Washington Laboratories, Ltd.

FCC & Industry Canada Certification Test Report
For the
Matric Limited
CAN Bridge CB-500LR

FCC ID: K5B-CB500LR
IC ID: 3926A-CB500LR

WLL JOB# **9233**
August 31, 2006

Prepared for:

Matric Limited
2099 Hill City Road
Seneca, PA 16346

Prepared By:

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

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Prepared by: Brian J. Dettling
Documentation Specialist

Reviewed by: Gregory M. Snyder
Chief EMC Engineer

Abstract

This report has been prepared on behalf of Matric Limited to support the attached Application for Equipment Authorization. The test report and application are submitted for a Digital Transmissions System under Part 15.247 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 a Matric Limited CAN Bridge CB-500LR.

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 NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The Matric Limited CAN Bridge CB-500LR complies with the limits for a Digital Transmissions System under FCC Part 15.247 and Industry Canada RSS-210.

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1 Introduction

1.1 Compliance Statement

The Matric Limited CAN Bridge CB-500LR complies with the limits for a Digital Transmission System under FCC Part 15.247 and Industry Canada RSS-210.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with FCC DTS Measurement Guidance of 2005 and the 2003 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	Matric Limited 2099 Hill City Road Seneca, PA 16346
Purchase Order Number:	129410
Quotation Number:	62719

1.4 Test Dates

Testing was performed on the following date(s):	May 30, 2006 to August 4, 2006

1.5 Test and Support Personnel

Washington Laboratories, LTD	James Ritter, Steve Dovell
Client Representative	Rick Rogers

2 Equipment Under Test

2.1 EUT Identification & Description

The Matric Limited CAN Bridge CB-500LR functions as a wireless link that transfers CAN messages. Using the Wireless CAN Bridge, nodes on either side of a wireless link can communicate at a typical separation of 500 feet. Since actual CAN messages are transferred, the Wireless CAN Bridge supports any type of CAN bus standard. The unit has 15 available channels from 2405 – 2475 MHz.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Matric Limited
FCC ID:	K5B-CB500LR
IC:	3926A-CB500LR
Model:	CAN Bridge CB-500LR
FCC Rule Parts:	§15.247
Industry Canada:	RSS210
Frequency Range:	2405MHz – 2475MHz
Maximum Output Power:	3.54mW (5.5dBm)
Modulation:	FSK
Occupied Bandwidth:	758.37kHz
Keying:	Automatic
Type of Information:	CAN Bus Data
Number of Channels:	15
Power Output Level	Fixed
Antenna Connector	Reverse SMA
Antenna Type	Whip 1 and 5 dBi, Collinear Array 10 dBi, and Yagi 16 dBi
Interface Cables:	5-pin DIN Com, power
Power Source & Voltage:	12-24 Vdc from 120ac

2.2 Test Configuration

The CAN Bridge CB-500LR was configured with a support laptop providing control and an AC/DC power supply. All data reported was obtained with the unit set to 500 kHz Baud rate. It was verified that no difference in the power or 6dB bandwidth occurs with the unit set at 125 kHz or 250 kHz Baud rate.

2.3 Testing Algorithm

The support laptop sent test commands to the unit via a RS-232 port for setting the EUT for continuous transmission. Internal dip switches inside the EUT controlled the transmit channel and data 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

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 NIST NVLAP (NVLAP Lab Code: 200066-0) 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

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

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.

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
0073	HP 8568B	SPECTRUM ANALYZER	6/26/2007
0069	HP 85650A	QUASI-PEAK ADAPTER	6/26/2007
0071	HP 85685A	RF PRESELECTOR	6/26/2007
3003A00168	HP 8563A	SPECTRUM ANALYZER	2/28/2007
0125	SOLAR 8028-50-TS-BNC	LISN	1/31/2007
0126	SOLAR 8028-50-TS-BNC	LISN	1/31/2007
0557	SCHAFFNER CBL6141A	BICONILOG ANTENNA	12/1/2006
0074	HEWLETT-PACKARD 8593A	SPECTRUM ANALYZER	10/04/2006
0522	HEWLETT-PACKARD 8449B	MICROWAVE PREAMP	5/4/2007
0004	ARA DRG118/A	MICROWAVE HORN ANTENNA	2/2/2007
0425	ARA, DRG-118/A	MICROWAVE HORN ANTENNA	1/17/2007
0280	ITC, 21C-3A1	WAVEGUIDE	2/7/2007
0281	ITC, 21A-3A1	WAVEGUIDE	2/7/2007
209	NARDA, V638	STANDARD GAIN ANTENNA	12/25/2008
210	NARDA, V637	STANDARD GAIN ANTENNA	12/25/2008

4 Test Results

4.1 RF Power Output: (FCC Part §2.1046)

To measure the output power the unit was set to the low, mid, and high 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 spectrum analyzer RBW was set to 2 MHz which is much greater than the 20dB emission bandwidth of the signal being measured.

Table 3. RF Power Output

Frequency	Level	Limit	Pass/Fail
Low Channel (Ch1) 2405MHz	2.8 dBm	30 dBm	Pass
Mid Channel (Ch8) 2440MHz	3.87 dBm	30 dBm	Pass
High Channel (Ch15) 2475MHz	5.5 dBm	30 dBm	Pass

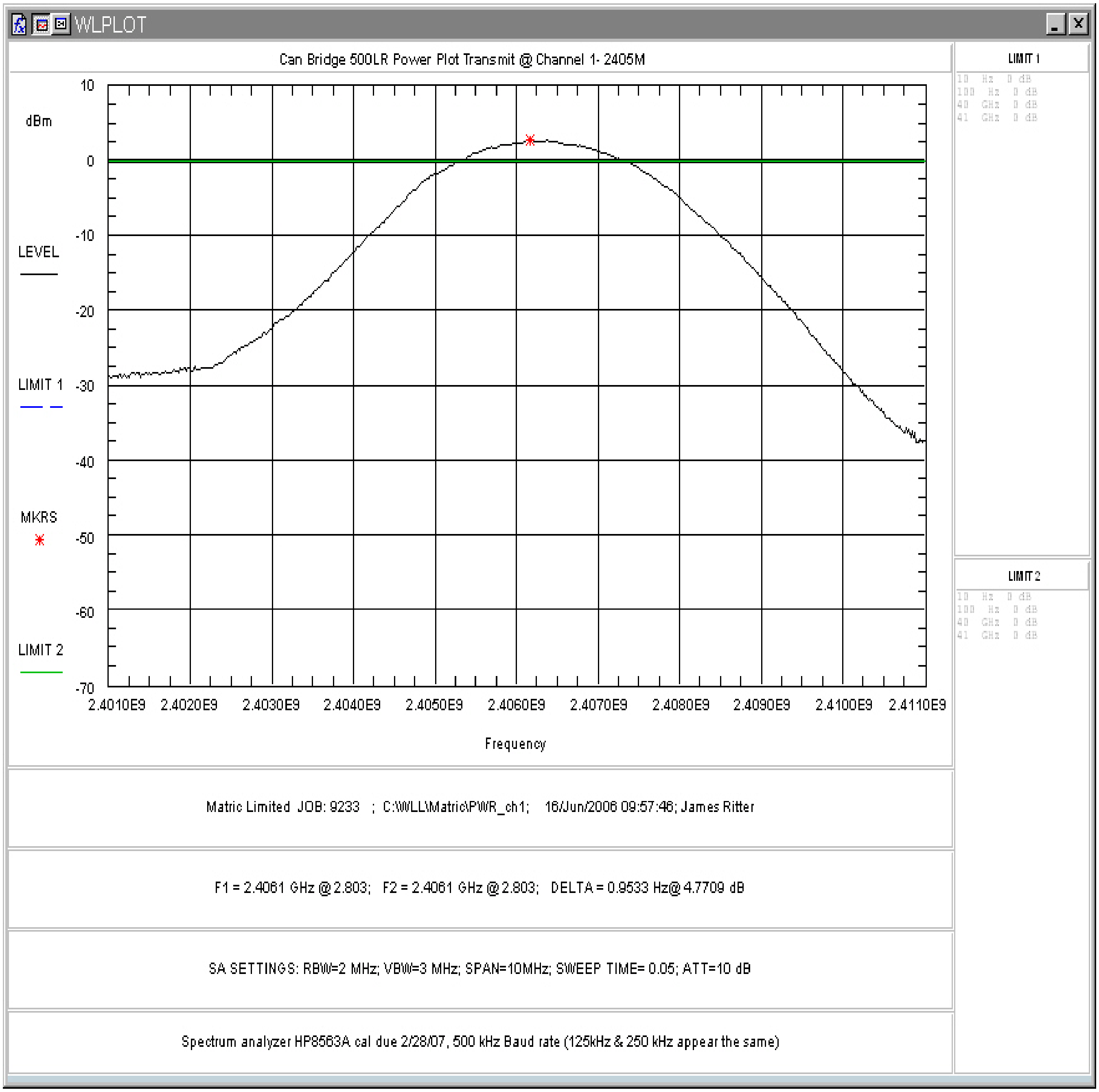

Figure 4-1. RF Peak Power, Low Channel

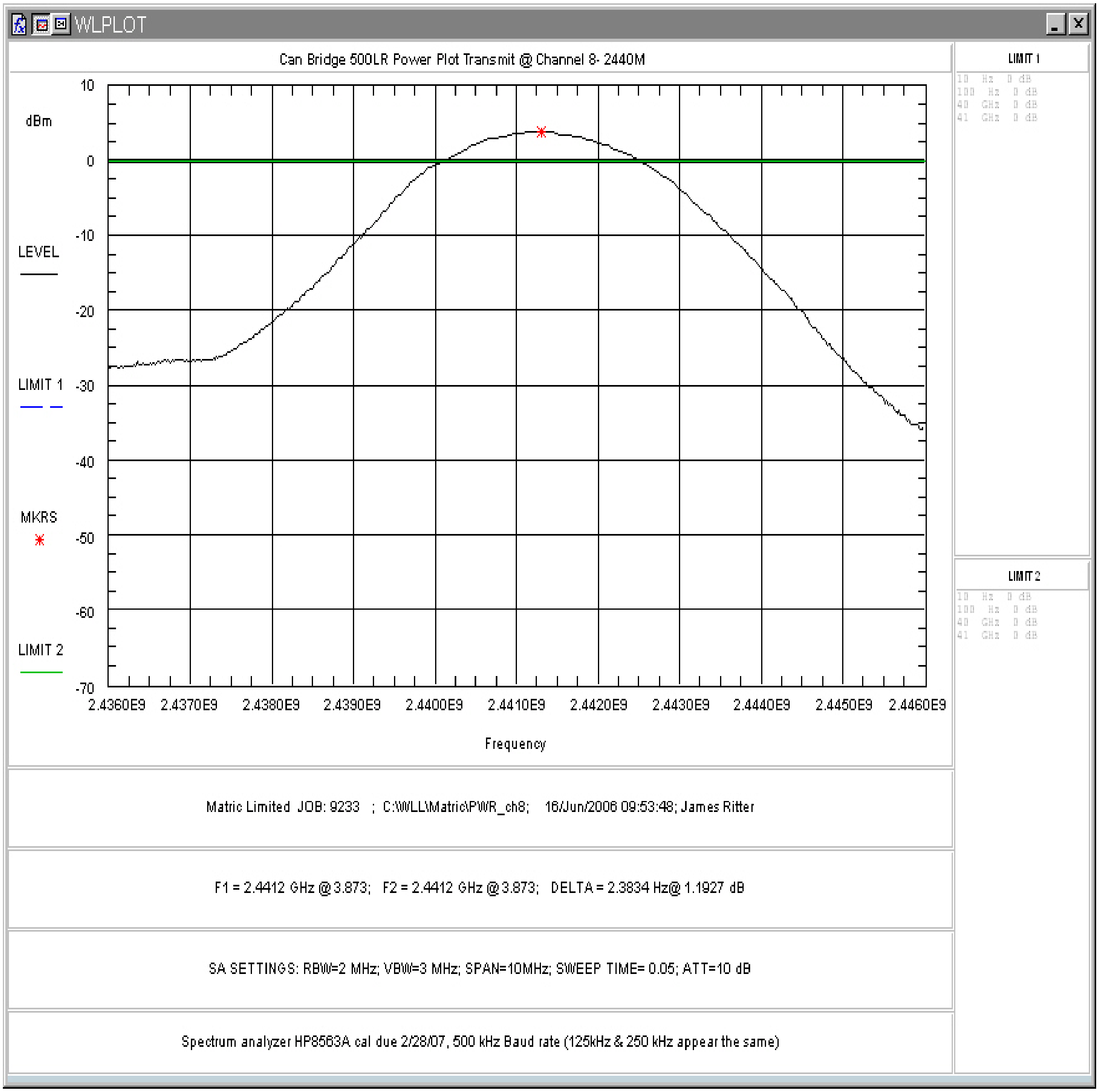

Figure 4-2. RF Peak Power, Mid Channel

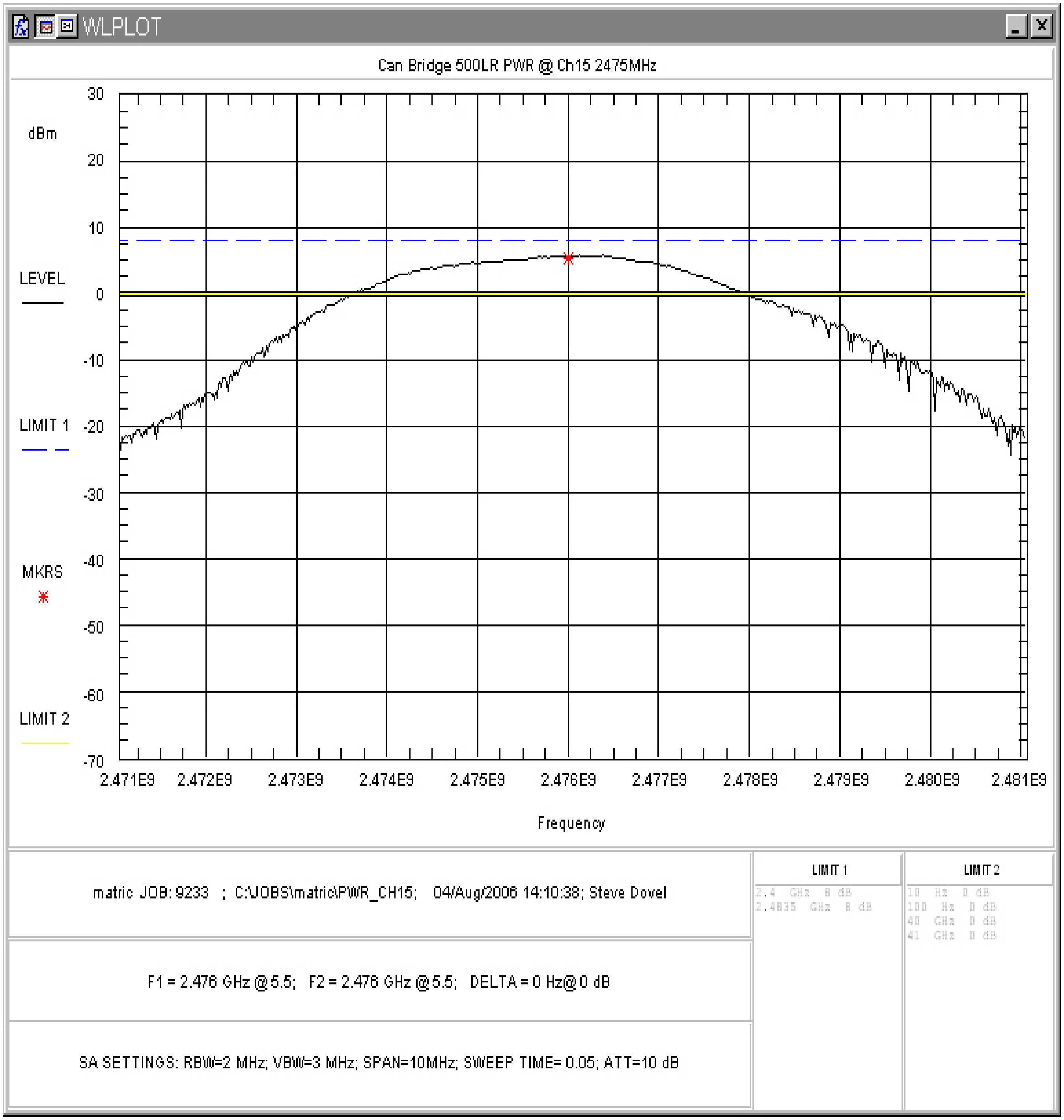

Figure 4-3. RF Peak Power, High Channel

4.2 Occupied Bandwidth: (FCC Part §2.1049)

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

For Digital Transmission Systems the FCC Part 15.247 requires the minimum 6dB bandwidth of 500 kHz.

