Washington Laboratories, Ltd.

FCC & Industry Canada Certification Test Report
For the
Datamatic, Ltd.
D4000 Water Meter Interface Unit (WMIU)

FCC ID: ODYD4000
IC ID: TBD

WLL JOB# **10404**
May 2008

Revision 1 issued June 26, 2008

Prepared for:

Datamatic, Ltd.
3600 K Avenue
Plano, TX 75074

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

ACCREDITED

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Documentation Specialist

Reviewed by: Steven D. Koster
EMC Operations Manager

Abstract

This report has been prepared on behalf of Datamatic, Ltd. 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 (9/2007) of the FCC Rules and Regulations and Spectrum Management and Telecommunications Policy RSS-210 of Industry Canada. This Certification Test Report documents the test configuration and test results for an Datamatic, Ltd. D4000 Water Meter Interface Unit (WMIU).

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 the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 as an independent FCC test laboratory.

The Datamatic, Ltd. D4000 Water Meter Interface Unit (WMIU) complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 and Industry Canada RSS-210.

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1 Introduction

1.1 Compliance Statement

The Datamatic, Ltd. D4000 Water Meter Interface Unit (WMIU) complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 (9/2007) and Industry Canada RSS-210e issue 7.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with 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.

1.3 Contract Information

Customer:	Datamatic, Ltd. 3600 K Avenue Plano, TX 75074

1.4 Test Dates

Testing was performed on the following date(s):	May 5 through May 7, 2008

1.5 Test and Support Personnel

Washington Laboratories, LTD	Steven Dovell, Steve Koster
Client Representative	Frank Moody

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1.6 Abbreviations

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

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2 Equipment Under Test

2.1 EUT Identification & Description

The Datamatic, Ltd. D4000 Water Meter Interface Unit (WMIU) is a wireless electric metering system for monitoring of water usage.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Datamatic, Ltd.
FCC ID:	ODY4000
IC:	TBD
Model:	D4000 Water Meter Interface Unit (WMIU)
FCC Rule Parts:	§15.247
Industry Canada:	RSS210
Frequency Range:	902.5 – 927MHz
Maximum Output Power:	204.2mW (23.1dBm)
Modulation:	FSK FHSS
Occupied Bandwidth: 80kHz Modulation	160.8kHz
Occupied Bandwidth: 160kHz Modulation	362.9kHz
Keying:	Automatic, Manual
Type of Information:	Data
Number of Channels:	50
Power Output Level	Fixed
Antenna Connector	None
Antenna Type	Integral
Interface Cables:	None
Power Source & Voltage:	3.3V Lithium Batteries

2.2 Test Configuration

The D4100 WMIU (Water Meter Interface Unit) was configured with an integral antenna. A test port located inside the enclosure was connected to a support laptop to run the test configurations. The sensor cables were left unterminated for this test.

2.3 Testing Algorithm

The D4000 Water Meter Interface Unit (WMIU) was programmed for FHSS operation via a support Laptop that connected to a maintenance port. A HyperTerminal connection allowed the unit to transmit /receive on one of 3 channels (Low: 902.5MHz, Center: 915MHz, & High: 927MHz) with both a 80kHz modulation Rate and a 160KHz modulation rate. The unit was also programmed to hop on 50 channels with its normal pseudorandom rate.

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

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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 the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 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. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

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3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2: Test Equipment List

WLL Asset #	Manufacturer Model/Type	Function	Cal. Due
00074	HP, 8593A	Analyzer, Spectrum	01/29/2009
00522	HP, 8449B	Pre-Amplifier, 1-26.5GHz	07/27/2008
00004	ARA, DRG-118/A	Antenna, DRG, 1-18GHz	02/02/2009
00667	MegaPhase, LLC EM18-S1NK5-600	Test cable for OATS testing DC to 18 GHz SMA male	3/17/2009
00337	WLL, 1.2-5GHz	Filter, Band Pass	02/19/2010
00280	ITC, 21C-3A1	Waveguide 3.45-11.0GHz	02/19/2010
00281	ITC, 21A-3A1	Waveguide 4.51-10.0GHz	02/19/2010

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4 Test Summary

The Table Below shows the results of testing for compliance with a Digital Transmission System in accordance with FCC Part 15.247:2007 and RSS210e issue 7. Full results are shown in section 5.

Table 3: Test Summary Table

TX Test Summary (Frequency Hopping Spread Spectrum)			
FCC Rule Part	**IC Rule Part**	**Description**	**Result**
15.247 (a)(1)(i)	RSS-210 [A8. 1(c)]	20dB Bandwidth	Pass
15.247 (b)(2)	RSS-210 [A8.4 (1)]	Transmit Output Power	Pass
15.247 (a)(1)	RSS-210 [A8.1 (b)]	Channel Separation	Pass
15.247 (a)(1)(i)	RSS-210 [A8. 1 (c)]	Number of Channels (50 min)	Pass
15.247 (a)(1)(i)	RSS-210 [A8. 1 (c)]	Time of Occupancy	Passs
15.247 (d)	RSS-210 [A8. 5]	Out-of-Band Emissions (Band Edge @ 20dB below)	Pass
15.205 15.209	RSS-210 [A8. 5]	General Field Strength Limits (Restricted Bands & RE Limits)	Pass
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions	N/A
RX/Digital Test Summary (Frequency Hopping Spread Spectrum)			
FCC Rule Part	**IC Rule Part**	**Description**	**Result**
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions	Pass
15.209	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands & RE Limits)	Pass

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5 Test Results

5.1 RF Power Output: (15.247 (b)(2),RSS-210 [A8.4 (1)])

To measure the output power the hopping sequence was stopped while the frequency dwelled on a low, high and middle 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.

Table 4. RF Power Output 160kHz Modulation Rate

Frequency	Level	Limit	Pass/Fail
Low Channel: 902.5MHz	22.9 dBm	30 dBm	Pass
Mid Channel: 915MHz	23.0 dBm	30 dBm	Pass
High Channel: 927MHz	22.66 dBm	30 dBm	Pass

Table 5. RF Power Output 80kHz Modulation Rate

Frequency	Level	Limit	Pass/Fail
Low Channel: 902.5MHz	23.0 dBm	30 dBm	Pass
Mid Channel: 915MHz	23.1 dBm	30 dBm	Pass
High Channel: 927MHz	22.8 dBm	30 dBm	Pass

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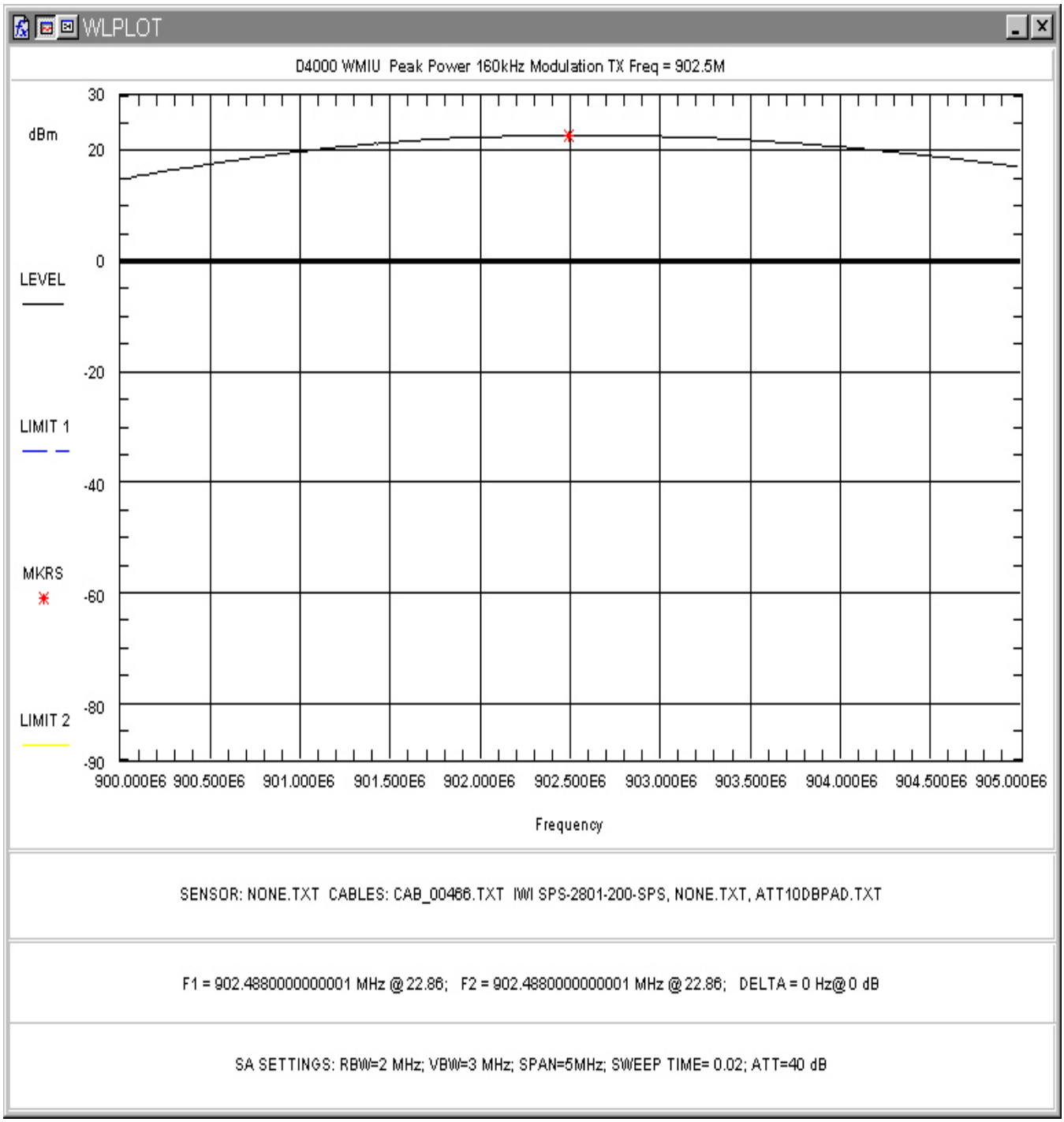

Figure 5-1. RF Peak Power, 160kHz Modulation Rate Low Channel

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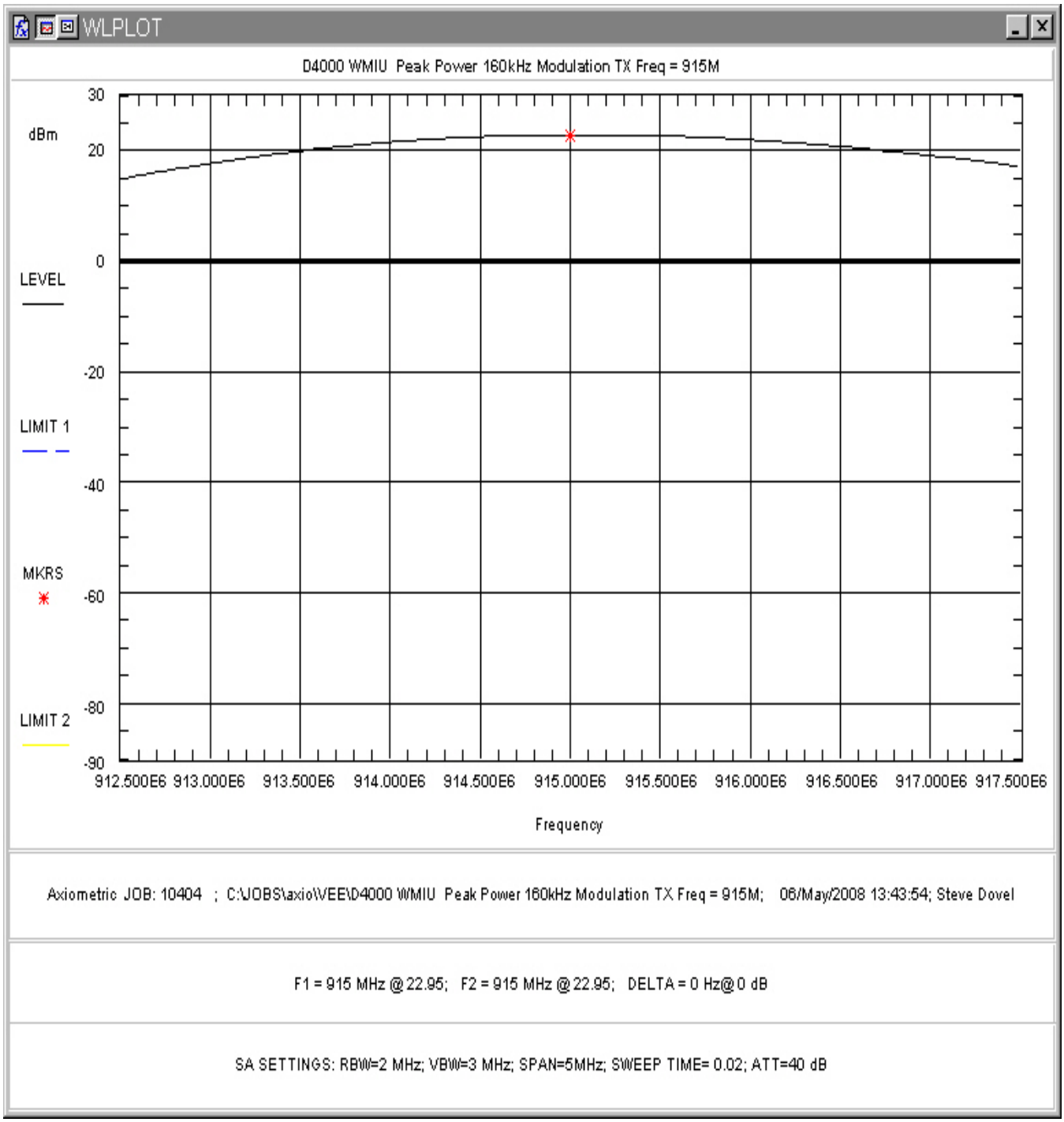

Figure 5-2. RF Peak Power 160kHz Modulation, Mid Channel

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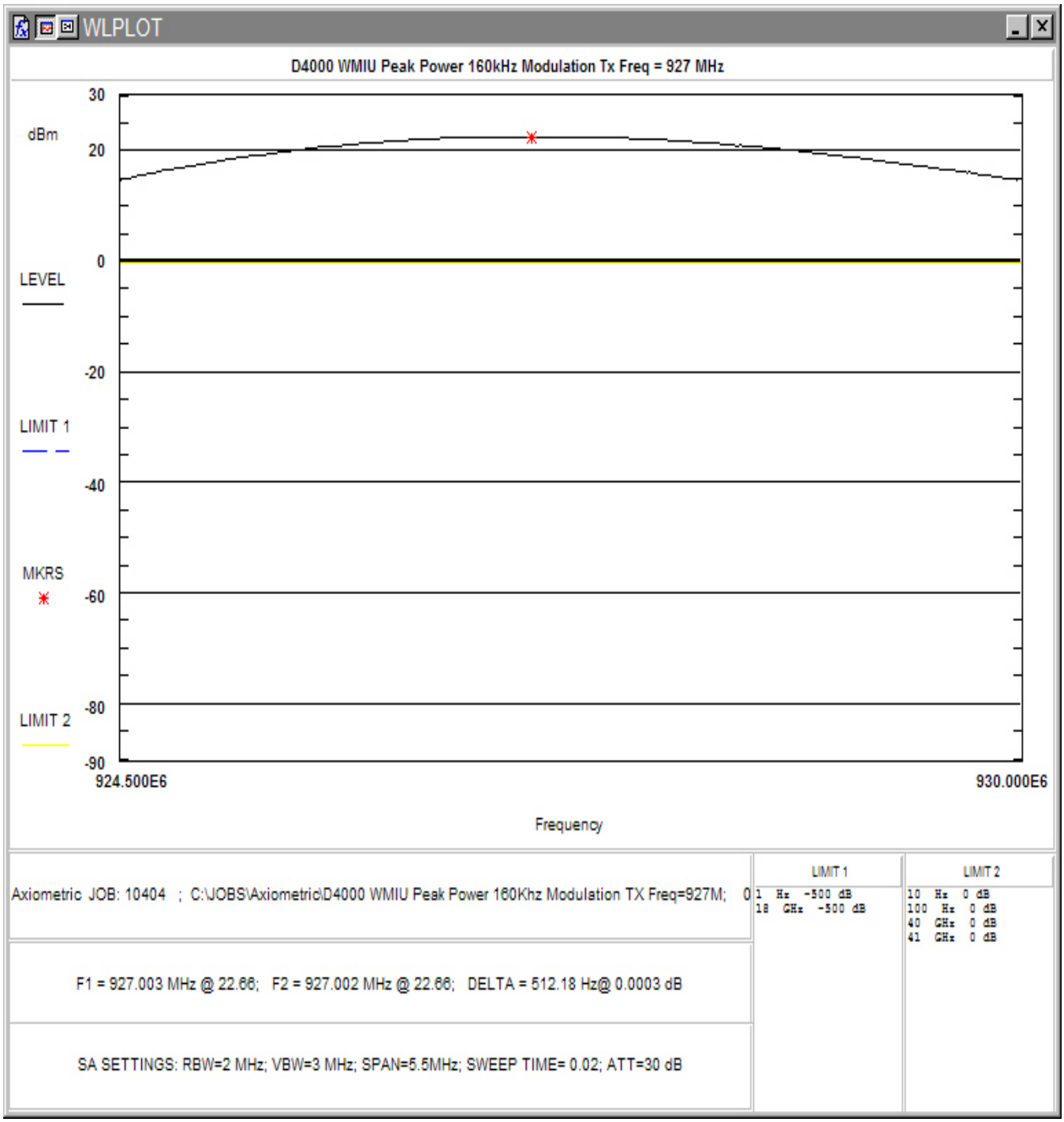

Figure 5-3. RF Peak Power 160kHz Modulation, High Channel

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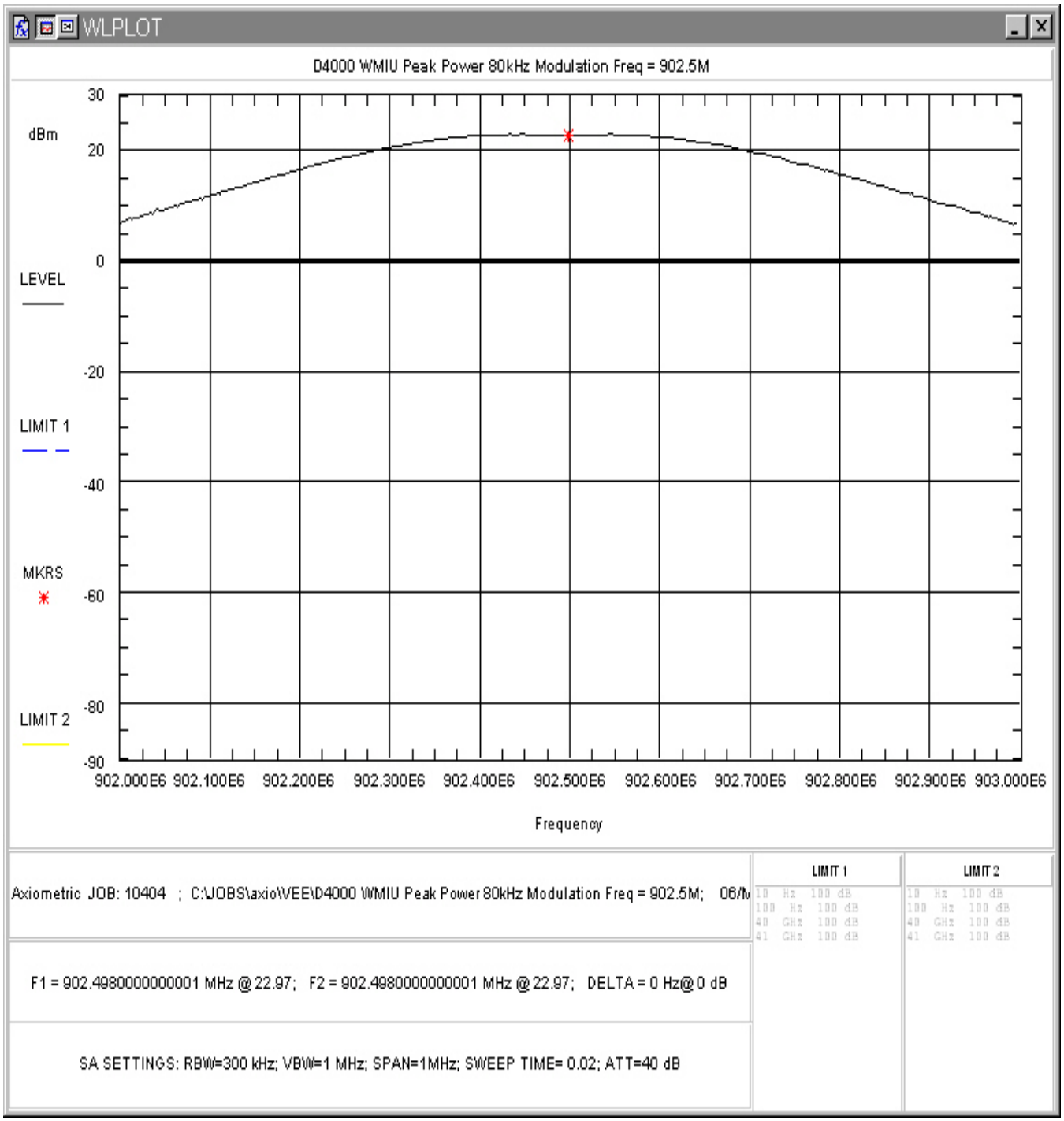

Figure 5-4. RF Peak Power, 80kHz Modulation Rate Low Channel

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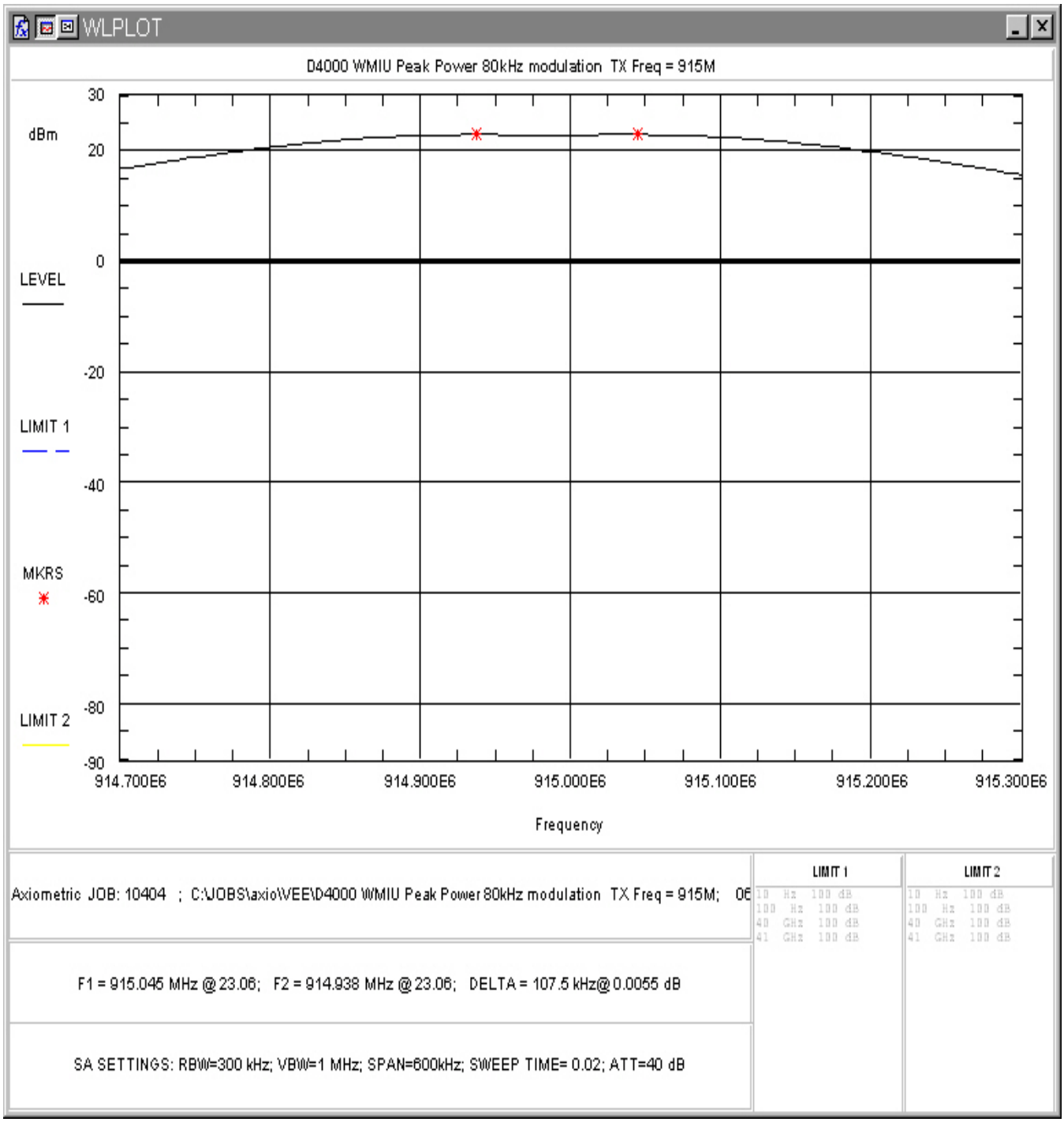

Figure 5-5. RF Peak Power 80kHz Modulation, Mid Channel

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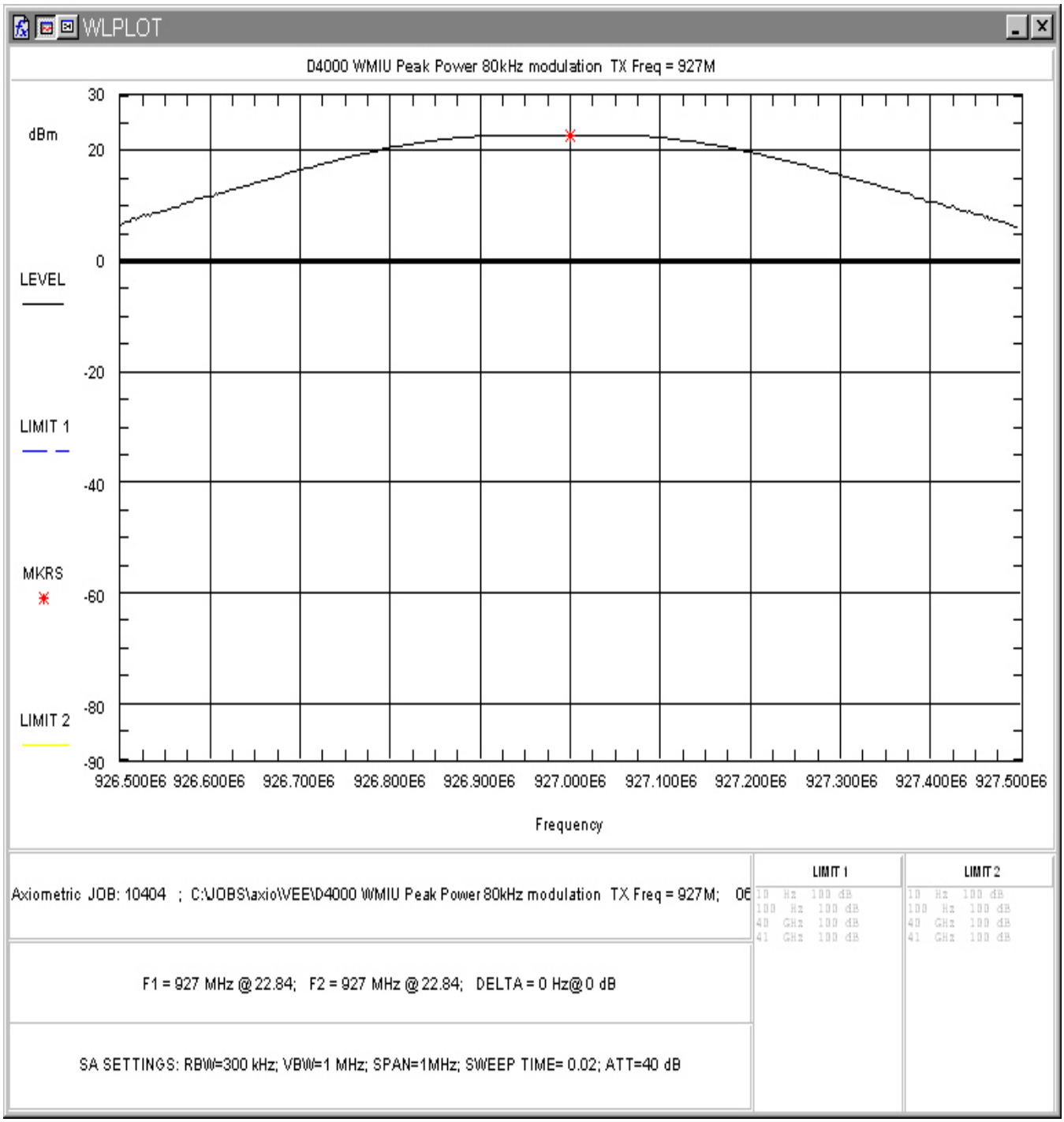

Figure 5-6. RF Peak Power 80kHz Modulation, High Channel

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5.2 Occupied Bandwidth: (15.247 (a)(1)(i),RSS-210 [A8. 1(c)])

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 500kHz.

