



**FCC & Industry Canada Certification Test Report**  
**For the**  
**Cooper Power Systems**  
**RFN-500LG MODULE**

**FCC ID: P9X-500LG**  
**IC: 6766A-500LG**

**WLL JOB# 14418-01 Rev 3**  
**February 29, 2016**

**Re-Issued**  
**October 24, 2016**

Prepared for:

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**Gaithersburg MD 20878**

Prepared By:

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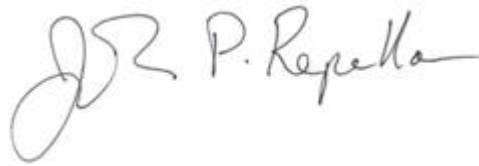
**Testing Certificate AT-1448**

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Prepared by:



John P. Repella  
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Reviewed by:



Steven D. Koster  
President

## Abstract

This report has been prepared on behalf of Cooper Power Systems to support the attached Application for Equipment Authorization. The test report and application are submitted for a Frequency Hopping Spread Spectrum Transmitter under Part 15.247 (10/2014) of the FCC Rules and Regulations and Spectrum Management and Telecommunications Policy RSS-247 Issue 1 of Industry Canada. This Certification Test Report documents the test configuration and test results for the Cooper Power Systems RFN-500LG Module.

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 Industry Canada 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 ACLASS under Certificate AT-1448 as an independent FCC test laboratory.

The Cooper Power Systems RFN-500LG Module complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 and Industry Canada RSS-247.

| Revision History | Description of Change                                                                                                                                                     | Date              |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Rev 0            | Initial Release                                                                                                                                                           | February 29, 2016 |
| Rev 1            | Update to include to correct grammatical errors, Correct the FCC/IC ID's and the customer address                                                                         | March 3, 2016     |
| Rev 2            | Added Radiated data for new antenna :Molex P-N 1052620003 (pages 62,66,70), added antenna to table 1.                                                                     | August 23, 2016   |
| Rev 3            | Updated to address comments from ACB. Updated section 2.2 to address EUT setup description. Section 5.4 & 5.5 updated to reflect the correct the RBW/VBW stated settings. | October 24, 2016  |

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## **1 Introduction**

### **1.1 Compliance Statement**

The Cooper Power Systems RFN-500LG Module complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 (10/2014) and Industry Canada RSS-247 Issue 1.

### **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.

### **1.3 Contract Information**

|                        |                                                                                |
|------------------------|--------------------------------------------------------------------------------|
| Customer:              | Cooper Power Systems<br>910 Clopper Road, Suite 201 S<br>Gaithersburg MD 20878 |
| Purchase Order Number: | 4507774621                                                                     |
| Quotation Number:      | 69044                                                                          |

### **1.4 Test Dates**

|                                                 |                        |
|-------------------------------------------------|------------------------|
| Testing was performed on the following date(s): | 2/16/2016 to 8/23/2016 |
|-------------------------------------------------|------------------------|

### **1.5 Test and Support Personnel**

|                              |                               |
|------------------------------|-------------------------------|
| Washington Laboratories, LTD | John P. Repella, James Ritter |
| Customer Representative      | Steve Seymour                 |

## 1.6 Abbreviations

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



## 2 Equipment Under Test

### 2.1 EUT Identification & Description

The RFN-500LG is a radio communications device designed for use in L+G Focus meters. It can also be used in Eaton's Cooper Power Systems Gateways and Relay Nodes. The RFN-500LG provides a 915 MHz radio interface to an RF mesh network.

This test report covers the 902-928MHz FHSS radio.

**Table 1: Device Summary**

| ITEM                         | DESCRIPTION                                                                                                                                                                                                                                                                                                                           |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manufacturer:                | Cooper Power Systems                                                                                                                                                                                                                                                                                                                  |
| FCC ID:                      | P9X-500LG                                                                                                                                                                                                                                                                                                                             |
| IC:                          | 6766A-500LG                                                                                                                                                                                                                                                                                                                           |
| Model:                       | RFN-500LG                                                                                                                                                                                                                                                                                                                             |
| FCC Rule Parts:              | §15.247                                                                                                                                                                                                                                                                                                                               |
| Industry Canada:             | RSS-247                                                                                                                                                                                                                                                                                                                               |
| Frequency Range:             | 902.75 – 927.25MHz                                                                                                                                                                                                                                                                                                                    |
| Maximum Output Power:        | 29.520dBm (895.4mW)                                                                                                                                                                                                                                                                                                                   |
| Modulation:                  | FSK                                                                                                                                                                                                                                                                                                                                   |
| Occupied Bandwidth:          | 476.4 kHz                                                                                                                                                                                                                                                                                                                             |
| Keying:                      | Automatic                                                                                                                                                                                                                                                                                                                             |
| Type of Information:         | Data                                                                                                                                                                                                                                                                                                                                  |
| Number of Channels:          | 50                                                                                                                                                                                                                                                                                                                                    |
| Power Output Level           | Variable from 29.520dBm to -7.129dBm                                                                                                                                                                                                                                                                                                  |
| Antenna Connector            | MCX                                                                                                                                                                                                                                                                                                                                   |
| Antenna Type                 | 4 antennas: <ul style="list-style-type: none"> <li>• Linx ¼ Wave Through-hole Helical, 2.4dBi Gain</li> <li>• Laird OD9-5 900MHz Omnidirectional Antenna, 5dBi Gain</li> <li>• Laird B(B)8965CN 5/8 Wave Loaded Coil 900MHz Omnidirectional Antenna, 5dBi gain</li> <li>• Omnidirectional Molex P-N 1052620003, 1.2dB Gain</li> </ul> |
| Interface Cables:            | None (plug in module)                                                                                                                                                                                                                                                                                                                 |
| Power Source & Voltage:      | 120/240VAC                                                                                                                                                                                                                                                                                                                            |
| Emission Designator          | 484KFXD                                                                                                                                                                                                                                                                                                                               |
| Highest TX Spurious Emission | 644.8uV/m@3m- 8232.75MHz                                                                                                                                                                                                                                                                                                              |
| Highest RX Spurious Emission | 61.1uV/m @ 3m, 167.61MHz                                                                                                                                                                                                                                                                                                              |

## 2.2 Test Configuration

The Cooper Power Systems RFN-500LG, Equipment Under Test (EUT), was operated from a 115Vac power supply. Programming commands were sent from a support laptop via a custom RS232 adaptor board to a header on the EUT module. The measurements were performed on the EUT in a manner which represents the typical installation configuration. A piece of closed cell foam was used to support the EUT and antenna combination.

## 2.3 Testing Algorithm

The RFN-500LG was programmed for operation from a support laptop via a custom RS232 adaptor board to a header on the EUT module. UTF TeraTermPro console program was used on the support laptop to enter commands setting the EUT to the desired channel or hopping mode.

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 Industry Canada 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 "Procedures for Compliance Testing of Unlicensed Wireless Devices"

ANSI C63.2 "Specifications for Electromagnetic Noise and Field Strength Instrumentation"

ANSI C63.4 "Methods of Measurement of Radio Noise from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz".

## 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

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

Where  $u_c$  = standard uncertainty

$a, b, c, \dots$  = individual uncertainty elements

$div_a, div_b, div_c$  = 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**

| Parameter                                          | Uncertainty            | Actual (+/-) | Unit  |
|----------------------------------------------------|------------------------|--------------|-------|
| Radio Frequency                                    | $\pm 1 \times 10^{-7}$ | 8.64E-08     | parts |
| RF Power conducted (up to 160 W)                   | $\pm 0.75$ dB          | 0.3          | dB    |
| Conducted RF Power variations using a test fixture | $\pm 0.75$ dB          | 0.3          | dB    |
| Radiated RF power                                  | $\pm 6$ dB             | N/A          | dB    |
| Average sensitivity (radiated)                     | $\pm 3$ dB             | N/A          | dB    |

| Scope               | Standard(s)                            | Expanded Uncertainty |
|---------------------|----------------------------------------|----------------------|
| Conducted Emissions | CISPR11, CISPR22, CISPR14, FCC Part 15 | $\pm 2.63$ dB        |
| Radiated Emissions  | CISPR11, CISPR22, CISPR14, FCC Part 15 | $\pm 4.55$ dB        |

### 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: <b>Radiated Emissions &amp; Bench Conducted Emissions</b> |                                  | Test Date: <b>02/18/2016</b> |                 |
|----------------------------------------------------------------------|----------------------------------|------------------------------|-----------------|
| <b>Asset #</b>                                                       | <b>Manufacturer/Model</b>        | <b>Description</b>           | <b>Cal. Due</b> |
| 823                                                                  | AGILENT - N9010A                 | EXA SPECTRUM ANALYZER        | 8/5/2016        |
| 382                                                                  | SUNOL SCIENCES CORPORATION - JB1 | ANTENNA BICONLOG             | 8/31/2017       |
| 276                                                                  | ELECTROMETRICS - BPA-1000        | PRE-AMPLIFIER RF 50KHZ-1GHZ  | 9/18/2016       |
| 627                                                                  | AGILENT - 8449B                  | AMPLIFIER 1-26GHZ            | 6/6/2016        |
| 825                                                                  | MEGAPHASE - TM40-K1K5-36         | RF CABLE - 2.9MM-2.9MM 36    | 11/3/2016       |

| Test Name: <b>Conducted Emissions Voltage</b> |                           | Test Date: <b>02/21/2016</b> |                 |
|-----------------------------------------------|---------------------------|------------------------------|-----------------|
| <b>Asset #</b>                                | <b>Manufacturer/Model</b> | <b>Description</b>           | <b>Cal. Due</b> |
| 125                                           | SOLAR - 8028-50-TS-24-BNC | LISN                         | 10/10/2016      |
| 125                                           | SOLAR - 8028-50-TS-24-BNC | LISN                         | 10/10/2016      |
| 823                                           | AGILENT - N9010A          | EXA SPECTRUM ANALYZER        | 8/5/2016        |

## 4 Test Summary

The Table Below shows the results of testing for compliance with a Frequency Hopping System in accordance with FCC Part 15.247 10/2014 and RSS-247 Issue 1. Full test results are shown in Section 5.

**Table 4: Test Summary Table**

| <b>TX Test Summary<br/>(Frequency Hopping Spread Spectrum)</b>         |                            |                                                                     |               |
|------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------|---------------|
| <b>FCC Rule Part</b>                                                   | <b>IC Rule Part</b>        | <b>Description</b>                                                  | <b>Result</b> |
| 15.247 (a)(1)(i)                                                       | RSS-247<br>Section 5.1 (1) | 20dB Bandwidth                                                      | Pass          |
| 15.247 (b)(2)                                                          | RSS-247<br>Section 5.4 (1) | Transmit Output Power                                               | Pass          |
| 15.247 (a)(1)                                                          | RSS-247<br>Section 5.1 (2) | Channel Separation                                                  | Pass          |
| 15.247 (a)(1)(i)                                                       | RSS-247<br>Section 5.1 (3) | Number of Channels =50<br>minimum                                   | Pass          |
| 15.247 (a)(1)(i)                                                       | RSS-247<br>Section 5.1 (3) | Time of Occupancy                                                   | Pass          |
| 15.247 (d)                                                             | RSS-247<br>Section 5.5     | Occupied BW / Out-of-<br>Band Emissions (Band<br>Edge @ 20dB below) | Pass          |
| 15.205<br>15.209                                                       | RSS-247<br>Section 5.5     | General Field Strength<br>Limits (Restricted Bands<br>& RE Limits)  | Pass          |
| 15.207                                                                 | RSS-Gen                    | AC Conducted Emissions                                              | Pass          |
| <b>RX/Digital Test Summary<br/>(Frequency Hopping Spread Spectrum)</b> |                            |                                                                     |               |
| <b>FCC Rule Part</b>                                                   | <b>IC Rule Part</b>        | <b>Description</b>                                                  | <b>Result</b> |
| 15.207                                                                 | RSS-Gen                    | AC Conducted Emissions                                              | Pass          |
| 15.209                                                                 | RSS-Gen                    | General Field Strength<br>Limits                                    | Pass          |

## 5 Test Results

### 5.1 Duty Cycle Correction and Time of Occupancy

In accordance with the FCC Public Notice the average spurious radiated emissions measurements may be further adjusted using a duty cycle correction factor if the dwell time per channel of the hopping signal is less than 100 ms.

The duty cycle correction factor is calculated by:

$$20 \times \text{LOG} (\text{dwell time}/100 \text{ ms})$$

The following figure shows the plot of the dwell time for the transmitter. Based on this plot, the dwell time per hop is 19.04ms. The maximum total dwell time per 100ms is 57.12ms. This corresponds to a duty cycle correction of -4.86dB for radiated spurious emissions.

The transmitter shall have a time of occupancy for systems having a 20dB bandwidth greater than 250 kHz of no more than 0.4seconds in any 10 second period.

These tests were conducted with the RF output connected through appropriate attenuators to the input of a spectrum analyzer set to zero span mode. The unit was set to hopping mode with the spectrum analyzer set to 902.75MHz. The results are shown in the plots below.

**Table 5: Duty Cycle/time of Occupancy Results**

| Test                 | Result                        | Limit       | Pass/Fail |
|----------------------|-------------------------------|-------------|-----------|
| Dwell time per Hop   | 19.04ms                       | NA          | NA        |
| Dwell time per 100ms | 57.12ms<br>-4.87dB Correction | NA          | NA        |
| Time of Occupancy    | 0.1714s/10 sec                | 0.4s/10 sec | Pass      |



Figure 1: Single Hop Duty Cycle Plot





Figure 2: Dwell time per 100ms

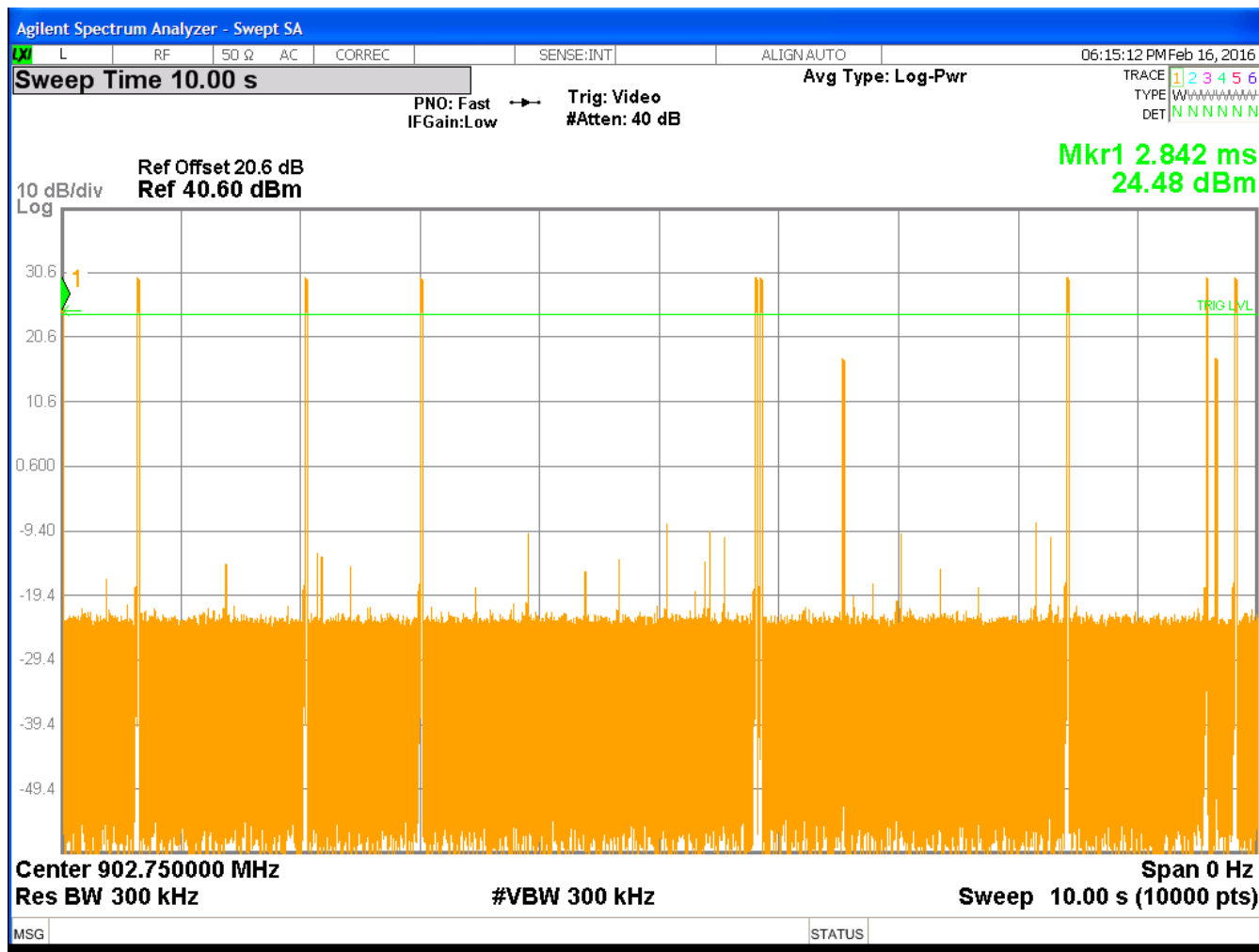


Figure 3: Time of Occupancy

## 5.2 RF Power Output: (FCC Part §2.1046)

To measure the output power the hopping sequence was stopped while the frequency dwelled on a low, high and Center channel. The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system. The EUT has an adjustable output range. The highest and lowest power available is shown below.

**Table 6: RF Power Output**

| Frequency                 | Power Setting | Level (dBm) | Limit (dBm) | Pass/Fail |
|---------------------------|---------------|-------------|-------------|-----------|
| Low Channel: 902.75MHz    | High          | 29.285      | 30          | Pass      |
| Center Channel: 914.75MHz | High          | 29.455      | 30          | Pass      |
| High Channel: 927.25MHz   | High          | 29.520      | 30          | Pass      |
| Low Channel: 902.75MHz    | Low           | -6.463      | 30          | Pass      |
| Center Channel: 914.75MHz | Low           | -6.766      | 30          | Pass      |
| High Channel: 927.25MHz   | Low           | -7.129      | 30          | Pass      |

