FCC & ISED CANADA CERTIFICATION

TEST REPORT

for the

INSULET CORPORATION

FCC ID: RBV-029

IC ID: 8446A-029

WLL REPORT# 16743-01 REV 2

Prepared for:

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Testing Certificate AT-1448

FCC & ISED Canada Certification Test Report

for the

Insulet Corporation

Omnipod 5 Pod

FCC ID: RBV-029

ISED ID: 8446A-029

November 6, 2020

WLL Report# 16743-01 Rev 2

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Reviewed by:

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President

Abstract

This report has been prepared on behalf of Insulet Corporation to support the attached Application for Equipment Authorization. The test report and application are submitted for a Digital Transmission System (DTS) Transmitter under Part 15.247 of the FCC Rules and Regulations and Spectrum Management and Telecommunications Policy and under RSS-247 of Innovation, Science and Economic Development Canada (ISED). This Certification Test Report documents the test configuration and test results for the Insulet Corporation Omnipod 5 Pod. The information provided on this report is only applicable to device herein documented.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 4840 Winchester Boulevard, Frederick MD 21703. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The ISED Canada number is 3035A for Washington Laboratories, Ltd. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Certificate AT-1448 as an independent FCC test laboratory.

The Insulet Corporation Omnipod 5 Pod complies with the limits for a Digital Transmission System (DTS) Transmitter device under FCC Part 15.247 and Innovation, Science and Economic Development Canada (ISED) RSS-247.

Revision History	Description of Change	Date
Rev 0	Initial Release	November 6, 2020
Rev 1	Edit Table Data, per Client Request	November 29, 2020
Rev 2	Removal of TM Logo, per Client Request	December 8, 2020

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1 Introduction

1.1 Compliance Statement

The Insulet Corporation Omnipod 5 Pod complies with the limits for a Digital Transmission System (DTS) Transmitter device under FCC Part 15.247 and ISED Canada RSS-247.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with C63.10 "ANSI Procedures for Compliance Testing of Unlicensed Wireless Devices". The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

The Table Below shows the results of testing for compliance with a Digital Transmission System in accordance with FCC Part 15.247 10/2014 and RSS-247 Issue 2.

Full test results are shown in subsequent sub-sections.

Table 1: Test Summary Table

Digital Transmission System (DTS) Test Summary			
FCC Rule Part	**IC Rule Part**	**Description**	**Result**
15.247(a) (2)	RSS-247 [5.2 (1)]	6dB Occupied Bandwidth	Pass
15.247 (b)(3)	RSS-247 [5.4 (4)]	Transmit Output Power	Pass
15.247 (e)	RSS-247 [5.2 (2)]	Power Spectral Density	Pass
15.247 (d)	RSS-247 [5.5]	Out-of-Band Emissions & Band Edge (20dBc)	Pass
15.205 15.209	RSS-Gen [8.9/8.10]	General Field Strength Limits (Restricted Bands & RE Limits)	Pass
15.207	RSS-Gen [8.8]	AC Conducted Emissions	Not Applicable/ Battery Powered Device

2 Test Results

2.1 Occupied Bandwidth

Occupied bandwidth was performed by monitoring the output of the EUT antenna port with a spectrum analyzer, which has been corrected for any cable/attenuator loss.

For Digital Transmission Systems, FCC Part 15.247 requires the minimum 6dB bandwidth be at least 500 kHz.

2.1.1 Measurement Method

Tests were performed as specified in ANSI C63.10 section 11.8., “DTS bandwidth”.

Table 2: Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
100kHz	1MHz

Table 3: Occupied Bandwidth Test Results

Frequency	Bandwidth (kHz)	Minimum (kHz)	Pass/Fail
Low Channel: 2402 MHz	669.932	500	Pass
Mid Channel: 2440 MHz	582.971	500	Pass
High Channel: 2480 MHz	580.360	500	Pass

Figure 1: Occupied Bandwidth, Low Channel

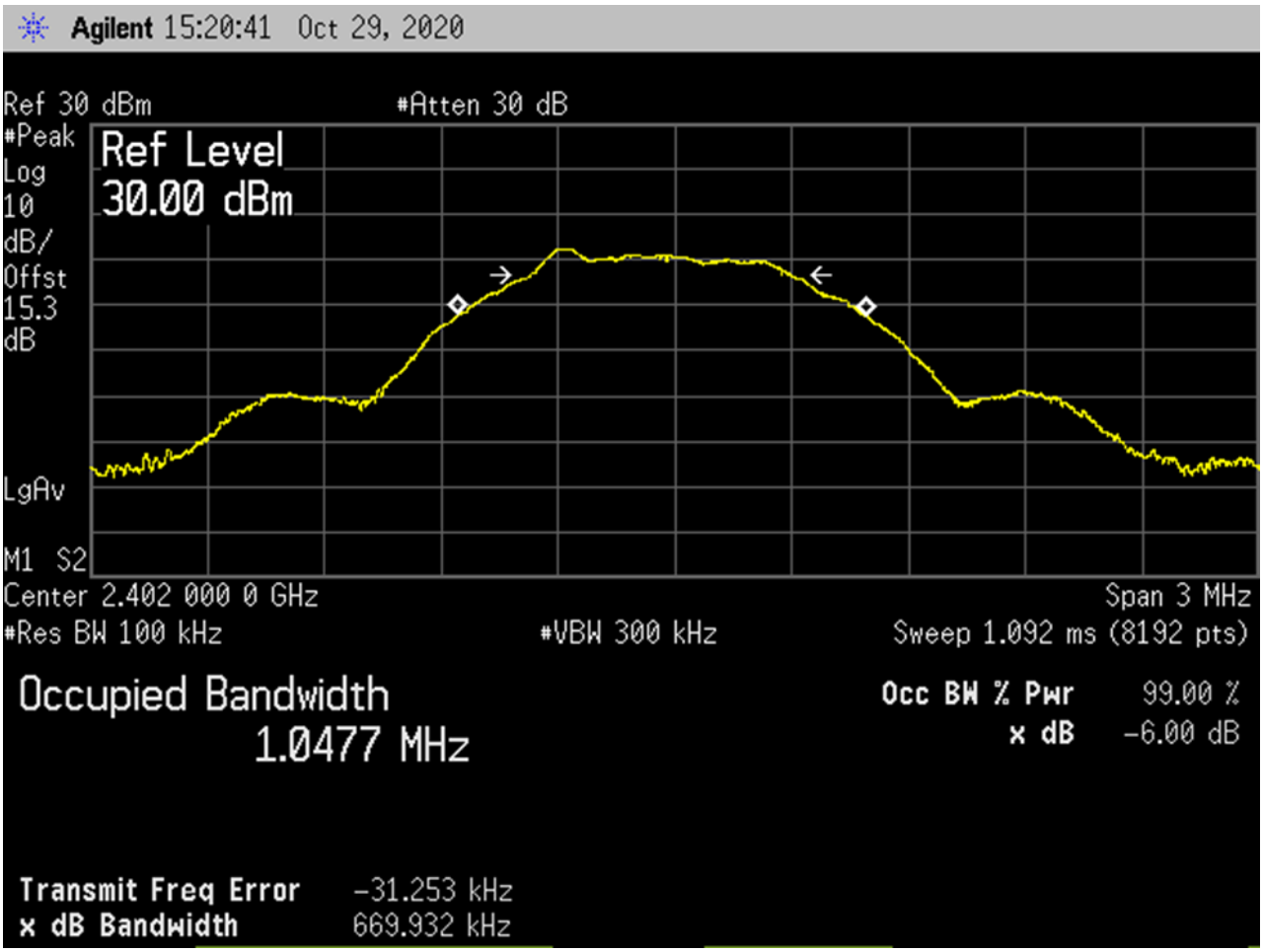


Figure 2: Occupied Bandwidth, Center Channel

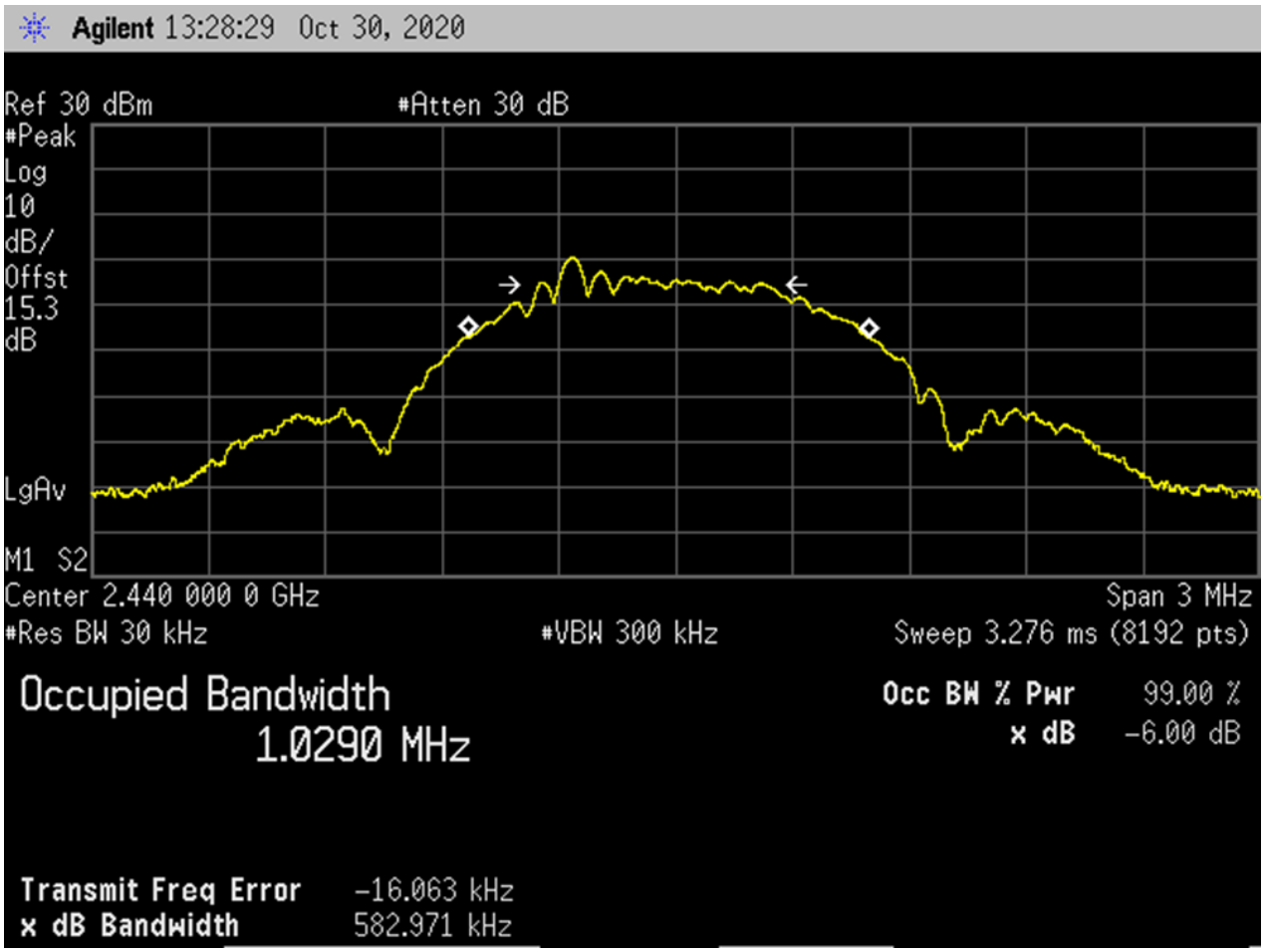
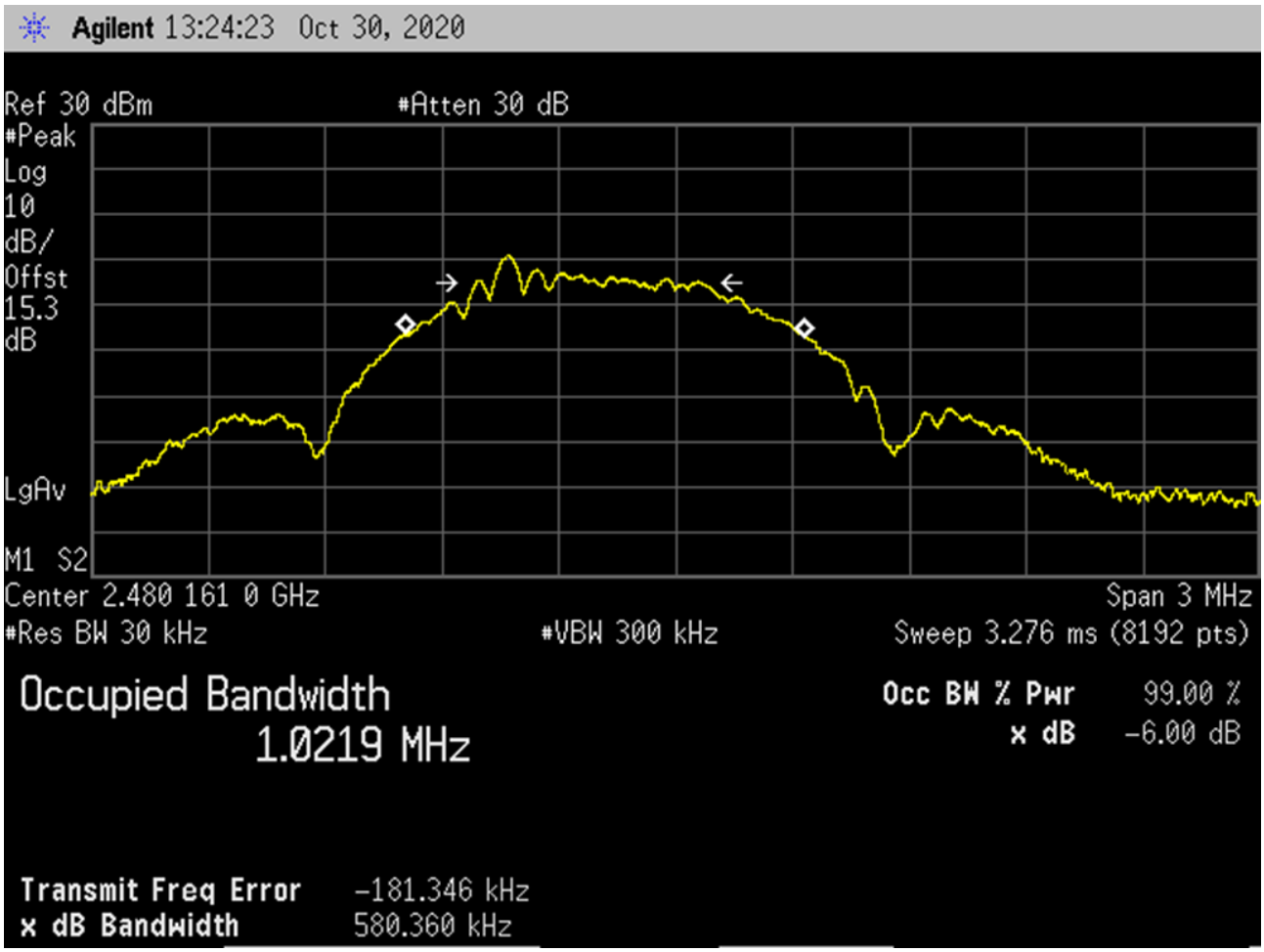


Figure 3: Occupied Bandwidth, High Channel



2.2 Conducted RF Power Output

To measure the output power of the transmitter, the hopping sequence was stopped while the frequency dwelled on the low, middle, and high channels. The output from the transmitter was connected to an attenuator and then to the input of a Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system.

2.2.1 Measurement Method:

Tests were performed as specified in ANSI C63.10 section 11.9.1., "Maximum peak conducted output power".

Table 4: Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
1 MHz	3 MHz

Table 5: RF Power Output Test Results

Frequency	Level (dBm)	Limit (dBm)	Pass/Fail
Low Channel: 2402 MHz	2.60	30	Pass
Mid Channel: 2440 MHz	2.54	30	Pass
High Channel: 2480 MHz	2.90	30	Pass

