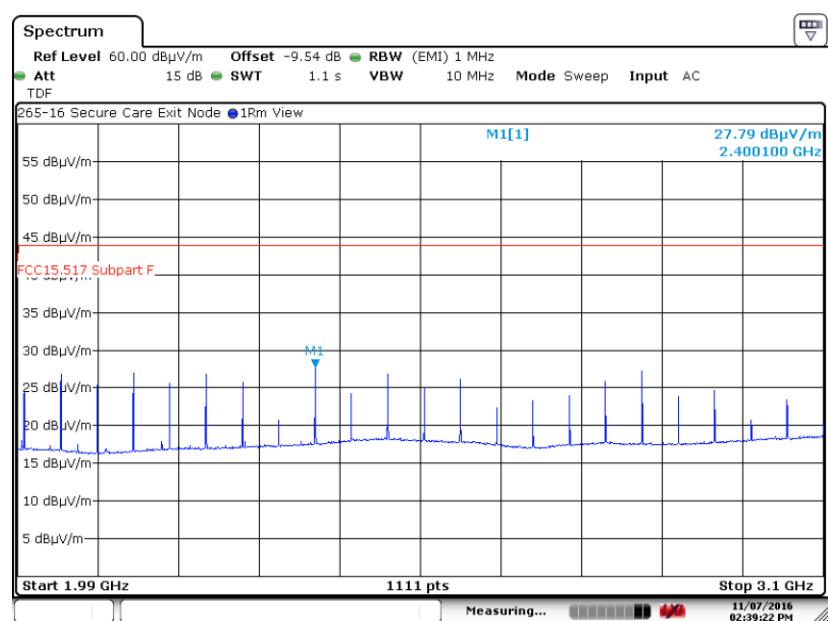
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions (15.517 (c))

6.5.7. 1990 MHz to 3.1 GHz Horizontal at 1 Meter



6.5.8. 1990 MHz to 3.1 GHz Vertical at 1 Meter



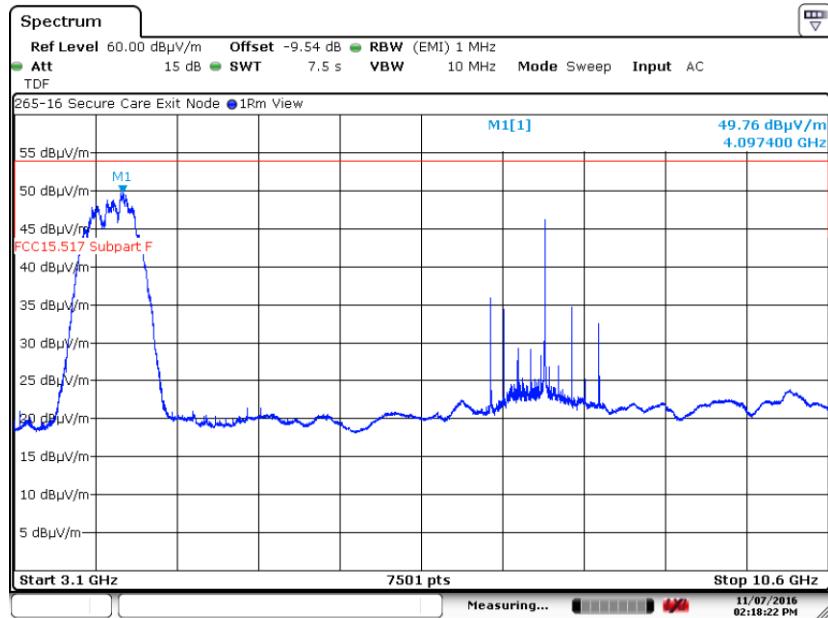
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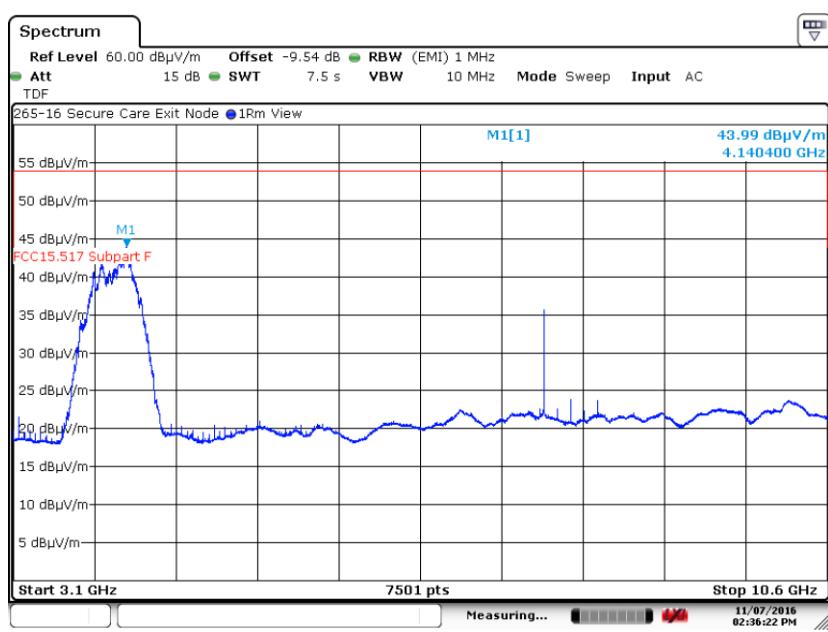
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions (15.517 (c))

6.5.9. 3.1 to 10.6 GHz Horizontal at 1 Meter



6.5.10. 3.1 to 10.6 GHz Vertical at 1 Meter



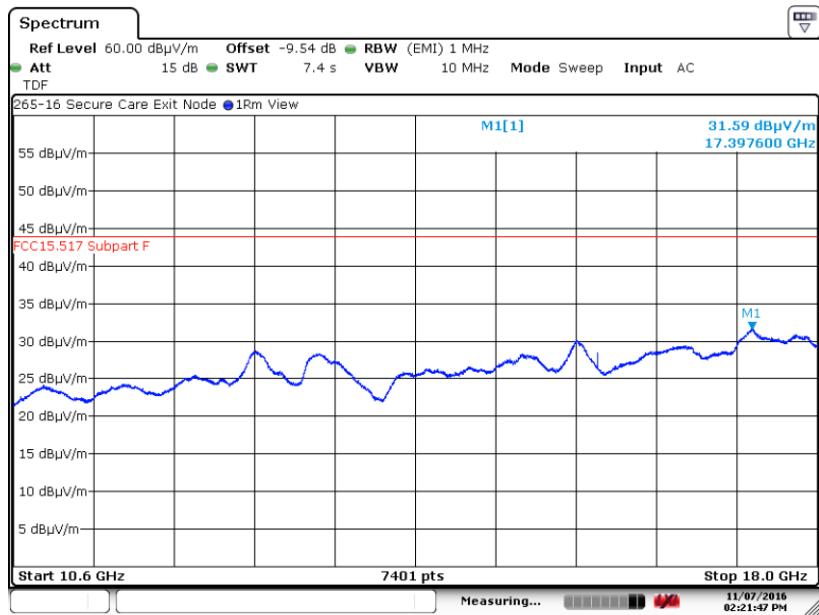
Test Number: 265-16R1

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6. Measurement Data (continued)

