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FCC Certification Test Report
For the
Specifi-Kali, LLC.
Laelaps Dog Tracking System
(Collar Model)

FCC ID: 2AFKF-C01

WLL JOB# 14626-01 Rev 1
September 19, 2016
Revised October 6, 2016

Prepared for:

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Prepared By:

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Testing Certificate AT-1448

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Prepared by:

James Ritter
EMC Compliance Engineer

Reviewed by:

Steven D. Koster
President

Abstract

This report has been prepared on behalf of Specifi-Kali, LLC. 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 (10/2014) of the FCC Rules. This Certification Test Report documents the test configuration and test results for the Specifi-Kali, LLC. Laelaps Dog Tracking System (Collar Model).

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. 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 OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Certificate AT-1448 as an independent FCC test laboratory.

The Specifi-Kali, LLC. Laelaps Dog Tracking System (Collar Model) complies with the limits for a Digital Transmission System (DTS) Transmitter device under FCC Part 15.247.

Revision History	Description of Change	Date
Rev 0	Initial Release	September 19, 2016
Rev 1	Corrected typographical errors	October 6, 2016

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1 Introduction

1.1 Compliance Statement

The Specifi-Kali, LLC. Laelaps Dog Tracking System (Collar Model) complies with the limits for a Digital Transmission System (DTS) Transmitter device under FCC Part 15.247 (10/2014).The system also incorporates a VHF MURS transceiver that is certified under FCC part 95J (WLL report 14625-01). This report covers the Bluetooth Low Energy transceiver only.

1.1 Co-Located Transmitters Attestation

The Laelops dog tracking device (EUT) was scanned in a radiated fashion with both the BLE transmitter and VHF MURS transmitters simultaneously transmitting. During this radiated emissions scan no spurious emissions over the FCC class 'B' limits (or Part95 limits for the VHF MURS) or intermodulation products were noted. The unit was scanned up to 25GHz (10 harmonic)

1.2 Test Scope

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

1.3 Contract Information

Customer:	Specifi-Kali, LLC 11675 Jollyville Road STE 100 Austin, TX 78759
Quotation Number:	68978A

1.4 Test Dates

Testing was performed on the following date(s):	6/30/2016 through 8/19/2016

1.5 Test and Support Personnel

Washington Laboratories, LTD	James Ritter
Customer Representative	Robert Holland

1.6 Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	**Amp**ere**s**
b/s	**b**its per **s**econd
BW	**B**and**W**idth
CE	**C**onducted **E**mission
cm	**C**enti**m**eter
CW	**C**ontinuous **W**ave
dB	**decibel**
dc	**d**irect **c**urrent
EMI	**E**lectro**m**agnetic **I**nterference
EUT	**E**quipment **U**nder **T**est
FM	**F**requency **M**odulation
G	**g**iga – prefix for 10^9 multiplier
Hz	**H**ertz
IF	**I**ntermediate **F**requency
k	**k**ilo – prefix for 10^3 multiplier
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
M	**M**ega – prefix for 10^6 multiplier
m	**M**eter
µ	**m**icro – prefix for 10^{-6} multiplier
NB	**N**arrow**b**and
QP	**Q**uasi-**P**eak
RE	**R**adiated **E**missions
RF	**R**adio **F**requency
rms	**r**oot-**m**ean-**s**quare
SN	**S**erial **N**umber
S/A	**S**pectrum **A**nalyzer
V	**V**olt

2 Equipment Under Test

2.1 EUT Identification & Description

Dog collar system with GPS that sends positions by MURS to a pointer transceiver, which provides positions to a smartphone by Bluetooth Low Energy.

Laelaps Dog Tracking System (Collar Model) consists of the following models:

- Collar (2 models)
- Pointer

Each system has 4 PWB modules:

- Main board which contains the radio and BLE
- GPS board contains GPS chip and antenna (collar units only)
- Status board has lights for functionality and the power button
  Charger board--mini USB board the charges the device.

All models have the identical transceivers and antenna types / gain. The collars have an additional GPS board. This was tested as worst case configuration. The differences in the models are with the housing styles even though all are plastic.

The EUT does not transmit while charging.

Table 1: Device Summary

ITEM	DESCRIPTION
Manufacturer:	Specifi-Kali, LLC.
FCC ID:	2AFKF-C01
Model Name & Number:	Laelaps Collar model DTC 10.0, (tested) Laelaps Collar model DTC 10.1
FCC Rule Parts:	§15.247
Frequency Range:	2402-2480MHz
Maximum Output Power:	1.57mW (1.96dBm) conducted
Modulation:	GFSK
Occupied Bandwidth:	858kHz
Keying:	Automatic
Type of Information:	Data
Number of Channels:	40
Power Output Level	Fixed
Antenna	-0.5dBi Chip Antenna
Interface Cables:	None
Power Source & Voltage:	lithium Ion 3.7 VDC battery

2.2 Test Configuration

Two devices were submitted for testing, 1 units with the antenna replaced by a temporary antenna port and one with antennas for radiated testing. The EUTs were programmed to transmit at one of 3 frequencies (2402, 2440, & 2480MHz) via a button on the EUT. All units were tested in a stand-alone configuration. All tests were performed in accordance with ANSI C63.10.

2.3 Testing Algorithm

The Laelaps Dog Tracking System (Collar Model) was programmed for DTS operation by the manufacturer. The EUT was set to transmit PRBS packets continuously at the desired transmit frequency. Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, 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 OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

- ANSI C63.10:2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
- ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

2.6 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 u_c = standard uncertainty

a, b, c,.. = individual uncertainty elements

$Div_{a, b, c}$ = 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

$$U = ku_c$$

Where U = expanded uncertainty

k = coverage factor

$k \leq 2$ for 95% coverage (ANSI/NCSL Z540-2 Annex G)

u_c = 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 2 below.

Table 2: Expanded Uncertainty List

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

Parameter	Uncertainty	Actual (+/-)	Unit
Radio Frequency	±1 x 10^{-7}	8.64E-08	parts
RF Power conducted (up to 160 W)	±0.75 dB	0.3	dB
Conducted RF Power variations using a test fixture	±0.75 dB	0.3	dB
Transmitter transient frequency (frequency difference)	±250 Hz	160.7	Hz
Transmitter transient time	±20 %	9.2	%

3 Test Equipment

Table 3 shows a list of the test equipment used for measurements along with the calibration information.

Table 3: Test Equipment List

Test Name: **Radiated Emissions**			Test Date: **07/15/2016**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
Rental	AGILENT - E7405A	EMC ANALYZER	09/28/2016
644	SUNOL SCIENCES CORPORATION - JB1 925-833-9936	BICONALOG ANTENNA	8/14/2017
4	ARA - DRG-118/A	ANTENNA DRG 1-18GHZ	10/8/2016
627	AGILENT - 8449B	AMPLIFIER 1-26GHZ	7/30/2016
559	HP - 8447D	AMPLIFIER	7/30/2016
453	AH SYSTEMS - PAM1840	PRE-AMPLIFIER 18GHZ-40 GHZ	7/30/2016
209	NARDA - V637	HORN STANDARD GAIN	CNR

Test Name: **Bench Tests**			Test Date: **7/13/2016**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
823	AGILENT - N9010A	EXA SPECTRUM ANALYZER	8/5/2016
528	AGILENT - E4446A	3HZ - 44GHZ ANALYZER SPECTRUM	8/17/2016

4 Test Summary

The Table Below shows the results of testing for compliance with a Digital Transmission System in accordance with FCC Part 15.247 10/2014. Full results are shown in section 5.

Table 4: Test Summary Table

FCC Rule Part	Description	Result
15.247(a) (2)	6dB Bandwidth	Pass
15.247 (b)(3)	Transmit Output Power	Pass
15.247 (e)	Power Spectral Density	Pass
15.247 (d)	/Out-of-Band Emissions (Band Edge @ 20dB below)	Pass
15.205 15.209	General Field Strength Limits (Restricted Bands & RE Limits)	Pass
15.207	AC Conducted Emissions	NA

5 Test Results

5.1 Occupied (DTS) Bandwidth:

Occupied bandwidth was performed by monitoring the output of the EUT antenna port with a spectrum analyzer corrected for any cable/attenuator losses.

For Direct Sequence Spread Spectrum Systems, FCC Part 15.247 requires the minimum 6 dB bandwidth be at least 500 kHz.

5.1.1 Measurement Method:

Tests were performed as specified in ANSI C63.10 section 11.8 "DTS bandwidth" Option 1 (11.8.1).

Table 5: Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
100kHz	1MHz

At full modulation, the occupied bandwidth was measured as shown in Figures 1-3.

Table 6 provides a summary of the Occupied Bandwidth Results.

Table 6: Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
Low Channel: 2402MHz	811kHz	≥500kHz	Pass
Center Channel: 2440MHz	858kHz	≥500kHz	Pass
High Channel: 2480MHz	806kHz	≥500kHz	Pass

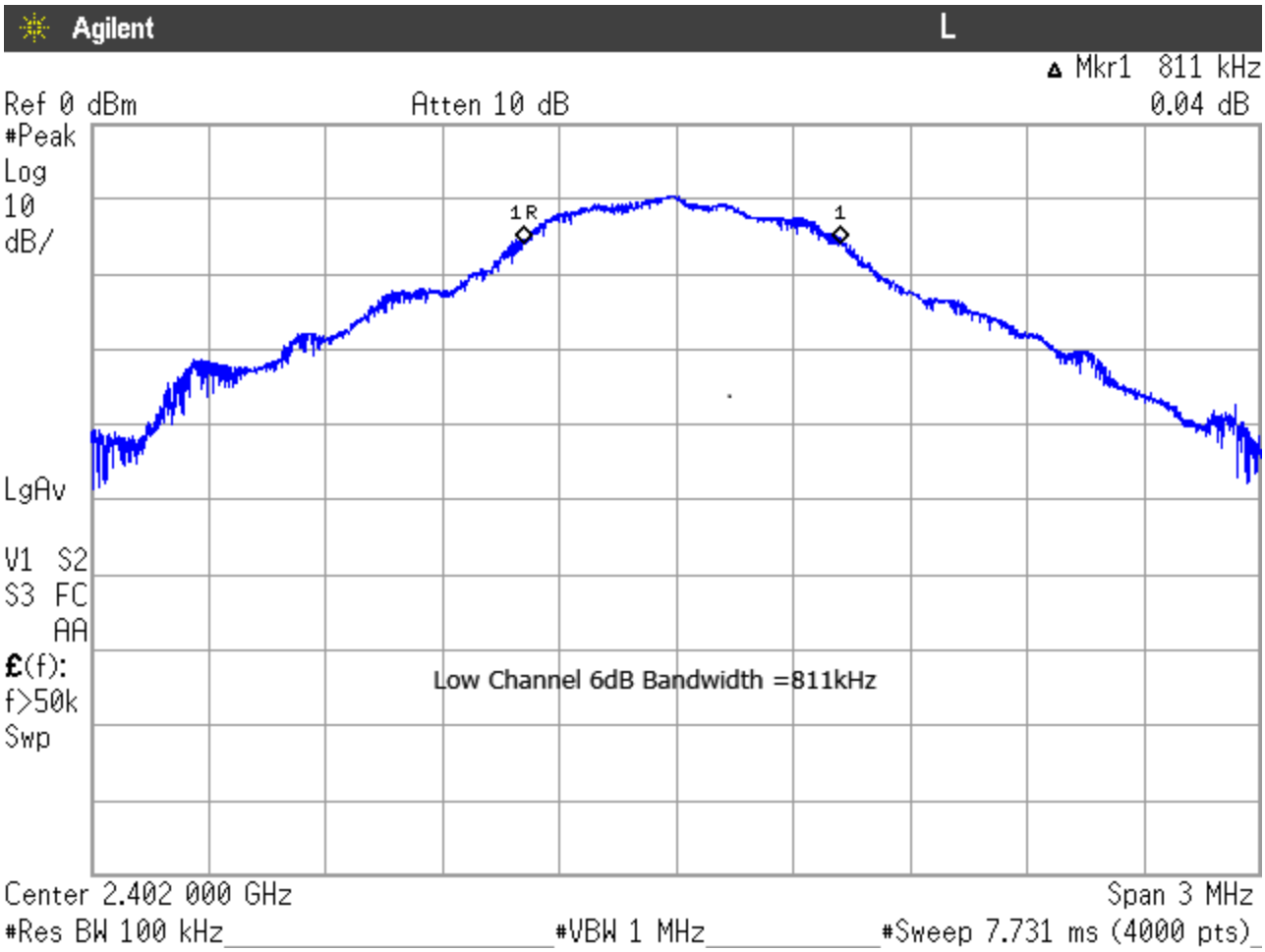

Figure 1: Occupied Bandwidth, Low Channel

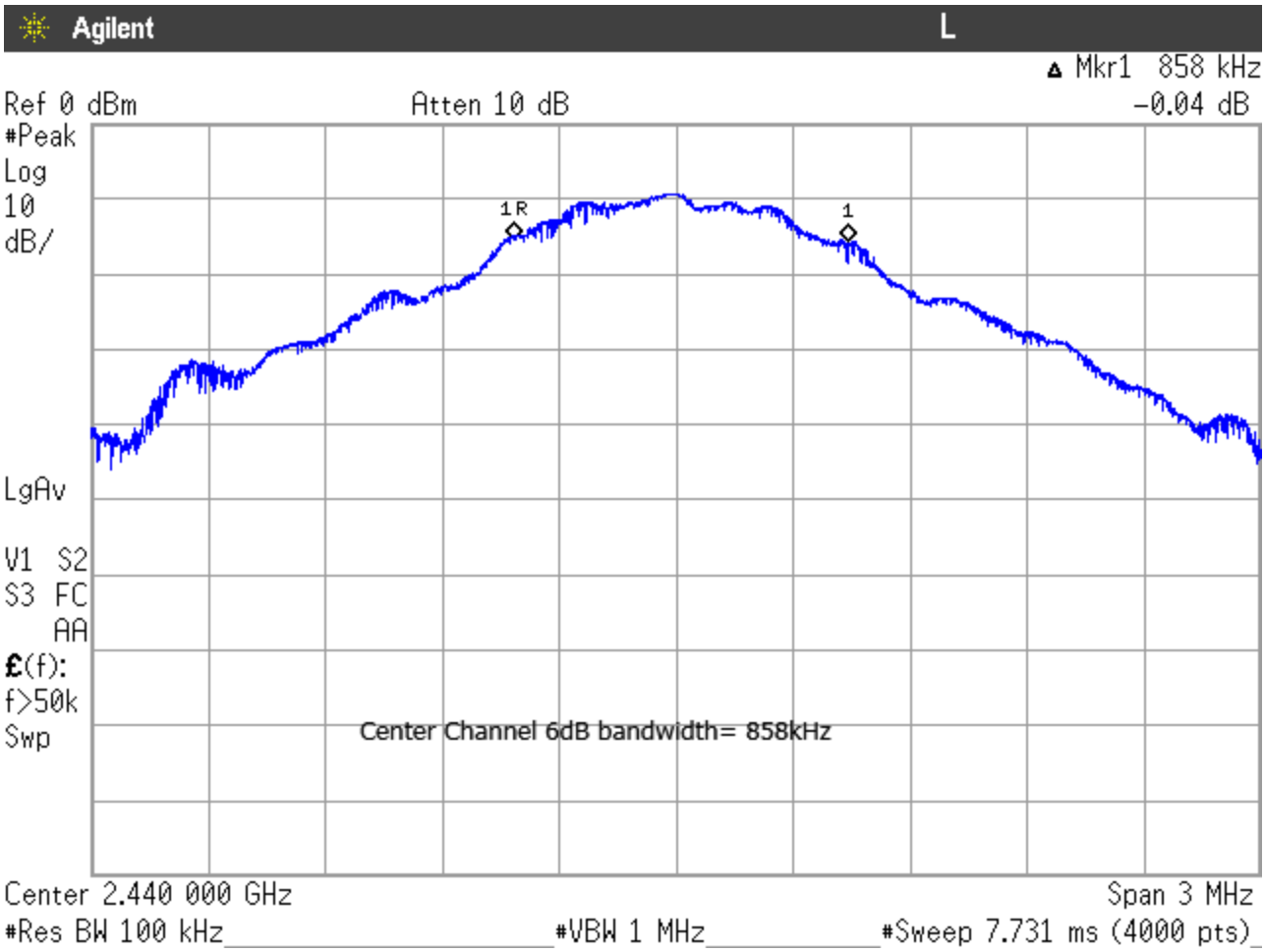

Figure 2: Occupied Bandwidth, Center Channel

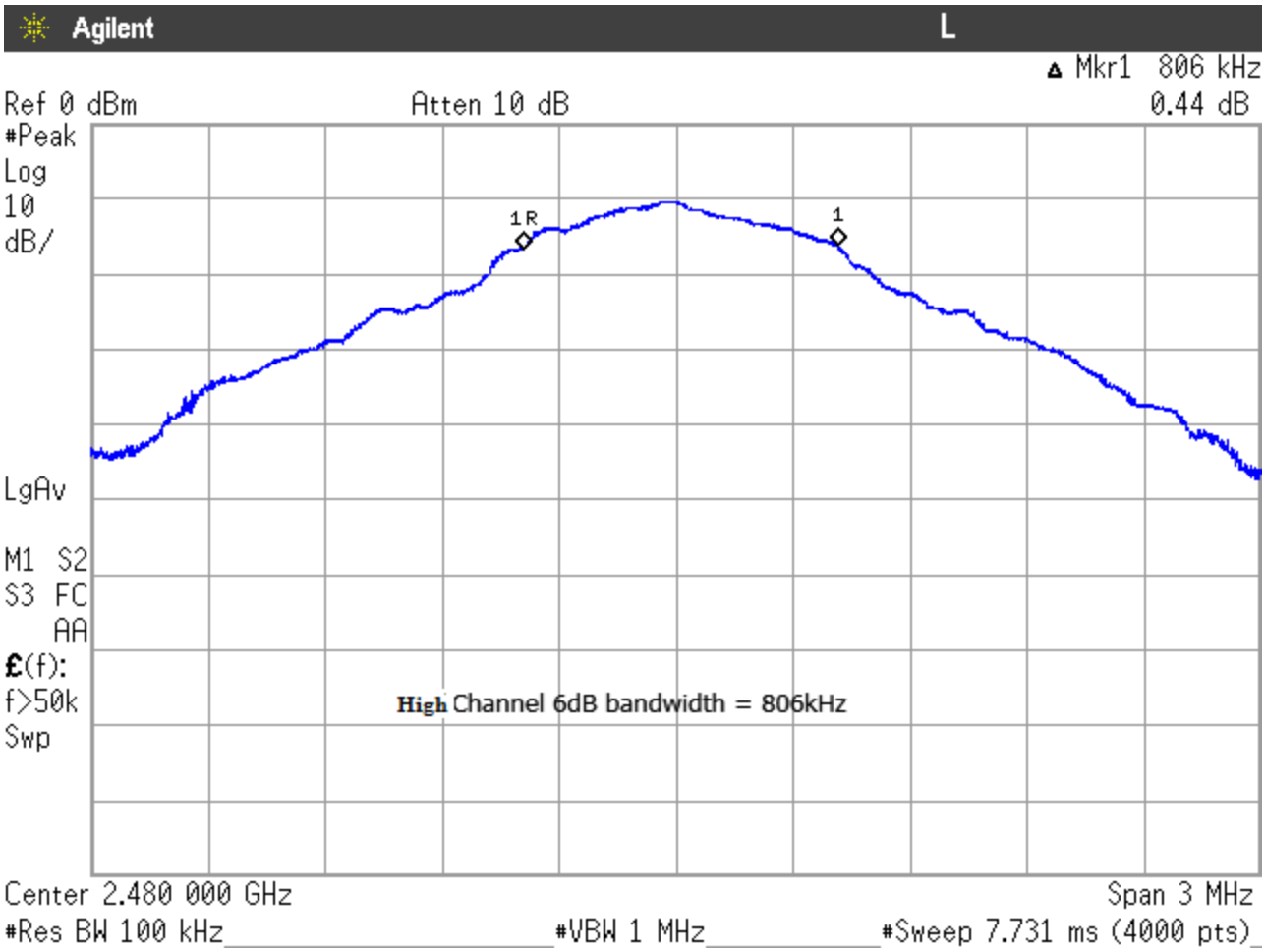

Figure 3: Occupied Bandwidth, High Channel

5.2 RF Power Output:

To measure the output power the unit was set to dwell on the low, high and middle channel. Testing was performed using the method from C63.10 section 11.9.1.1 "RBW ≥ DTS bandwidth" at the antenna port as follows:

a) Set the RBW ≥ DTS bandwidth.

b) Set VBW ≥ [3 × RBW].

c) Set span ≥ [3 × RBW].

d) Sweep time = auto couple.

e) Detector = peak.

f) Trace mode = max hold.

g) Allow trace to fully stabilize.

h) Use peak marker function to determine the peak amplitude level..

