



**FCC Class 2 Permissive Change Test Report**  
**For the**  
**Mueller Systems**  
**UGM-H Radio Module**  
**FCC ID: SM6-UGM-H**

WLL JOB# 11968-01  
May 6, 2011

Prepared for:

**Mueller Systems**  
**48 Leona Drive**  
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Prepared By:

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**7560 Lindbergh Drive**  
**Gaithersburg, Maryland 20879**



**Testing Certificate AT-1448**

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Prepared by:



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### Abstract

This report has been prepared on behalf of Mueller Systems to support the attached Class 2 permissive change. The Class 2 Permissive Change Test Report for a modular Frequency Hopping Spread Spectrum Transmitter operating under Part 15.247 (10/2009) of the FCC Rules. This Class 2 Permissive Change Test Report documents the test configuration and test results for a Mueller Systems UGM-H Radio 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 Mueller Systems UGM-H Radio Module remains in compliance with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247.

Revision History	Description of Change	Date
Rev 0	Initial Release	May 6, 2011

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## 1 Introduction

### 1.1 Reason for Class 2 Permissive Change

This class 2 permissive change is being generated to incorporate an additional “Frequency Hopping Spread Spectrum (FHSS)” mode. This mode will be utilized to initiate communications between mesh network nodes that have a sleep mode. This mode of operation utilizes a different set of RF channels from the previously certified data channels within the 902-928 MHz band but shares the same power and bandwidth as the data channels. This mode of operation was implemented via EUT manufacturer software code and does not include any hardware modifications. See the theory of operation for details of this mode of operation.

### 1.2 Compliance Statement

The Mueller Systems UGM-H Radio Module remains in compliance with the limits for a modular Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 (10/2009).

### 1.3 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed in the host device. All measurements were performed in accordance with FCC Public Notice DA 00-705, “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems”. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

### 1.4 Contract Information

Customer:	Mueller Systems 48 Leona Drive Middleboro, MA, 02346 USA
Purchase Order Number:	751632
Quotation Number:	66202

### 1.5 Test Dates

Testing was performed on the following date(s):	4/25/2011 to 5/3/2011
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### 1.6 Test and Support Personnel

Washington Laboratories, LTD	James Ritter, John Reidell
Client Representative	David Splitz

## 1.7 Abbreviations

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

## 2 Equipment Under Test

### 2.1 EUT Identification & Description

The Mueller Systems UGM-H radio module is a 120VAC powered transceiver using 902.5-927.35MHz FHSS technology. The system uses 2 modes of operation data mode which uses 50 channels from 902.5 to 927MHz. The system also has a hailing mode to awaken units that are sleeping (these units go into a sleep mode when inactive). The hailing frequencies consist of 50 hailing channels from 902.65 to 927.35MHz. Both of these modes use FHSS technology. The characteristics (power & bandwidth) of the hailing channels are identical to the data channels and are produced from the same RF circuitry. For more detailed information refer to the theory of operation. Serial Number of Module: 10070 07640

**Table 1. Device Summary**

(this table shows the previously granted data channels compared to the new hailing channels)

ITEM	Data channels	Hailing Channels
Frequency Range:	902.5-927.0MHz	902.65- 927.35MHz
Maximum Output Power: (conducted at antenna port)	812.8mW (29.1dBm)	811.0mW (29.09dBm)
Modulation:	FM	FM
Occupied Bandwidth:	61.5 kHz	40.97kHz
Keying:	Automatic	Automatic
Type of Information:	Data	Data
Number of Channels:	50	50
Power Output Level	Fixed	Fixed
Antenna Type	0dBi 2.7dBi dipole antenna	Same as data channel
Power Source & Voltage:	120VAC	Same as data channel

### 2.2 Test Configuration

The UGM-H Radio Module was operated from 120VAC 60Hz power. Commands were sent to the UGM-H Radio Module using a programming to a support laptop using Windows HyperTerminal program. This connection was disconnected after the test mode was set (radiated tests).

### 2.3 Testing Algorithm

The UGM-H Radio Module was programmed via a programming port on the EUT to a Serial port on the support laptop. The support laptop used HyperTerminal to command the EUT to transmit on the lowest, center, and highest channels. Commands were also sent to allow the unit to transmit in a hopping fashion. The unit was preloaded with a typical data payload to transmit.

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

## 2.5 Measurements

### 2.5.1 References

FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

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

## 2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 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

$div_{a, b, c}$  = the individual uncertainty element divisor based on the probability distribution

divisor = 1.732 for rectangular distribution

divisor = 2 for normal distribution

divisor = 1.414 for trapezoid distribution

**Equation 2: Expanded Uncertainty**

$$U = ku_c$$

- where U = expanded uncertainty  
k = coverage factor  
k ≤ 2 for 95% coverage (ANSI/NCSL Z540-2 Annex G)  
u<sub>c</sub> = standard uncertainty

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

**Table 2: Expanded Uncertainty List**

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

### 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>Conducted Antenna Port</b>		Test Date: <b>4/25-26/2011</b>	
<b>Asset #</b>	<b>Manufacturer/Model</b>	<b>Description</b>	<b>Cal. Due</b>
618	HP, 8563A	ANALYZER, SPECTRUM	6/4/2011
528	AGILENT, E4446A	ANALYZER, SPECTRUM	8/27/2011

Test Name: <b>Radiated Emissions</b>		Test Date: <b>5/2-3/2011</b>	
<b>Asset #</b>	<b>Manufacturer/Model</b>	<b>Description</b>	<b>Cal. Due</b>
644	SUNOL SCIENCES CORPORATION - JB1 925-833-9936	BICONALOG ANTENNA	12/20/2011
70	HP - 85685A	PRESELECTOR RF W/OPT 8ZE	6/22/2011
72	HP - 8568B	ANALYZER SPECTRUM	6/22/2011
68	HP - 85650A	ADAPTER QP	6/22/2011
522	HP - 8449B	PRE-AMPLIFIER 1-26.5GHZ	7/27/2011
337	WLL - 1.2-5GHZ	FILTER BAND PASS	3/24/2012
281	ITC - 21A-3A1	WAVEGUIDE 4.51-10.0GHZ	3/24/2012

## 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 10:2009, RSS210 issue 8, and RSS-Gen issue 3. Full results are shown in section 5.

**Table 4. Test Summary Table**

<b>FCC Rule Part</b>	<b>Description</b>	<b>Result</b>
15.247 (a)(1)(i)	20dB Bandwidth	Pass
15.247 (b)(2)	Transmit Output Power	Pass
15.247 (a)(1)	Channel Separation	Pass
15.247 (a)(1)(i)	Number of Channels =50 minimum	Pass
15.247 (a)(1)(i)	Time of Occupancy	Pass
15.247 (d)	Occupied BW / Out-of-Band Emissions (Band Edge @ 20dB below)	Pass
15.205 15.209	General Field Strength Limits (Restricted Bands & RE Limits)	Pass
15.207	AC Conducted Emissions	NA

## 5 Test Results

### 5.1.1 Hailing Mode Timing

As the Maximum Dwell time of this device in hailing mode is 400ms no duty cycle correction is allowed.

FCC part 15.247 requires that for hopping signals with an occupied bandwidth less than 250 kHz the limit is 0.4 seconds dwell time per 20 seconds

The following figures show the plot of the dwell time and time of occupancy for the transmitter. Based on this plot, the dwell time per hop is 391.7ms. As the unit is on a hailing channel once in a 20 second period the time of occupancy is 391.7ms per 20 seconds, thus complying with the 0.4 second requirement.

Mueller Systems, UGM-H Module, Single Channel on time for one hop in hopping mode.  
Measured = 391.7mSec per Hop

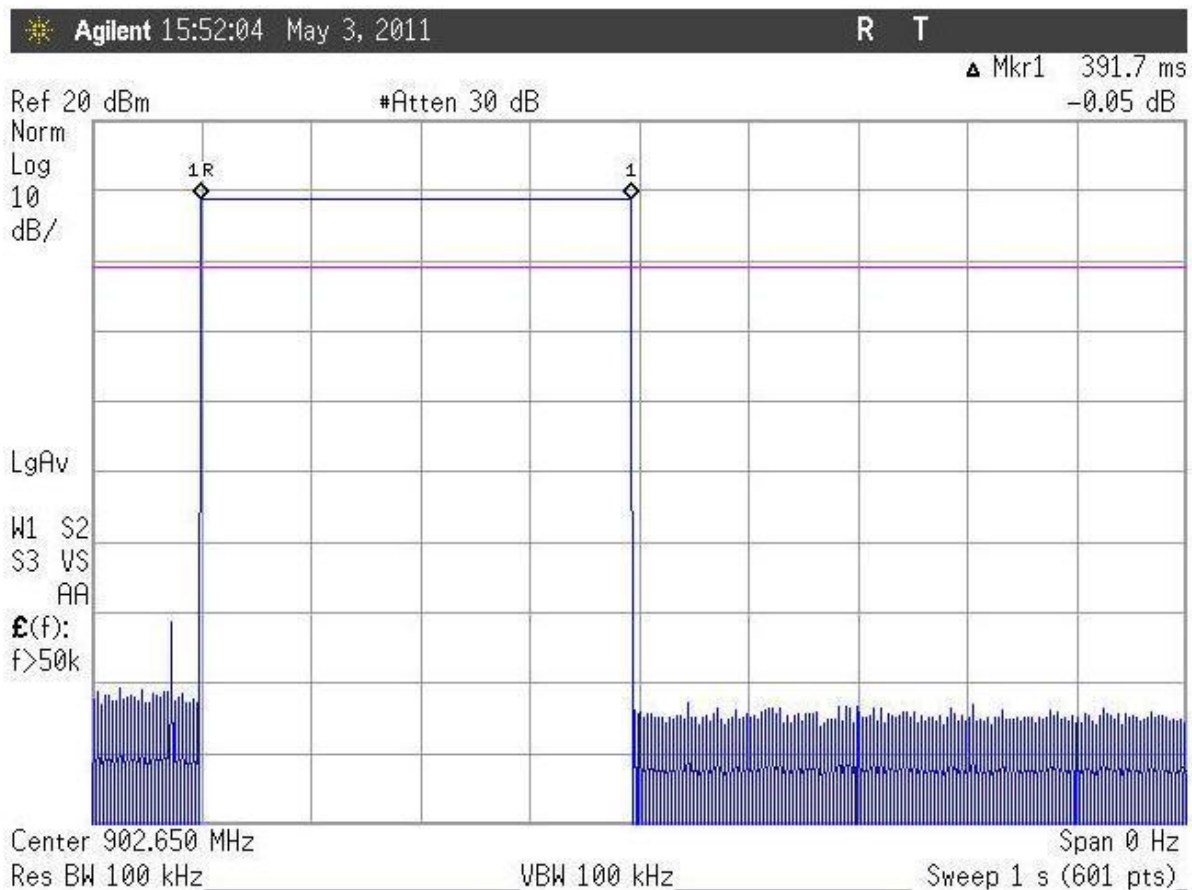
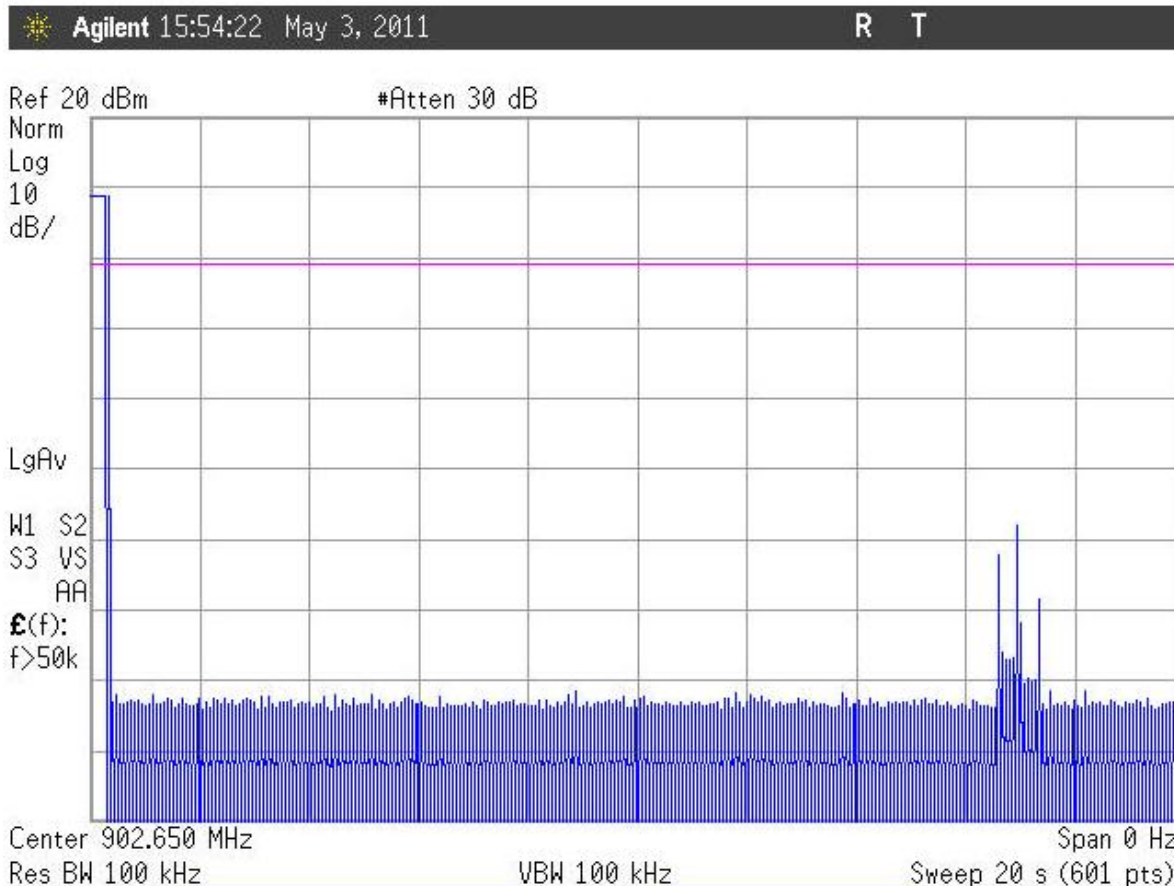


Figure 1. Hailing Channel Duty Cycle Plot

**Mueller Systems, UGM-H Module, Time of Occupancy per 20 Seconds**  
**Limit = 400mSec per 20 Seconds, Measured= 1 pulse of 391.7mSec per 20 Seconds**



**Figure 2. Hailing Channel Time of Occupancy Plot**

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

To measure the output power the hopping sequence was stopped while the frequency dwelled on the lowest, Center, and highest 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, cable, and other losses in the system.

