COMPLIANCE WORLDWIDE INC.
TEST REPORT 425-21R2

In Accordance with the Requirements of

Federal Communications Commission 47 CFR Part 15.250, Subpart C
Wideband Systems within the band 5925 to 7250 MHz
ISED RSS-220, Issue 1 (March 2009) + Amendment 1 (July 2018)
Devices Using Ultra-Wideband (UWB) Technology

Issued to

Pozyx NV
Vrijdagmarkt 10/201
9000 Ghent, Belgium

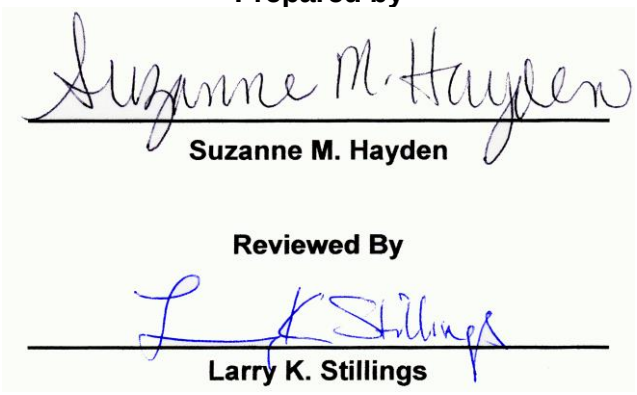
For the

Wearable Interactive Tag
Model 210020001

FCC ID: 2AYPJ-210201
IC: 27327-210201

Report Issued on August 31, 2021
Revision R2 Issued on April 13, 2022

Prepared by



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1. Scope

This test report certifies that the Pozyx NV Wearable Interactive Tag as tested, meets the FCC Part 15.250, Subpart C and ISED Canada 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. The purpose of this testing was to add an alternate antenna design to the certification. Revision R1 adds operational requirements to section 6.11 of this report per RSS-220 5.3.1(b). Revision R2 updates RF Exposure based on time-averaged band power.

2. Product Details

2.1. Manufacturer:	Pozyx NV
2.2. Product Name:	Wearable Interactive Tag
2.3. Model Number:	210020001
2.4. Serial Number:	Pre production
2.5. Description:	The Pozyx Wearable Interactive tag is designed to be used in an RTLS system with TDOA scheme. It has an UWB radio and features an accelerometer (3-axis accelerometer and temperature measurement).
2.6. Power Source:	3 VDC via CR2450 Coin cell battery
2.7. Hardware Revision:	v1.1
2.8. Software Revision:	N/A
2.9. Modulation Type:	Pulse Modulation, Frequency Hopping
2.10. Operating Frequency:	CH 5 – 6.49 GHz Nominal
2.11. EMC Modifications:	None

3. Product Configuration

3.1 Operational Characteristics & Software

Connect the ST-link v2 to the laptop over USB. open ‘STM32 ST-Link Utility’ and click the icon marked connect to target.

Using the provided python script configure the tag to transmit on Channel 5 using the applicable settings.

Using the NFC reader configure the tag to activate or de-activate as necessary.

3.2. Cables

Cable Type	Length	Shield	From	To
DC Power	2M	No	EUT	3 VDC Power Supply

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3. Product Configuration (cont.)

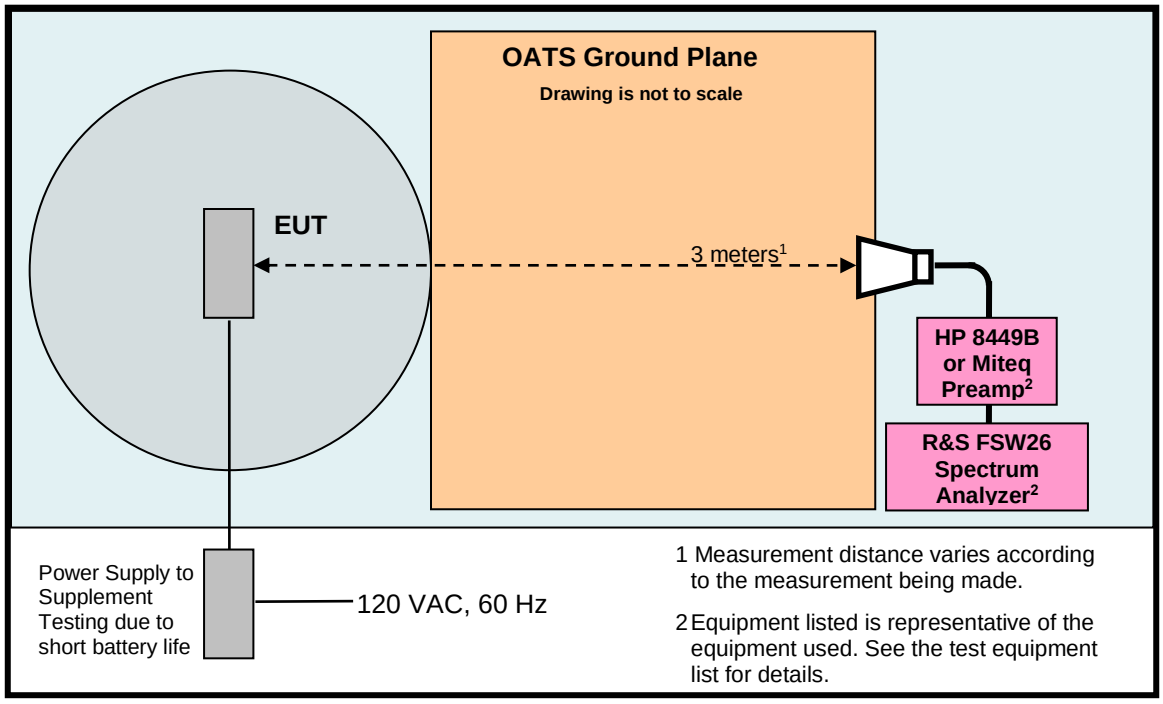
3.3. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Volts	Freq (Hz)	Description/Function
Pozyx NV	210020001	Pre production	3	DC	Wearable Interactive Tag

3.4. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
Lenovo	X240 Thinkpad	P8-025PWG	120	60	For controlling the UWB Module

3.5. Test Setup Diagram



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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 Test Receiver, 9kHz - 7GHz [1]	Rohde & Schwarz	ESR7	101156	10/25/2022	1 Year
EMI Test Receiver, 10 Hz - 7GHz [1]	Rohde & Schwarz	ESR7	101770	7/23/2022	1 Year
Spectrum Analyzer, 2 Hz to 26.5 GHz[2]	Rohde & Schwarz	FSW26	102057	6/24/2023	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz[3]	Rohde & Schwarz	FSV40	100899	8/12/2022	2 Years
Spectrum Analyzer 10 Hz – 40 GHz[4]	Rohde & Schwarz	FSVR40	100909	9/18/2022	2 Years
Loop Antenna 9 kHz - 30 MHz	EMCO	6512	9309-1139	1/28/2022	3 Years
Biconilog Antenna, 30 MHz - 2 GHz	Sunol Sciences	JB1	A050913	7/1/2023	2 Years
Dbl Ridged Guide Antenna 1- 18 GHz	ETS-Lindgren	3117	00143292	3/21/2022	3 Years
Dbl Ridged Guide Antenna 1- 18 GHz	ETS-Lindgren	3117	00227631	12/4/2022	3 Years
Preamplifier 100 MHz to 7 GHz	Miteq	AFS3-00100200-10-15P-4	988773	1/9/2022	2 Years
Preamplifier 100 MHz to 18 GHz	Miteq	AMF-7D-00101800-30-10P	1953081	1/6/2022	2 Years
Preamplifier 2 to 12 GHz	JCA	JCA48-4111B1	7087S	1/6/2022	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A01323	11/30/2023	2 Years
Preamplifier 18 to 40 GHz	Miteq	JSD42-21004200-40-5P	649199/649219	1/6/2022	2 Years
Horn Antenna 18 to 40 GHz	Com Power	AH-840	101032	1/25/2024	2 Years
High Pass Filter 8 to 18 GHz	Micro-Tronics	HPM50107	G036	1/6/2022	2 Years
Barometric Pressure/Humidity & Temp Datalogger	Extech Instruments	SD700	Q590483	10/14/2022	1 Year

[1] ESR7 Firmware revision: V3.48 SP3, Date installed: 09/30/2020 Previous V3.48 SP2, installed 07/23/2020.
[2] FSW26 Firmware revision: V4.71 SP1, Date installed: 11/16/2020 Previous V4.61, installed 08/11/2020.
[3] FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016 Previous V2.30 SP1, installed 10/22/2014.
[4] FSVR40 Firmware revision: V2.23 SP1, Date installed: 08/19/2016 Previous V2.23, installed 10/22/2014.

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4. Measurements Parameters (continued)

4.2. Measurement & Equipment Setup

Test Dates:	7/9/2021, 8/17/2021, 8/18/2021, 8/20/2021, 8/23/2021, 4/1/2022, 4/13/2022
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
EMI Receiver IF Bandwidth:	200 Hz – 10 kHz to 150 kHz 9 kHz – 10 to 30 MHz 120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	≥ 3 * RBW or IF(BW)
Detector Function:	Peak, Quasi-Peak, RMS & CISPR Average

4.3. Measurement Procedure

Test measurements were made in accordance FCC Parts 15.209, 15.250 Subpart C, and ISED RSS-220.

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

4.4. Measurement Uncertainty

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

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

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5. Measurements Summary

Test Requirement	FCC Rule Requirement	ISED Rule Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-220 5.1 (b)	6.1	Compliant	
Operational Requirements	15.250 (a)	RSS-220	6.2	Compliant	
Wideband Bandwidth	15.250 (b)	RSS-220 2 RSS-220 5.1	6.3	Compliant	
Spurious Radiated Emissions	15.250 (d) (1) 15.209	RSS-220 3.4	6.4	Compliant	
Radiated Emissions in GPS Bands	15.250 (d) (2)	RSS-220 5.3.1 (e)	6.5	Compliant	
RMS Power in a 1 MHz Bandwidth	15.250 (d) (1)	RSS-220 5.3.1 (d)	6.6	Compliant	
Peak Emissions in a 50 MHz Bandwidth	15.250 (d) (3)	RSS-220 5.3.1 (g)	6.7	Compliant	
Conducted Emissions	15.207	RSS-GEN	6.8	N/A	Battery Powered
99% Emission Bandwidth	N/A	RSS-GEN	6.9	Compliant	
Radio Frequency Exposure	FCC OET Bulletin 65 1.1310	RSS-102, Issue 5	6.10	Compliant	
Operational Requirements	N/A	RSS-220 5.3.1(b)	6.11	Compliant	

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6. Measurement Data

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

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

Result: The antenna utilized by the product is a PCB mounted board antenna.

6.2. Operational Requirements of the Device under Test (15.250 (a), RSS-220)

Requirement: The -10 dB bandwidth of a device operating under the provisions of this section must be contained within the 5925 to 7250 MHz band under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

Result: Compliant

6.2.1 Frequency Stability over Temperature

Marker	Temp °C	Measured Frequency	-10 dB Band Edges		15.250 Frequency Band		Result
		(MHz)	Lower	Upper	F_{MIN} (MHz)	F_{MAX} (MHz)	
-	OATS	6503.0	6214.3	6761.7	5925	7250	Compliant
-	Ambient	6500.0	6214.3	6808.7	5925	7250	Compliant
1	-20	6500.0	6138.4	6808.7	5925	7250	Compliant
2	-10	6500.0	6138.4	6808.7	5925	7250	Compliant
3	0	6500.0	6169.3	6791.7	5925	7250	Compliant
4	+10	6500.0	6169.3	6791.7	5925	7250	Compliant
5	+20	6500.0	6188.3	6838.7	5925	7250	Compliant
6	+30	6500.0	6214.3	6807.7	5925	7250	Compliant
7	+40	6500.0	6215.3	6787.7	5925	7250	Compliant
8	+50	6500.0	6215.3	6781.7	5925	7250	Compliant

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6. Measurement Data (continued)

6.3. Wideband Bandwidth (15.250 (b), RSS-220, 5.1)

Requirement: The -10 dB bandwidth of the fundamental emission shall be at least 50 MHz.

Result: Compliant

6.3.1. Measurement Data – Values in GHz

f_M	The highest emission peak	6.503
f_L	10 dB below the highest peak	6.2143
f_H	10 dB above the highest peak	6.7617
Bandwidth	Calculated: (f_H - f_L)	0.5475

6.3.2. Measurement Plot of 10 dB frequencies

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6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (1), 15.209, RSS-220 3.4)

Requirement: The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in Section 15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
960 - 1610	-75.3	19.9
1610 - 1990	-63.3	31.9
1990 - 3100	-61.3	33.9
3100 – 5925	-51.3	43.9
5925 – 7250	-41.3	53.9
7250 – 10,600	-51.3	43.9
Above 10,600	-61.3	33.9

Spurious Radiated Emissions (RSS-220 5.3.1 (d))

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:

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/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

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6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (1), 15.209, RSS-220 3.4 continued)

Radiated Emissions Field Strength Limits at 3 Meters (Section 15.250 (d),15.209)

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
0.009 to 0.490	2,400/F	128.5 to 93.8
0.490 to 1.705	24,000/F	73.8 to 63
1.705 - 30	30	69.5
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
960 - 40,000	500	54

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

The signals in plots 6.4.31 to 6.4.42 at 12.979 and 25.9581 GHz are the 2nd and 3rd Harmonics of the Local Oscillator (LO) and not intended to be transmitted out of the antenna.

Frequency Range:	30 kHz to 40 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	200 Hz – 10 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):	≥ 3 * RBW or IF(BW)
Detector Function:	Peak, Quasi-Peak & Average

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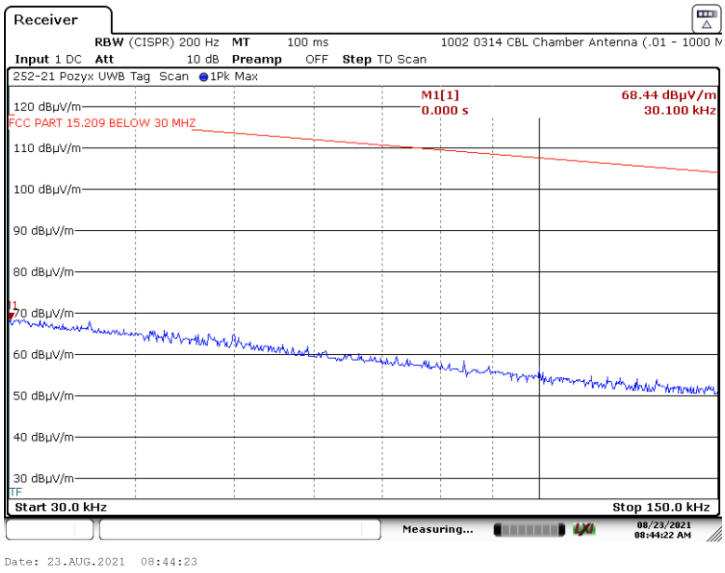
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

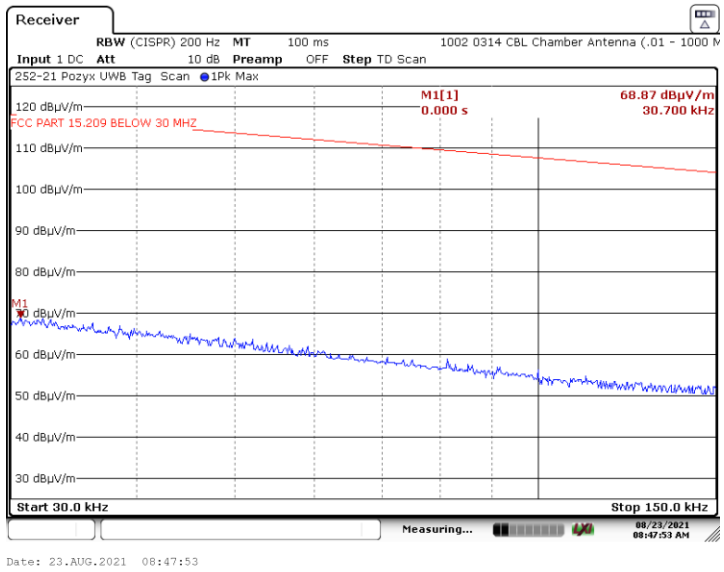
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

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 – X Axis



6.4.1.2 Perpendicular Measurement Antenna – 30 to 150 kHz – X Axis



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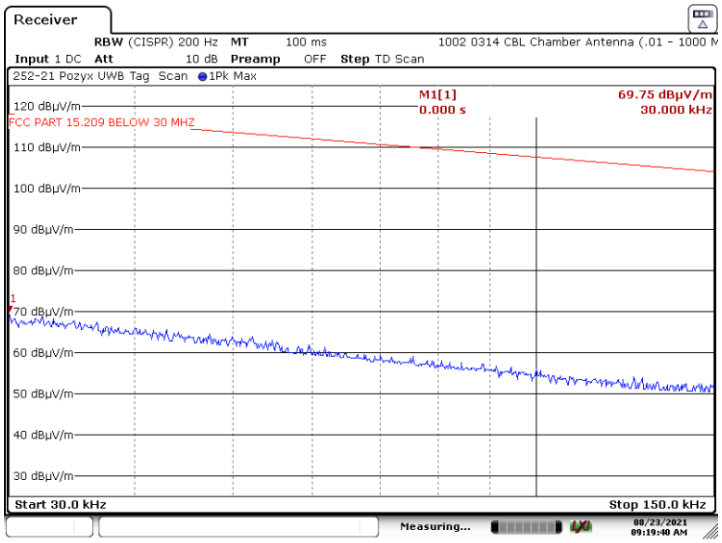
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

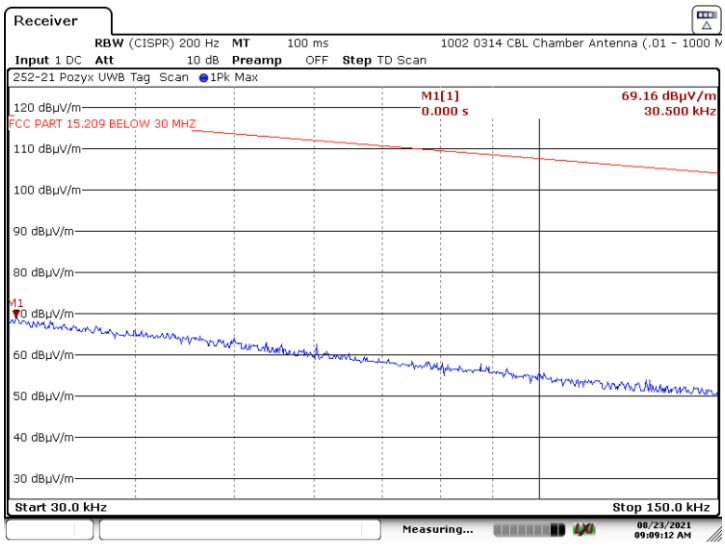
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