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

Table 6. Occupied Bandwidth Results 160kHz Modulation

Frequency	Bandwidth	Max Limit	Pass/Fail
Low Channel: 902.5MHz	362.853kHz	500kHz	Pass
Mid Channel: 915MHz	313.854kHz	500kHz	Pass
High Channel: 927MHz	322.391kHz	500kHz	Pass

Table 7. Occupied Bandwidth Results 80kHz Modulation

Frequency	Bandwidth	Max Limit	Pass/Fail
Low Channel: 902.5MHz	159.808kHz	500kHz	Pass
Mid Channel: 915MHz	158.857kHz	500kHz	Pass
High Channel: 927MHz	160.757kHz	500kHz	Pass

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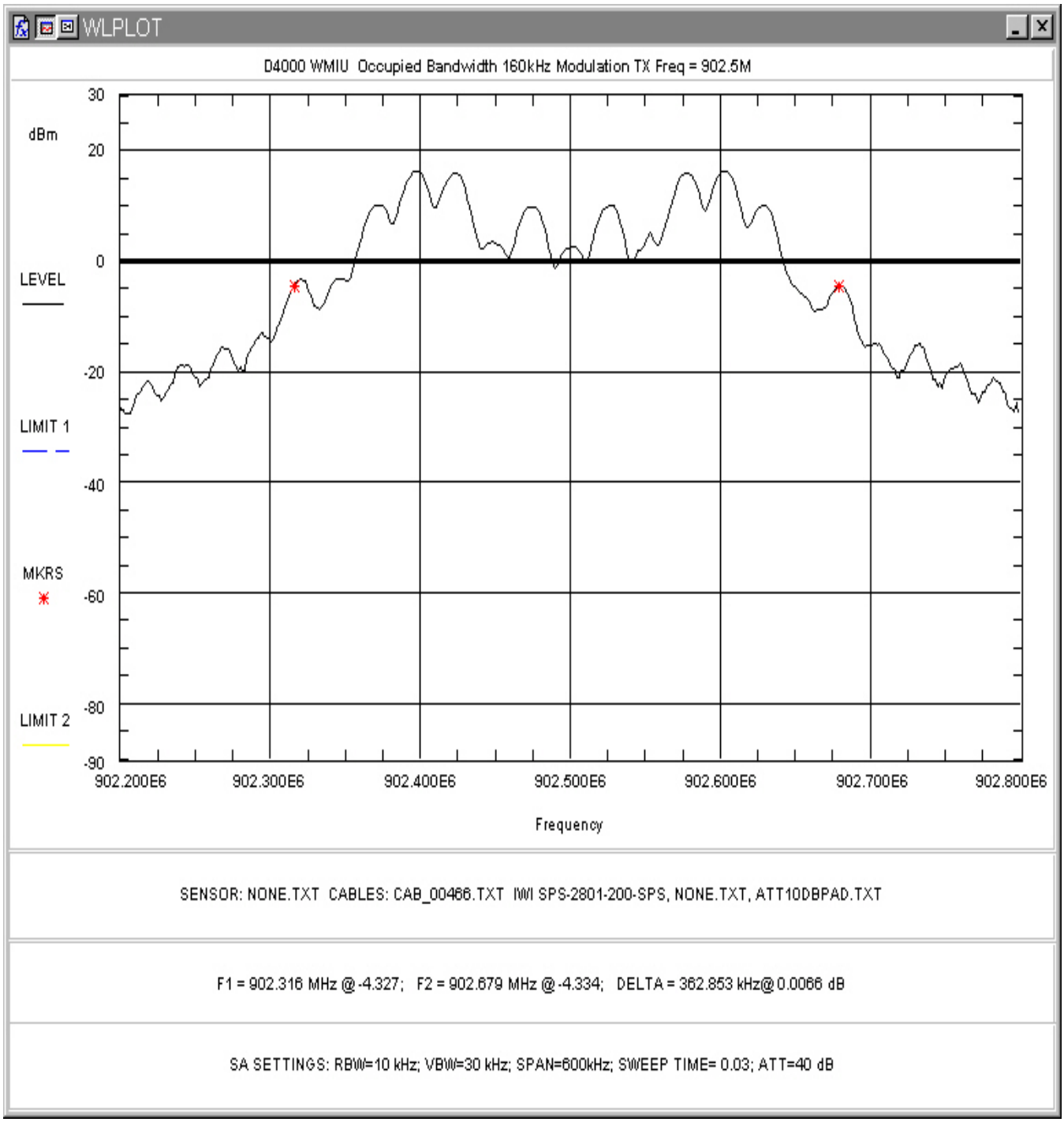

Figure 5-7. Occupied Bandwidth 160kHz Modulation, Low Channel

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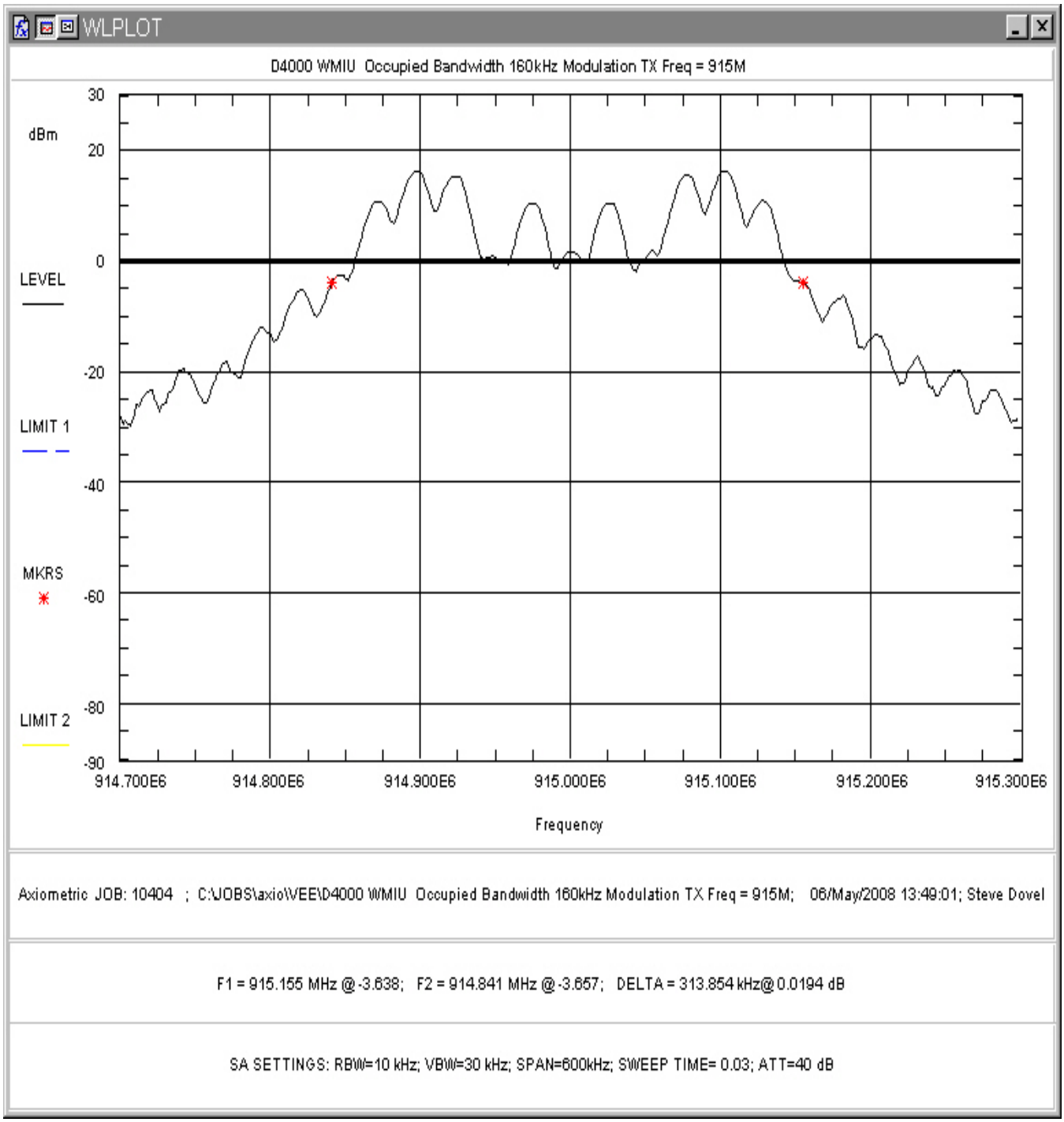

Figure 5-8. Occupied Bandwidth 160kHz Modulation, Mid Channel

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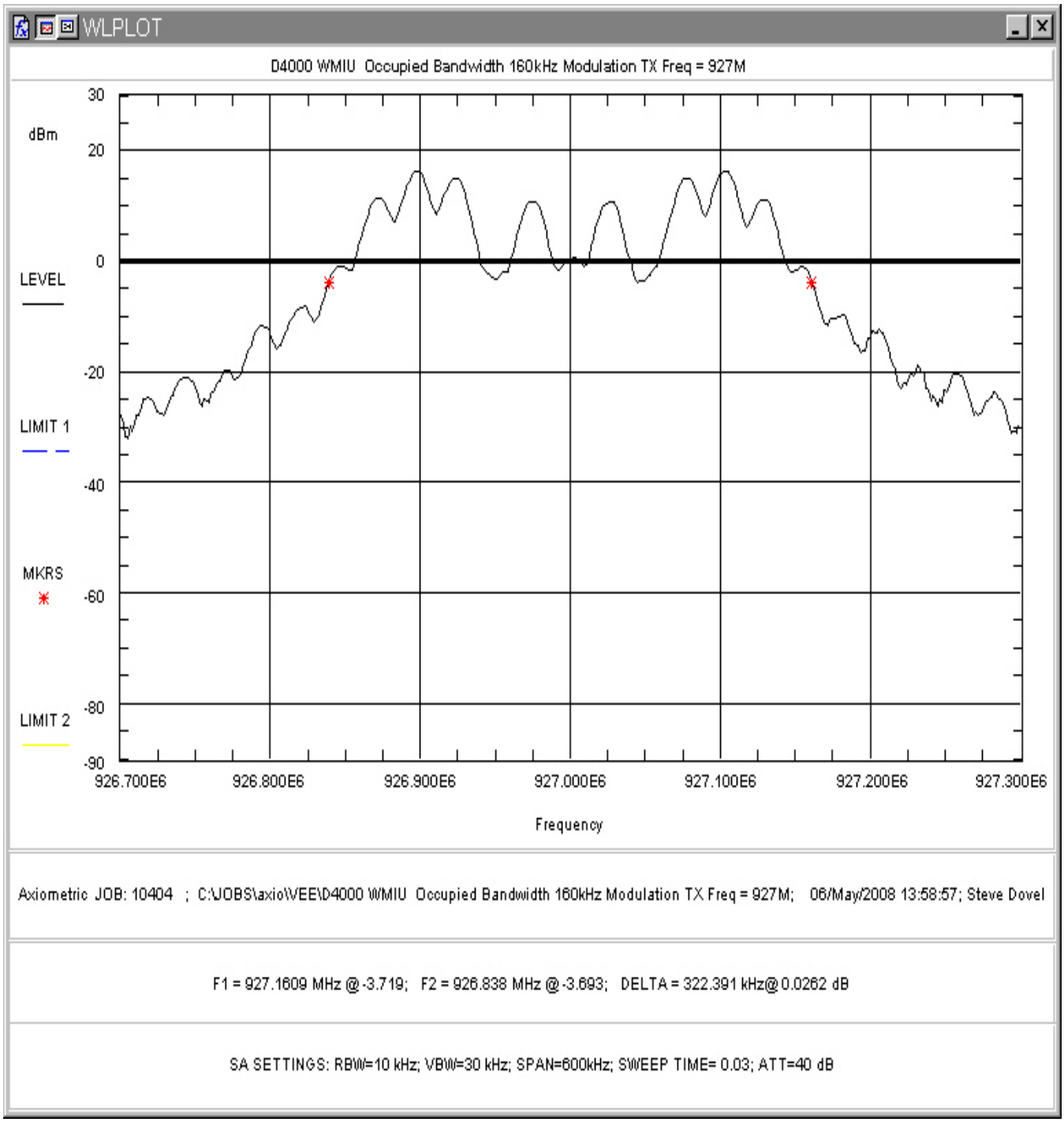

Figure 5-9. Occupied Bandwidth 160kHz Modulation, High Channel

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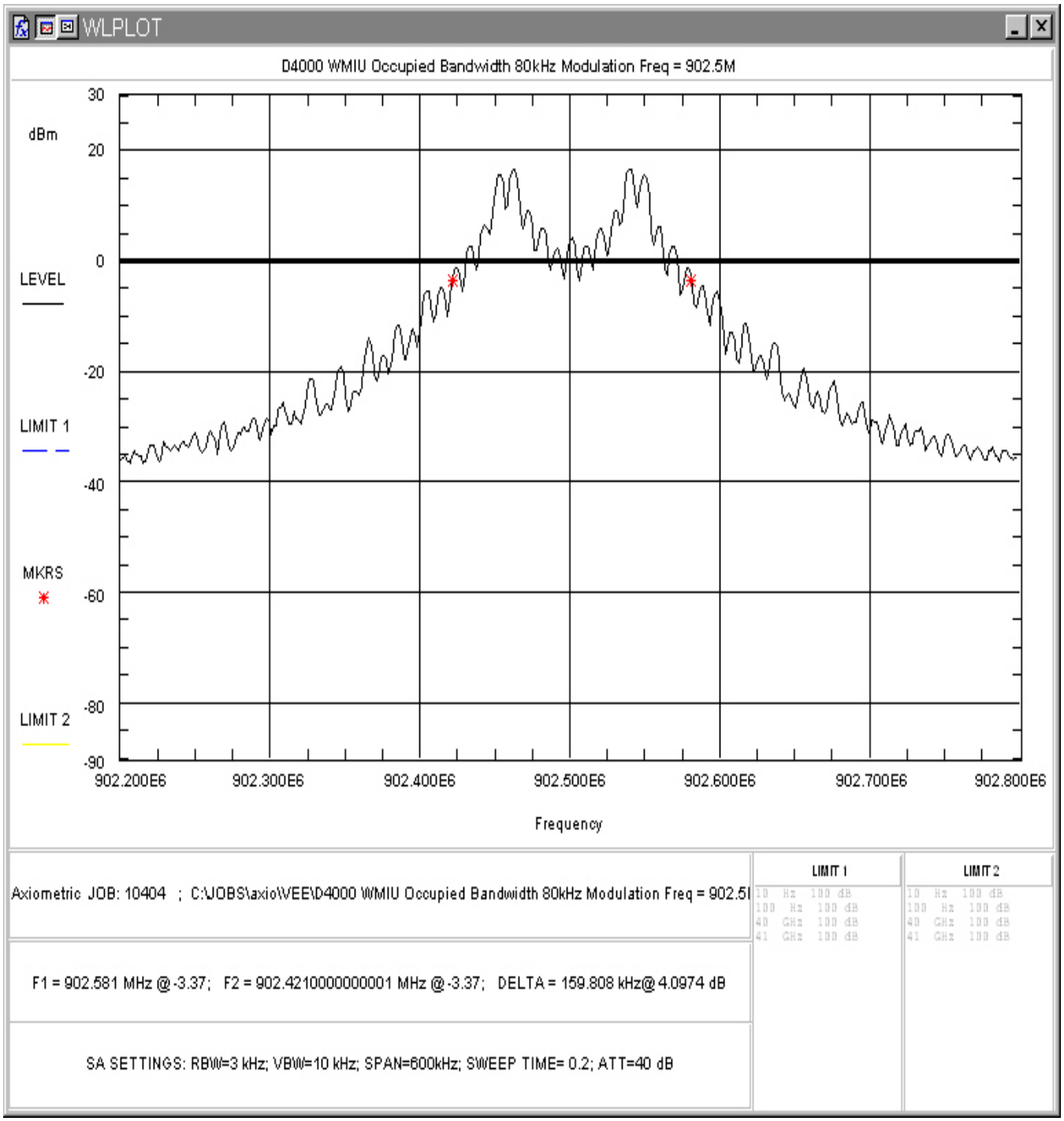

Figure 5-10. Occupied Bandwidth 80kHz Modulation, Low Channel

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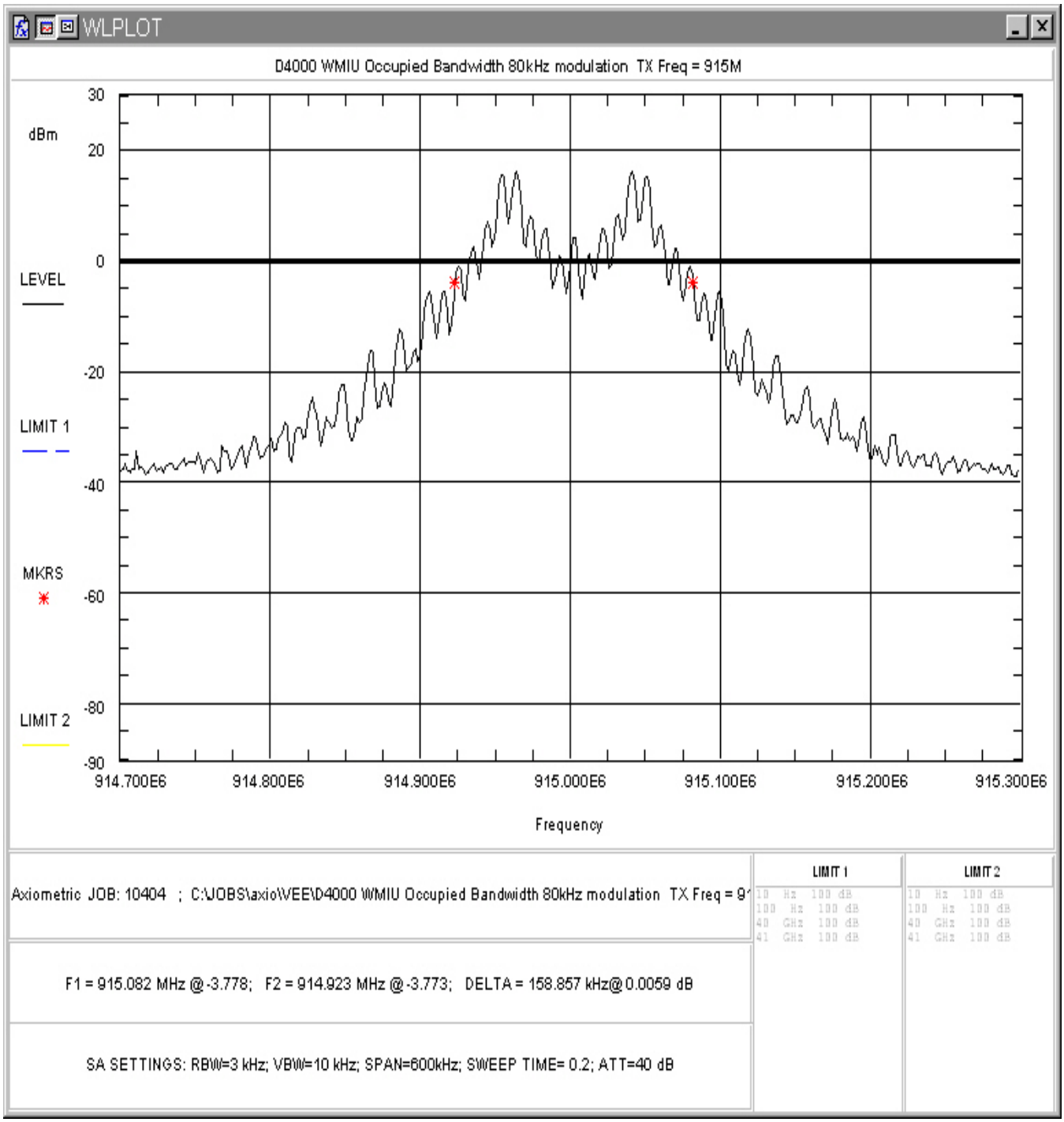

Figure 5-11. Occupied Bandwidth 80kHz Modulation, Mid Channel

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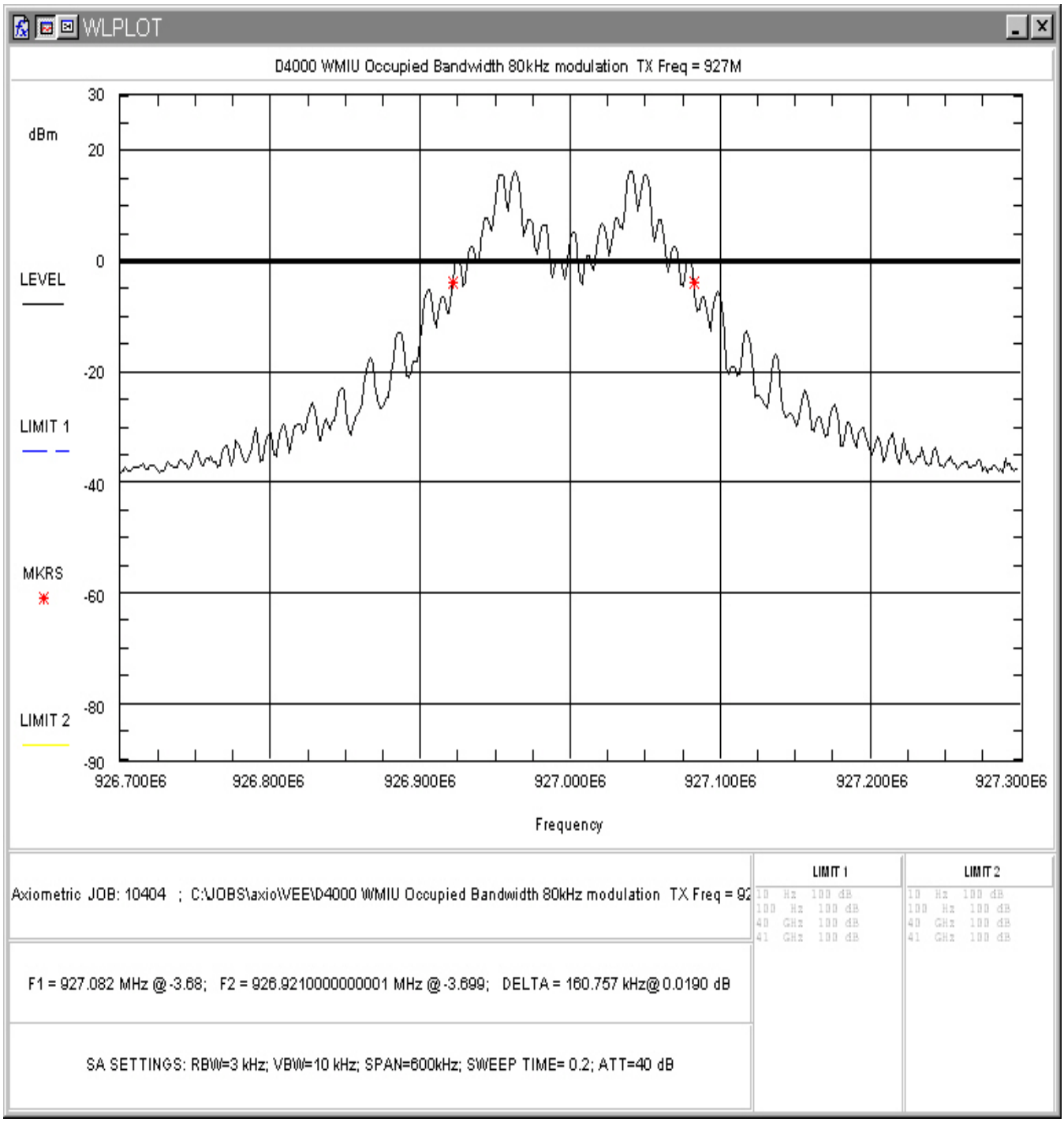

Figure 5-12. Occupied Bandwidth 80kHz Modulation, High Channel

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5.3 Channel Spacing & Number of Hop Channels (15.247 (a)(1)(i), RSS-210 [A8. 1 (c)])

Per the FCC requirements, frequency hopping systems 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 160.8kHz and 362.9kHz so the channel spacing must be more than 160.8kHz and 362.9kHz for the 80kHz modulation and the 160kHz modulation respectively. In addition, for a 902-928MHz system the number of hopping channels shall be at least 50.