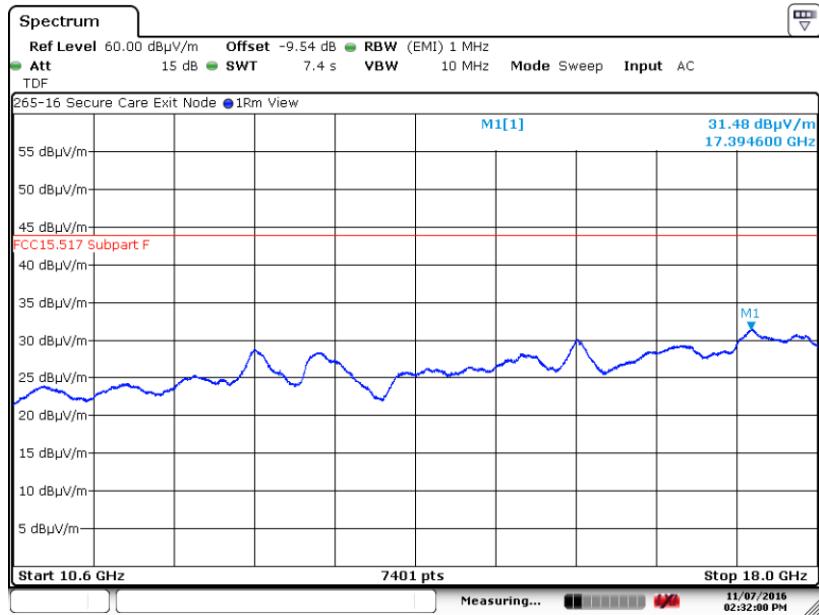
6.5. Spurious Radiated Emissions (15.517 (c))

6.5.11. 10.6 to 18 GHz Horizontal at 1 Meter



Date: 7.NOV.2016 14:21:46

6.5.12. 10.6 to 18 GHz Vertical at 1 Meter



Date: 7.NOV.2016 14:31:58

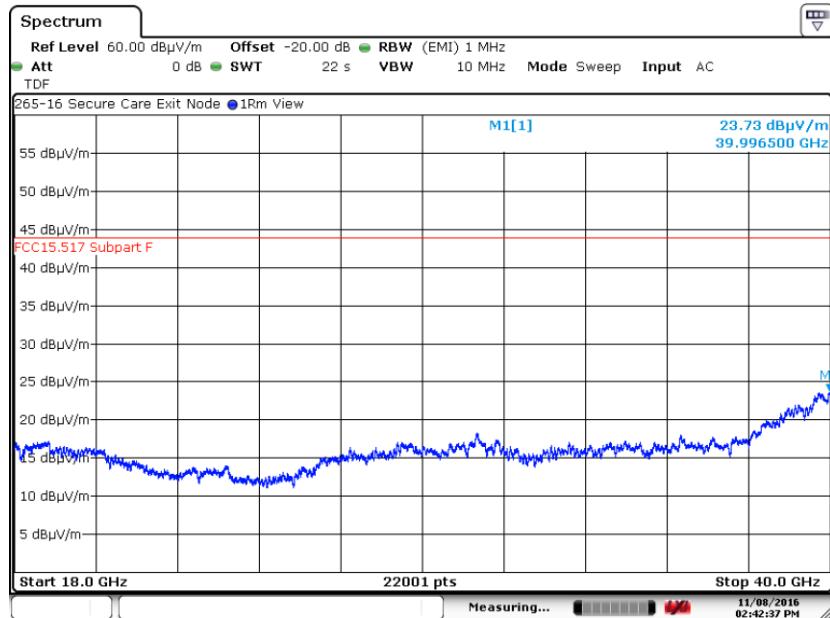
Test Number: 265-16R1

Issue Date: 1/23/2017

6. Measurement Data (continued)

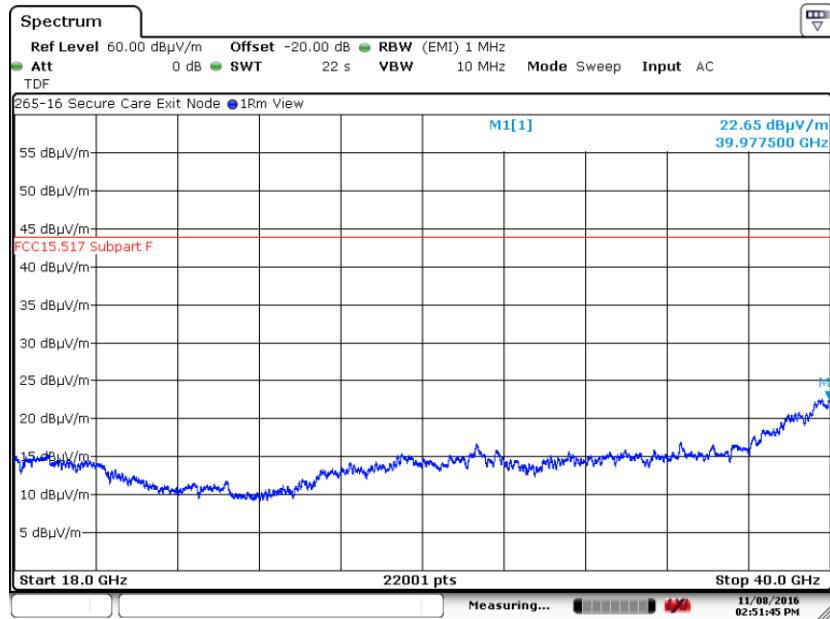
6.4. Spurious Radiated Emissions (15.517 (c))

6.5.13. 18 to 40 GHz Horizontal at 0.3 Meter



Date: 8.NOV.2016 14:42:35

6.5.14. 18 to 40 GHz Vertical at 0.3 Meter



Date: 8.NOV.2016 14:51:43

Test Number: 265-16R1

Issue Date: 1/23/2017

6. Measurement Data (continued)

6.6. Spurious Radiated Emissions in GPS Bands (15.517 (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 (dB μ V/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 Function: RMS

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 3 Meters and the -85.3 dBm limit was converted to a field strength limit of 9.9 dB μ V/m using a factor of 95.2

NOTE: The emissions at 1.200 GHz and 1.5998 GHz are related to the digital circuitry within the device and not related to the UWB transmission and therefore fall under the 15.209 limit. Plots from 6.6.3.5 to 6.6.3.8 are with the 25 MHz Oscillator removed from the Ethernet chip.

