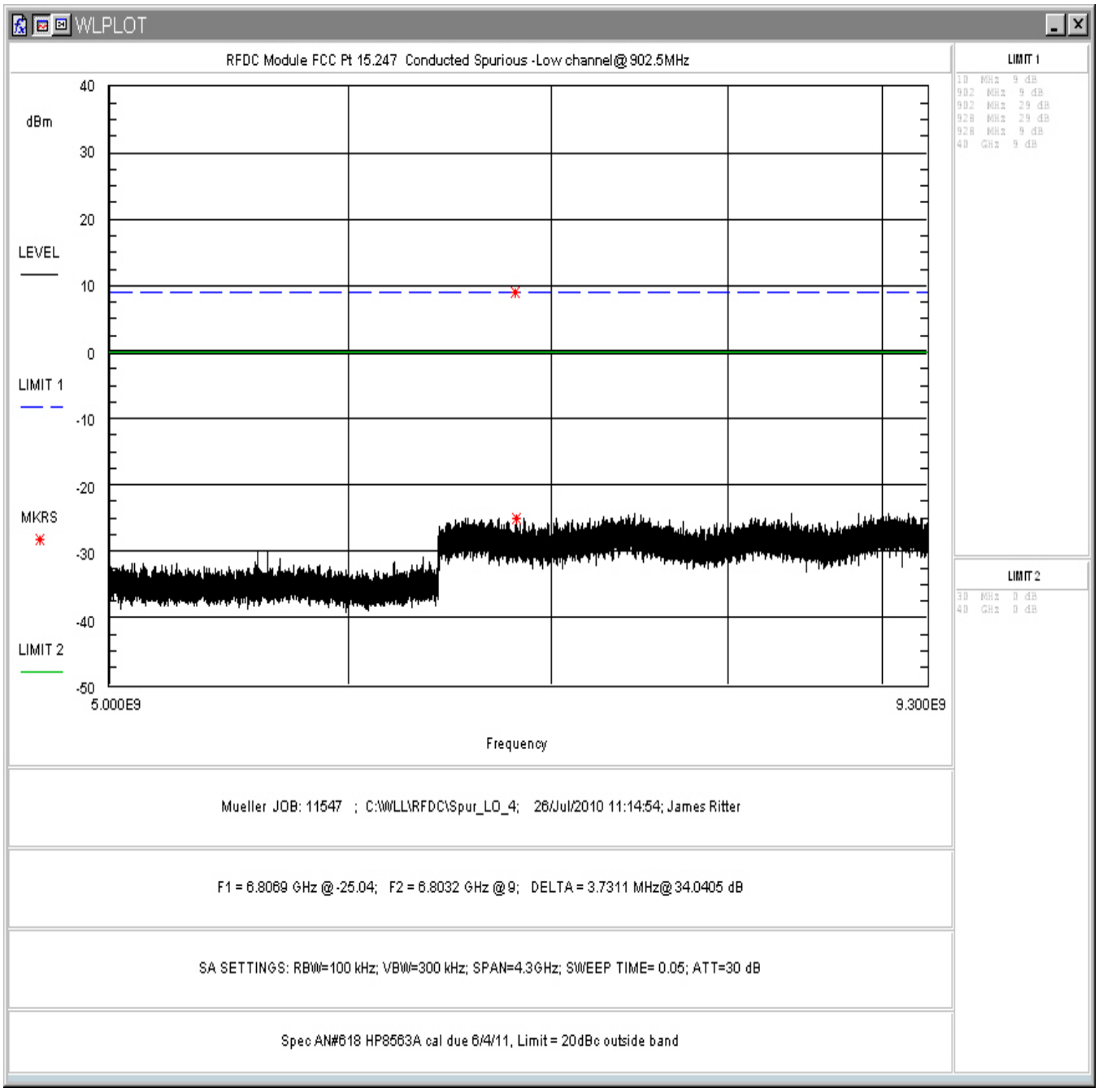

Figure 28: Conducted Spurious Emissions, Low Data Channel 5 -9.3GHz