5.2.1 Measurement Method:

ANSI C63.10 section "11.9.1 Maximum peak conducted output power" subsection "11.9.1.1 RBW > DTS bandwidth"

Table 7: Spectrum Analyzer Settings

Resolution Bandwidth	Video Bandwidth
1MHz	3MHz

Table 8: RF Power Output Summary

Frequency	Level	Limit	Pass/Fail
Low Channel: 2402MHz	1.96 dBm	30 dBm	Pass
Center Channel: 2440MHz	1.76 dBm	30 dBm	Pass
High Channel: 2480MHz	1.94 dBm	30 dBm	Pass

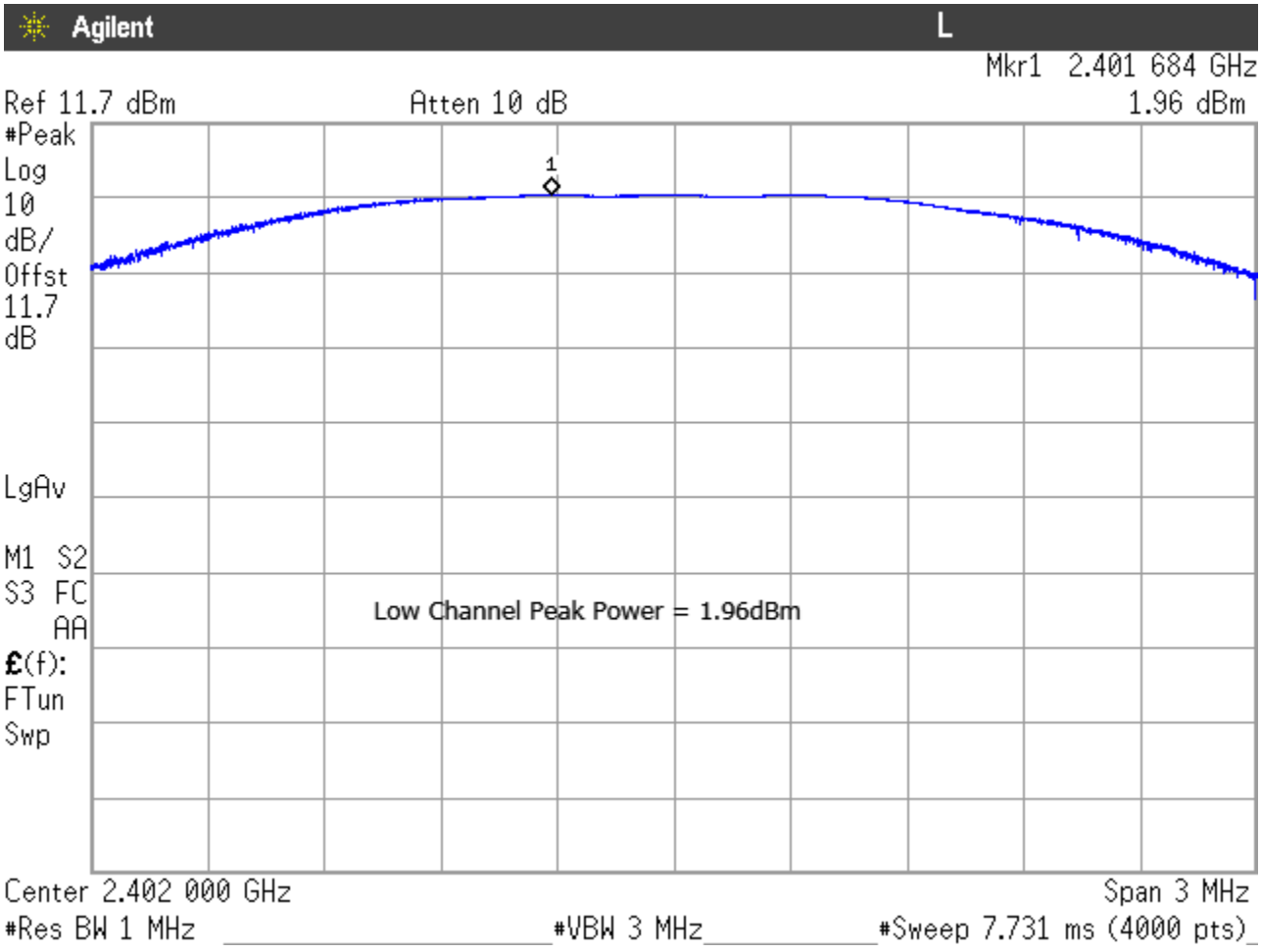

Figure 4: RF Peak Power, Low Channel

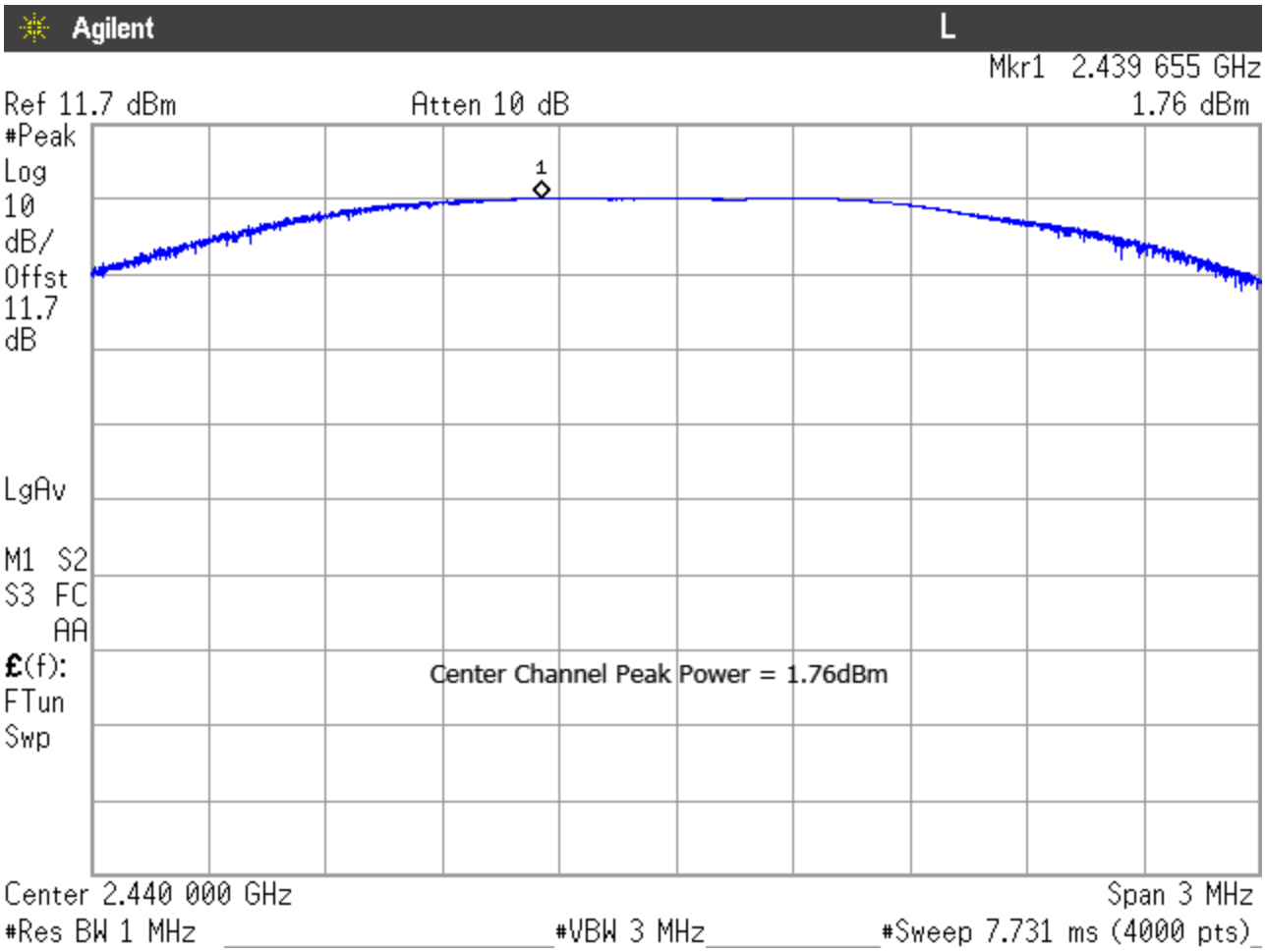

Figure 5: RF Peak Power, Center Channel

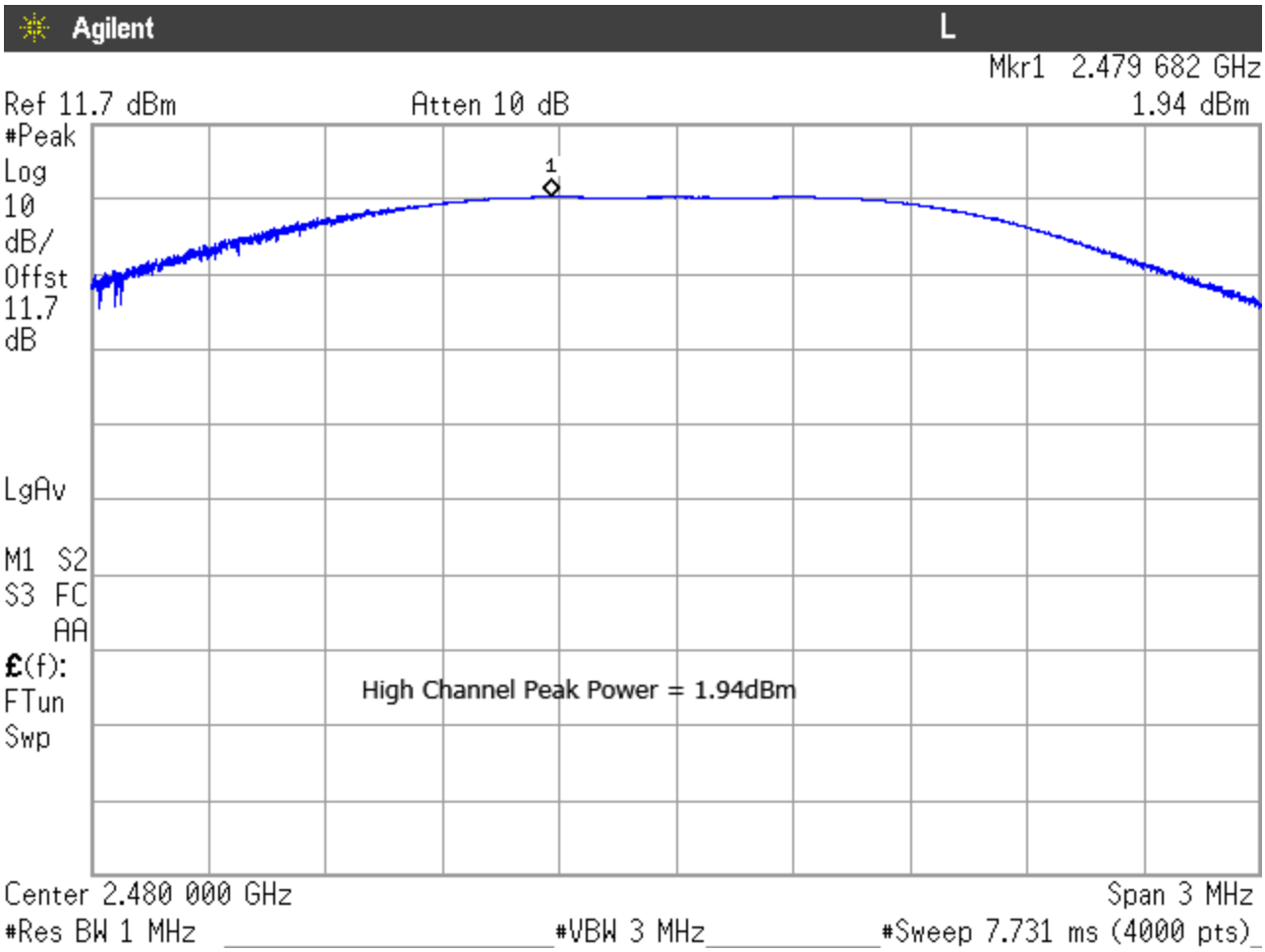

Figure 6: RF Peak Power, High Channel

5.3 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 100kHz ,VBW of 300kHz across a span 1.5X the DTS bandwidth using an auto sweep time..

5.3.1 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 9: Power Spectral Density

Frequency	Peak Level	Limit	Pass/Fail
Low Channel: 2402MHz	1.69 dBm	8 dBm	Pass
Center Channel: 2440MHz	1.56 dBm	8 dBm	Pass
High Channel: 2480MHz	1.69 dBm	8 dBm	Pass

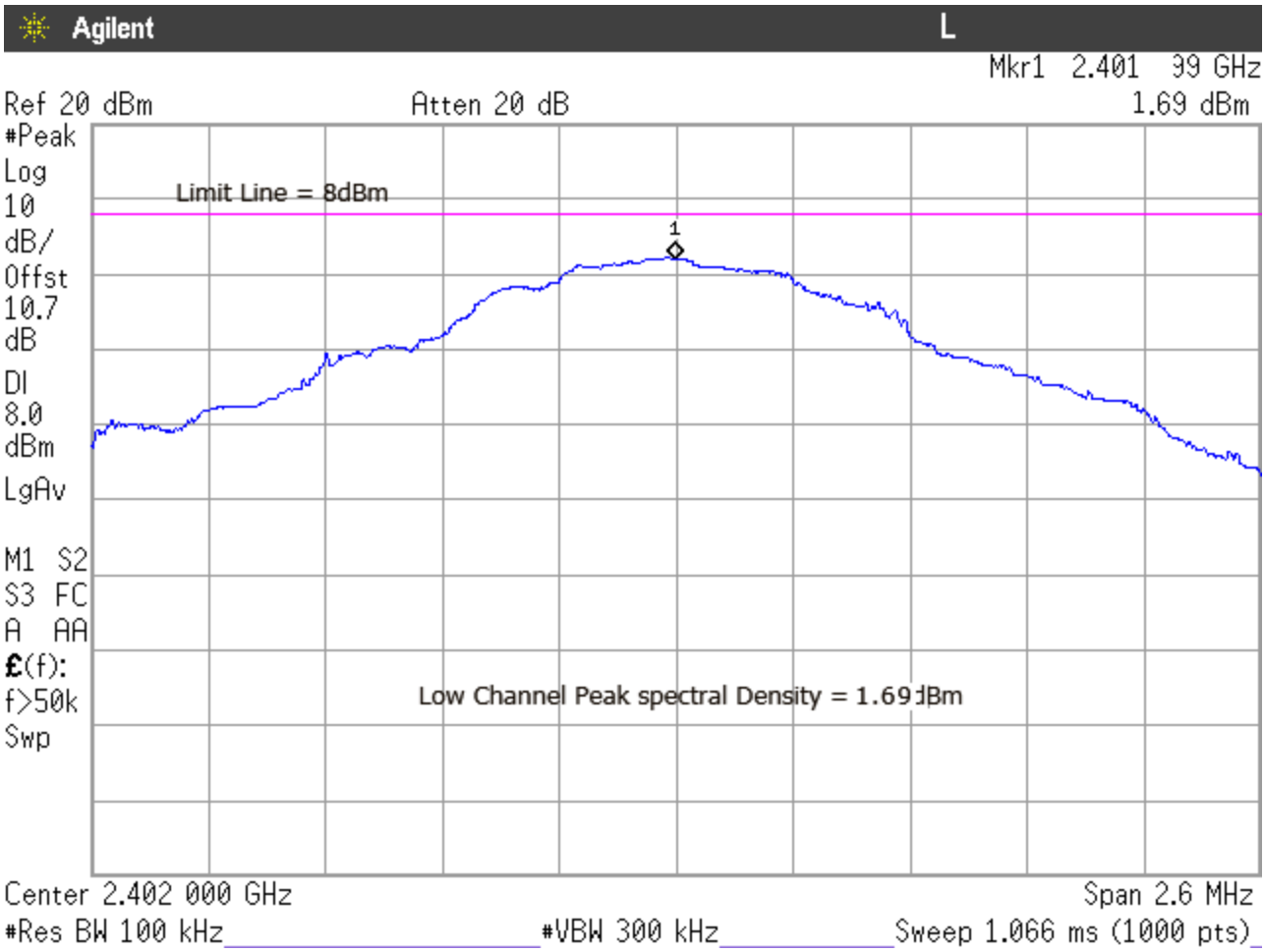

Figure 7: Power Spectral Density, Low Channel

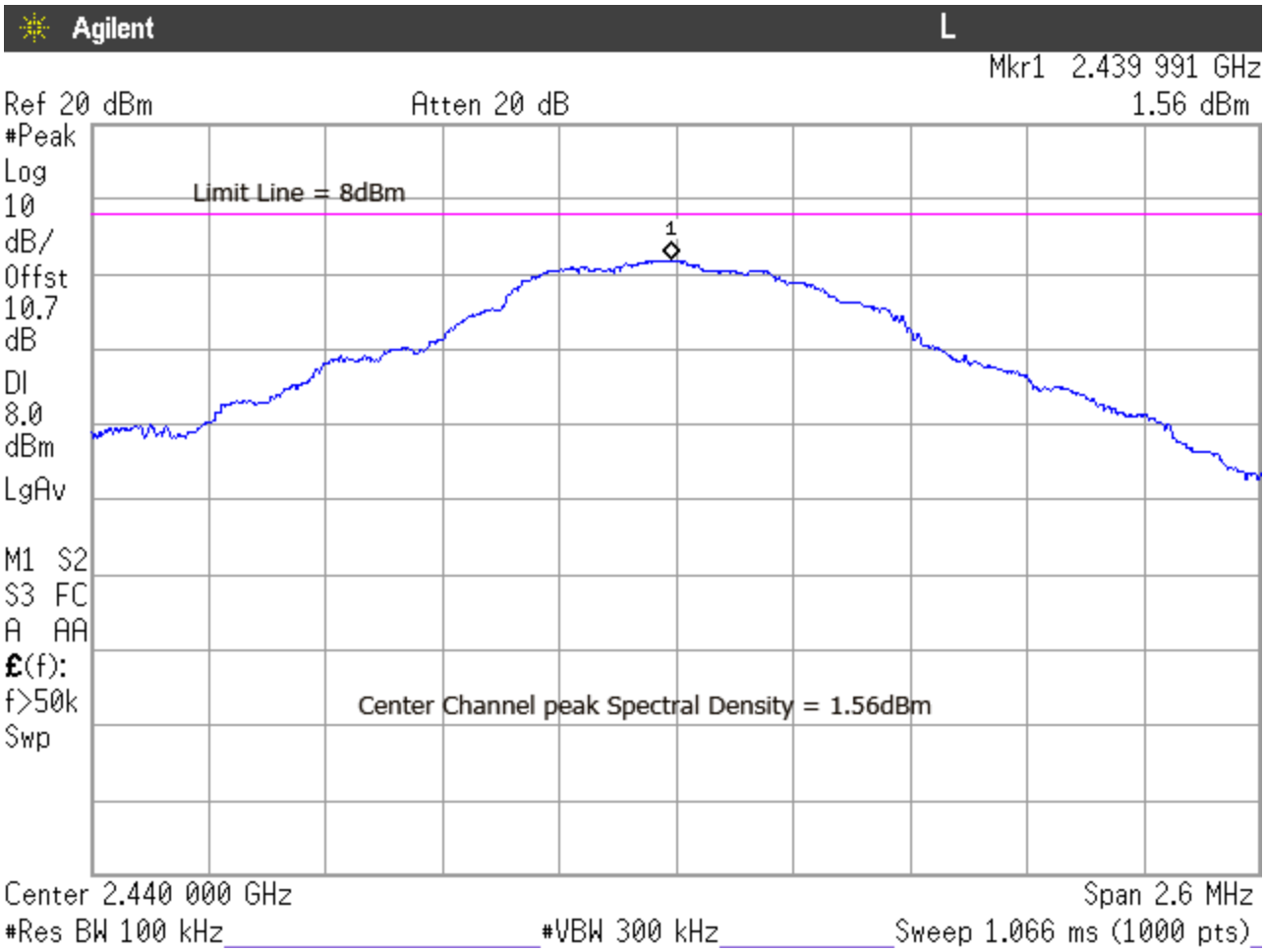

Figure 8: Power Spectral Density, Center Channel

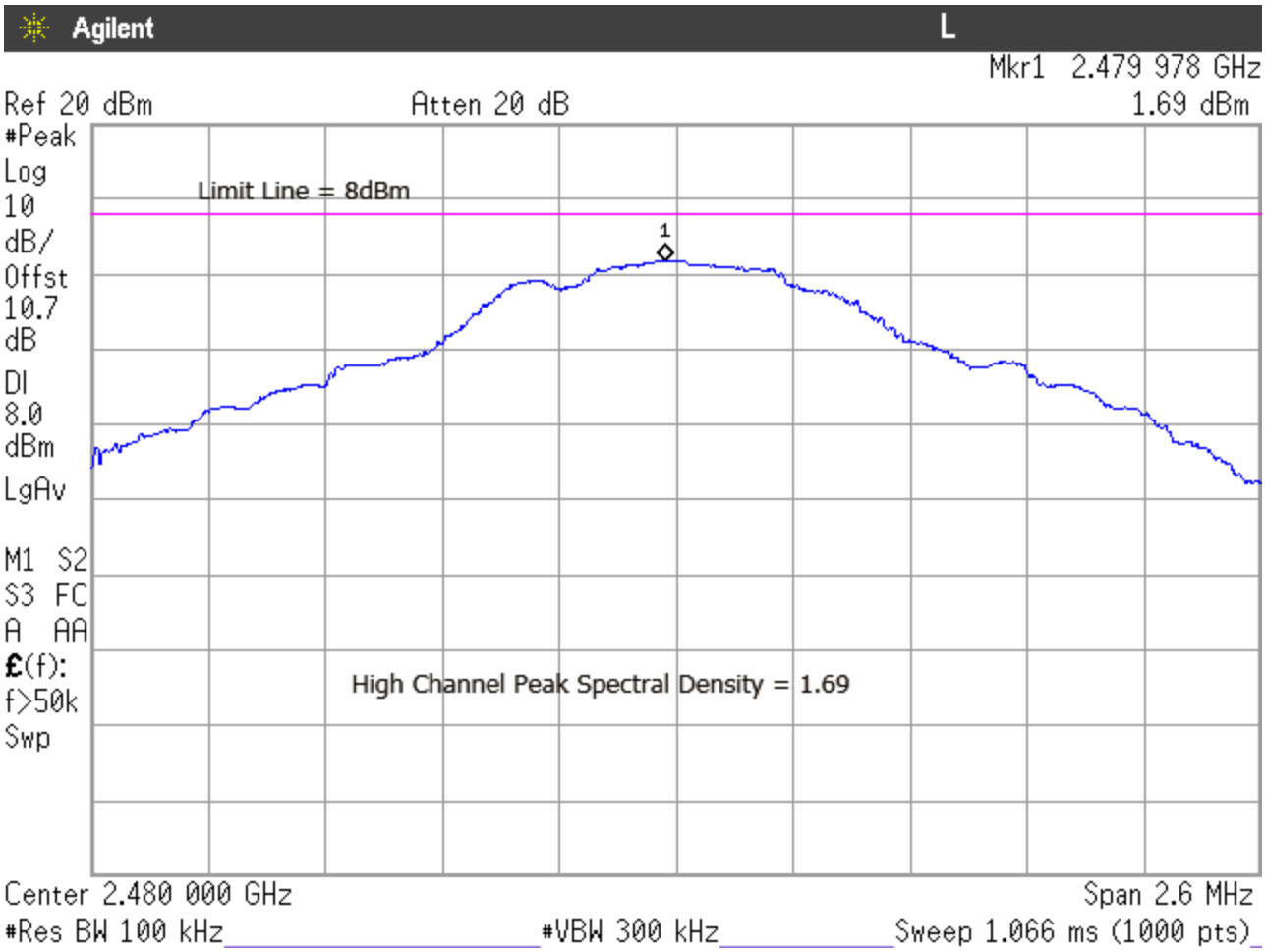

Figure 9: Power Spectral Density, High Channel

5.4 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.

As per ANSI C63.10 section 11.11.2 the Center channel has the highest PSD and the limit for all channels was based on this level.

The following table shows the spurious emissions data.