Figure 4: RF Peak Power, Low Channel

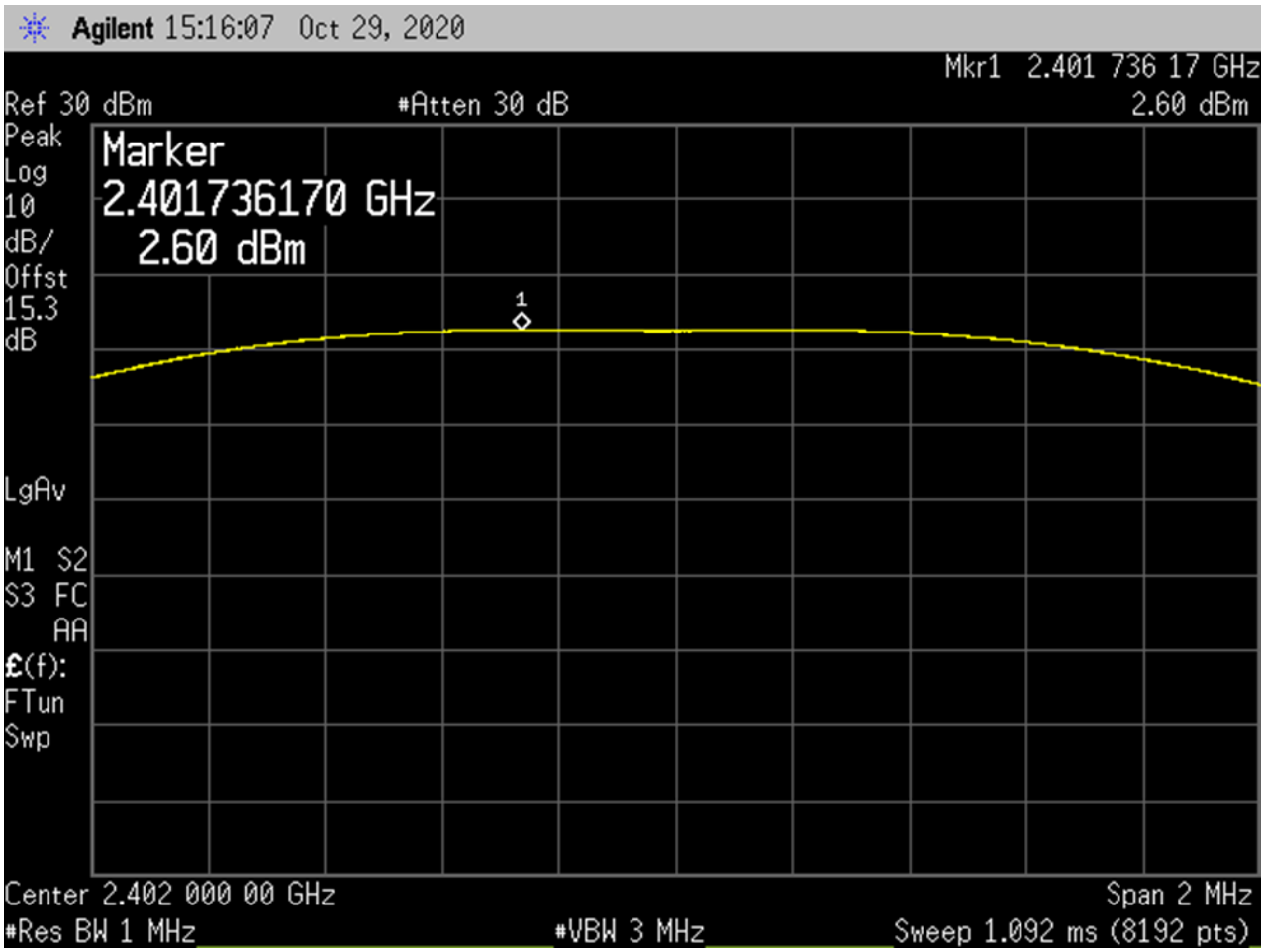


Figure 5: RF Peak Power, Mid Channel

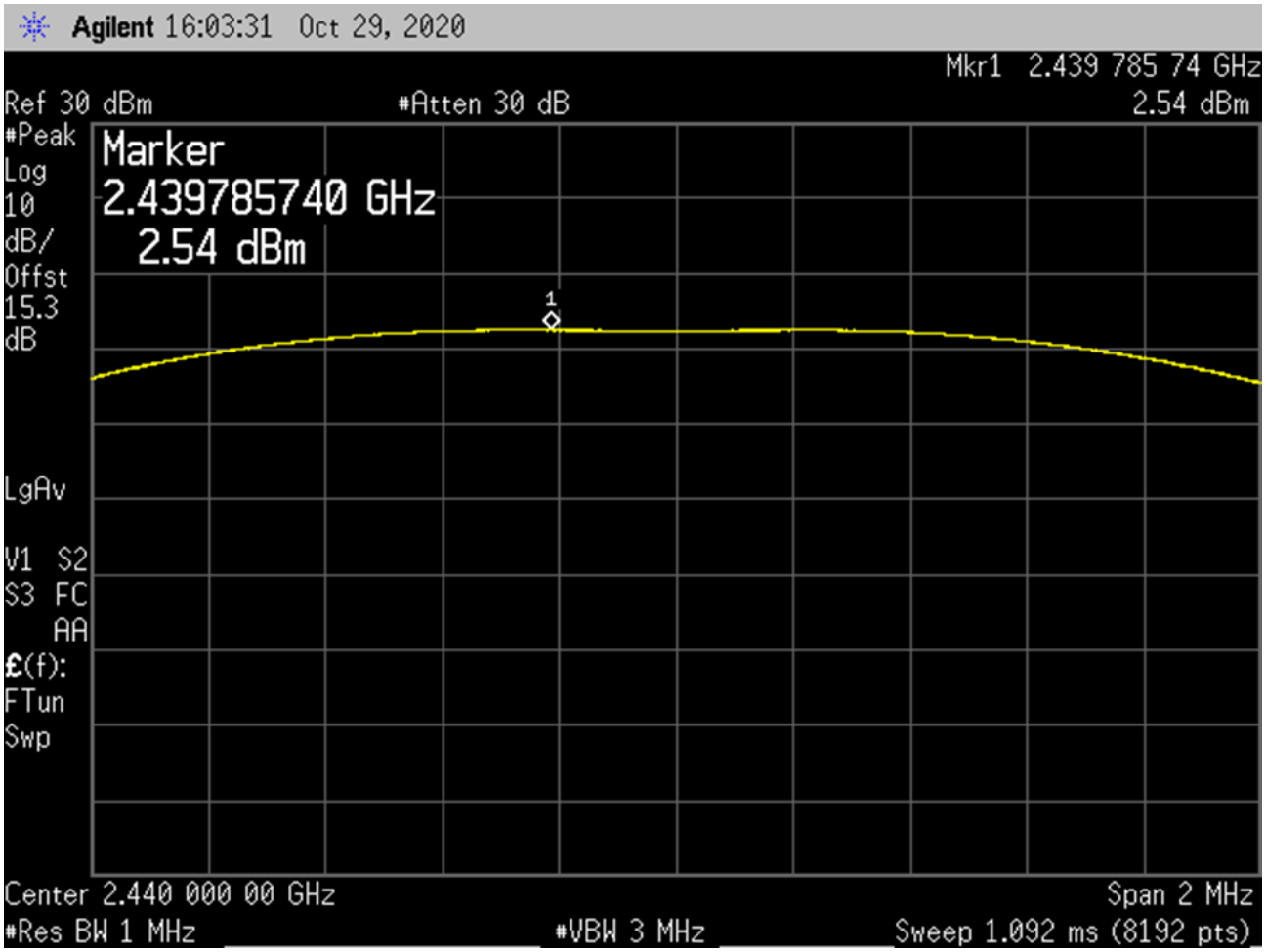
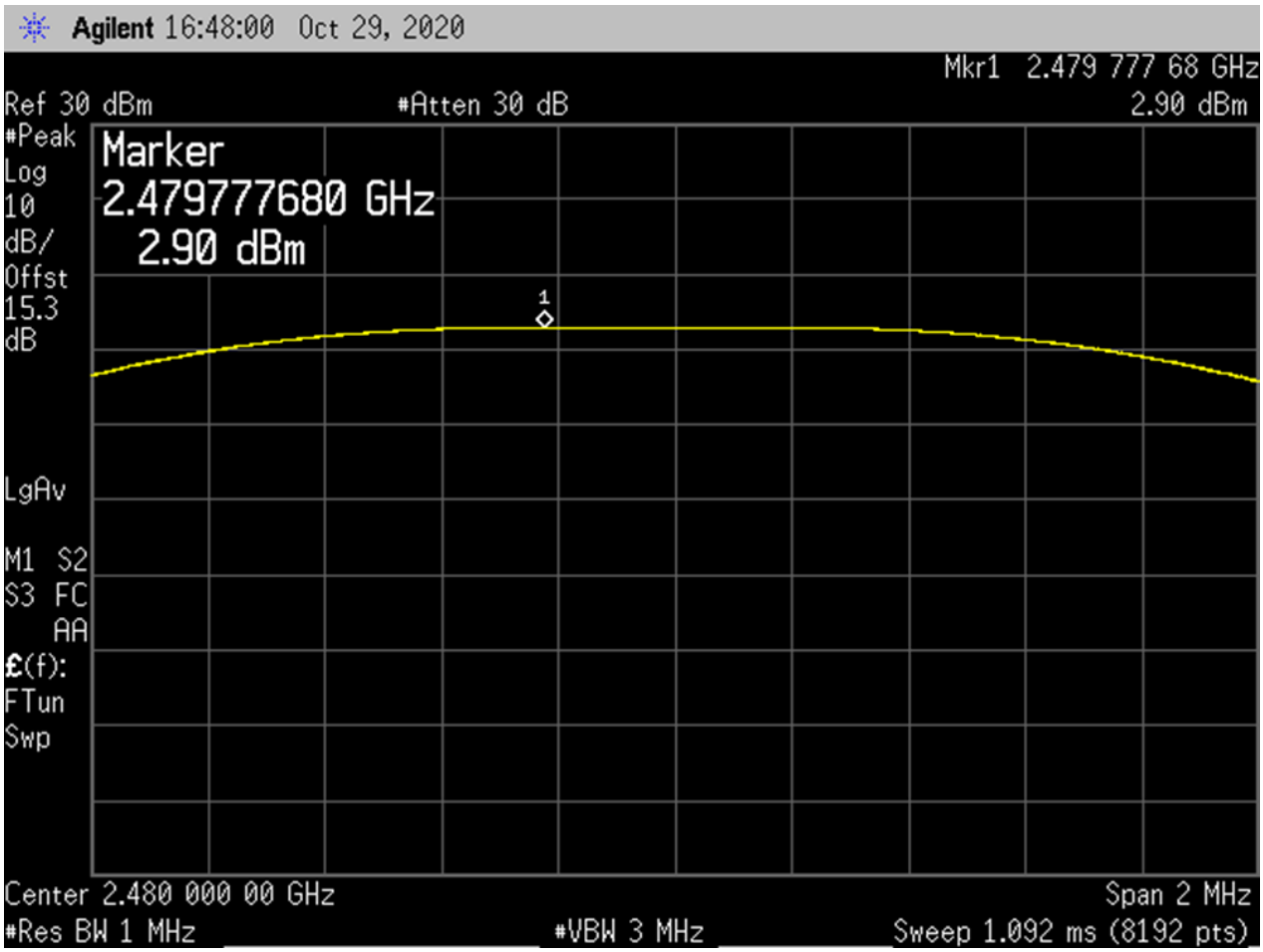


Figure 6: RF Peak Power, High Channel



2.3 Power Spectral Density

Measurements for power spectral density were taken at the antenna port in accordance with ANSI C63.10. The spectrum analyzer was set to peak detect mode with a RBW of 3 kHz; VBW of 10 kHz across a span of at least 1.5X the DTS bandwidth, using auto sweep.

2.3.1 Measurement Method

ANSI C63.10 SECTION 11.10 "Maximum power spectral density level in the fundamental emission subsection 11.10.2 "Method PKPSD (peak PSD)"

The highest level detected across any 3 kHz band for continuous transmission was then recorded and compared to the limit 8dBm. The following table and plots give the results for power spectral density testing.

Table 6: Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
3 kHz	10 kHz

Table 7: Power Spectral Density Test Results

Frequency	Peak Level (dBm)	Limit (dBm)	Pass/Fail
Low Channel: 2402 MHz	-12.88	8	Pass
Center Channel: 2442 MHz	-12.84	8	Pass
High Channel: 2480 MHz	-14.89	8	Pass

Figure 7: Power Spectral Density, Low Channel

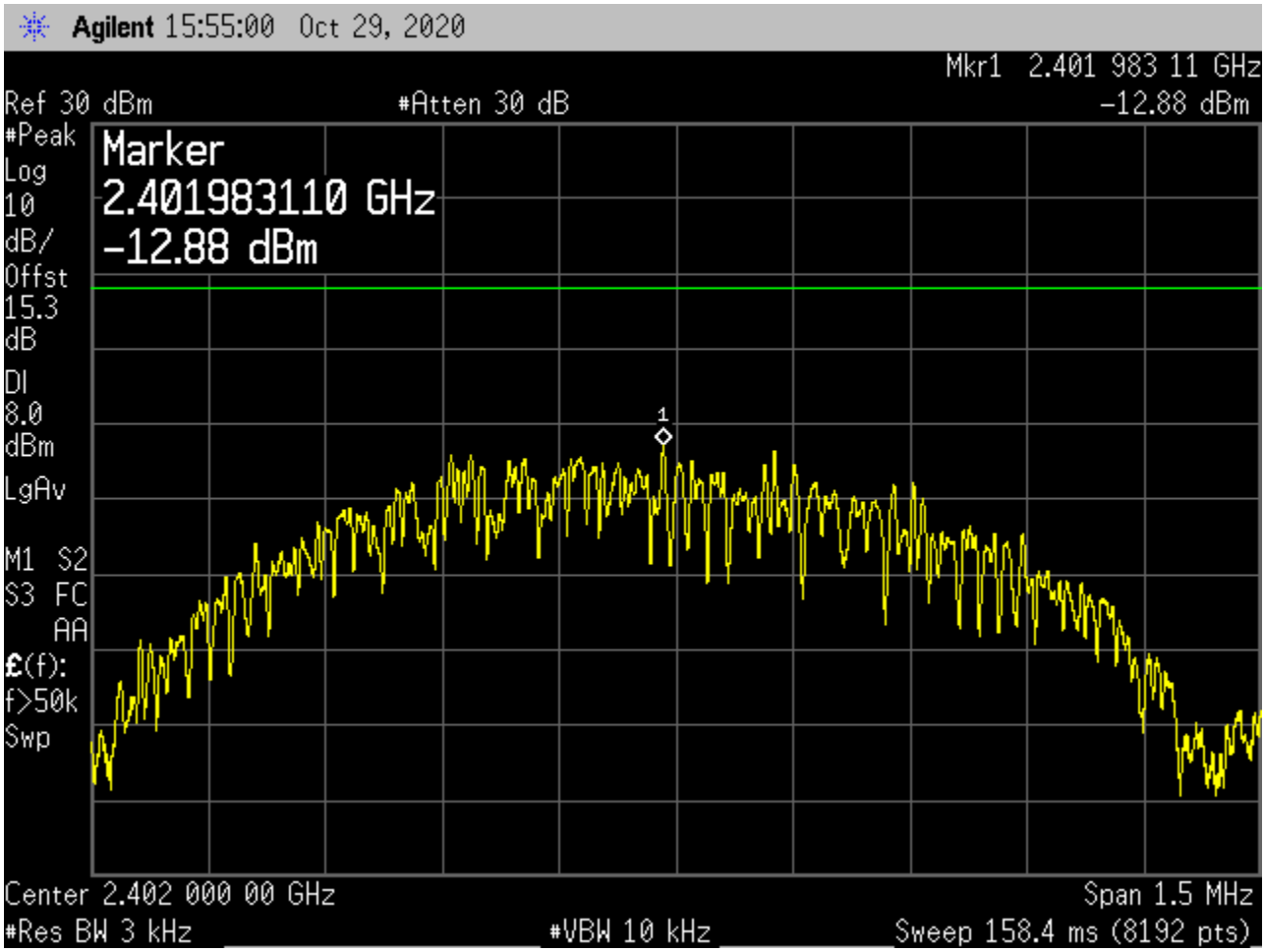


Figure 8: Power Spectral Density, Mid Channel

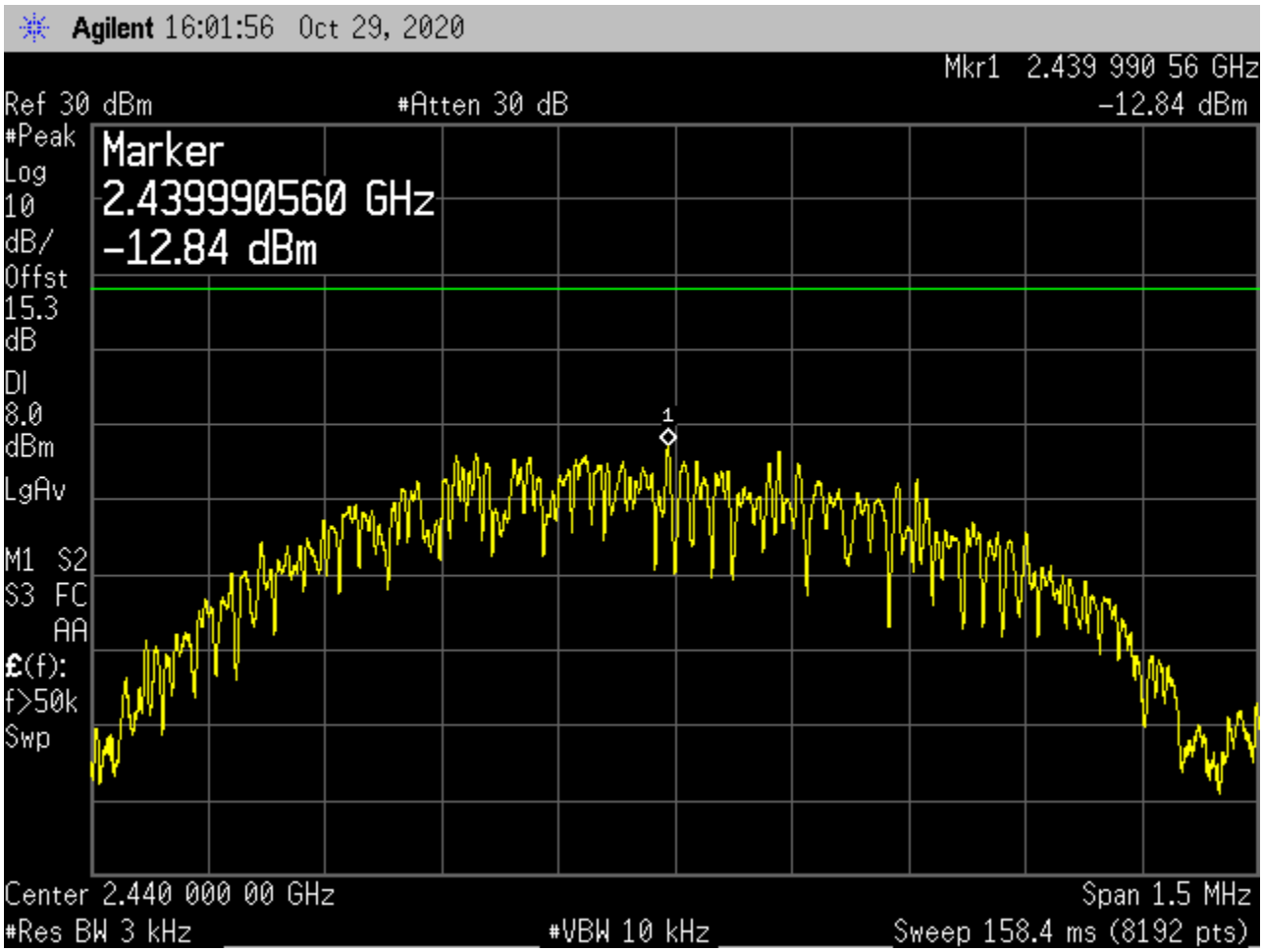
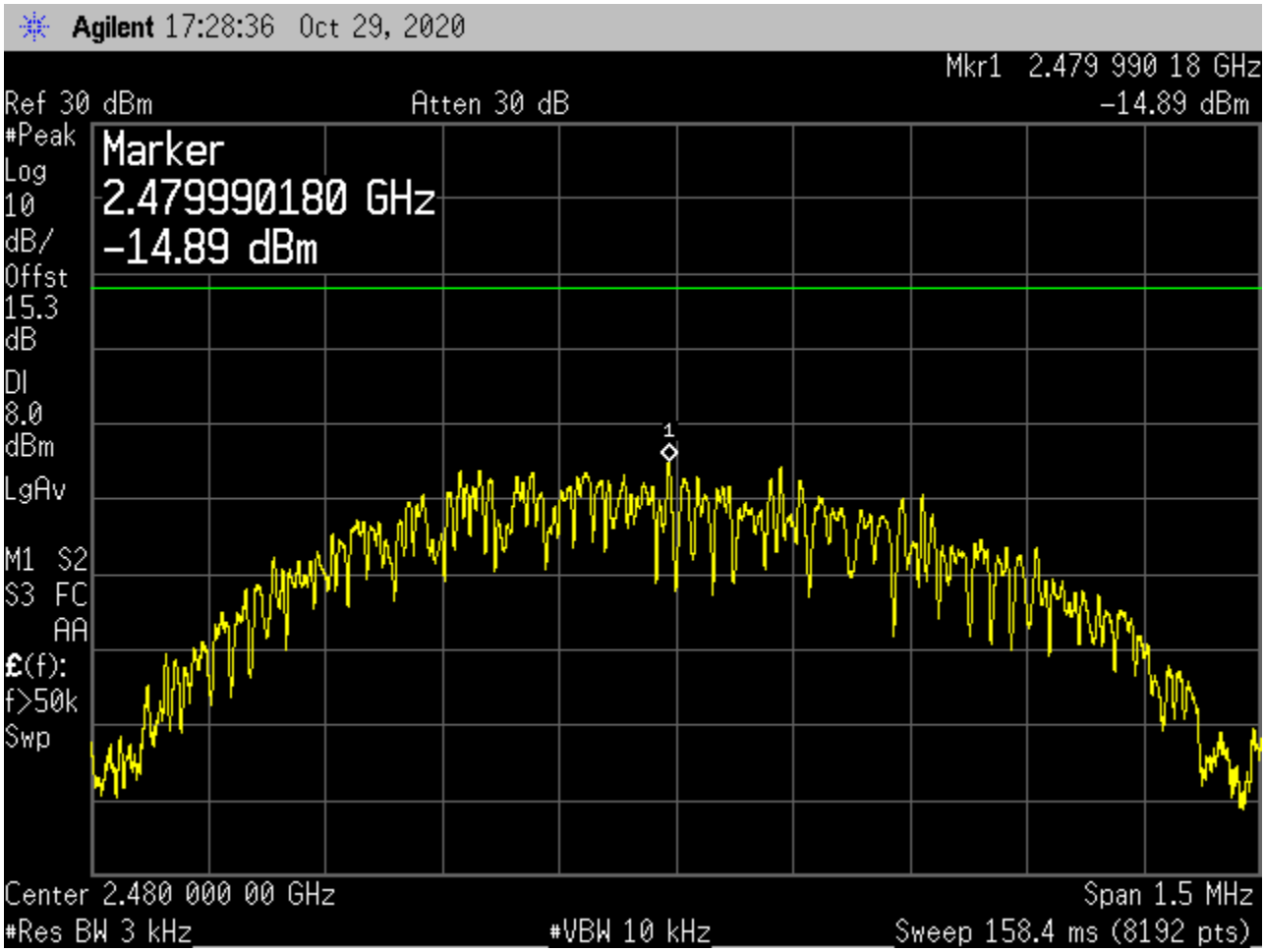


Figure 9: Power Spectral Density, High Channel



2.4 Conducted Band Edge

In accordance with FCC Public Notice DA-00-705 close-up plots of the low cannel, and of the high channel, with respect to the nearest authorized band-edge, are provided below.

2.4.1 Measurement Method

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Table 8: Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
100 kHz	300 kHz

Table 9: Band Edge Test Results

Frequency	Band Edge (dBc)	Minimum (dBc)	Pass/Fail
Low Channel: 2402 MHz	45.6	20	Pass
High Channel: 2480 MHz	49.7	20	Pass

Figure 10: Low Channel, Lower Band-Edge

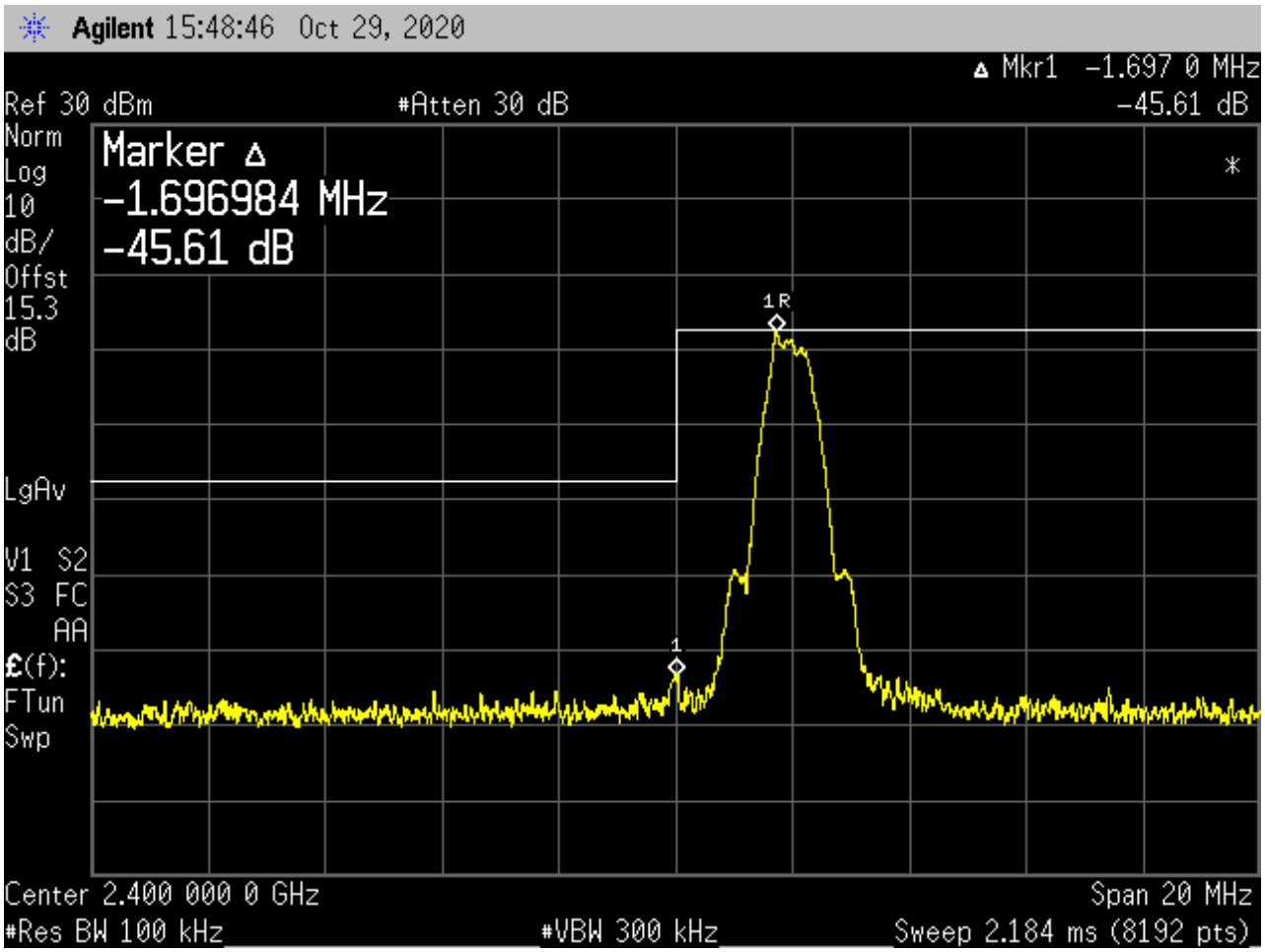
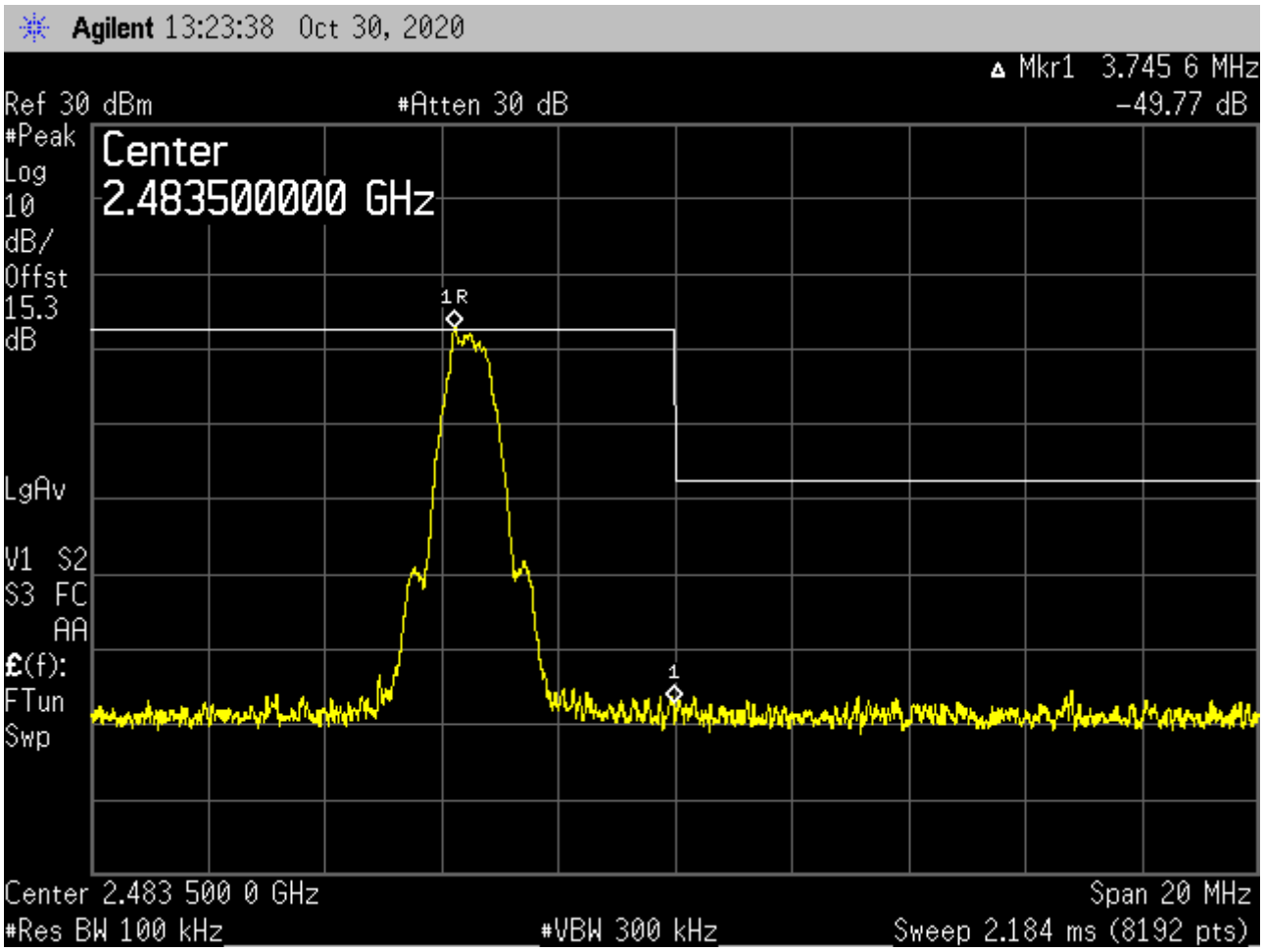


Figure 11: High Channel, Upper Band-Edge



2.5 Conducted Spurious Emissions Compliance

The EUT must comply with requirements for spurious emissions. Per §15.247(d) all spurious emissions in any 100 kHz bandwidth outside the frequency band in which the spread spectrum device is operating shall be attenuated 20 dB below the highest power level in a 100 kHz bandwidth within the band containing the highest level of the desired power.

