

## **COMPLIANCE WORLDWIDE INC. TEST REPORT 139-20**

**In Accordance with the Requirements of  
FCC TITLE 47 CFR Part 15.519, Subpart F  
Technical Requirements for Handheld UWB Systems  
Class II Permissive Change**

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

**Issued to**

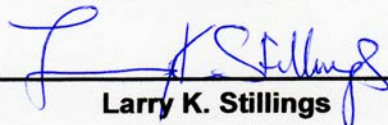
**Wiser Systems, Inc.  
1017 Main Campus Drive, Suite 2300  
Raleigh, NC 27606 USA  
919-833-8253**

**For the  
Client Tag  
Model: TAGV1.2T**

**FCC ID: 2AGZM-B11017  
IC: 25948-B01017**


**Report Issued on February 28, 2020**

**Tested By**



**Larry K. Stillings**

**Reviewed By**



**Brian F. Breault**

This test report shall not be reproduced, except in full, without written permission from Compliance Worldwide, Inc.

## Table of Contents

1. Scope.....	3
2. Product Details .....	3
2.1. Manufacturer .....	3
2.2. Model Number.....	3
2.3. Serial Number .....	3
2.4. Description .....	3
2.5. Power Source.....	3
2.6. Hardware Revision.....	3
2.7. Software Revision .....	3
2.8. Modulation Type.....	3
2.9. Operating Frequency .....	3
2.10. EMC Modifications .....	3
3. Product Configuration.....	3
3.1. Operational Characteristics & Software .....	3
3.2. EUT Hardware .....	3
3.3. EUT Cables/Transducers.....	3
3.4. Support Equipment .....	3
3.5. Test Setup.....	4
3.6. EUT Orientation Diagram.....	4
4. Measurements Parameters .....	5
4.1. Measurement Equipment Used to Perform Test .....	5
4.2. Measurement & Equipment Setup .....	6
4.3. Measurement Procedure .....	6
4.4. Measurement Uncertainty .....	6
5. Measurement Summary .....	7
6. Measurement Data .....	8
6.1. Antenna Requirement .....	8
6.2. Operational Requirements .....	9
6.3. UWB Bandwidth .....	11
6.4. Radiated Emissions below 960 MHz .....	23
6.5. Radiated Emissions above 960 MHz .....	32
6.6. Radiated Emissions in the GPS Bands.....	44
6.7. RMS Emissions of UWB Transmission.....	47
6.8. Peak Emissions in a 50 MHz Bandwidth .....	60
6.9. Conducted Emissions Test Setup.....	73
6.10. 99% Emission Bandwidth .....	74
6.11. Public Exposure to Radio Frequency Energy Levels.....	77
7. Test Site Description .....	81
8. Test Images .....	82
8.1. Spurious and Harmonic Emissions - 30 kHz to 1 GHz Front.....	82
8.2. Spurious and Harmonic Emissions - 30 kHz to 30 MHz Rear .....	83
8.3. Spurious and Harmonic Emissions - 30 MHz to 1 GHz Rear .....	84
8.4. Spurious and Harmonic Emissions - 1 to 18 GHz Front.....	85
8.5. Spurious and Harmonic Emissions - 1 to 18 GHz Rear.....	86
8.6. Spurious and Harmonic Emissions - 18 to 40 GHz Side .....	87

## 1. Scope

This test report certifies that the Wiser Systems Client Tag as tested, meets the FCC Part 15, Subpart F and ISSED 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:** Wiser Systems, Inc.
- 2.2. **Model Numbers:** TAGV1.2T
- 2.3. **Serial Numbers:** Pre production
- 2.4. **Description:** RRLT Locator System leverages new advances in Ultra-Wideband technology to deliver low cost/high accuracy, real-time localization.
- 2.5. **Power Source:** 3.0 VDC Regulated (Two 3.6V Lithium Size A in Parallel)
- 2.6. **Hardware Revision:** N/A
- 2.7. **Software Revision:** N/A
- 2.8. **Modulation Type:** Pulse Modulation, Frequency Hopping
- 2.9. **Operating Frequencies:** 3.993 GHz Center Frequency Nominal (Channel 2 – 500 MHz BW,  
Channel 4 – 900 MHz BW)  
6489.5 GHz Center Frequency Nominal (Channel 5 – 500 MHz BW)
- 2.10. **EMC Modifications:** None

## 3. Product Configuration

### 3.1 Operational Characteristics & Software

#### Hardware Setup:

Connect the Wiser USB Dongle to a laptop computer via USB. Place a battery into the client tag.

Using the software tool configure the USB dongle to configure the tag to transmit on Channel 2 (16M or 64M PRF), Channel 4 (16M or 64M PRF) or Channel 5 (16M or 64M PRF) using data rates of 110 kbps or 6.8 Mbps.

### 3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Volts	Freq (Hz)	Description/Function
Wiser Systems	TAGV1.2T	Pre production	3.0	DC	Client Tag

### 3.3. EUT Cables/Transducers

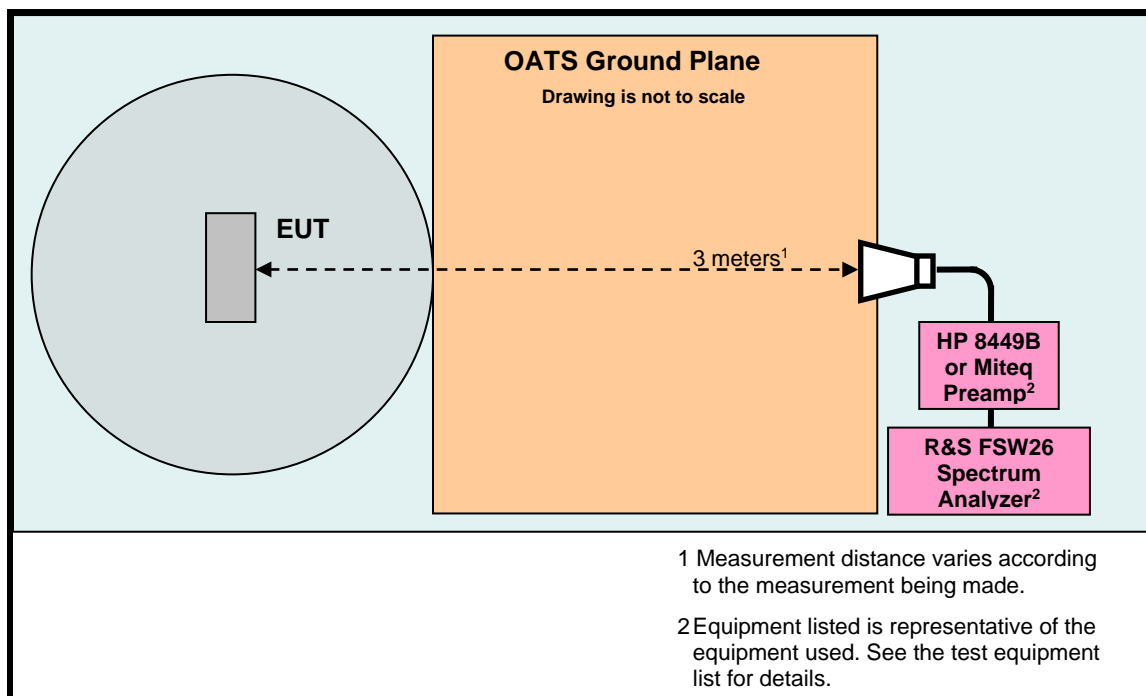
Cable Type	Length	Shield	From	To
None				

### 3.4. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
Wiser Systems	USB Dongle	n/a	5.0	DC	For setting up the DUT operation.
Dell	Laptop		120	60	For controlling the USB Dongle

### 3. Product Configuration (cont.)

#### 3.5. Test Setup Diagram



#### 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	5/3/2020	3 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	6/5/2021	2 Years
Loop Antenna 9 kHz to 30 MHz	EMCO	6512	9309-1139	1/28/2022	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	4/16/2020	2 Years
Preamplifier 2 to 12 GHz	JCA	JCA48-4111B1	7087S	4/17/2020	2 Years
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	1/6/2021	1 Year
Horn Antenna 1 to 18 GHz	ETS-Lindgren	3117	00143292	3/21/2022	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	7/20/2020	2 Years
Barometer	Control Company	4195	Cal ID# 236	4/3/2020	2 Years

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

#### **4. Measurements Parameters (continued)**

##### **4.2. Measurement & Equipment Setup**

Test Dates:	12/20/2019, 2/5/2020, 2/6/2020, 2/7/2020, 2/8/2020
Test Engineers:	Sean Defelice, Larry Stillings
Normal Site Temperature (15 – 35°C):	21.6
Relative Humidity (20 -75%RH):	35
Frequency Range:	30 kHz to 40 GHz
Measurement Distance:	3 Meters
	200 Hz – 30 kHz to 150 kHz
EMI Receiver IF Bandwidth:	9 kHz – 150 kHz to 30 MHz
	120 kHz - 30 MHz to 1 GHz
	1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	$\geq 3 \times \text{RBW}$
Detector Function:	Peak, Quasi-Peak & Average

##### **4.3. Measurement Procedure**

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

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	$\pm 4.55 \text{ dB}$
Radiated Emission of Receiver	$\pm 4.55 \text{ dB}$
Temperature	$\pm 0.91^{\circ} \text{ C}$
Humidity	$\pm 5\%$

## 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	
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 (c) 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 (c) 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	N/A	EUT is Battery Powered
99% Emission Bandwidth	N/A	RSS-GEN	6.10	Compliant	
Radio Frequency Exposure	1.1307(b)(2), 2.1093 & 1.1310	RSS-102, Issue 5	6.11	Compliant	

## 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 chip type.



## 6. Measurement Data (continued)

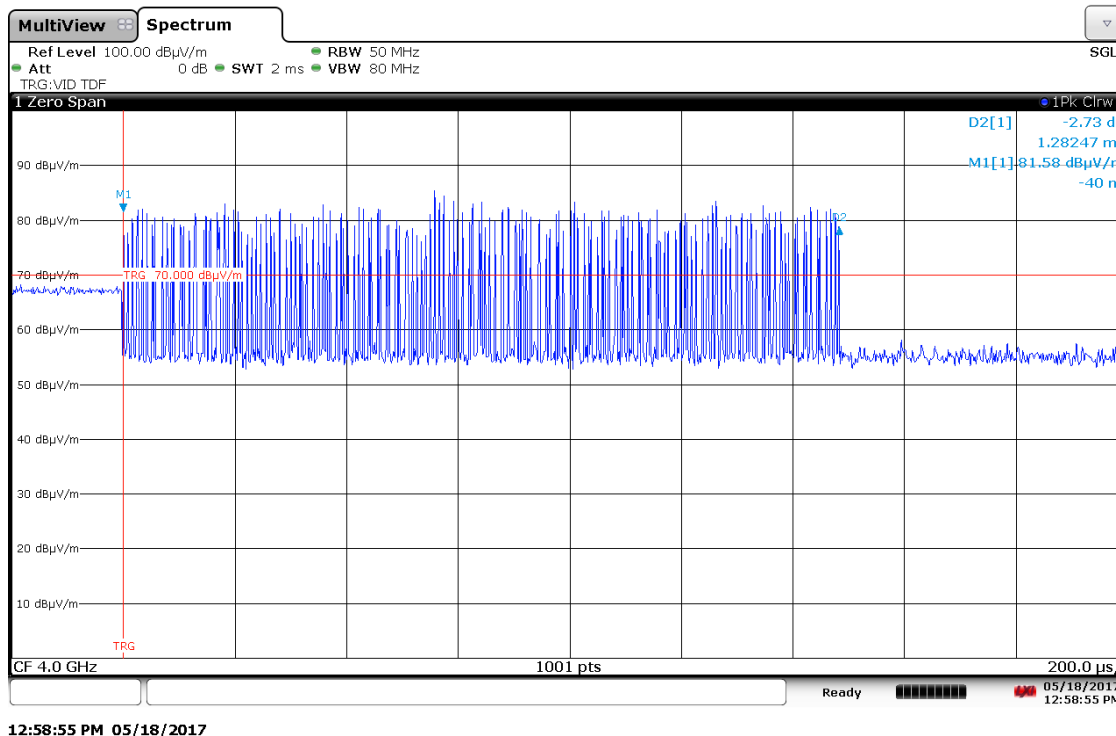
### 6.2. Operational Requirements of the Device under Test (15.519 (a) (1))

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, the EUT transmits a 1.28 mS burst of location information every 11.865 seconds to an associated receiver.

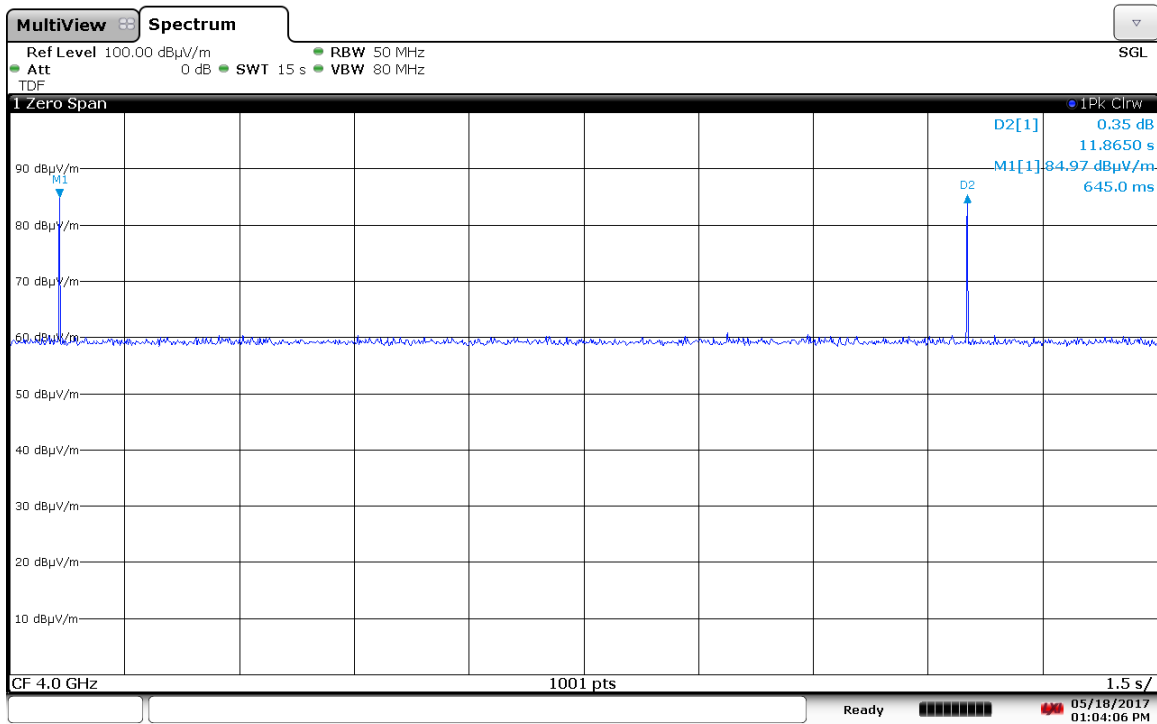
#### 6.2.1 Plot of Transmission



## 6. Measurement Data (continued)

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

#### 6.2.2 Plot of Transmission Period



01:04:06 PM 05/18/2017

## 6. Measurement Data (continued)

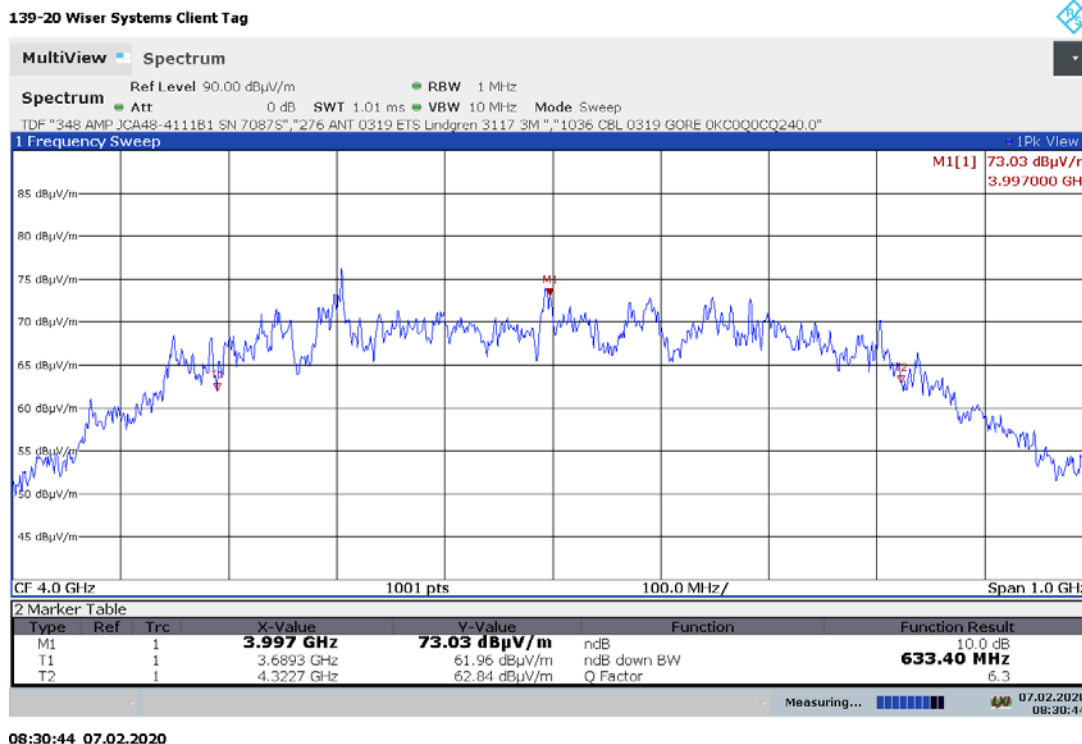
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b))

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

		CH2
$f_M$	The highest emission peak	3.9970
$f_L$	10 dB below the highest peak	3.6893
$f_H$	10 dB above the highest peak	4.3227
$f_C$	Calculated: $(f_H + f_L) / 2$	4.0060
Bandwidth	Calculated: $(f_H - f_L)$	0.6334
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.1581

#### 6.3.2. Measurement Plot of 10 dB frequencies (Channel 2, 16M PRF, 110kbps)



## 6. Measurement Data (continued)

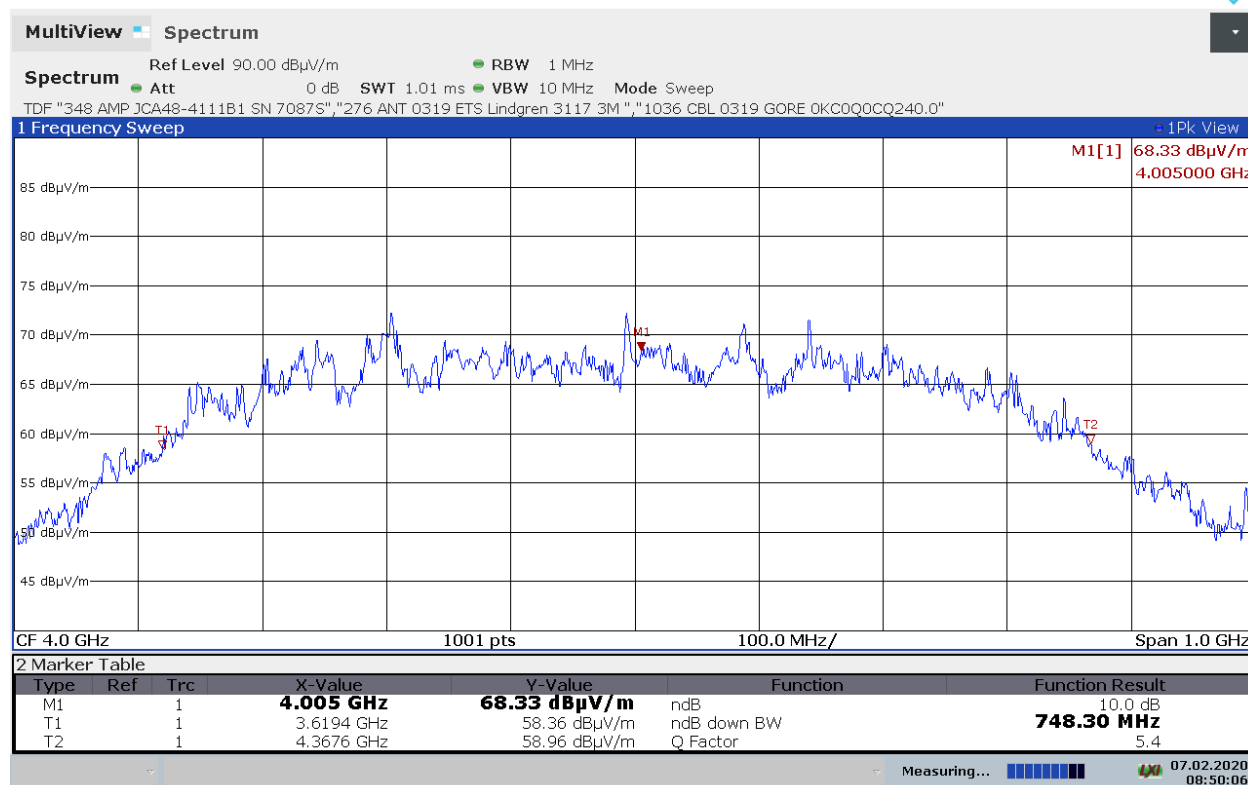
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.3. Measurement Data – Values in GHz

		CH2
$f_M$	The highest emission peak	4.0050
$f_L$	10 dB below the highest peak	3.6194
$f_H$	10 dB above the highest peak	4.3676
$f_c$	Calculated: $(f_H + f_L) / 2$	3.9935
Bandwidth	Calculated: $(f_H - f_L)$	0.7482
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.1874

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

139-20 Wisner Systems Client Tag



08:50:06 07.02.2020

## 6. Measurement Data (continued)

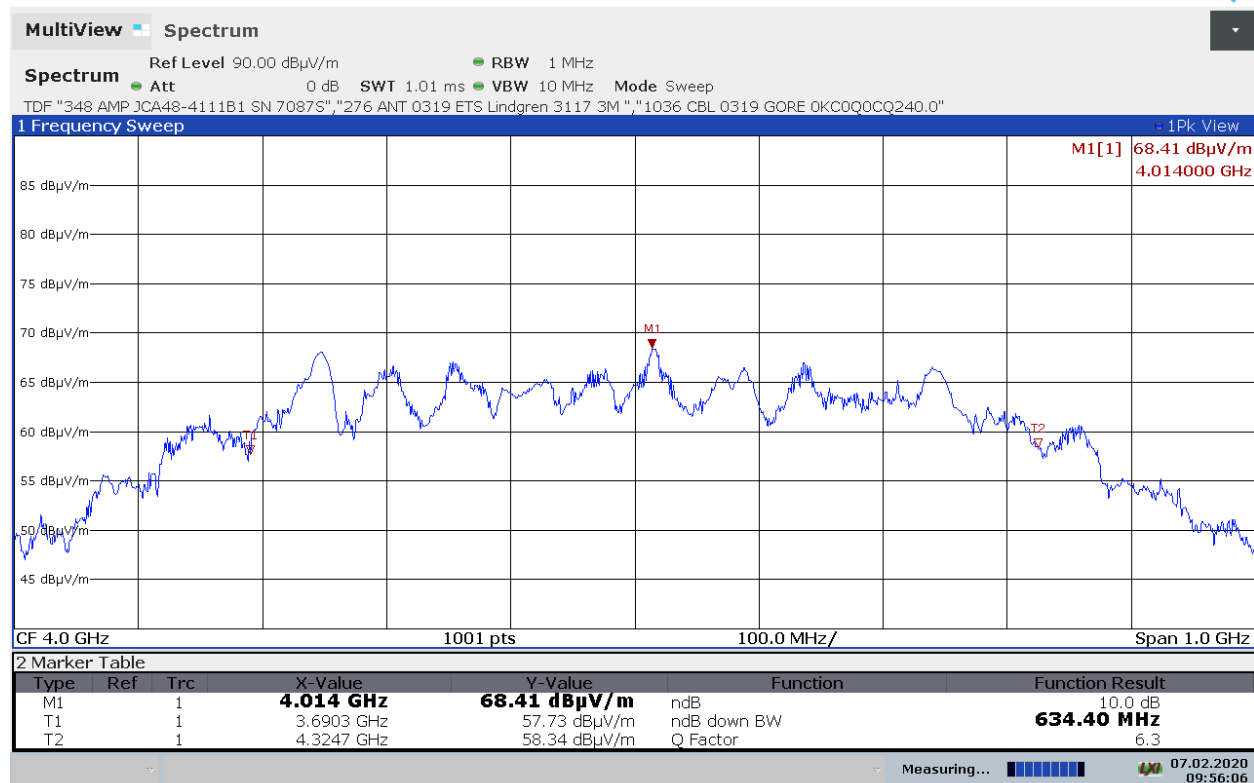
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.5. Measurement Data – Values in GHz

		CH2
$f_M$	The highest emission peak	4.0140
$f_L$	10 dB below the highest peak	3.6903
$f_H$	10 dB above the highest peak	4.3247
$f_c$	Calculated: $(f_H + f_L) / 2$	4.0075
Bandwidth	Calculated: $(f_H - f_L)$	0.6344
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.1583

#### 6.3.6. Measurement Plot of 10 dB frequencies (Channel 2, 16M PRF, 6.8 Mbps)

139-20 Wisser Systems Client Tag



09:56:07 07.02.2020

## 6. Measurement Data (continued)

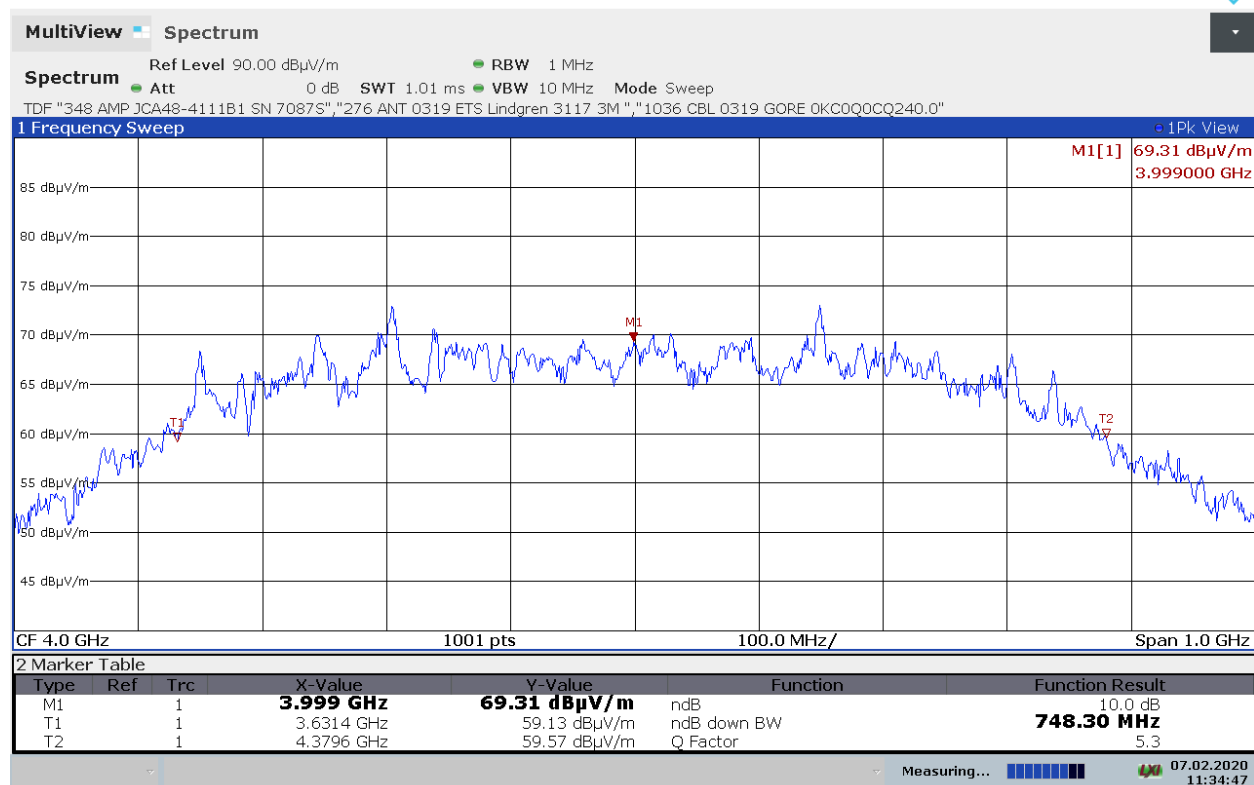
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.7. Measurement Data – Values in GHz