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 – X Axis



6.4.1.4 Parallel Measurement Antenna – 30 to 150 kHz – Y Axis



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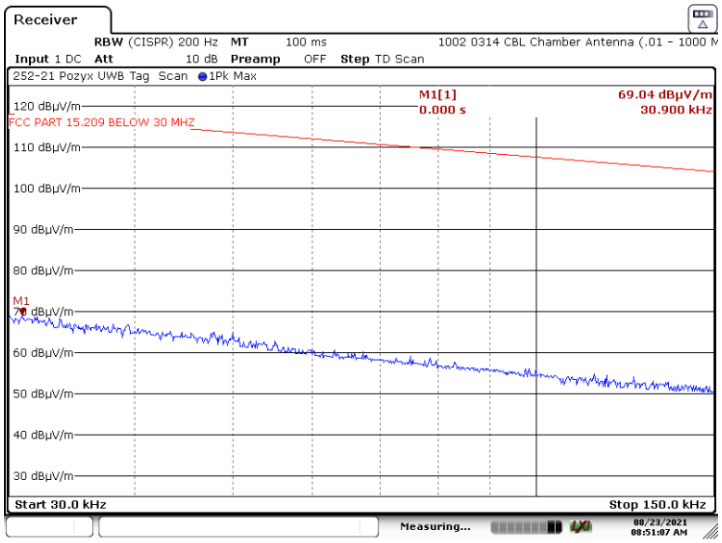
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 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 – 30 to 150 kHz – Y Axis



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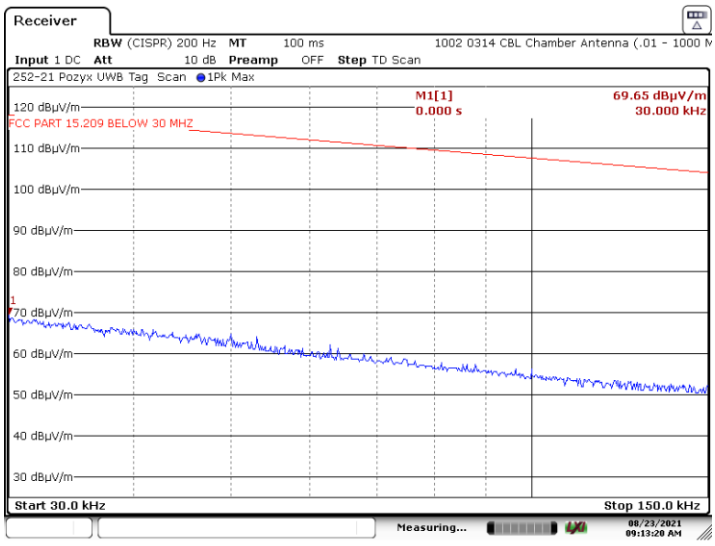
6.4.1.6 Ground Parallel Measurement Antenna – 30 to 150 kHz – Y Axis



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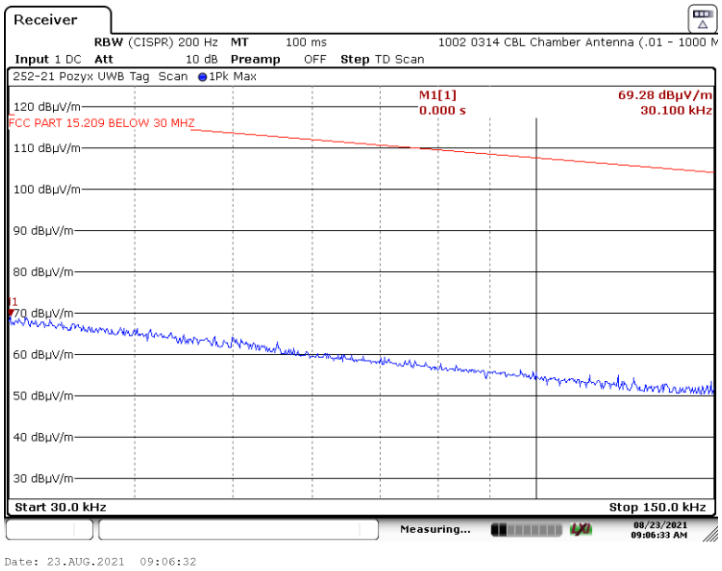
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

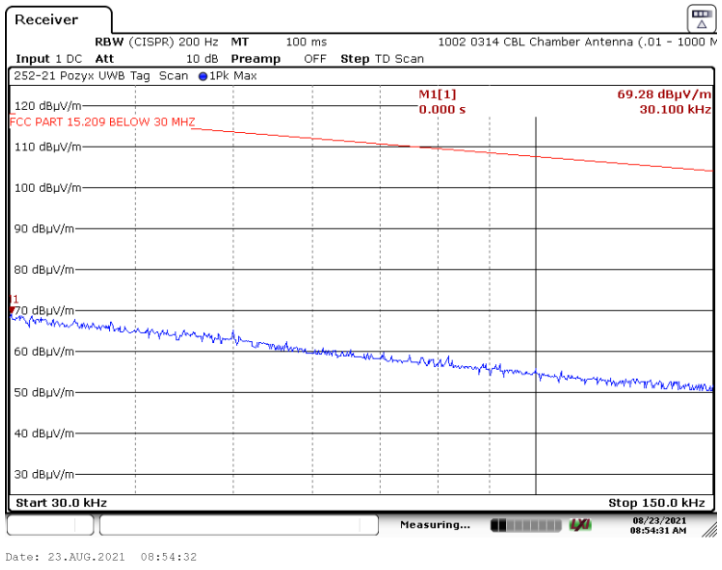
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

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 Parallel Measurement Antenna – 30 to 150 kHz – Z Axis



6.4.1.8 Perpendicular Measurement Antenna – 30 to 150 kHz – Z Axis



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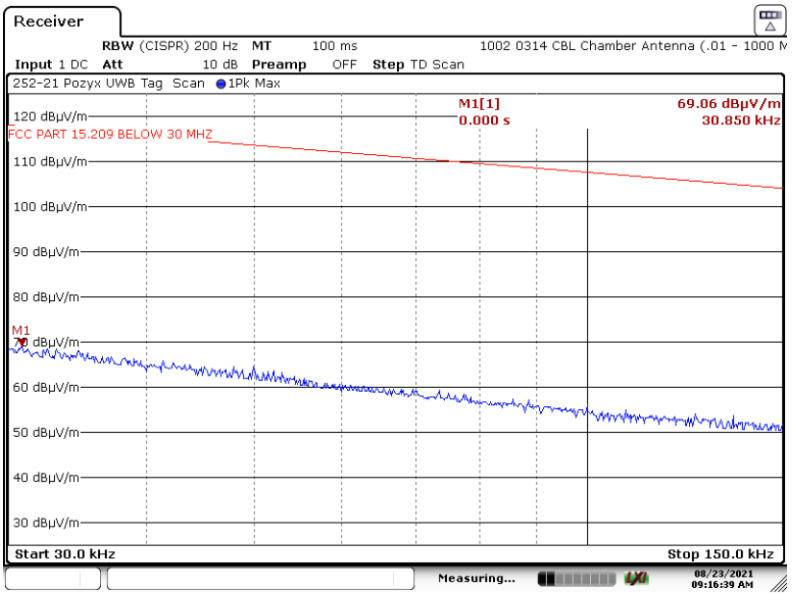
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 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.

6.4.1.9 Ground Parallel Measurement Antenna – 30 to 150 kHz – Z Axis



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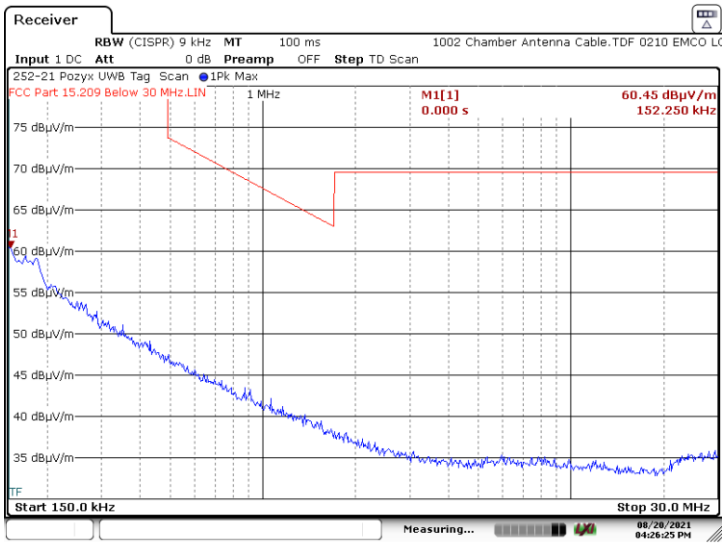
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

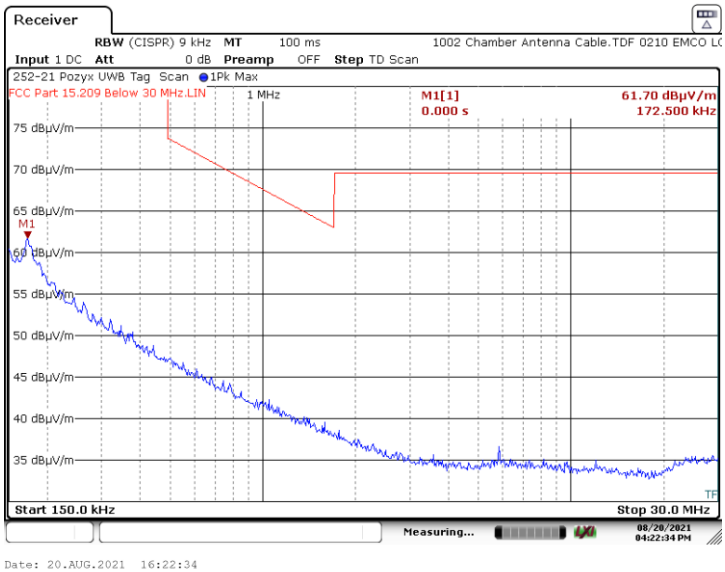
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

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

6.4.1.10 Parallel Measurement Antenna – 150 kHz to 30 MHz – X Axis



6.4.1.11 Perpendicular Measurement Antenna – 150 kHz to 30 MHz – X Axis



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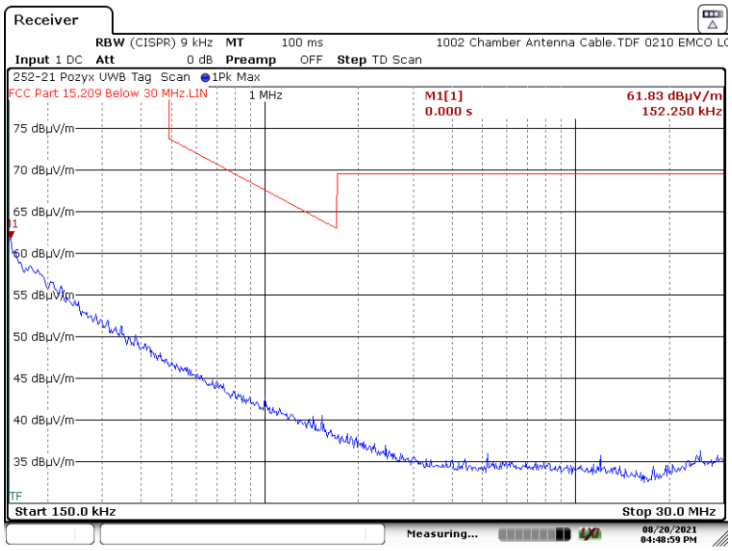
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

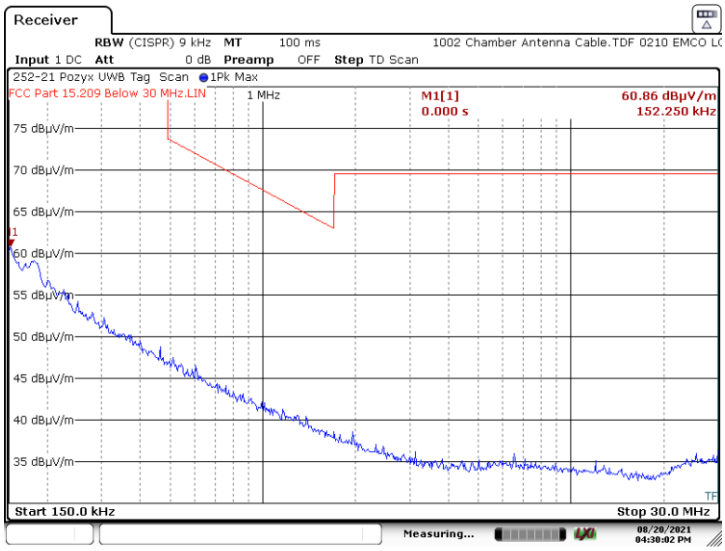
The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.12 Ground Parallel Measurement Antenna – 150 kHz to 30 MHz – X Axis



Date: 20.AUG.2021 16:48:59

6.4.1.13 Parallel Measurement Antenna – 150 kHz to 30 MHz – Y Axis



Date: 20.AUG.2021 16:30:02

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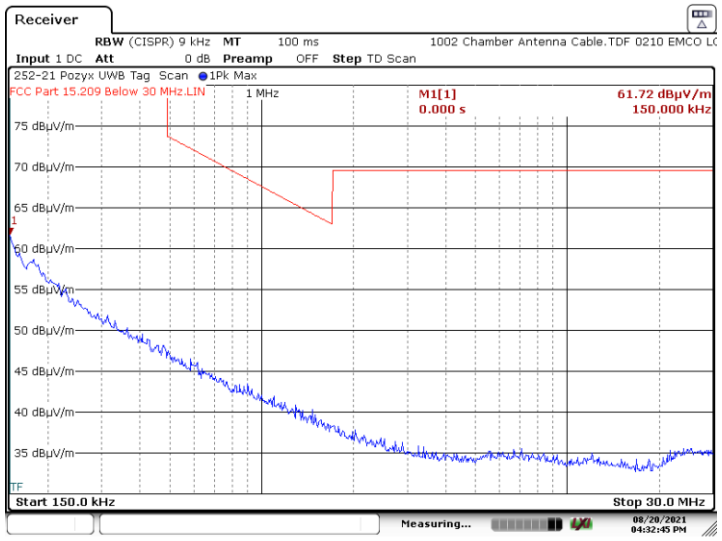
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

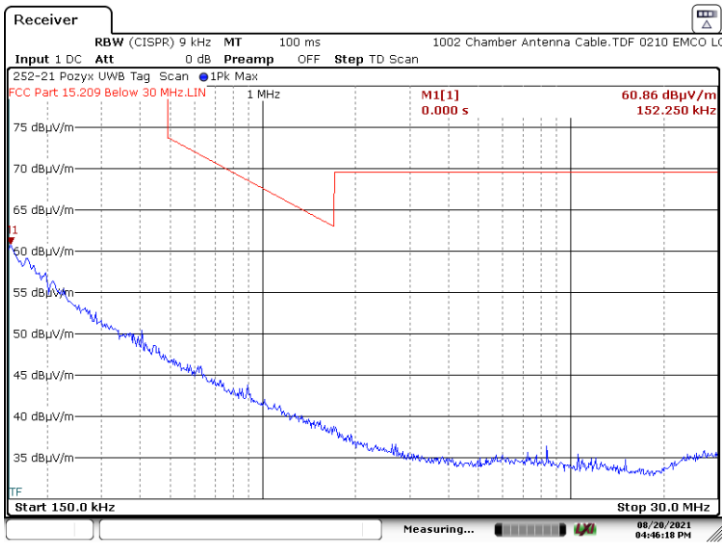
The device was prescreened in our 3 Meter Semi-Anechoic Chamber. There were no measurable emissions below 960 MHz on our 3 Meter OATS.

6.4.1.14 Perpendicular Measurement Antenna – 150 kHz to 30 MHz – Y Axis



Date: 20.AUG.2021 16:32:45

6.4.1.15 Ground Parallel Measurement Antenna – 150 kHz to 30 MHz – Y Axis



Date: 20.AUG.2021 16:46:19

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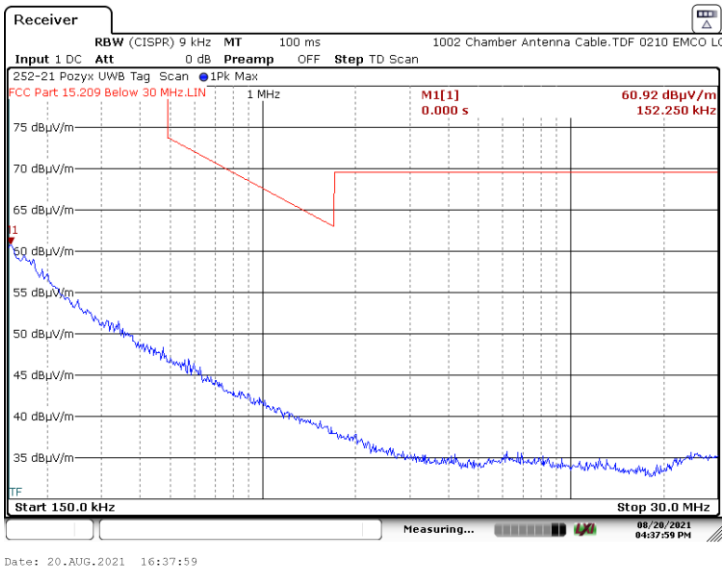
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

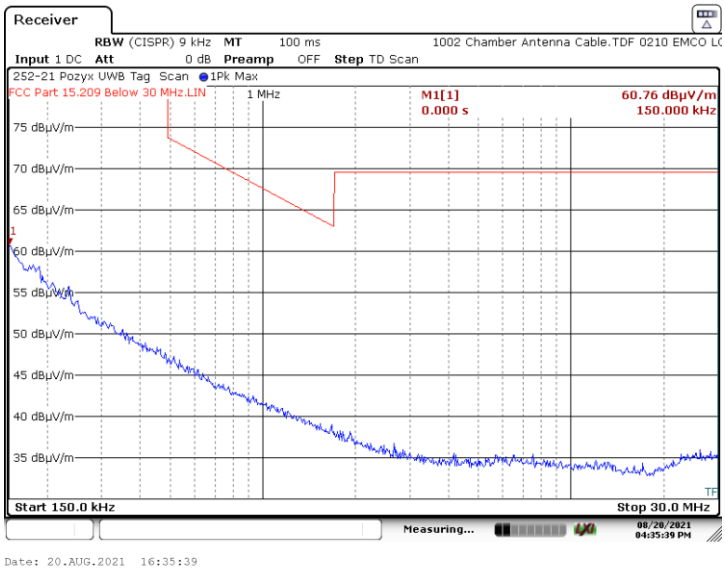
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

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

6.4.1.16 Parallel Measurement Antenna – 150 kHz to 30 MHz – Z Axis



6.4.1.17 Perpendicular Measurement Antenna – 150 kHz to 30 MHz – Z Axis



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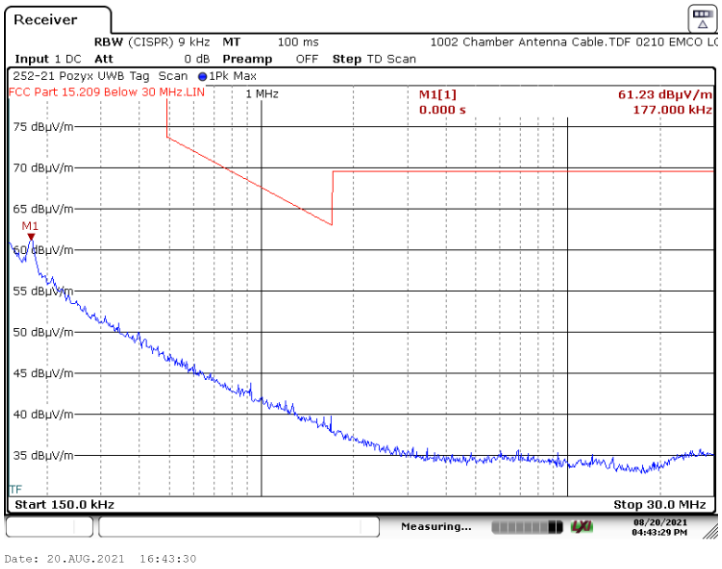
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 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.