Per ANSI C63.10 section 11.11 "Emissions in non-restricted frequency bands" this test may be performed in an antenna port conducted manner. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 300 kHz. The amplitude of the EUT carrier frequency was measured to determine the emissions limit (20 dB below the carrier frequency amplitude). The emissions outside of the allocated frequency band were then scanned from 30 MHz up to the tenth harmonic of the carrier.

2.5.1 Test Summary

The EUT complied with the requirements for Spurious emissions at the antenna port.

The frequency range of 30MHz to 25GHz was examined.

The measurement results are shown below.

Table 10: Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
100 kHz	300 kHz

Figure 12: Low Channel Conducted Spurious Plot 1

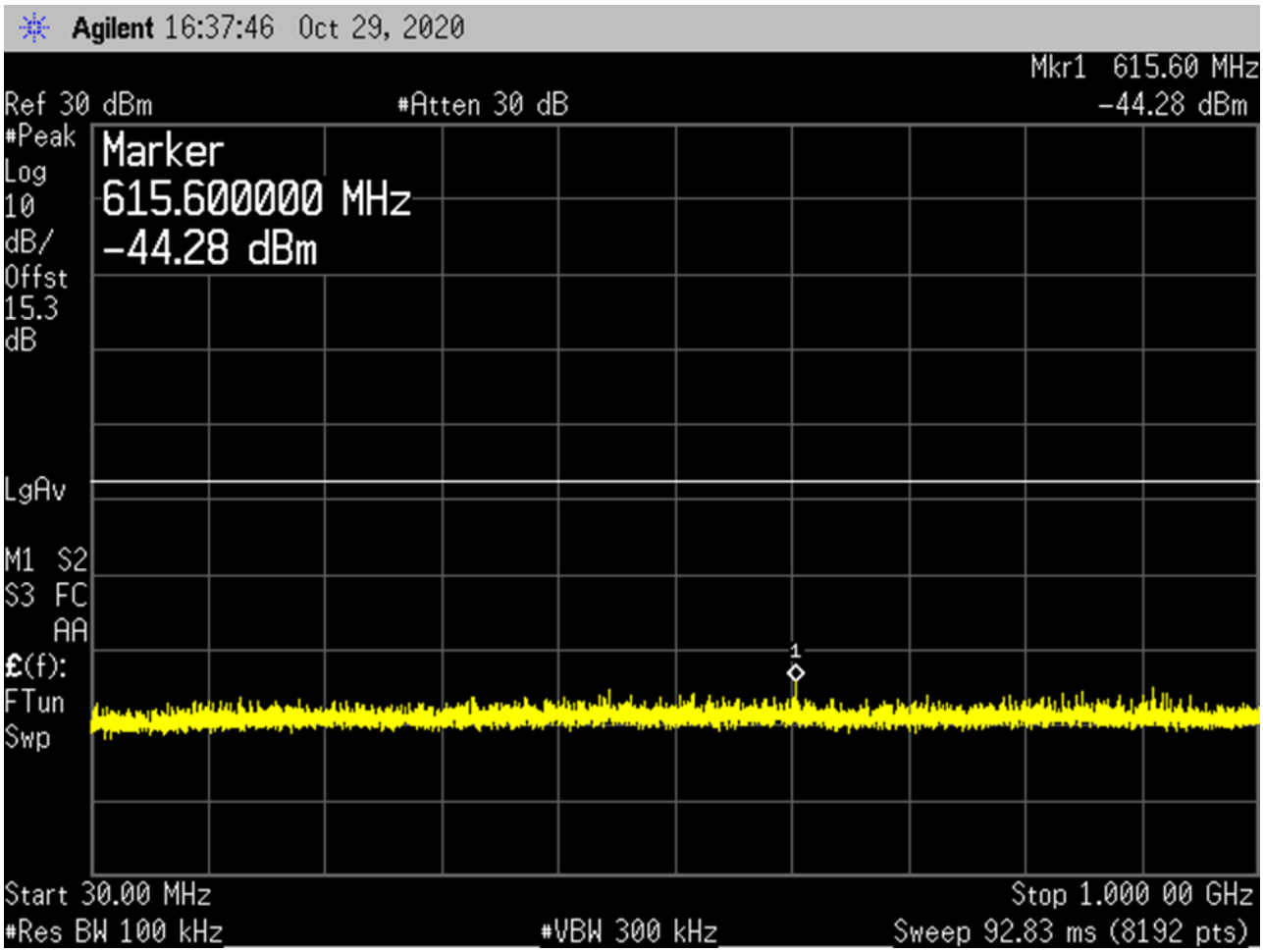


Figure 13: Low Channel Conducted Spurious Plot 2

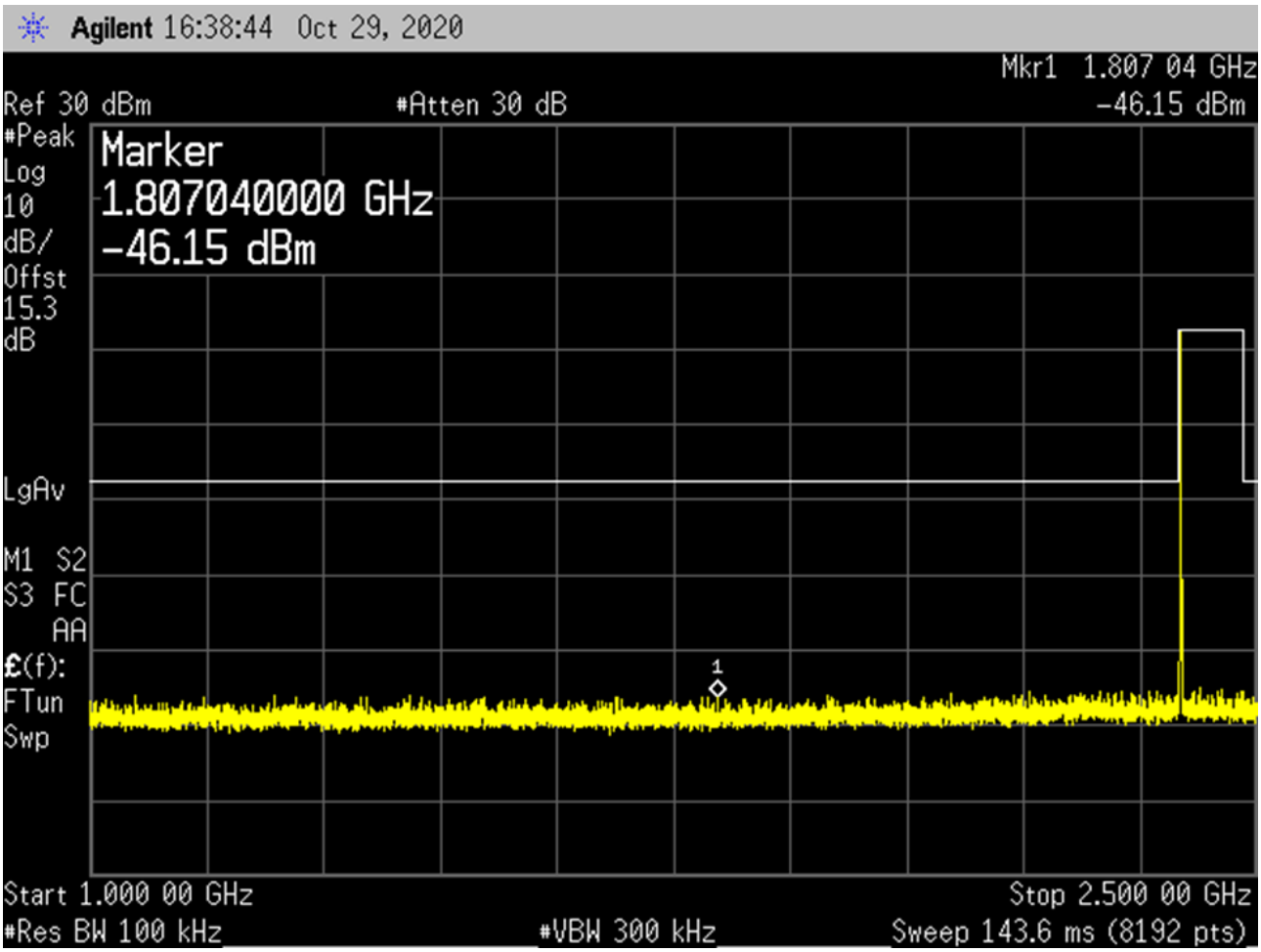


Figure 14: Low Channel Conducted Spurious Plot 3

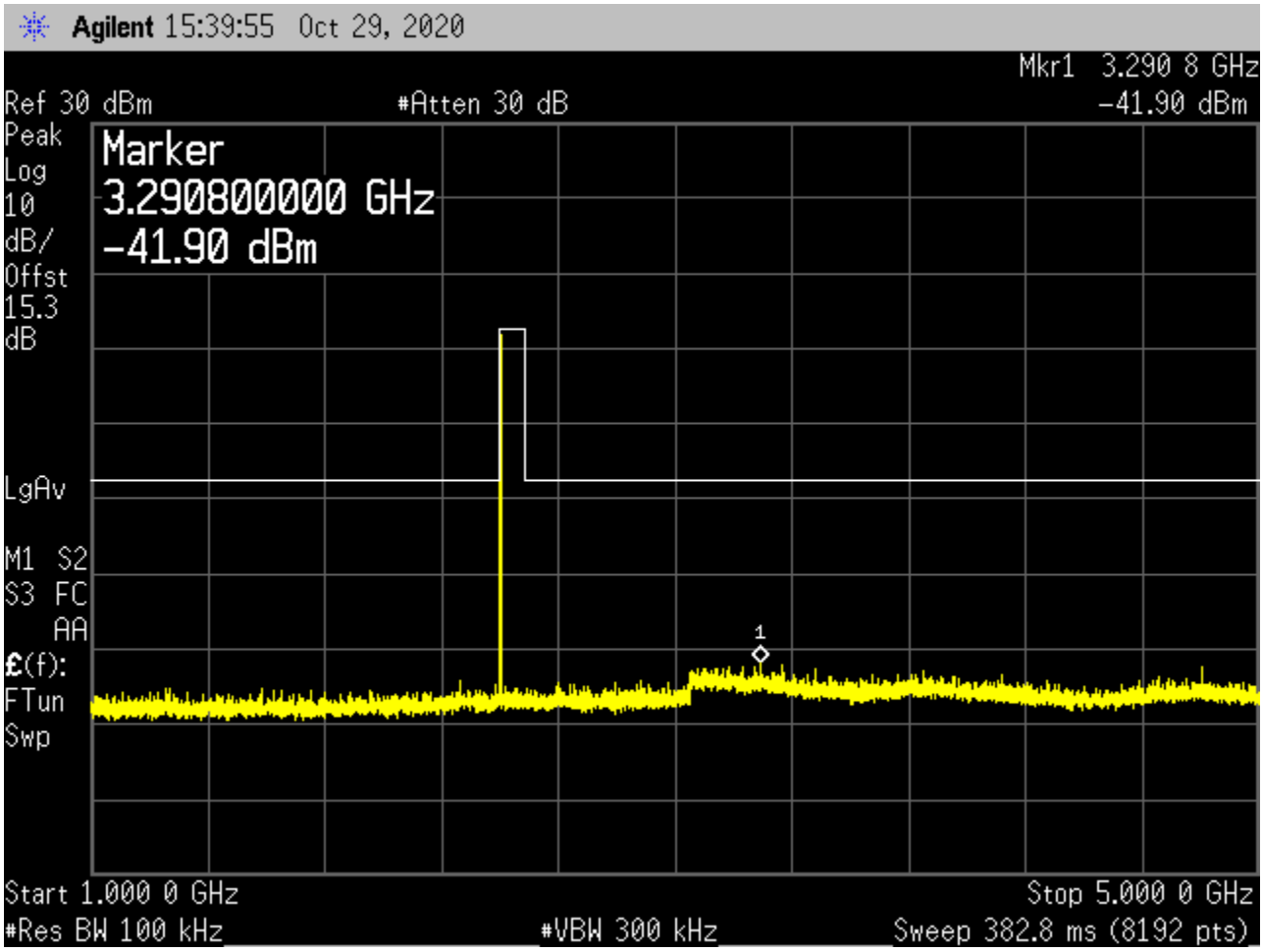


Figure 15: Low Channel Conducted Spurious Plot 4

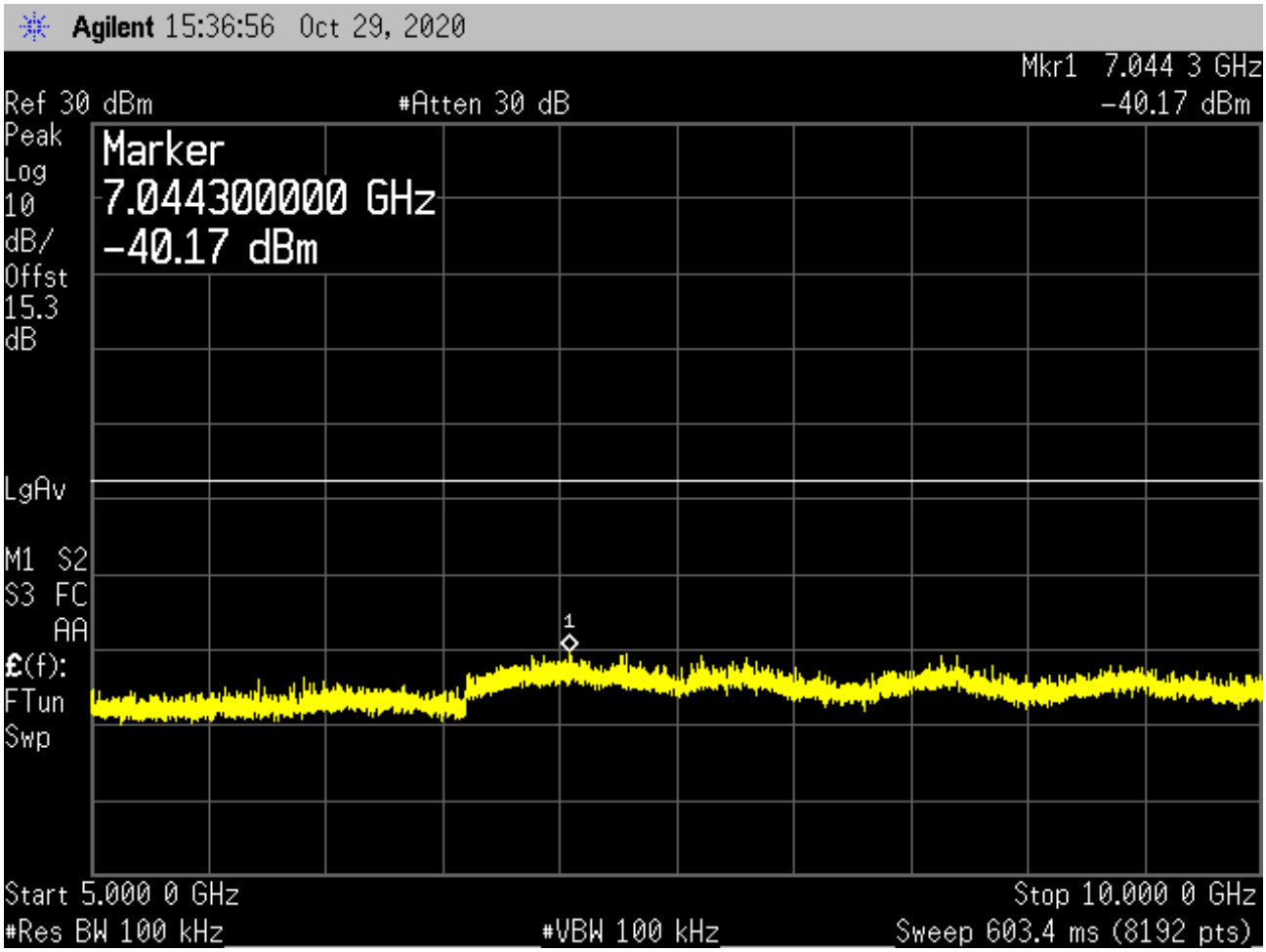


Figure 16: Low Channel Conducted Spurious Plot 5

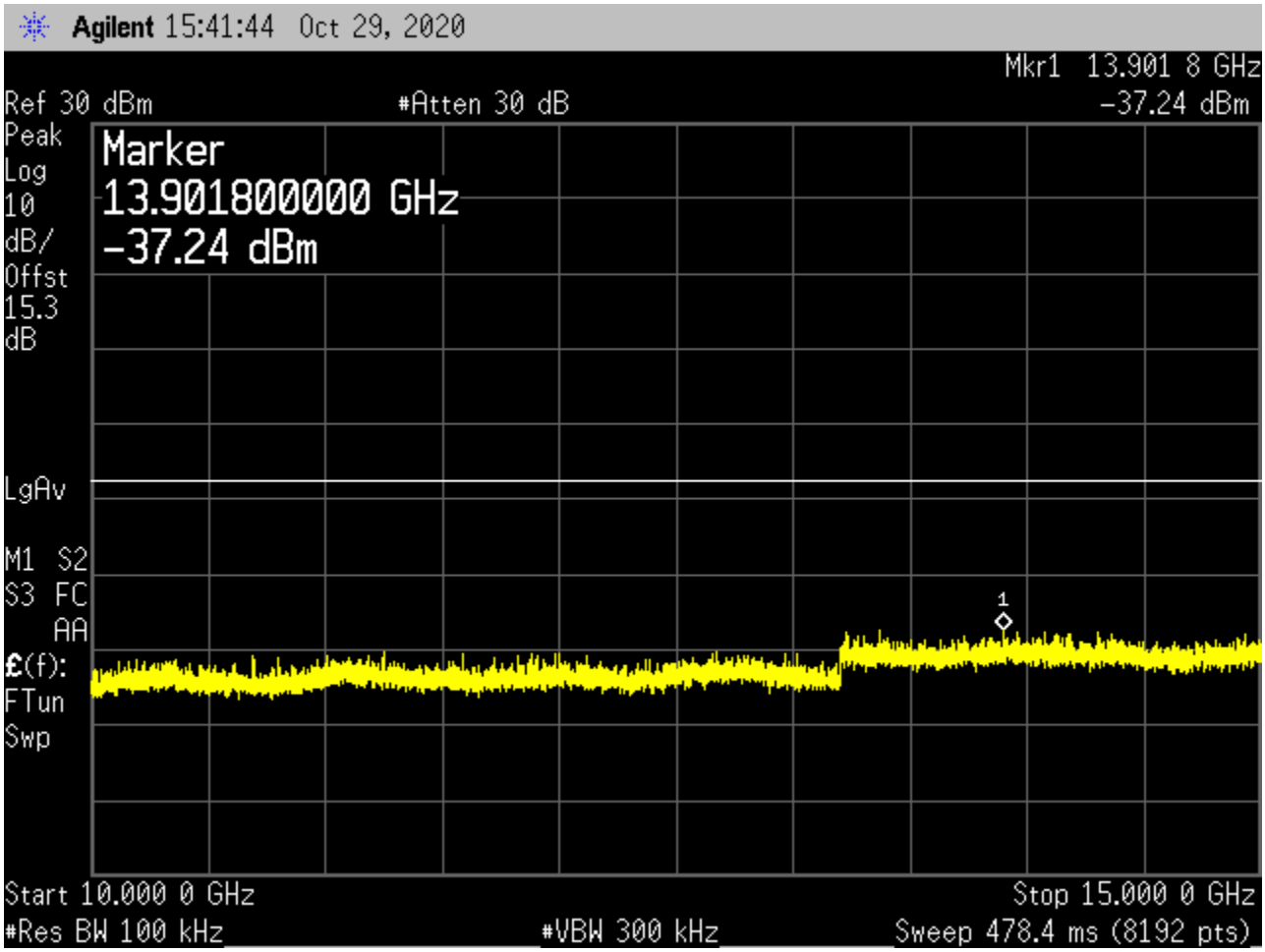


Figure 17: Low Channel Conducted Spurious Plot 6

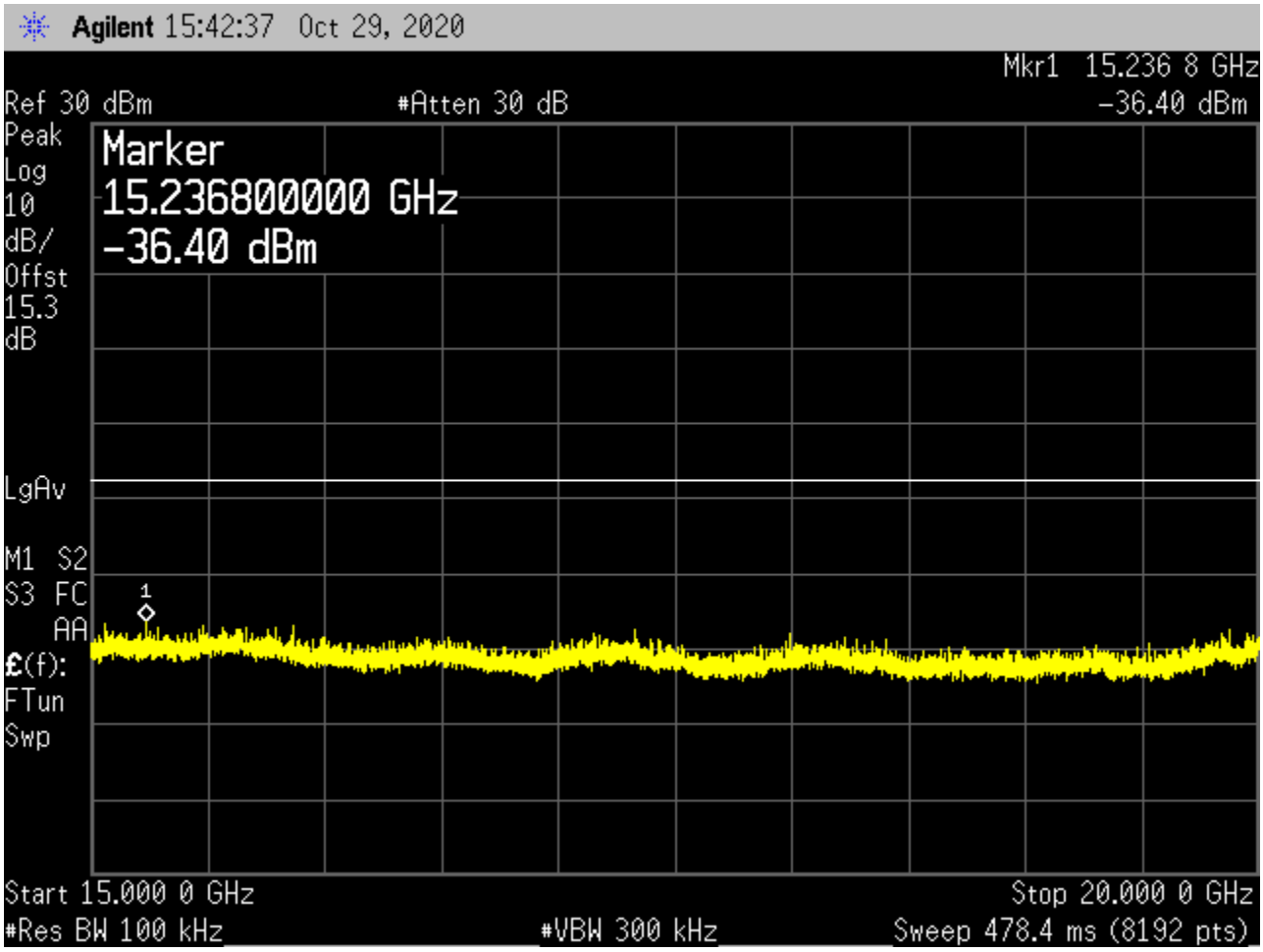


Figure 18: Low Channel Conducted Spurious Plot 7

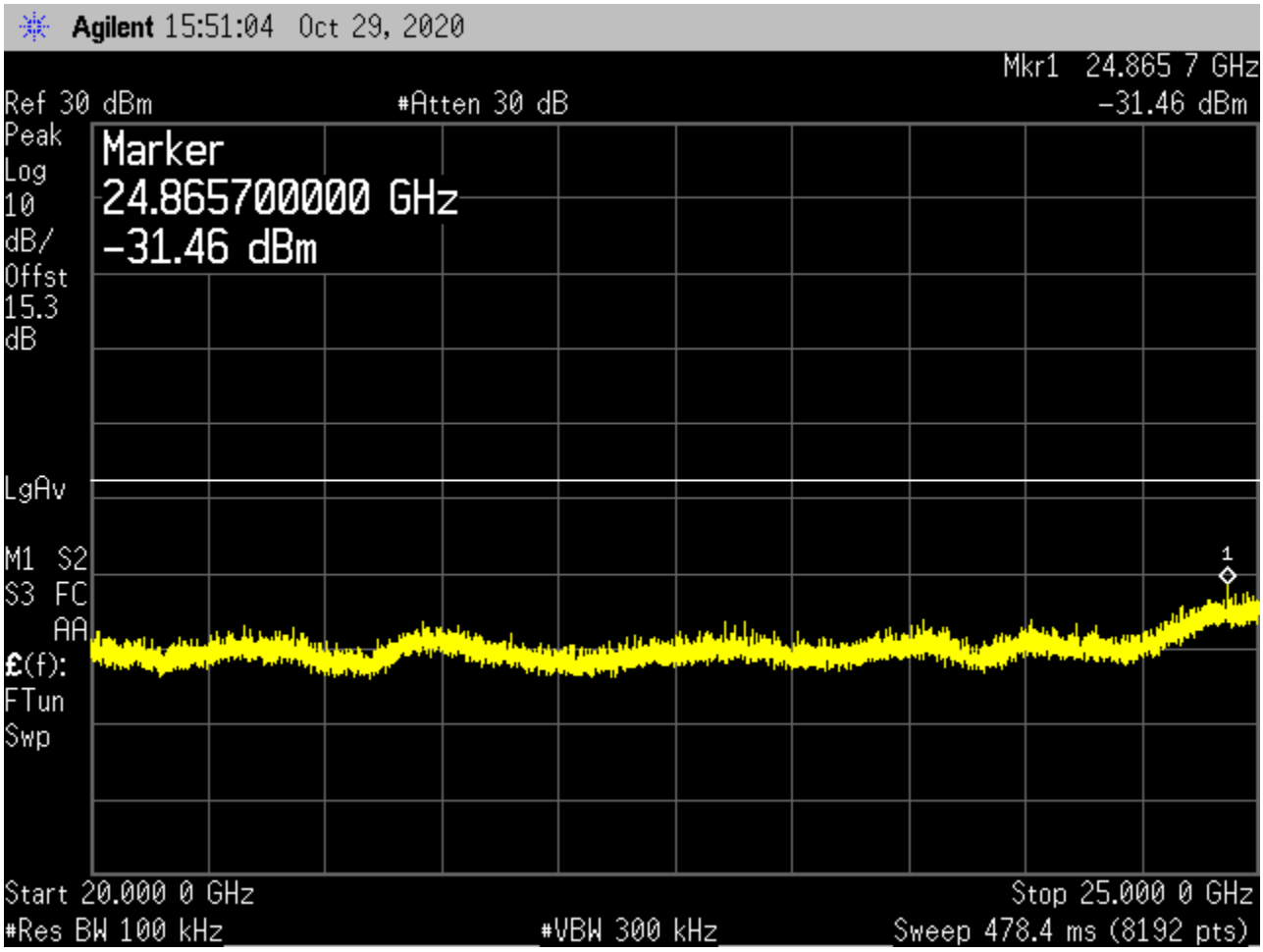


Figure 19: Center Channel Conducted Spurious Plot 1

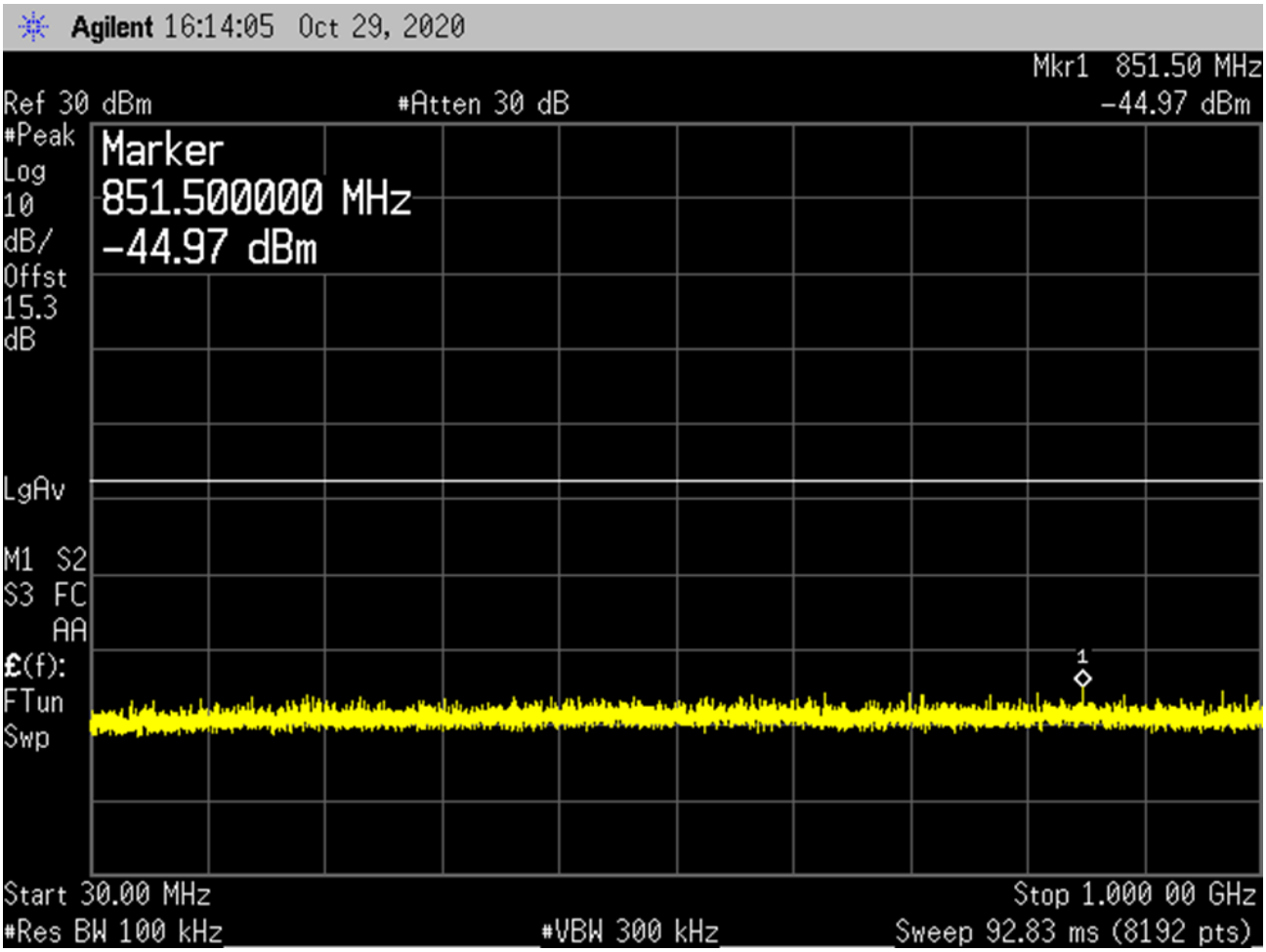


Figure 20: Center Channel Conducted Spurious Plot 2

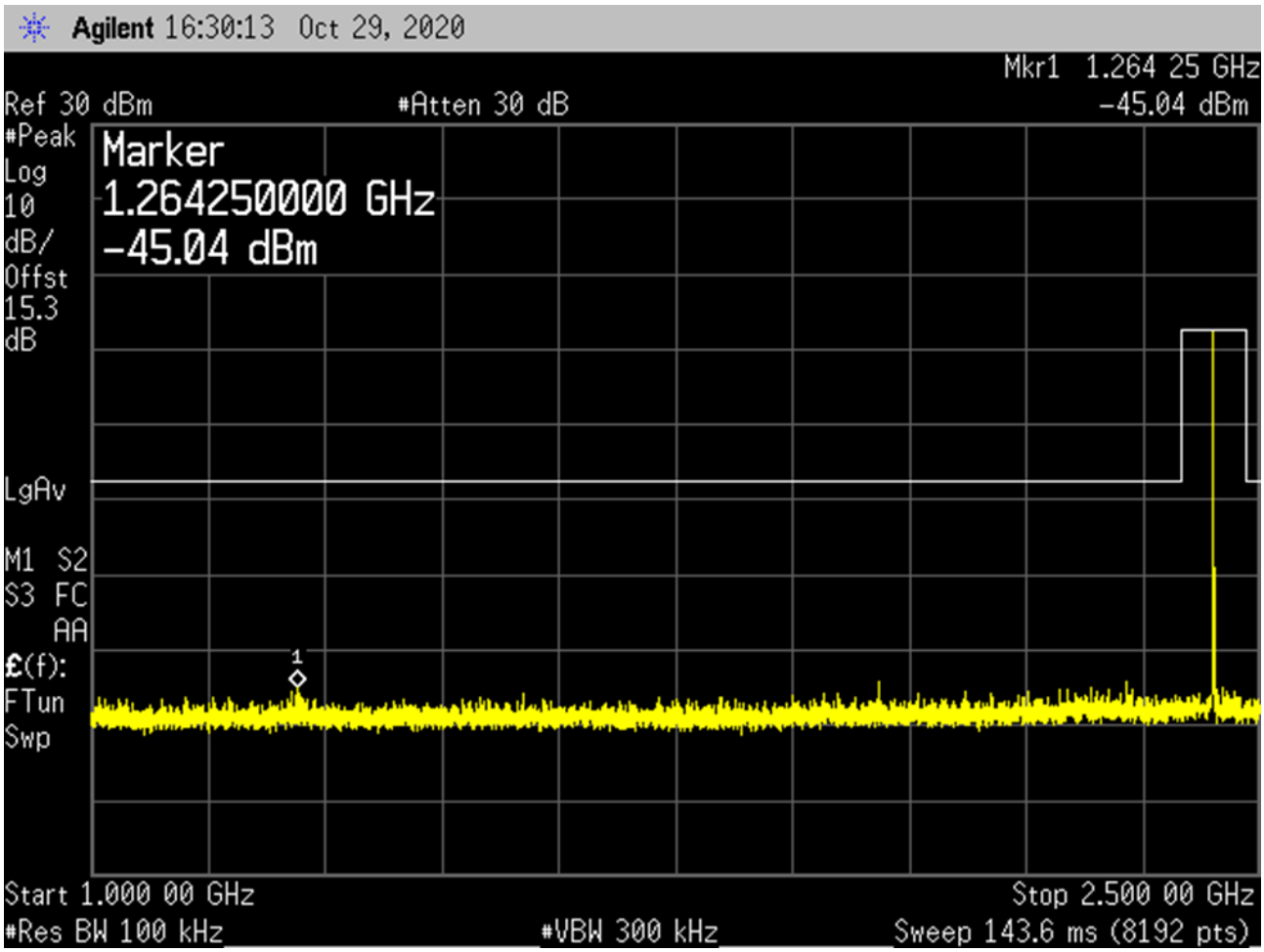


Figure 21: Center Channel Conducted Spurious Plot 3

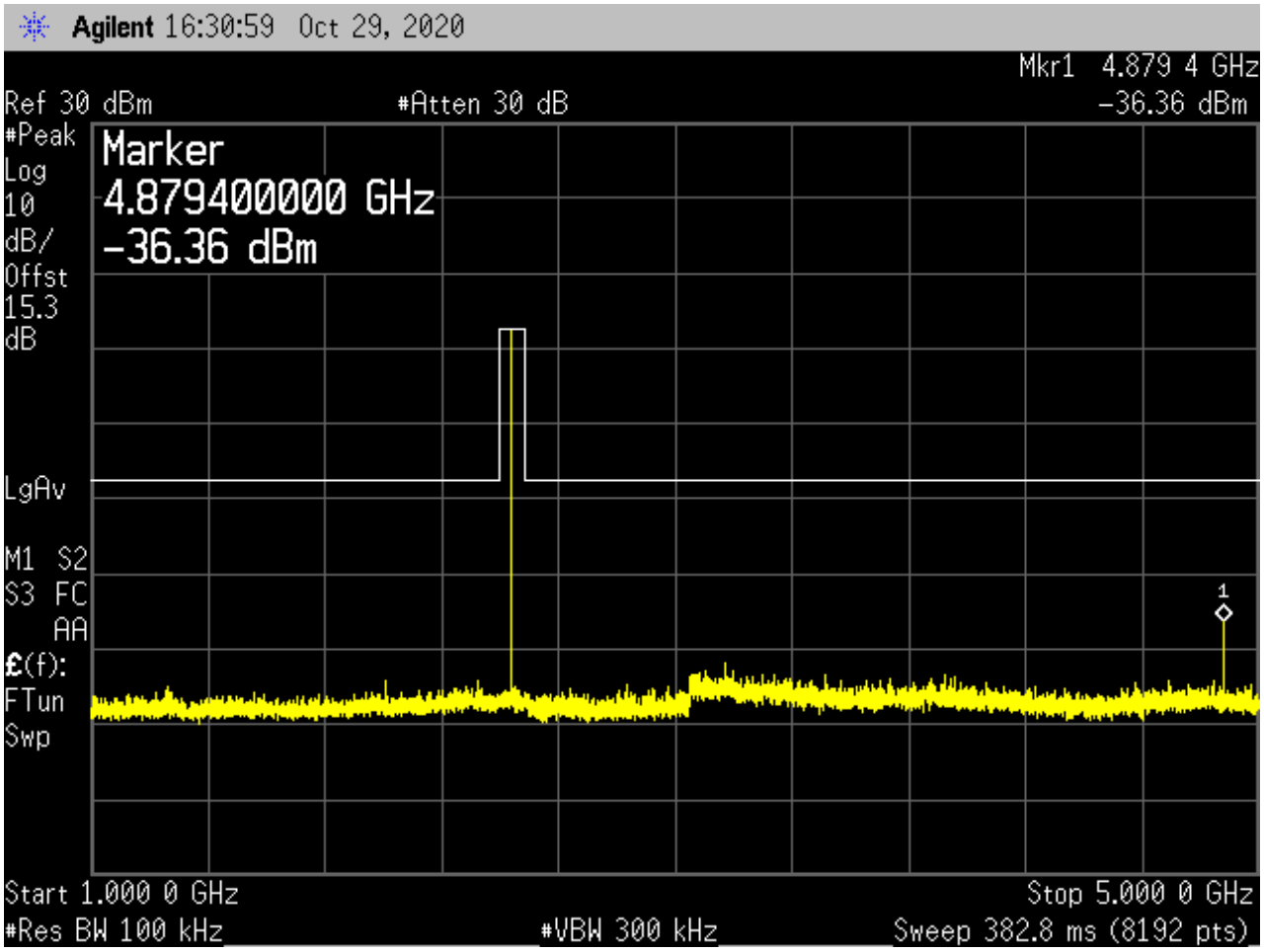


Figure 22: Center Channel Conducted Spurious Plot 4

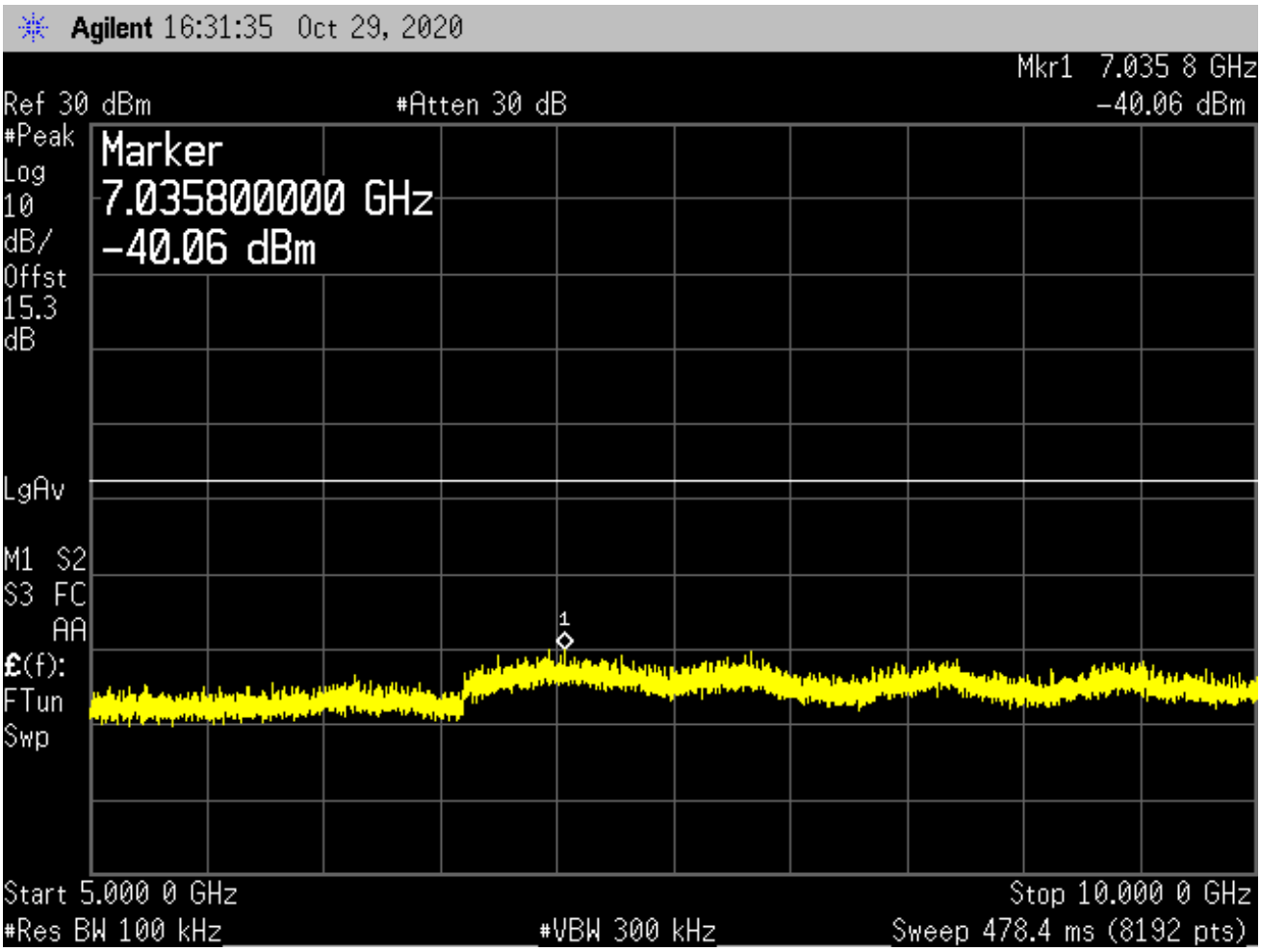


Figure 23: Center Channel Conducted Spurious Plot 5

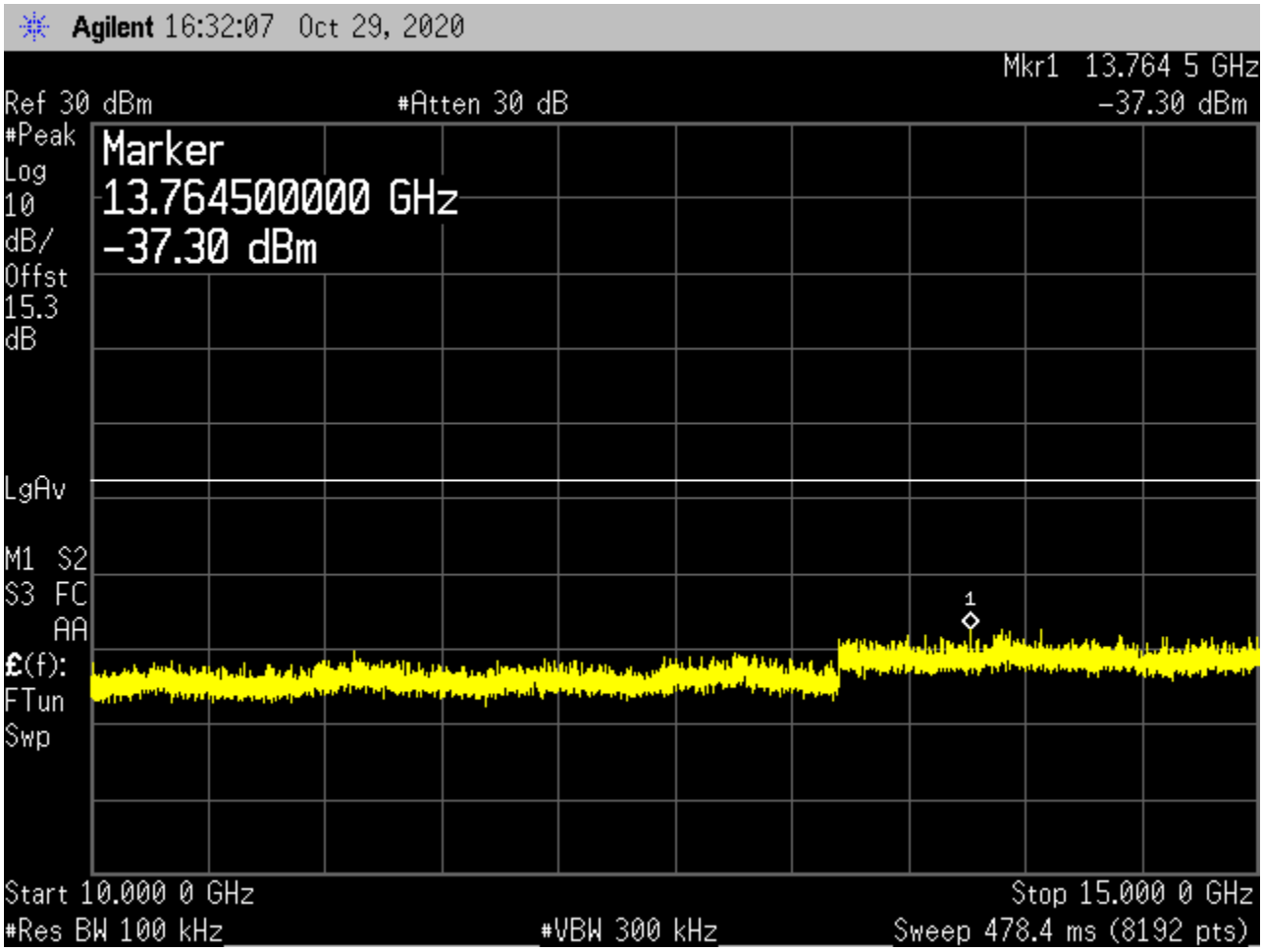