5.4.1 Test Summary

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

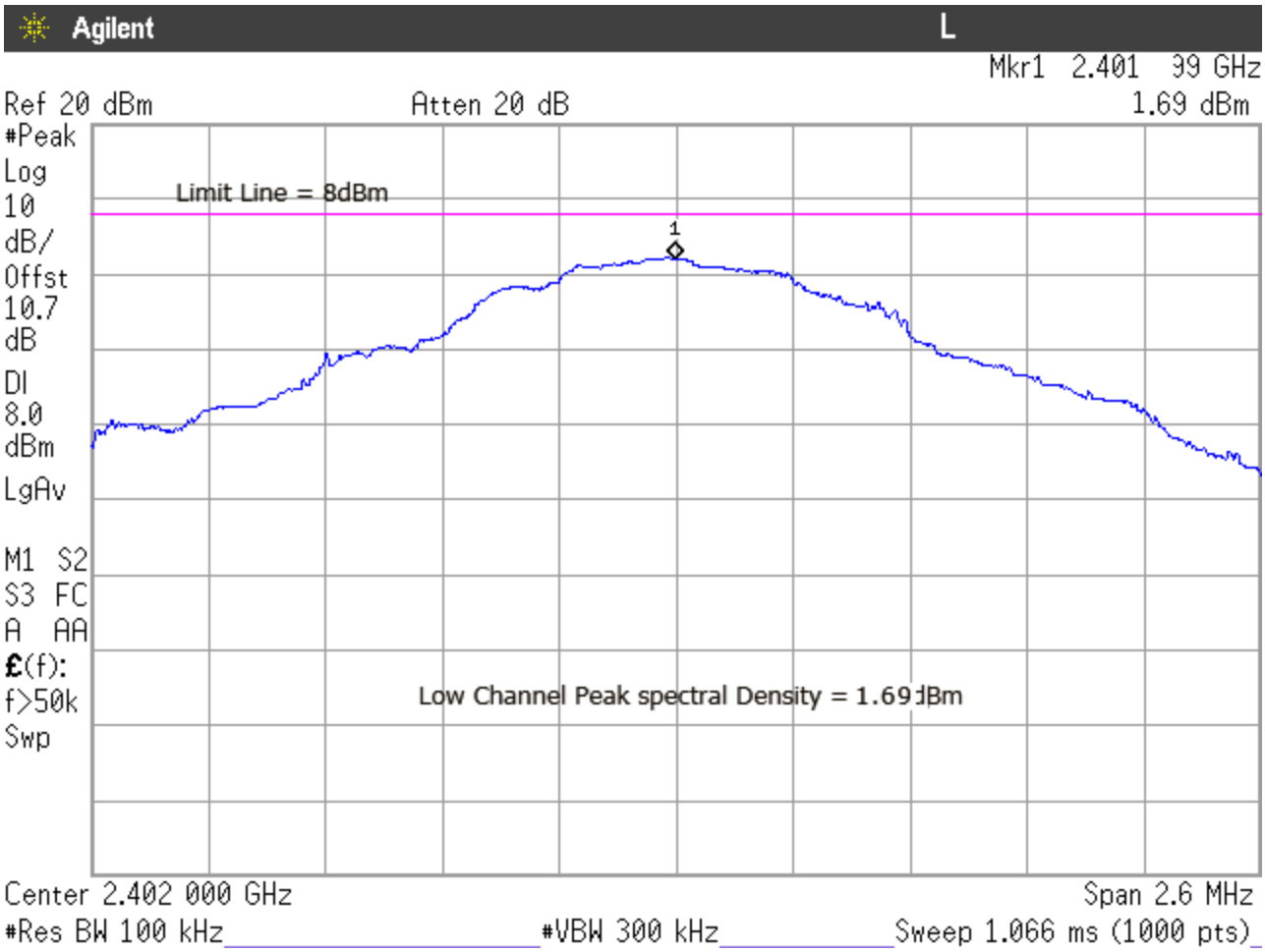

Figure 10: Highest PSD Level (Low channel)