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 100 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 1.5MHz. Also, the number of hopping channels was measured from 901 to 928MHz.

The following are plots of the channel spacing and number of hopping channels data for both the 80kHz and 160kHz modulation. For the 80kHz modulation The channel spacing was measured to be 502kHz and the number of channels used is 50. For the 160kHz modulation The channel spacing was measured to be 504.2kHz and the number of channels used is 50.

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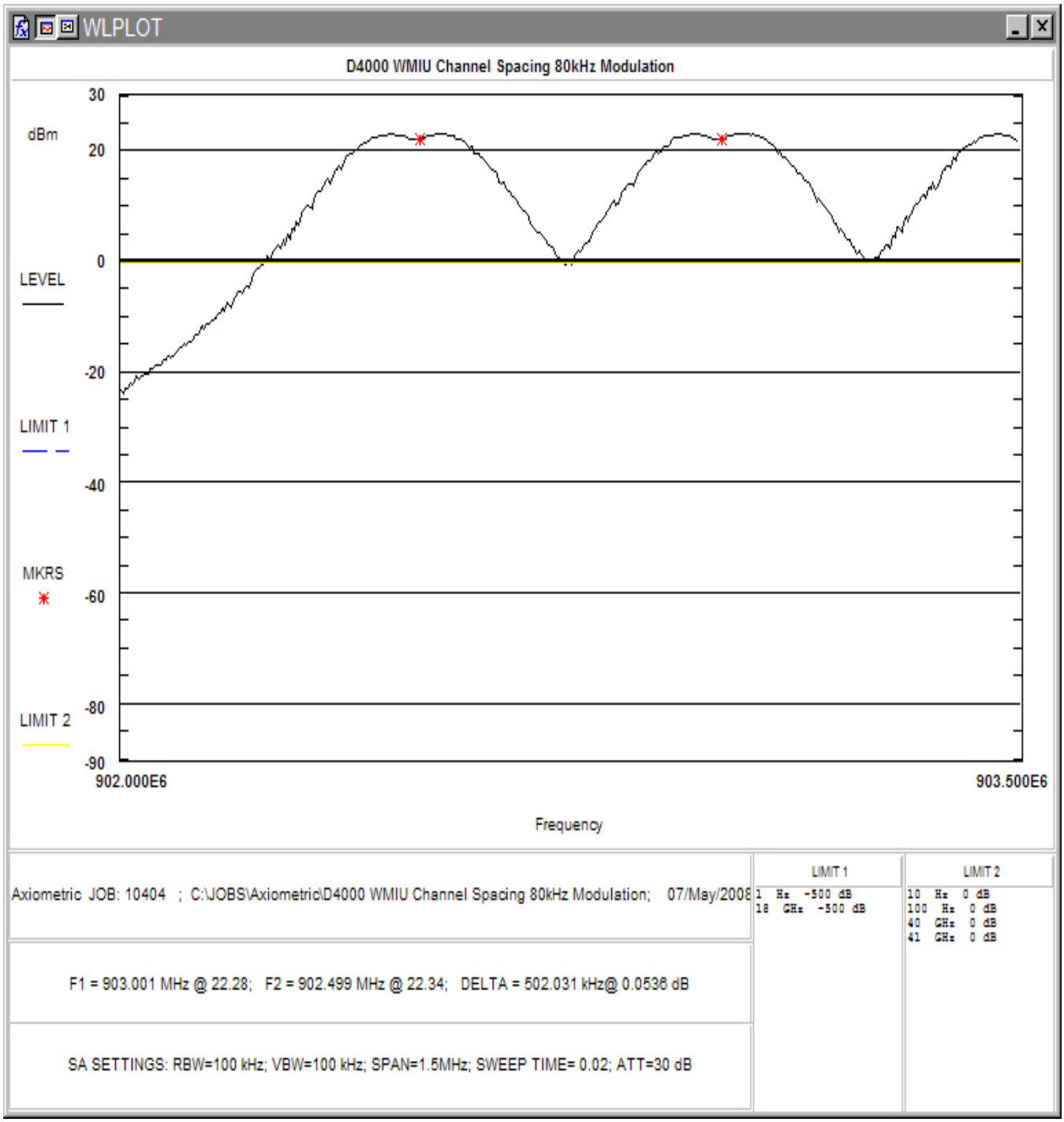

Figure 5-13. Channel Spacing, 502kHz

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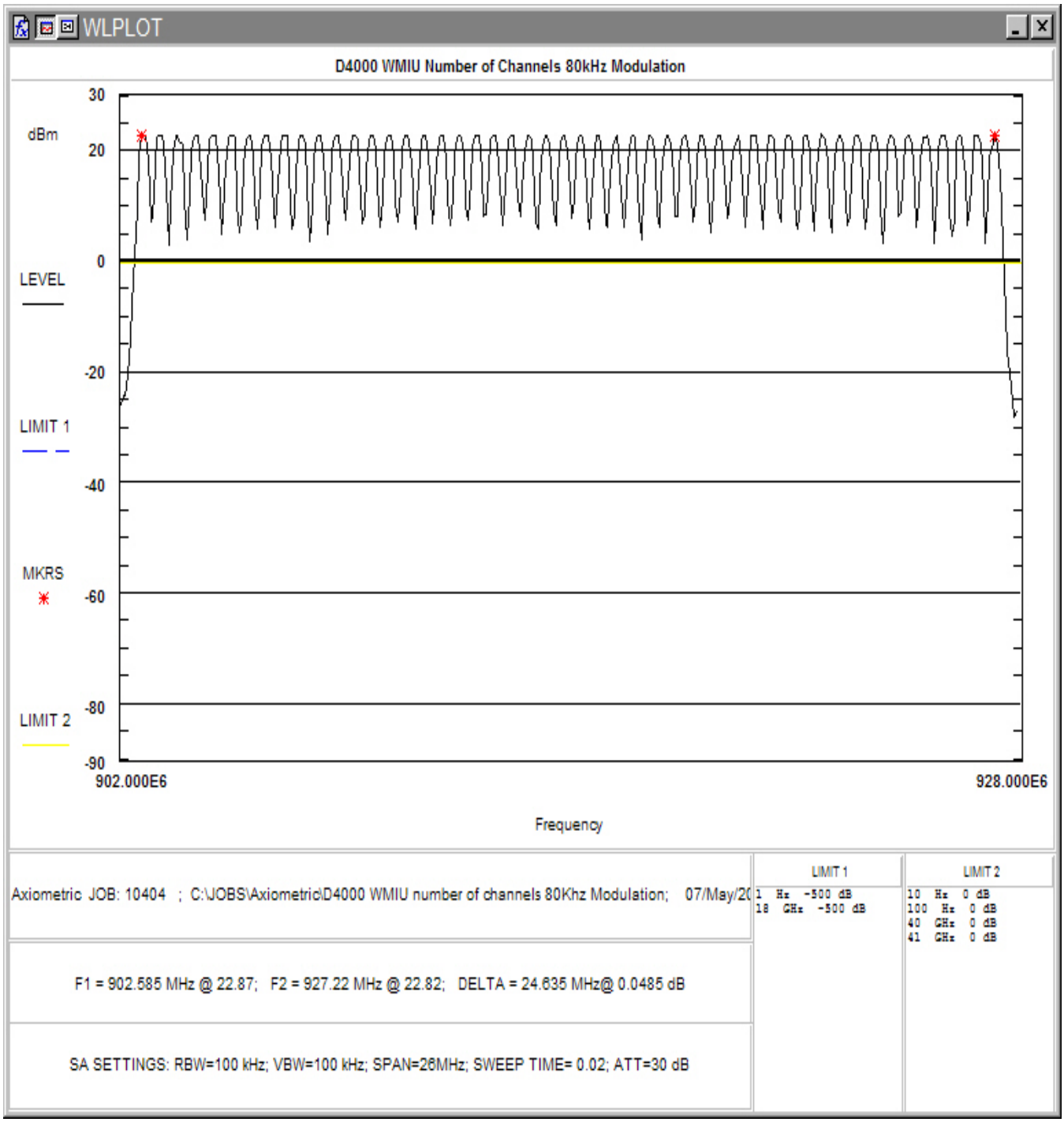

Figure 5-14. Number of Channels

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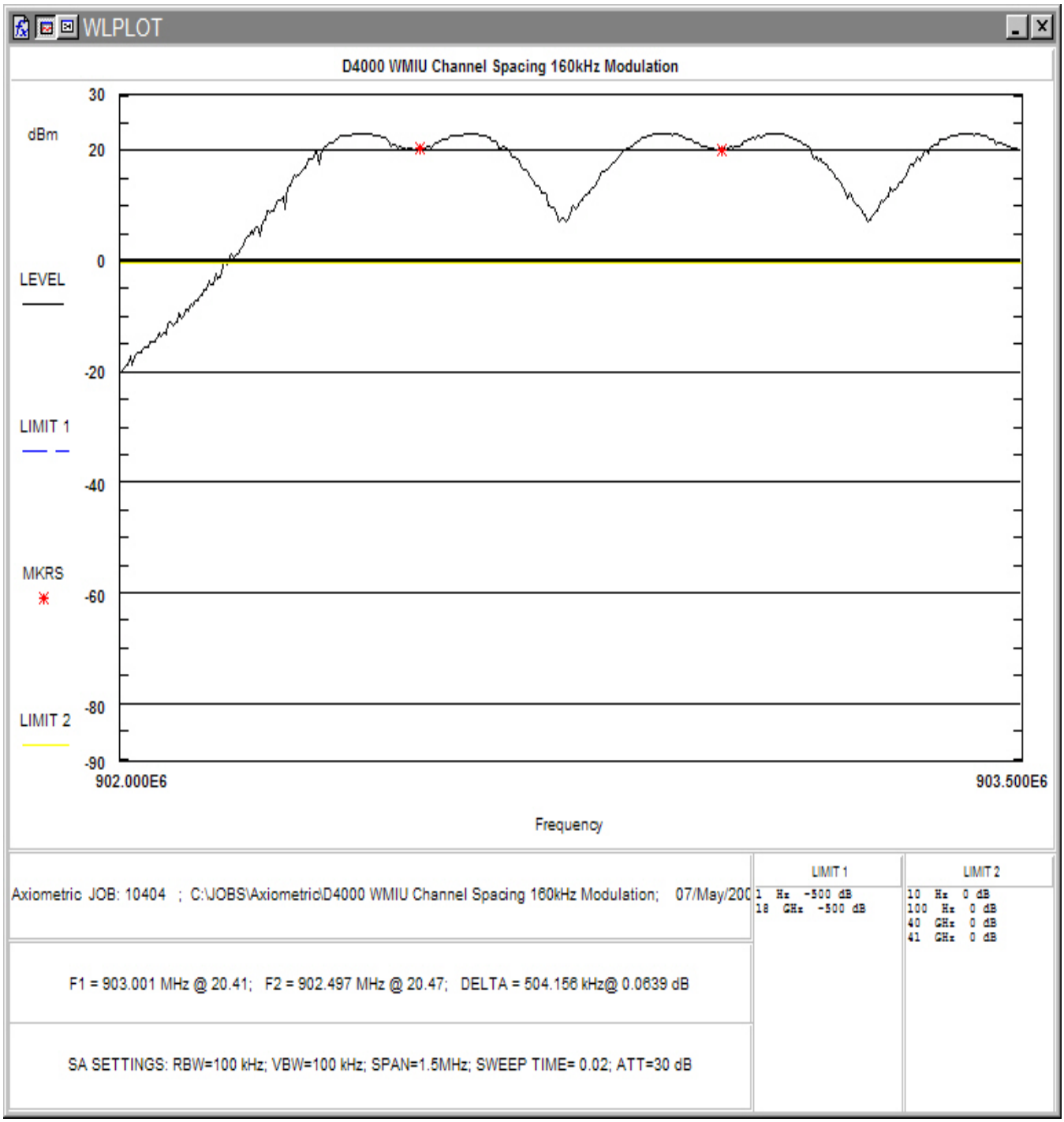

Figure 5-15. Channel Spacing, 362.85kHz

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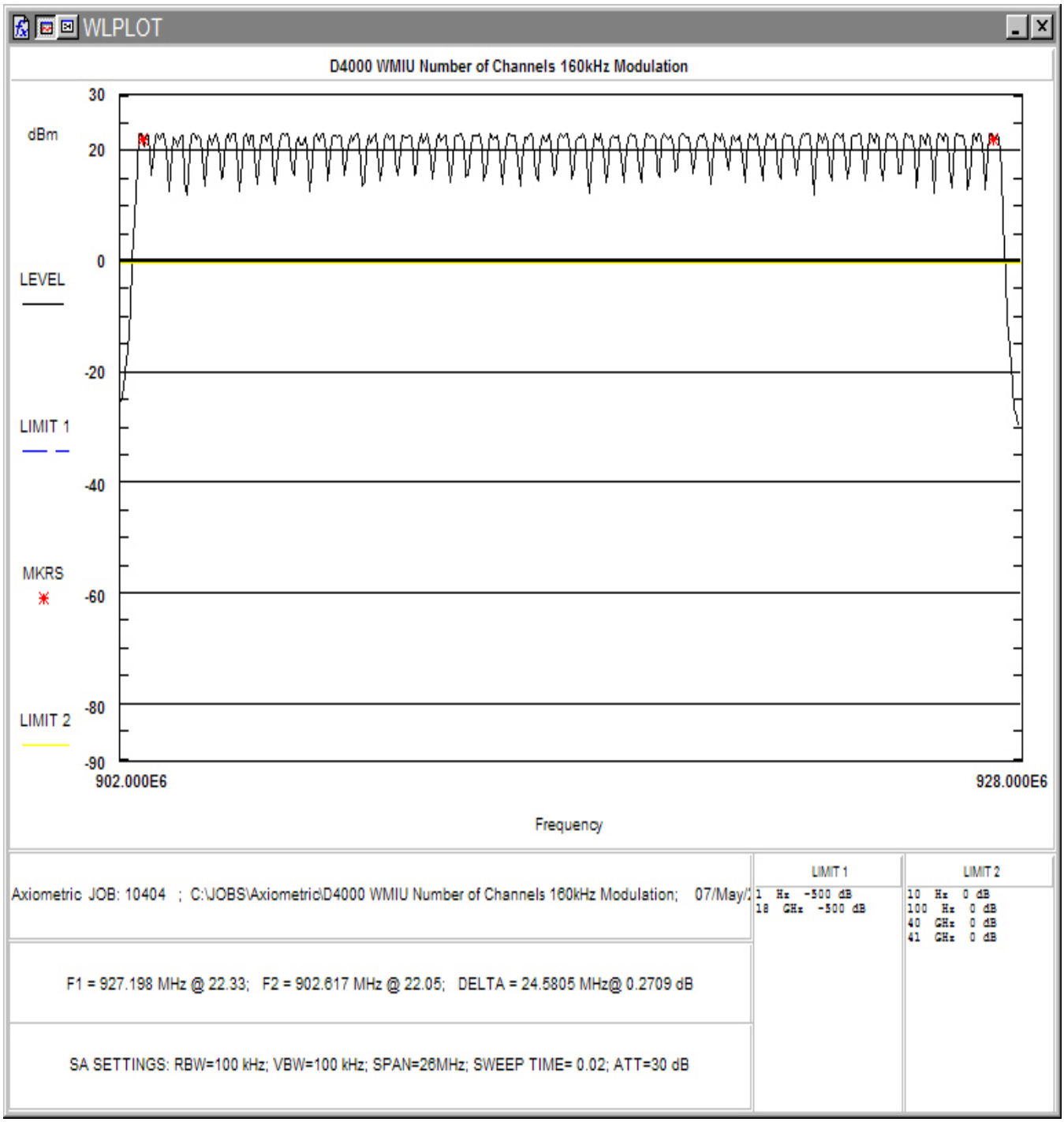

Figure 5-16. Number of Channels

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5.4 Duty Cycle Correction & Time of Occupancy (15.247 (a)(1)(i), RSS-210 [A8. 1 (c)])

In accordance with the FCC Public Notice the spurious radiated emissions measurements may be adjusted if 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 x LOG (dwell time/100 ms)

The following figure shows the plot of the dwell time for the transmitter. Based on this plot, the dwell time per hop is 108msec.

No Duty cycle correction is allowed.

In Accordance with FCC Part 15.247 (a)(i) systems operating in the 902-928 MHz band with a bandwidth of less than 250kHz and 50 hopping channels shall transmit no more than 0.4 seconds in any 20 second period.

The following plots shows compliance with this paragraph.

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Axiometric Job #10404 WMIU, 80kHz Modulation, FCC Pt. 15.247 Time of Occupany, single pulse, 108 msec

Figure 5-17. Time of Occupancy, 80kHz; Single Pulse

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Axiometric Job# 10404, D4000 WMIU FCC Pt. 15 Time of Occupancy, single pulse, 40.33 msec.

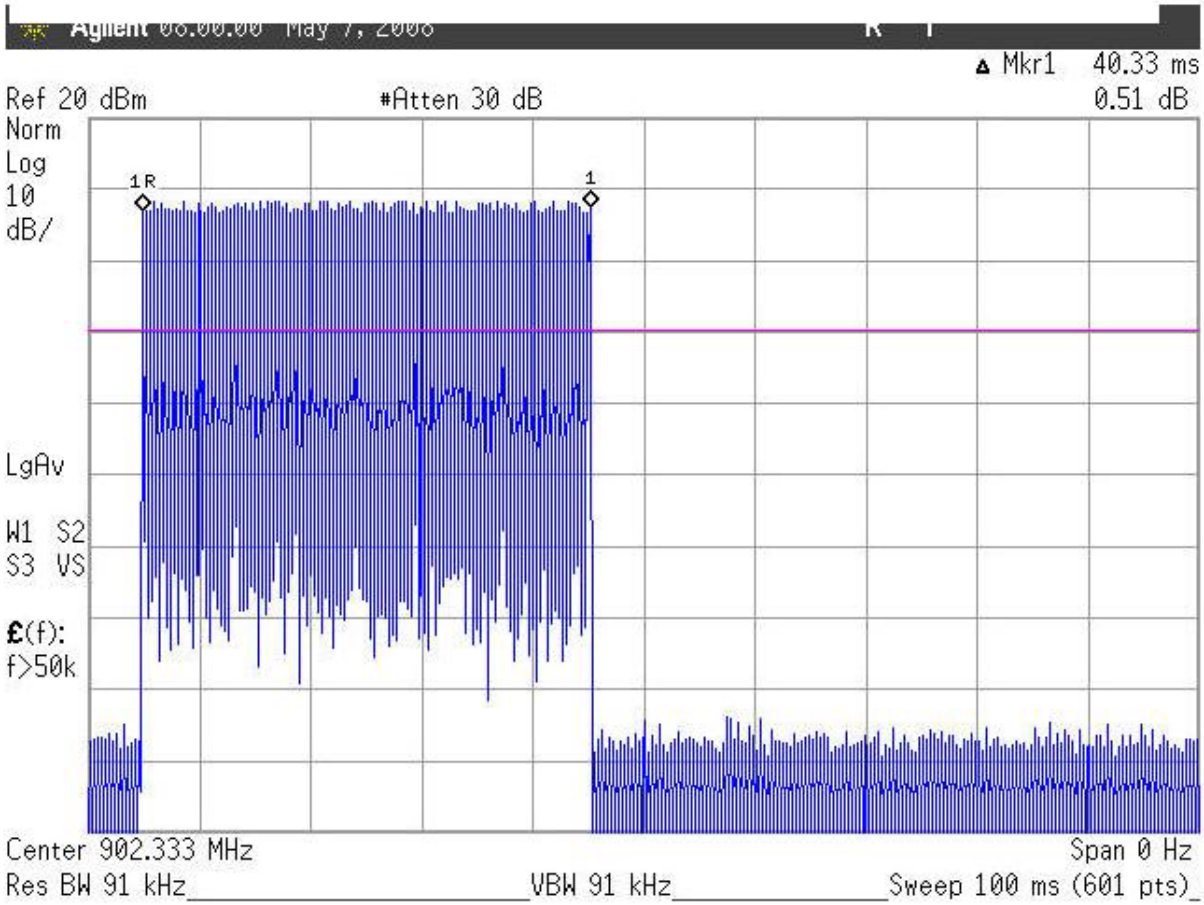

Figure 5-18. Time of Occupancy, 160kHz; Single Pulse

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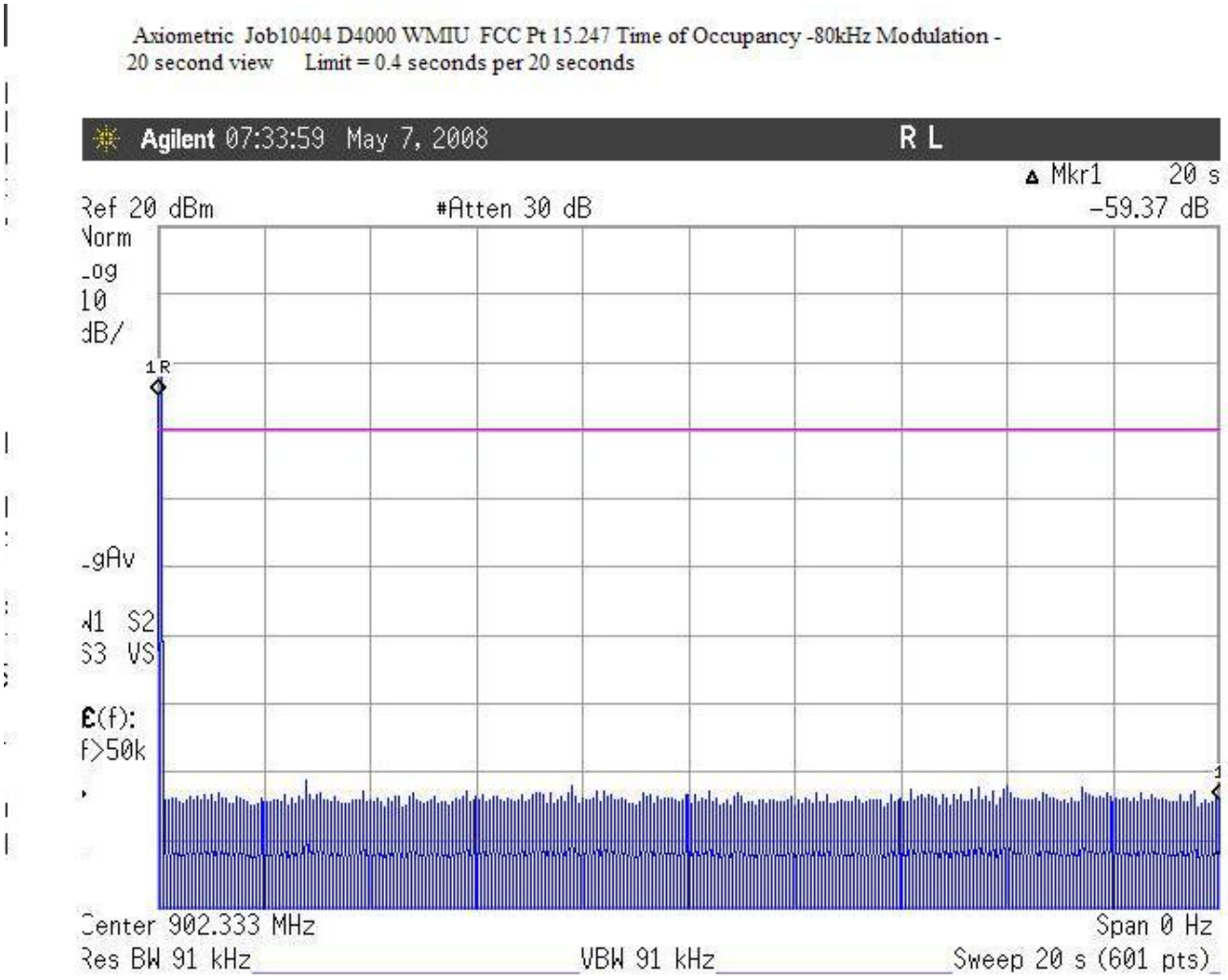

Figure 5-19. Time of Occupancy, 80kHz; 20 Seconds

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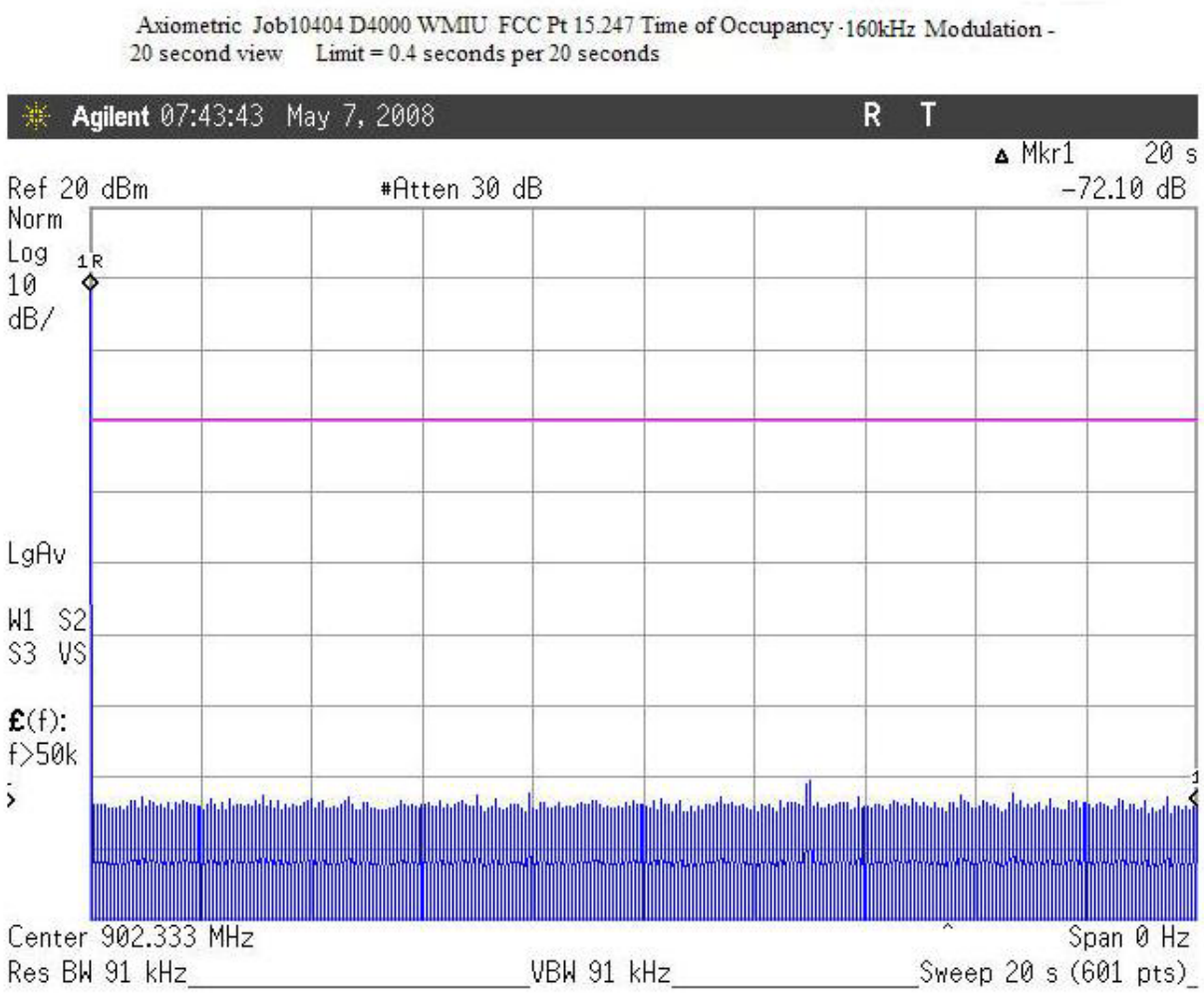

Figure 5-20. Time of Occupancy, 160kHz; 20 Seconds

5.5 Conducted Spurious Emissions at Antenna Terminals (15.247 (d), RSS-210 [A8. 5])

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 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 100 kHz and the video bandwidth was set to 100 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.