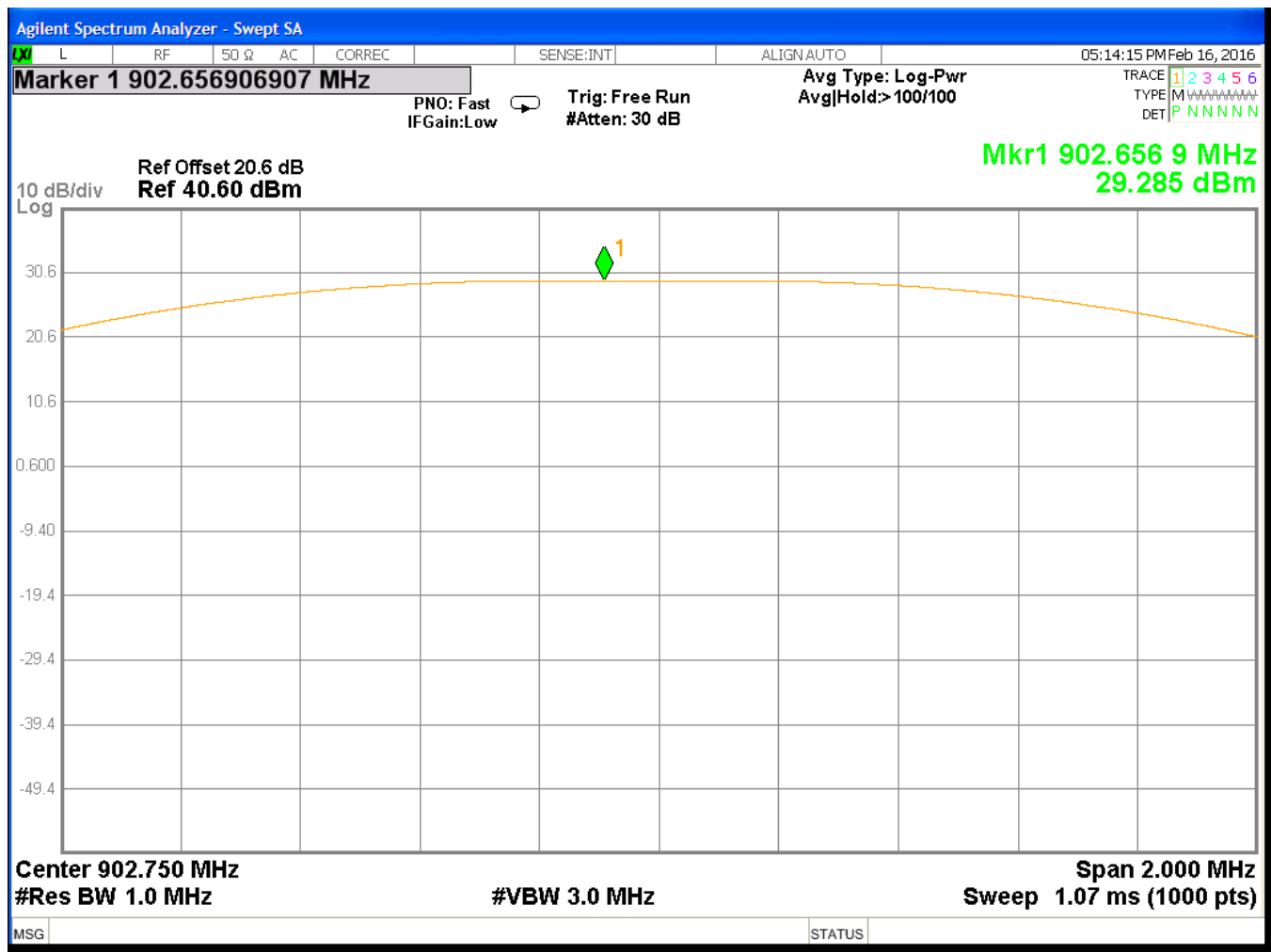


Figure 4: RF Peak Power, High Power, Low Channel

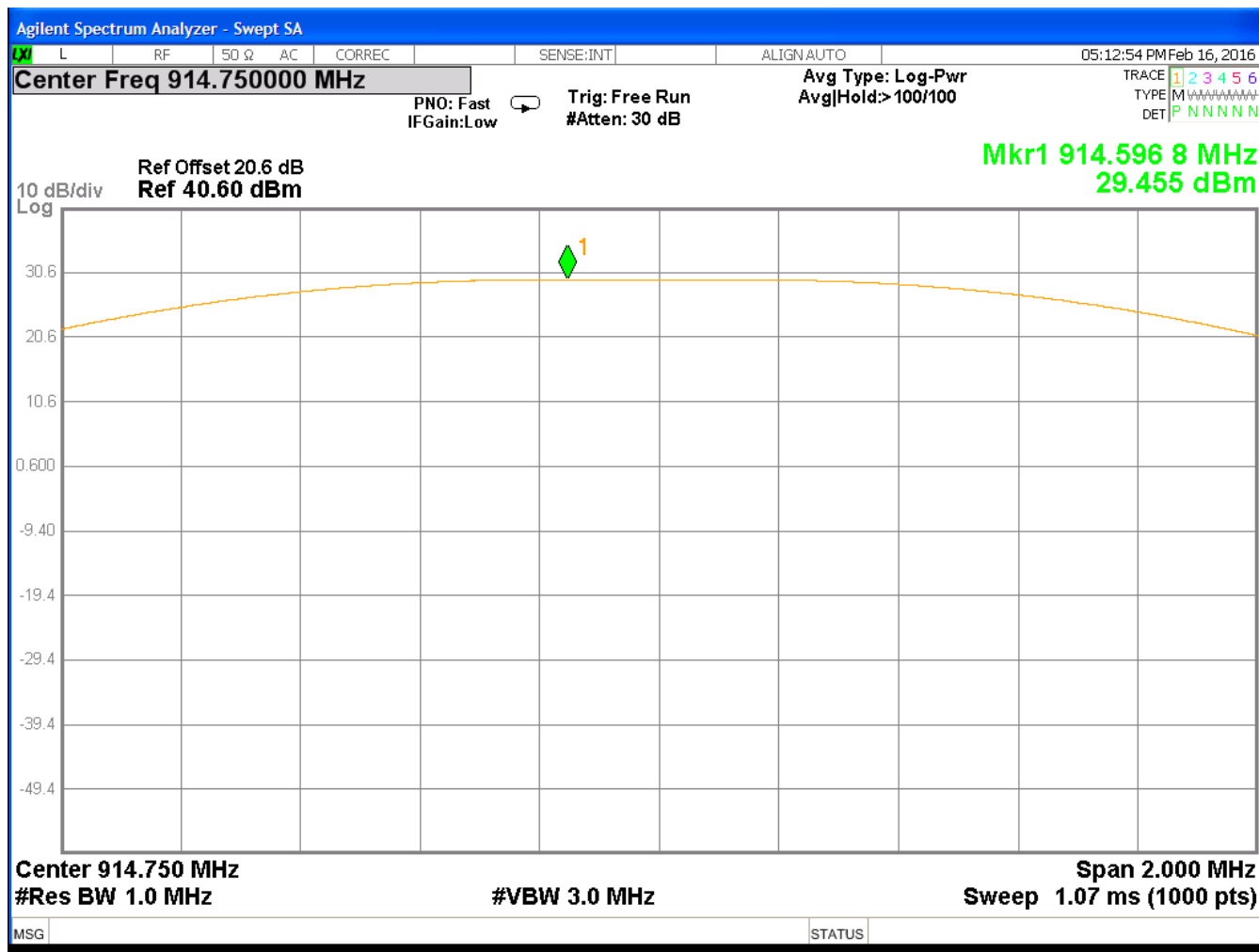


Figure 5: RF Peak Power, High Power, Center Channel

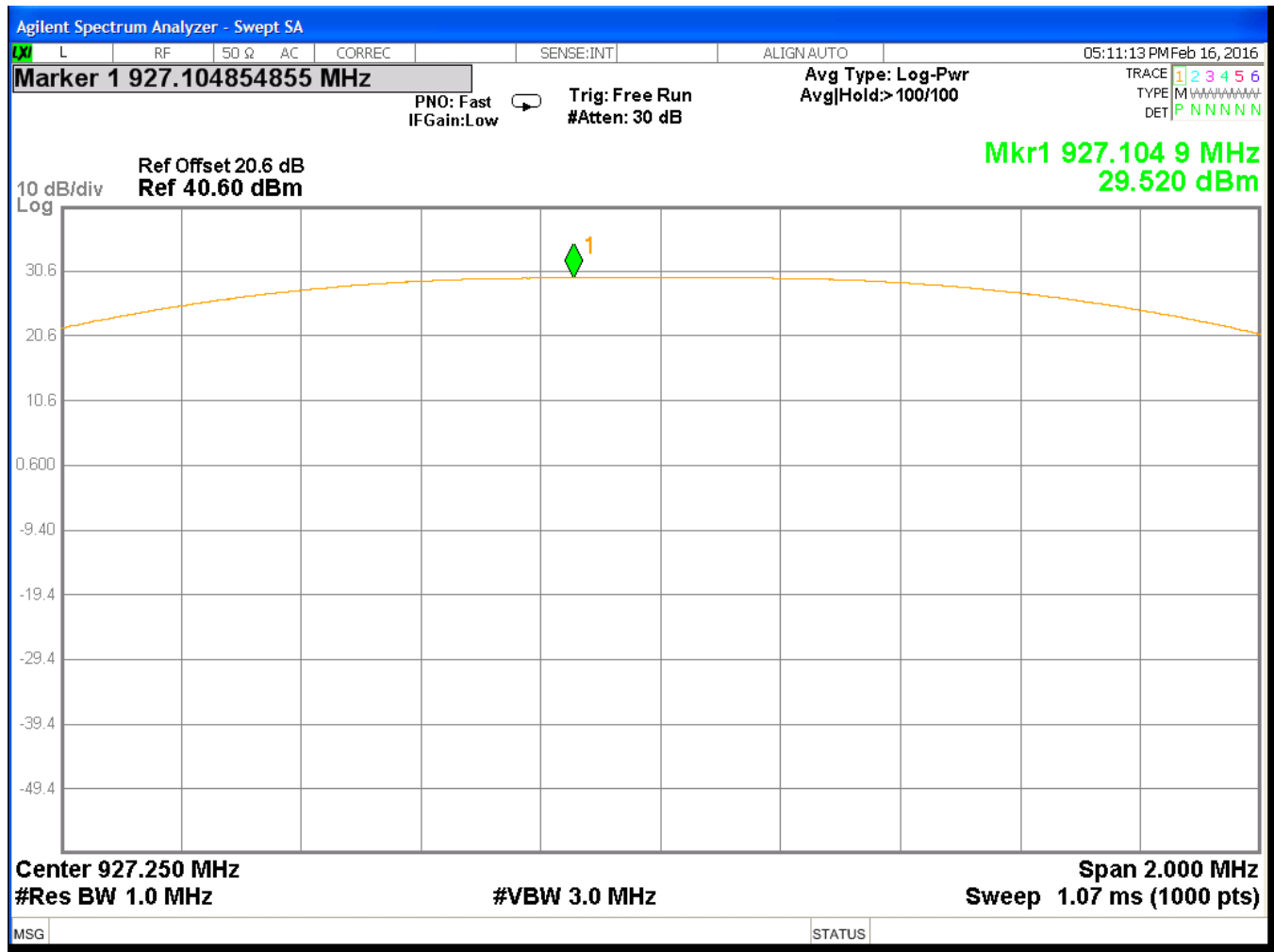


Figure 6: RF Peak Power, High Power, High Channel

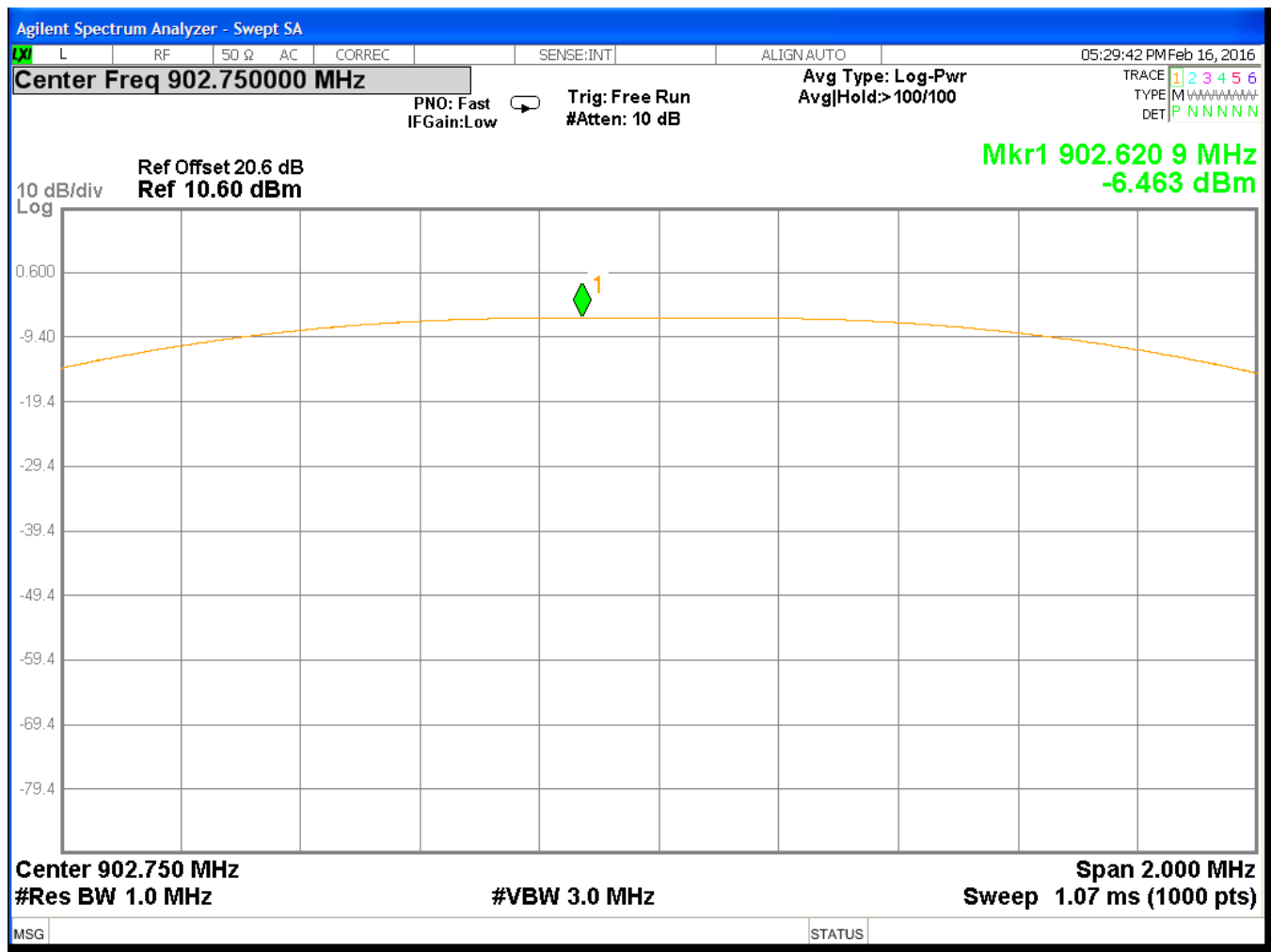


Figure 7: RF Peak Power, Low Power, Low Channel

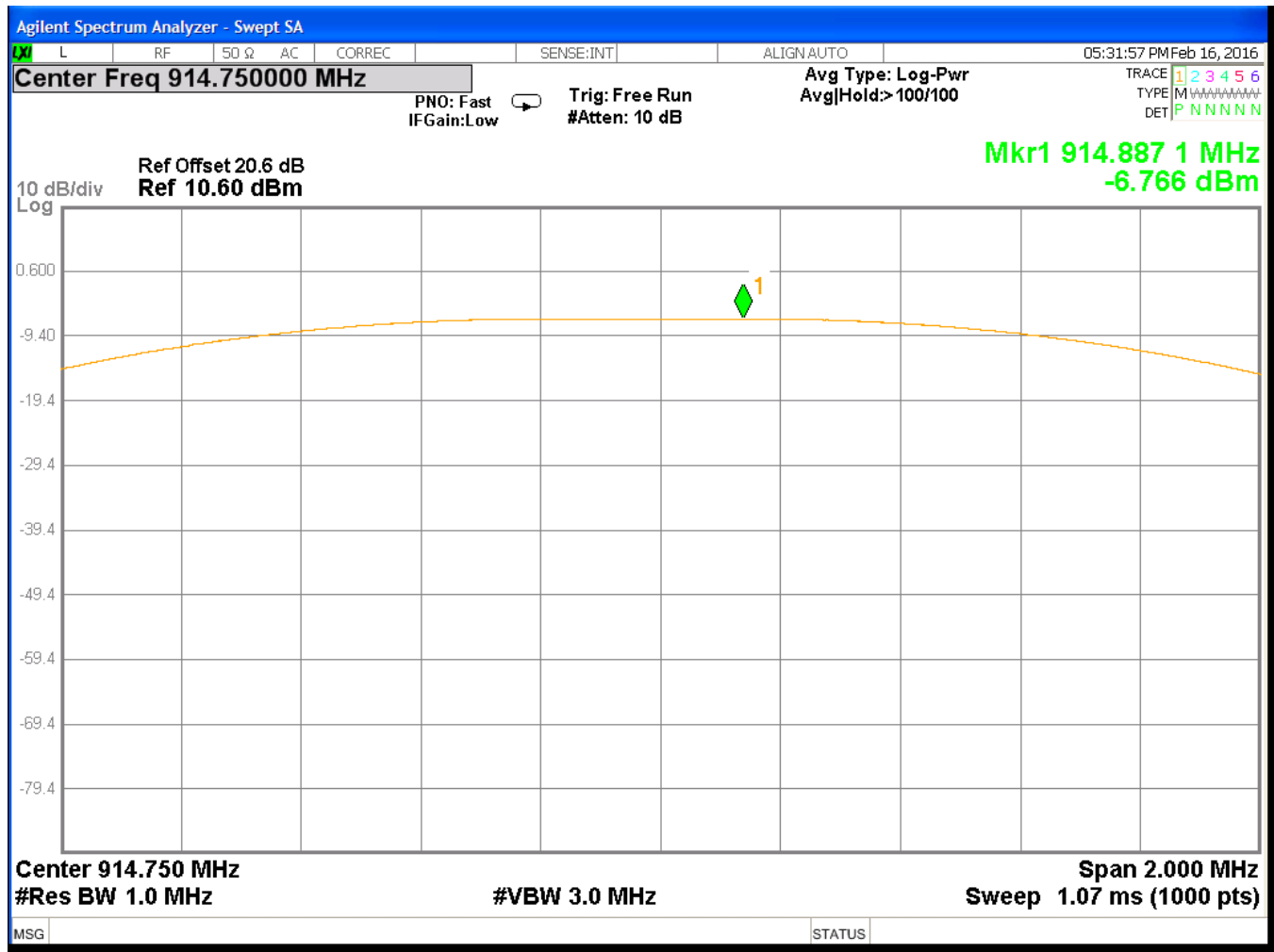


Figure 8: RF Peak Power, Low Power, Center Channel



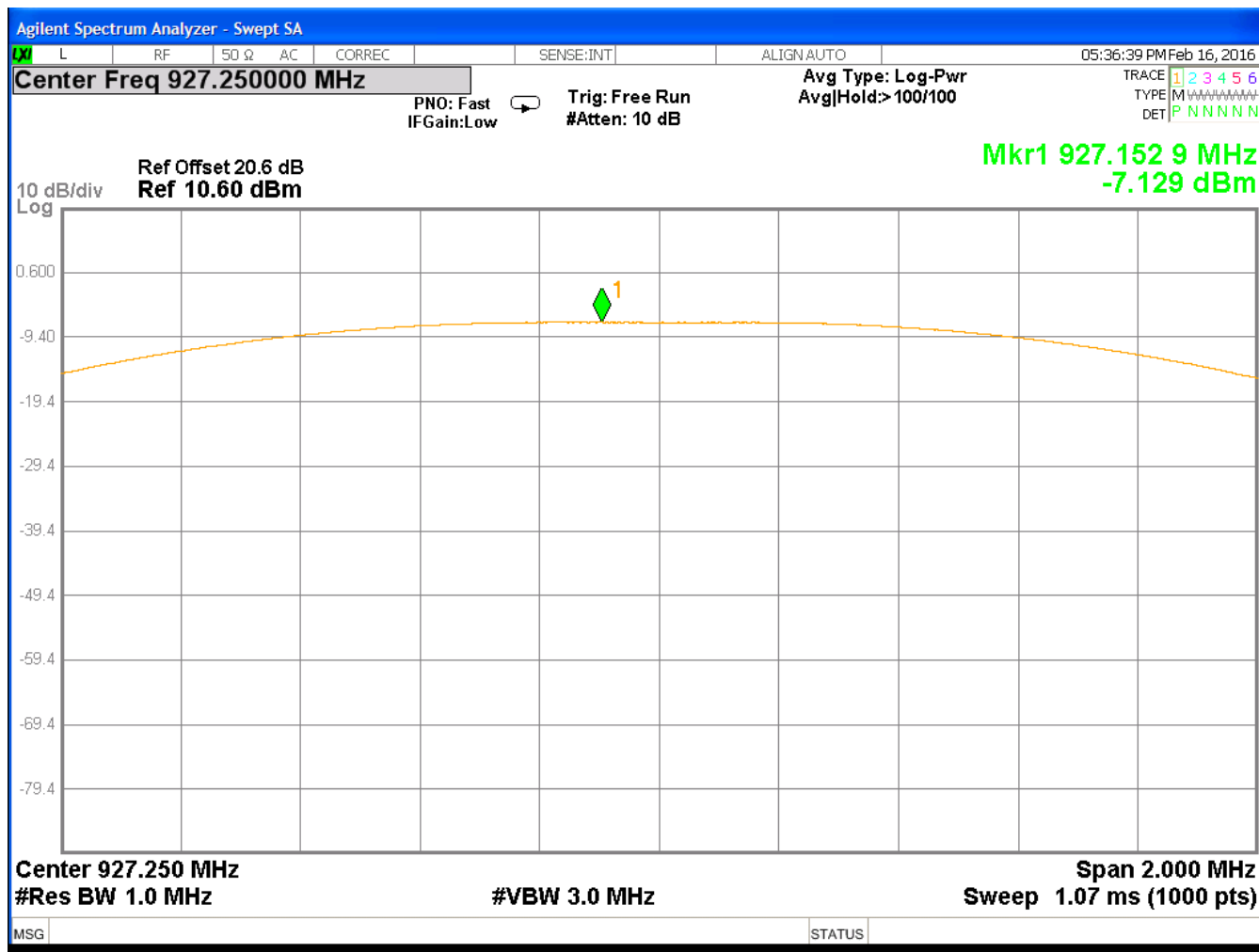


Figure 9: RF Peak Power, Low Power, High Channel

### 5.3 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

For Frequency Hopping Spread Spectrum Systems, FCC Part 15.247 requires the maximum 20 dB bandwidth not exceed 500 kHz.

At full modulation, the occupied bandwidth was measured as shown:

Table 7 provides a summary of the Occupied Bandwidth Results.

**Table 7: Occupied Bandwidth Results**

| Frequency                 | Bandwidth<br>(kHz) | Limit<br>(kHz) | Pass/Fail |
|---------------------------|--------------------|----------------|-----------|
| Low Channel: 902.75MHz    | 471.3              | 500            | Pass      |
| Center Channel: 914.75MHz | 473.4              | 500            | Pass      |
| High Channel: 927.25MHz   | 476.4              | 500            | Pass      |

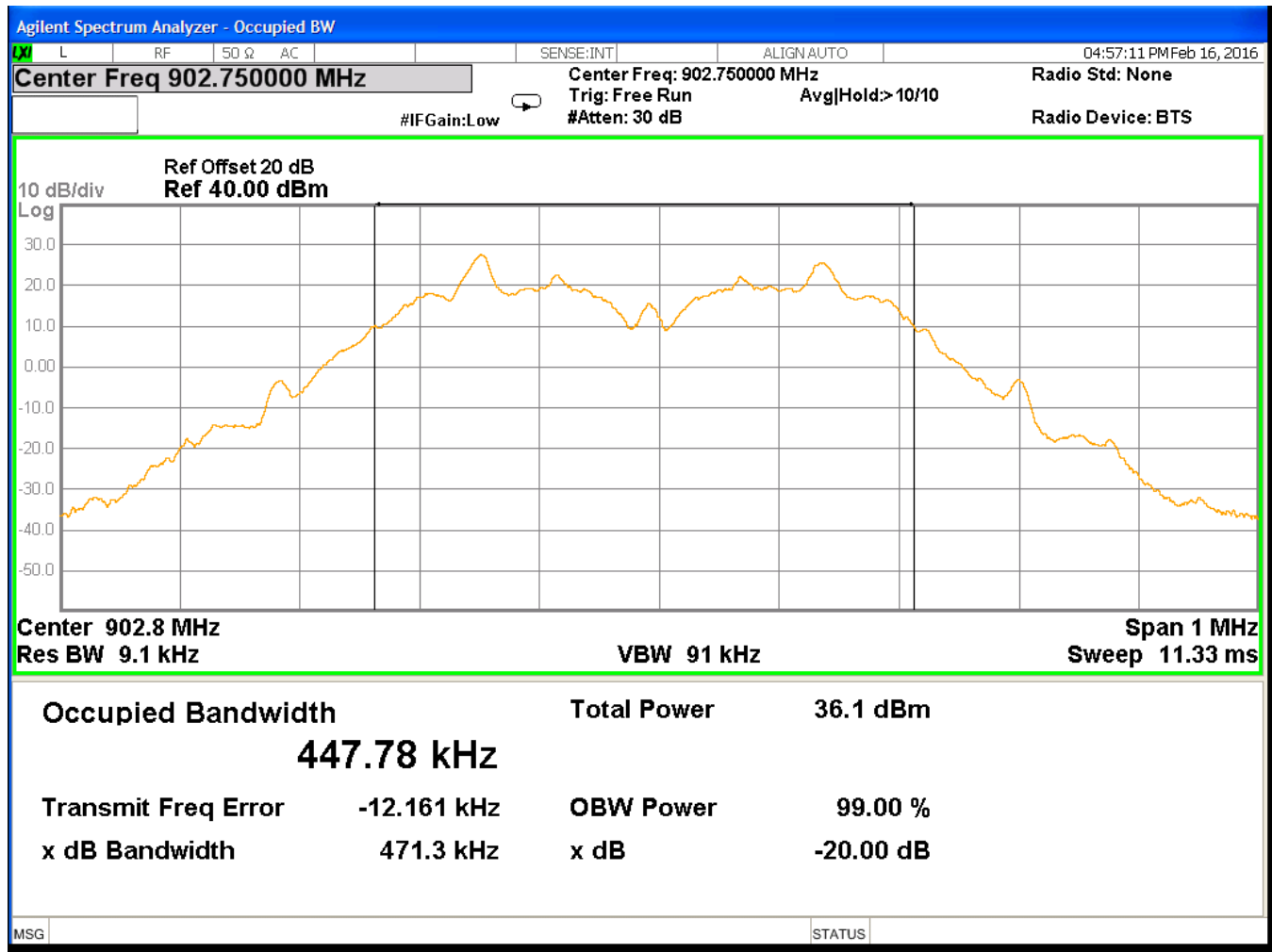


Figure 10: Occupied Bandwidth, Low Channel

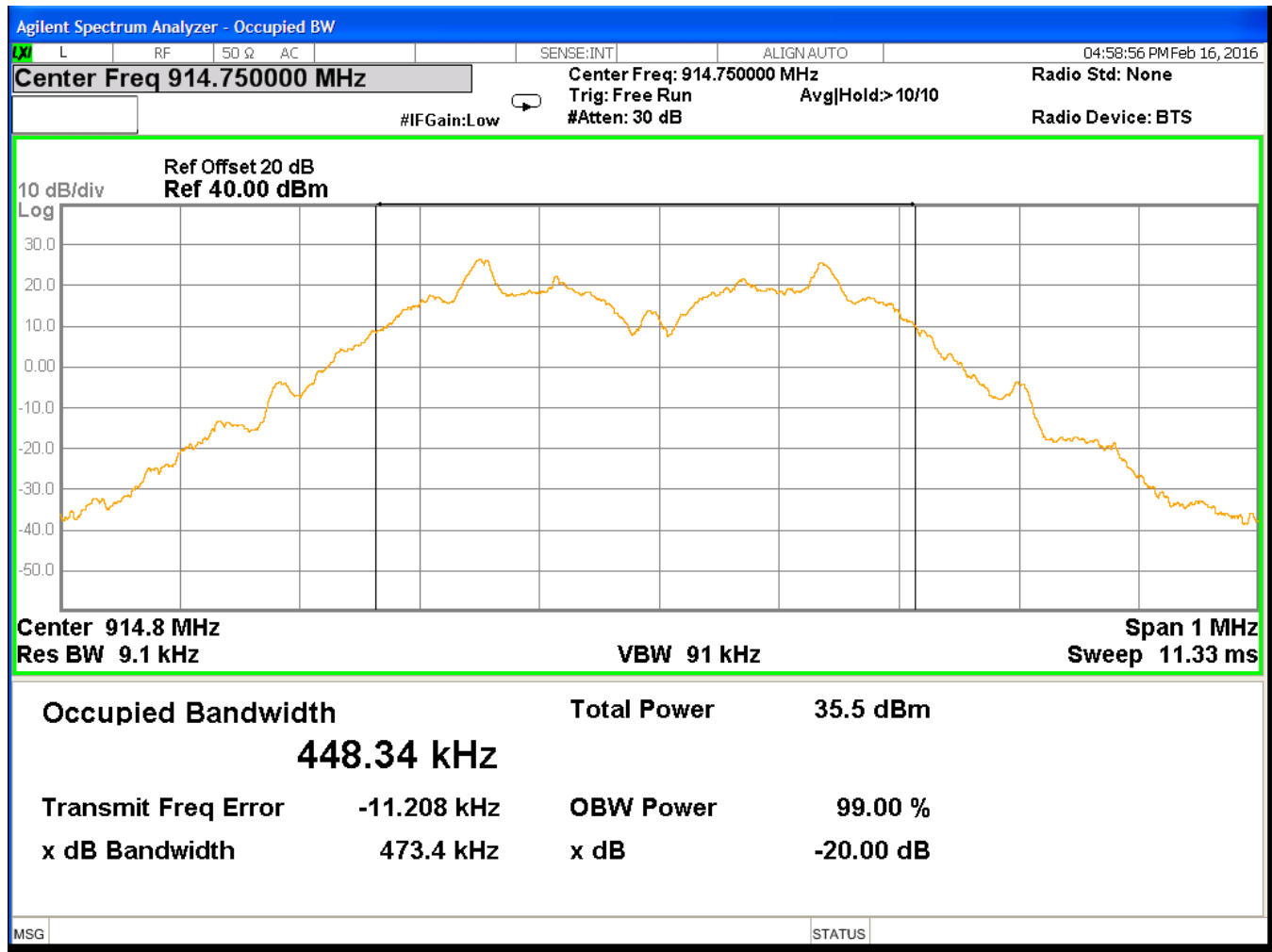


Figure 11: Occupied Bandwidth, Center Channel

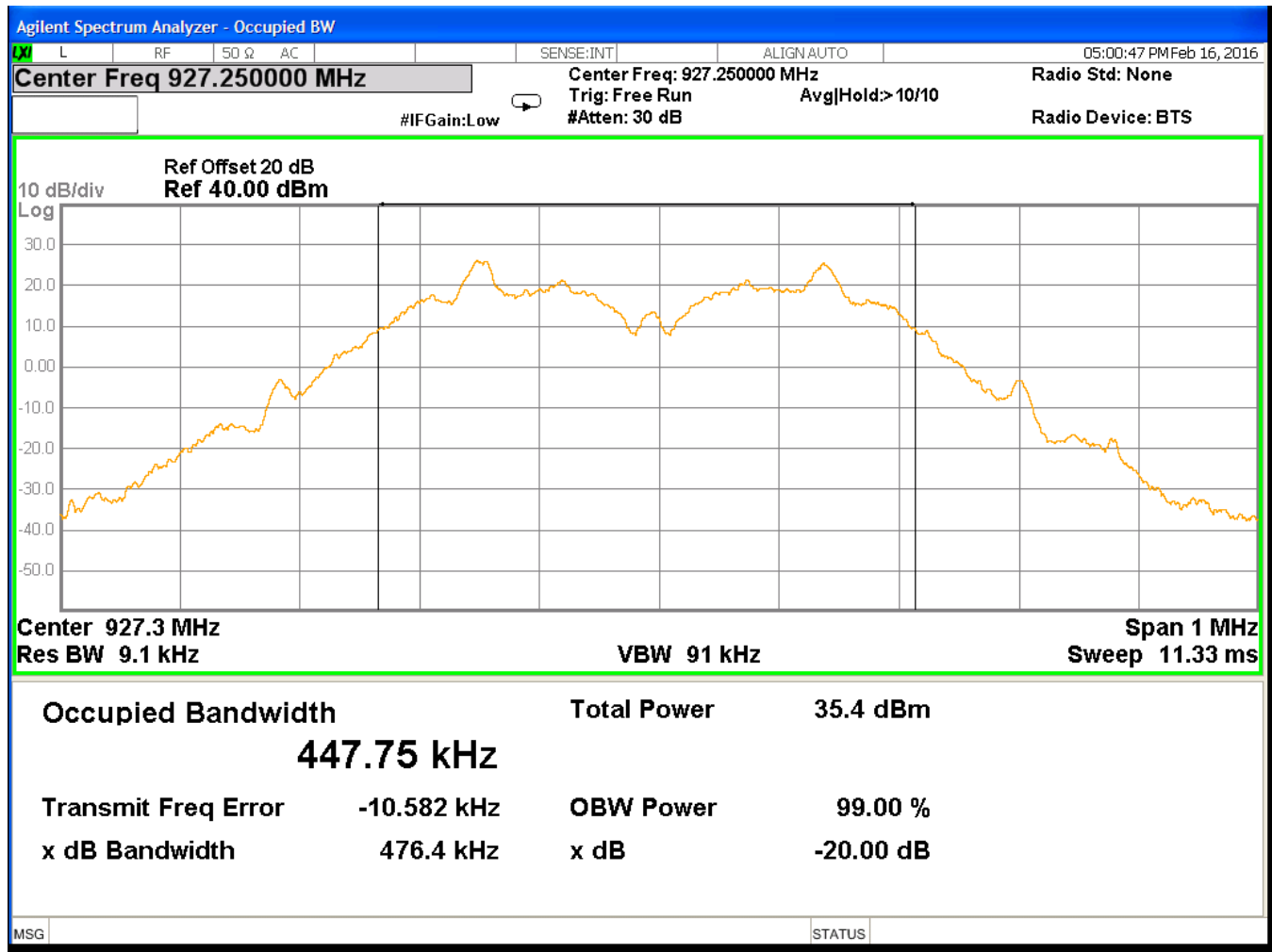


Figure 12: Occupied Bandwidth, High Channel

#### 5.4 Channel Spacing and Number of Hop Channels (FCC Part §15.247(a)(1))

Per the FCC requirements, frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth, whichever is greater. The maximum 20dB bandwidth measured is 476.4 kHz so the channel spacing must be more than 476.4 kHz. In addition, for a 902-928MHz transmitter with an occupied bandwidth greater than 250 kHz the minimum number of hopping channels shall be 25.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 20 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. The spectrum analyzer resolution bandwidth was set to 30 kHz and the video bandwidth was set to 100 kHz. The channel spacing of 2 adjacent channels was measured using a spectrum analyzer span setting of 100 kHz. Also, the number of hopping channels was measured from 902-928MHz using a RBW/VBW setting of 30/100 kHz.

The following are plots of the channel spacing and number of hopping channels data. The channel spacing was measured to be 492.4 kHz and the number of channels used is 50.

Note: In the following plots each channel is composed of 2 distinct peaks.