**Table 5, Hailing Channel RF Power Output**

Frequency	Level	Limit	Pass/Fail
Low Channel: 902.65MHz	29.08dBm	30dBm	Pass
Center Channel: 915.35MHz	29.00dBm	30dBm	Pass
High Channel: 927.35MHz	28.84dBm	30dBm	Pass

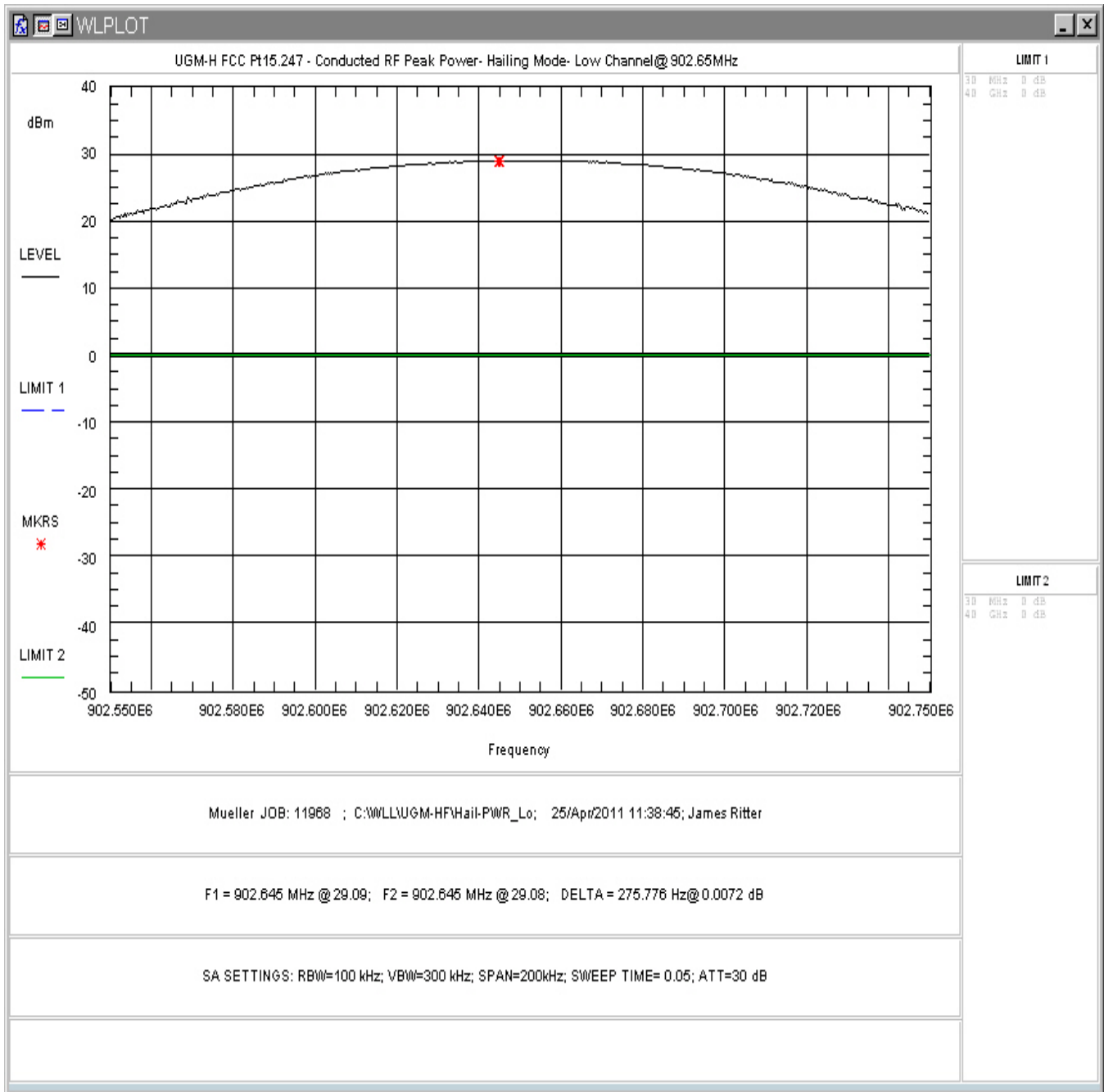


Figure 3. Hailing Channel RF Peak Power, Low Channel



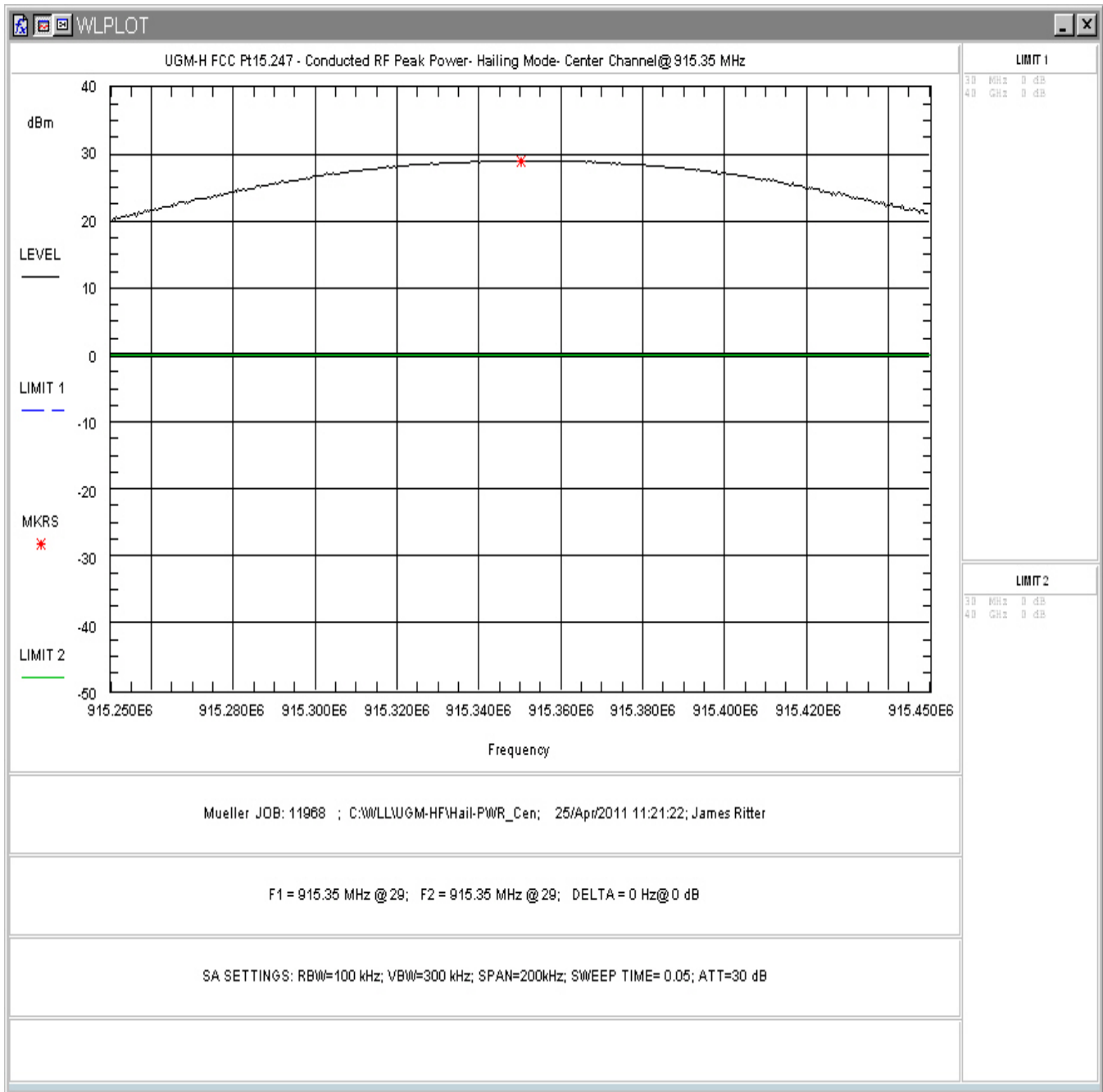


Figure 4. Hailing Channel RF Peak Power, Center Channel

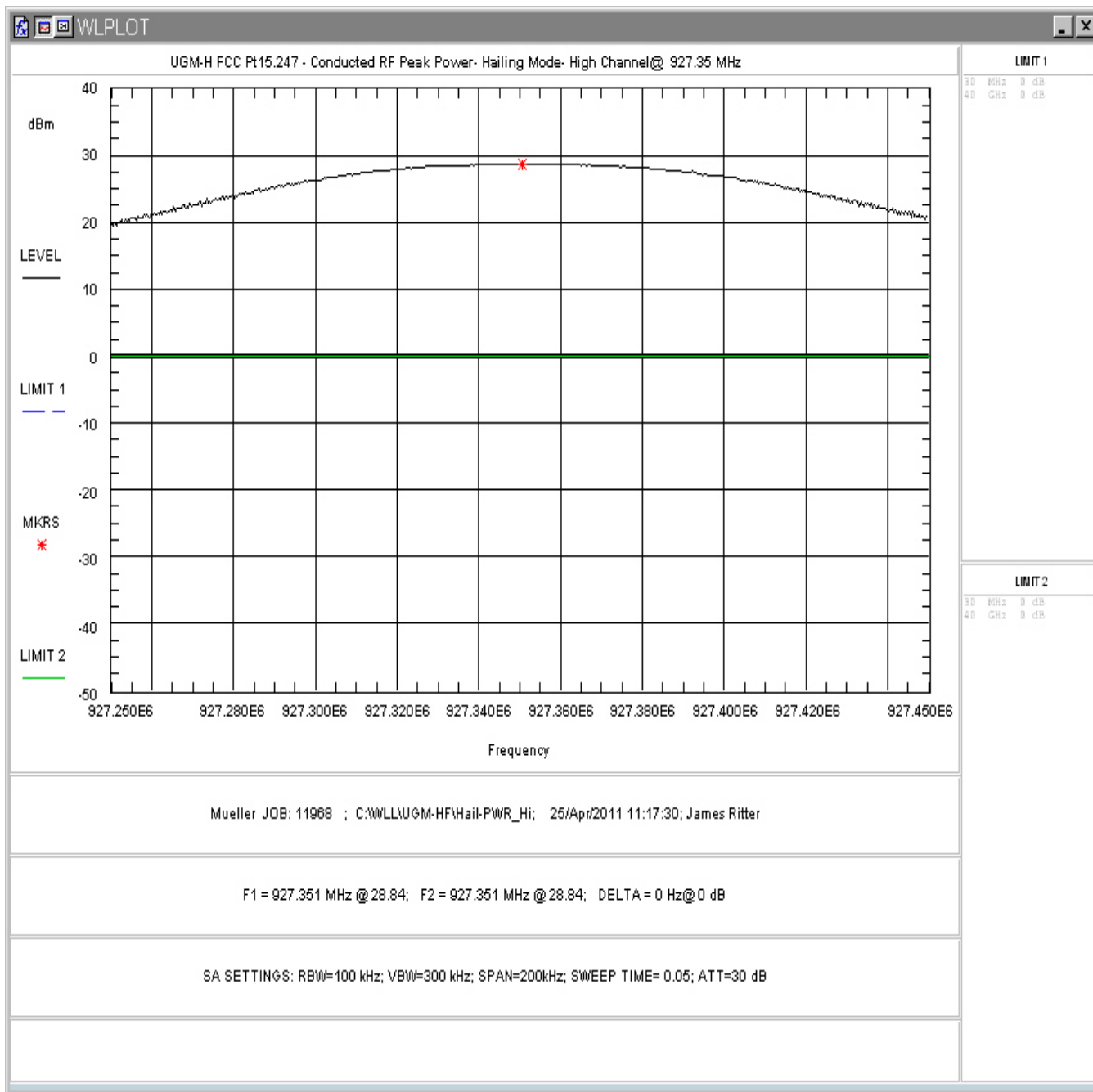


Figure 5. Hailing Channel RF Peak Power, High Channel

### 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, operating in the 902-928MHz frequency range, FCC Part 15.247 requires that devices with occupied bandwidths less than 250kHz have a minimum of 50 hopping channels.

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

The below tables provide a summary of the Occupied Bandwidth Results.

**Table 6. Hailing Channel Occupied Bandwidth Results**

Frequency	Bandwidth	Limit	Pass/Fail
Low Channel: 902.65MHz	40.97kHz	500kHz Maximum	Pass
Center Channel: 915.35MHz	39.47kHz	500kHz Maximum	Pass
High Channel: 927.35MHz	40.72kHz	500kHz Maximum	Pass

