Washington Laboratories, Ltd.

FCC Certification Test Report
For the
EKA Systems, Inc.
EKA Meter Module ECR-2400

FCC ID: P9X2400B

WLL JOB# **9335**
August 11, 2006

Prepared for:

EKA Systems, Inc.
20251 Century Blvd. Suite 120
Gaithersburg, MD 20874

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 EKA Systems, Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Bluetooth device operating as a Frequency Hopping Spread Spectrum Transmitter under Part 15.247 of the FCC Rules. This Certification Test Report documents the test configuration and test results for an EKA Systems, Inc. EKA Meter Module ECR-2400.

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 EKA Systems, Inc. EKA Meter Module ECR-2400 complies with the limits for a Bluetooth Transmitter device under FCC Part 15.247.

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Compliance Statement

The EKA Systems, Inc. EKA Meter Module ECR-2400 complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with FCC Public Notice DA 00-705 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:	EKA Systems, Inc. 20251 Century Blvd. Suite 120 Gaithersburg, MD 20874
Quotation Number:	62997

1.4 Test Dates

Testing was performed on the following date(s): August 1 through August 3, 2006

1.5 Test and Support Personnel

Washington Laboratories, LTD	Steve Dovell
Client Representative	Joe Adams

2 Equipment Under Test

2.1 EUT Identification & Description

The EKA Systems, Inc. EKA Meter Module ECR-2400 is an under-the-glass board designed for installation in an ECR-2400 meter. The node plugs into the meter and enables meters to automatically form a wireless mesh network.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	EKA Systems, Inc.
FCC ID:	P9X2400B
Model:	EKA Meter Module ECR-2400
FCC Rule Parts:	§15.247
Industry Canada:	RSS210
Frequency Range:	2401-2480MHz
Maximum Output Power:	57.5mW (17.6dBm)
Occupied Bandwidth:	1.196MHz
Keying:	Automatic
Type of Information:	Data
Number of Channels:	79
Power Output Level	Fixed
Antenna Connector	N/A
Antenna Type	PCB Mounted Stub
Interface Cables:	N/A
Power Source & Voltage:	120Vac

2.2 Test Configuration

The EKA Meter Module ECR-2400 was configured as shown in Figure 1 below.

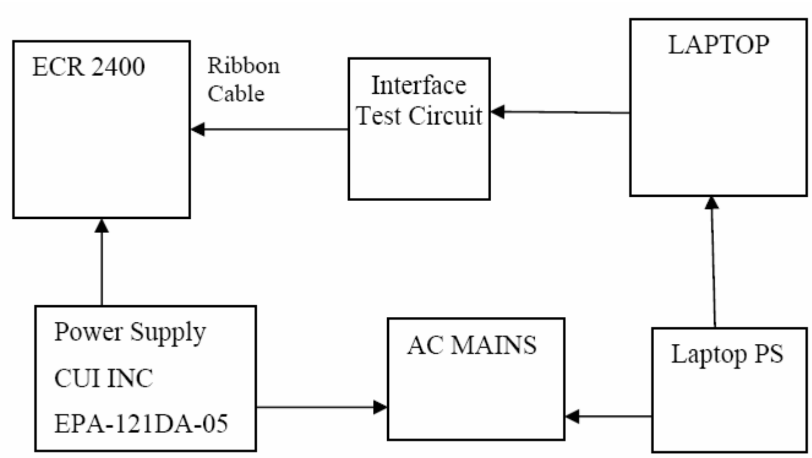


Figure 2-1: Test Configuration

2.3 Testing Algorithm

The EKA Meter Module ECR-2400 was configured with software supplied by the radio chip manufacture. It allowed for setting the mode (Hop, No hop, channel selection and level selection).

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
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	12/01/2006
0522	HEWLETT-PACKARD 8449B	MICROWAVE PREAMP	4/11/2006
0004	ARA DRG118/A	MICROWAVE HORN ANTENNA	2/02/2007

4 Test Results

4.1 Duty Cycle Correction

In accordance with the FCC Public Notice DA 00-705 and Pt 15.209 the spurious radiated harmonic emissions measurements may be adjusted using a duty cycle correction factor in addition to video averaging 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)

Figure 4-3 through Figure 4-2 are the plots of the dwell time for the transmitter. Based on these plots, the pulse width of each hop is 438.3μs and the total dwell time per 100 ms is 2.19ms (assuming 5 pulses per 100ms). This corresponds to a duty cycle correction of -33.2dB, however, the maximum allowed duty cycle correction is 20dB.

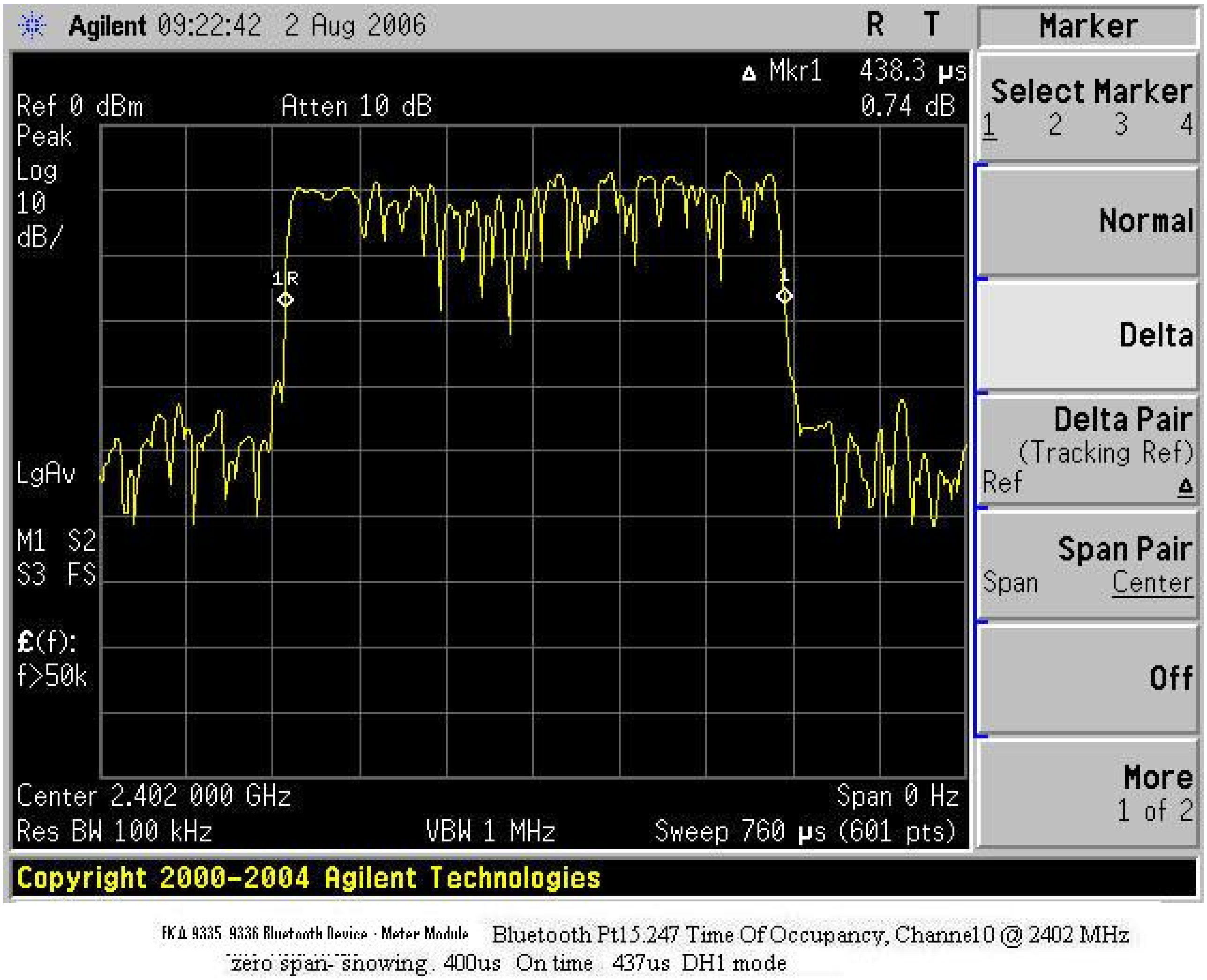
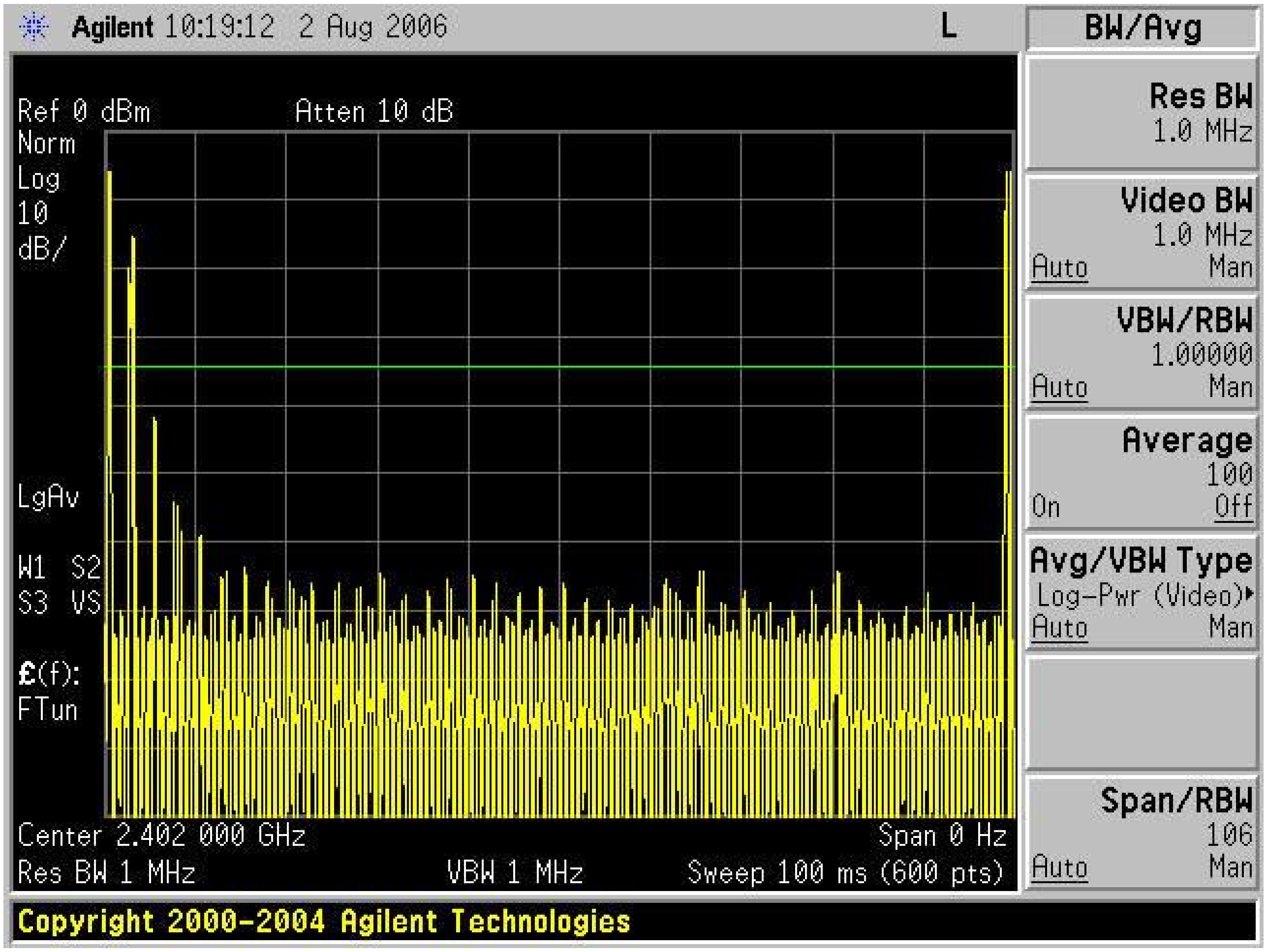


Figure 4-1. Duty Cycle Plot, Pulse Width, 438.3µs



EKA Meter Module: Job#9335_9336: Pt15.247Duty Cycle Correction cH0@2402MHz
Correction = 20Log(Dwell/100ms)
The picture demonstrates that there are 5 pulse in a 100ms period. Each pulse = 438us = 2.19ms
Correction = 20log(2.19/100) = -33.2dB. 20 dB is the max allowed.

Figure 4-2. Duty Cycle Plot, Worst Case 100ms

In accordance with FCC 15.247(a)(1)(iii) the occupancy time of any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds times the number of channels.

For this EUT:

79 Channels/Frequencies X 0.4 seconds = 31.6 seconds (Limit = 0.4 seconds per 31.6 seconds, per channel).

The following occupancy time is calculated from data shown in Figure 4-1 through Figure 4-3.

43.83 ms/31.6 s. interval, based on 100 pulses of 438.3 µs.

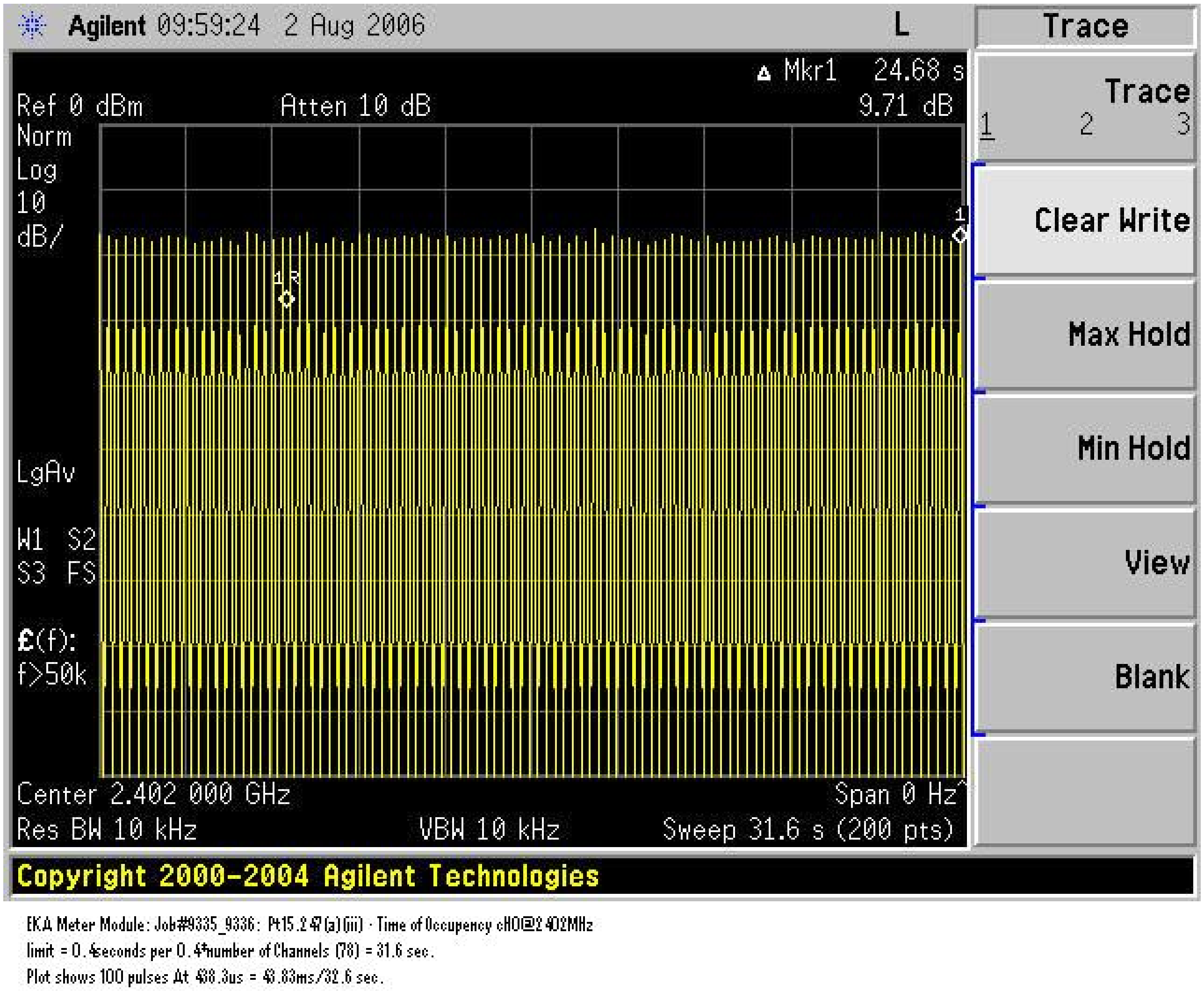


Figure 4-3. Time of Occupancy, 31.6 seconds

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 3. RF Power Output

Frequency	Level	Limit	Pass/Fail
Low Channel 2402MHz	17.59 dBm	30 dBm	Pass
Mid Channel 2441MHz	17.51 dBm	30 dBm	Pass
High Channel 2480MHz	17.17 dBm	30 dBm	Pass

