



Washington Laboratories, Ltd.

FCC Certification Test Report
For the
Mine Safety Appliance
FireHawk M7 2.4 GHz HUD Transceiver
FCC ID: P9R-10083132

WLL REPORT# **9849-02 Rev 0**
9/21/2007

Prepared for:

Mine Safety Appliance
1000 Cranberry Woods Drive
Cranberry Township, PA 16066

Prepared By:

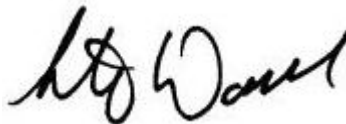
Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

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Mine Safety Appliance
FireHawk M7 2.4 GHz HUD Transceiver
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Prepared by:



Steven Dovell
Compliance Engineer

Reviewed by:



Steven D. Koster
EMC Operations Manager

Abstract

This report has been prepared on behalf of Mine Safety Appliance to support the attached Application for Equipment Authorization. The test report and application are submitted for a Digital Transmission System Transmitter under Part 15.247 of the FCC Rules and Regulations.

This Certification Test Report documents the test configuration and test results for a Mine Safety Appliance FireHawk M7 2.4 GHz HUD Transceiver operating in the 802.11b mode.

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. 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 Mine Safety Appliance FireHawk M7 2.4 GHz HUD Transceiver complied with the limits for a Digital Transmission System Transmitter device under FCC Part 15.247.

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1 Introduction

1.1 Compliance Statement

The Mine Safety Appliance FireHawk M7 2.4 GHz HUD Transceiver complied with the limits for a Digital Transmission System Transmitter device under FCC Part 15.247.

1.2 Test Scope Summary

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

Test Specification	Specific Description	Date Completed	Result	Modifications? (Y/N)
CFR47 Part 2.1046	RF Power Output	8/20/07	Complied	No
CFR47 Part 2.1049	Occupied Bandwidth	8/20/07	Complied	No
CFR47 Part 2.1051	Conducted Spurious Emissions at Antenna Terminals	8/20/07	Complied	No
CFR47 Part 2.1053	Radiated Spurious Emissions	8/21/07	Complied	No
CFR47 Part 15.247	Power Spectral Density	8/20/07	Complied	No

1.3 Contract Information

Customer: Mine Safety Appliance
1000 Cranberry Woods Drive
Cranberry Township, PA 16066

Quotation Number: 63621

1.4 Test Dates

Testing performed on the following date(s): from 8/16/2007 to 8/21/2007

1.5 Test and Support Personnel

Washington Laboratories, LTD Steven Dovell
Client Representative Greg Imblum

2 Equipment Under Test

2.1 EUT Identification & Description

FireHawk® M7 HUD - The Heads-Up Display (HUD) similar in appearance and function to the existing HUD (P9R-10031511) device. The HUD is worn by fire-fighters on the face piece of their Self Contained Breathing Apparatus (SCBA). The HUD is designed to display the status of their air supply, PASS alarm and battery power. The HUD uses multi-colored LEDs to indicate the remaining air supply in a bar graph format. There are additional LEDs to indicate a PASS alarm, low battery indication and an evacuation signal. The LEDs are visible through the facemask so the fire-fighter can see the status indicators while working hands free. The HUD contains a Low-Frequency (27KHz) receiver. This receiver is used to wake the HUD out of standby mode and initiate pairing for the 2.4GHz transceiver between the HUD and the Control Module

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Mine Safety Appliance
FCC ID:	P9R-10083132
Model:	FireHawk M7 2.4 GHz HUD Transceiver
FCC Rule Parts:	§15.247
Frequency Range:	2405 - 2480MHz
Maximum Output Power:	0.0447W
Modulation:	DSSS
Occupied Bandwidth:	1.657MHz (6dB BW)
Keying:	Automatic
Type of Information:	Data 802.11b
Number of Channels:	16
Power Output Level	Fixed
Antenna Type	Integral (50Ω, unbalanced SMD chip) 1.5dBi
Interface Cables:	None
Power Source & Voltage:	3 AAA Batteries (4.5VDC)

2.2 Test Configuration

The EUT was configured with the following components:

Table 2: EUT Test Configuration

Description	Manufacturer/Model Number	Serial Number	Revision
FireHawk M7 HUD	Mine Safety Appliances	N/A	1

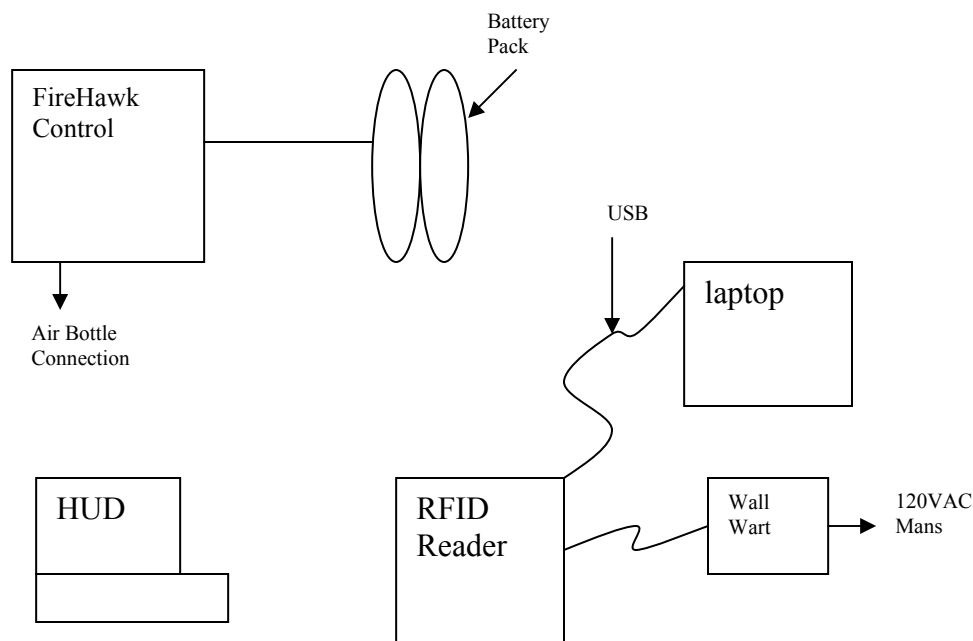


Figure 1: Radiated Emissions Configuration



Figure 2: Conducted Emissions Configuration

The FireHawk M7 HUD was tested in a standalone configuration. No external connections are available or required to operate the EUT. No interaction between the HUD and the remainder of the system.

2.3 Testing Algorithm

The EUT was configured to constantly transmit channel 1, channel 8 or channel 16, modulated.

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

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:

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

Table 3: Test Equipment List

WLL Asset #	Manufacturer Model/Type	Function	Cal. Due
00618	HP 8563A	ANALYZER, SPECTRUM	02/09/2008
00541	MEGAPHASE, LLC TM40-K1K1-36	CABLE, 36" BENCH TEST CABLE	09/11/2007
00068	HP, 85650A	ADAPTER, QP	7/6/2008
00072	HP, 8568B	ANALYZER, SPECTRUM	7/6/2008
00070	HP, 85685A	PRESELECTOR, RF W/OPT 8ZE	7/6/2008
00382	SUNOL, JB1	ANTENNA, BICONLOG	2/2/2008
00124	SOLAR, 8012-50-R-24-BNC	LISN	9/26/2007
00053	HP, 11947A	LIMITER, TRANSIENT	4/9/2008

4 Test Results

4.1 Duty Cycle Correction

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:

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

Duty cycle correction was not required.

4.2 RF Power Output: (FCC Part §2.1046)

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

Channel	Frequency	dBm	Limit	Watts	Pass/Fail
1	2405MHz	-17.9	+30dBm	0.016218	Pass
8	2440MHz	-13.5	+30dBm	0.044668	Pass
16	2480MHz	-18.5	+30dBm	0.014125	Pass

Test Engineer(s): Steven Dovell

Test Date(s): 8/17/07 & 8/20/07

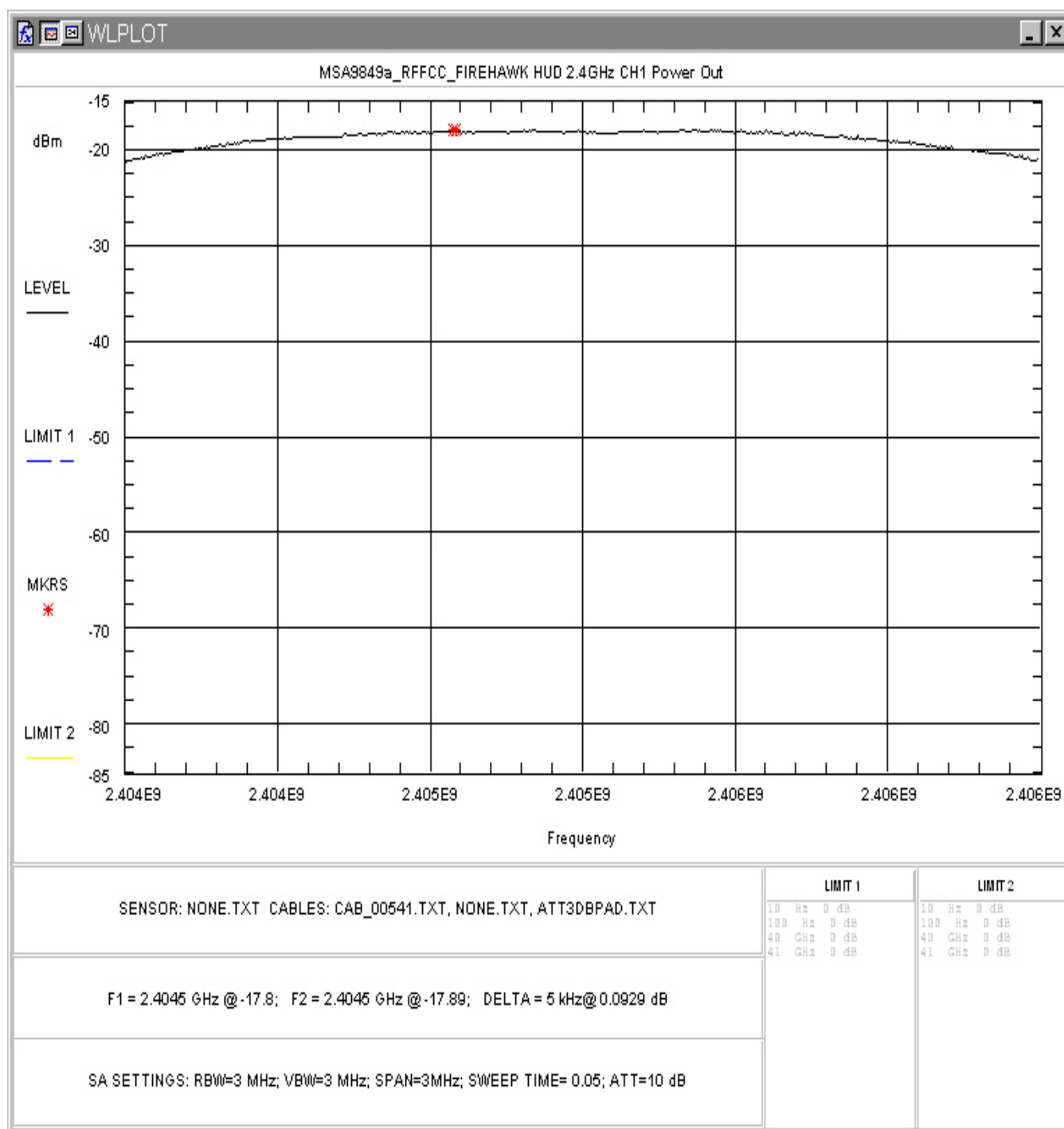


Figure 3: RF Peak Power, Low Channel

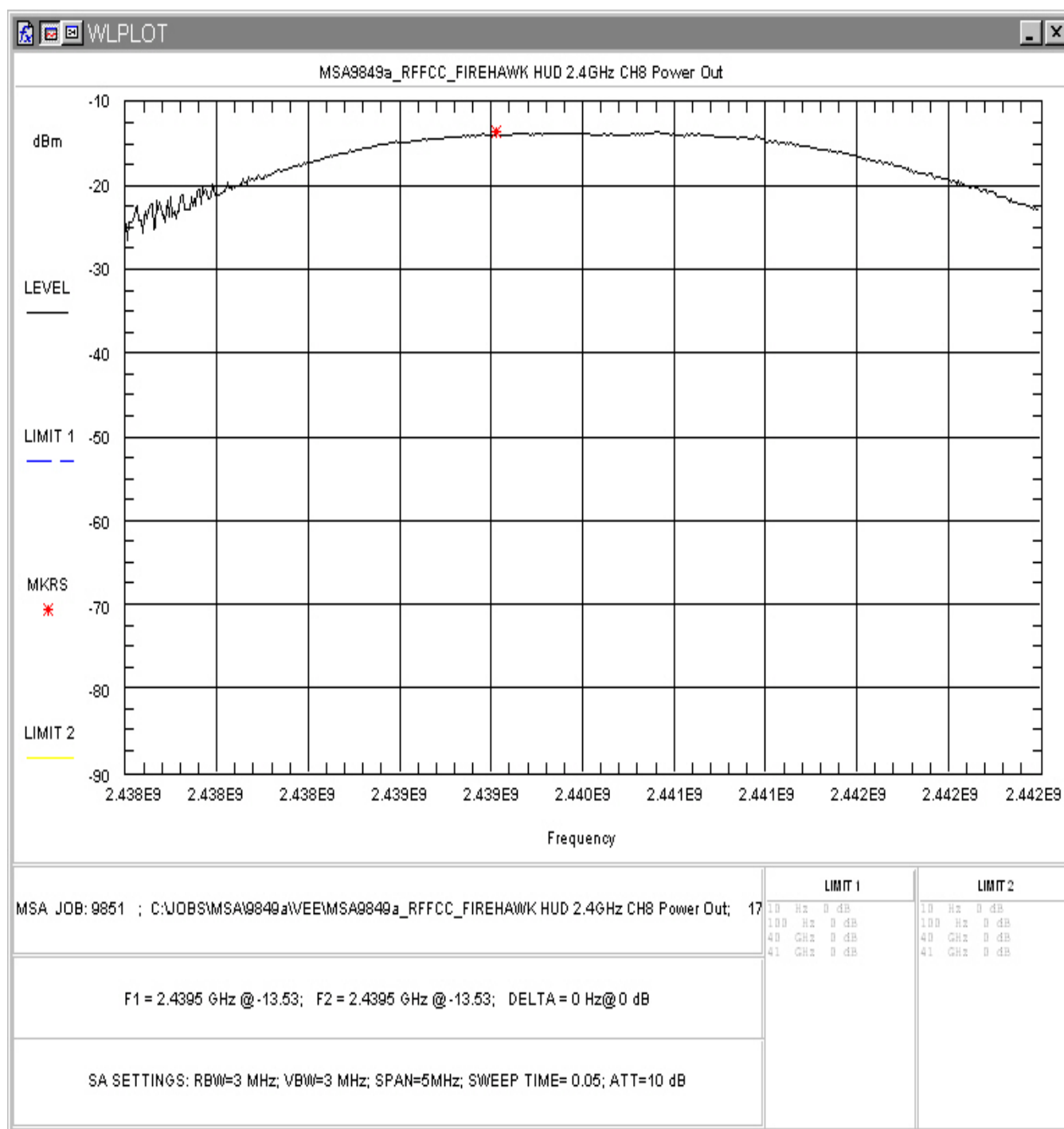


Figure 4: RF Peak Power, Mid Channel

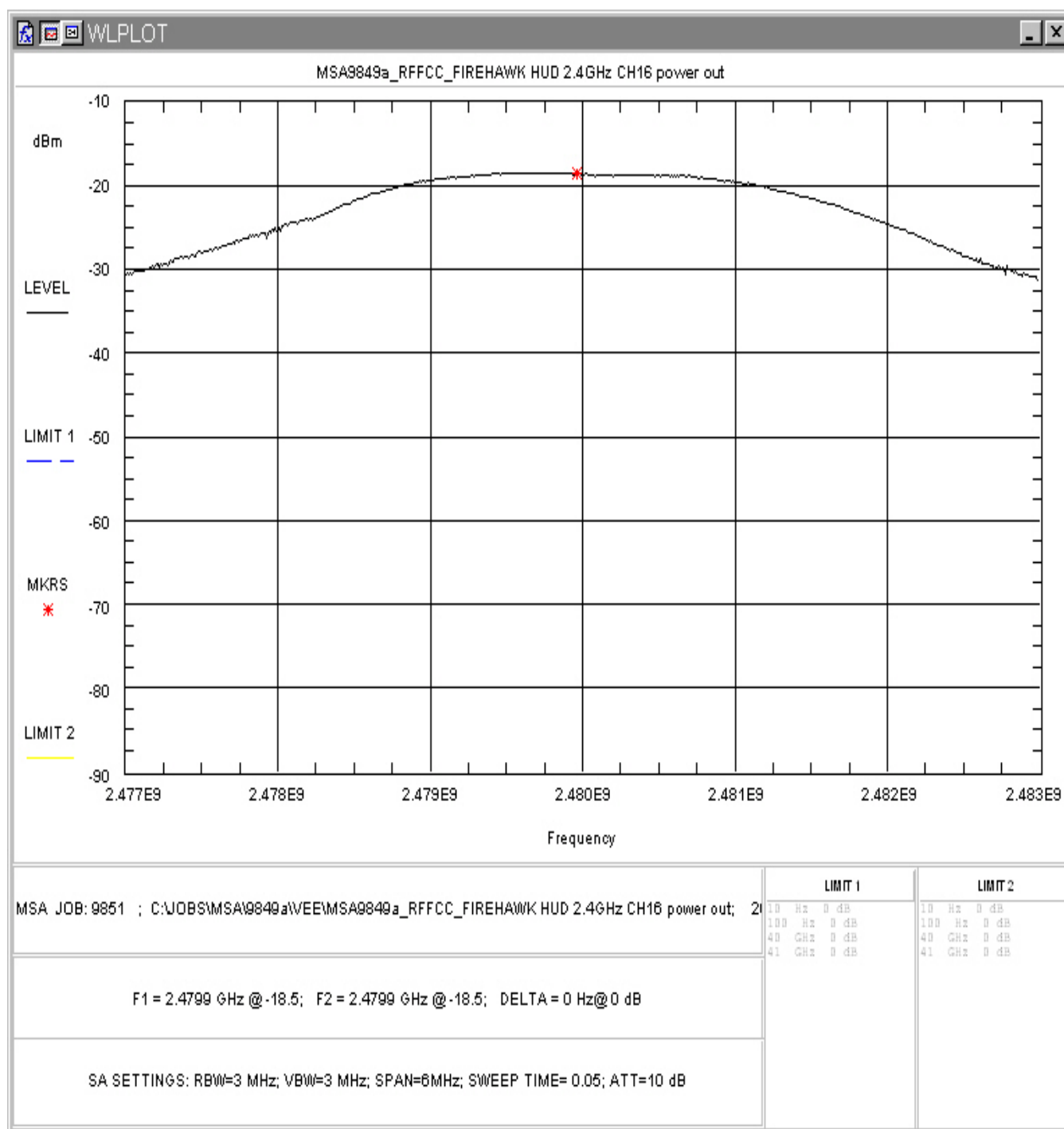


Figure 5: Peak Power, High Channel

4.3 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 Direct Sequence spread spectrum Systems, FCC Part 15.247 requires the maximum -6 dB bandwidth must be greater the 500kHz.