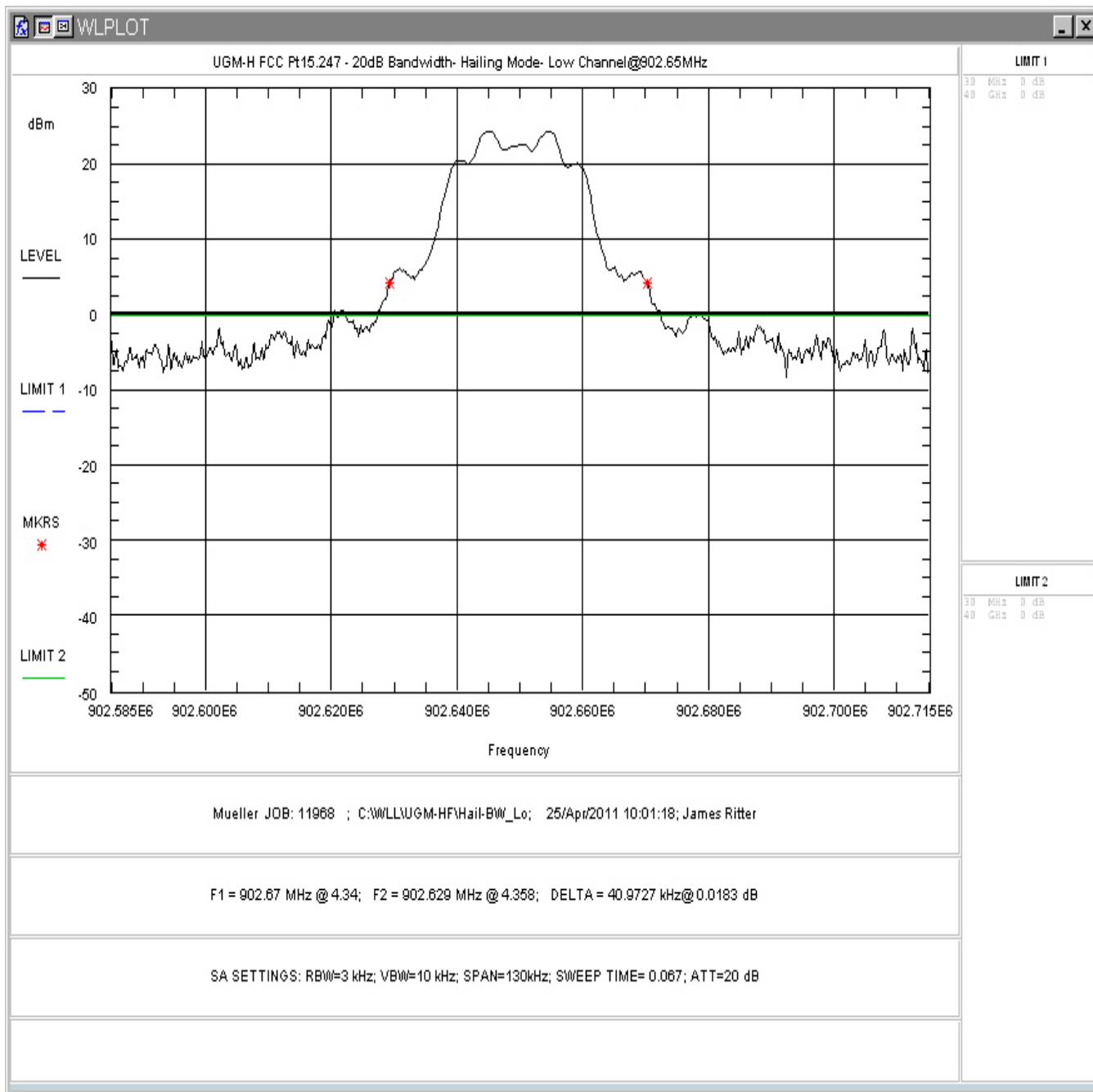


Figure 6. Hailing Channel Occupied Bandwidth, Low Channel

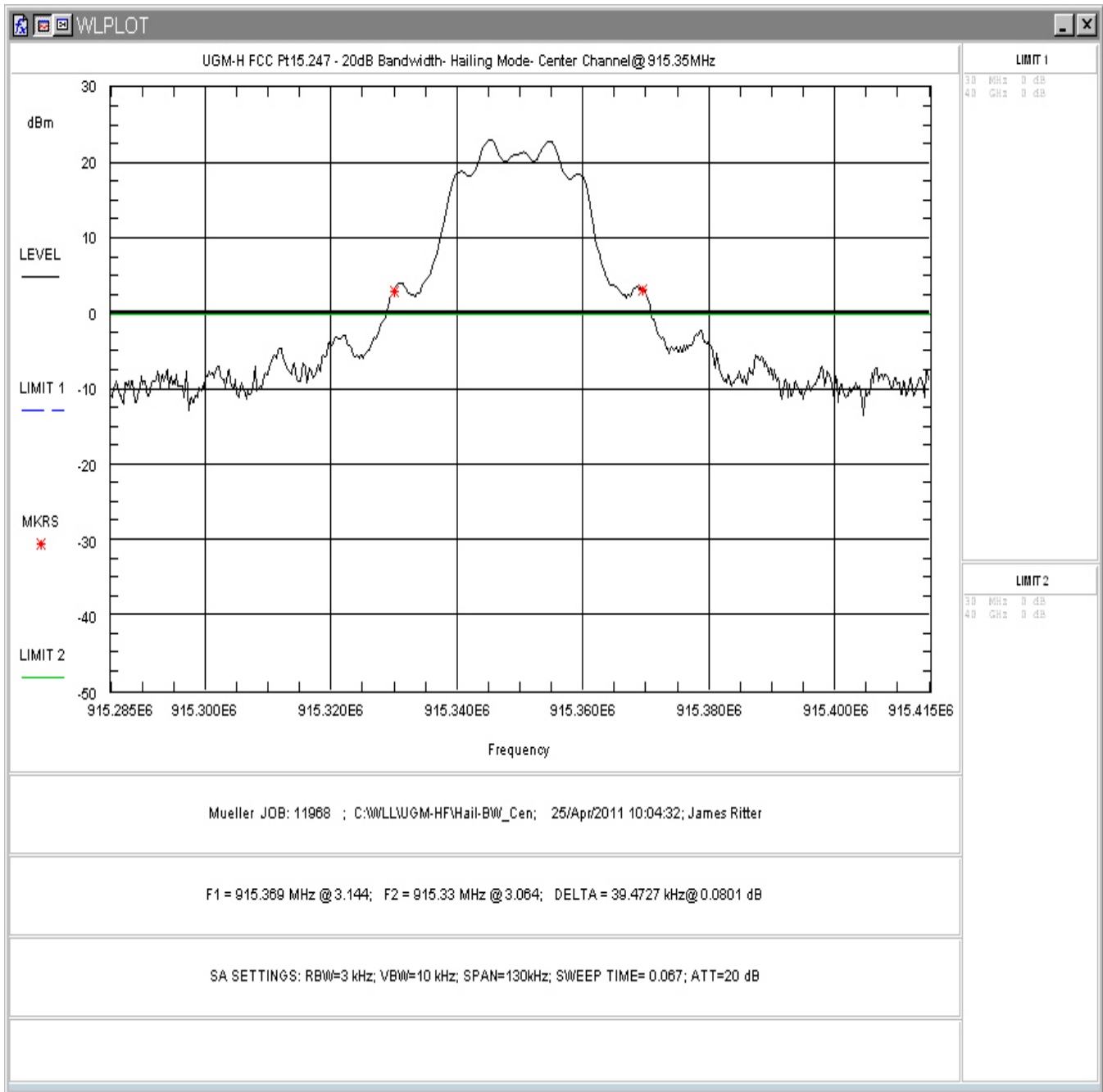


Figure 7. Hailing Channel Occupied Bandwidth, Center Channel

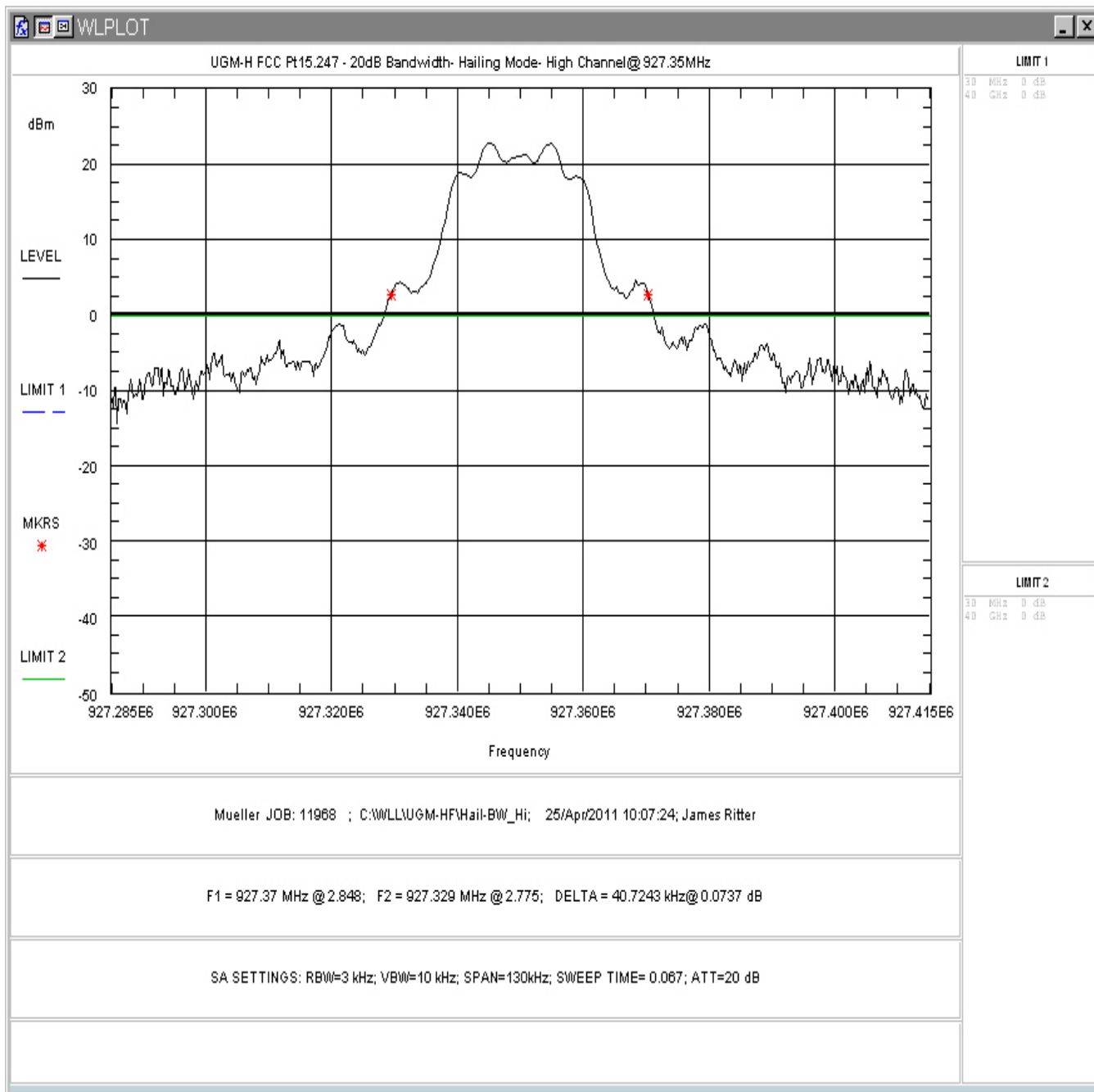


Figure 8. Hailing Channel Occupied Bandwidth, High Channel

**5.4 Channel Spacing and Number of Hop Channels (FCC Part §15247(a)(1))**

Per the FCC requirements, frequency hopping systems operating in the 902-928MHz shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth, whichever is greater. The maximum 20dB bandwidth measured is 40.97 kHz so the channel spacing must be more than 40.97 kHz. In addition, Part 15.247 requires that devices with occupied bandwidths less than 250kHz have a minimum of 50 hopping channels.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a calibrated cable and attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator/cable. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 300 kHz. The channel spacing of 2 adjacent channels was measured using a spectrum analyzer span setting of 2MHz. Also, the number of hopping channels was measured within the 902-928MHz frequency range.

The following are plots of the channel spacing and number of hopping channels data. The channel spacing was measured to be 150kHz for hailing channels and the number of hopping channels is 50 for the hailing channels.

The hailing channels are not evenly dispersed within the band with the closest hailing channels spaced 150 kHz apart. This still remains in compliance.

**Table 7 Channel spacing and number of hopping channels summary**

Test	Result	Limit	Pass/Fail
Hailing Channel Spacing	The closest channels are spaced 150kHz	40.97kHz Minimum	Pass
Number of Hailing Channels	50 channels	50 channels minimum	Pass