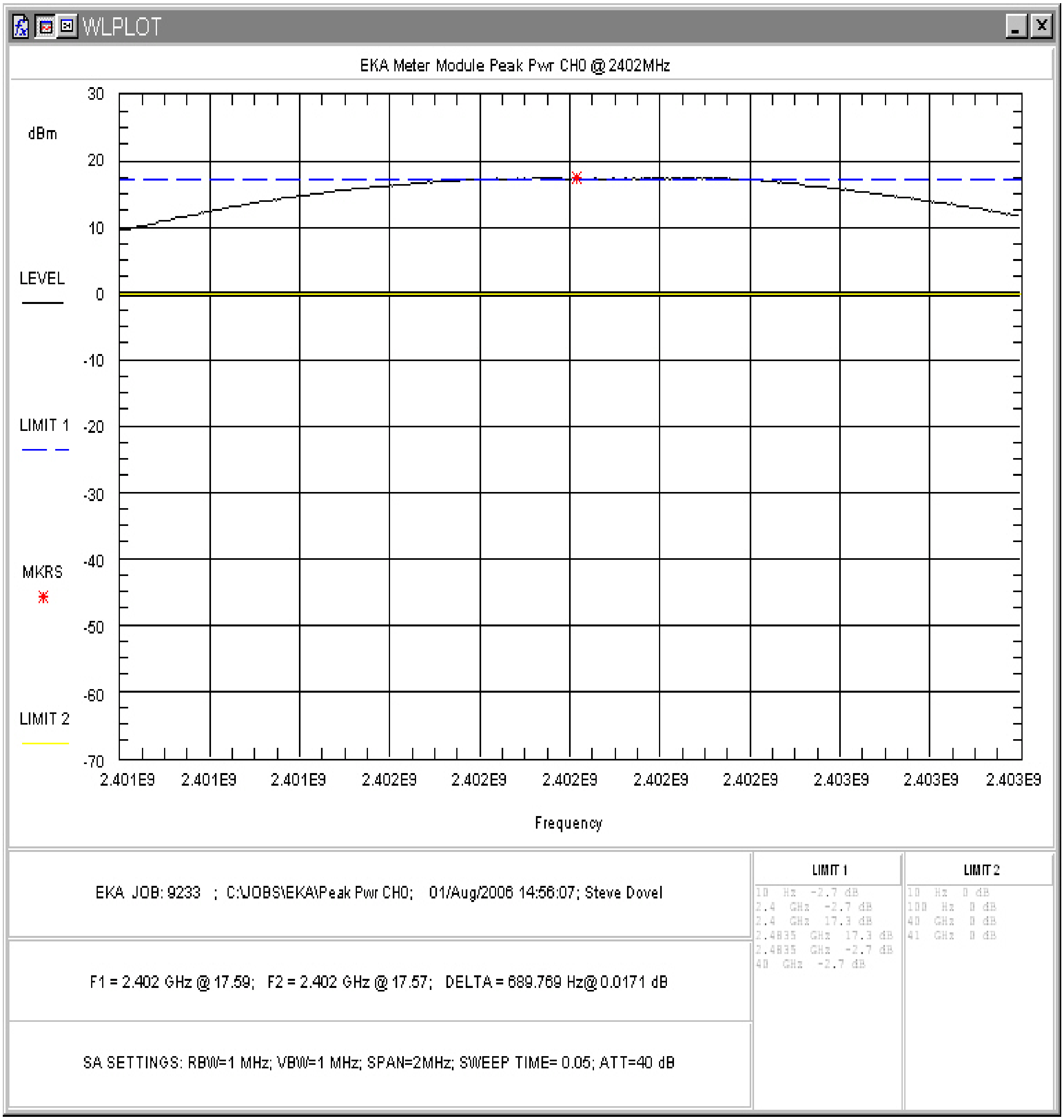


Figure 4-4. RF Peak Power, Low Channel

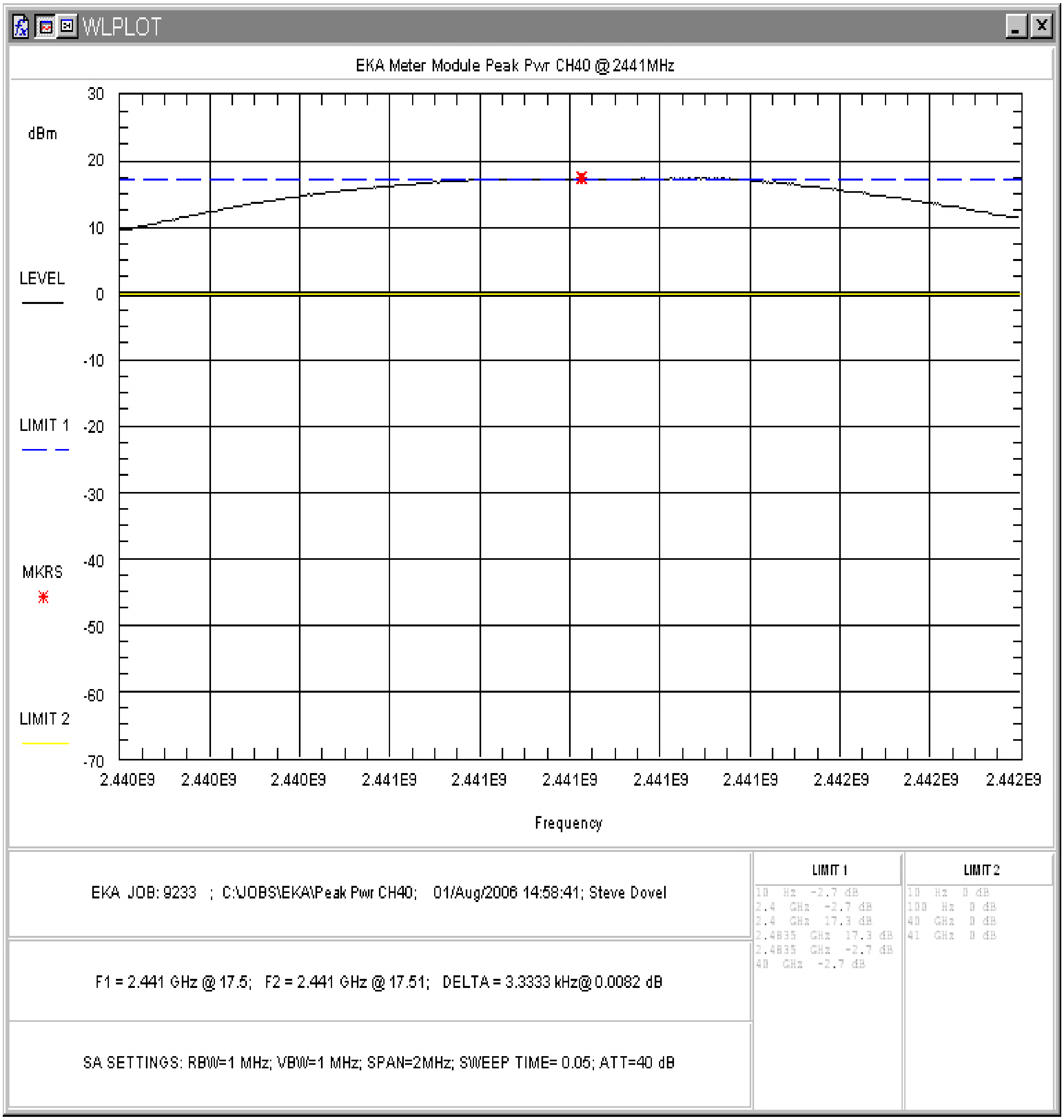


Figure 4-5. RF Peak Power, Mid Channel

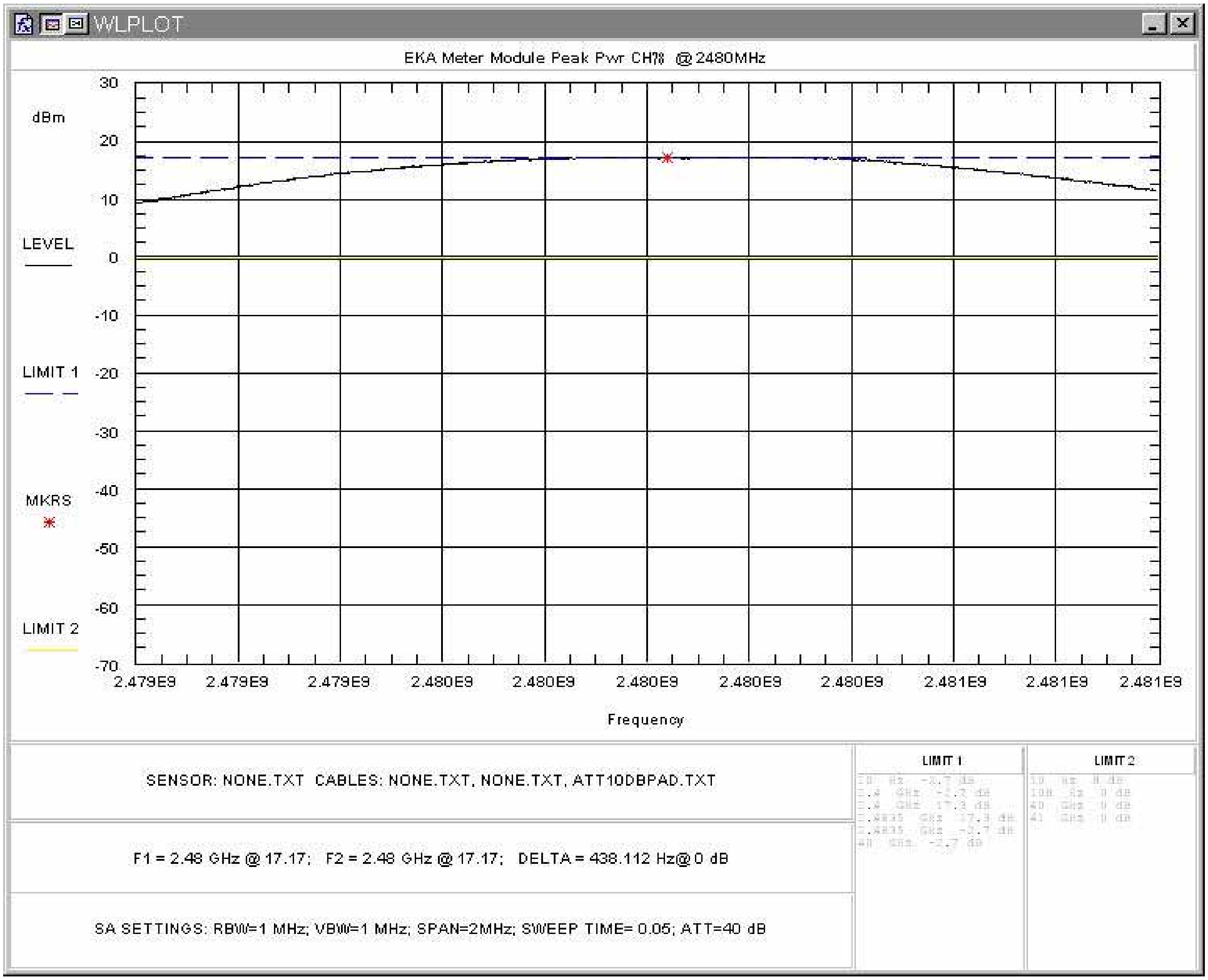


Figure 4-6. RF Peak Power, High Channel

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 Frequency Hopping Spread Spectrum Systems, FCC Part 15.247 requires the Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

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

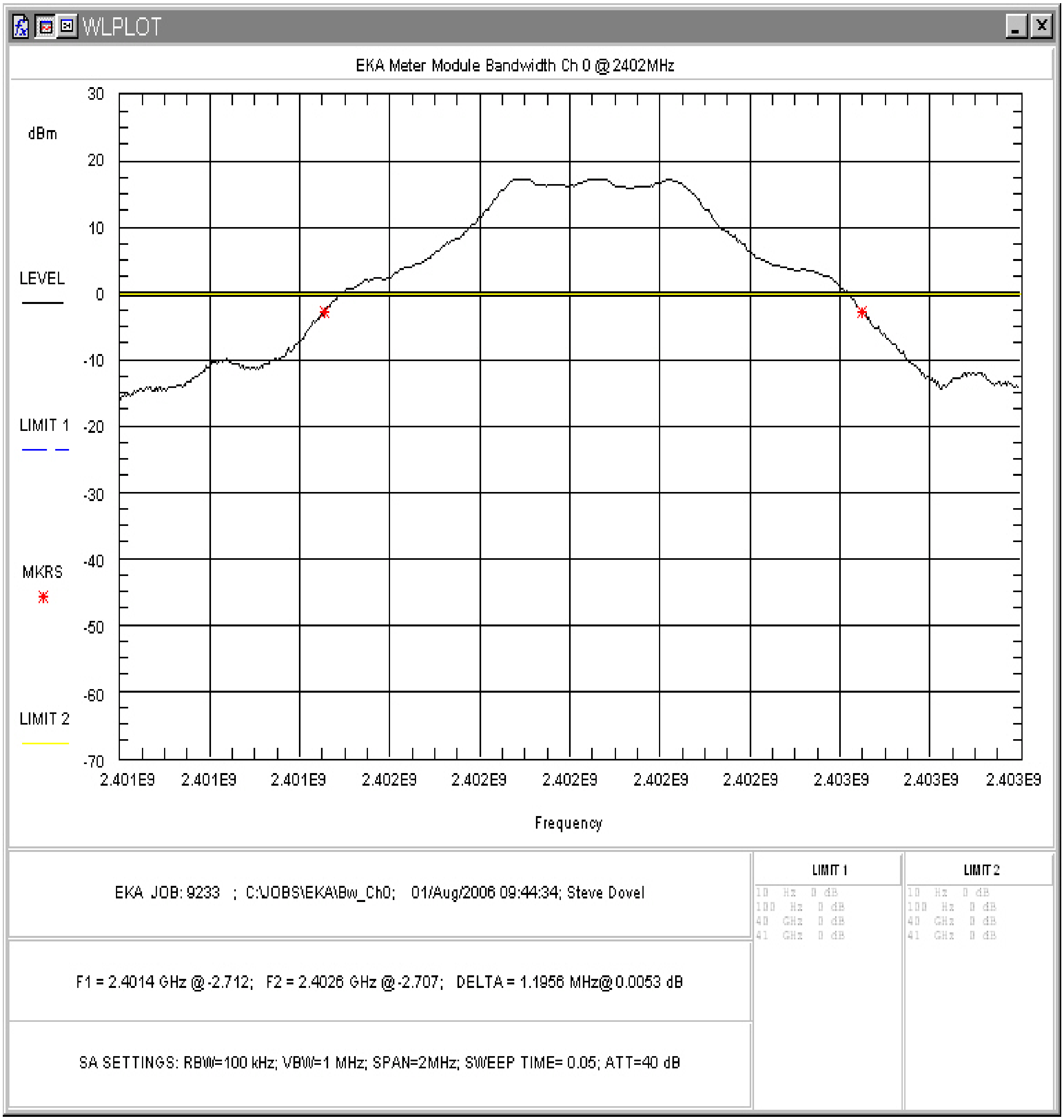


Figure 4-7. Occupied Bandwidth, Low Channel

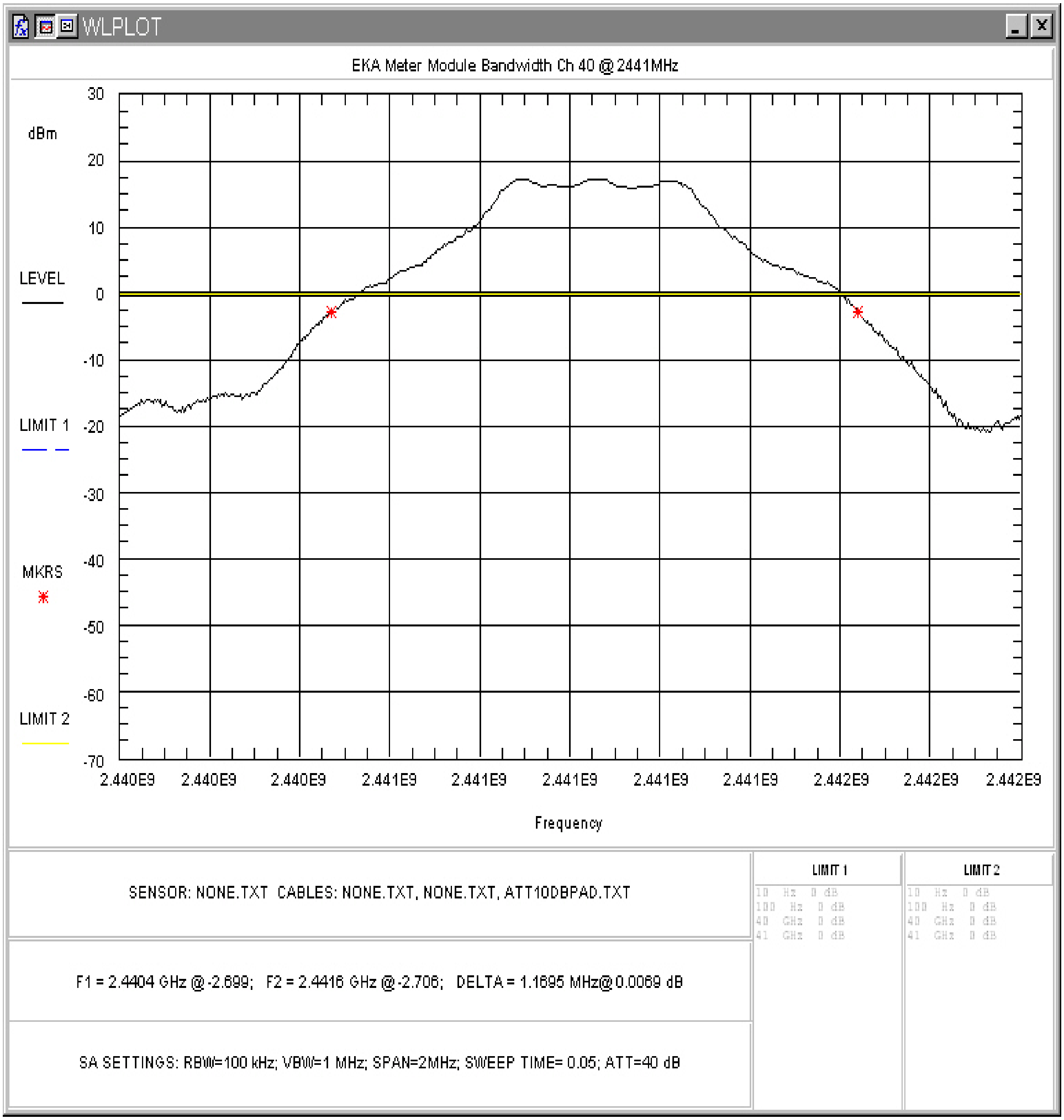


Figure 4-8. Occupied Bandwidth, Mid Channel

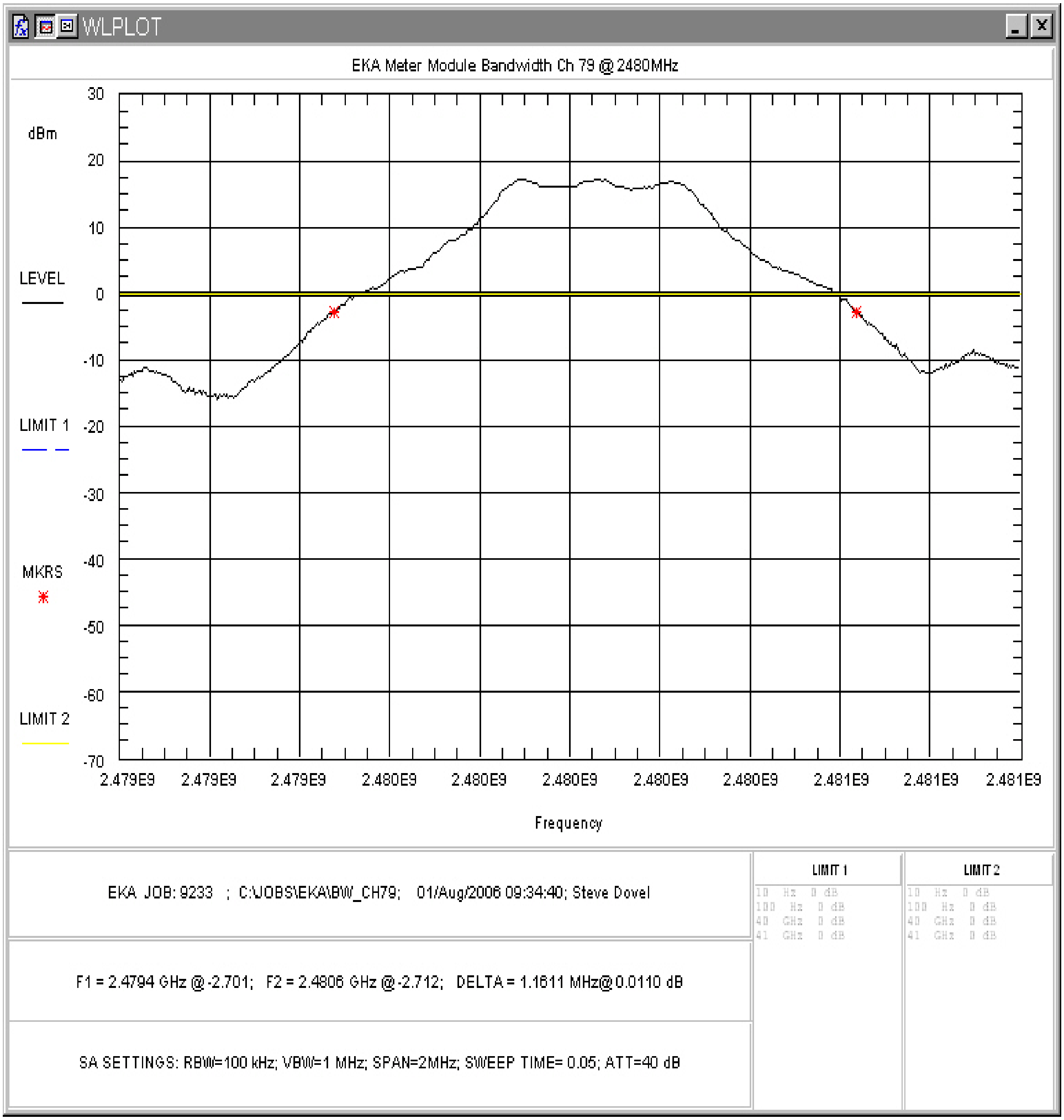


Figure 4-9. Occupied Bandwidth, High Channel

Table 4 provides a summary of the Occupied Bandwidth Results.