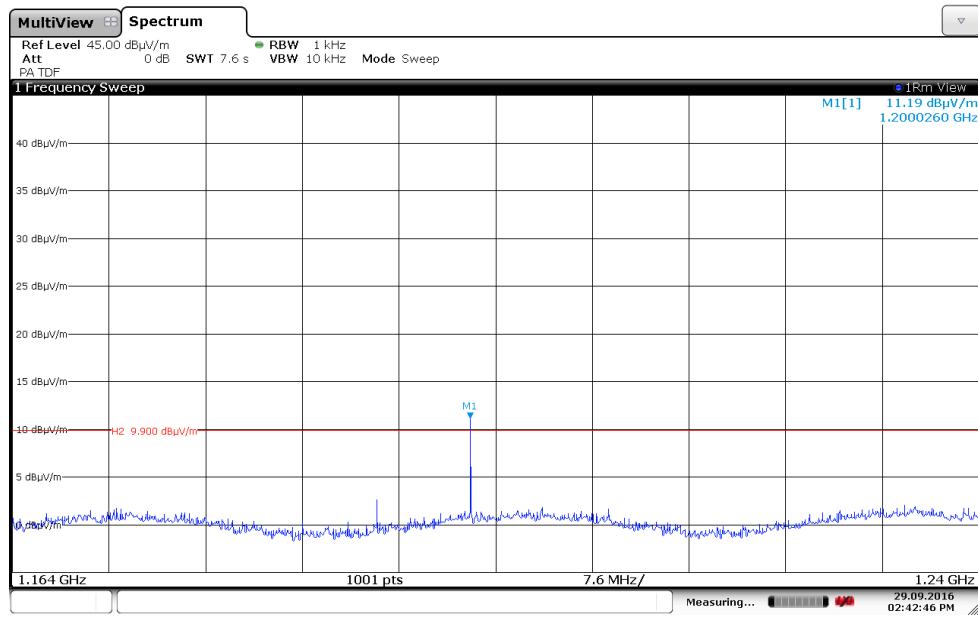
Test Number: 265-16R1

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6. Measurement Data (continued)

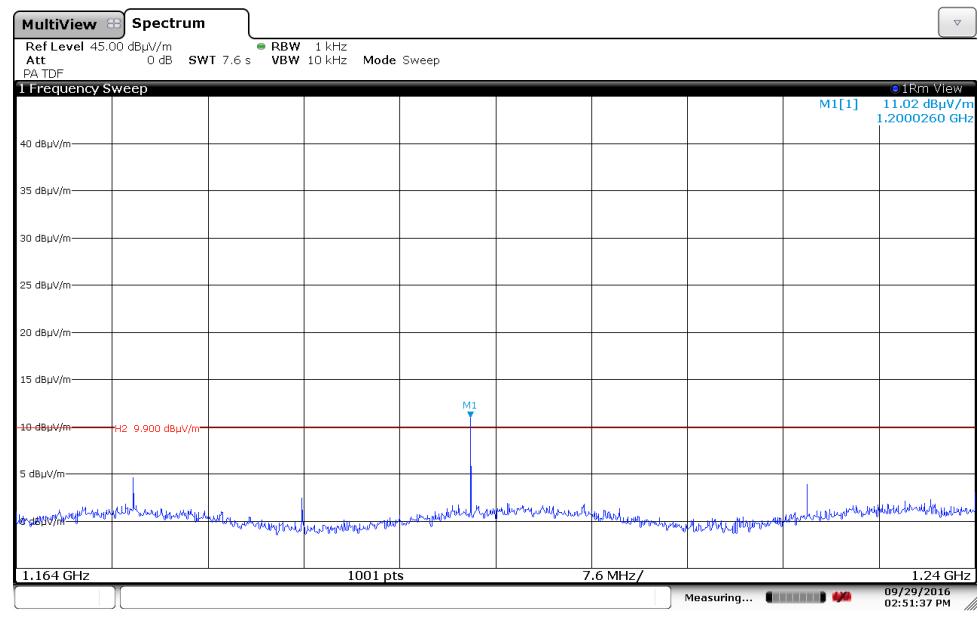
6.6. Spurious Radiated Emissions in GPS Bands (15.517 (d))