**Table 8: Channel Spacing and Number of Channels Results**

| Frequency          | Result      | Limit                  | Pass/Fail |
|--------------------|-------------|------------------------|-----------|
| Channel Spacing    | 492.4kHz    | 476.4kHz<br>Minimum    | Pass      |
| Number of channels | 50 channels | 25 Channels<br>Minimum | Pass      |

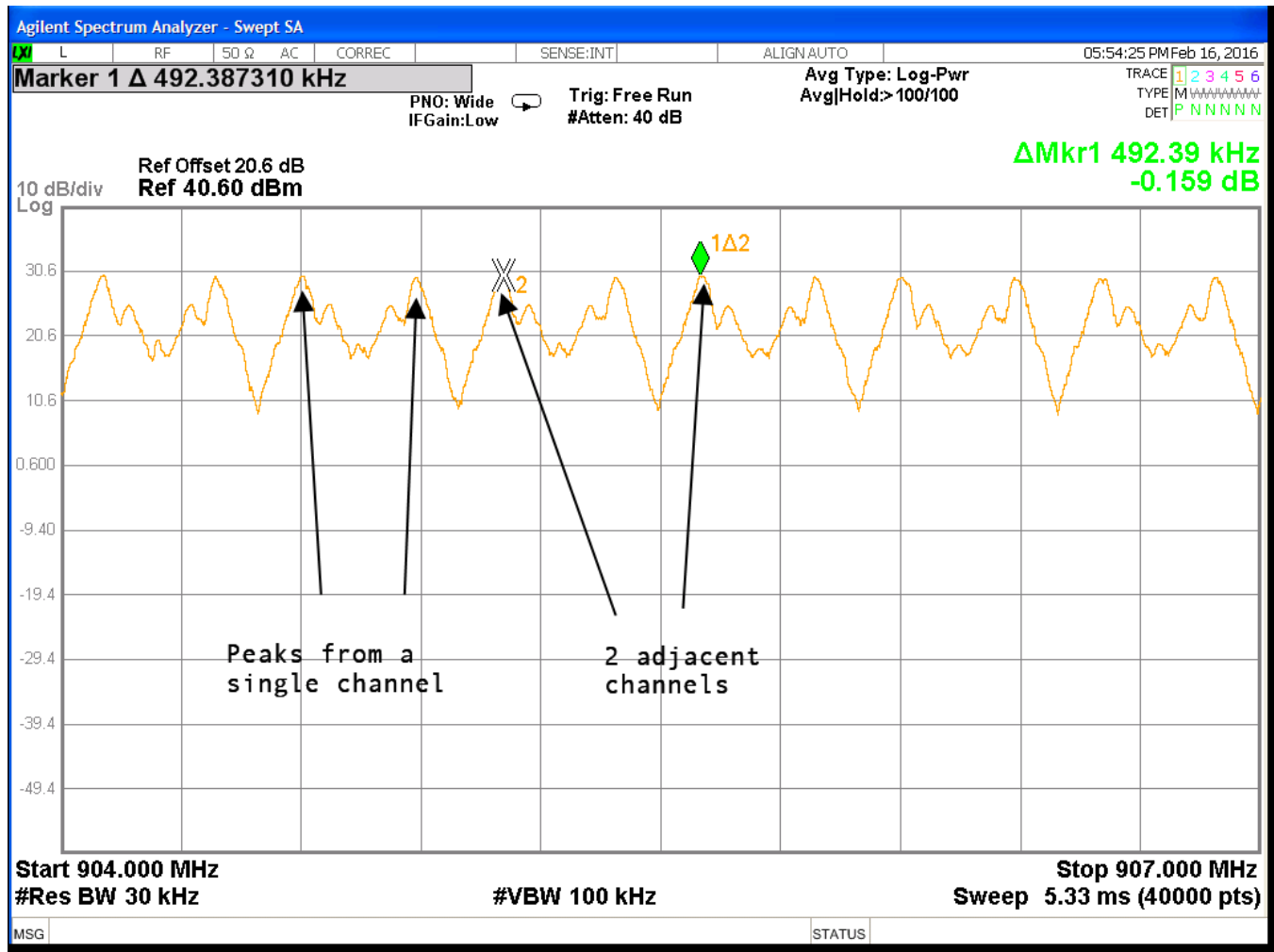


Figure 13: Channel Spacing

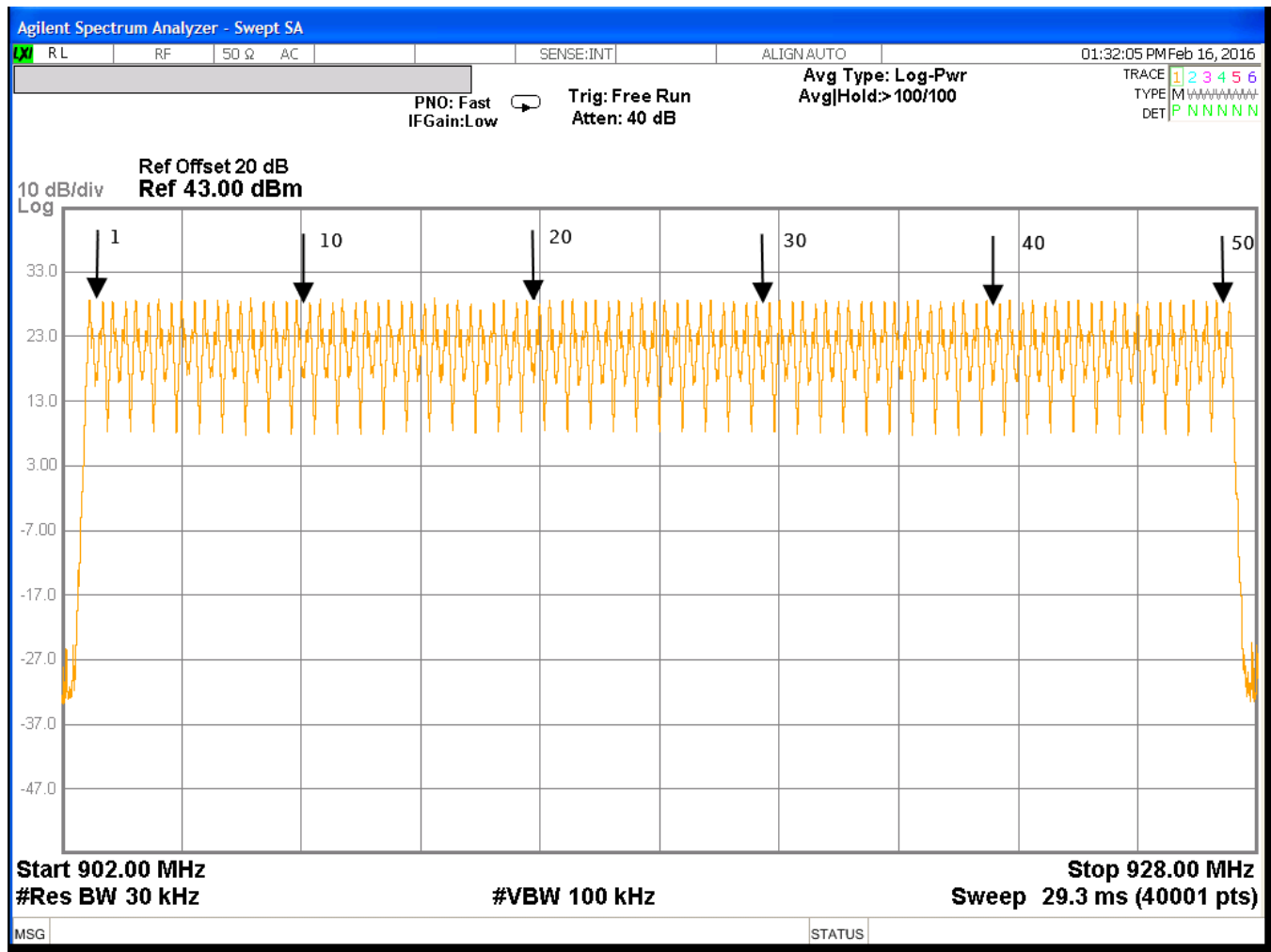


Figure 14: Number of Hopping Channels



## 5.5 Conducted Spurious Emissions at Antenna Terminals (FCC Part §2.1051)

The EUT must comply with requirements for spurious emissions at antenna terminals. Per §15.247(c) 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.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. 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.

The following are plots of the conducted spurious emissions data.