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

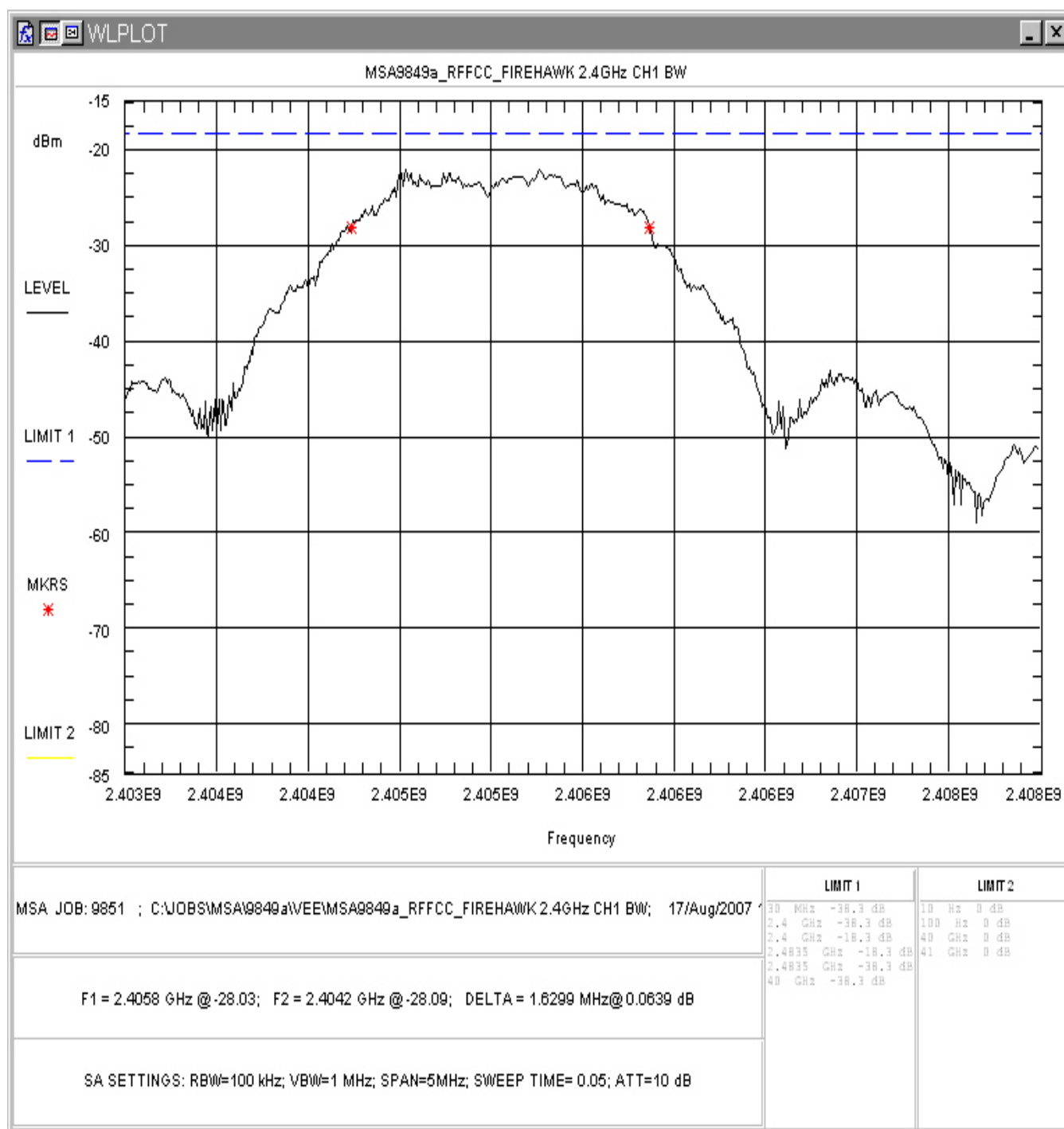


Figure 6: Occupied Bandwidth, Low Channel

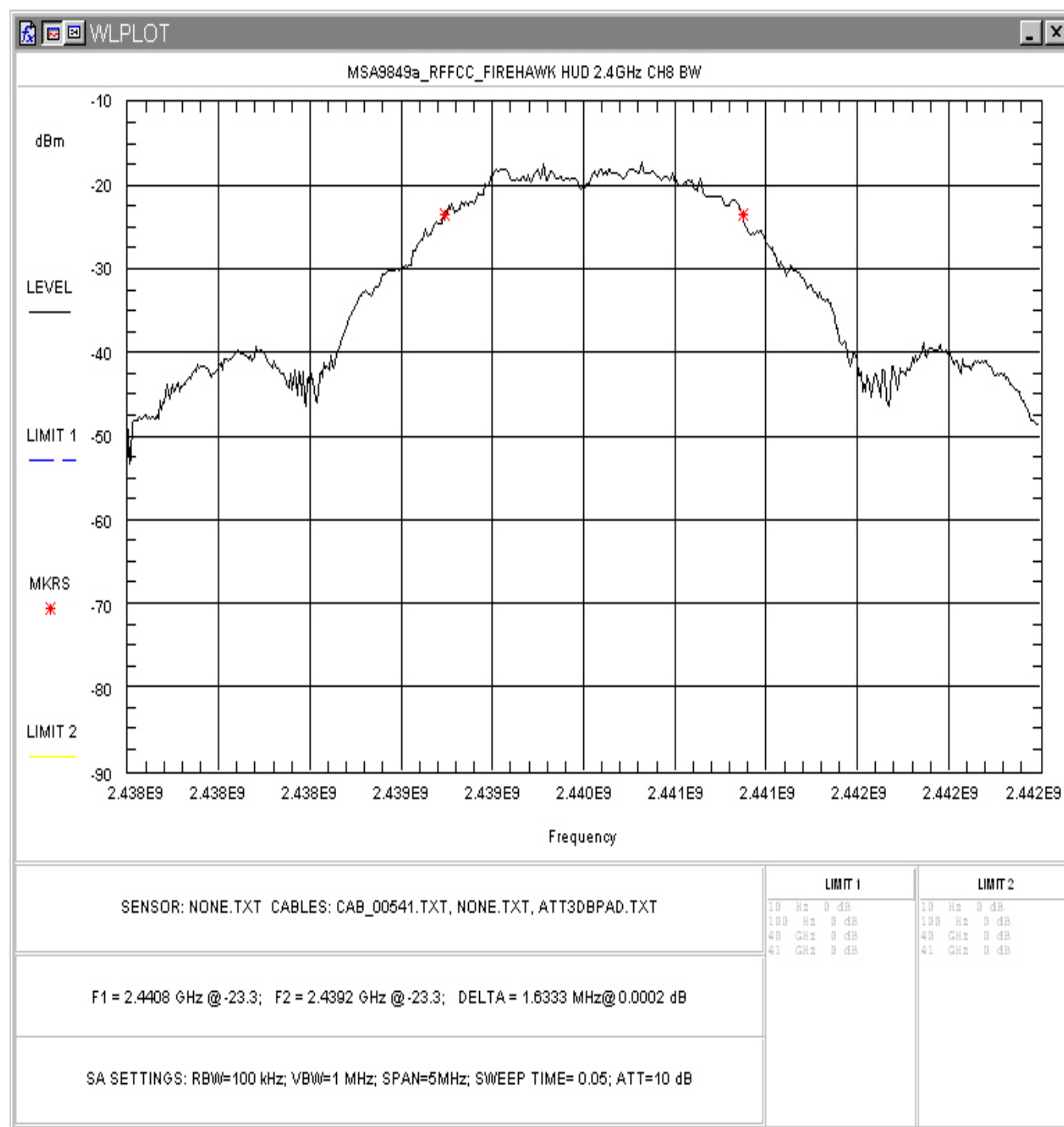


Figure 7: Occupied Bandwidth, Mid Channel

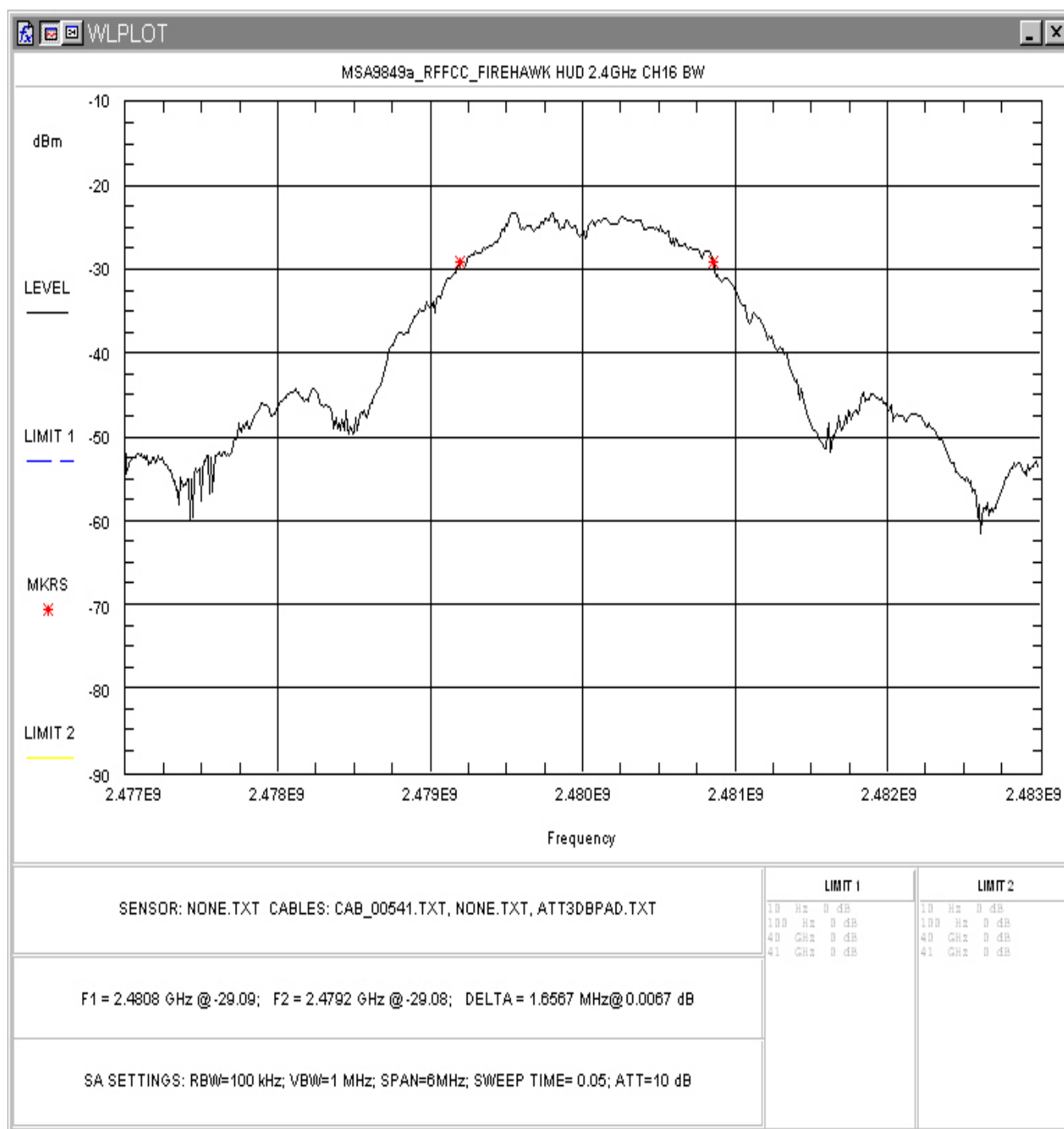


Figure 8: Occupied Bandwidth, High Channel

Table 5 provides a summary of the Occupied Bandwidth Results.

Table 5. Occupied Bandwidth Results

Channel	Frequency	-6dB Bandwidth
1	2405MHz	1.630MHz
8	2440MHz	1.633MHz
16	2480MHz	1.657MHz

Test Engineer(s): Steven Dovell

Test Date(s): 8/17/07 & 8/20/07

4.4 Power Spectral Density (FCC Part 15.247/RSS-210)

For DSSS devices, 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.

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.