		CH2
$f_M$	The highest emission peak	3.9990
$f_L$	10 dB below the highest peak	3.6314
$f_H$	10 dB above the highest peak	4.3796
$f_c$	Calculated: $(f_H + f_L) / 2$	4.0055
Bandwidth	Calculated: $(f_H - f_L)$	0.7482
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.1868

#### 6.3.8. Measurement Plot of 10 dB frequencies (Channel 2, 64M PRF, 6.8 Mbps)

139-20 Wisner Systems Client Tag



11:34:47 07.02.2020

## 6. Measurement Data (continued)

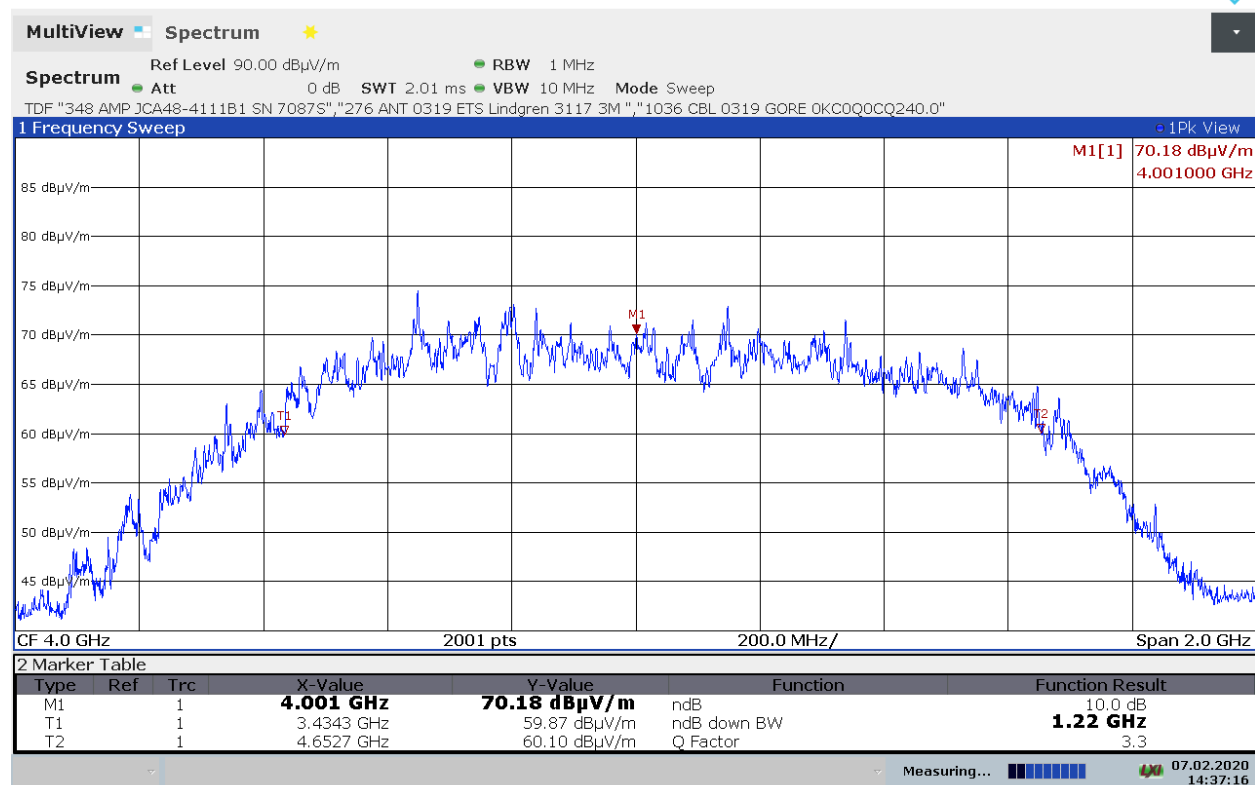
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.9. Measurement Data – Values in GHz

		CH4
$f_M$	The highest emission peak	4.0010
$f_L$	10 dB below the highest peak	3.4343
$f_H$	10 dB above the highest peak	4.6527
$f_c$	Calculated: $(f_H + f_L) / 2$	4.0435
Bandwidth	Calculated: $(f_H - f_L)$	1.2184
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.3013

#### 6.3.10. Measurement Plot of 10 dB frequencies (Channel 4, 16M PRF, 110kbps)

139-20 Wiser Systems Client Tag



14:37:16 07.02.2020

## 6. Measurement Data (continued)

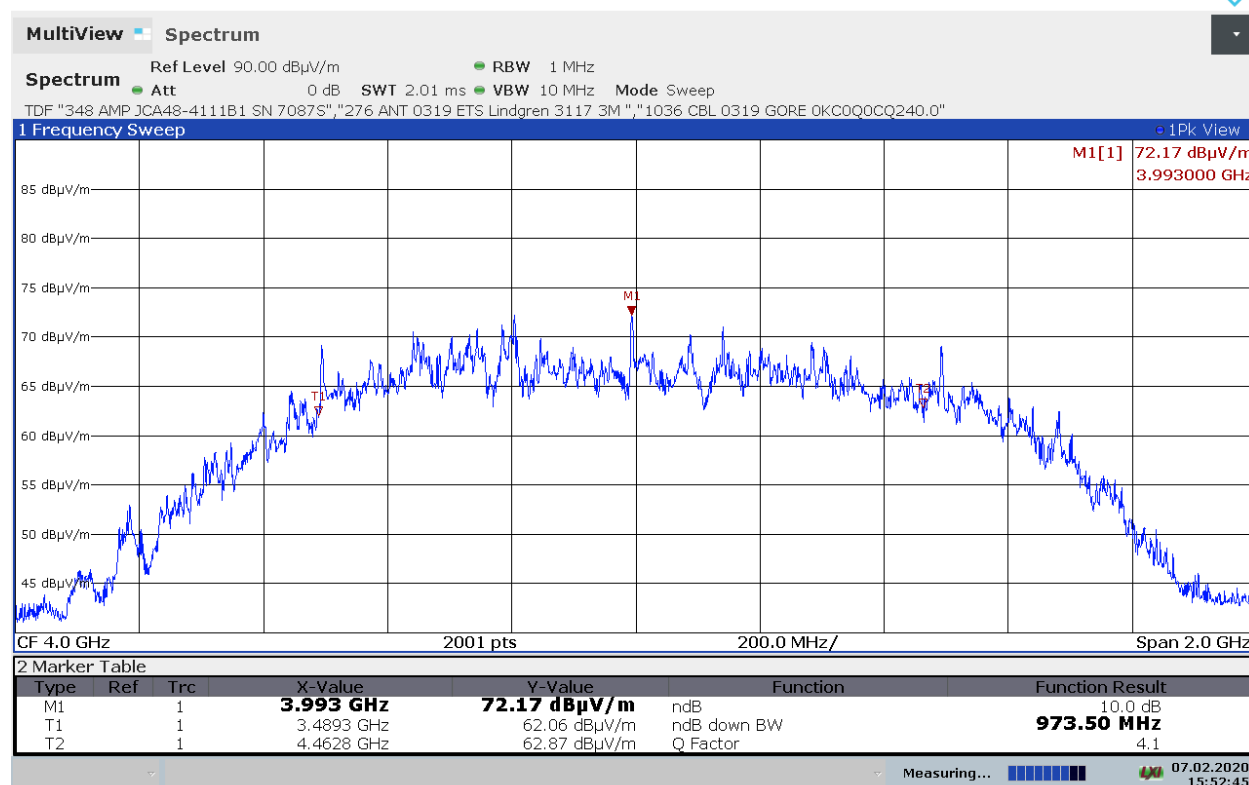
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.11. Measurement Data – Values in GHz

		CH4
$f_M$	The highest emission peak	3.9930
$f_L$	10 dB below the highest peak	3.4893
$f_H$	10 dB above the highest peak	4.4628
$f_c$	Calculated: $(f_H + f_L) / 2$	3.9761
Bandwidth	Calculated: $(f_H - f_L)$	0.9735
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.2448

#### 6.3.12. Measurement Plot of 10 dB frequencies (Channel 4, 64M PRF, 110 kbps)

139-20 Wiser Systems Client Tag



15:52:45 07.02.2020



## 6. Measurement Data (continued)

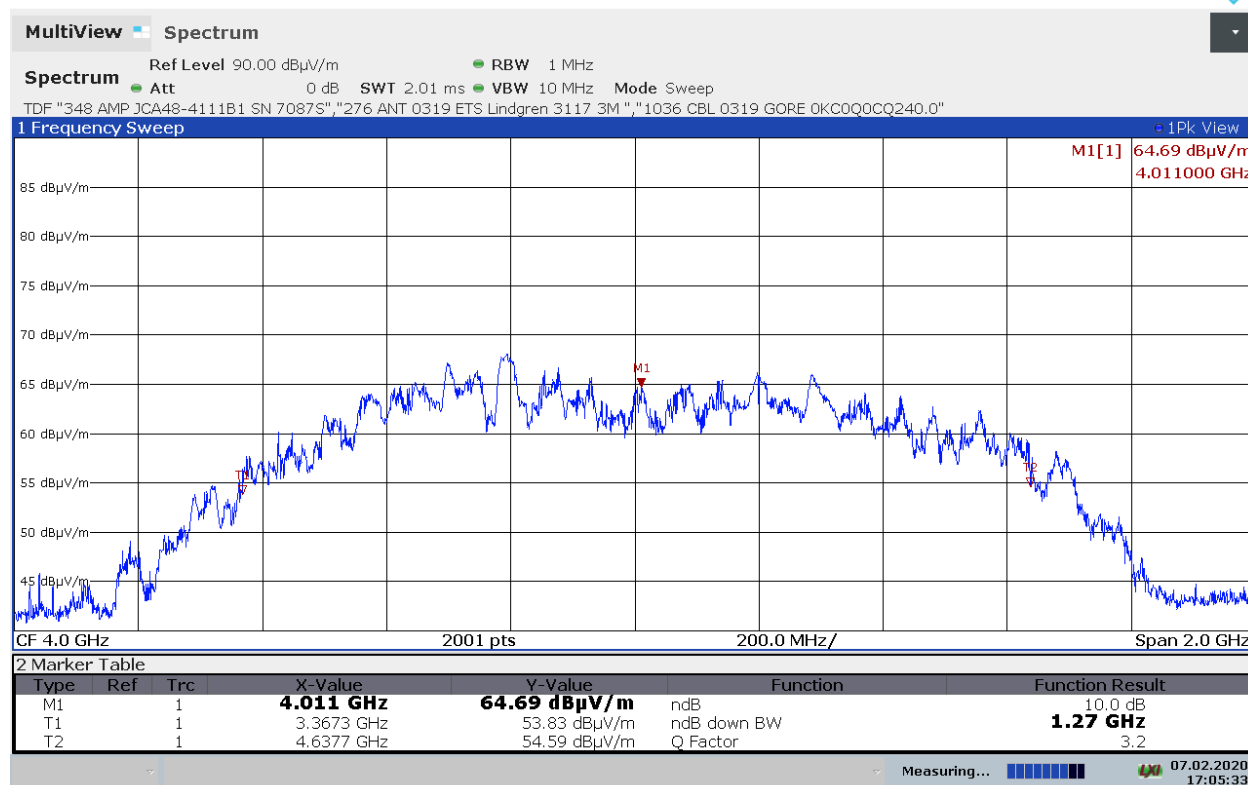
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.13. Measurement Data – Values in GHz

		CH4
$f_M$	The highest emission peak	4.0110
$f_L$	10 dB below the highest peak	3.3673
$f_H$	10 dB above the highest peak	4.6377
$f_c$	Calculated: $(f_H + f_L) / 2$	4.0025
Bandwidth	Calculated: $(f_H - f_L)$	1.2704
Fractional BW	Calculated: $2 \cdot (f_H - f_L) / (f_H + f_L)$	0.3174

#### 6.3.14. Measurement Plot of 10 dB frequencies (Channel 4, 16M PRF, 6.8 Mbps)

139-20 Wiser Systems Client Tag



17:05:33 07.02.2020

## 6. Measurement Data (continued)

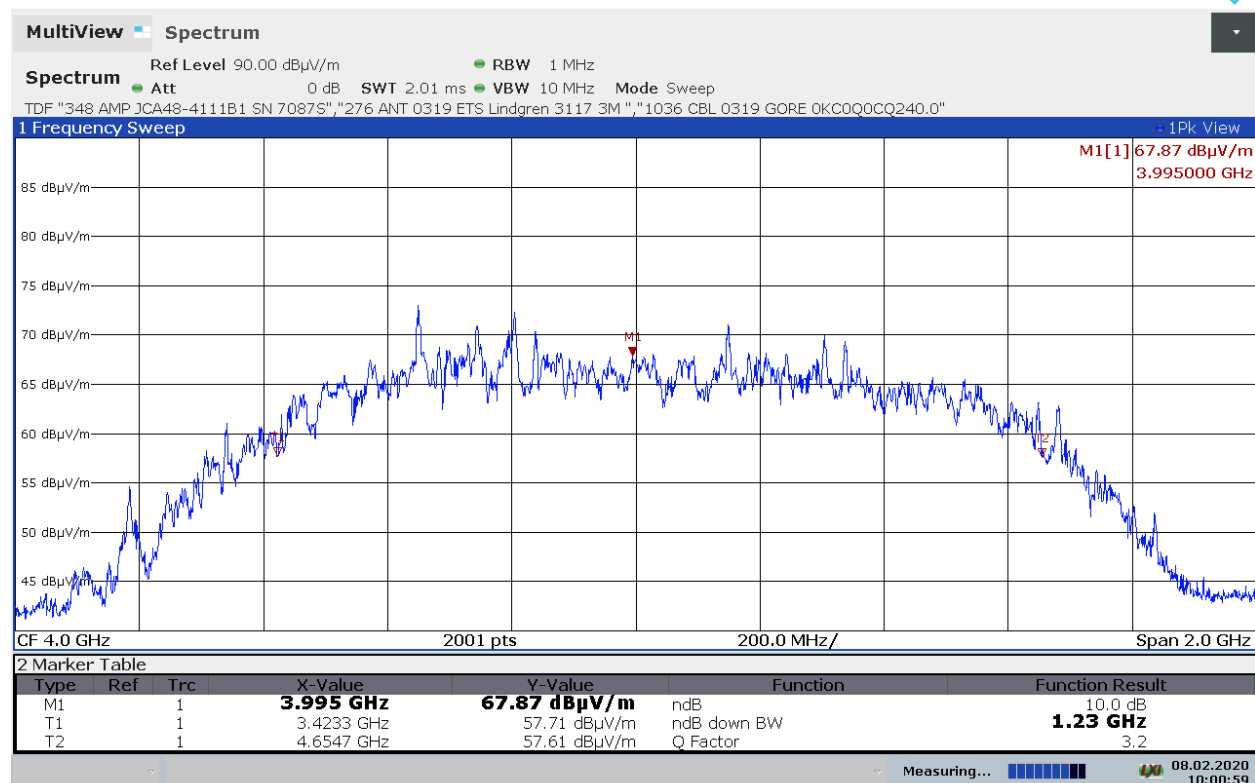
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.15. Measurement Data – Values in GHz

		CH4
$f_M$	The highest emission peak	3.9950
$f_L$	10 dB below the highest peak	3.4233
$f_H$	10 dB above the highest peak	4.6547
$f_c$	Calculated: $(f_H + f_L) / 2$	4.0390
Bandwidth	Calculated: $(f_H - f_L)$	1.2314
Fractional BW	Calculated: $2 \cdot (f_H - f_L) / (f_H + f_L)$	0.3049

#### 6.3.16. Measurement Plot of 10 dB frequencies (Channel 4, 64M PRF, 6.8 Mbps)

139-20 Wisser Systems Client Tag



10:00:59 08.02.2020

## 6. Measurement Data (continued)

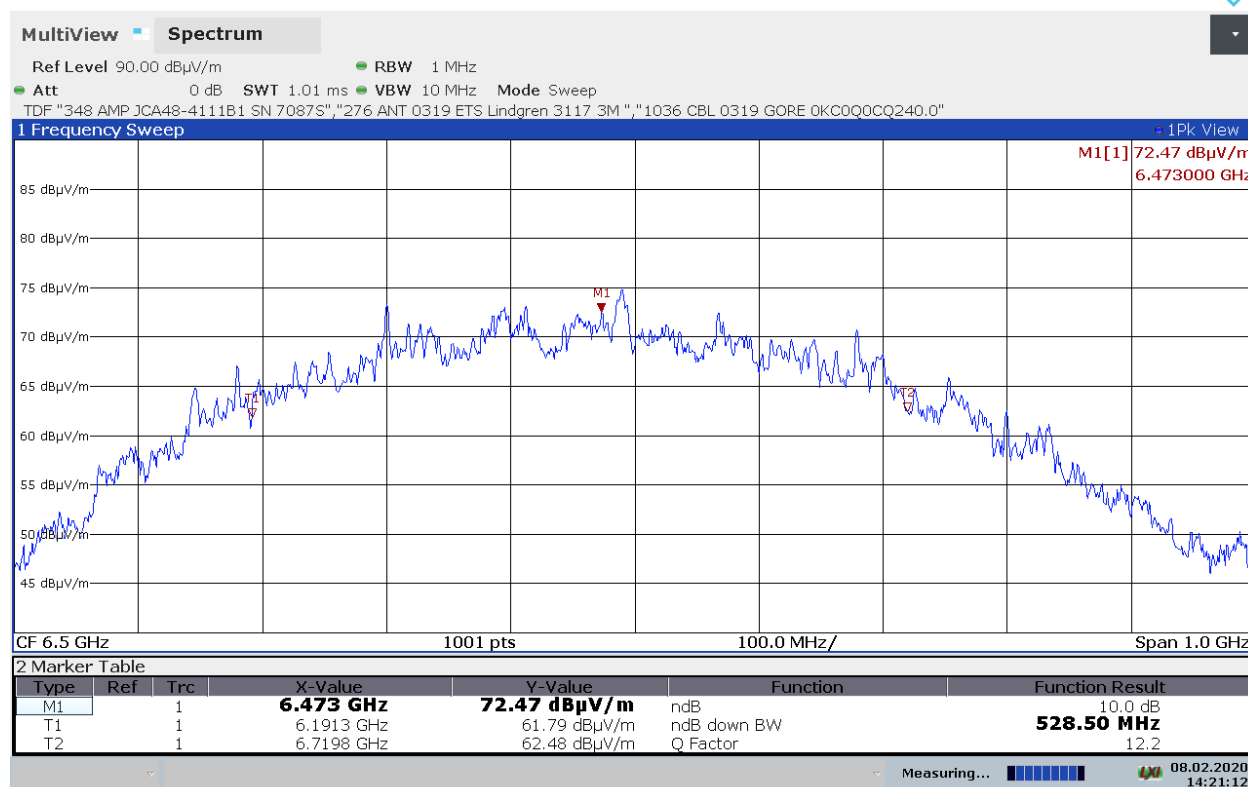
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.17. Measurement Data – Values in GHz

		CH5
$f_M$	The highest emission peak	6.4730
$f_L$	10 dB below the highest peak	6.1913
$f_H$	10 dB above the highest peak	6.7198
$f_c$	Calculated: $(f_H + f_L) / 2$	6.4556
Bandwidth	Calculated: $(f_H - f_L)$	0.5285
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.0819

#### 6.3.18. Measurement Plot of 10 dB frequencies (Channel 5, 16M PRF, 110kpbs)

139-20 Wisser Systems Client Tag



14:21:12 08.02.2020

## 6. Measurement Data (continued)

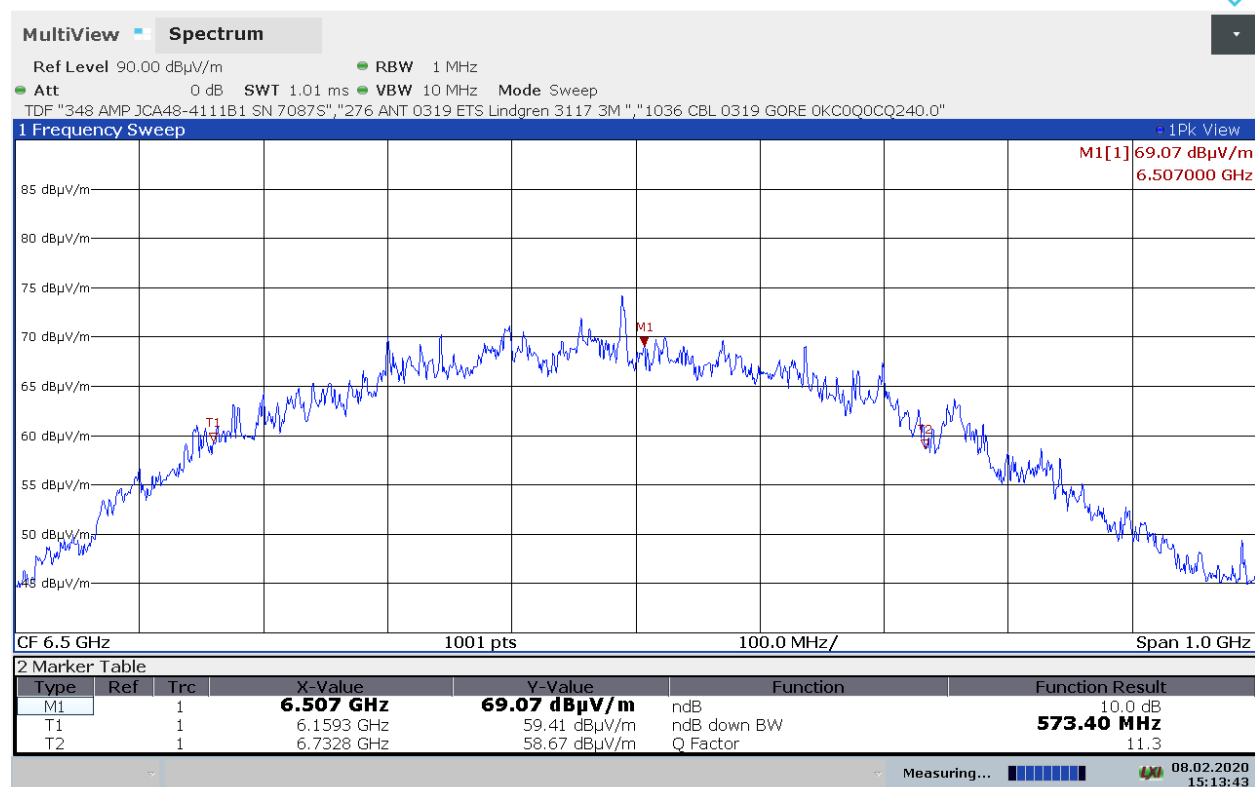
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.19. Measurement Data – Values in GHz

		CH5
$f_M$	The highest emission peak	6.5070
$f_L$	10 dB below the highest peak	6.1593
$f_H$	10 dB above the highest peak	6.7328
$f_c$	Calculated: $(f_H + f_L) / 2$	6.4461
Bandwidth	Calculated: $(f_H - f_L)$	0.5735
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.0890

#### 6.3.20. Measurement Plot of 10 dB frequencies (Channel 5, 64M PRF, 110 kbps)

139-20 Wiser Systems Client Tag



15:13:43 08.02.2020

## 6. Measurement Data (continued)

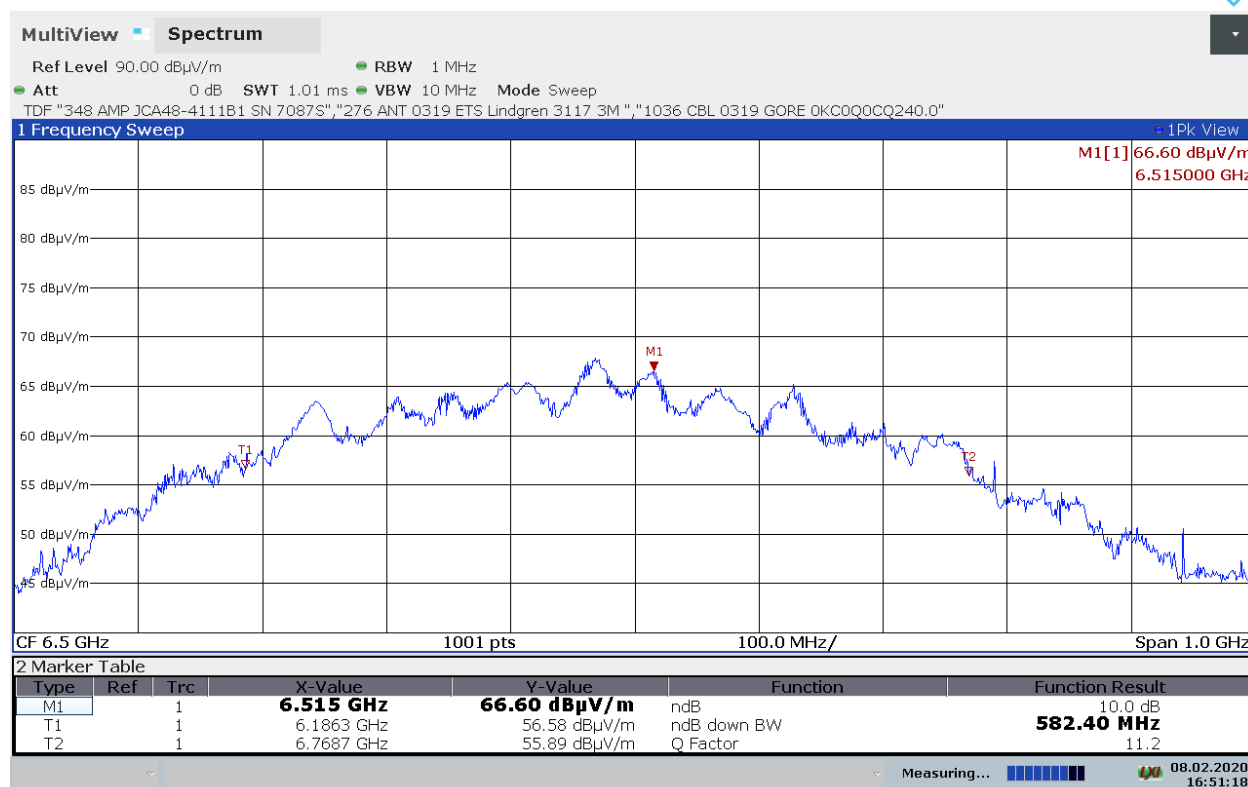
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.21. Measurement Data – Values in GHz