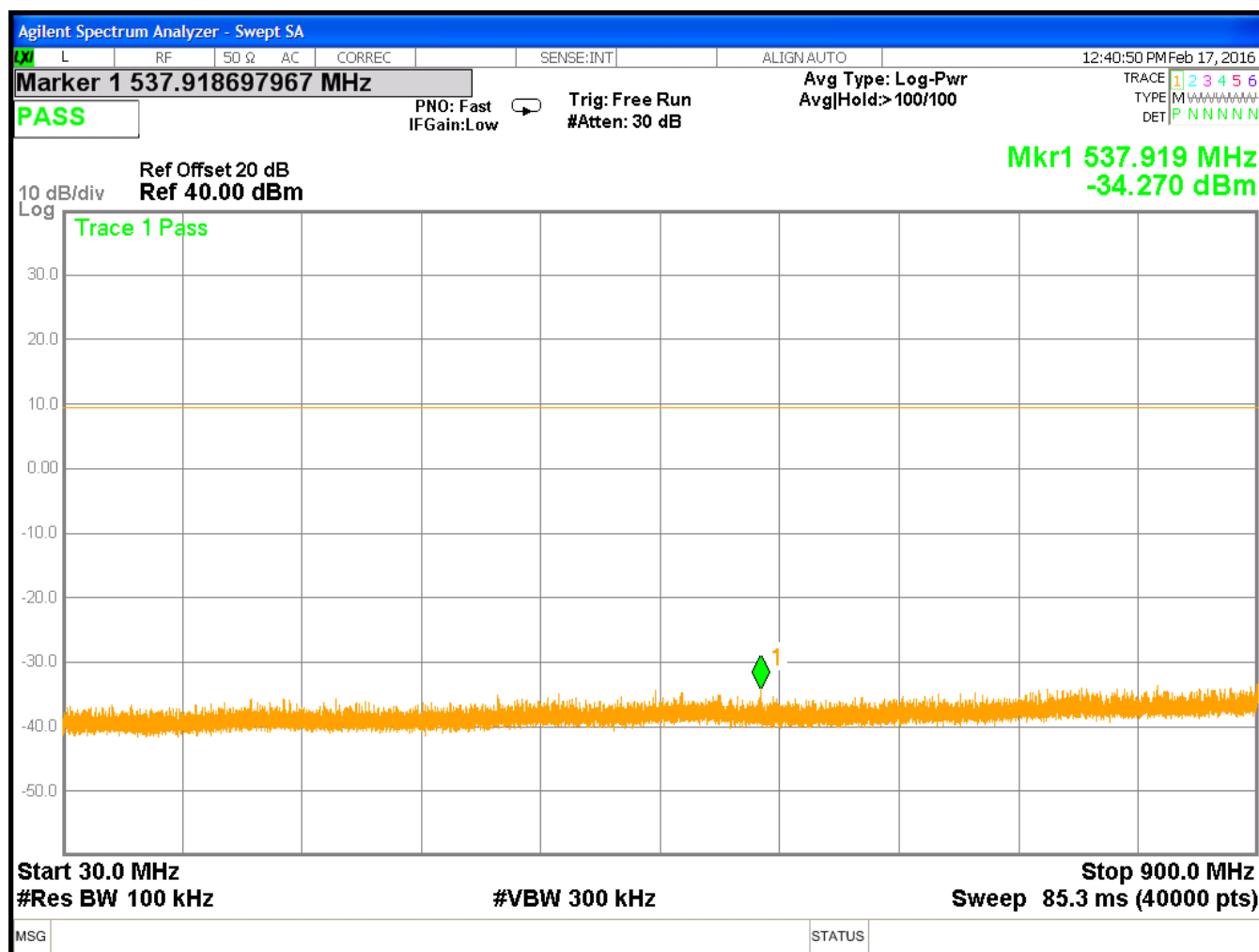


Figure 15: Conducted Spurious Emissions, High Power, Low Channel 30 - 900MHz

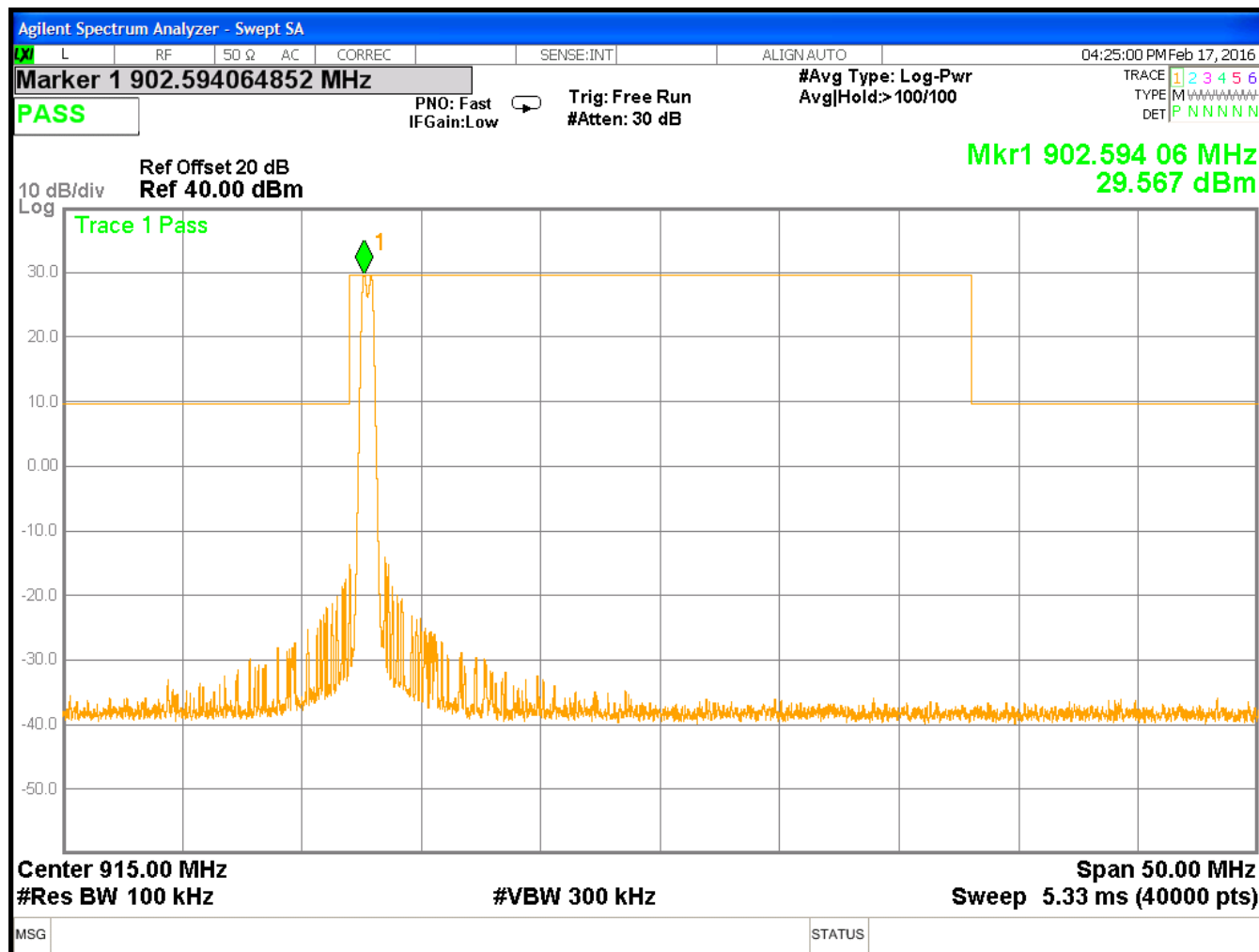


Figure 16: Conducted Spurious Emissions, High Power, Low Channel 900 – 930MHz



Figure 17: Conducted Spurious Emissions, High Power, Low Channel 930-5000MHz

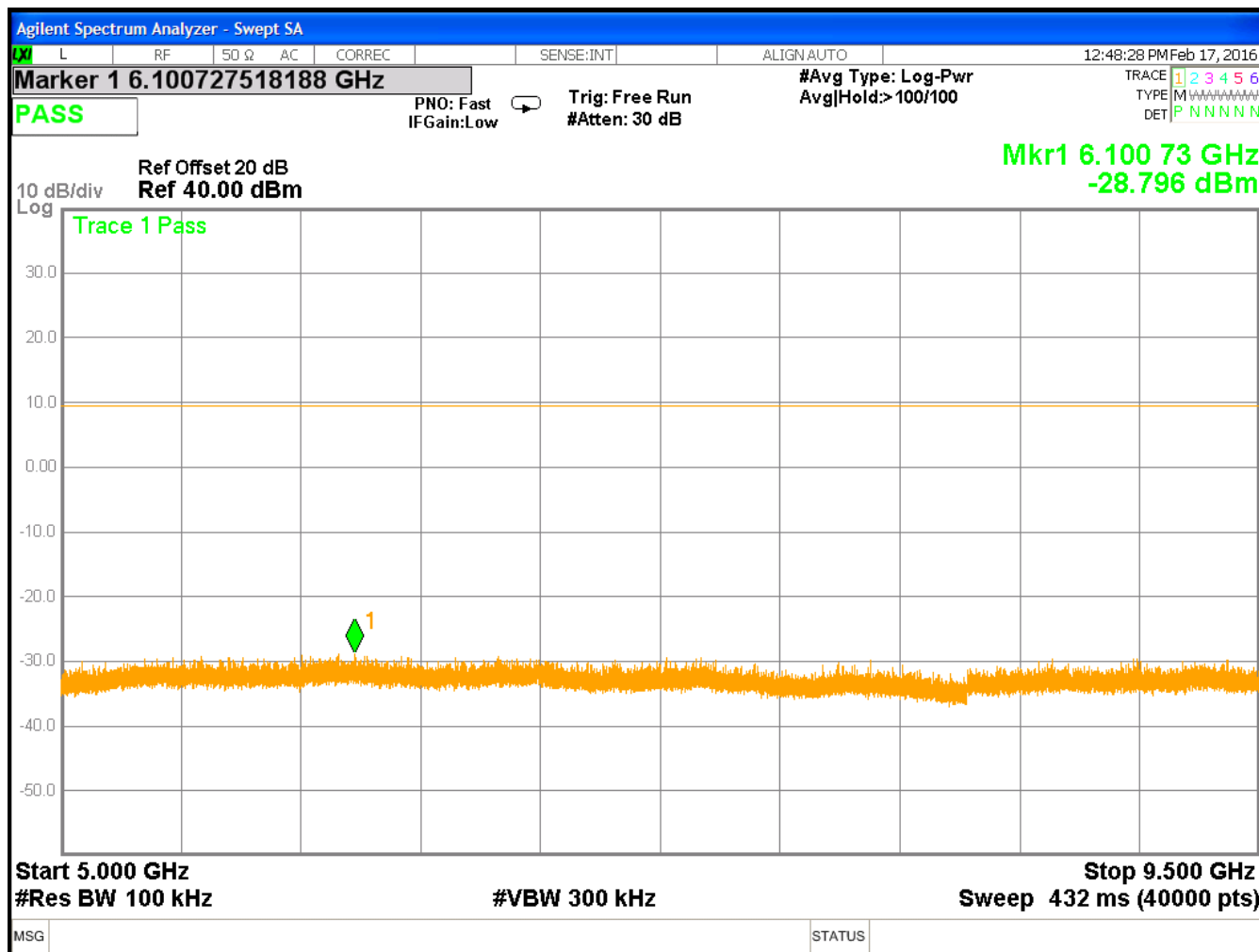


Figure 18: Conducted Spurious Emissions, High Power, Low Channel 5-9.5GHz

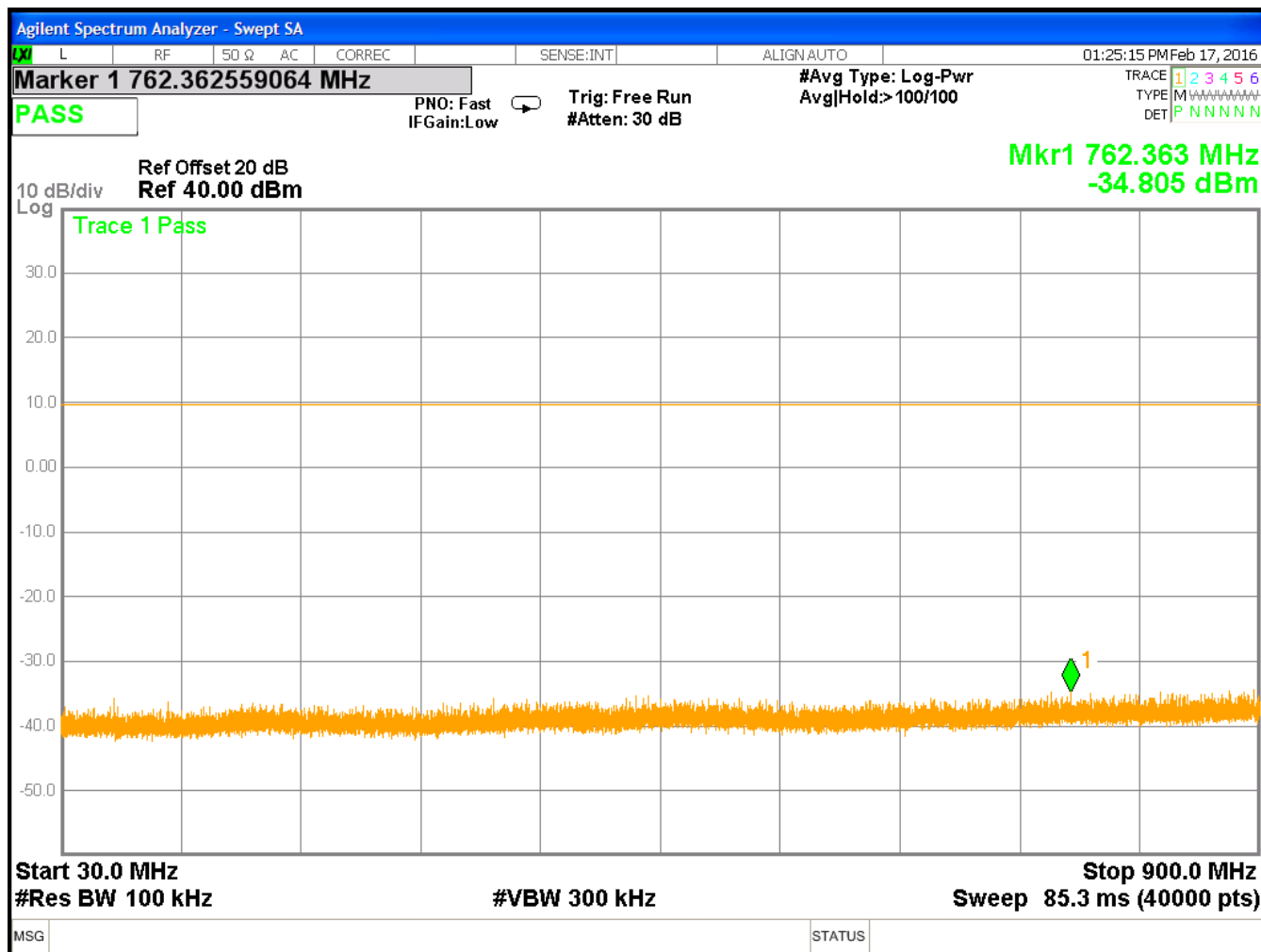


Figure 19: Conducted Spurious Emissions, High Power, Center Channel 30 - 900MHz

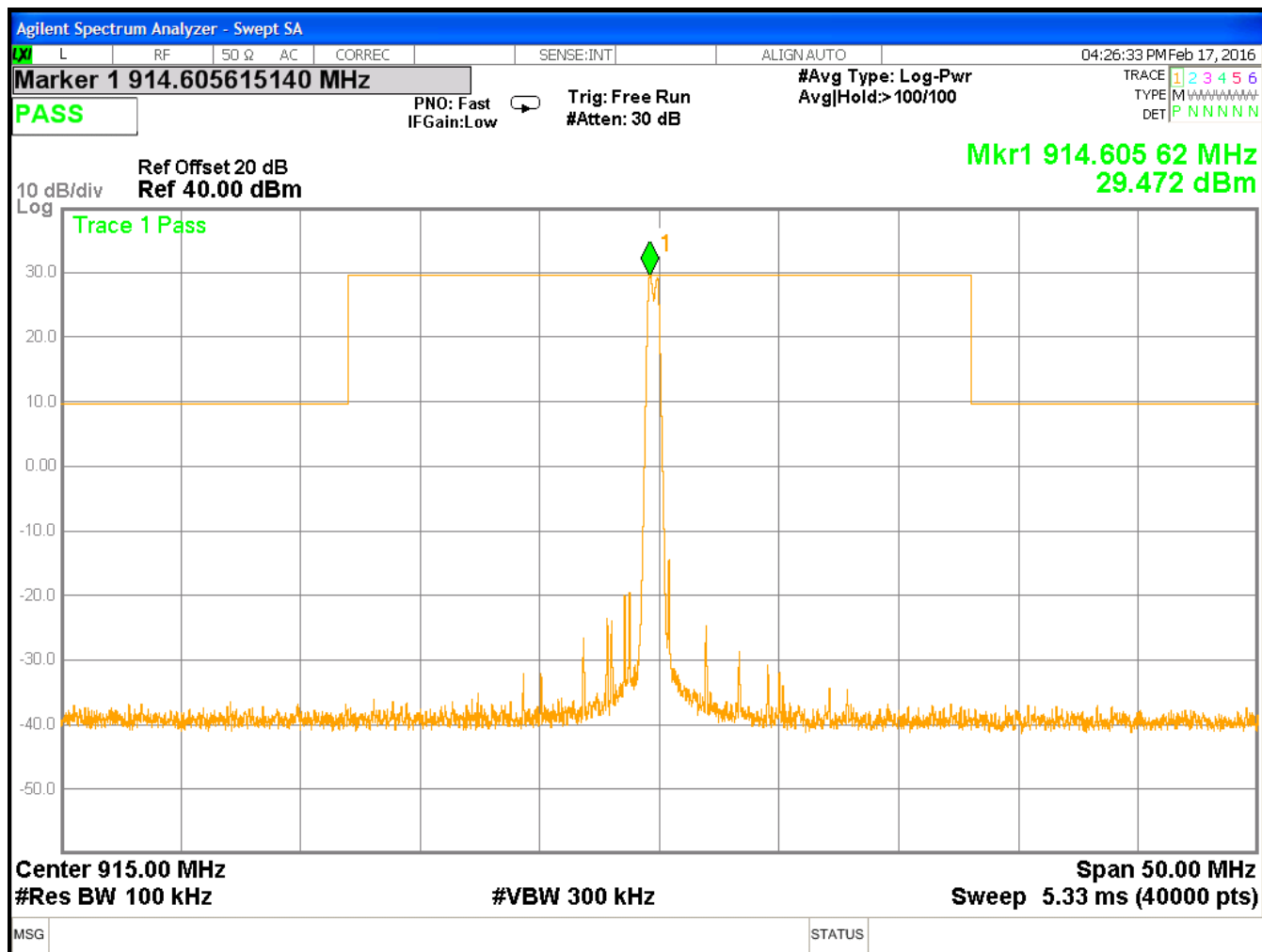


Figure 20: Conducted Spurious Emissions, High Power, Center Channel 900 – 930MHz

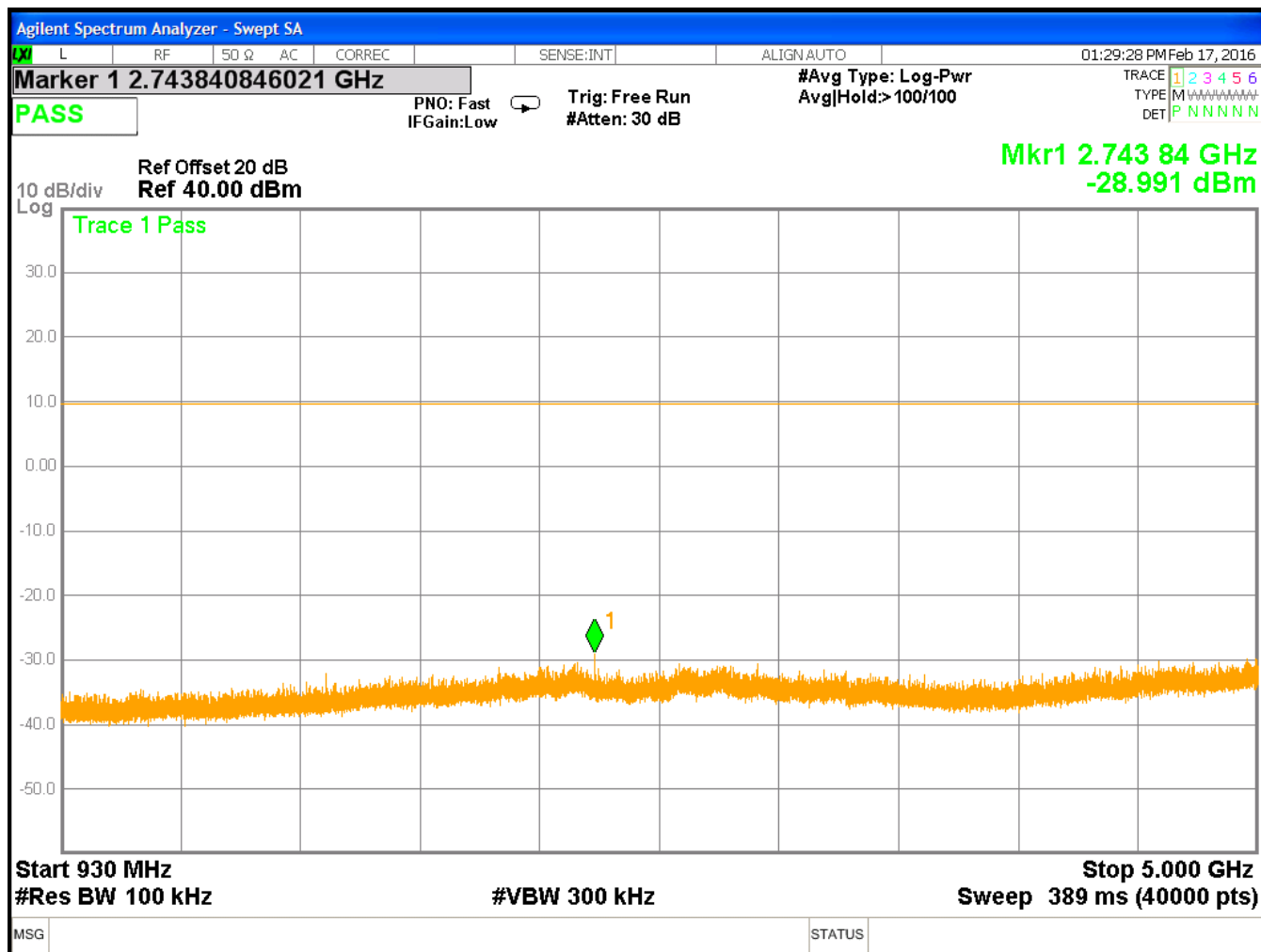


Figure 21: Conducted Spurious Emissions, High Power, Center Channel 930-5000MHz

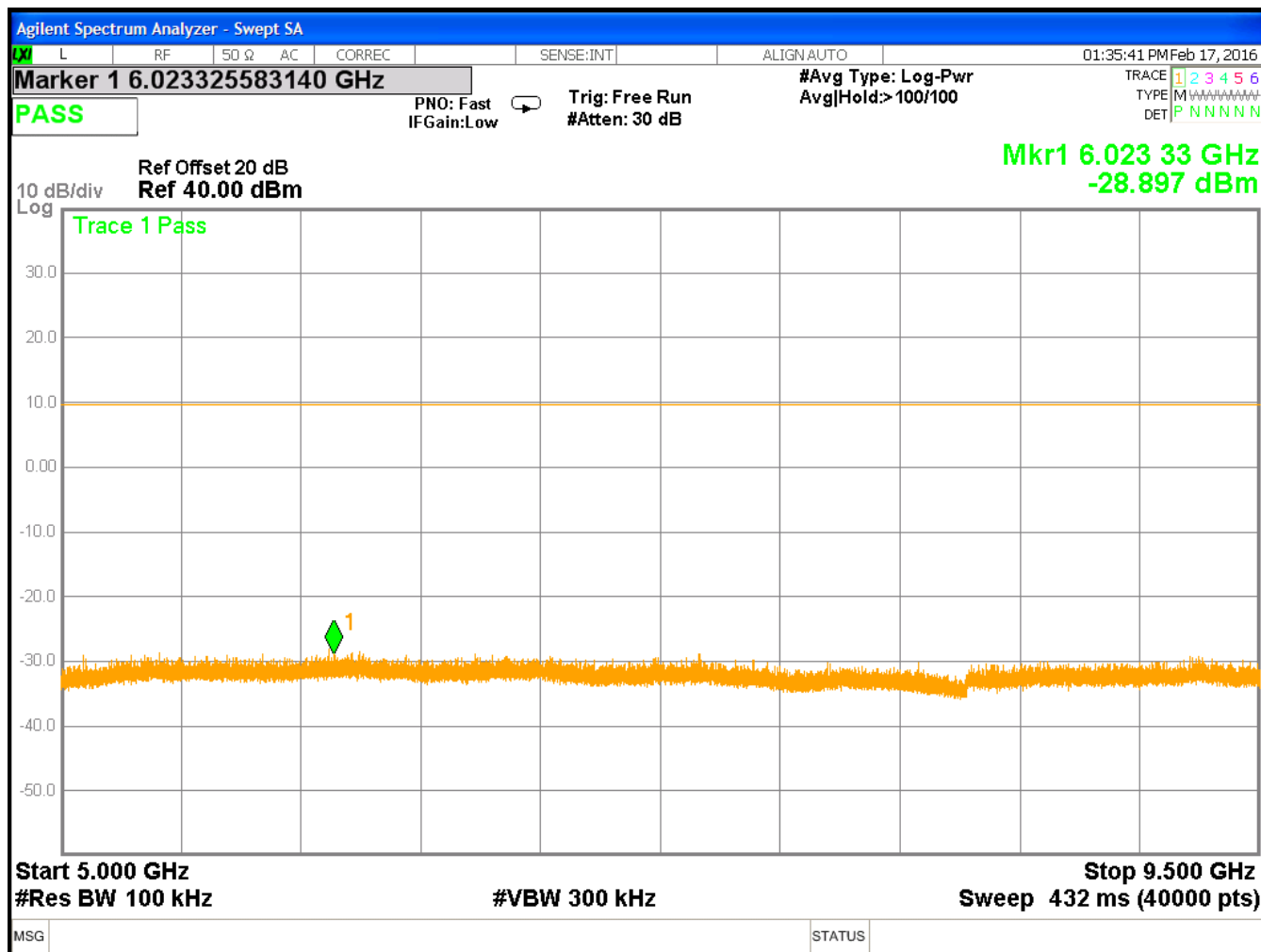


Figure 22: Conducted Spurious Emissions, High Power, Center Channel 5-9.5GHz



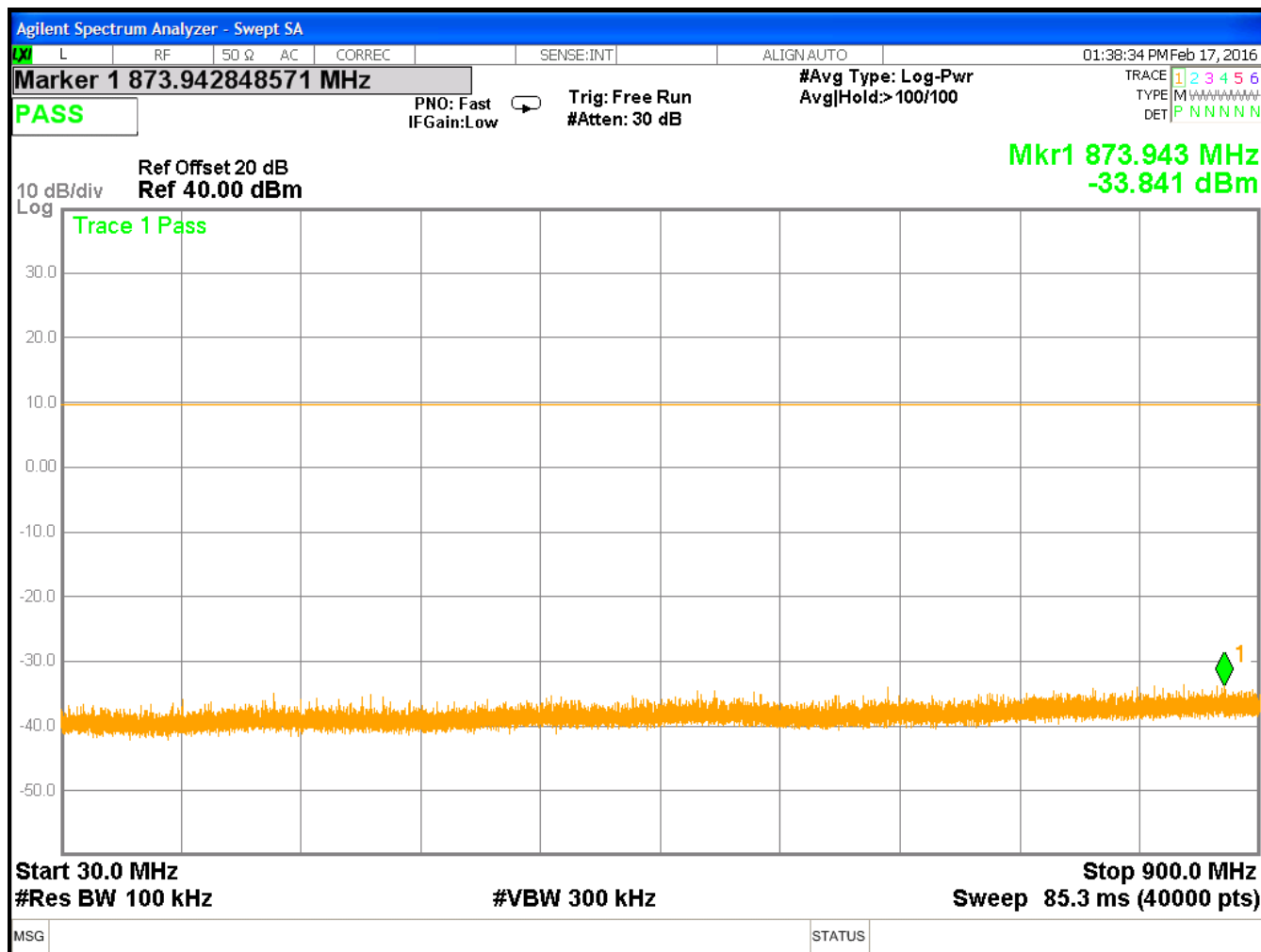


Figure 23: Conducted Spurious Emissions, High Power, High Channel 30 - 900MHz

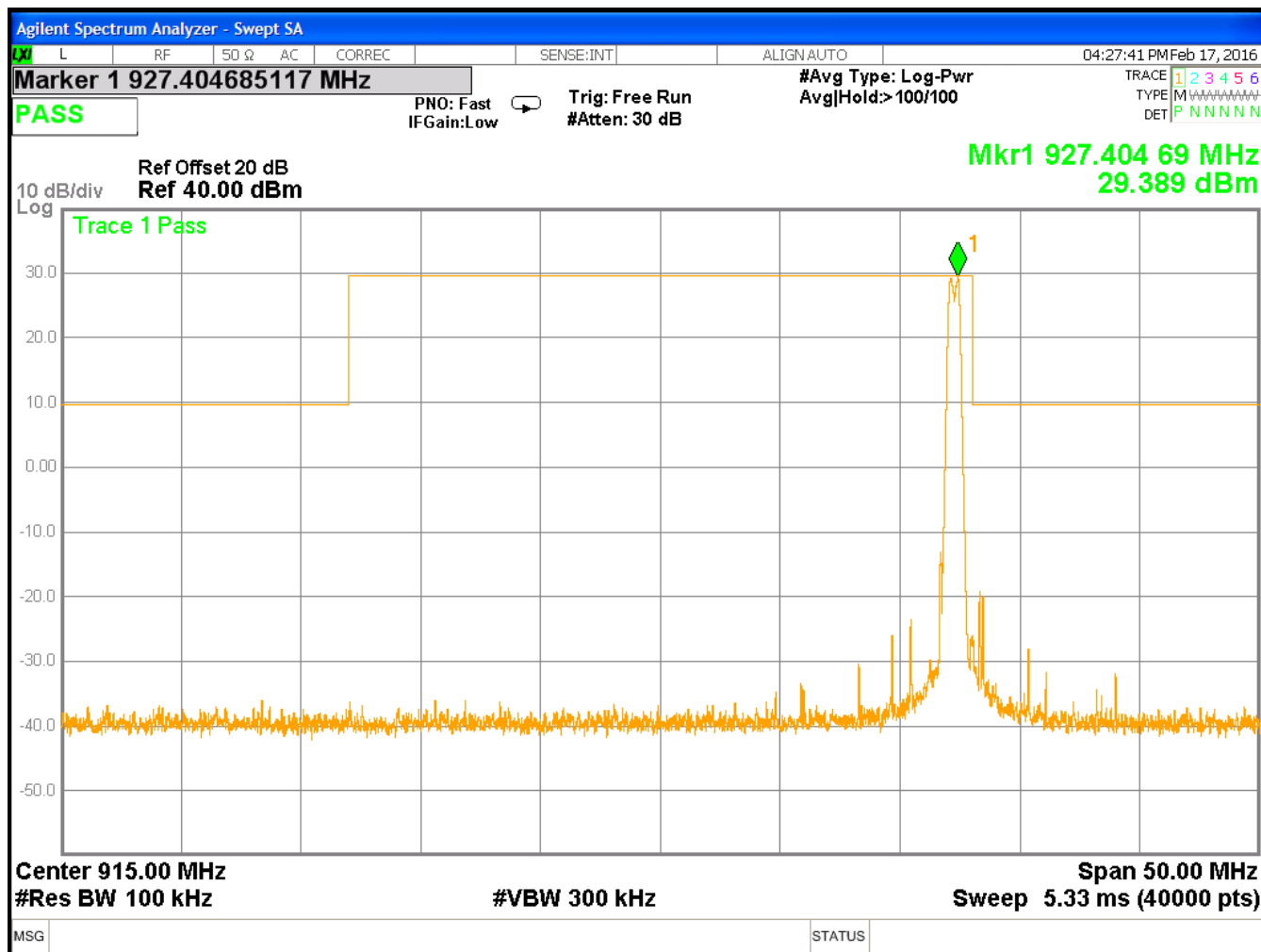


Figure 24: Conducted Spurious Emissions, High Power, High Channel 900 – 930MHz



Figure 25: Conducted Spurious Emissions, High Power, High Channel 930-5000MHz