Figure 24: Center Channel Conducted Spurious Plot 6

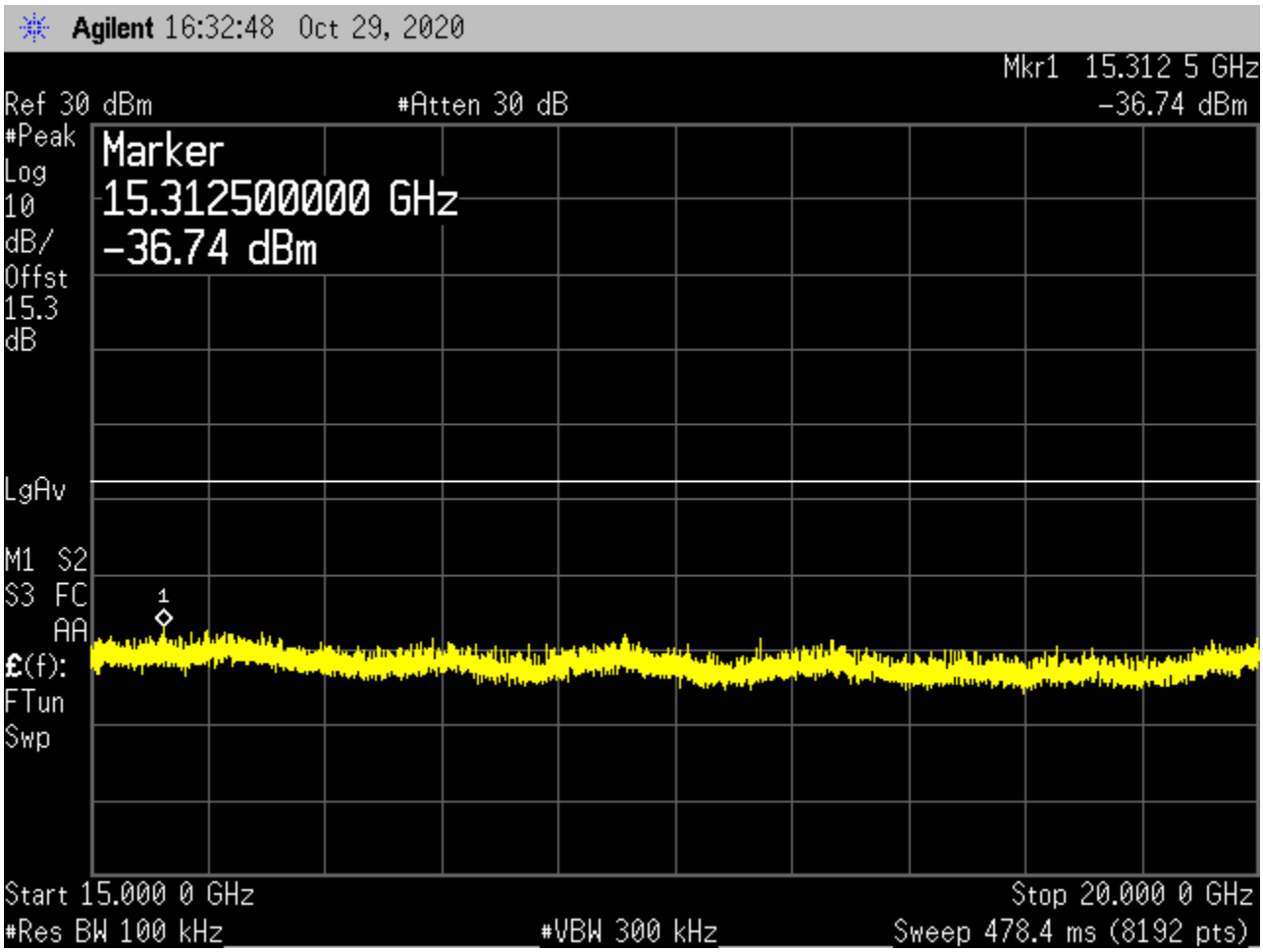


Figure 25: Center Channel Conducted Spurious Plot 7

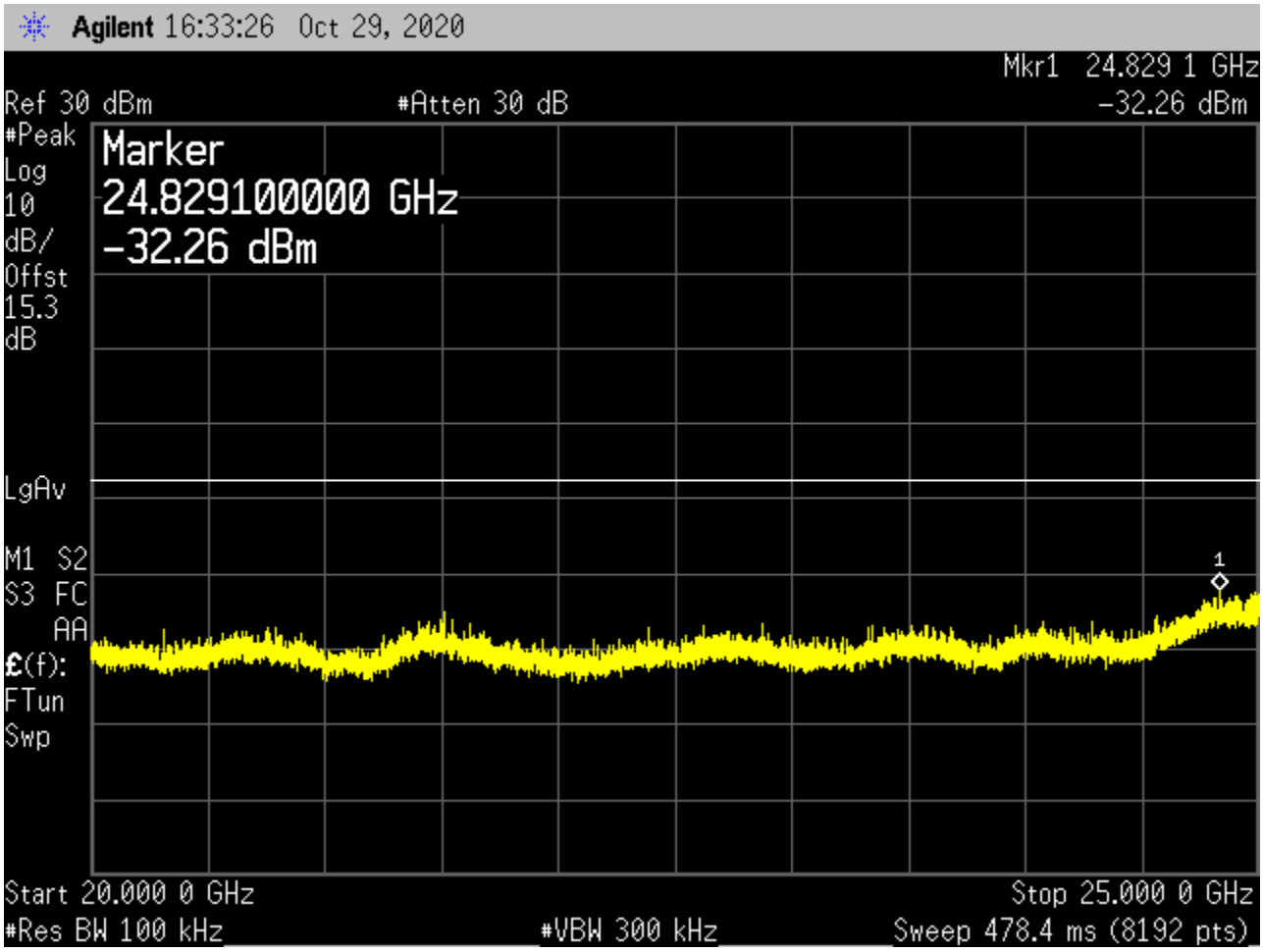


Figure 26: High Channel Conducted Spurious Plot 1

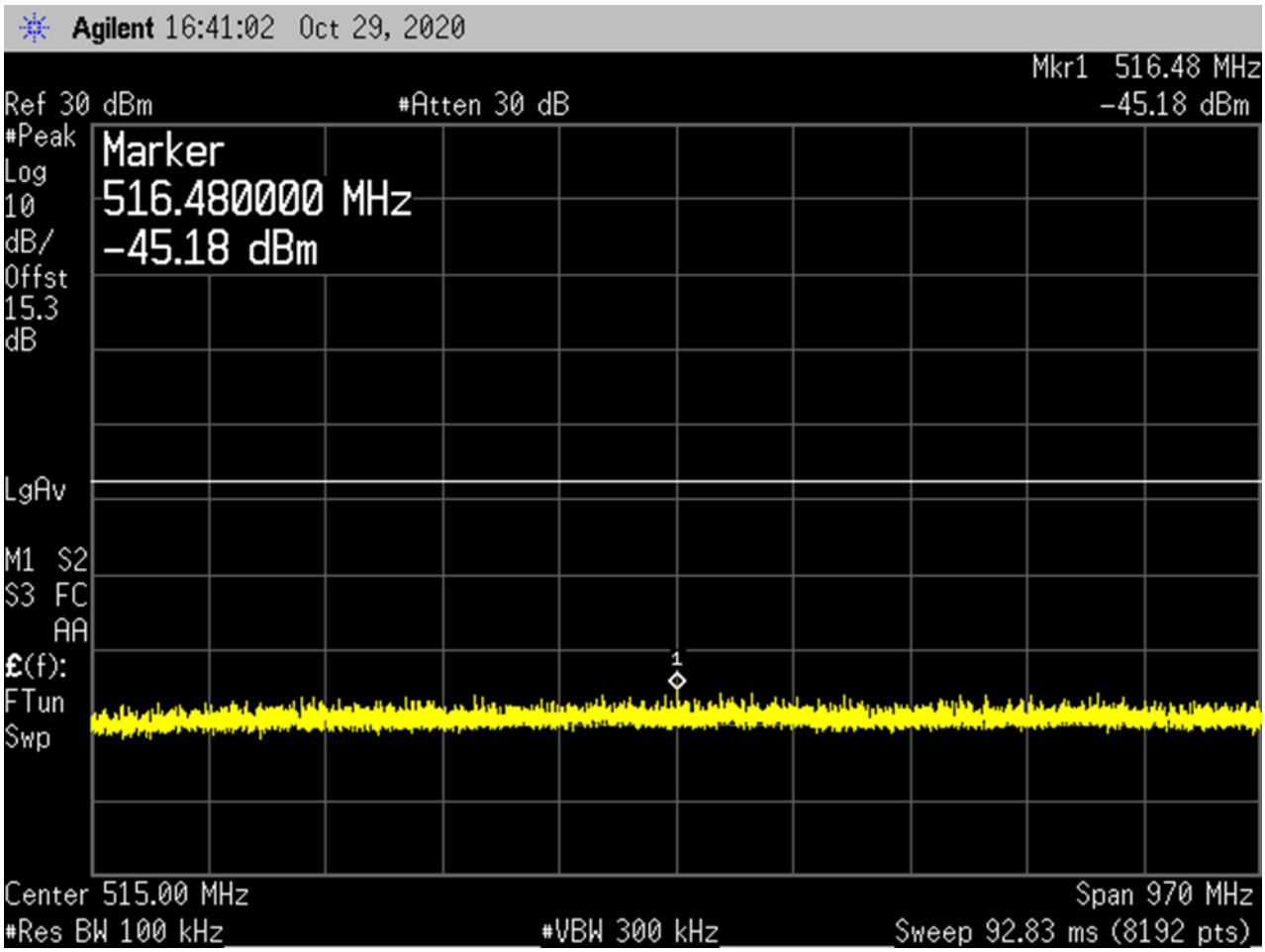


Figure 27: High Channel Conducted Spurious Plot 2

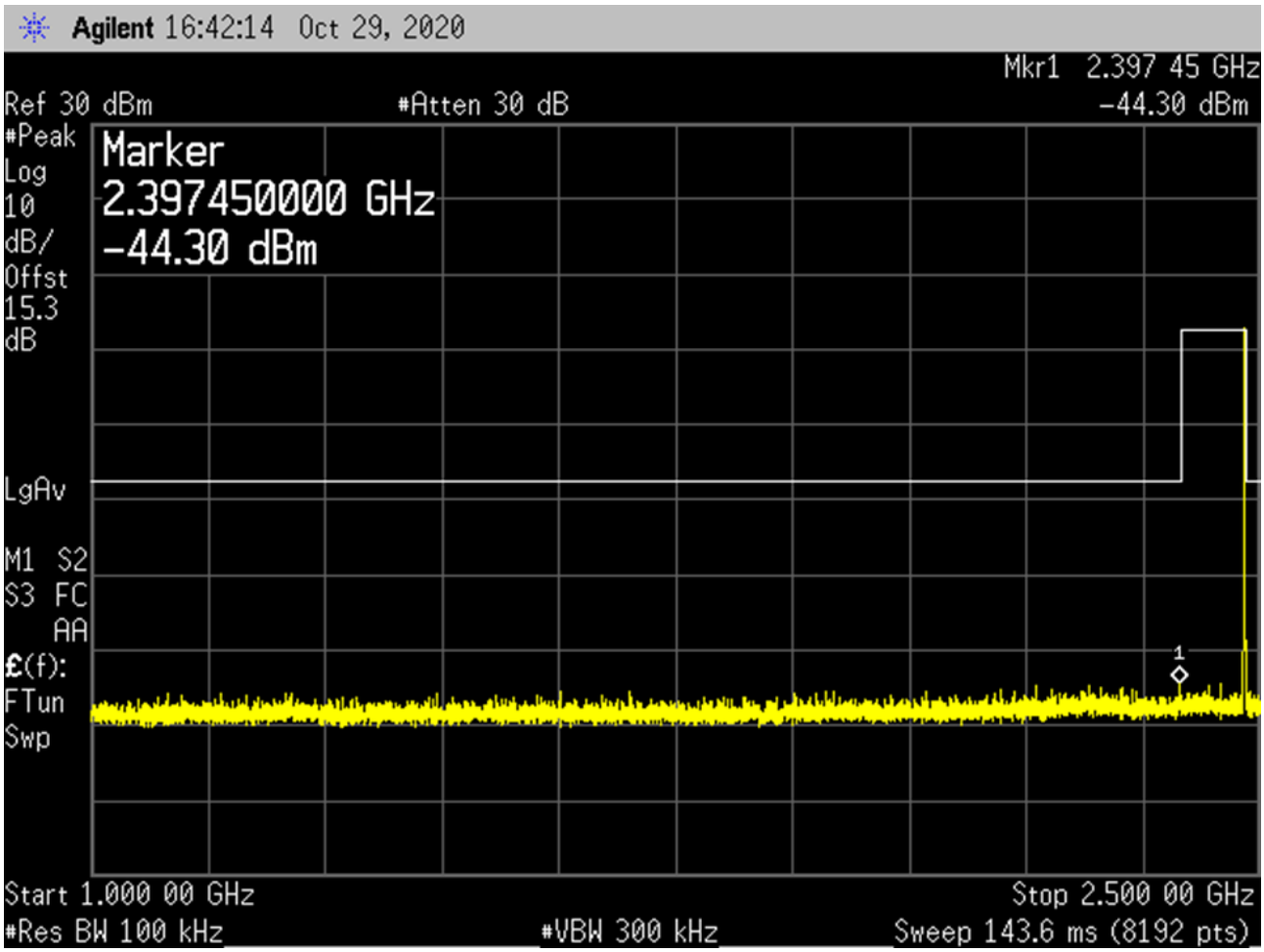


Figure 28: High Channel Conducted Spurious Plot 3

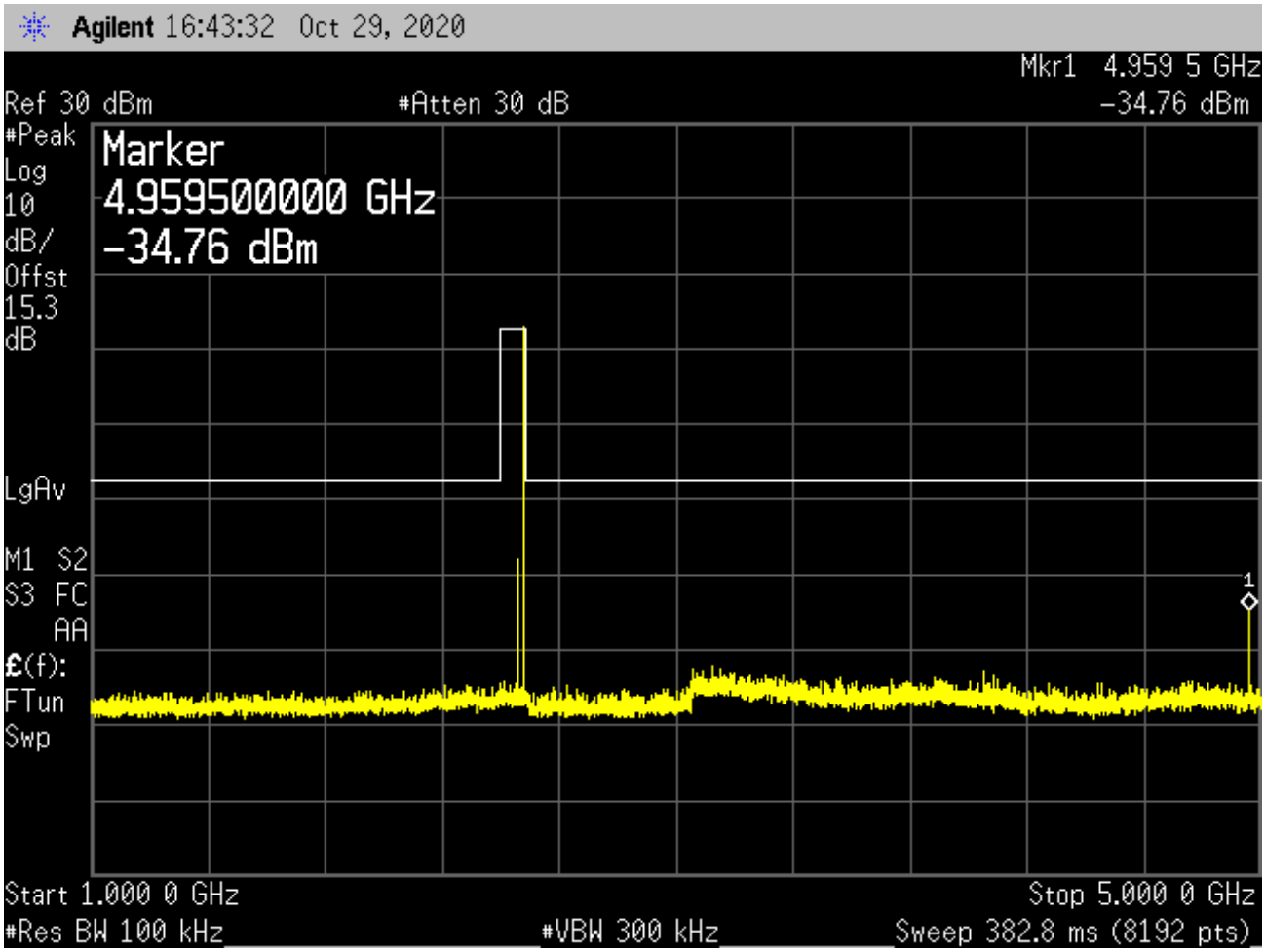


Figure 29: High Channel Conducted Spurious Plot 4

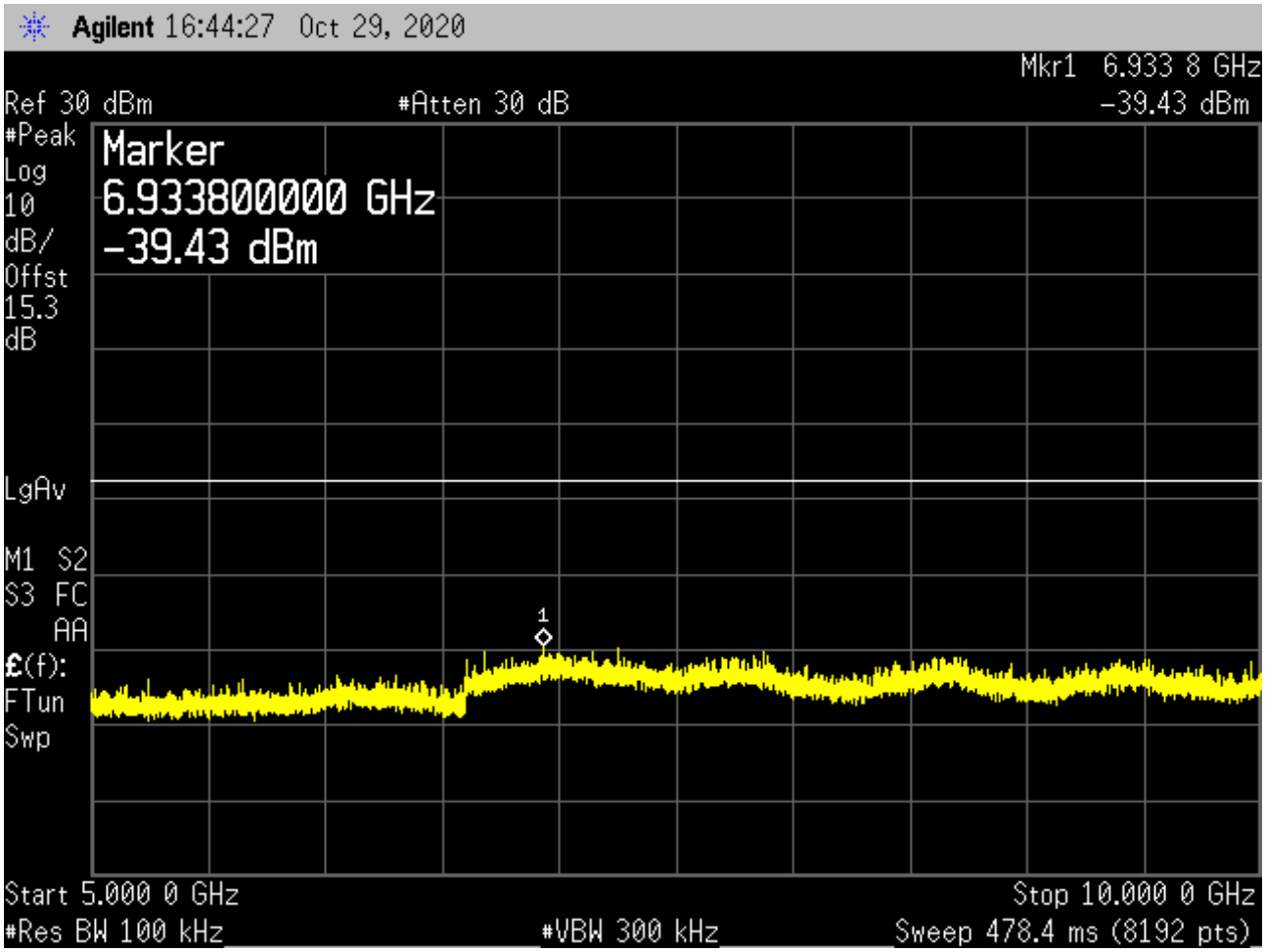


Figure 30: High Channel Conducted Spurious Plot 5

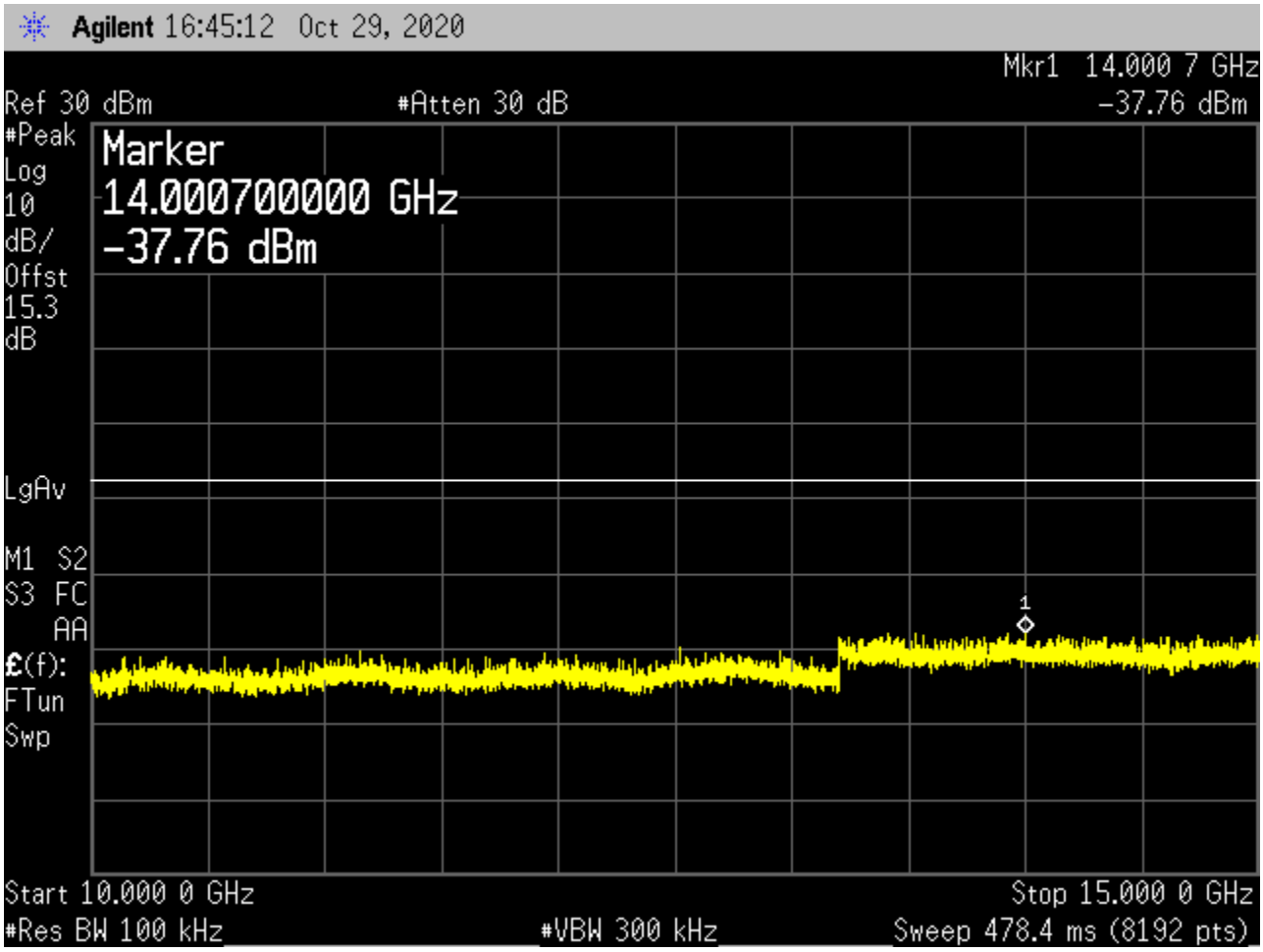


Figure 31: High Channel Conducted Spurious Plot 6

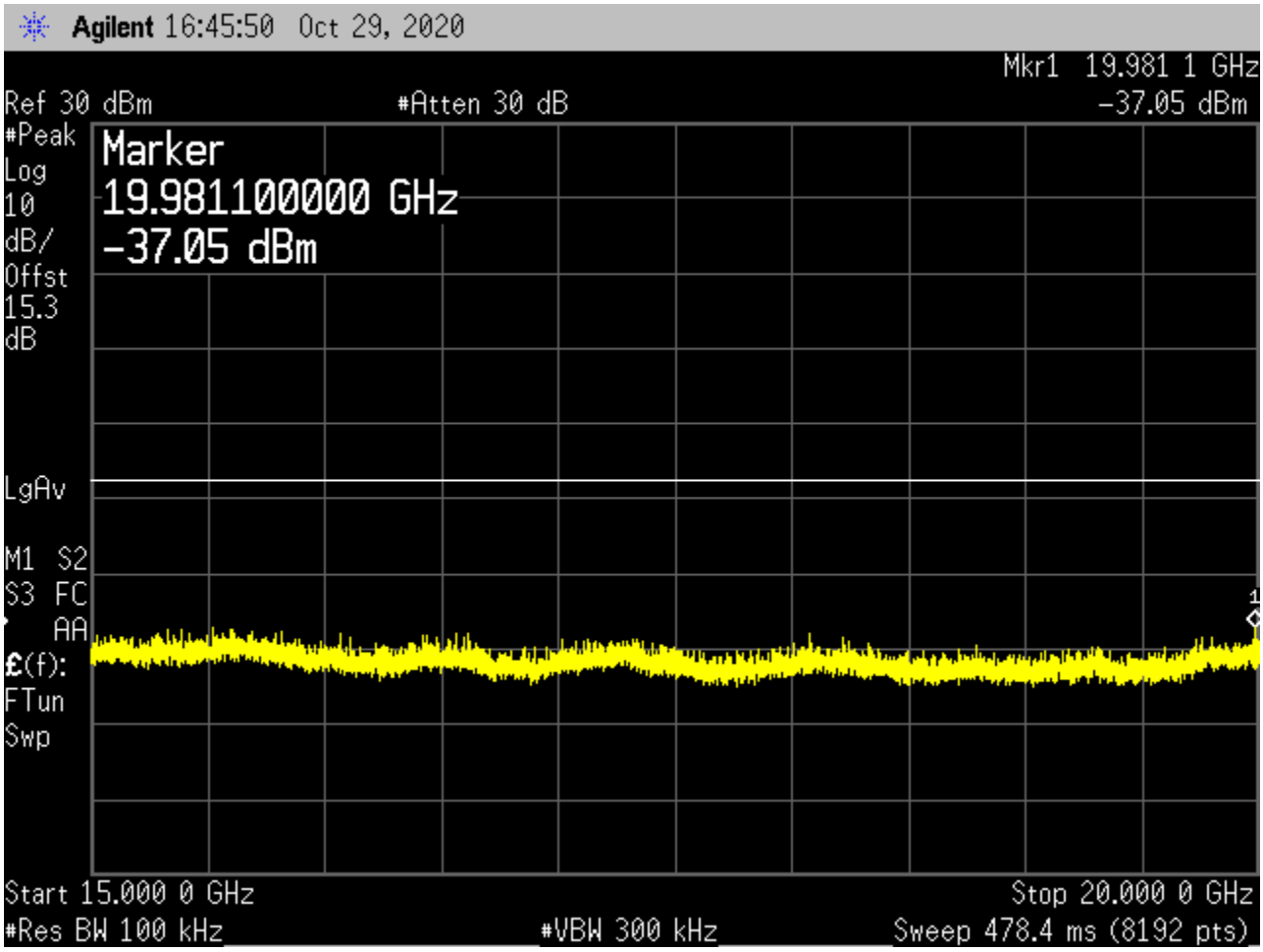


Figure 32: High Channel Conducted Spurious Plot 7

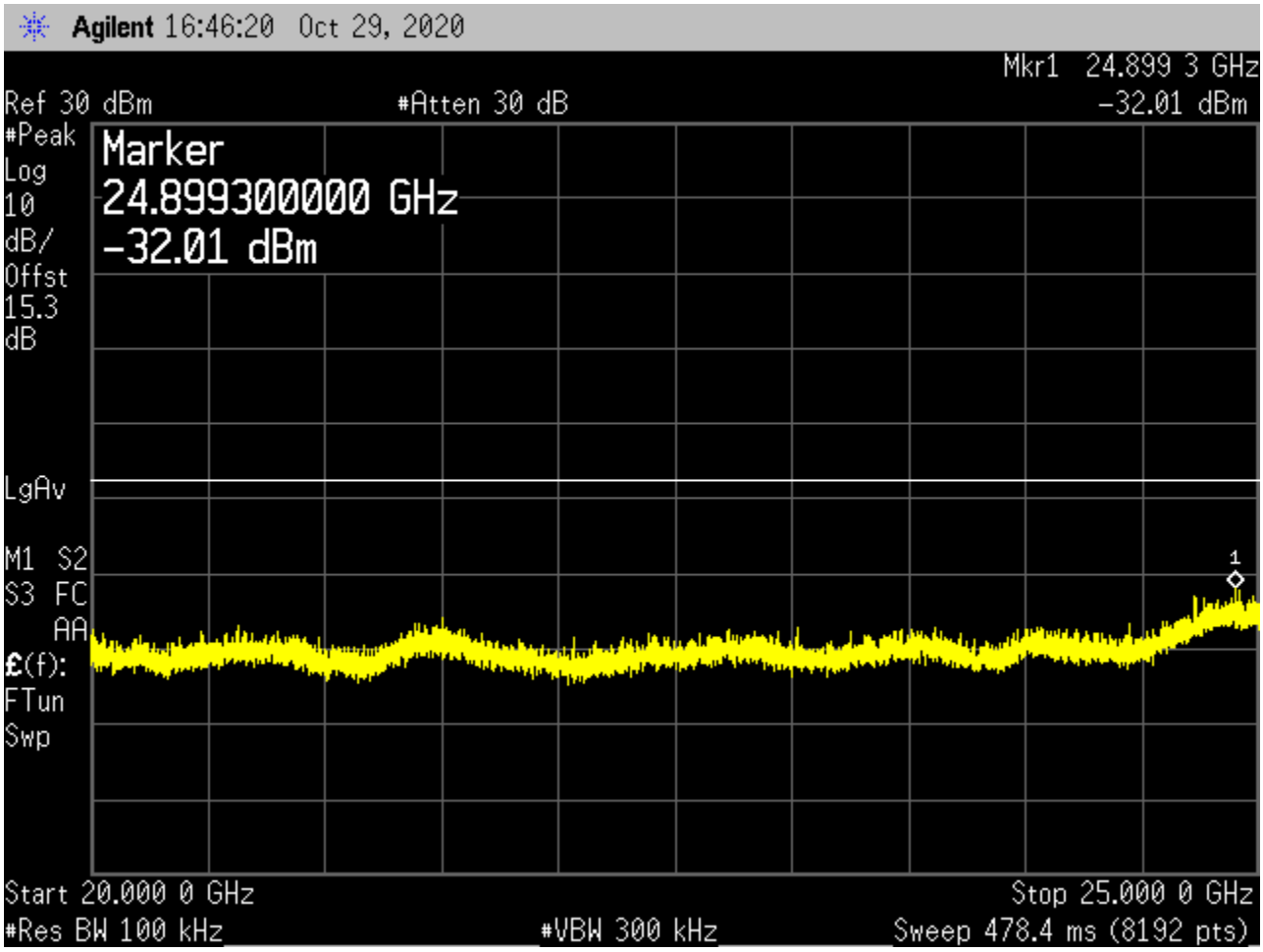


Figure 33: Receive (RX Mode) Conducted Spurious Plot 1

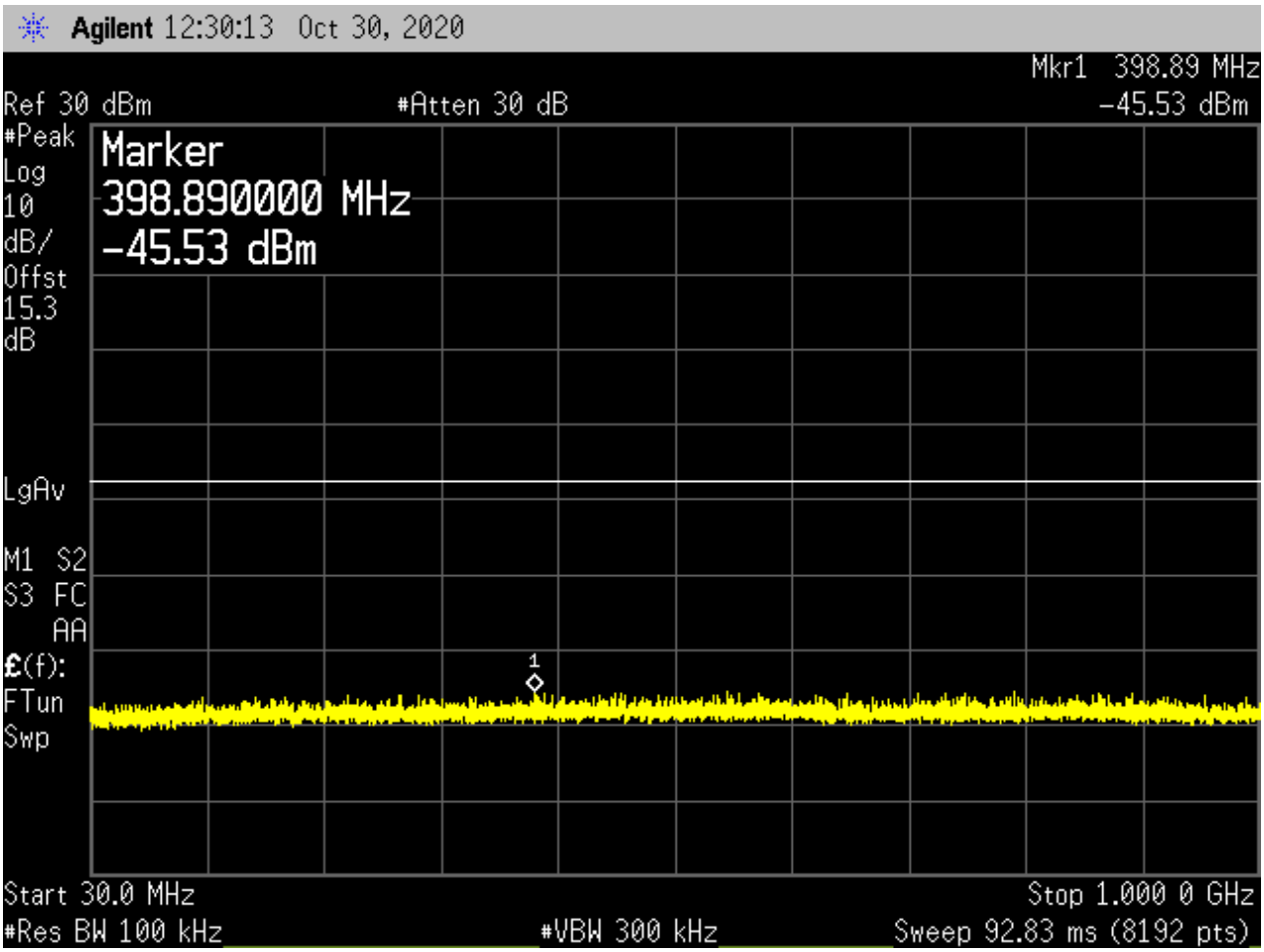


Figure 34: Receive (RX Mode) Conducted Spurious Plot 2

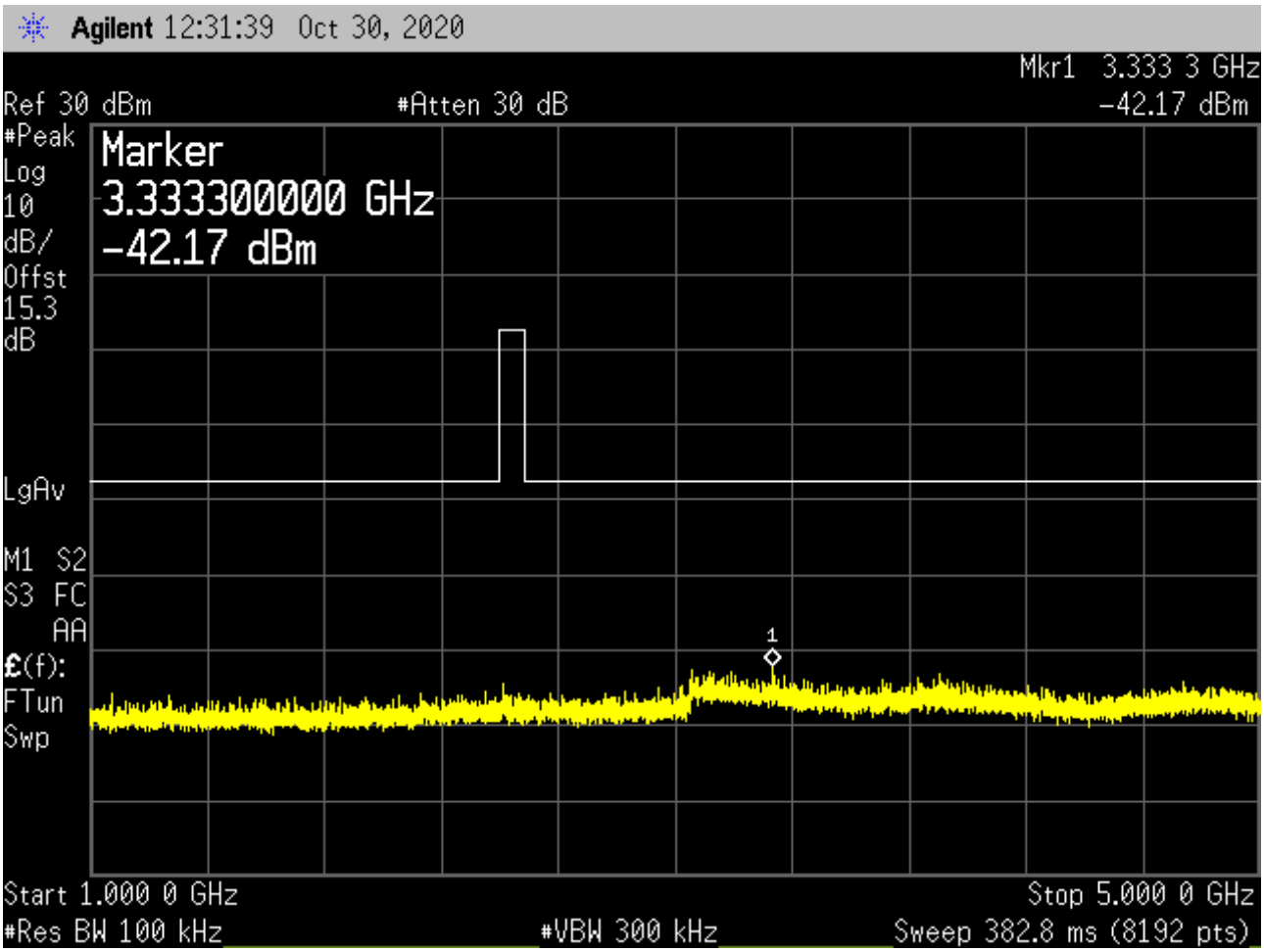


Figure 35: Receive (RX Mode) Conducted Spurious Plot 3

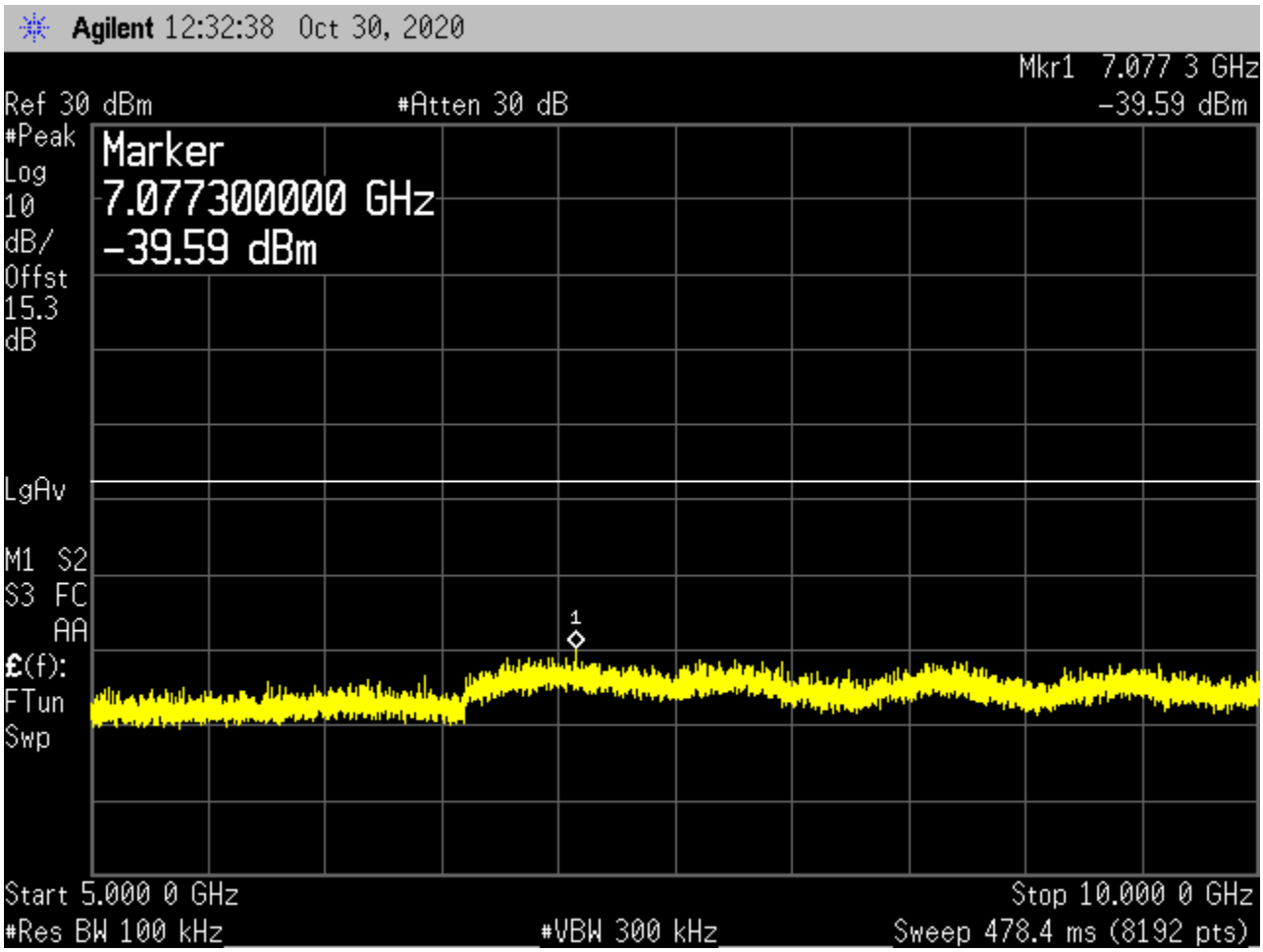


Figure 36: Receive (RX Mode) Conducted Spurious Plot 4

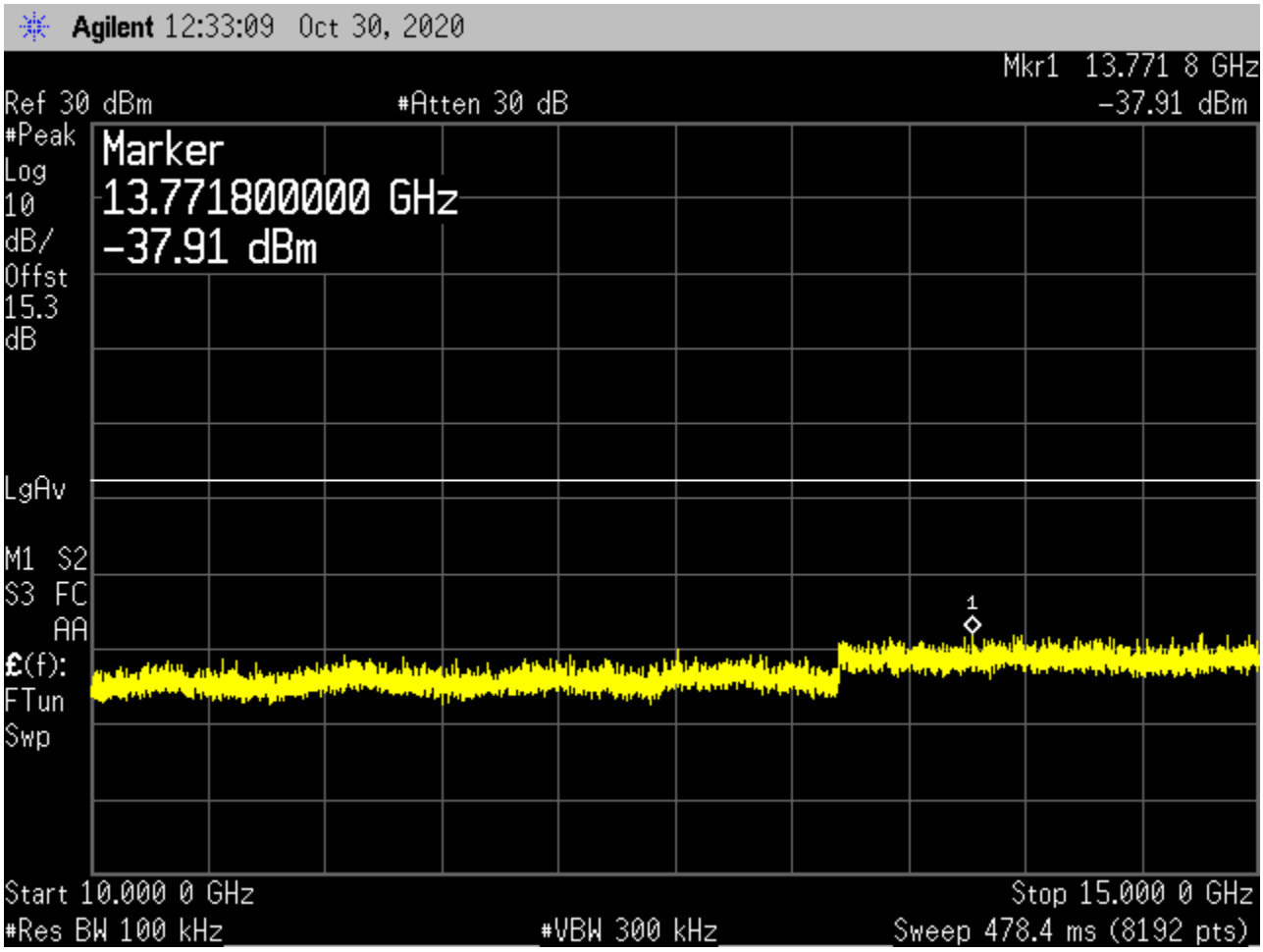


Figure 37: Receive (RX Mode) Conducted Spurious Plot 5

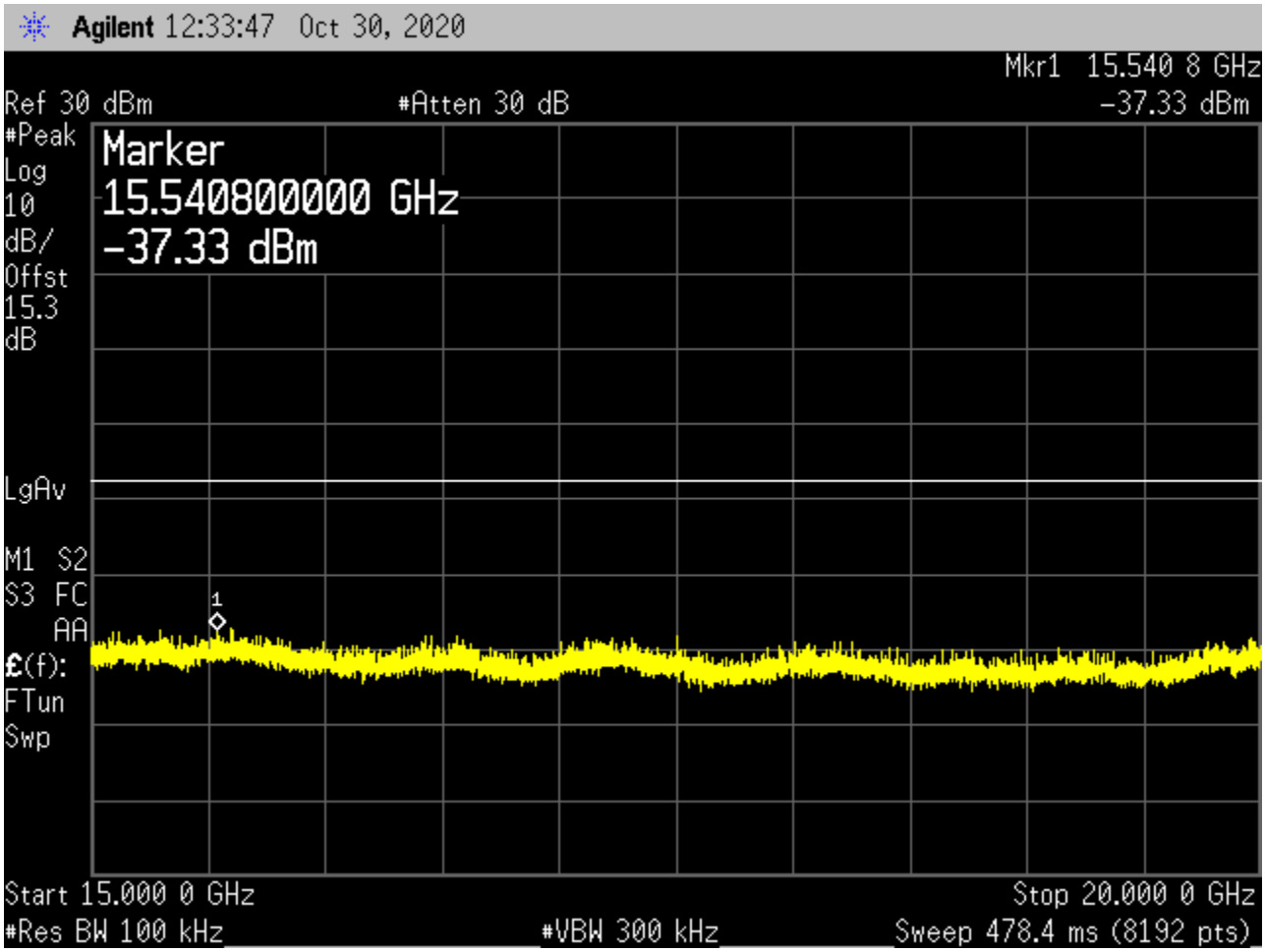
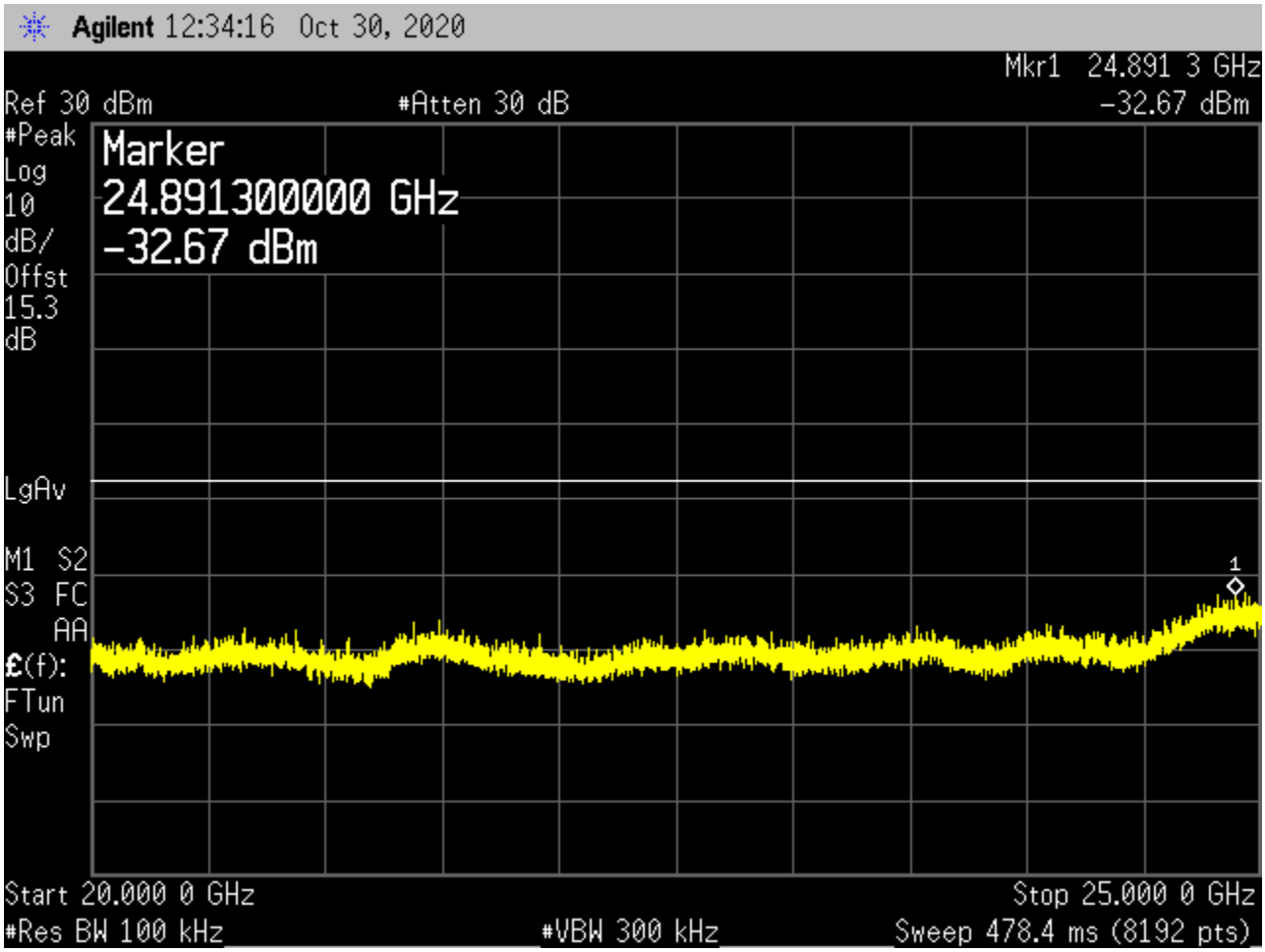


Figure 38: Receive (RX Mode) Conducted Spurious Plot 6



2.6 Radiated Emissions

2.6.1 Requirements

Compliance Standard: FCC Part 15, Class B

FCC Compliance Limits		
Frequency Range	Limit (distance)	
	Class A (10 meter)	Class B (3 meter)
30-88 MHz	90 µV/m	100 µV/m
88-216 MHz	150 µV/m	150 µV/m
216-960 MHz	210 µV/m	200 µV/m
>960MHz	300 µV/m	500 µV/m

2.6.2 Test Procedure

The requirements of FCC Part 15 and ICES-003 call for the EUT to be placed on an 80 cm high 1 X 1.5 meters non-conductive motorized turntable for radiated testing on a 3-meter open field test site.