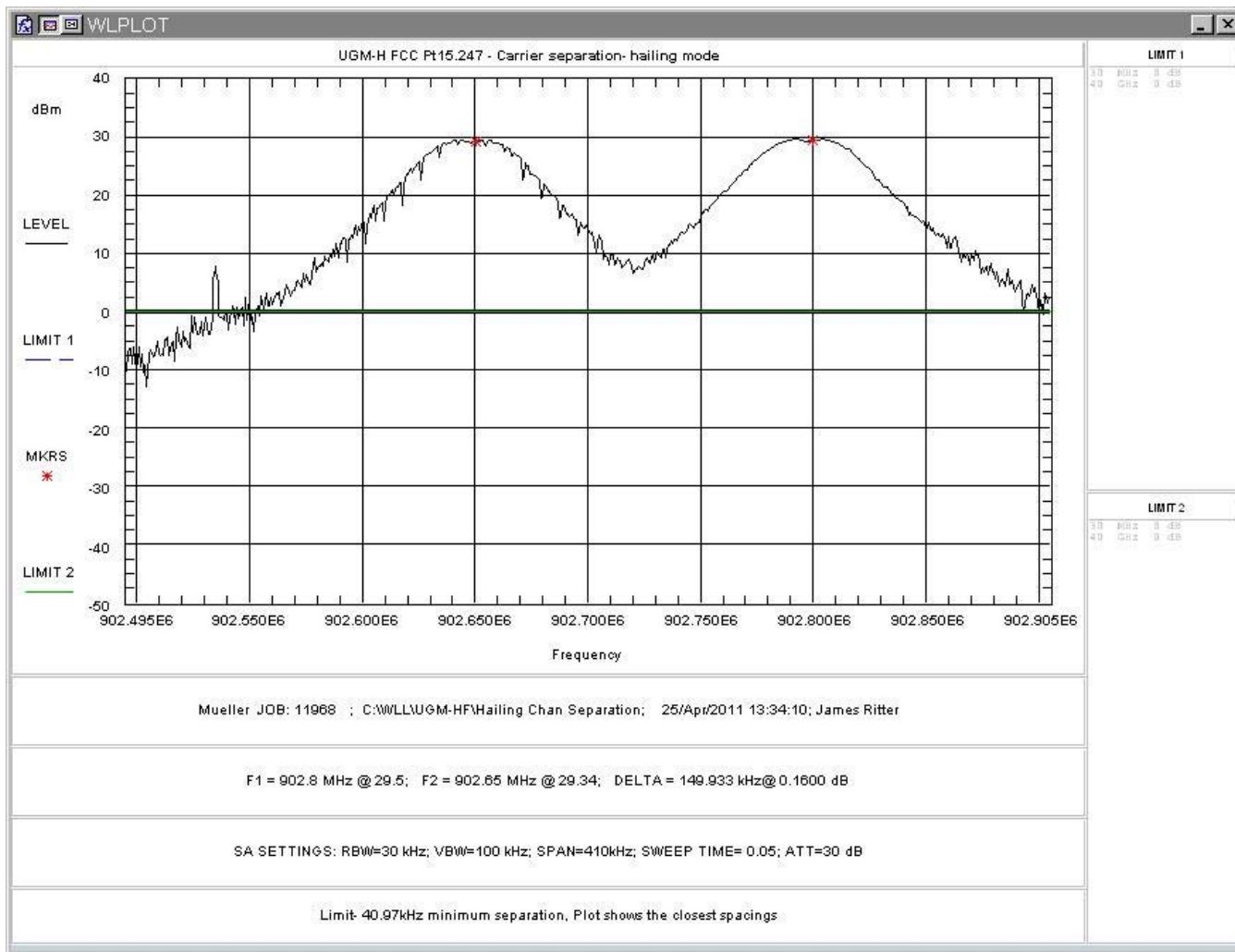


Figure 9. Hailing Channel Spacing



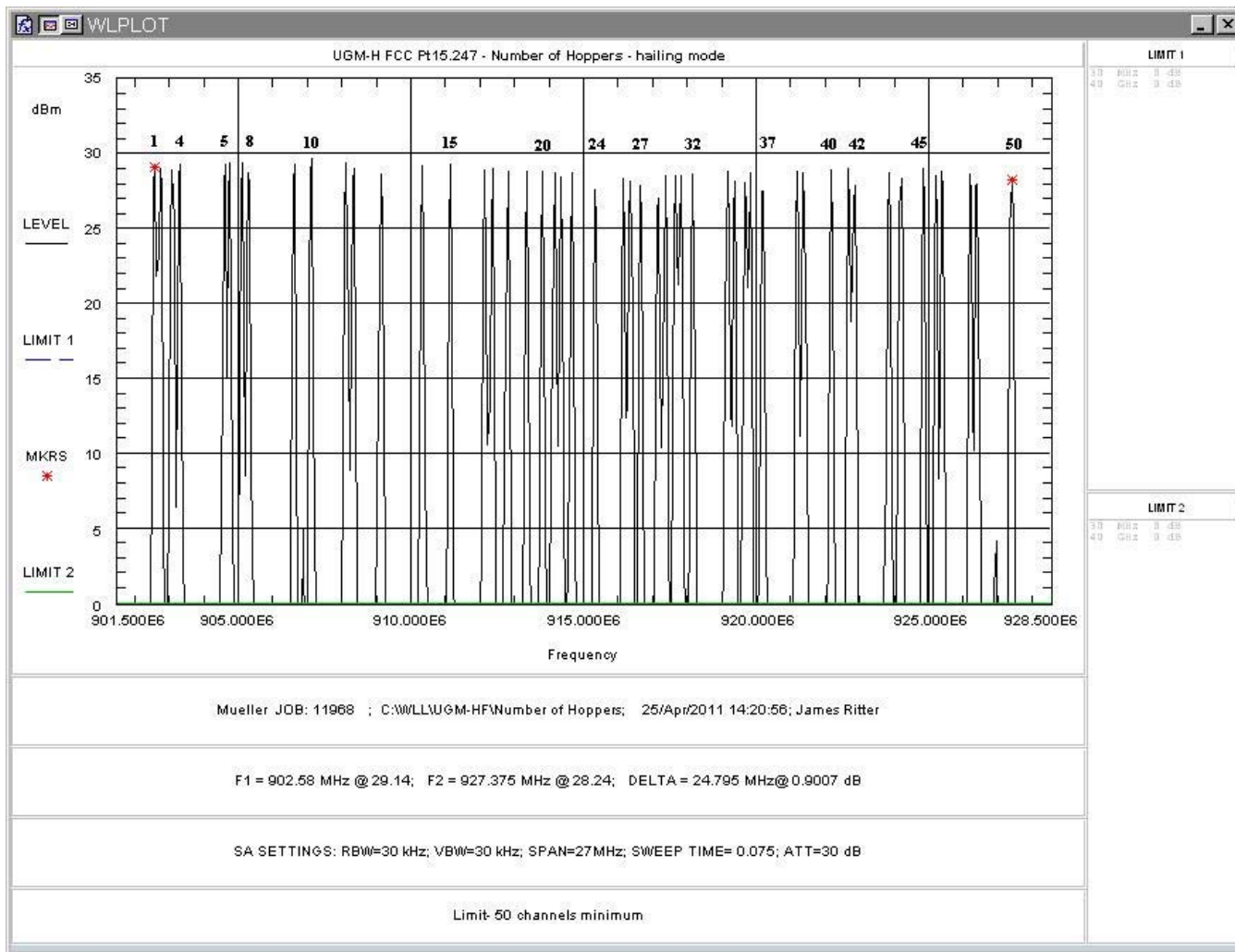


Figure 10. Number of Hailing Channels

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

The EUT must comply with requirements for spurious emissions at the antenna terminal. Per §15.247(c) all spurious emissions in any 100 kHz bandwidth outside the frequency band in which the device is operating shall be attenuated 20 dB below the highest power level in any 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 suitable 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 maximum modulated transmit frequency amplitude). The emissions outside of the allocated frequency band were then scanned from 30 MHz up to the tenth harmonic of the carrier.

Close-up plots of the 902-928MHz band edges are provided in both the hopping and non-hopping modes to show compliance at both of these points.

The following are plots of the conducted spurious emissions data.