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

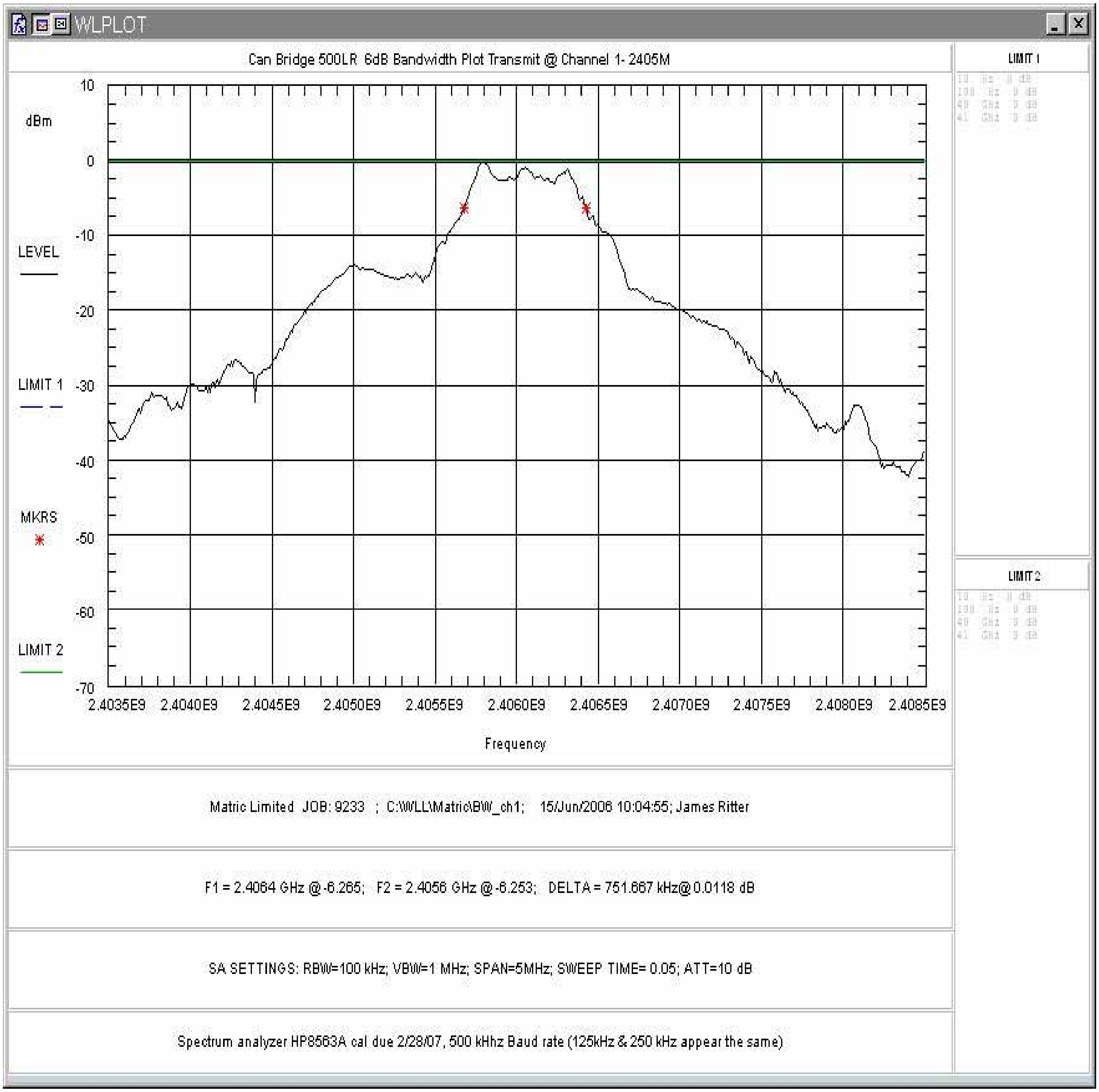

Figure 4-4. Occupied Bandwidth, Low Channel

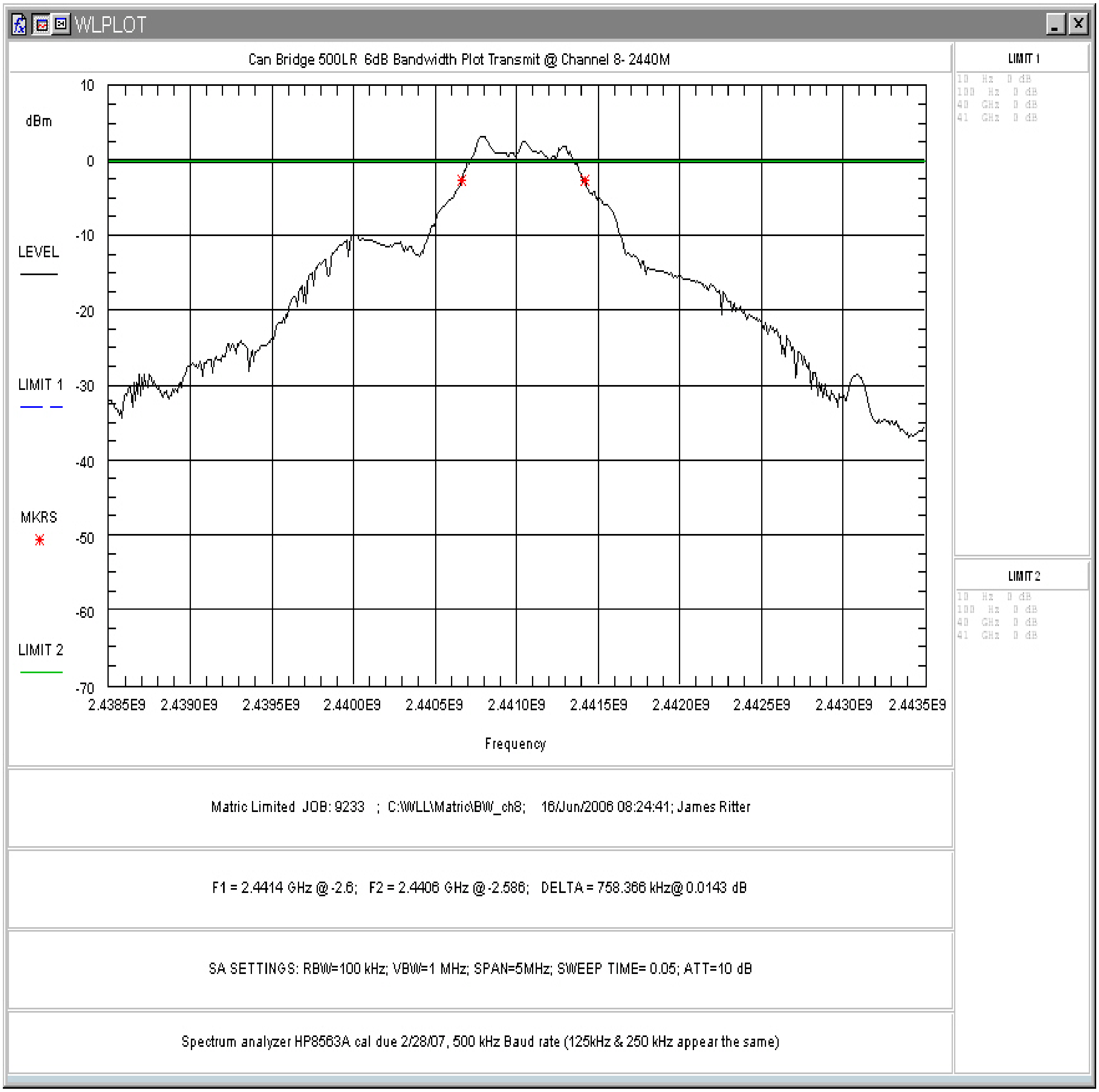

Figure 4-5. Occupied Bandwidth, Mid Channel

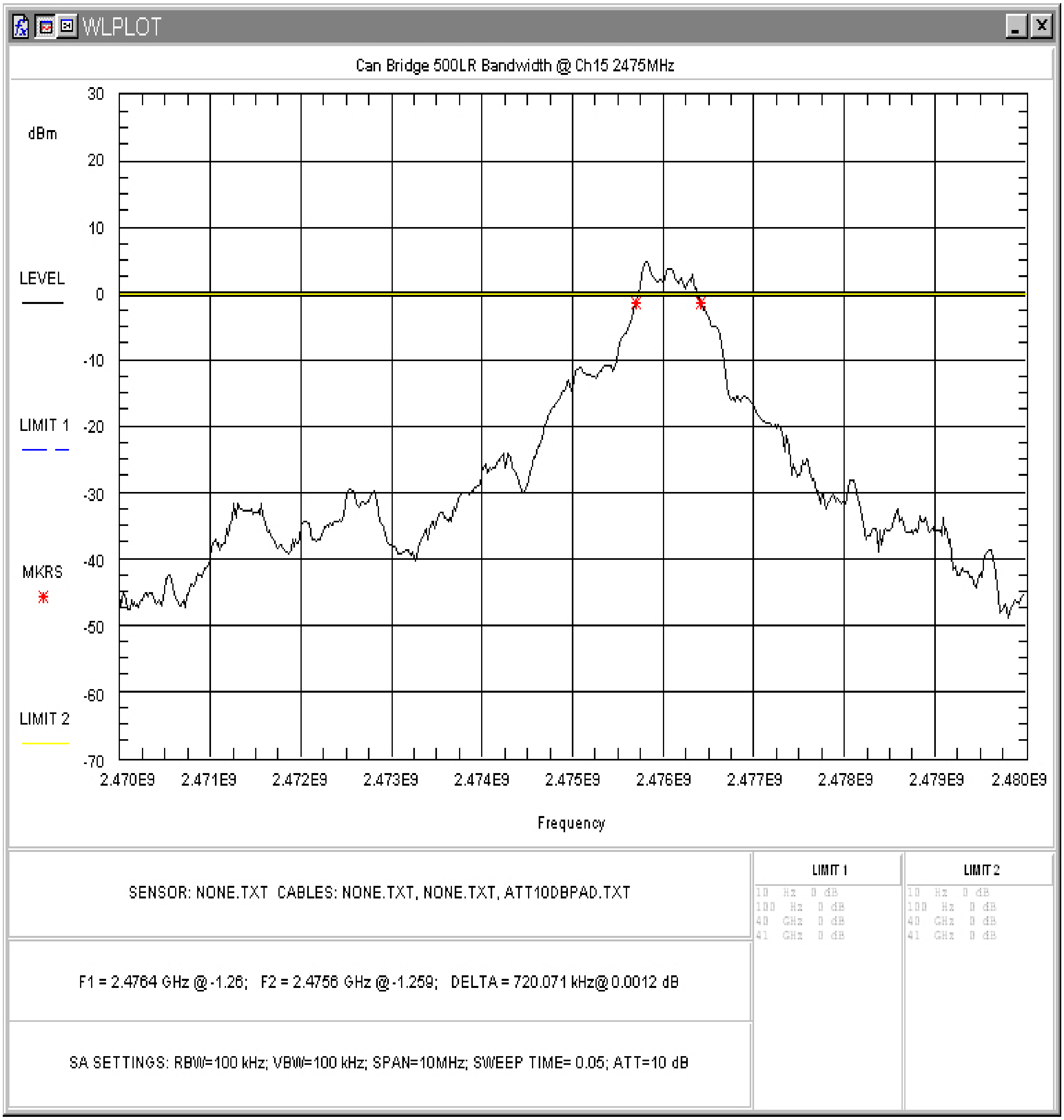

Figure 4-6. Occupied Bandwidth, High Channel

Table 4 provides a summary of the Occupied Bandwidth Results.

Table 4. Occupied Bandwidth Results

Frequency	Bandwidth	Limit (Minimum)	Pass/Fail
Low Channel (Ch1) 2405MHz	752 kHz	500 kHz	Pass
Mid Channel (Ch8) 2440MHz	758 kHz	500 kHz	Pass
High Channel (Ch15) 2475MHz	720 kHz	500 kHz	Pass

4.3 RF Peak Power Spectral Density (§15.247(e) and RSS-210, Annex 8.2)

For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

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 frequency span was set to 1.5 MHz while the total sweep time for the span was 500 seconds.

The highest peak within the transmission was located and measured for the low, mid, and high channels. Plots of the PSD were taken as shown in Figure 4-7 through Figure 4-9 below. Table 5 provides a summary of the data.