Table 4. Occupied Bandwidth Results

Frequency	Bandwidth
Low Channel 2402MHz	1.196MHz
Mid Channel 2441MHz	1.17MHz
High Channel 2480MHz	1.16MHz

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

Per the FCC requirements, For Frequency Hopping Spread Spectrum Systems, FCC Part 15.247 requires the Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

The output of the EUT is under the limit 125 mW specification and therefore the channels must be separated by two-thirds of the 20dB bandwidth. The maximum 20dB bandwidth measured 1.196MHz. Therefore the channel spacing must be at least 797.3kHz.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 100kHz. The channel spacing of 2 adjacent channels was measured on the spectrum analyzer. The following are plots of the channel spacing and number of hopping channels data. The channel spacing was measured to be 1MHz and the number of channels used is 79.

Figure 4-10 shows the channel spacing and Figure 4-11 and Figure 4-12 are plots of the 79 channels.

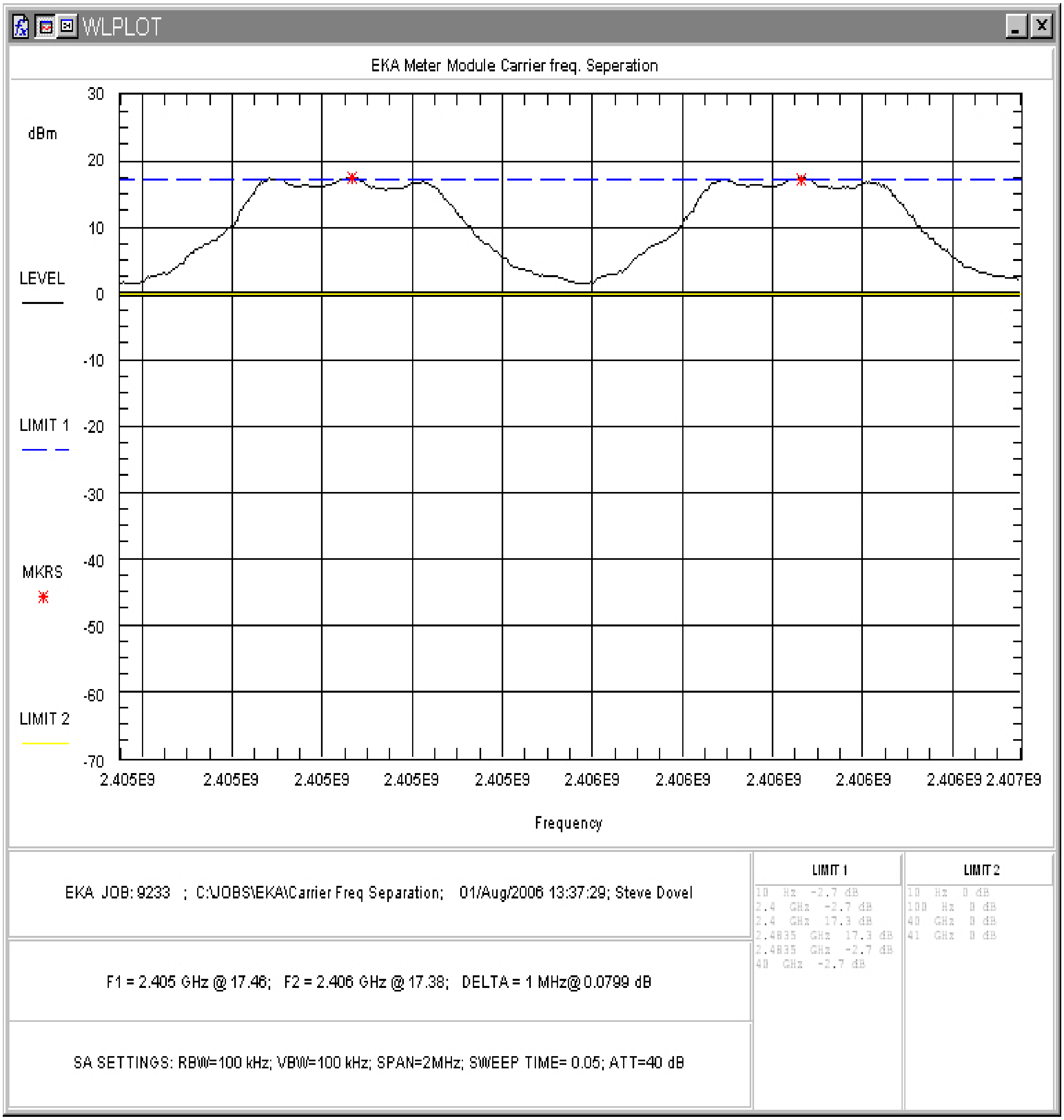


Figure 4-10. Channel Spacing, 1MHz

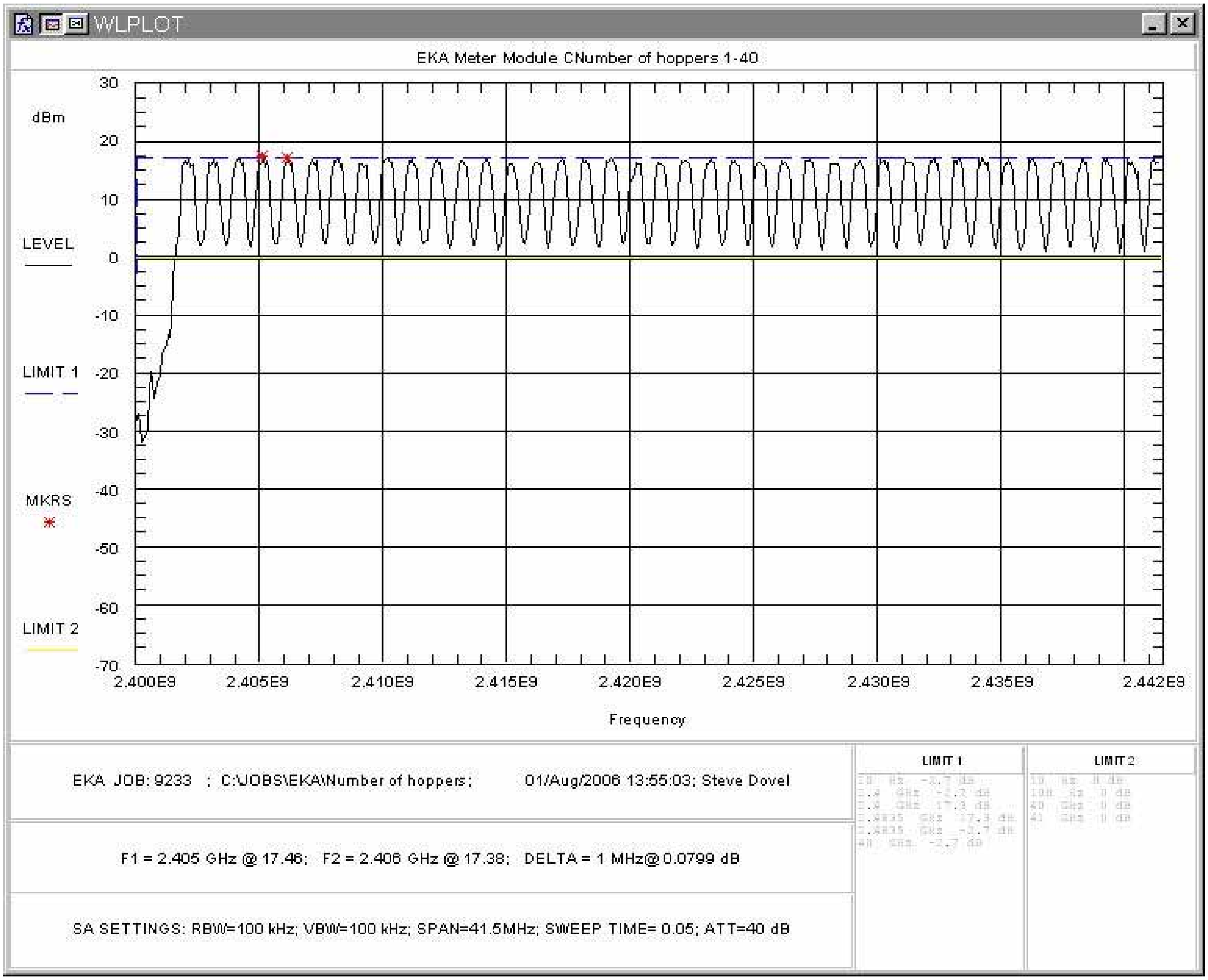


Figure 4-11. Number of Channels, Plot 1, Channels 1 - 40

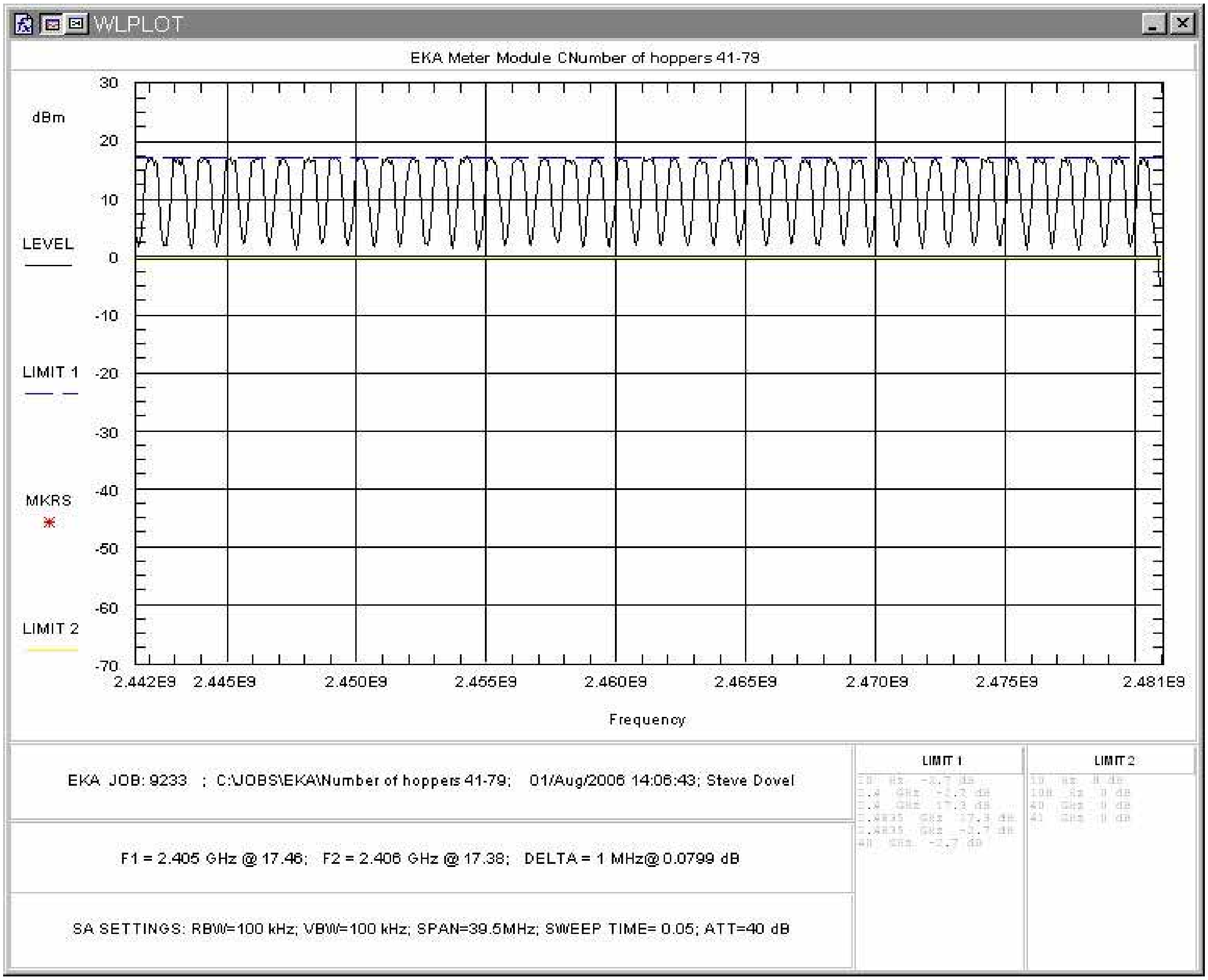


Figure 4-12. Number of Channels, Plot 2, Channels 41-79

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. Band edge plots are shown in Figure 4-34 through Figure 4-37 for both the hopping and non-hopping modes.