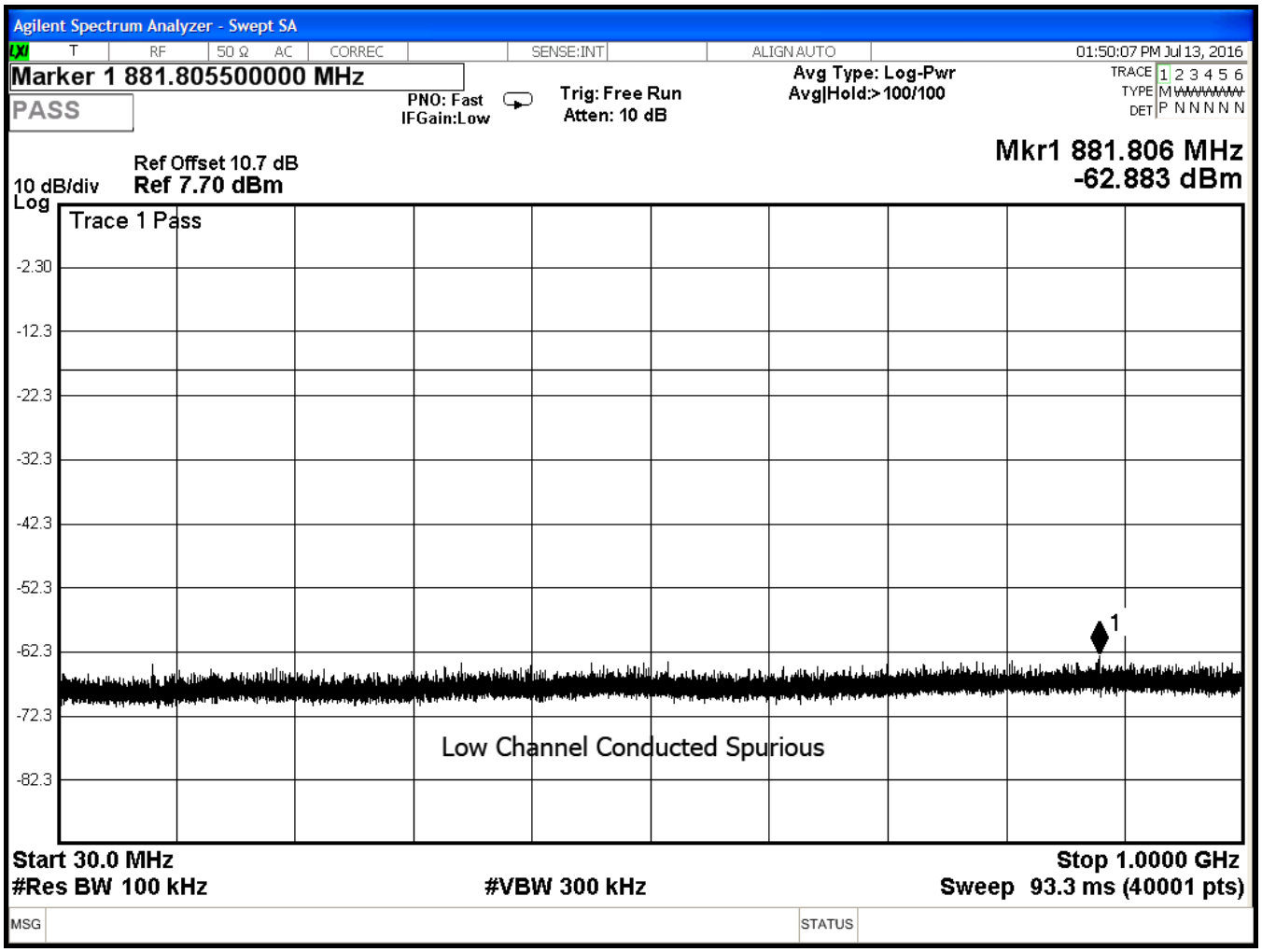

Figure 11: Low Channel Conducted Spurious Plot 1

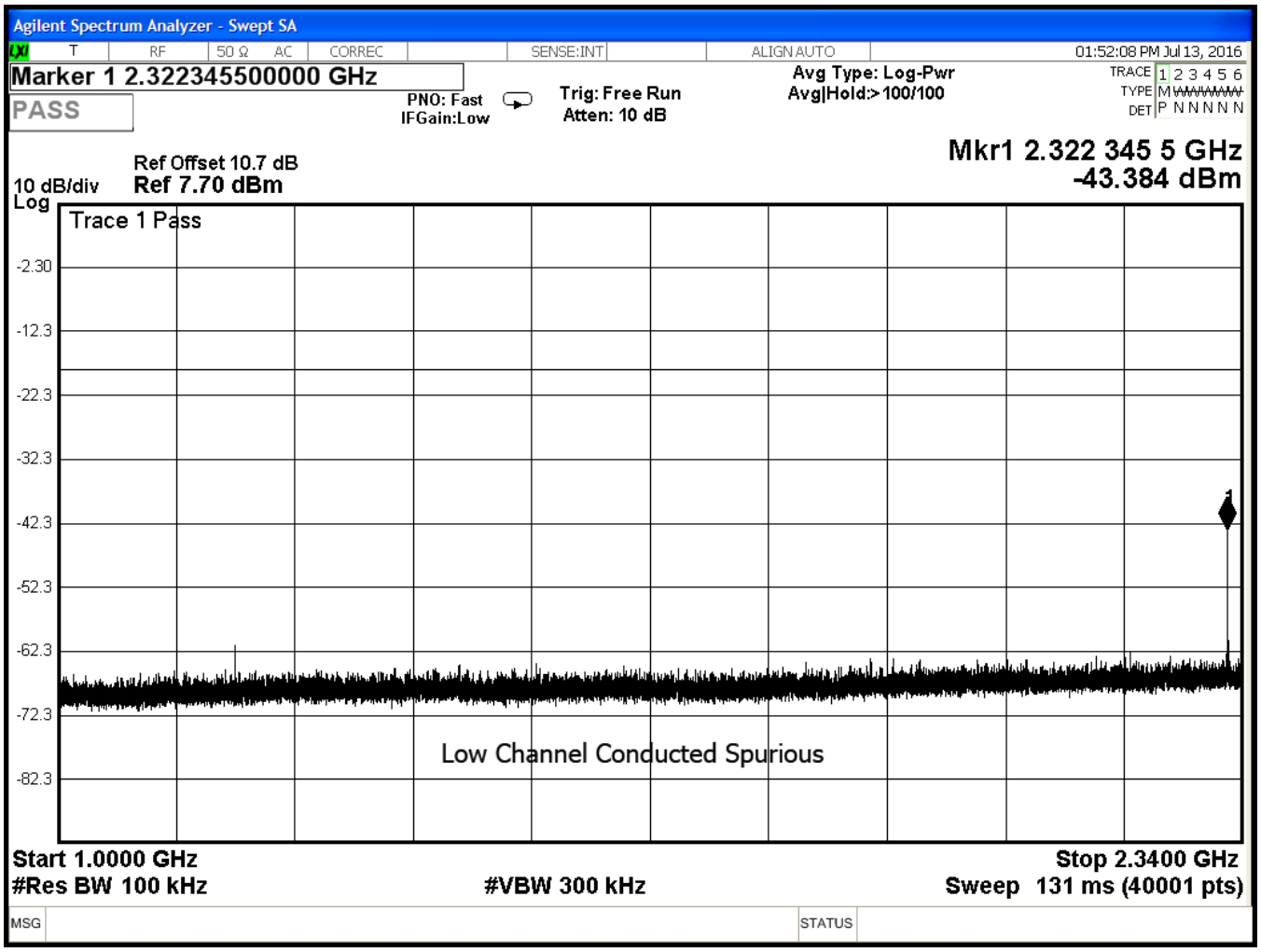

Figure 12: Low Channel Conducted Spurious Plot 2

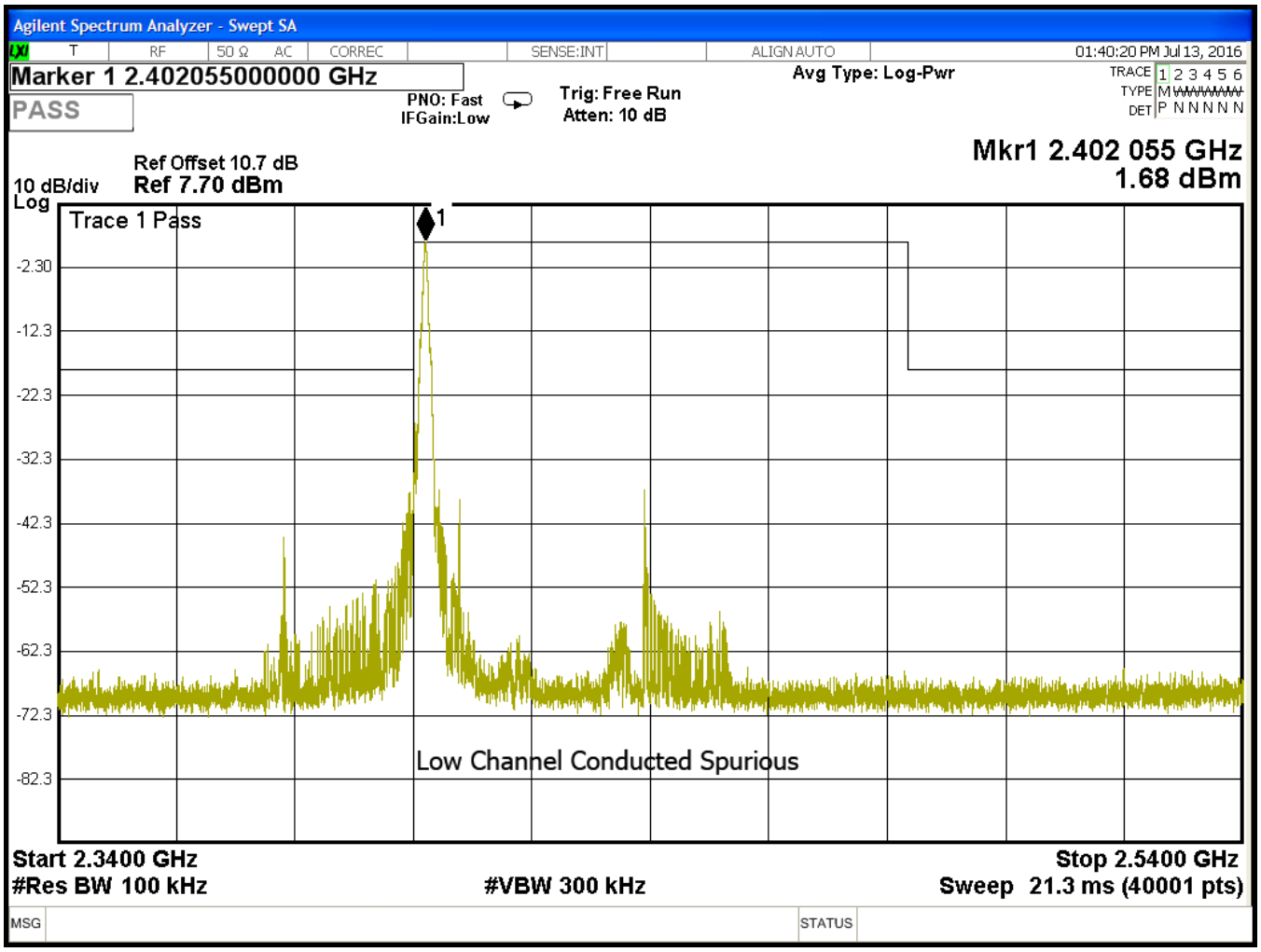

Figure 13: Low Channel Conducted Spurious Plot 3

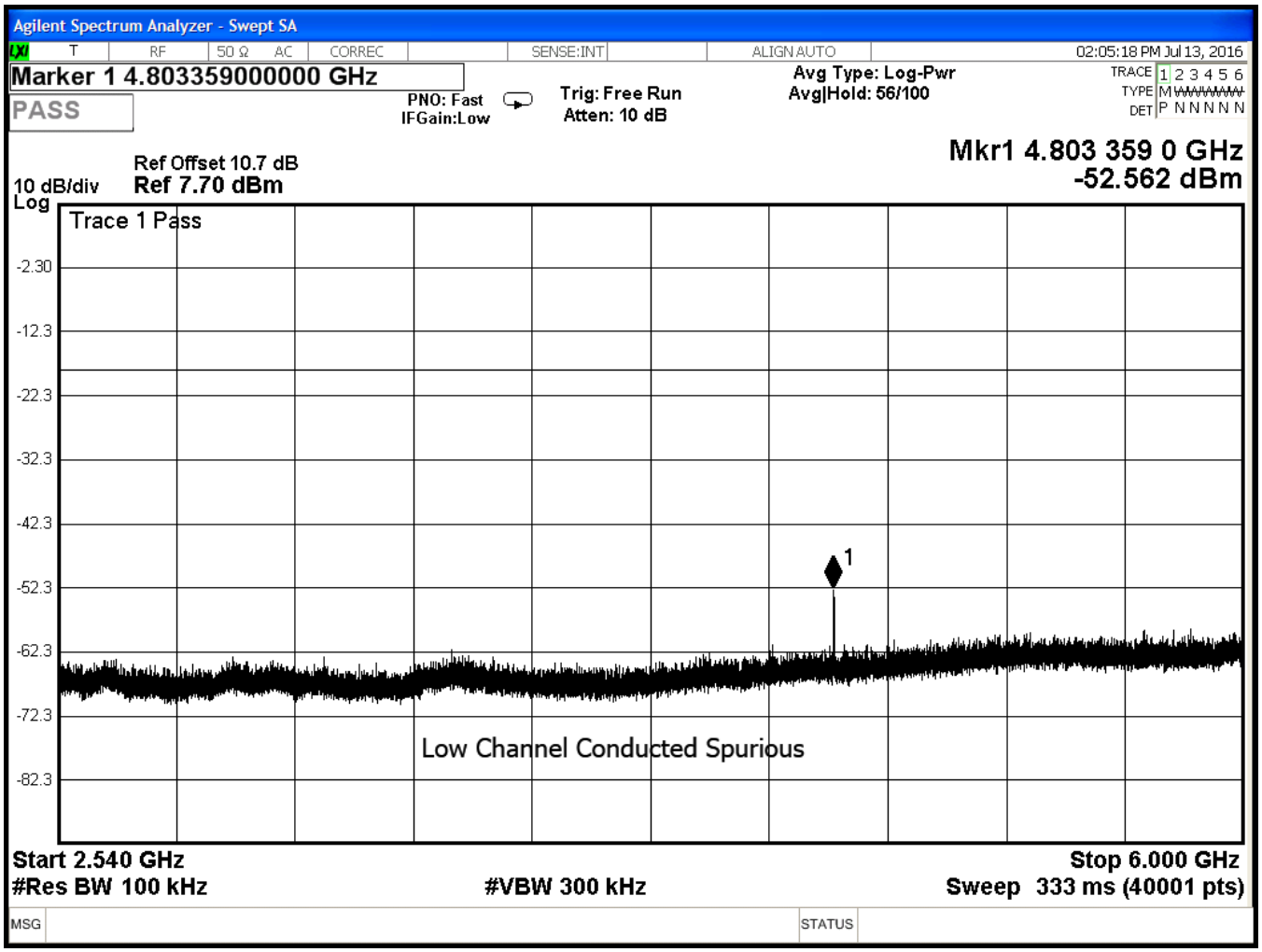

Figure 14: Low Channel Conducted Spurious Plot 4

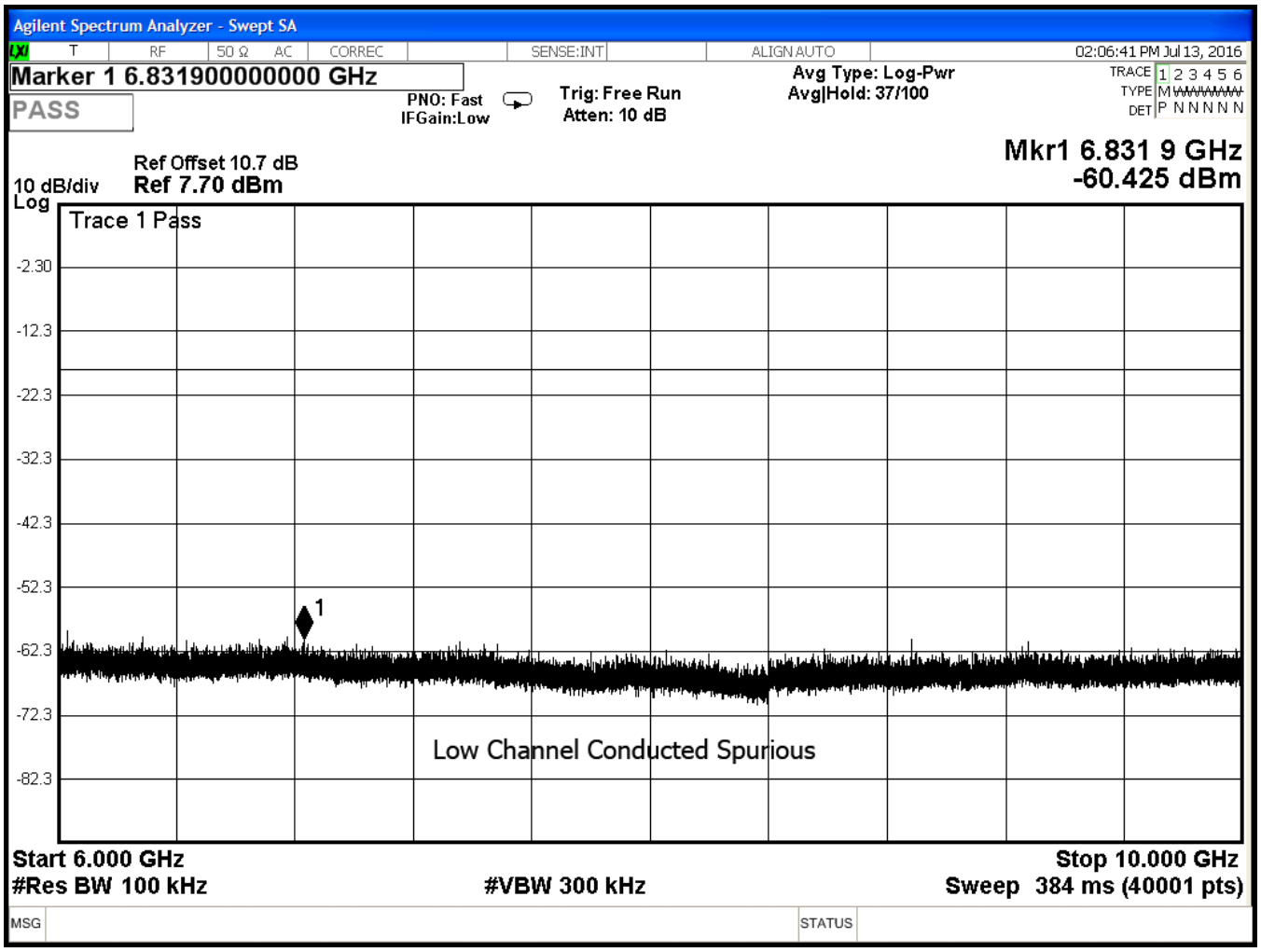

Figure 15: Low Channel Conducted Spurious Plot 5

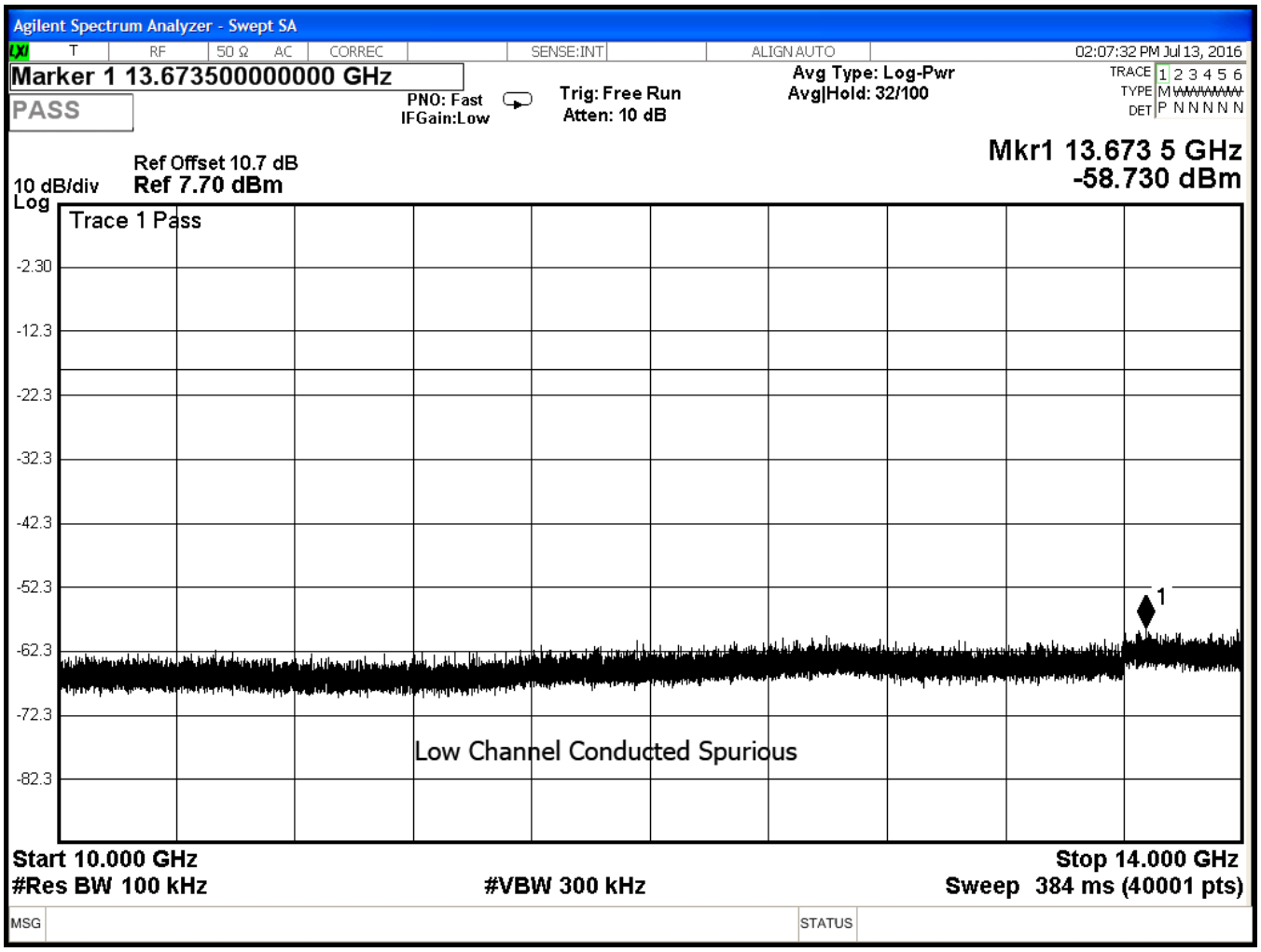

Figure 16: Low Channel Conducted Spurious Plot 6

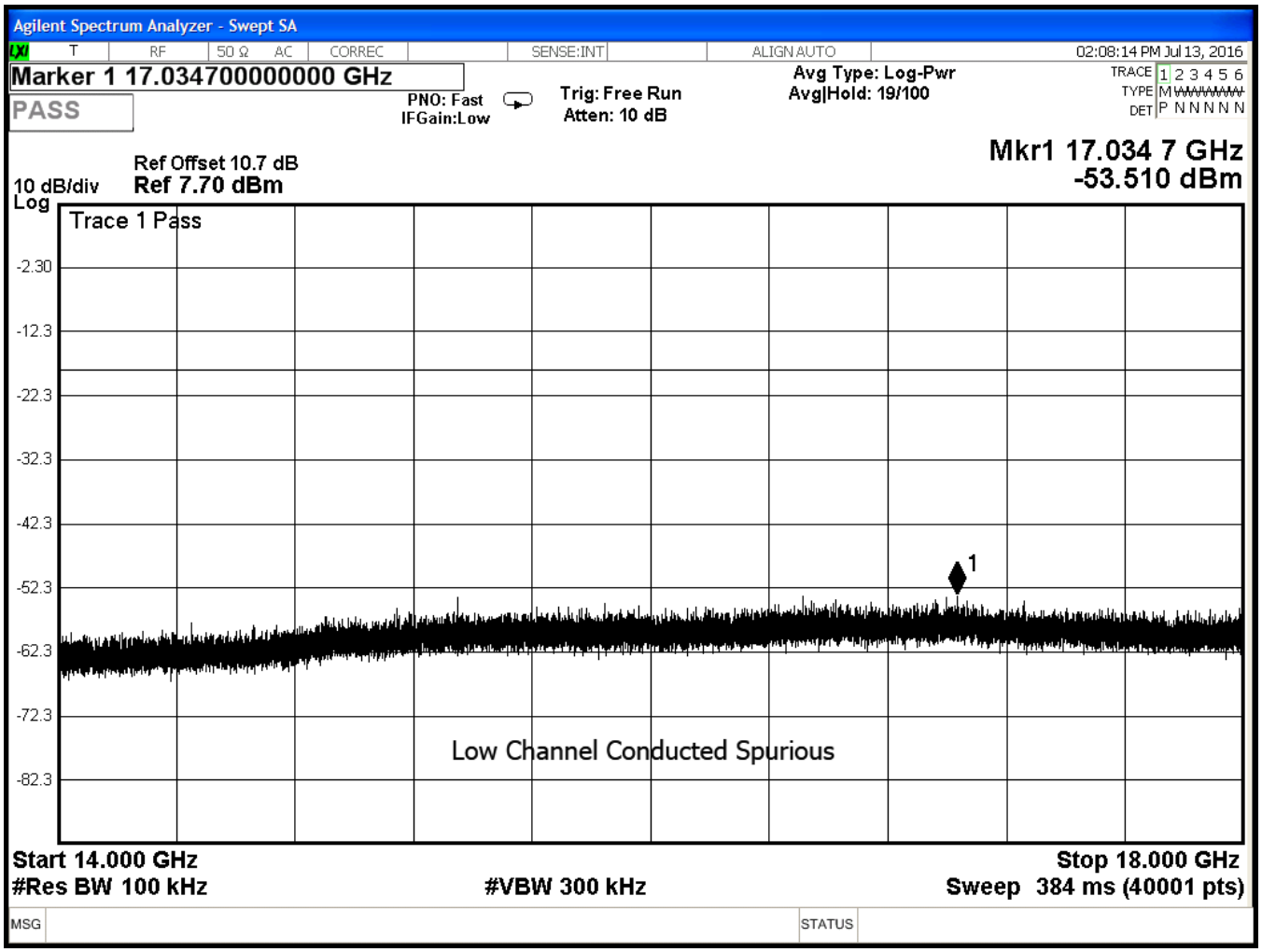

Figure 17: Low Channel Conducted Spurious Plot 7

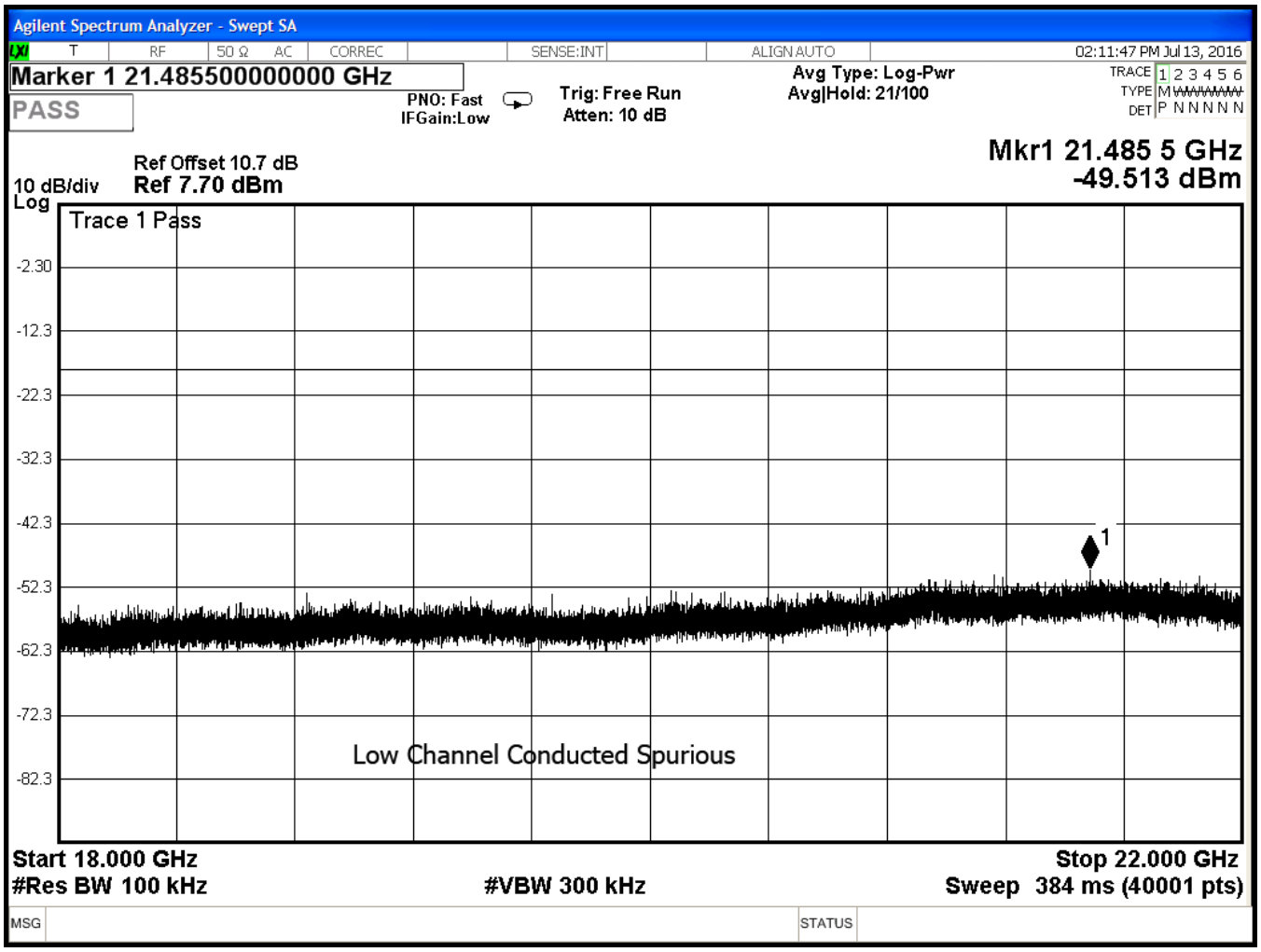