6.6.3.1 Horizontal Measurement Polarity 1164 to 1240 MHz



02:42:46 PM 09/29/2016

6.6.3.2 Vertical Measurement Polarity 1164 to 1240 MHz



02:51:38 PM 09/29/2016

Note: Narrow band emission @ 1.2000 GHz fails under 15.209 limit

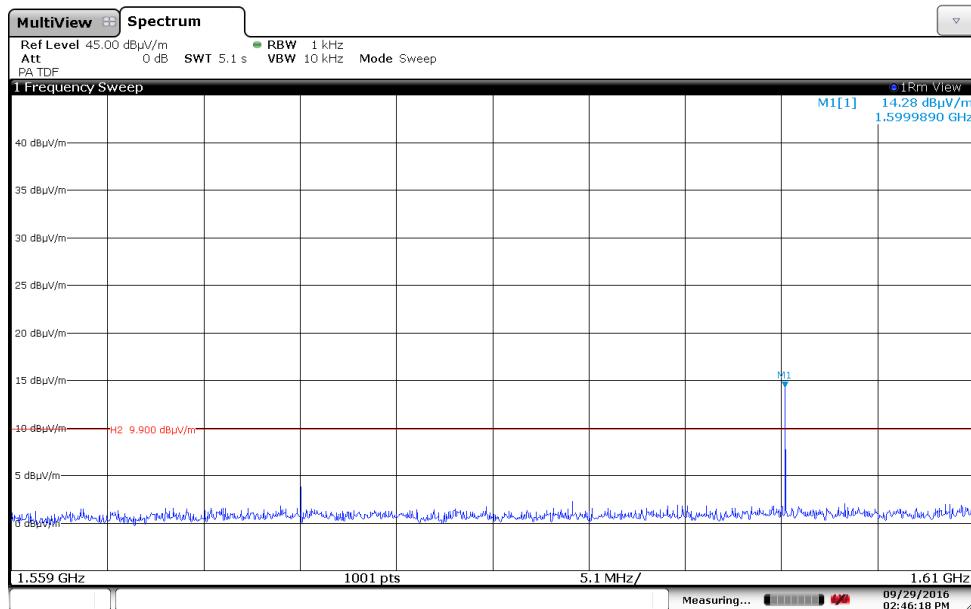
Test Number: 265-16R1

Issue Date: 1/23/2017

6. Measurement Data (continued)

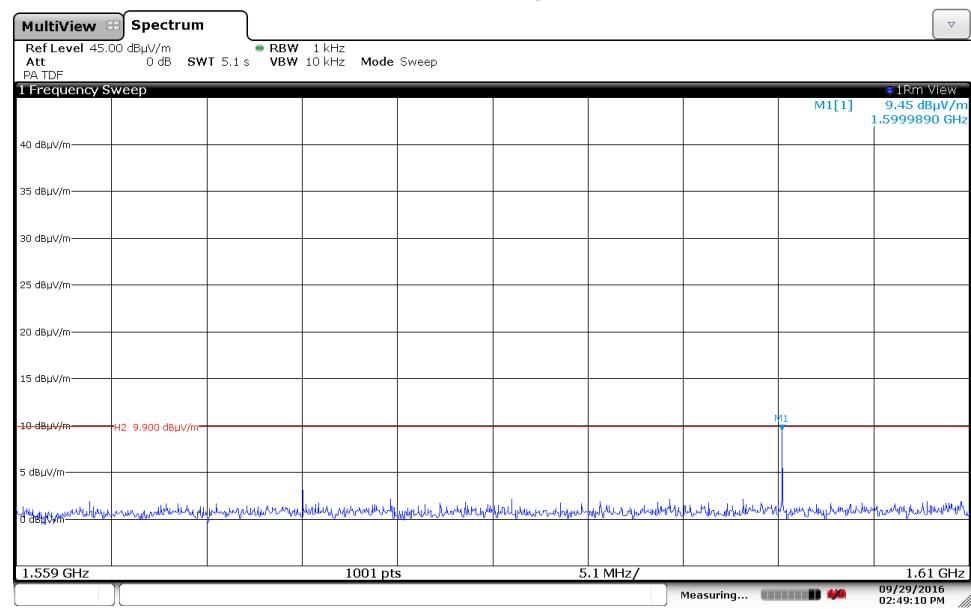
6.6. Spurious Radiated Emissions in GPS Bands (15.517 (d))

6.6.3.3 Horizontal Measurement Polarity 1559 to 1610 MHz



02:46:18 PM 09/29/2016

6.5.3.4 Vertical Measurement Polarity 1559 to 1610 MHz



02:49:11 PM 09/29/2016

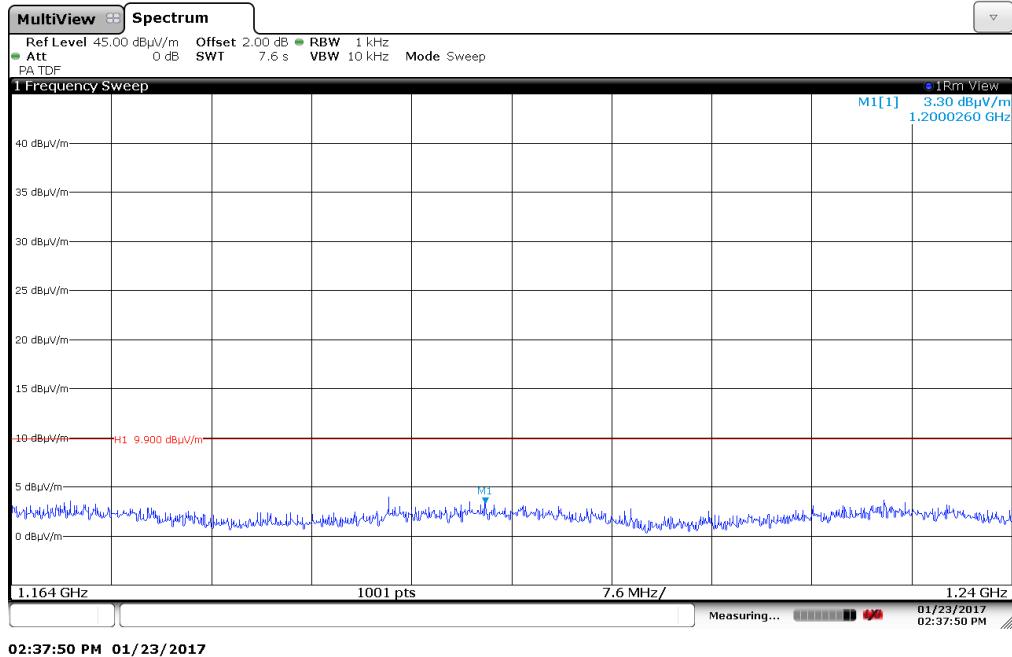
Note: Narrow band emission @ 1.5998 GHz fails under 15.209 limit