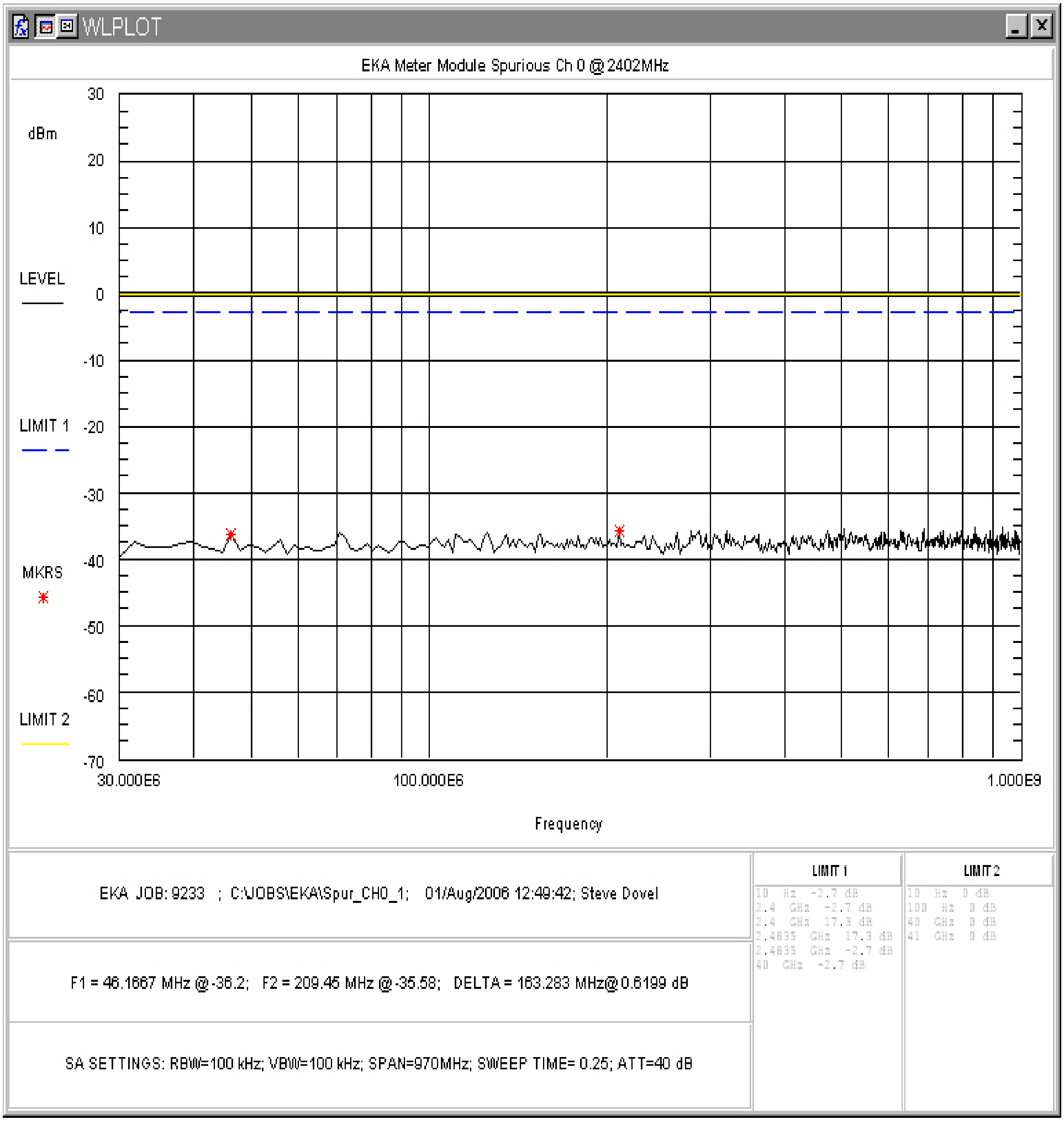


Figure 4-13. Conducted Spurious Emissions, Low Channel 30 - 1000MHz

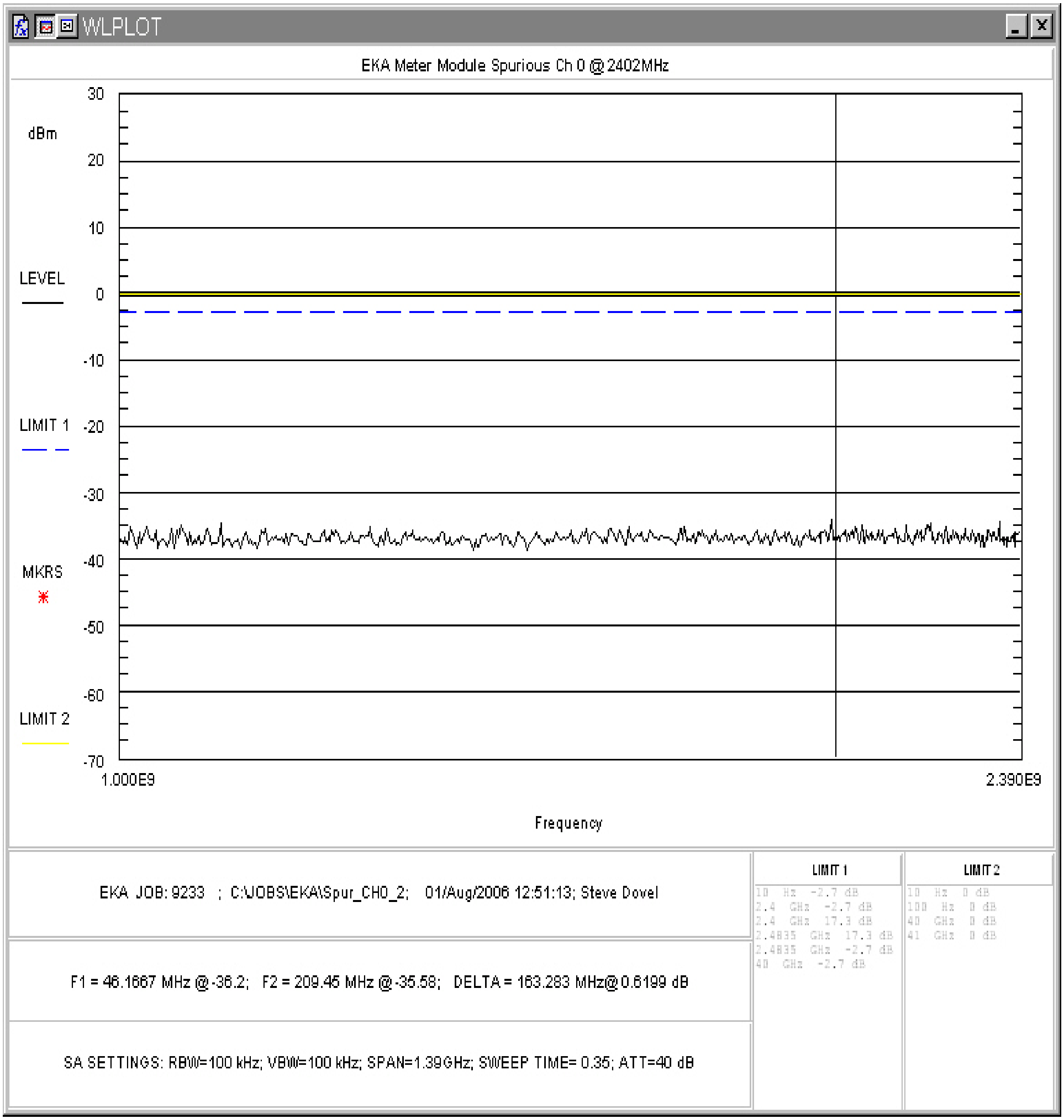


Figure 4-14. Conducted Spurious Emissions, Low Channel 1 – 2.39GHz

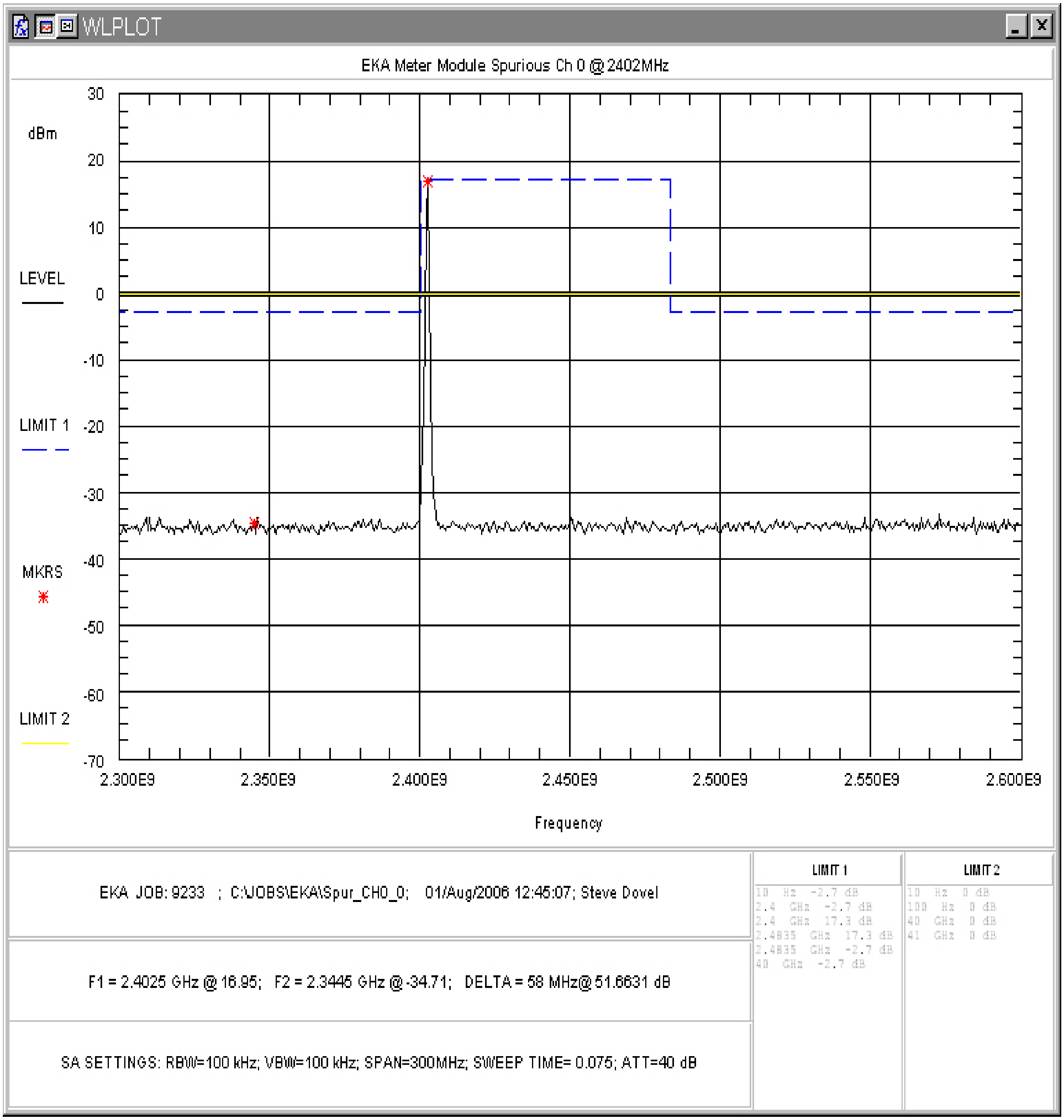


Figure 4-15. Conducted Spurious Emissions, Low Channel, 2.39 – 2.6GHz

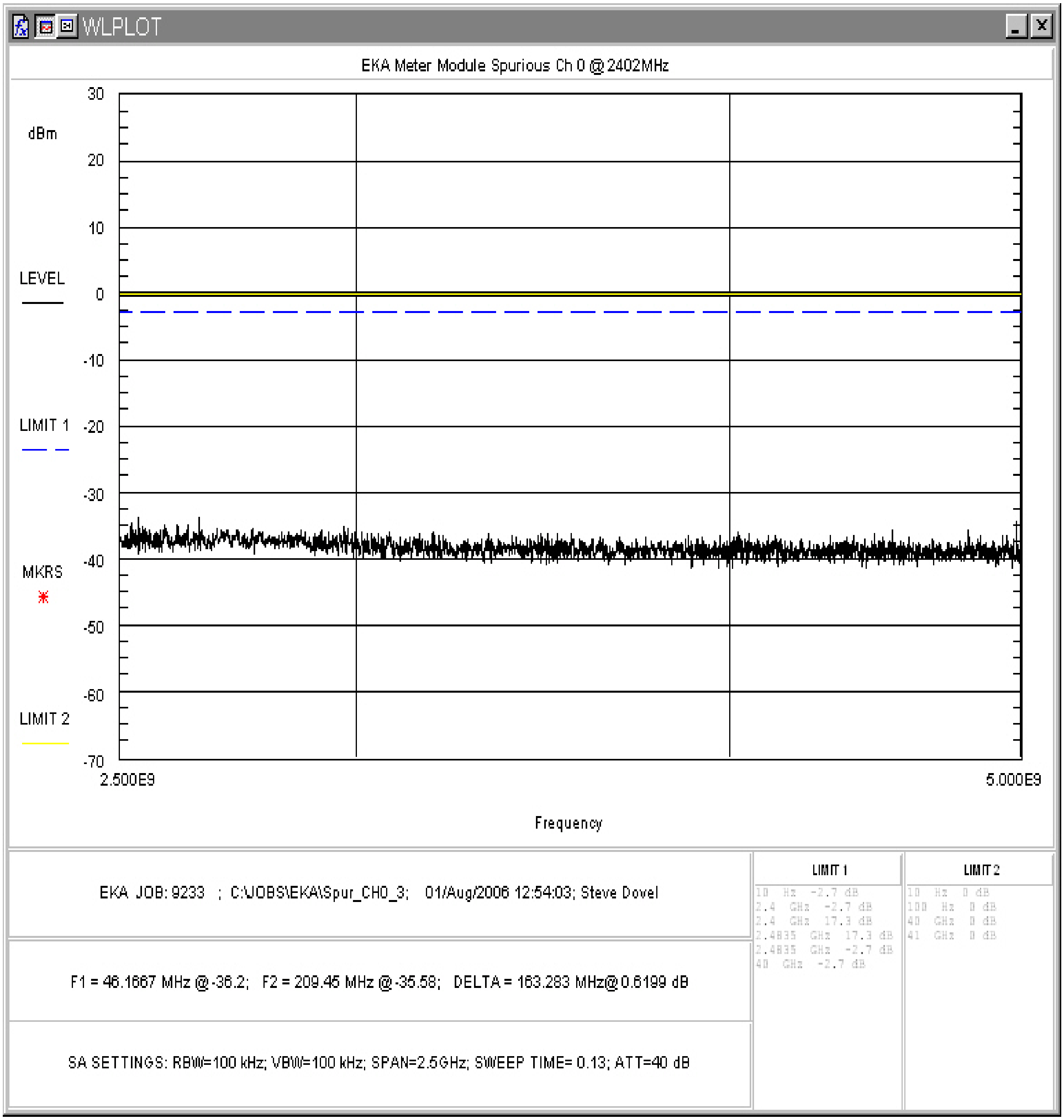


Figure 4-16. Conducted Spurious Emissions, Low Channel 2.5 – 5GHz

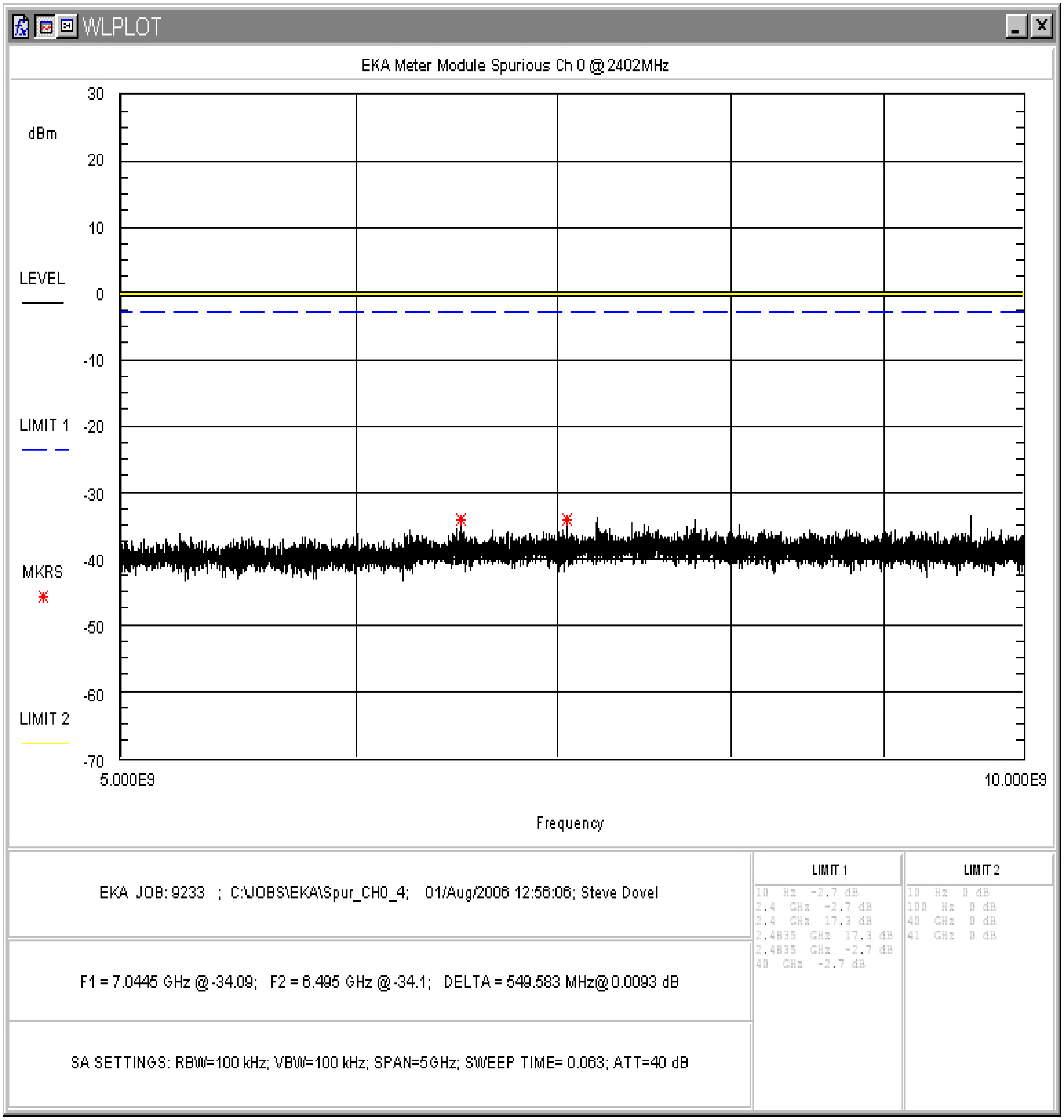


Figure 4-17. Conducted Spurious Emissions, Low Channel 5 – 10GHz

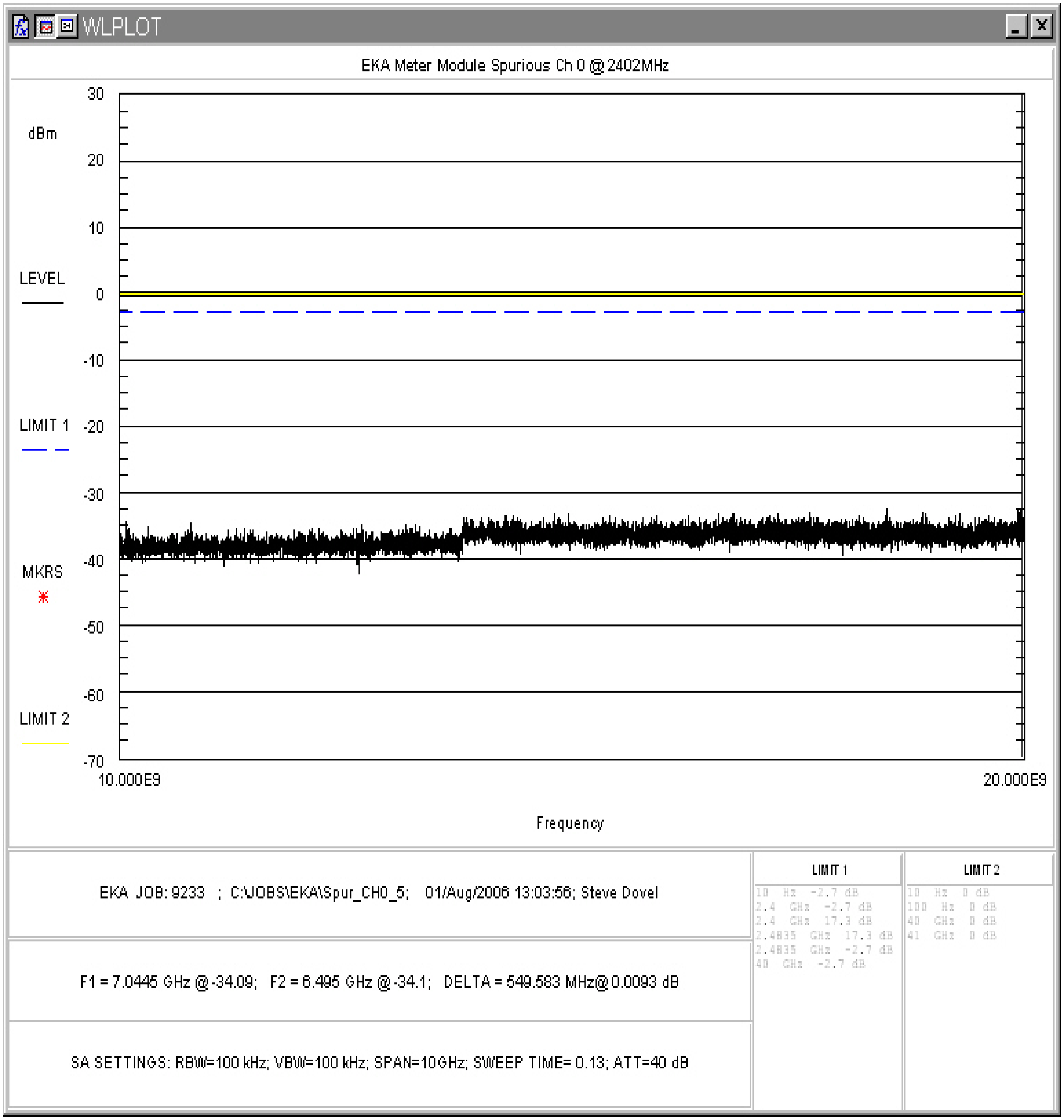


Figure 4-18. Conducted Spurious Emissions, Low Channel 10 - 20GHz

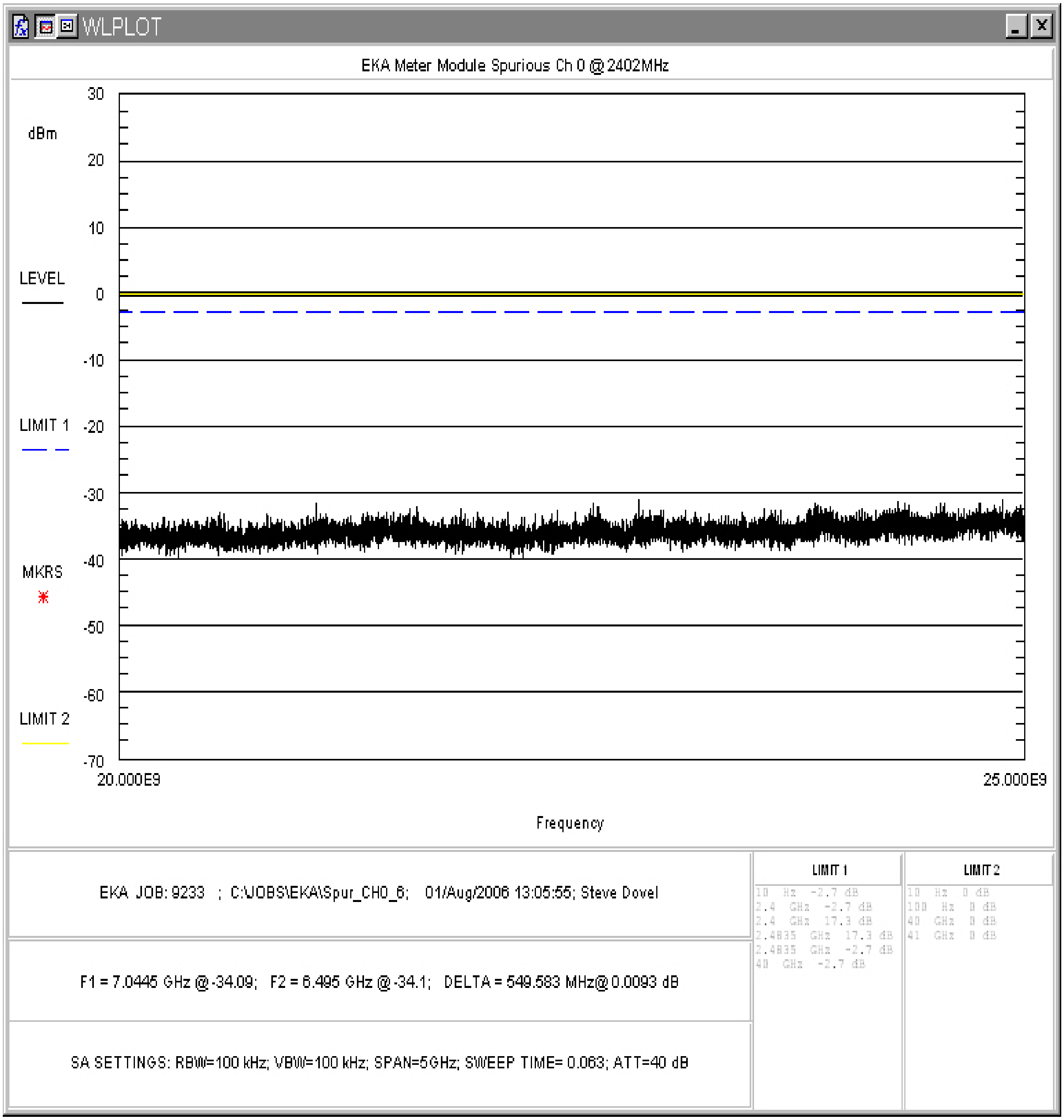


Figure 4-19. Conducted Spurious Emissions, Low Channel 20 - 25GHz

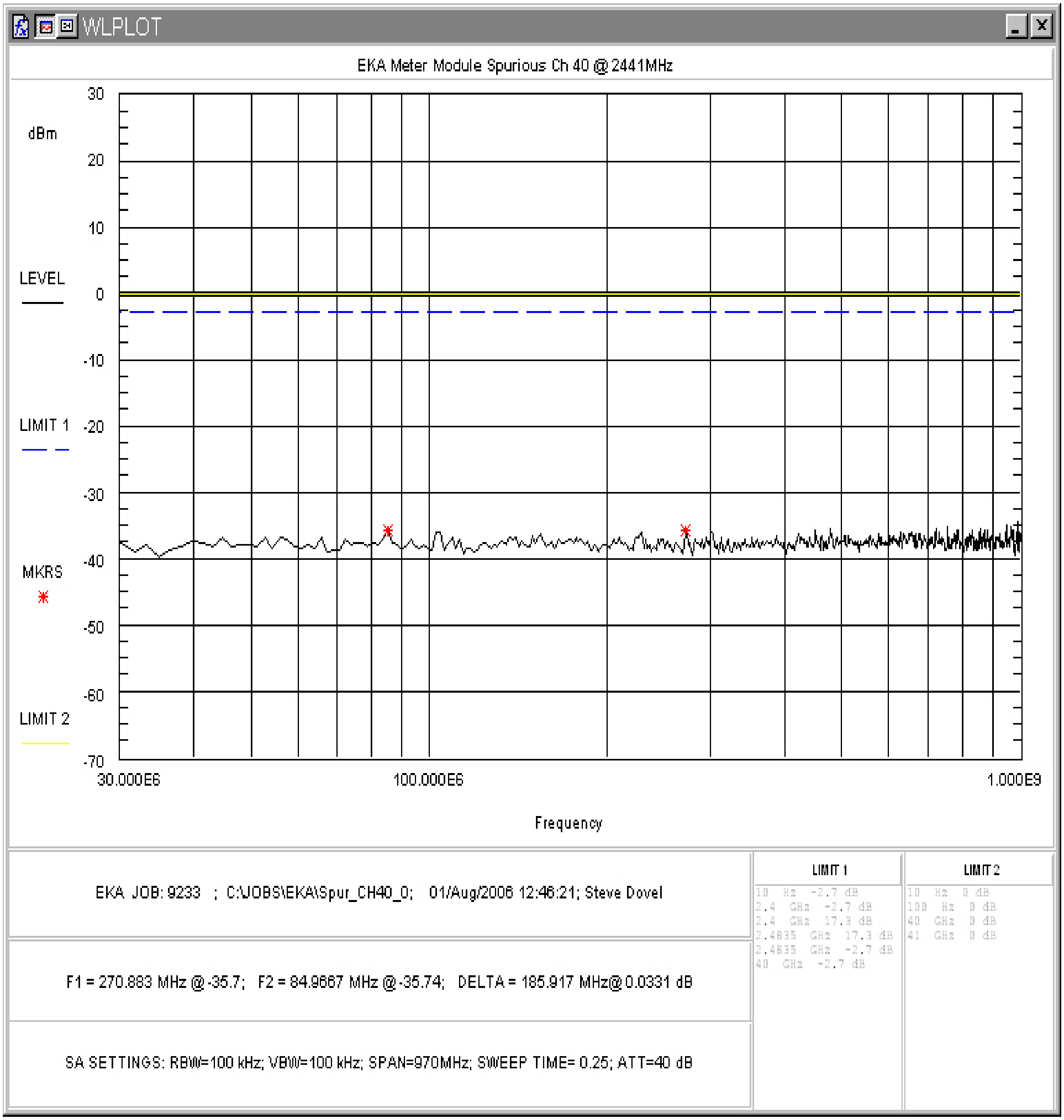


Figure 4-20. Conducted Spurious Emissions, Mid Channel 30 - 1000MHz

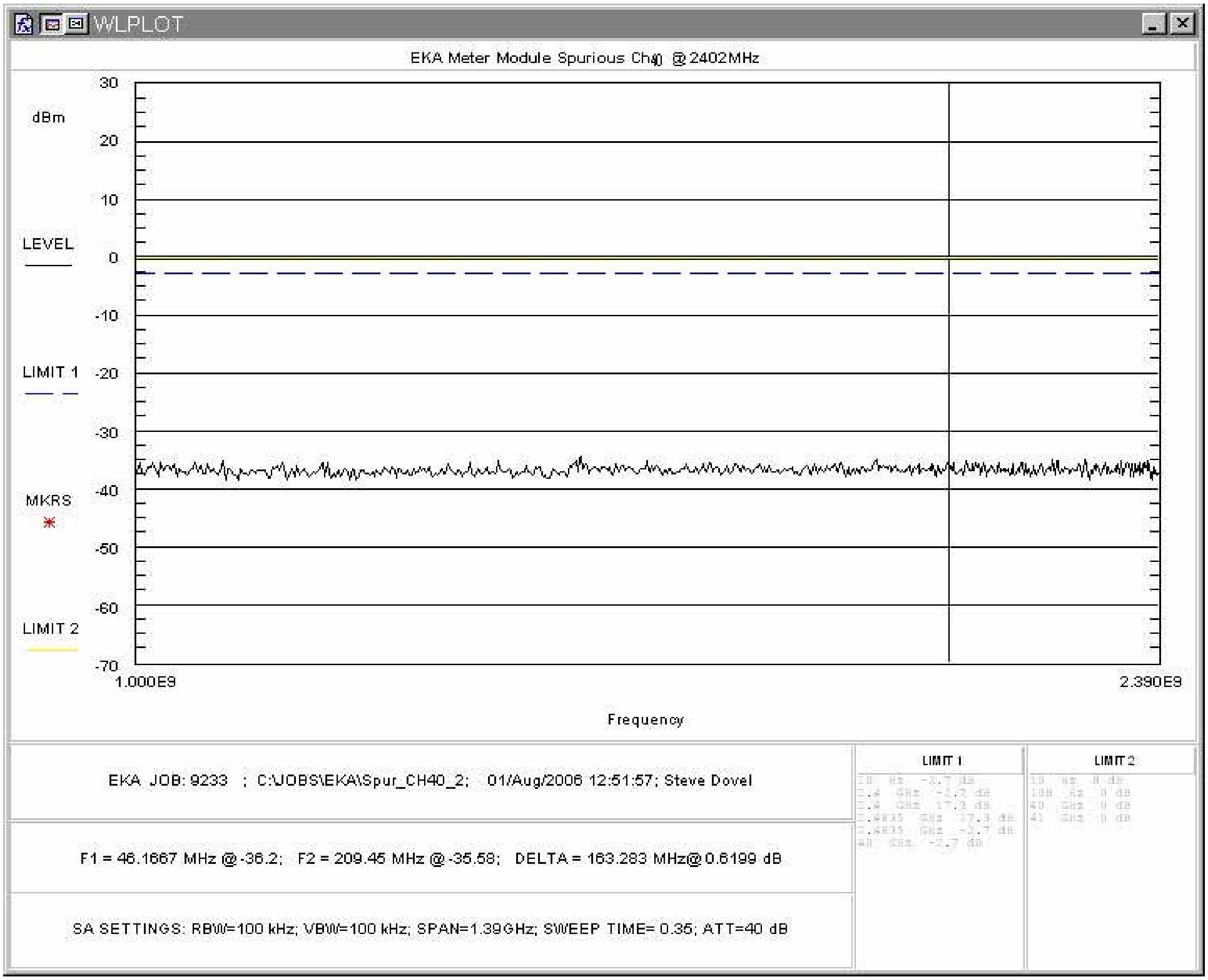


Figure 4-21. Conducted Spurious Emissions, Mid Channel 1 – 2.39GHz

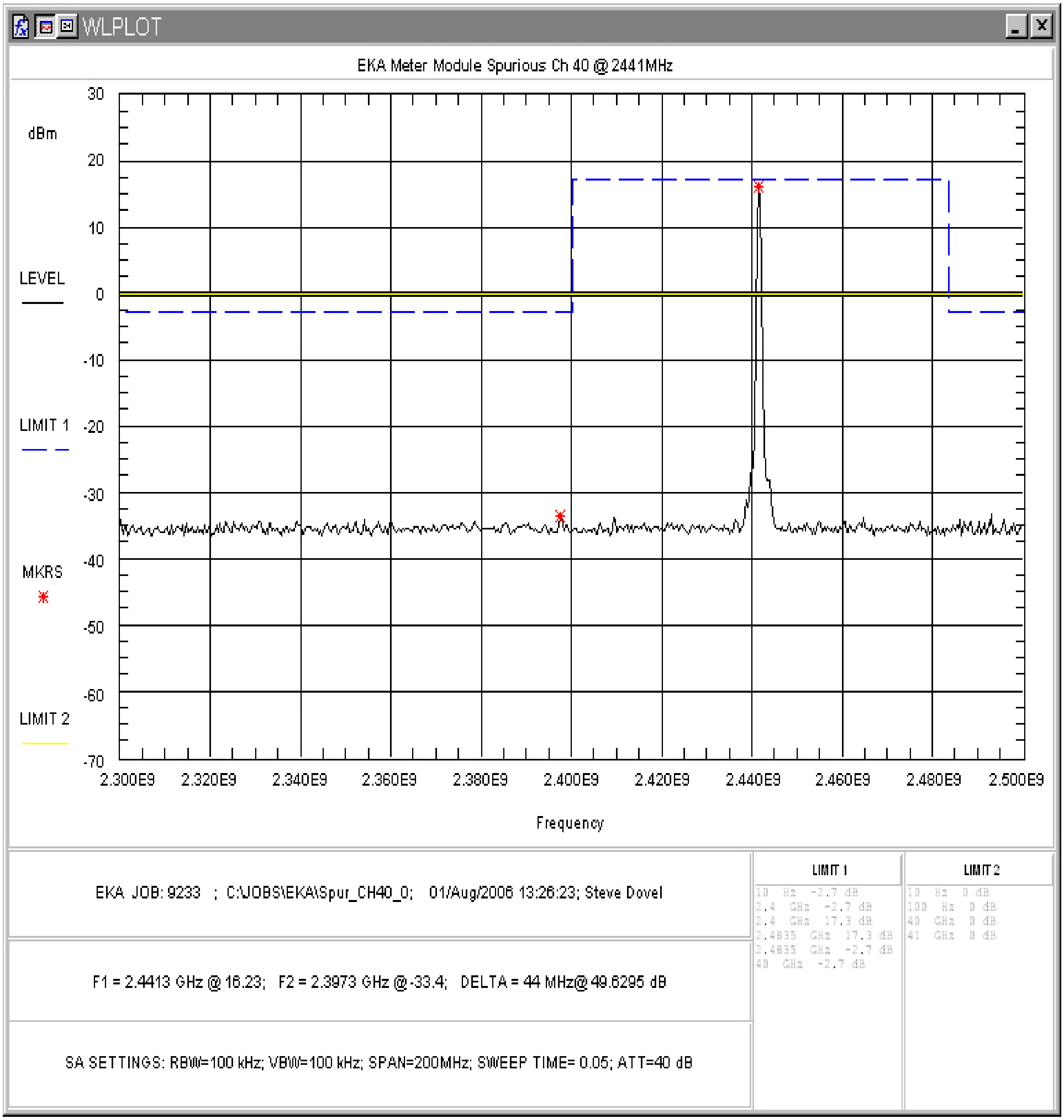


Figure 4-22. Conducted Spurious Emissions, Mid Channel In-band

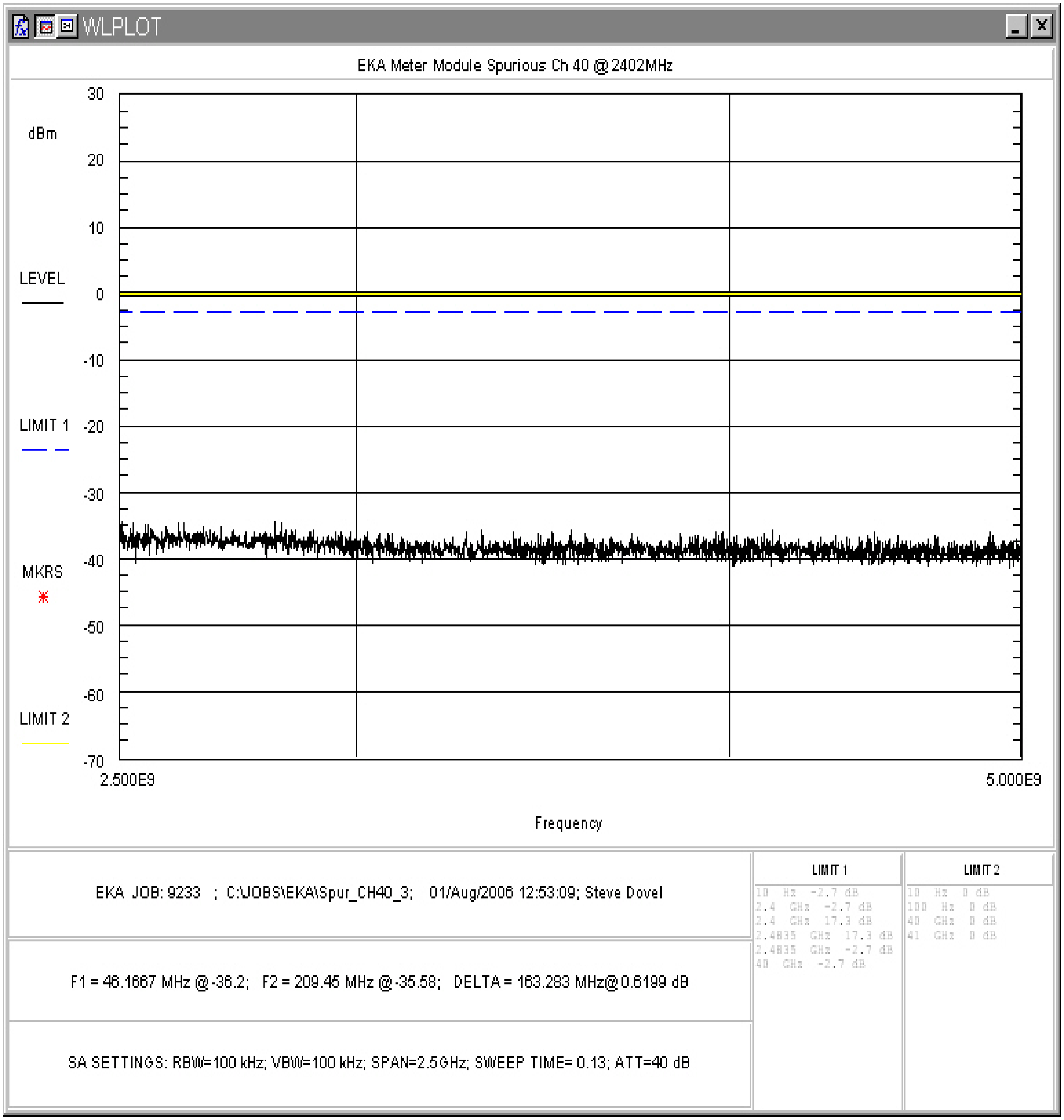


Figure 4-23. Conducted Spurious Emissions, Mid Channel 2.5 –5GHz

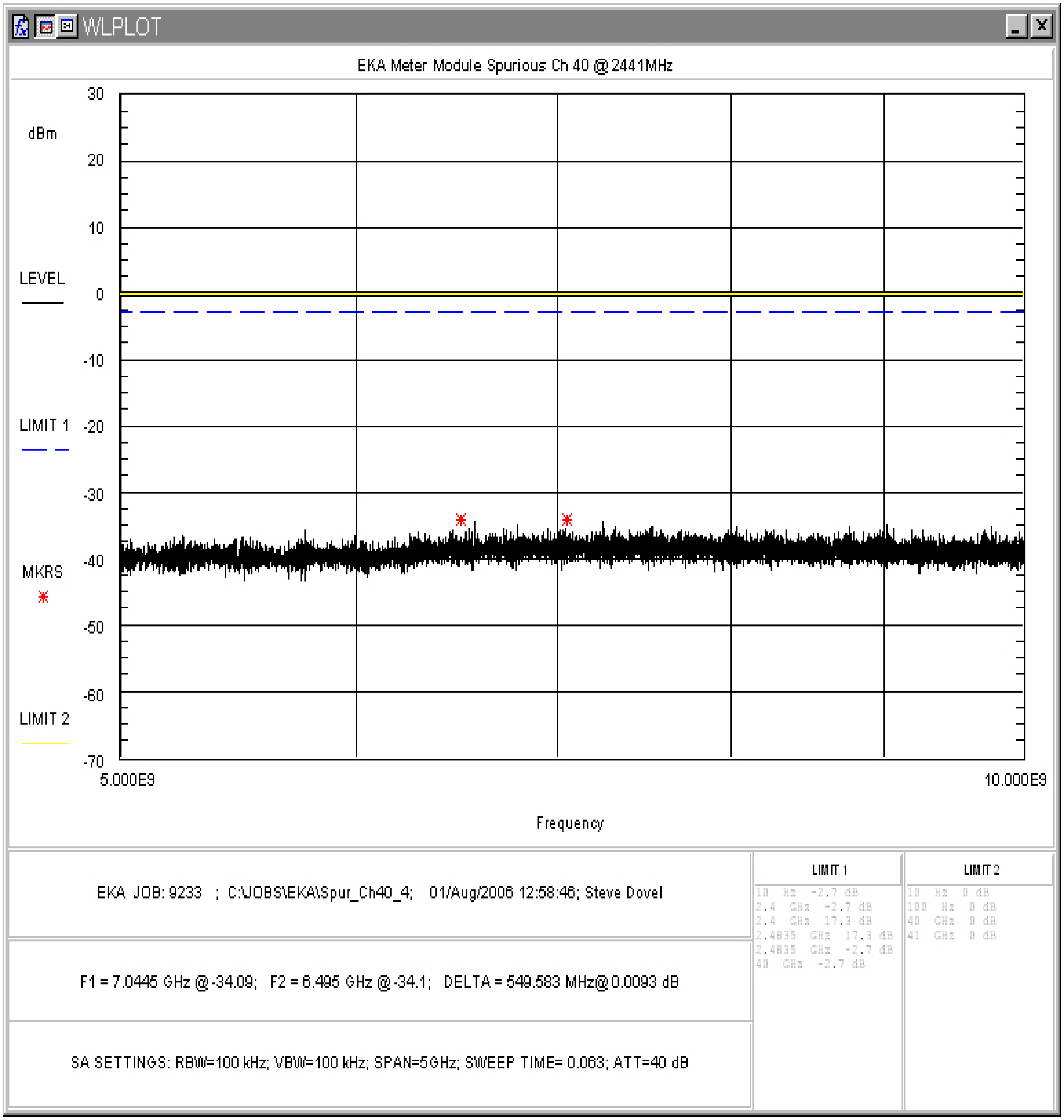


Figure 4-24. Conducted Spurious Emissions, Mid Channel 5 - 10GHz

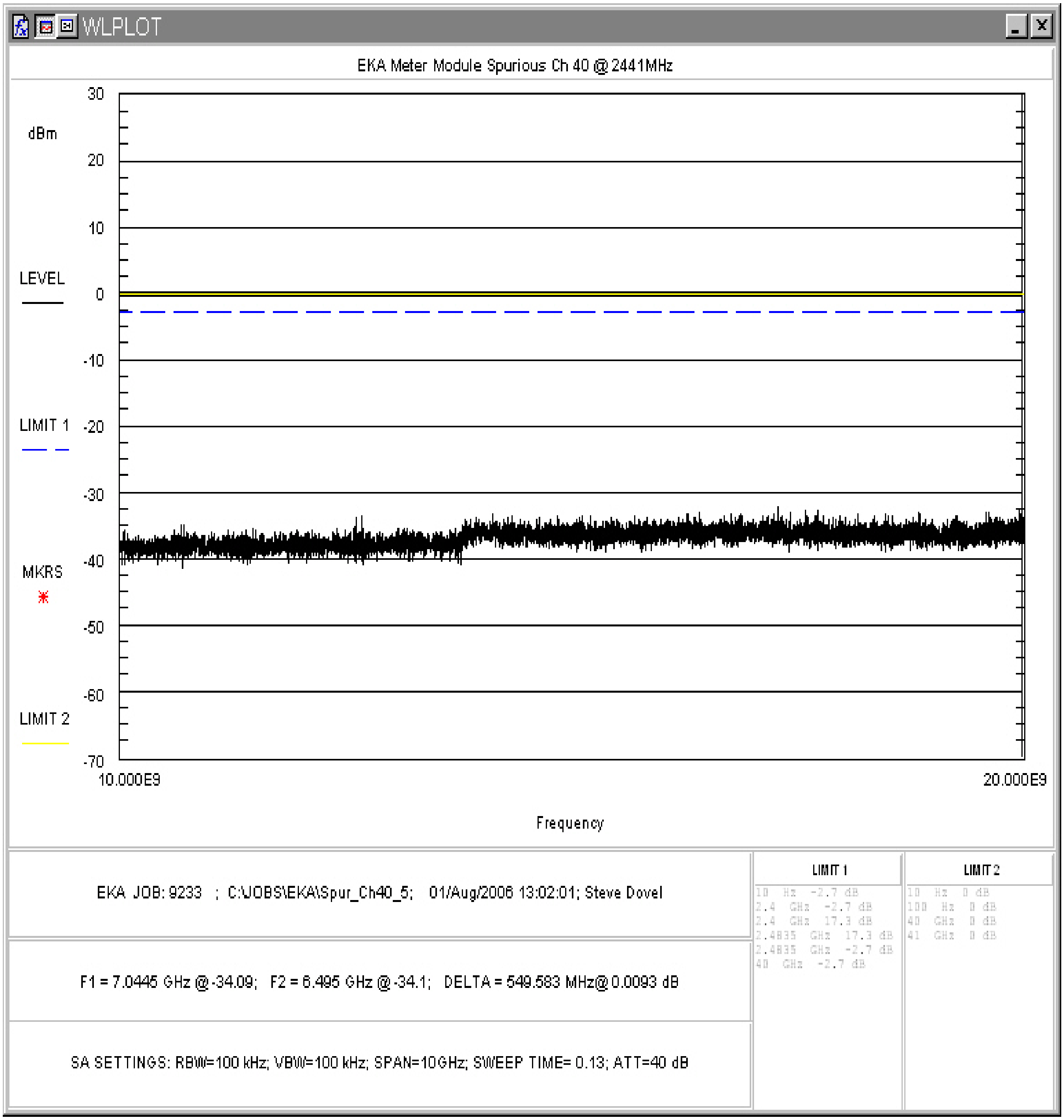


Figure 4-25. Conducted Spurious Emissions, Mid Channel 10 - 20GHz

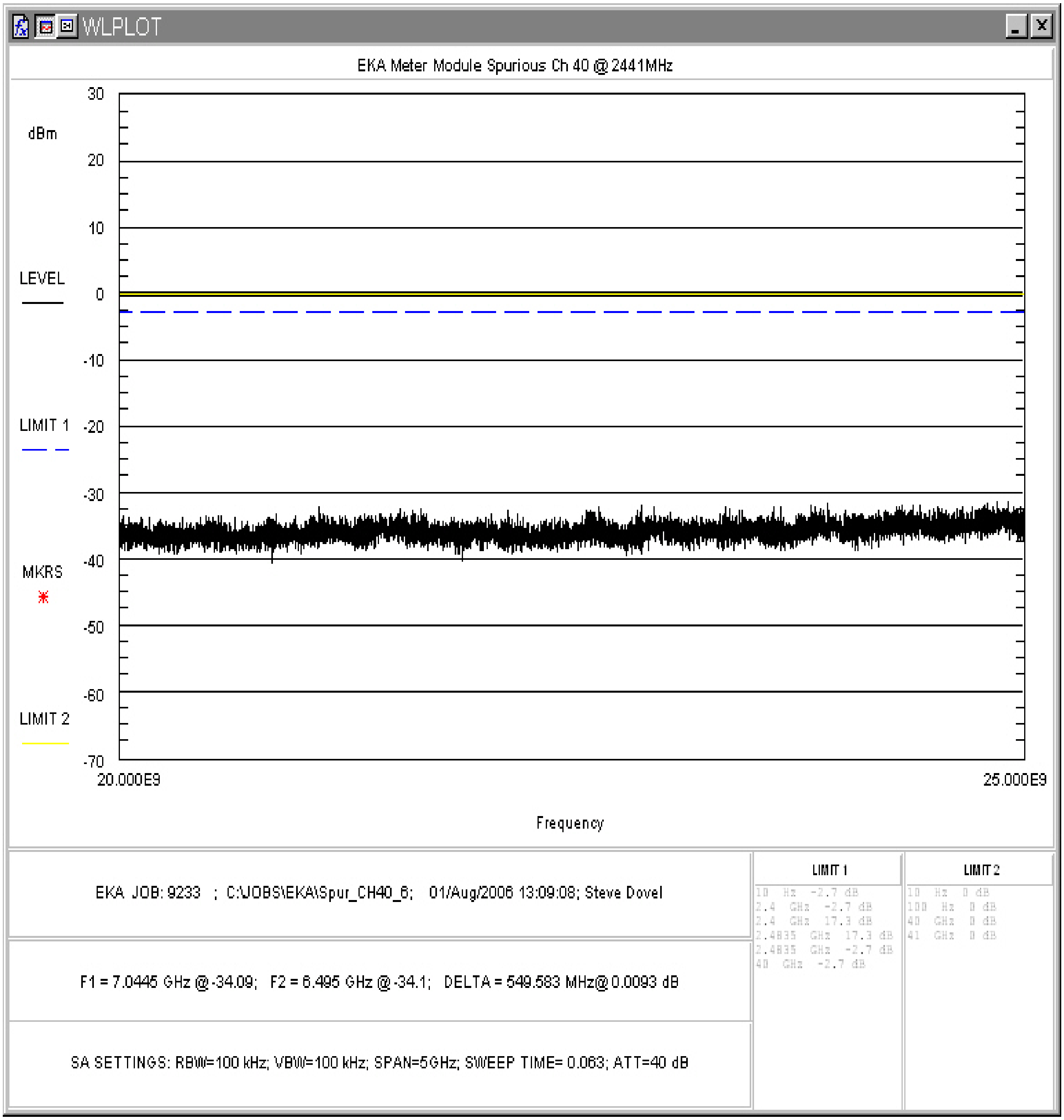


Figure 4-26. Conducted Spurious Emissions, Mid Channel 20 - 25GHz

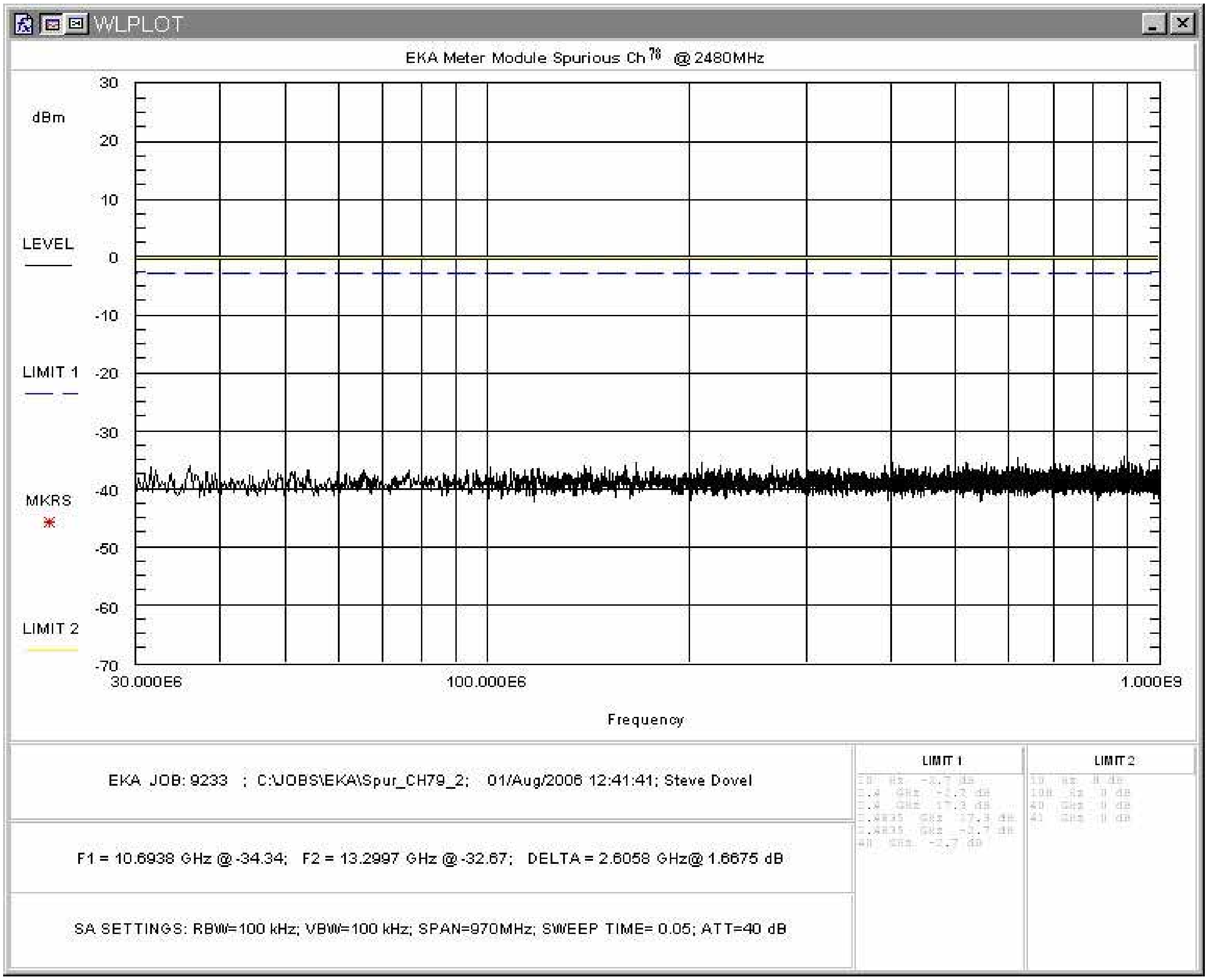


Figure 4-27. Conducted Spurious Emissions, High Channel 30 - 1000MHz

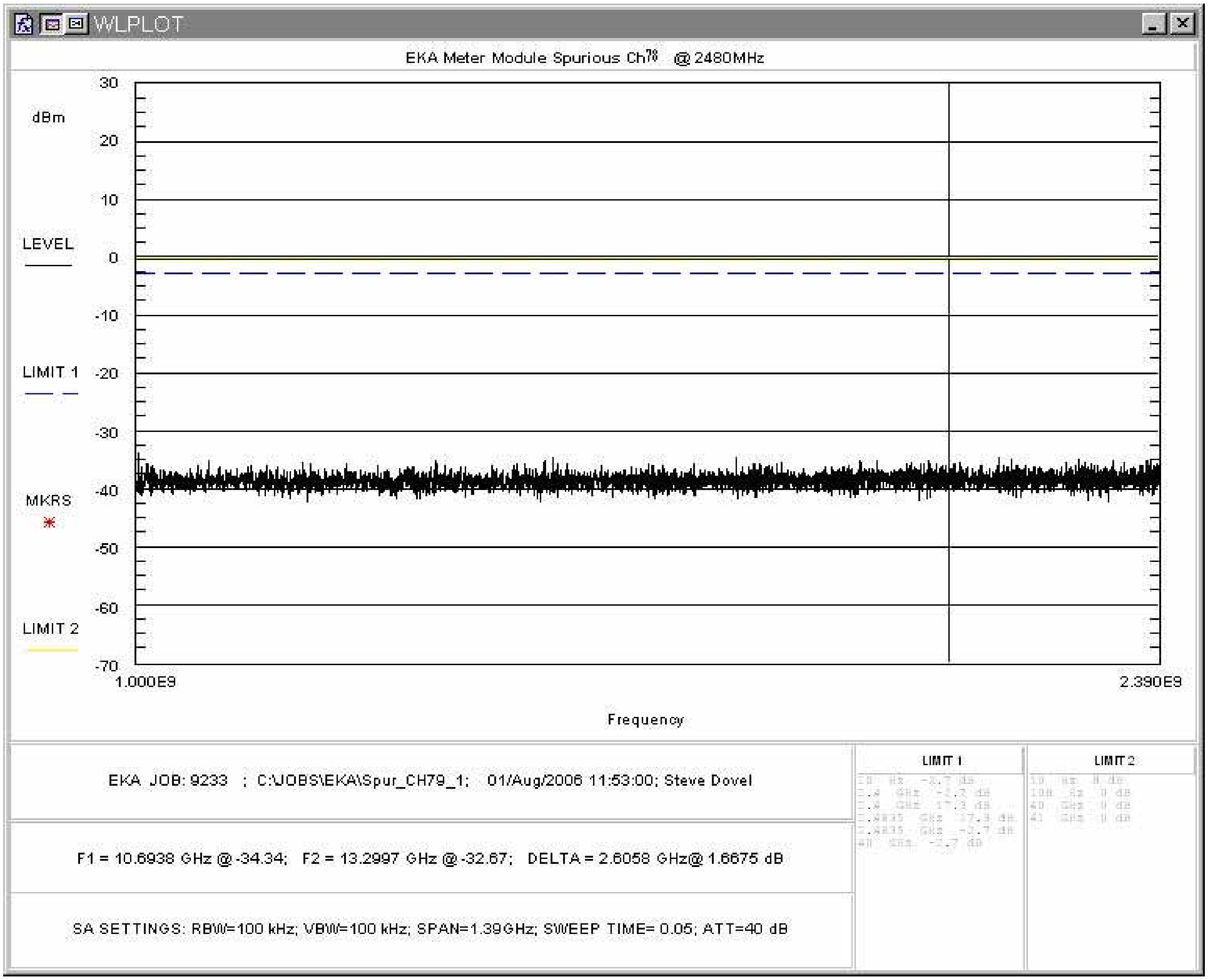


Figure 4-28. Conducted Spurious Emissions, High Channel 1 – 2.39GHz