Figure 18: Low Channel Conducted Spurious Plot 8

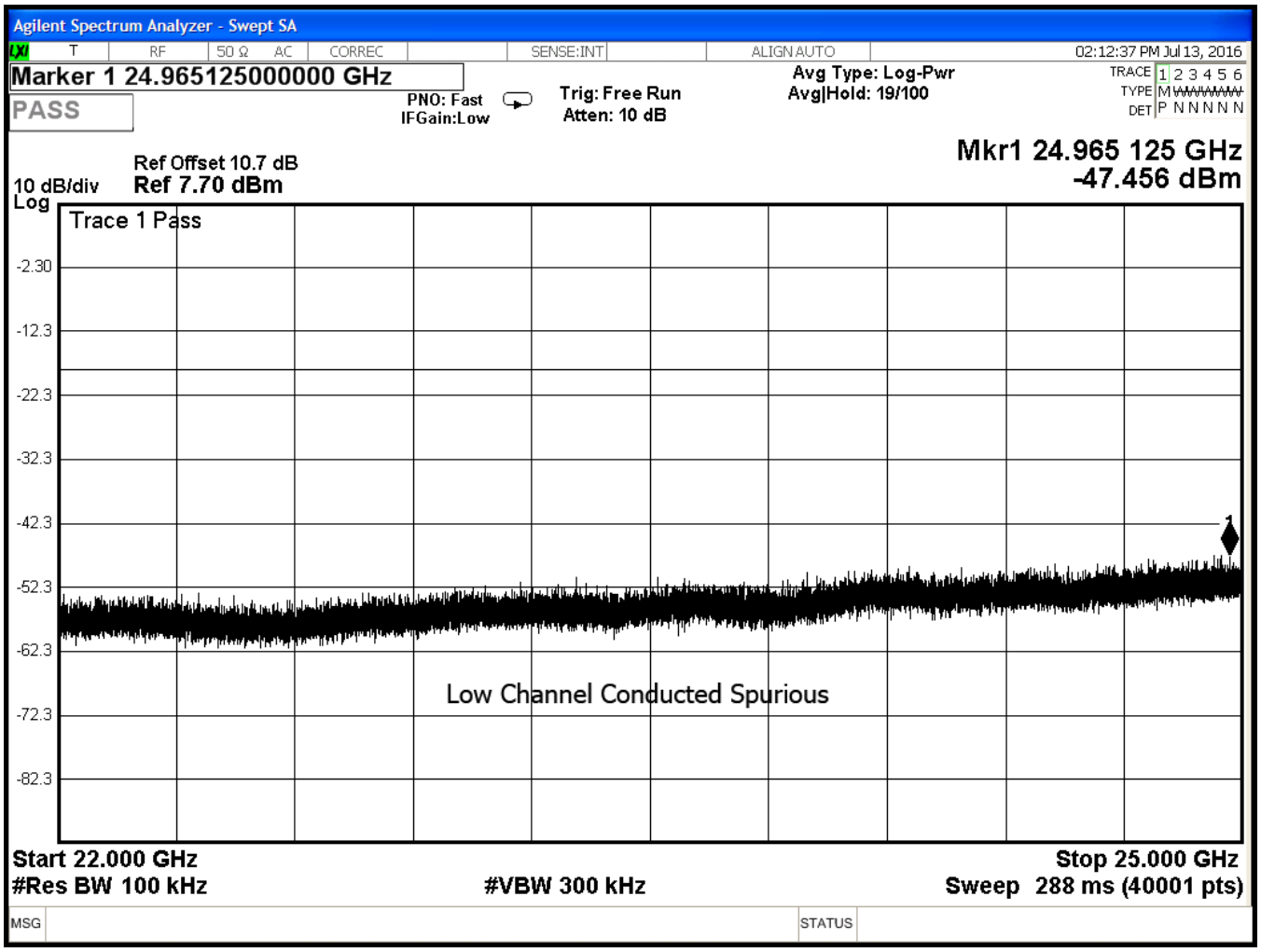

Figure 19: Low Channel Conducted Spurious Plot 9

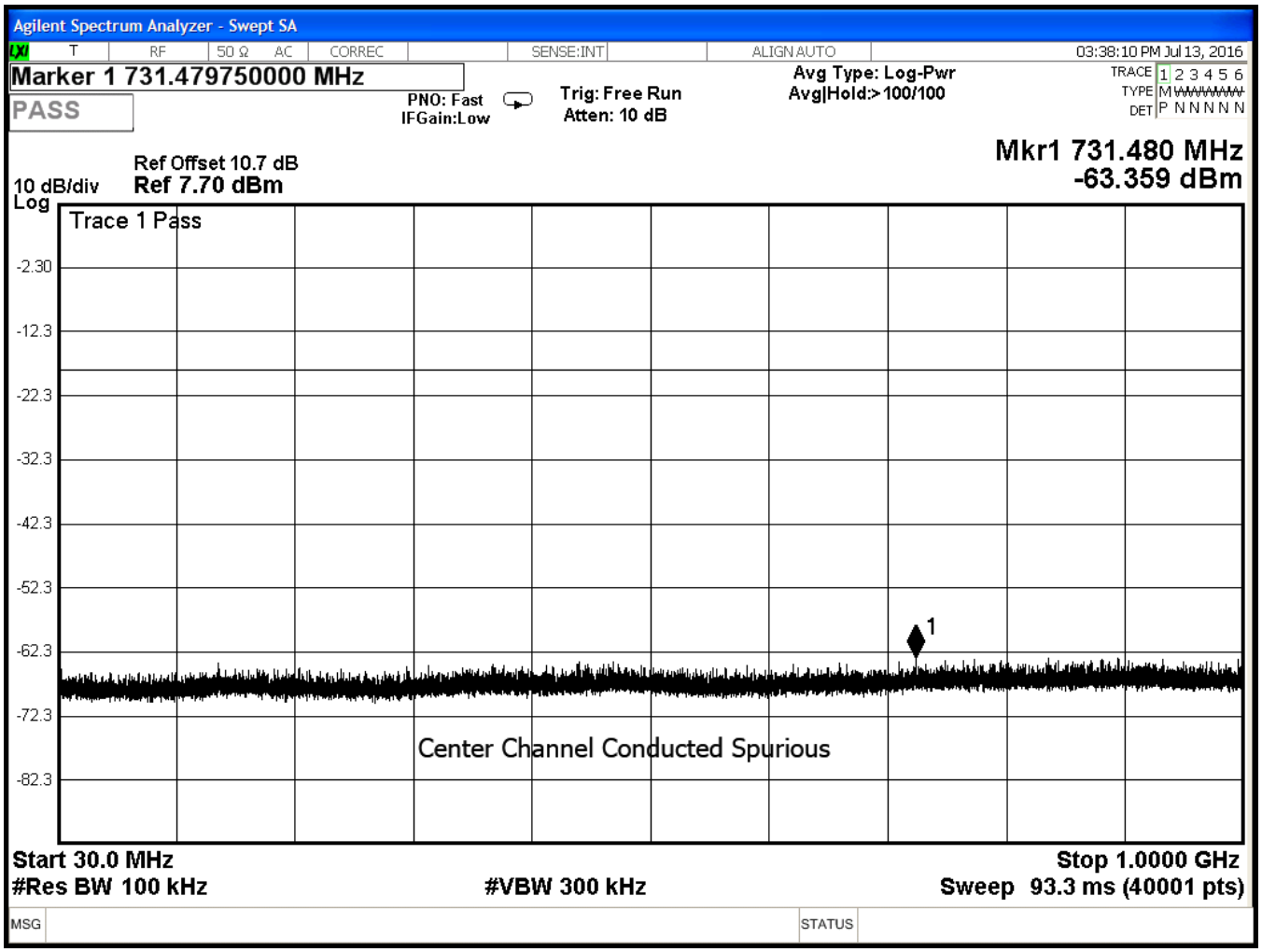

Figure 20: Center Channel Conducted Spurious Plot 1

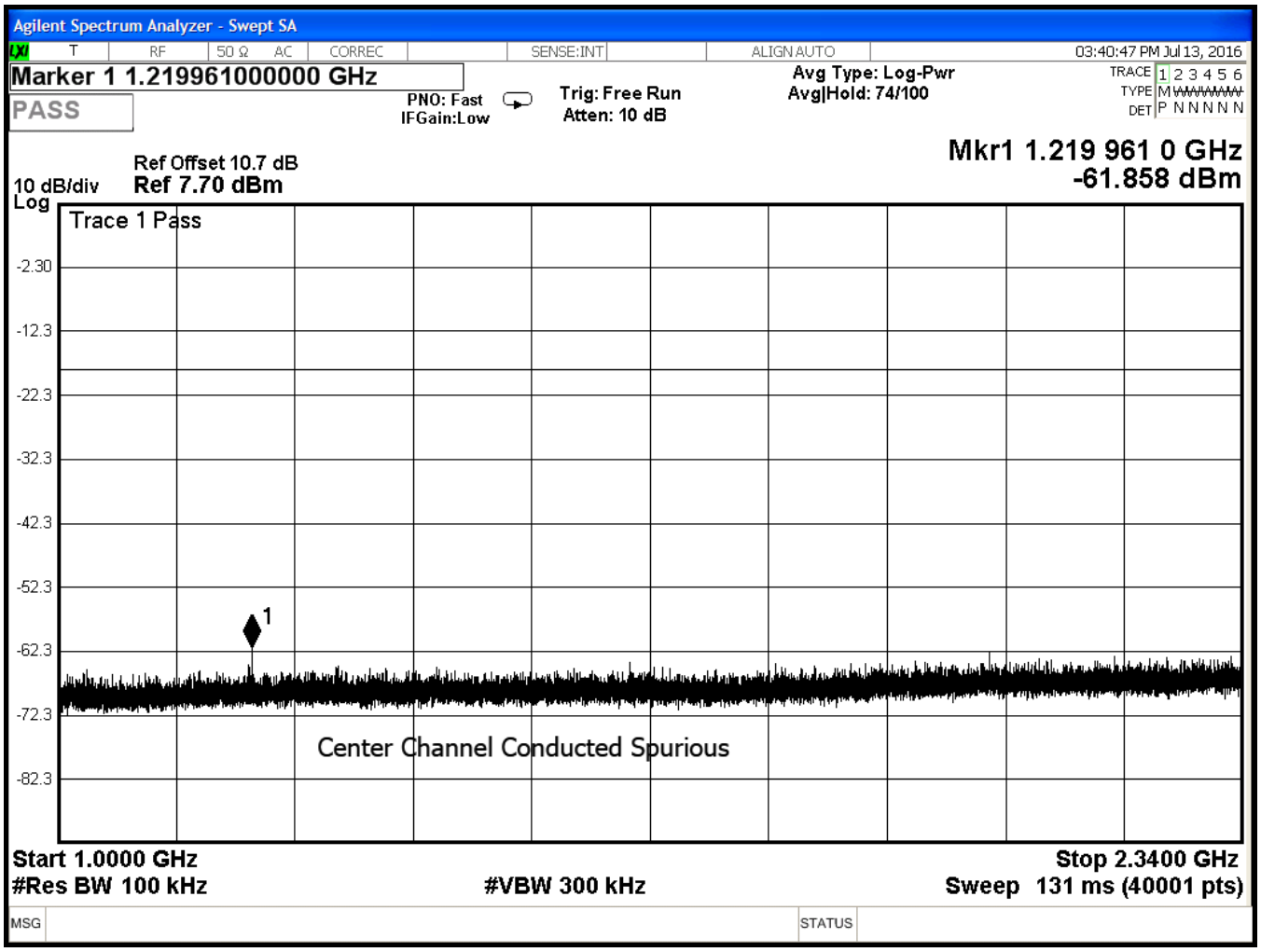

Figure 21: Center Channel Conducted Spurious Plot 2

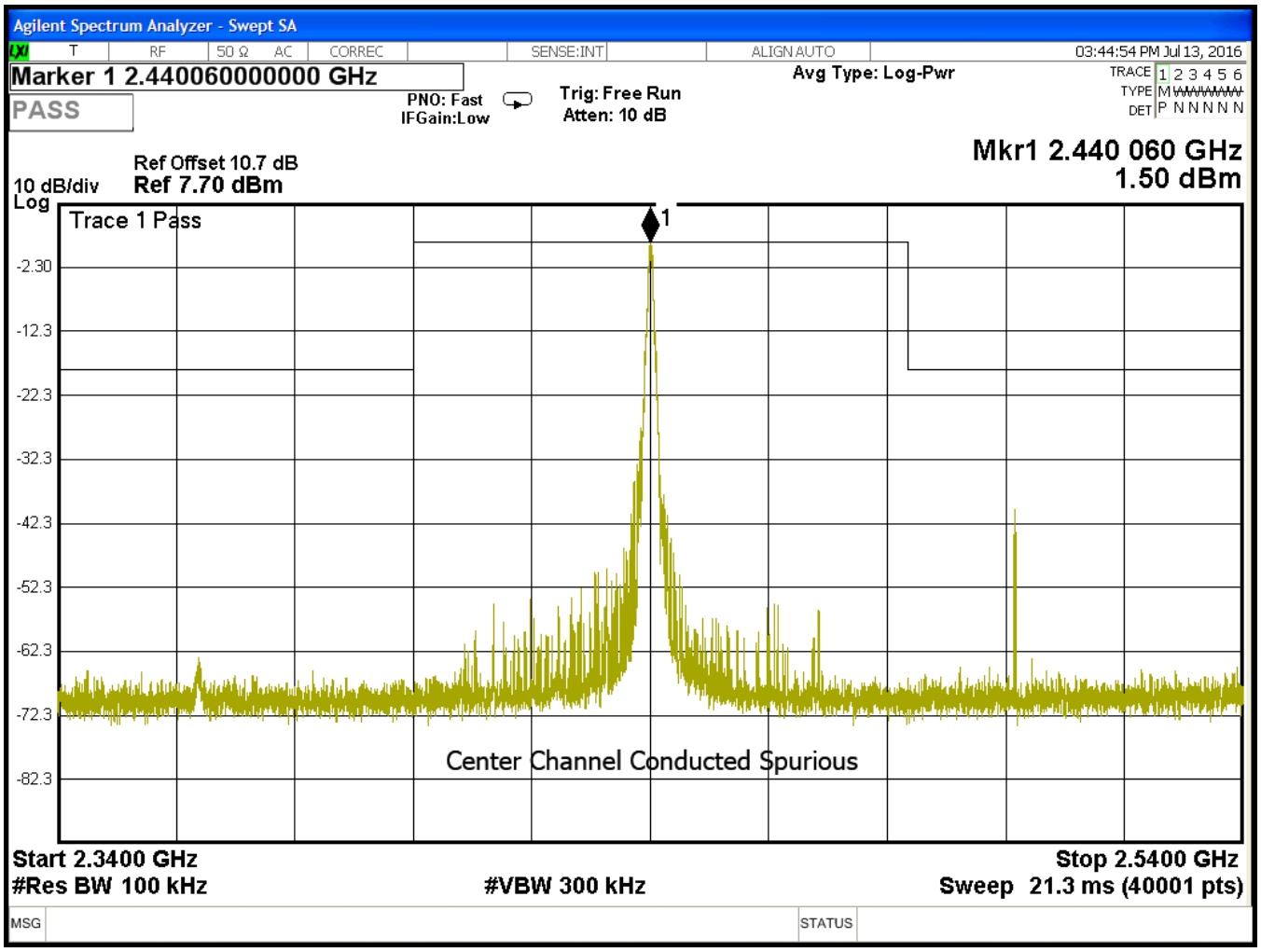

Figure 22: Center Channel Conducted Spurious Plot 3

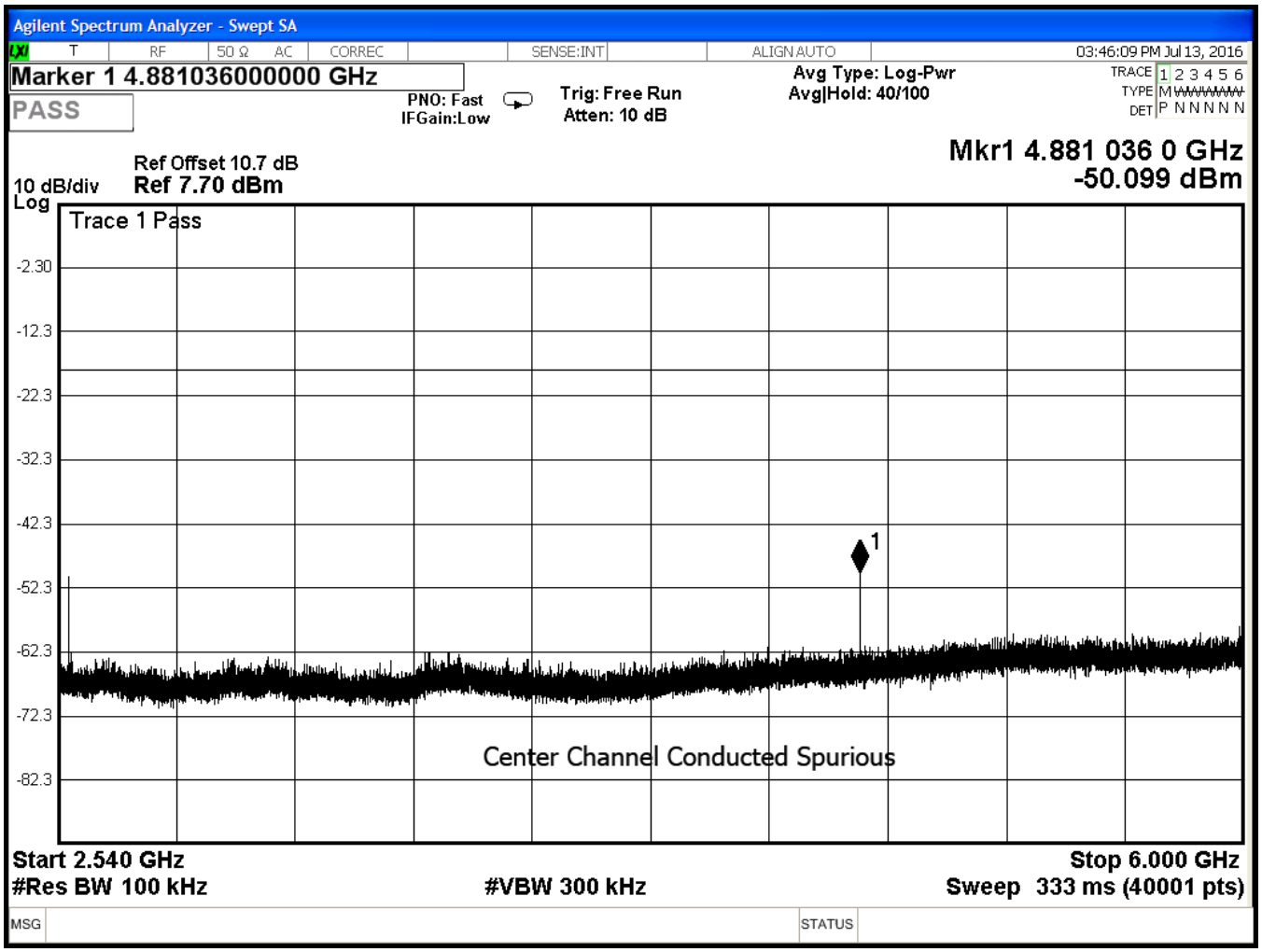

Figure 23: Center Channel Conducted Spurious Plot 4

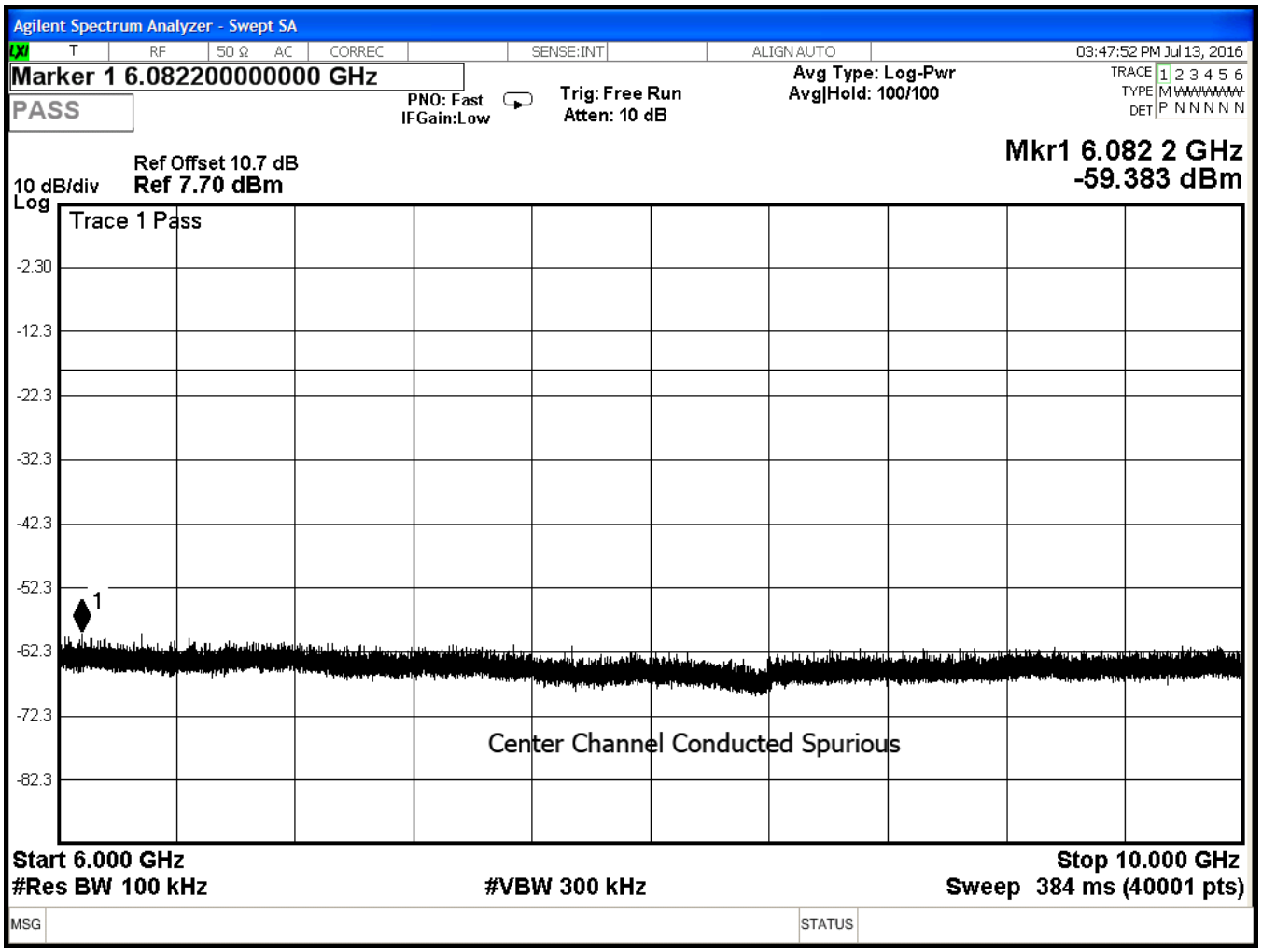

Figure 24: Center Channel Conducted Spurious Plot 5

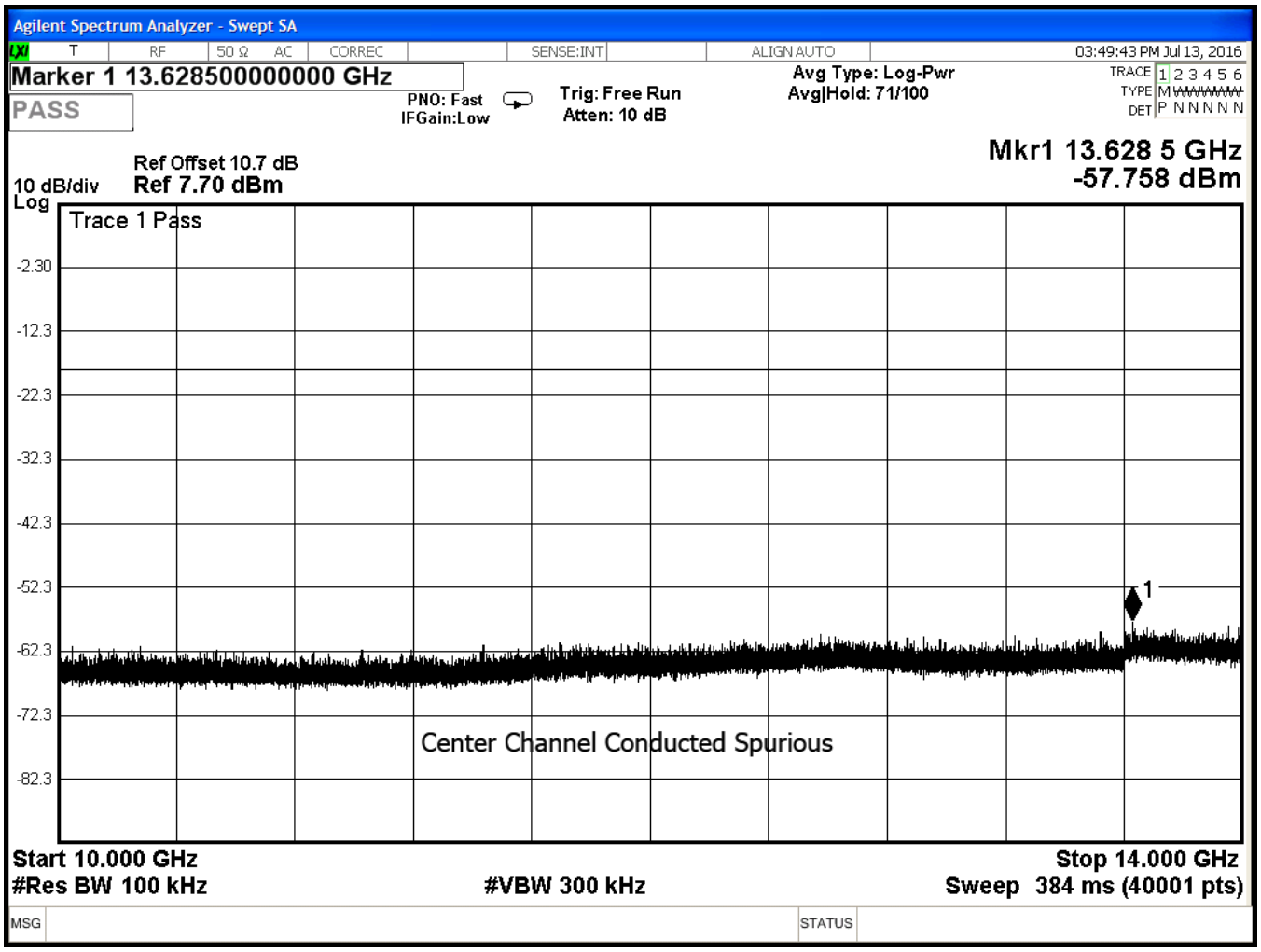

Figure 25: Center Channel Conducted Spurious Plot 6