6.4.1.18 Ground Parallel Measurement Antenna – 150 kHz to 30 MHz – Z Axis



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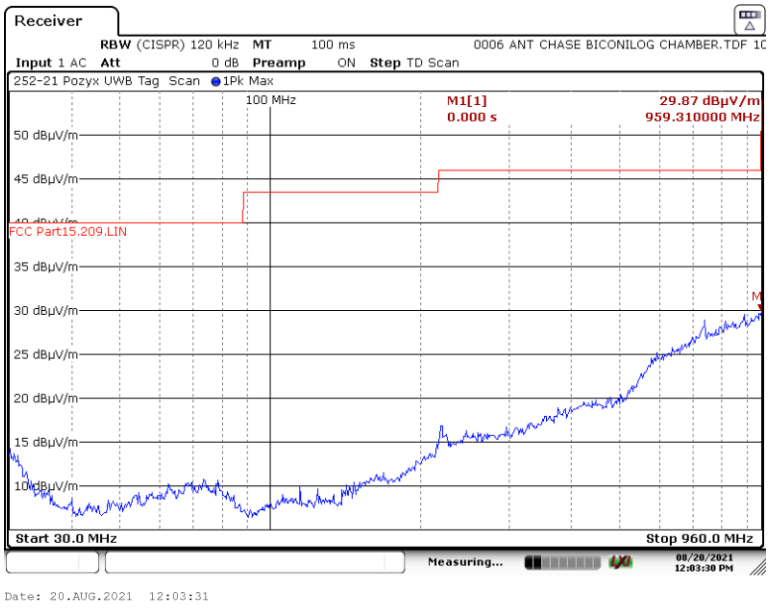
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

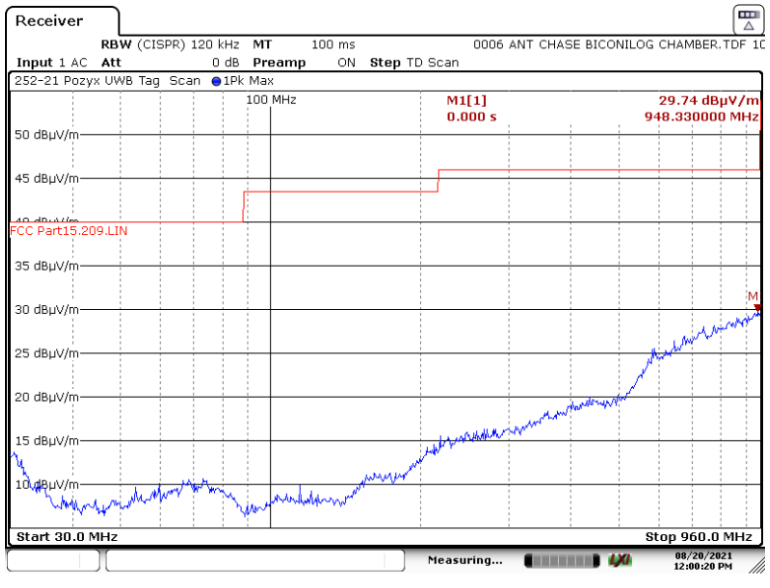
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

6.4.1.19 Horizontal Polarity – 30 to 960 MHz – X Axis



Date: 20.AUG.2021 12:03:31

6.4.1.20 Vertical Polarity – 30 to 960 MHz – X Axis



Date: 20.AUG.2021 12:00:21

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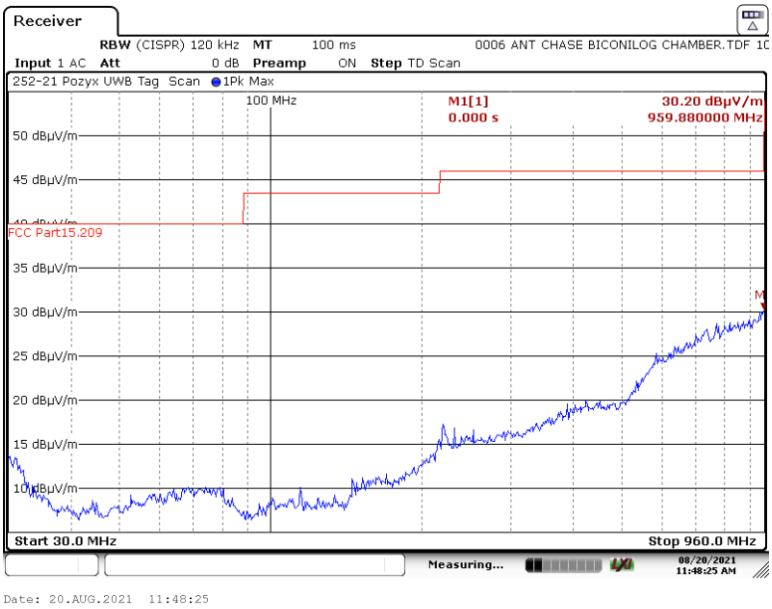
6. Measurement Data (continued)

6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

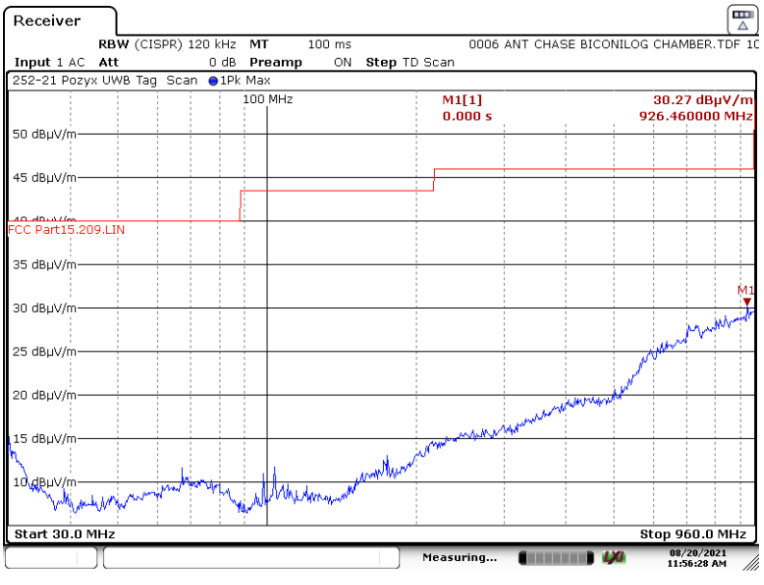
6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

6.4.1.21 Horizontal Polarity – 30 to 960 MHz – Y Axis



Date: 20.AUG.2021 11:48:25

6.4.1.22 Vertical Polarity – 30 to 960 MHz – Y Axis



Date: 20.AUG.2021 11:56:29

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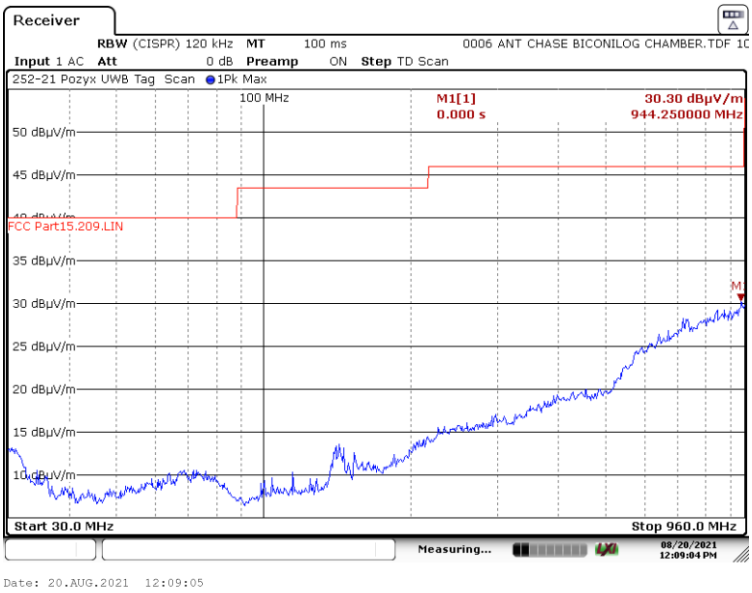
6. Measurement Data (continued)

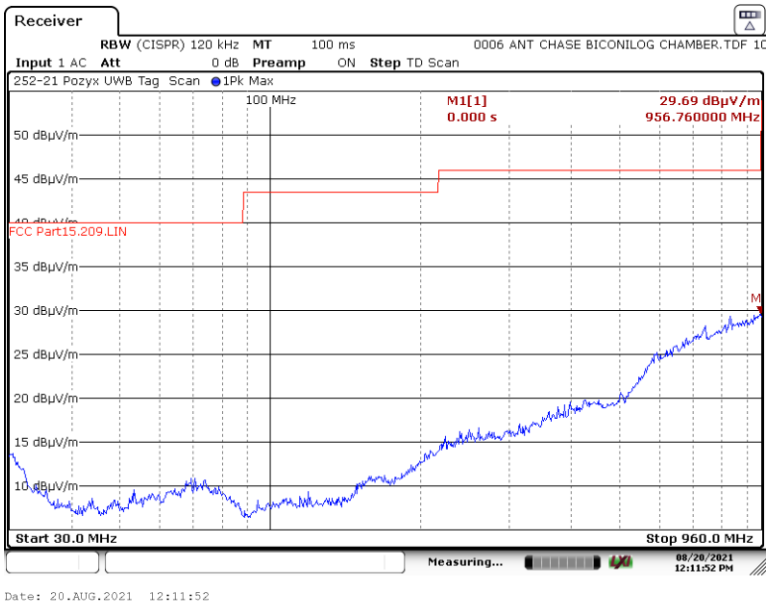
6.4. Spurious Radiated Emissions (15.250 (d) (5), 15.209, RSS-220 3.4 continued)

6.4.1. 30 kHz to 960 MHz, measured at 3 Meters

6.4.1.23 Horizontal Polarity – 30 to 960 MHz – Z Axis



6.4.1.24 Vertical Polarity – 30 to 960 MHz – Z Axis



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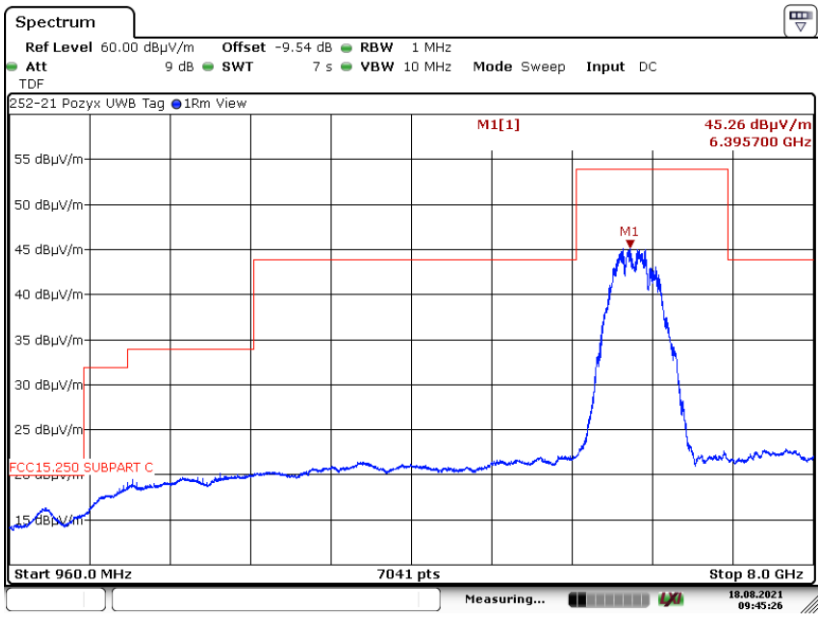
6. Measurement Data (continued)

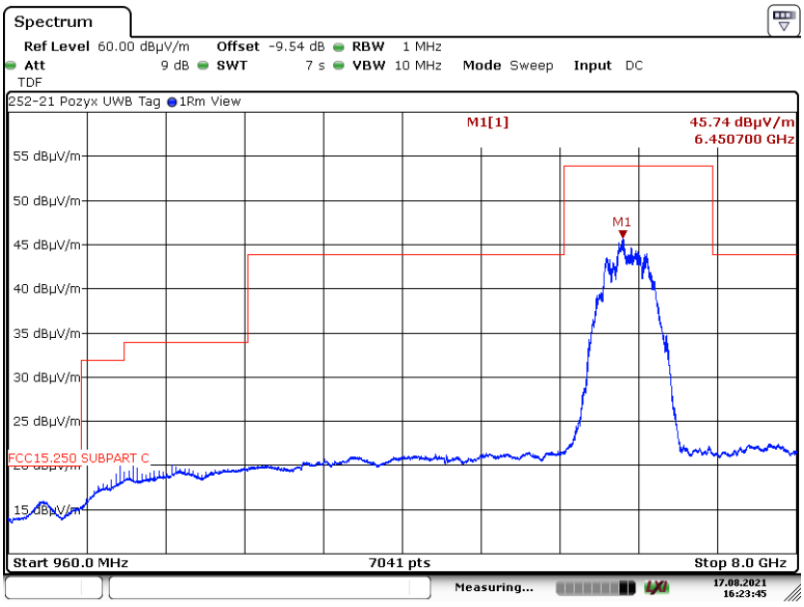
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1(d))

6.4.25. 960 MHz to 8 GHz Horizontal at 1 Meter – X Axis



Date: 18.AUG.2021 09:45:26

6.4.26. 960 MHz to 8 GHz Vertical at 1 Meter – X Axis



Date: 17.AUG.2021 16:23:45

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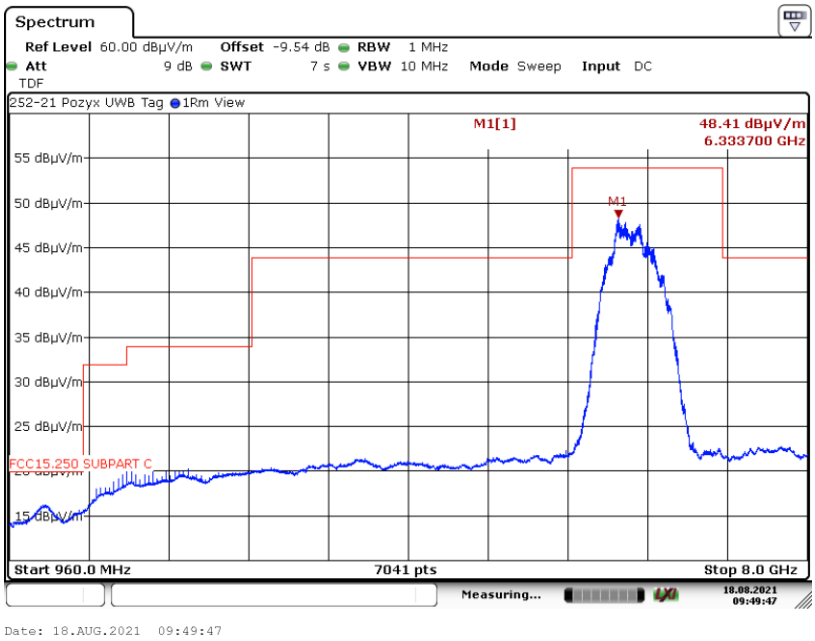
6. Measurement Data (continued)

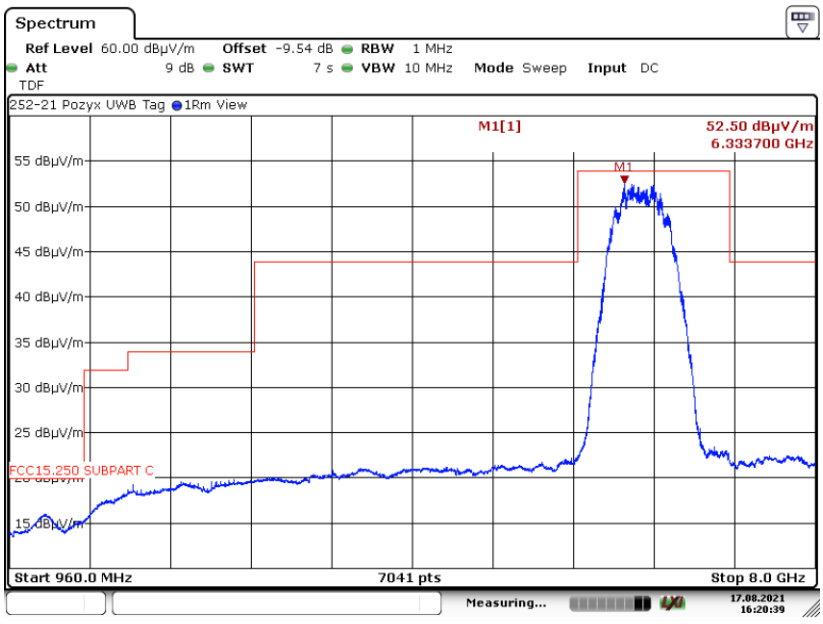
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1(d))