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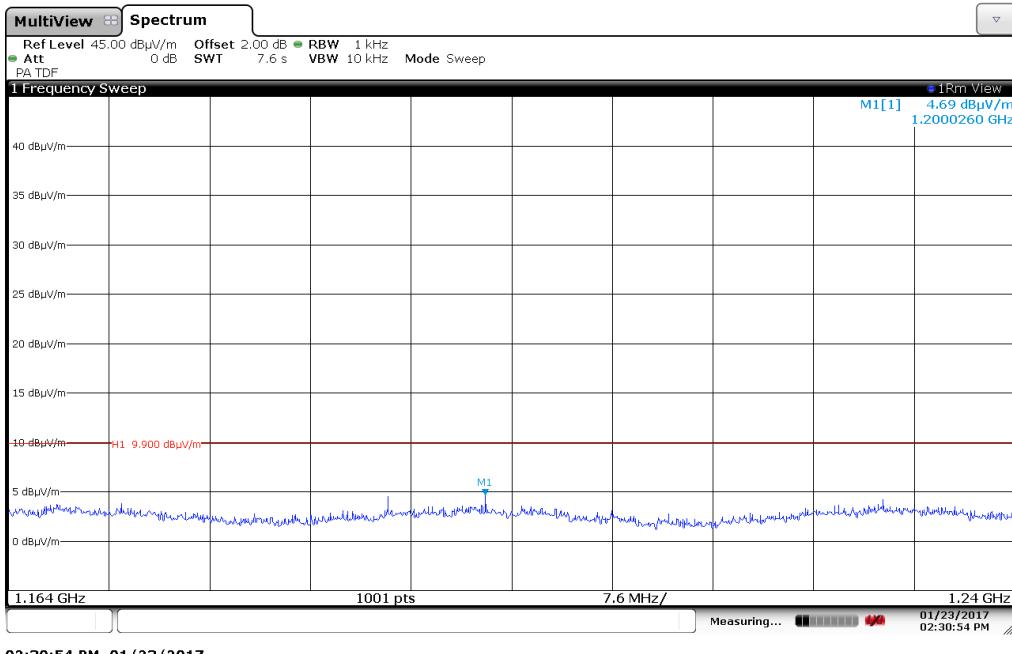
6. Measurement Data (continued)

6.6. Spurious Radiated Emissions in GPS Bands (15.517 (d))

6.6.3.5 Horizontal Measurement 1164 to 1240 MHz (25 MHz Osc Removed)



6.6.3.6 Vertical Measurement 1164 to 1240 MHz (25 MHz Osc Removed)

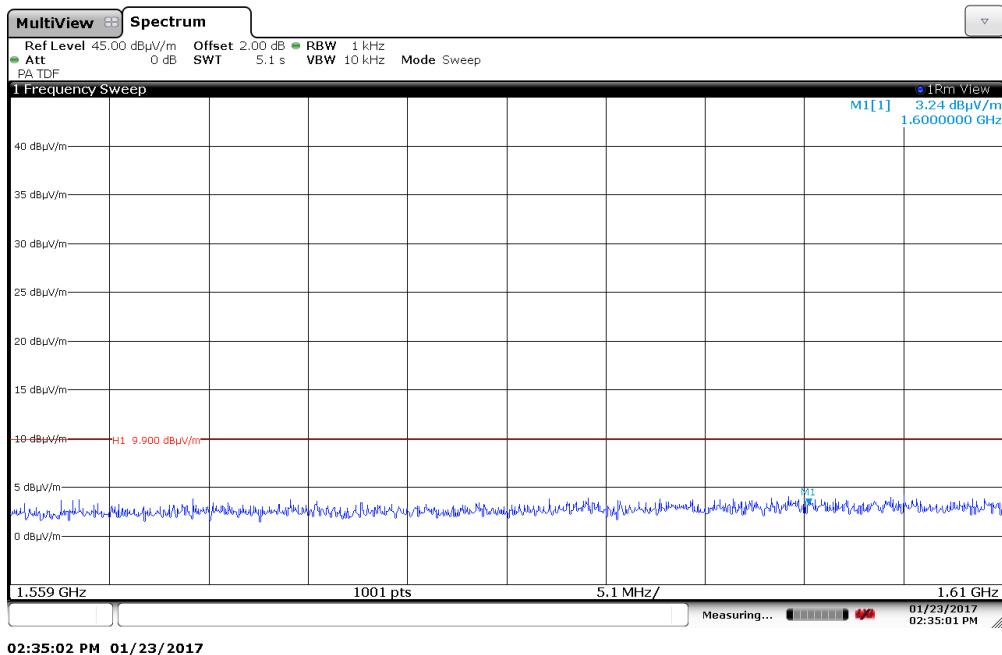


Test Number: 265-16R1
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6. Measurement Data (continued)

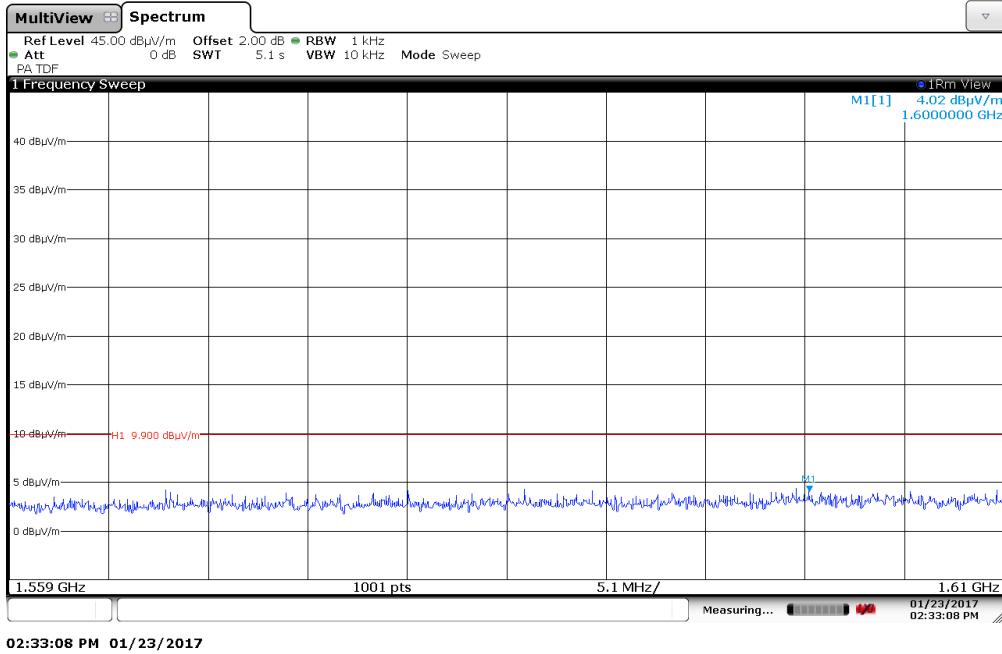
6.6. Spurious Radiated Emissions in GPS Bands (15.517 (d))

6.6.3.7 Horizontal Measurement 1559 to 1610 MHz (25 MHz Osc Removed)



02:35:02 PM 01/23/2017

6.5.3.8 Vertical Measurement 1559 to 1610 MHz (25 MHz Osc Removed)



02:33:08 PM 01/23/2017

Test Number: 265-16R1**Issue Date: 1/23/2017****6. Measurement Data (continued)****6.7. Radiated Emissions of UWB Transmission (15.517 (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.