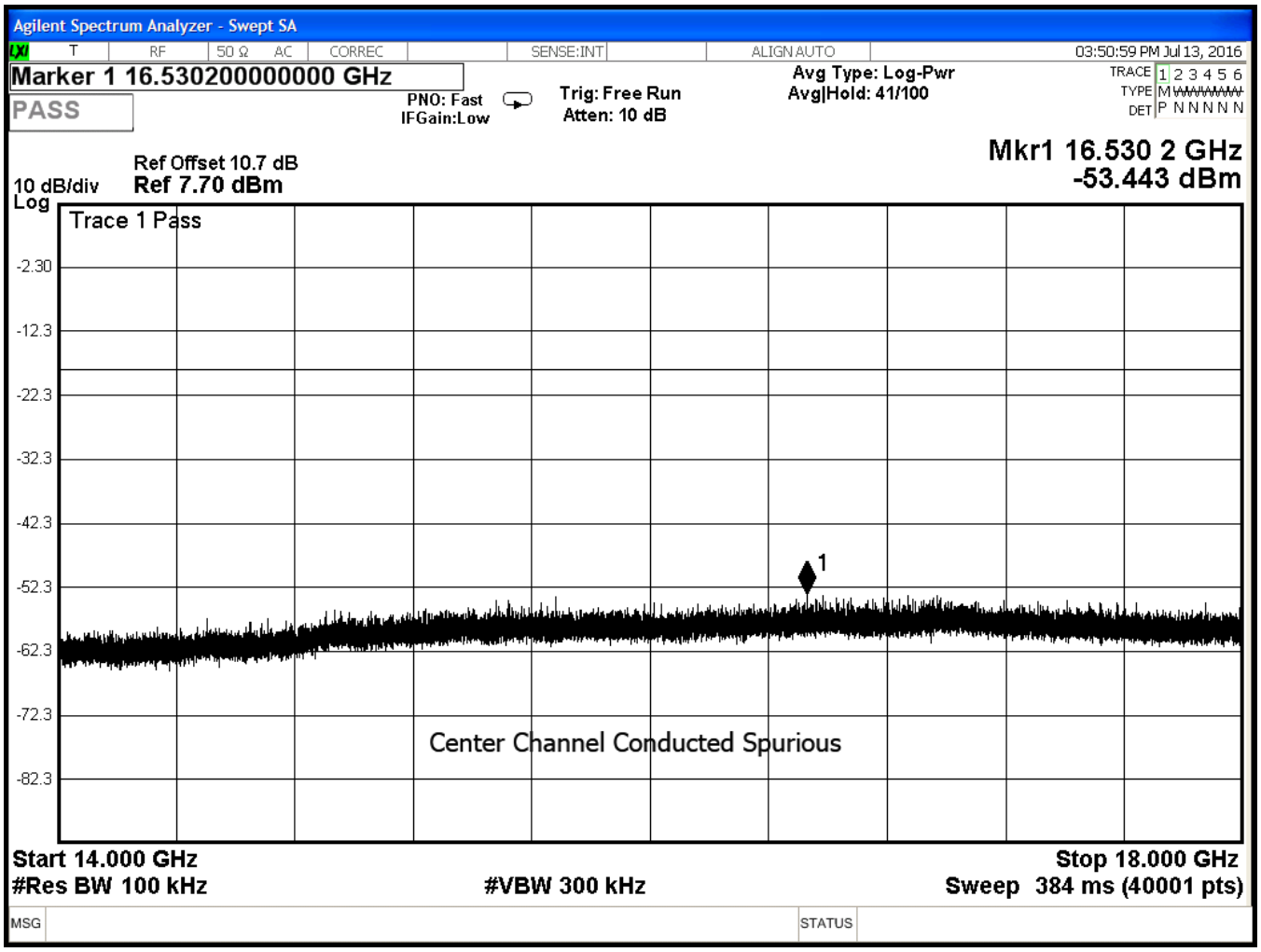

Figure 26: Center Channel Conducted Spurious Plot 7

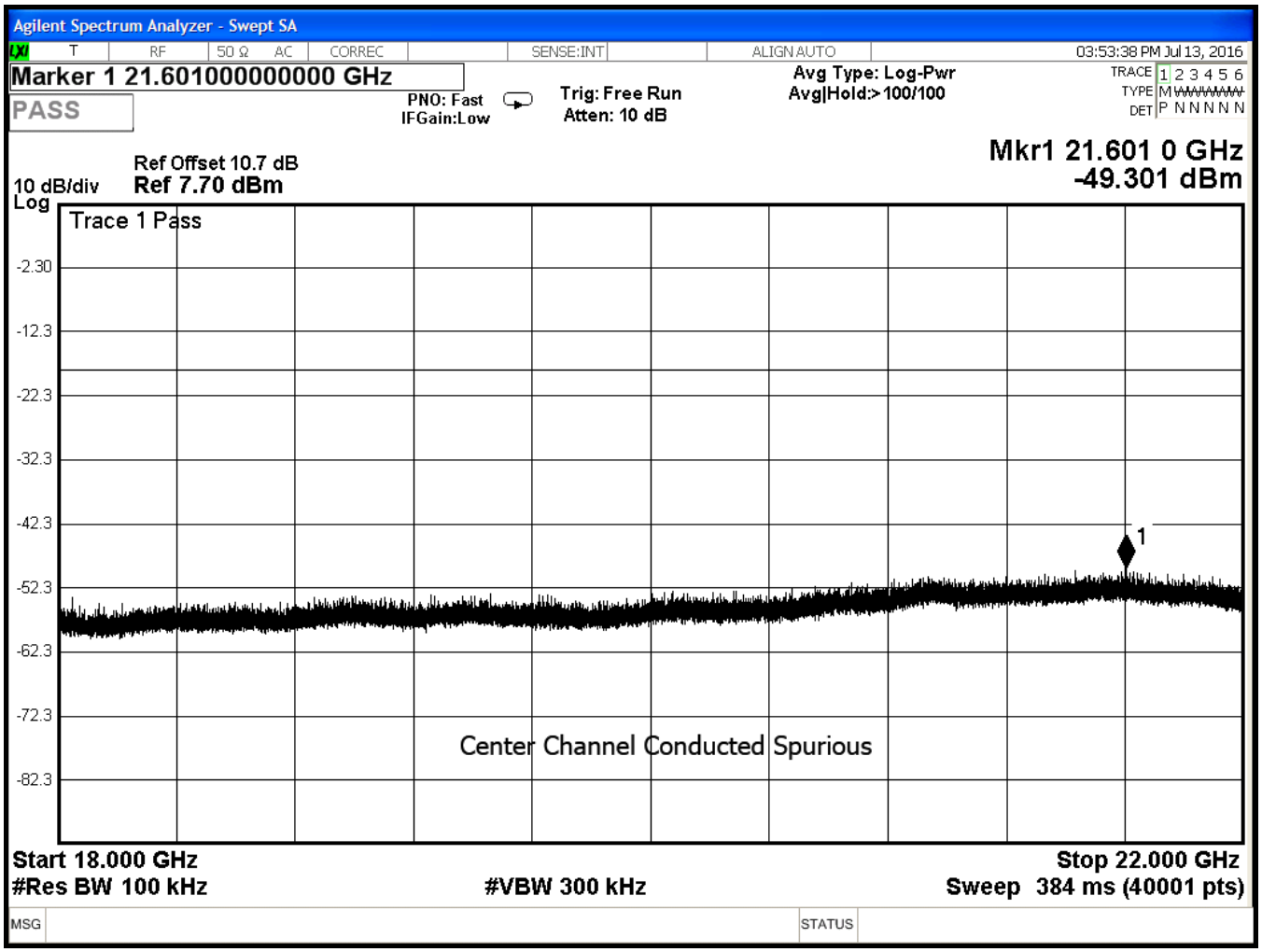

Figure 27: Center Channel Conducted Spurious Plot 8

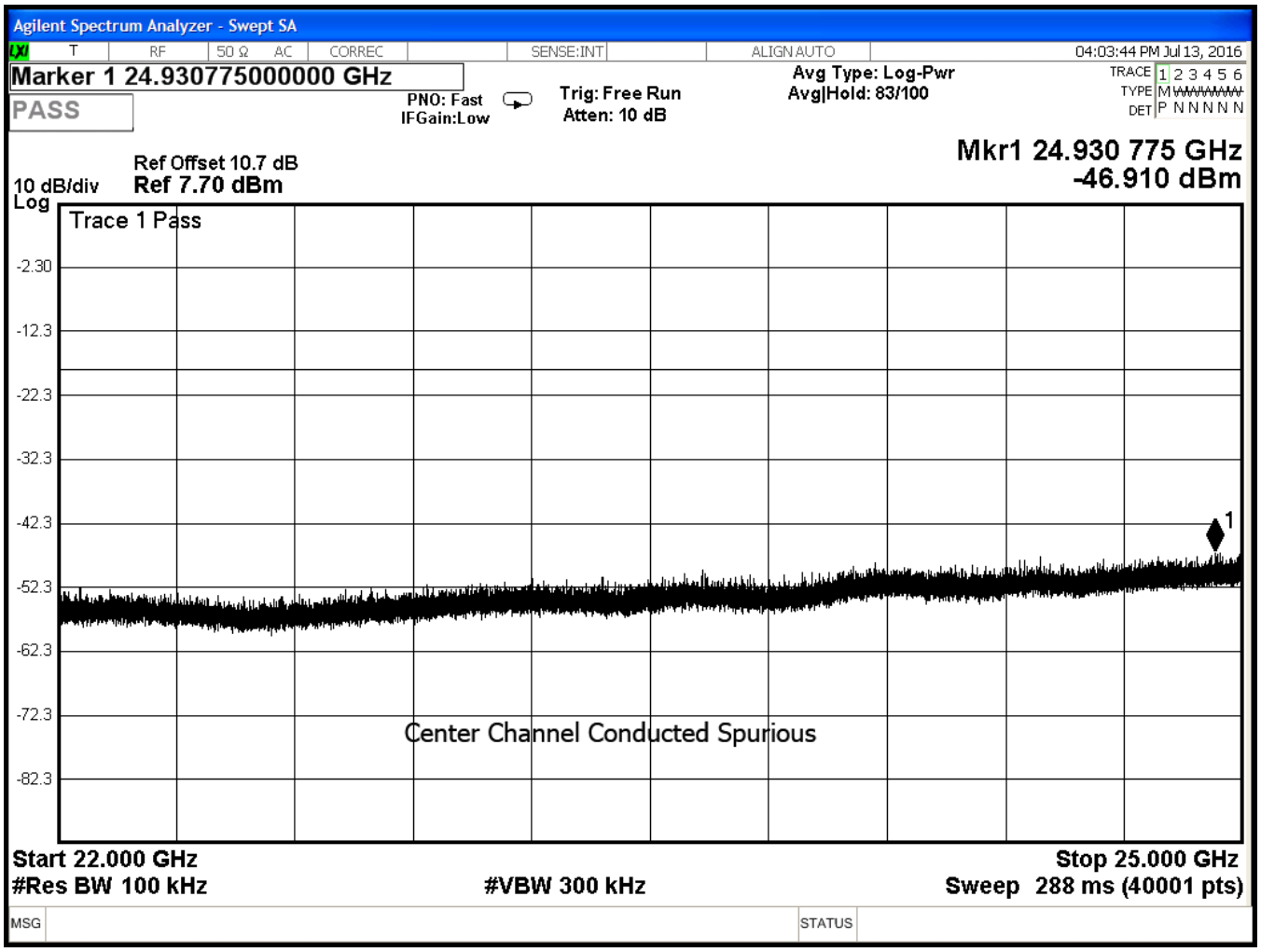

Figure 28: Center Channel Conducted Spurious Plot 9

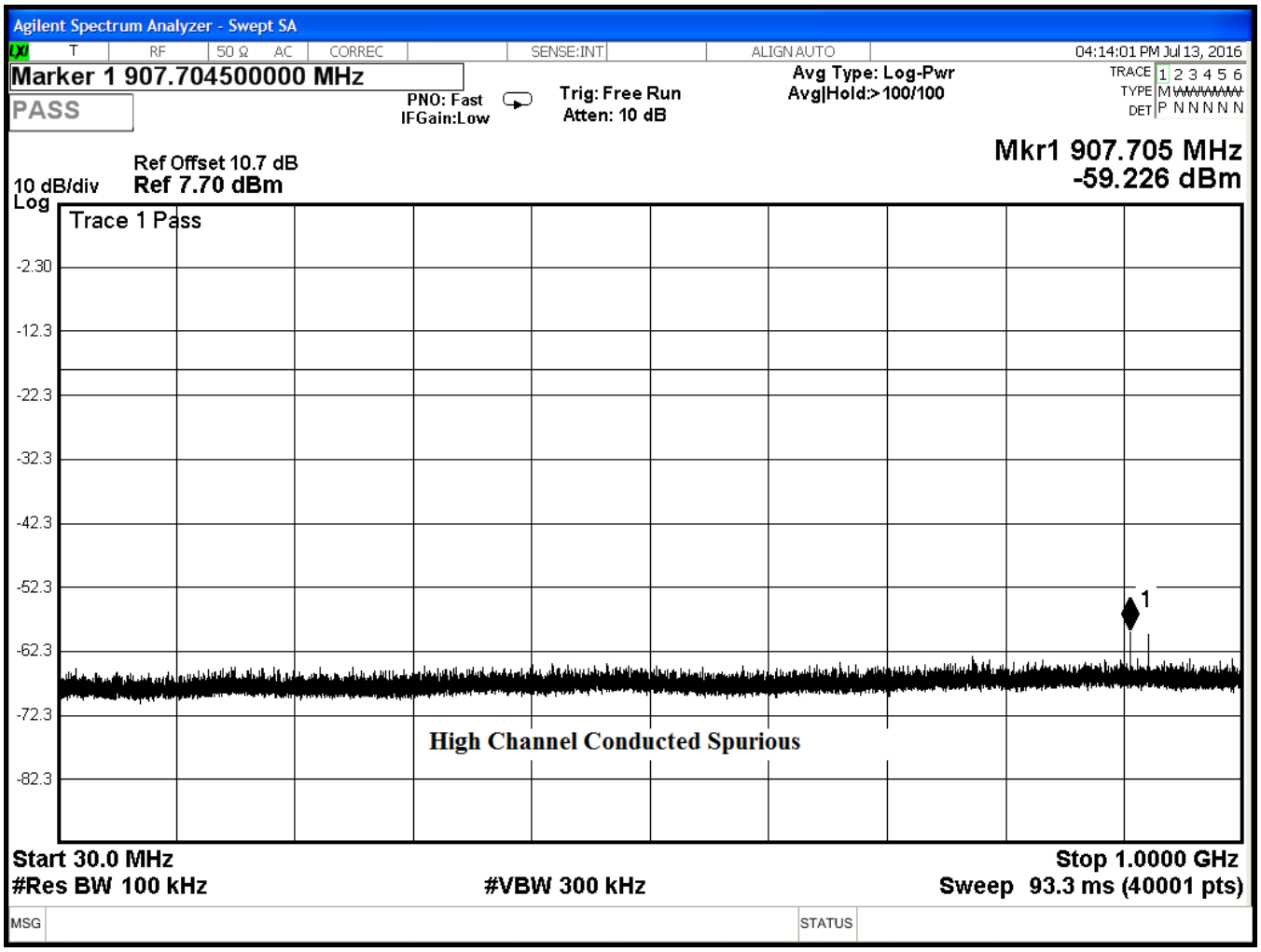

Figure 29: High Channel Conducted Spurious Plot 1

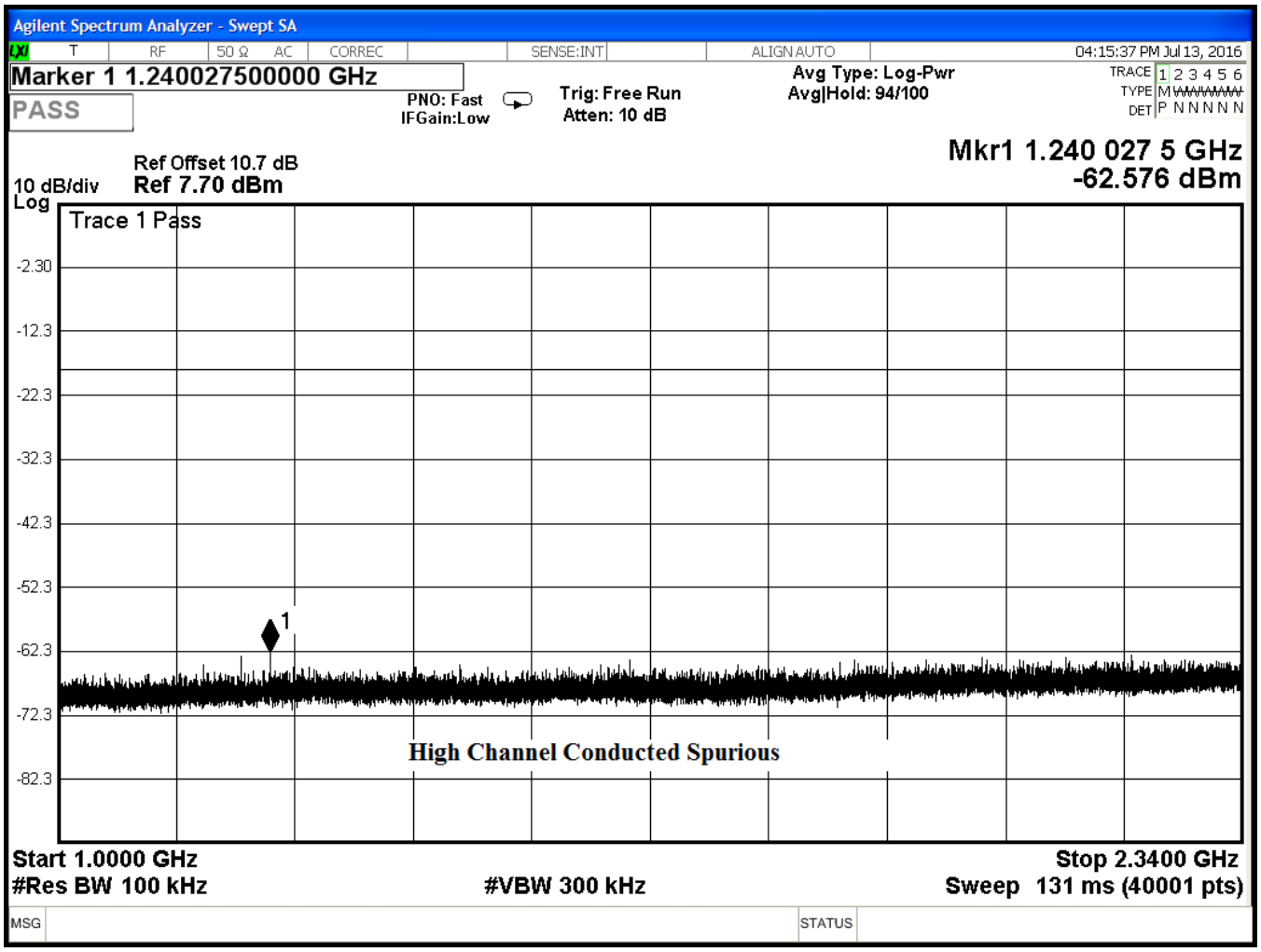

Figure 30: High Channel Conducted Spurious Plot 2

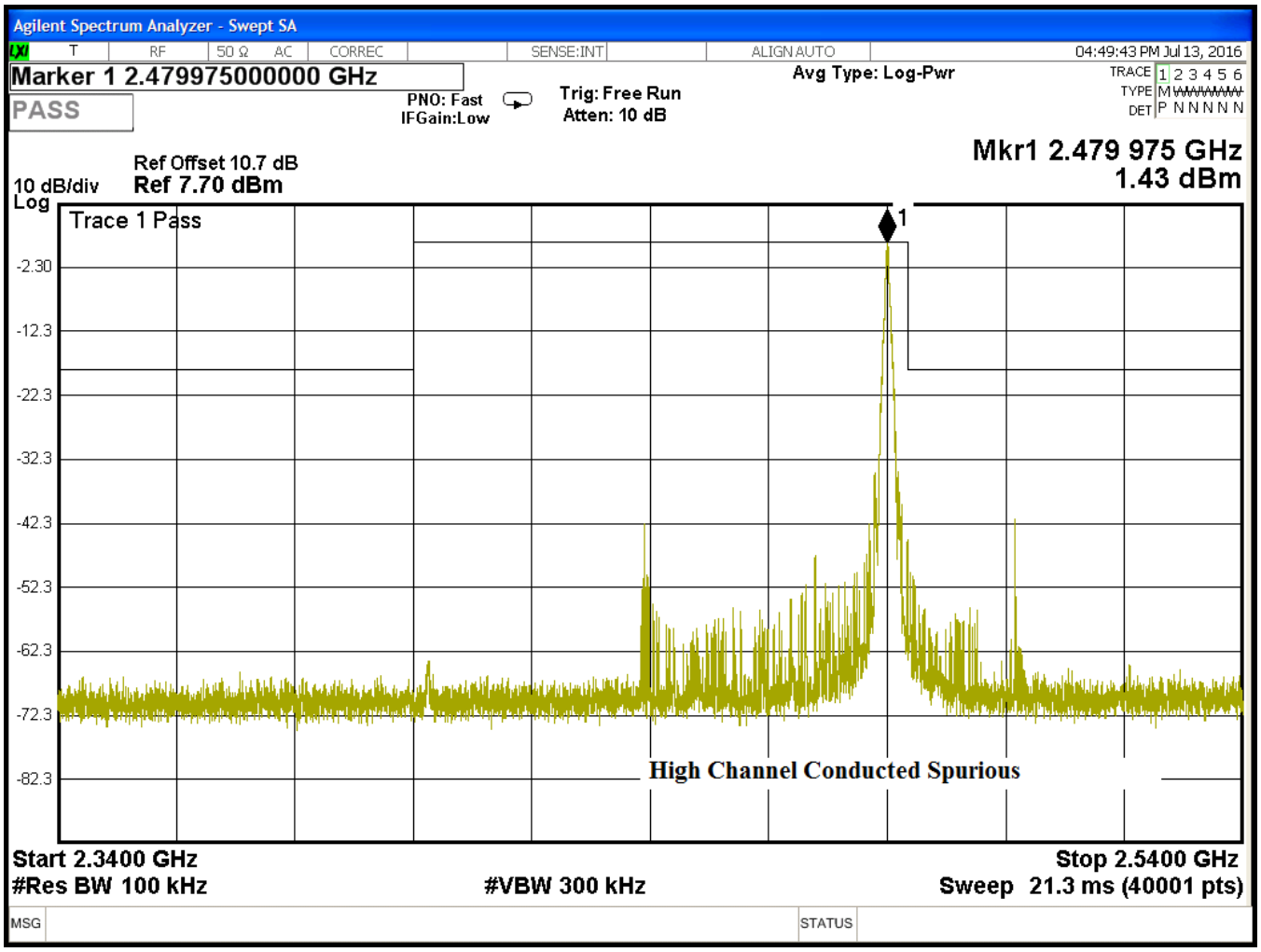

Figure 31: High Channel Conducted Spurious Plot 3

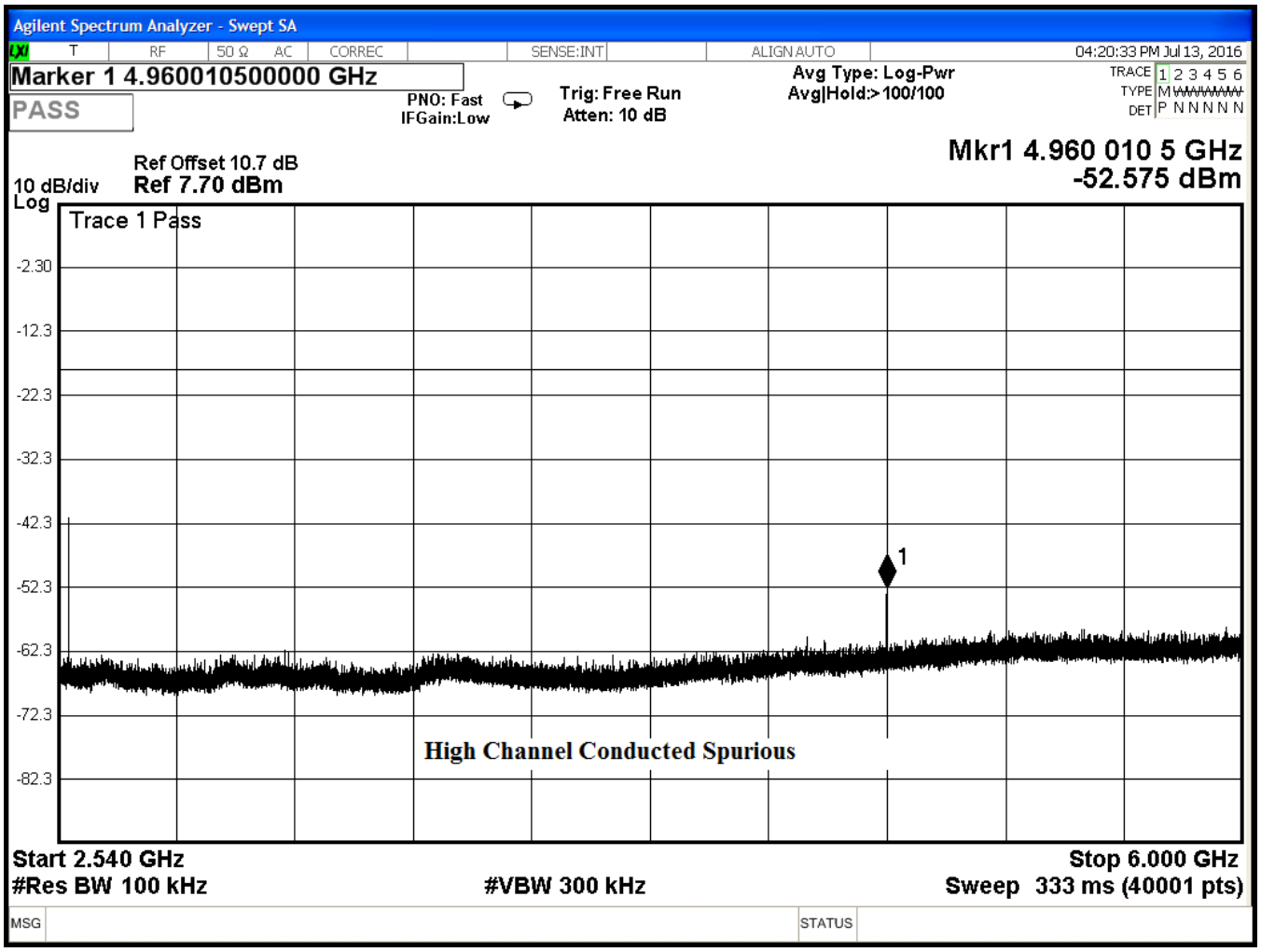

Figure 32: High Channel Conducted Spurious Plot 4

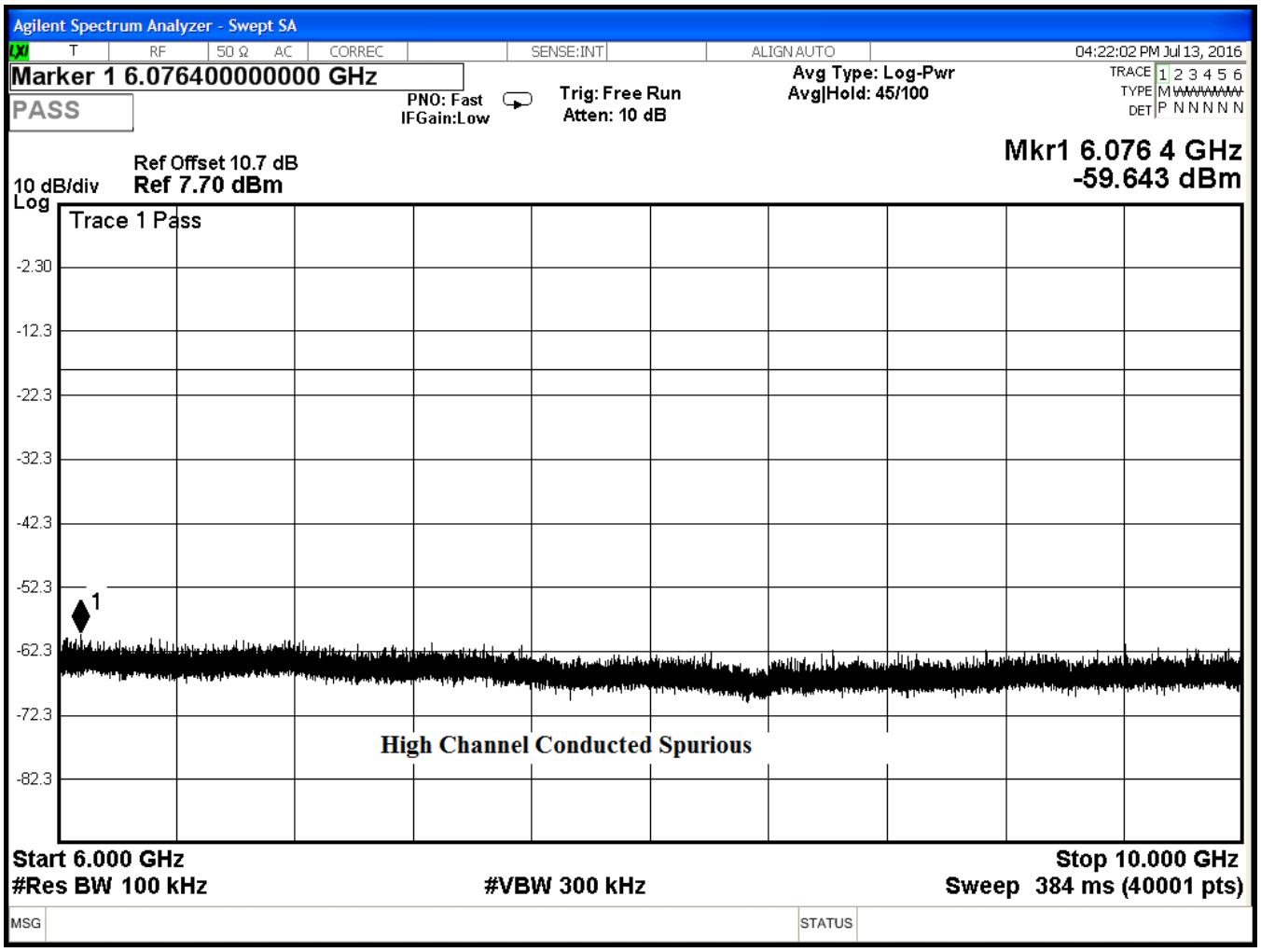