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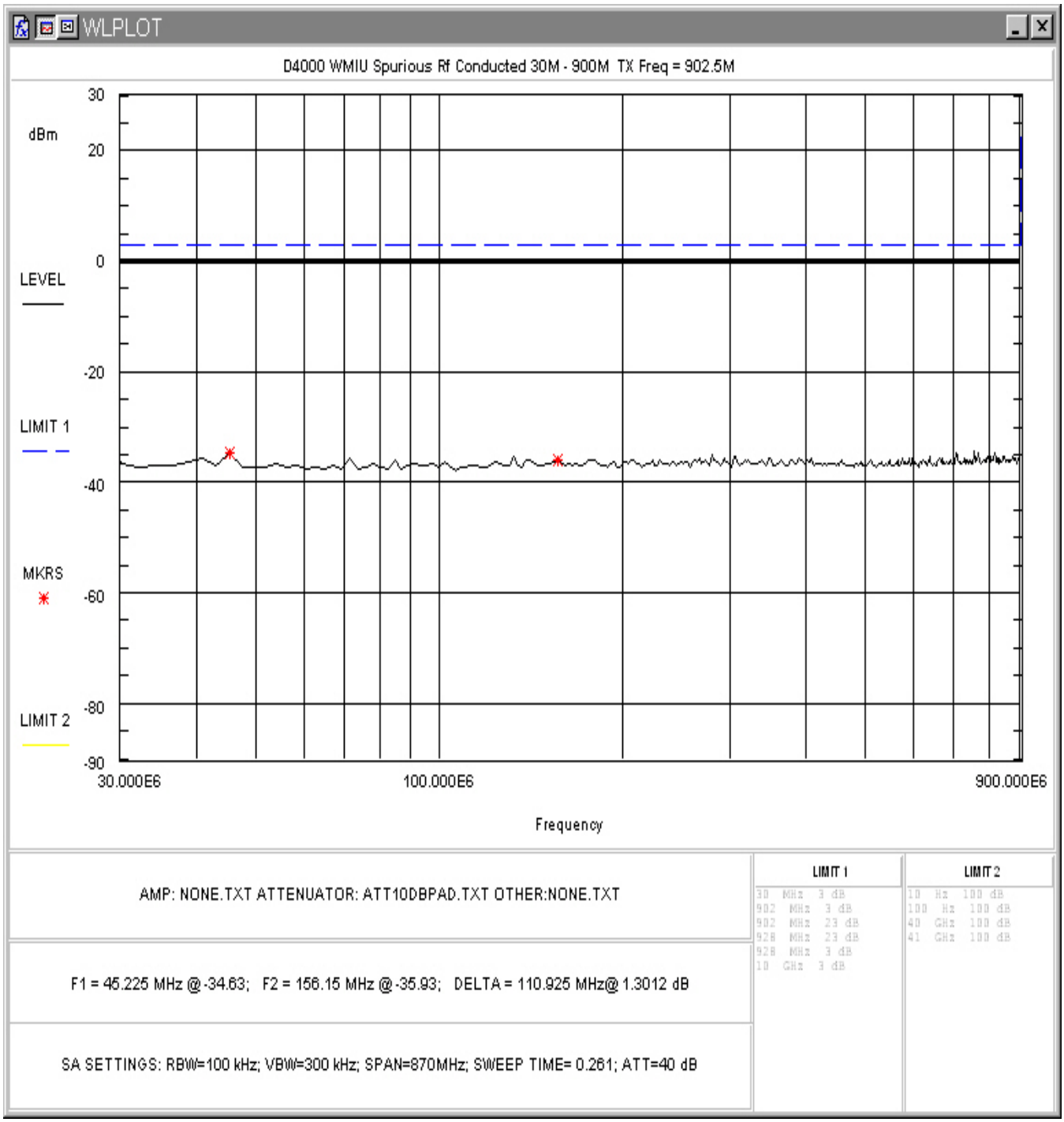

Figure 5-21. Conducted Spurious Emissions, Low Channel 80kHz Modulation 30 - 900MHz

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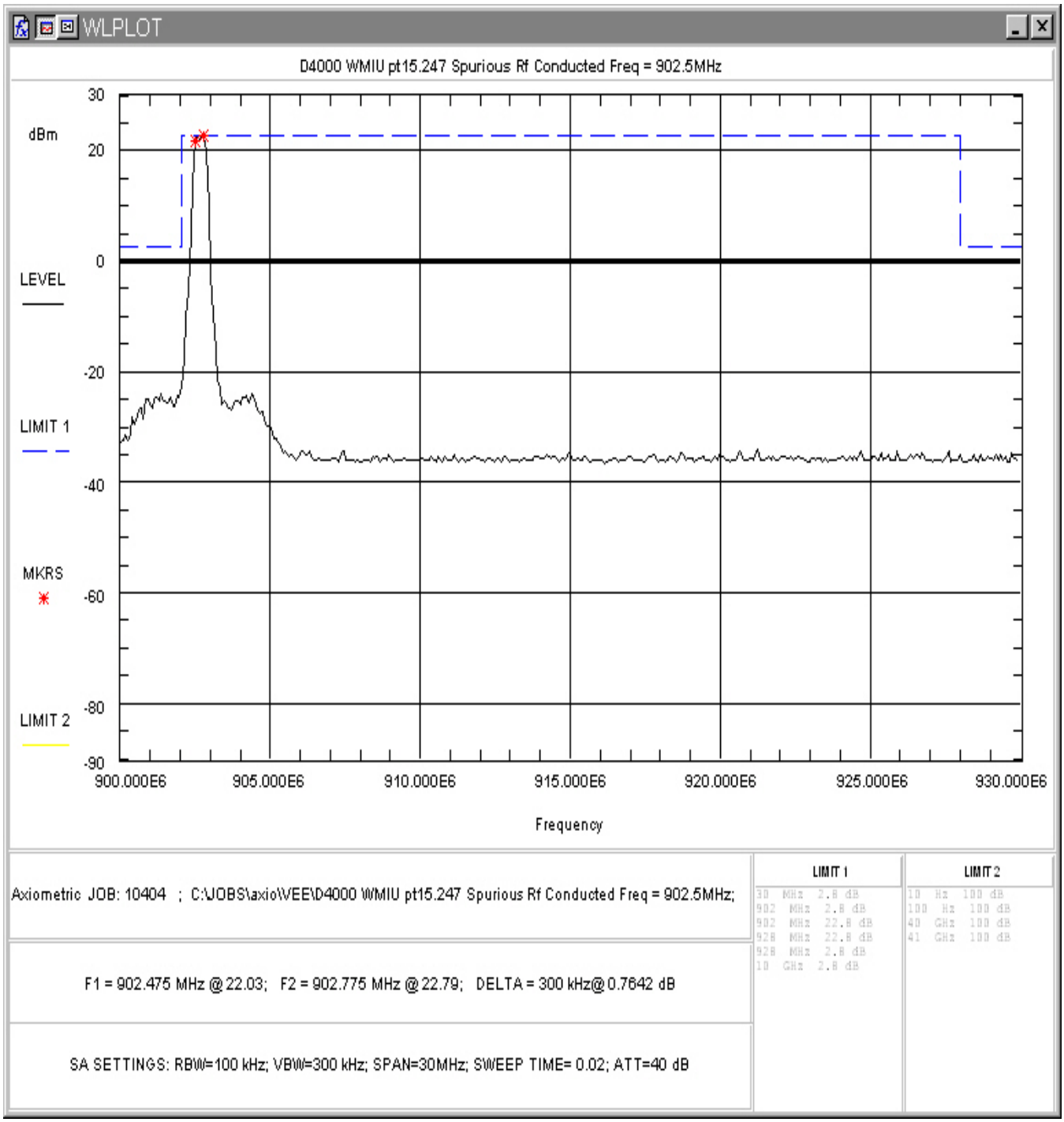

Figure 5-22. Conducted Spurious Emissions, Low Channel 80kHz Modulation 900 – 930MHz

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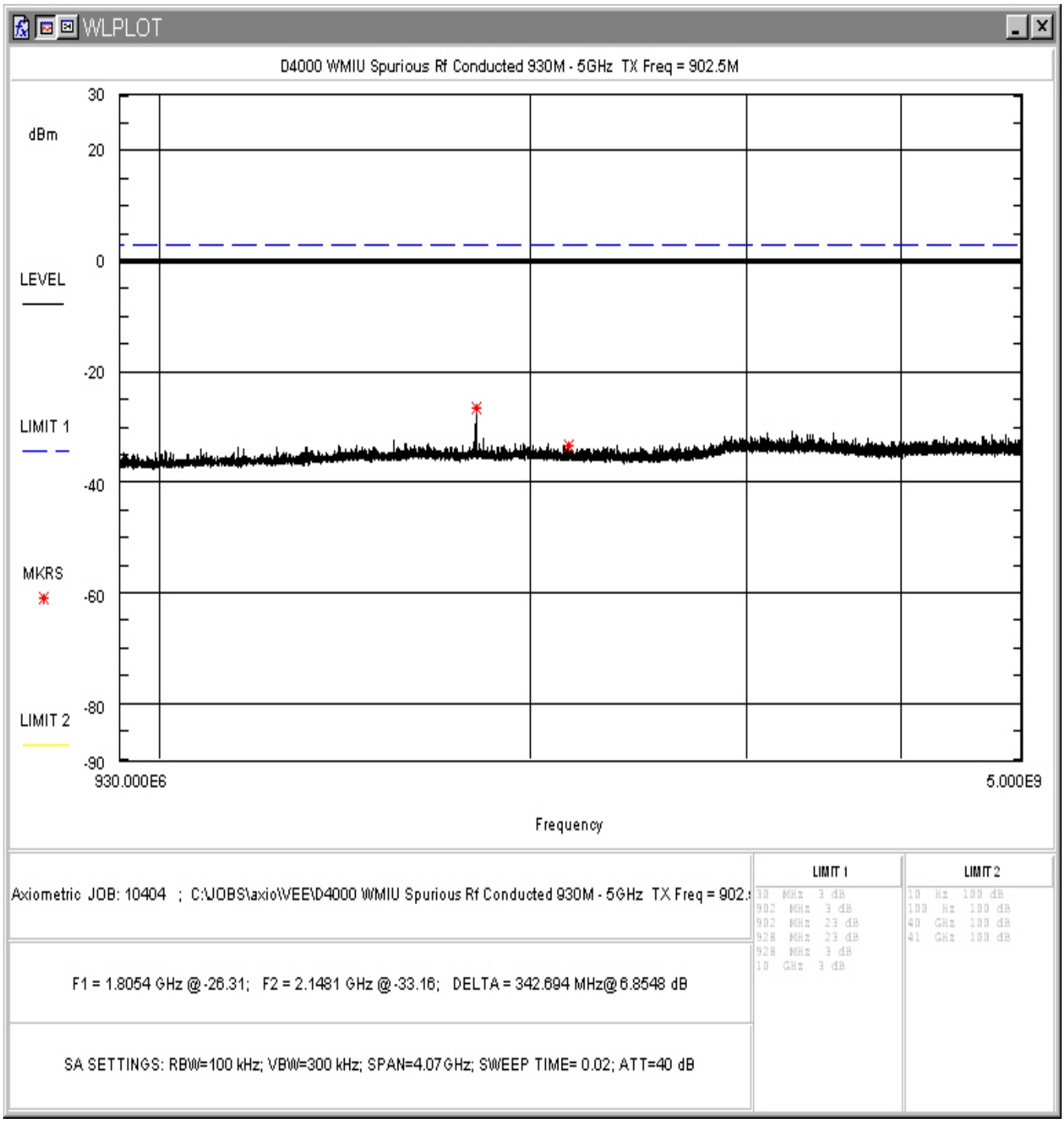

Figure 5-23. Conducted Spurious Emissions, Low Channel 80kHz Modulation 930 –5000 MHz

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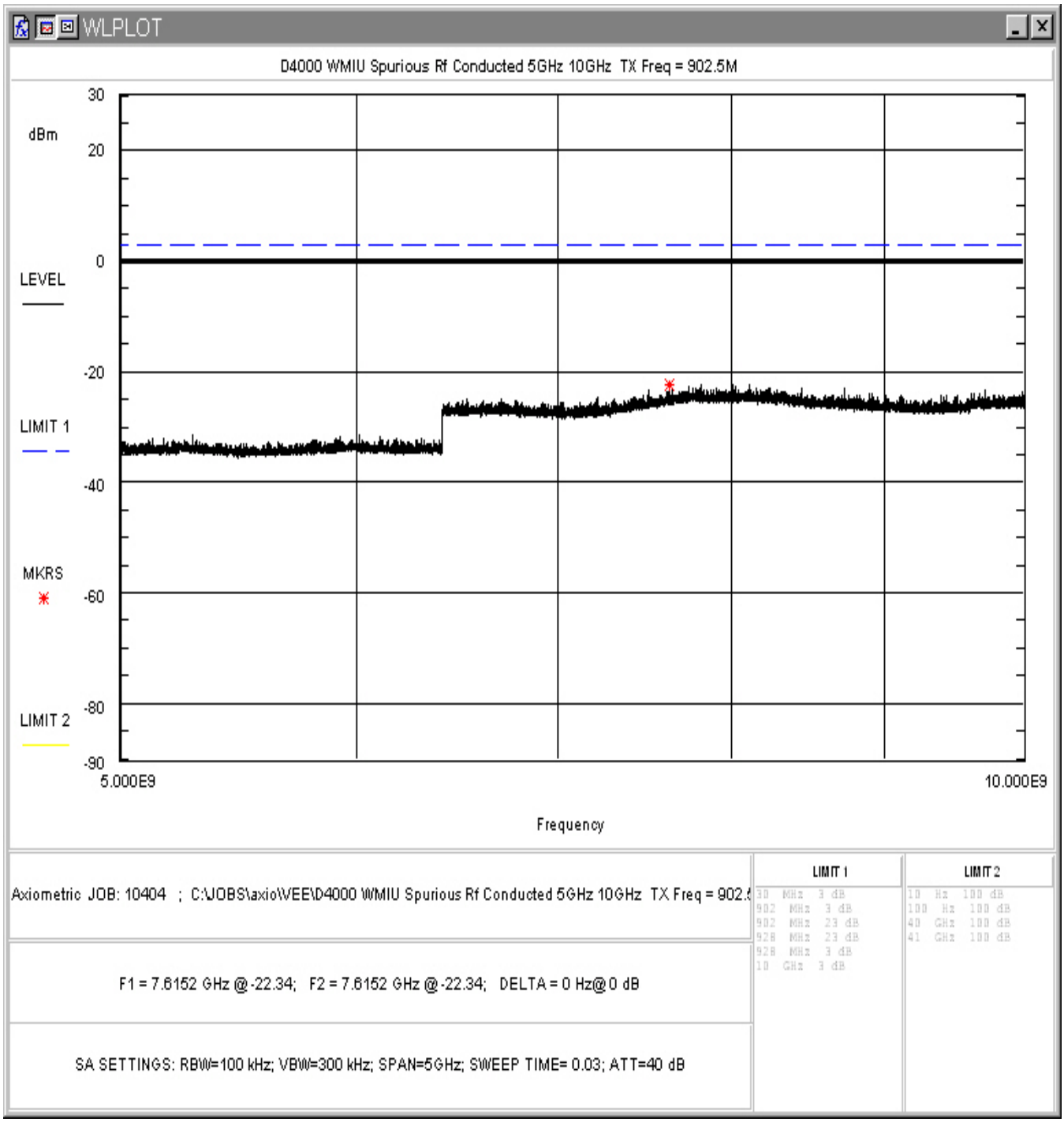

Figure 5-24. Conducted Spurious Emissions, Low Channel 80kHz Modulation 5 - 10GHz

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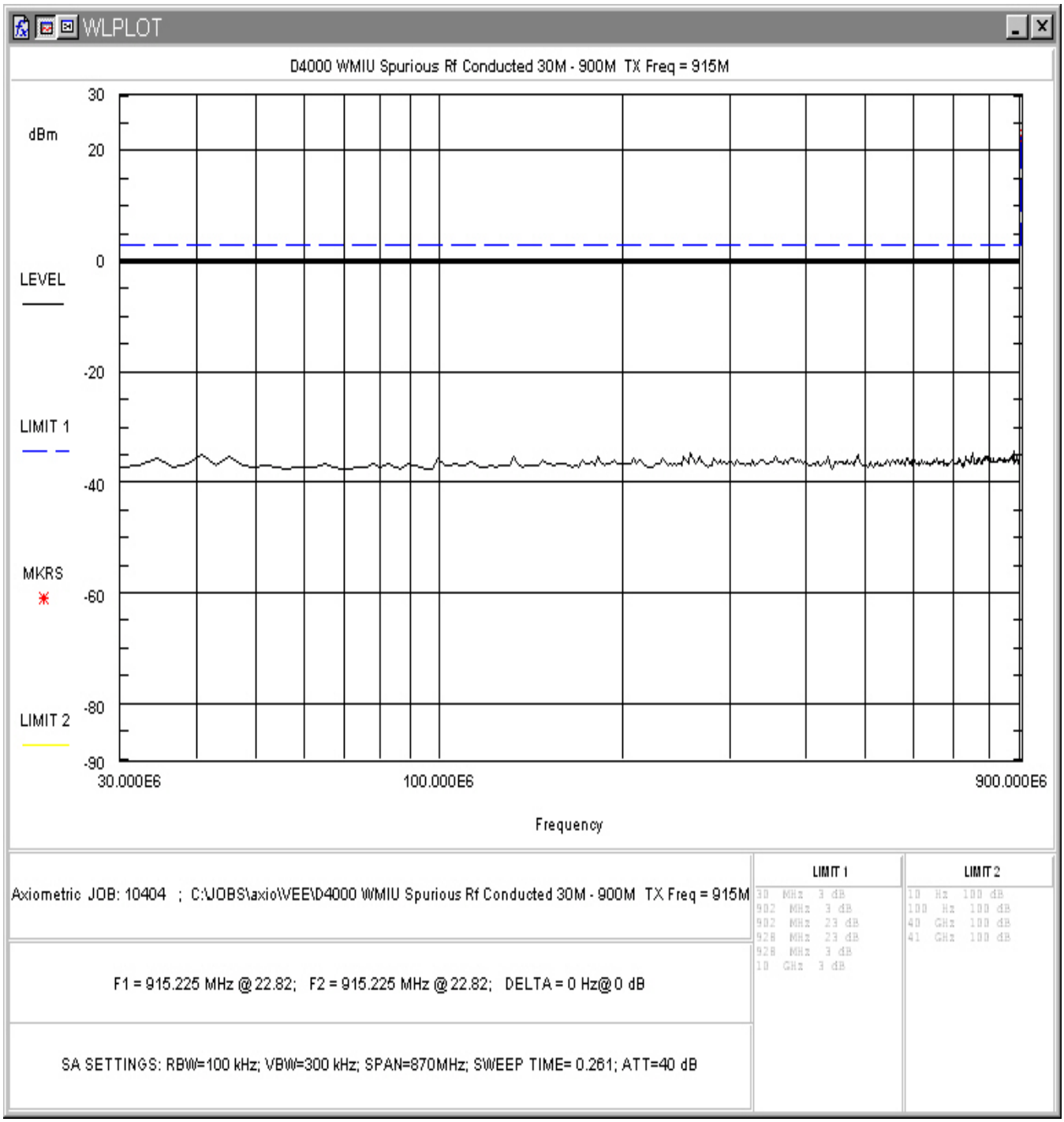

Figure 5-25. Conducted Spurious Emissions, Center Channel 80kHz Modulation 30 - 900MHz

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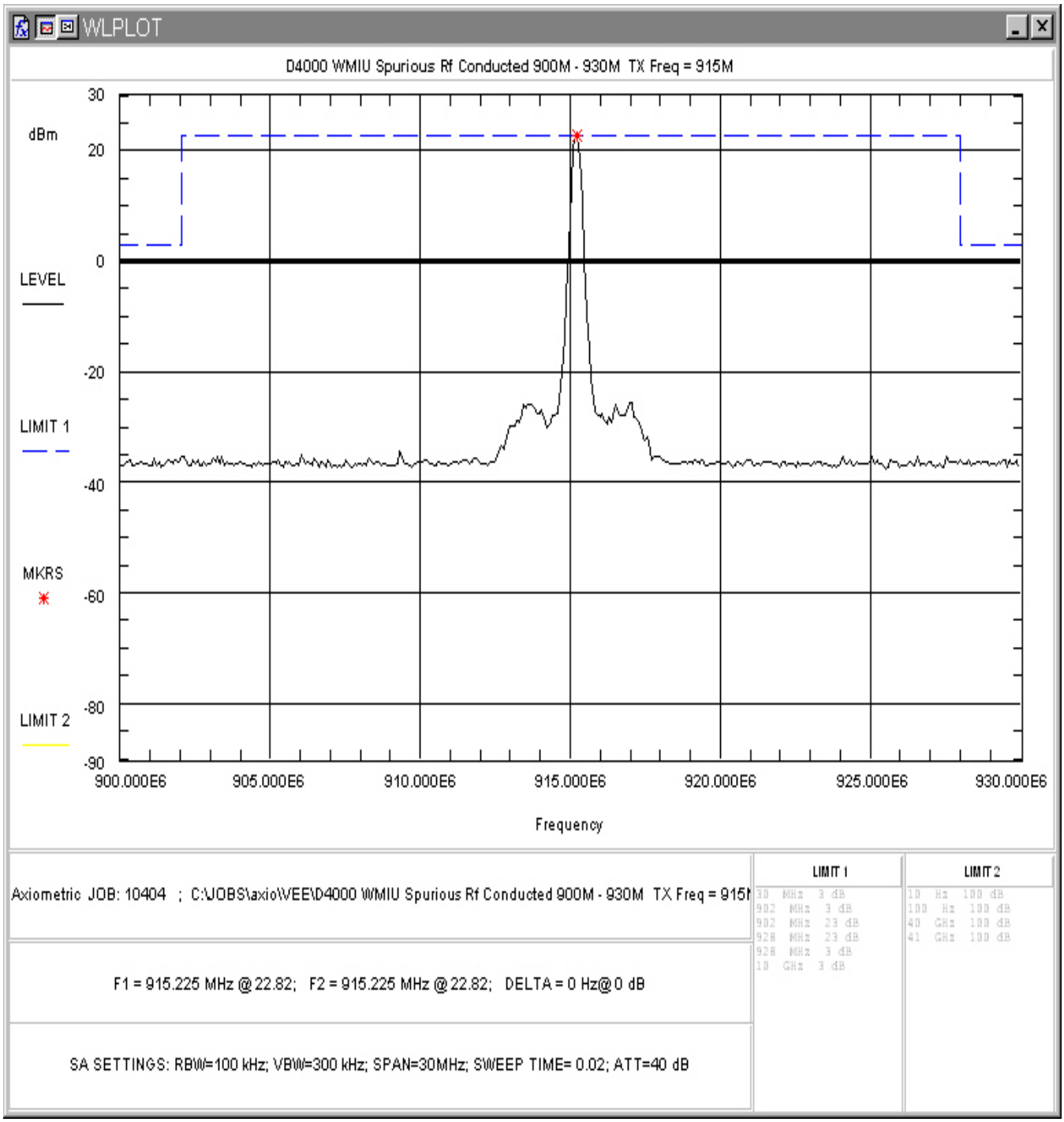

Figure 5-26. Conducted Spurious Emissions, Center Channel 80kHz Modulation 900 – 930MHz

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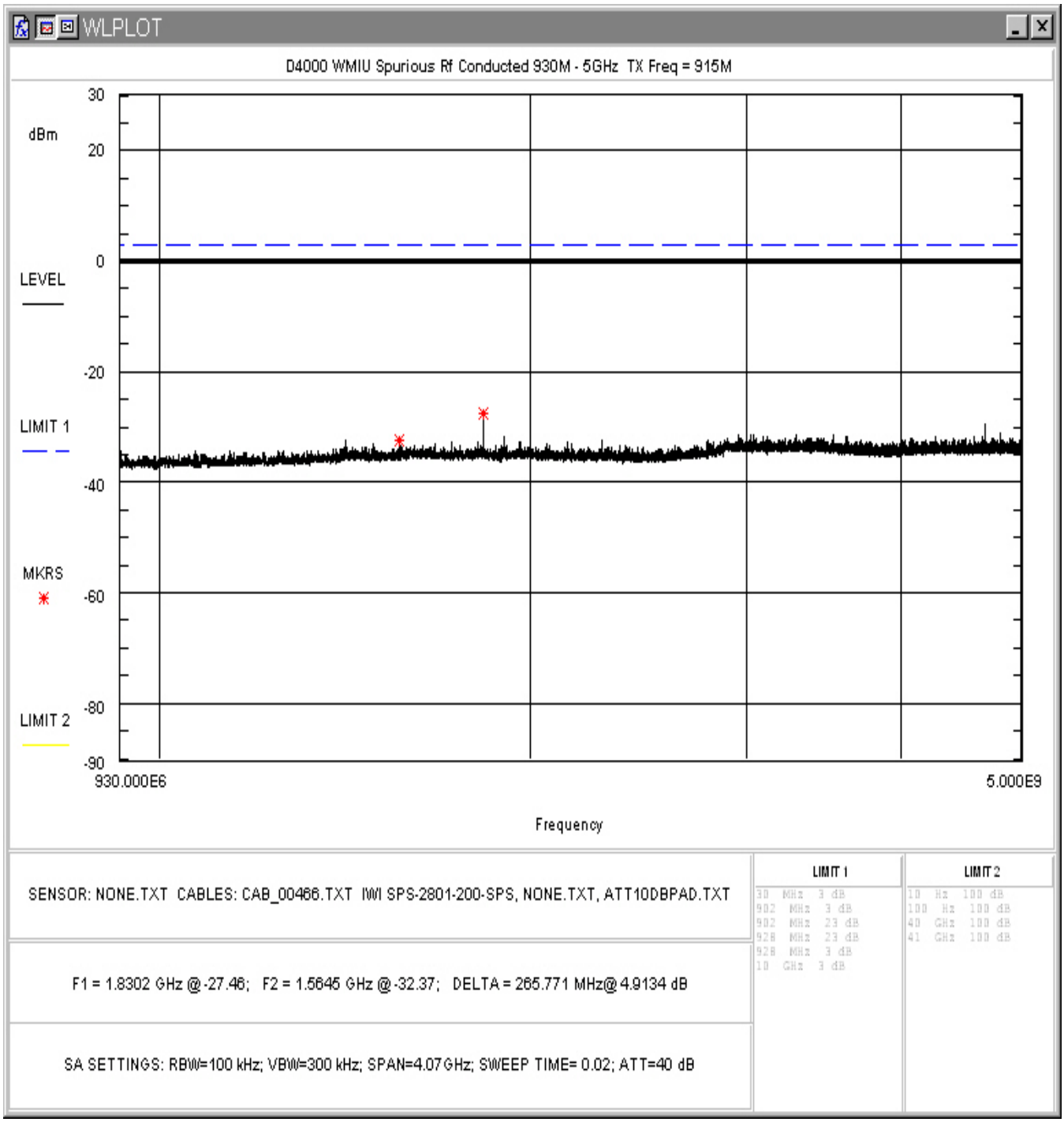

Figure 5-27. Conducted Spurious Emissions, Center Channel 80kHz Modulation 930 - 5000MHz

 © 2008 Washington Laboratories, Ltd.