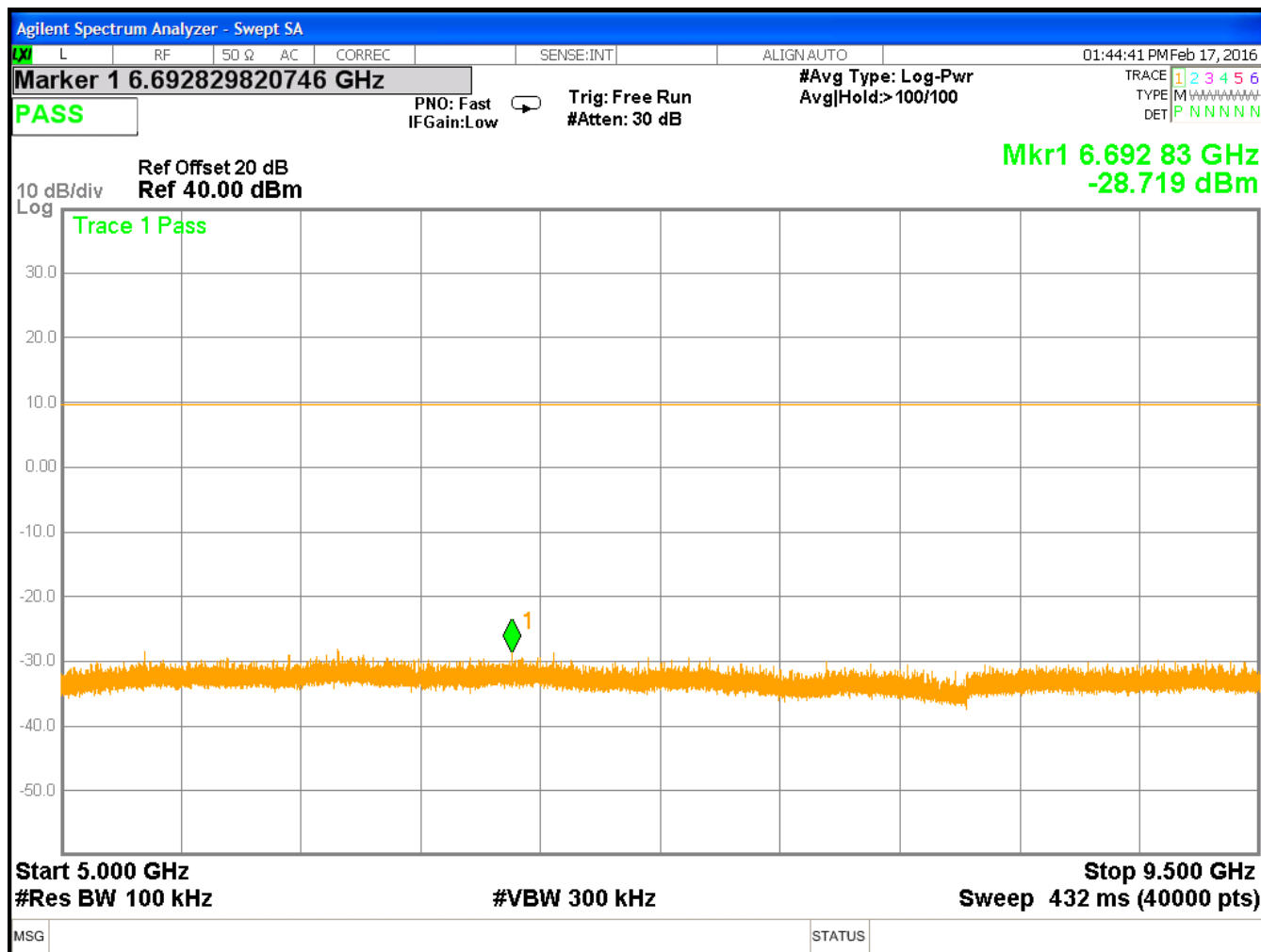


Figure 26: Conducted Spurious Emissions, High Power, High Channel 5-9.5GHz

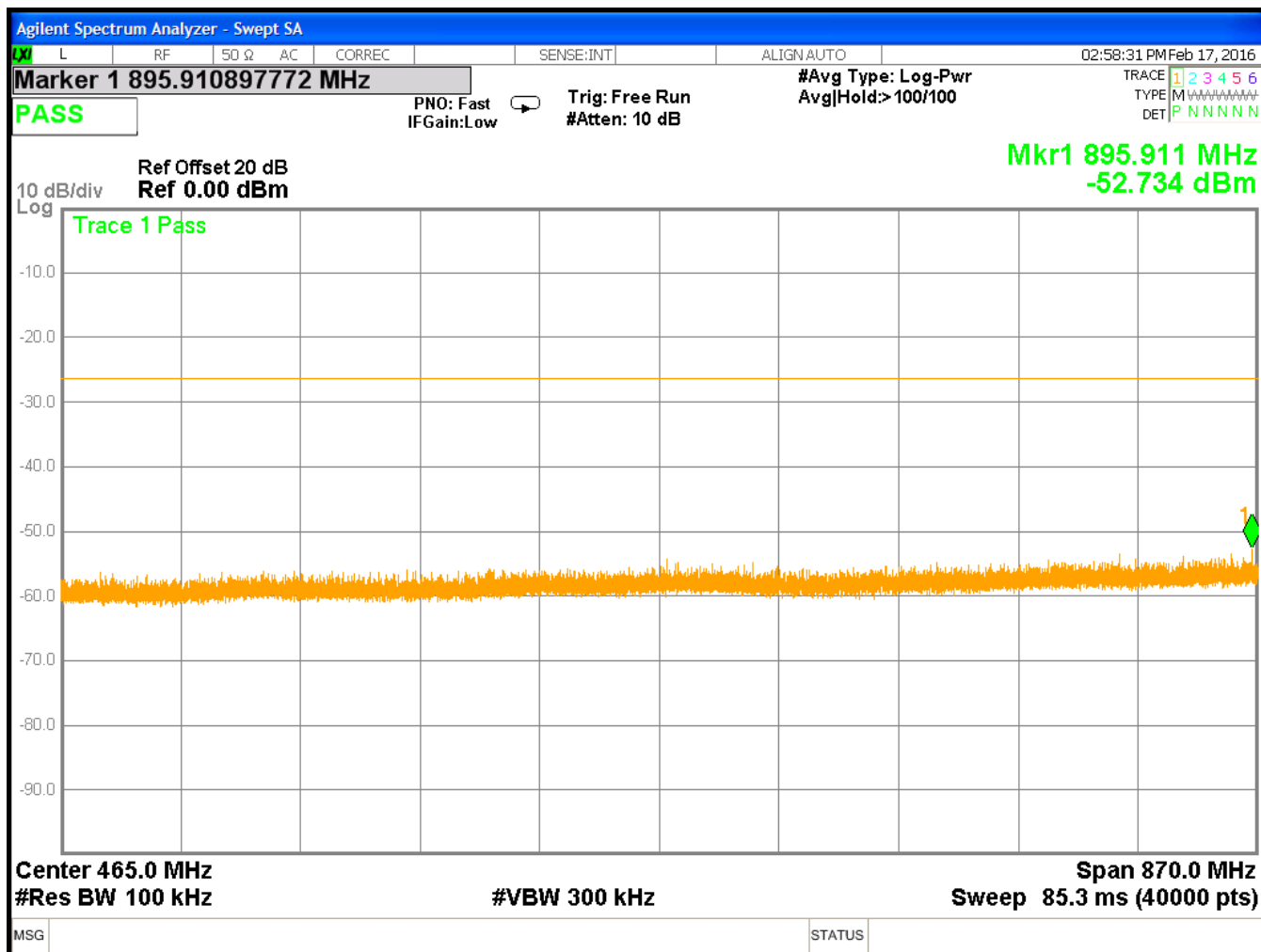


Figure 27: Conducted Spurious Emissions, Low Power, Low Channel 30 - 900MHz

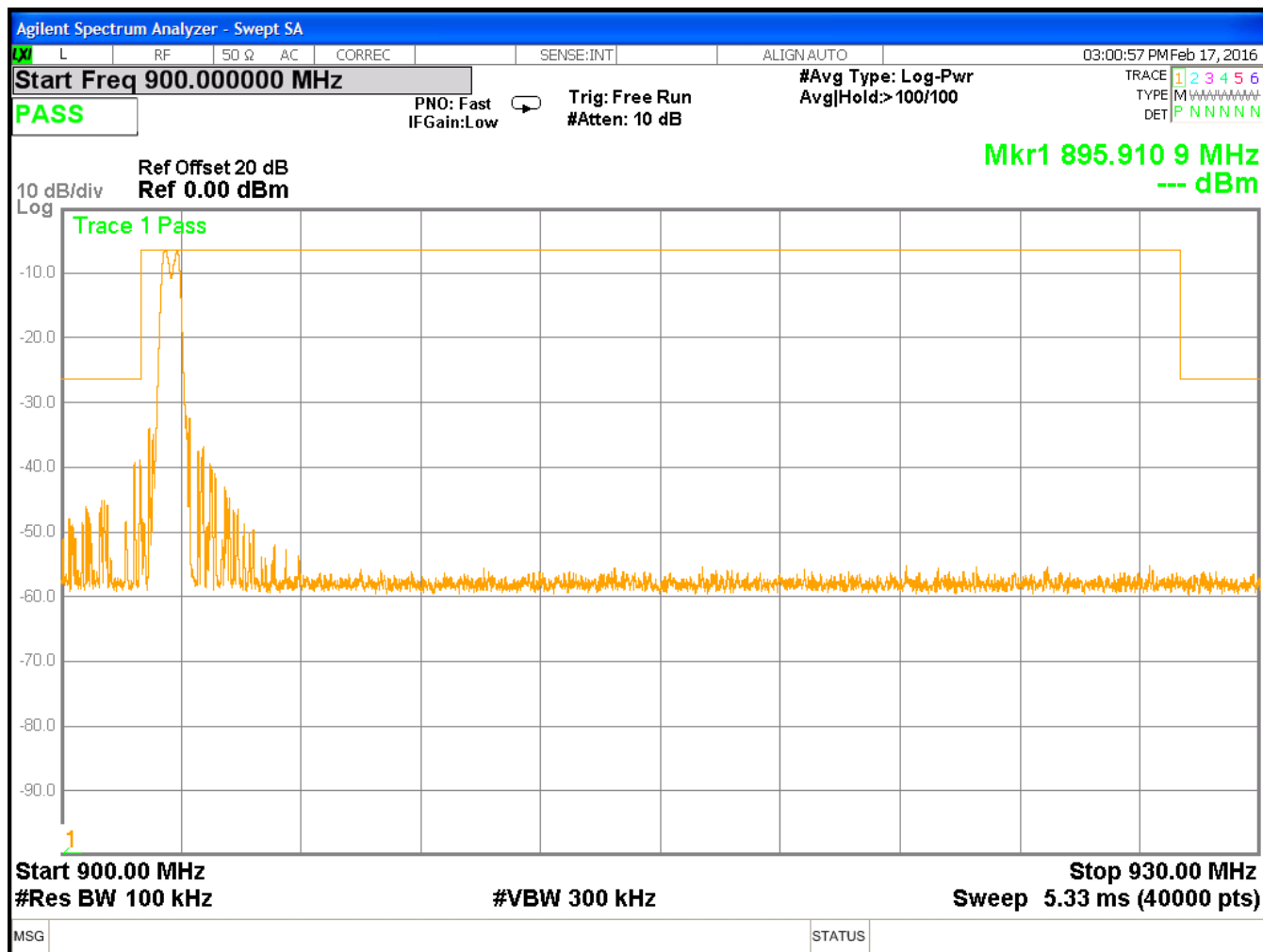


Figure 28: Conducted Spurious Emissions, Low Power, Low Channel 900 – 930MHz

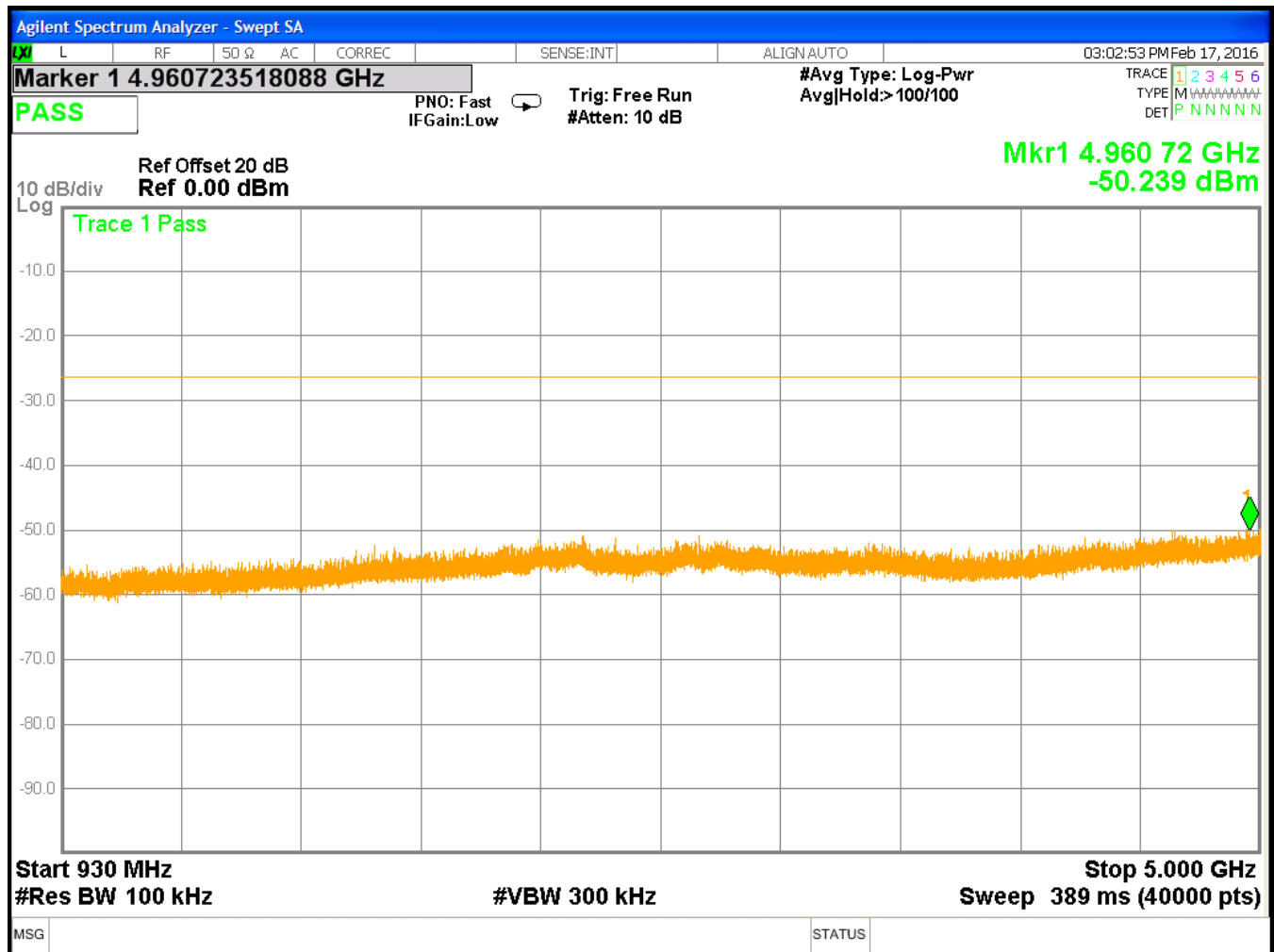


Figure 29: Conducted Spurious Emissions, Low Power, Low Channel 930-5000MHz

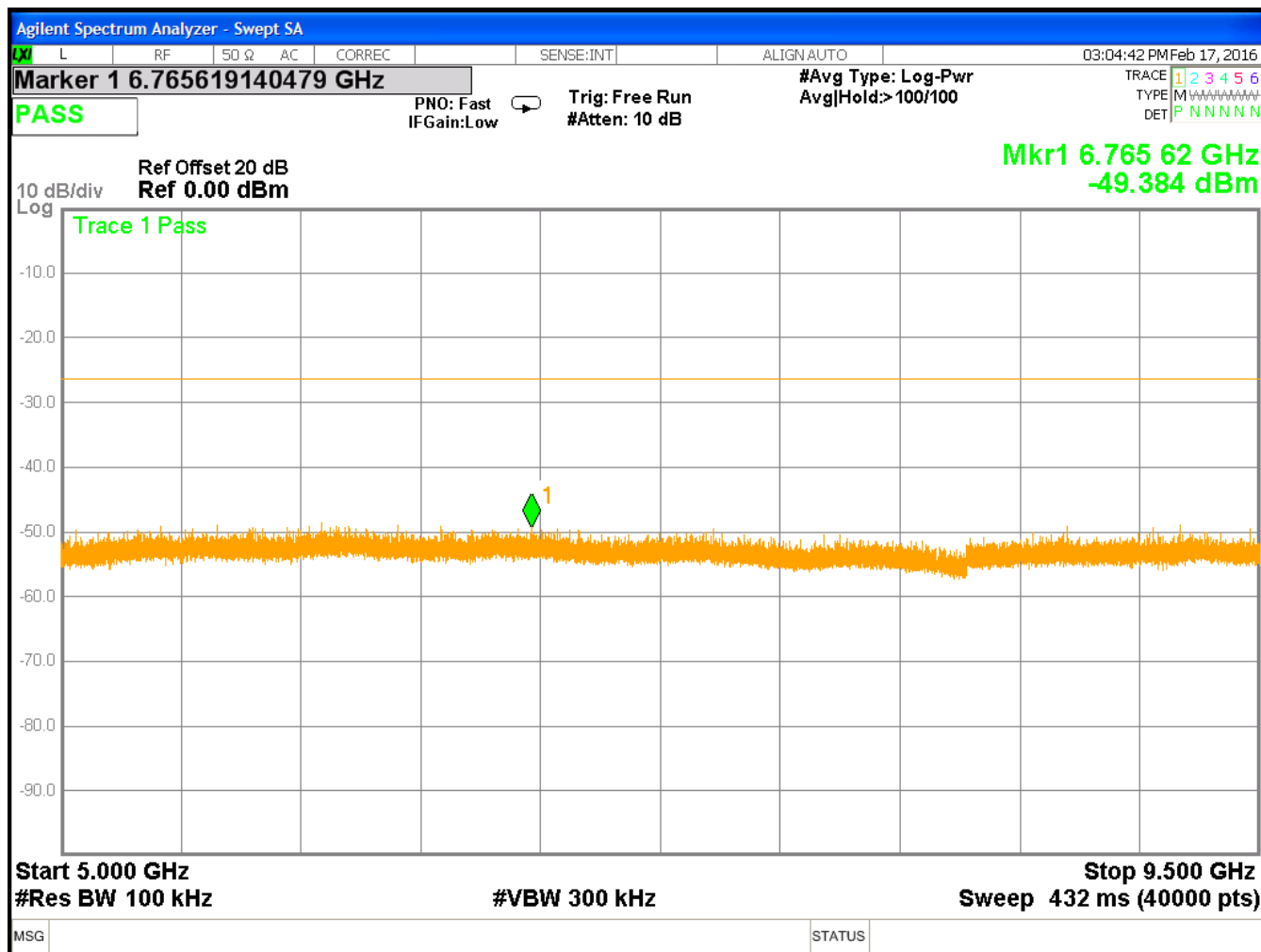


Figure 30: Conducted Spurious Emissions, Low Power, Low Channel 5-9.5GHz



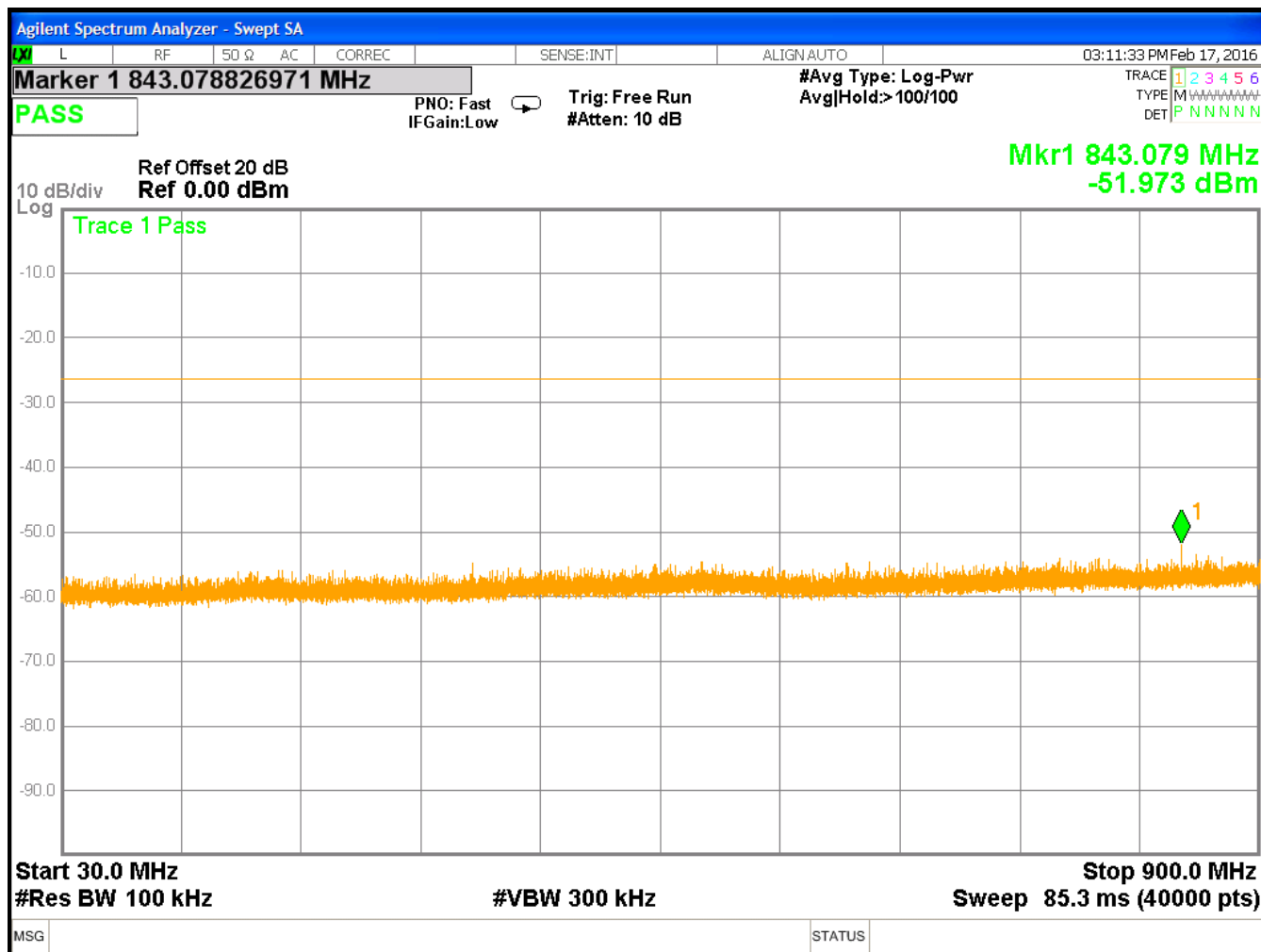


Figure 31: Conducted Spurious Emissions, Low Power, Center Channel 30 - 900MHz

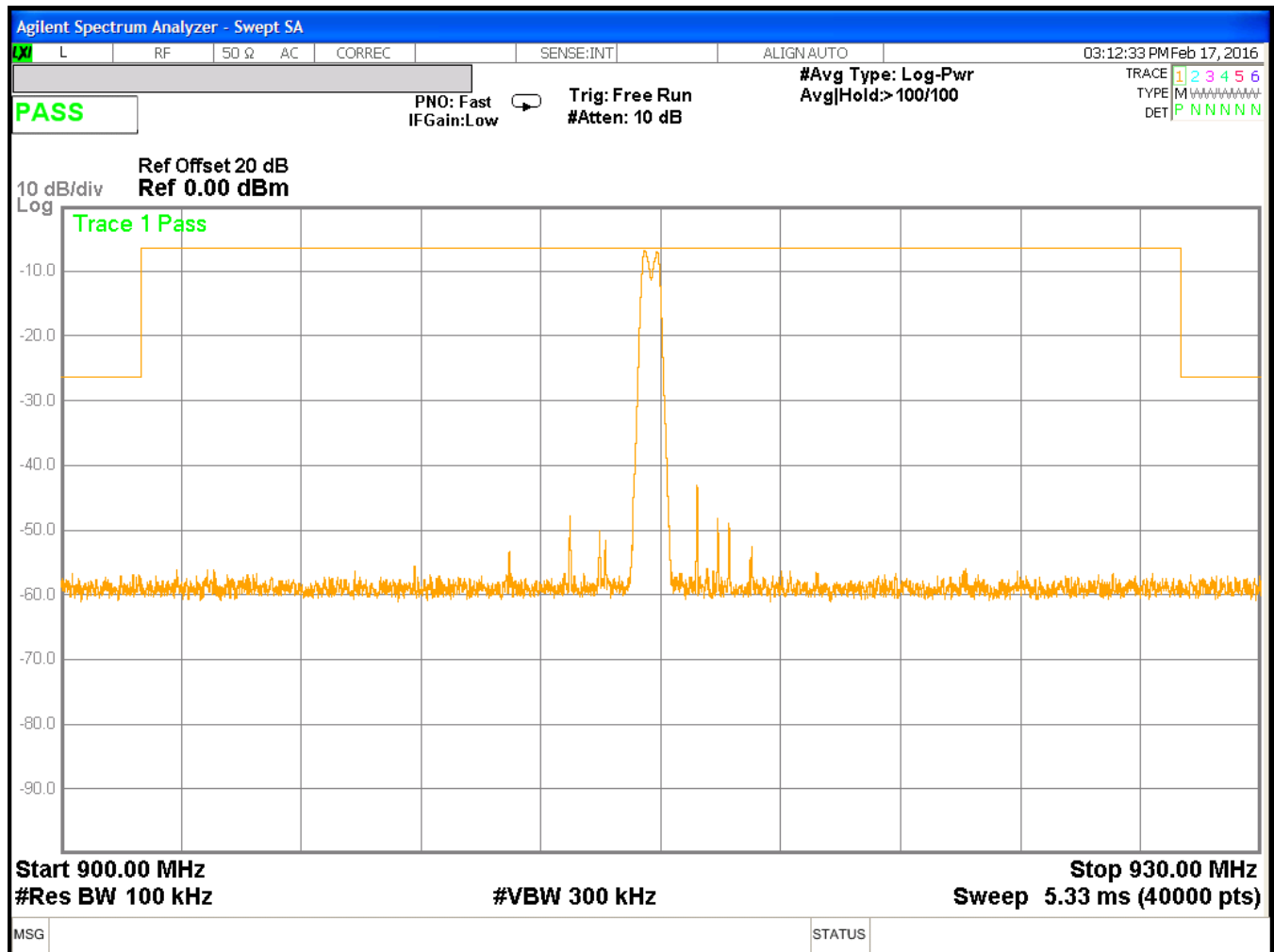


Figure 32: Conducted Spurious Emissions, Low Power, Center Channel 900 – 930MHz

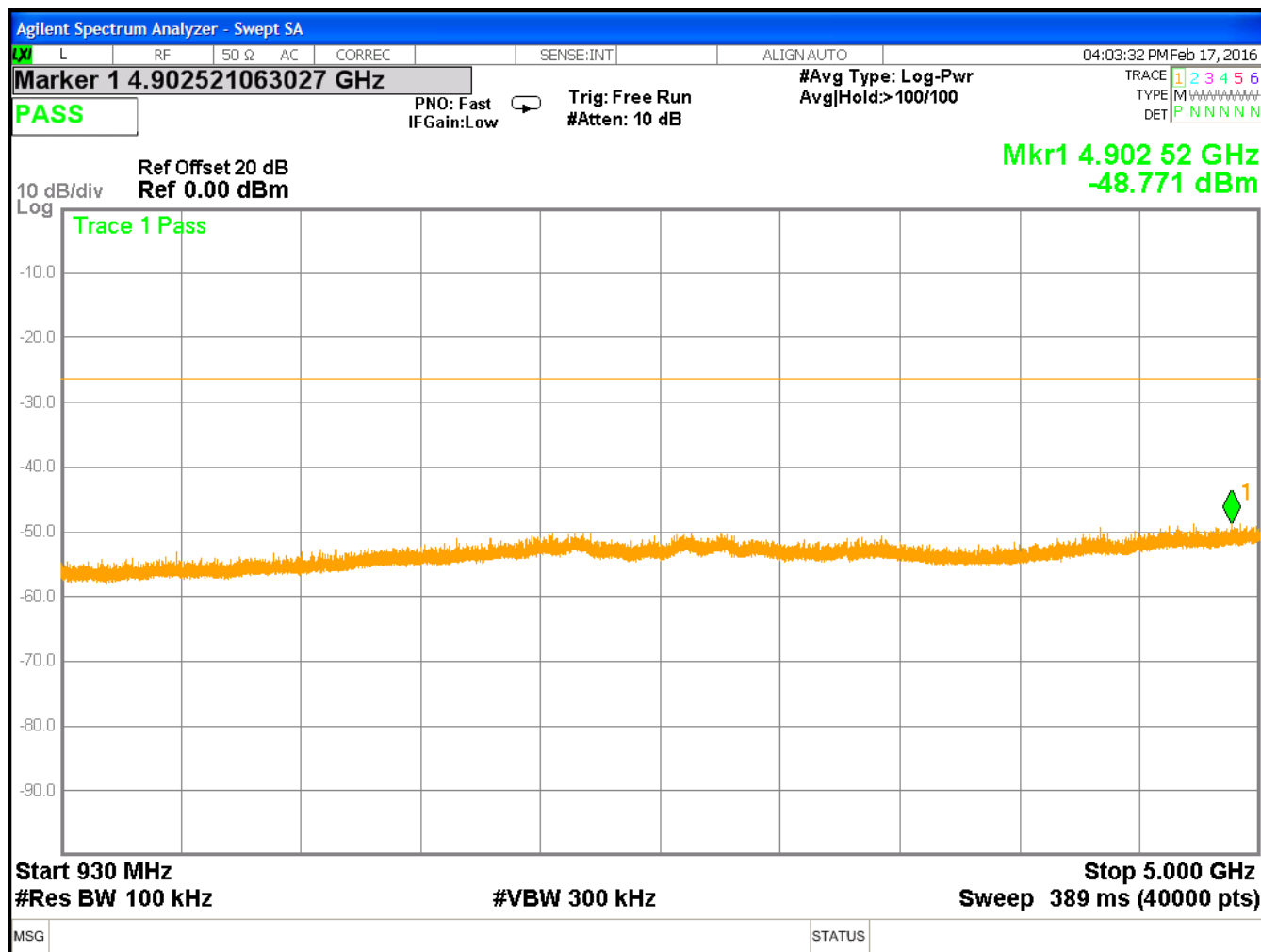


Figure 33: Conducted Spurious Emissions, Low Power, Center Channel 930-5000MHz

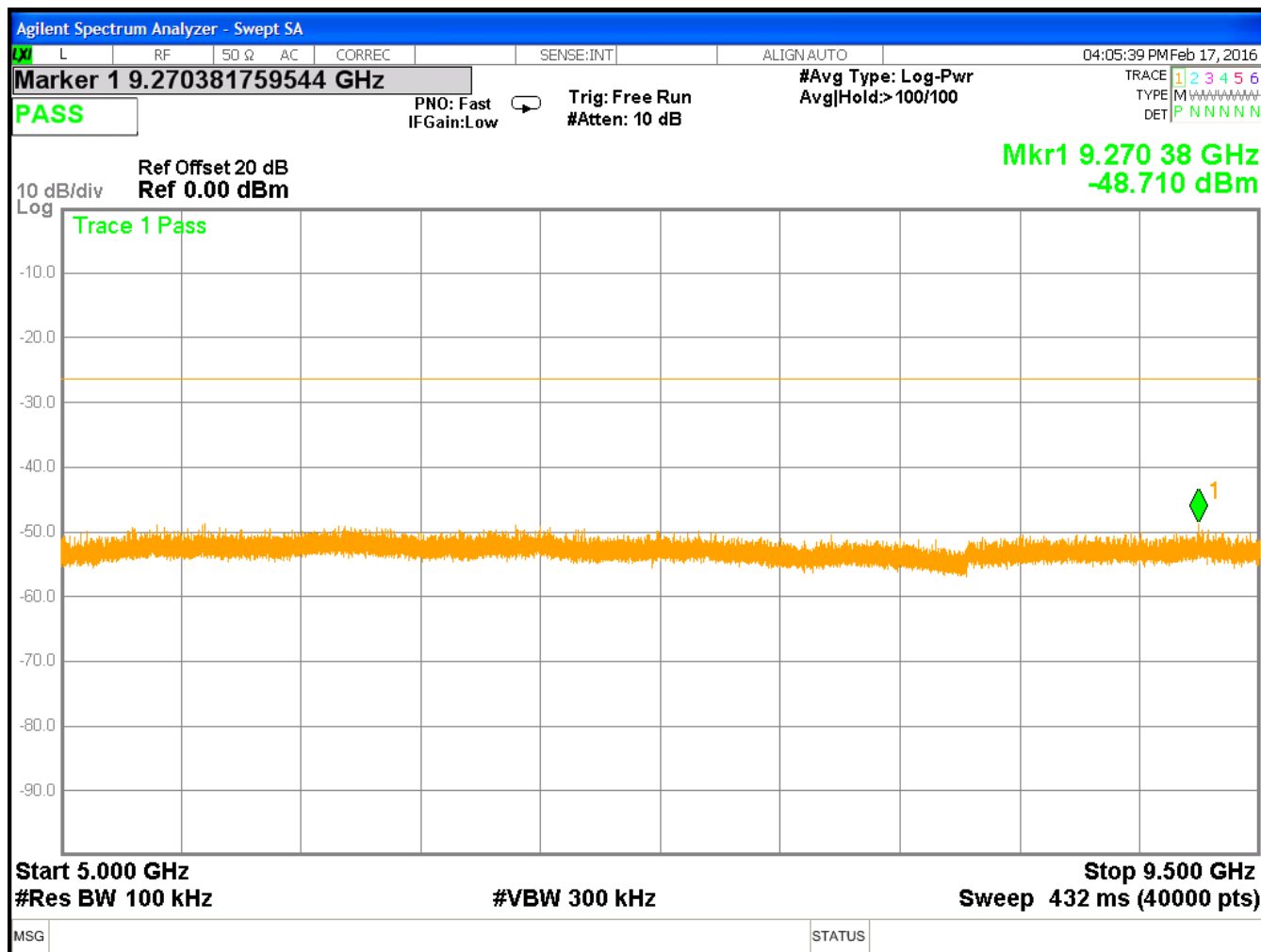


Figure 34: Conducted Spurious Emissions, Low Power, Center Channel 5-9.5GHz

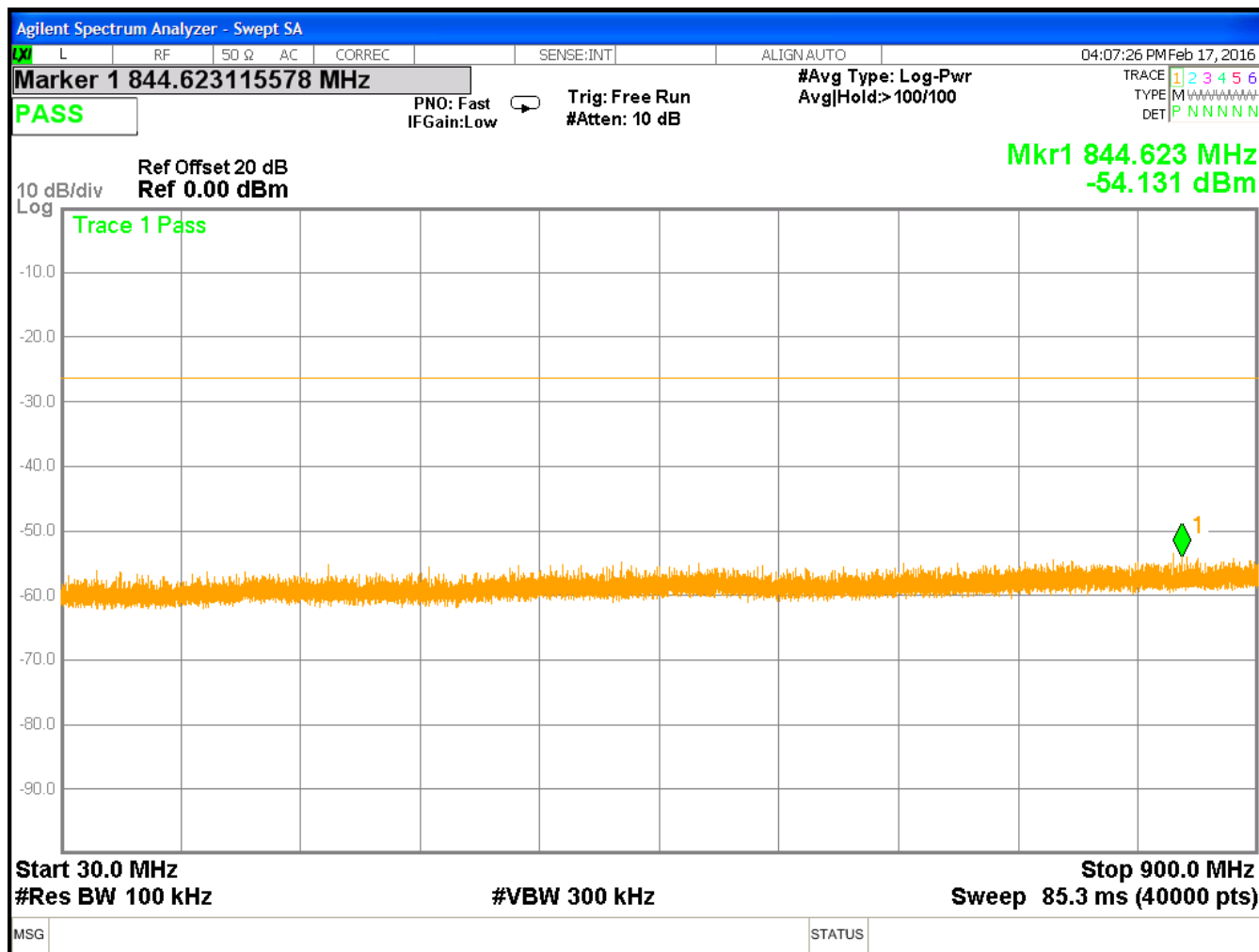


Figure 35: Conducted Spurious Emissions, Low Power, High Channel 30 - 900MHz

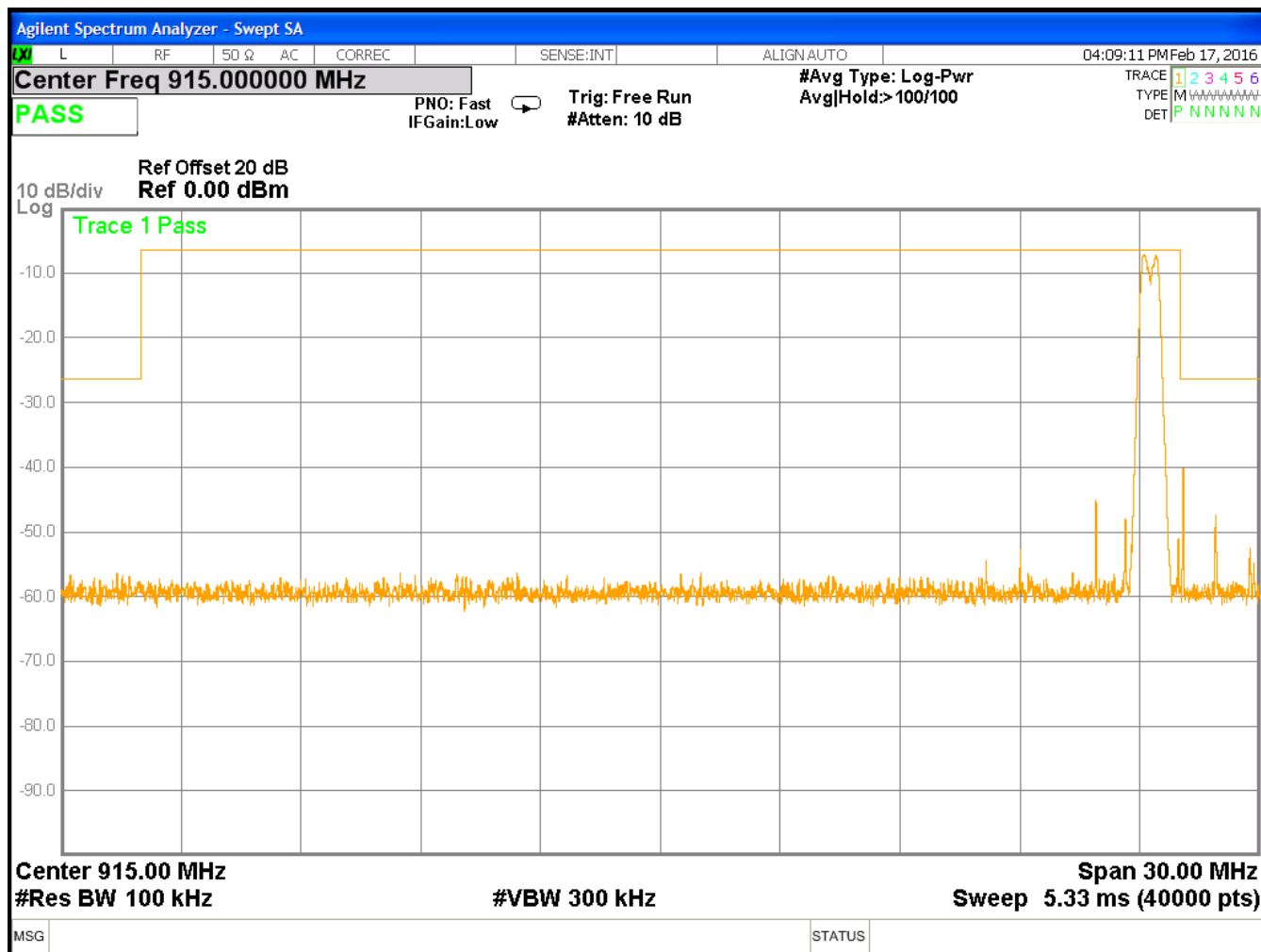


Figure 36: Conducted Spurious Emissions, Low Power, High Channel 900 – 930MHz