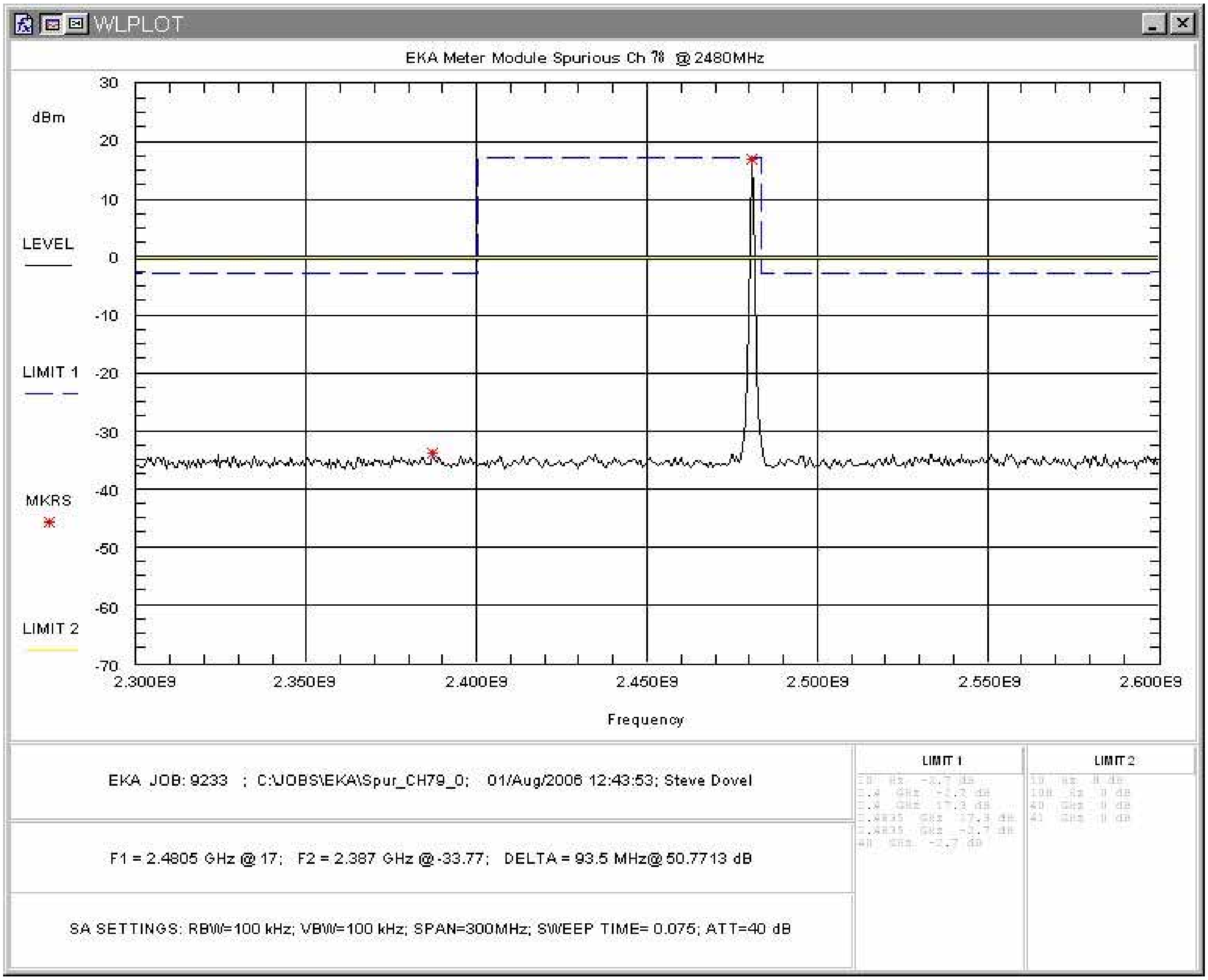


Figure 4-29. Conducted Spurious Emissions, High Channel In-band

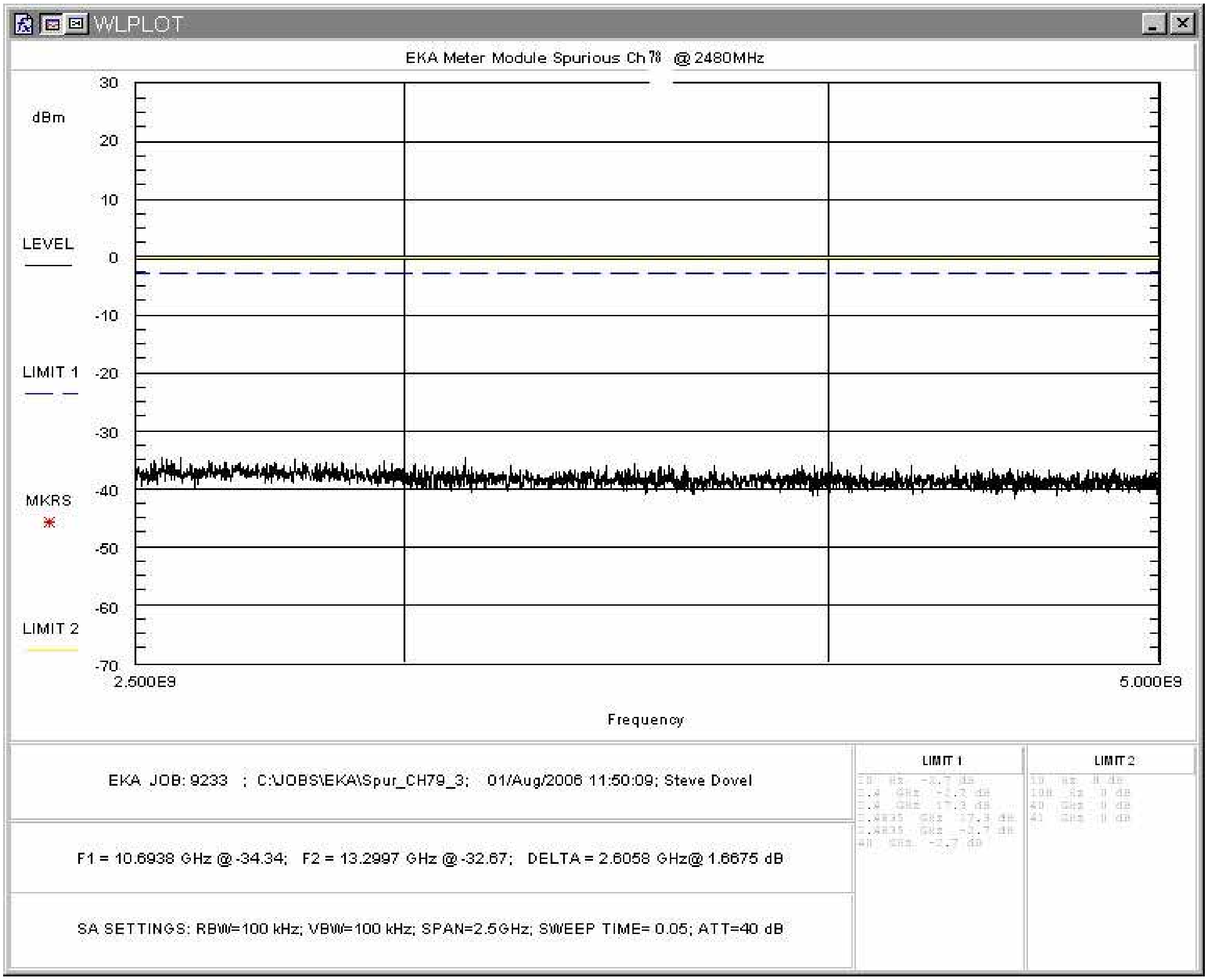


Figure 4-30. Conducted Spurious Emissions, High Channel 2.5 –5GHz

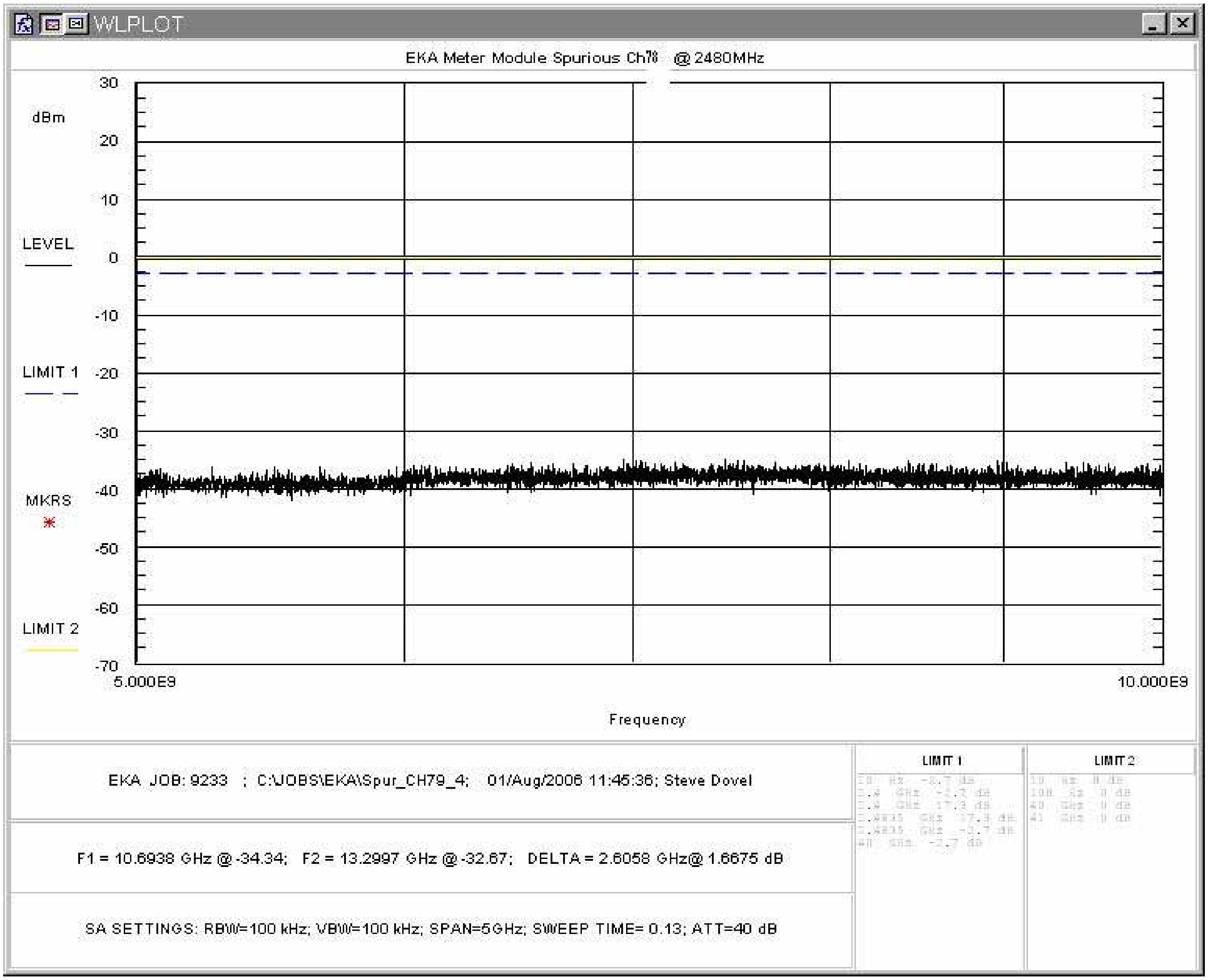


Figure 4-31. Conducted Spurious Emissions, High Channel 5 - 10GHz

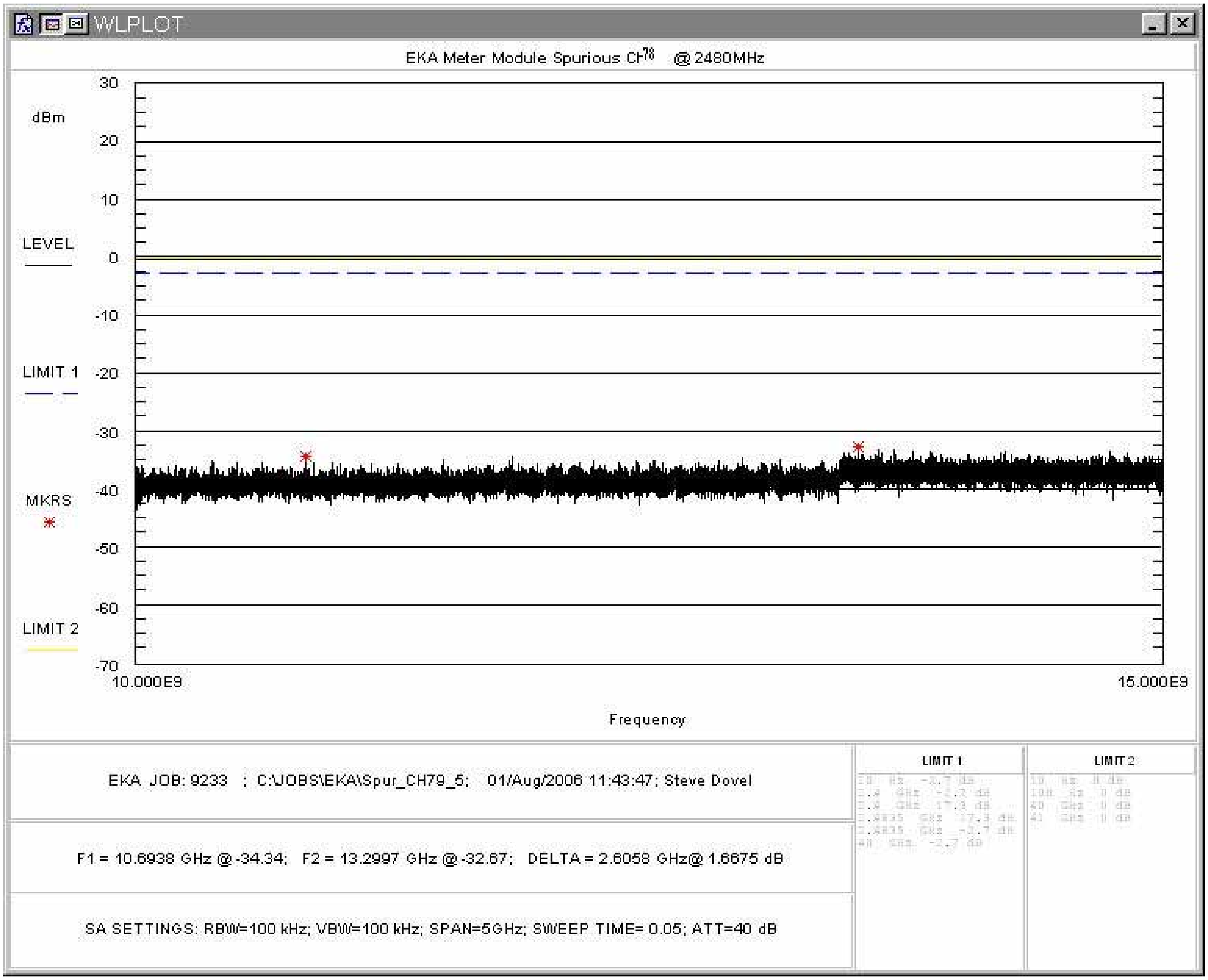


Figure 4-32. Conducted Spurious Emissions, High Channel 10 - 15GHz

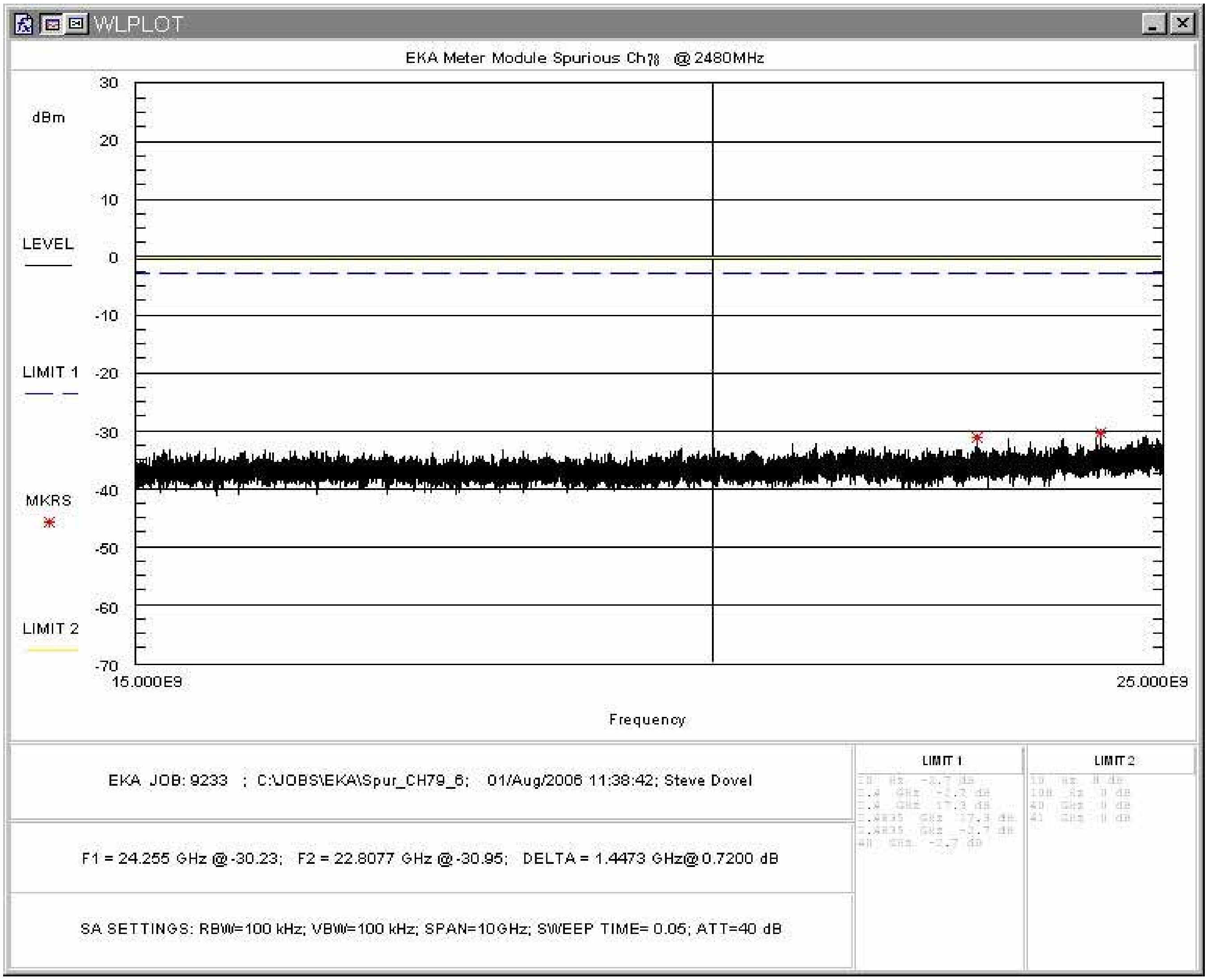


Figure 4-33. Conducted Spurious Emissions, High Channel 15 - 25GHz

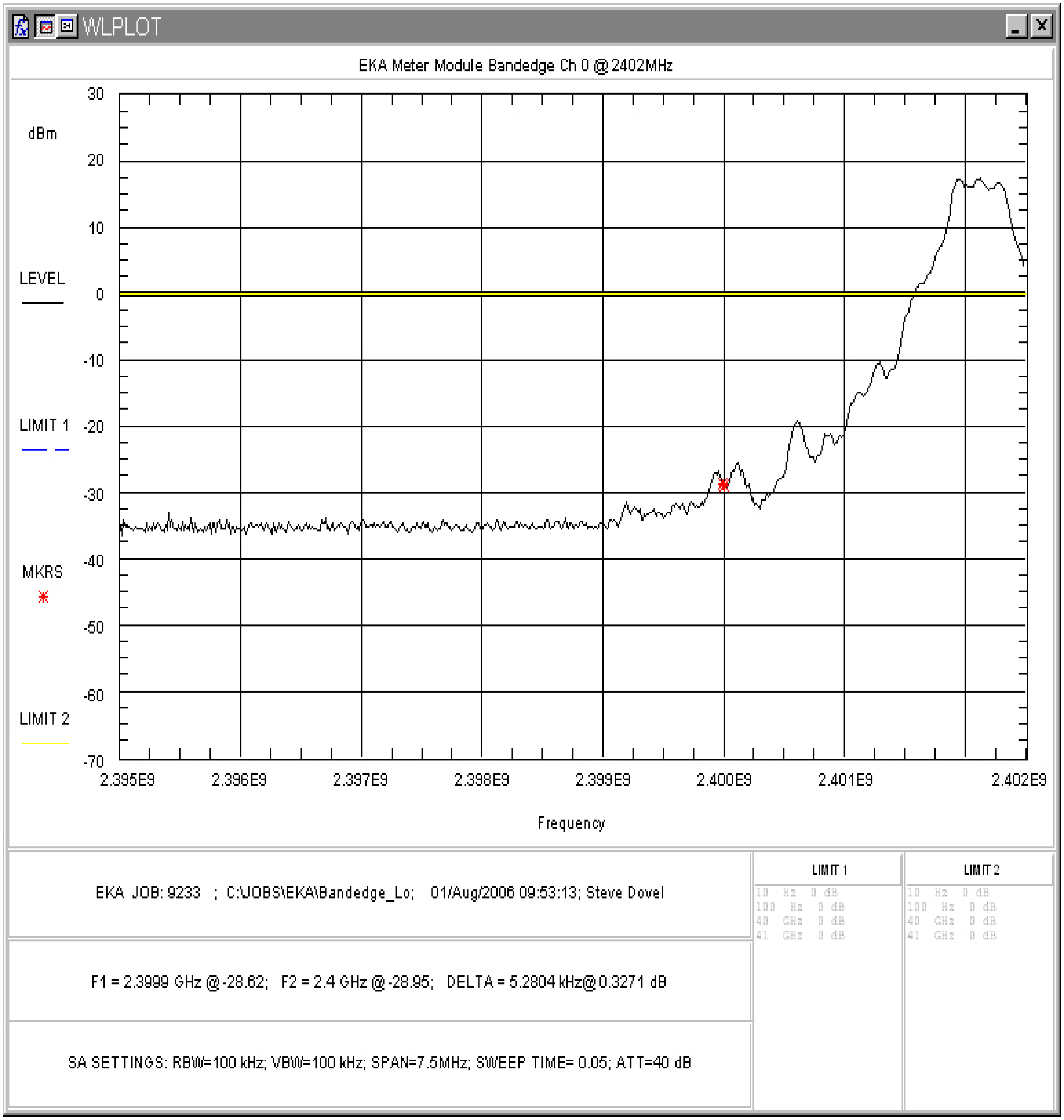


Figure 4-34. Conducted Spurious Emissions, Bandedge, Low Channel, Non-hopping

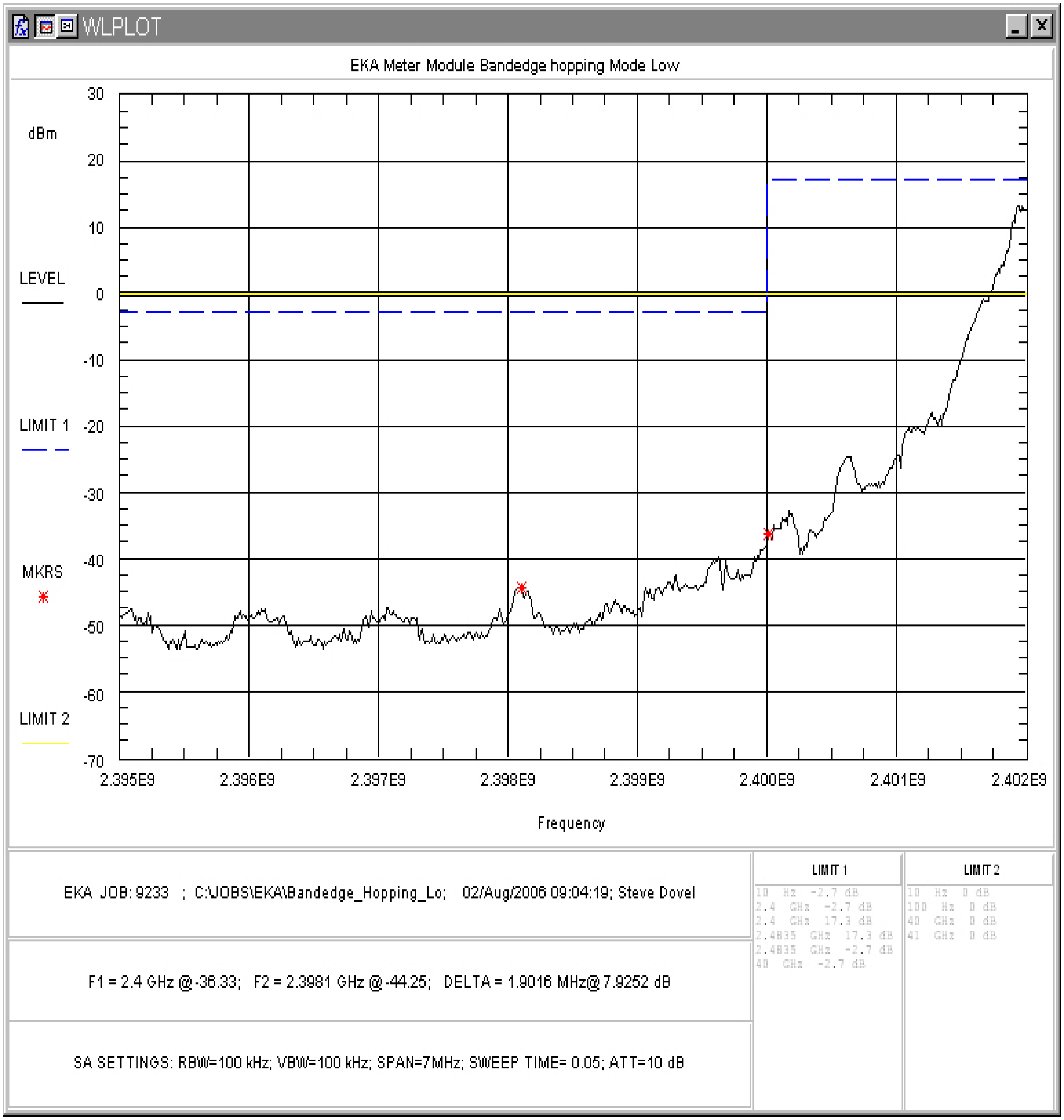


Figure 4-35. Conducted Spurious Emissions, Bandedge, Low Channel, Hopping

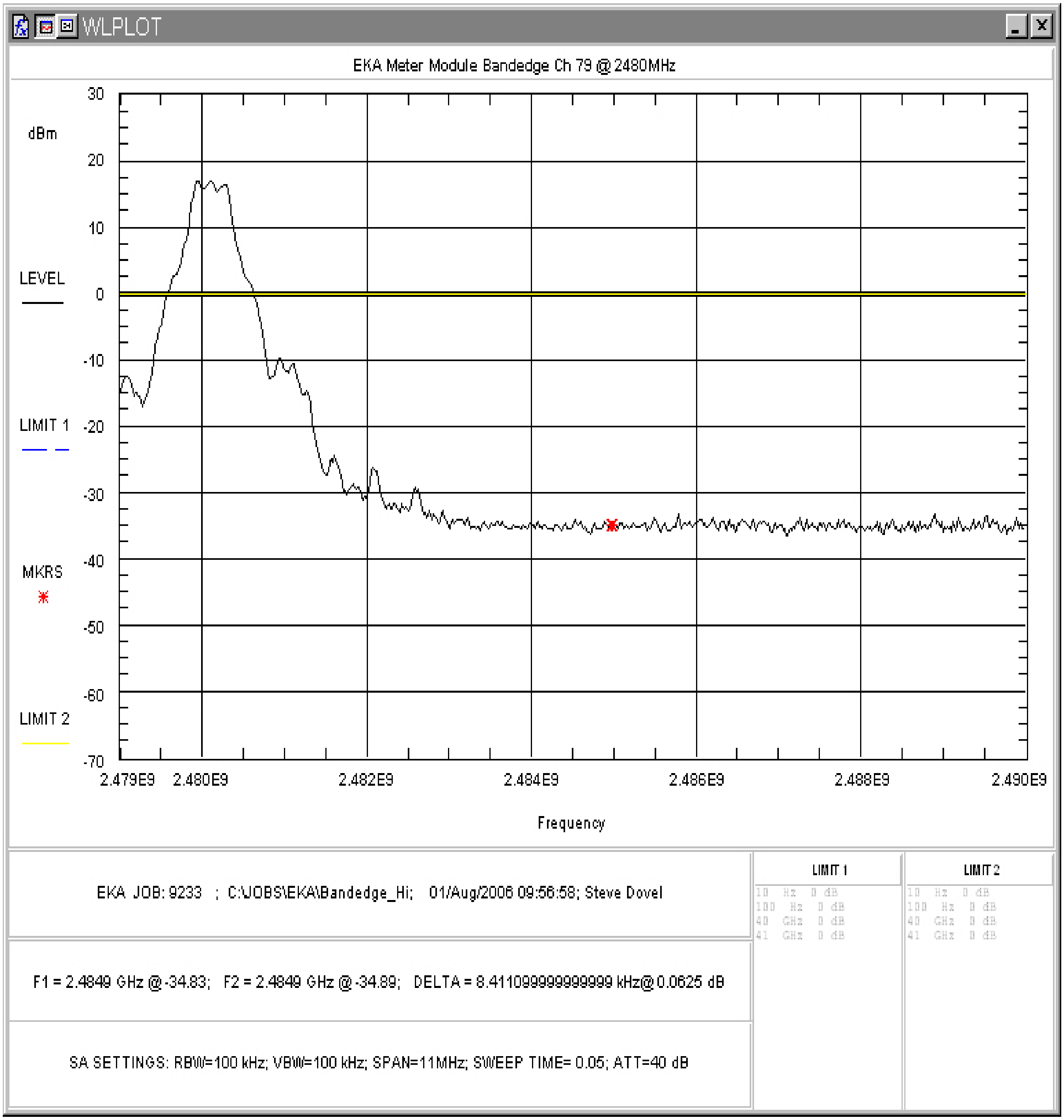


Figure 4-36. Conducted Spurious Emissions, Bandedge, High Channel, Non-hopping

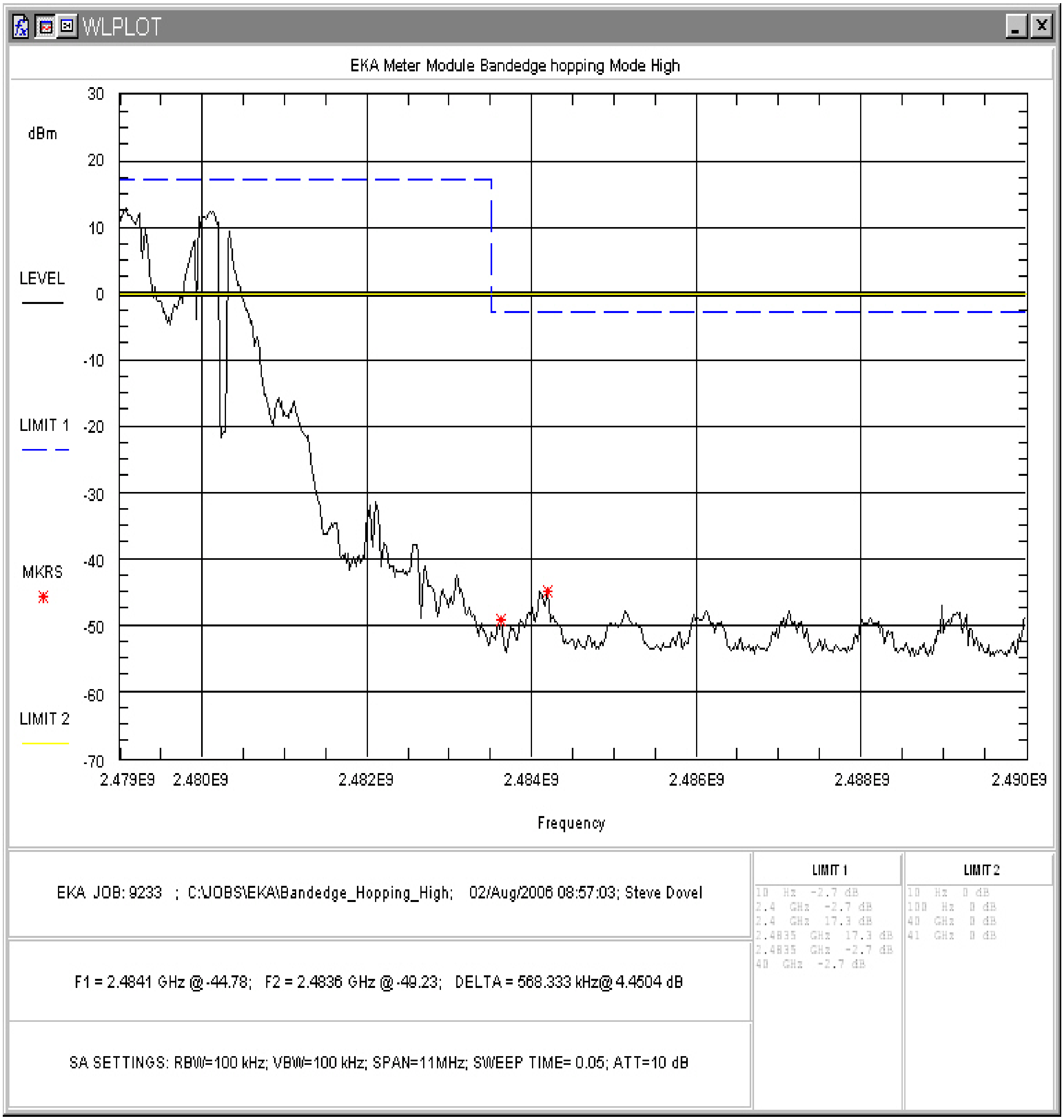


Figure 4-37. Conducted Spurious Emissions, Bandedge, High Channel, Hopping

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	3000Hz (Avg.) 1MHz (Peak)

Harmonic and Spurious emissions that were identified as coming from the EUT were checked in Peak and in Average Mode. It was verified that the peak-to-average ratio did not exceed 20dB.

Peak measurements and average measurements are made. All emissions were determined to have a peak-to-average ratio of less than 20 dB. Also, as described in FCC DA 00-705 if the dwell time per channel of the hopping signal is less than 100 ms then the average reading may be further adjusted by the duty cycle correction obtained in Section 4.1.

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):	V dBμV
Antenna Factor (Ant Corr):	AFdB/m