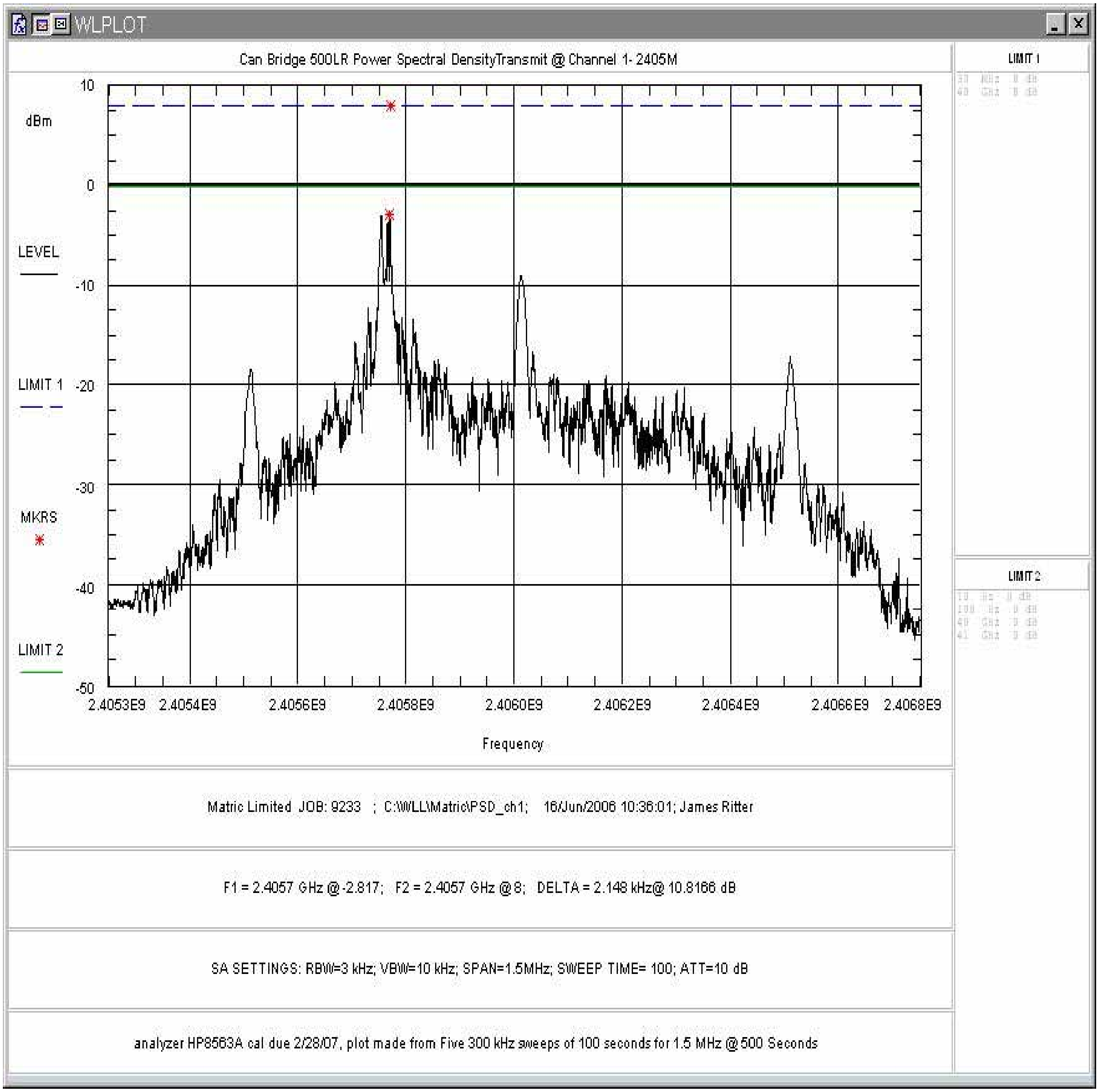

Figure 4-7. Power Spectral Density, Low Channel

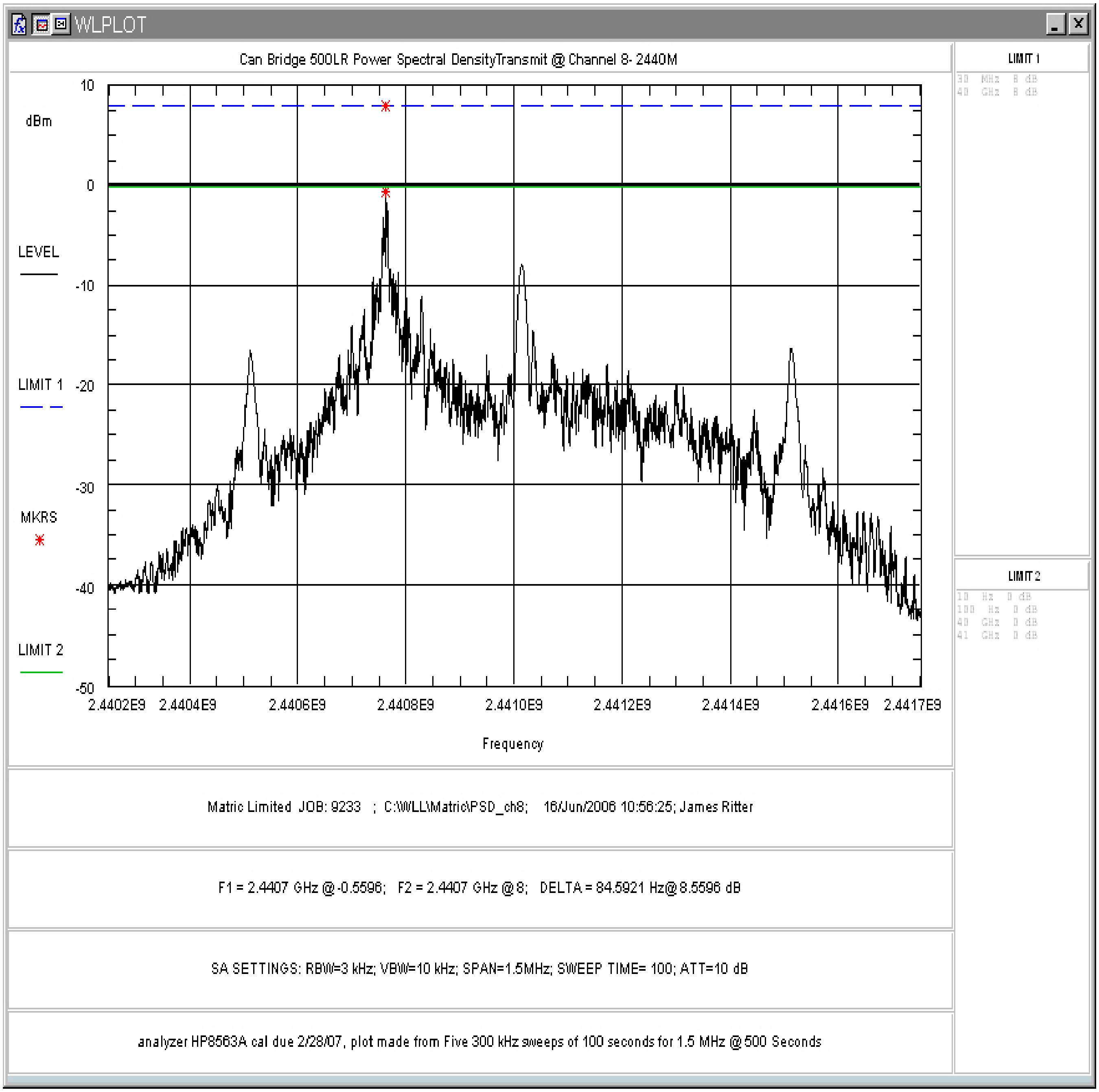

Figure 4-8. Power Spectral Density, Mid Channel

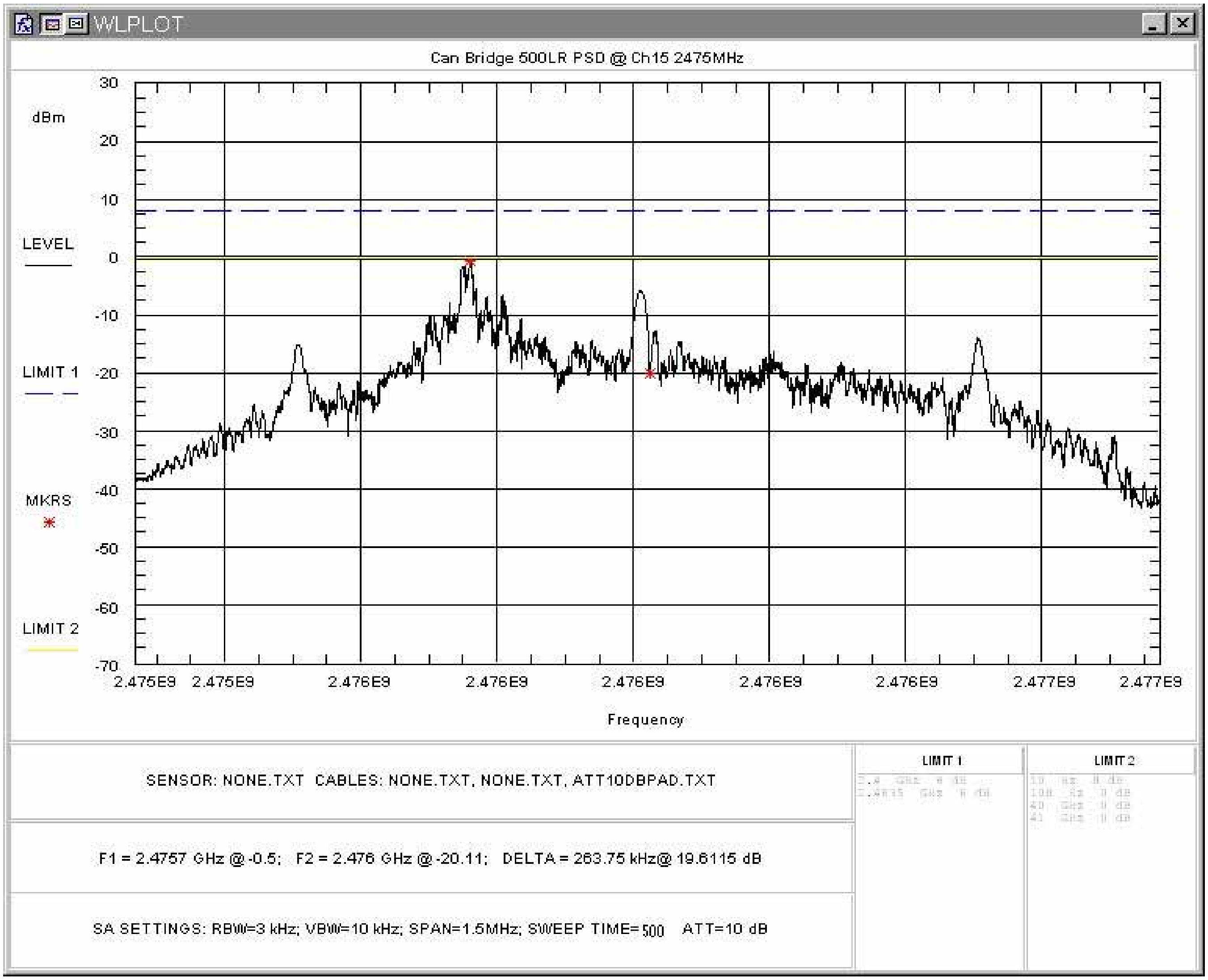

Figure 4-9. Power Spectral Density, High Channel

Table 5. RF Power Spectral Density

Frequency	Level (dBm)	Limit (dBm)	Pass/Fail
2405MHz (Ch1)	-2.8	8	Pass
2440MHz (Ch8)	-0.6	8	Pass
2475MHz (Ch15)	-0.5	8	Pass

4.4 Conducted Spurious Emissions at Antenna Terminals (FCC Part §15.247(d))

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 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.