The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Bi-conical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 30 MHz to 25 GHz were measured. The peripherals were placed on the table in accordance with ANSI C63.4. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. Above 1GHz average measurement are recorded. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. Frequencies above 1GHz were performed using a measurement bandwidth of 1 MHz with a video bandwidth setting of 10 Hz for the average measurement.

2.6.3 Test Summary

The EUT complied with Class B Radiated Emissions requirements.

2.6.4 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included into the antenna factor (AF) column of the table and in the cable factor (CF) column of the table. The AF (in dB/m) and the CF (in dB) is algebraically added to the raw Spectrum Analyzer Voltage in dBµV to obtain the Radiated Electric Field in dBµV/m. This logarithm amplitude is converted to a linear amplitude, then compared to the FCC limit.

Example:

Spectrum Analyzer Voltage: VdBµV
Antenna Correction Factor: AFdB/m
Cable Correction Factor: CFdB
Pre-Amplifier Gain (if applicable): GdB
Electric Field: EdBµV/m = V dBµV + AFdB/m + CFdB - GdB
To convert to linear units of measure: EdBµV/m/20 Inv log

2.6.5 Test Data

The radiated measurement results are shown below.

Radiated Band Edge was also observed.

Table 11: Radiated Emission Test Data – All Channels

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector
52.60	V	180.0	1.4	19.0	-11.6	2.4	100.0	-32.6	QP
99.60	V	0.0	1.4	19.9	-15.5	1.7	150.0	-39.2	QP
120.20	V	90.0	1.4	20.1	-13.0	2.3	150.0	-36.4	QP
488.60	V	90.0	1.4	20.6	-3.9	6.8	200.0	-29.3	QP
550.00	V	90.0	1.4	20.1	-4.7	5.9	200.0	-30.7	QP
638.10	V	180.0	1.4	19.9	-3.6	6.5	200.0	-29.7	QP
765.80	V	120.0	1.4	20.6	-1.6	8.9	200.0	-27.0	QP