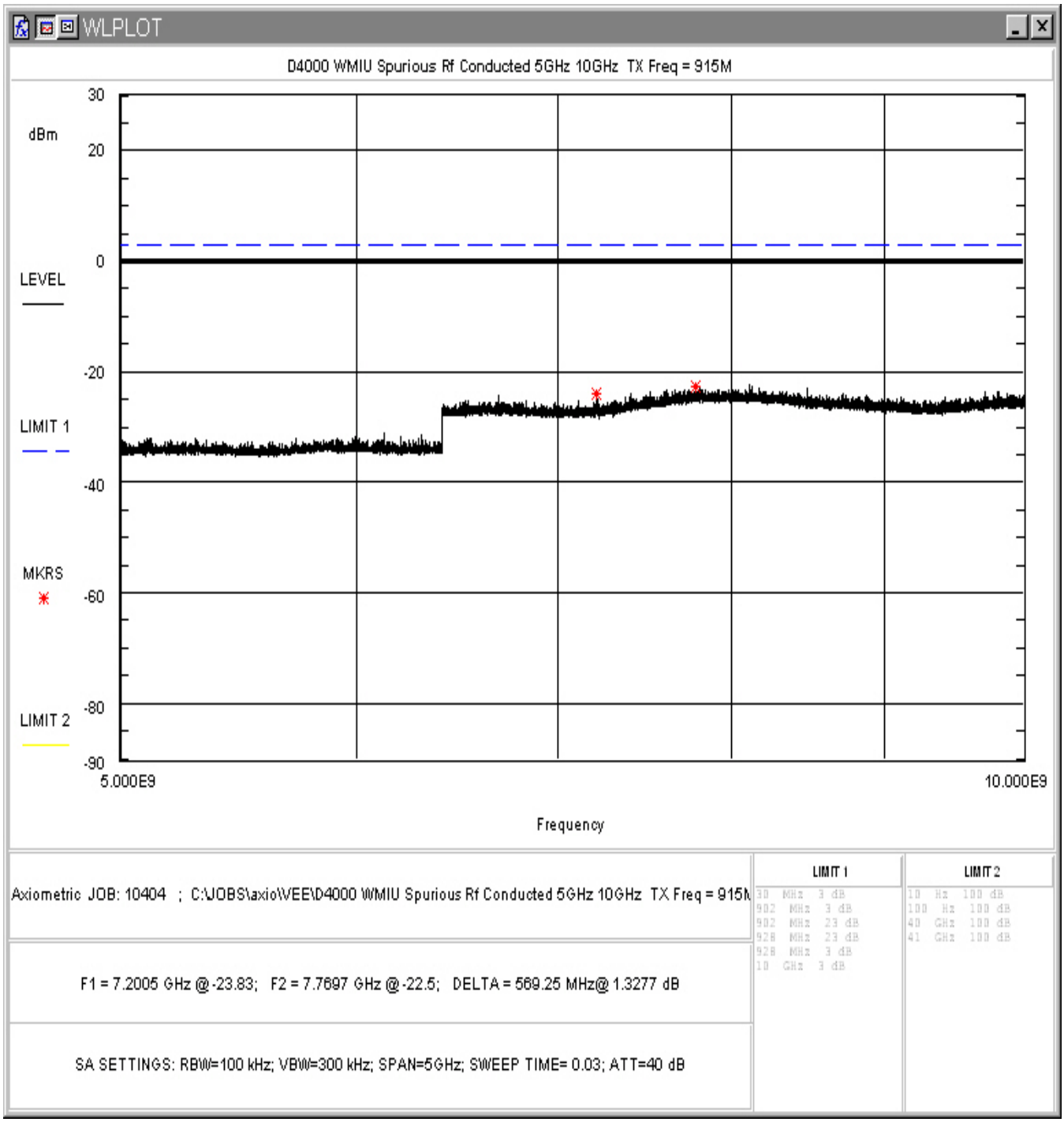

Figure 5-28. Conducted Spurious Emissions, Center Channel 80kHz Modulation 5 – 10GHz

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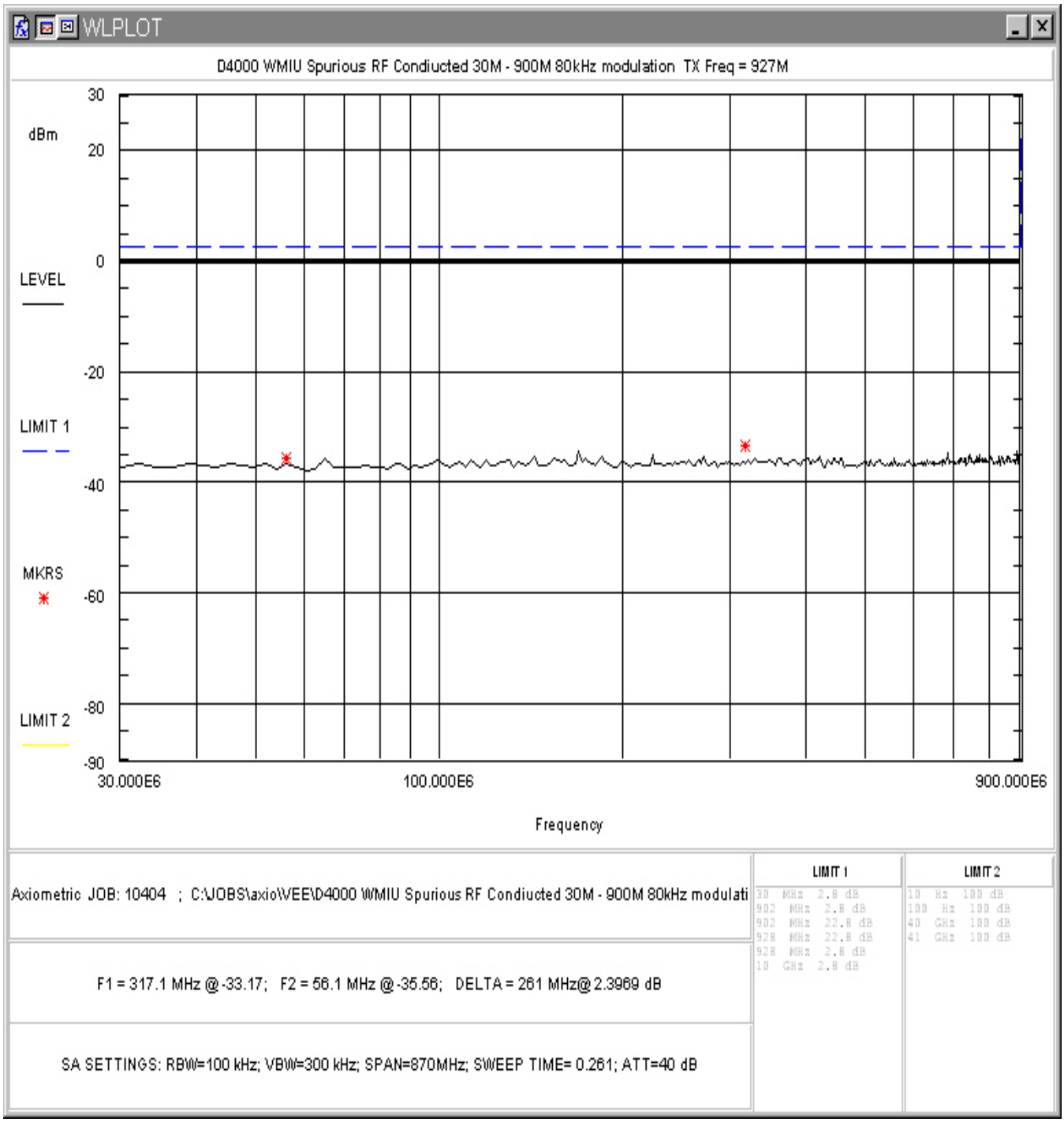

Figure 5-29. Conducted Spurious Emissions, High Channel 80kHz Modulation 30 - 900MHz

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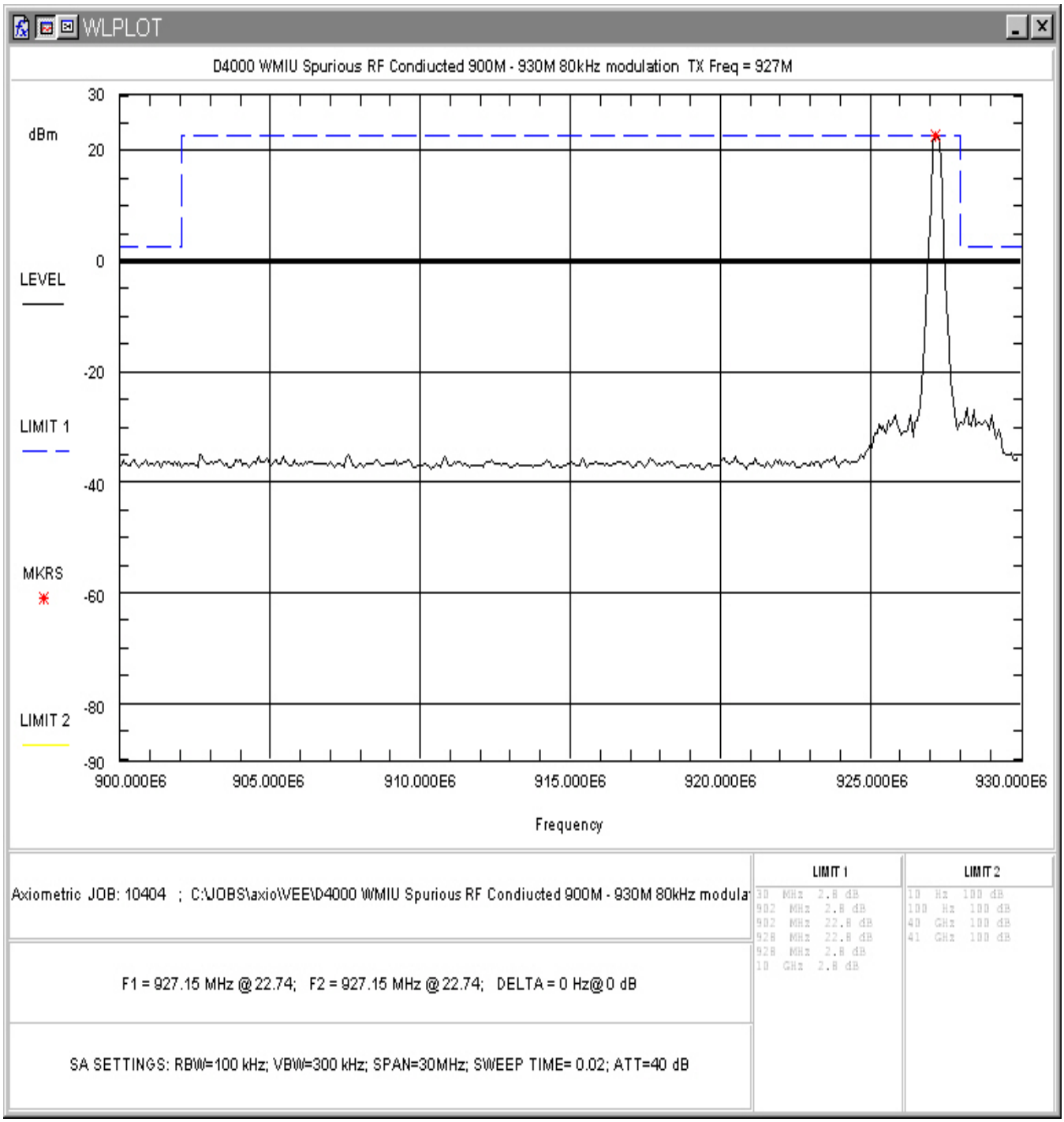

Figure 5-30. Conducted Spurious Emissions, High Channel 80kHz Modulation 900 -930MHz

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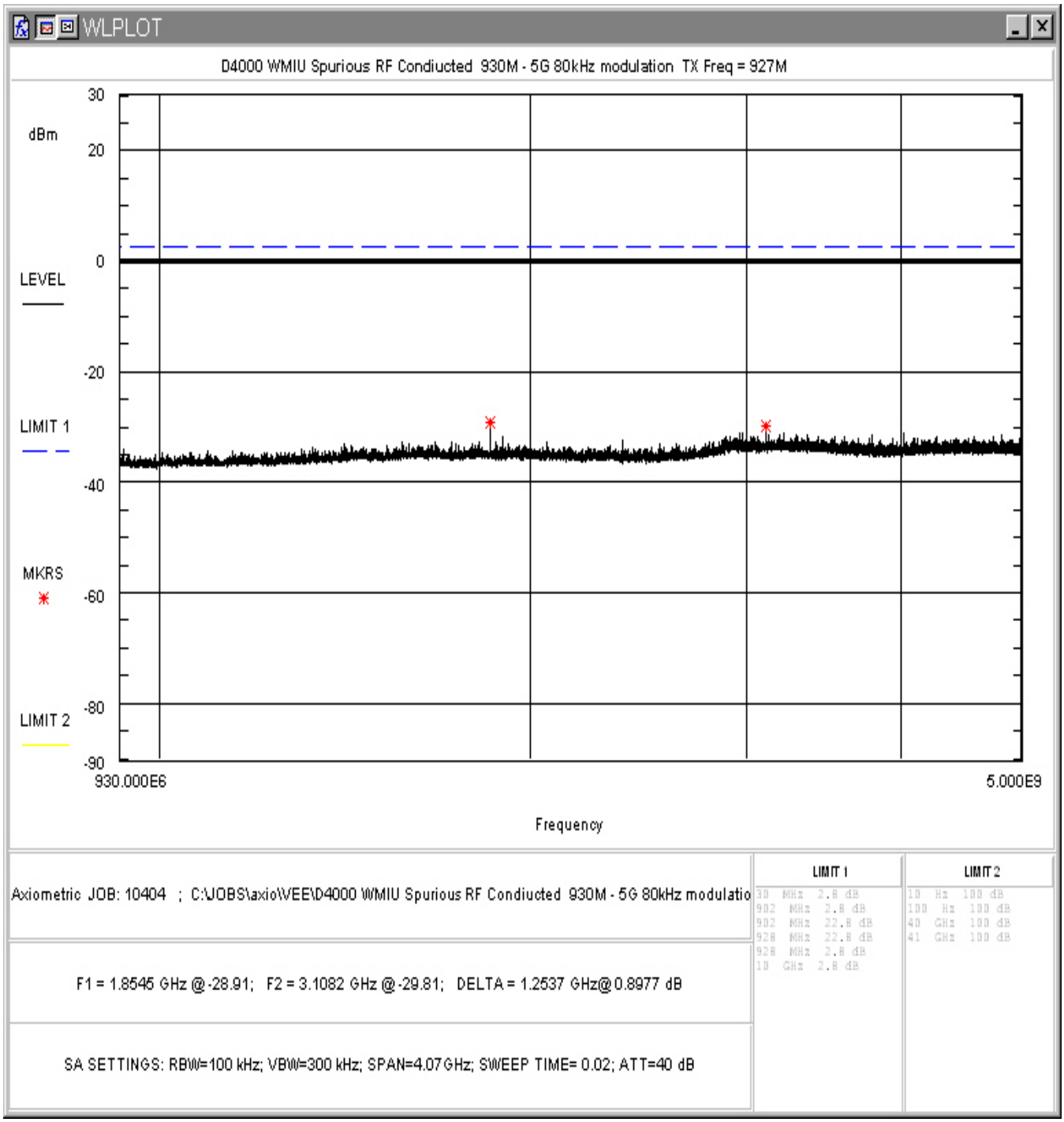

Figure 5-31. Conducted Spurious Emissions, High Channel 80kHz Modulation 930 – 5000MHz

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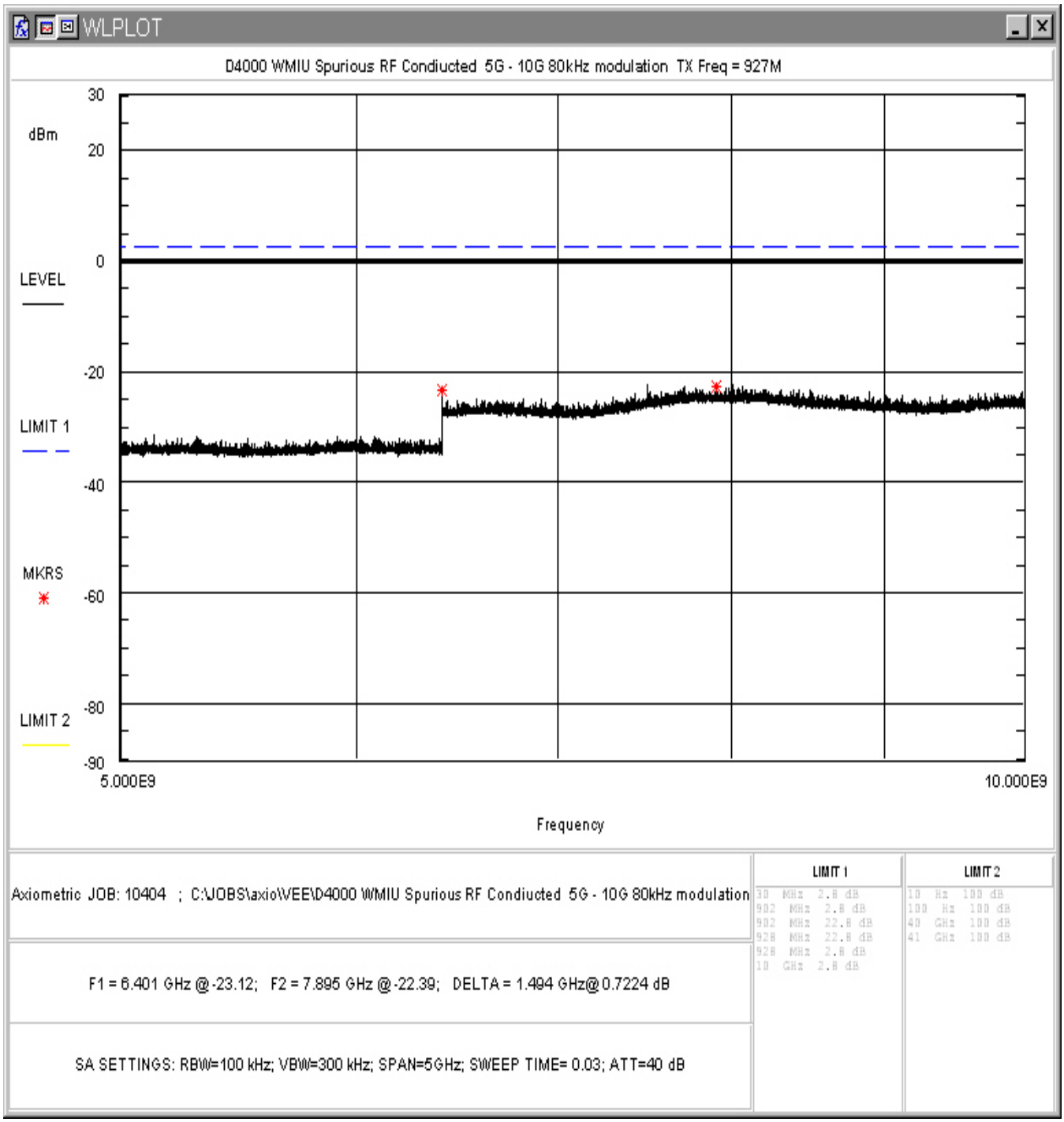

Figure 5-32. Conducted Spurious Emissions, High Channel 80kHz Modulation 5 - 10GHz

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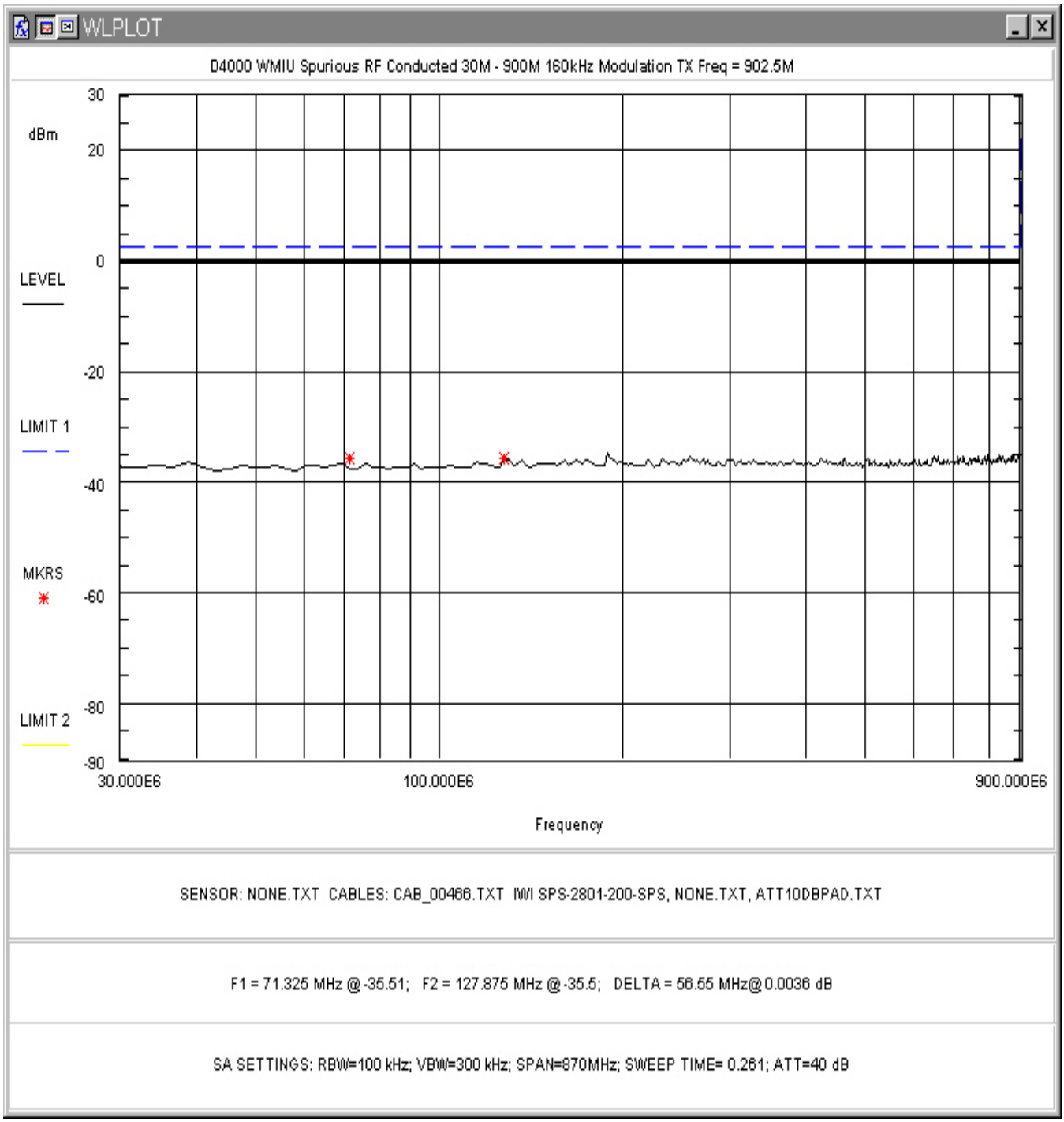

Figure 5-33. Conducted Spurious Emissions, Low Channel 160kHz Modulation 30M – 900M