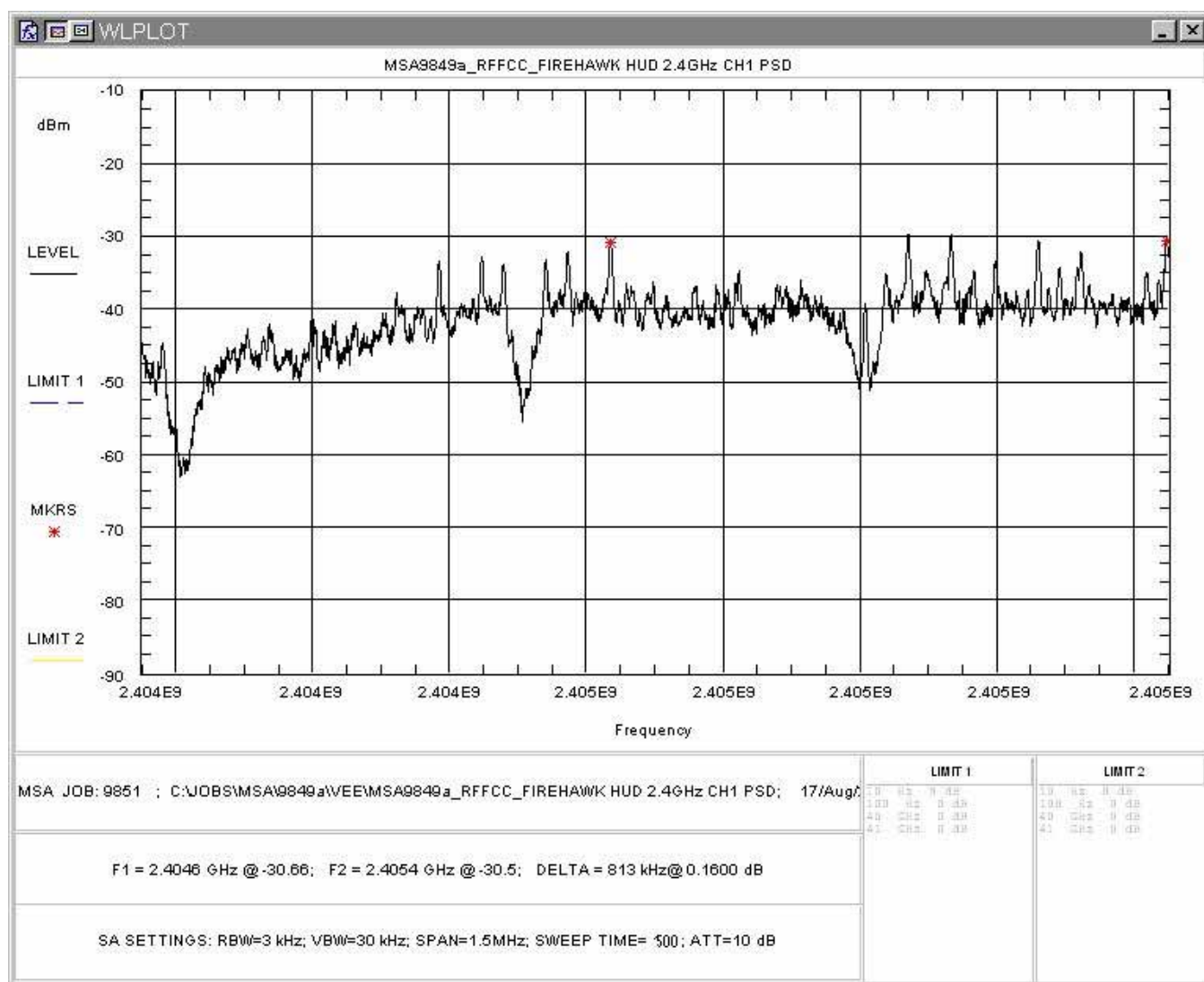


Figure 9: Power Spectral Density Plot, Low Channel

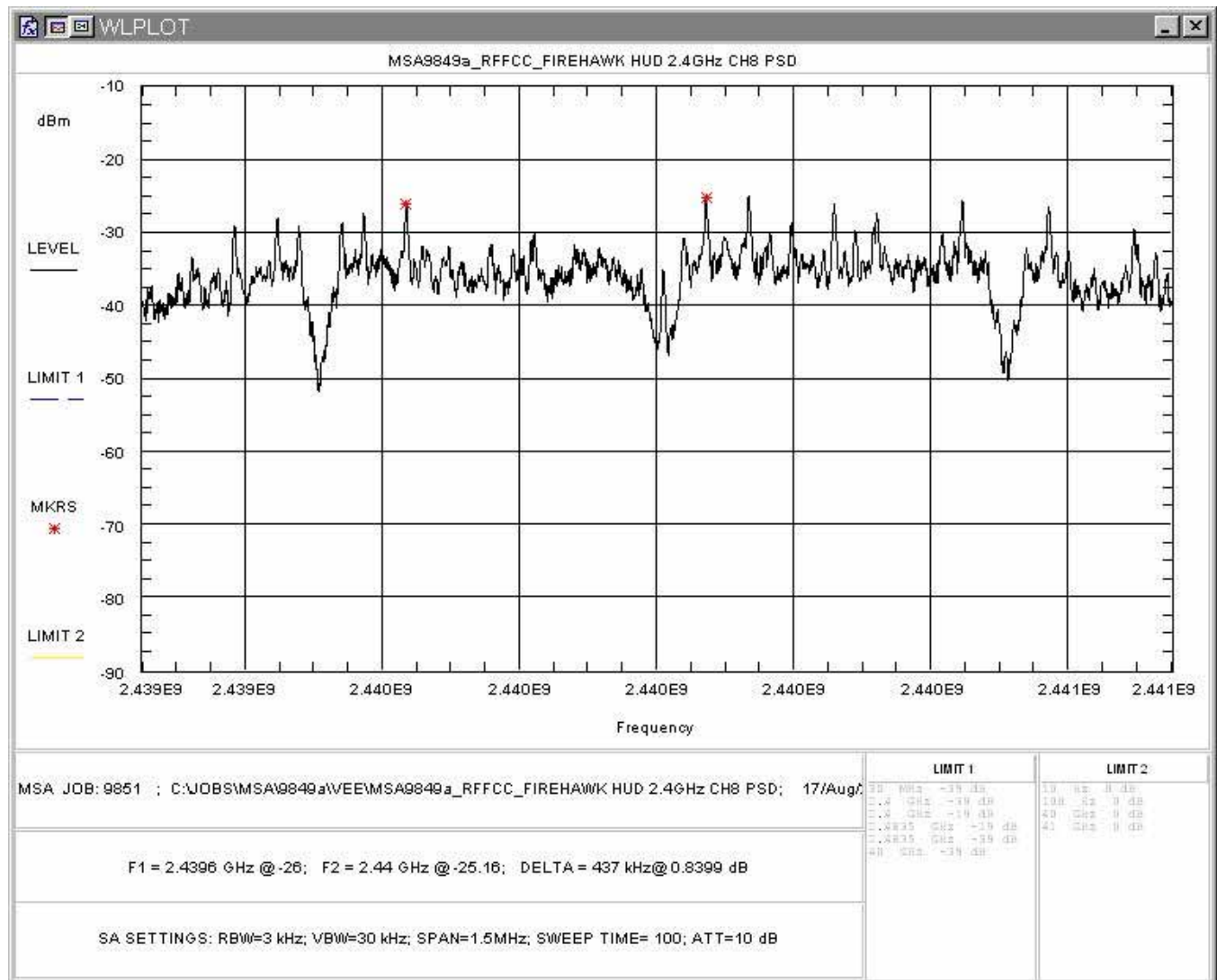


Figure 10: Power Spectral Density Plot, Mid Channel

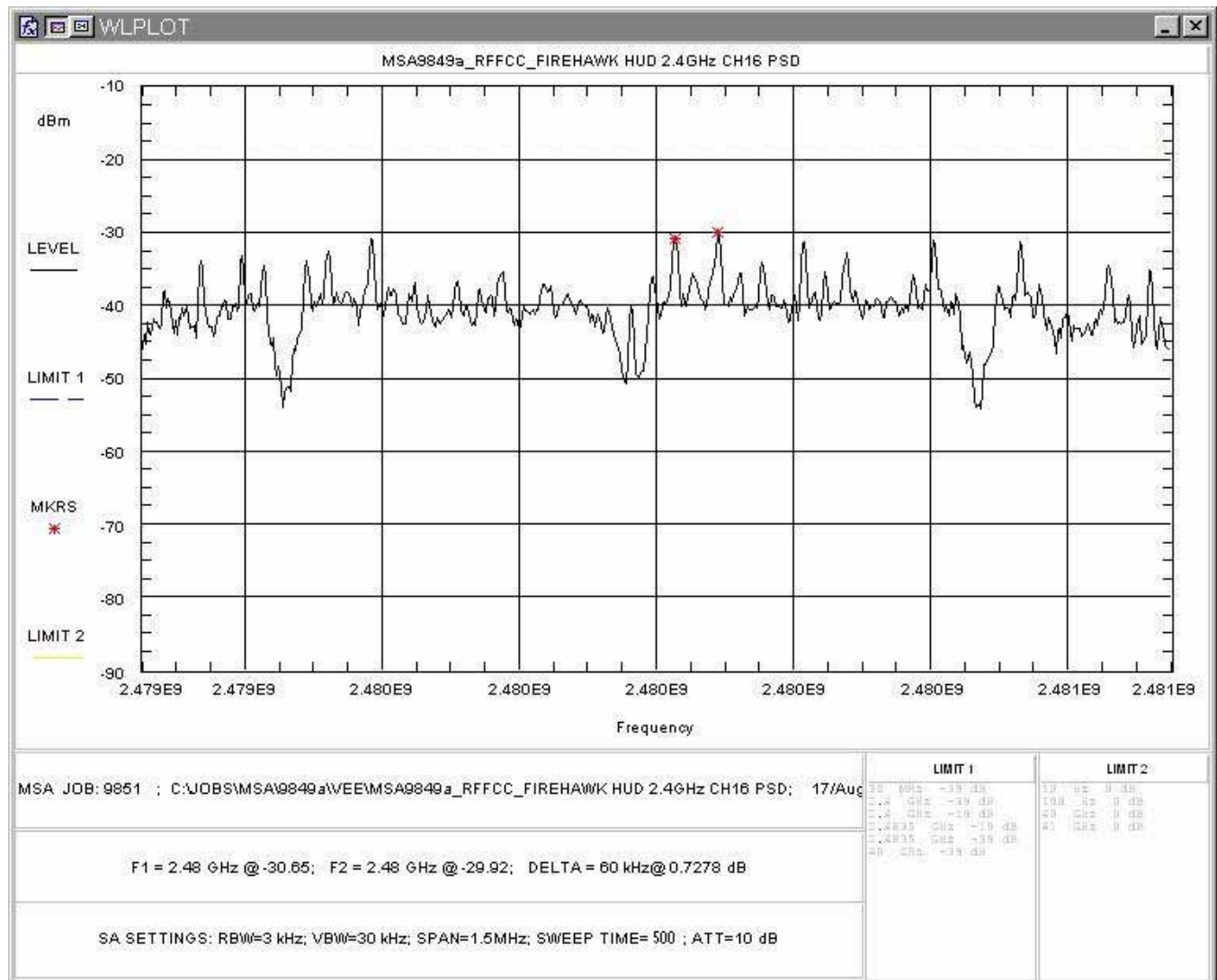


Figure 11: Power Spectral Density Plot, High Channel

Table 6 Power Spectral Density results

Channel	Peak	Limit	Pass/Fail
1	-30.5dBm	+8dBm	Pass
8	-25.2dBm	+8dBm	Pass
16	-29.9dBm	+8dBm	Pass

Test Engineer(s): Steven Dovell

Test Date(s): 8/17/07 & 8/20/07

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

The EUT must comply with requirements for spurious emissions at antenna terminals. Per §15.247(c) all spurious emissions in any 100 kHz bandwidth outside the frequency band in which the spread spectrum device is operating shall be attenuated 20 dB below the highest power level in a 100 kHz bandwidth within the band containing the highest level of the desired power.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 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.