		CH5
$f_M$	The highest emission peak	6.5150
$f_L$	10 dB below the highest peak	6.1863
$f_H$	10 dB above the highest peak	6.7687
$f_c$	Calculated: $(f_H + f_L) / 2$	6.4775
Bandwidth	Calculated: $(f_H - f_L)$	0.5824
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.0899

#### 6.3.22. Measurement Plot of 10 dB frequencies (Channel 5, 16M PRF, 6.8 Mbps)

139-20 Wiser Systems Client Tag



16:51:18 08.02.2020

## 6. Measurement Data (continued)

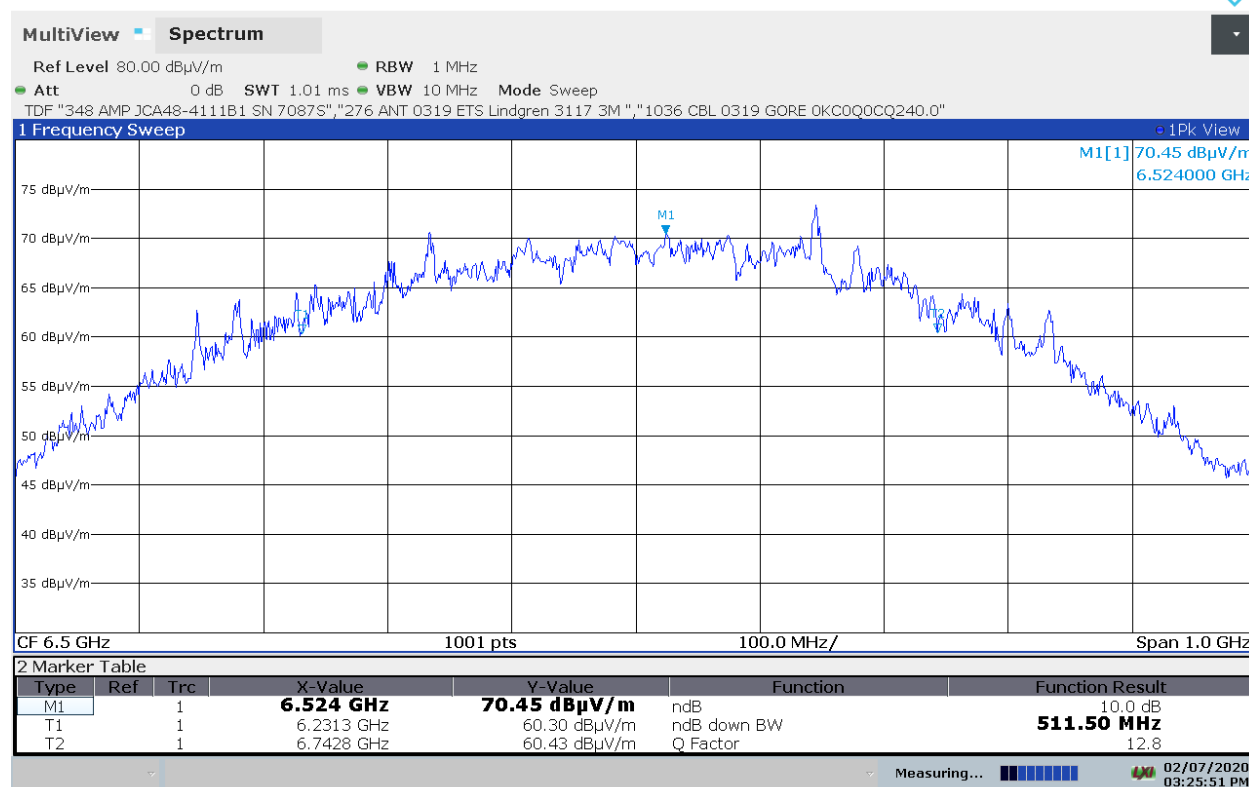
### 6.3. UWB Bandwidth (15.503 (a) (d), 15.519 (b) continued)

#### 6.3.23. Measurement Data – Values in GHz

		CH5
$f_M$	The highest emission peak	6.5240
$f_L$	10 dB below the highest peak	6.2313
$f_H$	10 dB above the highest peak	6.7428
$f_c$	Calculated: $(f_H + f_L) / 2$	6.4871
Bandwidth	Calculated: $(f_H - f_L)$	0.5115
Fractional BW	Calculated: $2 * (f_H - f_L) / (f_H + f_L)$	0.0788

#### 6.3.24. Measurement Plot of 10 dB frequencies (Channel 5, 64M PRF, 6.8 Mbps)

139-20 Wiser Systems Client Tag



03:25:51 PM 02/07/2020

## 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 ( $\mu\text{V/m}$ )	Field Strength ( $\text{dB}\mu\text{V/m}$ )
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

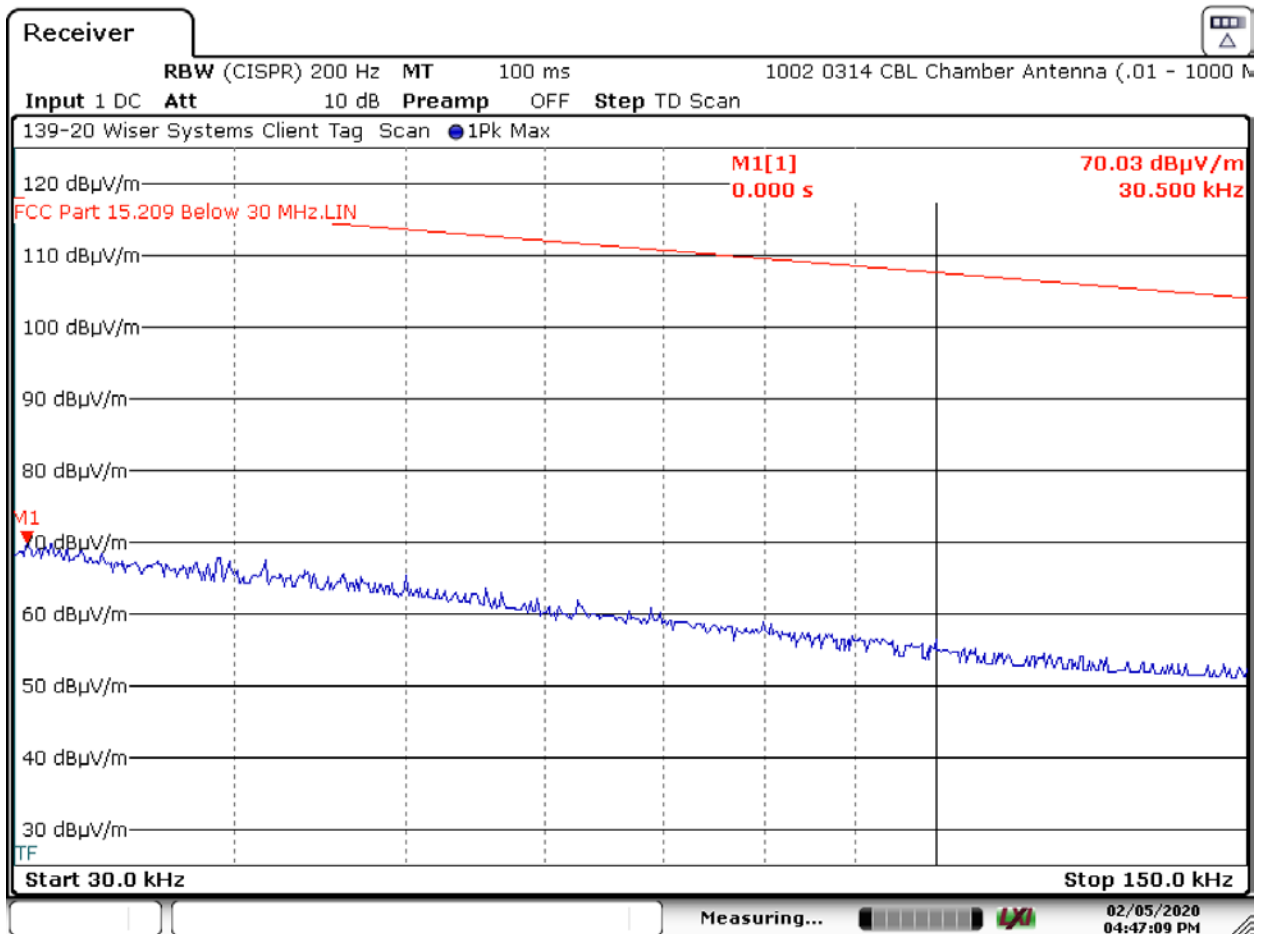
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209, continued)

#### 6.4.1. 30 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 – 6.8 Mbps 64M PRF



Date: 5.FEB.2020 16:47:09

**Note:** The other data rate / PRFs were also noise floor



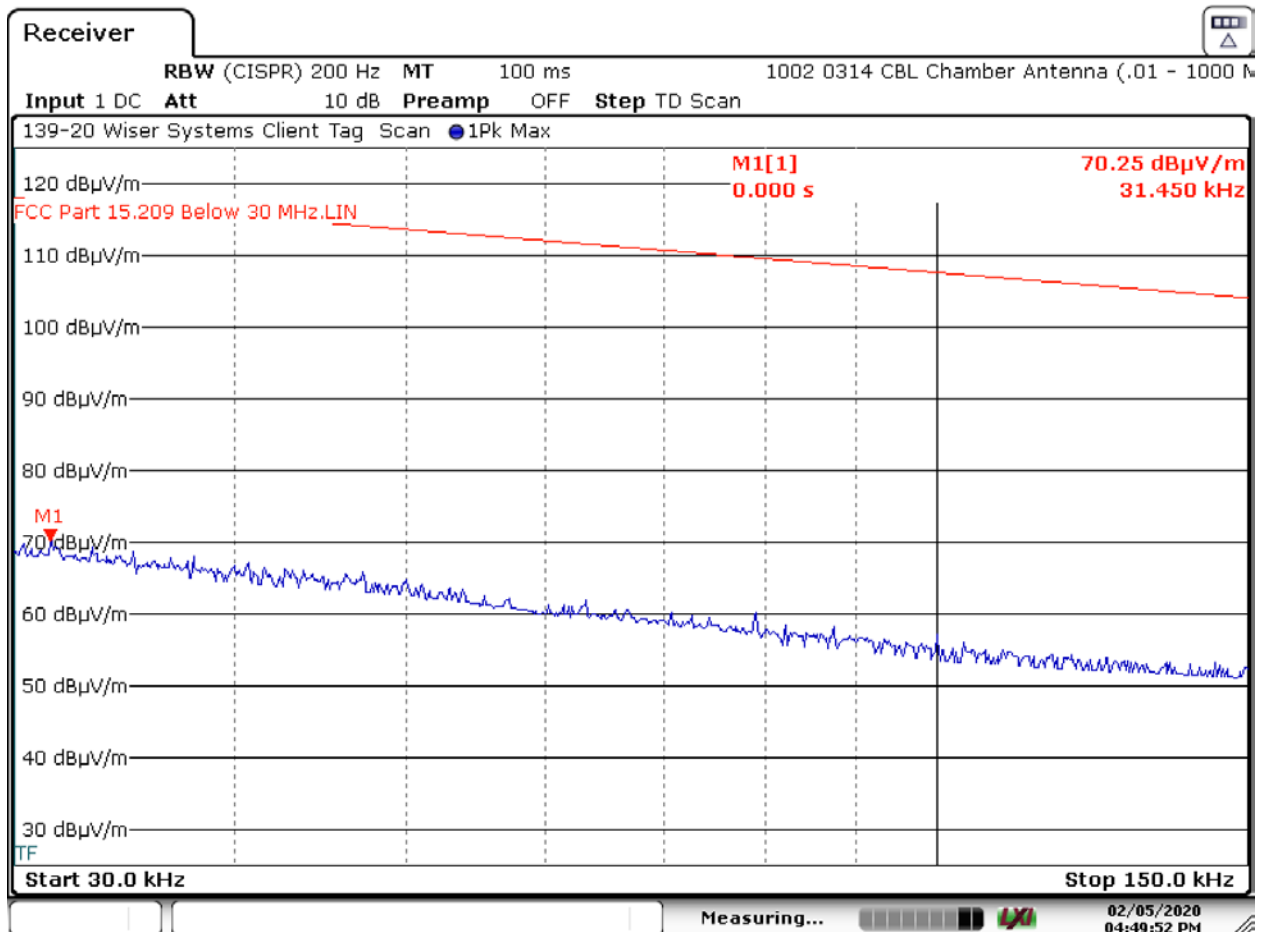
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps 64M



Date: 5.FEB.2020 16:49:53

**Note:** The other data rate / PRFs were also noise floor

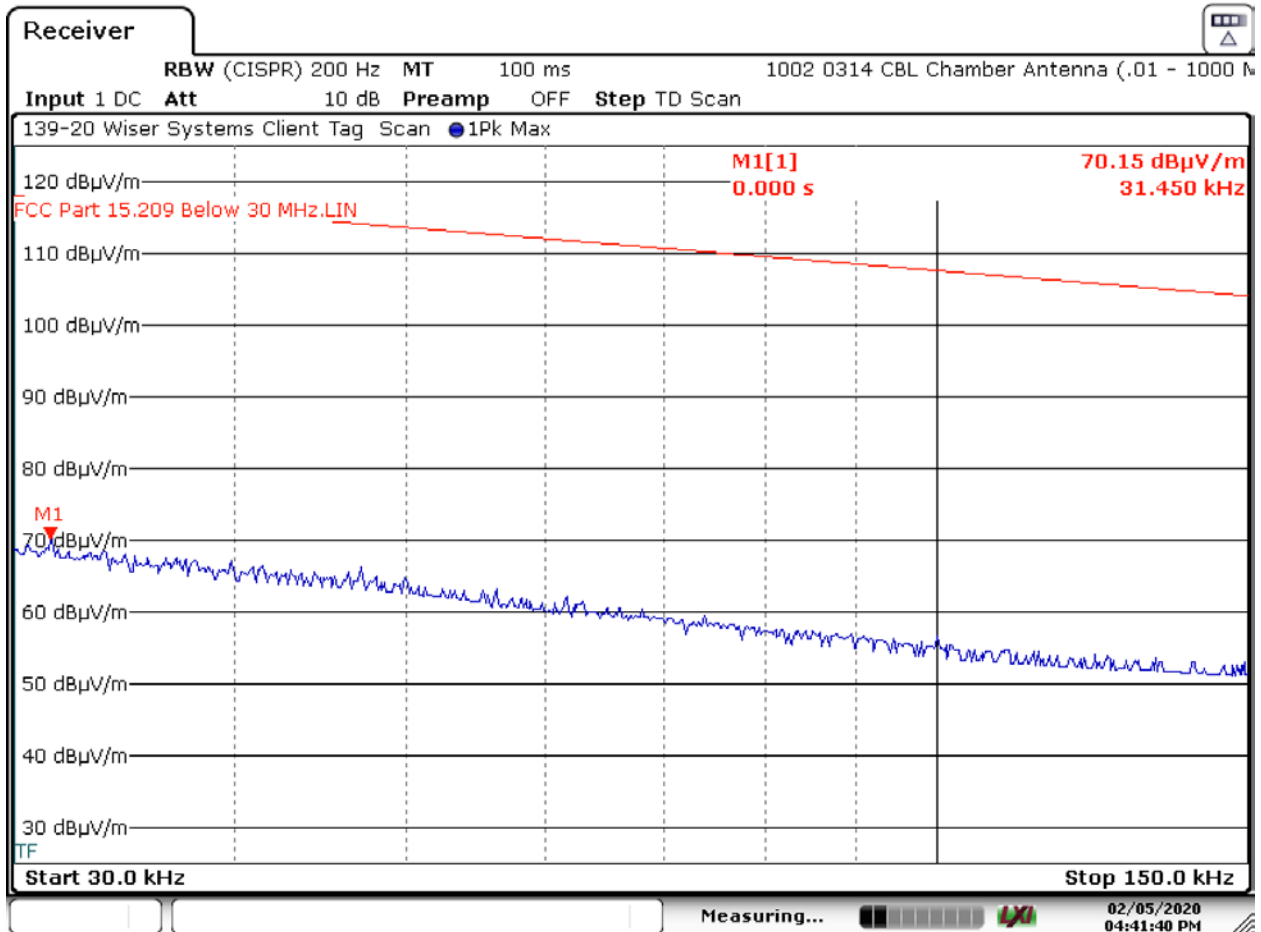
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps 64M



Date: 5.FEB.2020 16:41:40

**Note:** The other data rate / PRFs were also noise floor

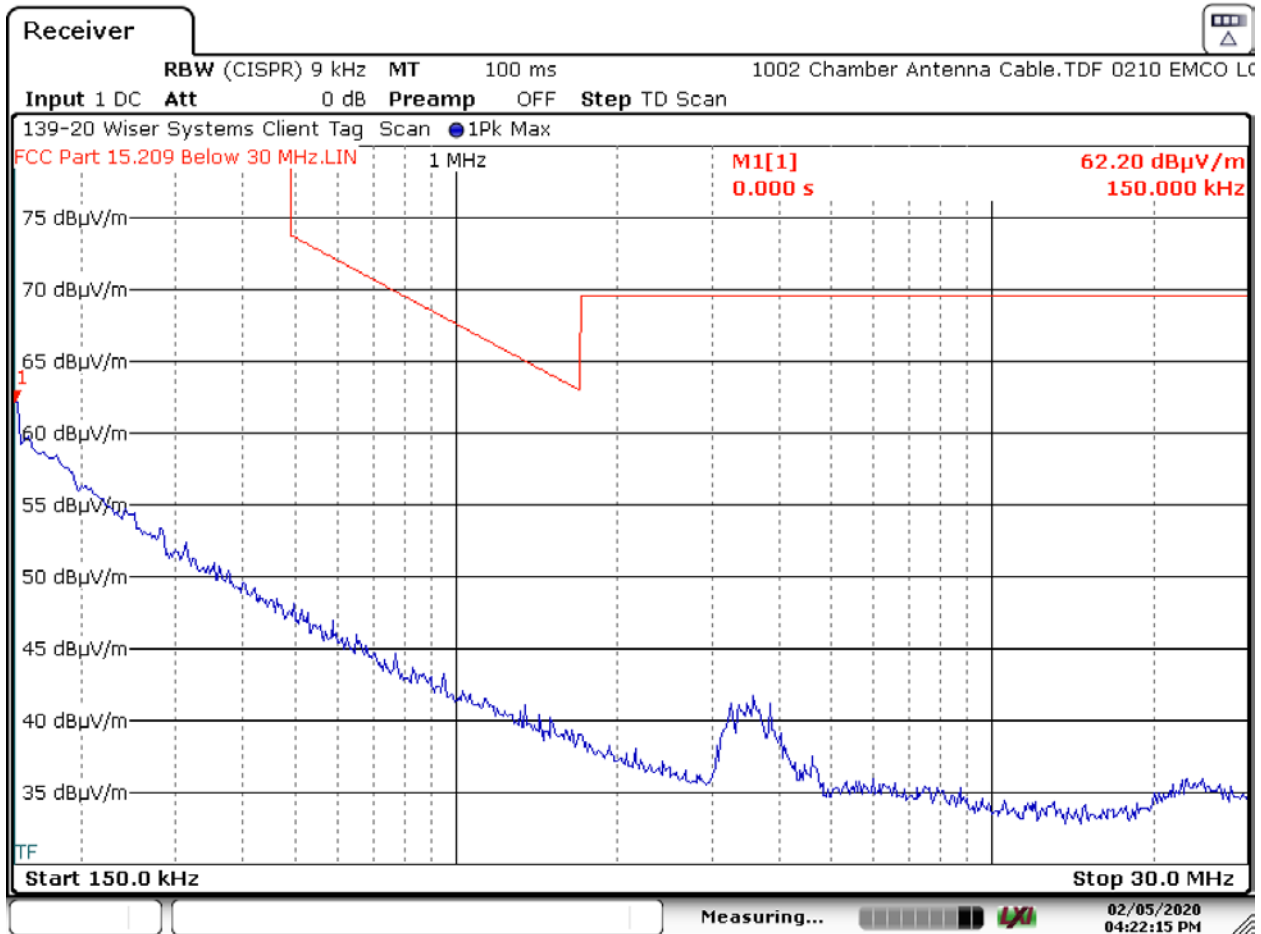
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps 64M



Date: 5.FEB.2020 16:22:16

**Note:** The other data rate / PRFs were also noise floor

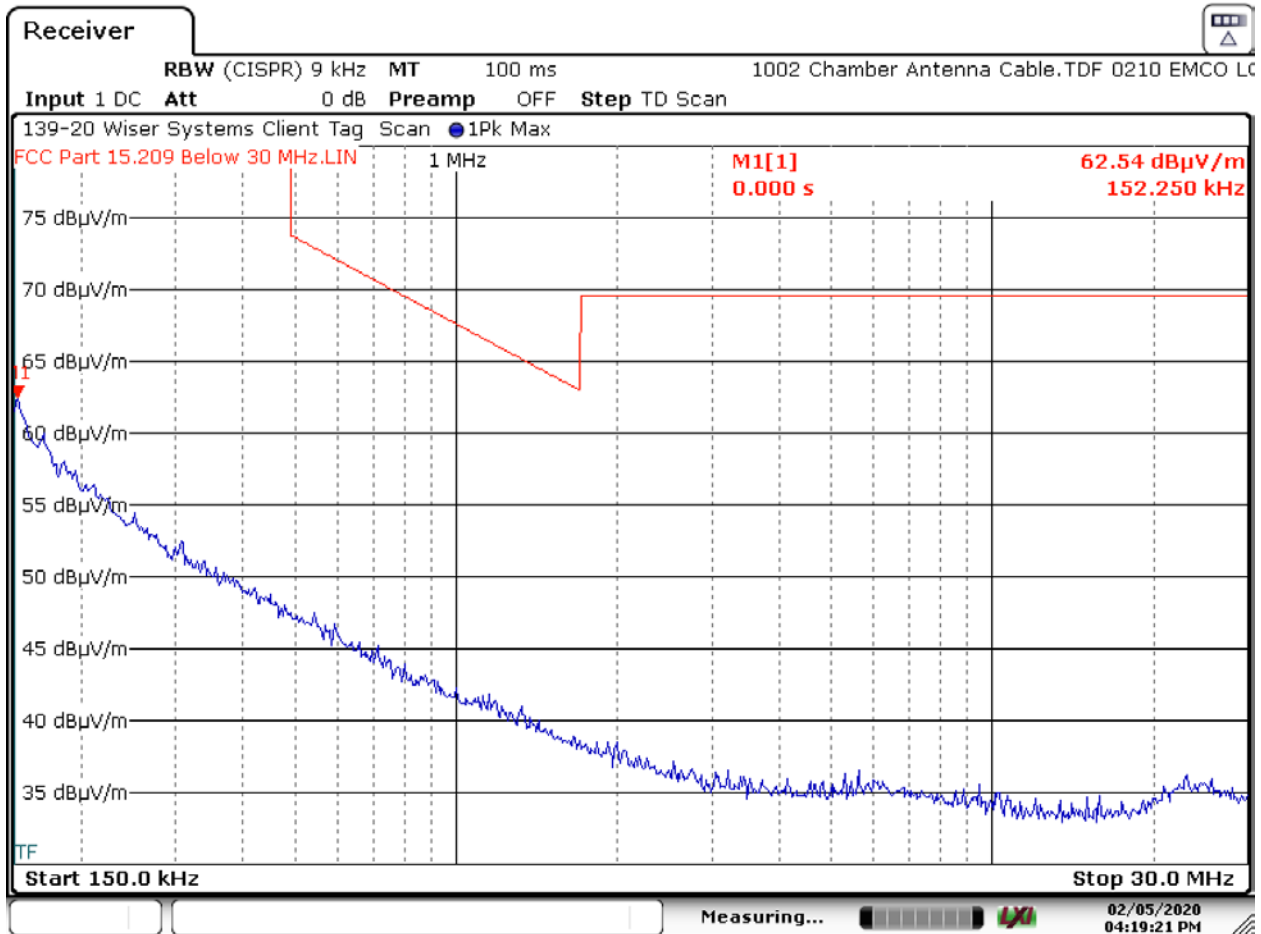
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps 64M



Date: 5.FEB.2020 16:19:21

**Note:** The other data rate / PRFs were also noise floor

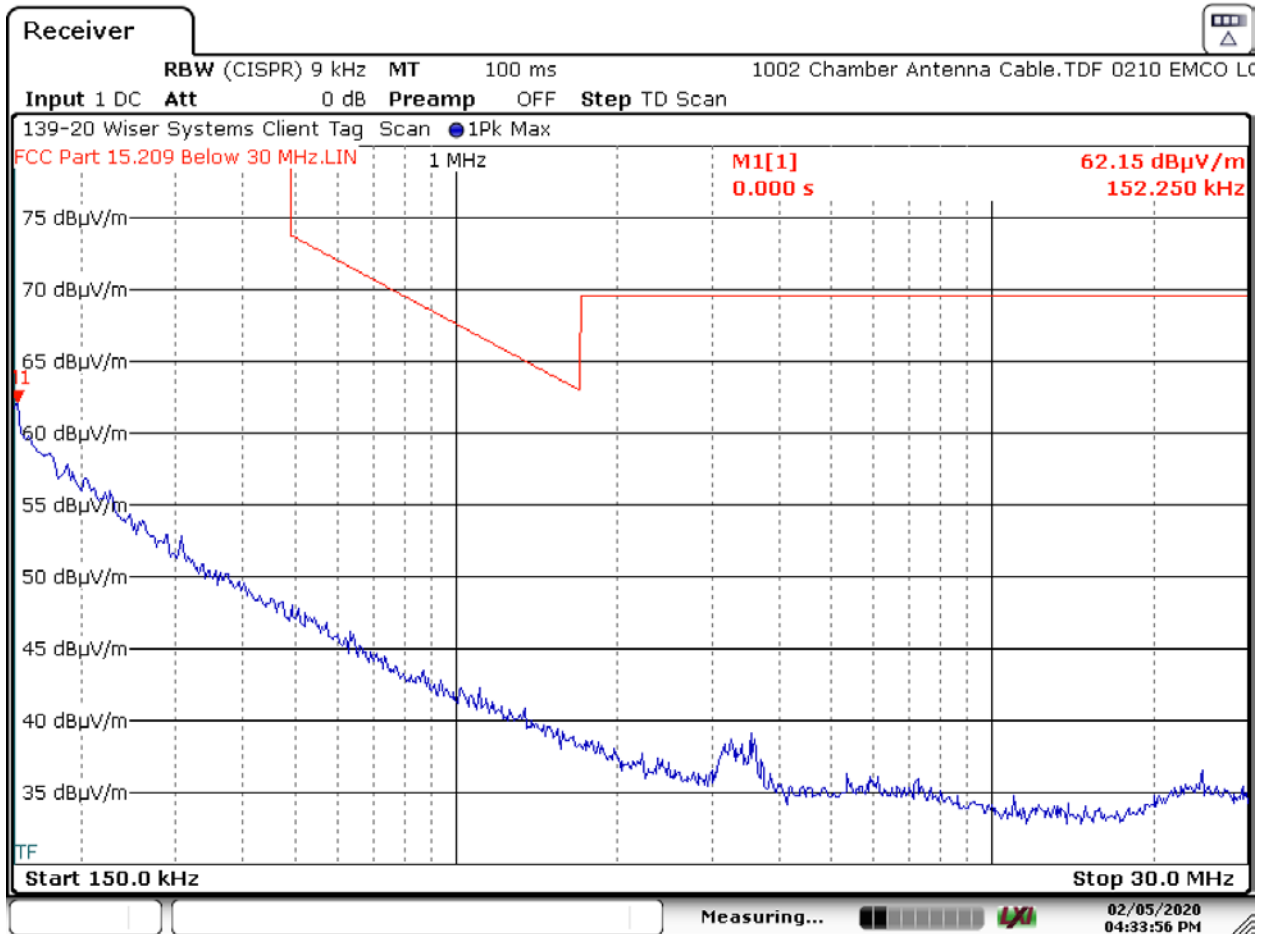
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps 64M