Cable Loss Correction (Cable Corr):	CCdB
Duty Cycle Correction:	DCCdB
Amplifier Gain:	GdB
Electric Field (Corr Level):	EdBμV/m = VdBμV + AFdB/m + CCdB +DCCdB - GdB
To convert to linear units:	EμV/m = 10^(EdBμV/m/20)

Data are supplied in the following tables. Testing was performed to 25GHz. No emissions were detected above the 3rd harmonic. Also, no emissions were detected at the band edge. Emissions below

1GHz are the same for all channels. All detected emissions are reported in the following tables. Both peak and average measurements are listed.

Table 5: Radiated Emission Test Data, Worst Case Low Frequency Data (<1GHz)

Client: EKA
Tester: Steve Dovell
Date: 8/2/2006
Job #: 9335

EUT Information:
EUT: Meter Module
Configuration: Normal

Test Requirements:
TEST STANDARD: FCC Part 15
DISTANCE: 3m

Test Equipment (<1GHz):
ANTENNA: A_00557
CABLE: CSITE2_3m

Test Equipment (>1GHz):
ANTENNA: A_00004
CABLE: CSITE2_HF
AMPLIFIER: A_00522

LIMIT: LFCC_3m_Class_B

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)
229.336	H	0.0	2.5	8.2	13.0	2.9	24.2	16.2	200.0	-21.8
294.896	H	45.0	1.5	10.9	13.5	3.3	27.7	24.3	200.0	-18.3
928.903	H	0.3	1.5	3.1	23.7	7.1	33.9	49.5	200.0	-12.1
229.336	V	360.0	1.0	5.7	13.0	2.9	21.7	12.1	200.0	-24.3
950.852	V	270.0	1.0	2.4	24.4	7.2	34.0	49.9	200.0	-12.1
262.135	V	350.0	1.0	18.9	13.2	3.1	35.2	57.8	200.0	-10.8
294.896	V	270.0	1.0	8.1	13.5	3.3	24.9	17.6	200.0	-21.1
928.903	V	90.0	2.0	6.2	23.7	7.1	37.0	70.7	200.0	-9.0

Table 6: Radiated Emission Test Data, High Frequency Data (>1GHz)

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Duty Cycle Cor	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)	Notes
2402MHz													
3267.000	V	180.0	1.0	43.2	30.3	1.9	37.8	20.0	17.7	7.7	500.0	-36.3	avg