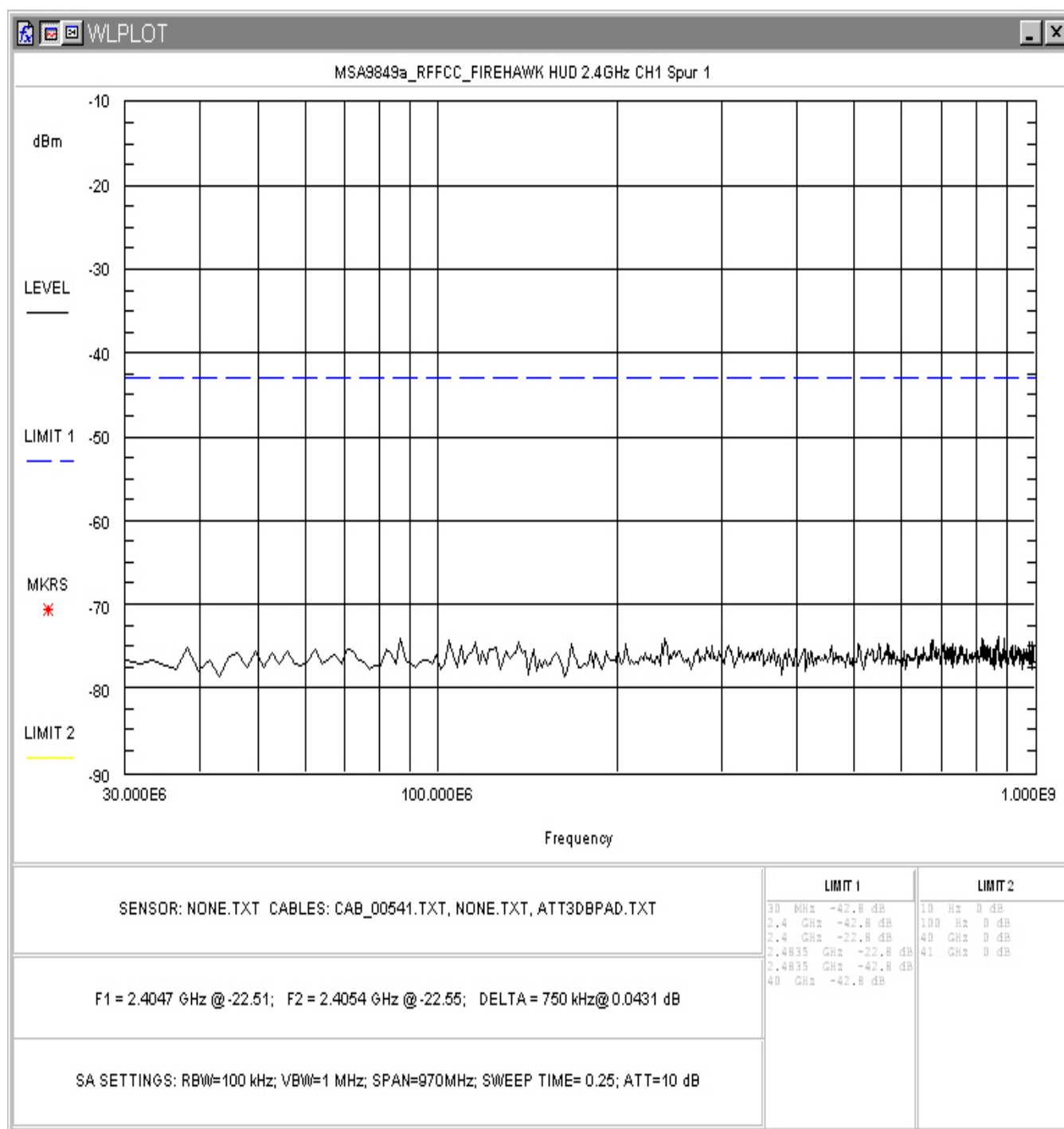


Figure 12: Conducted Spurious Emissions, Low Channel, 30 - 1000MHz

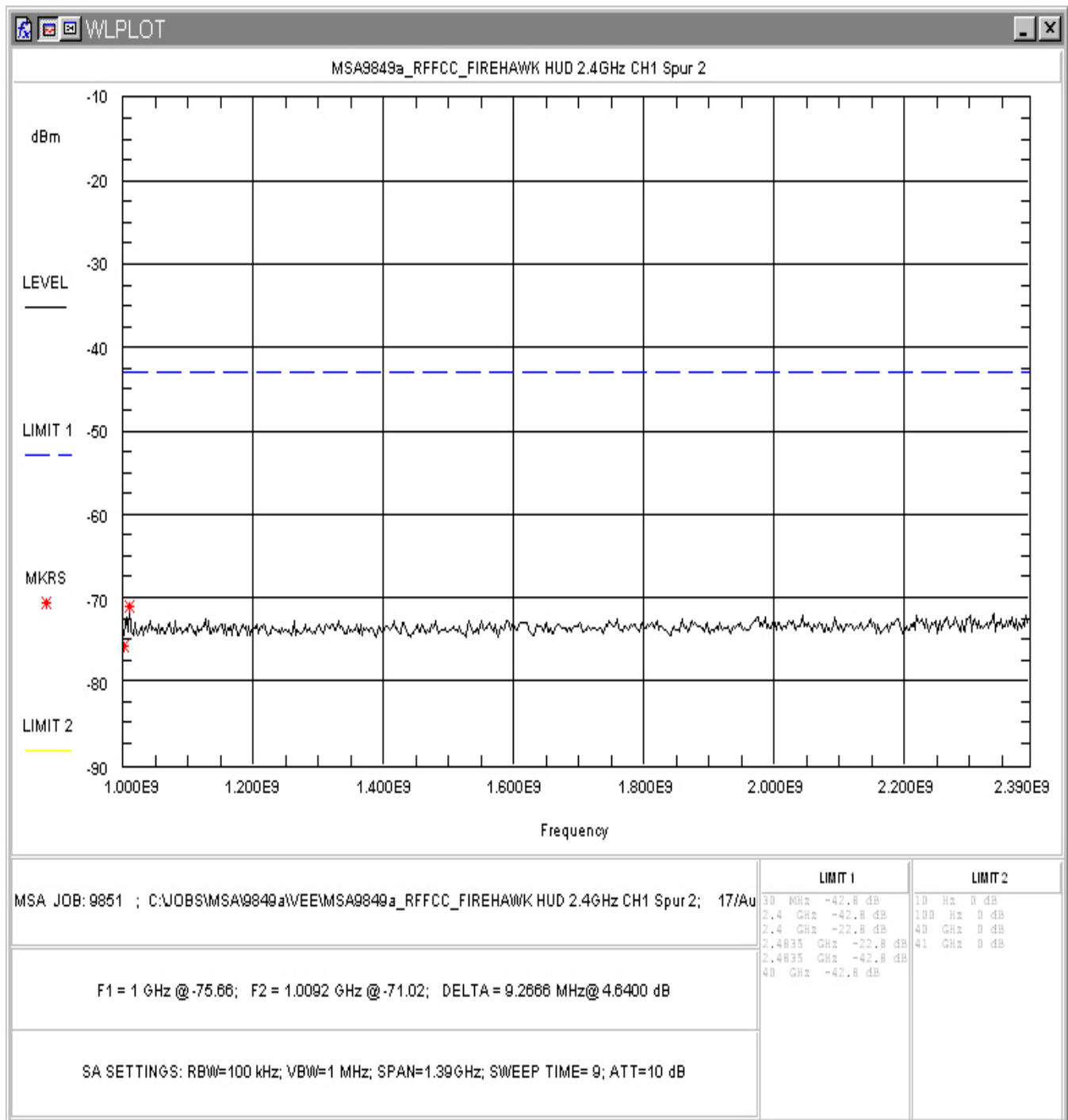


Figure 13: Conducted Spurious Emissions, Low Channel, 1 – 2.3GHz

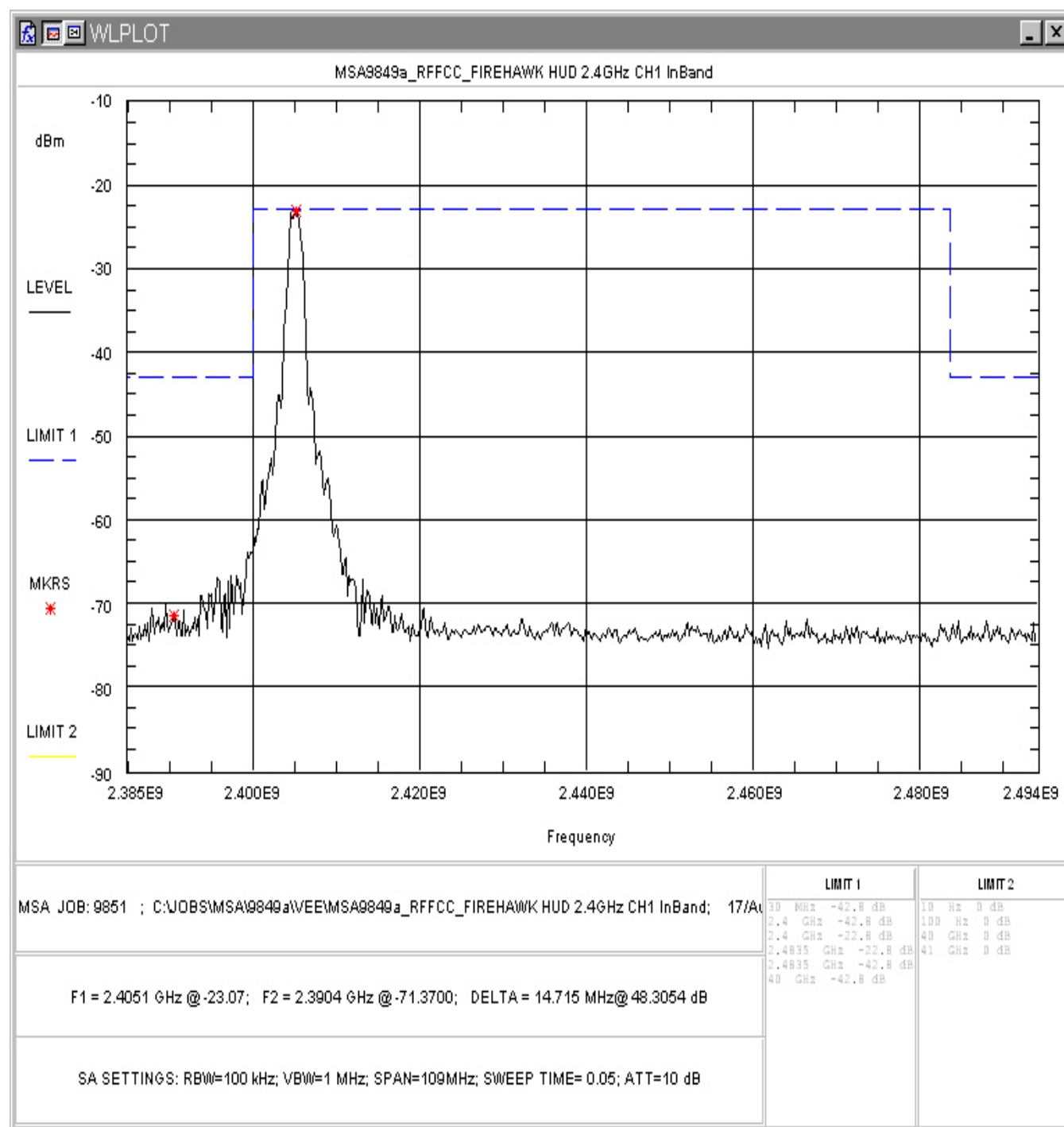


Figure 14: Conducted Spurious Emissions, Low Channel, 2.3 – 2.5GHz

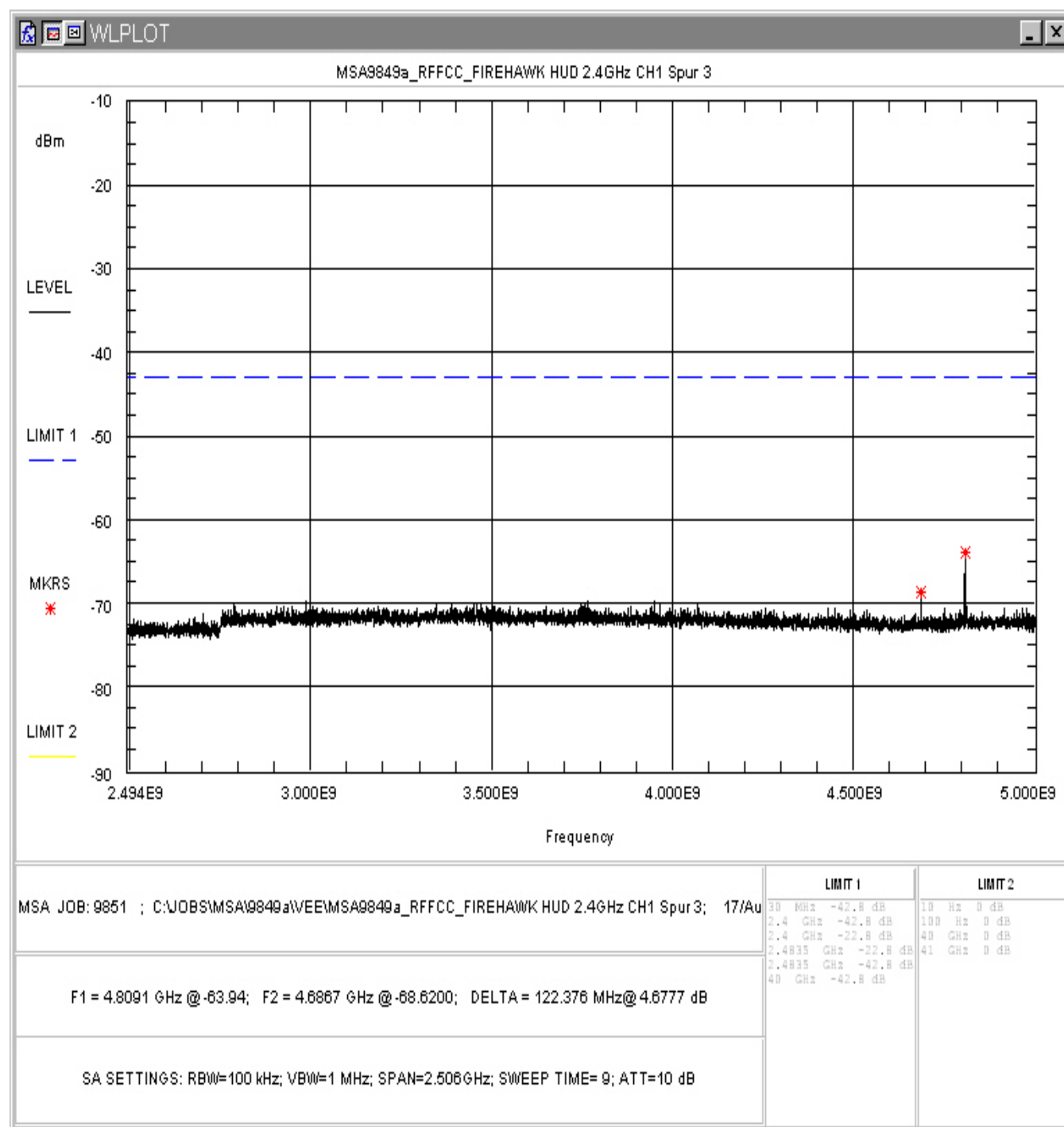


Figure 15: Conducted Spurious Emissions, Low Channel, 2.5 - 5GHz

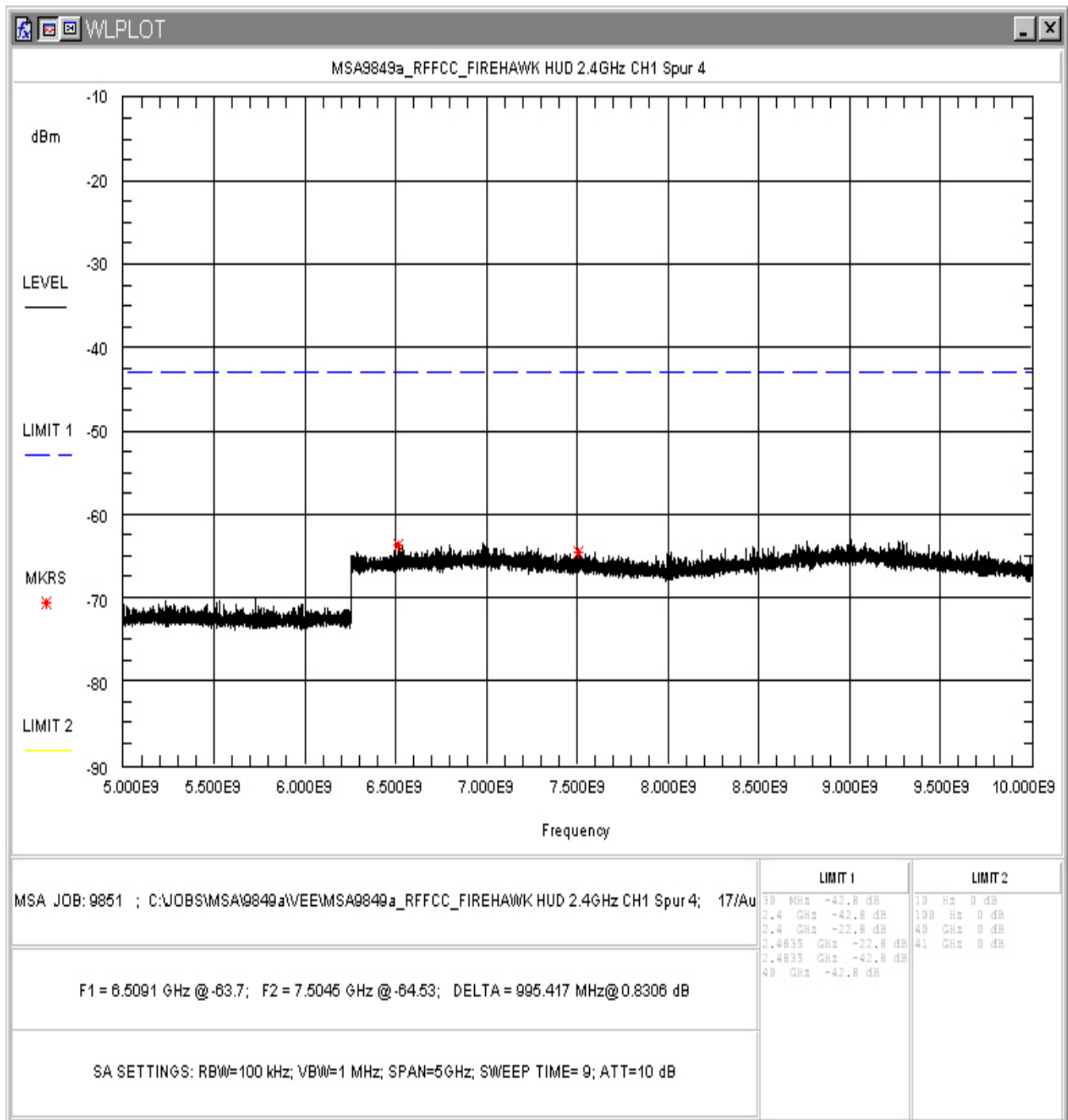


Figure 16: Conducted Spurious Emissions, Low Channel, 5 - 10GHz