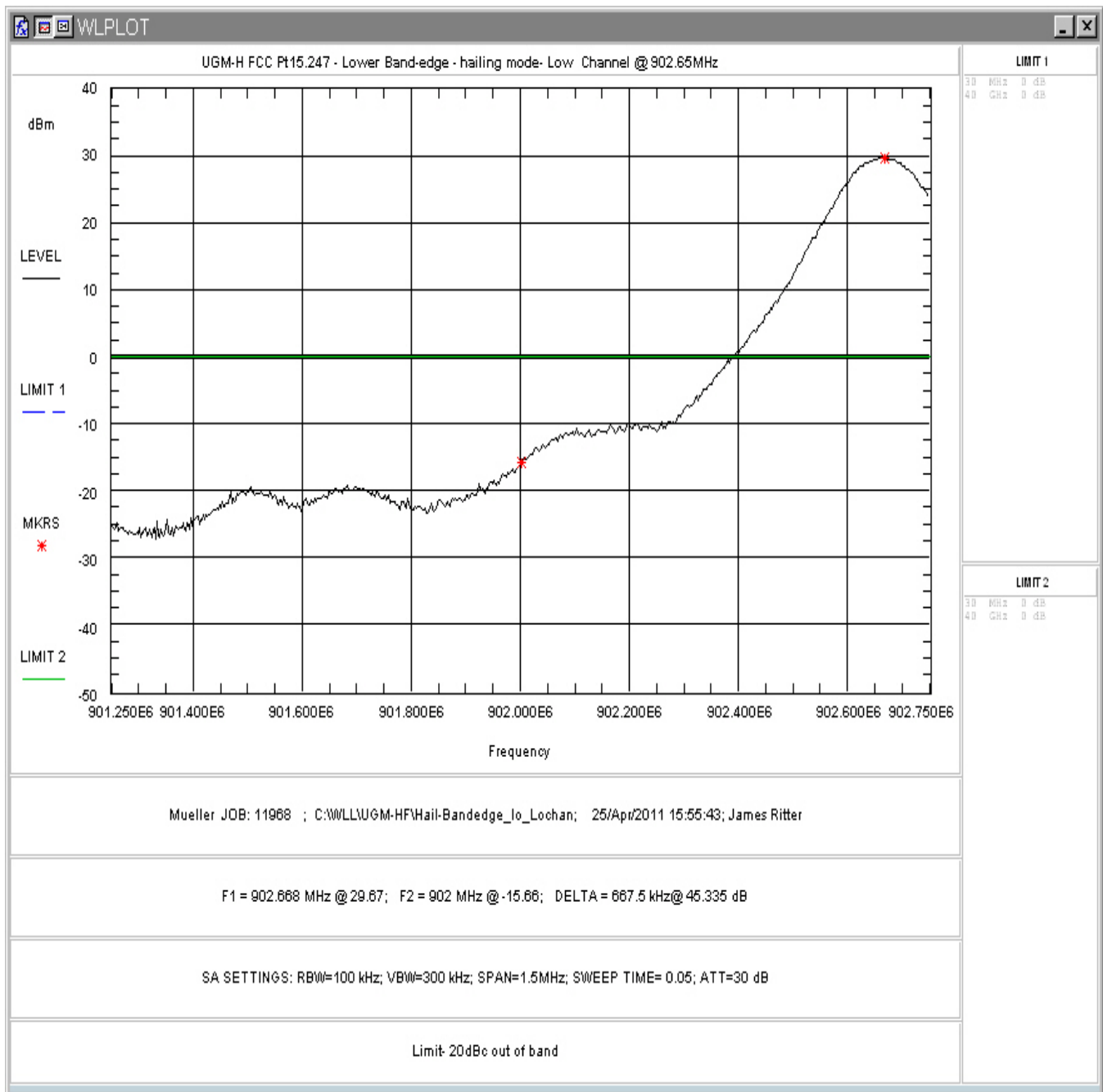


Figure 11. Low Band Edge Plot, Low Hailing Channel

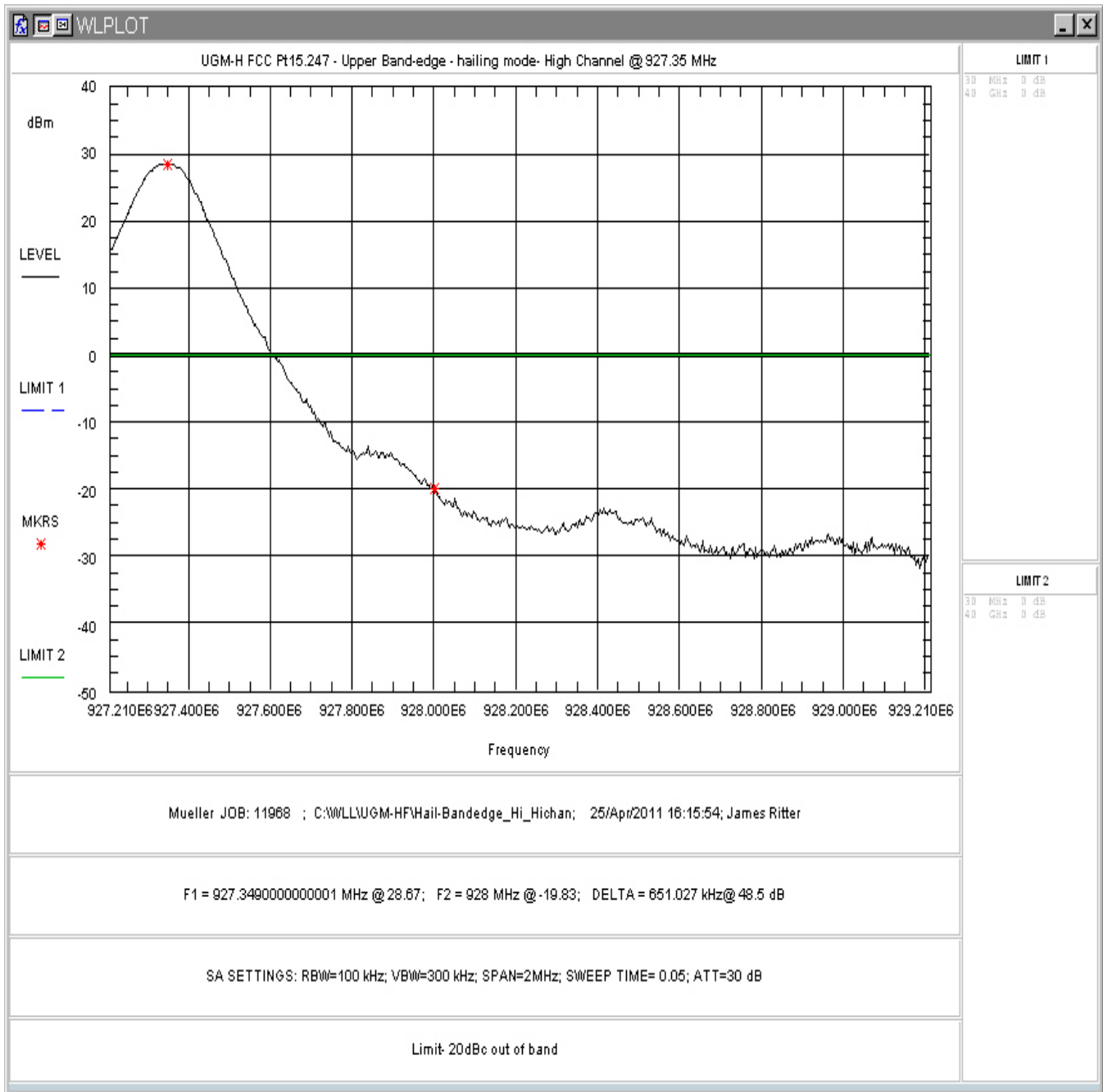


Figure 12. Upper Band Edge Plot, High Hailing Channel

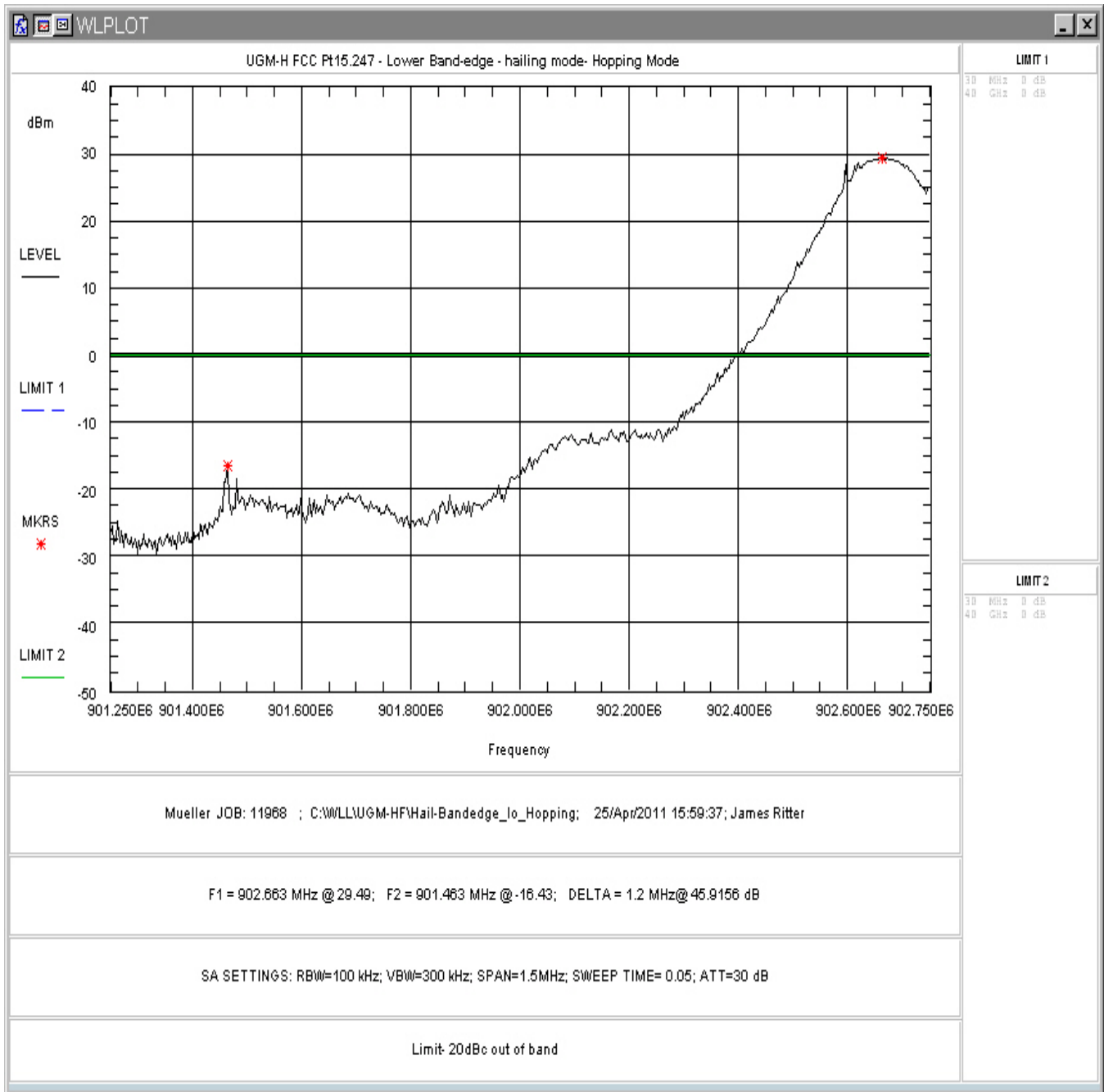


Figure 13. Low Band Edge Plot, Hopping Hailing Channel

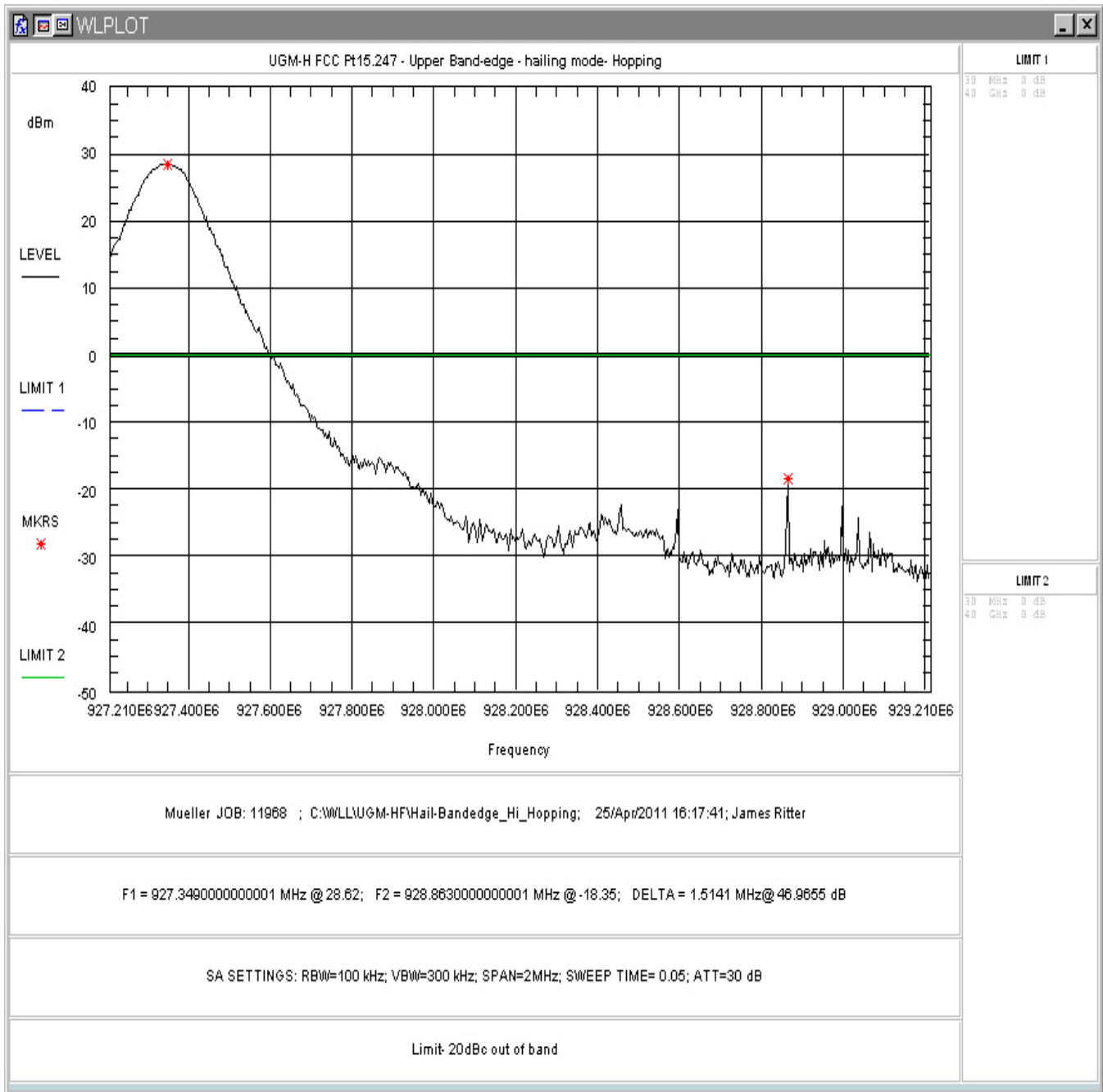


Figure 14. High Band Edge Plot, Hopping Hailing Channel

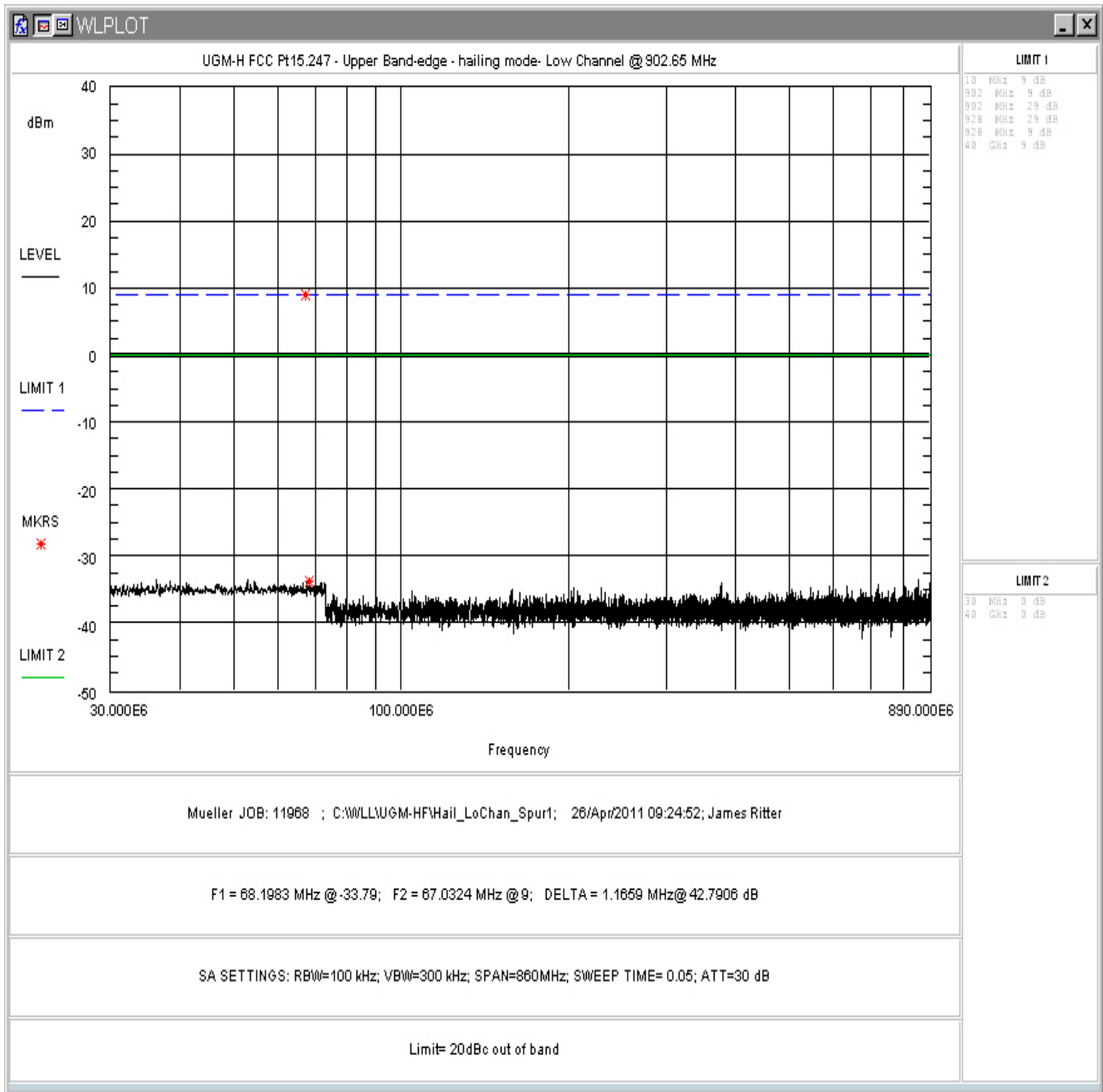


Figure 15. Conducted Spurious, Low HailingChannel, 30- 890MHz

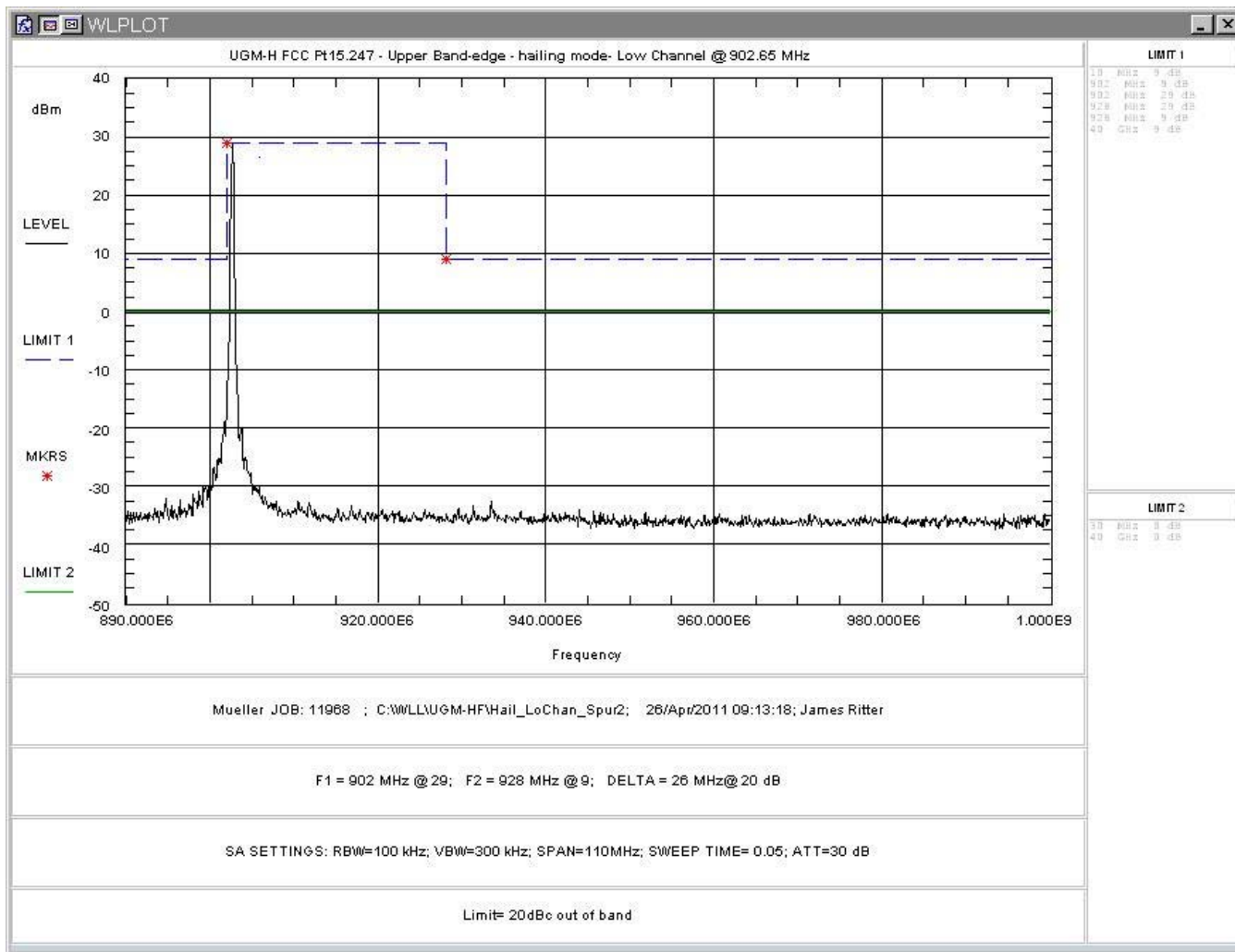
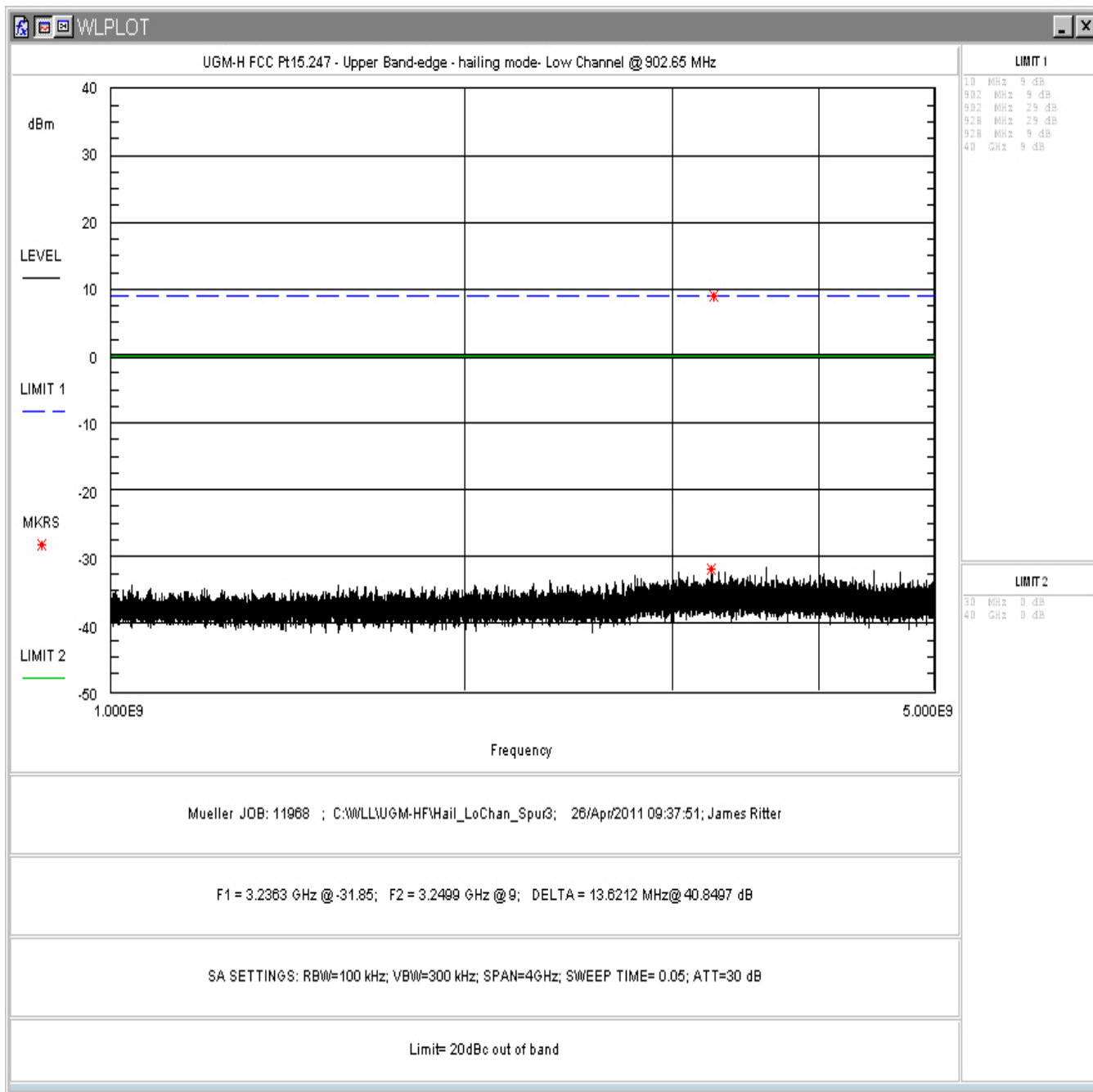