Date: 5.FEB.2020 16:33:56

**Note:** The other data rate / PRFs were also noise floor

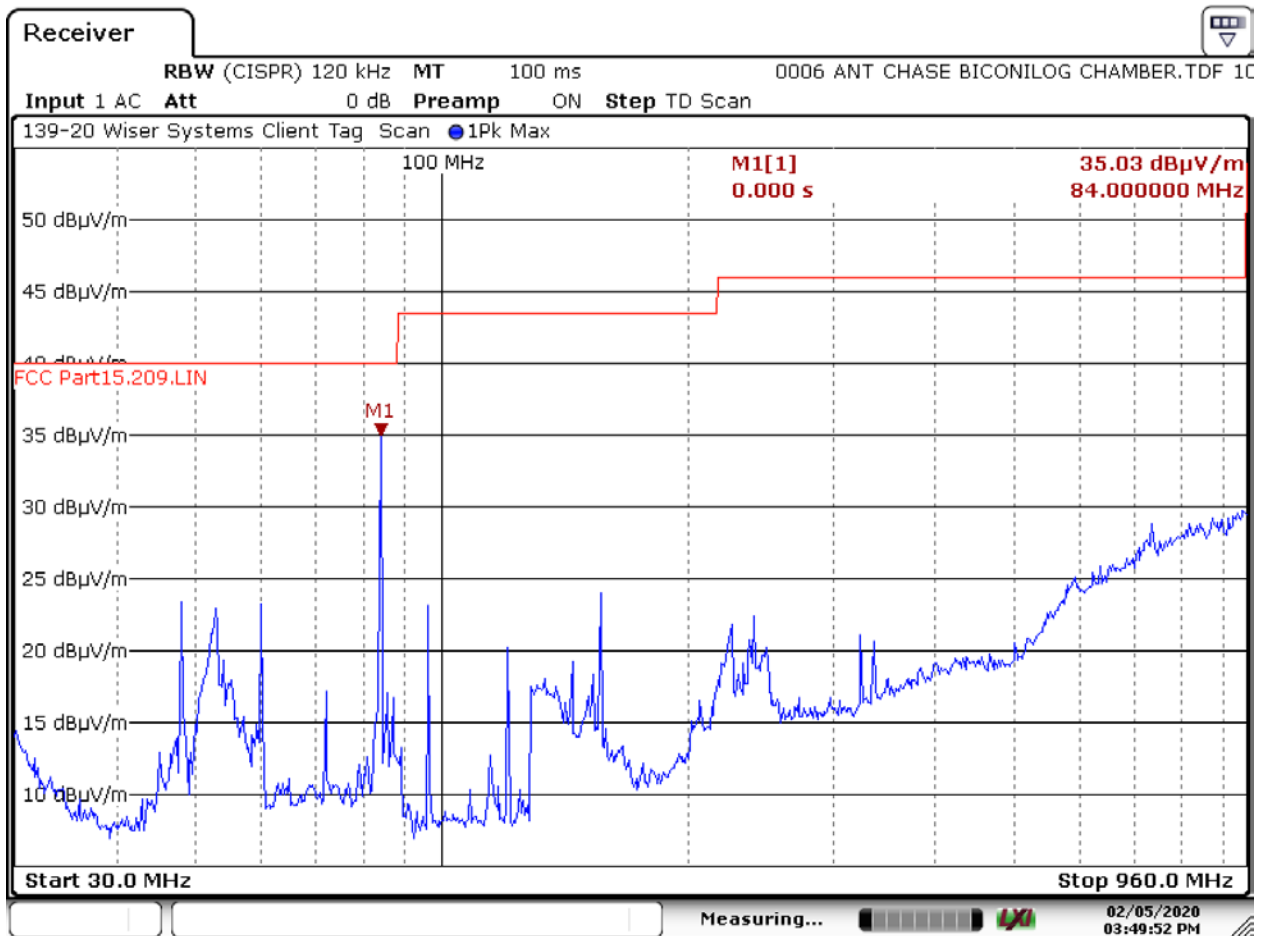
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps – 64M PRF



Date: 5.FEB.2020 15:49:52

**Note:** The other data rate / PRFs were also significantly below the limits.

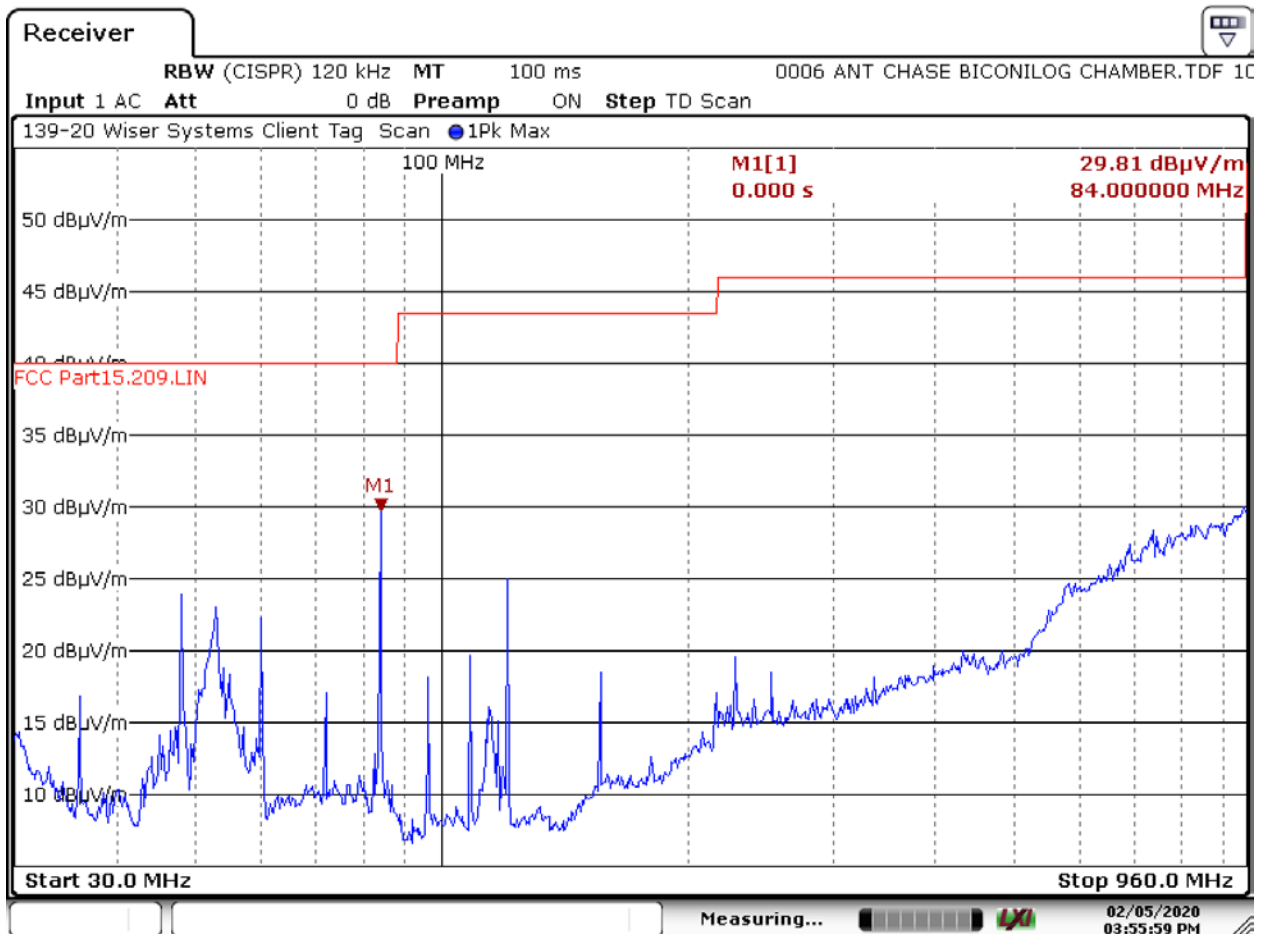
## 6. Measurement Data (continued)

### 6.4. Spurious Radiated Emissions (15.209 continued)

#### 6.4.1. 30 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 – 6.8 Mbps – 64M PRF



Date: 5.FEB.2020 15:55:59

**Note:** The other data rate / PRFs were also significantly below the limits.



## 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 dB $\mu$ V/m at 3 Meters by adding 95.2.

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dB $\mu$ V/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.

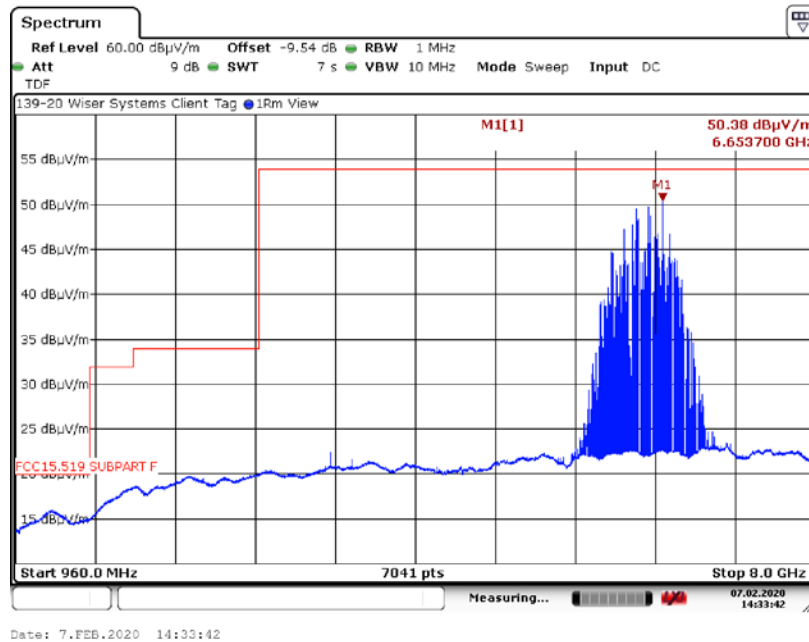
Measurements made from 18 to 40 GHz were done at 0.3 meters and a -20.00 dB distance offset was programmed into the spectrum analyzer.



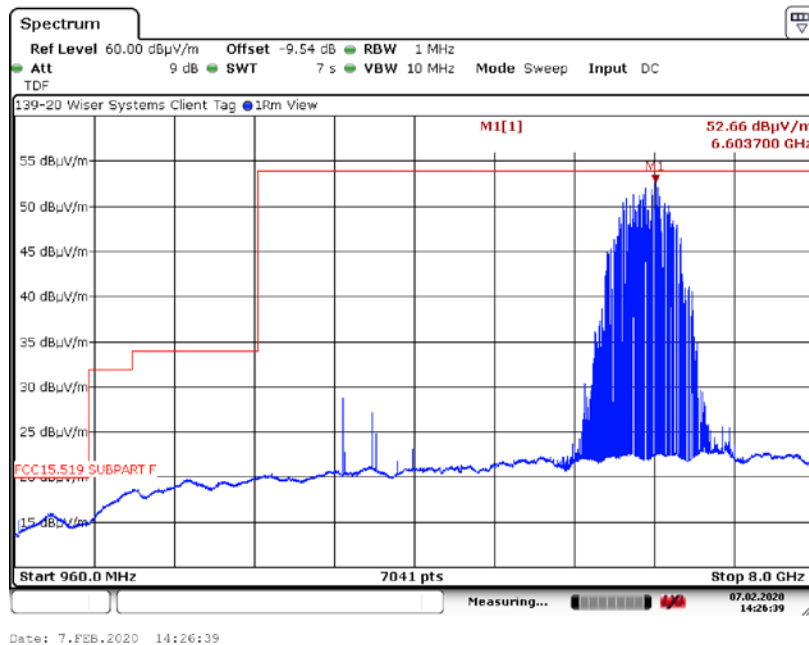
## 6. Measurement Data (continued)

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

#### 6.5.1. 960 MHz to 8 GHz Horizontal at 1 Meter, 110kbps - 16M



#### 6.5.2. 960 MHz to 8 GHz Vertical at 1 Meter, 110kbps - 16M

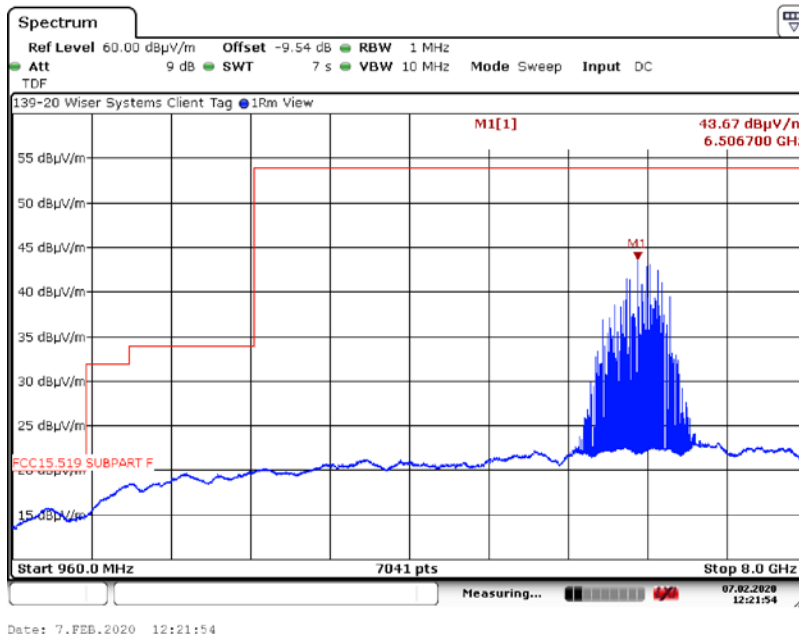




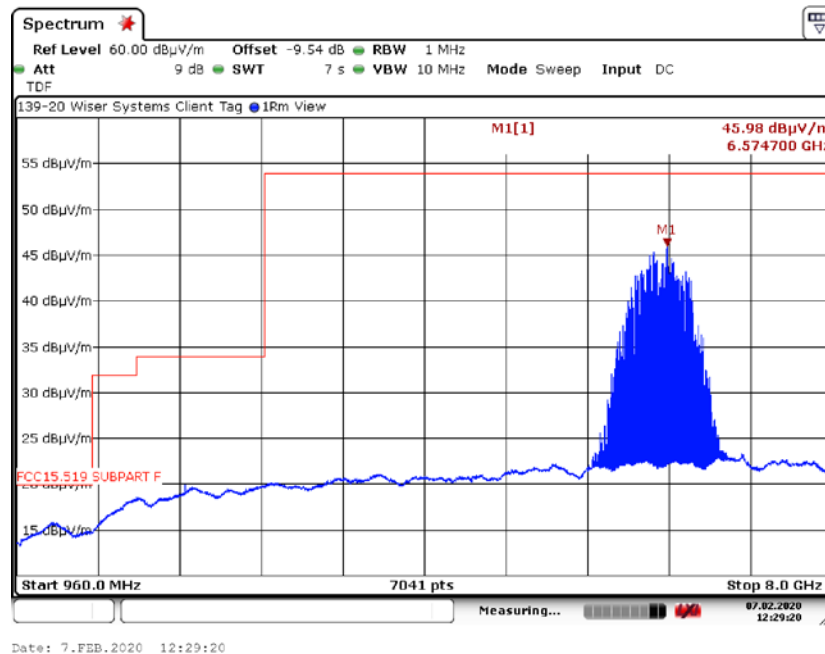
## 6. Measurement Data (continued)

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

#### 6.5.5. 960 MHz to 8 GHz Horizontal at 1 Meter, 6.8 Mbps - 16M



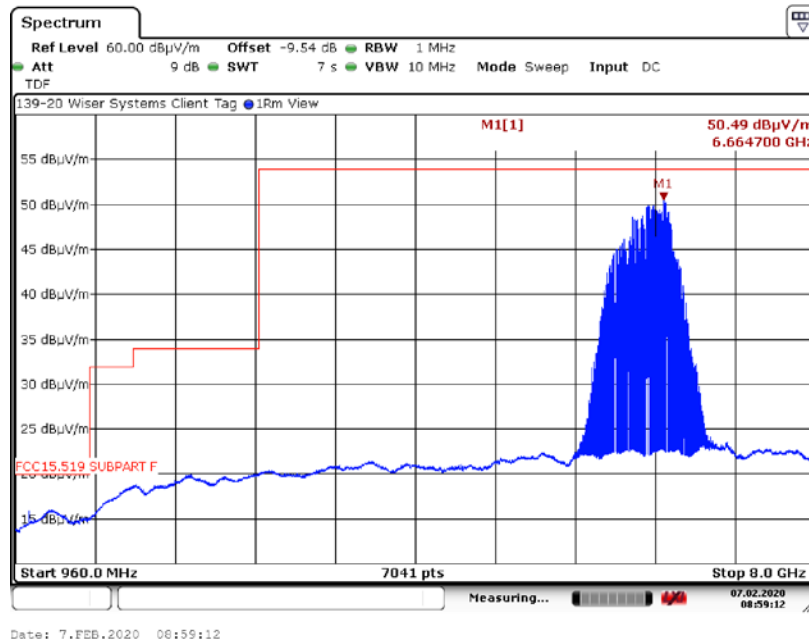
#### 6.5.6. 960 MHz to 8 GHz Vertical at 1 Meter, 6.8 Mbps - 16M



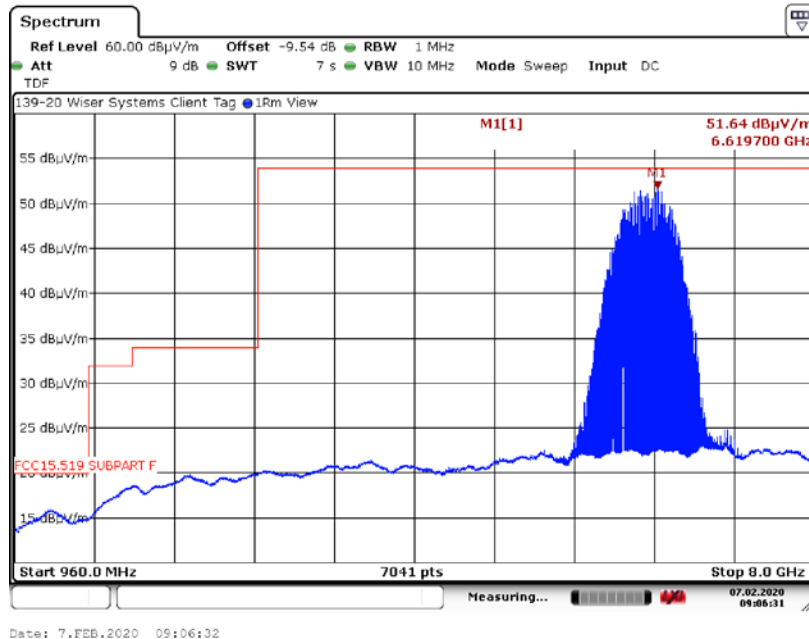
## 6. Measurement Data (continued)

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

#### 6.5.7. 960 MHz to 8 GHz Horizontal at 1 Meter, 6.8 Mbps - 64M



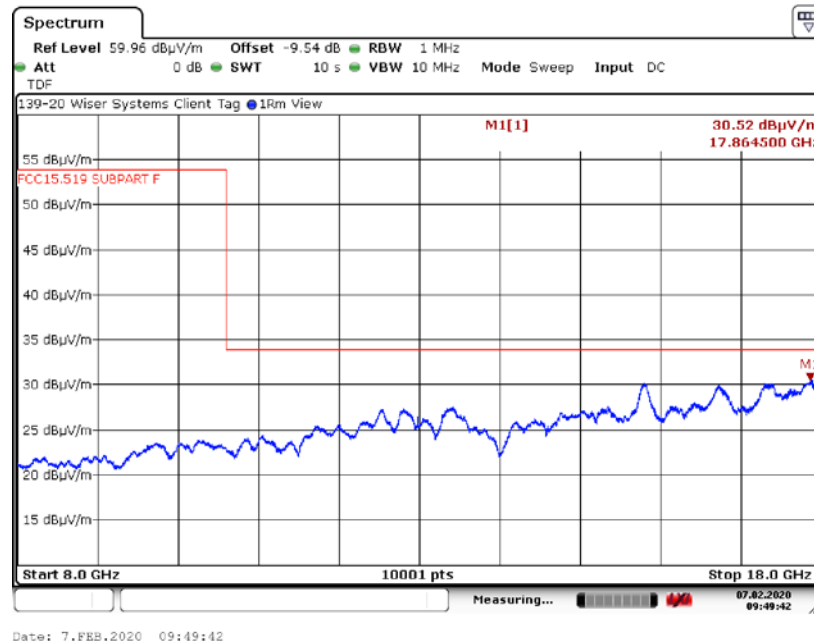
#### 6.5.8. 960 MHz to 8 GHz Vertical at 1 Meter, 6.8 Mbps - 64M



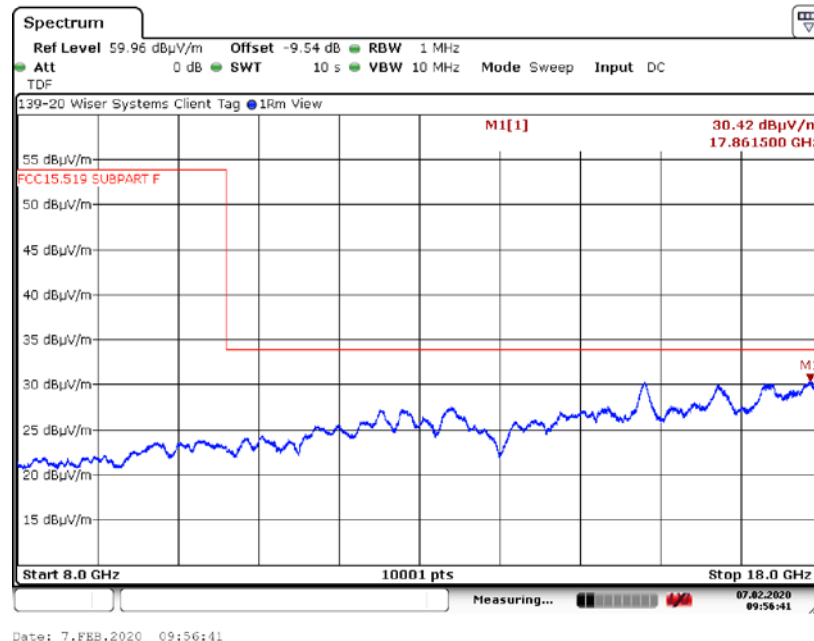
## 6. Measurement Data (continued)

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

#### 6.5.9. 8 to 18 GHz Horizontal at 1 Meter, 6.8 Mbps - 64M



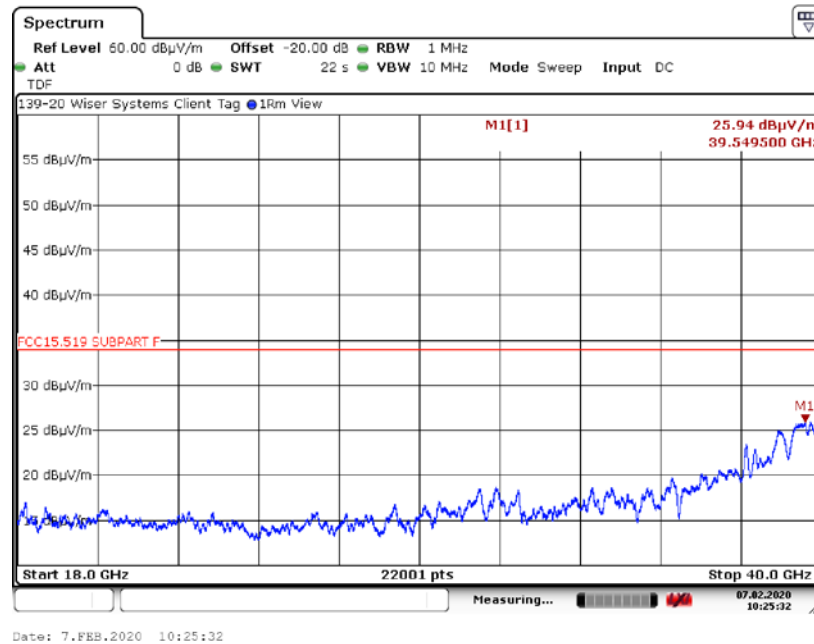
#### 6.5.10. 8 to 18 GHz Vertical at 1 Meter, 6.8 Mbps - 64M



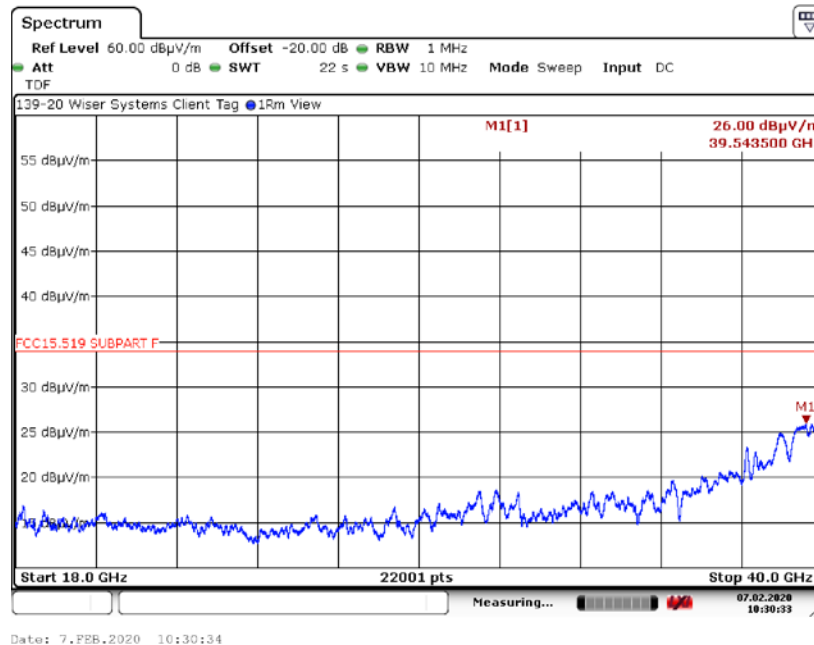
## 6. Measurement Data (continued)

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

#### 6.5.11. 18 to 40 GHz Horizontal at 0.3 Meter, 6.8 Mbps - 64M



#### 6.5.12. 18 to 40 GHz Vertical at 0.3 Meter, 6.8 Mbps - 64M



## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (RSS-220 5.3.1 (d) continued)

Requirement: The radiated emissions at or below 960 MHz from a device shall not exceed the limits in Section 3.4. The radiated emissions above 960 MHz from a device 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 dB $\mu$ V/m at 3 Meters by adding 95.2.