6.4.27. 960 MHz to 8 GHz Horizontal at 1 Meter – Y Axis



Date: 18.AUG.2021 09:49:47

6.4.28. 960 MHz to 8 GHz Vertical at 1 Meter – Y Axis



Date: 17.AUG.2021 16:20:39

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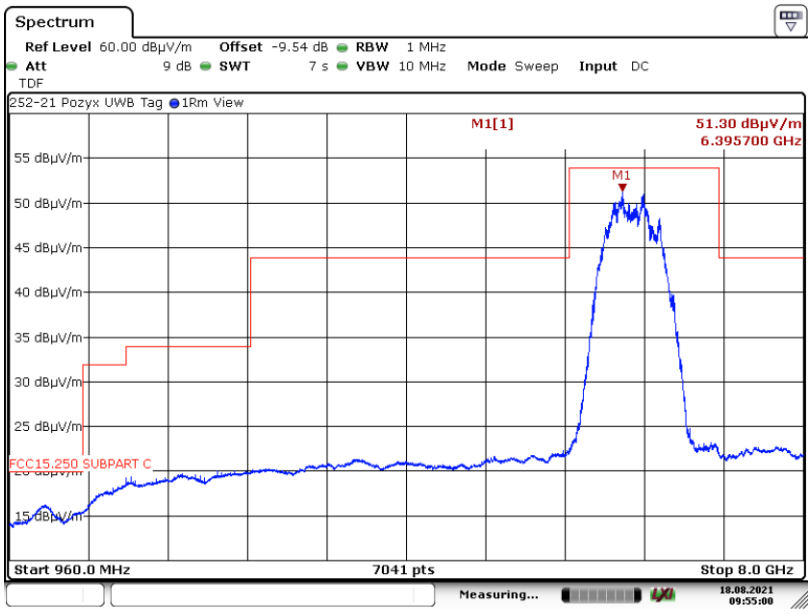
6. Measurement Data (continued)

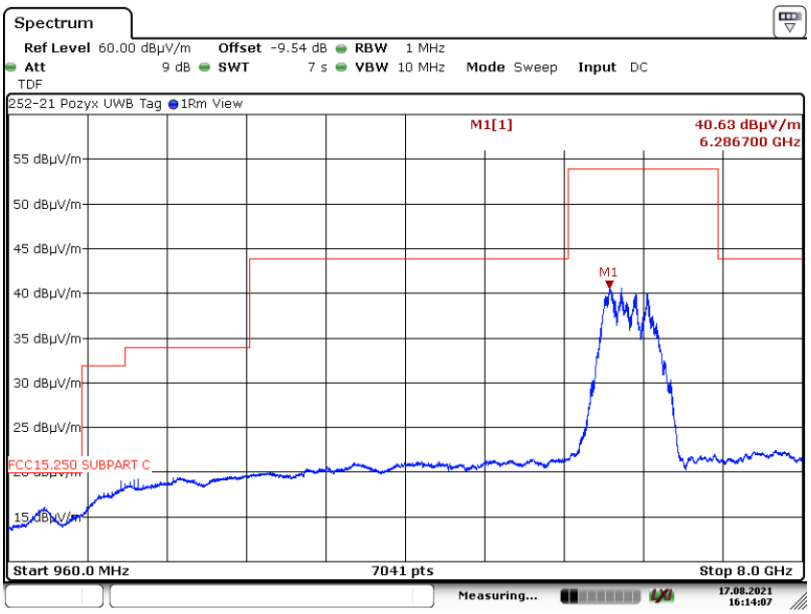
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1(d))

6.4.29. 960 MHz to 8 GHz Horizontal at 1 Meter – Z Axis



Date: 18.AUG.2021 09:55:00

6.4.30. 960 MHz to 8 GHz Vertical at 1 Meter – Z Axis



Date: 17.AUG.2021 16:14:07

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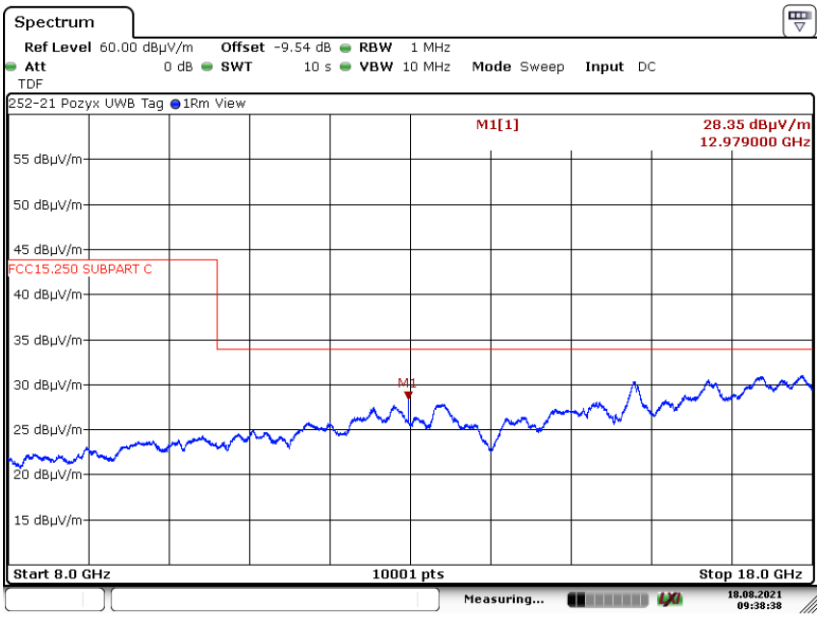
6. Measurement Data (continued)

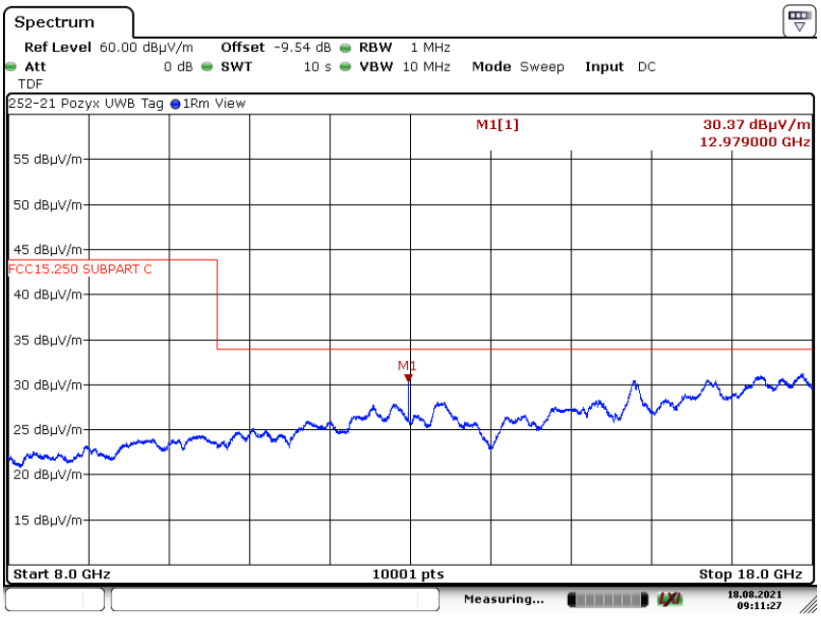
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1 (d) continued)

6.4.31. 8 to 18 GHz Horizontal at 1 Meter – X Axis



Date: 18.AUG.2021 09:38:38

6.4.32. 8 to 18 GHz Vertical at 1 Meter – X Axis



Date: 18.AUG.2021 09:11:26

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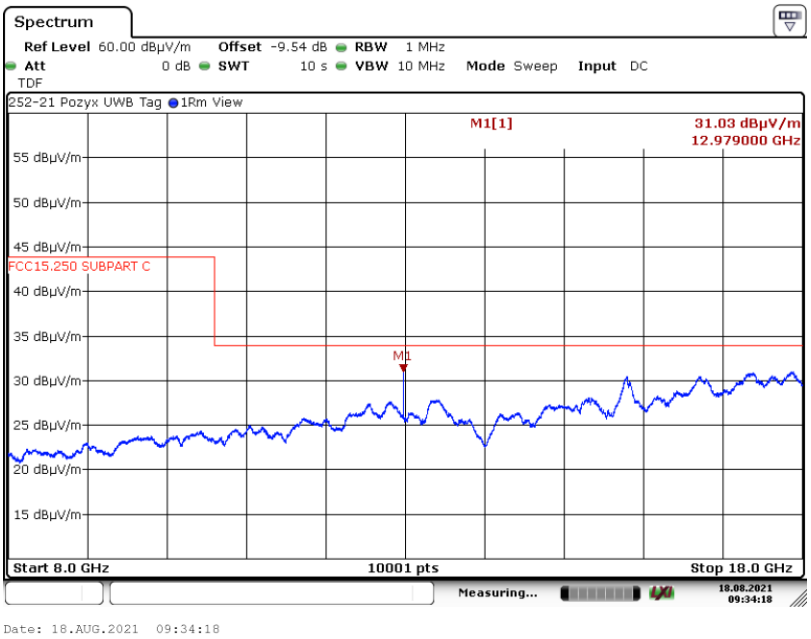
6. Measurement Data (continued)

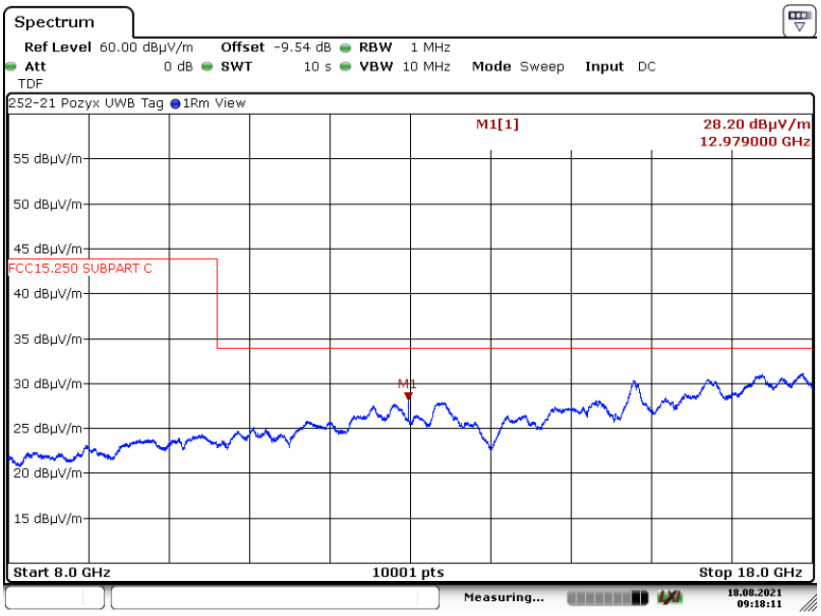
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1 (d) continued)

6.4.33. 8 to 18 GHz Horizontal at 1 Meter – Y Axis



Date: 18.AUG.2021 09:34:18

6.4.34. 8 to 18 GHz Vertical at 1 Meter – Y Axis



Date: 18.AUG.2021 09:18:11

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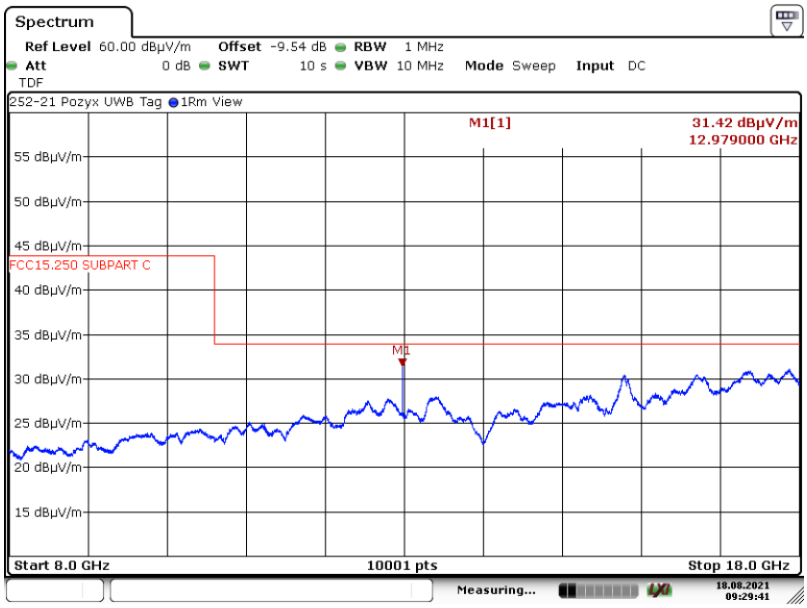
. Measurement Data (continued)

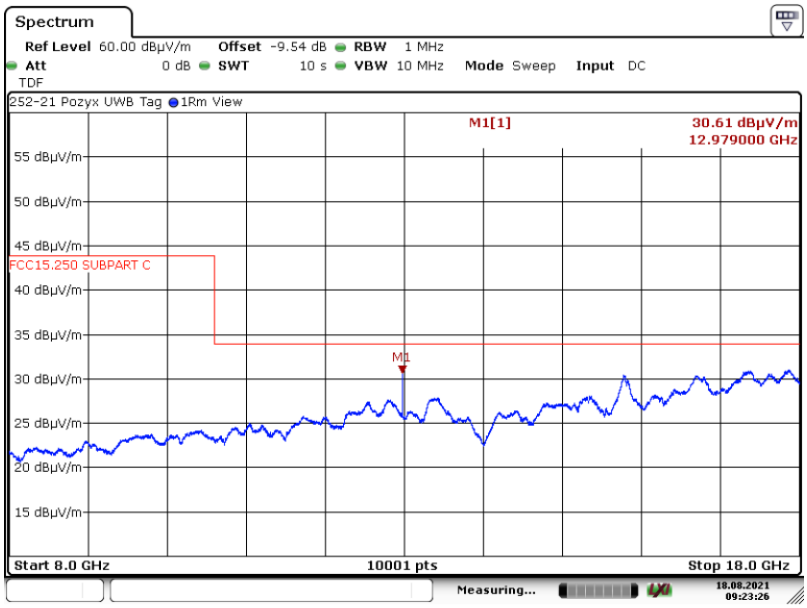
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1 (d) continued)

6.4.35. 8 to 18 GHz Horizontal at 1 Meter – Z Axis



Date: 18.AUG.2021 09:29:40

6.4.36. 8 to 18 GHz Vertical at 1 Meter – Z Axis



Date: 18.AUG.2021 09:23:27

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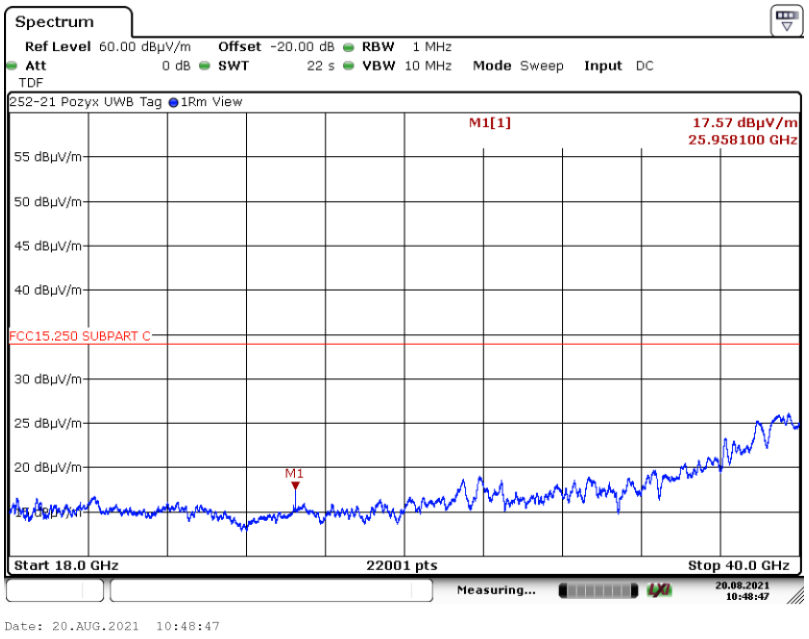
6. Measurement Data (continued)

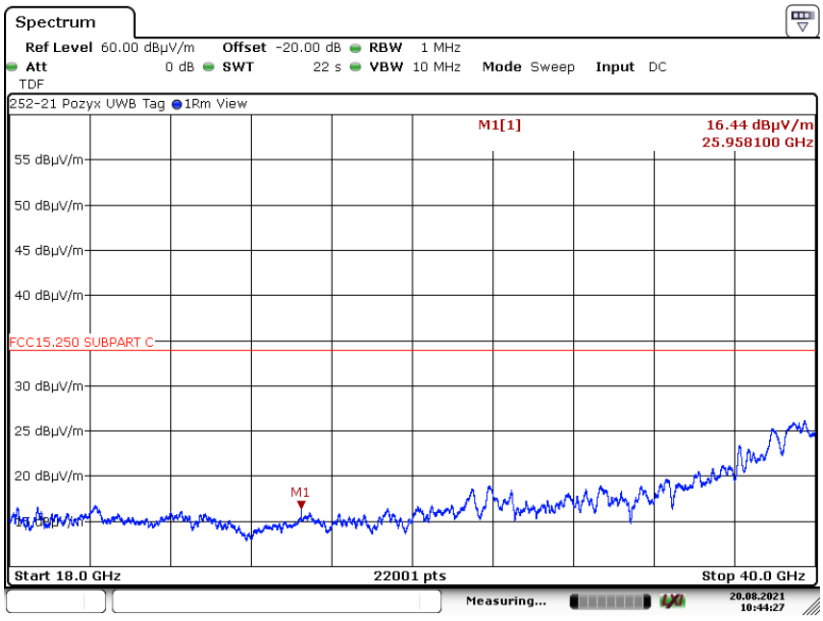
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1 (d) continued)

6.4.37. 18 to 40 GHz Horizontal at 0.3 Meter – X Axis



Date: 20.AUG.2021 10:48:47

6.4.38. 18 to 40 GHz Vertical at 0.3 Meter – X Axis



Date: 20.AUG.2021 10:44:27

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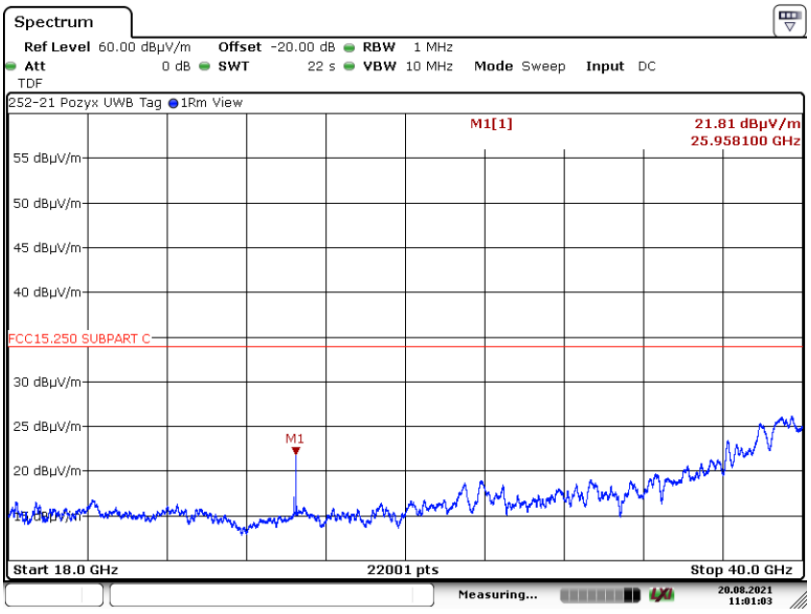
6. Measurement Data (continued)