Figure 16. Conducted Spurious, Low Hailing Channel, 890 - 1000MHz





**Figure 17. Conducted Spurious, Low Hailing Channel, 1-5GHz**

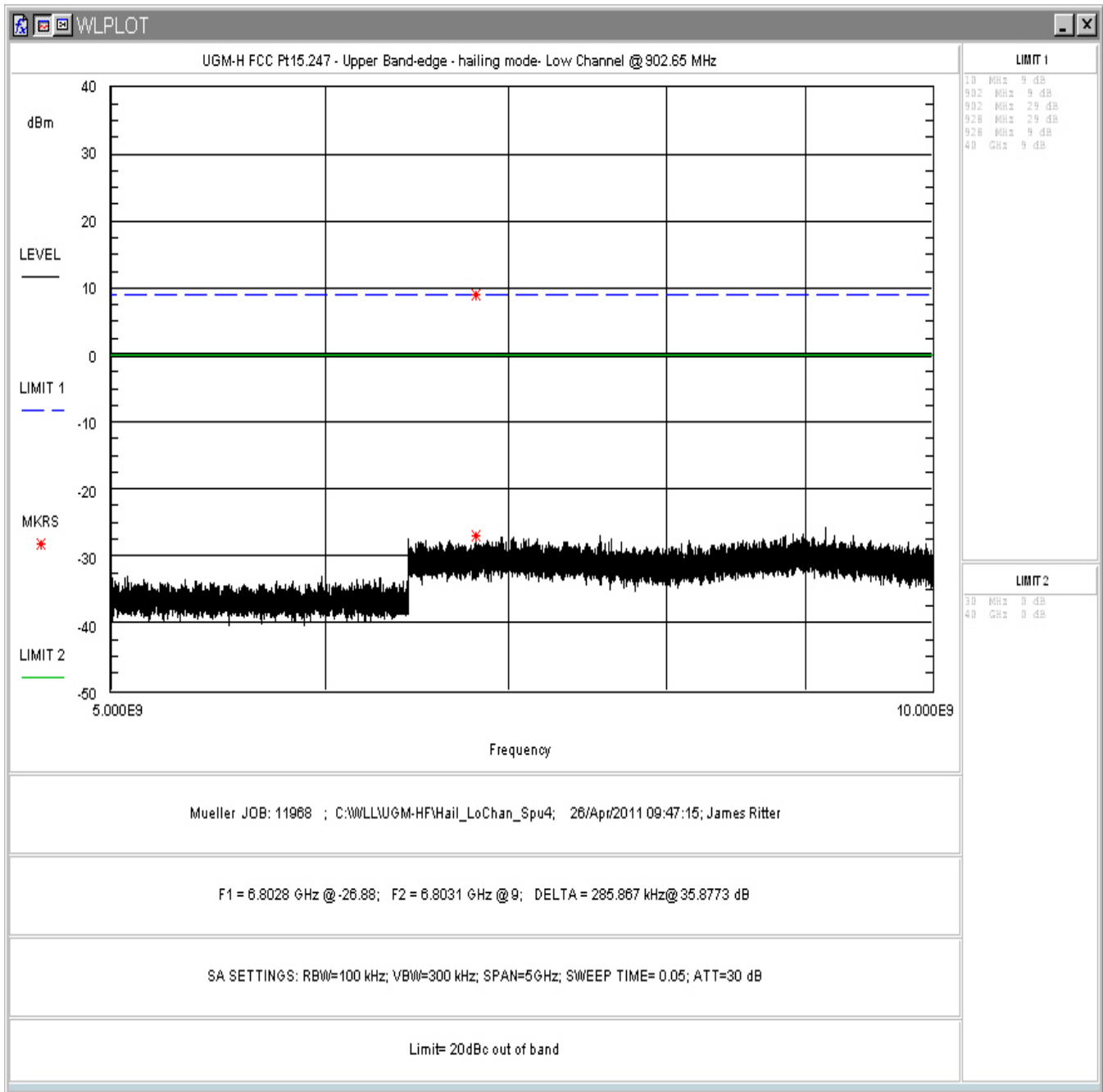
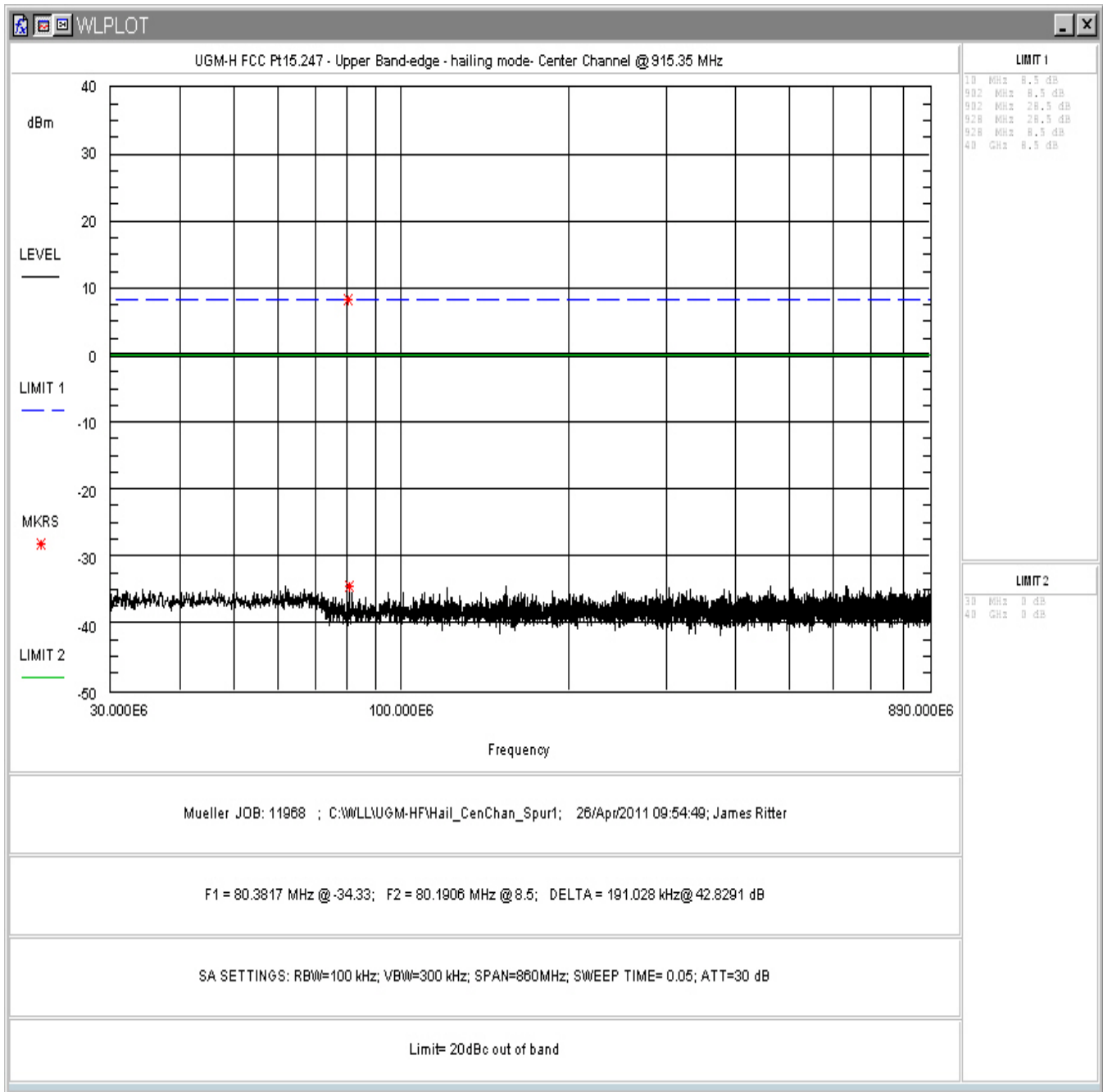