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dB $\mu$ V/m)
960 - 1610	-75.3	19.9
1610 – 4750	-70.0	25.2
4750 – 10,600	-41.3	53.9
Above 10,600	-61.3	33.9

Frequency Range:	960 MHz to 8 GHz
Measurement Distance:	1 Meter
EMI Receiver IF Bandwidth:	1 MHz
EMI Receiver Avg Bandwidth	10 MHz
Detector Function:	RMS 1 mS Average as defined in Annex Section 4(b)

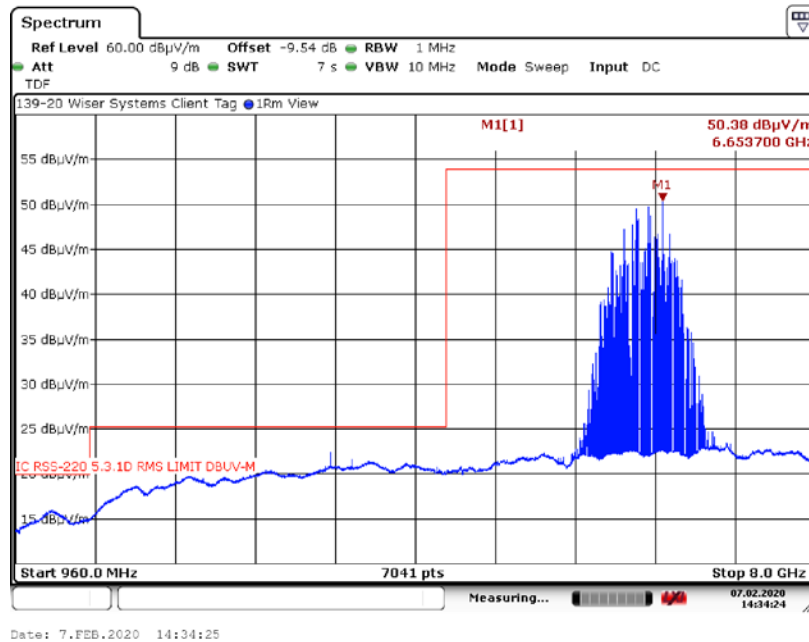
Notes: Measurements made from 960 MHz to 8 GHz were made in a semi-anechoic chamber at 1 Meter using a -9.54 dB distance offset was programmed into the spectrum analyzer.

Measurement data above 8 GHz for Channel 5 is provided in plots 6.5.9 to 6.5.12 on the previous pages.

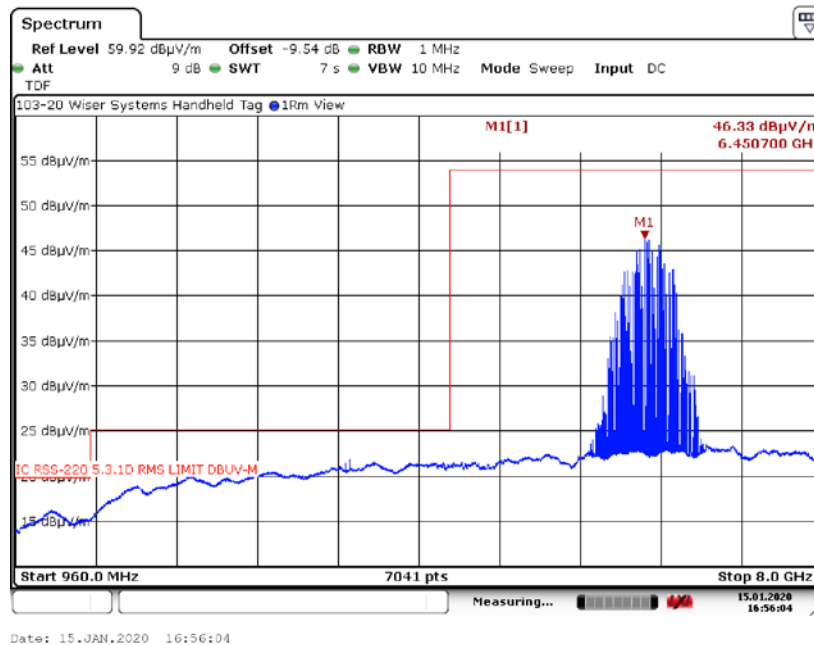
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (RSS-220 5.3.1 (d)) continued)

#### 6.5.13. 960 MHz to 8 GHz Horizontal at 1 Meter, 110 kbps - 16M



#### 6.5.14. 960 MHz to 8 GHz Vertical at 1 Meter, 110 kbps - 16M

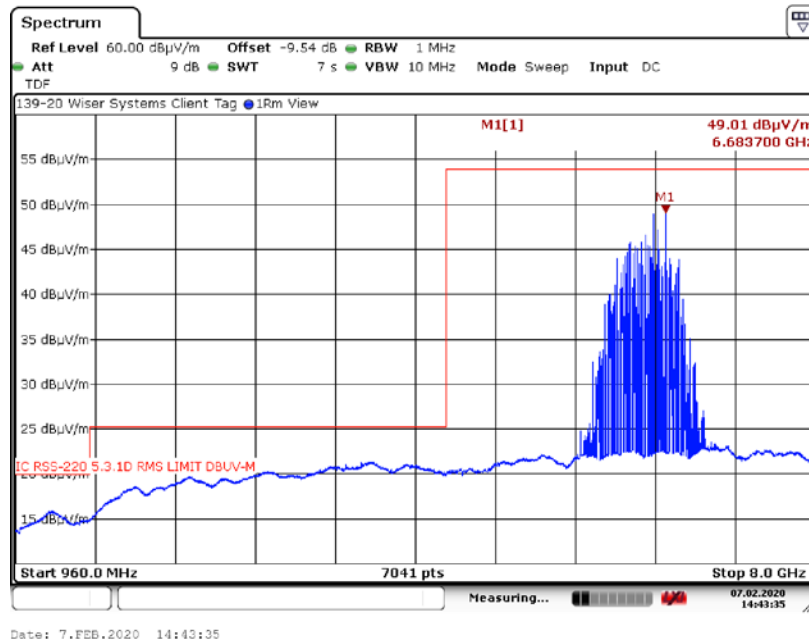




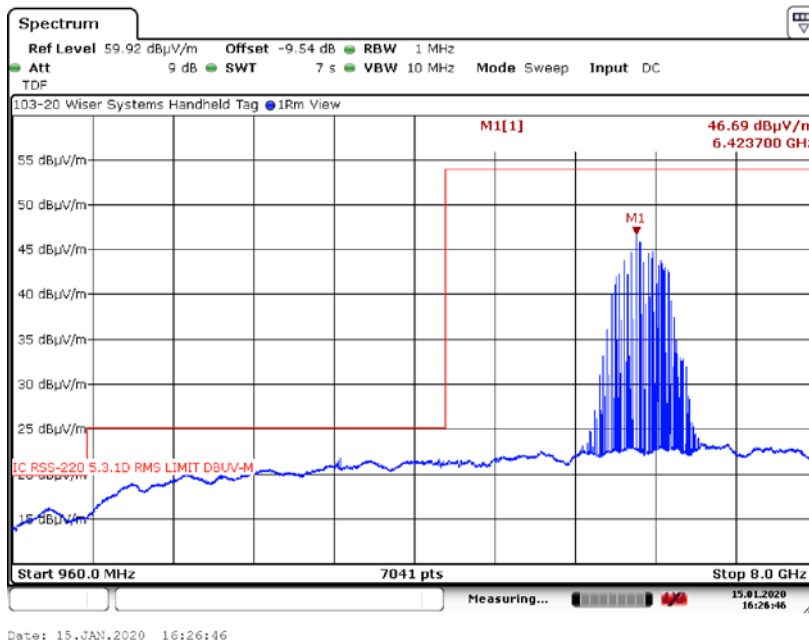
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (RSS-220 5.3.1 (d)) continued)

#### 6.5.15. 960 MHz to 8 GHz Horizontal at 1 Meter, 110 kbps - 64M



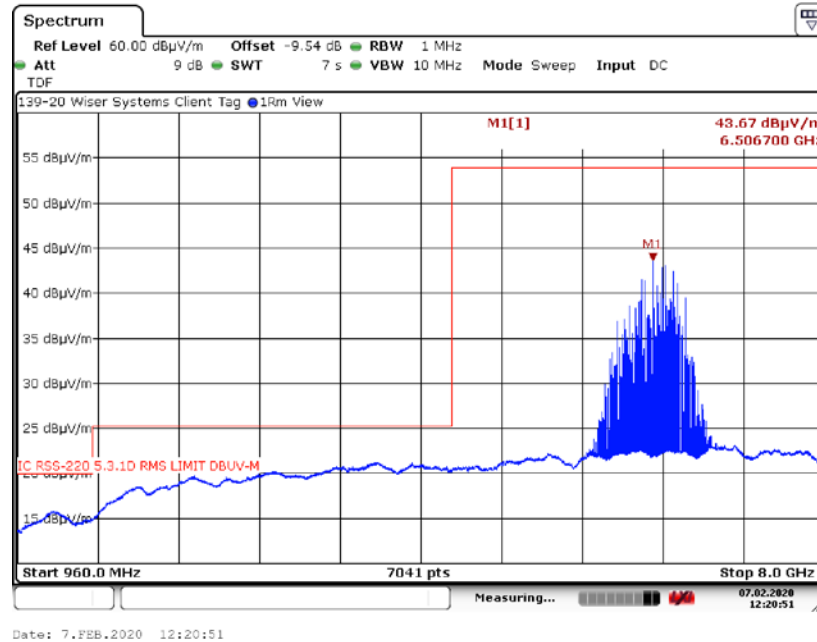
#### 6.5.16. 960 MHz to 8 GHz Vertical at 1 Meter, 110 kbps - 64M



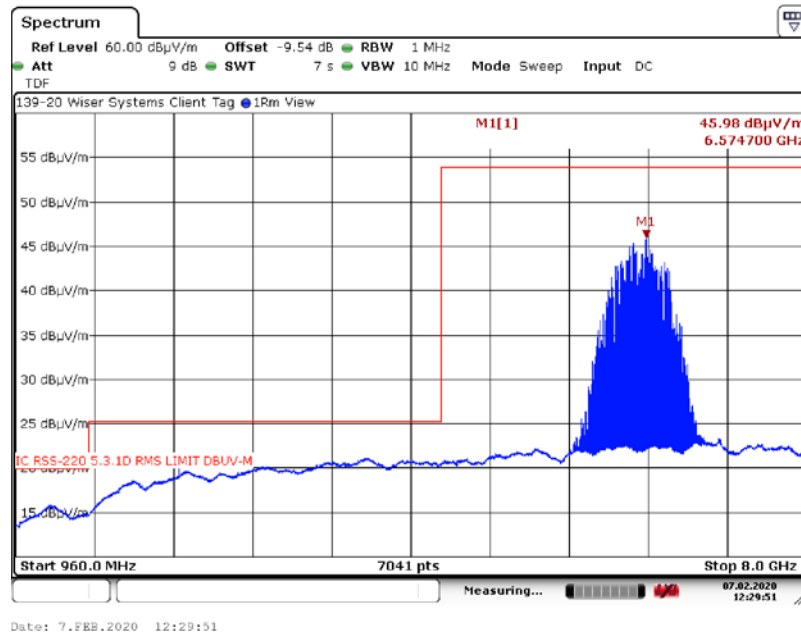
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (RSS-220 5.3.1 (d)) continued)

#### 6.5.17. 960 MHz to 8 GHz Horizontal at 1 Meter, 6.8 Mbps - 16M



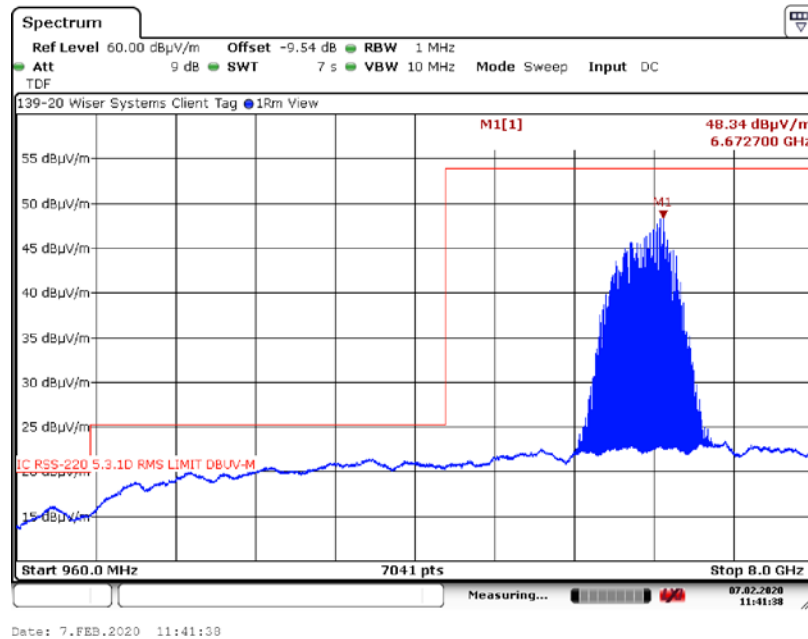
#### 6.5.18. 960 MHz to 8 GHz Vertical at 1 Meter, 6.8 Mbps - 16M



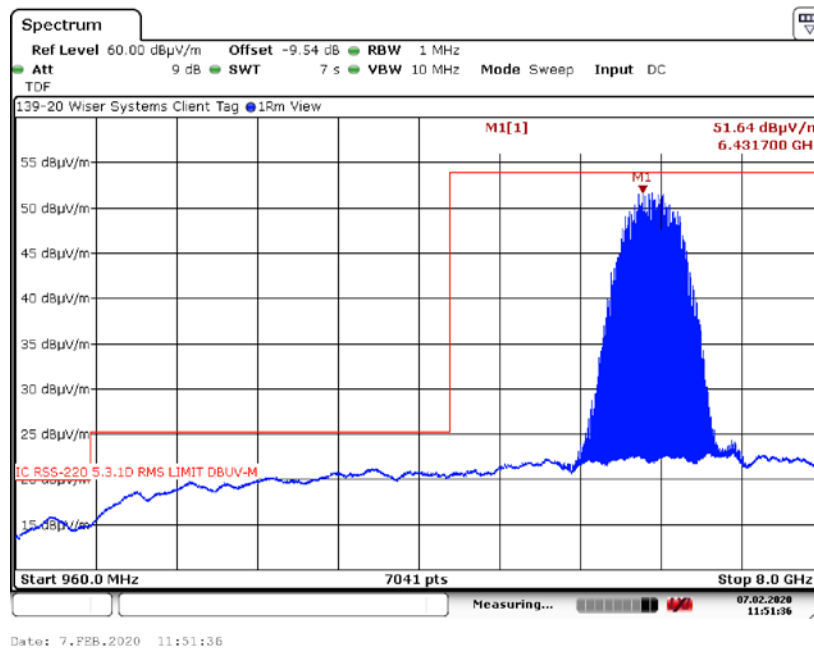
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (RSS-220 5.3.1 (d)) continued)

#### 6.5.19. 960 MHz to 8 GHz Horizontal at 1 Meter, 6.8 Mbps - 64M



#### 6.5.20. 960 MHz to 8 GHz Vertical at 1 Meter, 6.8 Mbps - 64M



## 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

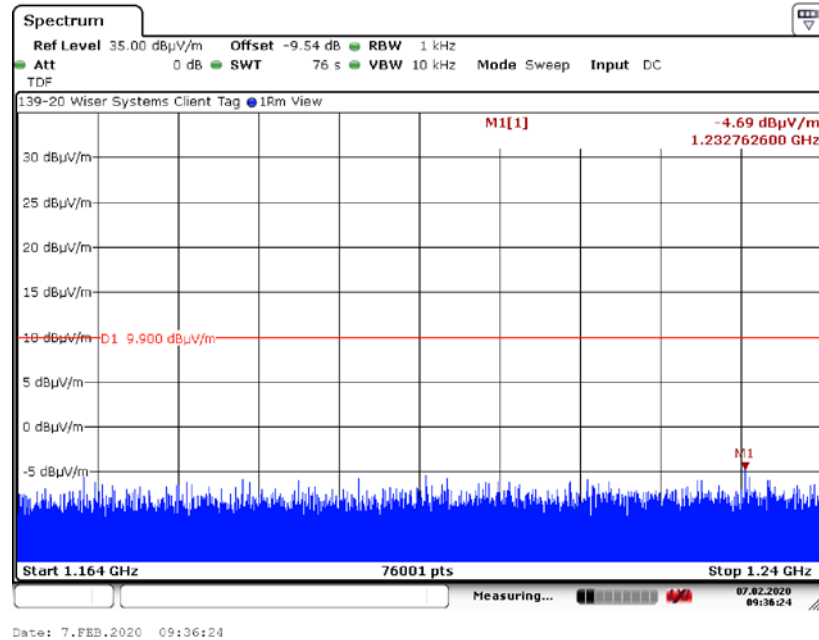
There were no broadband emissions related to the UWB transmitter. Measured signals were narrowband and related to the microprocessor / clocks and do not fall under the requirements of this section. Measurements were made at 1.0 Meter with a -9.54 dB distance correction factor. The -85.3 dBm limit was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

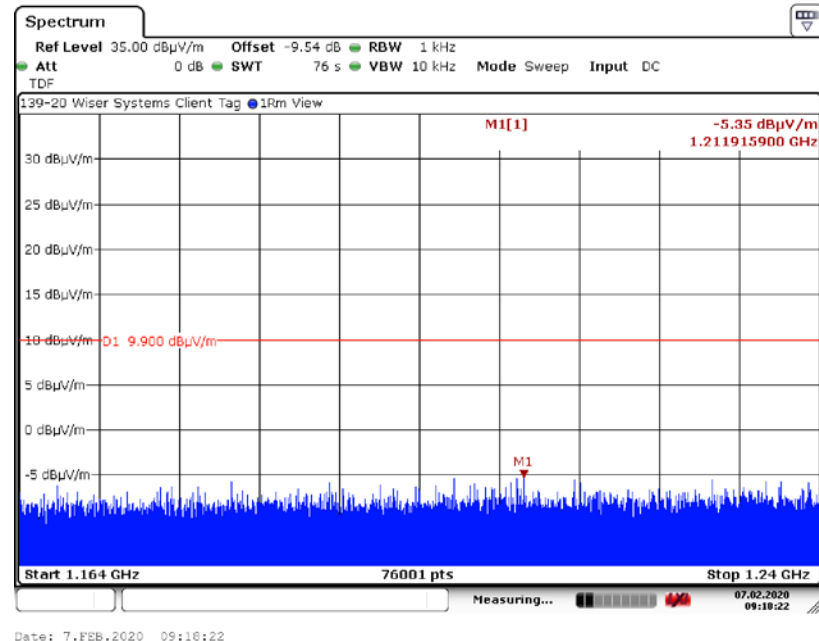
## 6. Measurement Data (continued)

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

#### 6.6.3.1 Horizontal Measurement Polarity 1164 to 1240 MHz



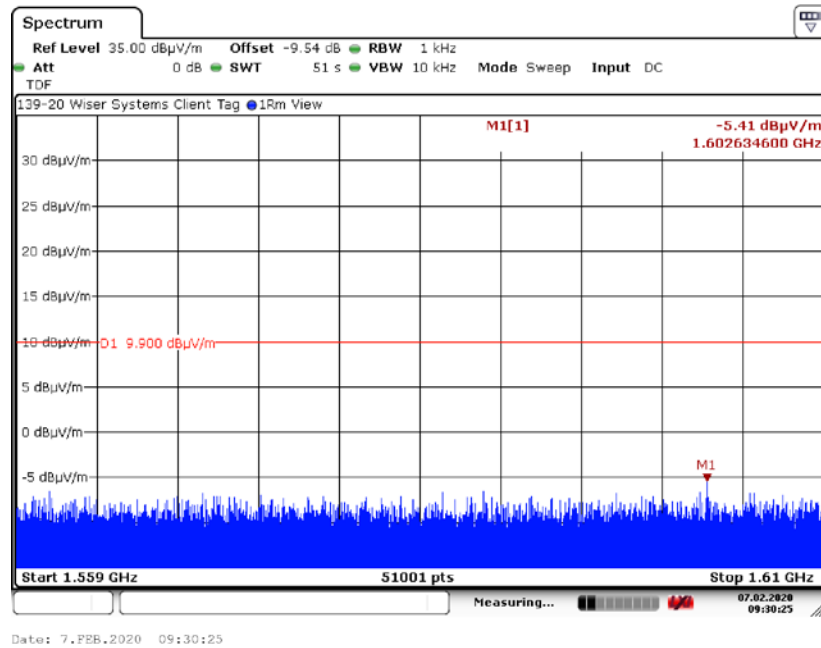
#### 6.6.3.2 Vertical Measurement Polarity 1164 to 1240 MHz



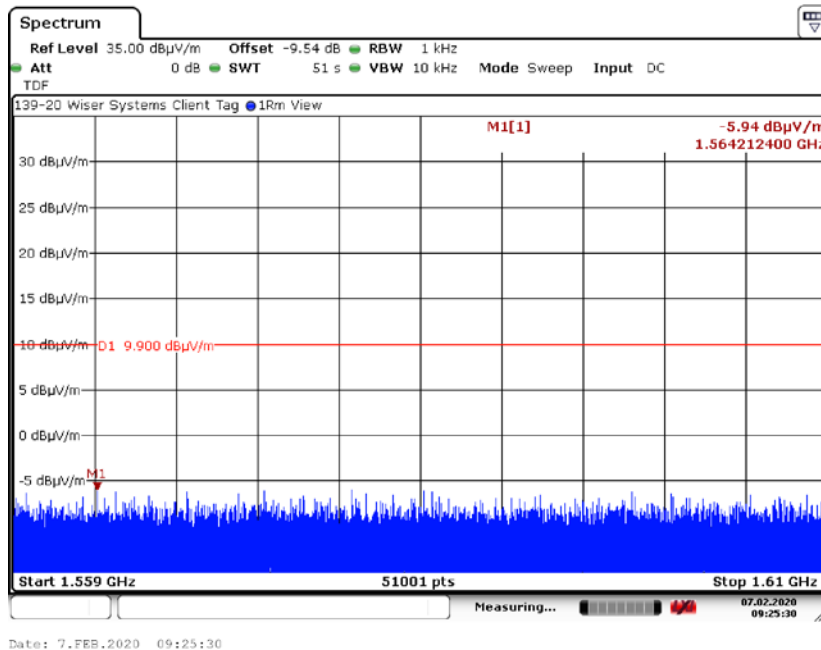
## 6. Measurement Data (continued)

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

#### 6.6.3.3 Horizontal Measurement Polarity 1559 to 1610 MHz



#### 6.6.3.4 Vertical Measurement Polarity 1559 to 1610 MHz



## 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 dB $\mu$ V/m at 3 Meters by adding 95.2.

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

Frequency Range:	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)

## 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 2, 110 kbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7982	53.30	53.90	-0.60	V	135	45	Compliant

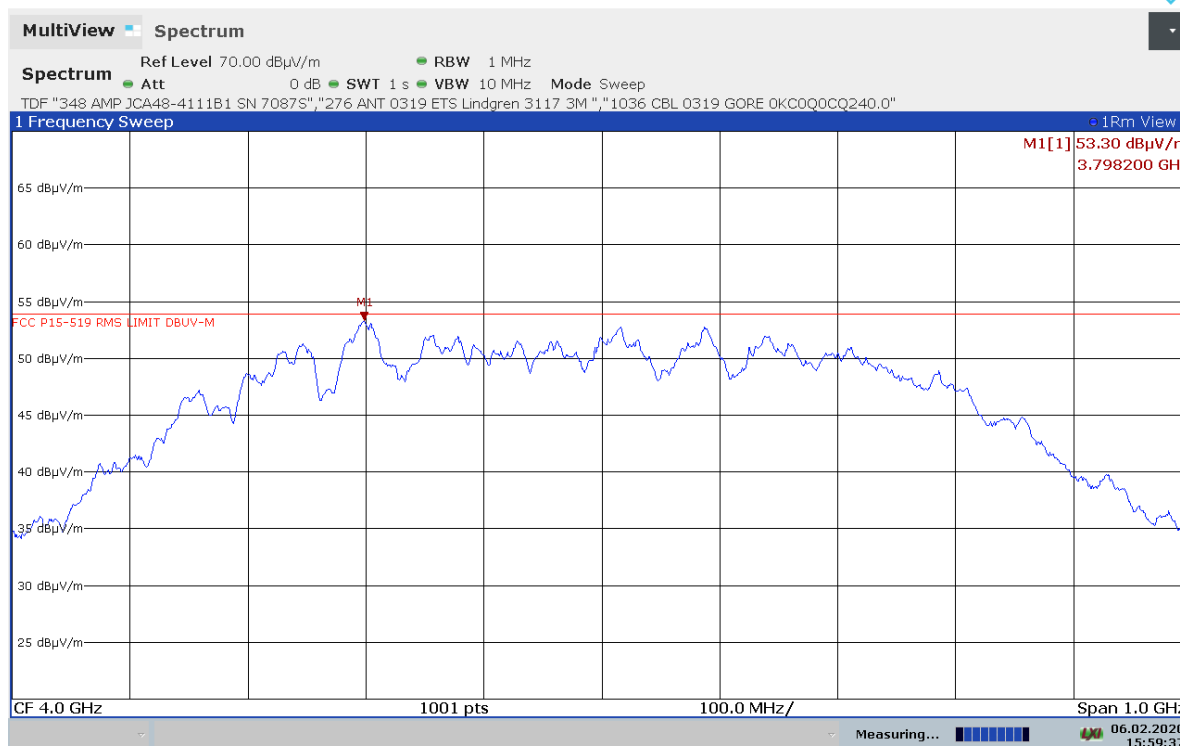
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7982	-41.90	-41.30	-0.60	V	135	45	Compliant