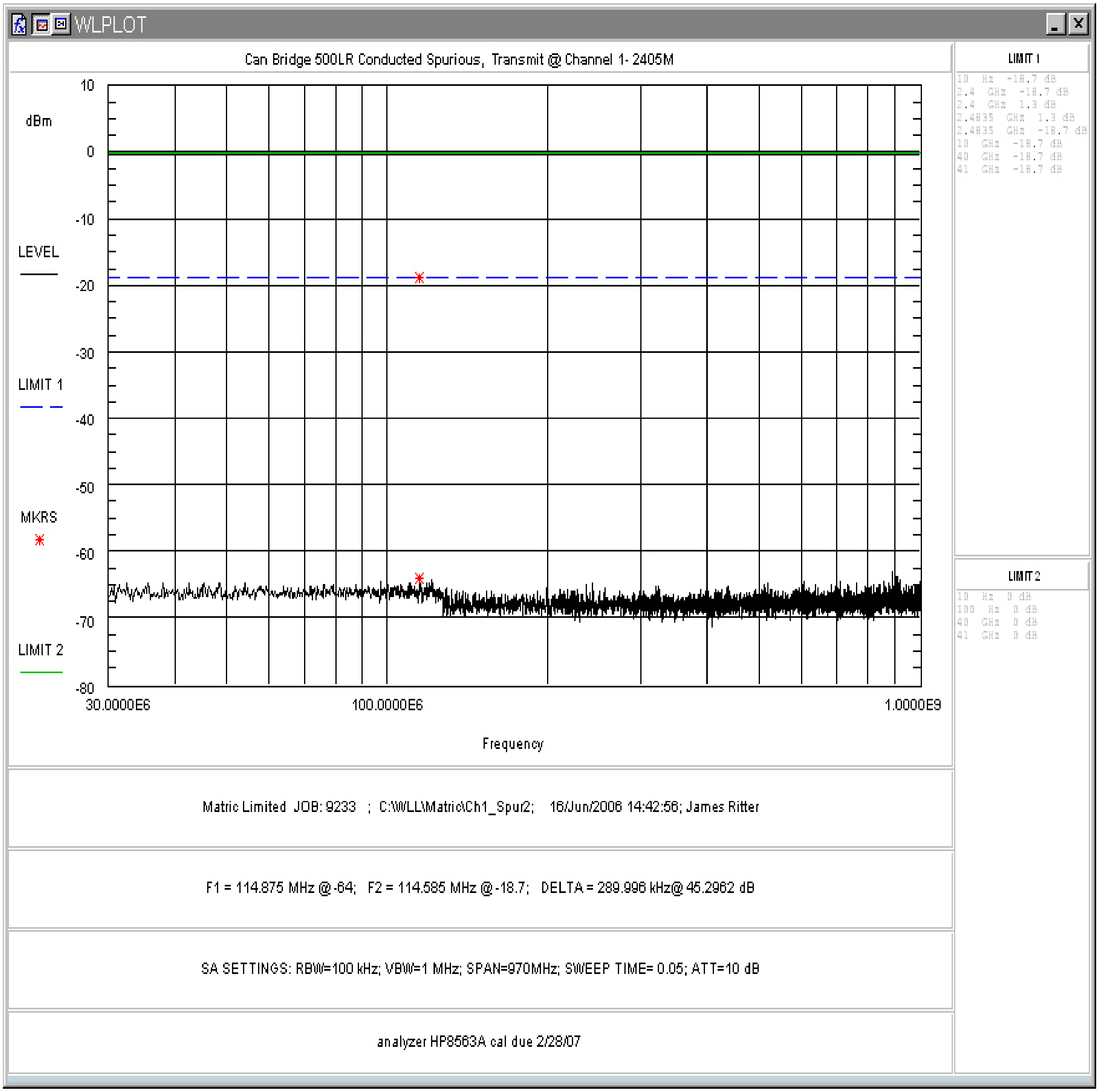

Figure 4-10. Conducted Spurious Emissions, Low Channel 30 - 1000MHz

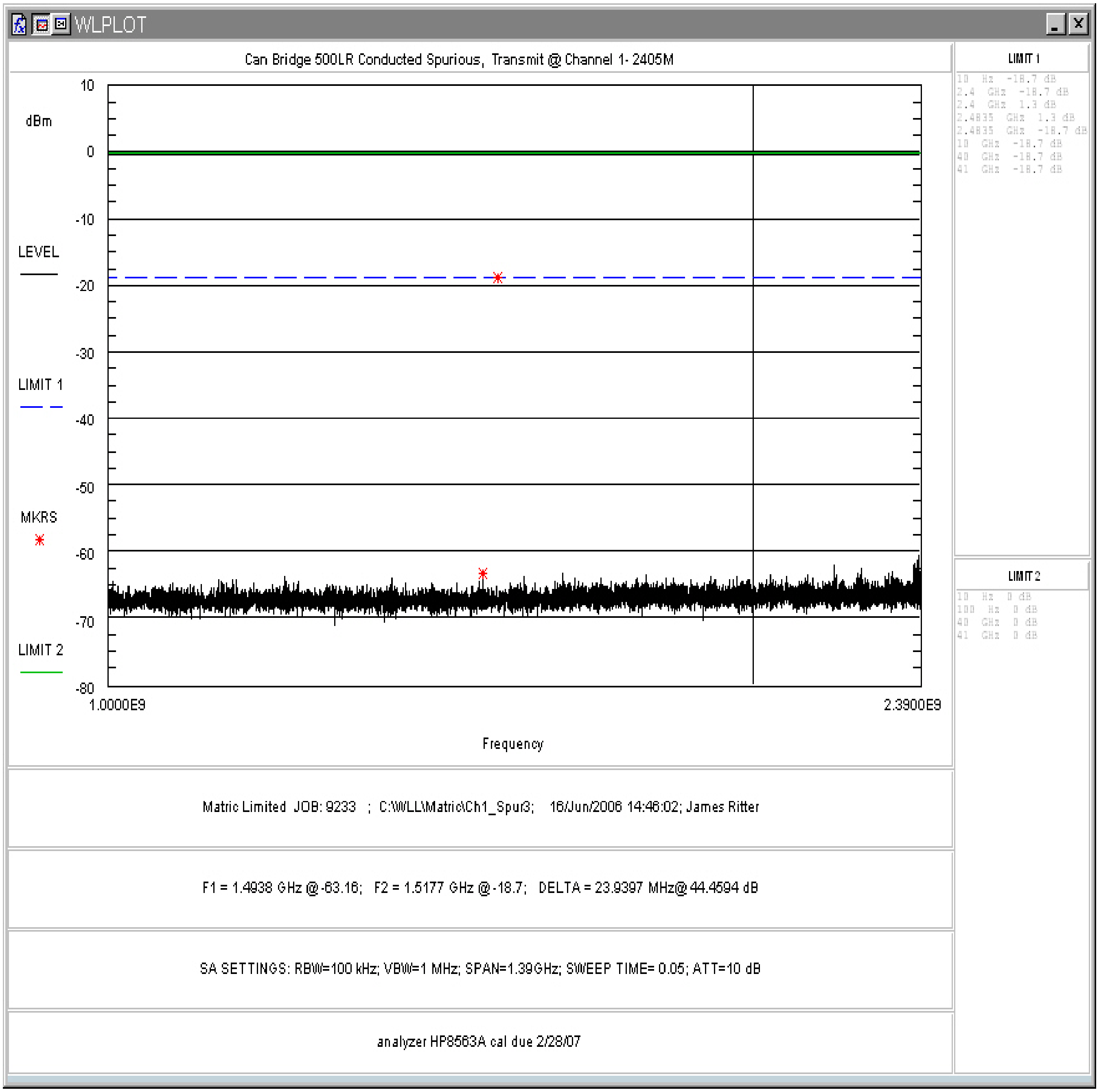

Figure 4-11. Conducted Spurious Emissions, Low Channel 1 – 2.39GHz

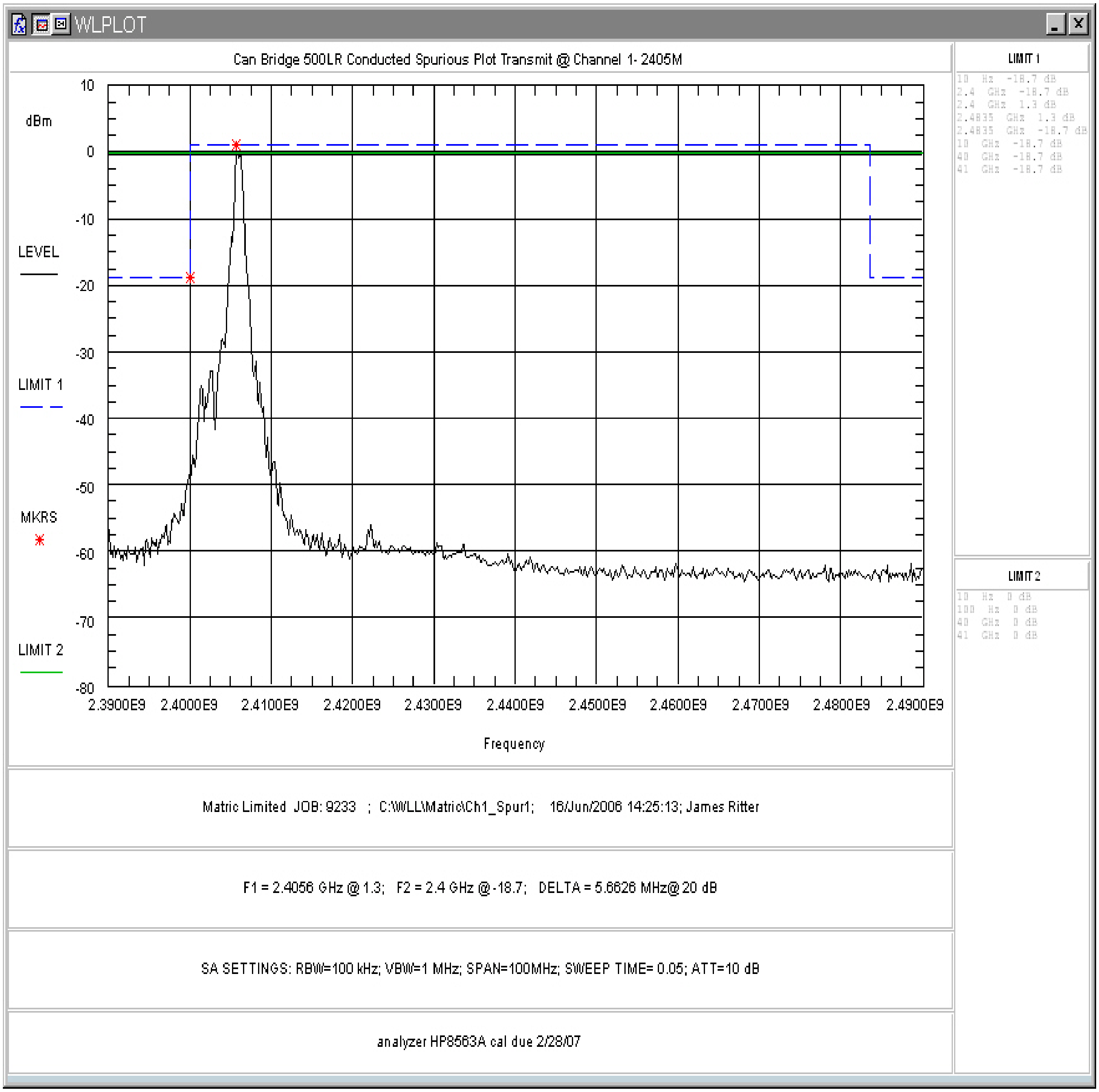

Figure 4-12. Conducted Spurious Emissions, Low Channel Inband

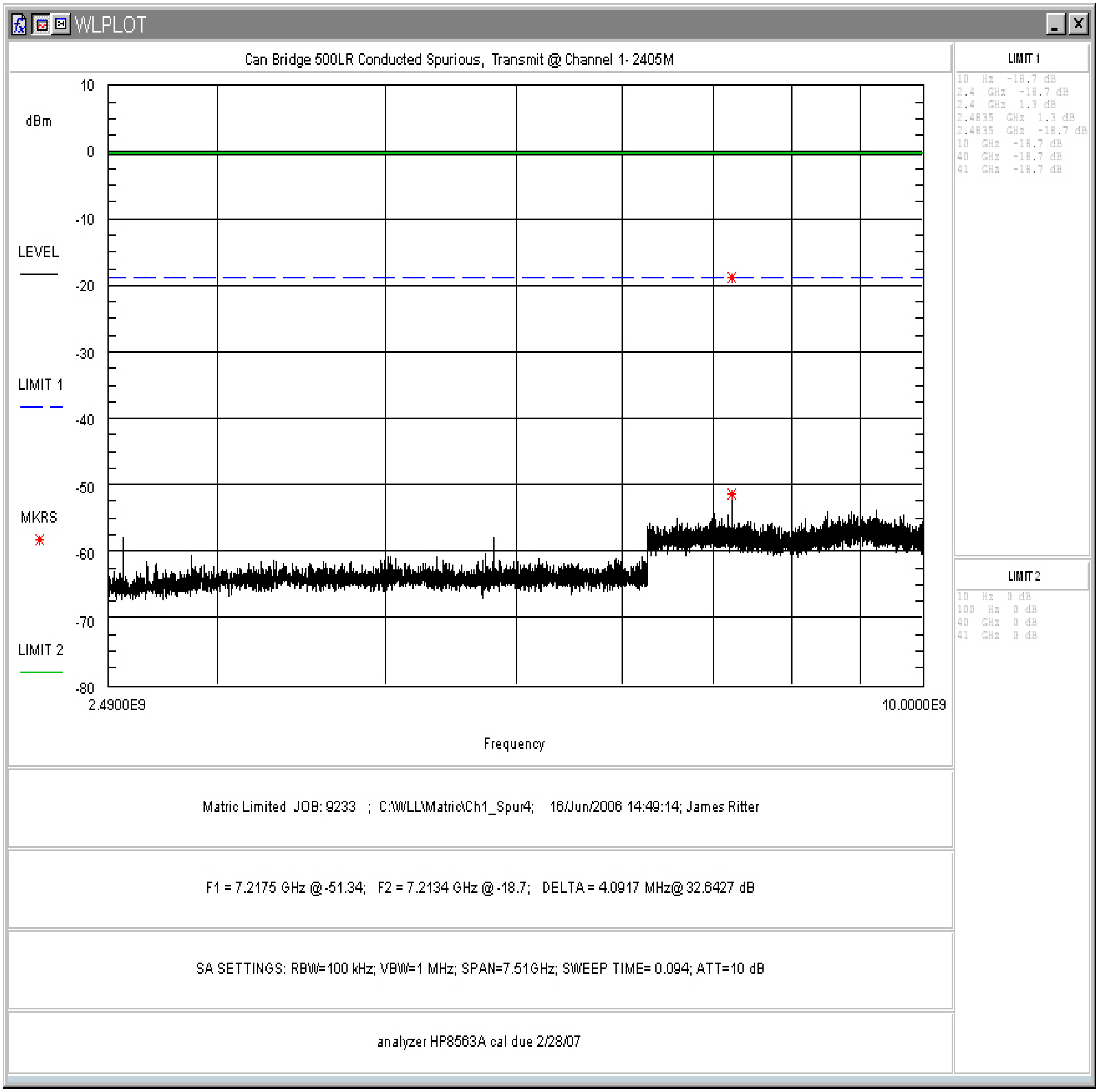

Figure 4-13. Conducted Spurious Emissions, Low Channel 2.49 - 10GHz

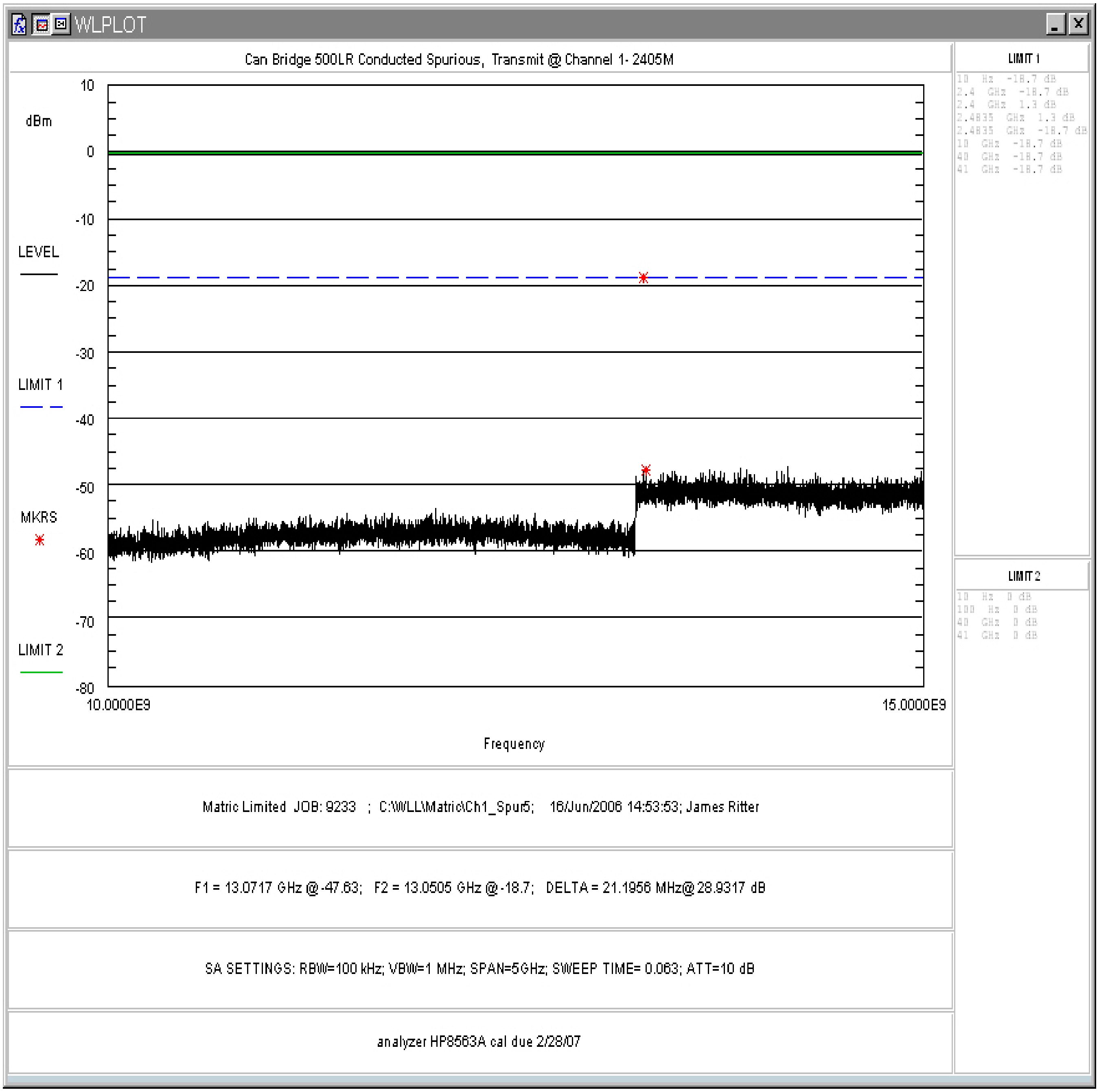

Figure 4-14. Conducted Spurious Emissions, Low Channel 10 - 15GHz

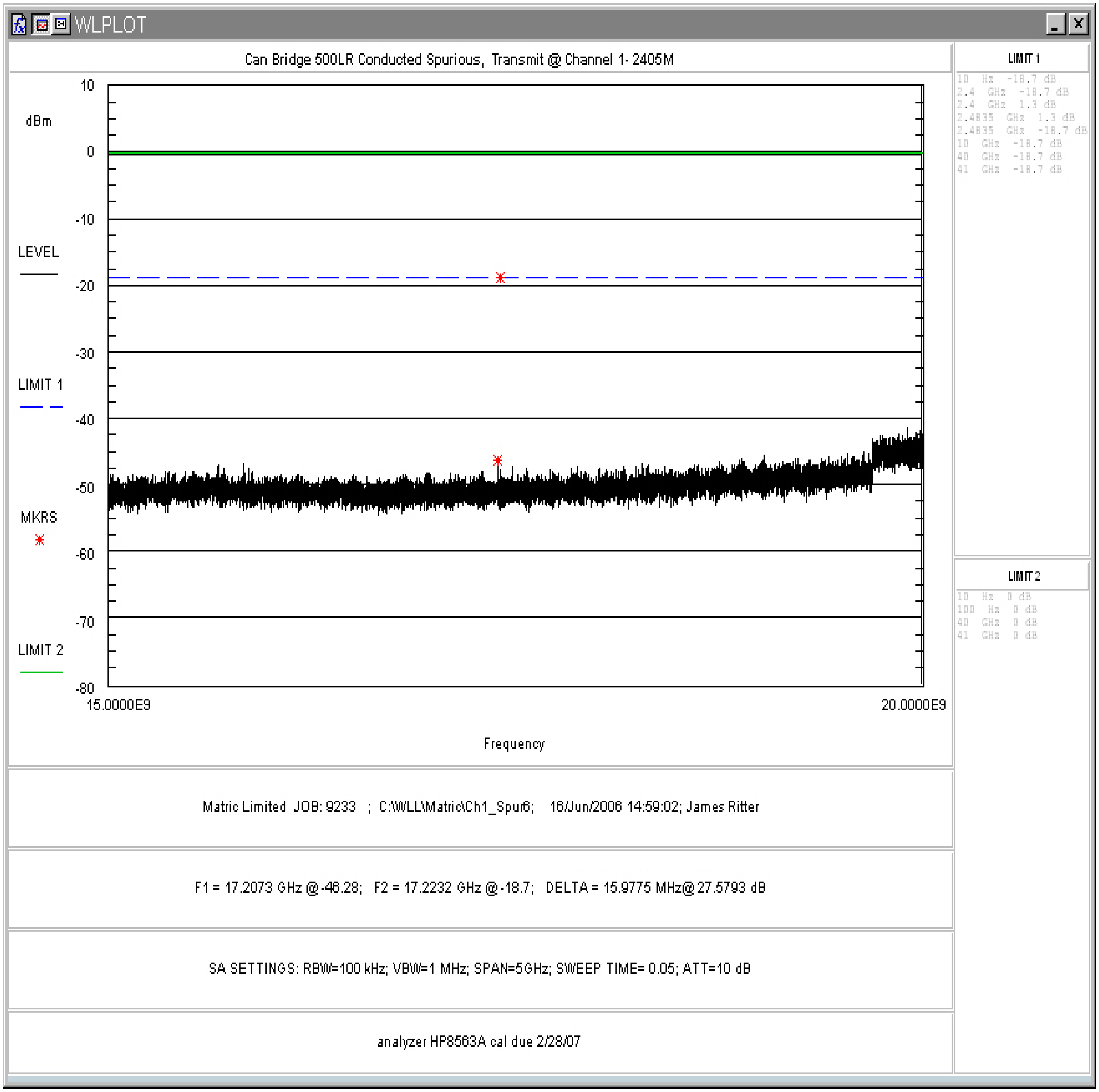

Figure 4-15. Conducted Spurious Emissions, Low Channel 15 - 20GHz

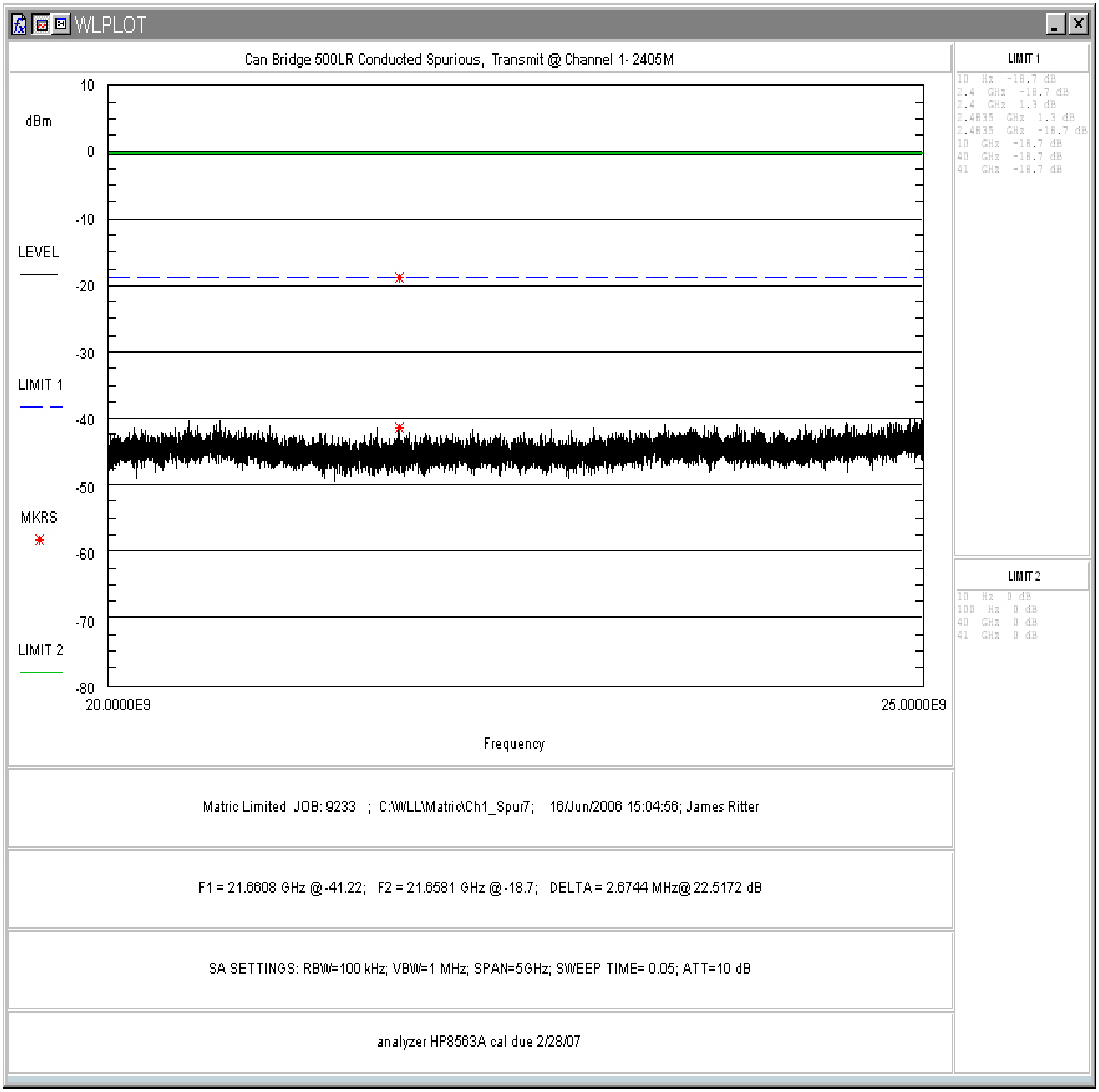

Figure 4-16. Conducted Spurious Emissions, Low Channel 20 - 25GHz

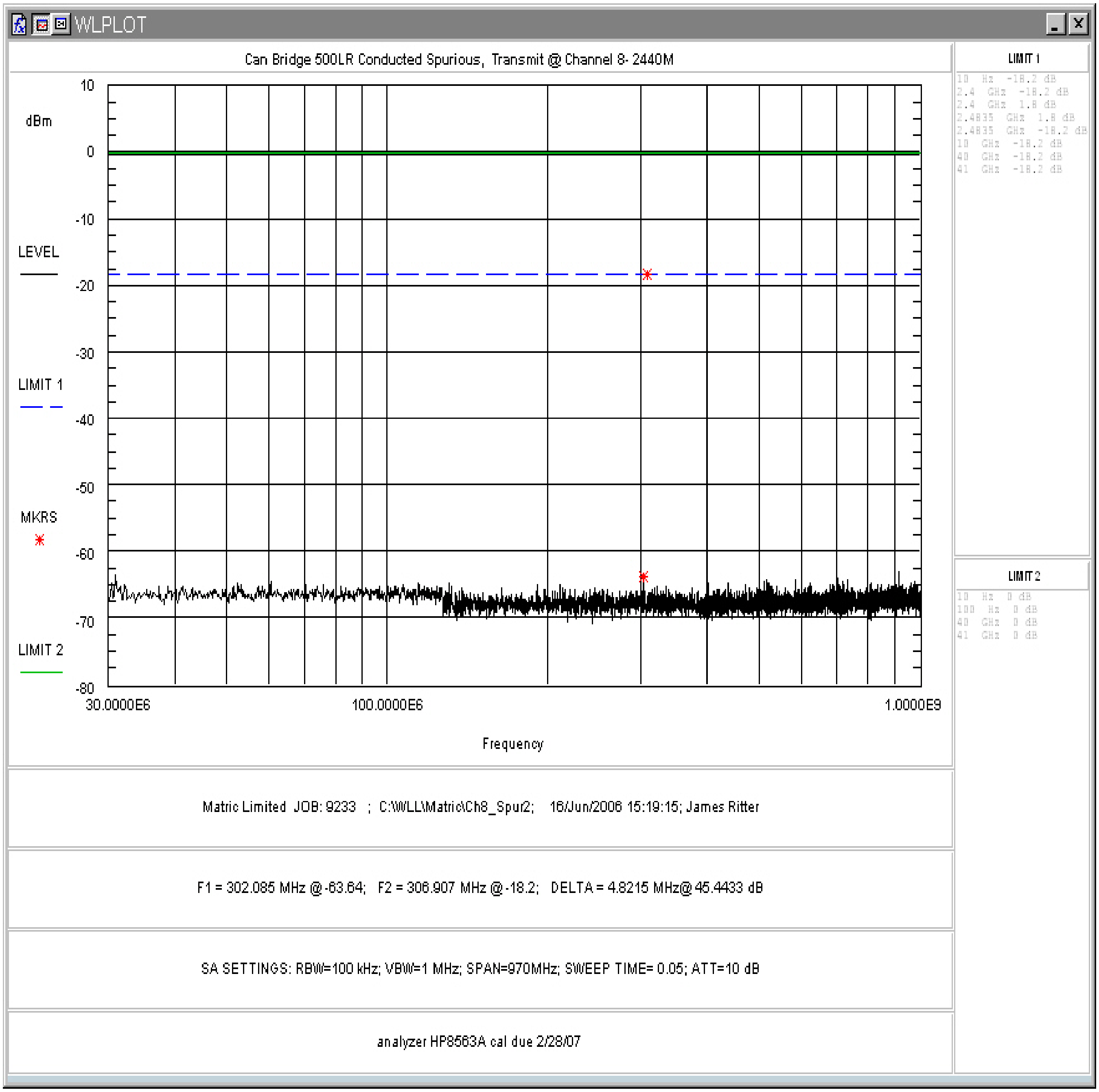