Figure 18. Conducted Spurious, Low Hailing Channel, 5-10GHz



**Figure 19. Conducted Spurious, Center Hailing Channel, 30- 890MHz**

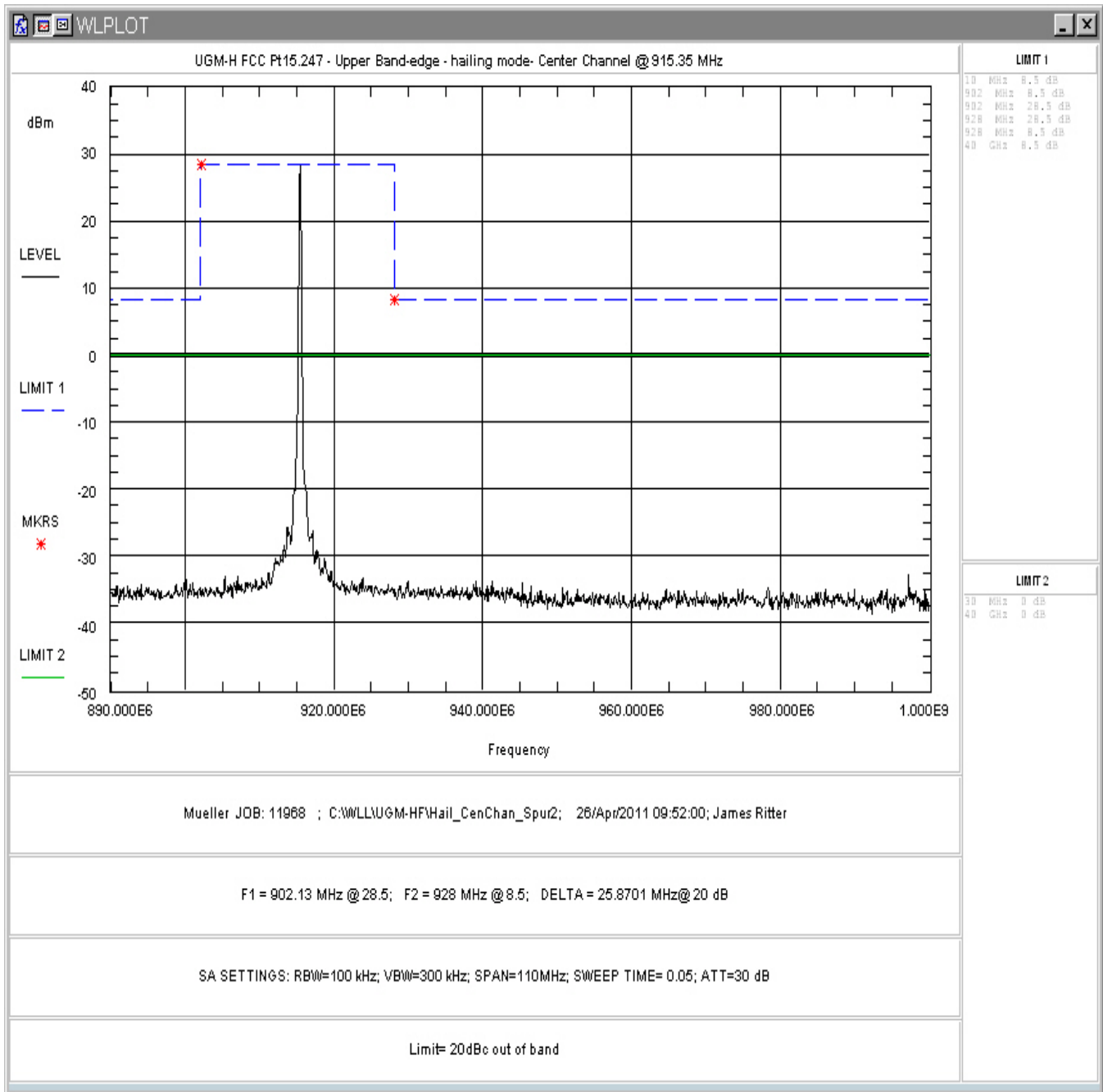


Figure 20. Conducted Spurious, Center Hailing Channel, 890 - 1000MHz

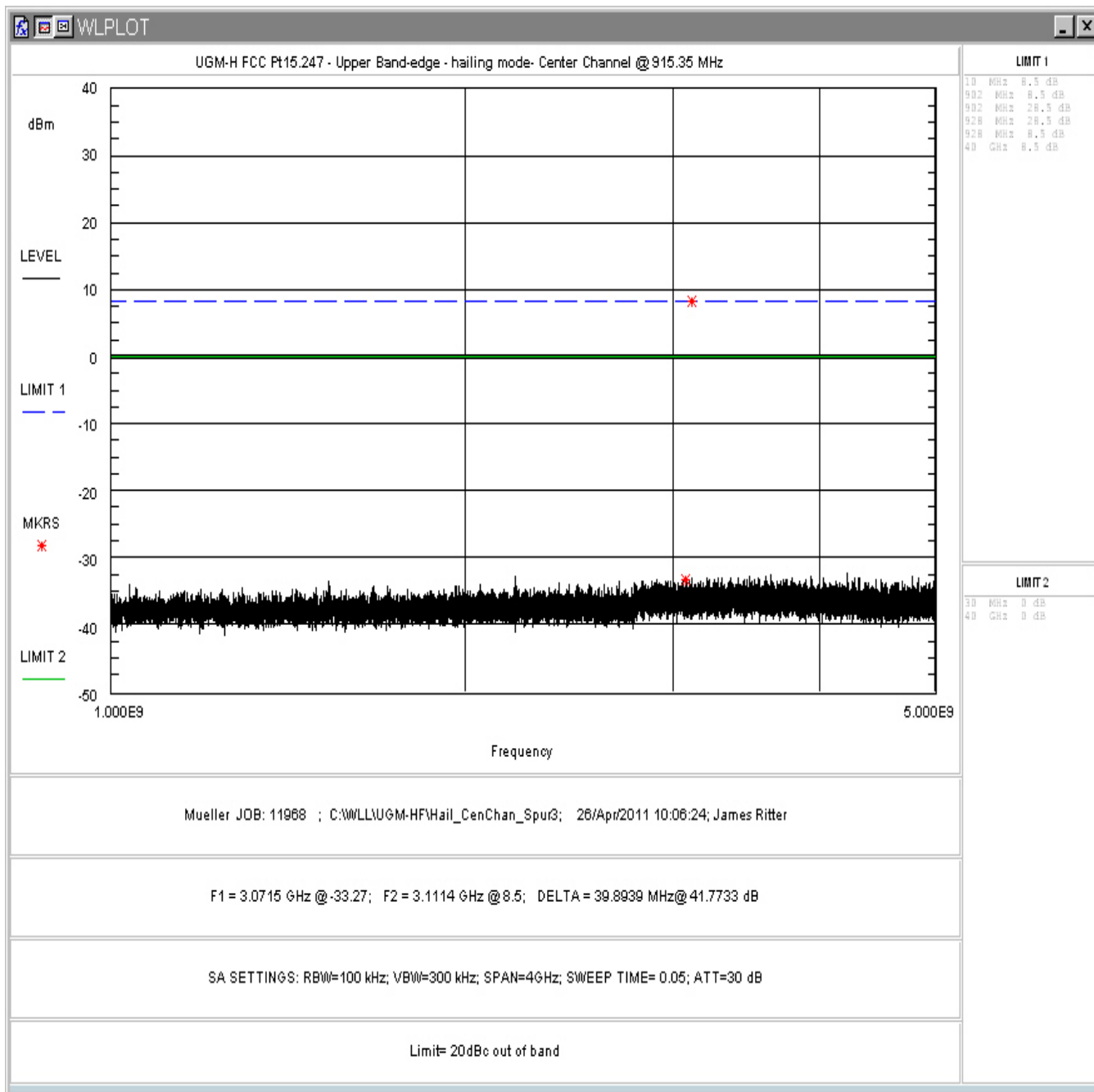


Figure 21. Conducted Spurious, Center Hailing Channel, 1-5GHz

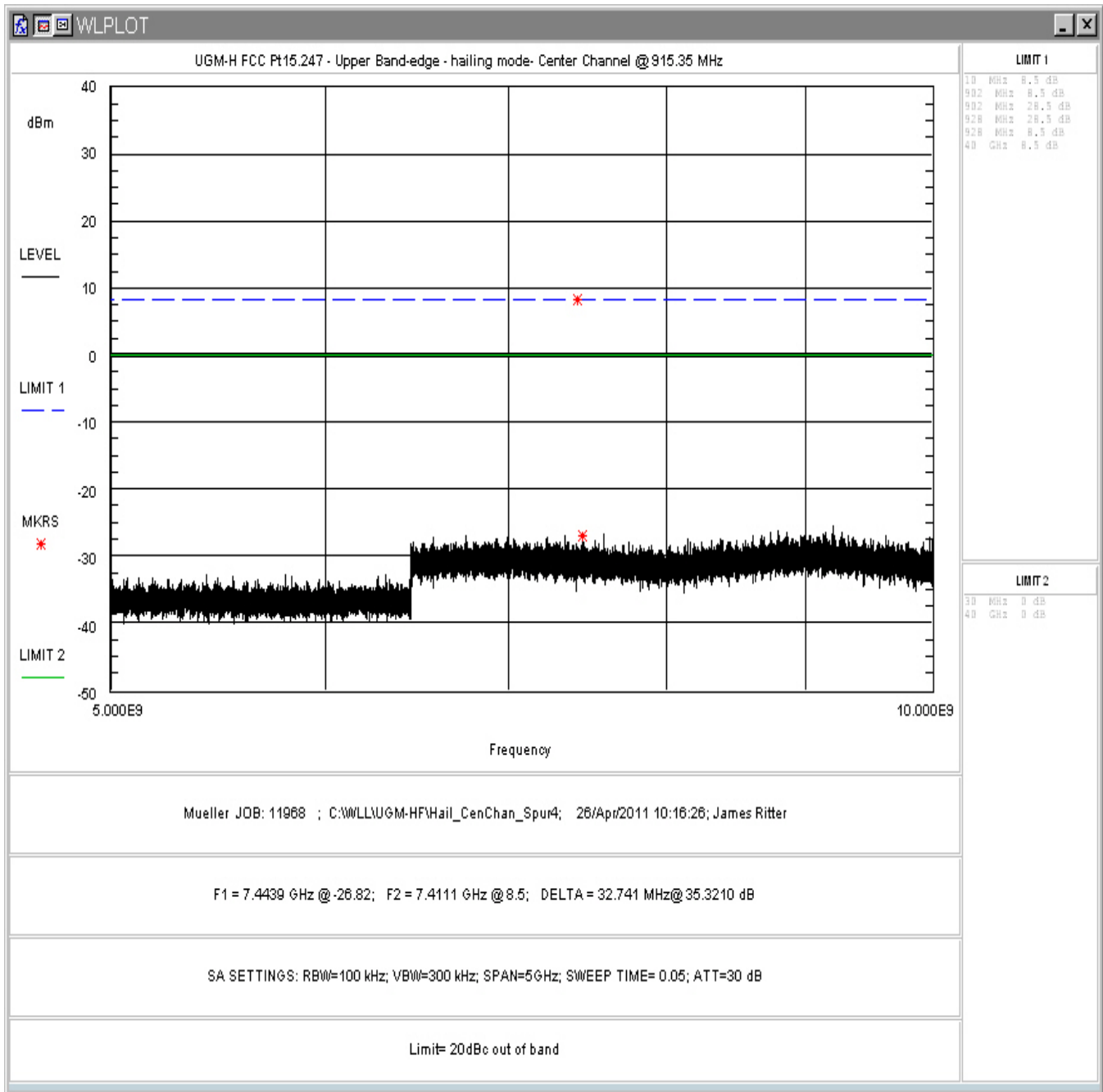


Figure 22. Conducted Spurious, Center Hailing Channel, 5-10GHz

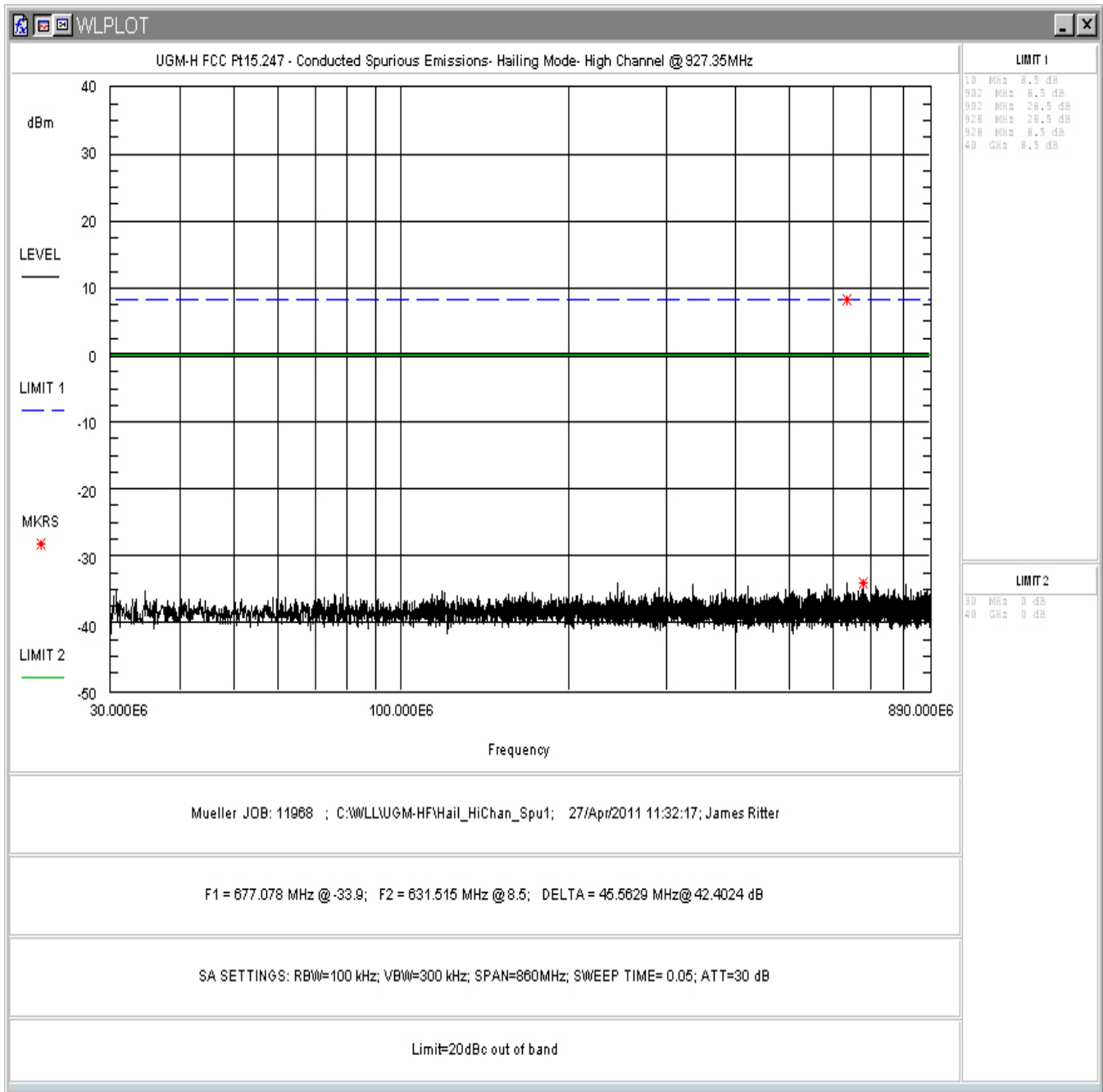


Figure 23. Conducted Spurious, High Hailing Channel, 30- 890MHz

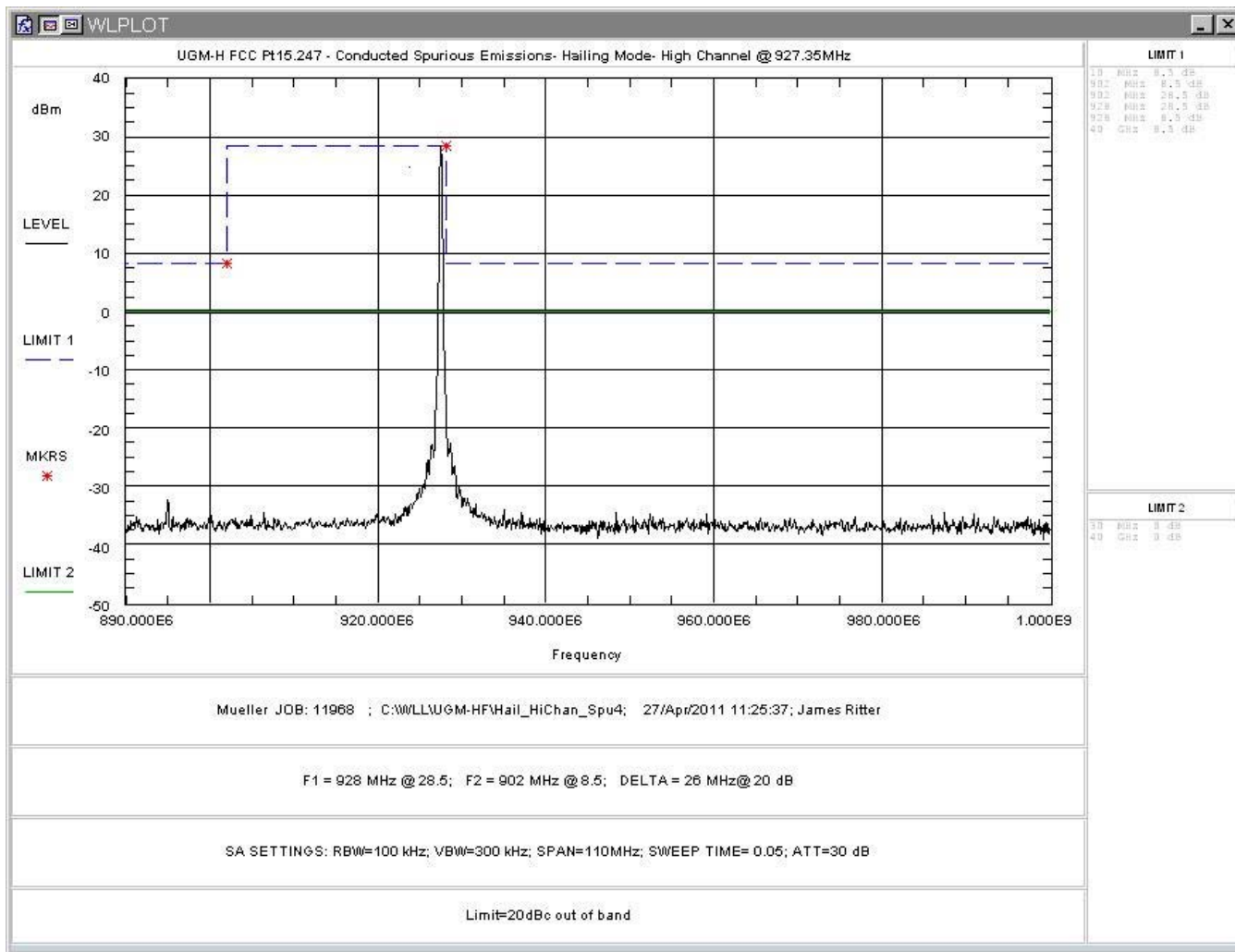
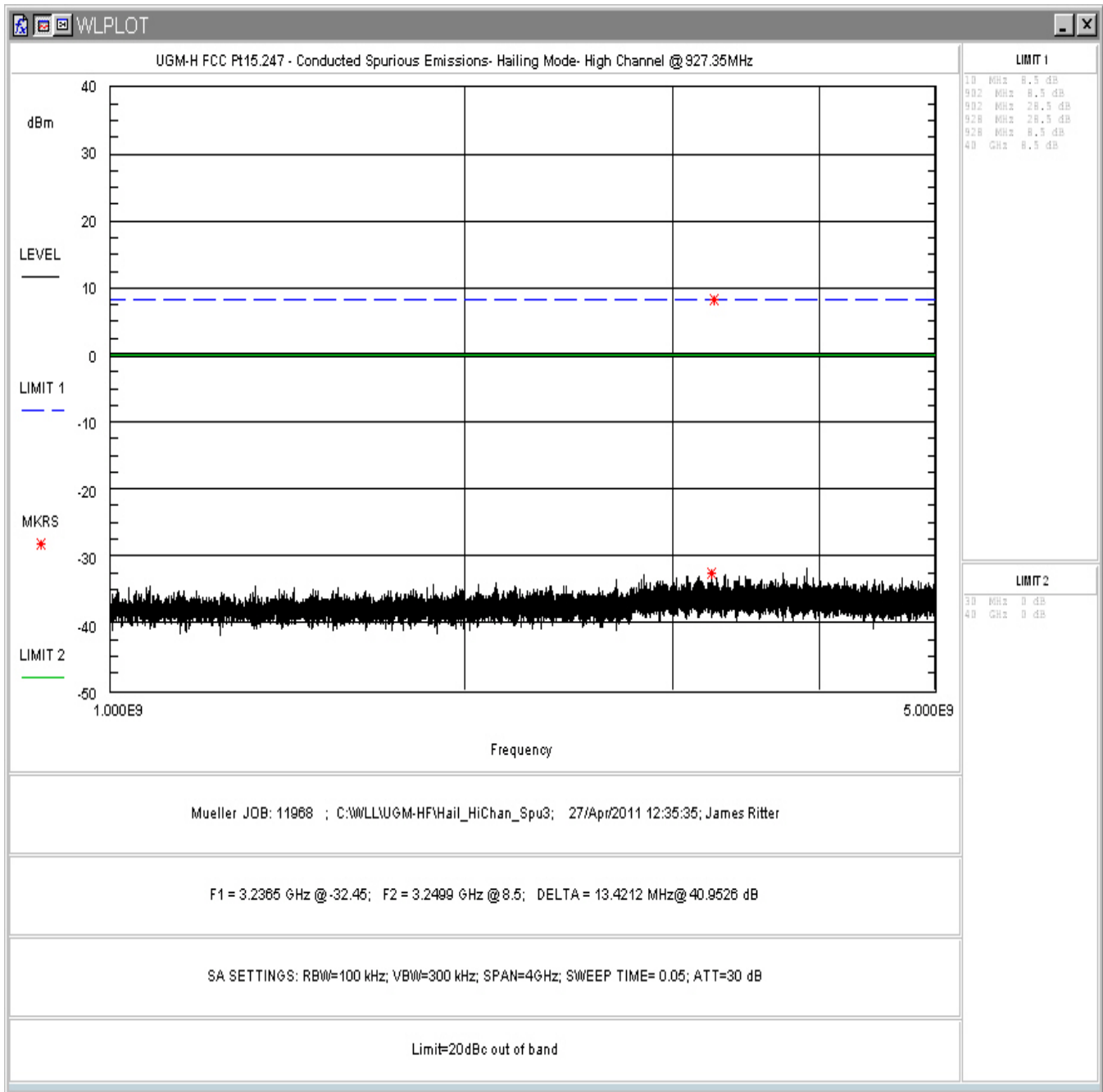