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

Frequency Range: 3.5 to 4.5 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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Issue Date: 1/23/2017

6. Measurement Data (continued)

6.7. RMS Power in a 1 MHz RBW (15.517 (c), 15.521 (d))

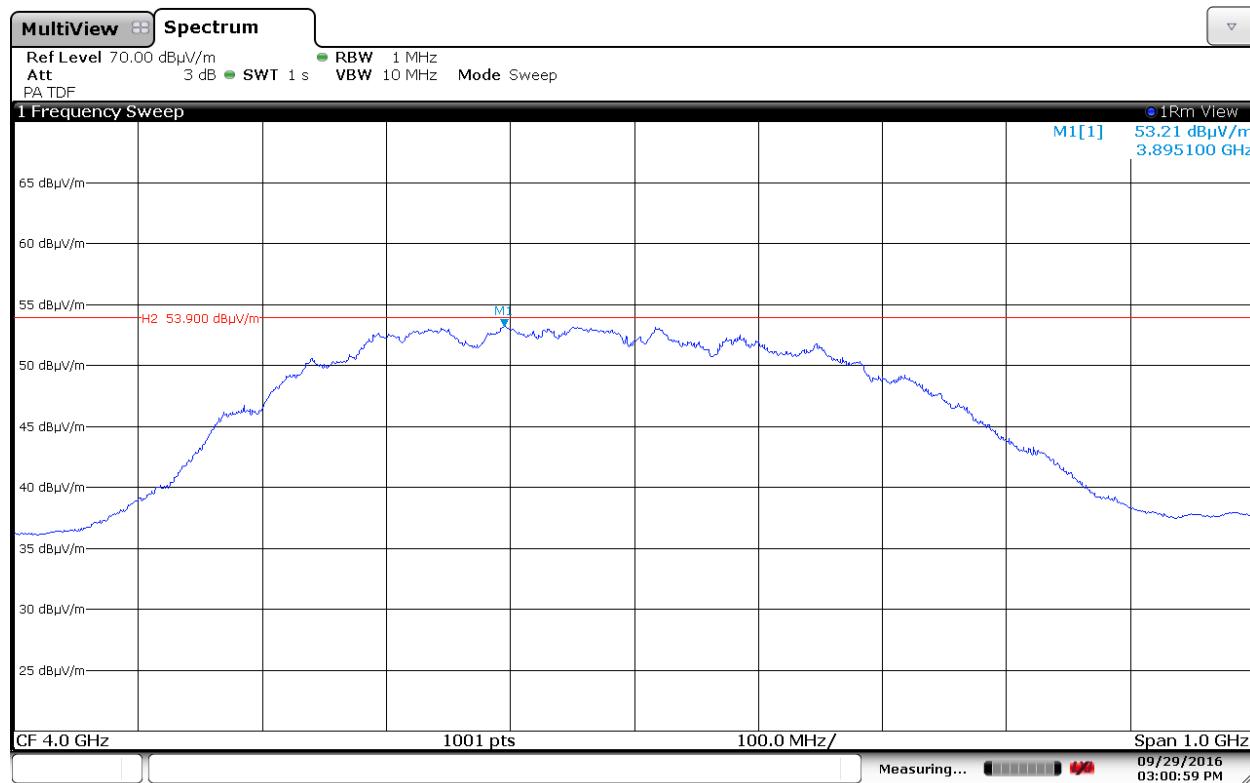
6.7.1. Plot of RMS Power at 3 Meters (Channel 2, 110 kbps, 64M PRF)

Frequency (GHz)	Amplitude ¹	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dB μ V/m)	(dB μ V/m)	(dB)	H/V	cm	Deg	
3.8951	53.21	53.90	-0.69	H	100	307	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, $EIRP = E_{meas} + 20 \log (d_{meas}) - 104.7$; $d_{meas} = 3$
 $EIRP (\text{dBm}) = E_{meas} (\text{dB}\mu\text{V/m}) - 95.2$

Frequency (GHz)	Amplitude ¹	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBm)	(dBm)	(dB)	H/V	cm	Deg	
3.8951	-41.99	-41.30	-0.69	H	100	307	Compliant



03:01:00 PM 09/29/2016

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6. Measurement Data (continued)**6.8. Peak Emissions in a 50 MHz Bandwidth (15.517 (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 dB μ V/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 (dB μ V/m)
3100 - 10600	0	95.2

Frequency Range: 3.5 to 4.5 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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Issue Date: 1/23/2017

6. Measurement Data (continued)

6.8. Peak Emissions in a 50 MHz Bandwidth (15.517(e), 15.521(g))

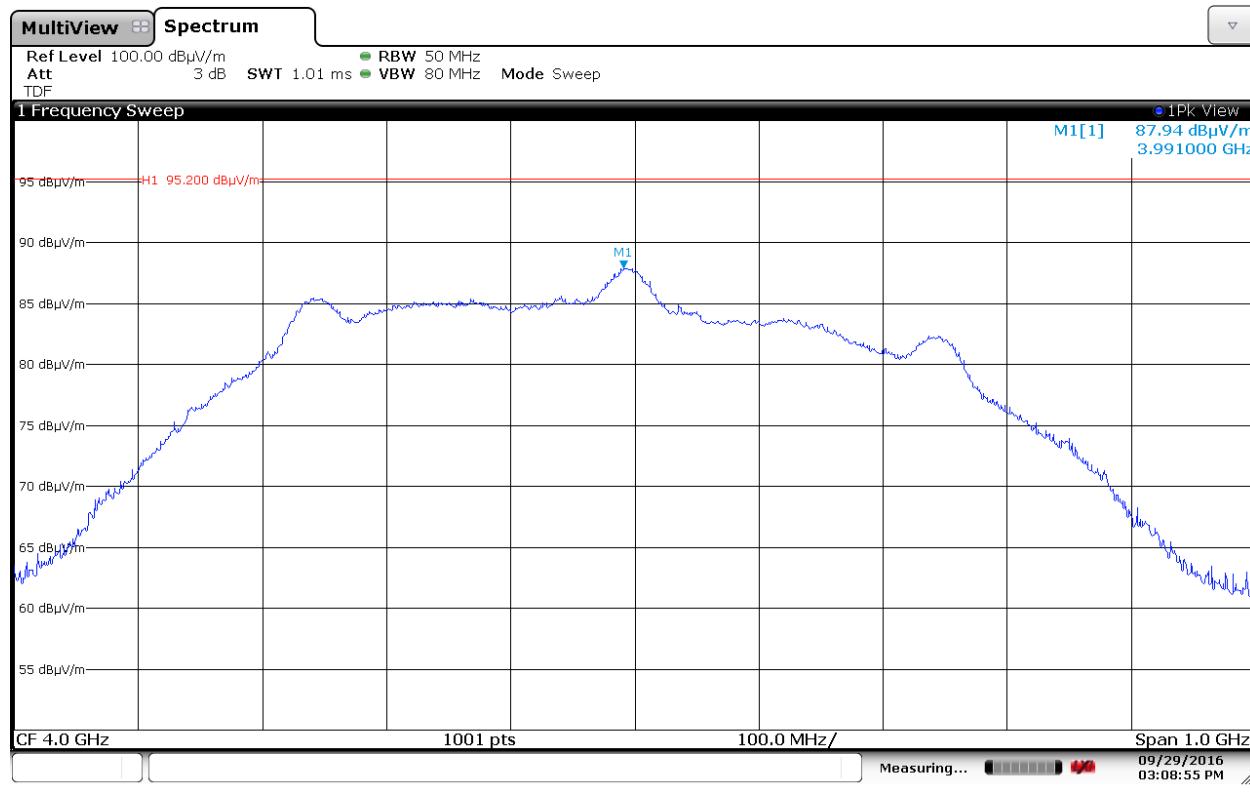
6.8.1 Plot of Peak Power at 3 Meters (Channel 2, 110 kbps, 64M PRF)