Figure 37: Conducted Spurious Emissions, Low Power, High Channel 930-5000MHz

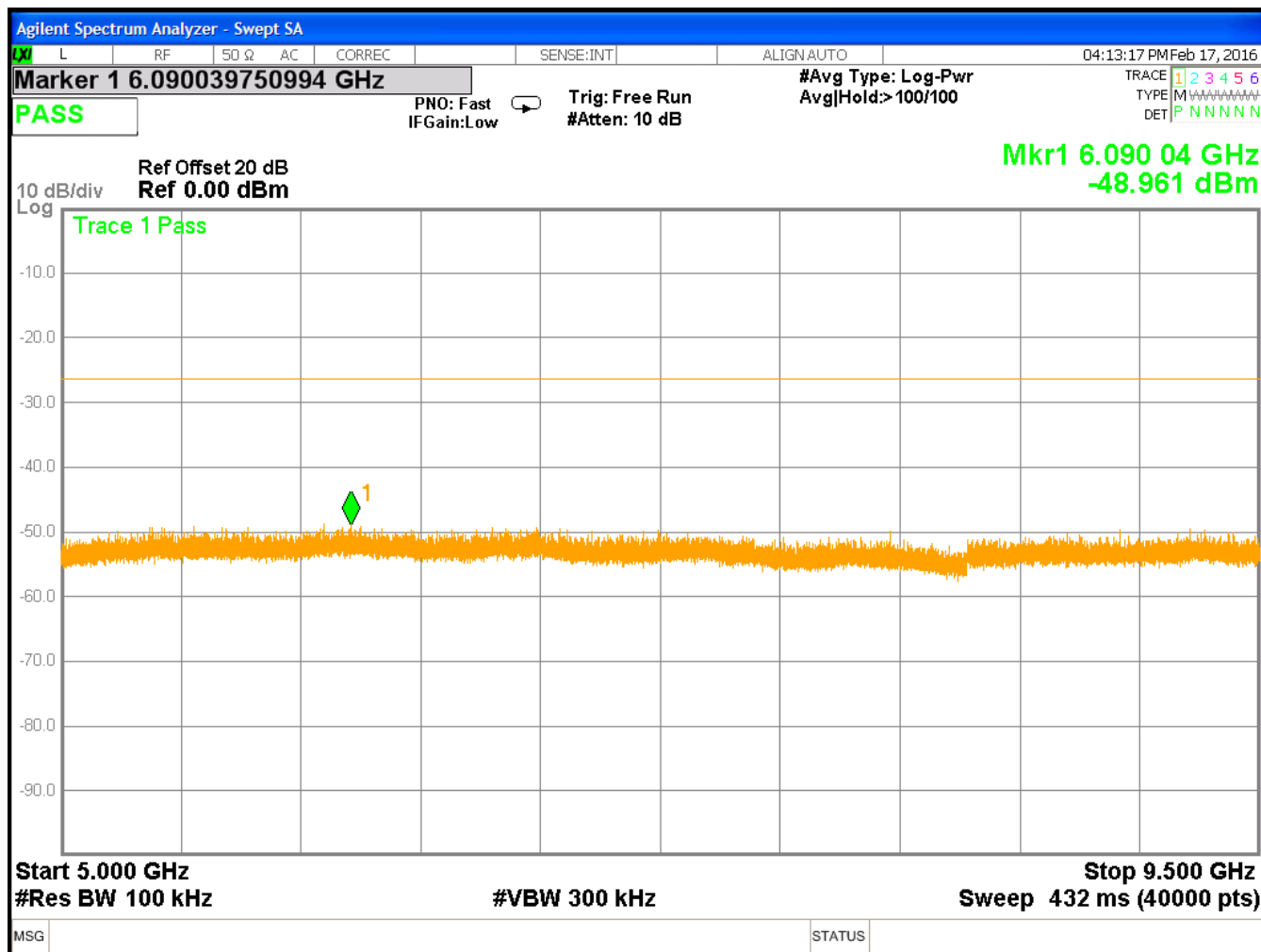


Figure 38: Conducted Spurious Emissions, Low Power, High Channel 5-9.5GHz



### 5.5.1 Band Edge Compliance

In accordance with FCC Public Notice DA-00-705 close-up plots of the upper and lower channels in both hopping and non-hopping modes with respect to the nearest authorized band-edges are provided below. The tests were performed in the same manner as the above conducted spurious emissions tests.

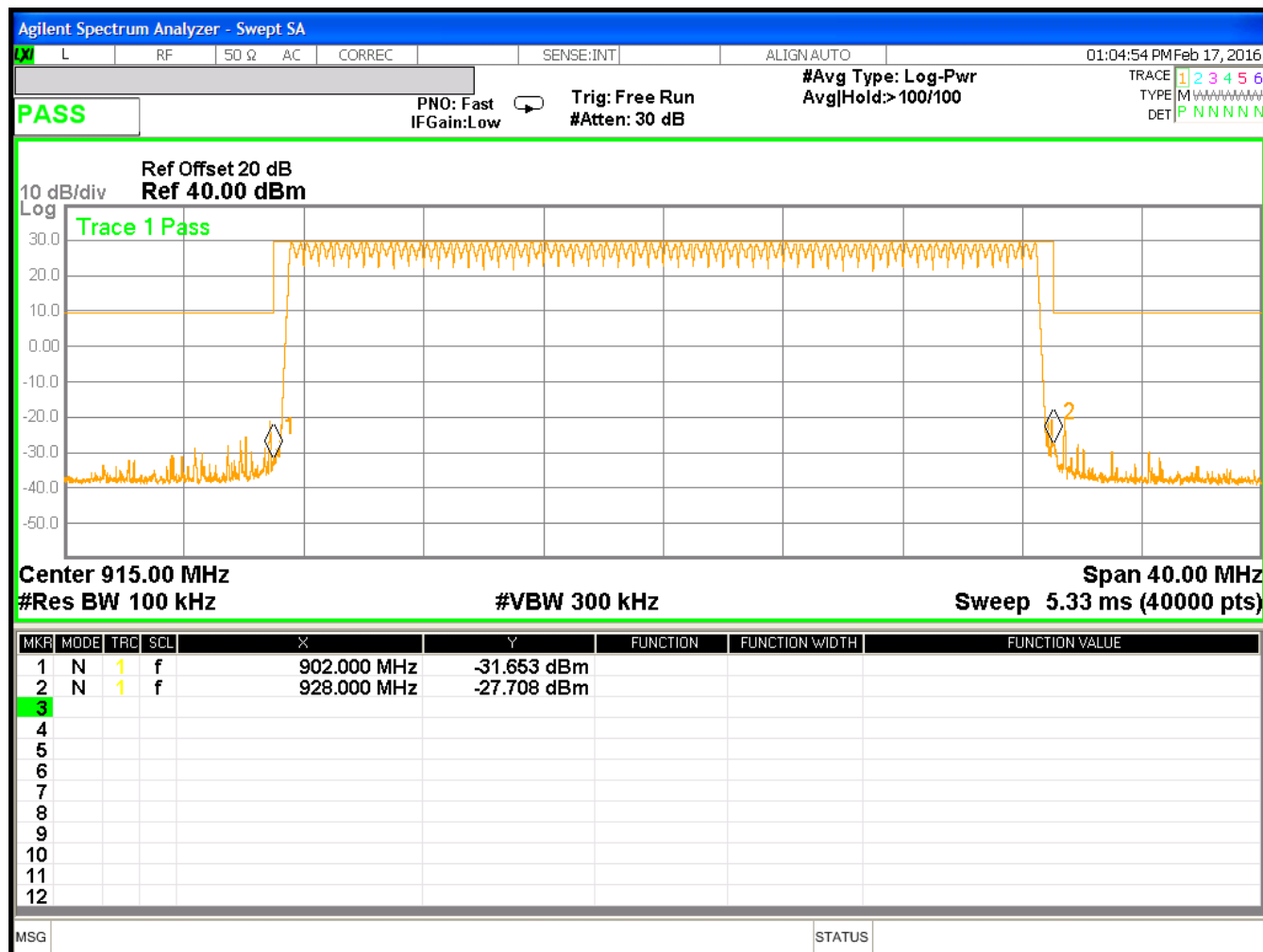


Figure 39: Band-edge, Hopping Mode, High Power Setting

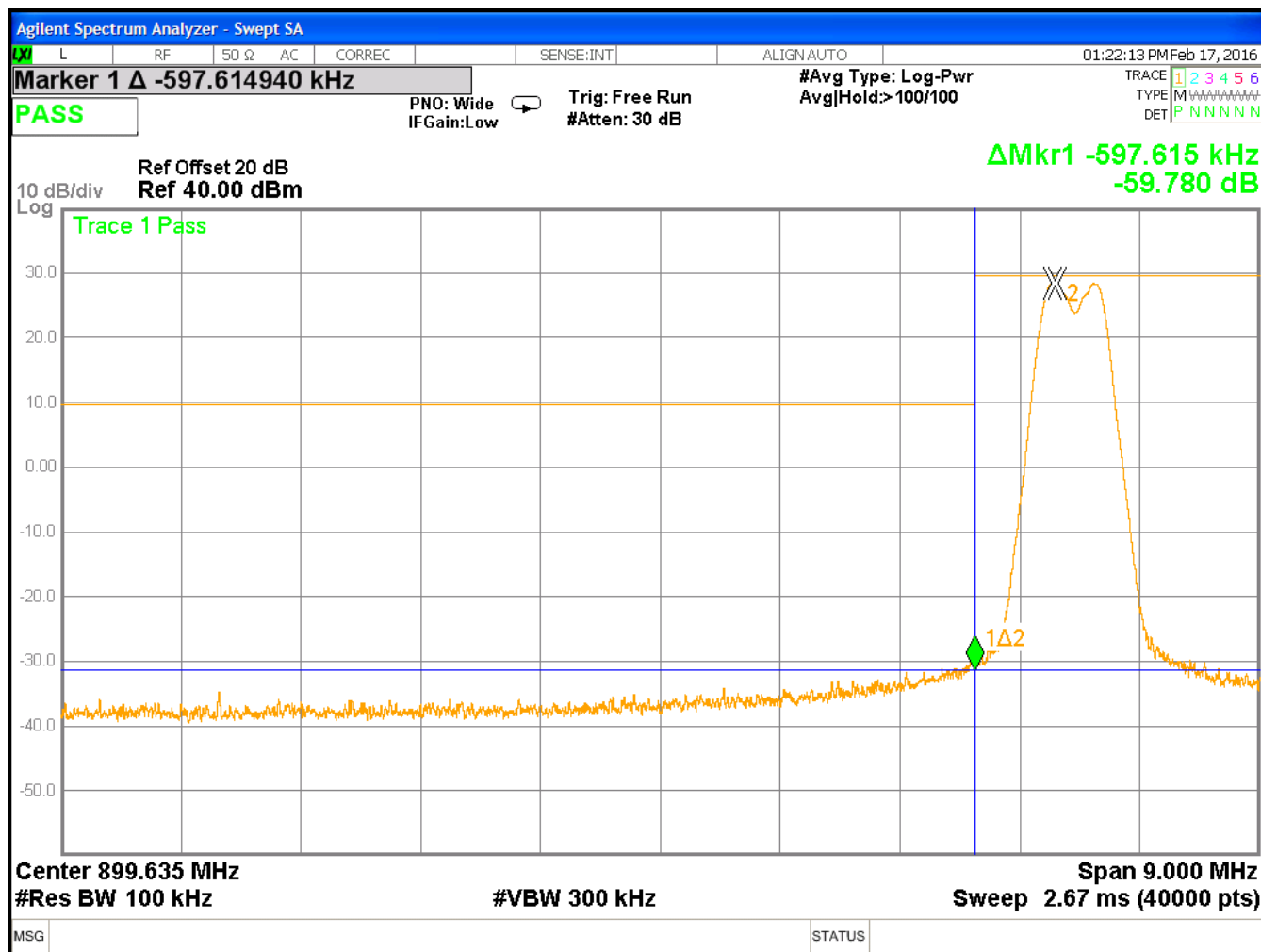


Figure 40: Low Channel, Lower Band-edge, High Power Setting

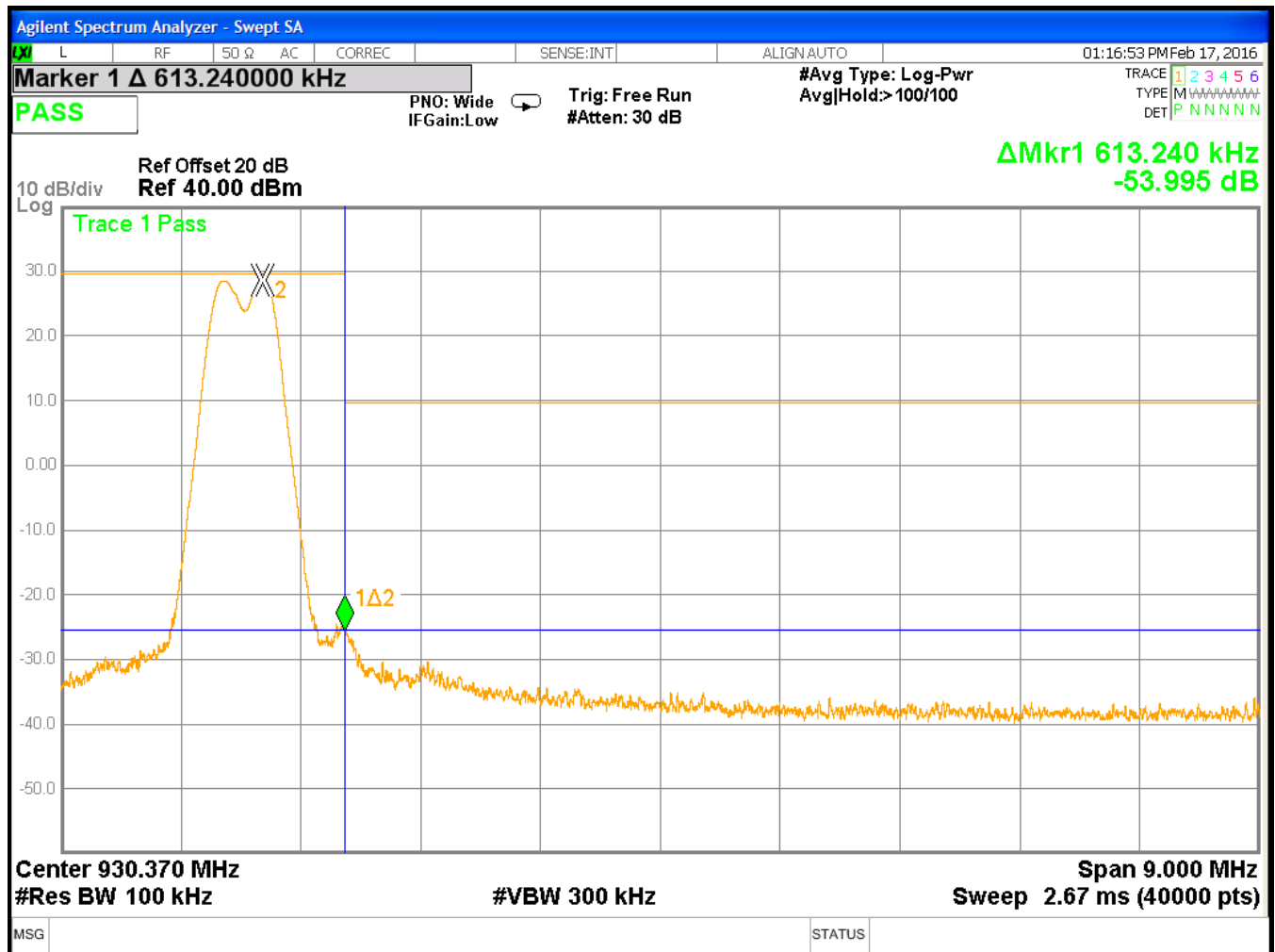


Figure 41: High Channel, Upper Band-edge, High Power Setting

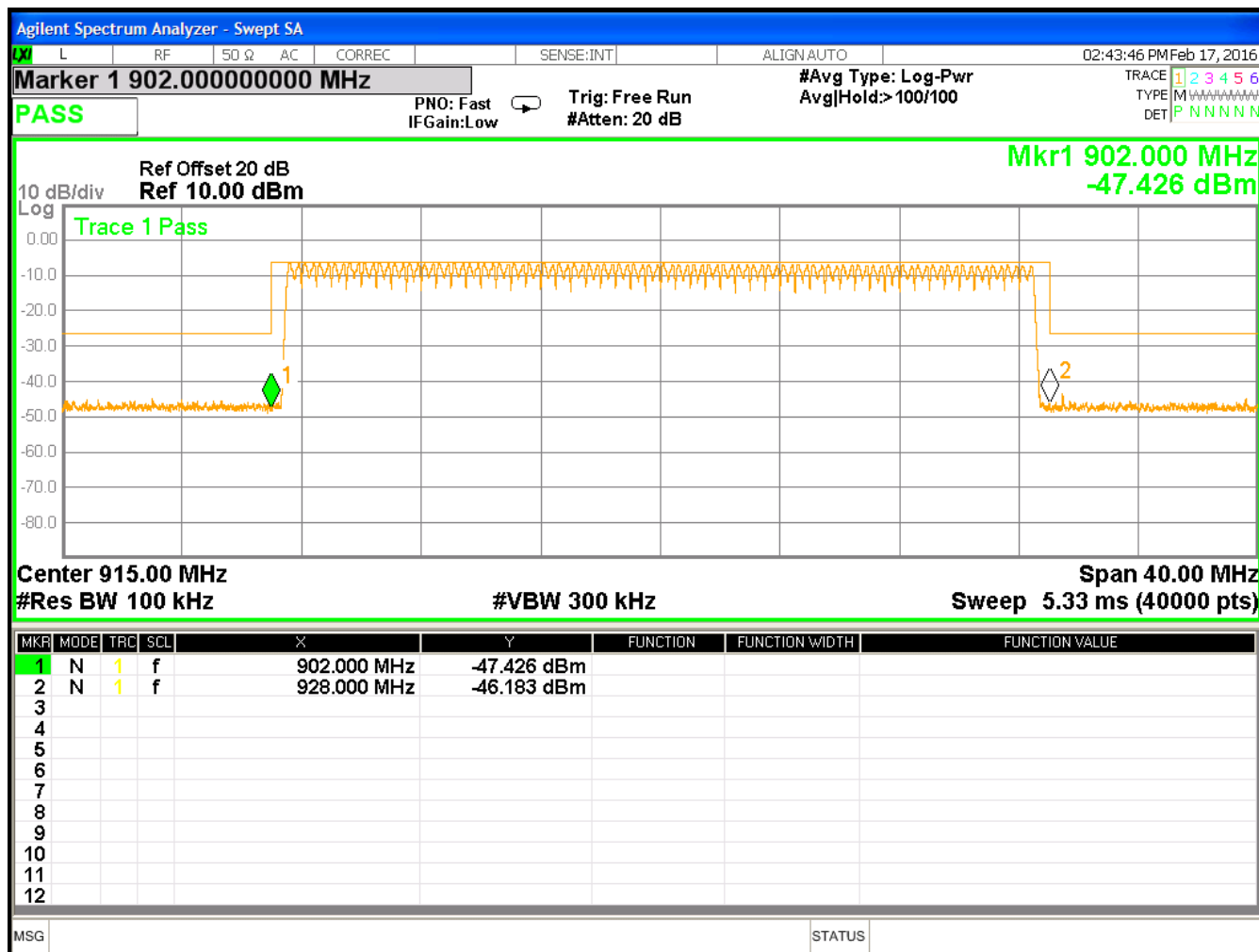


Figure 42: Band-edge, Hopping Mode, Low Power Setting

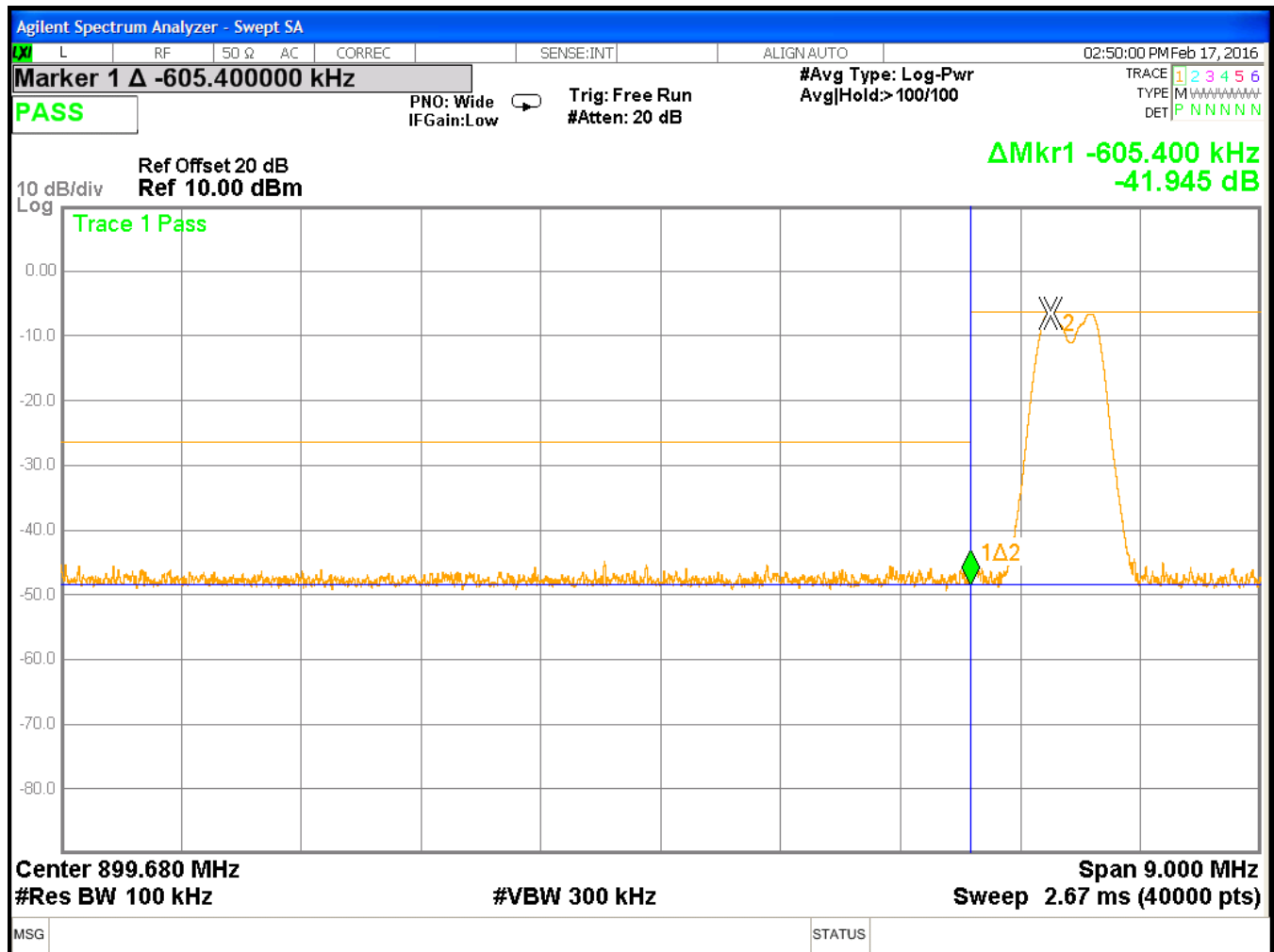


Figure 43: Low Channel, Lower Band-edge, Low Power Setting

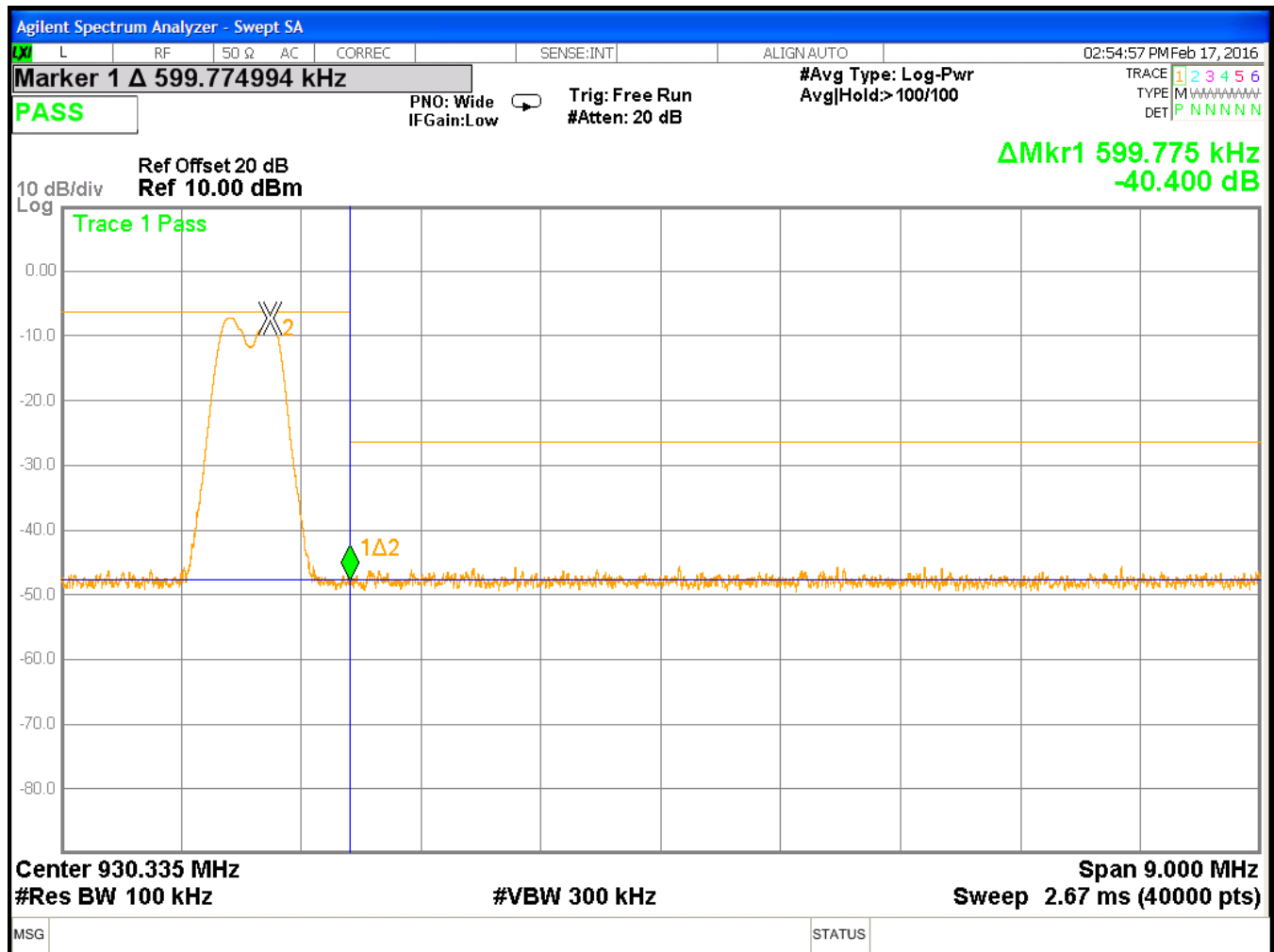


Figure 44: High Channel, Upper Band-edge, Low Power Setting

## 5.6 Radiated Spurious Emissions: (FCC Part §2.1053)

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.