Figure 24. Conducted Spurious, High Hailing Channel, 890 - 1000MHz





**Figure 25. Conducted Spurious, High Hailing Channel, 1-5GHz**

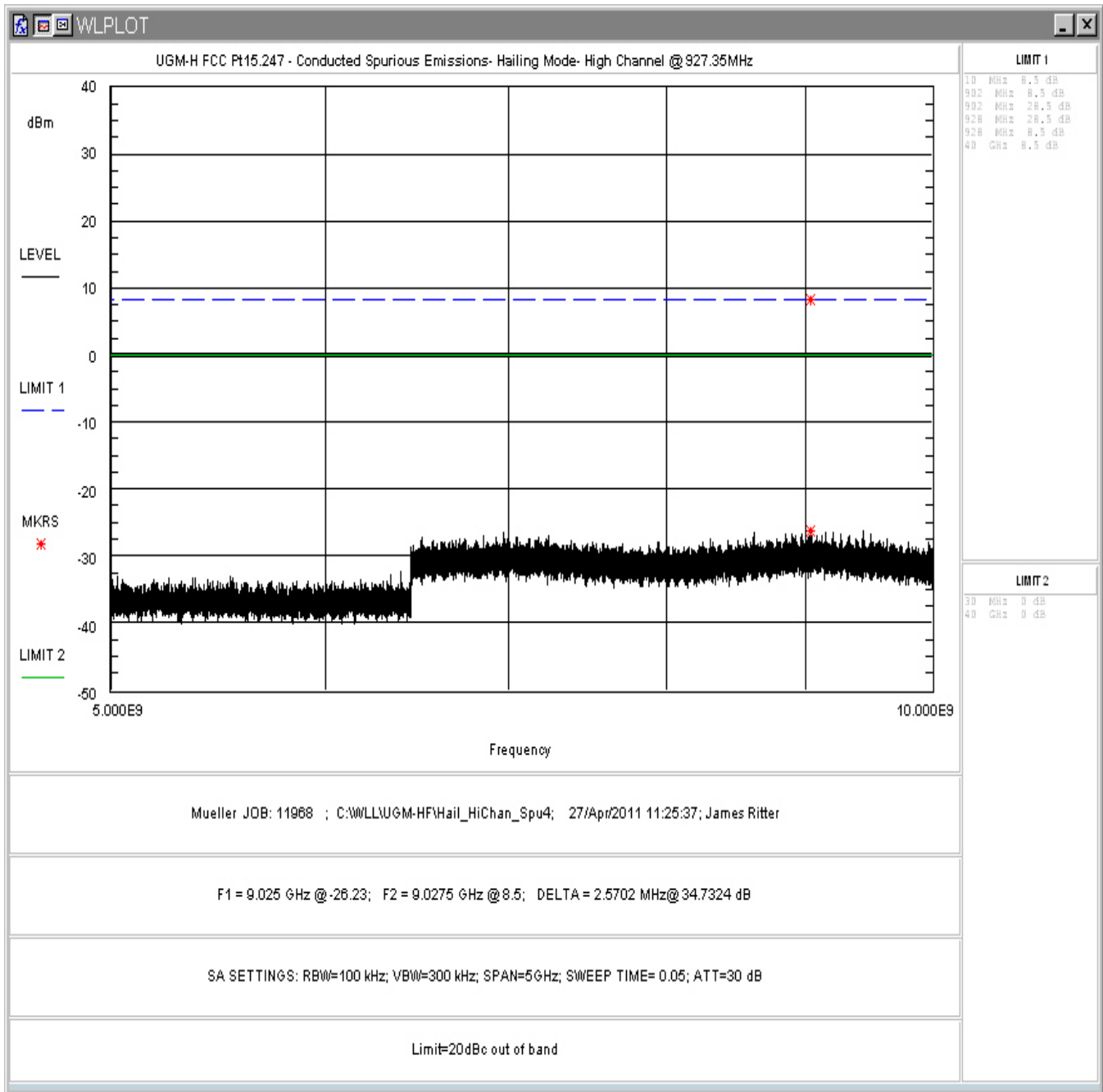


Figure 26. Conducted Spurious, High Hailing Channel, 5-10GHz

### 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 a 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 EUT was tested in 3 orthogonal with the worst case readings provided. Both the horizontal and vertical field components were measured. The emissions were measured using the following resolution bandwidths:

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

#### 5.6.2 Areas of concern

None

**Table 8: Radiated Emission Test Data, Restricted Bands, Low Hailing Channel @ 902.35MHz**

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)
<b>Peak</b>								
2707.95	V	90.00	3.48	50.33	-3.9	208.5	5000.0	-27.6
3610.60	V	165.00	3.57	47.50	-1.2	206.1	5000.0	-27.7
4513.25	V	170.00	3.51	44.00	0.5	167.8	5000.0	-29.5
5415.90	V	165.00	3.45	44.17	2.9	225.6	5000.0	-26.9
8123.85	V	165.00	3.53	47.83	7.1	561.0	5000.0	-19.0
9026.50	V	170.00	3.56	45.83	8.7	530.1	5000.0	-19.5
<b>AVG</b>								
2707.95	V	90.00	3.48	38.33	-3.9	52.4	500.0	-19.6
3610.60	V	165.00	3.57	33.33	-1.2	40.3	500.0	-21.9
4513.25	V	170.00	3.51	32.17	0.5	43.0	500.0	-21.3
5415.90	V	165.00	3.45	31.83	2.9	54.5	500.0	-19.3
8123.85	V	165.00	3.53	33.50	7.1	107.8	500.0	-13.3
9026.50	V	170.00	3.56	33.00	8.7	121.0	500.0	-12.3
<b>Non-harmonics</b>								
123.98	V	195.00	1.00	4.30	14.7	8.9	150.0	-24.6
964.05	V	180.00	1.00	4.20	27.3	37.7	500.0	-22.5
<b>Peak</b>								
2707.95	H	0.00	3.14	48.00	-3.9	159.4	5000.0	-29.9
3610.60	H	0.00	3.68	45.67	-1.2	166.9	5000.0	-29.5
4513.25	H	0.00	3.62	44.17	0.5	171.2	5000.0	-29.3
5415.90	H	0.00	3.47	46.33	2.9	289.3	5000.0	-24.8
8123.85	H	0.00	3.53	46.00	7.1	454.4	5000.0	-20.8
9026.50	H	25.00	3.64	46.00	8.7	540.6	5000.0	-19.3
<b>AVG</b>								
2707.95	H	0.00	3.14	37.50	-3.9	47.6	500.0	-20.4
3610.60	H	0.00	3.68	33.17	-1.2	39.6	500.0	-22.0
4513.25	H	0.00	3.62	31.83	0.5	41.3	500.0	-21.7
5415.90	H	0.00	3.47	34.67	2.9	75.6	500.0	-16.4
8123.85	H	0.00	3.53	33.50	7.1	107.8	500.0	-13.3
9026.50	H	25.00	3.64	33.00	8.7	121.0	500.0	-12.3
<b>Non-harmonics</b>								
111.03	H	215.00	4.00	8.10	13.5	12.0	150.0	-21.9
962.60	H	180.00	1.00	5.50	27.3	43.5	500.0	-21.2
963.19	H	180.00	1.00	6.10	27.3	46.7	500.0	-20.6
963.66	H	180.00	1.00	8.10	27.3	59.0	500.0	-18.6
964.09	H	180.00	1.00	10.70	27.3	79.7	500.0	-16.0
964.33	H	180.00	1.00	8.60	27.3	62.7	500.0	-18.0

**Table 9: Radiated Emission Test Data, Restricted Bands, Center Hailing Channel @ 915.35MHz**

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)
<b>Peak</b>								
2746.05	V	270.00	3.20	48.17	-4.0	161.9	5000.0	-29.8
3661.40	V	135.00	3.11	46.50	-1.2	184.6	5000.0	-28.7
4576.75	V	135.00	3.91	44.00	0.5	167.7	5000.0	-29.5
7322.80	V	135.00	3.86	46.17	6.8	442.8	5000.0	-21.1
8238.15	V	135.00	3.82	47.83	7.2	565.9	5000.0	-18.9
9153.50	V	135.00	3.78	47.33	10.1	742.7	5000.0	-16.6
<b>AVG</b>								
2746.05	V	270.00	3.20	38.67	-4.0	54.2	500.0	-19.3
3661.40	V	135.00	3.11	32.33	-1.2	36.1	500.0	-22.8
4576.75	V	135.00	3.91	31.67	0.5	40.6	500.0	-21.8
7322.80	V	135.00	3.86	34.17	6.8	111.2	500.0	-13.1
8238.15	V	135.00	3.82	33.17	7.2	104.7	500.0	-13.6
9153.50	V	135.00	3.78	33.33	10.1	148.2	500.0	-10.6
<b>Non-harmonics</b>								
109.60	V	325.00	1.00	5.60	13.4	8.9	150.0	-24.6
<b>Peak</b>								
2746.05	H	0.00	3.61	50.00	-4.0	199.9	5000.0	-28.0
3661.40	H	0.00	3.40	44.83	-1.2	152.3	5000.0	-30.3
4576.75	H	345.00	3.42	46.00	0.5	211.2	5000.0	-27.5
7322.80	H	25.00	3.45	47.67	6.8	526.3	5000.0	-19.6
8238.15	H	15.00	3.51	46.33	7.2	476.2	5000.0	-20.4
9153.50	H	45.00	3.62	45.33	10.1	589.9	5000.0	-18.6
<b>AVG</b>								
2746.05	H	0.00	3.61	38.17	-4.0	51.2	500.0	-19.8
3661.40	H	0.00	3.40	32.33	-1.2	36.1	500.0	-22.8
4576.75	H	345.00	3.42	32.50	0.5	44.6	500.0	-21.0
7322.80	H	25.00	3.45	33.50	6.8	103.0	500.0	-13.7
8238.15	H	15.00	3.51	33.33	7.2	106.6	500.0	-13.4
9153.50	H	45.00	3.62	33.00	10.1	142.7	500.0	-10.9
<b>Non-harmonics</b>								
114.30	H	90.00	4.00	6.00	13.9	9.9	150.0	-23.6
250.03	H	180.00	4.00	7.10	13.6	10.8	200.0	-25.3
268.93	H	25.00	2.43	12.00	15.9	24.7	200.0	-18.1
406.42	H	325.00	2.84	13.10	18.7	38.7	200.0	-14.3
977.69	H	270.00	1.00	7.60	27.9	59.8	500.0	-18.4

**Table 10: Radiated Emission Test Data, Restricted Bands, Center Hailing Channel @ 927.35MHz**

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)
<b>Peak</b>								
2782.05	V	270.00	2.23	49.33	-3.8	189.7	5000.0	-28.4
3709.40	V	45.00	2.32	46.33	-1.1	183.5	5000.0	-28.7
4636.75	V	270.00	3.00	44.90	1.1	200.4	5000.0	-27.9
7418.80	V	280.00	2.86	49.23	6.8	636.4	5000.0	-17.9
8346.15	V	25.00	2.75	44.90	6.8	384.6	5000.0	-22.3
9273.50	V	125.00	3.04	45.23	9.3	531.6	5000.0	-19.5
<b>AVG</b>								
2782.05	V	270.00	2.23	39.33	-3.8	60.0	500.0	-18.4
3709.40	V	45.00	2.32	35.17	-1.1	50.8	500.0	-19.9
4636.75	V	270.00	3.00	32.73	1.1	49.4	500.0	-20.1
7418.80	V	280.00	2.86	38.73	6.8	190.0	500.0	-8.4
8346.15	V	25.00	2.75	33.07	6.8	98.5	500.0	-14.1
9273.50	V	125.00	3.04	34.23	9.3	149.8	500.0	-10.5
<b>Non-harmonics</b>								
324.21	V	180.00	1.00	2.30	16.6	8.8	200.0	-27.1
<b>Peak</b>								
2782.05	H	45.00	3.51	47.67	-3.8	156.7	5000.0	-30.1
3709.40	H	100.00	3.55	46.83	-1.1	194.4	5000.0	-28.2
4636.75	H	45.00	3.59	45.17	1.1	206.7	5000.0	-27.7
7418.80	H	180.00	3.43	46.67	6.8	473.9	5000.0	-20.5
8346.15	H	180.00	2.84	45.90	6.8	431.5	5000.0	-21.3
9273.50	H	90.00	2.76	45.57	9.3	552.9	5000.0	-19.1
<b>AVG</b>								
2782.05	H	45.00	3.51	36.50	-3.8	43.3	500.0	-21.2
3709.40	H	100.00	3.55	34.00	-1.1	44.4	500.0	-21.0
4636.75	H	45.00	3.59	32.50	1.1	48.1	500.0	-20.3
7418.80	H	180.00	3.43	34.33	6.8	114.5	500.0	-12.8
8346.15	H	180.00	2.84	35.07	6.8	124.0	500.0	-12.1
9273.50	H	90.00	2.76	34.23	9.3	149.8	500.0	-10.5
<b>Non-harmonics</b>								
268.91	H	325.00	1.27	11.20	15.9	22.6	200.0	-19.0
325.07	H	270.00	1.20	6.40	16.6	14.2	200.0	-23.0
400.51	H	90.00	2.44	4.30	18.5	13.8	200.0	-23.2

### 5.7 AC Conducted Emissions (FCC Pt.15.207)

As the EUT hardware has not changed from the initial grant this test has not been applied.

### 5.8 Receiver Radiated Emissions

As the EUT hardware has not changed from the initial grant this test has not been applied.