Figure 33: High Channel Conducted Spurious Plot 5

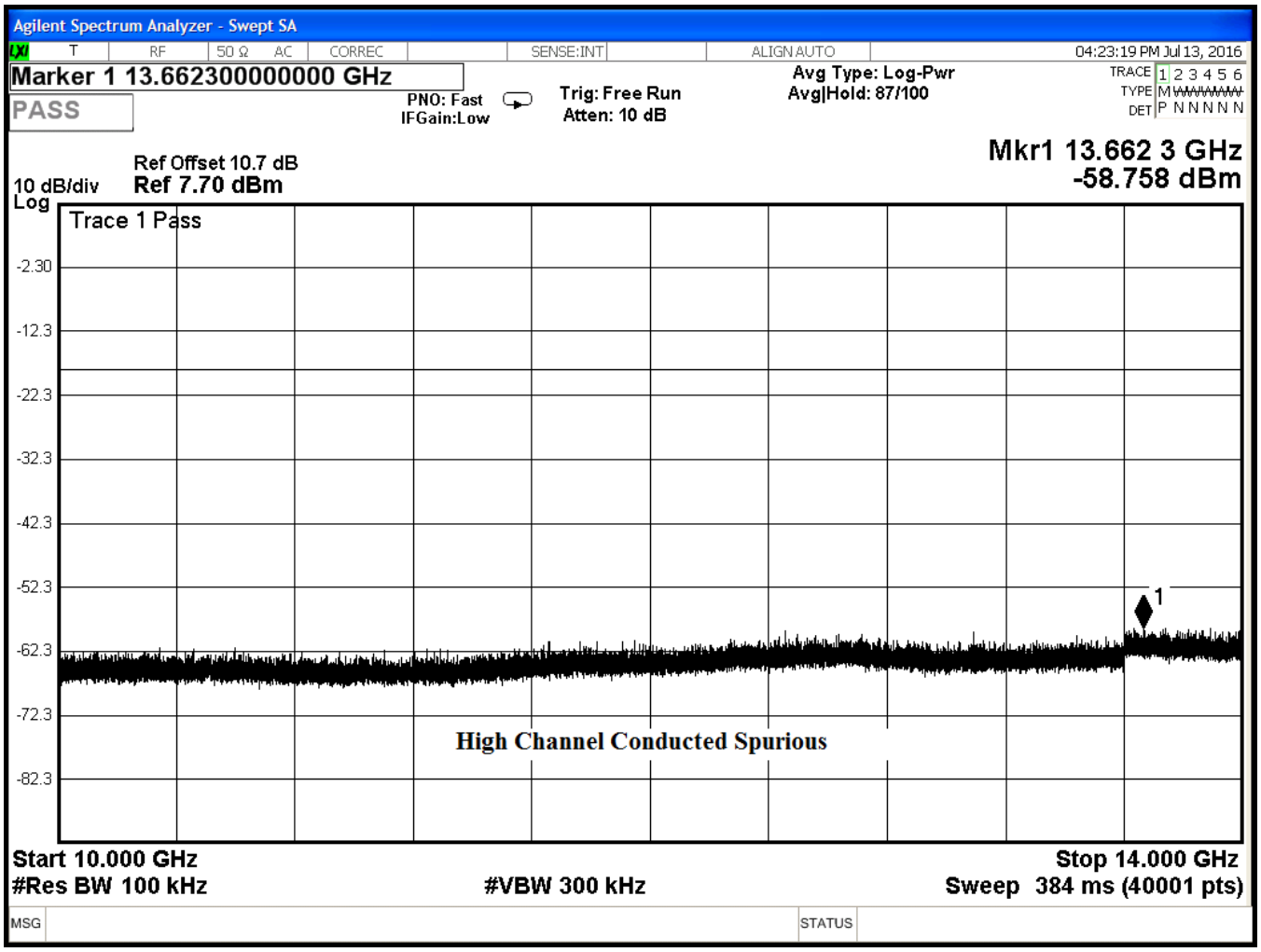

Figure 34: High Channel Conducted Spurious Plot 6

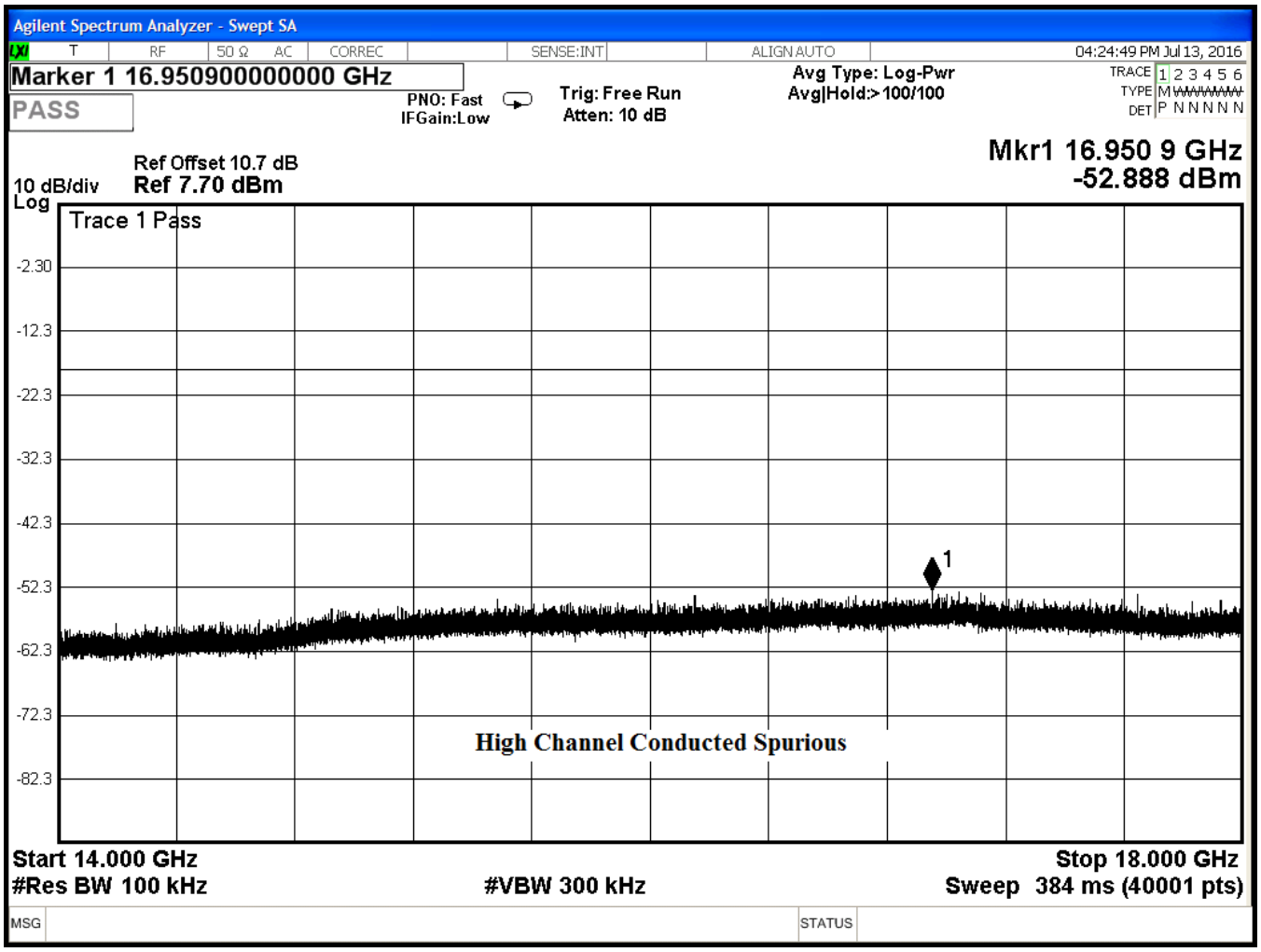

Figure 35: High Channel Conducted Spurious Plot 7

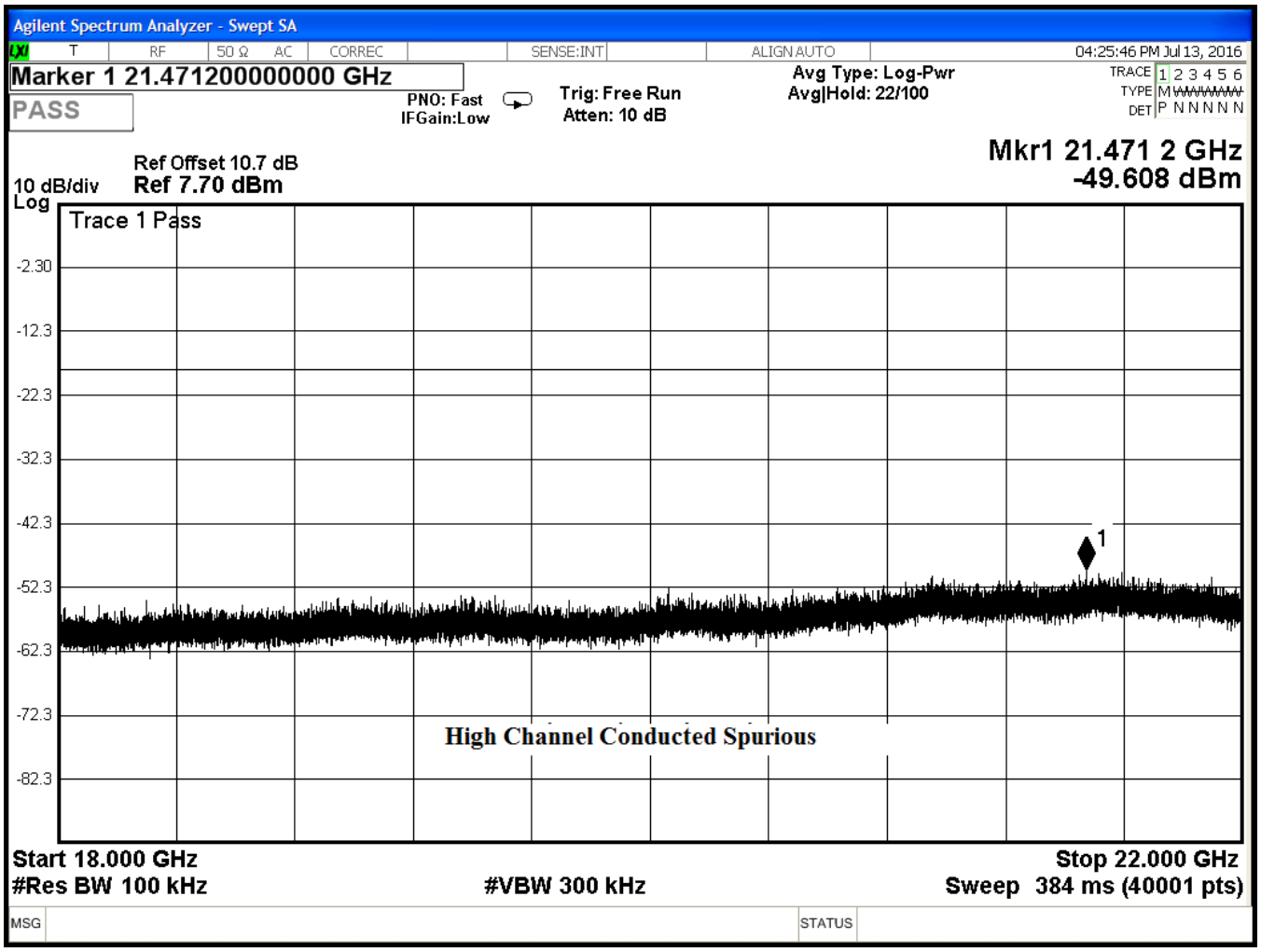

Figure 36: High Channel Conducted Spurious Plot 8

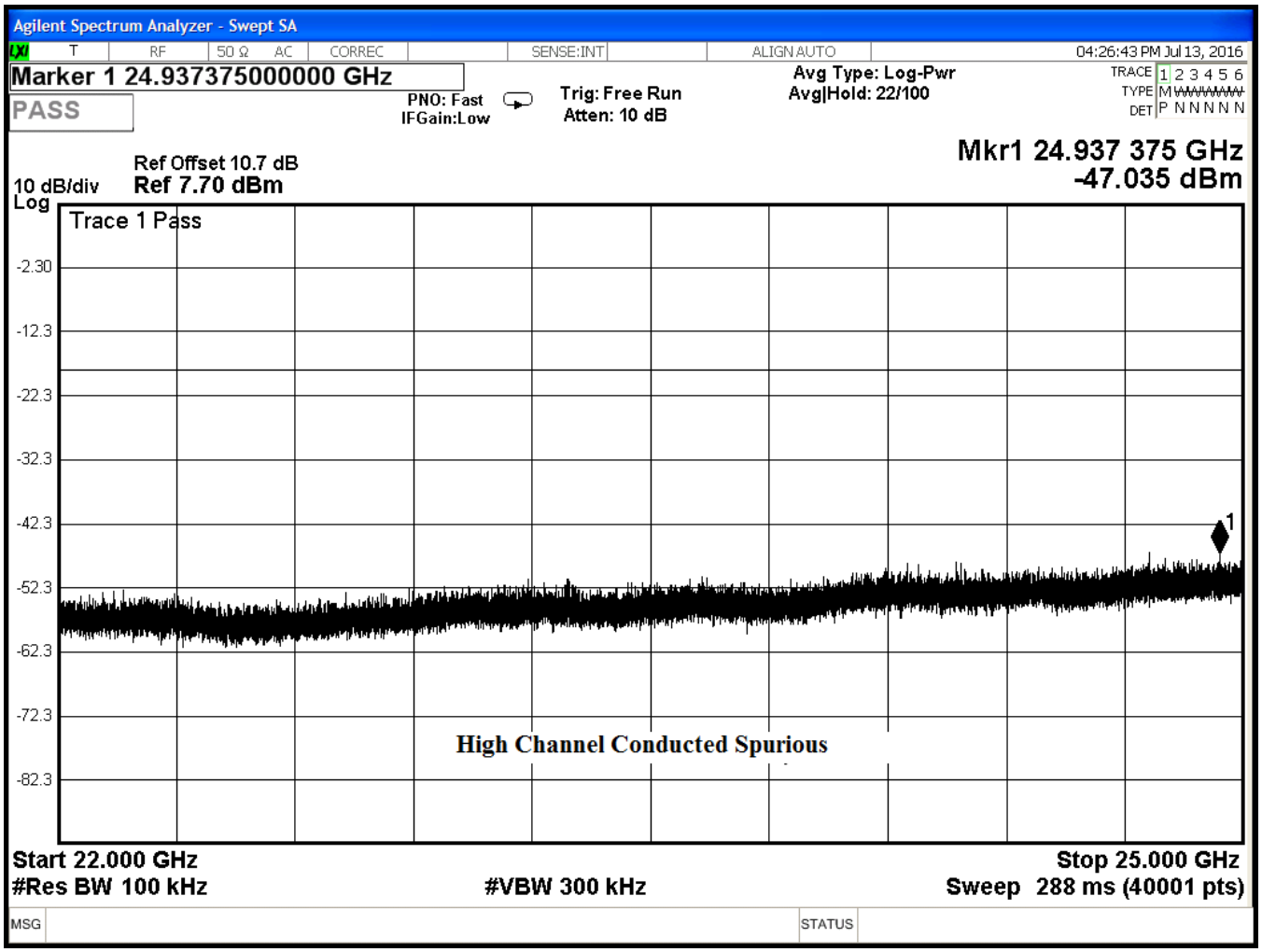

Figure 37: High Channel Conducted Spurious Plot 9

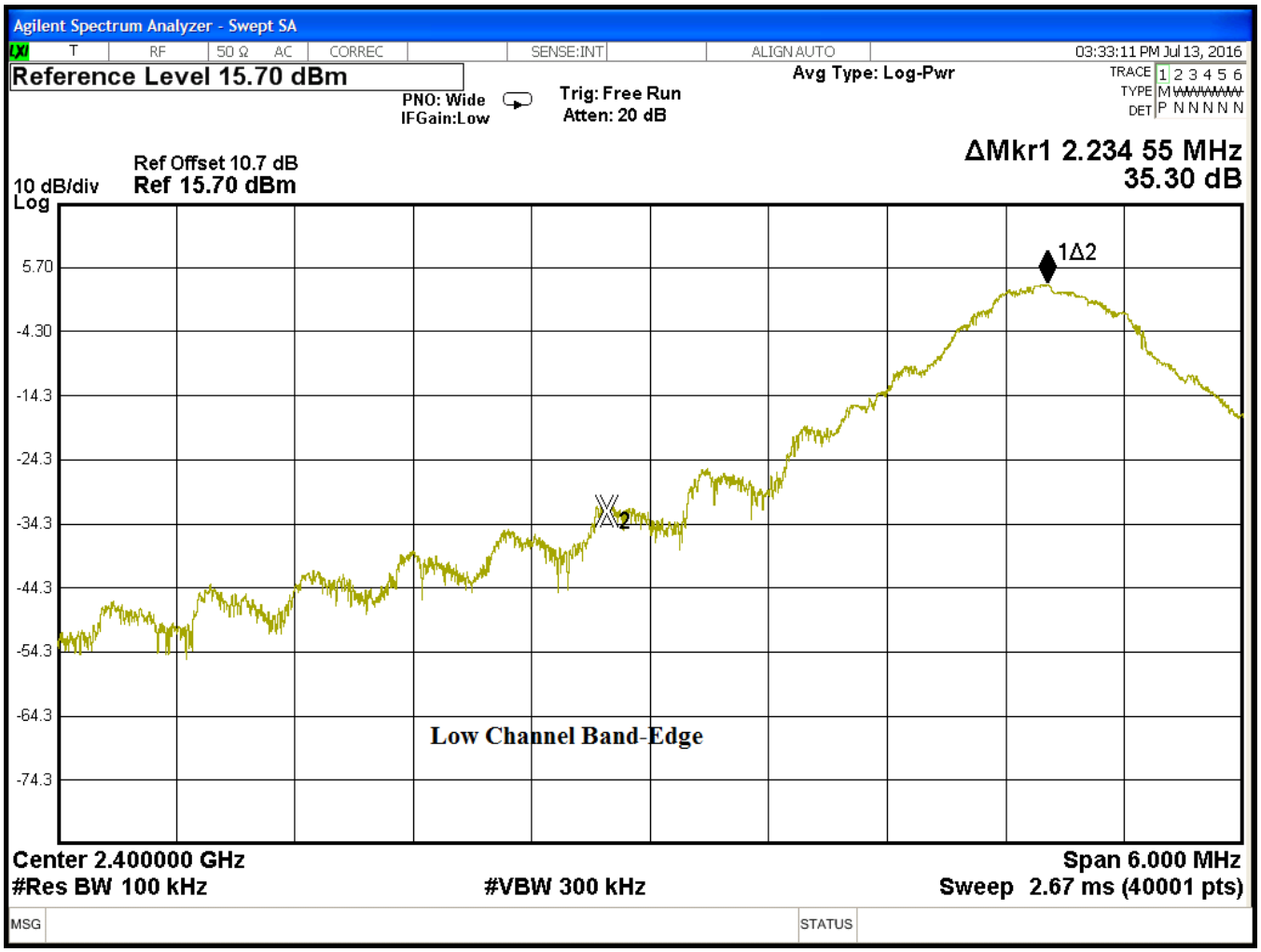

Figure 38: Lower Band Edge Low Channel

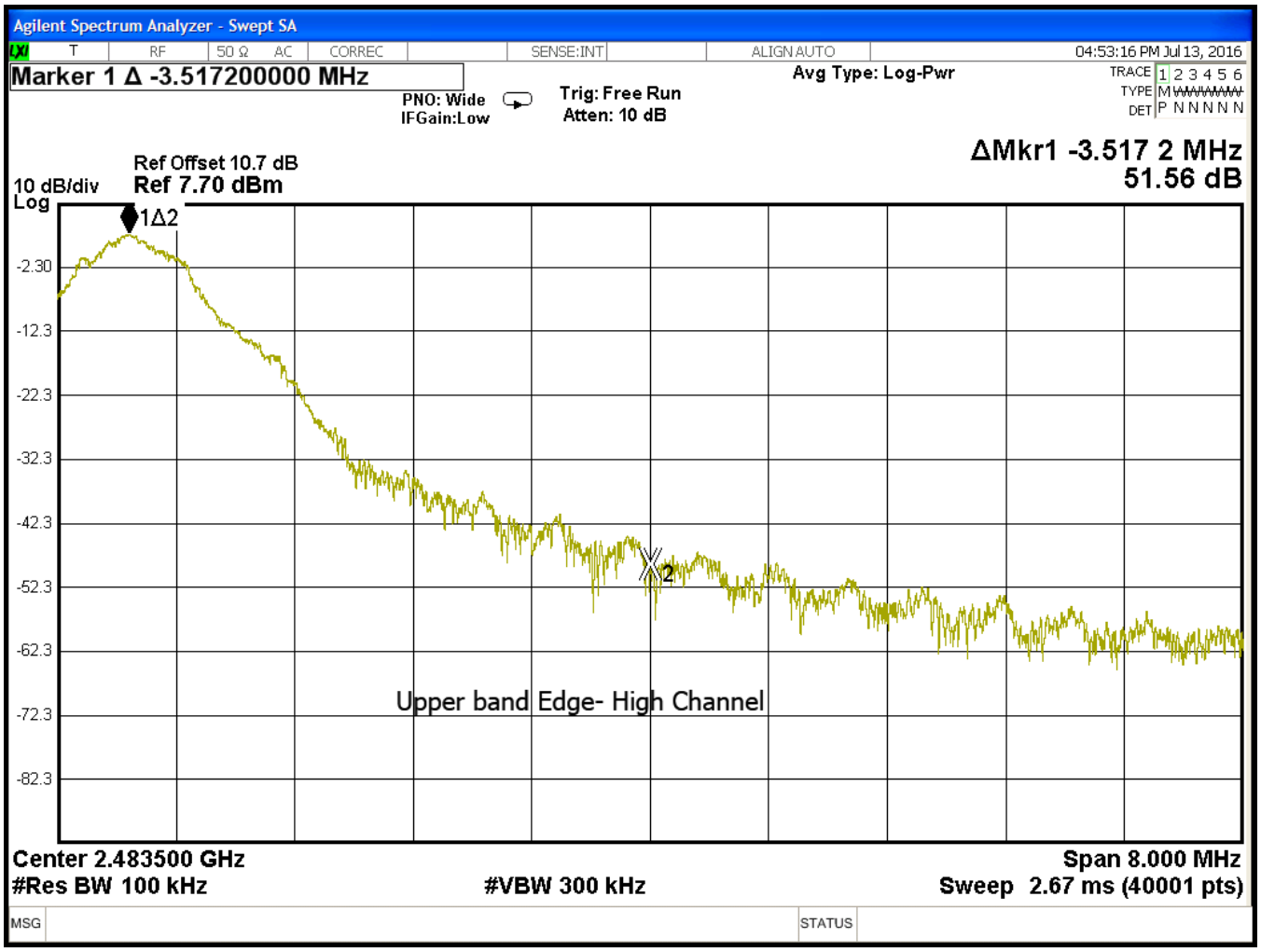

Figure 39: Upper Band Edge High Channel

5.5 Radiated Spurious Emissions:

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.209 and §15.35(b) for peak measurements.