4804.000	V	280.0	1.0	60.2	32.5	3.5	37.2	20.0	39.0	89.0	500.0	-15.0	avg
9608.000	V	75.0	1.0	58.5	38.6	4.9	38.0	20.0	43.9	156.2	500.0	-10.1	avg
4804.000	H	200.0	1.0	57.8	32.5	3.5	37.2	20.0	36.6	67.5	500.0	-17.4	avg
9608.000	H	180.0	1.0	59.9	38.6	4.9	38.0	20.0	45.3	183.5	500.0	-8.7	avg
1193.700	V	80.0	1.0	52.1	25.5	1.3	39.0	0.0	19.9	9.8	5000.0	-54.1	Peak
1458.860	V	270.0	1.0	51.3	26.5	1.4	38.7	0.0	20.5	10.6	5000.0	-53.5	Peak
1536.340	V	120.0	1.0	54.5	26.7	1.4	38.6	0.0	24.1	16.0	5000.0	-49.9	Peak
3267.000	V	180.0	1.0	53.2	30.3	1.9	37.8	0.0	27.7	24.3	5000.0	-46.3	Peak
4804.000	V	280.0	1.0	68.7	32.5	3.5	37.2	0.0	47.4	235.4	5000.0	-26.5	Peak
9608.000	V	75.0	1.0	65.9	38.6	4.9	38.0	0.0	51.3	366.1	5000.0	-22.7	Peak
4804.000	H	200.0	1.0	60.2	32.5	3.5	37.2	0.0	39.0	89.0	5000.0	-35.0	Peak
9608.000	H	180.0	1.0	63.8	38.6	4.9	38.0	0.0	49.2	287.5	5000.0	-24.8	Peak
2441MHz													
4882.000	V	120.0	1.0	56.2	32.6	3.5	37.2	20.0	35.2	57.2	500.0	-18.8	avg
7323.000	V	270.0	1.0	54.8	37.1	4.5	37.6	20.0	38.8	87.6	500.0	-15.1	avg
9764.000	V	200.0	1.0	58.5	38.7	4.9	38.1	20.0	44.0	157.8	500.0	-10.0	avg
4882.000	H	180.0	1.0	58.3	32.6	3.5	37.2	20.0	37.3	72.9	500.0	-16.7	avg
7323.000	H	270.0	1.0	55.2	37.1	4.5	37.6	20.0	39.2	91.7	500.0	-14.7	avg
9764.000	H	270.0	1.0	59.5	38.7	4.9	38.1	20.0	45.0	177.1	500.0	-9.0	avg
4882.000	V	120.0	1.0	60.0	32.6	3.5	37.2	0.0	39.0	88.7	5000.0	-35.0	Peak
7323.000	V	270.0	1.0	58.2	37.1	4.5	37.6	0.0	42.2	129.5	5000.0	-31.7	Peak
9764.000	V	200.0	1.0	62.2	38.7	4.9	38.1	0.0	47.7	241.7	5000.0	-26.3	Peak
4882.000	H	180.0	1.0	60.6	32.6	3.5	37.2	0.0	39.5	94.7	5000.0	-34.5	Peak
7323.000	H	270.0	1.0	59.5	37.1	4.5	37.6	0.0	43.5	150.4	5000.0	-30.4	Peak
9764.000	H	270.0	1.0	63.9	38.7	4.9	38.1	0.0	49.4	293.9	5000.0	-24.6	Peak
2480MHz													
4960.000	V	0.0	1.0	56.7	32.7	3.6	37.2	20.0	35.8	61.8	500.0	-18.2	avg