139-20 Wiser Systems Client Tag



15:59:38 06.02.2020



## 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 2, 110 kbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.8022	53.75	53.90	-0.15	V	135	45	Compliant

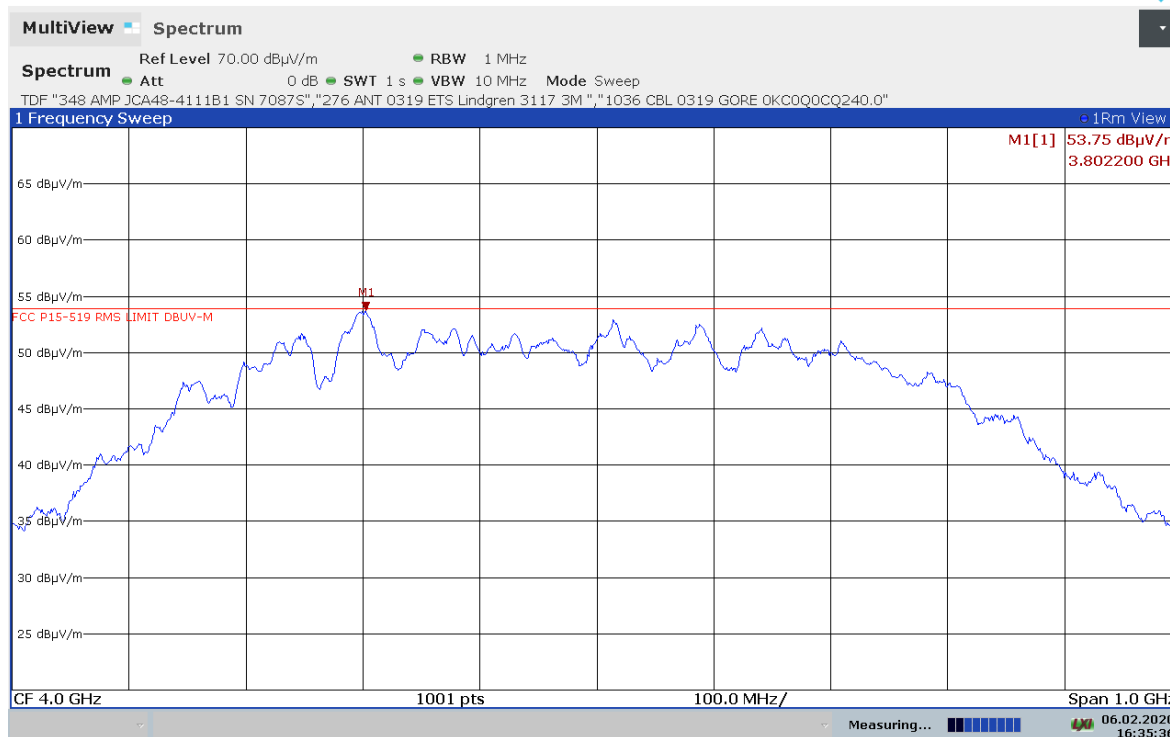
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.8022	-41.45	-41.30	-0.15	V	135	45	Compliant

139-20 Wiser Systems Client Tag



16:35:37 06.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.3. Plot of RMS Power at 3 Meters (Channel 2, 6.8 Mbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.8022	50.75	53.90	-3.15	V	135	45	Compliant

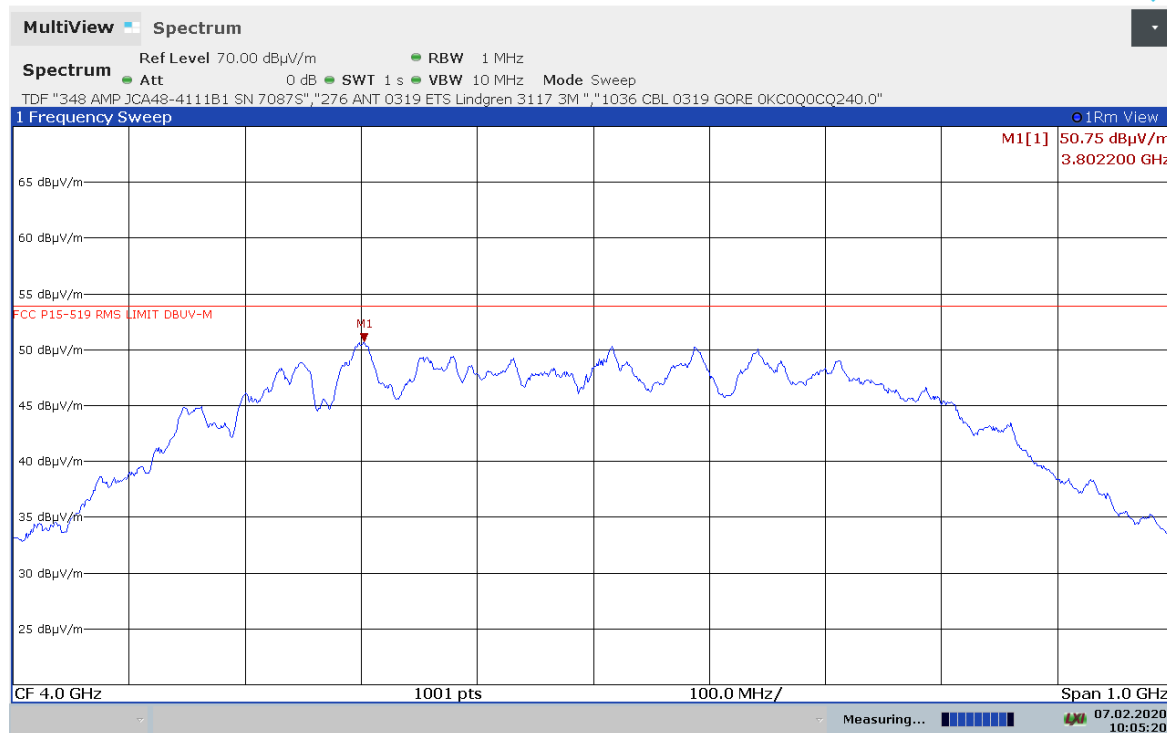
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.8022	-44.45	-41.30	-3.15	V	135	45	Compliant

139-20 Wiser Systems Client Tag



10:05:20 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.4. Plot of RMS Power at 3 Meters (Channel 2, 6.8 Mbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7992	53.76	53.90	-0.14	V	135	45	Compliant

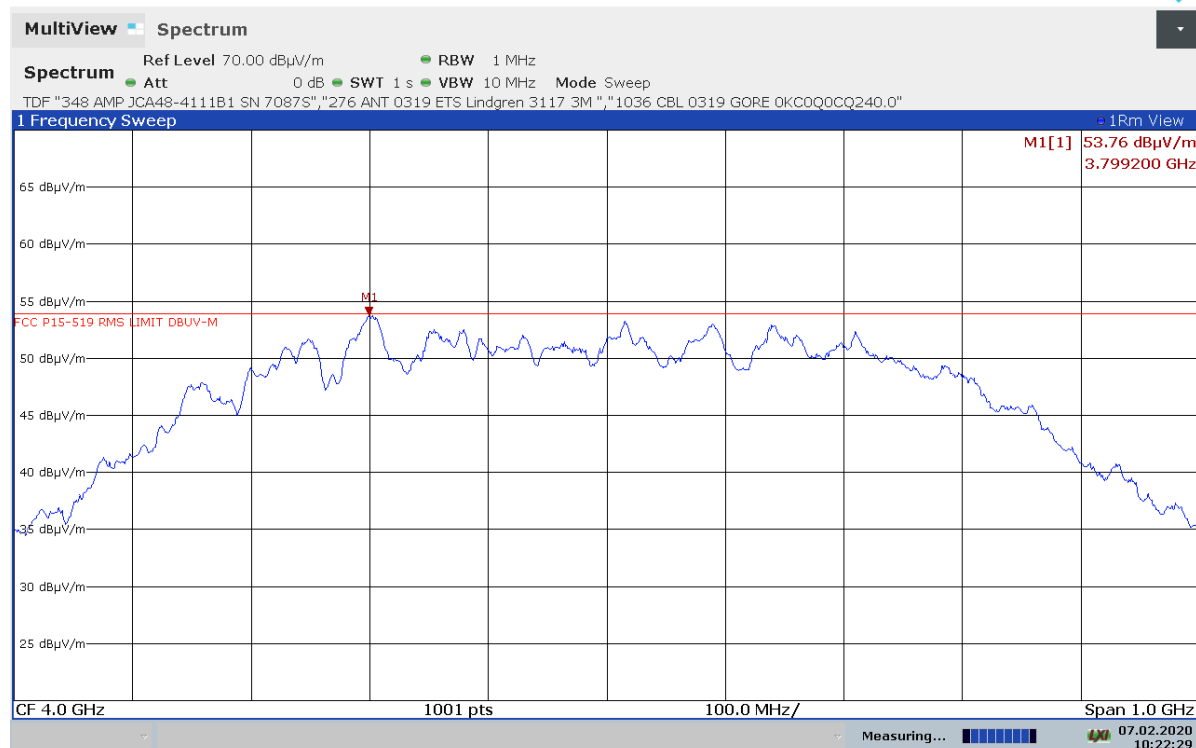
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7992	-41.44	-41.30	-0.14	V	135	45	Compliant

139-20 Wiser Systems Client Tag



10:22:30 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.5. Plot of RMS Power at 3 Meters (Channel 4, 110 kbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7971	53.16	53.90	-0.74	V	135	45	Compliant

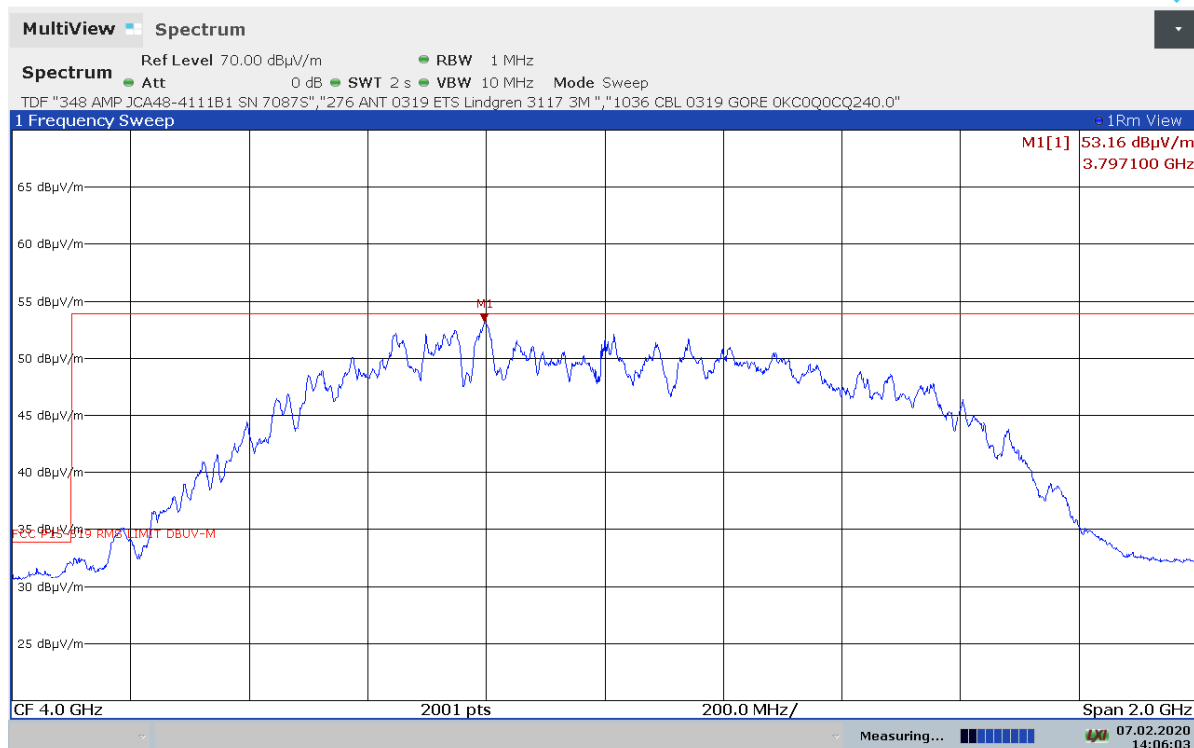
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBm)	(dBm)	(dB)	H/V	cm	Deg	
3.7971	-42.04	-41.30	-0.74	V	135	45	Compliant

139-20 Wiser Systems Client Tag



14:06:03 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.6. Plot of RMS Power at 3 Meters (Channel 4, 110 kbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7981	53.40	53.90	-0.50	V	135	45	Compliant

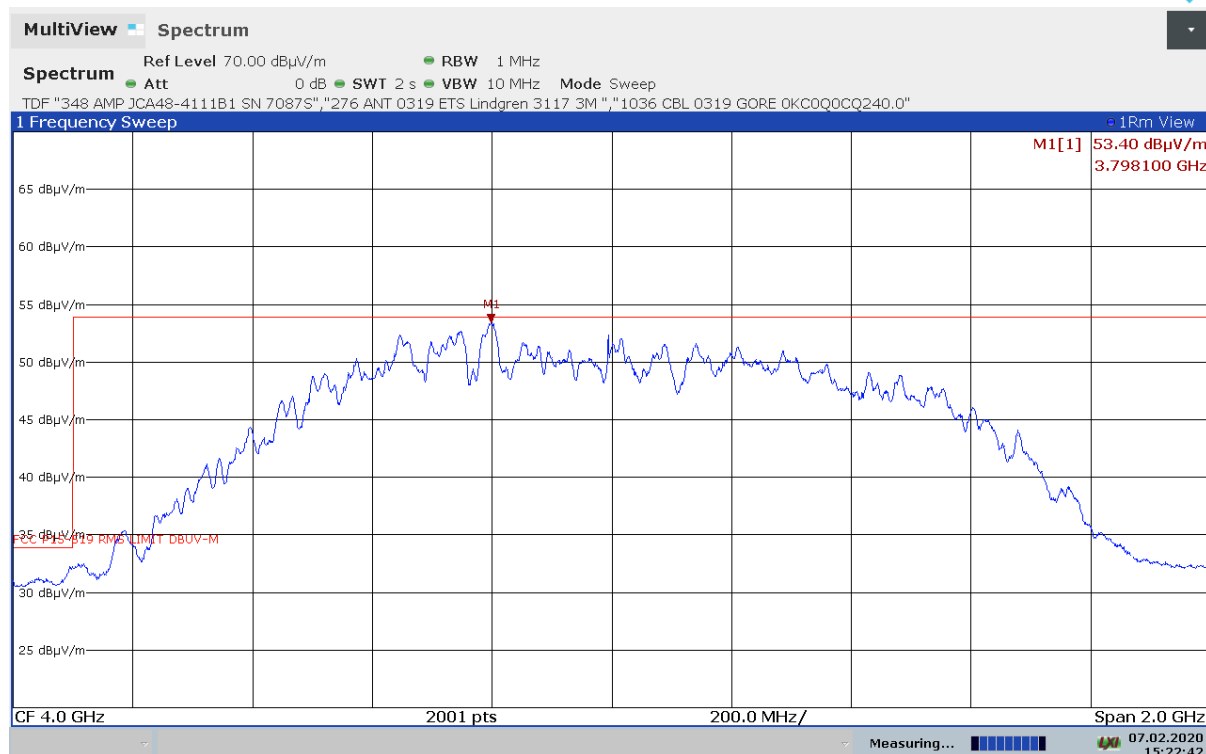
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7981	-41.80	-41.30	-0.50	V	135	45	Compliant

139-20 Wiser Systems Client Tag



15:22:42 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.7. Plot of RMS Power at 3 Meters (Channel 4, 6.8 Mbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7961	50.65	53.90	-3.25	V	135	45	Compliant

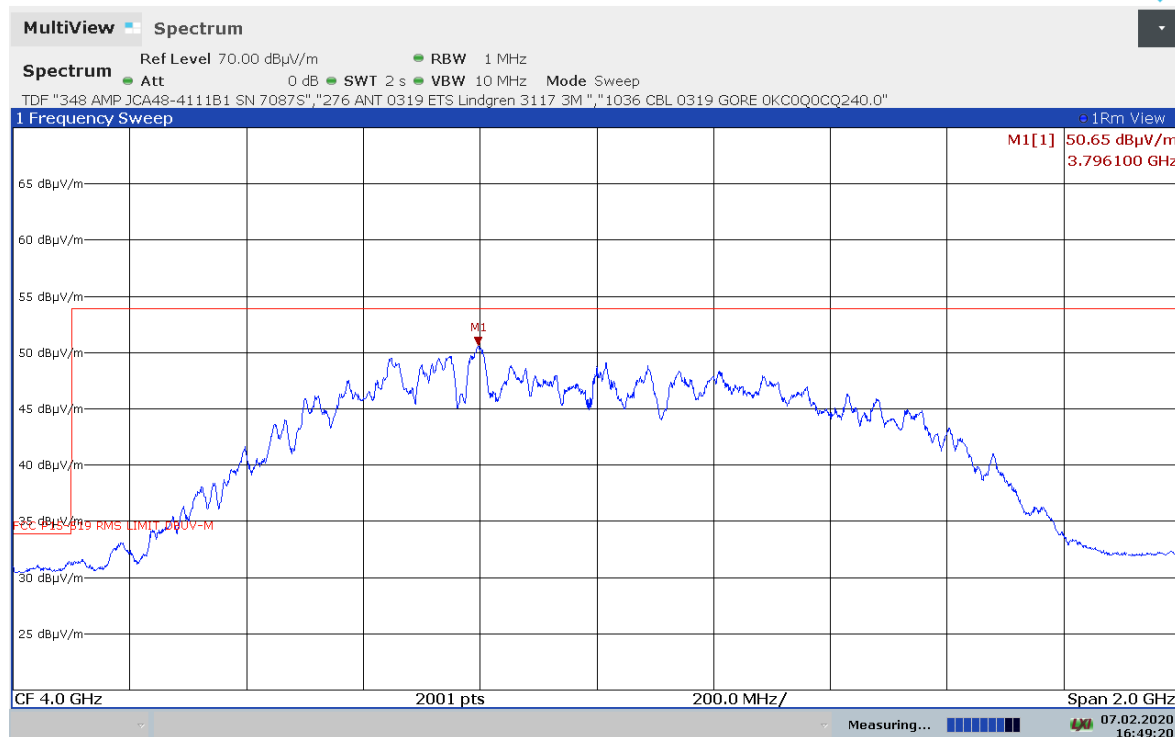
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7961	-44.55	-41.30	-3.25	V	135	45	Compliant

139-20 Wiser Systems Client Tag



16:49:20 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.8. Plot of RMS Power at 3 Meters (Channel 4, 6.8 Mbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7991	53.44	53.90	-0.46	V	135	45	Compliant

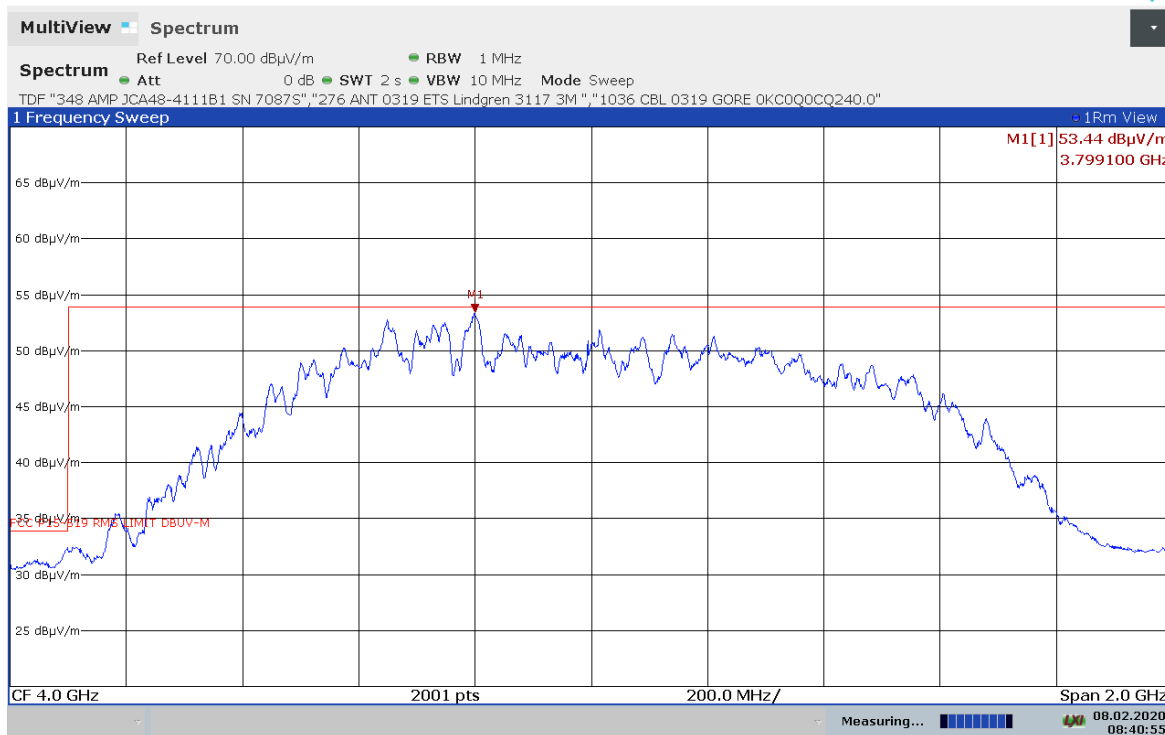
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7991	-41.76	-41.30	-0.46	V	135	45	Compliant

139-20 Wiser Systems Client Tag



08:40:55 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.9. Plot of RMS Power at 3 Meters (Channel 5, 110 kbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.458	53.60	53.90	-0.30	V	110	125	Compliant

Notes: <sup>1</sup> 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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.458	-41.60	-41.30	-0.30	V	110	125	Compliant

139-20 Wiser Systems Client Tag



14:01:21 08.02.2020



## 6. Measurement Data (continued)

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

#### 6.7.10. Plot of RMS Power at 3 Meters (Channel 5, 110 kbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.458	53.58	53.90	-0.32	V	110	125	Compliant

Notes: <sup>1</sup> 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 <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBm)	(dBm)	(dB)	H/V	cm	Deg	
6.458	-41.62	-41.30	-0.32	V	110	125	Compliant

#### 139-20 Wiser Systems Client Tag



15:04:58 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.11. Plot of RMS Power at 3 Meters (Channel 5, 6.8 Mbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.482	49.45	53.90	-4.45	V	110	125	Compliant

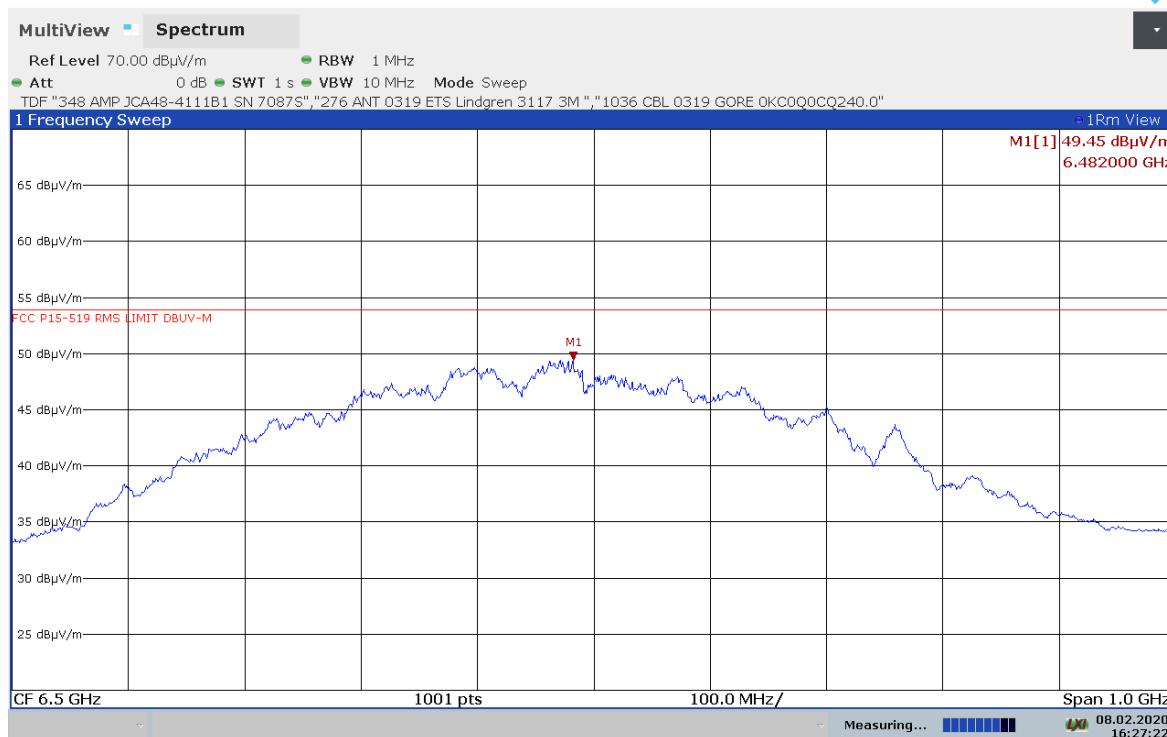
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.482	-45.75	-41.30	-4.45	V	110	125	Compliant

139-20 Wiser Systems Client Tag



16:27:22 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.7.12. Plot of RMS Power at 3 Meters (Channel 5, 6.8 Mbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.550	53.65	53.90	-0.25	V	110	125	Compliant

Notes: <sup>1</sup> 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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.550	-41.55	-41.30	-0.25	V	110	125	Compliant

#### 139-20 Wiser Systems Client Tag



02:07:56 PM 02/07/2020

**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 dB $\mu$ 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 $\mu$ V/m)
3100 - 10600	0	95.2

Frequency Range:	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

## 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 2, 110 kbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.995	93.18	95.20	-2.02	V	135	45	Compliant