Figure 4-17. Conducted Spurious Emissions, Mid Channel 30 - 1000MHz

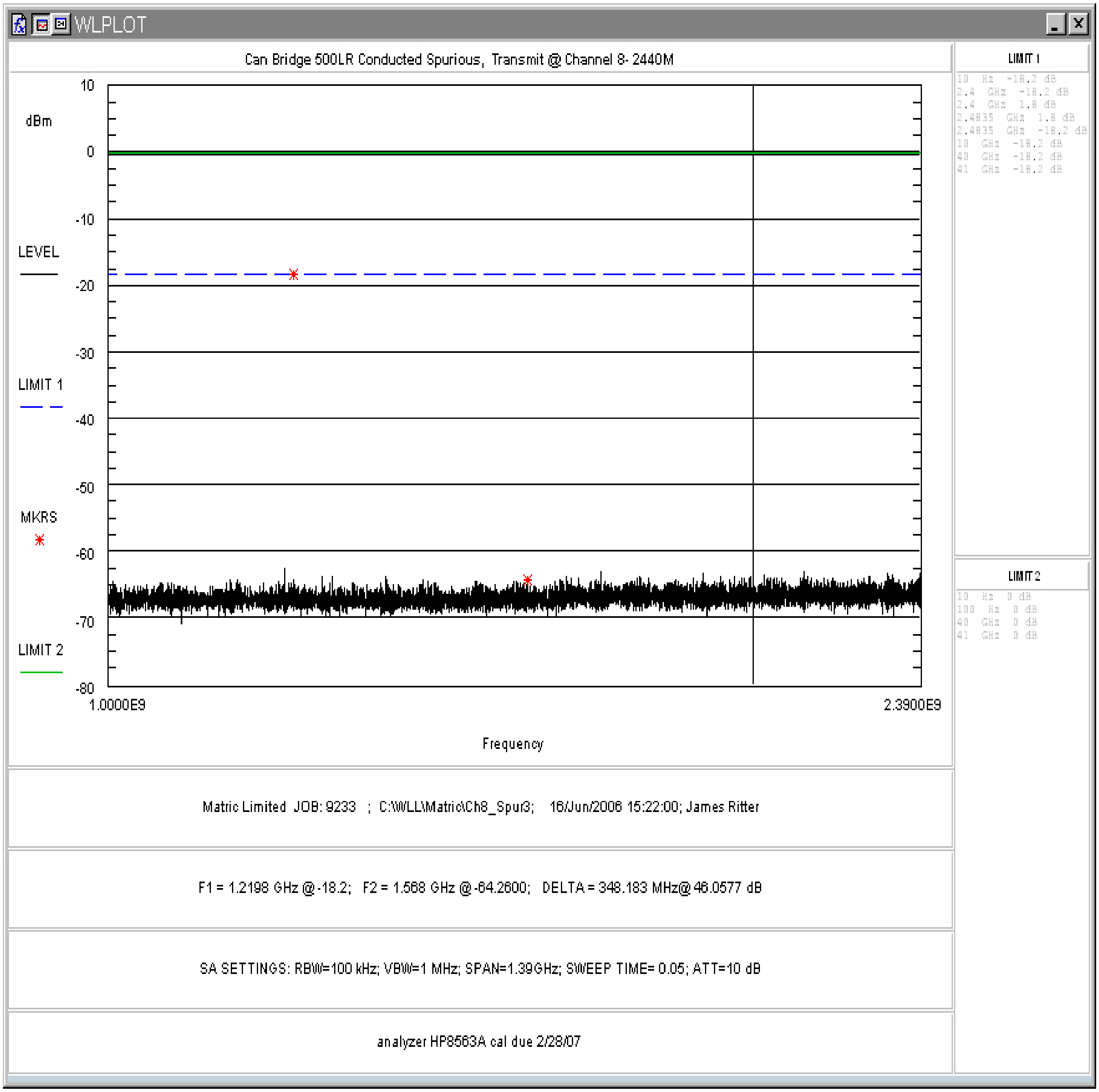

Figure 4-18. Conducted Spurious Emissions, Mid Channel 1 – 2.39GHz

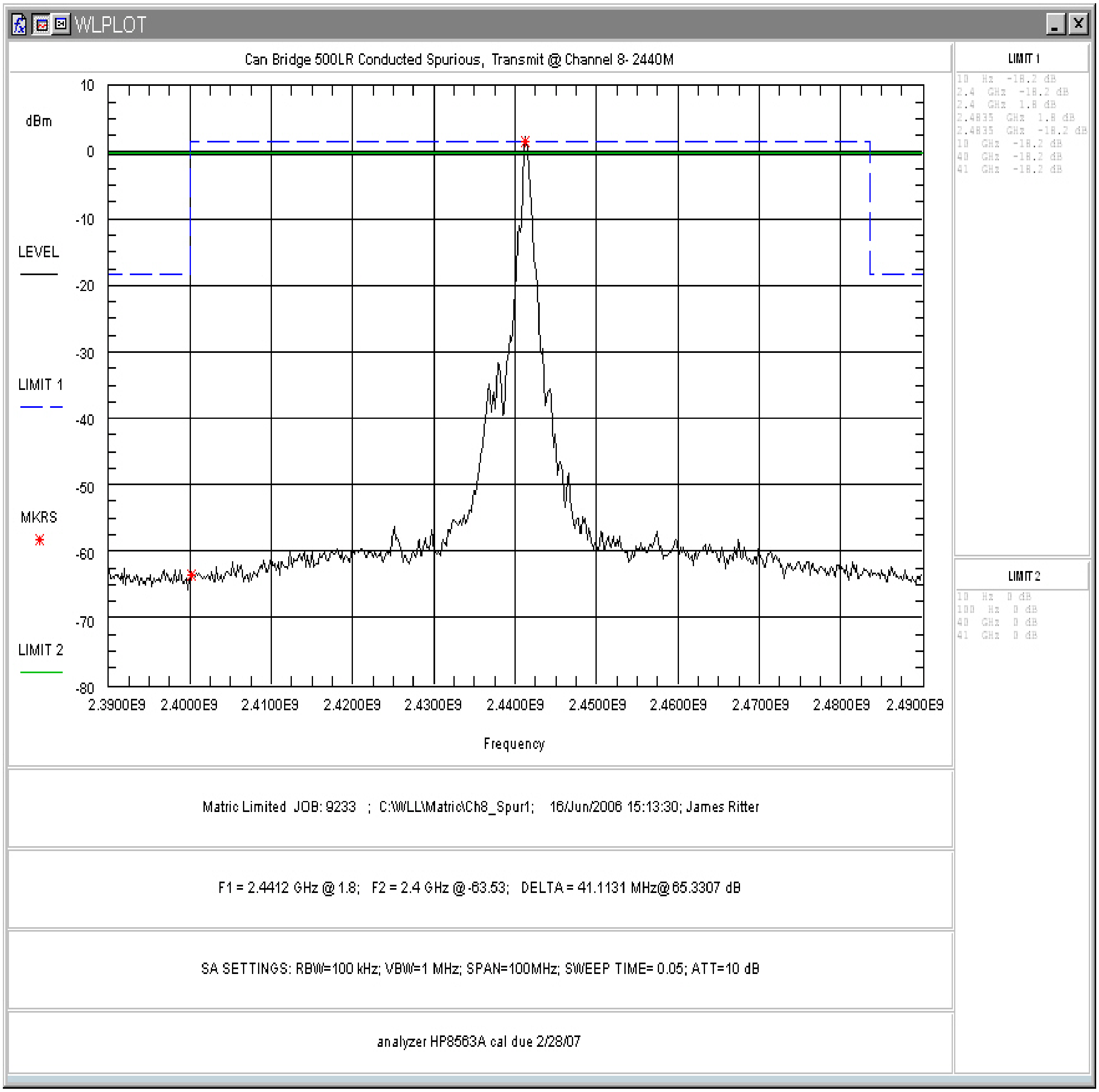

Figure 4-19. Conducted Spurious Emissions, Mid Channel Inband

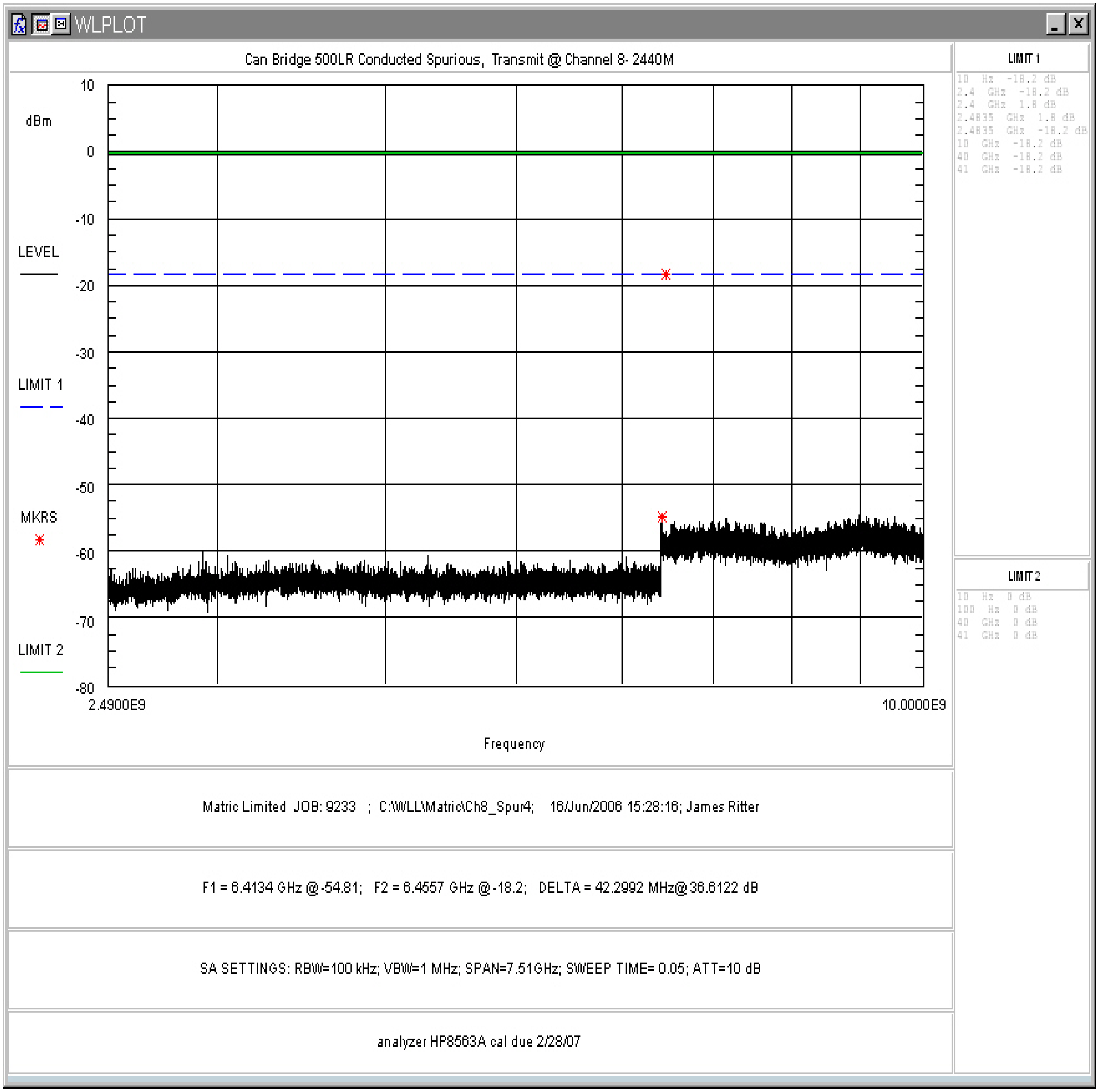

Figure 4-20. Conducted Spurious Emissions, Mid Channel 2.49 - 10GHz

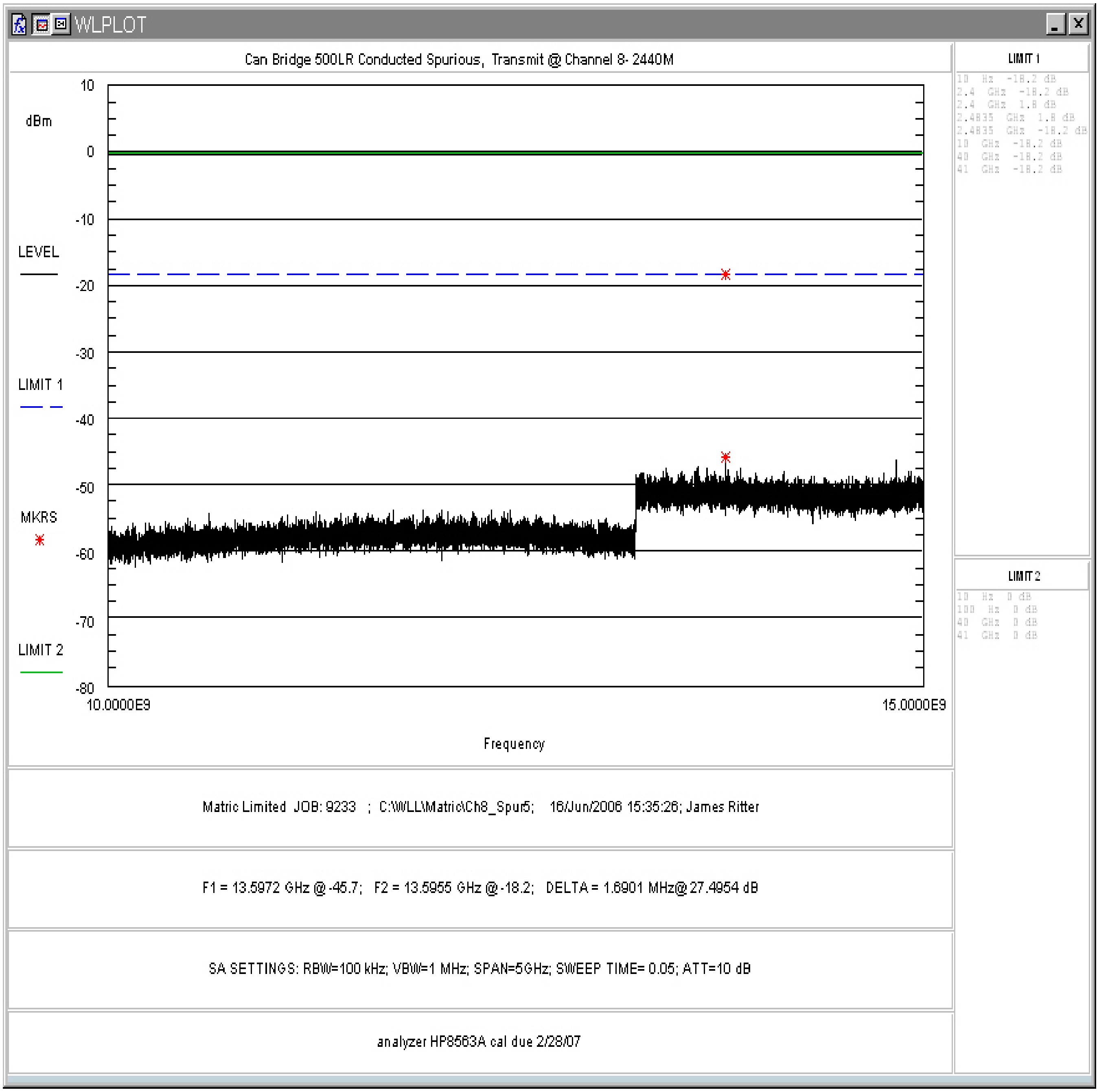

Figure 4-21. Conducted Spurious Emissions, Mid Channel 10 - 15GHz

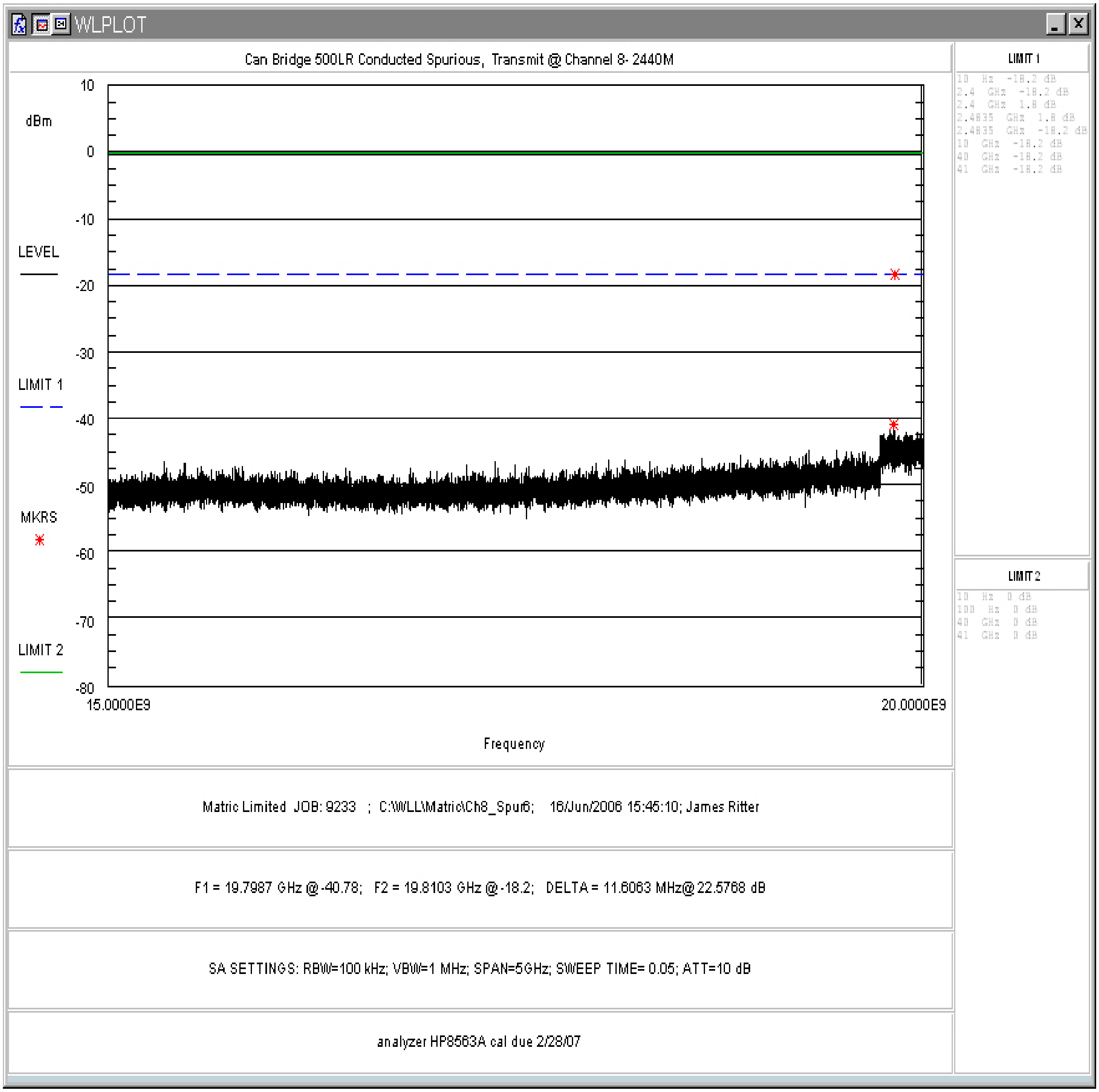

Figure 4-22. Conducted Spurious Emissions, Mid Channel 15 - 20GHz

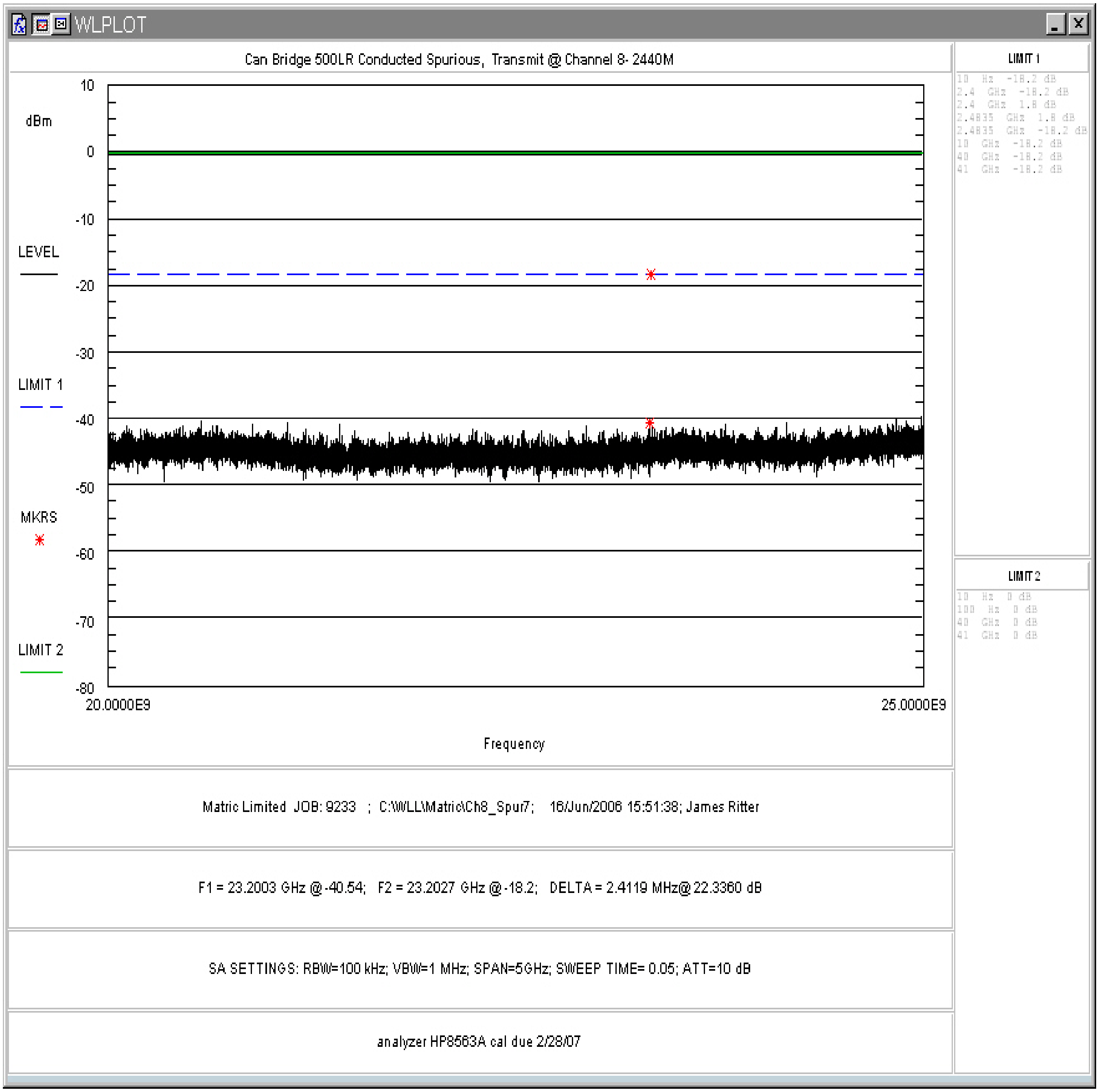

Figure 4-23. Conducted Spurious Emissions, Mid Channel 20 - 25GHz

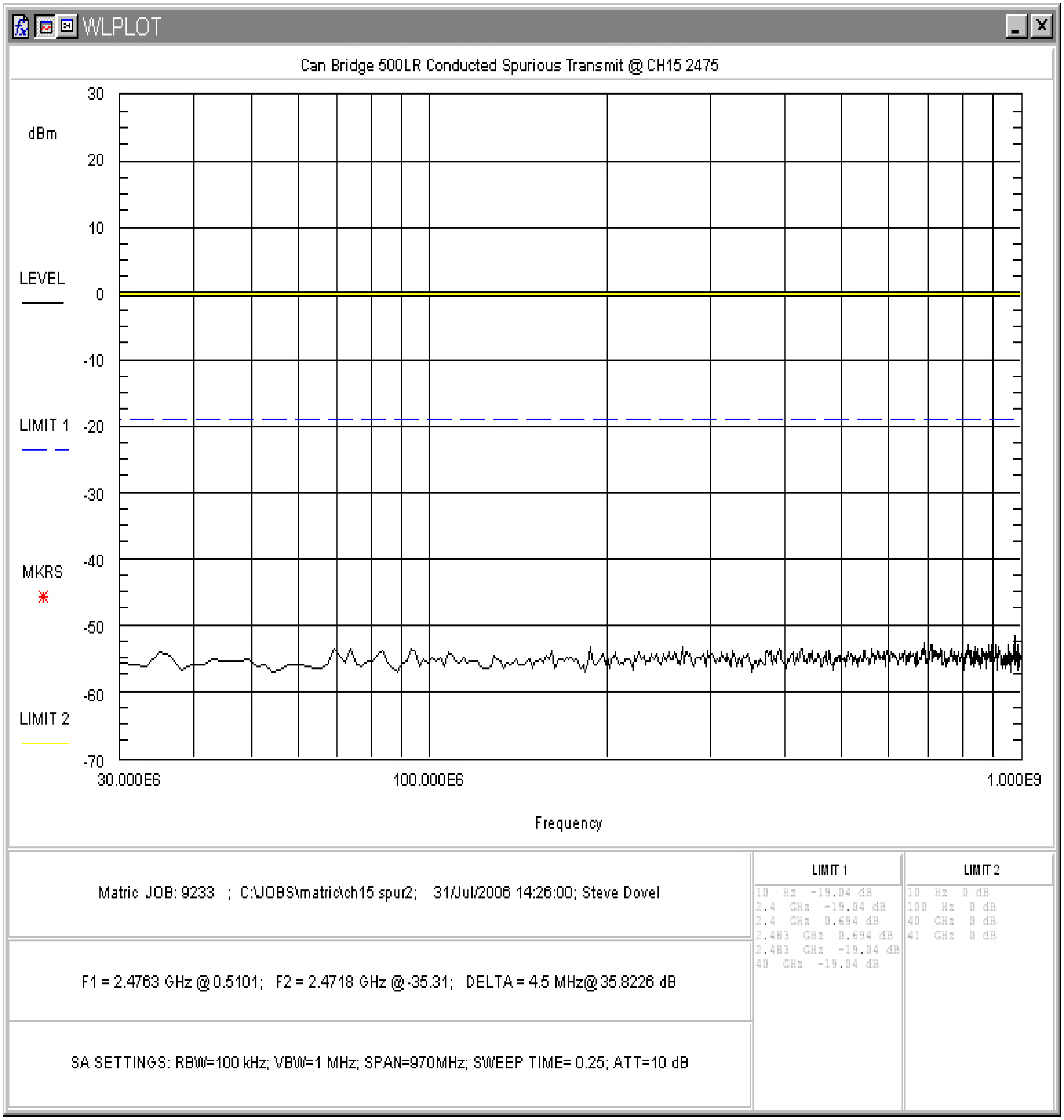