933.60	V	190.0	1.4	19.9	0.7	10.7	200.0	-25.5	QP
61.30	H	90.0	1.4	19.6	-15.2	1.7	100.0	-35.6	QP
95.20	H	90.0	1.4	19.9	-16.0	1.6	150.0	-39.6	QP
133.80	H	90.0	1.4	20.0	-14.2	1.9	150.0	-37.7	QP
477.20	H	90.0	1.4	20.3	-4.6	6.1	200.0	-30.4	QP
550.00	H	0.0	1.4	20.1	-4.7	5.9	200.0	-30.7	QP
699.10	H	0.0	1.4	19.9	-2.5	7.4	200.0	-28.6	QP
728.50	H	0.0	1.4	20.0	-2.5	7.5	200.0	-28.5	QP
901.20	H	180.0	1.4	19.9	0.0	9.9	200.0	-26.1	QP

Table 12: Radiated Emission Test Data – Low Channel

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector
2402.00	V	190.0	1.2	94.1	-2.4	38645.7	Fundamental		
1201.00	V	190.0	1.2	49.8	-8.4	117.7	5000.0	-32.6	Peak
1201.00	V	190.0	1.2	37.4	-8.4	28.2	500.0	-25.0	AVG
3290.00	V	190.0	1.2	52.3	1.0	460.6	5000.0	-20.7	Peak
3290.00	V	190.0	1.2	39.8	1.0	109.2	500.0	-13.2	AVG
3601.00	V	190.0	1.2	51.9	2.0	496.8	5000.0	-20.1	Peak
3601.00	V	190.0	1.2	39.1	2.0	113.8	500.0	-12.9	AVG
4515.00	V	190.0	1.2	51.8	4.2	631.9	5000.0	-18.0	Peak
4515.00	V	190.0	1.2	38.8	4.2	141.5	500.0	-11.0	AVG
4755.00	V	190.0	1.2	51.7	6.0	768.9	5000.0	-16.3	Peak
4755.00	V	190.0	1.2	39.0	6.0	178.2	500.0	-9.0	AVG
4804.00	V	190.0	1.2	52.2	6.2	832.1	5000.0	-15.6	Peak
4804.00	V	190.0	1.2	39.1	6.2	184.1	500.0	-8.7	AVG
5400.00	V	190.0	1.2	50.6	7.5	799.8	5000.0	-15.9	Peak
5400.00	V	190.0	1.2	38.9	7.5	208.0	500.0	-7.6	AVG
2402.00	H	170.0	1.5	95.3	-2.4	44269.2	Fundamental		
1201.00	H	170.0	1.5	49.8	-8.4	117.7	5000.0	-32.6	Peak
1201.00	H	170.0	1.5	37.3	-8.4	27.9	500.0	-25.1	AVG
3290.00	H	170.0	1.5	52.8	1.0	487.9	5000.0	-20.2	Peak
3290.00	H	170.0	1.5	39.4	1.0	104.3	500.0	-13.6	AVG
3601.00	H	170.0	1.5	50.8	2.0	437.7	5000.0	-21.2	Peak
3601.00	H	170.0	1.5	39.2	2.0	115.1	500.0	-12.8	AVG
4515.00	H	170.0	1.5	51.2	4.2	589.7	5000.0	-18.6	Peak
4515.00	H	170.0	1.5	38.9	4.2	143.1	500.0	-10.9	AVG
4755.00	H	170.0	1.5	51.9	6.0	786.9	5000.0	-16.1	Peak
4755.00	H	170.0	1.5	39.1	6.0	180.3	500.0	-8.9	AVG