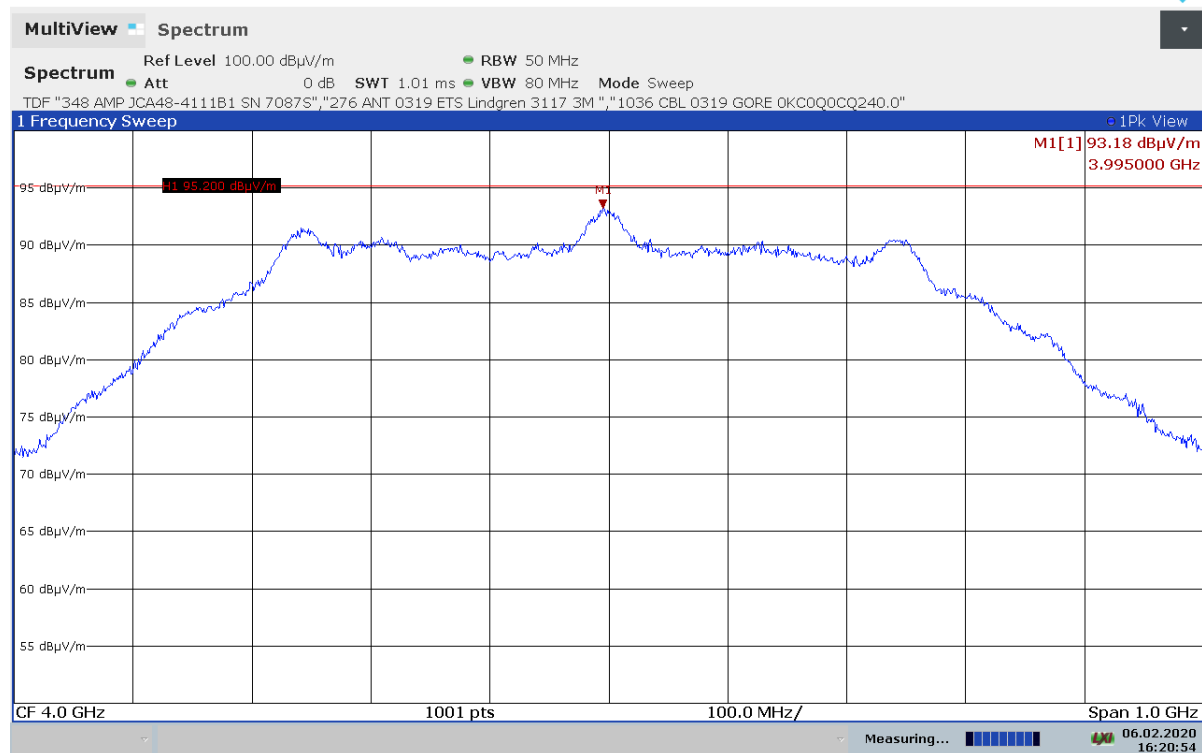
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.995	-2.02	0.00	-2.02	V	135	45	Compliant

139-20 Wiser Systems Client Tag



16:20:55 06.02.2020

## 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 2, 110 kbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.993	87.37	95.20	-7.83	V	135	45	Compliant

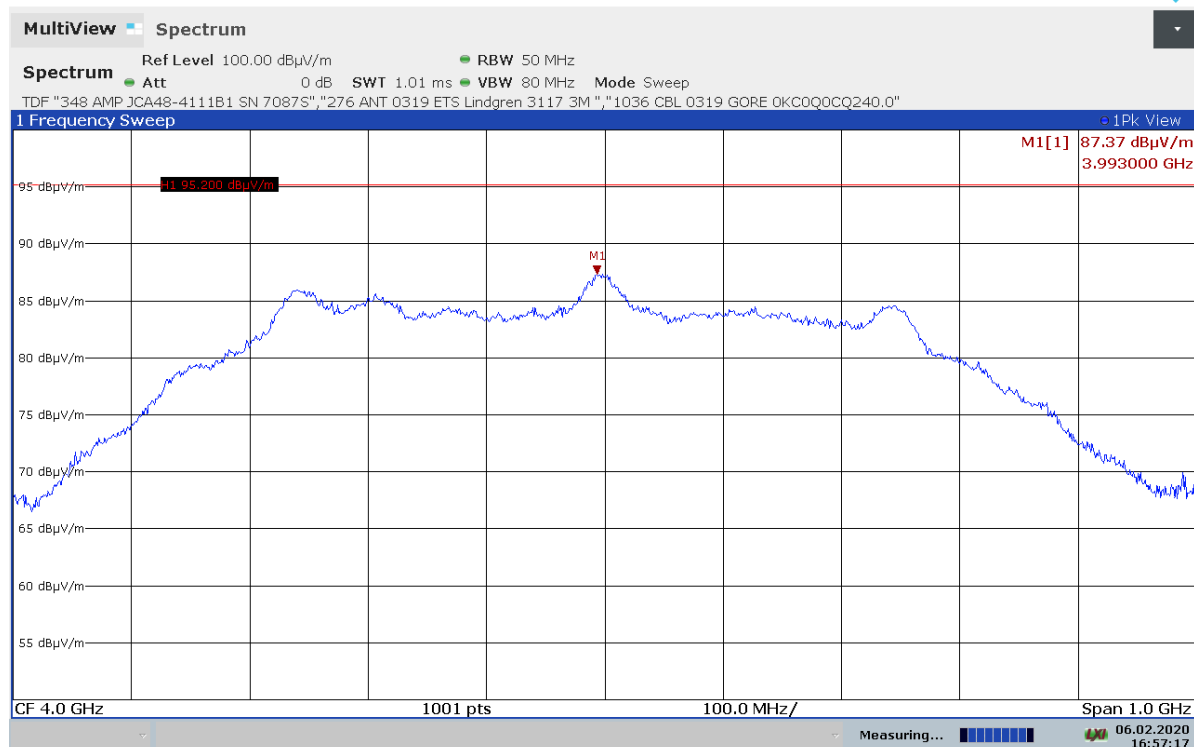
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.993	-7.83	0.00	-7.83	V	135	45	Compliant

139-20 Wiser Systems Client Tag



16:57:17 06.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.3 Plot of Peak Power at 3 Meters (Channel 2, 6.8 Mbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.999	94.81	95.20	-0.39	V	135	45	Compliant

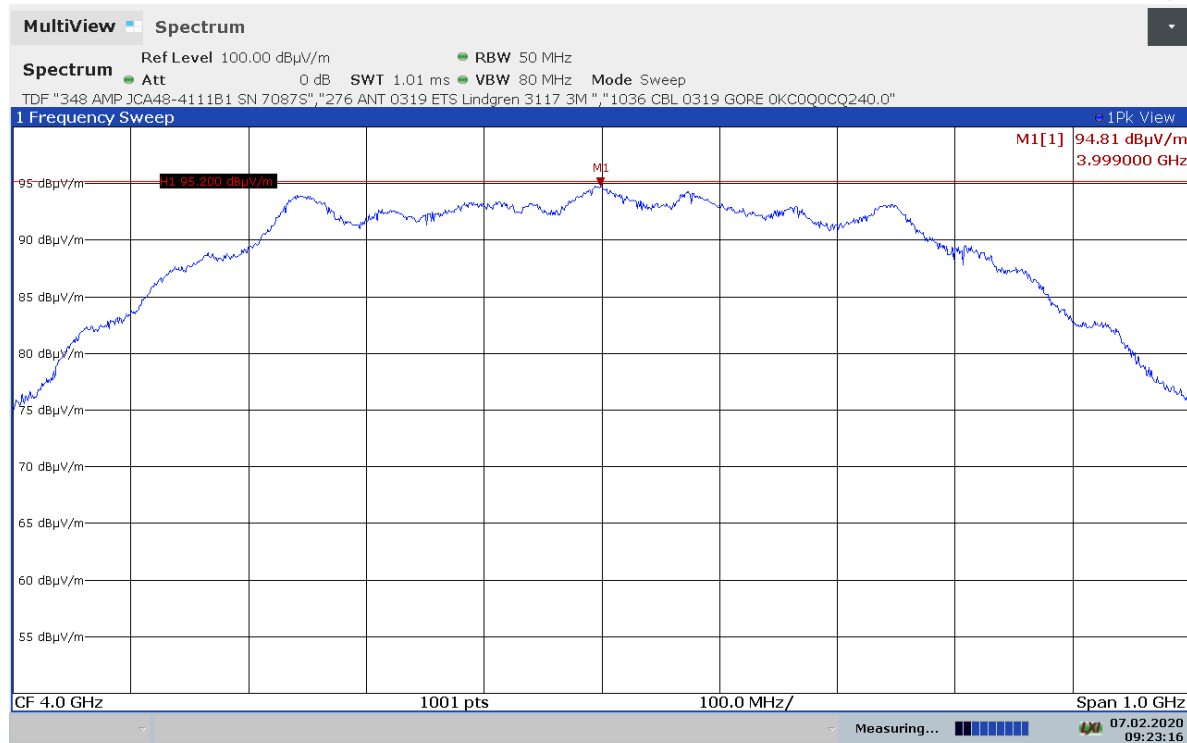
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.999	-0.39	0.00	-0.39	V	135	45	Compliant

#### 139-20 Wiser Systems Client Tag



09:23:16 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.4 Plot of Peak Power at 3 Meters (Channel 2, 6.8 Mbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
4.004	94.23	95.20	-0.97	V	135	45	Compliant

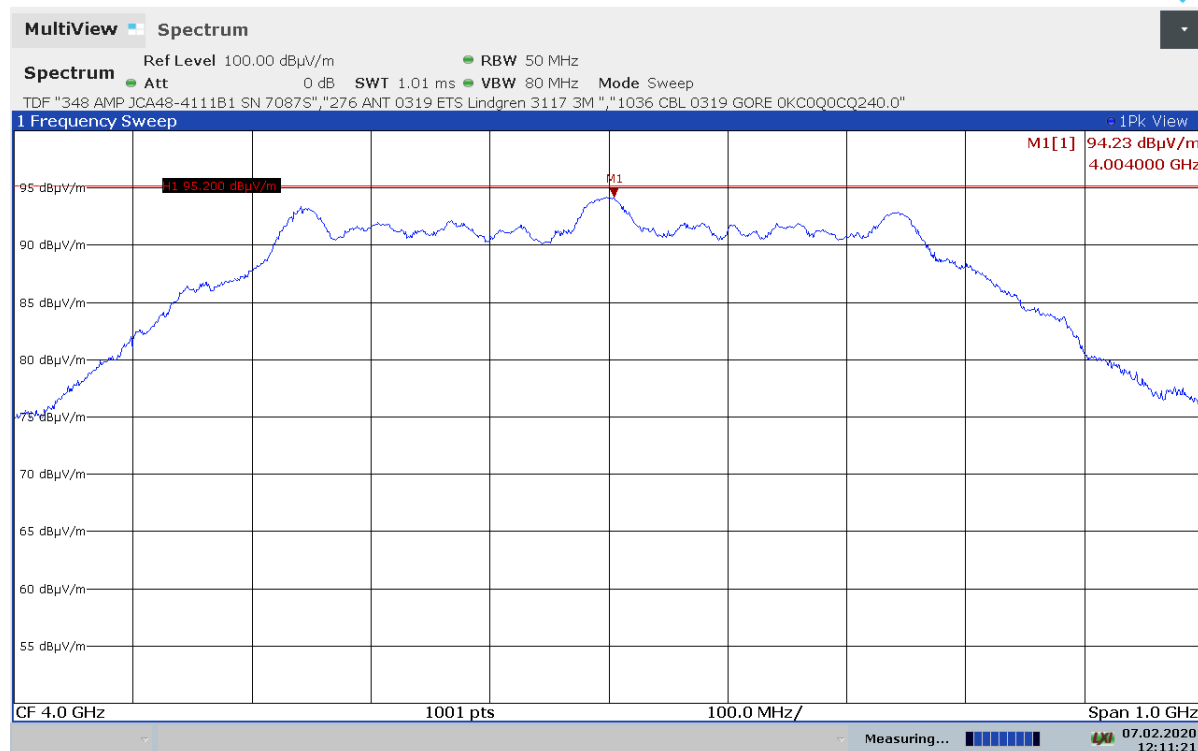
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
4.004	-0.97	0.00	-0.97	V	135	45	Compliant

139-20 Wiser Systems Client Tag



12:11:22 07.02.2020



## 6. Measurement Data (continued)

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

#### 6.8.5 Plot of Peak Power at 3 Meters (Channel 4, 110 kbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7431	92.36	95.20	-2.84	V	135	45	Compliant

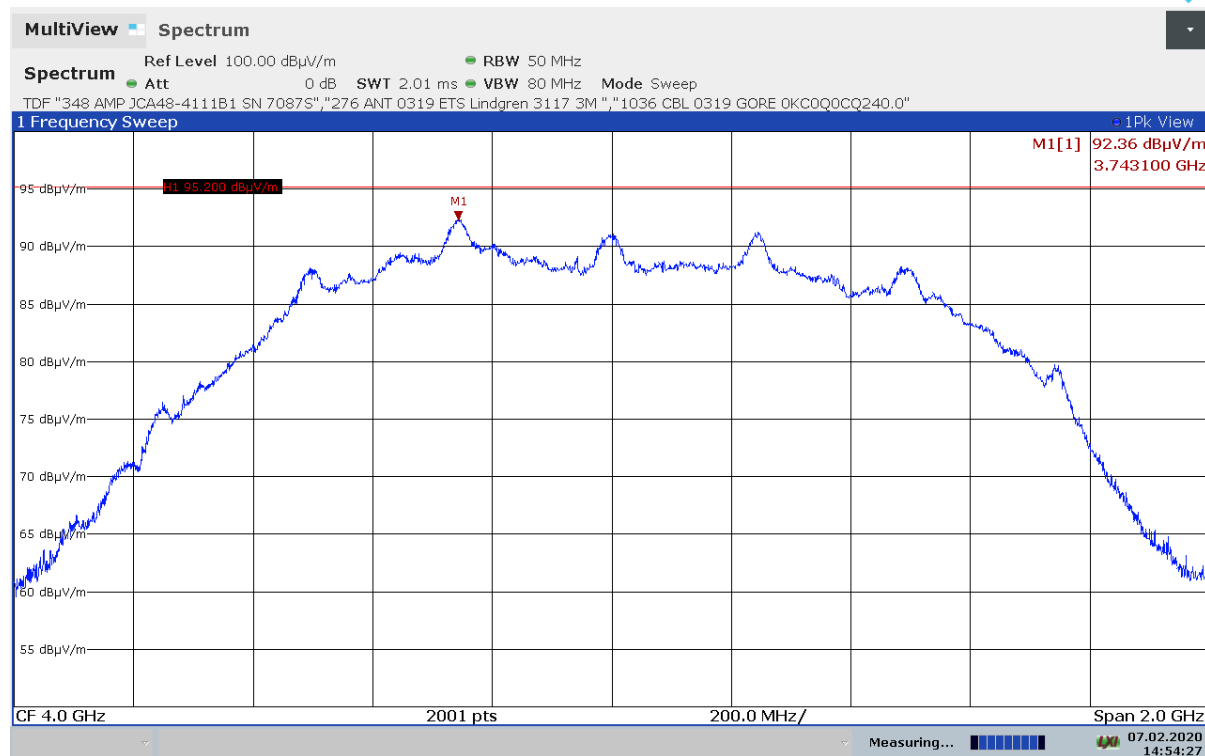
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7431	-2.84	0.00	-2.84	V	135	45	Compliant

139-20 Wiser Systems Client Tag



14:54:28 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.6 Plot of Peak Power at 3 Meters (Channel 4, 110 kbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7371	87.30	95.20	-7.90	V	135	45	Compliant

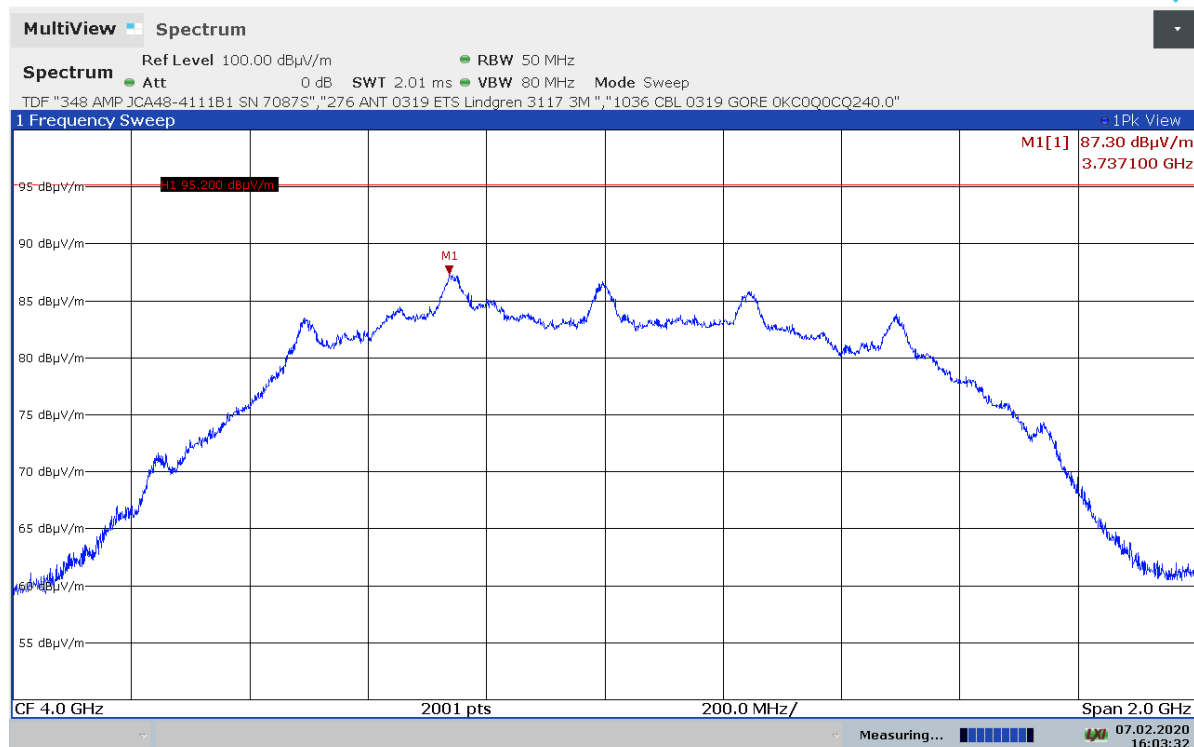
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7371	-7.90	0.00	-7.90	V	135	45	Compliant

139-20 Wiser Systems Client Tag



16:03:32 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.7 Plot of Peak Power at 3 Meters (Channel 4, 6.8 Mbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7931	94.85	95.20	-0.35	V	135	45	Compliant

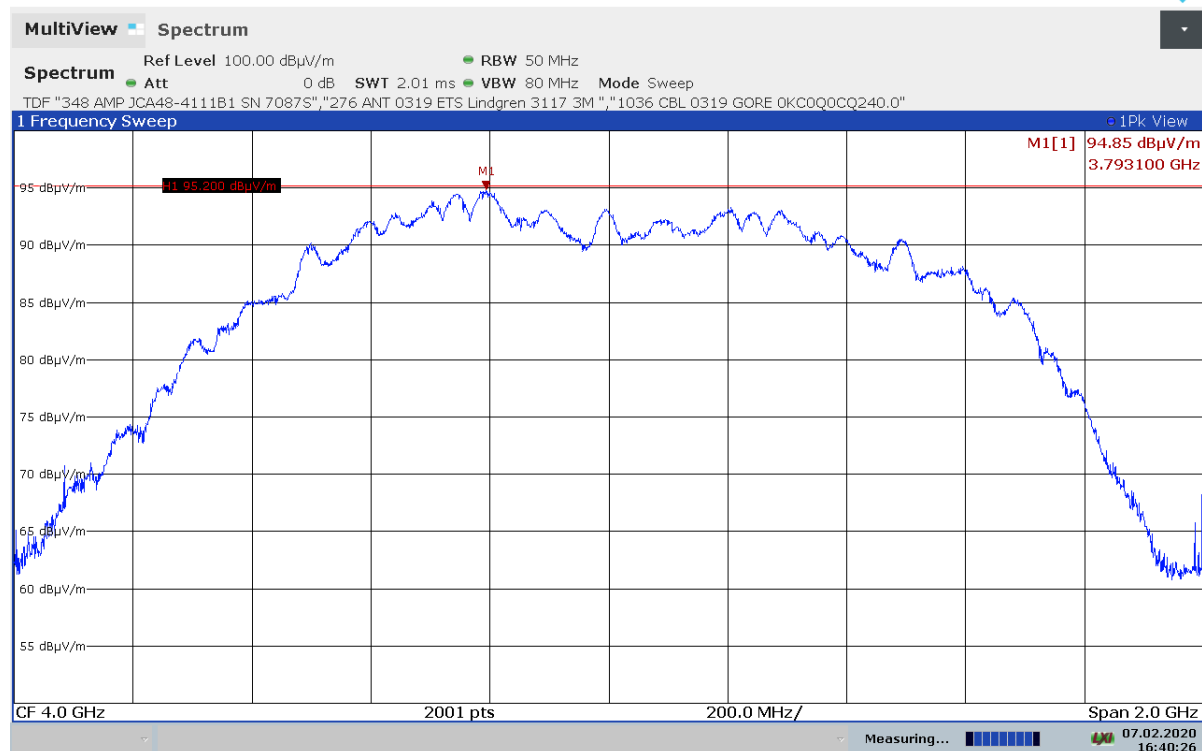
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7931	-0.35	0.00	-0.35	V	135	45	Compliant

139-20 Wiser Systems Client Tag



16:40:26 07.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.8 Plot of Peak Power at 3 Meters (Channel 4, 6.8 Mbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
3.7411	94.19	95.20	-1.01	V	135	45	Compliant

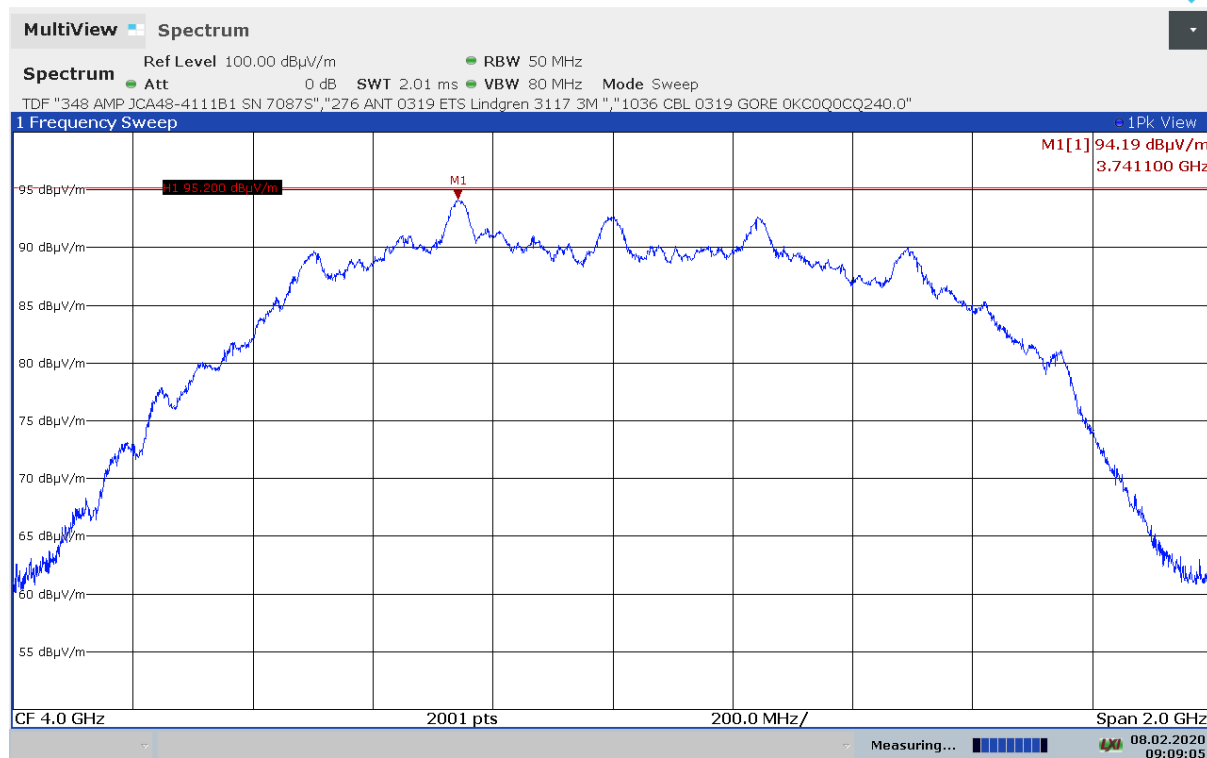
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
3.7411	-1.01	0.00	-1.01	V	135	45	Compliant

139-20 Wiser Systems Client Tag



09:09:05 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.9 Plot of Peak Power at 3 Meters (Channel 5, 110 kbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.489	94.11	95.20	-1.09	V	110	125	Compliant

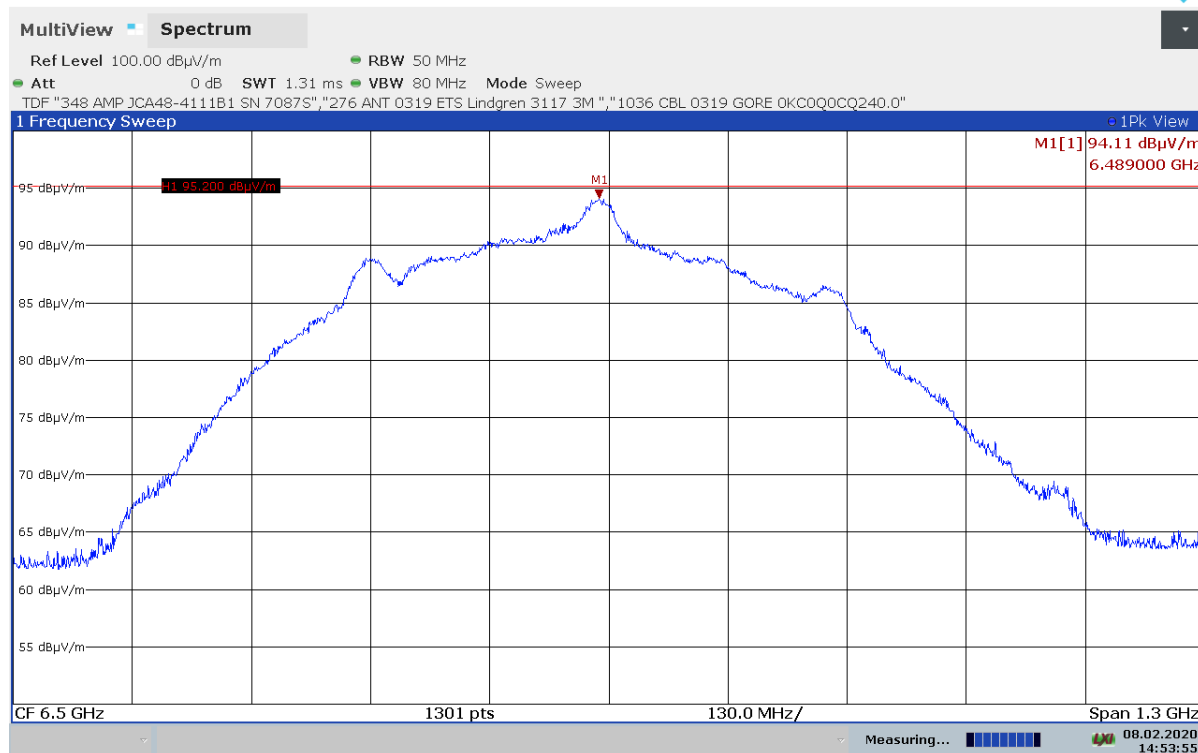
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.489	-1.09	0.00	-1.09	V	110	125	Compliant

#### 139-20 Wiser Systems Client Tag



14:53:55 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.10 Plot of Peak Power at 3 Meters (Channel 5, 110 kbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.493	88.51	95.20	-6.69	V	110	125	Compliant