Frequency (GHz)	Amplitude ¹	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dB μ V/m)	(dB μ V/m)	(dB)	H/V	cm	Deg	
3.991	87.94	95.20	-7.26	H	100	307	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, $EIRP = E_{meas} + 20 \log (d_{meas}) - 104.7$; $d_{meas} = 3$
 $EIRP (\text{dBm}) = E_{meas} (\text{dB}\mu\text{V/m}) - 95.2$

Frequency (GHz)	Amplitude ¹	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBm)	(dBm)	(dB)	H/V	cm	Deg	
3.991	-7.26	0.00	-7.26	H	100	307	Compliant



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6. Measurement Data (continued)

6.9 Conducted Emissions Test Setup 15.207

6.9.1. Regulatory Limit: FCC Part 15, Class B

Frequency Range (MHz)	Limits (dB μ V)	
	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	6/2/2017
RF Filter Section	Hewlett Packard	85460A	3325A00121	6/2/2017
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

6.9.3. Measurement & Equipment Setup

Test Date:	06/24/2016
Test Engineer:	Mark McSweeney
Site Temperature (°C):	23
Relative Humidity (%RH):	32
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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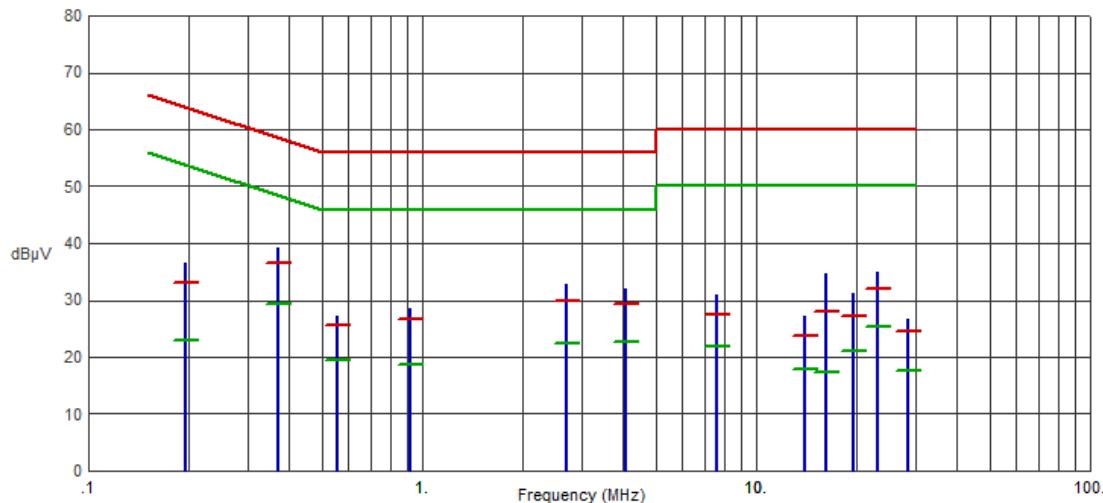
6. Measurement Data (continued)

6.10 Conducted Emissions Test Results

6.10.1. 120 Volts, 60 Hz Phase

Test No.: 265-16, 120 Volts, 60 Hz Phase

FCC, Class B



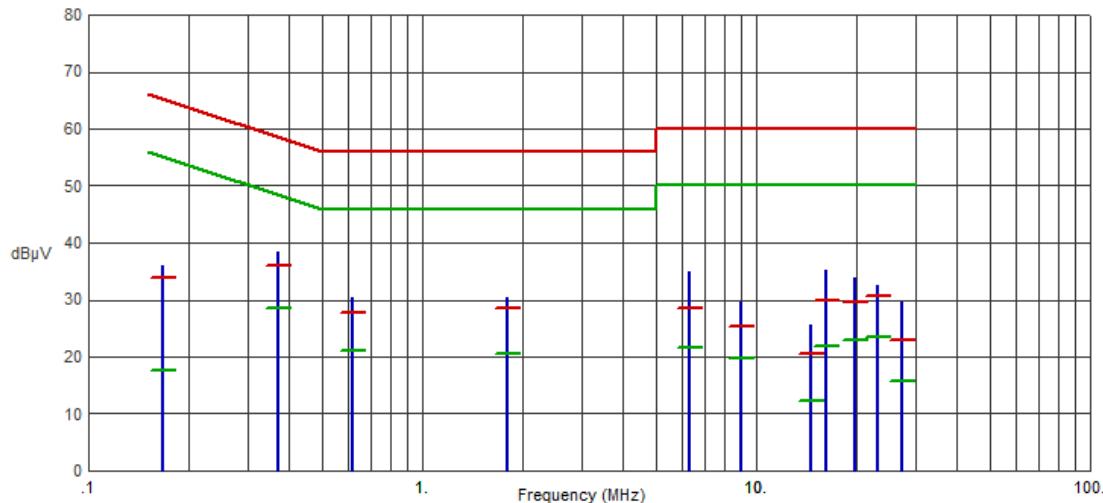
Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
.1953	36.64	33.13	63.81	-30.68	23.04	53.81	-30.77	
.3708	39.07	36.65	58.48	-21.83	29.28	48.48	-19.20	
.5586	27.24	25.72	56.00	-30.28	19.43	46.00	-26.57	
.9222	28.66	26.62	56.00	-29.38	18.69	46.00	-27.31	
2.6919	32.87	29.79	56.00	-26.21	22.36	46.00	-23.64	
4.0709	32.05	29.32	56.00	-26.68	22.67	46.00	-23.33	
7.6318	31.04	27.42	60.00	-32.58	21.89	50.00	-28.11	
14.0298	27.12	23.76	60.00	-36.24	17.93	50.00	-32.07	
16.1992	34.58	27.97	60.00	-32.03	17.31	50.00	-32.69	
19.5858	31.29	27.28	60.00	-32.72	21.00	50.00	-29.00	
23.1265	34.97	31.97	60.00	-28.03	25.45	50.00	-24.55	
28.5639	26.74	24.47	60.00	-35.53	17.49	50.00	-32.51	