5.5.1 Test Procedure

The EUT was placed on 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. Receiving 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. Both the horizontal and vertical field components were measured.

The EUT was tested in 3 orthogonal planes with the worst case readings reported.

Above 1GHz the EUT was placed on a 1.5meter table with RF absorber material between the EUT and Receive antenna.

The emissions were measured using the following resolution bandwidths:

Table 10: Spectrum Analyzer Settings

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	120kHz	1MHz
>1000 MHz	1 MHz	3MHz

Average measurements above 1GHz were made with the Spectrum analyzer set to RMS Average. Correction factors were then applied and the resulting value was compared to the limit.

The EUT was scanned up to 25GHz.

5.5.1.1 Duty Cycle Corrections

A duty cycle correction of 0.4dB was added to the RMS average readings to compensate for the on time of the EUT in accordance with C63.10 section 11.13.3.4.

The measured duty cycle = (Time on)/ (Time on and Time off)=1.059ms/1.162ms=0.91 (91%)

Correction Calculation = 10*Log (1/(duty cycle) =10*Log (1/0.91)= 0.4dBm

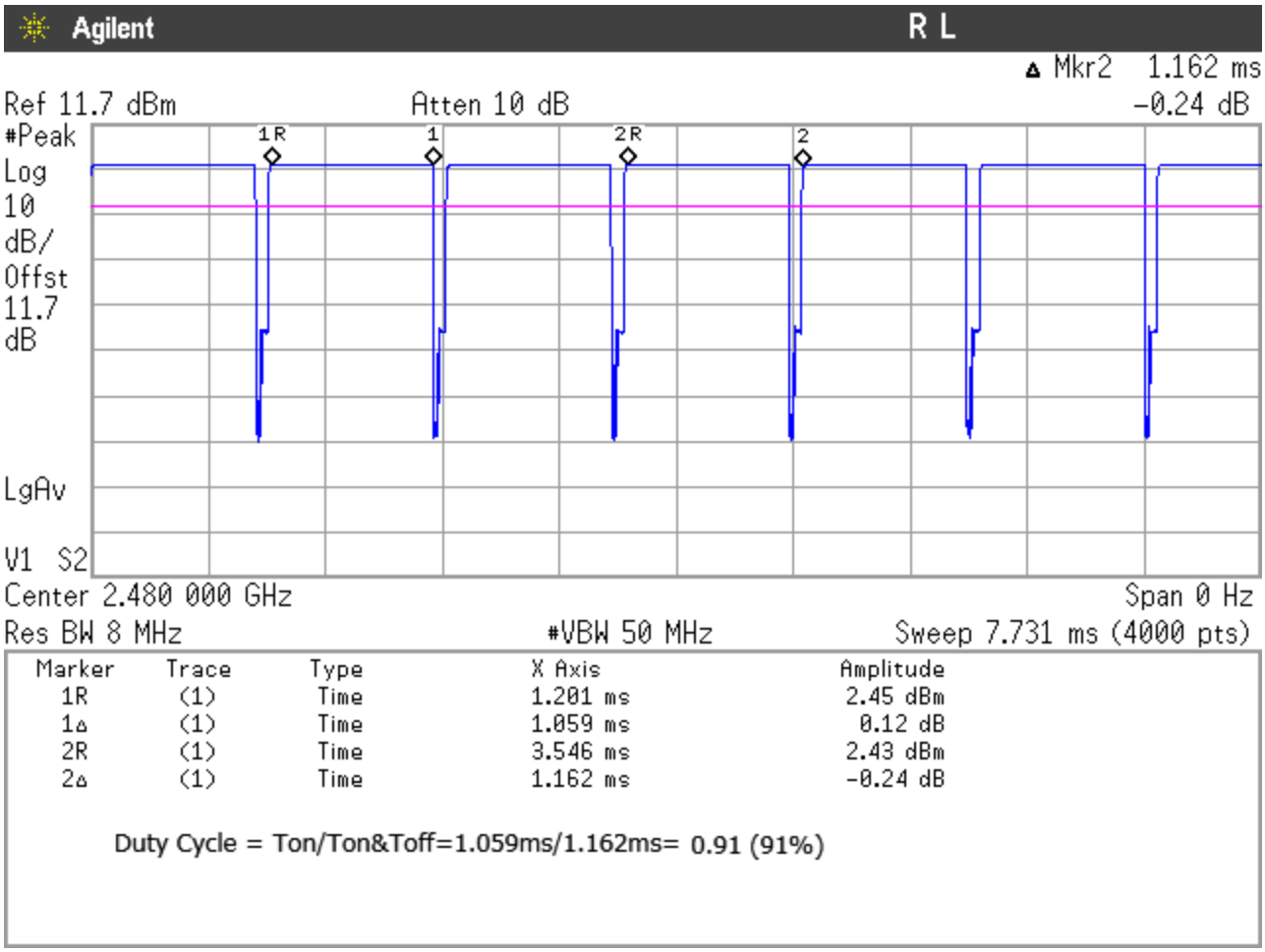

Figure 40: Duty Cycle Calculation

5.5.2 Test Summary

The EUT complied with the requirements for radiated spurious emissions.

Table 11: Radiated Emission Test Data (all Channels)

(Restricted Bands)

	Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)
Unit Upright	150.00	V	90.00	1.20	34.80	-14.1	0.0	10.8	150.0	-22.9
	240.00	V	270.00	2.50	31.20	-9.8	0.0	11.7	200.0	-24.6
	270.00	V	90.00	1.80	34.87	-8.1	0.0	21.9	200.0	-19.2
	150.00	H	90.00	3.60	29.80	-14.1	0.0	6.1	150.0	-27.9
	240.00	H	100.00	2.80	30.90	-9.8	0.0	11.3	200.0	-24.9
	270.00	H	180.00	2.80	29.70	-8.1	0.0	12.1	200.0	-24.4
Unit On Side	150.00	V	90.00	1.50	33.90	-14.1	0.0	9.7	150.0	-23.8
	240.00	V	90.00	2.20	32.10	-9.8	0.0	13.0	200.0	-23.7
	270.00	V	90.00	2.50	33.50	-8.1	0.0	18.7	200.0	-20.6
	150.00	H	45.00	3.40	30.10	-14.1	0.0	6.3	150.0	-27.6
	240.00	H	45.00	2.60	29.80	-9.8	0.0	10.0	200.0	-26.0
	270.00	H	220.00	2.40	29.30	-8.1	0.0	11.5	200.0	-24.8
Unit Flat	150.00	V	100.00	1.60	32.80	-14.1	0.0	8.6	150.0	-24.9
	240.00	V	180.00	2.20	32.90	-9.8	0.0	14.2	200.0	-22.9
	270.00	V	180.00	2.40	32.80	-8.1	0.0	17.2	200.0	-21.3
	150.00	H	90.00	3.50	31.50	-14.1	0.0	7.4	150.0	-26.2
	240.00	H	270.00	2.50	30.50	-9.8	0.0	10.8	200.0	-25.3
	270.00	H	240.00	2.40	31.70	-8.1	0.0	15.2	200.0	-22.4

Table 12: Radiated Emission Test Data, Low Channel

	Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
unit on side	2402.00	V	0.00	2.80	91.85	-1.5	0.0	32866.2	NA	NA	Fundamental-pk
	2390.00	V	0.00	2.80	37.74	-1.5	0.0	65.0	5000.0	-37.7	Band Edge -pk
	2390.00	V	0.00	2.80	35.70	-1.5	0.4	53.8	500.0	-19.4	Band Edge -Av
	4804.00	V	10.00	3.20	39.75	4.5	0.0	162.4	5000.0	-29.8	pk
	4804.00	V	10.00	3.20	30.01	4.5	0.4	55.4	500.0	-19.1	av
	12010.00	V	10.00	3.40	34.50	17.2	0.0	385.8	5000.0	-22.3	pk- ambient
	12010.00	V	10.00	3.40	27.90	17.2	0.4	189.0	500.0	-8.5	av- ambient
	2402.00	H	90.00	2.60	92.59	-1.5	0.0	35789.0	NA	NA	Fundamental-pk
	2390.00	H	90.00	2.60	43.37	-1.5	0.0	124.3	5000.0	-32.1	Band Edge -pk
	2390.00	H	90.00	2.60	39.10	-1.5	0.4	76.0	500.0	-16.4	Band Edge -Av
	4804.00	H	10.00	2.80	45.33	4.5	0.0	308.7	5000.0	-24.2	pk
	4804.00	H	10.00	2.80	38.60	4.5	0.4	142.3	500.0	-10.9	av
	12010.00	H	0.00	3.60	39.99	17.2	0.0	725.9	5000.0	-16.8	pk- ambient
	12010.00	H	0.00	3.60	29.80	17.2	0.4	224.6	500.0	-7.0	av- ambient
unit upright	2402.00	V	180.00	2.80	90.28	-1.5	0.0	27431.5	NA	NA	Fundamental-pk
	2390.00	V	180.00	2.80	42.40	-1.5	0.0	111.2	5000.0	-33.1	Band Edge -pk
	2390.00	V	180.00	2.80	33.90	-1.5	0.4	43.8	500.0	-21.2	Band Edge -Av
	4804.00	V	90.00	3.50	43.12	4.5	0.0	239.4	5000.0	-26.4	pk
	4804.00	V	90.00	3.50	36.92	4.5	0.4	122.8	500.0	-12.2	av
	12010.00	V	45.00	2.80	36.20	17.2	0.0	469.2	5000.0	-20.6	pk- ambient
	12010.00	V	45.00	2.80	28.90	17.2	0.4	212.0	500.0	-7.5	av- ambient
	2402.00	H	0.00	2.60	91.51	-1.5	0.0	31604.6	NA	NA	Fundamental-pk
	2390.00	H	0.00	2.60	43.93	-1.5	0.0	132.6	5000.0	-31.5	Band Edge -pk
	2390.00	H	0.00	2.60	34.05	-1.5	0.4	44.5	500.0	-21.0	Band Edge -Av
	4804.00	H	90.00	2.80	42.10	4.5	0.0	212.8	5000.0	-27.4	pk
	4804.00	H	90.00	2.80	37.71	4.5	0.4	134.4	500.0	-11.4	av
	12010.00	H	90.00	3.00	40.10	17.2	0.0	735.1	5000.0	-16.7	pk- ambient
	12010.00	H	90.00	3.00	29.50	17.2	0.4	227.2	500.0	-6.9	av- ambient

	Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
unit flat	2402.00	V	90.00	3.00	86.98	-1.5	0.0	18760.7	NA	NA	Fundamental-pk
	2390.00	V	90.00	3.00	43.79	-1.5	0.0	130.5	5000.0	-31.7	Band Edge -pk
	2390.00	V	90.00	3.00	32.97	-1.5	0.4	39.3	500.0	-22.1	Band Edge -Av
	4804.00	V	45.00	3.40	41.62	4.5	0.0	201.4	5000.0	-27.9	pk
	4804.00	V	45.00	3.40	35.94	4.5	0.4	109.7	500.0	-13.2	av
	12010.00	V	90.00	3.80	38.20	17.2	0.0	590.7	5000.0	-18.6	pk- ambient
	12010.00	V	90.00	3.80	29.50	17.2	0.4	227.2	500.0	-6.9	av- ambient
	2402.00	H	0.00	2.80	92.19	-1.5	0.0	34178.2	NA	NA	Fundamental-pk
	2390.00	H	0.00	2.80	43.50	-1.5	0.0	126.2	5000.0	-32.0	Band Edge -pk
	2390.00	H	0.00	2.80	34.90	-1.5	0.4	49.1	500.0	-20.2	Band Edge -Av
	4804.00	H	45.00	3.20	43.89	4.5	0.0	261.5	5000.0	-25.6	pk
	4804.00	H	45.00	3.20	35.91	4.5	0.4	109.3	500.0	-13.2	av
	12010.00	H	65.00	3.40	38.53	17.2	0.0	613.6	5000.0	-18.2	pk- ambient
	12010.00	H	65.00	3.40	29.50	17.2	0.4	227.2	500.0	-6.9	av- ambient

Table 13: Radiated Emission Test Data, Center Channel

	Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
unit on side	2440.00	V	350.00	3.20	88.39	-1.5	0.0	22116.3	NA	NA	Fundamental-pk
	4880.00	V	0.00	3.60	50.53	4.5	0.0	565.0	5000.0	-18.9	pk
	4880.00	V	0.00	3.60	40.60	4.5	0.4	188.6	500.0	-8.5	Av
	7320.00	V	0.00	3.60	39.10	11.3	0.0	330.4	5000.0	-23.6	pk- ambient
	7320.00	V	0.00	3.60	31.50	11.3	0.4	144.2	500.0	-10.8	av- ambient
	2440.00	H	180.00	2.60	89.20	-1.5	0.0	24278.0	NA	NA	Fundamental-pk
	4880.00	H	45.00	3.20	50.63	4.5	0.0	571.6	5000.0	-18.8	pk
	4880.00	H	45.00	3.20	40.97	4.5	0.4	196.8	500.0	-8.1	Av
	7320.00	H	350.00	3.80	38.60	11.3	0.0	311.9	5000.0	-24.1	pk- ambient
	7320.00	H	350.00	3.80	30.11	11.3	0.4	122.9	500.0	-12.2	av- ambient
unit upright	2440.00	V	45.00	2.80	90.38	-1.5	0.0	27810.8	NA	NA	Fundamental-pk
	4880.00	V	340.00	3.00	47.25	4.5	0.0	387.3	5000.0	-22.2	pk
	4880.00	V	340.00	3.00	35.85	4.5	0.4	109.2	500.0	-13.2	Av
	7320.00	V	270.00	3.40	38.90	11.3	0.0	322.9	5000.0	-23.8	pk- ambient
	7320.00	V	270.00	3.40	33.20	11.3	0.4	175.4	500.0	-9.1	av- ambient
	2440.00	H	180.00	2.60	89.16	-1.5	0.0	24166.4	NA	NA	Fundamental-pk
	4880.00	H	90.00	3.00	48.62	4.5	0.0	453.5	5000.0	-20.8	pk
	4880.00	H	90.00	3.00	38.61	4.5	0.4	150.0	500.0	-10.5	Av
	7320.00	H	350.00	3.80	38.80	11.3	0.0	319.2	5000.0	-23.9	pk- ambient
	7320.00	H	350.00	3.80	29.31	11.3	0.4	112.1	500.0	-13.0	av- ambient
unit flat	2440.00	V	90.00	2.60	88.50	-1.5	0.0	22398.2	NA	NA	Fundamental-pk
	4880.00	V	45.00	3.00	47.00	4.5	0.0	376.3	5000.0	-22.5	pk
	4880.00	V	45.00	3.00	38.64	4.5	0.4	150.5	500.0	-10.4	Av
	7320.00	V	0.00	3.80	39.20	11.3	0.0	334.2	5000.0	-23.5	pk- ambient
	7320.00	V	0.00	3.80	28.70	11.3	0.4	104.5	500.0	-13.6	av- ambient
	2440.00	H	90.00	2.80	93.20	-1.5	0.0	38478.0	NA	NA	Fundamental-pk

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
4880.00	H	45.00	3.20	50.58	4.5	0.0	568.3	5000.0	-18.9	pk
4880.00	H	45.00	3.20	39.50	4.5	0.4	166.2	500.0	-9.6	Av
7320.00	H	0.00	3.80	39.90	11.3	0.0	362.3	5000.0	-22.8	pk- ambient
7320.00	H	0.00	3.80	32.80	11.3	0.4	167.5	500.0	-9.5	av- ambient

Table 14: Radiated Emission Test Data, High Channel

	Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
unit on side	2480.00	V	90.00	2.60	86.26	-1.5	0.0	17346.4	NA	NA	Fundamental-pk
	2483.50	V	90.00	2.60	50.40	-1.5	0.0	279.4	5000.0	-25.1	Band Edge -pk
	2483.50	V	90.00	2.60	37.07	-1.5	0.4	63.1	500.0	-18.0	Band Edge -Av
	4960.00	V	0.00	3.40	51.10	4.7	0.0	617.5	5000.0	-18.2	pk
	4960.00	V	0.00	3.40	43.20	4.7	0.4	260.4	500.0	-5.7	av
	7440.00	V	0.00	3.20	38.90	11.1	0.0	317.8	5000.0	-23.9	pk
	7440.00	V	0.00	3.20	29.80	11.1	0.4	116.7	500.0	-12.6	av
	2480.00	H	20.00	2.60	90.80	-1.5	0.0	29255.7	NA	NA	Fundamental-pk
	2483.50	H	20.00	2.60	52.32	-1.5	0.0	348.6	5000.0	-23.1	Band Edge -pk
	2483.50	H	20.00	2.60	42.48	-1.5	0.4	117.6	500.0	-12.6	Band Edge -Av
	4960.00	H	45.00	3.20	52.38	4.7	0.0	715.6	5000.0	-16.9	pk
	4960.00	H	45.00	3.20	42.49	4.7	0.4	240.0	500.0	-6.4	av
	7440.00	H	10.00	3.80	38.50	11.1	0.0	303.5	5000.0	-24.3	pk- ambient
	7440.00	H	10.00	3.80	32.00	11.1	0.4	150.3	500.0	-10.4	av- ambient
unit upright	2480.00	V	10.00	2.60	88.76	-1.5	0.0	23131.9	NA	NA	Fundamental-pk
	2483.50	V	10.00	2.60	53.20	-1.5	0.0	385.7	5000.0	-22.3	Band Edge -pk
	2483.50	V	10.00	2.60	39.50	-1.5	0.4	83.4	500.0	-15.6	Band Edge -Av
	4960.00	V	0.00	3.00	47.80	4.7	0.0	422.3	5000.0	-21.5	pk
	4960.00	V	0.00	3.00	39.90	4.7	0.4	178.1	500.0	-9.0	av
	7440.00	V	90.00	3.60	41.24	11.1	0.0	416.0	5000.0	-21.6	pk
	7440.00	V	90.00	3.60	30.80	11.1	0.4	130.9	500.0	-11.6	av
	2480.00	H	0.00	2.80	86.86	-1.5	0.0	18587.1	NA	NA	Fundamental-pk
	2483.50	H	0.00	2.80	50.66	-1.5	0.0	287.9	5000.0	-24.8	Band Edge -pk
	2483.50	H	0.00	2.80	36.53	-1.5	0.4	59.3	500.0	-18.5	Band Edge -Av
	4960.00	H	90.00	3.00	51.70	4.7	0.0	661.7	5000.0	-17.6	pk
	4960.00	H	90.00	3.00	41.09	4.7	0.4	204.2	500.0	-7.8	av

	Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Duty Cycle Correction (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
	7440.00	H	180.00	3.60	39.50	11.1	0.0	340.5	5000.0	-23.3	pk- ambient
	7440.00	H	180.00	3.60	31.60	11.1	0.4	143.6	500.0	-10.8	av- ambient
unit flat	2480.00	V	0.00	3.20	87.10	-1.5	0.0	19107.8	NA	NA	Fundamental-pk
	2483.50	V	0.00	3.20	49.47	-1.5	0.0	251.1	5000.0	-26.0	Band Edge -pk
	2483.50	V	0.00	3.20	39.26	-1.5	0.4	81.2	500.0	-15.8	Band Edge -Av
	4960.00	V	10.00	2.80	51.92	4.7	0.0	678.6	5000.0	-17.3	pk
	4960.00	V	10.00	2.80	43.24	4.7	0.4	261.6	500.0	-5.6	av
	7440.00	V	45.00	3.60	39.70	11.1	0.0	348.4	5000.0	-23.1	pk
	7440.00	V	45.00	3.60	30.10	11.1	0.4	120.8	500.0	-12.3	av
	2480.00	H	180.00	3.00	90.05	-1.5	0.0	26835.5	NA	NA	Fundamental-pk
	2483.50	H	180.00	3.00	55.28	-1.5	0.0	490.1	5000.0	-20.2	Band Edge -pk
	2483.50	H	180.00	3.00	39.50	-1.5	0.4	83.4	500.0	-15.6	Band Edge -Av
	4960.00	H	0.00	3.60	50.40	4.7	0.0	569.7	5000.0	-18.9	pk
	4960.00	H	0.00	3.60	40.91	4.7	0.4	200.1	500.0	-8.0	av
	7440.00	H	10.00	3.60	40.28	11.1	0.0	372.5	5000.0	-22.6	pk- ambient
	7440.00	H	10.00	3.60	29.80	11.1	0.4	116.7	500.0	-12.6	av- ambient