### 5.6.1 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. The peripherals were placed on the table in accordance with ANSI C63.4-2014. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

**Table 9: Spectrum Analyzer Settings**

| Frequency Range | Resolution Bandwidth | Video Bandwidth            |
|-----------------|----------------------|----------------------------|
| 30MHz-1000 MHz  | 120kHz               | >100 kHz                   |
| >1000 MHz       | 1 MHz                | <10 Hz (Avg.), 1MHz (Peak) |

**Table 10: Radiated Emission Test Data < 1GHz  
(Covers all antenna configurations)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 38.23           | V            | 180.00           | 1.00            | 42.85           | -11.3             | 38.0               | 100.0        | -8.4        |          |
| 42.19           | V            | 180.00           | 1.00            | 42.07           | -14.2             | 24.8               | 100.0        | -12.1       |          |
| 46.99           | V            | 180.00           | 1.00            | 43.65           | -17.3             | 20.8               | 100.0        | -13.6       |          |
| 49.94           | V            | 180.00           | 1.00            | 43.02           | -18.6             | 16.7               | 100.0        | -15.5       |          |
| 52.02           | V            | 180.00           | 1.00            | 46.24           | -19.1             | 22.9               | 100.0        | -12.8       |          |
| 61.02           | V            | 225.00           | 1.00            | 43.93           | -18.8             | 18.0               | 100.0        | -14.9       |          |
| 142.62          | V            | 225.00           | 1.00            | 41.35           | -12.7             | 27.0               | 150.0        | -14.9       |          |
| 143.22          | V            | 225.00           | 1.00            | 39.63           | -12.8             | 22.0               | 150.0        | -16.7       |          |
| 167.61          | V            | 225.00           | 1.00            | 42.93           | -13.5             | 29.8               | 150.0        | -14.1       |          |
| 177.50          | V            | 135.00           | 1.00            | 40.50           | -13.8             | 21.5               | 150.0        | -16.9       |          |
| 192.01          | V            | 135.00           | 1.00            | 35.40           | -13.7             | 12.1               | 150.0        | -21.8       |          |
| 204.40          | V            | 135.00           | 1.00            | 42.40           | -13.3             | 28.4               | 150.0        | -14.4       |          |
| 215.90          | V            | 180.00           | 1.00            | 38.10           | -14.3             | 15.5               | 150.0        | -19.7       |          |
| 240.41          | V            | 180.00           | 1.30            | 39.90           | -13.1             | 21.8               | 200.0        | -19.3       |          |
| 448.20          | V            | 180.00           | 1.80            | 38.60           | -6.5              | 40.5               | 200.0        | -13.9       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 38.23           | H            | 180.00           | 4.00            | 36.73           | -11.3             | 18.8               | 100.0        | -14.5       |          |
| 42.19           | H            | 180.00           | 4.00            | 39.84           | -14.2             | 19.2               | 100.0        | -14.3       |          |
| 46.99           | H            | 180.00           | 4.00            | 47.40           | -17.3             | 32.0               | 100.0        | -9.9        |          |
| 49.94           | H            | 180.00           | 4.00            | 41.99           | -18.6             | 14.9               | 100.0        | -16.6       |          |
| 52.02           | H            | 180.00           | 4.00            | 41.37           | -19.1             | 13.1               | 100.0        | -17.7       |          |
| 61.02           | H            | 225.00           | 4.00            | 35.03           | -18.8             | 6.4                | 100.0        | -23.8       |          |
| 142.62          | H            | 135.00           | 4.00            | 39.26           | -12.7             | 21.2               | 150.0        | -17.0       |          |
| 143.22          | H            | 135.00           | 4.00            | 38.77           | -12.8             | 19.9               | 150.0        | -17.5       |          |
| 167.61          | H            | 135.00           | 4.00            | 49.18           | -13.5             | 61.1               | 150.0        | -7.8        |          |
| 177.50          | H            | 180.00           | 4.00            | 37.90           | -13.8             | 16.0               | 150.0        | -19.5       |          |
| 192.01          | H            | 180.00           | 4.00            | 40.50           | -13.7             | 21.8               | 150.0        | -16.7       |          |
| 204.40          | H            | 180.00           | 3.80            | 41.20           | -13.3             | 24.8               | 150.0        | -15.6       |          |
| 215.90          | H            | 180.00           | 3.80            | 39.50           | -14.3             | 18.3               | 150.0        | -18.3       |          |
| 240.41          | H            | 180.00           | 3.80            | 36.10           | -13.1             | 14.1               | 200.0        | -23.1       |          |
| 448.20          | H            | 180.00           | 3.20            | 37.30           | -6.5              | 34.9               | 200.0        | -15.2       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

Same for all channels



**Table 11: Radiated Emission Test Data >1GHz, Low Channel**

**(Linx ¼ Wave Helical)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2708.25         | V            | 0.00             | 1.00            | 54.12           | -12.1             | 126.0              | 5000.0       | -32.0       |          |
| 3611.00         | V            | 190.00           | 1.00            | 49.47           | -9.2              | 103.5              | 5000.0       | -33.7       |          |
| 4513.75         | V            | 290.00           | 1.00            | 48.61           | -6.3              | 130.7              | 5000.0       | -31.7       |          |
| 5416.50         | V            | 90.00            | 1.00            | 49.51           | -2.8              | 217.1              | 5000.0       | -27.2       |          |
| 8124.80         | V            | 190.00           | 1.00            | 46.29           | 6.9               | 455.2              | 5000.0       | -20.8       |          |
| 2708.25         | V            | 0.00             | 1.00            | 45.01           | -12.1             | 44.1               | 500.0        | -21.1       |          |
| 3611.00         | V            | 190.00           | 1.00            | 37.40           | -9.2              | 25.8               | 500.0        | -25.8       |          |
| 4513.75         | V            | 290.00           | 1.00            | 36.44           | -6.3              | 32.2               | 500.0        | -23.8       |          |
| 5416.50         | V            | 90.00            | 1.00            | 34.79           | -2.8              | 39.9               | 500.0        | -22.0       |          |
| 8124.80         | V            | 190.00           | 1.00            | 33.47           | 6.9               | 104.1              | 500.0        | -13.6       |          |
| 2708.25         | H            | 90.00            | 2.20            | 54.05           | -12.1             | 125.0              | 5000.0       | -32.0       |          |
| 3611.00         | H            | 180.00           | 2.20            | 48.14           | -9.2              | 88.8               | 5000.0       | -35.0       |          |
| 4513.75         | H            | 270.00           | 2.20            | 46.03           | -6.3              | 97.1               | 5000.0       | -34.2       |          |
| 5416.50         | H            | 180.00           | 2.20            | 47.65           | -2.8              | 175.2              | 5000.0       | -29.1       |          |
| 8124.80         | H            | 190.00           | 2.20            | 46.35           | 6.9               | 458.4              | 5000.0       | -20.8       |          |
| 2708.25         | H            | 90.00            | 2.20            | 43.74           | -12.1             | 38.1               | 500.0        | -22.4       |          |
| 3611.00         | H            | 180.00           | 2.20            | 38.10           | -9.2              | 28.0               | 500.0        | -25.1       |          |
| 4513.75         | H            | 270.00           | 2.20            | 35.40           | -6.3              | 28.6               | 500.0        | -24.9       |          |
| 5416.50         | H            | 180.00           | 2.20            | 35.69           | -2.8              | 44.2               | 500.0        | -21.1       |          |
| 8124.80         | H            | 190.00           | 2.20            | 35.40           | 6.9               | 129.9              | 500.0        | -11.7       |          |

**Table 12: Radiated Emission Test Data >1GHz, Low Channel**

**(Laird OD9-5 900MHz Omnidirectional Antenna, 5dBi Gain)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | V            | 180.00           | 1.00            | 49.41           | -12.1             | 73.2               | 5000.0       | -36.7       |          |
| 3611.00         | V            | 180.00           | 1.00            | 48.17           | -9.2              | 89.1               | 5000.0       | -35.0       |          |
| 4513.75         | V            | 290.00           | 1.00            | 46.57           | -6.3              | 103.4              | 5000.0       | -33.7       |          |
| 5416.50         | V            | 180.00           | 1.00            | 47.38           | -2.8              | 169.9              | 5000.0       | -29.4       |          |
| 8124.75         | V            | 190.00           | 1.00            | 43.35           | 6.9               | 324.5              | 5000.0       | -23.8       |          |
| 9027.50         | V            | 180.00           | 1.00            | 44.65           | 9.9               | 536.7              | 5000.0       | -19.4       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | V            | 180.00           | 1.00            | 38.89           | -12.1             | 21.8               | 500.0        | -27.2       |          |
| 3611.00         | V            | 180.00           | 1.00            | 36.62           | -9.2              | 23.6               | 500.0        | -26.5       |          |
| 4513.75         | V            | 290.00           | 1.00            | 32.52           | -6.3              | 20.5               | 500.0        | -27.7       |          |
| 5416.50         | V            | 180.00           | 1.00            | 33.32           | -2.8              | 33.7               | 500.0        | -23.4       |          |
| 8124.75         | V            | 190.00           | 1.00            | 32.24           | 6.9               | 90.3               | 500.0        | -14.9       |          |
| 9027.50         | V            | 180.00           | 1.00            | 32.64           | 9.9               | 134.7              | 500.0        | -11.4       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | H            | 120.00           | 2.20            | 52.14           | -12.1             | 100.3              | 5000.0       | -34.0       |          |
| 3611.00         | H            | 180.00           | 2.20            | 47.58           | -9.2              | 83.3               | 5000.0       | -35.6       |          |
| 4513.75         | H            | 180.00           | 2.20            | 45.59           | -6.3              | 92.3               | 5000.0       | -34.7       |          |
| 5416.50         | H            | 90.00            | 2.20            | 43.95           | -2.8              | 114.5              | 5000.0       | -32.8       |          |
| 8124.75         | H            | 180.00           | 2.20            | 43.45           | 6.9               | 328.3              | 5000.0       | -23.7       |          |
| 9027.50         | H            | 150.00           | 2.20            | 45.28           | 9.9               | 577.1              | 5000.0       | -18.8       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | H            | 120.00           | 2.20            | 42.61           | -12.1             | 33.5               | 500.0        | -23.5       |          |
| 3611.00         | H            | 180.00           | 2.20            | 34.62           | -9.2              | 18.7               | 500.0        | -28.5       |          |
| 4513.75         | H            | 180.00           | 2.20            | 33.38           | -6.3              | 22.6               | 500.0        | -26.9       |          |
| 5416.50         | H            | 90.00            | 2.20            | 33.66           | -2.8              | 35.0               | 500.0        | -23.1       |          |
| 8124.75         | H            | 180.00           | 2.20            | 32.22           | 6.9               | 90.1               | 500.0        | -14.9       |          |
| 9027.50         | H            | 150.00           | 2.20            | 32.62           | 9.9               | 134.4              | 500.0        | -11.4       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

**Table 13: Radiated Emission Test Data >1GHz, Low Channel****(Laird B (B)8965CN 5/8 Wave Loaded Coil)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | V            | 200.00           | 1.00            | 49.61           | -12.1             | 74.9               | 5000.0       | -36.5       |          |
| 3611.00         | V            | 180.00           | 1.00            | 44.81           | -9.2              | 60.5               | 5000.0       | -38.3       |          |
| 4513.75         | V            | 270.00           | 1.00            | 45.61           | -6.3              | 92.6               | 5000.0       | -34.7       |          |
| 5416.50         | V            | 180.00           | 1.00            | 44.71           | -2.8              | 124.9              | 5000.0       | -32.0       |          |
| 8124.75         | V            | 180.00           | 1.00            | 42.41           | 6.9               | 291.2              | 5000.0       | -24.7       |          |
| 9027.50         | V            | 190.00           | 1.00            | 42.51           | 9.9               | 419.5              | 5000.0       | -21.5       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | V            | 200.00           | 1.00            | 39.01           | -12.1             | 22.1               | 500.0        | -27.1       |          |
| 3611.00         | V            | 180.00           | 1.00            | 34.49           | -9.2              | 18.4               | 500.0        | -28.7       |          |
| 4513.75         | V            | 270.00           | 1.00            | 32.03           | -6.3              | 19.4               | 500.0        | -28.2       |          |
| 5416.50         | V            | 180.00           | 1.00            | 32.41           | -2.8              | 30.3               | 500.0        | -24.3       |          |
| 8124.75         | V            | 180.00           | 1.00            | 33.11           | 6.9               | 99.8               | 500.0        | -14.0       |          |
| 9027.50         | V            | 190.00           | 1.00            | 32.35           | 9.9               | 130.2              | 500.0        | -11.7       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | H            | 180.00           | 2.20            | 48.71           | -12.1             | 67.6               | 5000.0       | -37.4       |          |
| 3611.00         | H            | 190.00           | 2.20            | 46.51           | -9.2              | 73.6               | 5000.0       | -36.6       |          |
| 4513.75         | H            | 180.00           | 2.20            | 43.61           | -6.3              | 73.5               | 5000.0       | -36.7       |          |
| 5416.50         | H            | 180.00           | 2.20            | 44.41           | -2.8              | 120.7              | 5000.0       | -32.3       |          |
| 8124.75         | H            | 180.00           | 2.20            | 44.01           | 6.9               | 350.1              | 5000.0       | -23.1       |          |
| 9027.50         | H            | 170.00           | 2.20            | 43.51           | 9.9               | 470.7              | 5000.0       | -20.5       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | H            | 180.00           | 2.20            | 37.61           | -12.1             | 18.8               | 500.0        | -28.5       |          |
| 3611.00         | H            | 190.00           | 2.20            | 35.71           | -9.2              | 21.2               | 500.0        | -27.4       |          |
| 4513.75         | H            | 180.00           | 2.20            | 32.61           | -6.3              | 20.7               | 500.0        | -27.7       |          |
| 5416.50         | H            | 180.00           | 2.20            | 32.61           | -2.8              | 31.0               | 500.0        | -24.1       |          |
| 8124.75         | H            | 180.00           | 2.20            | 32.41           | 6.9               | 92.1               | 500.0        | -14.7       |          |
| 9027.50         | H            | 170.00           | 2.20            | 31.71           | 9.9               | 121.0              | 500.0        | -12.3       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

**Table 14: Radiated Emission Test Data >1GHz, Low Channel**  
**(Molex P-N 1052620003, Omnidirectional , 1.2dB Gain )**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2708.25         | V            | 190.00           | 2.60            | 52.38           | -3.0              | 293.6              | 5000.0       | -24.6       | peak     |
| 3611.00         | V            | 180.00           | 2.50            | 49.10           | -0.4              | 271.0              | 5000.0       | -25.3       | peak     |
| 4513.75         | V            | 90.00            | 2.50            | 46.51           | 1.6               | 253.4              | 5000.0       | -25.9       | peak     |
| 5416.50         | V            | 190.00           | 3.00            | 46.88           | 5.0               | 392.2              | 5000.0       | -22.1       | peak     |
| 8124.75         | V            | 270.00           | 2.80            | 41.73           | 9.7               | 370.8              | 5000.0       | -22.6       | peak     |
| 9027.50         | V            | 0.00             | 3.20            | 40.44           | 10.7              | 359.5              | 5000.0       | -22.9       | peak     |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | V            | 190.00           | 2.60            | 41.88           | -3.0              | 87.7               | 500.0        | -15.1       | Average  |
| 3611.00         | V            | 180.00           | 2.50            | 39.14           | -0.4              | 86.1               | 500.0        | -15.3       | Average  |
| 4513.75         | V            | 90.00            | 2.50            | 35.25           | 1.6               | 69.4               | 500.0        | -17.2       | Average  |
| 5416.50         | V            | 190.00           | 3.00            | 36.56           | 5.0               | 119.6              | 500.0        | -12.4       | Average  |
| 8124.75         | V            | 270.00           | 2.80            | 31.40           | 9.7               | 112.9              | 500.0        | -12.9       | Average  |
| 9027.50         | V            | 0.00             | 3.20            | 31.16           | 10.7              | 123.5              | 500.0        | -12.1       | Average  |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | H            | 160.00           | 2.40            | 51.01           | -3.0              | 250.9              | 5000.0       | -26.0       | peak     |
| 3611.00         | H            | 45.00            | 2.70            | 47.57           | -0.4              | 227.3              | 5000.0       | -26.8       | peak     |
| 4513.75         | H            | 90.00            | 2.80            | 44.45           | 1.6               | 199.9              | 5000.0       | -28.0       | peak     |
| 5416.50         | H            | 300.00           | 2.60            | 46.13           | 5.0               | 359.9              | 5000.0       | -22.9       | peak     |
| 8124.75         | H            | 10.00            | 3.00            | 42.13           | 9.7               | 388.3              | 5000.0       | -22.2       | peak     |
| 9027.50         | H            | 190.00           | 2.80            | 40.86           | 10.7              | 377.3              | 5000.0       | -22.4       | peak     |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2708.25         | H            | 160.00           | 2.40            | 45.11           | -3.0              | 127.2              | 500.0        | -11.9       | Average  |
| 3611.00         | H            | 45.00            | 2.70            | 38.32           | -0.4              | 78.4               | 500.0        | -16.1       | Average  |
| 4513.75         | H            | 90.00            | 2.80            | 33.74           | 1.6               | 58.3               | 500.0        | -18.7       | Average  |
| 5416.50         | H            | 300.00           | 2.60            | 36.55           | 5.0               | 119.5              | 500.0        | -12.4       | Average  |
| 8124.75         | H            | 10.00            | 3.00            | 31.55           | 9.7               | 114.9              | 500.0        | -12.8       | Average  |
| 9027.50         | H            | 190.00           | 2.80            | 31.16           | 10.7              | 123.5              | 500.0        | -12.1       | Average  |

**Table 15: Radiated Emission Test Data >1GHz, Center Channel**

**(Linx ¼ Wave Helical)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2744.25         | V            | 180.00           | 1.00            | 56.98           | -12.1             | 175.3              | 5000.0       | -29.1       |          |
| 3659.00         | V            | 190.00           | 1.00            | 56.15           | -9.1              | 224.7              | 5000.0       | -26.9       |          |
| 4573.75         | V            | 180.00           | 1.00            | 51.91           | -6.0              | 198.3              | 5000.0       | -28.0       |          |
| 7318.00         | V            | 0.00             | 1.00            | 48.91           | 5.4               | 516.8              | 5000.0       | -19.7       |          |
| 8232.75         | V            | 180.00           | 1.00            | 49.25           | 7.2               | 664.4              | 5000.0       | -17.5       |          |
| 2744.25         | V            | 180.00           | 1.00            | 48.98           | -12.1             | 69.8               | 500.0        | -17.1       |          |
| 3659.00         | V            | 190.00           | 1.00            | 45.93           | -9.1              | 69.3               | 500.0        | -17.2       |          |
| 4573.75         | V            | 180.00           | 1.00            | 40.00           | -6.0              | 50.3               | 500.0        | -19.9       |          |
| 7318.00         | V            | 0.00             | 1.00            | 39.30           | 5.4               | 170.9              | 500.0        | -9.3        |          |
| 8232.75         | V            | 180.00           | 1.00            | 36.80           | 7.2               | 158.5              | 500.0        | -10.0       |          |
| 2744.25         | H            | 270.00           | 2.20            | 56.95           | -12.1             | 174.7              | 5000.0       | -29.1       |          |
| 3659.00         | H            | 165.00           | 2.20            | 55.11           | -9.1              | 199.4              | 5000.0       | -28.0       |          |
| 4573.75         | H            | 270.00           | 2.20            | 50.54           | -6.0              | 169.4              | 5000.0       | -29.4       |          |
| 7318.00         | H            | 90.00            | 2.20            | 49.08           | 5.4               | 527.0              | 5000.0       | -19.5       |          |
| 8232.75         | H            | 170.00           | 2.20            | 48.99           | 7.2               | 644.8              | 5000.0       | -17.8       |          |
| 2744.25         | H            | 270.00           | 2.20            | 47.83           | -12.1             | 61.1               | 500.0        | -18.3       |          |
| 3659.00         | H            | 165.00           | 2.20            | 43.71           | -9.1              | 53.7               | 500.0        | -19.4       |          |
| 4573.75         | H            | 270.00           | 2.20            | 38.07           | -6.0              | 40.3               | 500.0        | -21.9       |          |
| 7318.00         | H            | 90.00            | 2.20            | 36.46           | 5.4               | 123.3              | 500.0        | -12.2       |          |
| 8232.75         | H            | 170.00           | 2.20            | 36.88           | 7.2               | 159.9              | 500.0        | -9.9        |          |

**Table 16: Radiated Emission Test Data >1GHz, Center Channel**

**(Laird OD9-5 900MHz Omnidirectional Antenna, 5dBi Gain)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | V            | 290.00           | 1.00            | 49.06           | -12.1             | 70.4               | 5000.0       | -37.0       |          |
| 3659.00         | V            | 190.00           | 1.00            | 46.62           | -9.1              | 75.0               | 5000.0       | -36.5       |          |
| 4573.75         | V            | 180.00           | 1.00            | 47.06           | -6.0              | 113.4              | 5000.0       | -32.9       |          |
| 7318.00         | V            | 180.00           | 1.00            | 45.23           | 5.4               | 338.3              | 5000.0       | -23.4       |          |
| 8232.75         | V            | 180.00           | 1.00            | 44.06           | 7.2               | 365.5              | 5000.0       | -22.7       |          |
| 9147.50         | V            | 190.00           | 1.00            | 44.81           | 10.9              | 611.5              | 5000.0       | -18.3       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | V            | 290.00           | 1.00            | 36.00           | -12.1             | 15.7               | 500.0        | -30.1       |          |
| 3659.00         | V            | 190.00           | 1.00            | 36.23           | -9.1              | 22.7               | 500.0        | -26.9       |          |
| 4573.75         | V            | 180.00           | 1.00            | 33.43           | -6.0              | 23.6               | 500.0        | -26.5       |          |
| 7318.00         | V            | 180.00           | 1.00            | 32.22           | 5.4               | 75.7               | 500.0        | -16.4       |          |
| 8232.75         | V            | 180.00           | 1.00            | 32.75           | 7.2               | 99.4               | 500.0        | -14.0       |          |
| 9147.50         | V            | 190.00           | 1.00            | 32.60           | 10.9              | 149.9              | 500.0        | -10.5       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | H            | 190.00           | 2.20            | 50.18           | -12.1             | 80.1               | 5000.0       | -35.9       |          |
| 3659.00         | H            | 90.00            | 2.20            | 48.22           | -9.1              | 90.2               | 5000.0       | -34.9       |          |
| 4573.75         | H            | 190.00           | 2.20            | 44.51           | -6.0              | 84.6               | 5000.0       | -35.4       |          |
| 7318.00         | H            | 180.00           | 2.20            | 41.58           | 5.4               | 222.2              | 5000.0       | -27.0       |          |
| 8232.75         | H            | 180.00           | 2.20            | 43.75           | 7.2               | 352.7              | 5000.0       | -23.0       |          |
| 9147.50         | H            | 190.00           | 2.20            | 43.08           | 10.9              | 501.1              | 5000.0       | -20.0       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | H            | 190.00           | 2.20            | 37.32           | -12.1             | 18.2               | 500.0        | -28.8       |          |
| 3659.00         | H            | 90.00            | 2.20            | 37.26           | -9.1              | 25.5               | 500.0        | -25.8       |          |
| 4573.75         | H            | 190.00           | 2.20            | 33.33           | -6.0              | 23.3               | 500.0        | -26.6       |          |
| 7318.00         | H            | 180.00           | 2.20            | 35.12           | 5.4               | 105.6              | 500.0        | -13.5       |          |
| 8232.75         | H            | 180.00           | 2.20            | 32.75           | 7.2               | 99.4               | 500.0        | -14.0       |          |
| 9147.50         | H            | 190.00           | 2.20            | 32.55           | 10.9              | 149.1              | 500.0        | -10.5       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

**Table 17: Radiated Emission Test Data >1GHz, Center Channel**

**(Laird B (B)8965CN 5/8 Wave Loaded Coil)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2744.25         | V            | 190.00           | 1.00            | 50.31           | -12.1             | 81.3               | 5000.0       | -35.8       | Peak     |
| 3659.00         | V            | 180.00           | 1.00            | 46.11           | -9.1              | 70.7               | 5000.0       | -37.0       | Peak     |
| 4573.75         | V            | 290.00           | 1.00            | 45.31           | -6.0              | 92.7               | 5000.0       | -34.6       | Peak     |
| 7318.00         | V            | 160.00           | 1.00            | 44.71           | 5.4               | 318.7              | 5000.0       | -23.9       | Peak     |
| 8232.75         | V            | 180.00           | 1.00            | 41.81           | 7.2               | 282.1              | 5000.0       | -25.0       | Peak     |
| 9147.50         | V            | 180.00           | 1.00            | 42.41           | 10.9              | 463.9              | 5000.0       | -20.7       | Peak     |
| 2744.25         | V            | 190.00           | 1.00            | 40.33           | -12.1             | 25.8               | 500.0        | -25.8       | Ave      |
| 3659.00         | V            | 180.00           | 1.00            | 34.01           | -9.1              | 17.6               | 500.0        | -29.1       | Ave      |
| 4573.75         | V            | 290.00           | 1.00            | 31.73           | -6.0              | 19.4               | 500.0        | -28.2       | Ave      |
| 7318.00         | V            | 160.00           | 1.00            | 31.41           | 5.4               | 68.9               | 500.0        | -17.2       | Ave      |
| 8232.75         | V            | 180.00           | 1.00            | 32.31           | 7.2               | 94.5               | 500.0        | -14.5       | Ave      |
| 9147.50         | V            | 180.00           | 1.00            | 32.11           | 10.9              | 141.7              | 500.0        | -11.0       | Ave      |
| 2744.25         | H            | 200.00           | 2.20            | 49.31           | -12.1             | 72.5               | 5000.0       | -36.8       | Peak     |
| 3659.00         | H            | 270.00           | 2.20            | 46.71           | -9.1              | 75.8               | 5000.0       | -36.4       | Peak     |
| 4573.75         | H            | 180.00           | 2.20            | 44.11           | -6.0              | 80.8               | 5000.0       | -35.8       | Peak     |
| 7318.00         | H            | 180.00           | 2.20            | 44.11           | 5.4               | 297.4              | 5000.0       | -24.5       | Peak     |
| 8232.75         | H            | 190.00           | 2.20            | 43.31           | 7.2               | 335.3              | 5000.0       | -23.5       | Peak     |
| 9147.50         | H            | 190.00           | 2.20            | 43.31           | 10.9              | 514.6              | 5000.0       | -19.8       | Peak     |
| 2744.25         | H            | 200.00           | 2.20            | 38.11           | -12.1             | 20.0               | 500.0        | -28.0       | Ave      |
| 3659.00         | H            | 270.00           | 2.20            | 36.11           | -9.1              | 22.4               | 500.0        | -27.0       | Ave      |
| 4573.75         | H            | 180.00           | 2.20            | 32.01           | -6.0              | 20.1               | 500.0        | -27.9       | Ave      |
| 7318.00         | H            | 180.00           | 2.20            | 32.31           | 5.4               | 76.4               | 500.0        | -16.3       | Ave      |
| 8232.75         | H            | 190.00           | 2.20            | 31.41           | 7.2               | 85.2               | 500.0        | -15.4       | Ave      |
| 9147.50         | H            | 190.00           | 2.20            | 31.81           | 10.9              | 136.9              | 500.0        | -11.3       | Ave      |