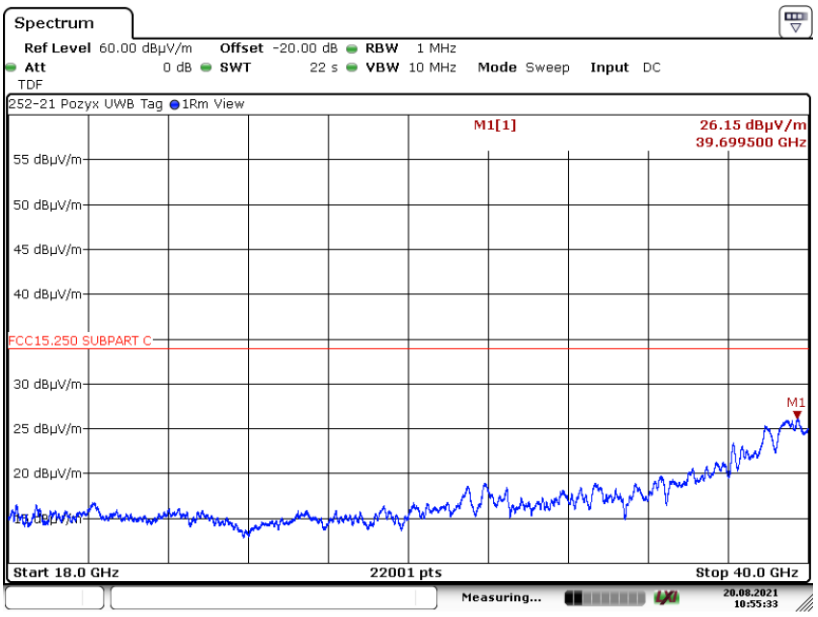
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1 (d) continued)

6.4.39. 18 to 40 GHz Horizontal at 0.3 Meter – Y Axis



Date: 20.AUG.2021 11:01:02

6.4.40. 18 to 40 GHz Vertical at 0.3 Meter – Y Axis



Date: 20.AUG.2021 10:55:33

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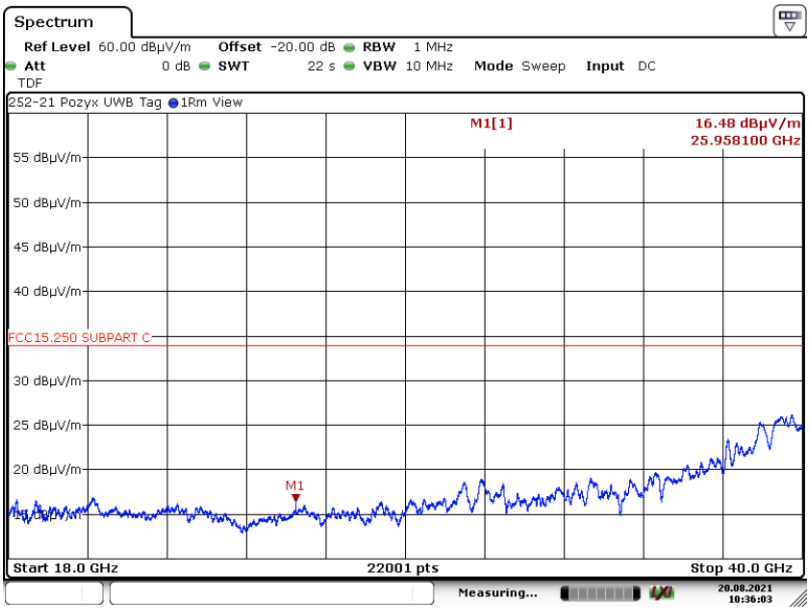
6. Measurement Data (continued)

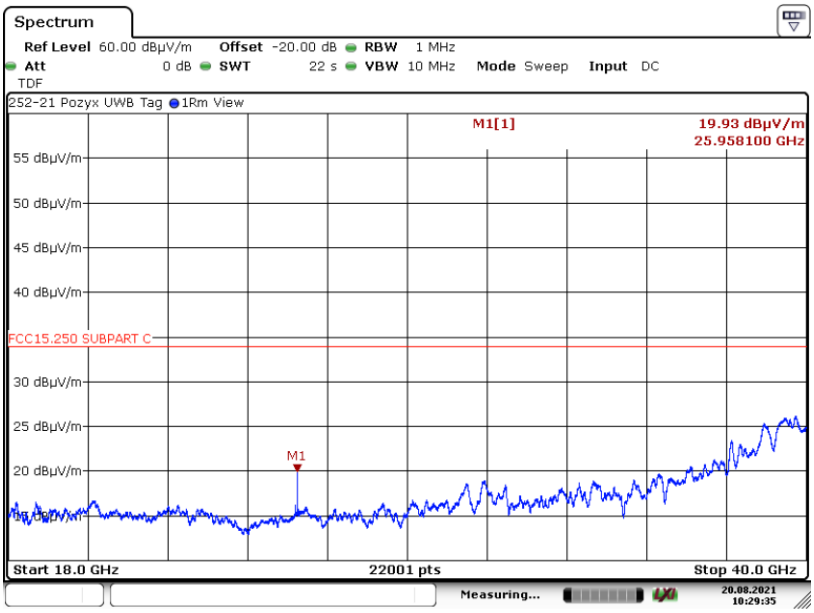
6.4. Spurious Radiated Emissions (15.250 (d) (1), RSS-220 5.3.1 (d) continued)

6.4.41. 18 to 40 GHz Horizontal at 0.3 Meter – Z Axis



Date: 20.AUG.2021 10:36:03

6.4.42. 18 to 40 GHz Vertical at 0.3 Meter – Z Axis



Date: 20.AUG.2021 10:29:35

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6. Measurement Data (continued)

6.4. 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:

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/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

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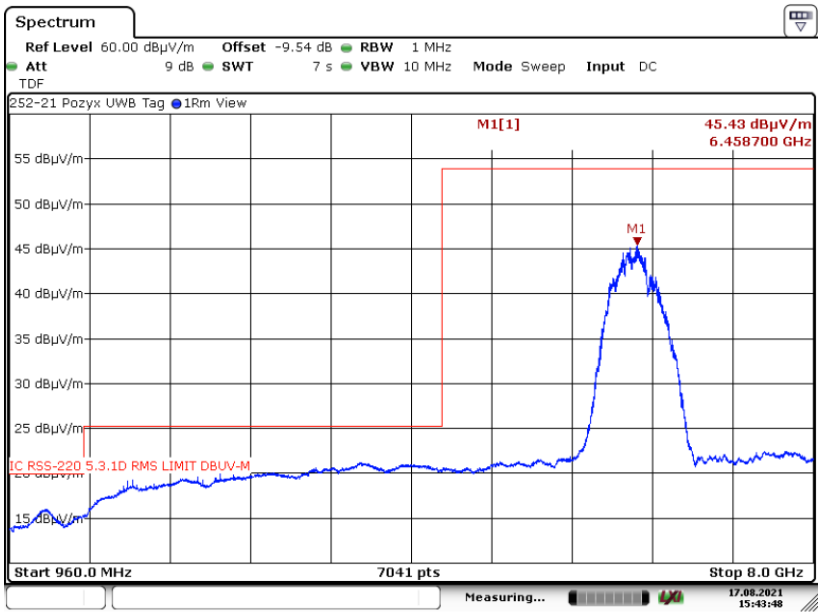
6. Measurement Data (continued)

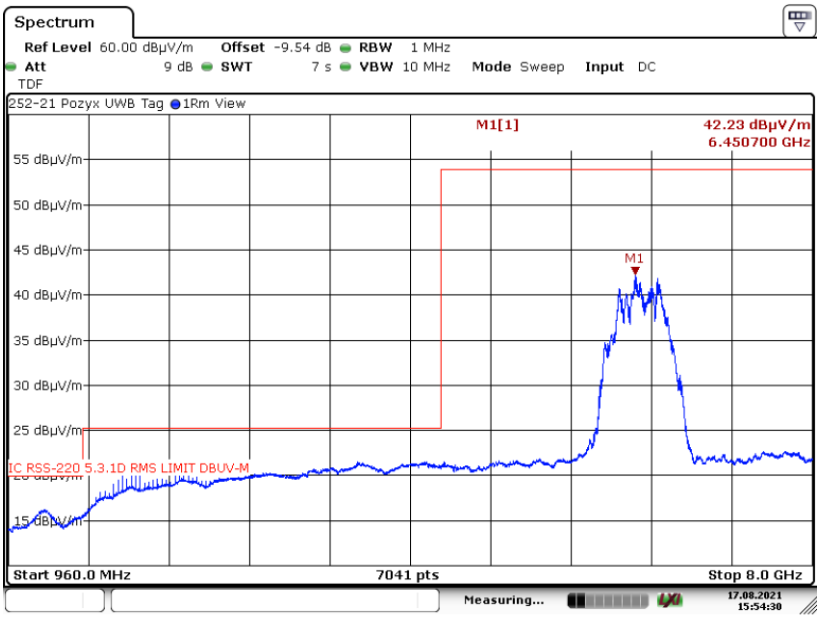
6.4. Spurious Radiated Emissions (RSS-220 5.3.1(d) Continued)

6.4.43. 960 MHz to 8 GHz Horizontal at 1 Meter – X Axis



Date: 17.AUG.2021 15:43:48

6.4.44. 960 MHz to 8 GHz Vertical at 1 Meter – X Axis



Date: 17.AUG.2021 15:54:30

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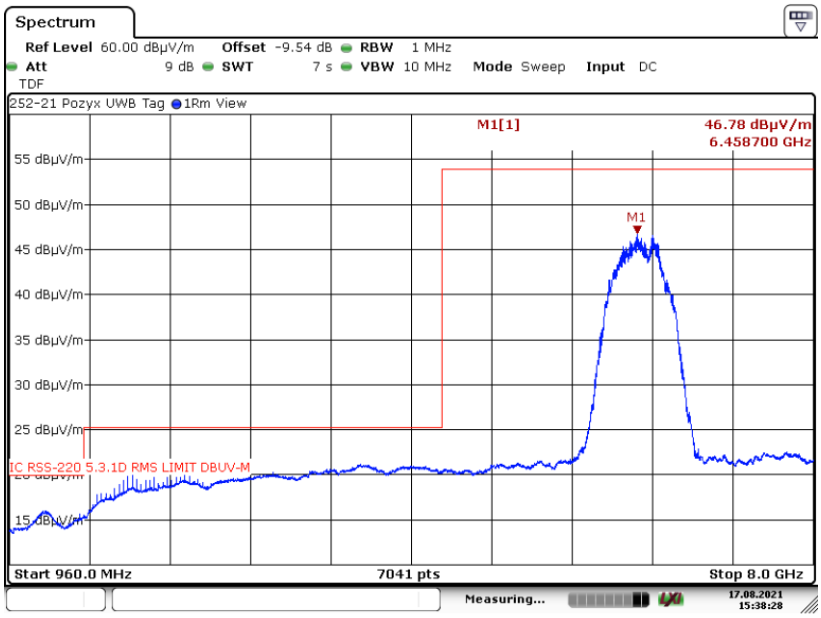
6. Measurement Data (continued)

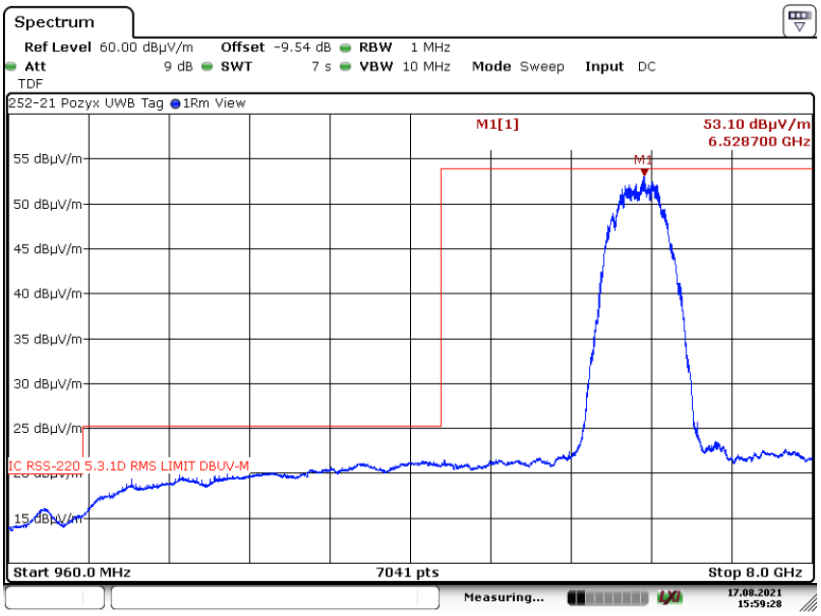
6.4. Spurious Radiated Emissions (RSS-220 5.3.1(d) Continued)

6.4.45. 960 MHz to 8 GHz Horizontal at 1 Meter – Y Axis



Date: 17.AUG.2021 15:38:27

6.4.46. 960 MHz to 8 GHz Vertical at 1 Meter – Y Axis



Date: 17.AUG.2021 15:59:28

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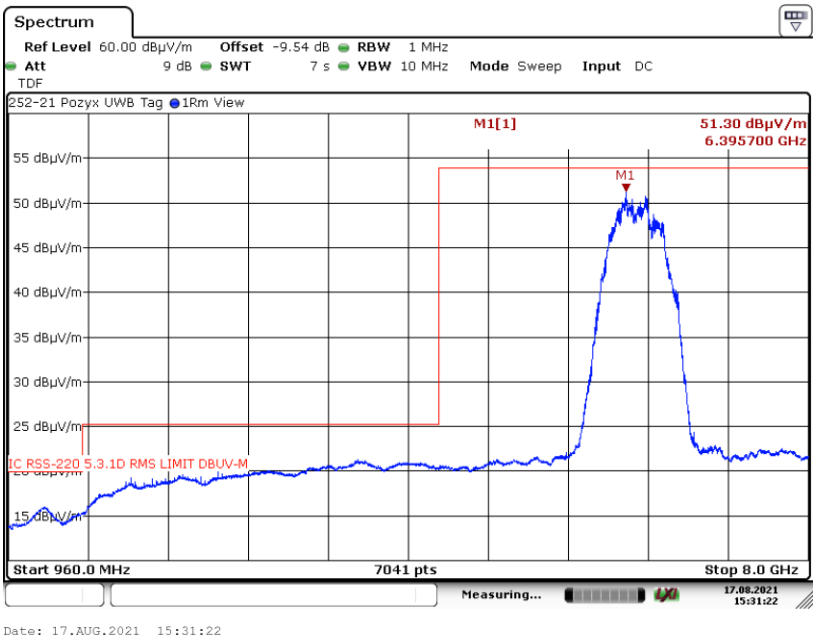
6. Measurement Data (continued)

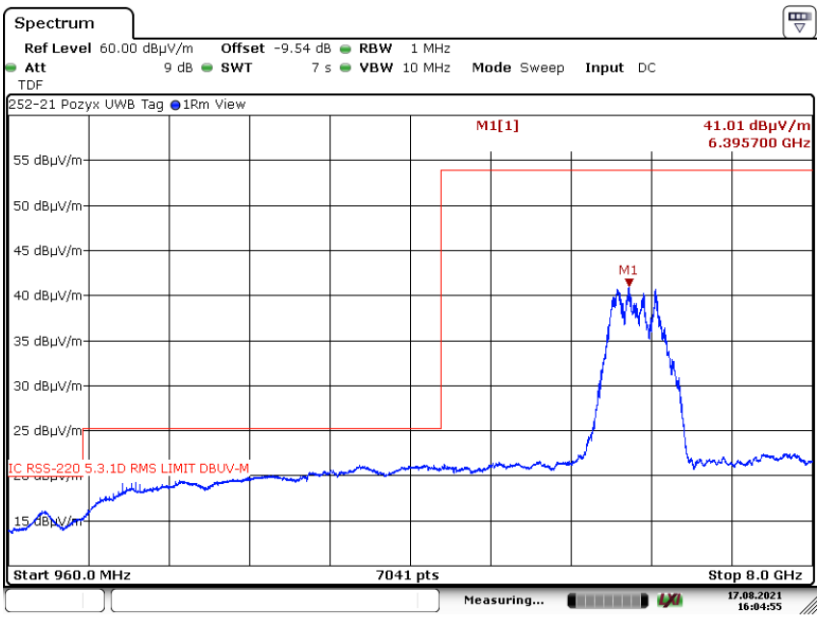
6.4. Spurious Radiated Emissions (RSS-220 5.3.1(d) Continued)

6.4.47. 960 MHz to 8 GHz Horizontal at 1 Meter – Z Axis



Date: 17.AUG.2021 15:31:22

6.4.48. 960 MHz to 8 GHz Vertical at 1 Meter – Z Axis



Date: 17.AUG.2021 16:04:55

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6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

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

6.5.1. Measurement & Equipment Setup

EMI Receiver IF Bandwidth:	1 kHz
EMI Receiver Avg Bandwidth:	10 kHz
Detector Function:	RMS

6.5.2. Test Procedure

Test measurements were made in accordance with ANSI C63.10:2013, American National Standard for Testing Unlicensed Wireless Devices.

6.5.3. 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. At 3 Meters the -85.3 dBm limit is converted to a field strength limit of 9.9 dBuV/m using a distance correction factor of 95.2.

A distance correction factor of -9.54 dB was entered into the analyzer as an offset since the measurements were made at 1 meter.