7440.000	V	0.0	1.0	55.2	37.1	4.8	37.6	20.0	39.6	95.3	500.0	-14.4	avg
9920.000	V	0.0	1.0	48.8	38.8	4.9	38.2	20.0	34.4	52.2	500.0	-19.6	avg
4960.000	H	350.0	1.0	53.0	32.7	3.6	37.2	20.0	32.1	40.4	500.0	-21.9	avg
7440.000	H	300.0	1.0	51.3	37.1	4.8	37.6	20.0	35.7	60.8	500.0	-18.3	avg
9920.000	H	270.0	1.0	55.9	38.8	4.9	38.2	20.0	41.5	118.2	500.0	-12.5	avg
4960.000	V	0.0	1.0	59.5	32.7	3.6	37.2	0.0	38.6	84.8	5000.0	-35.4	Peak
7440.000	V	0.0	1.0	58.6	37.1	4.8	37.6	0.0	43.0	140.9	5000.0	-31.0	Peak
9920.000	V	0.0	1.0	55.3	38.8	4.9	38.2	0.0	40.9	110.3	5000.0	-33.1	Peak
4960.000	H	350.0	1.0	56.2	32.7	3.6	37.2	0.0	35.3	58.3	5000.0	-38.7	Peak
7440.000	H	300.0	1.0	57.0	37.1	4.8	37.6	0.0	41.4	117.2	5000.0	-32.6	Peak
9920.000	H	270.0	1.0	60.3	38.8	4.9	38.2	0.0	45.9	196.2	5000.0	-28.1	Peak

4.7 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 7. AC Power line Conducted Emissions

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)
0.162	31.3	10.1	1.1	65.4	42.5	-22.8	7.8	10.1	19.0	55.4	-36.3
0.266	37.1	10.2	0.5	61.2	47.8	-13.4	17.8	10.2	28.5	51.2	-22.7
4.006	22.4	10.5	0.3	56.0	33.2	-22.8	5.0	10.5	15.8	46.0	-30.2
10.685	17.6	11.7	0.3	60.0	29.6	-30.4	2.0	11.7	14.0	50.0	-36.0
14.959	18.5	12.0	0.5	60.0	31.1	-28.9	4.3	12.0	16.9	50.0	-33.1
29.580	10.1	12.8	1.5	60.0	24.4	-35.6	-1.3	12.8	13.0	50.0	-37.0

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)
0.162	36.4	10.1	0.9	65.4	47.4	-18.0	8.9	10.1	19.9	55.4	-35.5
0.266	37.8	10.2	0.6	61.2	48.6	-12.7	19.8	10.2	30.6	51.2	-20.7
4.006	21.1	10.5	0.3	56.0	31.9	-24.1	5.6	10.5	16.4	46.0	-29.6
10.690	17.8	11.7	0.3	60.0	29.8	-30.2	2.9	11.7	14.9	50.0	-35.1
14.958	20.0	12.0	0.5	60.0	32.5	-27.5	4.6	12.0	17.1	50.0	-32.9
29.580	14.3	12.8	1.3	60.0	28.4	-31.6	-1.5	12.8	12.6	50.0	-37.4