**Table 18: Radiated Emission Test Data >1GHz, Center Channel  
(Molex P-N 1052620003, Omnidirectional, 1.2dB Gain)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2744.25         | V            | 10.00            | 3.20            | 49.08           | -3.0              | 201.2              | 5000.0       | -27.9       | peak     |
| 3659.00         | V            | 160.00           | 3.20            | 47.94           | -0.3              | 241.0              | 5000.0       | -26.3       | peak     |
| 4573.75         | V            | 90.00            | 2.80            | 43.22           | 1.7               | 176.4              | 5000.0       | -29.0       | peak     |
| 7318.00         | V            | 45.00            | 2.60            | 43.37           | 9.8               | 456.7              | 5000.0       | -20.8       | peak     |
| 8232.75         | V            | 180.00           | 2.80            | 42.89           | 9.7               | 425.3              | 5000.0       | -21.4       | peak     |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | V            | 10.00            | 3.20            | 39.62           | -3.0              | 67.7               | 500.0        | -17.4       | Average  |
| 3659.00         | V            | 160.00           | 3.20            | 37.98           | -0.3              | 76.6               | 500.0        | -16.3       | Average  |
| 4573.75         | V            | 90.00            | 2.80            | 34.17           | 1.7               | 62.3               | 500.0        | -18.1       | Average  |
| 7318.00         | V            | 45.00            | 2.60            | 31.90           | 9.8               | 121.9              | 500.0        | -12.3       | Average  |
| 8232.75         | V            | 180.00           | 2.80            | 32.08           | 9.7               | 122.5              | 500.0        | -12.2       | Average  |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | H            | 0.00             | 2.50            | 48.82           | -3.0              | 195.2              | 5000.0       | -28.2       | peak     |
| 3659.00         | H            | 10.00            | 2.60            | 47.18           | -0.3              | 221.0              | 5000.0       | -27.1       | peak     |
| 4573.75         | H            | 90.00            | 2.50            | 45.19           | 1.7               | 221.3              | 5000.0       | -27.1       | peak     |
| 7318.00         | H            | 180.00           | 2.80            | 43.28           | 9.8               | 452.2              | 5000.0       | -20.9       | peak     |
| 8232.75         | H            | 45.00            | 3.00            | 43.61           | 9.7               | 461.7              | 5000.0       | -20.7       | peak     |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2744.25         | H            | 0.00             | 2.50            | 38.46           | -3.0              | 59.3               | 500.0        | -18.5       | Average  |
| 3659.00         | H            | 10.00            | 2.60            | 35.99           | -0.3              | 60.9               | 500.0        | -18.3       | Average  |
| 4573.75         | H            | 90.00            | 2.50            | 33.88           | 1.7               | 60.2               | 500.0        | -18.4       | Average  |
| 7318.00         | H            | 180.00           | 2.80            | 32.09           | 9.8               | 124.7              | 500.0        | -12.1       | Average  |
| 8232.75         | H            | 45.00            | 3.00            | 32.12           | 9.7               | 123.0              | 500.0        | -12.2       | Average  |



**Table 19: Radiated Emission Test Data >1GHz, High Channel**

**(Linx ¼ Wave Helical)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | V            | 270.00           | 1.00            | 53.92           | -12.1             | 123.4              | 5000.0       | -32.2       |          |
| 3709.00         | V            | 240.00           | 1.00            | 50.60           | -9.1              | 119.5              | 5000.0       | -32.4       |          |
| 4636.25         | V            | 90.00            | 1.00            | 46.28           | -5.5              | 108.8              | 5000.0       | -33.2       |          |
| 7418.00         | V            | 200.00           | 1.00            | 45.31           | 5.5               | 346.0              | 5000.0       | -23.2       |          |
| 8345.25         | V            | 90.00            | 1.00            | 43.68           | 7.4               | 358.3              | 5000.0       | -22.9       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | V            | 270.00           | 1.00            | 45.80           | -12.1             | 48.5               | 500.0        | -20.3       |          |
| 3709.00         | V            | 240.00           | 1.00            | 41.48           | -9.1              | 41.8               | 500.0        | -21.6       |          |
| 4636.25         | V            | 90.00            | 1.00            | 34.32           | -5.5              | 27.4               | 500.0        | -25.2       |          |
| 7418.00         | V            | 200.00           | 1.00            | 32.22           | 5.5               | 76.7               | 500.0        | -16.3       |          |
| 8345.25         | V            | 90.00            | 1.00            | 31.75           | 7.4               | 90.7               | 500.0        | -14.8       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | H            | 290.00           | 2.20            | 56.00           | -12.1             | 156.8              | 5000.0       | -30.1       |          |
| 3709.00         | H            | 90.00            | 2.20            | 48.80           | -9.1              | 97.1               | 5000.0       | -34.2       |          |
| 4636.25         | H            | 180.00           | 2.20            | 45.95           | -5.5              | 104.7              | 5000.0       | -33.6       |          |
| 7418.00         | H            | 190.00           | 2.20            | 44.60           | 5.5               | 318.9              | 5000.0       | -23.9       |          |
| 8345.25         | H            | 180.00           | 2.20            | 43.32           | 7.4               | 343.8              | 5000.0       | -23.3       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | H            | 290.00           | 2.20            | 48.86           | -12.1             | 68.9               | 500.0        | -17.2       |          |
| 3709.00         | H            | 90.00            | 2.20            | 39.33           | -9.1              | 32.6               | 500.0        | -23.7       |          |
| 4636.25         | H            | 180.00           | 2.20            | 32.36           | -5.5              | 21.9               | 500.0        | -27.2       |          |
| 7418.00         | H            | 190.00           | 2.20            | 32.02           | 5.5               | 74.9               | 500.0        | -16.5       |          |
| 8345.25         | H            | 180.00           | 2.20            | 31.78           | 7.4               | 91.1               | 500.0        | -14.8       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

**Table 20: Radiated Emission Test Data >1GHz, High Channel**

**(Laird OD9-5 900MHz Omnidirectional Antenna, 5dBi Gain)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | V            | 180.00           | 1.00            | 51.01           | -12.1             | 88.3               | 5000.0       | -35.1       |          |
| 3709.00         | V            | 170.00           | 1.00            | 45.47           | -9.1              | 66.2               | 5000.0       | -37.6       |          |
| 4636.25         | V            | 195.00           | 1.00            | 44.99           | -5.5              | 93.8               | 5000.0       | -34.5       |          |
| 7418.00         | V            | 180.00           | 1.00            | 44.21           | 5.5               | 304.9              | 5000.0       | -24.3       |          |
| 8345.25         | V            | 180.00           | 1.00            | 44.53           | 7.4               | 395.2              | 5000.0       | -22.0       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | V            | 180.00           | 1.00            | 42.85           | -12.1             | 34.5               | 500.0        | -23.2       |          |
| 3709.00         | V            | 170.00           | 1.00            | 34.55           | -9.1              | 18.8               | 500.0        | -28.5       |          |
| 4636.25         | V            | 195.00           | 1.00            | 33.23           | -5.5              | 24.2               | 500.0        | -26.3       |          |
| 7418.00         | V            | 180.00           | 1.00            | 32.53           | 5.5               | 79.4               | 500.0        | -16.0       |          |
| 8345.25         | V            | 180.00           | 1.00            | 32.10           | 7.4               | 94.5               | 500.0        | -14.5       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | H            | 90.00            | 2.20            | 50.78           | -12.1             | 86.0               | 5000.0       | -35.3       |          |
| 3709.00         | H            | 190.00           | 2.20            | 44.60           | -9.1              | 59.9               | 5000.0       | -38.4       |          |
| 4636.25         | H            | 220.00           | 2.20            | 43.19           | -5.5              | 76.2               | 5000.0       | -36.3       |          |
| 7418.00         | H            | 170.00           | 2.20            | 44.27           | 5.5               | 307.0              | 5000.0       | -24.2       |          |
| 8345.25         | H            | 180.00           | 2.20            | 44.71           | 7.4               | 403.5              | 5000.0       | -21.9       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | H            | 90.00            | 2.20            | 42.73           | -12.1             | 34.0               | 500.0        | -23.3       |          |
| 3709.00         | H            | 190.00           | 2.20            | 33.31           | -9.1              | 16.3               | 500.0        | -29.7       |          |
| 4636.25         | H            | 220.00           | 2.20            | 32.62           | -5.5              | 22.6               | 500.0        | -26.9       |          |
| 7418.00         | H            | 170.00           | 2.20            | 32.54           | 5.5               | 79.5               | 500.0        | -16.0       |          |
| 8345.25         | H            | 180.00           | 2.20            | 32.18           | 7.4               | 95.3               | 500.0        | -14.4       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

**Table 21: Radiated Emission Test Data >1GHz, High Channel**

**(Laird B(B)8965CN 5/8 Wave Loaded Coil)**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2781.75         | V            | 180.00           | 1.00            | 49.94           | -12.1             | 78.0               | 5000.0       | -36.1       | Peak     |
| 3709.00         | V            | 180.00           | 1.00            | 46.75           | -9.1              | 76.7               | 5000.0       | -36.3       | Peak     |
| 4636.25         | V            | 250.00           | 1.00            | 46.58           | -5.5              | 112.6              | 5000.0       | -32.9       | Peak     |
| 7418.00         | V            | 170.00           | 1.00            | 45.53           | 5.5               | 354.9              | 5000.0       | -23.0       | Peak     |
| 8345.25         | V            | 190.00           | 1.00            | 41.72           | 7.4               | 286.0              | 5000.0       | -24.9       | Peak     |
| 2781.75         | V            | 180.00           | 1.00            | 39.78           | -12.1             | 24.2               | 500.0        | -26.3       | Ave      |
| 3709.00         | V            | 180.00           | 1.00            | 34.86           | -9.1              | 19.5               | 500.0        | -28.2       | Ave      |
| 4636.25         | V            | 250.00           | 1.00            | 32.61           | -5.5              | 22.5               | 500.0        | -26.9       | Ave      |
| 7418.00         | V            | 170.00           | 1.00            | 32.51           | 5.5               | 79.3               | 500.0        | -16.0       | Ave      |
| 8345.25         | V            | 190.00           | 1.00            | 32.04           | 7.4               | 93.8               | 500.0        | -14.5       | Ave      |
| 2781.75         | H            | 250.00           | 2.20            | 49.41           | -12.1             | 73.4               | 5000.0       | -36.7       | Peak     |
| 3709.00         | H            | 90.00            | 2.20            | 47.01           | -9.1              | 79.0               | 5000.0       | -36.0       | Peak     |
| 4636.25         | H            | 160.00           | 2.20            | 44.89           | -5.5              | 92.7               | 5000.0       | -34.6       | Peak     |
| 7418.00         | H            | 180.00           | 2.20            | 43.76           | 5.5               | 289.5              | 5000.0       | -24.7       | Peak     |
| 8345.25         | H            | 200.00           | 2.20            | 45.95           | 7.4               | 465.4              | 5000.0       | -20.6       | Peak     |
| 2781.75         | H            | 250.00           | 2.20            | 38.30           | -12.1             | 20.4               | 500.0        | -27.8       | Ave      |
| 3709.00         | H            | 90.00            | 2.20            | 36.09           | -9.1              | 22.5               | 500.0        | -26.9       | Ave      |
| 4636.25         | H            | 160.00           | 2.20            | 32.60           | -5.5              | 22.5               | 500.0        | -26.9       | Ave      |
| 7418.00         | H            | 180.00           | 2.20            | 32.38           | 5.5               | 78.1               | 500.0        | -16.1       | Ave      |
| 8345.25         | H            | 200.00           | 2.20            | 32.31           | 7.4               | 96.8               | 500.0        | -14.3       | Ave      |

**Table 22: Radiated Emission Test Data >1GHz, Low Channel**  
**( Molex P-N 1052620003, Omnidirectional , 1.2dB Gain )**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 2781.75         | V            | 180.00           | 2.60            | 49.86           | -3.0              | 220.7              | 5000.0       | -27.1       | peak     |
| 3709.00         | V            | 270.00           | 2.80            | 49.63           | -0.1              | 298.0              | 5000.0       | -24.5       | peak     |
| 4636.25         | V            | 270.00           | 3.80            | 45.39           | 1.9               | 231.4              | 5000.0       | -26.7       | peak     |
| 7418.00         | V            | 180.00           | 2.80            | 41.82           | 9.6               | 371.9              | 5000.0       | -22.6       | peak     |
| 8345.25         | V            | 10.00            | 3.00            | 41.69           | 9.7               | 371.9              | 5000.0       | -22.6       | peak     |
| 2781.75         | V            | 180.00           | 2.60            | 41.92           | -3.0              | 88.5               | 500.0        | -15.0       | Average  |
| 3709.00         | V            | 270.00           | 2.80            | 42.81           | -0.1              | 135.8              | 500.0        | -11.3       | Average  |
| 4636.25         | V            | 270.00           | 3.80            | 33.57           | 1.9               | 59.3               | 500.0        | -18.5       | Average  |
| 7418.00         | V            | 180.00           | 2.80            | 32.91           | 9.6               | 133.4              | 500.0        | -11.5       | Average  |
| 8345.25         | V            | 10.00            | 3.00            | 31.92           | 9.7               | 120.8              | 500.0        | -12.3       | Average  |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | H            | 190.00           | 2.60            | 47.09           | -3.0              | 160.4              | 5000.0       | -29.9       | peak     |
| 3709.00         | H            | 180.00           | 2.80            | 46.08           | -0.1              | 198.0              | 5000.0       | -28.0       | peak     |
| 4636.25         | H            | 180.00           | 2.60            | 44.80           | 1.9               | 216.2              | 5000.0       | -27.3       | peak     |
| 7418.00         | H            | 90.00            | 3.00            | 40.20           | 9.6               | 308.7              | 5000.0       | -24.2       | peak     |
| 8345.25         | H            | 0.00             | 3.20            | 39.90           | 9.7               | 302.6              | 5000.0       | -24.4       | peak     |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 2781.75         | H            | 190.00           | 2.60            | 37.13           | -3.0              | 51.0               | 500.0        | -19.8       | Average  |
| 3709.00         | H            | 180.00           | 2.80            | 35.53           | -0.1              | 58.8               | 500.0        | -18.6       | Average  |
| 4636.25         | H            | 180.00           | 2.60            | 32.90           | 1.9               | 54.9               | 500.0        | -19.2       | Average  |
| 7418.00         | H            | 90.00            | 3.00            | 41.80           | 9.6               | 371.2              | 500.0        | -2.6        | Average  |
| 8345.25         | H            | 0.00             | 3.20            | 32.10           | 9.7               | 123.3              | 500.0        | -12.2       | Average  |

## 5.7 Receiver Radiated Spurious Emissions: (RSS-210 sect 2.6)

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 §15.109 for peak measurements.

### 5.7.1 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. The peripherals were placed on the table in accordance with ANSI C63.4-2014. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

**Table 23: Spectrum Analyzer Settings**

| Frequency Range | Resolution Bandwidth | Video Bandwidth           |
|-----------------|----------------------|---------------------------|
| 30MHz-1000 MHz  | 120kHz               | >100 kHz                  |
| >1000 MHz       | 1 MHz                | 10 Hz (Avg.), 1MHz (Peak) |

**Table 24: Radiated Emission Test Data, Receiver**

| 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) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 38.23           | V            | 180.00           | 1.00            | 42.85           | -11.3             | 38.0               | 100.0        | -8.4        |          |
| 42.19           | V            | 180.00           | 1.00            | 42.07           | -14.2             | 24.8               | 100.0        | -12.1       |          |
| 46.99           | V            | 180.00           | 1.00            | 43.65           | -17.3             | 20.8               | 100.0        | -13.6       |          |
| 49.94           | V            | 180.00           | 1.00            | 43.02           | -18.6             | 16.7               | 100.0        | -15.5       |          |
| 52.02           | V            | 180.00           | 1.00            | 46.24           | -19.1             | 22.9               | 100.0        | -12.8       |          |
| 61.02           | V            | 225.00           | 1.00            | 43.93           | -18.8             | 18.0               | 100.0        | -14.9       |          |
| 142.62          | V            | 225.00           | 1.00            | 41.35           | -12.7             | 27.0               | 150.0        | -14.9       |          |
| 143.22          | V            | 225.00           | 1.00            | 39.63           | -12.8             | 22.0               | 150.0        | -16.7       |          |
| 167.61          | V            | 225.00           | 1.00            | 42.93           | -13.5             | 29.8               | 150.0        | -14.1       |          |
| 177.50          | V            | 135.00           | 1.00            | 40.50           | -13.8             | 21.5               | 150.0        | -16.9       |          |
| 192.01          | V            | 135.00           | 1.00            | 35.40           | -13.7             | 12.1               | 150.0        | -21.8       |          |
| 204.40          | V            | 135.00           | 1.00            | 42.40           | -13.3             | 28.4               | 150.0        | -14.4       |          |
| 215.90          | V            | 180.00           | 1.00            | 38.10           | -14.3             | 15.5               | 150.0        | -19.7       |          |
| 240.41          | V            | 180.00           | 1.30            | 39.90           | -13.1             | 21.8               | 200.0        | -19.3       |          |
| 448.20          | V            | 180.00           | 1.80            | 38.60           | -6.5              | 40.5               | 200.0        | -13.9       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |
| 38.23           | H            | 180.00           | 4.00            | 36.73           | -11.3             | 18.8               | 100.0        | -14.5       |          |
| 42.19           | H            | 180.00           | 4.00            | 39.84           | -14.2             | 19.2               | 100.0        | -14.3       |          |
| 46.99           | H            | 180.00           | 4.00            | 47.40           | -17.3             | 32.0               | 100.0        | -9.9        |          |
| 49.94           | H            | 180.00           | 4.00            | 41.99           | -18.6             | 14.9               | 100.0        | -16.6       |          |
| 52.02           | H            | 180.00           | 4.00            | 41.37           | -19.1             | 13.1               | 100.0        | -17.7       |          |
| 61.02           | H            | 225.00           | 4.00            | 35.03           | -18.8             | 6.4                | 100.0        | -23.8       |          |
| 142.62          | H            | 135.00           | 4.00            | 39.26           | -12.7             | 21.2               | 150.0        | -17.0       |          |
| 143.22          | H            | 135.00           | 4.00            | 38.77           | -12.8             | 19.9               | 150.0        | -17.5       |          |
| 167.61          | H            | 135.00           | 4.00            | 49.18           | -13.5             | 61.1               | 150.0        | -7.8        |          |
| 177.50          | H            | 180.00           | 4.00            | 37.90           | -13.8             | 16.0               | 150.0        | -19.5       |          |
| 192.01          | H            | 180.00           | 4.00            | 40.50           | -13.7             | 21.8               | 150.0        | -16.7       |          |
| 204.40          | H            | 180.00           | 3.80            | 41.20           | -13.3             | 24.8               | 150.0        | -15.6       |          |
| 215.90          | H            | 180.00           | 3.80            | 39.50           | -14.3             | 18.3               | 150.0        | -18.3       |          |
| 240.41          | H            | 180.00           | 3.80            | 36.10           | -13.1             | 14.1               | 200.0        | -23.1       |          |
| 448.20          | H            | 180.00           | 3.20            | 37.30           | -6.5              | 34.9               | 200.0        | -15.2       |          |
|                 |              |                  |                 |                 |                   |                    |              |             |          |

No frequencies noted above 1GHz

## 5.8 AC Conducted Emissions (FCC Part §15.207)

### 5.8.1 Requirements

Test Arrangement: Table Top

Compliance Standard: FCC Class B

| FCC Compliance Limits |                    |                    |
|-----------------------|--------------------|--------------------|
| Frequency             | Quasi-peak         | Average            |
| 0.15 - 0.5MHz         | 66 to 56dB $\mu$ V | 56 to 46dB $\mu$ V |
| 0.5 - 5MHz            | 56dB $\mu$ V       | 46dB $\mu$ V       |
| 5 - 30MHz             | 60dB $\mu$ V       | 50dB $\mu$ V       |

### 5.8.2 Test Procedure

The EUT was placed on an 80 cm high 1 X 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network bonded to a 3 X 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Power and data cables were moved about to obtain maximum emissions.

The 50  $\Omega$  output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak, peak, or average as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth. For average measurements the post-detector filter was set to 10 Hz.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed. The Conducted emissions level to be compared to the FCC limit is calculated as shown in the following example.

Example:

Spectrum Analyzer Voltage: VdB $\mu$ V

LISN Correction Factor: LISN dB

Cable Correction Factor: CF dB

Electric Field: EdB $\mu$ V = V dB $\mu$ V + LISN dB + CF dB

## 5.8.3 Test Data

The EUT complied with the Class B Conducted Emissions requirements. This system runs off of 120VAC or 230VAC. The following tables provide the test results for phase and neutral line power line conducted emissions.

Conducted Emissions was tested with the 915MHz radio in the “transmit on” state.

**Table 25: Conducted Emissions Data 120VAC, Transmit On**

## NEUTRAL

| Frequency (MHz) | Level QP (dBµV) | Level AVG (dBµV) | Cable Loss (dB) | LISN Corr (dB) | Level QP Corr (dBµV) | Level Corr Avg (dBµV) | Limit QP (dBµV) | Limit AVG (dBµV) | Margin QP (dB) | Margin AVG (dB) |
|-----------------|-----------------|------------------|-----------------|----------------|----------------------|-----------------------|-----------------|------------------|----------------|-----------------|
| 0.177           | 38.3            | 23.6             | 10.2            | 0.3            | 48.8                 | 34.1                  | 64.6            | 54.6             | -15.9          | -20.5           |
| 0.213           | 38.6            | 21.9             | 10.2            | 0.2            | 49.0                 | 32.2                  | 63.1            | 53.1             | -14.1          | -20.8           |
| 0.289           | 31.3            | 16.8             | 10.2            | 0.3            | 41.8                 | 27.2                  | 60.5            | 50.5             | -18.8          | -23.3           |
| 0.325           | 24.8            | 13.9             | 10.2            | 0.3            | 35.2                 | 24.3                  | 59.6            | 49.6             | -24.3          | -25.3           |
| 0.978           | 25.4            | 20.3             | 10.3            | 0.2            | 36.0                 | 30.8                  | 56.0            | 46.0             | -20.0          | -15.2           |
| 11.579          | 22.1            | 17.9             | 11.2            | 0.3            | 33.7                 | 29.4                  | 60.0            | 50.0             | -26.3          | -20.6           |

## PHASE

| Frequency (MHz) | Level QP (dBµV) | Level AVG (dBµV) | Cable Loss (dB) | LISN Corr (dB) | Level QP Corr (dBµV) | Level Corr Avg (dBµV) | Limit QP (dBµV) | Limit AVG (dBµV) | Margin QP (dB) | Margin AVG (dB) |
|-----------------|-----------------|------------------|-----------------|----------------|----------------------|-----------------------|-----------------|------------------|----------------|-----------------|
| 0.172           | 36.1            | 21.2             | 10.2            | 0.1            | 46.4                 | 31.5                  | 64.9            | 54.9             | -18.5          | -23.4           |
| 0.208           | 38.1            | 21.7             | 10.2            | 0.0            | 48.3                 | 31.9                  | 63.3            | 53.3             | -15.0          | -21.3           |
| 0.289           | 30.8            | 16.4             | 10.2            | 0.1            | 41.1                 | 26.7                  | 60.5            | 50.5             | -19.5          | -23.8           |
| 0.402           | 23.0            | 13.3             | 10.2            | 0.2            | 33.5                 | 23.8                  | 57.8            | 47.8             | -24.4          | -24.0           |
| 0.982           | 24.0            | 19.2             | 10.3            | 0.2            | 34.5                 | 29.8                  | 56.0            | 46.0             | -21.5          | -16.2           |
| 11.580          | 21.1            | 16.5             | 11.2            | 0.3            | 32.6                 | 28.0                  | 60.0            | 50.0             | -27.4          | -22.0           |



**Table 26: Conducted Emissions Data 230VAC, Transmit On**

NEUTRAL

| Frequency (MHz) | Level QP (dBµV) | Level AVG (dBµV) | Cable Loss (dB) | LISN Corr (dB) | Level QP Corr (dBµV) | Level Corr Avg (dBµV) | Limit QP (dBµV) | Limit AVG (dBµV) | Margin QP (dB) | Margin AVG (dB) |
|-----------------|-----------------|------------------|-----------------|----------------|----------------------|-----------------------|-----------------|------------------|----------------|-----------------|
| 0.164           | 31.3            | 19.1             | 10.2            | 0.3            | 41.7                 | 29.5                  | 65.3            | 55.3             | -23.6          | -25.8           |
| 0.200           | 35.6            | 19.4             | 10.2            | 0.2            | 45.9                 | 29.7                  | 63.6            | 53.6             | -17.7          | -23.9           |
| 0.276           | 26.3            | 14.1             | 10.2            | 0.3            | 36.7                 | 24.5                  | 60.9            | 50.9             | -24.2          | -26.4           |
| 0.303           | 29.5            | 15.5             | 10.2            | 0.3            | 40.0                 | 26.0                  | 60.2            | 50.2             | -20.2          | -24.2           |
| 0.330           | 23.0            | 12.4             | 10.2            | 0.3            | 33.4                 | 22.8                  | 59.5            | 49.5             | -26.1          | -26.6           |
| 0.483           | 19.3            | 10.6             | 10.2            | 0.3            | 29.8                 | 21.0                  | 56.3            | 46.3             | -26.5          | -25.3           |
| 12.006          | 18.4            | 11.2             | 11.2            | 0.4            | 29.9                 | 22.7                  | 60.0            | 50.0             | -30.1          | -27.3           |

PHASE

| Frequency (MHz) | Level QP (dBµV) | Level AVG (dBµV) | Cable Loss (dB) | LISN Corr (dB) | Level QP Corr (dBµV) | Level Corr Avg (dBµV) | Limit QP (dBµV) | Limit AVG (dBµV) | Margin QP (dB) | Margin AVG (dB) |
|-----------------|-----------------|------------------|-----------------|----------------|----------------------|-----------------------|-----------------|------------------|----------------|-----------------|
| 0.195           | 34.8            | 18.7             | 10.2            | 0.0            | 45.0                 | 28.9                  | 63.8            | 53.8             | -18.8          | -24.9           |
| 0.231           | 27.7            | 15.4             | 10.2            | 0.1            | 37.9                 | 25.6                  | 62.4            | 52.4             | -24.5          | -26.8           |
| 0.249           | 24.2            | 14.6             | 10.2            | 0.1            | 34.4                 | 24.8                  | 61.8            | 51.8             | -27.4          | -27.0           |
| 0.307           | 26.3            | 13.8             | 10.2            | 0.2            | 36.7                 | 24.1                  | 60.0            | 50.0             | -23.4          | -26.0           |
| 0.420           | 19.4            | 10.9             | 10.2            | 0.2            | 29.8                 | 21.4                  | 57.5            | 47.5             | -27.7          | -26.1           |
| 11.579          | 26.5            | 23.9             | 11.2            | 0.3            | 38.0                 | 35.4                  | 60.0            | 50.0             | -22.0          | -14.6           |
|                 |                 |                  |                 |                |                      |                       |                 |                  |                |                 |