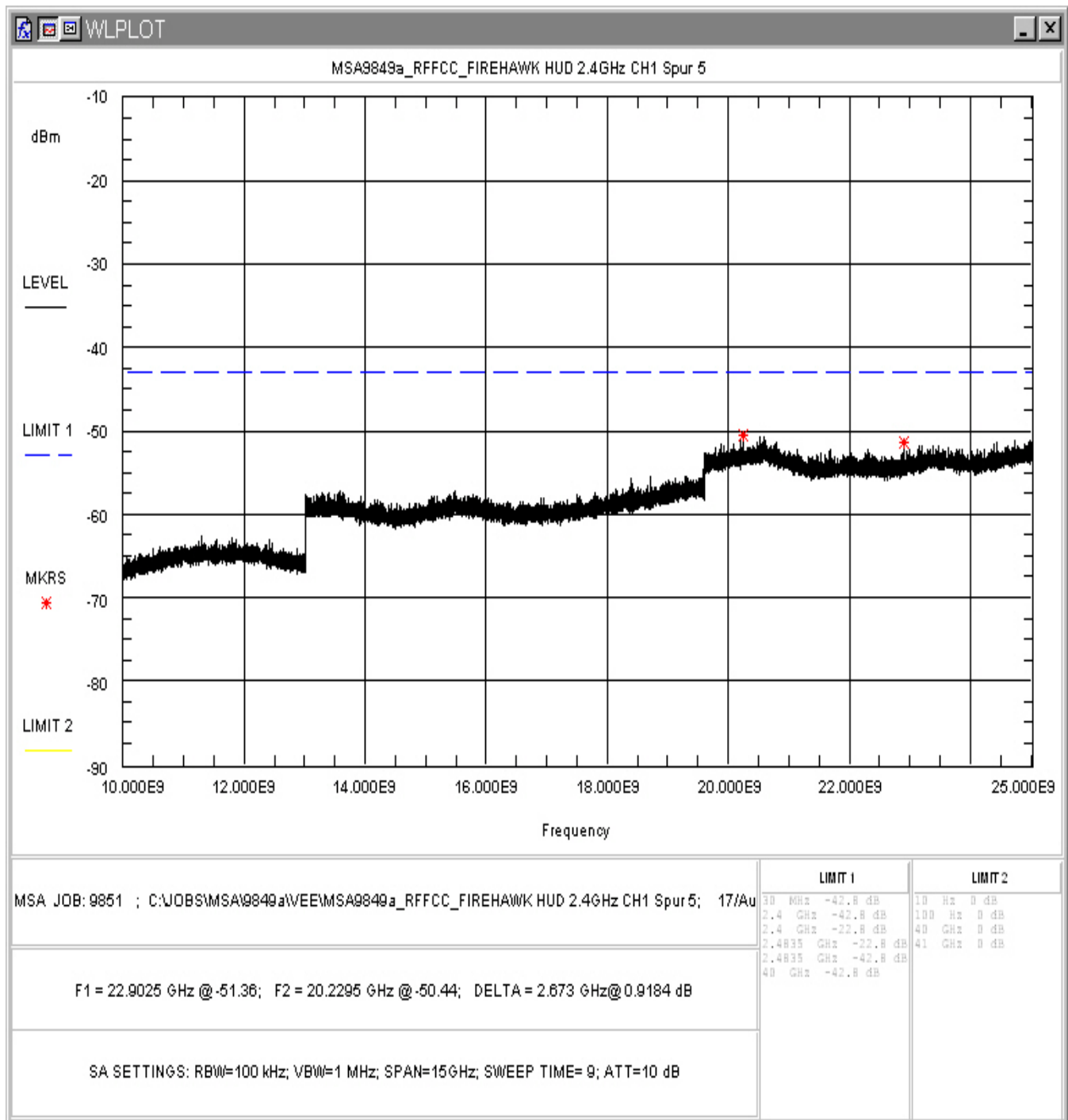


Figure 17: Conducted Spurious Emissions, Low Channel, 10 - 25GHz

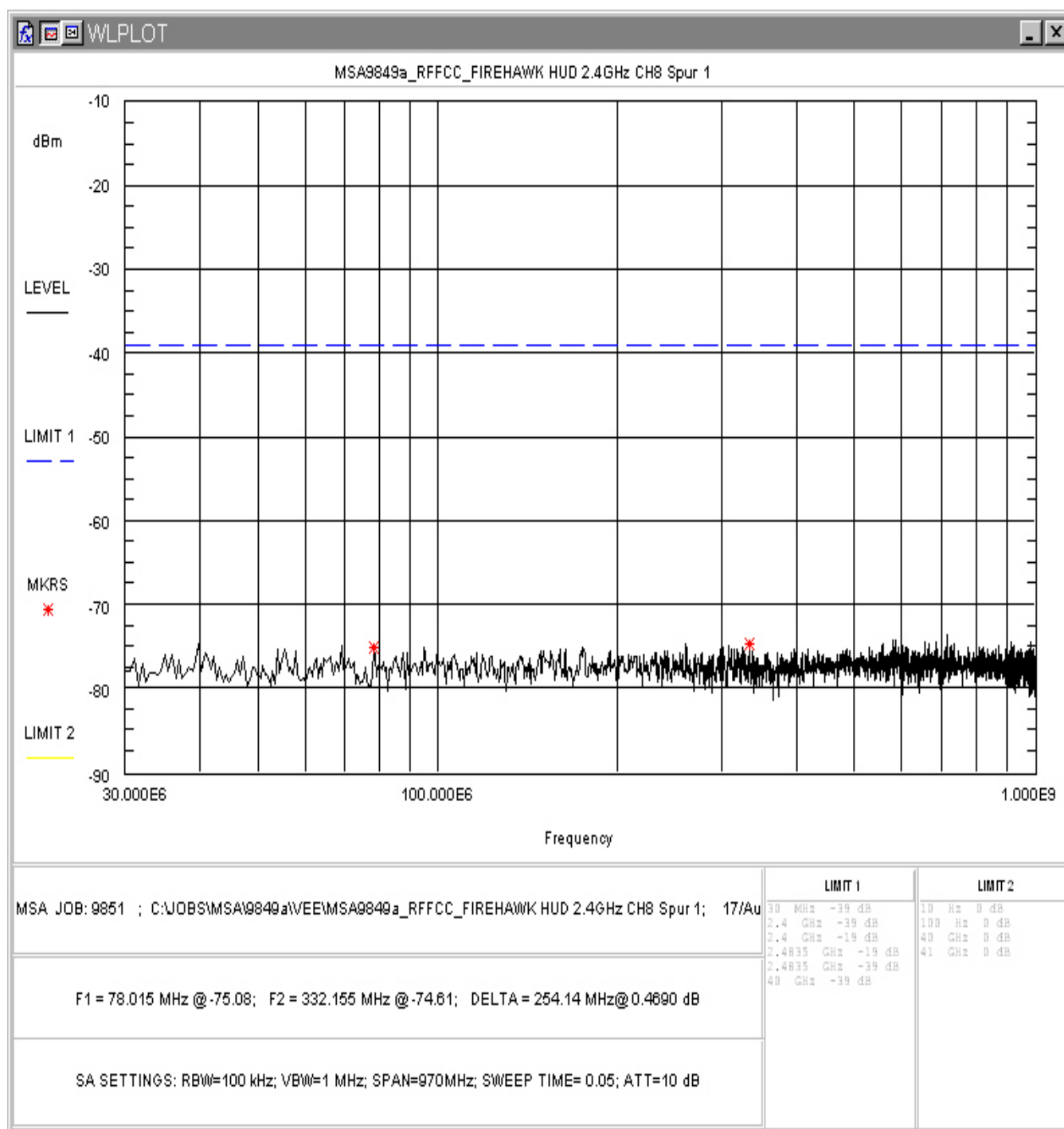


Figure 18: Conducted Spurious Emissions, Mid Channel, 30 - 1000MHz

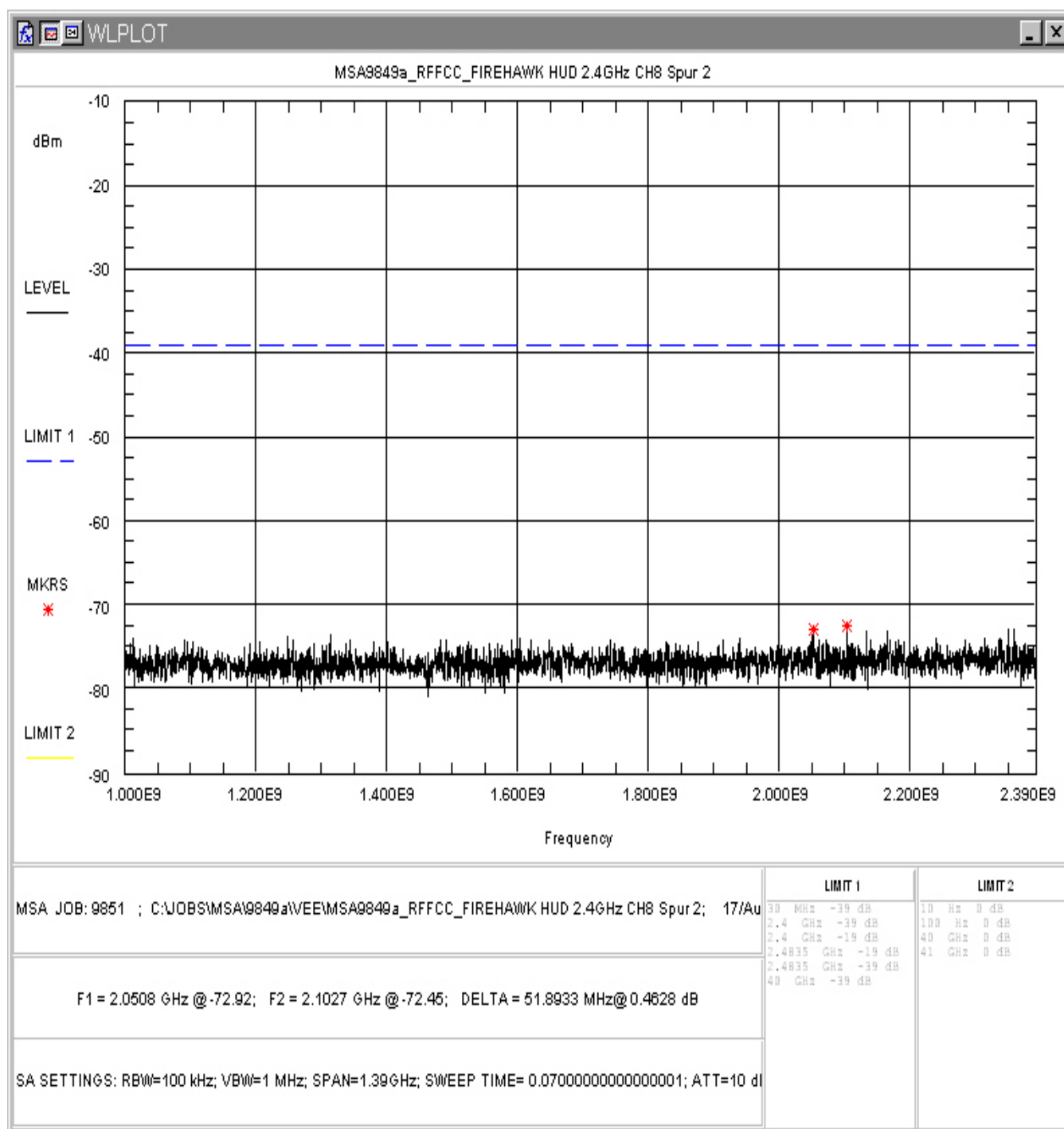


Figure 19: Conducted Spurious Emissions, Mid Channel, 1 – 2.3GHz

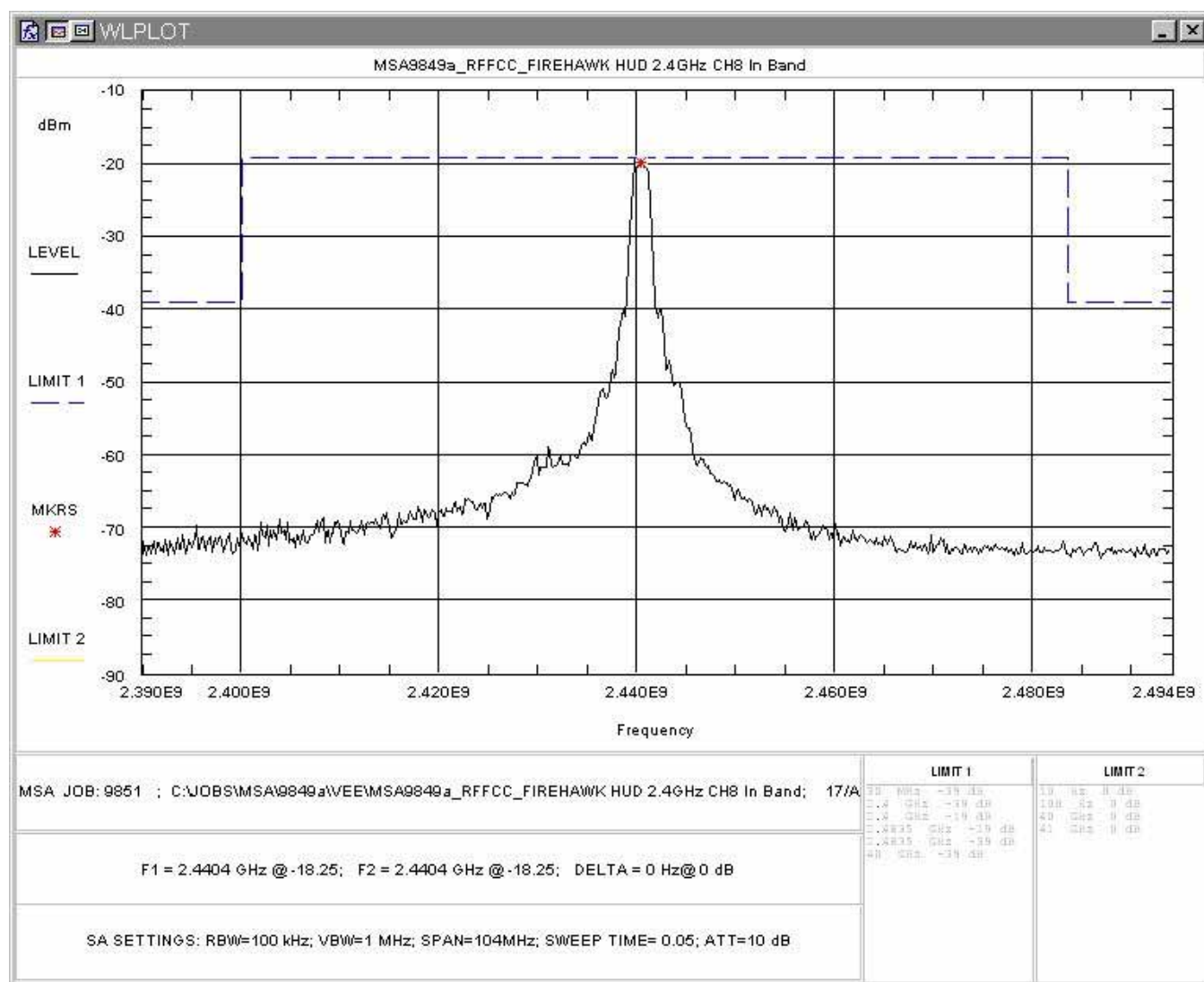


Figure 20: Conducted Spurious Emissions, Mid Channel, 2.3 – 2.5GHz

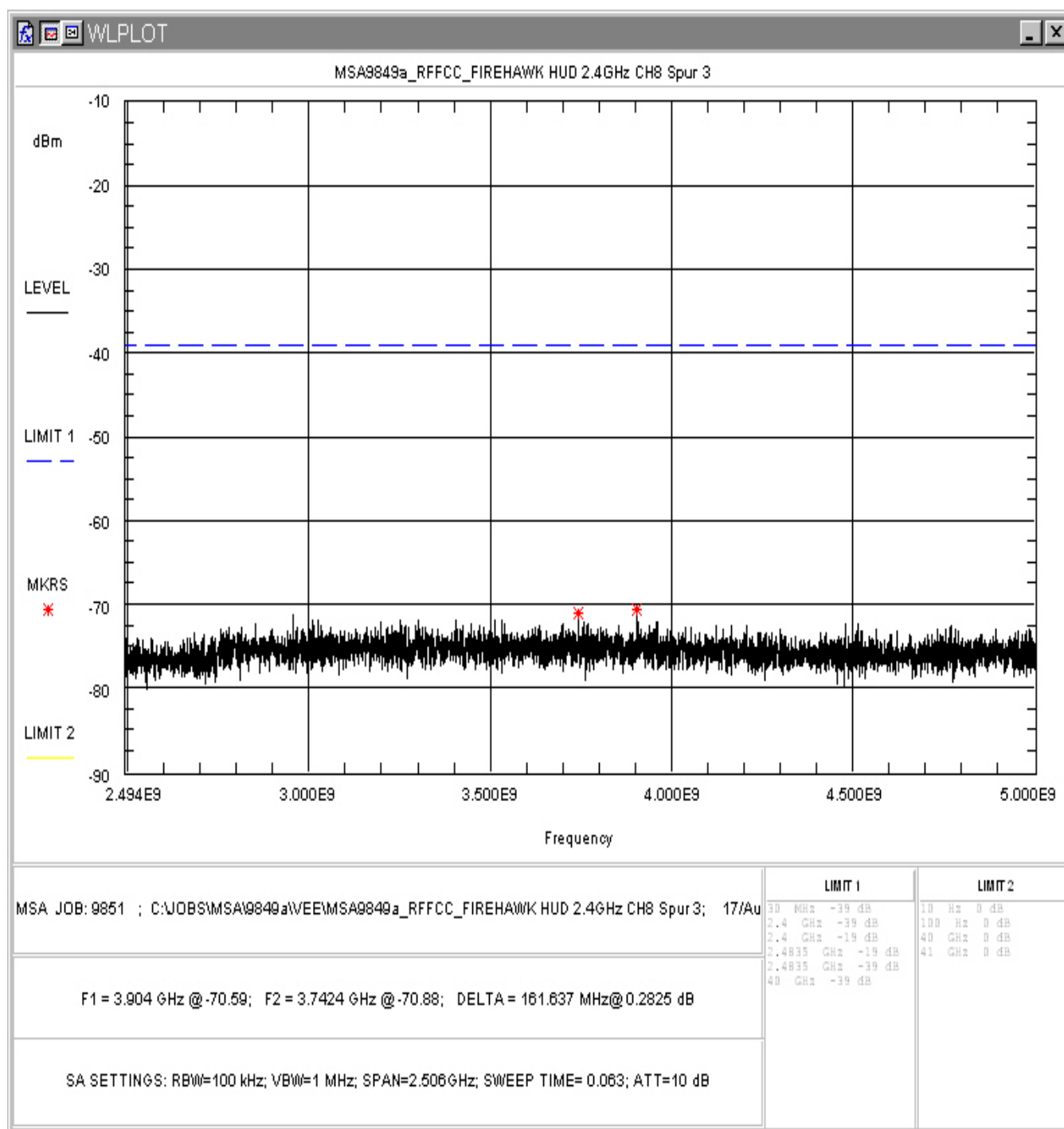


Figure 21: Conducted Spurious Emissions, Mid Channel, 2.5 - 5GHz