Test Number: 265-16R1
Issue Date: 1/23/2017

6. Measurement Data (continued)

6.10 Conducted Emissions Test Results (continued)

6.10.2. 120 Volts, 60 Hz Neutral

Test No.: 265-16, 120 Volts, 60 Hz Neutral
FCC, Class B


Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1676	36.11	33.75	65.08	-31.33	17.67	55.08	-37.41	
.3719	38.45	35.93	58.46	-22.53	28.57	48.46	-19.89	
.6193	30.32	27.69	56.00	-28.31	21.13	46.00	-24.87	
1.7952	30.42	28.50	56.00	-27.50	20.65	46.00	-25.35	
6.2978	34.81	28.53	60.00	-31.47	21.54	50.00	-28.46	
8.9729	29.52	25.24	60.00	-34.76	19.76	50.00	-30.24	
14.5826	25.66	20.47	60.00	-39.53	12.39	50.00	-37.61	
16.1652	35.07	29.80	60.00	-30.20	21.87	50.00	-28.13	
19.7081	33.80	29.59	60.00	-30.41	23.01	50.00	-26.99	
23.1310	32.55	30.60	60.00	-29.40	23.36	50.00	-26.64	
27.3420	29.55	22.94	60.00	-37.06	15.62	50.00	-34.38	

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6. Measurement Data (continued)

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

6.11.1. MPE Power Density Table

Frequency (GHz)	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
				(mW/cm ²)	(W/m ²)		
(1)	(2)	(3)	(4)		(5)		
3.991	20	-7.26	1.0	0.0000471	0.0004707	1	Compliant
2.412	20	20.44	2.0	0.0348923	0.3489234	1	Compliant
		SUM	0.0349394	0.3493941		1	Compliant

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

PD = Power Density

OP = DUT Output Power (dBm)

AG = Antenna Gain (dBi)

D = MPE Distance

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 20 centimeters of the body of the user.
2. Section 6.1 of this test report.
3. Power density is calculated from conducted power output measurement and antenna gain.
4. Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.



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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-0208.

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 required by EN 55022. 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



Test Number: 265-16R1

Issue Date: 1/23/2017

8. Test Images

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



Test Number: 265-16R1

Issue Date: 1/23/2017

8. Test Images

8.4. Spurious and Harmonic Emissions – Above 1 GHz Front



Test Number: 265-16R1

Issue Date: 1/23/2017

8. Test Images

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

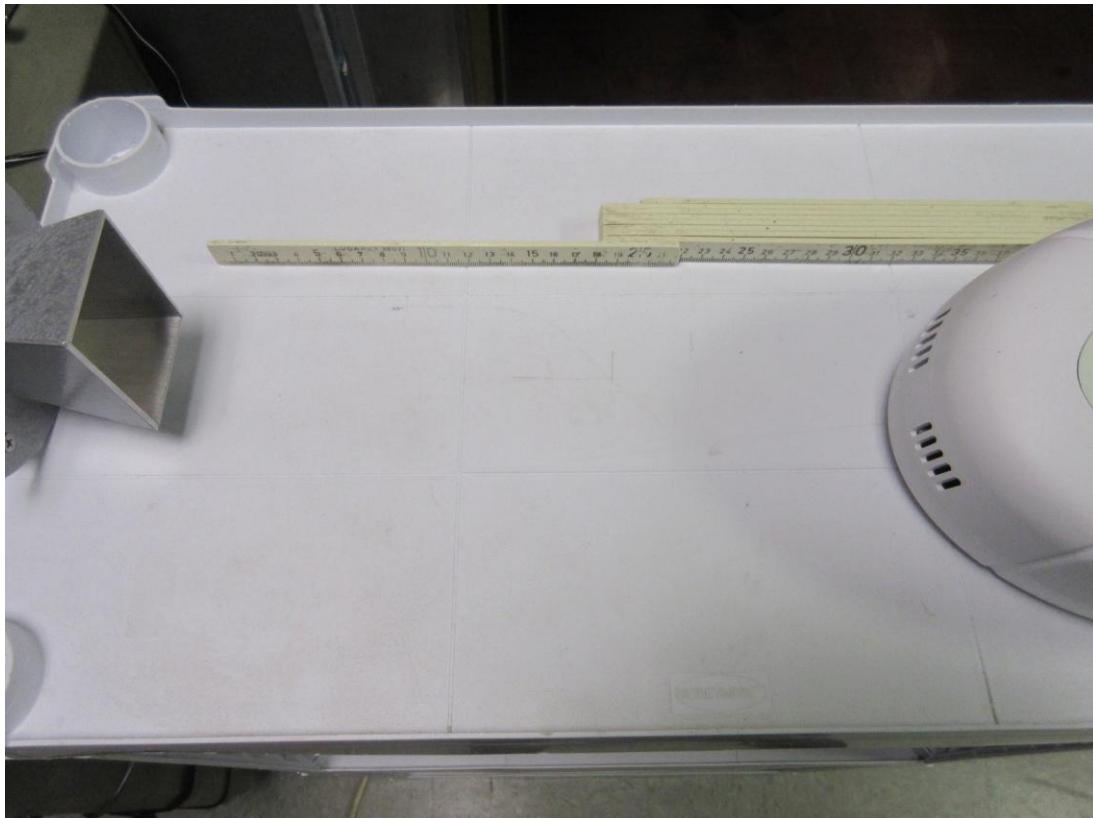


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Issue Date: 1/23/2017

8. Test Images

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



Test Number: 265-16R1

Issue Date: 1/23/2017

8. Test Images

8.7. Conducted Emissions (Front)



8. Test Images**8.8. Conducted Emissions (Rear)**