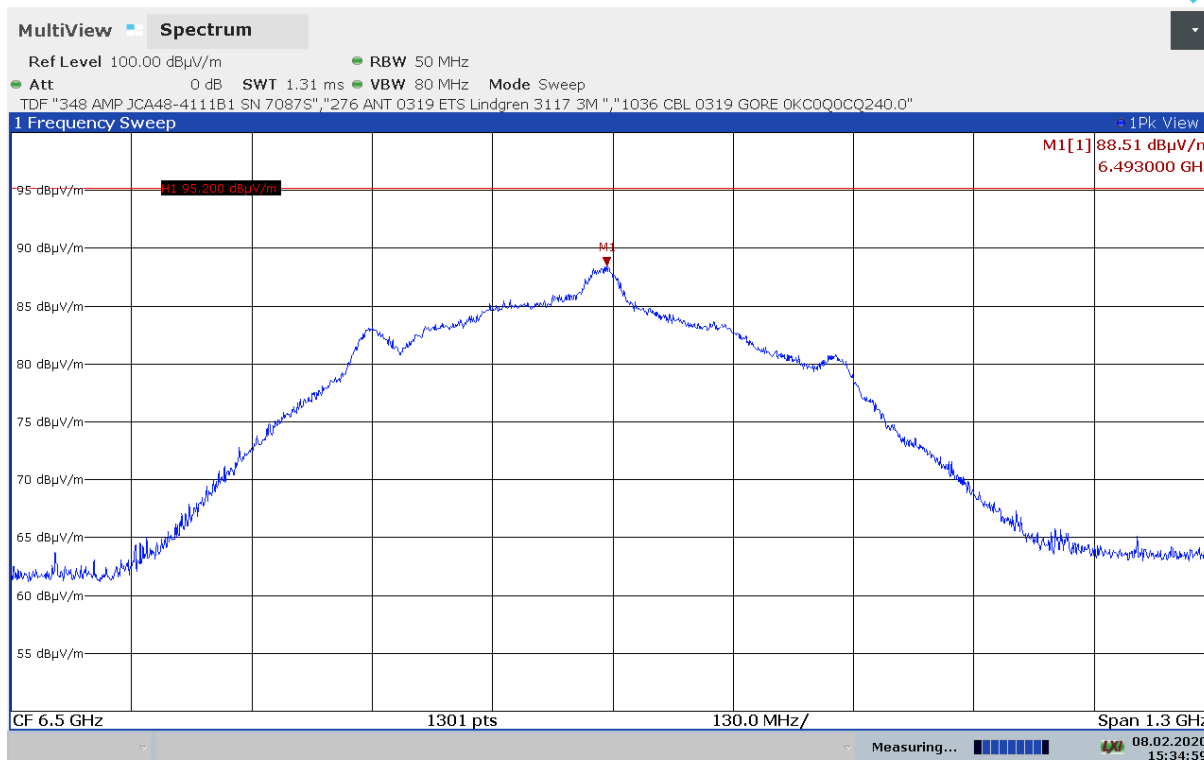
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.493	-6.69	0.00	-6.69	V	110	125	Compliant

139-20 Wiser Systems Client Tag



15:34:59 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.11 Plot of Peak Power at 3 Meters (Channel 5, 6.8 Mbps - 16M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.485	94.88	95.20	-0.32	V	110	125	Compliant

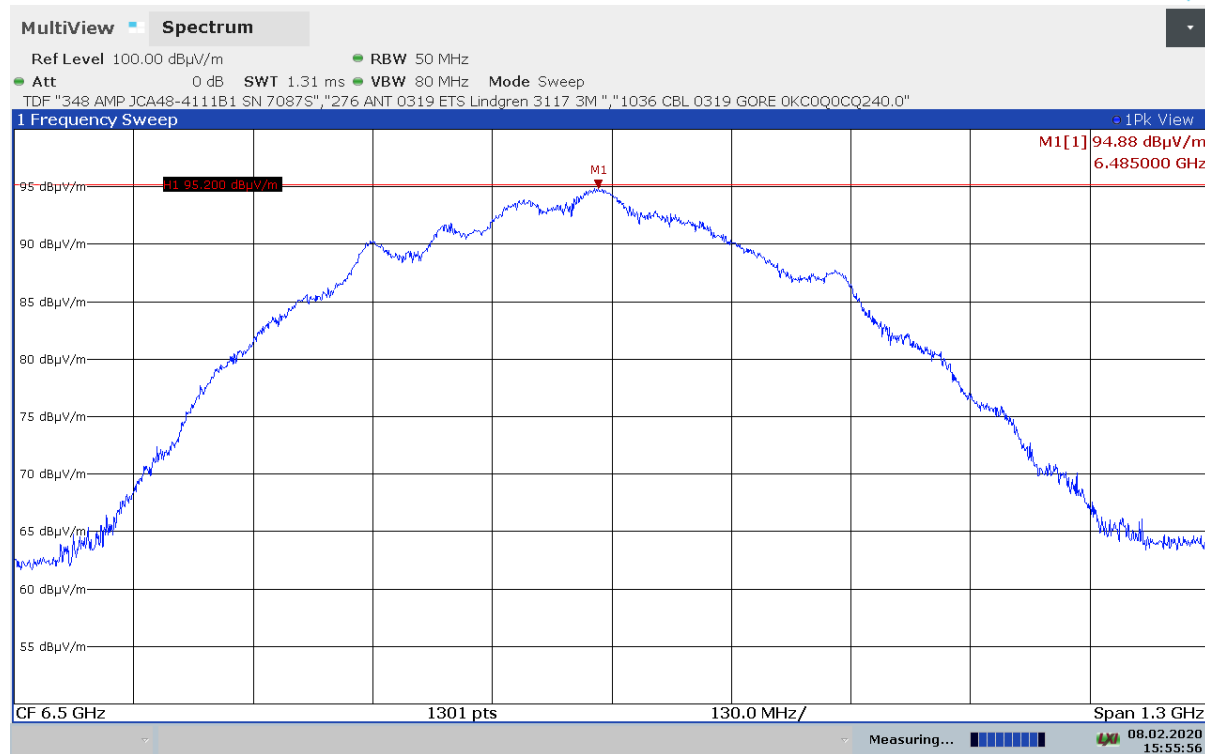
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.485	-0.32	0.00	-0.32	V	110	125	Compliant

139-20 Wiser Systems Client Tag



15:55:56 08.02.2020

## 6. Measurement Data (continued)

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

#### 6.8.12 Plot of Peak Power at 3 Meters (Channel 5, 6.8 Mbps - 64M PRF)

Frequency (GHz)	Amplitude <sup>1</sup>	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBμV/m)	(dBμV/m)	(dB)	H/V	cm	Deg	
6.497	95.12	95.20	-0.08	V	110	125	Compliant

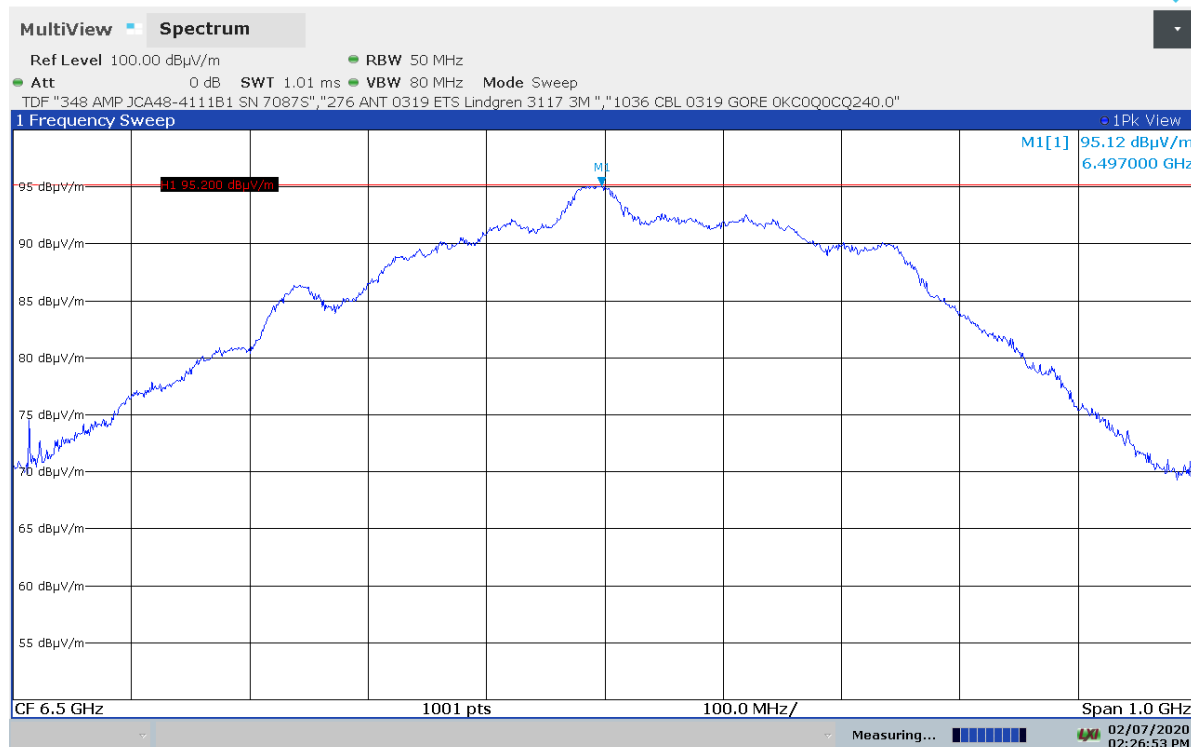
Notes: <sup>1</sup> Antenna Factor (AF), Cable Factor (CF) and External Preamplifier Gain (PAG) have been entered into the analyzer as transducer factors.

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 <sup>1</sup> (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.497	-0.08	0.00	-0.08	V	110	125	Compliant

#### 139-20 Wiser Systems Client Tag



02:26:54 PM 02/07/2020



## 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
LISN	EMCO	3825/2	9109-1860	9/10/2020
EMI Receiver	Rohde & Schwarz	ESR7	101156	9/10/2020
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:	N/A
Test Engineer:	N/A
Site Temperature (°C):	N/A
Relative Humidity (%RH):	N/A
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.

## 6. Measurement Data (continued)

### 6.10. 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.

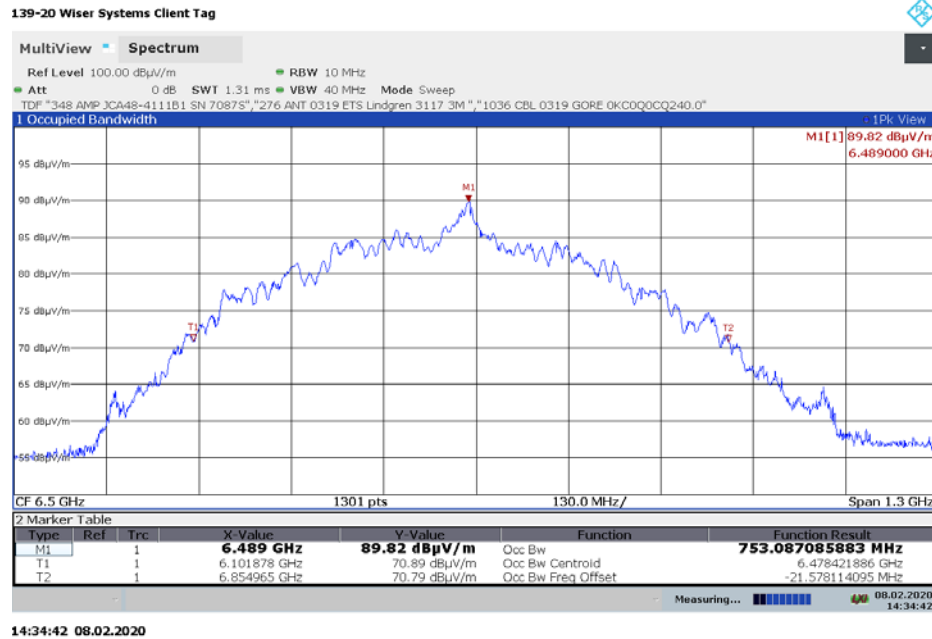
The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine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

Data rate / PRF	Frequency (GHz)	99% Power Bandwidth (MHz)
110 kbps, 16M	6.489	753.09
110 kbps, 64M	6.490	783.76
6.8 Mbps, 16M	6.466	792.61
6.8 Mbps, 64M	6.491	758.53

## 6. Measurement Data (continued)

### 6.10. 99% Emission Bandwidth (RSS-GEN 6.7)

#### 6.10.1 Plot of 99% Emission Bandwidth (110 kbps - 16M PRF)



#### 6.10.2 Plot of 99% Emission Bandwidth (110 kbps - 64M PRF)



## 6. Measurement Data (continued)

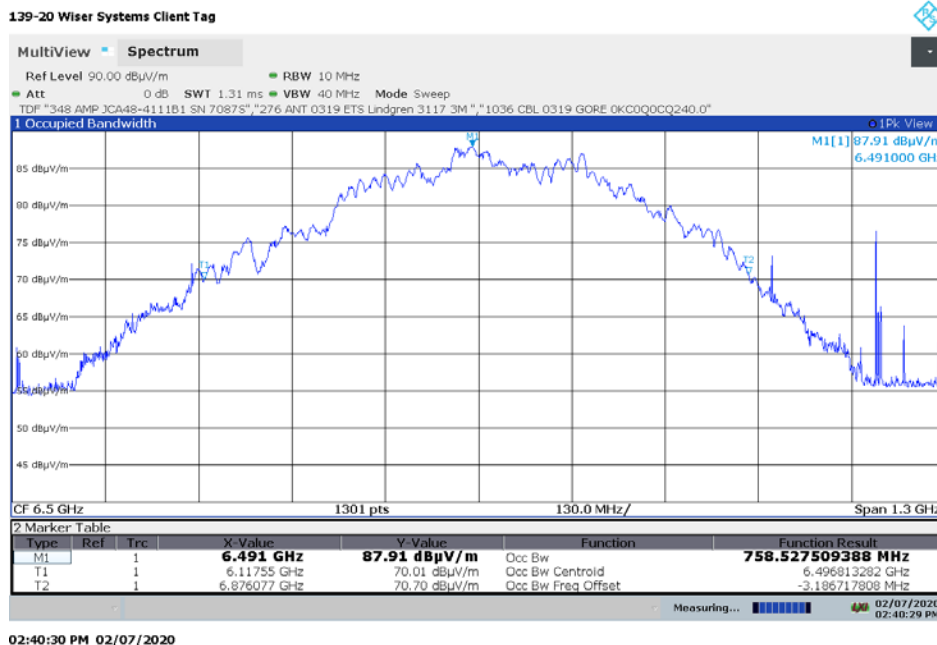
### 6.10. 99% Emission Bandwidth (RSS-GEN 6.7)

#### 6.10.3 Plot of 99% Emission Bandwidth (6.8 Mbps - 16M PRF)



16:11:25 08.02.2020

#### 6.10.4 Plot of 99% Emission Bandwidth (6.8 Mbps - 64M PRF)



02:40:30 PM 02/07/2020

## 6. Measurement Data (continued)

### 6.11. Public Exposure to Radio Frequency Energy Levels (1.1307 (b)(2))

#### 6.11.1. 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)(2) and 2.1093 of this chapter.

For a 1-g SAR, the test exclusion result must be  $\leq 3.0$ .

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

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

$P_{\text{MAX}}$  mW Maximum power of channel, including tune-up tolerance

$d_{\text{MIN}}$  mm Minimum test separation distance, mm ( $\leq 50$  mm)

$f_{(\text{GHz})}$  GHz  $f_{(\text{GHz})}$  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.

		CH 2	CH 2	CH 2	CH 2	CH 4	CH 4	CH 4	CH 4	
Input:	$P_{\text{MAX}}$	0.624	0.164	0.908	0.795	0.517	0.161	0.916	0.787	mW
	$d_{\text{MIN}}$	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	mm
	$f_{(\text{GHz})}$	3.995	3.993	3.999	4.004	3.743	3.737	3.793	3.741	GHz
Test Exclusion:		<b>0.249</b>	<b>0.065</b>	<b>0.363</b>	<b>0.318</b>	<b>0.200</b>	<b>0.062</b>	<b>0.357</b>	<b>0.305</b>	
Limit Exemption:		<b>3.000</b>	<b>3.000</b>	<b>3.000</b>	<b>3.000</b>	<b>3.000</b>	<b>3.000</b>	<b>3.000</b>	<b>3.000</b>	

<sup>1</sup> Taken from the peak data in Section 6.8 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.

## 6. Measurement Data (continued)

### 6.11. Public Exposure to Radio Frequency Energy Levels (1.1310)

#### 6.11.2 RF Exposure for devices that operate above 6 GHz (continued)

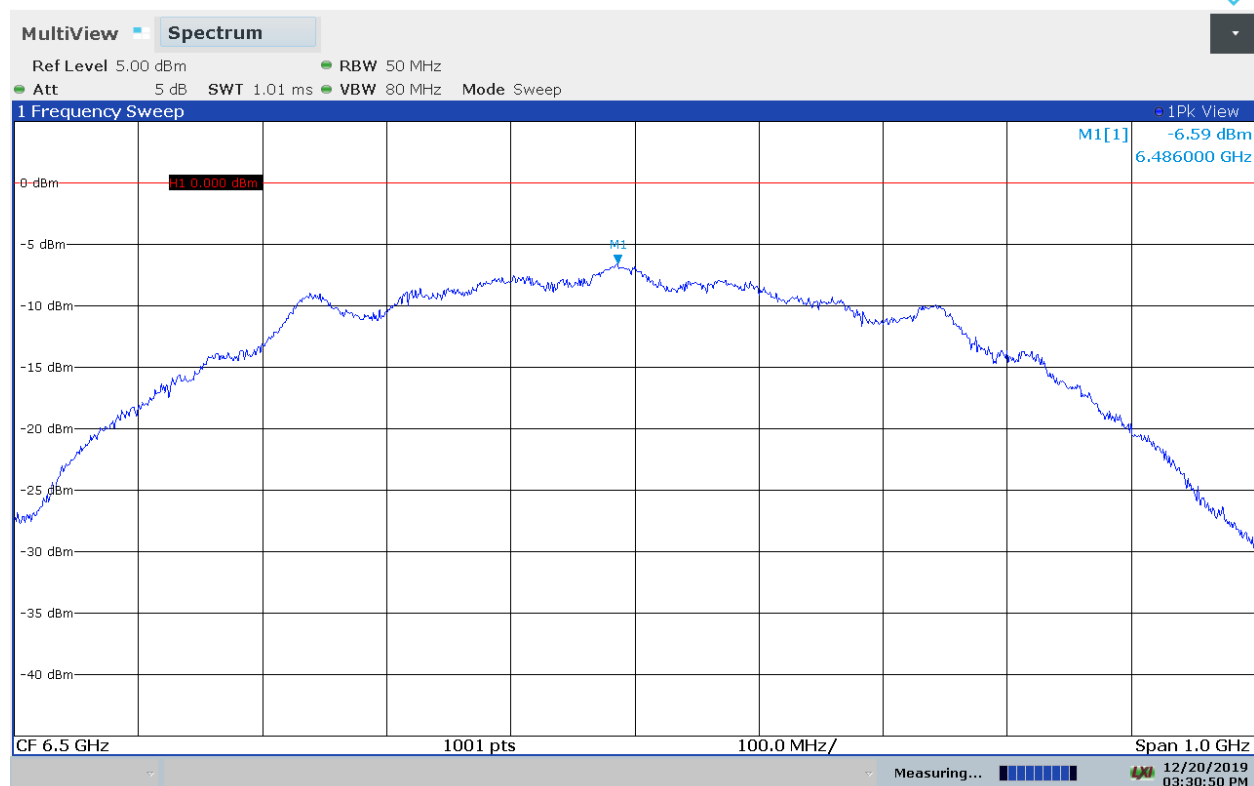
**Requirement:** TCB Workshop November 2019 RF Exposure Policy Updates dated November 13, 2019, specifically slide 11.

Test exclusion based on 1 mW may be used now with the portable device  $f > 6\text{GHz}$  FCC MPE power density limits. Maximum time-averaged conducted power irrespective of distance from the body.

Worst Case conducted peak power = **-6.59 dBm or 0.219 mW**

**Result:** Device is compliant with the Test Exclusion requirement of 1 mW.

103-20 Wiser Systems Handheld Tag



03:30:50 PM 12/20/2019

## 6. Measurement Data (continued)

### 6.11. Public Exposure to Radio Frequency Energy Levels (RSS-GEN, RSS-102)

#### 6.11.3. RSS 102 Issue 5 Exemption

**Requirement:** SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. Portable devices are subject to radio frequency radiation exposure requirements.

**Test Notes:** The limit was taken from Table 1 of RSS-102 Issue 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5.

**Results:** Compliant

Channel	Frequency	Separation Distance	Maximum Power	RSS-102 Limit	Result
	MHz	mm	mW	mW	
2	3995	≤5	0.624	2.64	Compliant
2	3993	≤5	0.164	4.46	Compliant
2	3999	≤5	0.908	1.78	Compliant
2	4004	≤5	0.795	1.78	Compliant
4	3743	≤5	0.517	1.89	Compliant
4	3737	≤5	0.161	1.90	Compliant
4	3793	≤5	0.916	1.00	Compliant
4	3741	≤5	0.787	1.00	Compliant

## 6. Measurement Data (continued)

### 6.11. Public Exposure to Radio Frequency Energy Levels (RSS-102)

#### 6.11.4 RF Exposure for devices that operate above 6 GHz (continued)

Requirements: All transmitters are exempt from routine SAR and RF exposure evaluations provided that they comply with the requirements of sections 2.5.1 or 2.5.2.

Section 2.5.1: SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. The limit at 5800 MHz is 1 mW at a distance of  $\leq 5$ mm.

Section 2.5.2: RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows: at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Center Frequency (GHz)	DUT Peak Output Power (dBm)	DUT Peak Output Power	ISED 2.5.1 Limit	DUT Peak Output Power	ISED 2.5.2 Limit
		(milliWatts EIRP)	(milliWatts)	(Watts EIRP)	(Watts)
	(1)	(2)	(3)	(4)	(5)
6.493	-1.09	0.778	1	0.000778	5
6.486	-6.69	0.214	1	0.000214	5
6.485	-0.32	0.929	1	0.000929	5
6.496	-0.08	0.982	1	0.000982	5

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

1. Section 6.8 of this test report. Measured Peak Power at 3 Meters
2. Converted dBm (E.I.R.P) measured in Section 6.8 to milliwatts
3. Reference ISED RSS-102 Section 2.5.1 Limit at 5800 MHz
4. Converted dBm (E.I.R.P) measured in Section 6.8 to Watts
5. Reference ISED RSS-102 Section 2.5.2 Limit above 6 GHz



## 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 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 32, 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.

The radiated emissions test site for measurements above 1GHz is a 3 Meter open area test site (OATS) with a 3.6 by 3.6 meter anechoic absorber floor patch to achieve a quasi-free space measurement environment per ANSI C63.4/C63.10 and CISPR 16-1-4 standards.

The 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.

## 8. Test Images

### 8.1. Spurious and Harmonic Emissions – 30 kHz to 1 GHz Front



## 8. Test Images

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



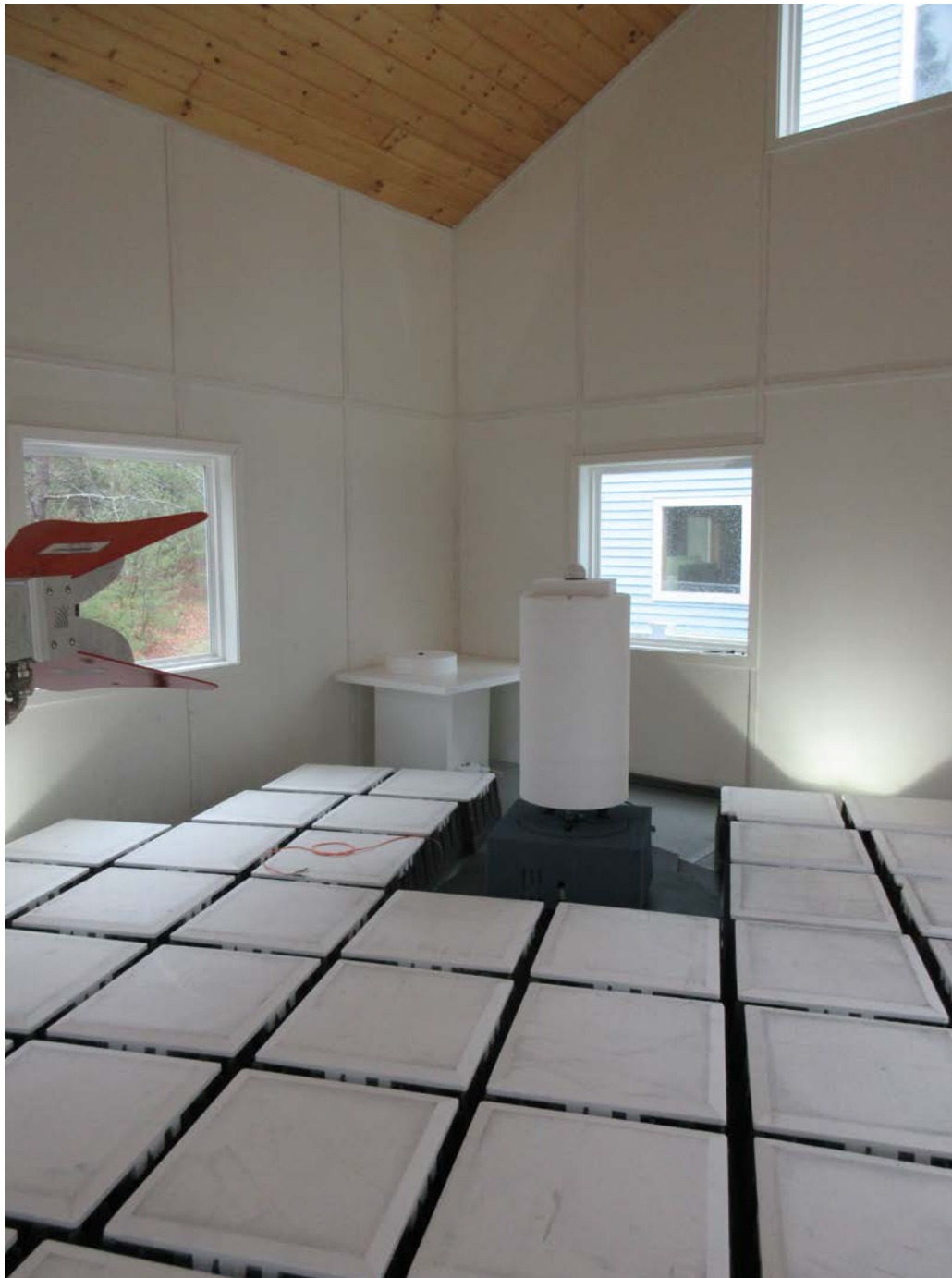
## 8. Test Images

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



## 8. Test Images

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





## 8. Test Images

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



## 8. Test Images

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