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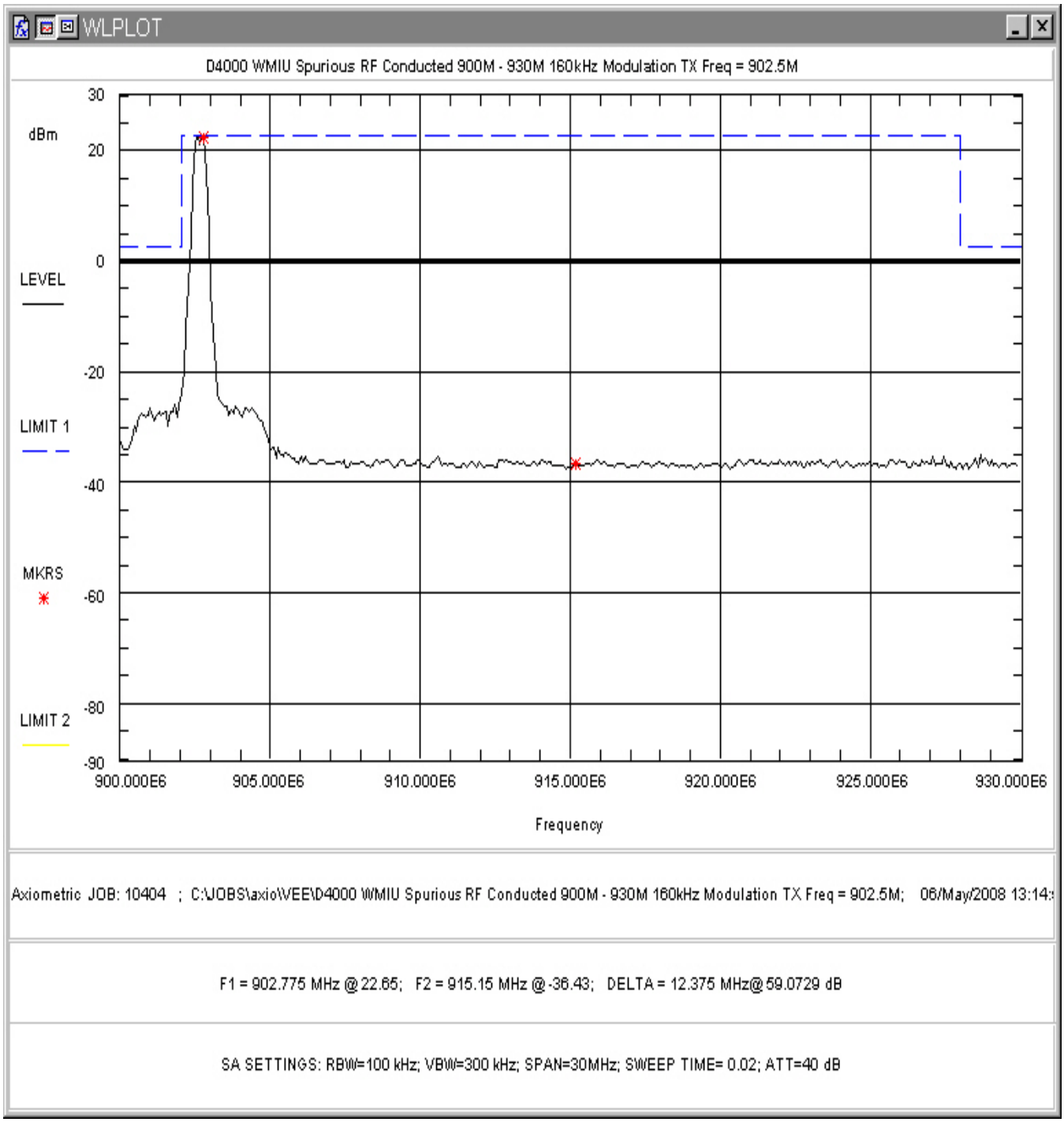

Figure 5-34. Conducted Spurious Emissions, Low Channel 160kHz Modulation 900M – 930M

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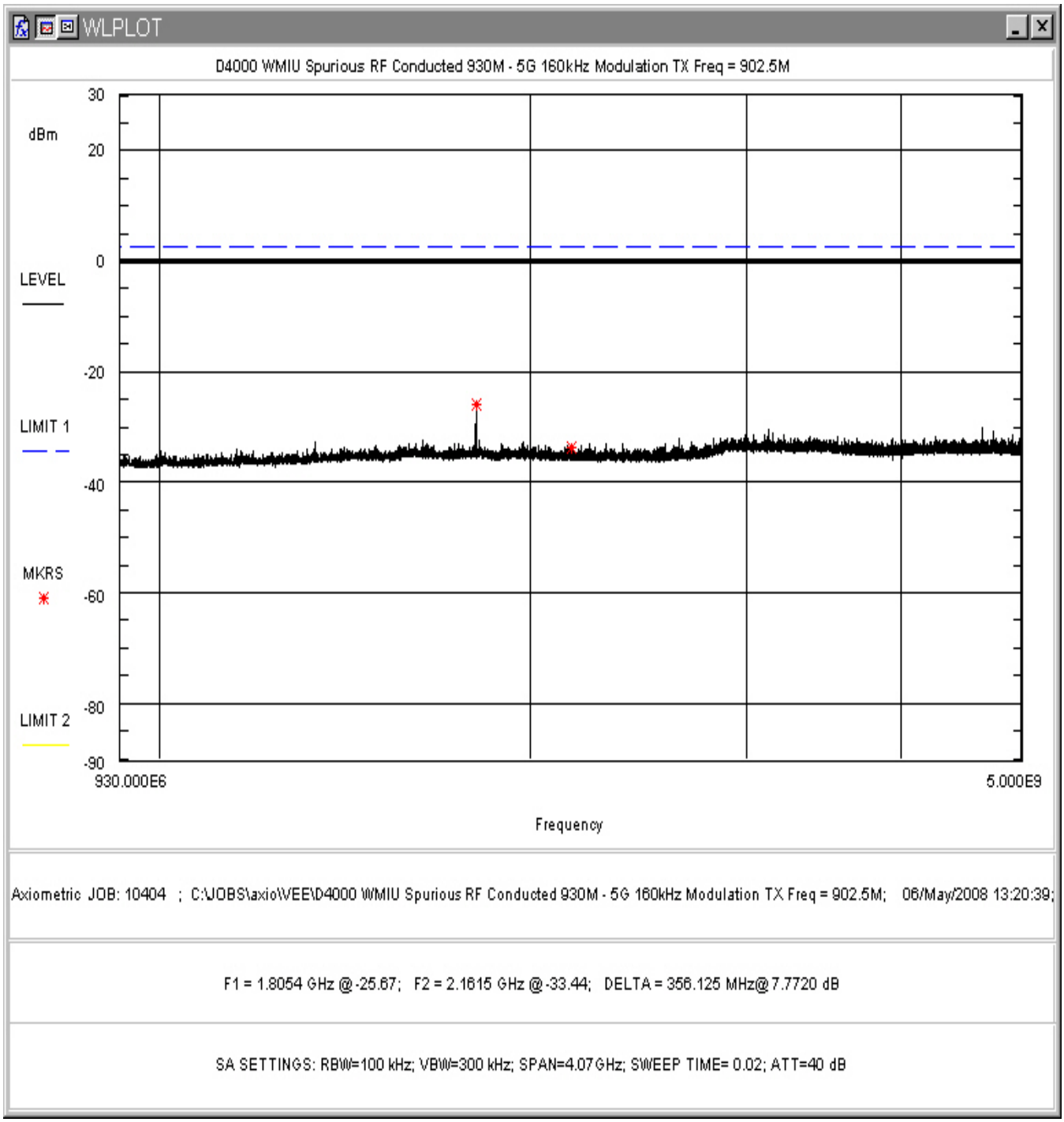

Figure 5-35. Conducted Spurious Emissions, Low Channel 160kHz Modulation 930M – 5G

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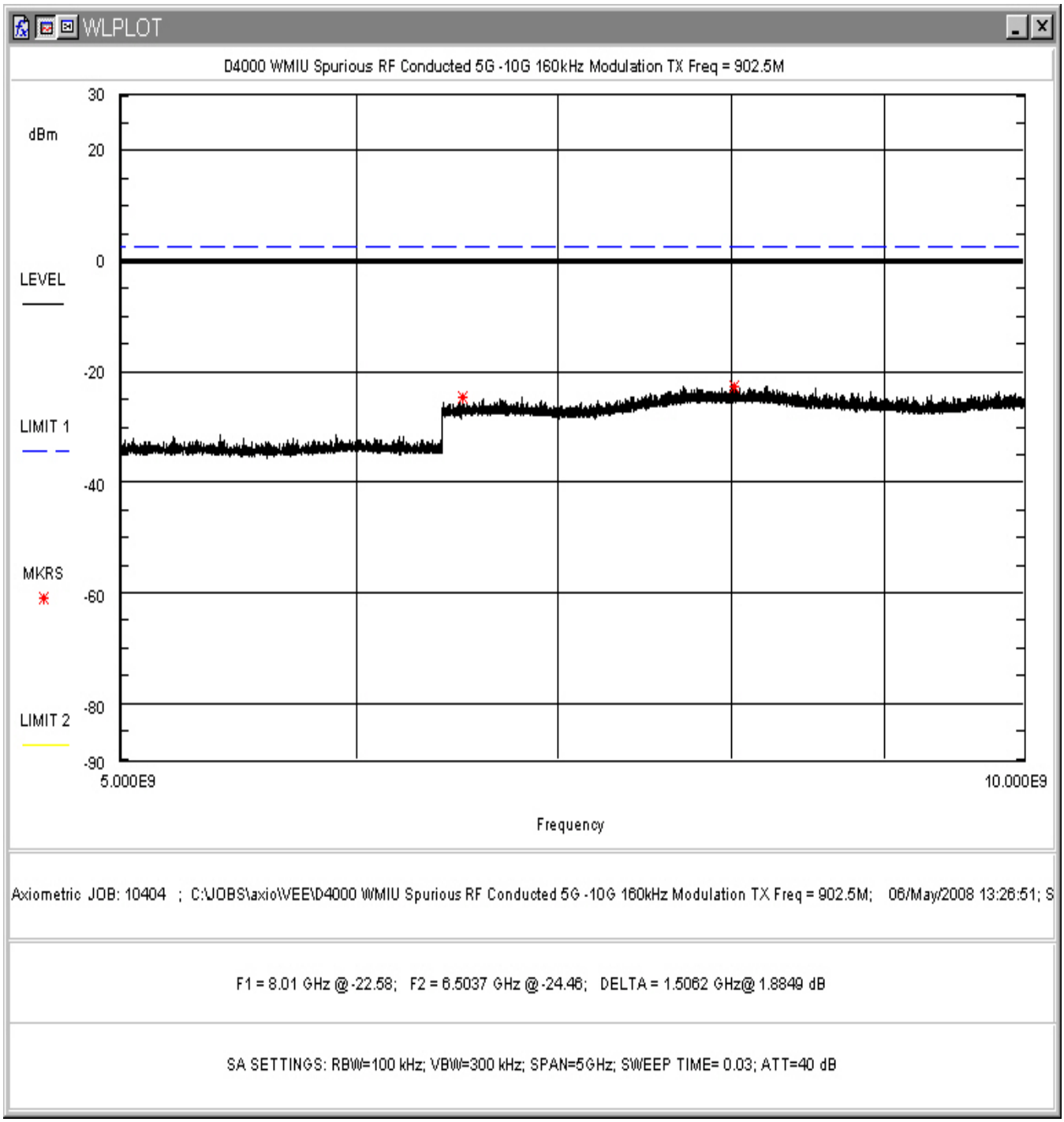

Figure 5-36. Conducted Spurious Emissions, Low Channel 160kHz Modulation 5G – 10G

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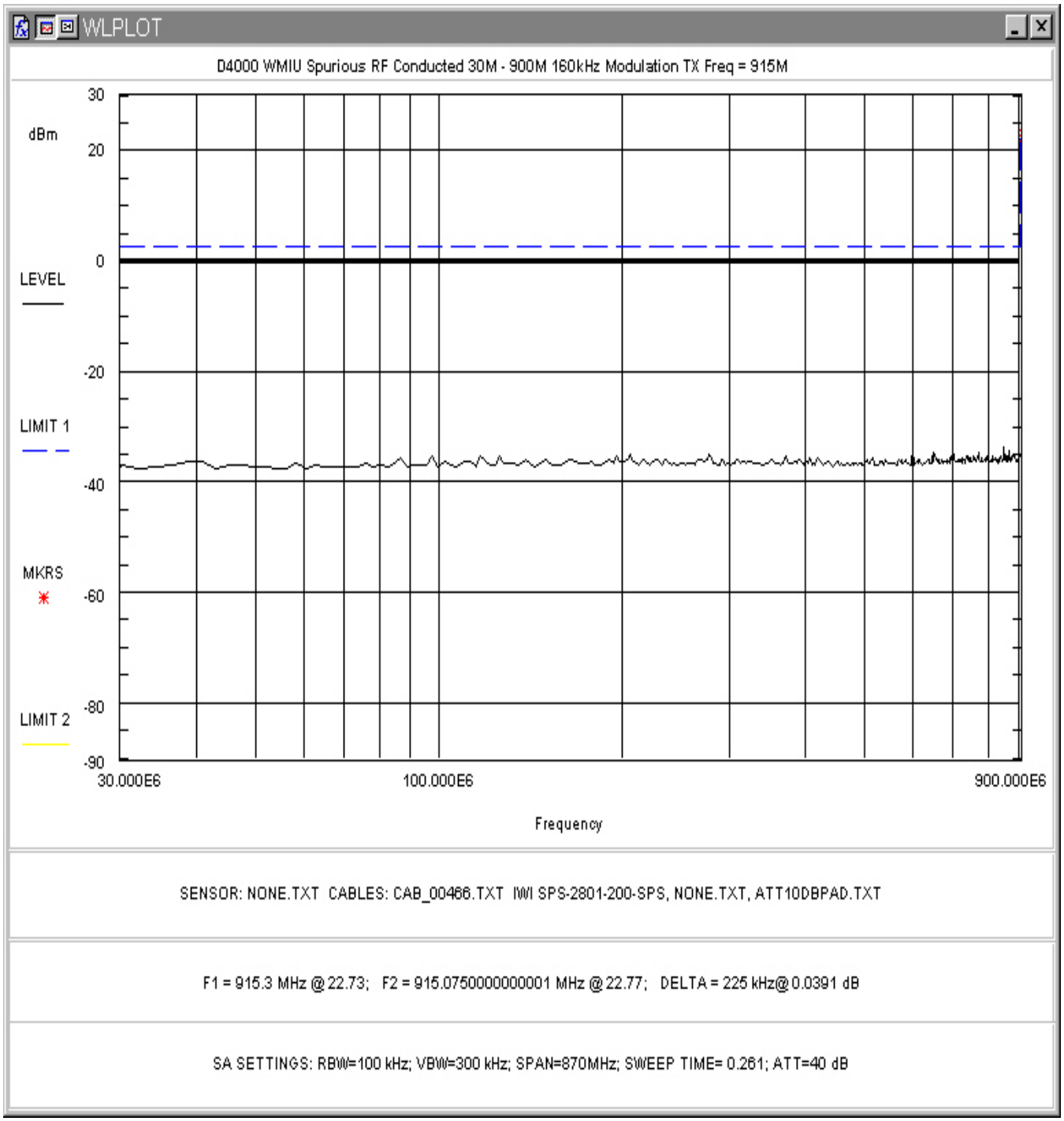

Figure 5-37. Conducted Spurious Emissions, Center Channel 160kHz Modulation 30M – 900M

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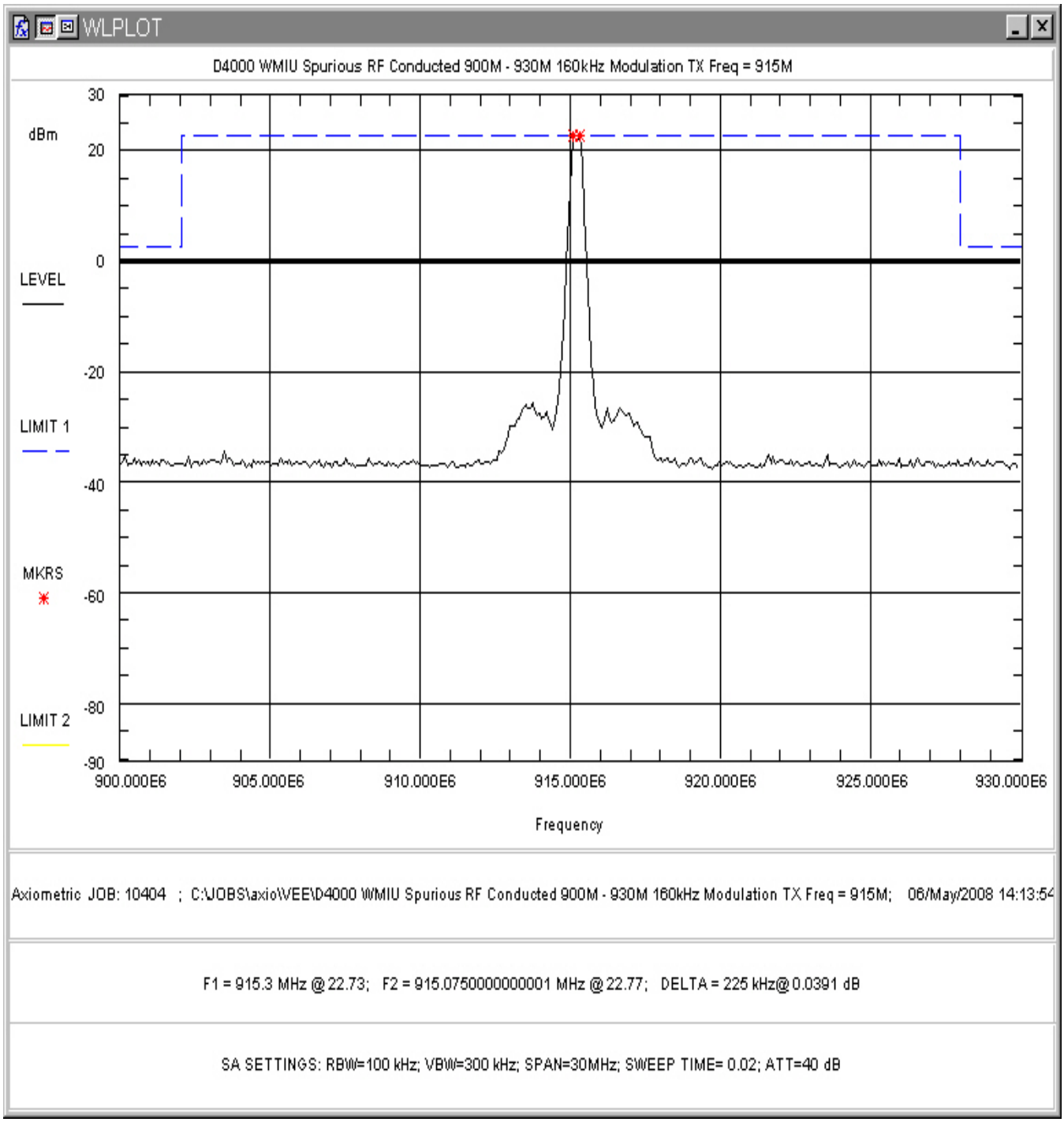

Figure 5-38. Conducted Spurious Emissions, Center Channel 160kHz Modulation 900M – 930M

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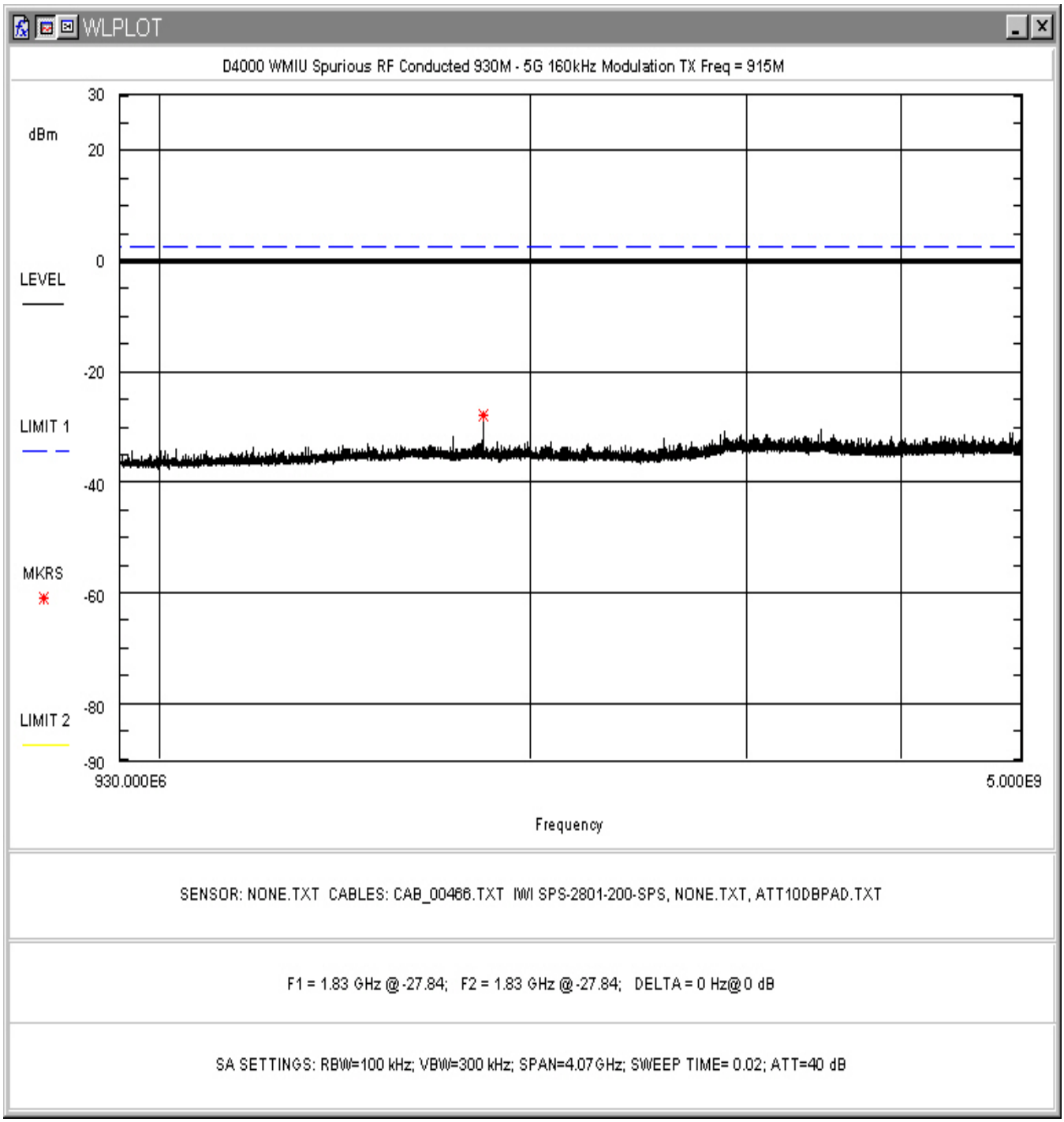

Figure 5-39. Conducted Spurious Emissions, Center Channel 160kHz Modulation 930M – 5G

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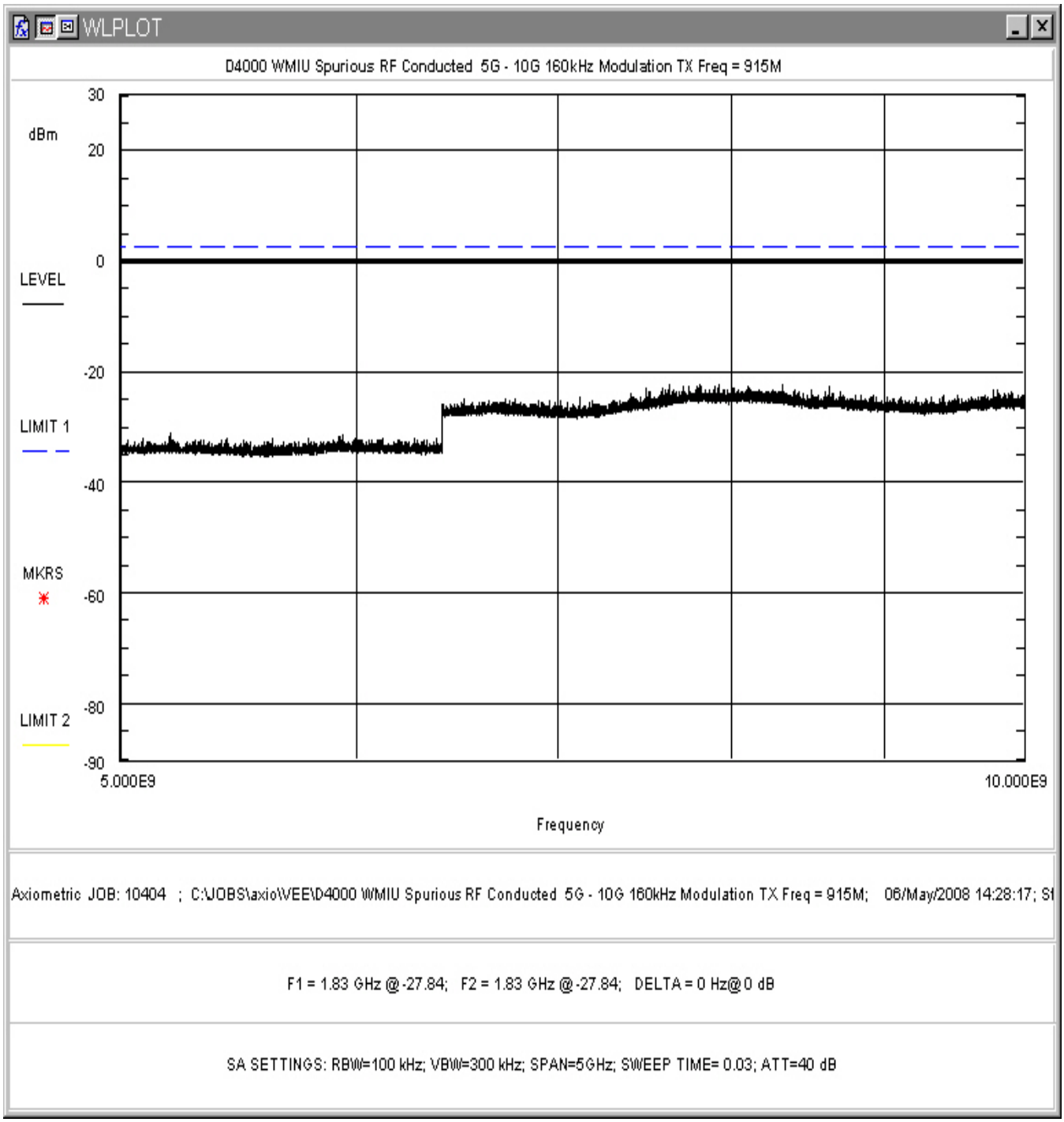

Figure 5-40. Conducted Spurious Emissions, Center Channel 160kHz Modulation 5G – 10G