Figure 4-24. Conducted Spurious Emissions, High Channel 30 - 1000MHz

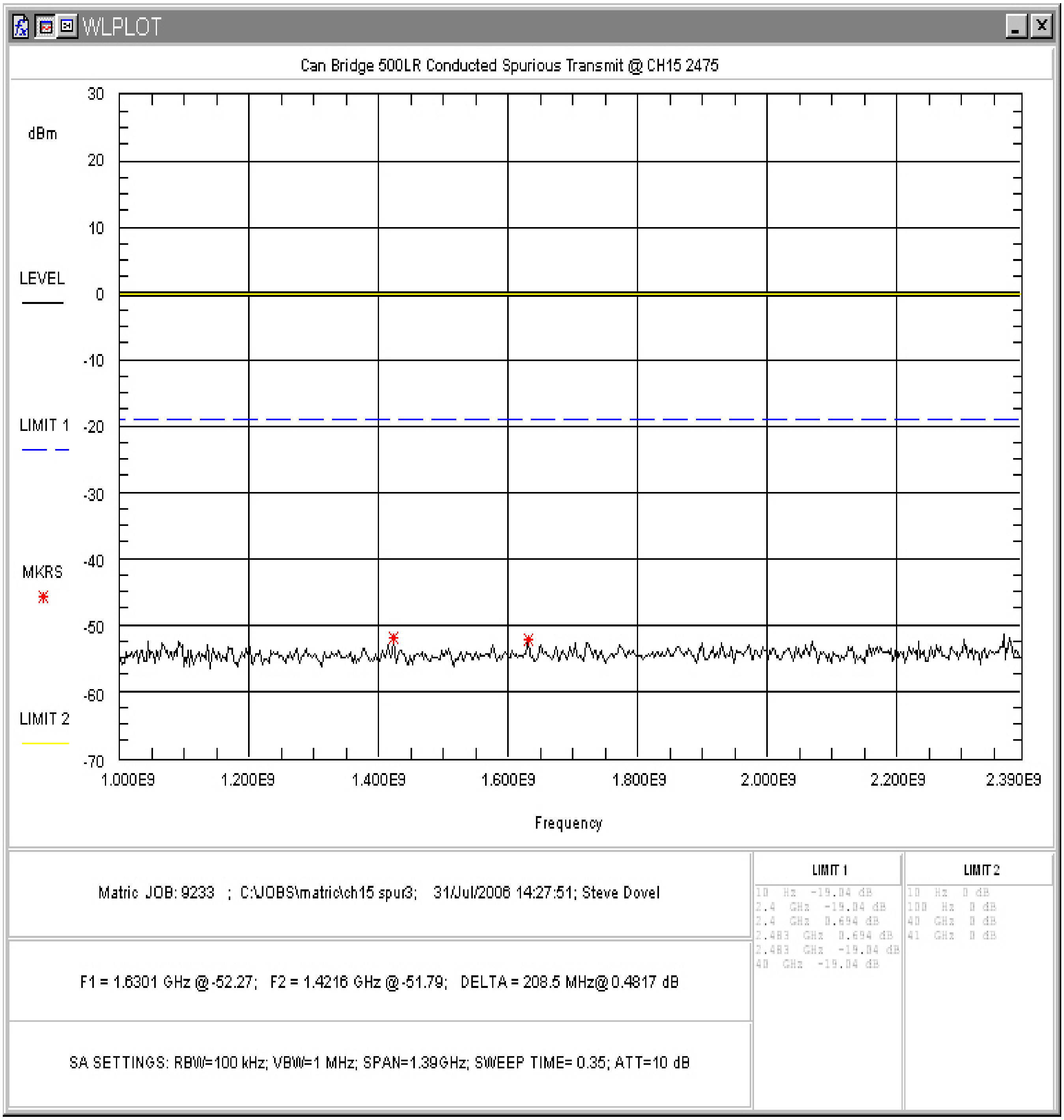

Figure 4-25. Conducted Spurious Emissions, High Channel 1 – 2.39GHz

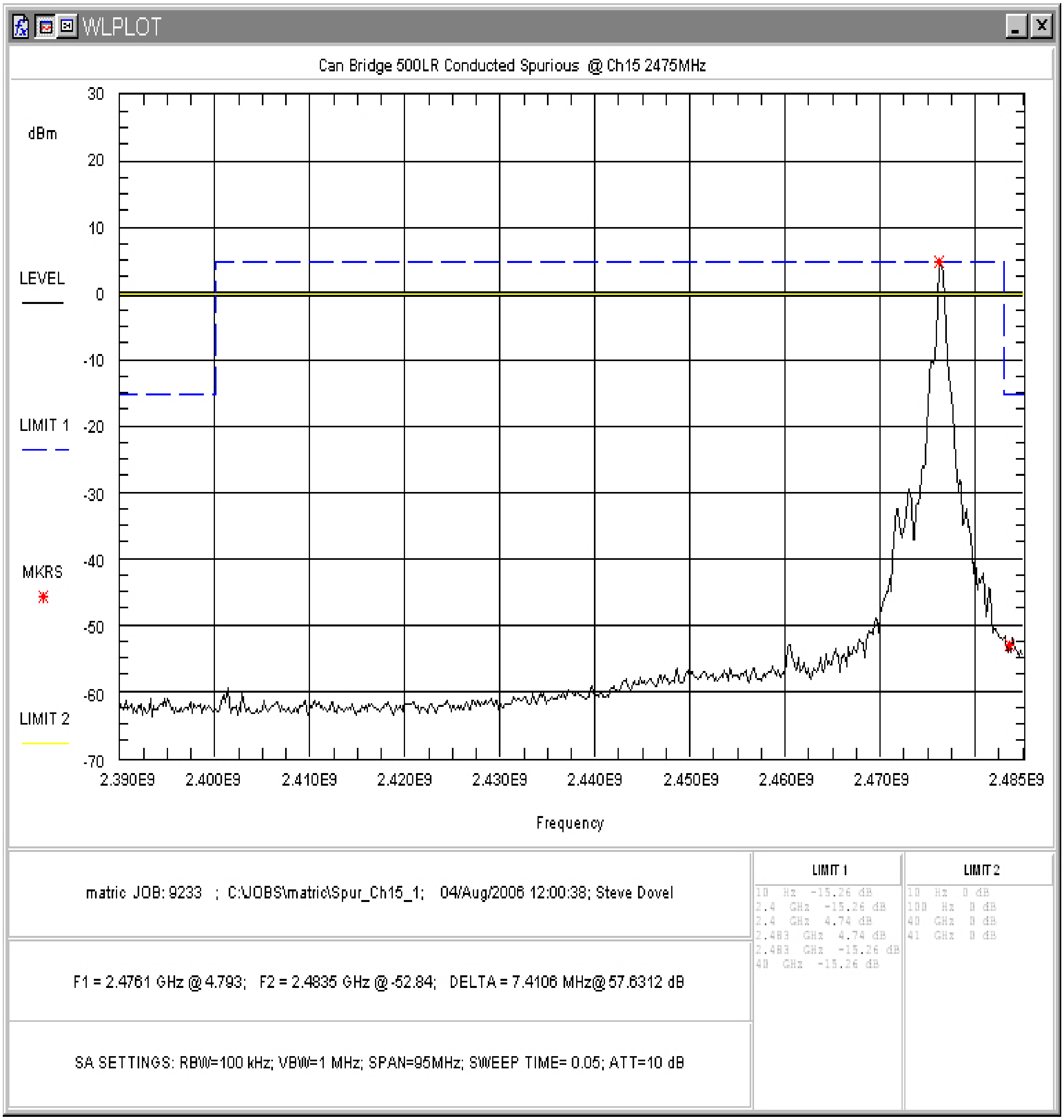

Figure 4-26. Conducted Spurious Emissions, High Channel Inband

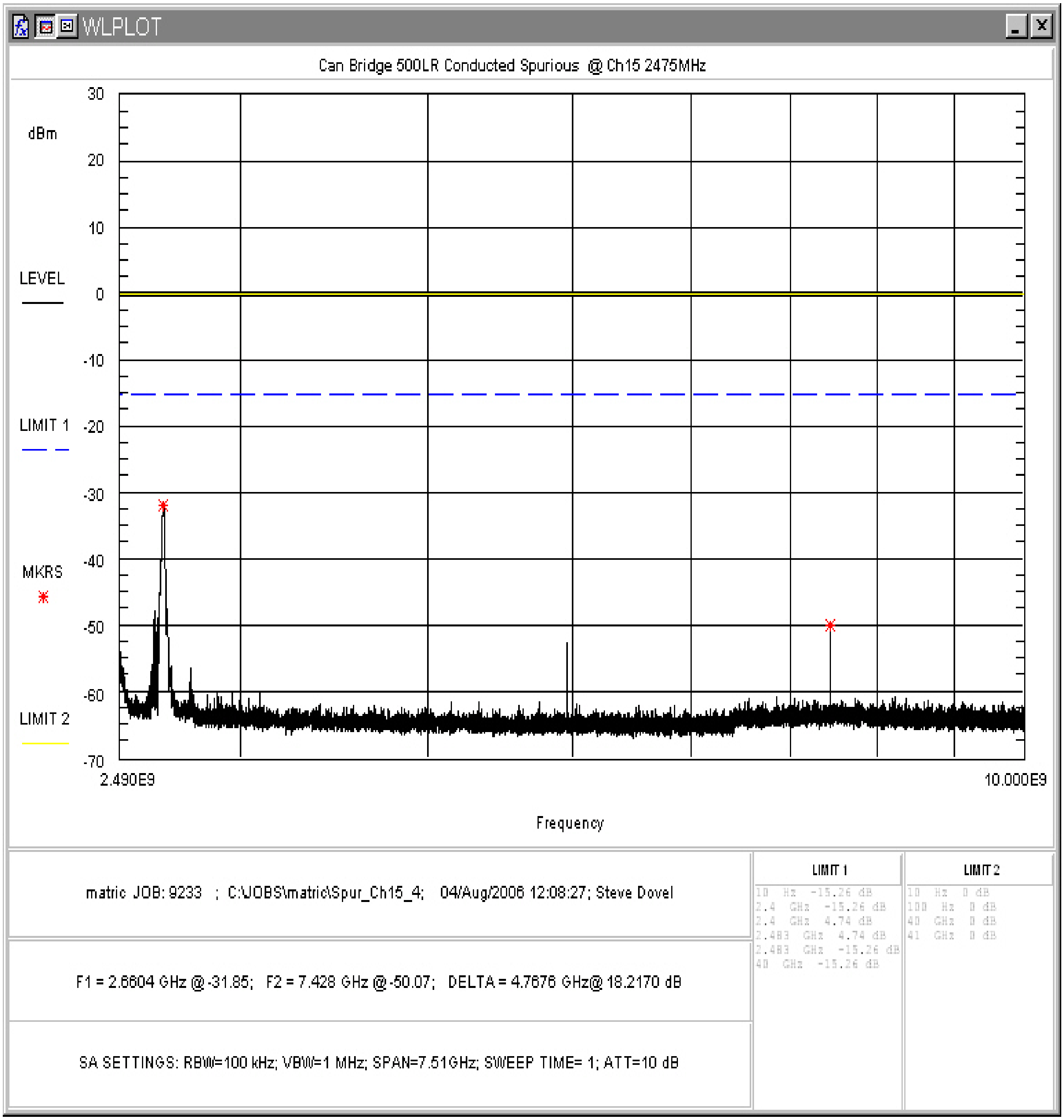

Figure 4-27. Conducted Spurious Emissions, High Channel 2.49 - 10GHz

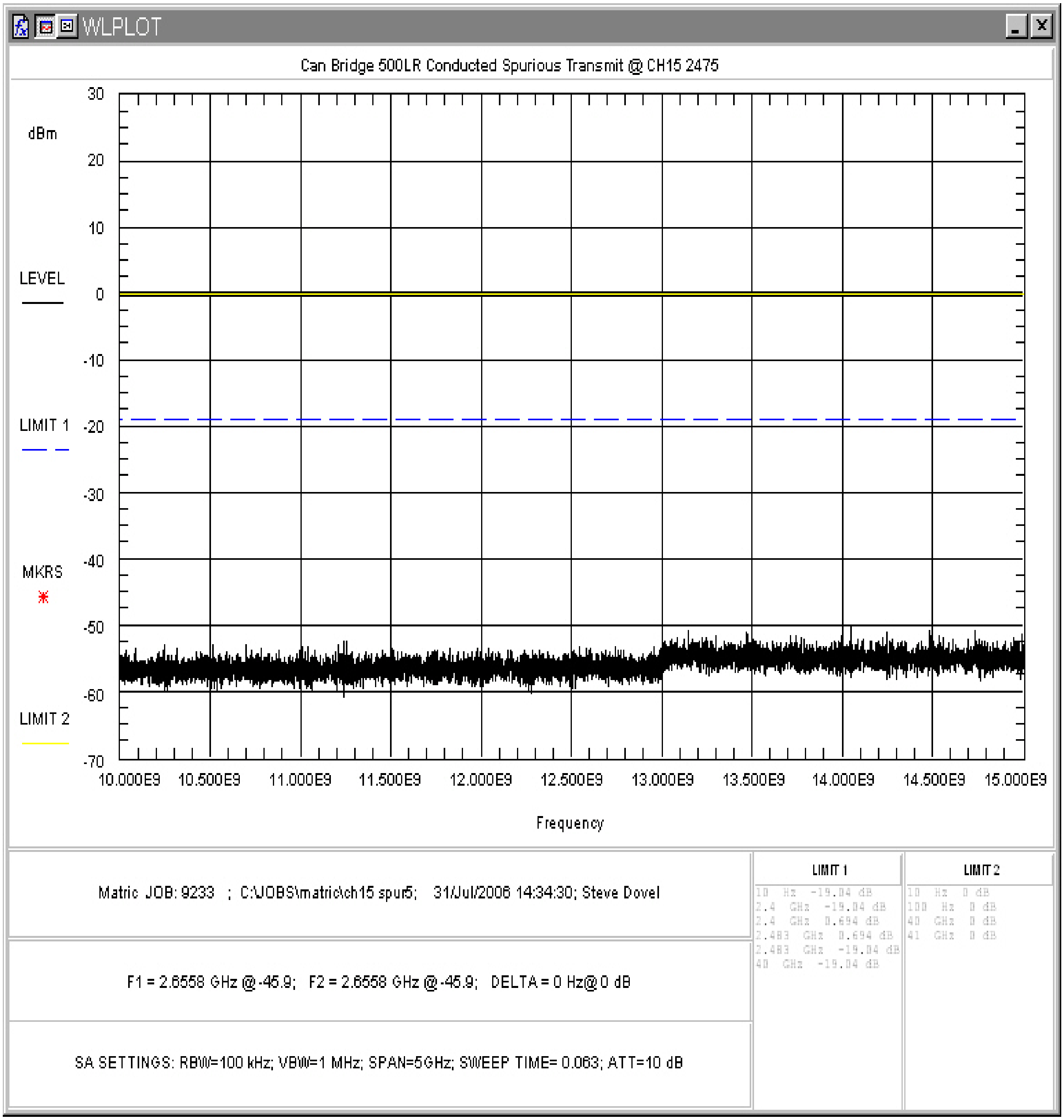

Figure 4-28. Conducted Spurious Emissions, High Channel 10 - 15GHz

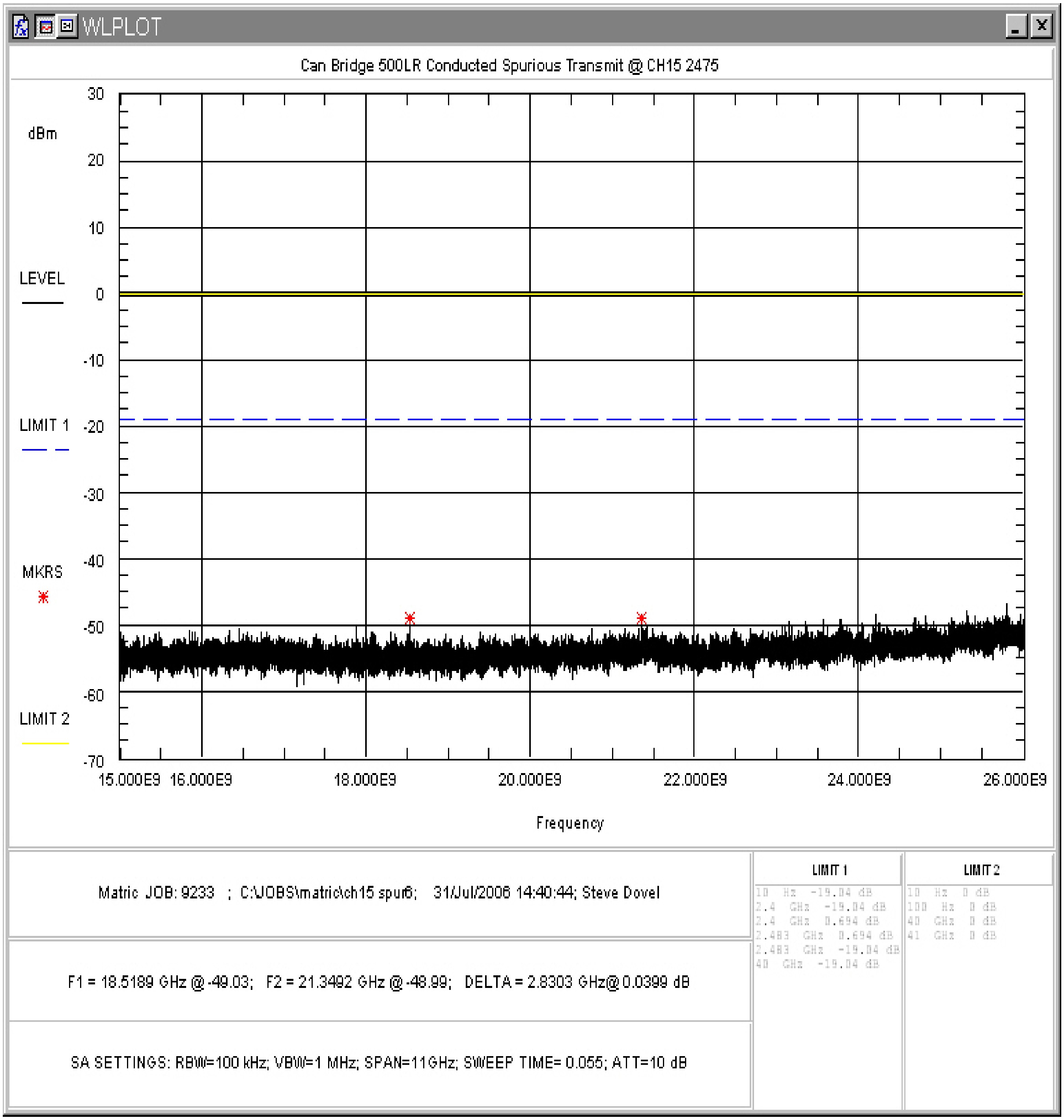

Figure 4-29. Conducted Spurious Emissions, High Channel 15 - 26GHz

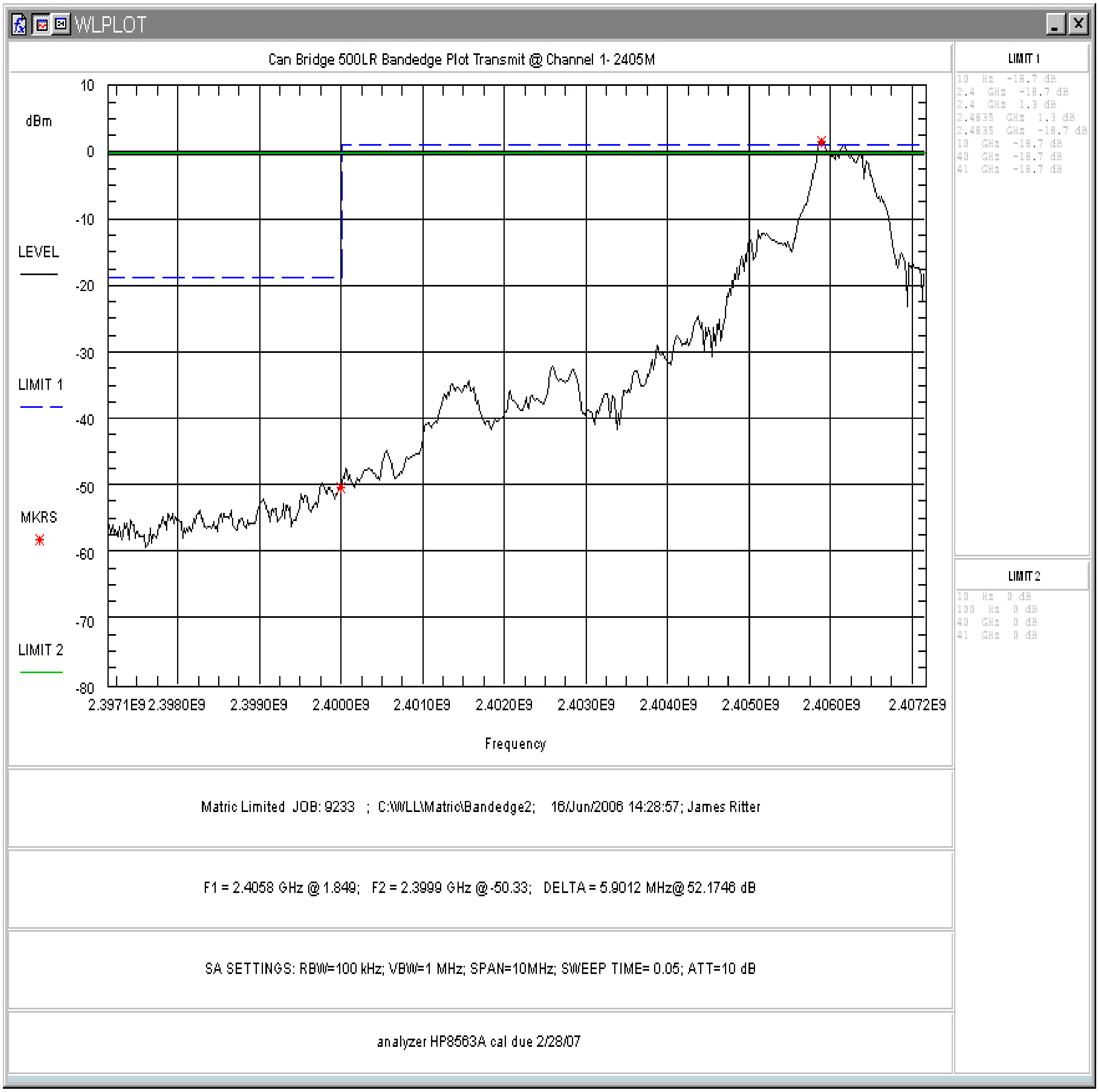

Figure 4-30. Conducted Spurious Emissions, Low Channel Band Edge

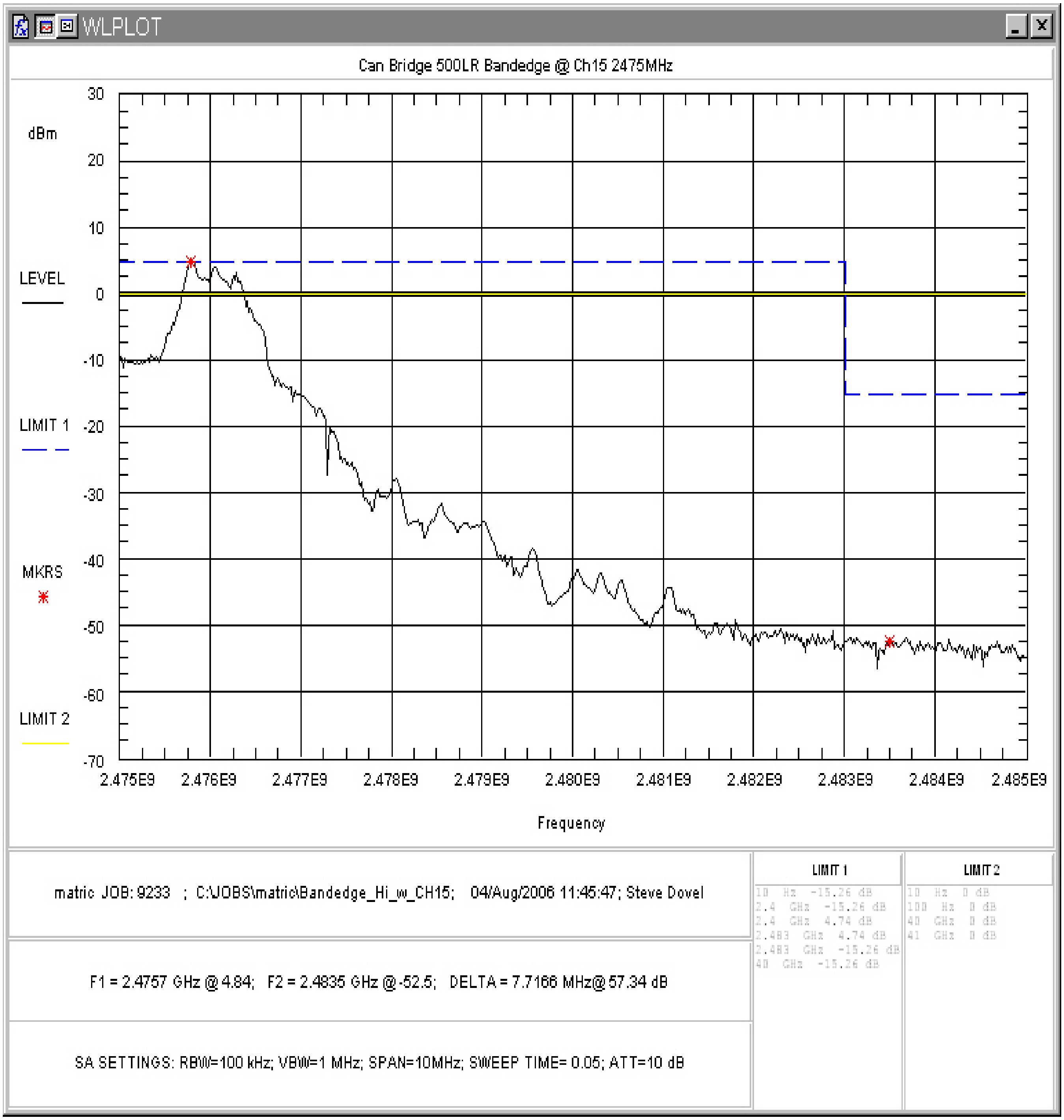

Figure 4-31. Conducted Spurious Emissions, High Channel Band Edge

4.5 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.

4.5.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2003. 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:

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

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level):	VdBμV
Antenna Factor (Ant Corr):	AFdB/m
Cable Loss Correction (Cable Corr):	CCdB
Amplifier Gain:	GdB
Electric Field (Corr Level):	EdBμV/m = VdBμV + AFdB/m + CCdB - GdB
To convert to linear units:	EμV/m = antilog (EdBμV/m/20)

4.5.2 Test Results

The following tables list the radiated emissions test results. No emissions were detected above the 2^{nd} harmonic of the transmit frequency. Worst case emissions are listed with the highest gain antenna of each type.