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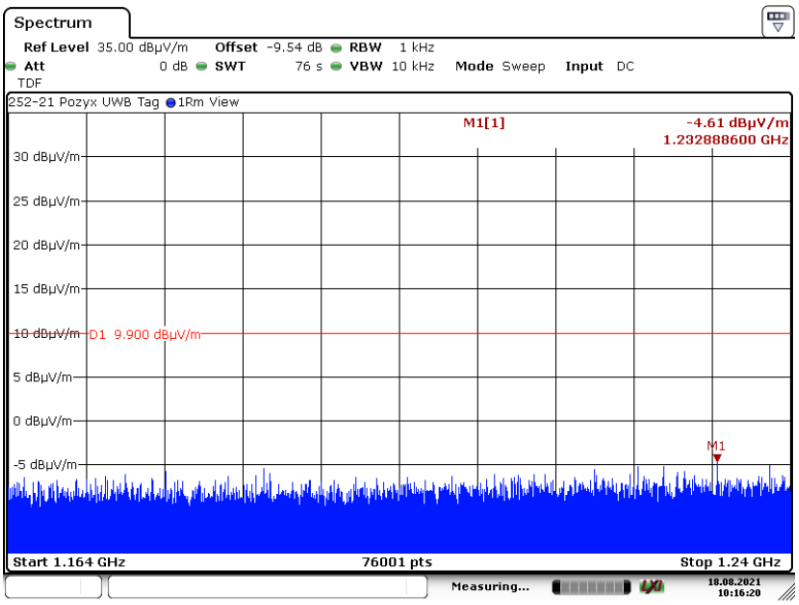
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

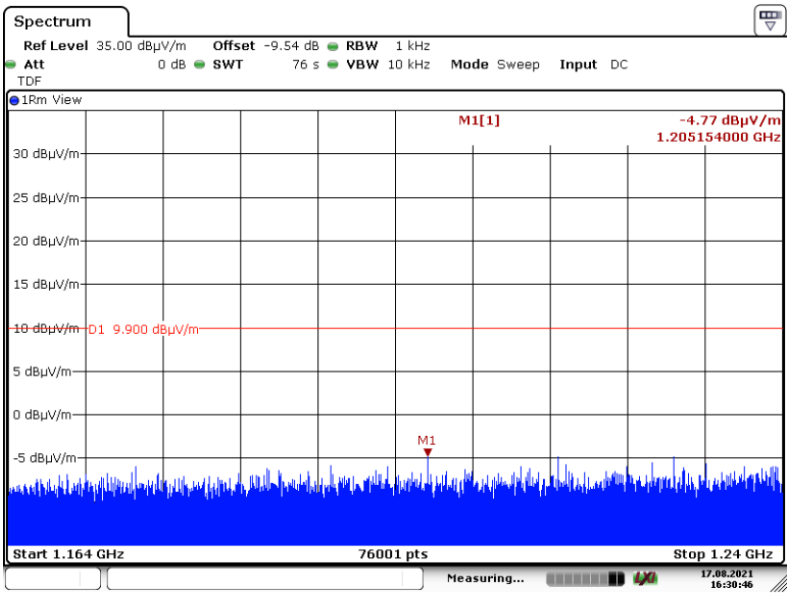
6.5.4 1164 to 1240 MHz Band

6.5.4.1 Horizontal Measurement Polarity 1164 to 1240 MHz – X Axis



Date: 18.AUG.2021 10:16:20

6.5.4.2 Vertical Measurement Polarity 1164 to 1240 MHz – X Axis



Date: 17.AUG.2021 16:30:47

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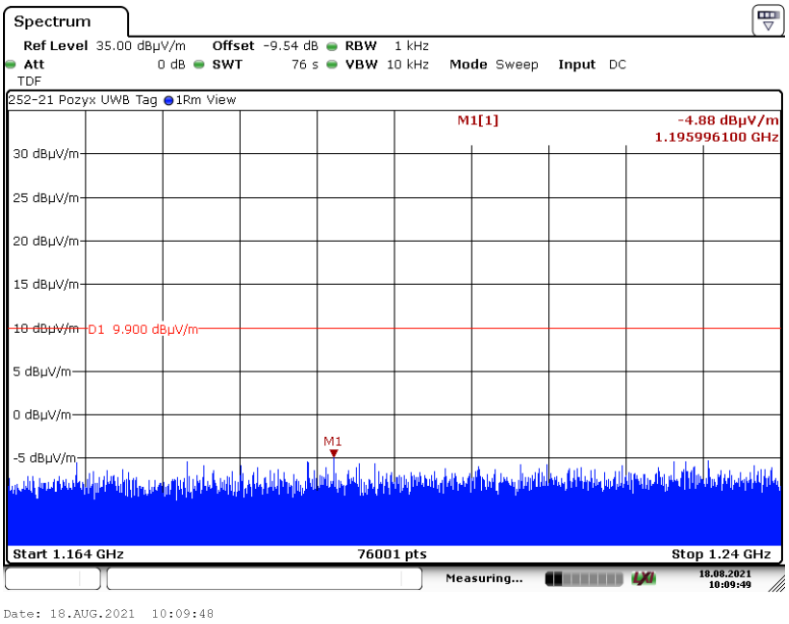
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

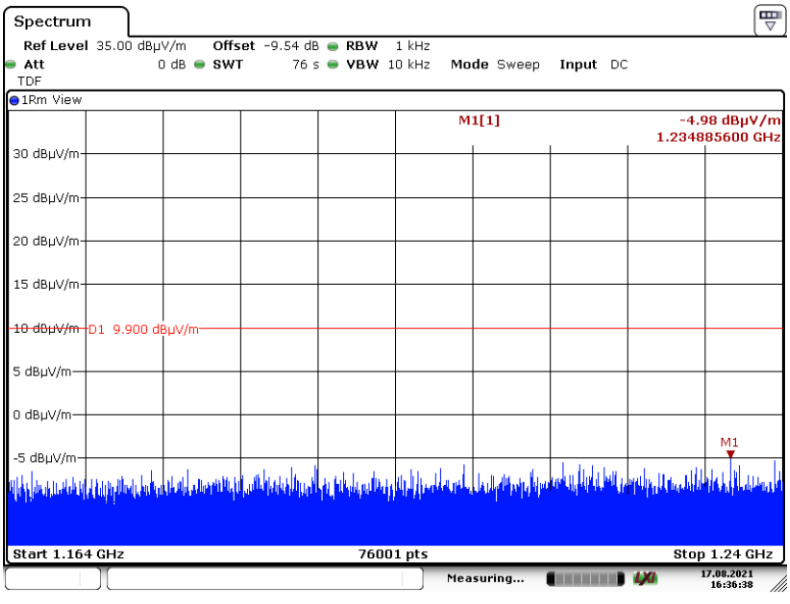
6.5.4 1164 to 1240 MHz Band

6.5.4.3 Horizontal Measurement Polarity 1164 to 1240 MHz – Y Axis



Date: 18.AUG.2021 10:09:48

6.5.4.4 Vertical Measurement Polarity 1164 to 1240 MHz – Y Axis



Date: 17.AUG.2021 16:36:38

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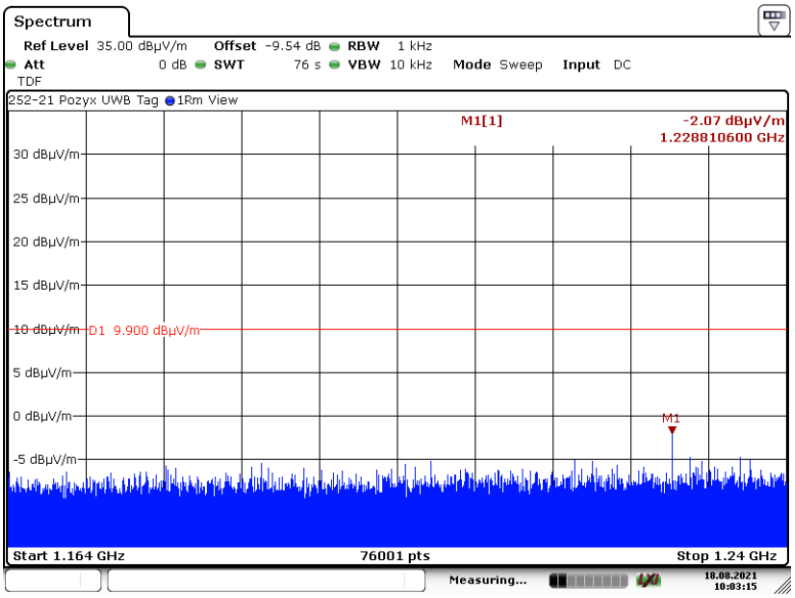
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

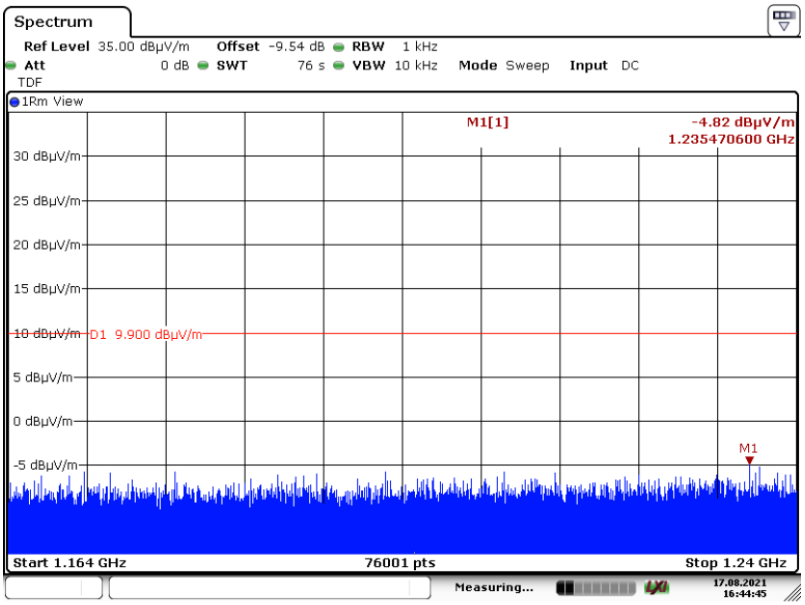
6.5.4 1164 to 1240 MHz Band

6.5.4.5 Horizontal Measurement Polarity 1164 to 1240 MHz – Z Axis



Date: 18.AUG.2021 10:03:14

6.5.4.6 Vertical Measurement Polarity 1164 to 1240 MHz – Z Axis



Date: 17.AUG.2021 16:44:45

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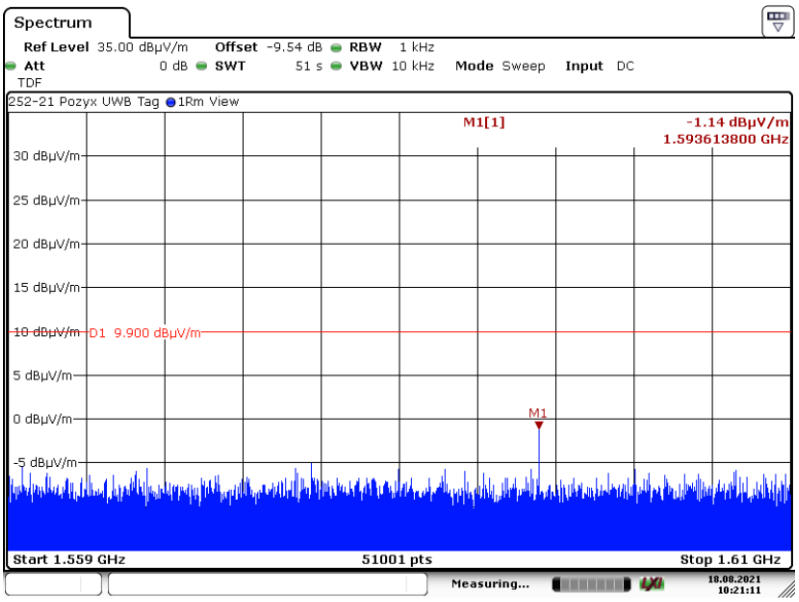
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

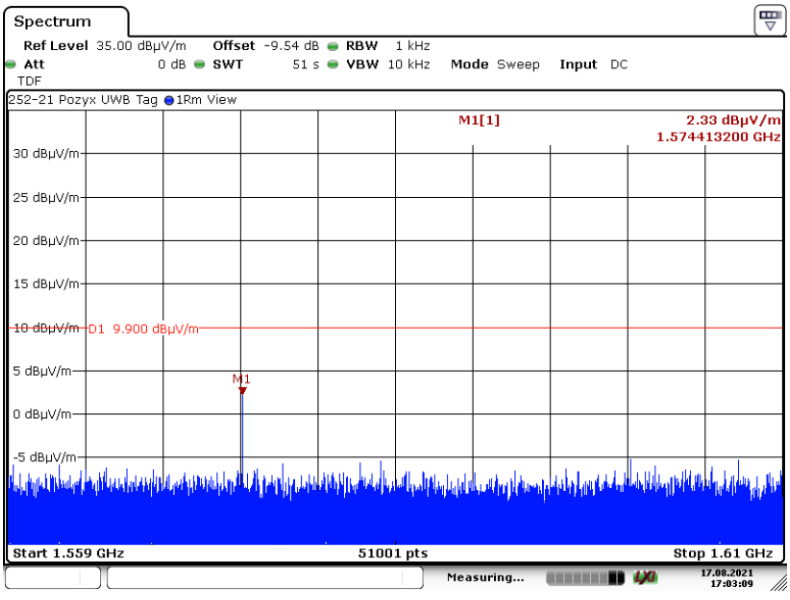
6.5.5 1559 to 1610 MHz Band

6.5.5.1 Horizontal Measurement Polarity 1559 to 1610 MHz – X Axis



Date: 18.AUG.2021 10:21:11

6.5.5.2 Vertical Measurement Polarity 1559 to 1610 MHz – X Axis



Date: 17.AUG.2021 17:03:09

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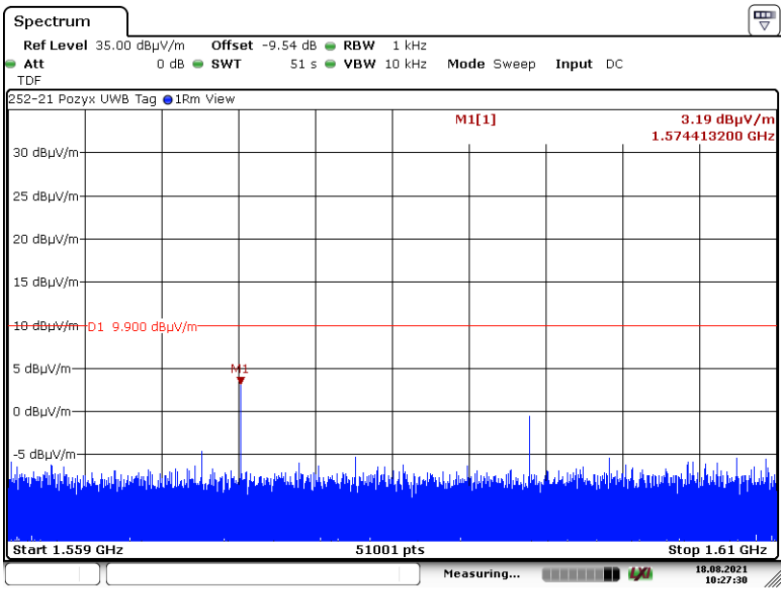
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

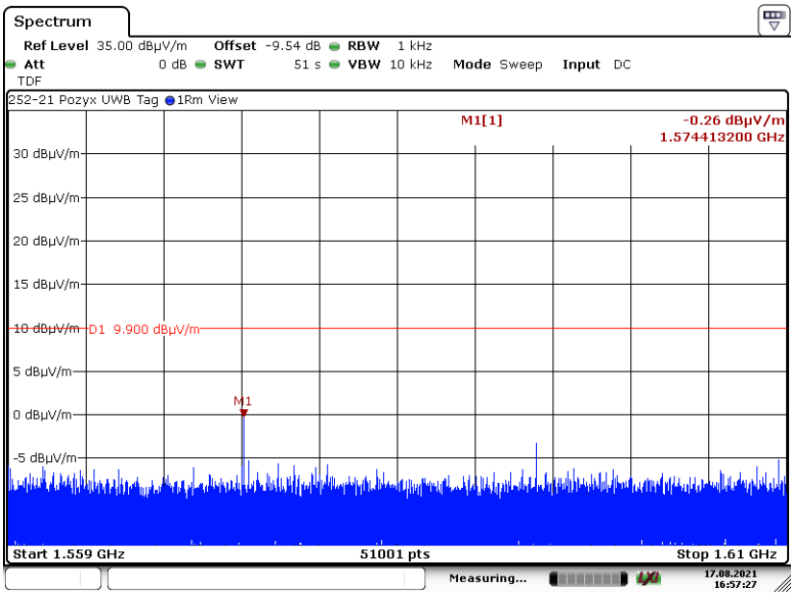
6.5.5 1559 to 1610 MHz Band

6.5.5.3 Horizontal Measurement Polarity 1559 to 1610 MHz – Y Axis



Date: 18.AUG.2021 10:27:30

6.5.5.4 Vertical Measurement Polarity 1559 to 1610 MHz – Y Axis



Date: 17.AUG.2021 16:57:26

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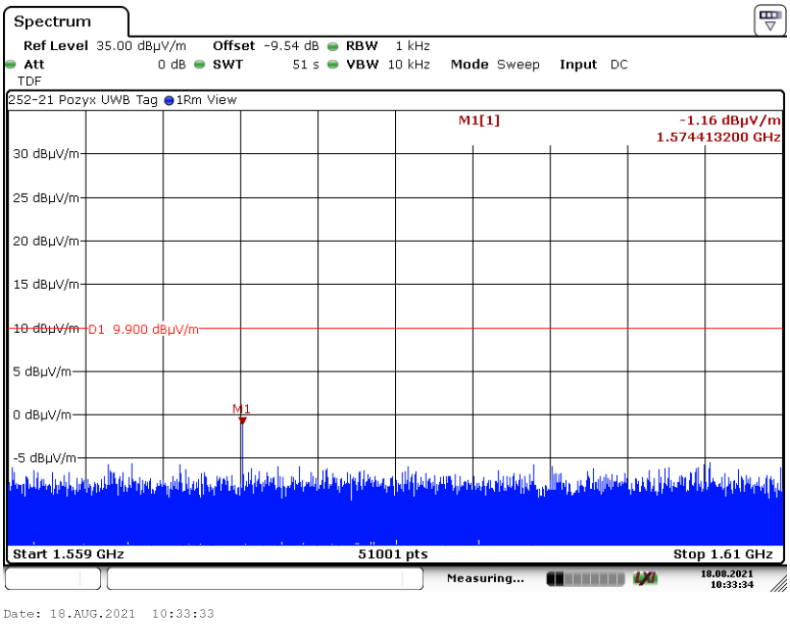
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions in GPS Bands (15.250 (d) (2), RSS-220 5.3.1 (e))

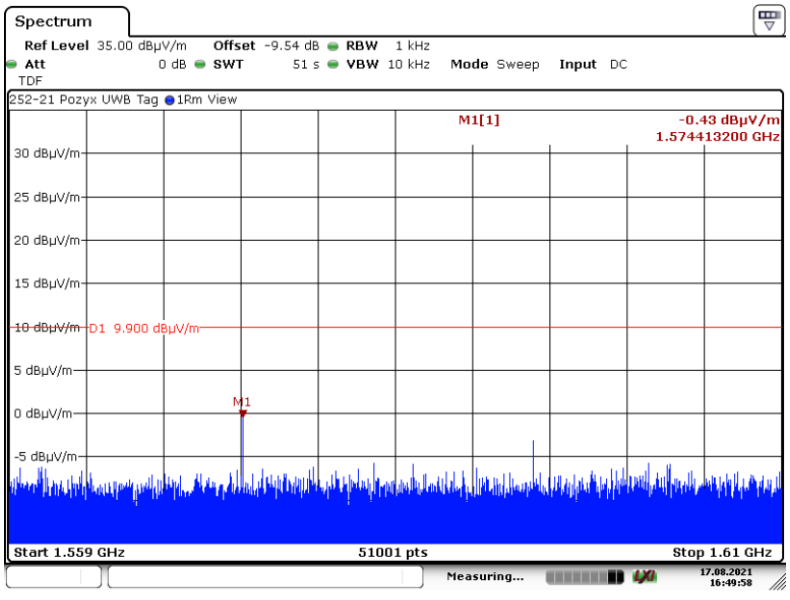
6.5.5 1559 to 1610 MHz Band

6.5.5.5 Horizontal Measurement Polarity 1559 to 1610 MHz – Z Axis



Date: 18.AUG.2021 10:33:33

6.5.5.6 Vertical Measurement Polarity 1559 to 1610 MHz – Z Axis



Date: 17.AUG.2021 16:49:58

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6. Measurement Data (continued)

6.6. RMS Power in a 1 MHz Bandwidth (15.250 (d) (1), RSS-220 5.3.1 (d))

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

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

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

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
5925 - 7250	-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

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6. Measurement Data (continued)

6.6. RMS Power in a 1 MHz Bandwidth (15.250 (d) (1), RSS-220 5.3.1 (d))

Requirement: The limit for operation in the 5925 to 7250 MHz band is -41.3 dBm EIRP.