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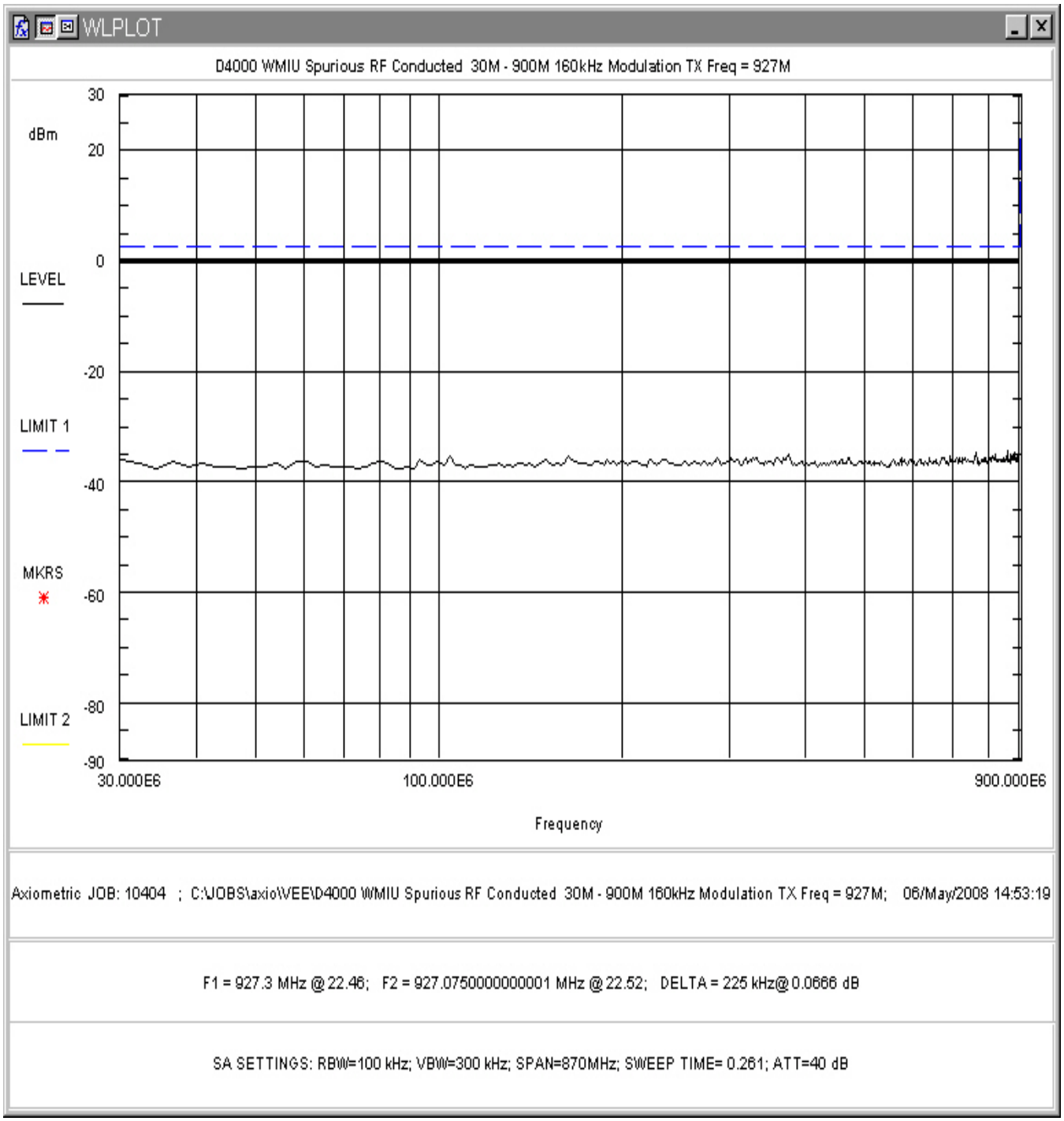

Figure 5-41. Conducted Spurious Emissions, High Channel 160kHz Modulation 30M – 900M

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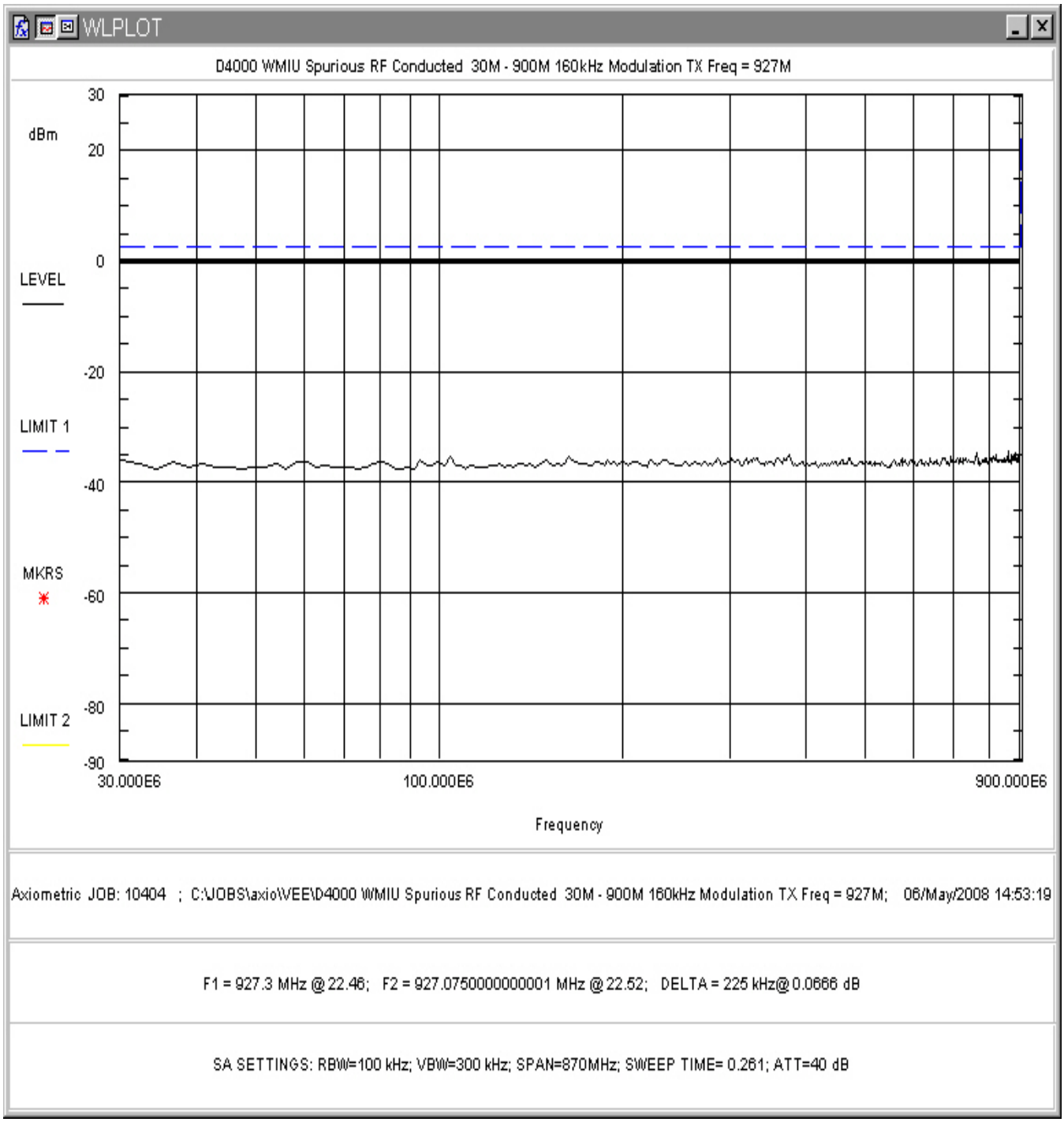

Figure 5-42. Conducted Spurious Emissions, High Channel 160kHz Modulation 900M – 930M

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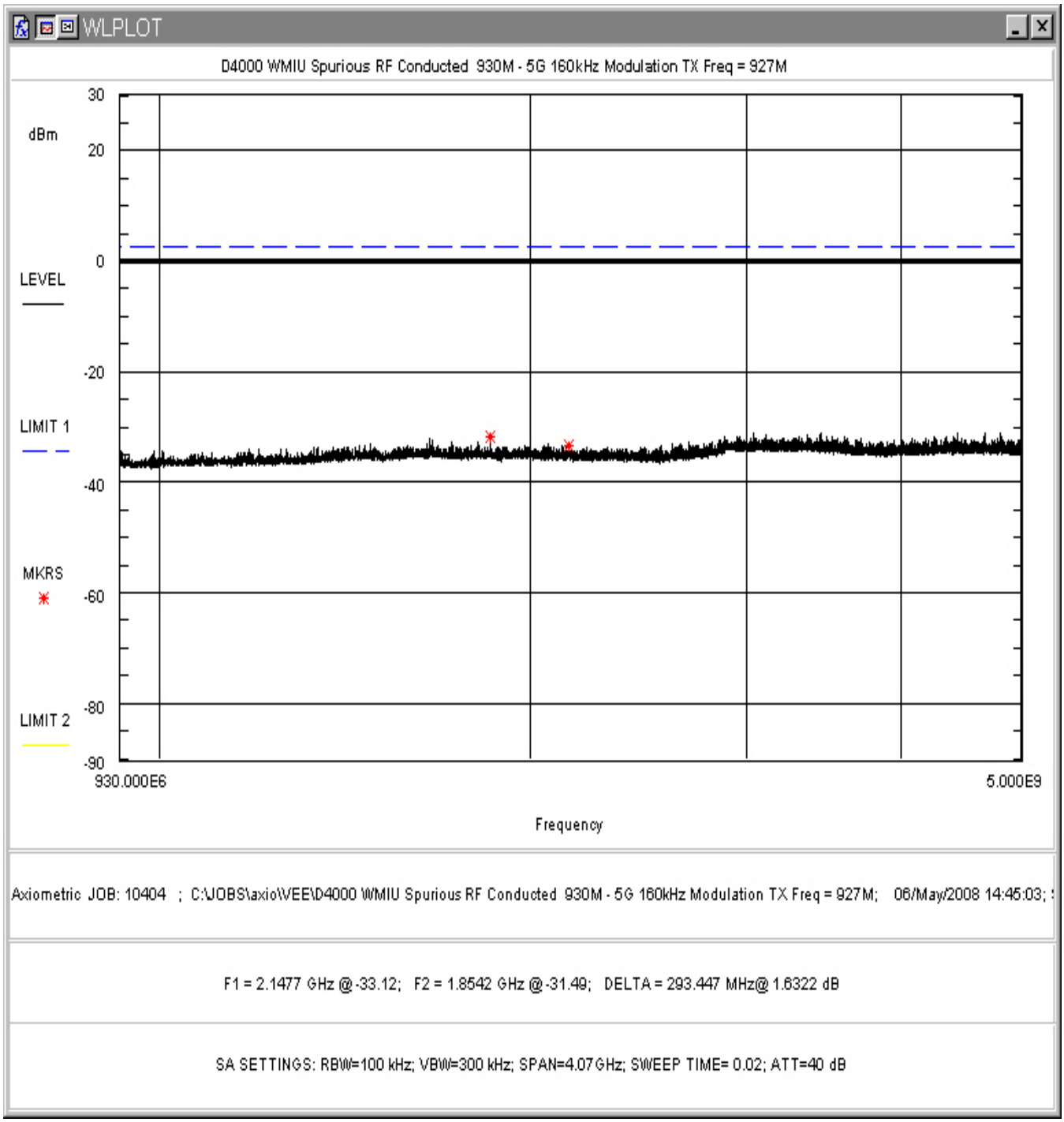

Figure 5-43. Conducted Spurious Emissions, High Channel 160kHz Modulation 930M – 5G

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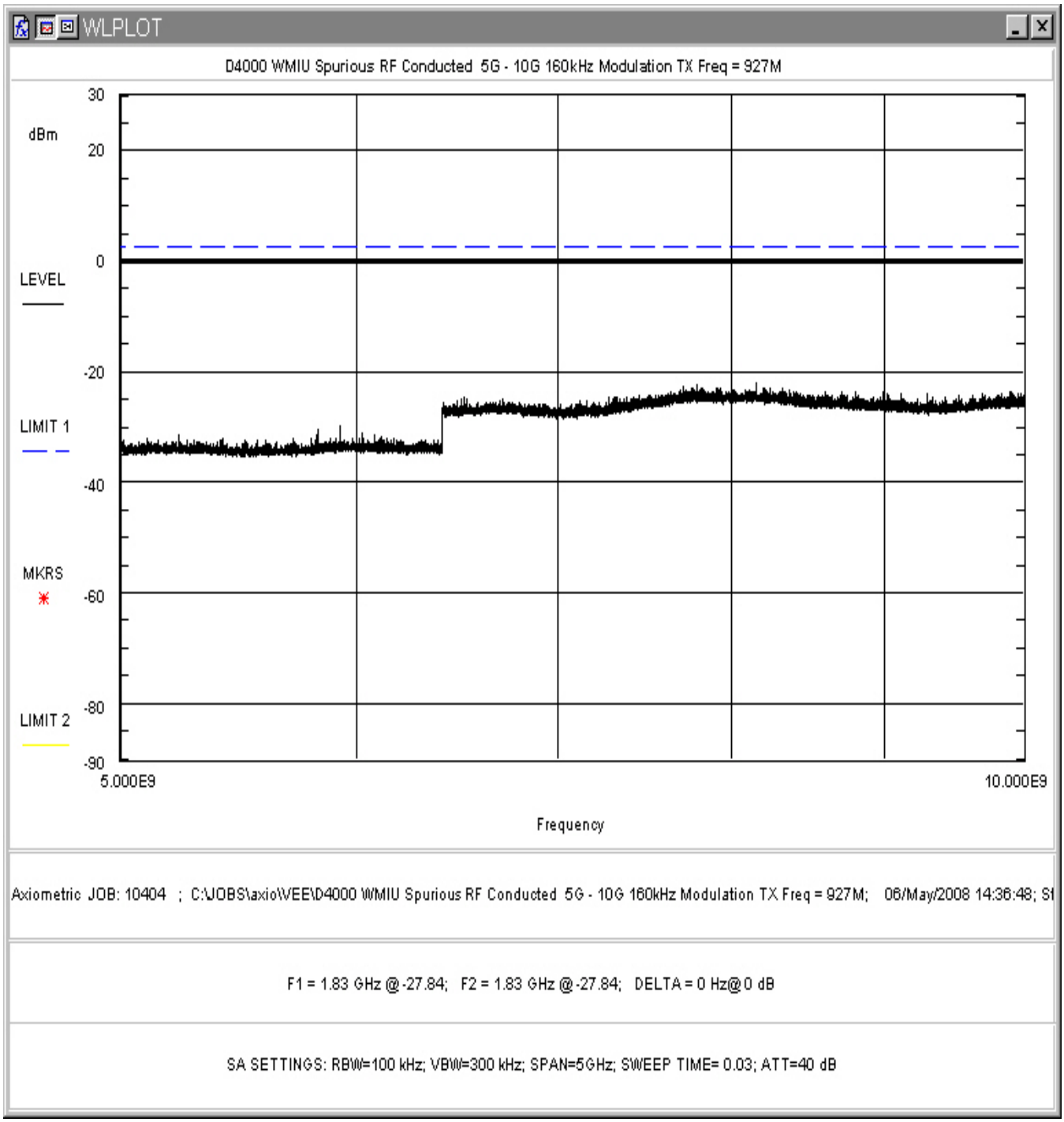

Figure 5-44. Conducted Spurious Emissions, High Channel 160kHz Modulation 5G – 10G

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5.6 Conducted Band Edge Emissions at Antenna Terminals: 15.247(d), RSS-210 [A8. 5]

The following plots show close-up plots of the allowable band edges with the EUT in both the stationary and hopping modes of operation. The EUT shall be 20dBc at the band edges in a 100kHz resolution bandwidth.

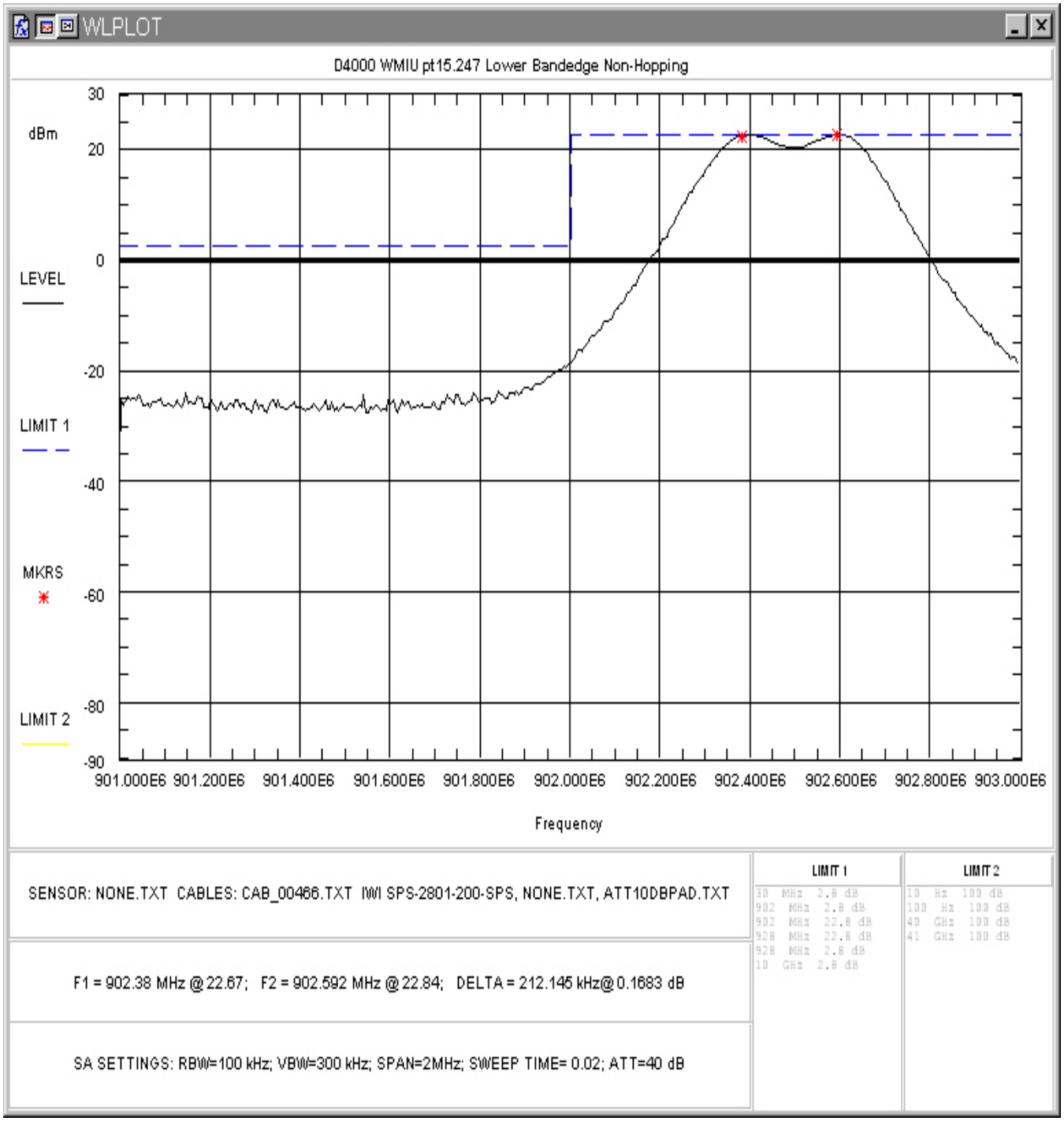

Figure 5-45. Conducted Lower Band Edge, Non-hopping 160kHz Modulation Low Channel

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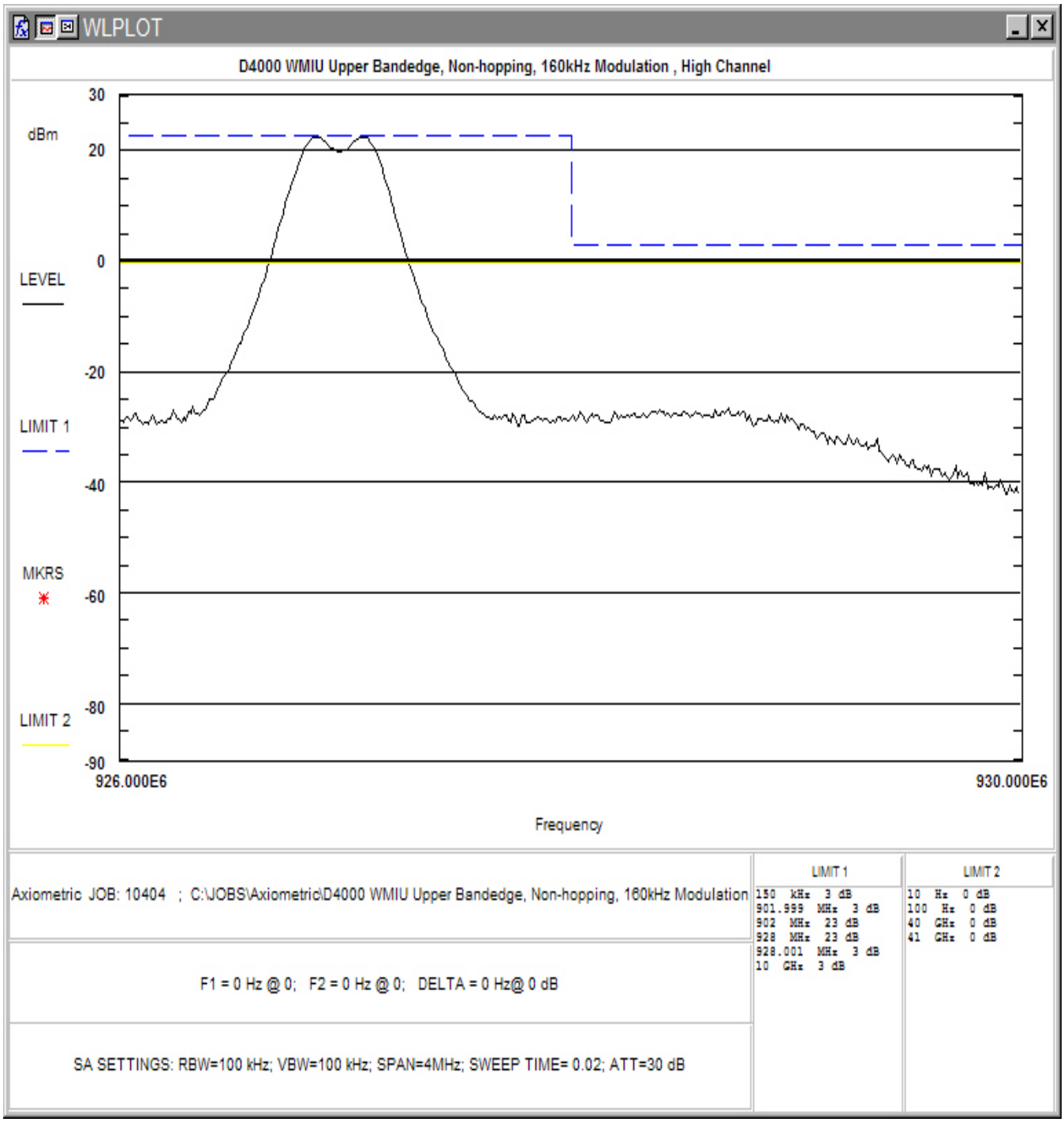

Figure 5-46. Conducted Upper Band Edge, Non-hopping 160kHz Modulation High Channel

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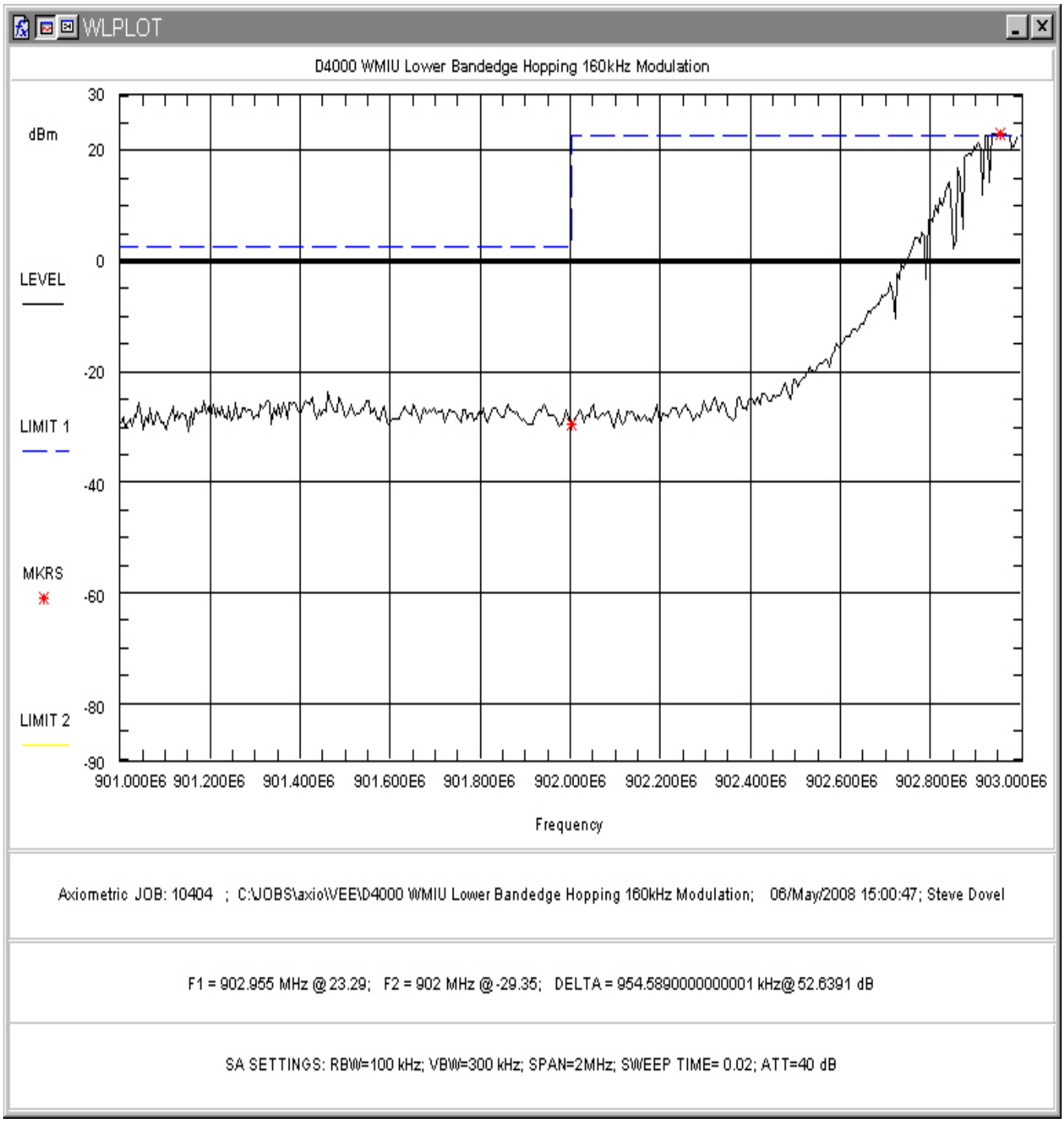