Table 6: Radiated Emission Test Data, Low Frequency Data (<1GHz)

Client:	Matric	**Date:**	7/27/2006
Tester:	Steve Dovell	**Job #:**	9233
EUT Information:		**Test Requirements:**	
EUT:	Can Bridge 500LR plus 3 addtl ants	TEST STANDARD:	FCC Part 15
Configuration:	Normal running TP	CLASS:	B
	Antenna = MaxRad MFB24010 10dBi	DISTANCE:	3m
Test Equipment (<1GHz):		**Test Equipment (>1GHz):**	
ANTENNA:	A_00557	ANTENNA:	A_00004
CABLE:	CSITE2_3m	CABLE:	CSITE2_HF
LIMIT:	LFCC_3m_Class_B	AMPLIFIER:	A_000522

Frequency (MHz)	Polarity H/V	Az Deg	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)	Notes
46.560	V	200.0	1.0	10.4	16.2	1.6	28.1	25.5	100.0	-11.9	
47.872	V	200.0	1.0	10.2	15.6	1.6	27.4	23.4	100.0	-12.6	
48.486	V	250.0	1.0	12.3	15.3	1.6	29.2	28.9	100.0	-10.8	
50.378	V	230.0	1.0	12.8	14.5	1.6	28.9	28.0	100.0	-11.1	
53.416	V	200.0	1.0	17.3	13.2	1.6	32.2	40.7	100.0	-7.8	
56.042	V	190.0	1.0	17.8	12.2	1.7	31.6	38.2	100.0	-8.4	
58.566	V	300.0	1.0	11.2	11.2	1.7	24.1	16.0	100.0	-15.9	
61.706	V	340.0	1.0	25.5	10.0	1.7	37.3	73.3	100.0	-2.7	
62.976	V	0.0	1.0	24.4	9.6	1.8	35.7	61.2	100.0	-4.3	
63.611	V	0.0	1.0	23.6	9.4	1.8	34.8	55.0	100.0	-5.2	
64.181	V	300.0	1.0	25.1	9.3	1.8	36.1	63.9	100.0	-3.9	
73.410	V	270.0	1.0	22.9	7.8	1.9	32.5	42.4	100.0	-7.5	
86.564	V	170.0	1.0	21.2	8.5	2.0	31.7	38.3	100.0	-8.3	
86.846	V	180.0	1.0	19.9	8.5	2.0	30.4	33.1	100.0	-9.6	
114.412	V	180.0	1.0	17.7	11.7	2.2	31.6	38.2	150.0	-11.9	
169.420	V	90.0	1.0	13.3	11.3	2.6	27.1	22.7	150.0	-16.4	
46.500	H	200.0	2.0	8.1	16.2	1.6	25.9	19.7	100.0	-14.1	
48.303	H	200.0	2.5	5.3	15.4	1.6	22.3	13.0	100.0	-17.7	
63.985	H	45.0	3.0	17.0	9.3	1.8	28.1	25.3	100.0	-11.9	
64.580	H	45.0	3.0	15.9	9.1	1.8	26.8	21.9	100.0	-13.2	
62.085	H	45.0	3.0	17.2	9.9	1.7	28.9	27.7	100.0	-11.1	
74.425	H	15.0	2.5	11.0	7.7	1.9	20.6	10.7	100.0	-19.4	
86.825	H	200.0	3.3	10.0	8.5	2.0	20.5	10.6	100.0	-19.5	
110.885	H	45.0	2.8	14.0	11.4	2.2	27.6	23.9	150.0	-16.0	
113.334	H	60.0	3.0	15.6	11.6	2.2	29.4	29.6	150.0	-14.1	

All emissions below 1 GHz were the same regardless of the Channel of operation or antenna used.

Table 7: Radiated Emission Test Data, High Frequency Data, MaxRad 5dBi Antenna

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Height (m)	SA Level (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
CH 1												
2390.000	H	200.0	1.0	35.3	28.9	1.6	38.1	27.6	24.1	500.0	-26.4	Avg.
2390.000	V	200.0	1.0	34.6	28.9	1.6	38.1	26.9	22.2	500.0	-27.1	Avg.
4811.400	V	300.0	1.0	34.2	32.5	3.5	37.2	35.8	61.7	500.0	-18.2	Avg.
4811.400	H	300.0	1.0	32.3	32.5	3.5	37.2	34.3	51.9	500.0	-19.7	Avg.
2390.000	H	200.0	1.0	46.2	28.9	1.6	38.1	38.5	84.1	5000.0	-35.5	Peak
2390.000	V	200.0	1.0	46.7	28.9	1.6	38.1	39.0	89.4	5000.0	-35.0	Peak
4811.400	V	300.0	1.0	45.7	32.5	3.5	37.2	50.4	331.3	5000.0	-23.6	Peak
4811.400	H	300.0	1.0	42.5	32.5	3.5	37.2	46.8	218.9	5000.0	-27.2	Peak
CH 8												
4882.200	V	200.0	1.0	34.2	32.6	3.5	37.2	33.2	45.5	500.0	-20.8	Avg.
4882.200	H	200.0	1.0	35.2	32.6	3.5	37.2	34.2	51.0	500.0	-19.8	Avg.
4882.200	V	200.0	1.0	45.7	32.6	3.5	37.2	44.7	170.9	5000.0	-29.3	Peak
4882.200	H	200.0	1.0	45.2	32.6	3.5	37.2	44.2	161.3	5000.0	-29.8	Peak
CH 15												
2483.500	V	45.0	1.0	46.1	29.3	1.5	38.1	38.9	403.4	500.0	-15.1	Avg.
2483.500	H	0.0	1.0	45.9	29.3	1.5	38.1	38.7	403.4	500.0	-15.3	Avg.
4951.540	V	45.0	1.0	48.7	33.2	3.6	37.2	48.3	60.3	500.0	-5.7	Avg.
4951.540	H	0.0	1.0	45.7	33.2	3.6	37.2	45.3	54.3	500.0	-8.7	Avg.
2483.500	V	45.0	1.0	61.2	29.3	1.5	38.1	54.0	1382.7	5000.0	-20.0	Peak
2483.500	H	0.0	1.0	58.4	29.3	1.5	38.1	51.2	1382.7	5000.0	-22.8	Peak
4951.540	V	45.0	1.0	57.3	33.2	3.6	37.2	56.9	272.3	5000.0	-17.1	Peak
4951.540	H	0.0	1.0	52.7	33.2	3.6	37.2	52.3	239.9	5000.0	-21.7	Peak

Table 8: Radiated Emission Test Data, High Frequency Data, MaxRad 10dBi Antenna

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Height (m)	SA Level (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
CH 1												
2390.000	V	200.0	1.0	36.5	28.9	1.6	38.1	28.8	27.6	500.0	-25.2	Avg.
2483.500	V	40.0	1.0	35.0	29.1	1.5	38.1	27.5	23.8	500.0	-26.5	Avg.
2690.000	V	200.0	1.0	35.0	29.5	1.5	38.1	27.9	24.9	500.0	-26.0	Avg.
3266.487	V	200.0	1.0	35.8	30.3	1.9	37.8	30.3	32.8	500.0	-23.7	Avg.
4811.600	V	200.0	1.0	34.0	32.5	3.5	37.2	32.8	43.7	500.0	-21.2	Avg.
2390.000	H	270.0	1.0	35.0	28.9	1.6	38.1	27.3	23.2	500.0	-26.7	Avg.
2483.500	H	40.0	1.0	33.5	29.1	1.5	38.1	27.5	23.8	500.0	-26.5	Avg.

2690.000	H	200.0	1.0	35.0	29.5	1.5	38.1	27.9	24.9	500.0	-26.0	Avg.
3266.487	H	200.0	1.0	35.0	30.3	1.9	37.8	29.5	29.9	500.0	-24.5	Avg.
4811.600	H	200.0	1.0	36.0	32.5	3.5	37.2	34.8	55.0	500.0	-19.2	Avg.
2390.000	V	200.0	1.0	53.9	28.9	1.6	38.1	46.3	205.4	5000.0	-27.7	Peak
2483.500	V	40.0	1.0	44.8	29.1	1.5	38.1	37.3	73.5	5000.0	-36.7	Peak
2690.000	V	200.0	1.0	52.0	29.5	1.5	38.1	44.9	176.5	5000.0	-29.0	Peak
3266.487	V	200.0	1.0	61.0	30.3	1.9	37.8	55.5	596.1	5000.0	-18.5	Peak
4811.600	V	200.0	1.0	54.2	32.5	3.5	37.2	53.0	446.9	5000.0	-21.0	Peak
2390.000	H	270.0	1.0	42.0	28.9	1.6	38.1	34.3	52.0	5000.0	-39.7	Peak
2483.500	H	40.0	1.0	43.0	29.1	1.5	38.1	37.3	73.5	5000.0	-36.7	Peak
2690.000	H	200.0	1.0	42.0	29.5	1.5	38.1	34.9	55.8	5000.0	-39.0	Peak
3266.487	H	200.0	1.0	42.0	30.3	1.9	37.8	36.5	66.9	5000.0	-37.5	Peak
4811.600	H	200.0	1.0	47.8	32.5	3.5	37.2	46.6	213.9	5000.0	-27.4	Peak
CH 8												
2390.000	V	200.0	1.0	35.0	28.9	1.6	38.1	27.3	23.2	500.0	-26.7	Avg.
2483.500	V	40.0	1.0	34.0	29.1	1.5	38.1	26.5	21.2	500.0	-27.5	Avg.
2690.000	V	200.0	1.0	35.5	29.5	1.5	38.1	28.4	26.4	500.0	-25.5	Avg.
3292.700	V	200.0	1.0	38.5	30.4	2.0	37.7	33.1	45.2	500.0	-20.9	Avg.
4811.530	V	200.0	1.0	38.2	32.5	3.5	37.2	37.0	70.8	500.0	-17.0	Avg.
2390.000	H	270.0	1.0	35.0	28.9	1.6	38.1	27.3	23.2	500.0	-26.7	Avg.
2483.500	H	40.0	1.0	33.5	29.1	1.5	38.1	27.5	23.8	500.0	-26.5	Avg.
2690.000	H	200.0	1.0	35.0	29.5	1.5	38.1	27.9	24.9	500.0	-26.0	Avg.
3292.700	H	200.0	1.0	34.0	30.4	2.0	37.7	28.6	26.9	500.0	-25.4	Avg.
4811.530	H	200.0	1.0	36.0	32.5	3.5	37.2	34.8	55.0	500.0	-19.2	Avg.
2390.000	V	200.0	1.0	46.7	28.9	1.6	38.1	39.0	89.4	5000.0	-35.0	Peak
2483.500	V	40.0	1.0	45.0	29.1	1.5	38.1	37.5	75.2	5000.0	-36.5	Peak
2690.000	V	200.0	1.0	49.7	29.5	1.5	38.1	42.6	135.4	5000.0	-31.3	Peak
3292.700	V	200.0	1.0	56.2	30.4	2.0	37.7	50.8	346.7	5000.0	-23.2	Peak
4811.530	V	200.0	1.0	54.2	32.5	3.5	37.2	53.0	446.9	5000.0	-21.0	Peak
2390.000	H	270.0	1.0	43.0	28.9	1.6	38.1	35.3	58.4	5000.0	-38.7	Peak
2483.500	H	40.0	1.0	43.0	29.1	1.5	38.1	37.3	73.5	5000.0	-36.7	Peak
2690.000	H	200.0	1.0	45.0	29.5	1.5	38.1	37.9	78.8	5000.0	-36.0	Peak
3292.700	H	200.0	1.0	48.0	30.4	2.0	37.7	42.6	134.9	5000.0	-31.4	Peak
4811.530	H	200.0	1.0	54.0	32.5	3.5	37.2	52.8	436.7	5000.0	-21.2	Peak
CH 15												
2390.000	H	200.0	1.0	35.3	28.9	1.6	38.1	27.6	24.1	500.0	-26.4	Avg.
2483.500	V	90.0	1.0	21.5	29.3	1.5	38.1	14.3	403.4	500.0	-39.7	Avg.
2690.000	V	200.0	1.0	38.0	29.5	1.5	38.1	30.9	35.2	500.0	-23.0	Avg.
4951.540	V	300.0	1.0	34.8	32.7	3.6	37.2	33.9	49.7	500.0	-20.0	Avg.
2390.000	H	200.0	1.0	34.6	28.9	1.6	38.1	26.9	22.2	500.0	-27.1	Avg.
2483.500	H	200.0	1.0	21.5	29.3	1.5	38.1	14.3	403.4	500.0	-39.7	Avg.
2690.000	H	200.0	1.0	36.2	29.5	1.5	38.1	29.1	28.6	500.0	-24.8	Avg.
4951.540	H	300.0	1.0	34.5	32.7	3.6	37.2	33.6	47.9	500.0	-20.4	Avg.
2390.000	H	200.0	1.0	46.2	28.9	1.6	38.1	38.5	84.1	5000.0	-35.5	Peak
2483.500	V	90.0	1.0	32.2	29.3	1.5	38.1	25.0	1382.7	5000.0	-49.0	Peak

2690.000	V	200.0	1.0	56.0	29.5	1.5	38.1	48.9	279.7	5000.0	-25.0	Peak
4951.540	V	300.0	1.0	47.5	32.7	3.6	37.2	46.6	213.8	5000.0	-27.4	Peak
2390.000	H	200.0	1.0	46.7	28.9	1.6	38.1	39.0	89.4	5000.0	-35.0	Peak
2483.500	H	200.0	1.0	32.2	29.3	1.5	38.1	25.0	1382.7	5000.0	-49.0	Peak
2690.000	H	200.0	1.0	54.3	29.5	1.5	38.1	47.2	230.0	5000.0	-26.7	Peak
4951.540	H	300.0	1.0	46.8	32.7	3.6	37.2	45.9	197.2	5000.0	-28.1	Peak

Table 9: Radiated Emission Test Data, High Frequency Data, PC2415 16dBi Antenna

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Height (m)	SA Level (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
CH 1												
2390.000	V	200.0	1.0	36.5	28.9	1.6	38.1	28.8	27.6	500.0	-25.2	Avg.
2390.000	H	270.0	1.0	35.0	28.9	1.6	38.1	27.3	23.2	500.0	-26.7	Avg.
4811.400	V	300.0	1.0	34.2	32.5	3.2	37.2	32.8	43.4	500.0	-21.2	Avg.
4811.400	H	300.0	1.0	32.3	32.5	3.2	37.2	30.8	34.8	500.0	-23.1	Avg.
2390.000	V	200.0	1.0	53.9	28.9	1.6	38.1	46.3	205.4	5000.0	-27.7	Peak
2390.000	H	270.0	1.0	42.0	28.9	1.6	38.1	34.3	52.0	5000.0	-39.7	Peak
4811.400	V	300.0	1.0	45.7	32.5	3.2	37.2	44.2	162.1	5000.0	-29.8	Peak
4811.400	H	300.0	1.0	42.5	32.5	3.2	37.2	41.0	112.8	5000.0	-32.9	Peak
CH 8												
4882.200	V	180.0	1.0	35.2	32.6	3.3	37.2	33.9	49.7	500.0	-20.1	Avg.
4882.200	H	180.0	1.0	32.2	32.6	3.3	37.2	30.9	35.2	500.0	-23.1	Avg.
4882.200	V	180.0	1.0	47.7	32.6	3.3	37.2	46.4	209.5	5000.0	-27.6	Peak
4882.200	H	180.0	1.0	41.0	32.6	3.3	37.2	39.7	96.9	5000.0	-34.3	Peak
CH15												
2483.500	V	0.0	1.0	33.8	29.1	1.5	38.1	26.3	403.4	500.0	-27.7	Avg.
4951.540	V	300.0	1.0	33.0	32.7	3.6	37.2	32.1	60.3	500.0	-21.9	Avg.
2483.500	H	0.0	1.0	33.7	29.1	1.5	38.1	26.2	403.4	500.0	-27.8	Avg.
4951.540	H	300.0	1.0	33.8	32.7	3.6	37.2	32.9	54.3	500.0	-21.1	Avg.
2483.500	V	0.0	1.0	46.2	29.1	1.5	38.1	38.7	1382.7	5000.0	-35.3	Peak
4951.540	V	300.0	1.0	42.9	32.7	3.6	37.2	42.0	272.3	5000.0	-32.0	Peak
2483.500	H	0.0	1.0	45.5	29.1	1.5	38.1	38.0	1382.7	5000.0	-36.0	Peak
4951.540	H	300.0	1.0	45.9	32.7	3.6	37.2	45.0	239.9	5000.0	-29.0	Peak

4.6 AC Powerline Conducted Emissions: (FCC Part §15.207 and RSS-GEN)

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 Ω/50 µH 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 and data cables were moved about to obtain maximum emissions.

The 50Ω 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 peak measurements.

Data is recorded in the following table.

Table 10. Conducted Emissions Test Data; §15.207

Client:	Matric	Date:	8/4/2006
Model:	Can Bridge 500LR	Job #:	9233
TEST STANDARD:	FCC Part 15	CLASS:	FCC_B
TEST SITE:	CSITE2_CE	TEST VOLTAGE:	120 VAC
LISN 1:	A_00125	LISN 2:	A_00126
Power Supply:	CalRad 45-752 DV-1212A (COTS)		

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBµV)	Level Corr (dBµV)	Margin QP (dB)	Level AVG (dBµV)	Cable Loss (dB)	Level Corr (dBµV)	Limit AVG (dBµV)	Margin AVG (dB)
0.151	46.9	10.1	0.8	66.0	57.8	-8.2	6.5	10.1	17.4	56.0	-38.6
0.180	44.3	10.1	0.6	64.5	55.1	-9.4	5.2	10.1	16.0	54.5	-38.5
0.412	41.5	10.3	0.3	57.6	52.1	-5.5	3.5	10.3	14.1	47.6	-33.5
16.286	14.3	12.1	2.5	60.0	28.9	-31.1	5.6	12.1	20.2	50.0	-29.8
20.000	18.9	12.4	3.1	60.0	34.4	-25.6	16.2	12.4	31.7	50.0	-18.3
29.423	19.5	12.8	5.2	60.0	37.5	-22.5	12.7	12.8	30.7	50.0	-19.3

LINE 2 - PHASE

Frequency (MHz)	Level QP (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBµV)	Level Corr (dBµV)	Margin QP (dB)	Level AVG (dBµV)	Cable Loss (dB)	Level Corr (dBµV)	Limit AVG (dBµV)	Margin AVG (dB)
0.151	47.5	10.1	0.4	66.0	58.0	-7.9	6.7	10.1	17.2	56.0	-38.7
0.180	45.5	10.1	0.3	64.5	56.0	-8.5	4.8	10.1	15.3	54.5	-39.2
0.412	41.1	10.3	0.2	57.6	51.6	-6.0	2.1	10.3	12.6	47.6	-35.0
16.286	16.1	12.1	3.3	60.0	31.6	-28.4	6.2	12.1	21.7	50.0	-28.3
20.000	19.5	12.4	4.1	60.0	36.0	-24.0	16.8	12.4	33.3	50.0	-16.7
29.423	20.5	12.8	6.2	60.0	39.5	-20.5	13.4	12.8	32.4	50.0	-17.6