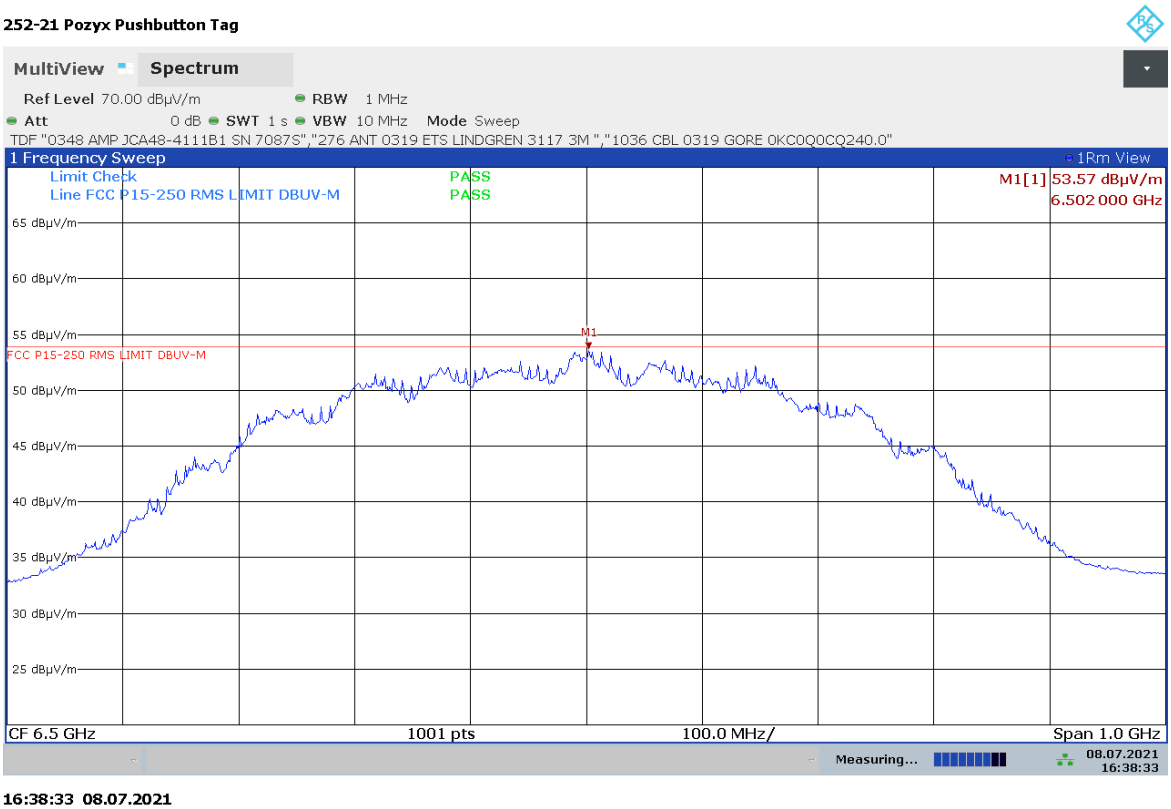
Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
6.502	53.57	53.90	-0.33	V	179	88	Compliant

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

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

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.502	-41.63	-41.30	-0.33	V	179	88	Compliant

6.6.1. Plot of RMS Power at 3 Meters



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6. Measurement Data (continued)

6.7. Peak Emissions in a 50 MHz Bandwidth (15.250 (d) (3), RSS-220 5.3.1 (g))

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

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

Frequency (MHz)	EIRP (dBm)	EIRP at 3 Meters (dBµV/m)
5925 - 7250	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

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6. Measurement Data (continued)

6.7. Peak Emissions in a 50 MHz Bandwidth (15.250 (d) (3), RSS-220 5.3.1 (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.

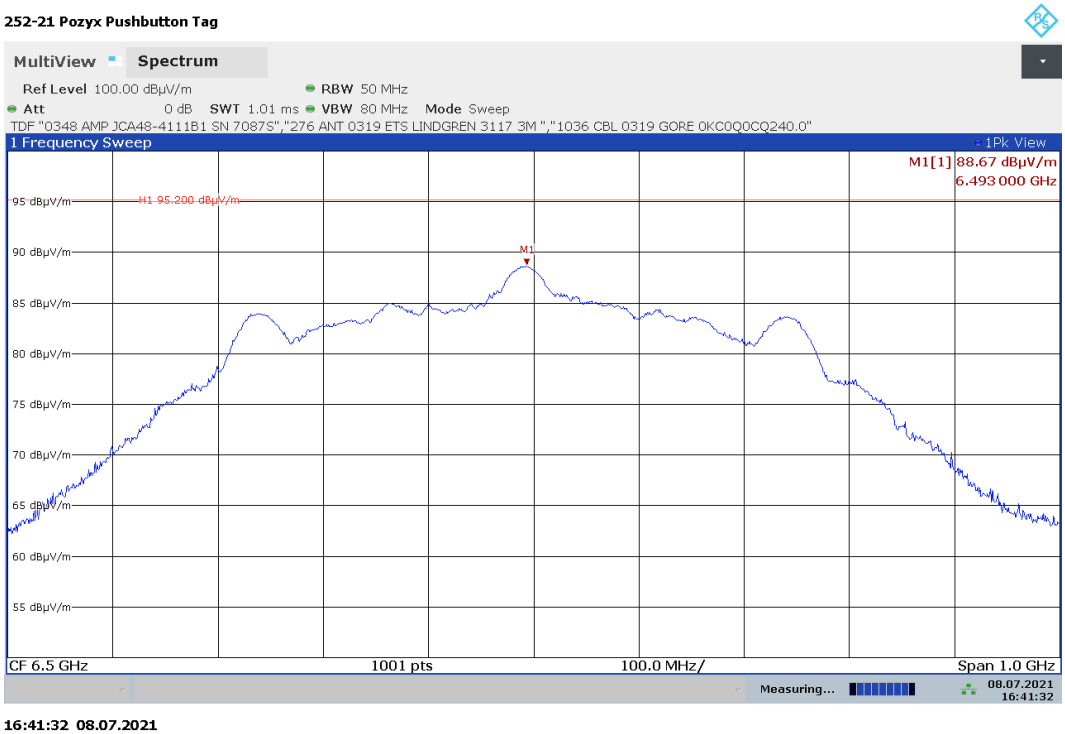
Frequency (GHz)	Amplitude[1]	Limit	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	(dBµV/m)	(dBµV/m)	(dB)	H/V	cm	Deg	
6.493	88.67	95.20	-6.53	V	179	88	Compliant

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

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

Frequency (GHz)	Amplitude[1] (dBm)	Limit (dBm)	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
	EIRP	EIRP	(dB)	H/V	cm	Deg	
6.493	-6.53	0.00	-6.53	V	179	88	Compliant

6.7.1 Plot of Peak Power at 3 Meters



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6. Measurement Data (continued)

6.8 Conducted Emissions Test Setup

6.8.1. Regulatory Limit: FCC Part 15.207, 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.		

6.8.2 Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Rohde & Schwarz	ESR7	101156	10/25/2022
LISN	EMCO	3825/2	9109-1860	1/4/2023
Manufacturer	**Software Description**		**Title/Model #**	**Rev.**
Compliance Worldwide	Test Report Generation Software		Test Report Generator	1.0

6.8.3. 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:	≥ 3 * RBW or IF(BW)
Detector Functions:	Peak, Quasi-Peak. & Average

6.8.4. 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)

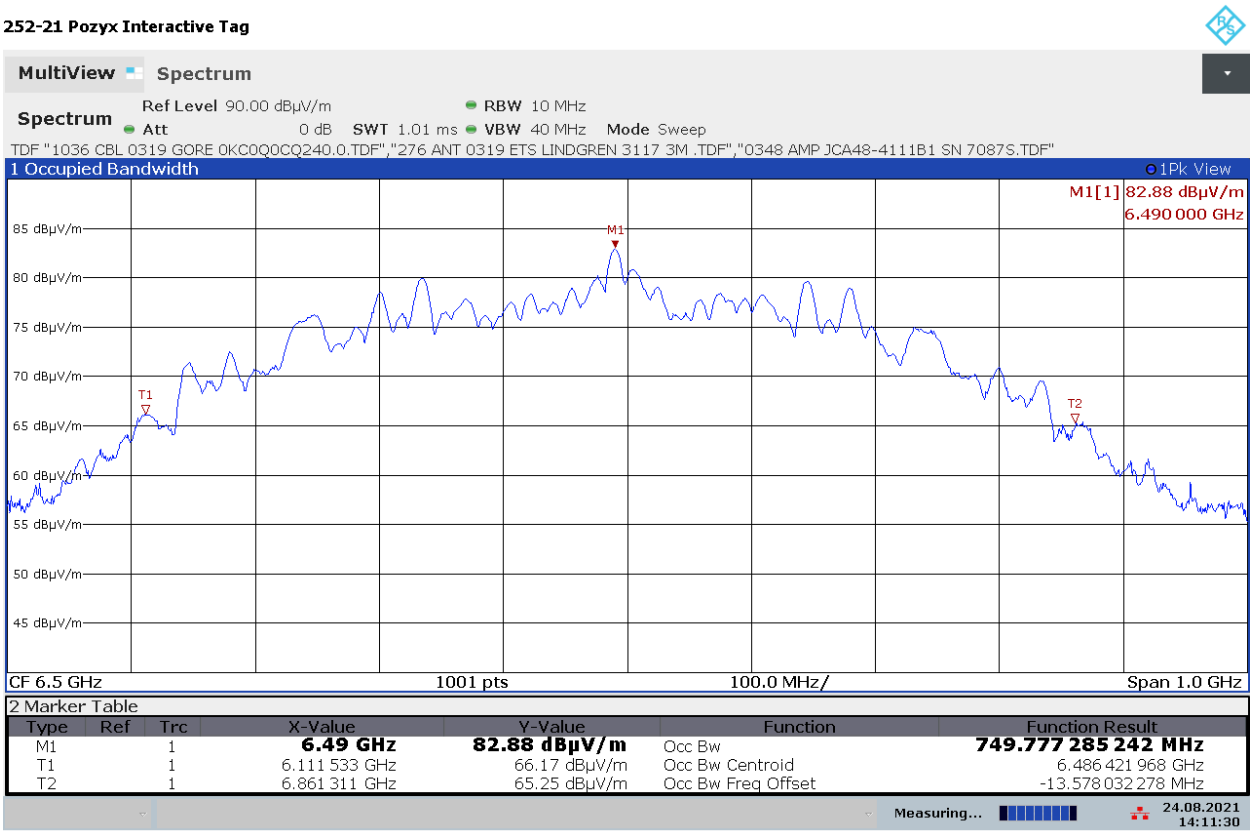
6.9. 99% Emission Bandwidth (RSS-GEN 6.7)

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

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

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

6.9.1 Plot of 99% Emission Bandwidth



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6. Measurement Data (continued)

6.10. Public Exposure to Radio Frequency Energy Levels (1.1310)

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

Requirement: Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for portable devices having single RF sources with more than an available maximum time-averaged power of 1 mW.

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it may not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period.

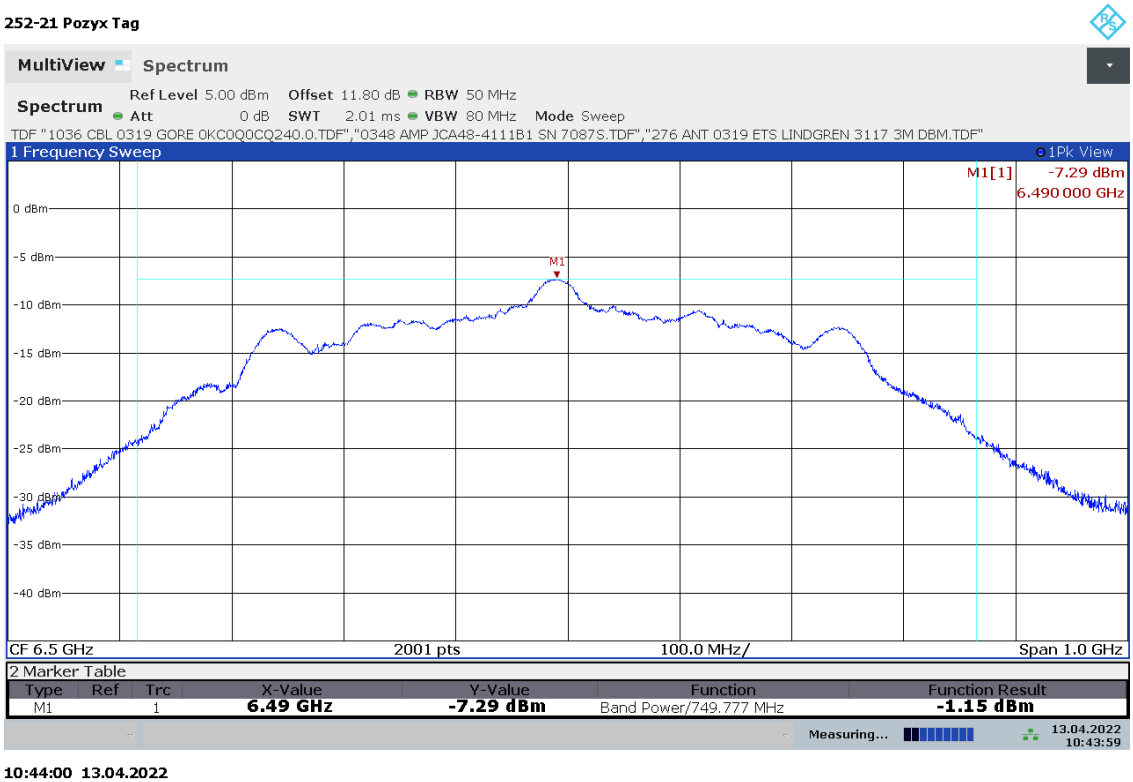
Band Peak Power = **-1.15 dBm or 0.767 mW**

TDoA tracking is configurable to 24 Hz or 41.667 mS

Time Averaging = 233 µS on time/41.667 mS off time 10 * LOG_{10} (233/41667)

Time Averaged Power = 0.00429 mW

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



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6. Measurement Data (continued)

6.10. Radio Frequency Exposure of Radiocommunication Apparatus (RSS-102, Notice 2021-DRS0005)

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

Requirement: ISED respect to Notice 2021-DRS0005: Introduction of an interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range.

Band Peak Power = **-1.15 dBm or 0.767 mW**

TDoA tracking is configurable to 24 Hz or 41.667 mS

Time Averaging = 233 µS on time/41.667 mS off time 10 * LOG_{10} (233/41667)

Time Averaged Power = 0.00429 mW

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

252-21 Pozyx Tag

10:44:00 13.04.2022

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6. Measurement Data (continued)

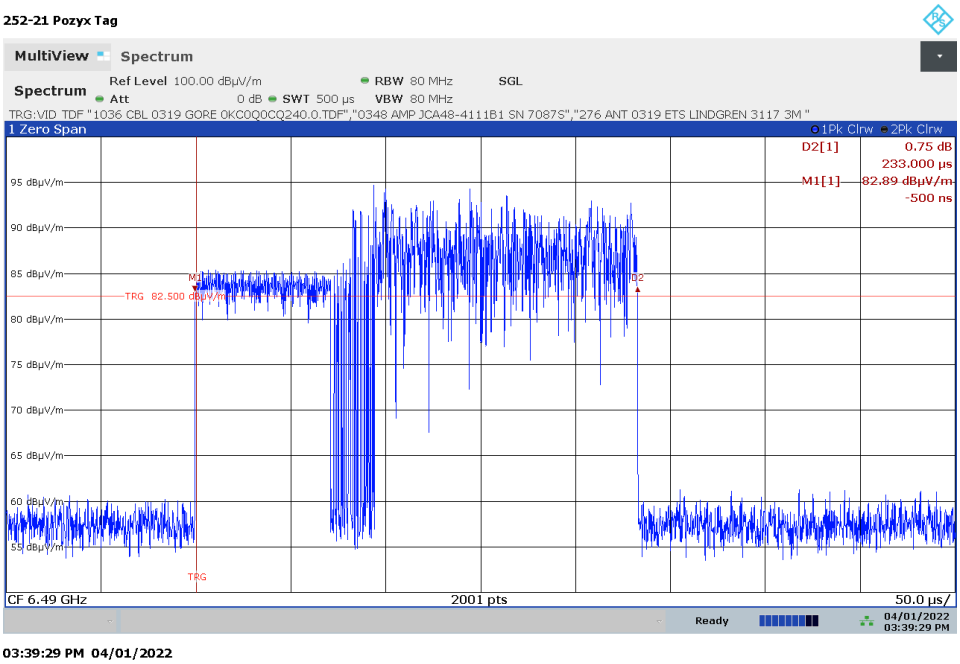
6.11. Operational Requirements of the Device under Test (RSS-220 5.3.1(b))

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.