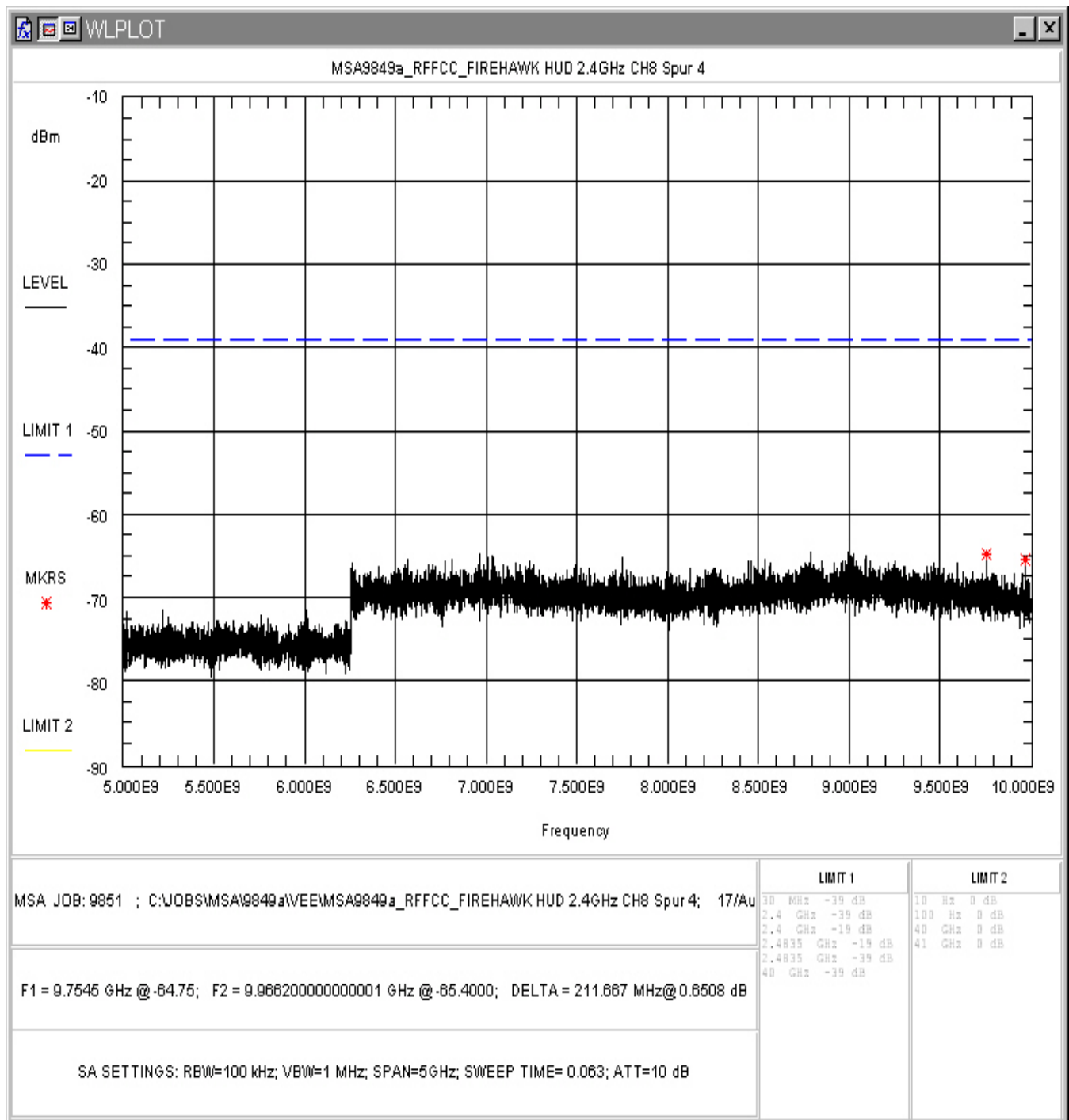


Figure 22: Conducted Spurious Emissions, Mid Channel, 5 - 10GHz

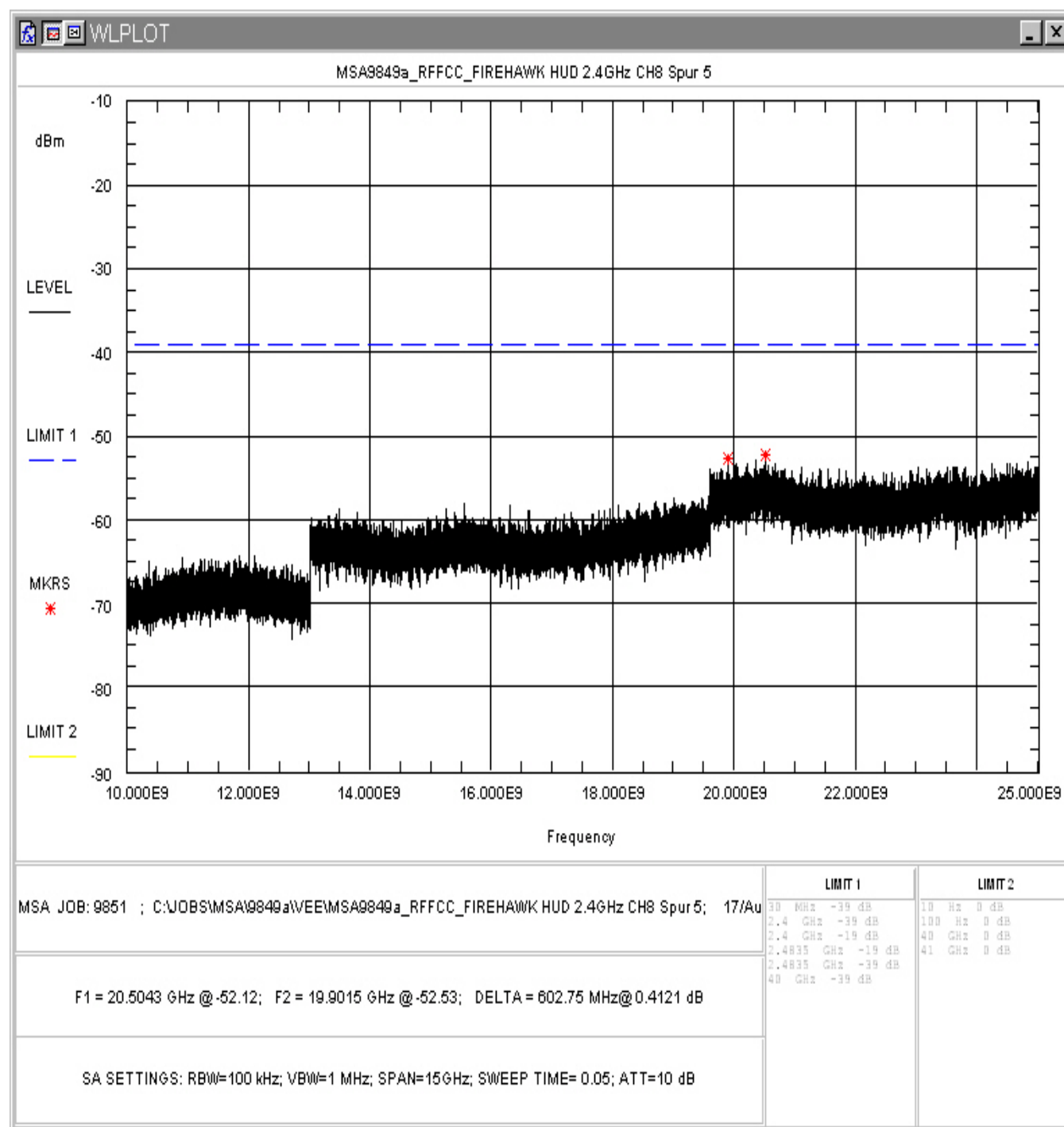


Figure 23: Conducted Spurious Emissions, Mid Channel, 10 - 25GHz

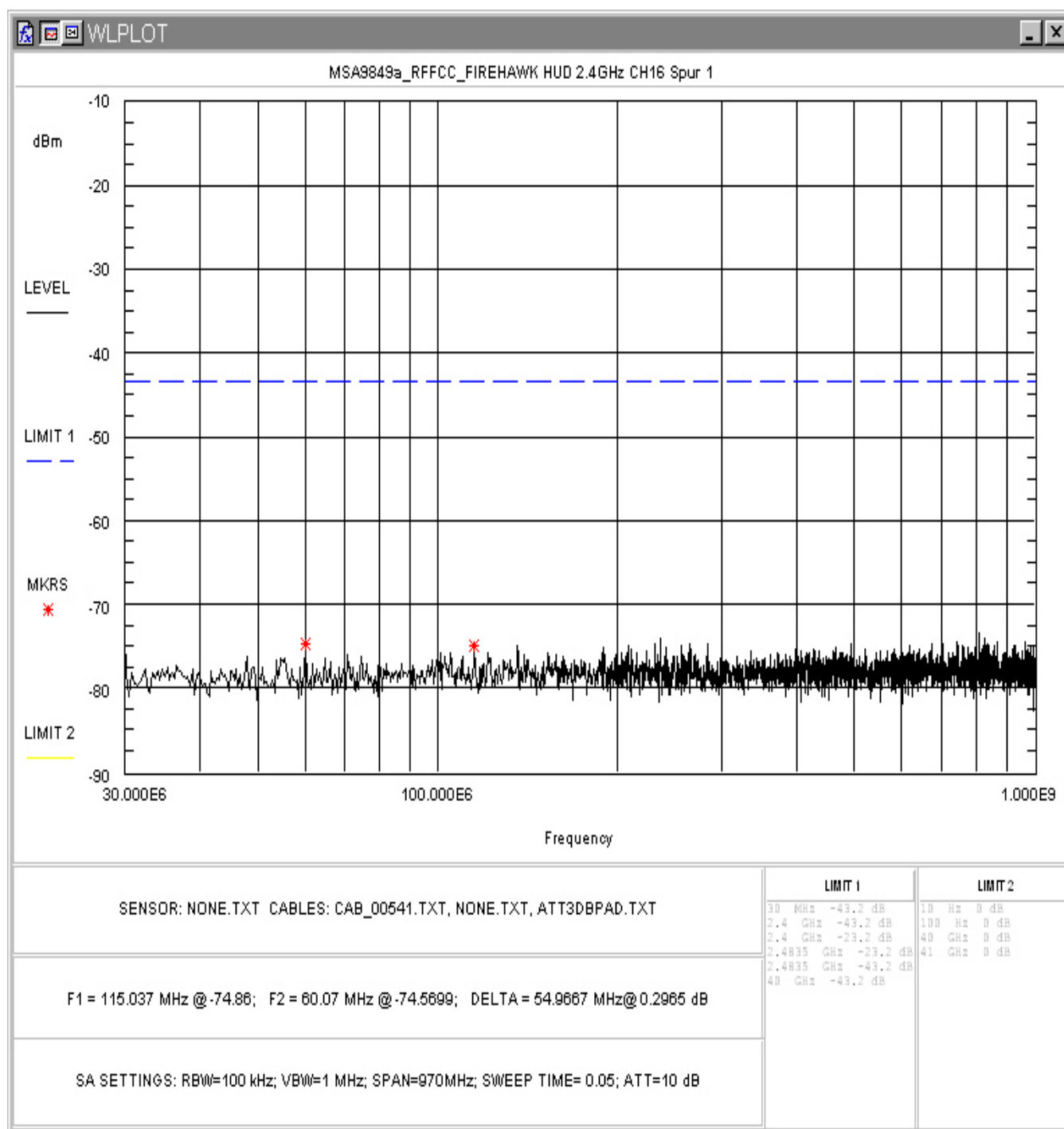


Figure 24: Conducted Spurious Emissions, High Channel, 30 - 1000MHz

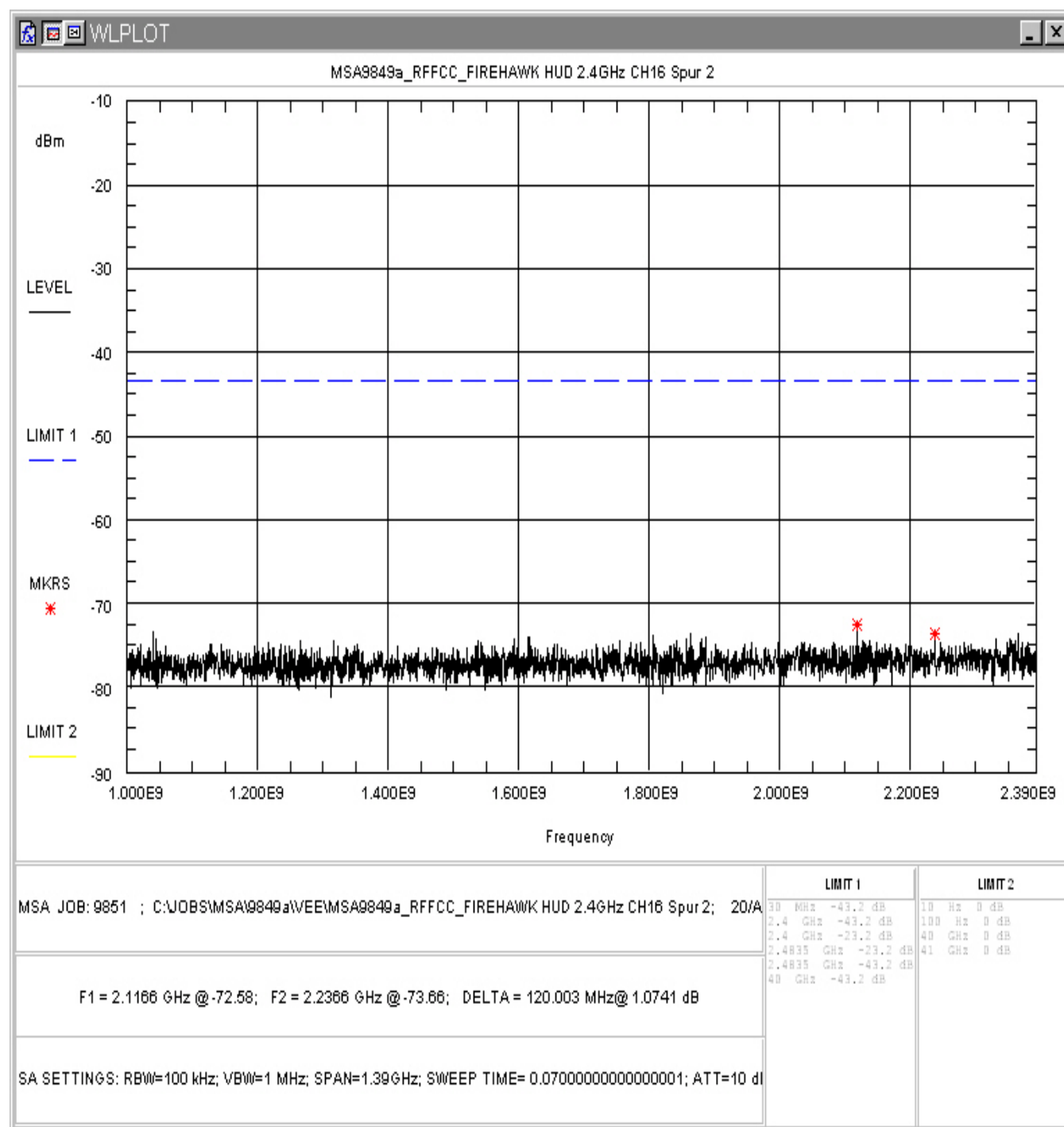


Figure 25: Conducted Spurious Emissions, High Channel, 1 – 2.3GHz

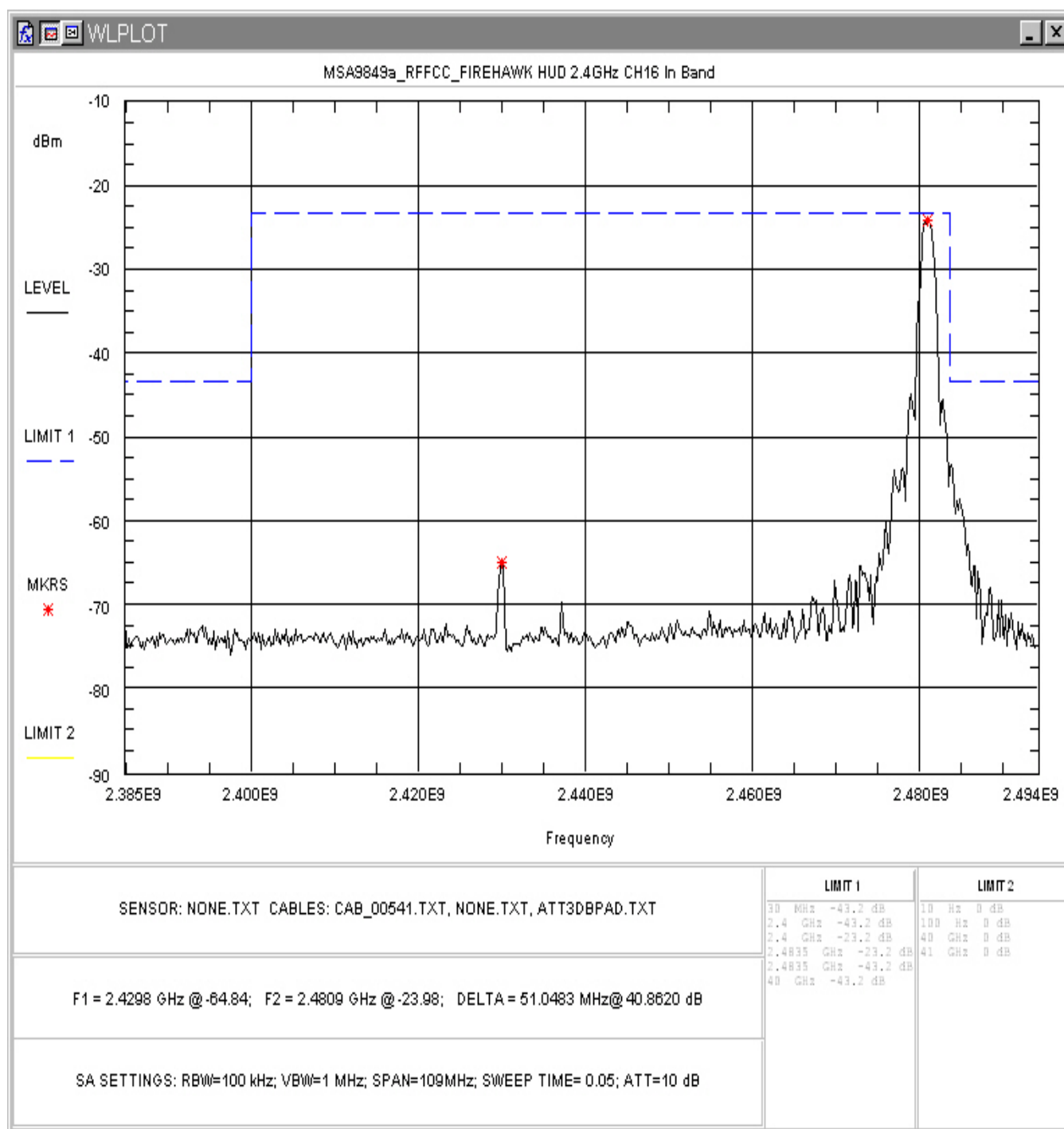


Figure 26: Conducted Spurious Emissions, High Channel, 2.3 – 2.5GHz