Figure 5-47. Conducted Lower Band Edge, 160kHz Modulation Hopping Mode

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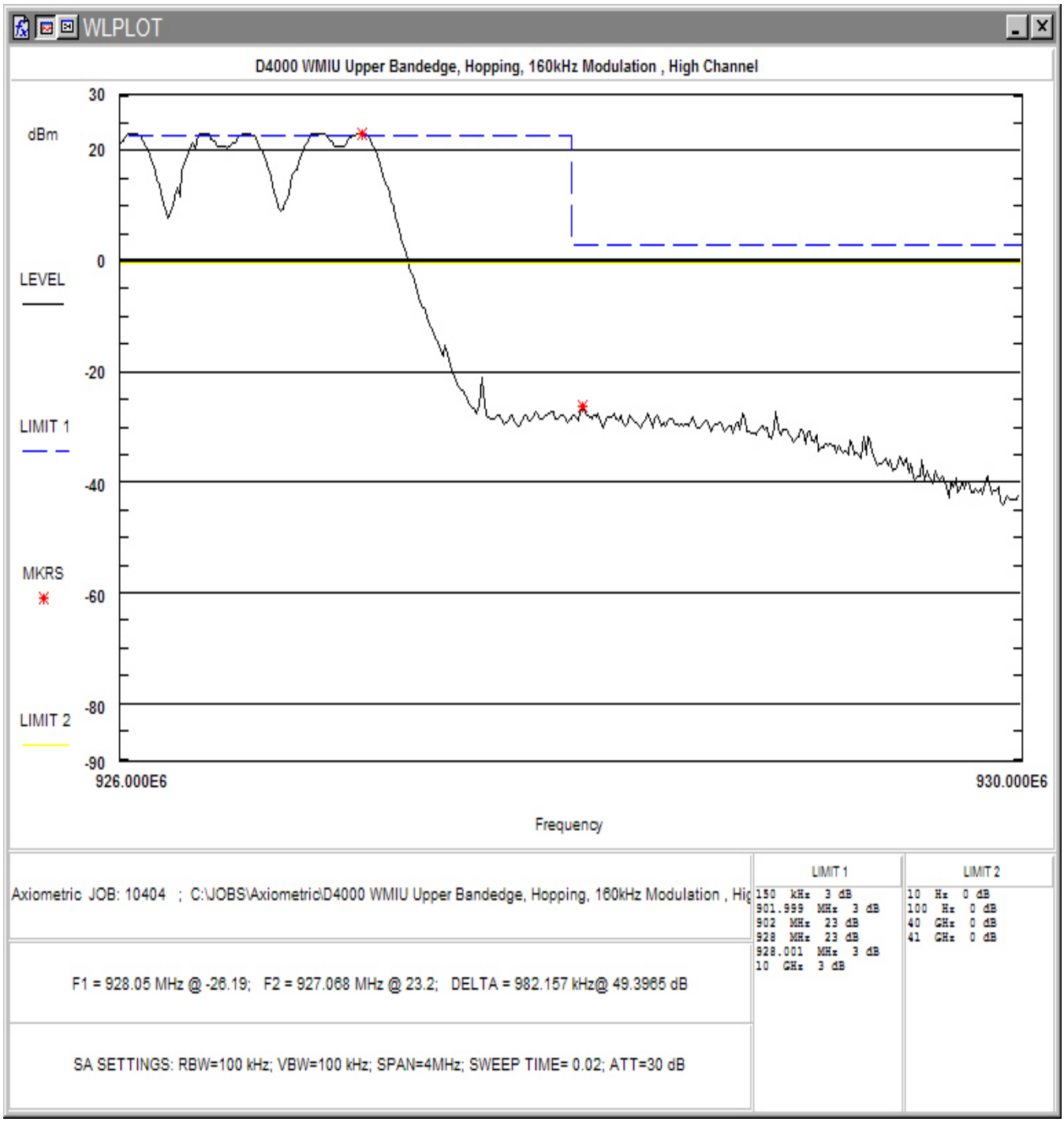

Figure 5-48. Conducted Upper Band Edge, 160kHz Modulation Hopping Mode

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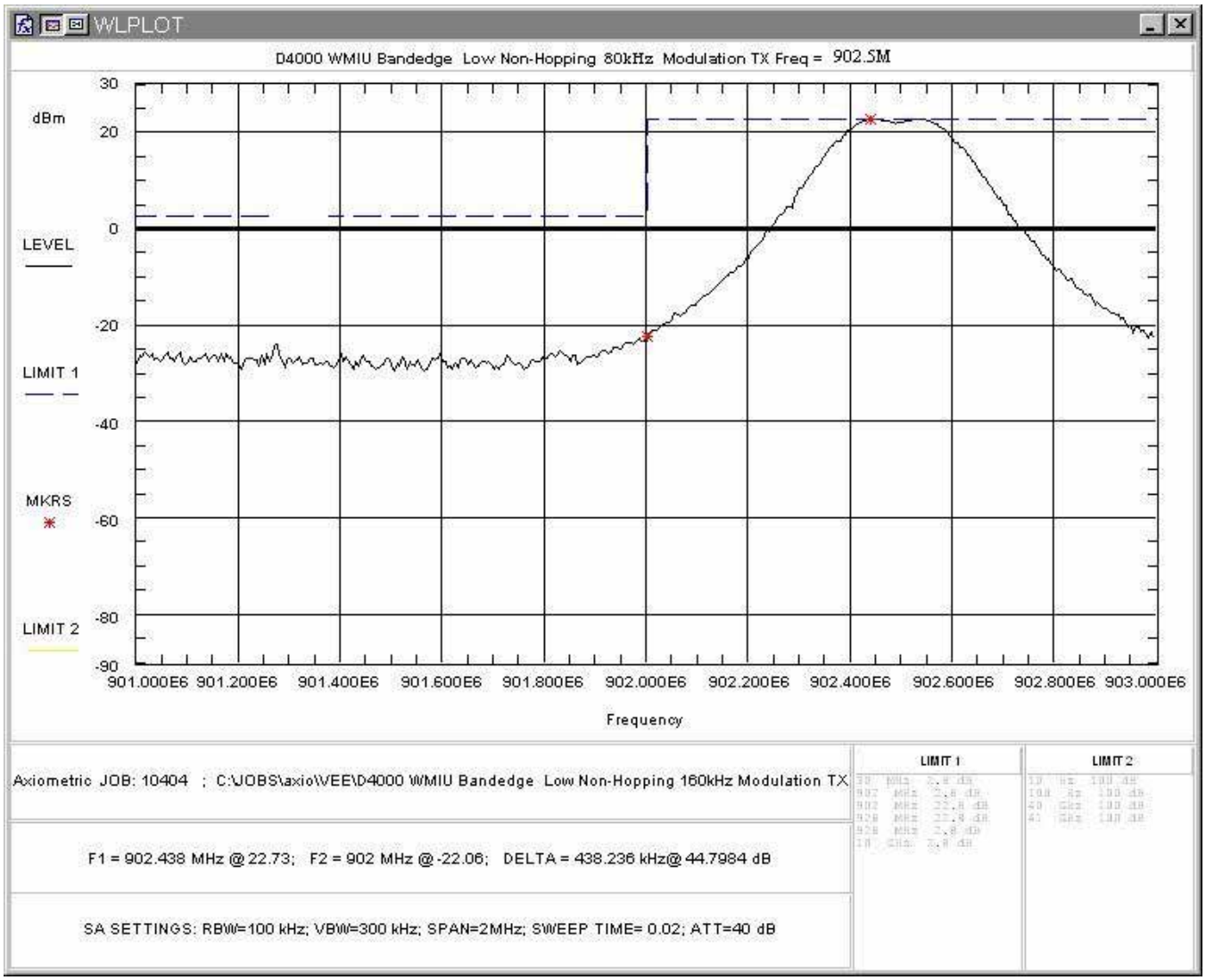

Figure 5-49. Conducted Lower Band Edge, Non-hopping 80kHz Modulation Low Channel

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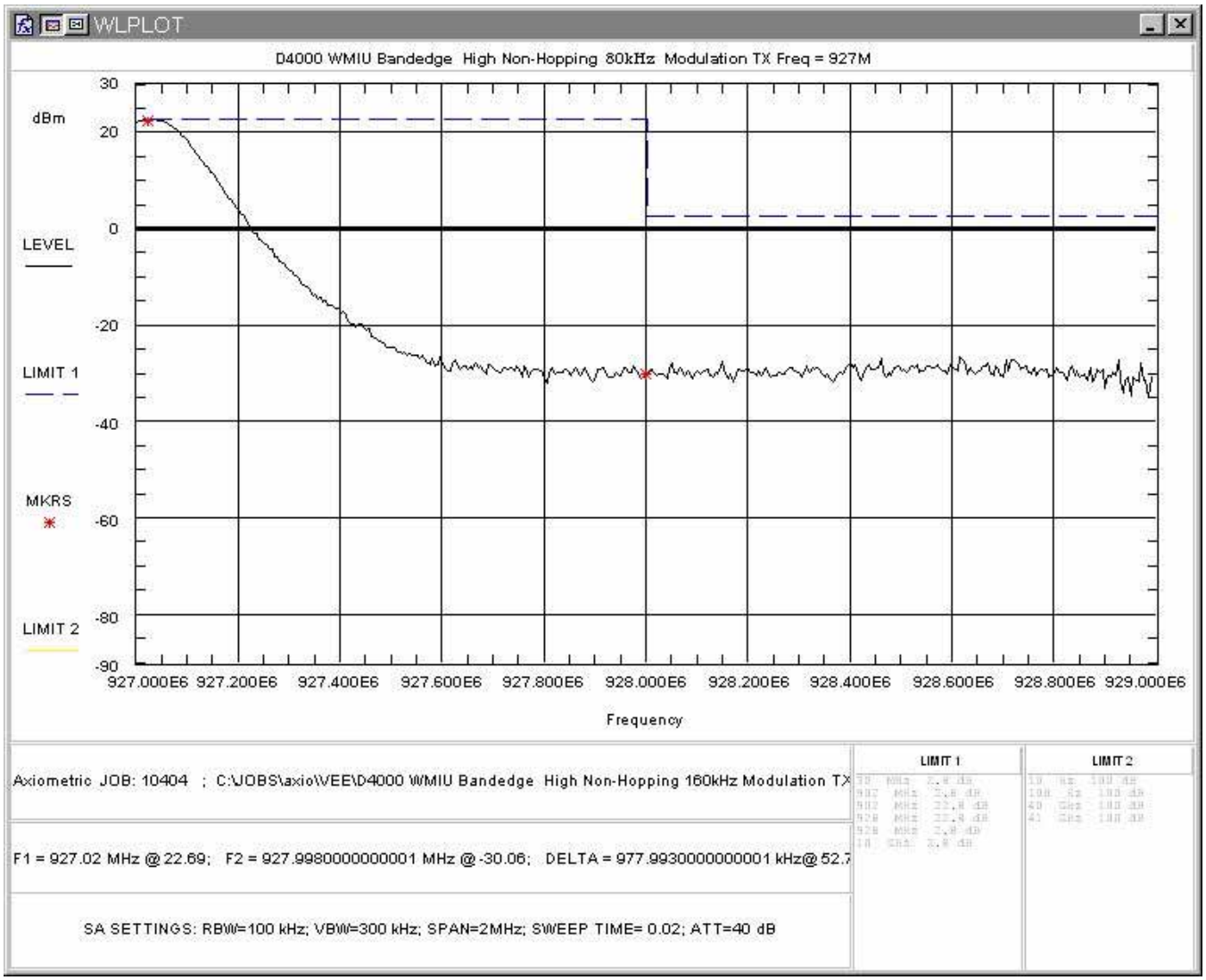

Figure 5-50. Conducted Upper Band Edge, Non-hopping 80kHz Modulation High Channel

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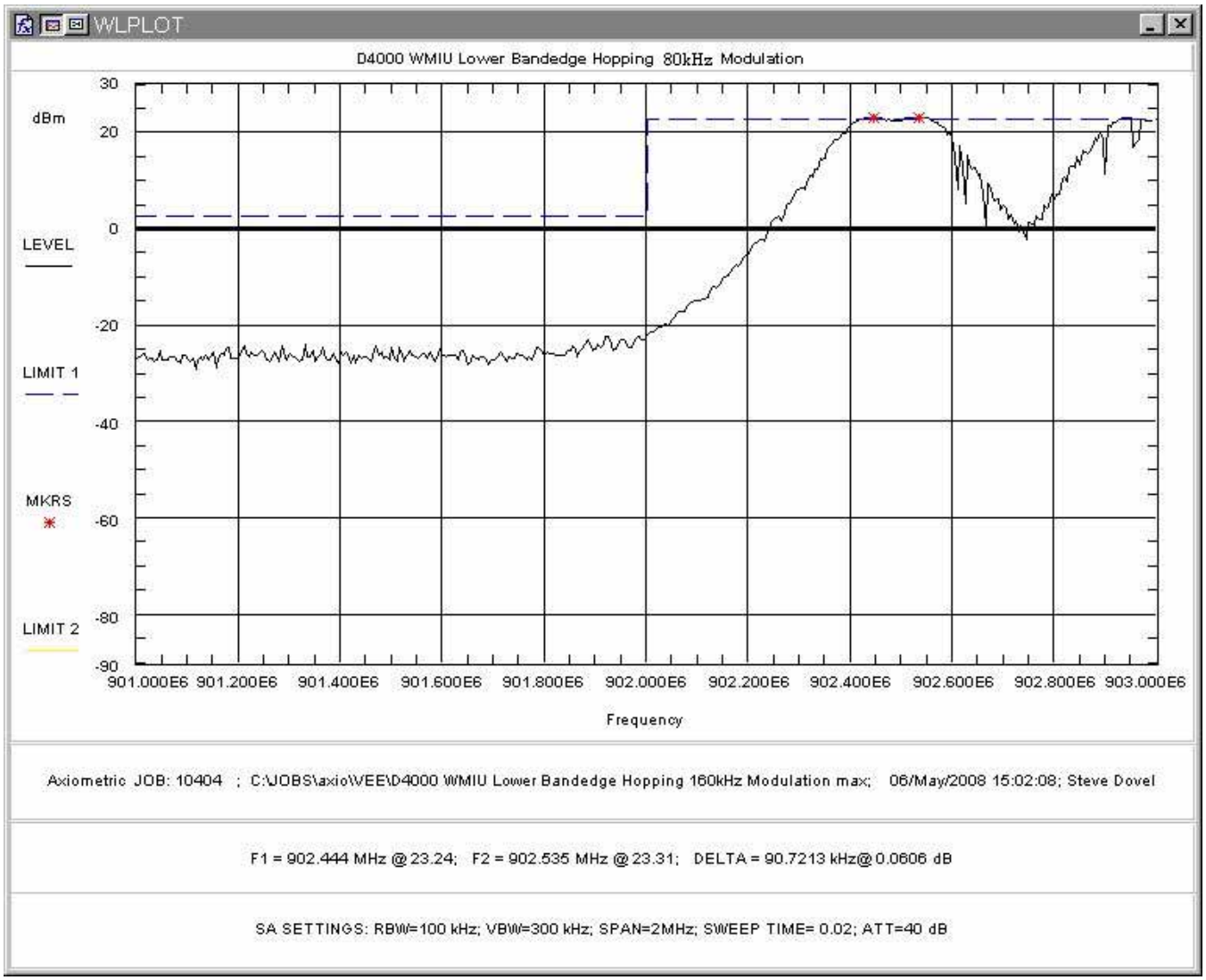

Figure 5-51. Conducted Lower Band Edge, 80kHz Modulation Hopping Mode

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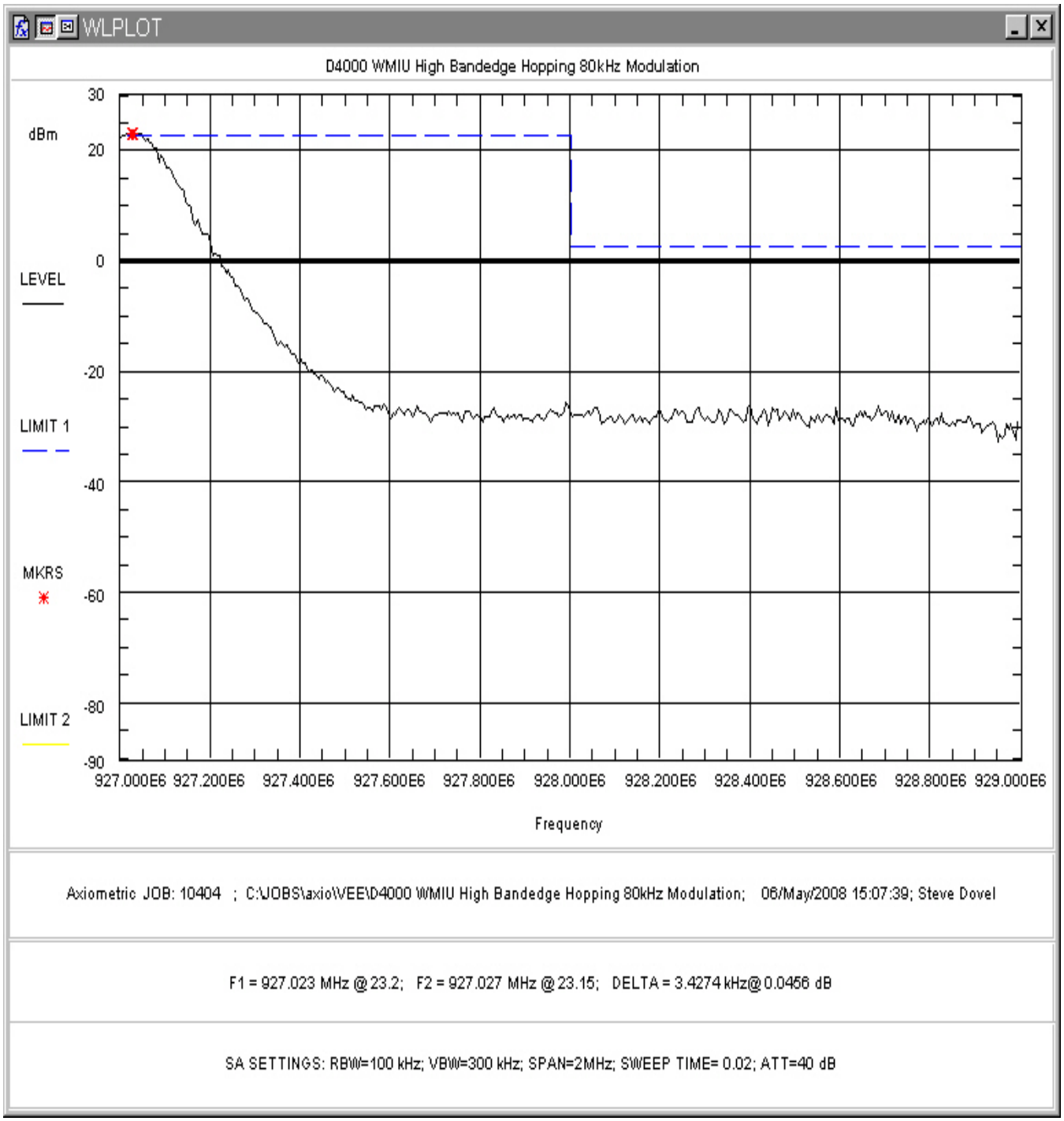

Figure 5-52. Conducted Upper Band Edge, 80kHz Modulation Hopping Mode

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5.7 Transmit Radiated Spurious Emissions: (FCC Part §15.205, §15.209, RSS210 (A.5))

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.

5.7.1 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 emissions were measured using the following resolution bandwidths:

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

5.7.2 Test Summary

The EUT complied with the requirements for radiated emissions FCC part 15.247 and IC RSS-210e issue 7.

Table 8: Radiated Emission Test Data, 3-meters

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
44.238	H	0.0	1.0	-2.6	10.5	0.8	8.6	2.7	100.0	-31.4
132.700	H	0.0	1.0	-1.1	13.6	1.1	13.6	4.8	150.0	-29.9
206.444	H	0.0	1.0	-2.0	11.4	1.2	10.6	3.4	150.0	-32.9
294.920	H	0.0	1.0	0.6	13.3	1.6	15.5	5.9	200.0	-30.5
353.904	H	0.0	1.0	0.7	14.7	1.9	17.2	7.3	200.0	-28.8
427.634	H	0.0	1.0	1.2	16.0	2.3	19.5	9.4	200.0	-26.6
737.300	H	0.0	1.0	-1.9	20.9	3.6	22.6	13.5	200.0	-23.4

Note: Only Ambient reading were taken because there were no emissions noted at 3 meters from the digital portion of the device. The frequencies were chosen because they are harmonics of the 14.746 MHz processor clock.

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Table 9: Radiated Emission Test Data, >1GHz

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)	Notes
TX @ 915 MHz												
2744.950	V	67.5	2.4	51.9	29.6	2.4	36.2	47.6	240.3	5000.0	-26.4	P
2744.950	V	67.5	2.4	42.6	29.6	2.4	36.2	38.3	82.4	500.0	-15.7	A
3659.950	V	90.0	1.8	55.4	30.8	4.0	35.7	54.5	532.1	5000.0	-19.5	P
3659.950	V	90.0	1.8	51.8	30.8	4.0	35.7	50.9	350.3	500.0	-3.1	A
4575.050	V	135.0	1.8	53.9	32.1	4.9	35.4	55.5	593.9	5000.0	-18.5	P
4575.050	V	135.0	1.8	48.2	32.1	4.9	35.4	49.8	308.8	500.0	-4.2	A
TX @ 902.5 MHz												
2707.450	V	90.0	2.3	51.3	29.5	2.2	36.3	46.8	219.0	5000.0	-27.2	P
2707.450	V	90.0	2.3	42.2	29.5	2.2	36.3	37.7	76.7	500.0	-16.3	A
3609.900	V	90.0	2.4	54.8	30.7	3.9	35.7	53.6	480.2	5000.0	-20.4	P
3609.900	V	90.0	2.4	50.1	30.7	3.9	35.7	48.9	278.9	500.0	-5.1	A
4512.640	V	135.0	2.0	54.4	32.0	4.9	35.4	55.9	623.6	5000.0	-18.1	P
4512.640	V	135.0	2.0	49.6	32.0	4.9	35.4	51.1	359.7	500.0	-2.9	A
5415.375	V	0.0	2.0	50.6	33.5	5.4	35.3	54.3	516.0	5000.0	-19.7	P
5415.375	V	0.0	2.0	42.2	33.5	5.4	35.3	45.8	195.0	500.0	-8.2	A
TX @ 927 MHz												
2781.000	V	90.0	2.3	51.0	29.6	2.6	36.2	47.0	224.2	5000.0	-27.0	P
2781.000	V	90.0	2.3	41.6	29.6	2.6	36.2	37.6	76.2	500.0	-16.3	A
3708.000	V	90.0	2.3	53.4	30.8	4.2	35.7	52.7	430.4	5000.0	-21.3	P
3708.000	V	90.0	2.3	48.6	30.8	4.2	35.7	47.9	248.5	500.0	-6.1	A
4635.000	V	135.0	1.7	53.7	32.2	5.0	35.4	55.4	589.2	5000.0	-18.6	P
4635.000	V	135.0	1.7	48.0	32.2	5.0	35.4	49.7	306.7	500.0	-4.2	A
TX @ 915 MHz												
2744.950	H	112.5	1.6	54.4	29.6	2.4	36.2	50.2	321.9	5000.0	-23.8	P
2744.950	H	112.5	1.6	49.5	29.6	2.4	36.2	45.3	183.9	500.0	-8.7	A
3659.950	H	0.0	1.6	51.4	30.8	4.0	35.7	50.4	333.0	5000.0	-23.5	P
3659.950	H	0.0	1.6	38.3	30.8	4.0	35.7	37.4	74.0	500.0	-16.6	A
4575.050	H	225.0	1.6	50.9	32.1	4.9	35.4	52.5	423.9	5000.0	-21.4	P
4575.050	H	225.0	1.6	44.3	32.1	4.9	35.4	45.9	196.4	500.0	-8.1	A
TX @ 902.5 MHz												
2707.450	H	67.5	2.2	51.9	29.5	2.2	36.3	47.4	233.3	5000.0	-26.6	P
2707.450	H	67.5	2.2	43.8	29.5	2.2	36.3	39.3	92.0	500.0	-14.7	A
3609.900	H	202.5	2.2	53.0	30.7	3.9	35.7	51.8	389.9	5000.0	-22.2	P
3609.900	H	202.5	2.2	47.8	30.7	3.9	35.7	46.6	214.8	500.0	-7.3	A
4512.640	H	225.0	2.3	53.8	32.0	4.9	35.4	55.3	581.3	5000.0	-18.7	P
4512.640	H	225.0	2.3	49.0	32.0	4.9	35.4	50.4	333.0	500.0	-3.5	A
5415.375	H	90.0	2.3	49.7	33.5	5.4	35.3	53.3	462.0	5000.0	-20.7	P
5415.375	H	90.0	2.3	38.5	33.5	5.4	35.3	42.1	127.7	500.0	-11.9	A
TX @ 927 MHz												
2781.000	H	90.0	2.3	51.6	29.6	2.6	36.2	47.6	240.6	5000.0	-26.4	P

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Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)	Notes
2781.000	H	90.0	2.3	44.5	29.6	2.6	36.2	40.5	105.7	500.0	-13.5	A
3708.000	H	180.0	2.3	52.6	30.8	4.2	35.7	51.9	394.8	5000.0	-22.1	P
3708.000	H	180.0	2.3	45.4	30.8	4.2	35.7	44.7	171.5	500.0	-9.3	A
4635.000	H	157.5	2.3	51.6	32.2	5.0	35.4	53.3	464.8	5000.0	-20.6	P
4635.000	H	157.5	2.3	44.5	32.2	5.0	35.4	46.2	205.2	500.0	-7.7	A

P = Peak A = Average

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5.8 Receiver Radiated Spurious Emissions: (FCC Part §15.209, RSS-Gen [7.2.3.2])

The EUT must comply with the requirements for radiated spurious emissions from the receiver. These emissions must meet the limits specified in §15.209 and RSS-Gen.

5.8.1 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 emissions were measured using the following resolution bandwidths:

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

5.8.2 Test Summary

The EUT complied with the requirements for receiver radiated emissions FCC 15.209 IC RSS-Gen. Receiver Radiated Spurious Test Data

Table 10: Receiver Radiated Test Data

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
44.238	H	0.0	1.0	-2.6	10.5	0.8	8.6	2.7	100.0	-31.4
132.700	H	0.0	1.0	-1.1	13.6	1.1	13.6	4.8	150.0	-29.9
206.444	H	0.0	1.0	-2.0	11.4	1.2	10.6	3.4	150.0	-32.9
294.920	H	0.0	1.0	0.6	13.3	1.6	15.5	5.9	200.0	-30.5
353.904	H	0.0	1.0	0.7	14.7	1.9	17.2	7.3	200.0	-28.8
427.634	H	0.0	1.0	1.2	16.0	2.3	19.5	9.4	200.0	-26.6
737.300	H	0.0	1.0	-1.9	20.9	3.6	22.6	13.5	200.0	-23.4

Note: Only Ambient reading were taken because there were no emissions noted at 3 meters from the device.

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