The device is to transmit only when it is sending information to an associated receiver. The device shall cease transmission of information 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 device at least every 10 seconds or the UWB device shall cease transmitting any information other than periodic signals used for the establishment or re-establishment of a communication link with an associated receiver.

Result: Compliant, the EUT transmits a 233 µS burst of location information every 10.155 seconds to re-establish communications with an associated receiver.

6.11.1 Plot of Transmission



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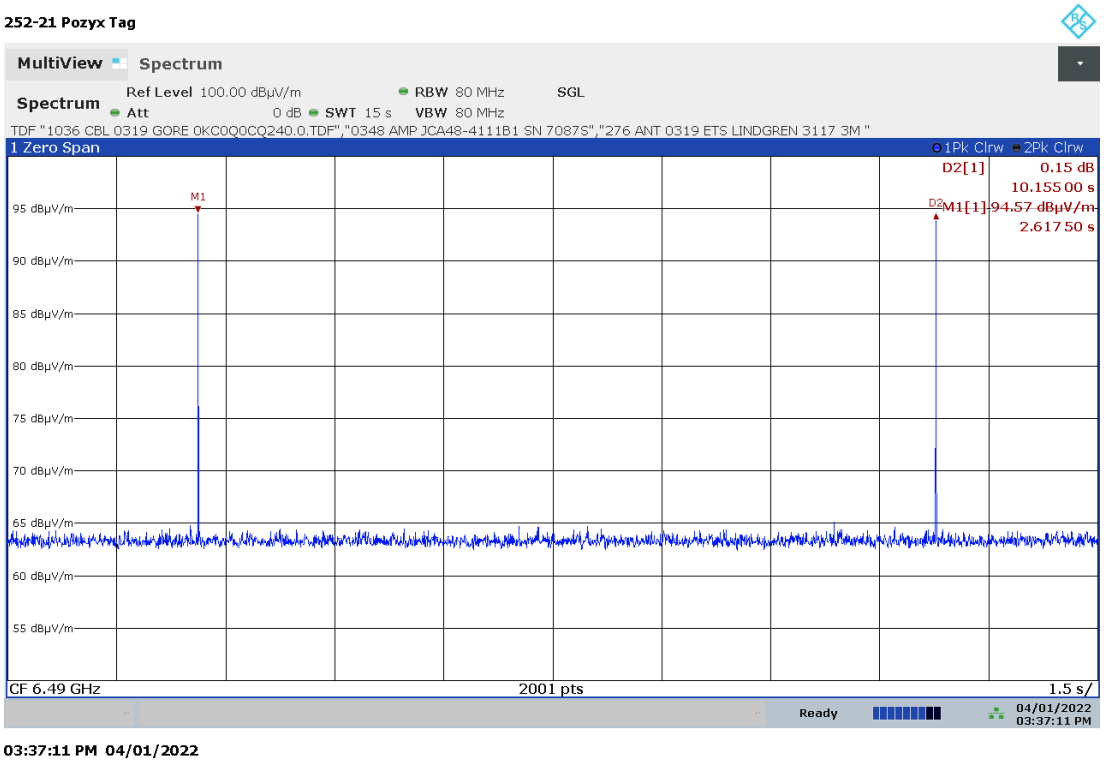
6. Measurement Data (continued)

6.11. Operational Requirements of the Device under Test (RSS-220 5.3.1(b))

6.11.2 Plot of Transmission Period



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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 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.

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8. Test Images

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

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8. Test Images

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

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8. Test Images

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

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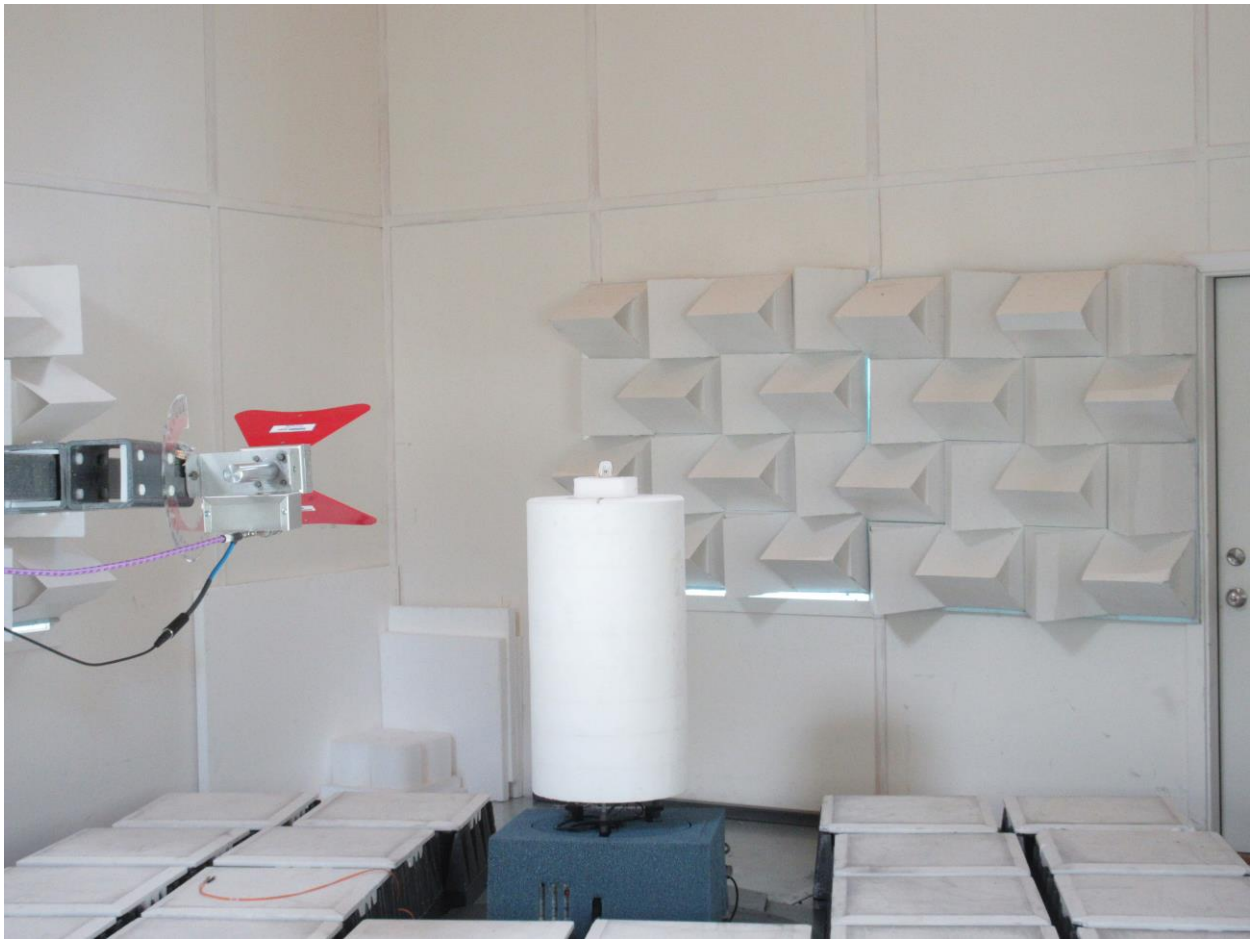
8. Test Images

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



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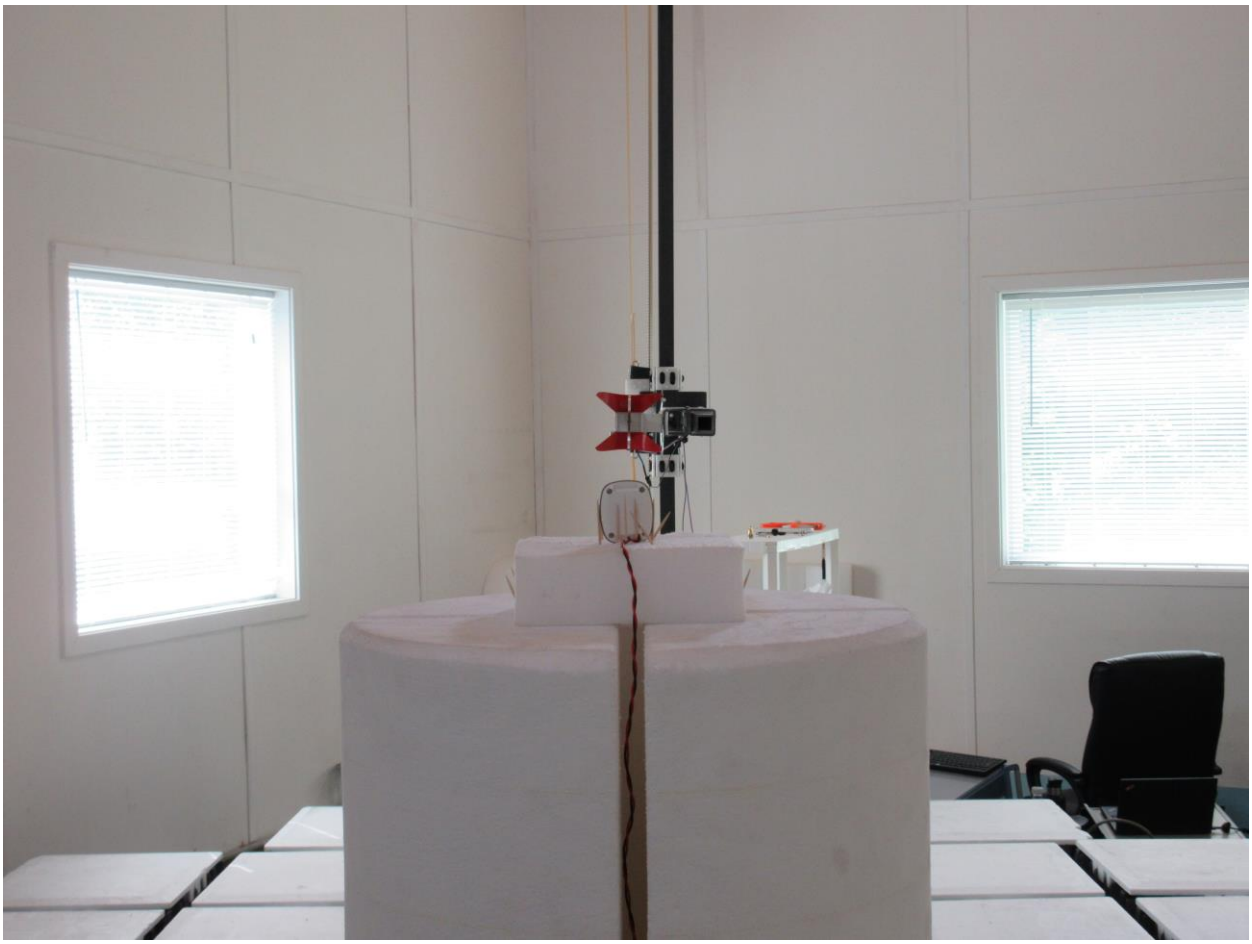
8. Test Images

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



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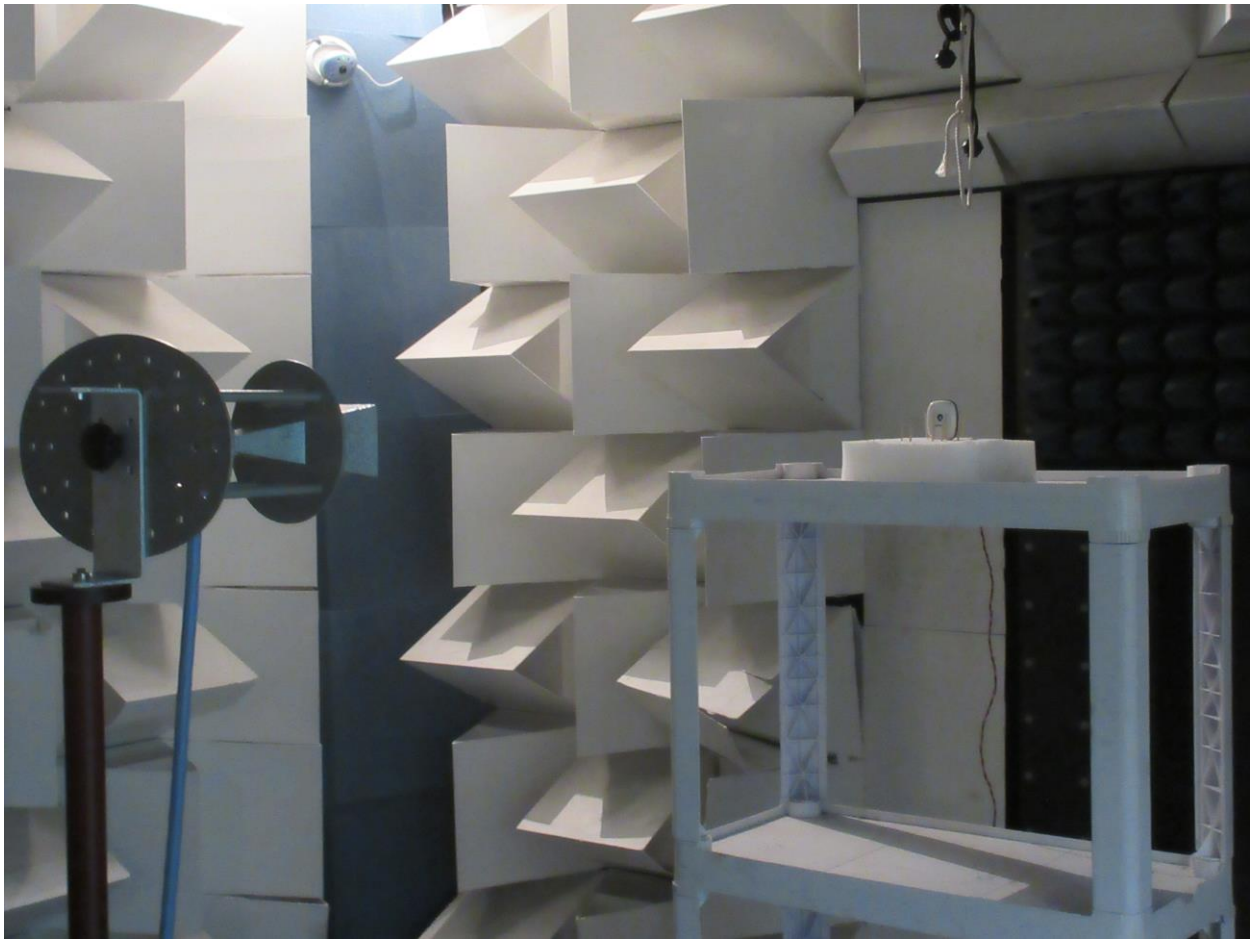
8. Test Images

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



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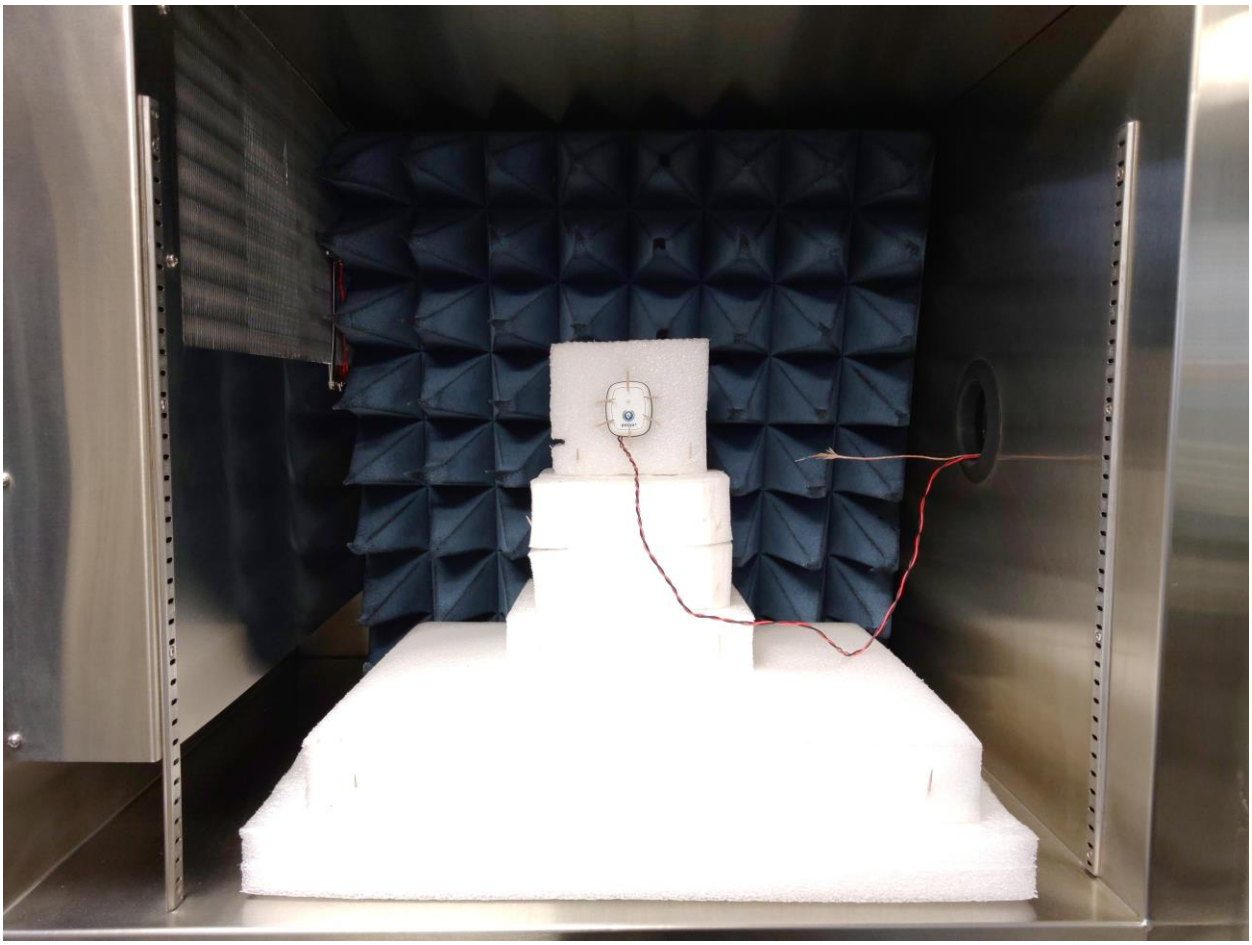
8. Test Images

8.7. Frequency Stability (Setup)



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