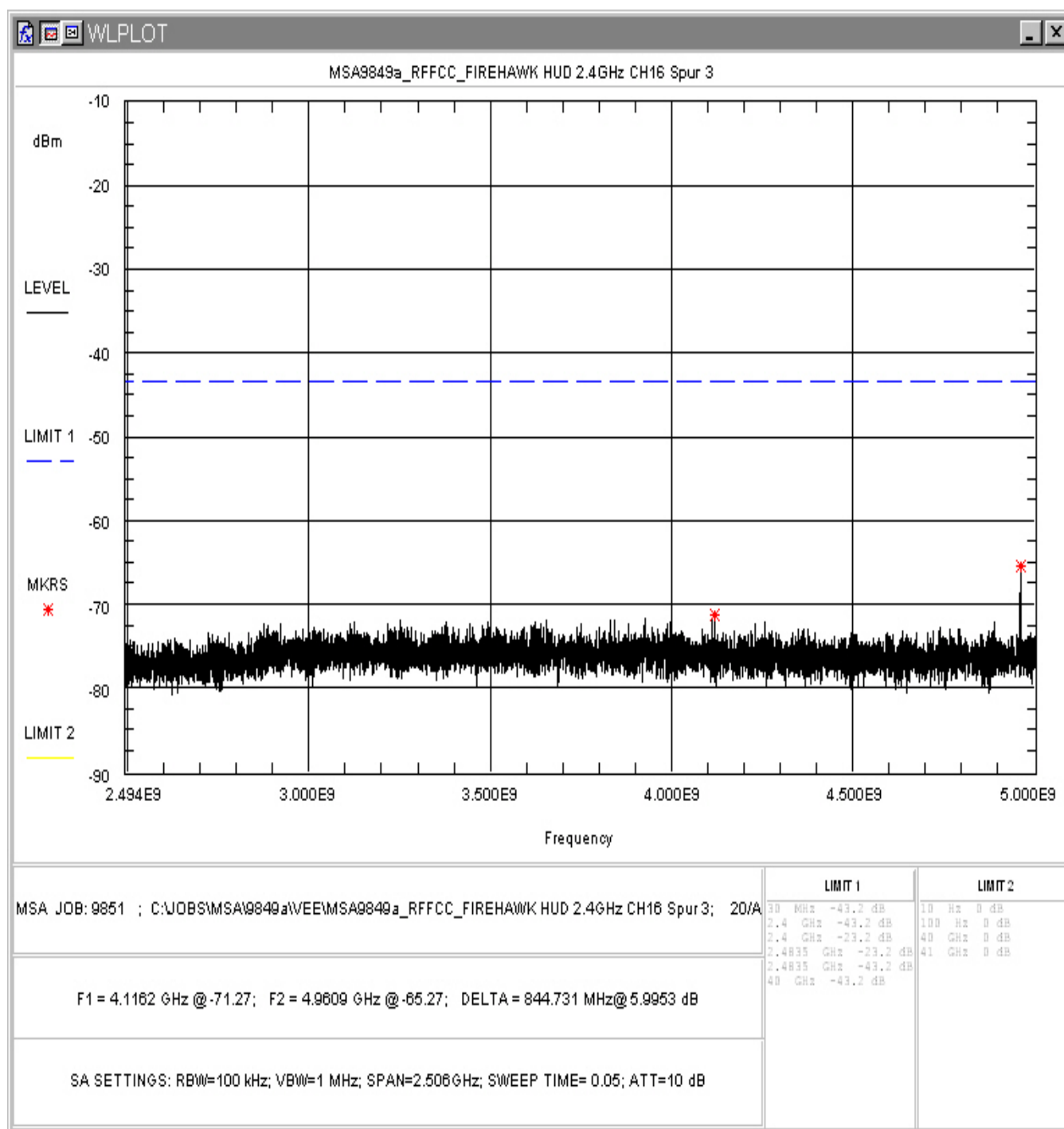


Figure 27: Conducted Spurious Emissions, High Channel, 2.5 - 5GHz

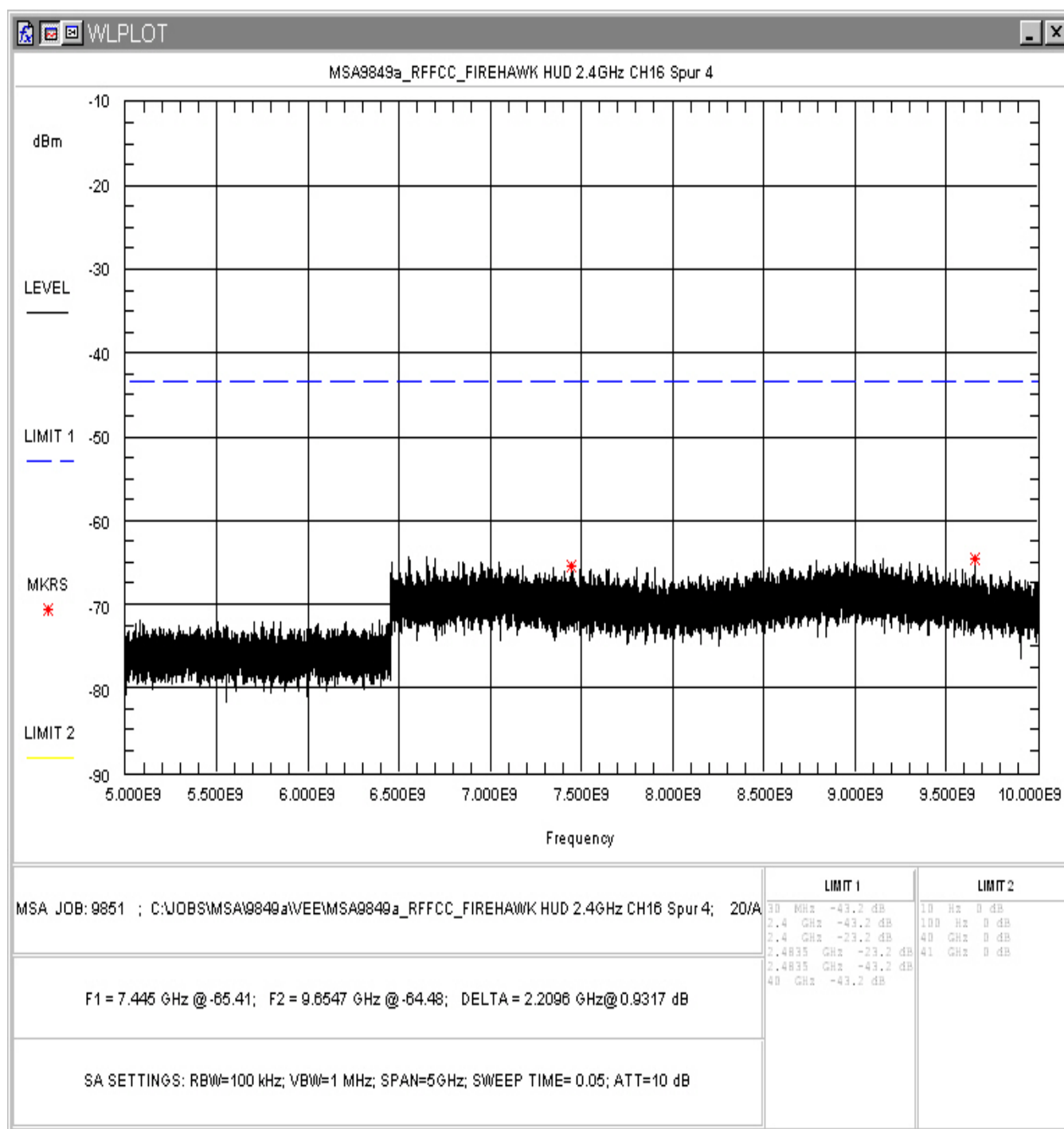


Figure 28: Conducted Spurious Emissions, High Channel, 5 - 10GHz

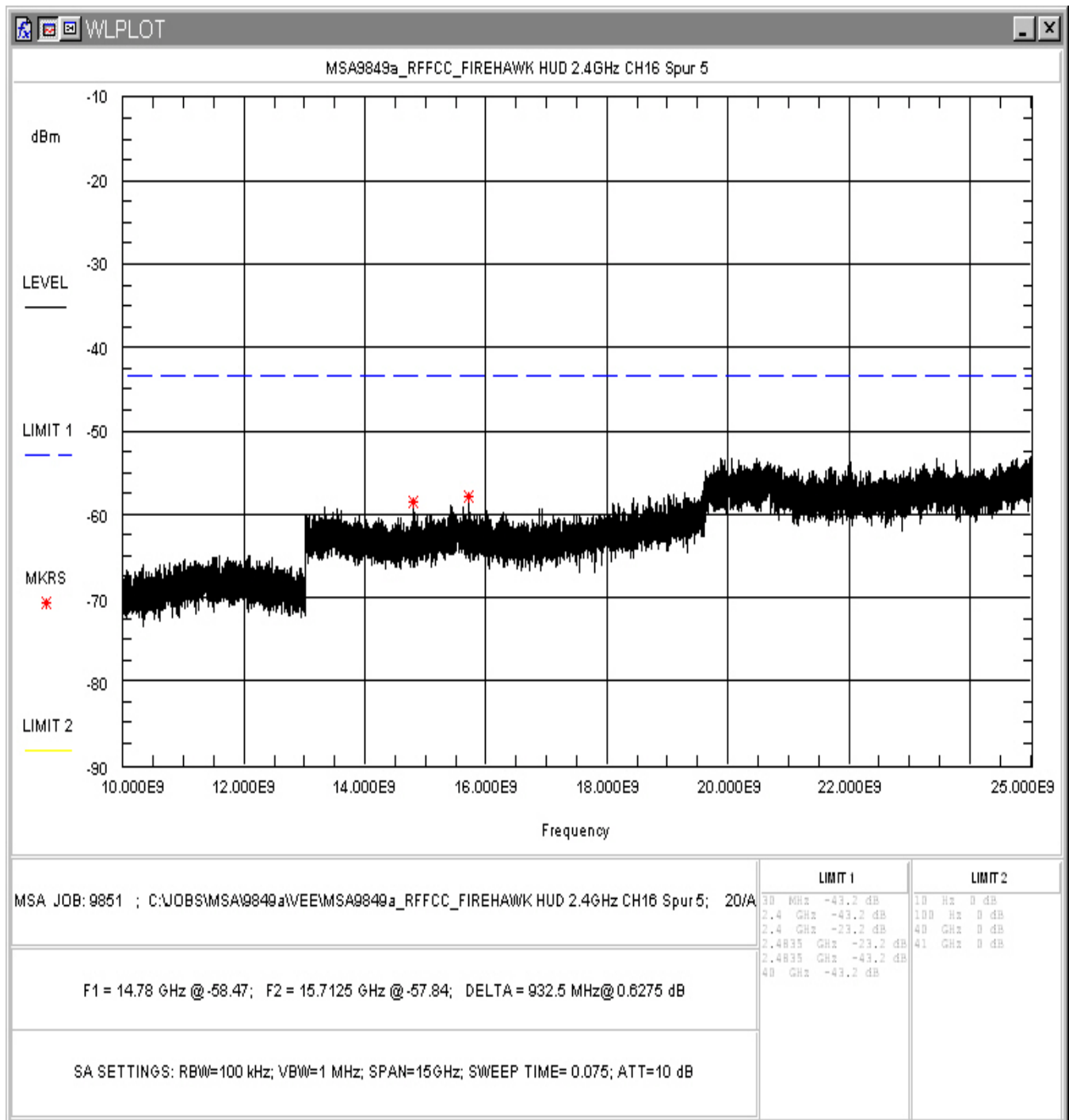


Figure 29: Conducted Spurious Emissions, High Channel, 10 - 25GHz

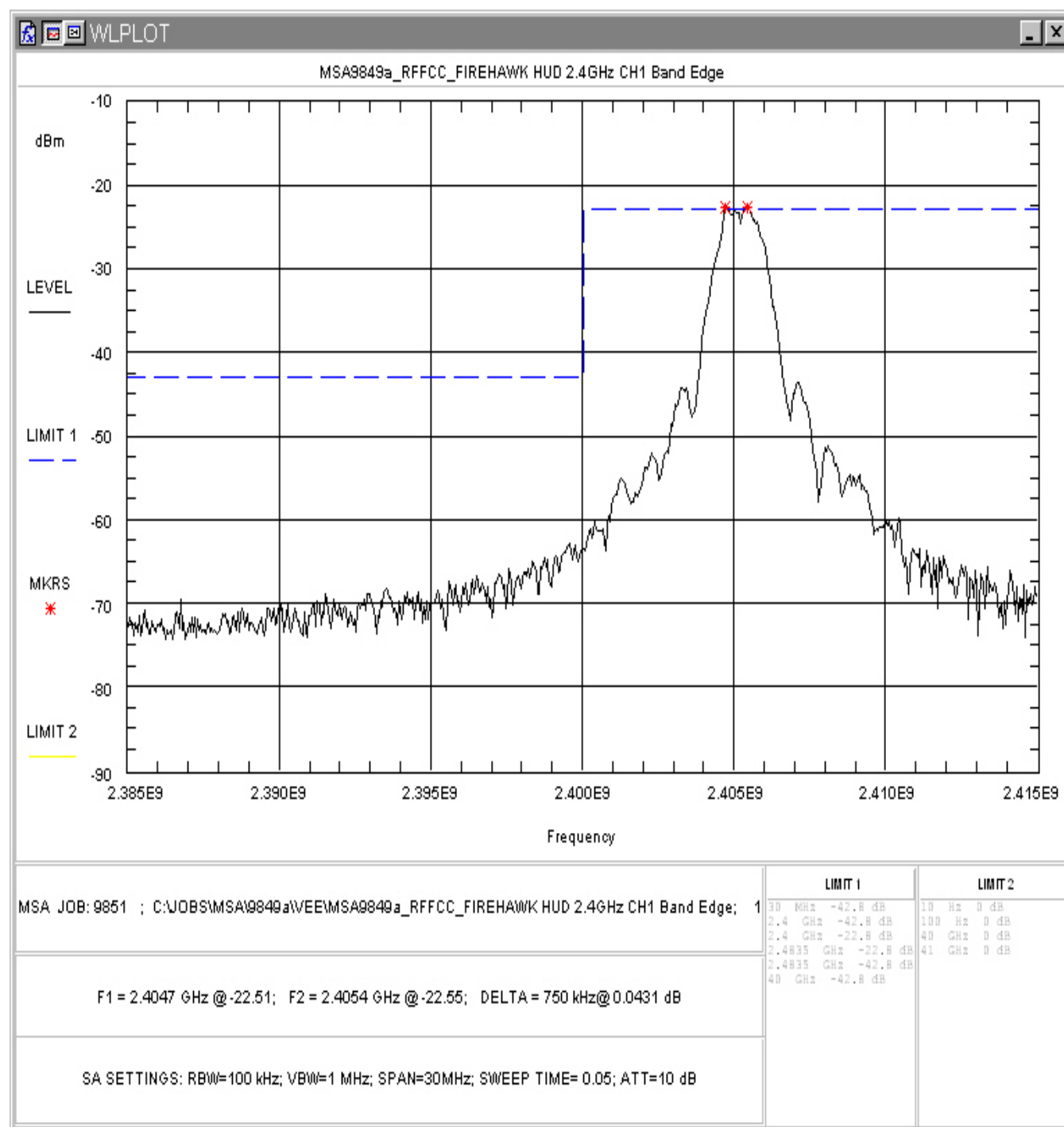


Figure 30: Band Edge 2.4GHz

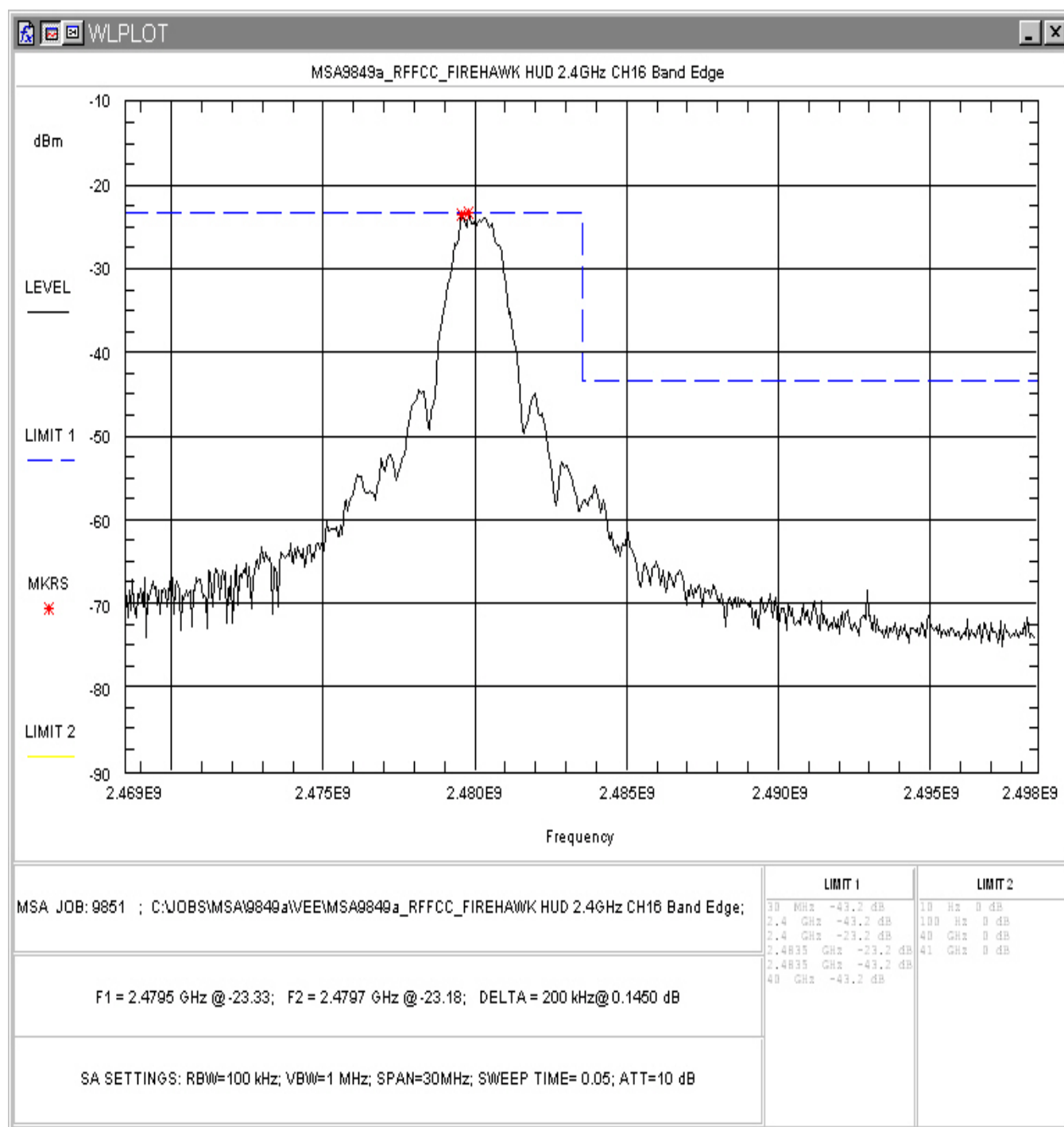


Figure 31: Band Edge 2.485GHz

4.6 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.