4804.00	H	170.0	1.5	52.2	6.2	832.1	5000.0	-15.6	Peak
4804.00	H	170.0	1.5	39.1	6.2	184.1	500.0	-8.7	AVG
5400.00	H	170.0	1.5	51.0	7.5	837.5	5000.0	-15.5	Peak
5400.00	H	170.0	1.5	38.8	7.5	205.6	500.0	-7.7	AVG

Table 13: Radiated Emission Test Data – Center Channel

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector
2440.00	V	270.0	1.7	93.8	-2.1	38463.7	Fundamental		
1220.50	V	270.0	1.7	49.5	-8.0	118.3	5000.0	-32.5	Peak
1220.50	V	270.0	1.7	37.4	-8.0	29.4	500.0	-24.6	AVG
3333.00	V	270.0	1.7	52.4	1.5	497.9	5000.0	-20.0	Peak
3333.00	V	270.0	1.7	39.9	1.5	118.1	500.0	-12.5	AVG
3701.00	V	270.0	1.7	52.0	1.8	489.9	5000.0	-20.2	Peak
3701.00	V	270.0	1.7	39.3	1.8	113.4	500.0	-12.9	AVG
4822.00	V	270.0	1.7	51.6	6.3	785.1	5000.0	-16.1	Peak
4822.00	V	270.0	1.7	39.4	6.3	191.6	500.0	-8.3	AVG
4877.00	V	270.0	1.7	51.4	6.6	794.1	5000.0	-16.0	Peak
4877.00	V	270.0	1.7	39.2	6.6	194.9	500.0	-8.2	AVG
5350.00	V	270.0	1.7	51.5	7.4	878.0	5000.0	-15.1	Peak
5350.00	V	270.0	1.7	38.9	7.4	205.8	500.0	-7.7	AVG
5428.00	V	270.0	1.7	51.1	7.5	847.5	5000.0	-15.4	Peak
5428.00	V	270.0	1.7	39.0	7.5	211.2	500.0	-7.5	AVG
2440.00	H	90.0	1.3	98.2	-2.1	63833.8	Fundamental		
1220.50	H	90.0	1.3	49.1	-8.0	113.0	5000.0	-32.9	Peak
1220.50	H	90.0	1.3	37.3	-8.0	29.0	500.0	-24.7	AVG
3333.00	H	90.0	1.3	51.7	1.5	459.3	5000.0	-20.7	Peak
3333.00	H	90.0	1.3	39.9	1.5	118.1	500.0	-12.5	AVG
3701.00	H	90.0	1.3	51.4	1.8	457.2	5000.0	-20.8	Peak
3701.00	H	90.0	1.3	39.3	1.8	113.5	500.0	-12.9	AVG
4822.00	H	90.0	1.3	51.9	6.3	812.7	5000.0	-15.8	Peak
4822.00	H	90.0	1.3	39.2	6.3	188.3	500.0	-8.5	AVG
4877.00	H	90.0	1.3	52.0	6.6	850.9	5000.0	-15.4	Peak
4877.00	H	90.0	1.3	39.1	6.6	192.7	500.0	-8.3	AVG
5350.00	H	90.0	1.3	51.2	7.4	848.2	5000.0	-15.4	Peak
5350.00	H	90.0	1.3	39.0	7.4	208.2	500.0	-7.6	AVG
5428.00	H	90.0	1.3	51.3	7.5	871.3	5000.0	-15.2	Peak
5428.00	H	90.0	1.3	39.2	7.5	216.3	500.0	-7.3	AVG

Table 14: Radiated Emission Test Data – High Channel

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector
2480.00	V	170.0	1.3	87.7	-1.5	20326.6	Fundamental		
1240.00	V	170.0	1.3	49.7	-8.1	120.4	5000.0	-32.4	Peak
1240.00	V	170.0	1.3	37.6	-8.1	29.9	500.0	-24.5	AVG
2205.00	V	170.0	1.3	50.2	-2.6	240.6	5000.0	-26.4	Peak
2205.00	V	170.0	1.3	38.1	-2.6	59.8	500.0	-18.5	AVG
3688.00	V	170.0	1.3	51.9	1.8	484.0	5000.0	-20.3	Peak
3688.00	V	170.0	1.3	39.5	1.8	116.1	500.0	-12.7	AVG
4399.00	V	170.0	1.3	51.1	3.8	553.0	5000.0	-19.1	Peak
4399.00	V	170.0	1.3	39.0	3.8	137.3	500.0	-11.2	AVG
4960.00	V	170.0	1.3	52.0	7.6	957.6	5000.0	-14.4	Peak
4960.00	V	170.0	1.3	39.2	7.6	219.4	500.0	-7.2	AVG
5360.00	V	170.0	1.3	51.4	7.4	870.1	5000.0	-15.2	Peak
5360.00	V	170.0	1.3	39.1	7.4	211.1	500.0	-7.5	AVG
5459.00	V	170.0	1.3	51.8	7.6	928.0	5000.0	-14.6	Peak
5459.00	V	170.0	1.3	38.9	7.6	210.2	500.0	-7.5	AVG
2480.00	H	270.0	1.1	96.4	-1.5	55343.4	Fundamental		
1240.00	H	270.0	1.1	49.5	-8.1	117.7	5000.0	-32.6	Peak
1240.00	H	270.0	1.1	37.5	-8.1	29.6	500.0	-24.6	AVG
2384.50	H	270.0	1.1	52.1	-2.3	307.6	5000.0	-24.2	Peak
2384.50	H	270.0	1.1	47.0	-2.3	171.0	500.0	-9.3	AVG
3688.00	H	270.0	1.1	51.9	1.8	484.0	5000.0	-20.3	Peak
3688.00	H	270.0	1.1	39.5	1.8	116.1	500.0	-12.7	AVG
4399.00	H	270.0	1.1	51.5	3.8	579.0	5000.0	-18.7	Peak
4399.00	H	270.0	1.1	38.9	3.8	135.7	500.0	-11.3	AVG
4960.00	H	270.0	1.1	50.9	7.6	843.7	5000.0	-15.5	Peak
4960.00	H	270.0	1.1	39.2	7.6	219.4	500.0	-7.2	AVG
5360.00	H	270.0	1.1	50.8	7.4	812.1	5000.0	-15.8	Peak
5360.00	H	270.0	1.1	39.2	7.4	213.6	500.0	-7.4	AVG
5459.00	H	270.0	1.1	51.5	8.6	1005.9	5000.0	-13.9	Peak
5459.00	H	270.0	1.1	39.0	8.6	238.5	500.0	-6.4	AVG

Table 15: Receive (RX Mode) Radiated Spurious Emissions

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector
52.60	V	180.0	1.4	19.0	-11.6	2.4	100.0	-32.6	QP
99.60	V	0.0	1.4	19.9	-15.5	1.7	150.0	-39.2	QP
120.20	V	90.0	1.4	20.1	-13.0	2.3	150.0	-36.4	QP
488.60	V	90.0	1.4	20.6	-3.9	6.8	200.0	-29.3	QP
550.00	V	90.0	1.4	20.1	-4.7	5.9	200.0	-30.7	QP
638.10	V	180.0	1.4	19.9	-3.6	6.5	200.0	-29.7	QP
765.80	V	120.0	1.4	20.6	-1.6	8.9	200.0	-27.0	QP
933.60	V	190.0	1.4	19.9	0.7	10.7	200.0	-25.5	QP
1721.10	V	90.0	1.4	19.9	1.5	11.8	500.0	-32.6	AVG
4847.00	V	18.0	1.4	20.6	10.5	35.9	500.0	-22.9	AVG
4991.20	V	0.0	1.4	21.0	10.8	39.0	500.0	-22.2	AVG
5150.00	V	0.0	1.4	19.9	11.3	36.2	500.0	-22.8	AVG
5760.50	V	180.0	1.4	20.6	1.1	12.2	500.0	-32.2	AVG
5806.70	V	180.0	1.4	21.2	1.2	13.2	500.0	-31.6	AVG
8112.30	V	180.0	1.4	20.6	3.6	16.2	500.0	-29.8	AVG
11001.00	V	180.0	1.4	17.1	8.8	19.8	500.0	-28.1	AVG
61.30	H	90.0	1.4	19.6	-15.2	1.7	100.0	-35.6	QP
95.20	H	90.0	1.4	19.9	-16.0	1.6	150.0	-39.6	QP
133.80	H	90.0	1.4	20.0	-14.2	1.9	150.0	-37.7	QP
477.20	H	90.0	1.4	20.3	-4.6	6.1	200.0	-30.4	QP
550.00	H	0.0	1.4	20.1	-4.7	5.9	200.0	-30.7	QP
699.10	H	0.0	1.4	19.9	-2.5	7.4	200.0	-28.6	QP
728.50	H	0.0	1.4	20.0	-2.5	7.5	200.0	-28.5	QP
901.20	H	180.0	1.4	19.9	0.0	9.9	200.0	-26.1	QP
1721.10	H	90.0	1.4	22.7	1.5	16.3	500.0	-29.8	AVG
4847.00	H	18.0	1.4	20.2	10.5	34.3	500.0	-23.3	AVG
4991.20	H	0.0	1.4	19.9	10.8	34.3	500.0	-23.3	AVG
5150.00	H	0.0	1.4	20.9	11.3	40.6	500.0	-21.8	AVG
5760.50	H	180.0	1.4	21.0	1.1	12.8	500.0	-31.8	AVG
5806.70	H	180.0	1.4	20.5	1.2	12.2	500.0	-32.3	AVG
8112.30	H	180.0	1.4	21.1	3.6	17.1	500.0	-29.3	AVG
11001.00	H	180.0	1.4	16.4	8.8	18.2	500.0	-28.8	AVG

Figure 39: 3m OATS, Radiated Band Edge – Low Channel

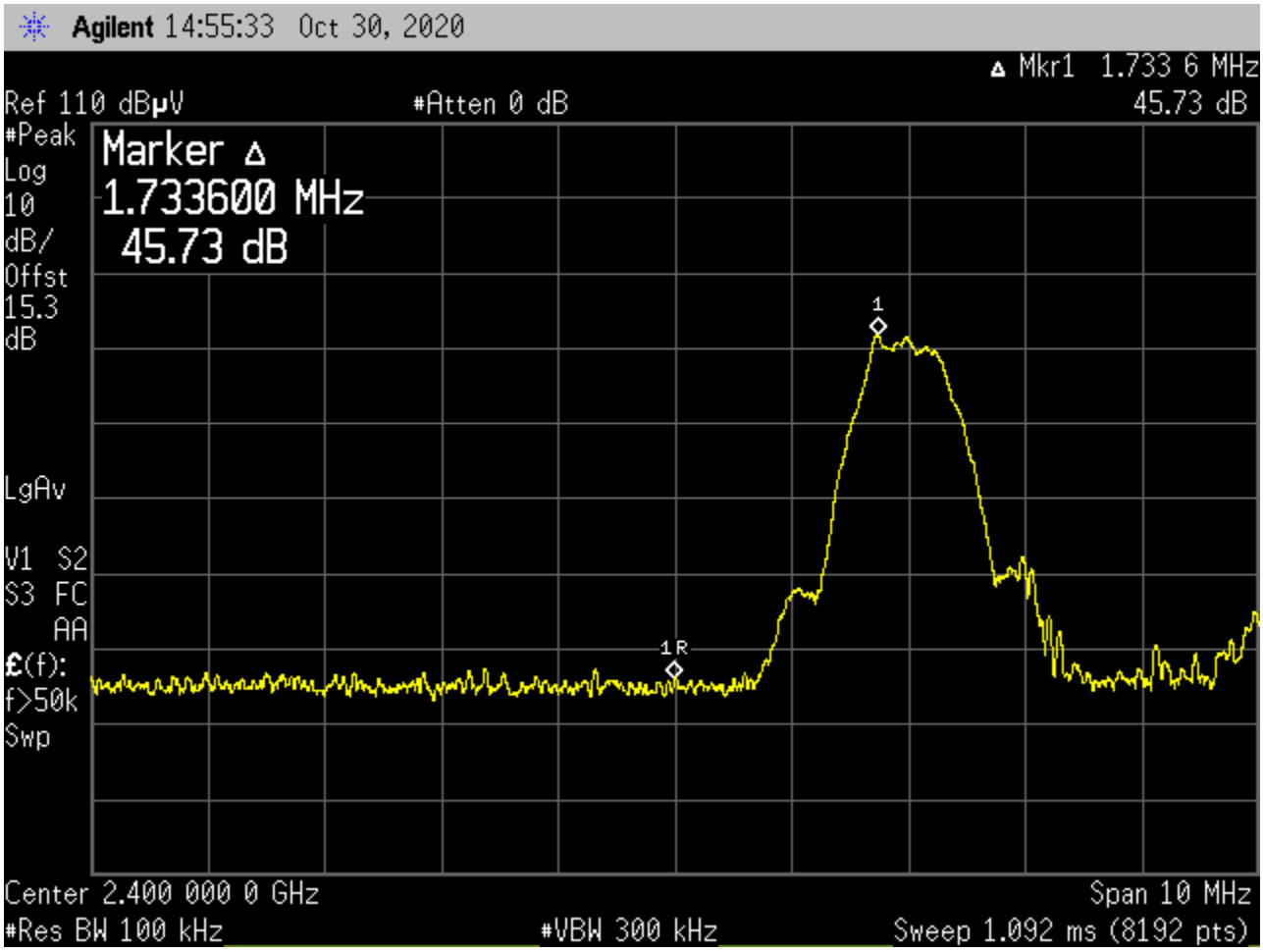
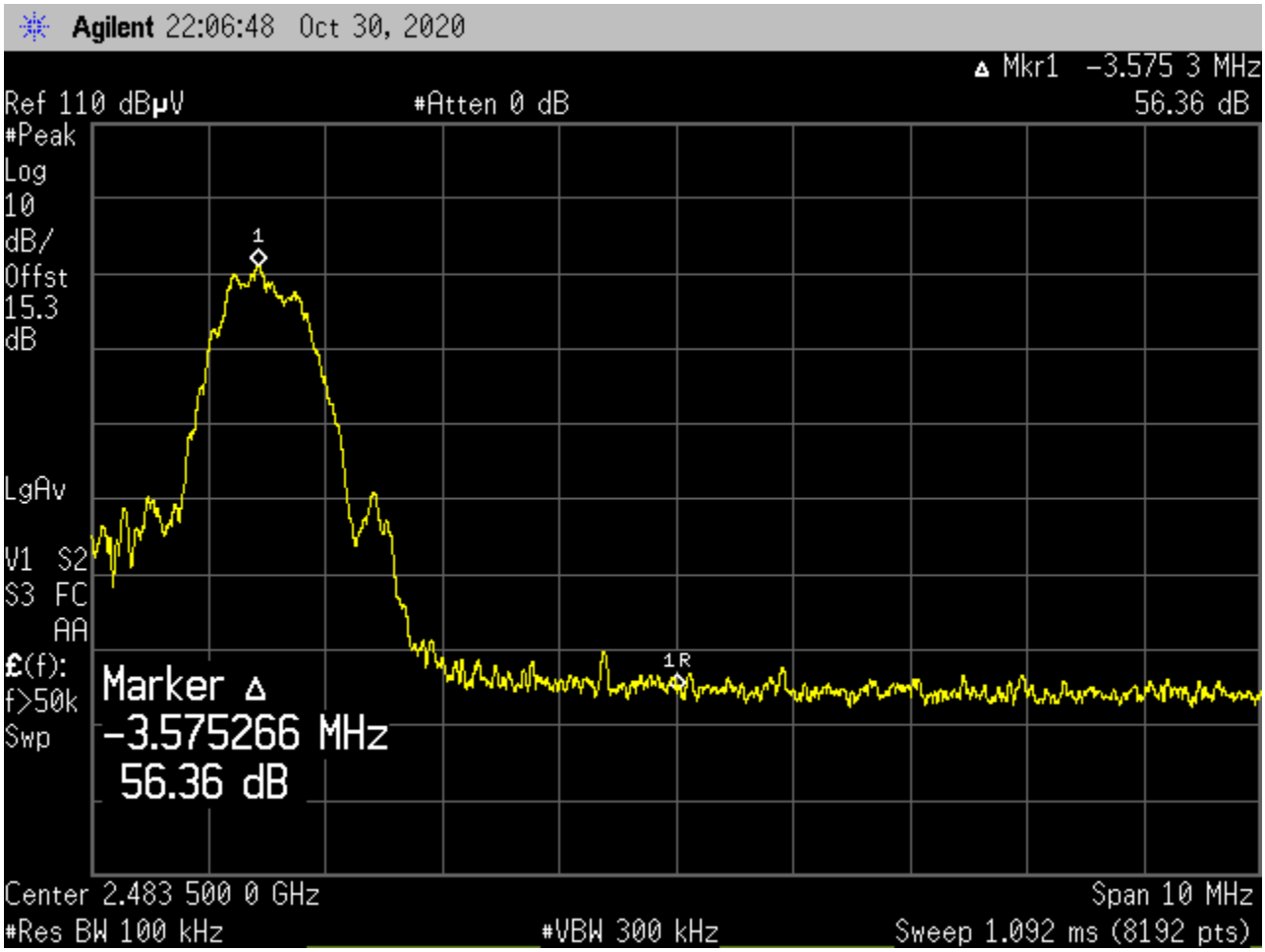


Figure 40: 3m OATS, Radiated Band Edge – High Channel



3 Equipment Under Test

3.1 EUT Identification

Table 16: Device Summary

Manufacturer:	Insulet Corporation
FCC ID:	RBV-029
ISED ID:	8446A-029
Model:	Omnipod 5 Pod
Serial Number of Unit Tested	See sample ID numbers in Table 17
FCC Rule Parts:	§15.247
ISED Rule Parts:	RSS-247
Frequency Range:	2402 MHz – 2483.5 MHz
Maximum Output Power:	2.9 dBm
Modulation:	GFSK
Highest Occupied Bandwidth (99%)	l.05 MHz
FCC Emission Designator:	670KG1D
ISED Emissions Designators:	1M05G1D
Keying:	Automatic
Type of Information:	Proprietary command set
Number of Channels:	40
Power Output Level	Fixed, ~ 2 dBm
Highest TX Spurious Emission:	-31.46 dBm
Highest RX Spurious Emission:	-32.67 dBm
Antenna Connector	N/A
Antenna Type	PCB Trace Inverted-F (Commercial system), antenna gain: 1.5dBi
Interface Cables:	None
Maximum Data Rate	1 Mbps
Power Source & Voltage:	IEC60086 LR44 Coincell 1.6V (Max) Each, three batteries, nominal voltage: 4.5V, max: 4.8V

3.2 EUT Description

The Insulet Corporation Omnipod 5 Pod - Automated Glucose Control System, is a single hormone insulin delivery system intended for the management of diabetes in persons requiring insulin. Continuous subcutaneous insulin infusion may be delivered by user-defined settings (manual mode) or automatically adjusted in response to feedback from a continuous glucose monitor (CGM).

The Omnipod 5 System can automatically increase insulin delivery based on CGM sensor glucose values and can decrease or suspend delivery of insulin when the glucose value falls below or is predicted to fall below predefined threshold values.

The Omnipod 5 System is comprised of an Omnipod device, PDM, iCGMs (commercially available).

3.3 Contract Information

Customer:	Chomerics, a division of Parker Hannifin Corporation
Purchase Order Number:	67421
Quotation Number:	72305

3.4 Test and Support Personnel

Washington Laboratories, LTD	Ryan Mascaro
Customer Representative	Patty Terilli

3.5 Test Configuration

For the purposes of testing, the Omnipod 5 Pod was provided in several sample-configurations. The number is the unit number as provided by the client. Formal serial numbers were note affixed to the devices.

1. Tx 2402MHz - Conducted (Transmit at 2402MHz for Conducted emission test)
2. Tx 2440MHz - Conducted (Transmit at 2440MHz for Conducted emission test)
3. Tx 2480MHz - Conducted (Transmit at 2402MHz for Conducted emission test)
4. Receive only - Conducted (Receive only mode for Conducted emission test)
5. Tx 2402MHz - Radiated (Transmit at 2402MHz for Radiated emission test)
6. Tx 2440MHz - Radiated (Transmit at 2440MHz for Radiated emission test)
7. Tx 2480MHz - Radiated (Transmit at 2480MHz for Radiated emission test)
8. Receive only - Radiated (Receive only mode for Radiated emission test)

Table 17: EUT Test Configuration for Omnipod 5 System

Name/Description	Model Number	Part Number	Serial Number	Rev #
Continuous Tx, maximum power with modulation applied at 2402 MHz with SMA cable	POD-BLE-H1-520	PT-000434*	Tx 2402 MHz_Conducted-01~03	001
Continuous Tx, maximum power with modulation applied at 2440 MHz with SMA cable	POD-BLE-H1-520	PT-000434*	Tx 2440 MHz_Conducted-01~03	001
Continuous Tx, maximum power with modulation applied at 2480 MHz with SMA cable	POD-BLE-H1-520	PT-000434*	Tx 2480 MHz_Conducted-01~03	001
Receive only at 2402 MHz with SMA cable	POD-BLE-H1-520	PT-000434*	Rx 2402 MHz_Conducted-01~02	001
Continuous Tx, maximum power with modulation applied at 2402 MHz	POD-BLE-H1-520	PT-000434*	Tx 2402 MHz_Radiated-01~02	001
Continuous Tx, maximum power with modulation applied at 2440 MHz	POD-BLE-H1-520	PT-000434*	Tx 2440 MHz_Radiated-01~02	001
Continuous Tx, maximum power with modulation applied at 2480 MHz	POD-BLE-H1-520	PT-000434*	Tx 2480 MHz_Radiated-01~02	001
Receive only at 2402 MHz	POD-BLE-H1-520	PT-000434*	Rx 2402 MHz_ Radiated-01~02	001
Production Pod (ASM, Horizon Pod, DEV) with no modifications to software, no SMA cable	POD-BLE-H1-520	PT-000434	40992	001

*** with modified software**

3.6 Support Equipment

Table 18: Support Equipment

Name / Description	Manufacturer	Model Number	Calibration
PDM/Personal Diabetes Manager	Insulet/Noetic	PDM-H001-G-XX/N5400L	N/A
iCGM	Dexcom	G6	N/A

3.7 Interface Cables

Table 19: Cable Configuration

Ref. ID	EUT Port Name	Cable Description	Qty.	Length (m)	Shielded	Termination Port ID
1	Pod RF Output	SMA	1	0.10 cm	Yes	Spectrum Analyzer

3.8 Testing Algorithm

The Omnipod 5 Pod was tested in a powered, on steady state. The EUT transmit signal was verified before and after each test. Worst case emission levels are provided in the test results data.

3.9 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Frederick, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The ISED Canada number is 3035A for Washington Laboratories, Ltd. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory.

3.10 Measurements

3.10.1 References

ANSI C63.2 (Jan-2016) Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 (Jan 2014) American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C63.10 (Jun 2013) American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

ANSI C63.26 (Dec 2015) American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

3.11 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 (R2002) with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{div_a^2} + \frac{b^2}{div_b^2} + \frac{c^2}{div_c^2} + ...}$$

Where uc = standard uncertainty
a, b, c,.. = individual uncertainty elements
Diva, b, c = the individual uncertainty element divisor based on the probability distribution
Divisor = 1.732 for rectangular distribution
Divisor = 2 for normal distribution
Divisor = 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = k u_c$$

Where:
U = expanded uncertainty
k = coverage factor
k ≤ 2 for 95% coverage (ANSI/NCSL Z540-2 Annex G)
uc = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 20 below.

Table 20: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Conducted Emissions	CISPR11, CISPR22, CISPR32, CISPR14, FCC Part 15	±2.63 dB
Radiated Emissions	CISPR11, CISPR22, CISPR32, CISPR14, FCC Part 15	±4.55 dB

4 Test Equipment

Below is a list of the test equipment used for measurements, along with the calibration information.

Table 21: Test Equipment List

Test Name:	**Radiated Emissions**	Test Date:	**11/2/2020**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00823	AGILENT	N9010A	5/7/2021
00425	ARA	DRG-118/A	8/18/2022
00849	AH SYSTEMS	SAC-18G-16, Cable	10/10/2021
00627	AGILENT	8449B	8/31/2021
00826	MEGAPHASE	TM40-K1K5-36, Cable	Cal. Before Use

Test Name:	**RF Conducted Emissions**	Test Date:	**10/30/2020**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00823	AGILENT	N9010A	5/7/2021
00826	MEGAPHASE	TM40-K1K5-36, Cable	Cal. Before Use

5 Abbreviations

A	Ampere
ac	alternating current
AM	Amplitude Modulation
Amps	Amperes
b/s	bits per second
BW	BandWidth
CE	Conducted Emission
cm	Centimeter
CW	Continuous Wave
dB	deciBel
dc	direct current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FM	Frequency Modulation
G	giga – prefix for 10^9 multiplier
Hz	Hertz
IF	Intermediate Frequency
k	kilo – prefix for 10^3 multiplier
LISN	Line Impedance Stabilization Network
M	Mega – prefix for 10^6 multiplier
m	Meter
µ	micro – prefix for 10^{-6} multiplier
NB	Narrowband
QP	Quasi-Peak
RE	Radiated Emissions
RF	Radio Frequency
rms	root-mean-square
SN	Serial Number
S/A	Spectrum Analyzer
V	Volt