4.6.1 Test Procedure

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

Table 7: Radiated Emission Test Data, Low Frequency Data (<1GHz)

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)
51.900	H	348.0	1.0	7.3	8.0	1.3	16.6	6.7	100.0	-23.4
62.170	H	198.0	2.0	3.3	7.6	1.5	12.3	4.1	100.0	-27.7
117.900	H	304.0	218.0	5.7	13.7	2.0	21.4	11.8	150.0	-22.1
136.380	H	65.0	4.0	12.0	13.2	2.2	27.4	23.5	150.0	-16.1
240.000	H	223.0	1.3	8.4	11.3	2.9	22.6	13.6	200.0	-23.4
268.920	H	333.0	3.5	7.3	12.9	3.2	23.3	14.7	200.0	-22.7
300.000	H	298.0	1.0	3.4	13.3	3.4	20.1	10.1	200.0	-26.0
332.440	H	234.0	1.0	4.8	14.0	3.6	22.4	13.1	200.0	-23.6
365.560	H	248.0	1.0	6.5	14.7	3.7	24.9	17.6	200.0	-21.1
44.980	V	325.0	1.0	12.0	10.7	1.3	24.0	15.8	100.0	-16.0
51.982	V	83.0	1.0	17.5	8.0	1.3	26.8	21.8	100.0	-13.2
62.170	V	193.0	1.0	10.0	7.6	1.5	19.0	8.9	100.0	-21.0
136.380	V	221.0	1.0	9.6	13.2	2.2	25.0	17.8	150.0	-18.5
240.000	V	298.0	1.0	4.7	11.3	2.9	18.9	8.9	200.0	-27.1
268.920	V	126.0	4.0	14.0	12.9	3.2	30.0	31.7	200.0	-16.0
300.000	V	223.0	1.7	3.2	14.7	3.4	21.2	11.5	200.0	-24.8
332.440	V	177.0	186.0	5.7	14.0	3.6	23.3	14.6	200.0	-22.7
365.560	V	200.0	2.0	9.5	14.7	3.7	27.9	24.9	200.0	-18.1

Table 8: Radiated Emission Test Data, High Frequency Data (>1GHz)
Lo Channel (Restricted Bands)

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
2405 (X)												
4810.000	V	0.0	1.0	38.8	32.5	6.1	34.3	43.1	143.5	5000.0	-30.8	Peak AMB
4810.000	V	0.0	1.0	31.7	32.5	6.1	34.3	36.0	63.4	500.0	-17.9	Avg AMB
12025.000	V	180.0	1.0	47.0	40.0	12.3	34.8	64.5	1674.5	5000.0	-9.5	Peak AMB
12025.000	V	180.0	1.0	31.7	40.0	12.3	34.8	49.2	287.7	500.0	-4.8	Avg AMB
4810.000	H	0.0	1.0	38.8	32.5	6.1	34.3	43.1	143.5	5000.0	-30.8	Peak AMB
4810.000	H	0.0	1.0	31.7	32.5	6.1	34.3	36.0	63.4	500.0	-17.9	Avg AMB
12025.000	H	180.0	1.0	47.0	40.0	12.3	34.8	64.5	1674.5	5000.0	-9.5	Peak AMB
12025.000	H	180.0	1.0	31.7	40.0	12.3	34.8	49.2	287.7	500.0	-4.8	Avg AMB
2405 (Y)												
4810.000	V	0.0	1.0	38.8	32.5	6.1	34.3	43.1	143.5	5000.0	-30.8	Peak AMB
4810.000	V	0.0	1.0	31.7	32.5	6.1	34.3	36.0	63.4	500.0	-17.9	Avg AMB
12025.000	V	180.0	1.0	47.0	40.0	12.3	34.8	64.5	1674.5	5000.0	-9.5	Peak AMB
12025.000	V	180.0	1.0	31.7	40.0	12.3	34.8	49.2	287.7	500.0	-4.8	Avg AMB
4810.000	H	0.0	1.0	38.8	32.5	6.1	34.3	43.1	143.5	5000.0	-30.8	Peak AMB
4810.000	H	0.0	1.0	31.7	32.5	6.1	34.3	36.0	63.4	500.0	-17.9	Avg AMB
12025.000	H	180.0	1.0	47.0	40.0	12.3	34.8	64.5	1674.5	5000.0	-9.5	Peak AMB
12025.000	H	180.0	1.0	31.7	40.0	12.3	34.8	49.2	287.7	500.0	-4.8	Avg AMB
2405 (Z)												
4810.000	V	0.0	1.0	38.8	32.5	6.1	34.3	43.1	143.5	5000.0	-30.8	Peak AMB
4810.000	V	0.0	1.0	31.7	32.5	6.1	34.3	36.0	63.4	500.0	-17.9	Avg AMB
12025.000	V	180.0	1.0	47.0	40.0	12.3	34.8	64.5	1674.5	5000.0	-9.5	Peak AMB
12025.000	V	180.0	1.0	31.7	40.0	12.3	34.8	49.2	287.7	500.0	-4.8	Avg AMB
4810.000	H	0.0	1.0	38.8	32.5	6.1	34.3	43.1	143.5	5000.0	-30.8	Peak AMB
4810.000	H	0.0	1.0	31.7	32.5	6.1	34.3	36.0	63.4	500.0	-17.9	Avg AMB
12025.000	H	180.0	1.0	47.0	40.0	12.3	34.8	64.5	1674.5	5000.0	-9.5	Peak AMB
12025.000	H	180.0	1.0	31.7	40.0	12.3	34.8	49.2	287.7	500.0	-4.8	Avg AMB

Table 9: Radiated Emission Test Data, High Frequency Data (>1GHz)
Mid Channel (Restricted Bands)

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
2440 (X)												
4880.000	V	0.0	1.0	44.2	32.6	6.2	34.3	48.7	271.4	5000.0	-25.3	Peak AMB
4880.000	V	0.0	1.0	32.0	32.6	6.2	34.3	36.5	66.6	500.0	-17.5	Avg AMB
7320.000	V	0.0	1.0	39.1	37.1	8.0	34.7	49.5	297.6	5000.0	-24.5	Peak AMB
7320.000	V	0.0	1.0	33.0	37.1	8.0	34.7	43.4	147.4	500.0	-10.6	Avg AMB
12200.000	V	0.0	1.0	45.3	40.0	12.7	34.6	63.3	1464.9	5000.0	-10.7	Peak AMB
12200.000	V	0.0	1.0	32.5	40.0	12.7	34.6	50.5	335.6	500.0	-3.5	Avg AMB
4880.000	H	0.0	1.0	32.0	32.6	6.2	34.3	36.5	66.6	5000.0	-37.5	Peak AMB
4880.000	H	0.0	1.0	38.8	32.6	6.2	34.3	43.3	145.7	500.0	-10.7	Avg AMB
7320.000	H	0.0	1.0	39.1	37.1	8.0	34.7	49.5	297.6	5000.0	-24.5	Peak AMB
7320.000	H	0.0	1.0	33.0	37.1	8.0	34.7	43.4	147.4	500.0	-10.6	Avg AMB
12200.000	V	0.0	1.0	45.3	40.0	12.7	34.6	63.3	1464.9	5000.0	-10.7	Peak AMB
12200.000	V	0.0	1.0	32.5	40.0	12.7	34.6	50.5	335.6	500.0	-3.5	Avg AMB
2440 (Y)												
4880.000	V	0.0	1.0	44.2	32.6	6.2	34.3	48.7	271.4	5000.0	-25.3	Peak AMB
4880.000	V	0.0	1.0	32.0	32.6	6.2	34.3	36.5	66.6	500.0	-17.5	Avg AMB
7320.000	V	0.0	1.0	39.1	37.1	8.0	34.7	49.5	297.6	5000.0	-24.5	Peak AMB
7320.000	V	0.0	1.0	33.0	37.1	8.0	34.7	43.4	147.4	500.0	-10.6	Avg AMB
12200.000	V	0.0	1.0	45.3	40.0	12.7	34.6	63.3	1464.9	5000.0	-10.7	Peak AMB
12200.000	V	0.0	1.0	32.5	40.0	12.7	34.6	50.5	335.6	500.0	-3.5	Avg AMB
4880.000	H	0.0	1.0	32.0	32.6	6.2	34.3	36.5	66.6	5000.0	-37.5	Peak AMB
4880.000	H	0.0	1.0	38.8	32.6	6.2	34.3	43.3	145.7	500.0	-10.7	Avg AMB
7320.000	H	0.0	1.0	39.1	37.1	8.0	34.7	49.5	297.6	5000.0	-24.5	Peak AMB
7320.000	H	0.0	1.0	33.0	37.1	8.0	34.7	43.4	147.4	500.0	-10.6	Avg AMB
12200.000	V	0.0	1.0	45.3	40.0	12.7	34.6	63.3	1464.9	5000.0	-10.7	Peak AMB
12200.000	V	0.0	1.0	32.5	40.0	12.7	34.6	50.5	335.6	500.0	-3.5	Avg AMB
2440 (Z)												
4880.000	V	0.0	1.0	44.2	32.6	6.2	34.3	48.7	271.4	5000.0	-25.3	Peak AMB
4880.000	V	0.0	1.0	32.0	32.6	6.2	34.3	36.5	66.6	500.0	-17.5	Avg AMB
7320.000	V	0.0	1.0	39.1	37.1	8.0	34.7	49.5	297.6	5000.0	-24.5	Peak AMB
7320.000	V	0.0	1.0	33.0	37.1	8.0	34.7	43.4	147.4	500.0	-10.6	Avg AMB
12200.000	V	0.0	1.0	45.3	40.0	12.7	34.6	63.3	1464.9	5000.0	-10.7	Peak AMB
12200.000	V	0.0	1.0	32.5	40.0	12.7	34.6	50.5	335.6	500.0	-3.5	Avg AMB
4880.000	H	0.0	1.0	32.0	32.6	6.2	34.3	36.5	66.6	5000.0	-37.5	Peak AMB
4880.000	H	0.0	1.0	38.8	32.6	6.2	34.3	43.3	145.7	500.0	-10.7	Avg AMB
7320.000	H	0.0	1.0	39.1	37.1	8.0	34.7	49.5	297.6	5000.0	-24.5	Peak AMB
7320.000	H	0.0	1.0	33.0	37.1	8.0	34.7	43.4	147.4	500.0	-10.6	Avg AMB
12200.000	V	0.0	1.0	45.3	40.0	12.7	34.6	63.3	1464.9	5000.0	-10.7	Peak AMB
12200.000	V	0.0	1.0	32.5	40.0	12.7	34.6	50.5	335.6	500.0	-3.5	Avg AMB

Table 10: Radiated Emission Test Data, High Frequency Data (>1GHz)
Hi Channel (Restricted Bands)

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
2480 (X)												
4960.000	V	0.0	1.0	44.2	32.7	6.2	34.3	48.8	276.2	5000.0	-25.2	Peak AMB
4960.000	V	0.0	1.0	32.0	32.7	6.2	34.3	36.6	67.8	500.0	-17.4	Avg AMB
7440.000	V	0.0	1.0	39.1	37.1	8.1	34.8	49.5	299.7	5000.0	-24.4	Peak AMB
7440.000	V	0.0	1.0	33.0	37.1	8.1	34.8	43.4	148.5	500.0	-10.5	Avg AMB
12400.000	V	0.0	1.0	45.3	40.0	13.1	34.5	63.9	1570.8	5000.0	-10.1	Peak AMB
12400.000	V	0.0	1.0	32.5	40.0	13.1	34.5	51.1	359.9	500.0	-2.9	Avg AMB
4960.000	H	0.0	1.0	32.0	32.7	6.2	34.3	36.6	67.8	5000.0	-37.4	Peak AMB
4960.000	H	0.0	1.0	38.8	32.7	6.2	34.3	43.4	148.3	500.0	-10.6	Avg AMB
7440.000	H	0.0	1.0	39.1	37.1	8.1	34.8	49.5	299.7	5000.0	-24.4	Peak AMB
7440.000	H	0.0	1.0	33.0	37.1	8.1	34.8	43.4	148.5	500.0	-10.5	Avg AMB
12400.000	V	0.0	1.0	45.3	40.0	13.1	34.5	63.9	1570.8	5000.0	-10.1	Peak AMB
12400.000	V	0.0	1.0	32.5	40.0	13.1	34.5	51.1	359.9	500.0	-2.9	Avg AMB
2480 (Y)												
4960.000	V	0.0	1.0	44.2	32.7	6.2	34.3	48.8	276.2	5000.0	-25.2	Peak AMB
4960.000	V	0.0	1.0	32.0	32.7	6.2	34.3	36.6	67.8	500.0	-17.4	Avg AMB
7440.000	V	0.0	1.0	39.1	37.1	8.1	34.8	49.5	299.7	5000.0	-24.4	Peak AMB
7440.000	V	0.0	1.0	33.0	37.1	8.1	34.8	43.4	148.5	500.0	-10.5	Avg AMB
12400.000	V	0.0	1.0	45.3	40.0	13.1	34.5	63.9	1570.8	5000.0	-10.1	Peak AMB
12400.000	V	0.0	1.0	32.5	40.0	13.1	34.5	51.1	359.9	500.0	-2.9	Avg AMB
4960.000	H	0.0	1.0	32.0	32.7	6.2	34.3	36.6	67.8	5000.0	-37.4	Peak AMB
4960.000	H	0.0	1.0	38.8	32.7	6.2	34.3	43.4	148.3	500.0	-10.6	Avg AMB
7440.000	H	0.0	1.0	39.1	37.1	8.1	34.8	49.5	299.7	5000.0	-24.4	Peak AMB
7440.000	H	0.0	1.0	33.0	37.1	8.1	34.8	43.4	148.5	500.0	-10.5	Avg AMB
12400.000	V	0.0	1.0	45.3	40.0	13.1	34.5	63.9	1570.8	5000.0	-10.1	Peak AMB
12400.000	V	0.0	1.0	32.5	40.0	13.1	34.5	51.1	359.9	500.0	-2.9	Avg AMB
2480 (Z)												
4960.000	V	0.0	1.0	44.2	32.7	6.2	34.3	48.8	276.2	5000.0	-25.2	Peak AMB
4960.000	V	0.0	1.0	32.0	32.7	6.2	34.3	36.6	67.8	500.0	-17.4	Avg AMB
7440.000	V	0.0	1.0	39.1	37.1	8.1	34.8	49.5	299.7	5000.0	-24.4	Peak AMB
7440.000	V	0.0	1.0	33.0	37.1	8.1	34.8	43.4	148.5	500.0	-10.5	Avg AMB
12400.000	V	0.0	1.0	45.3	40.0	13.1	34.5	63.9	1570.8	5000.0	-10.1	Peak AMB
12400.000	V	0.0	1.0	32.5	40.0	13.1	34.5	51.1	359.9	500.0	-2.9	Avg AMB
4960.000	H	0.0	1.0	32.0	32.7	6.2	34.3	36.6	67.8	5000.0	-37.4	Peak AMB
4960.000	H	0.0	1.0	38.8	32.7	6.2	34.3	43.4	148.3	500.0	-10.6	Avg AMB
7440.000	H	0.0	1.0	39.1	37.1	8.1	34.8	49.5	299.7	5000.0	-24.4	Peak AMB
7440.000	H	0.0	1.0	33.0	37.1	8.1	34.8	43.4	148.5	500.0	-10.5	Avg AMB
12400.000	V	0.0	1.0	45.3	40.0	13.1	34.5	63.9	1570.8	5000.0	-10.1	Peak AMB
12400.000	V	0.0	1.0	32.5	40.0	13.1	34.5	51.1	359.9	500.0	-2.9	Avg AMB