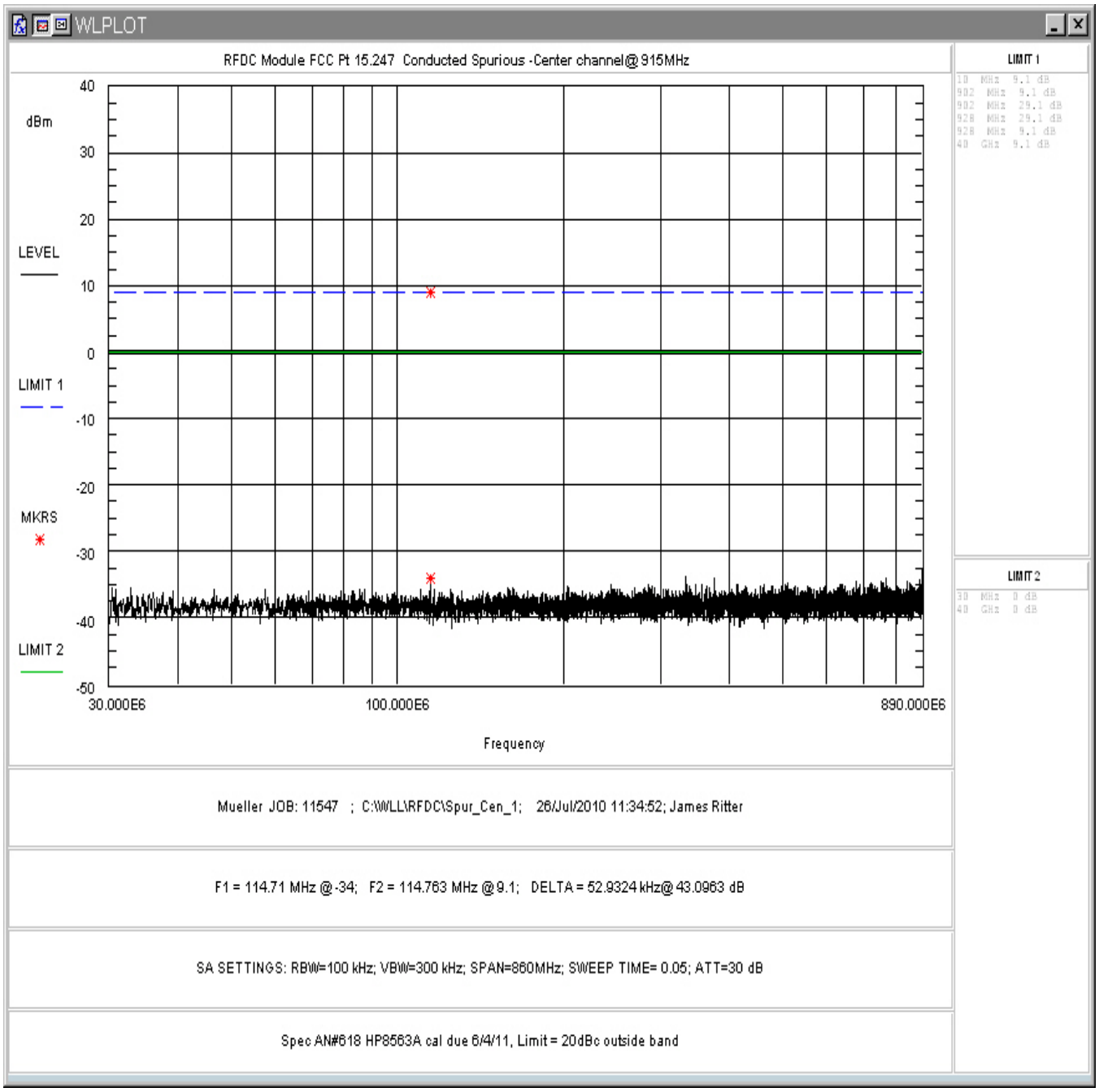

Figure 29: Conducted Spurious Emissions, Mid Data Channel 30 - 890MHz

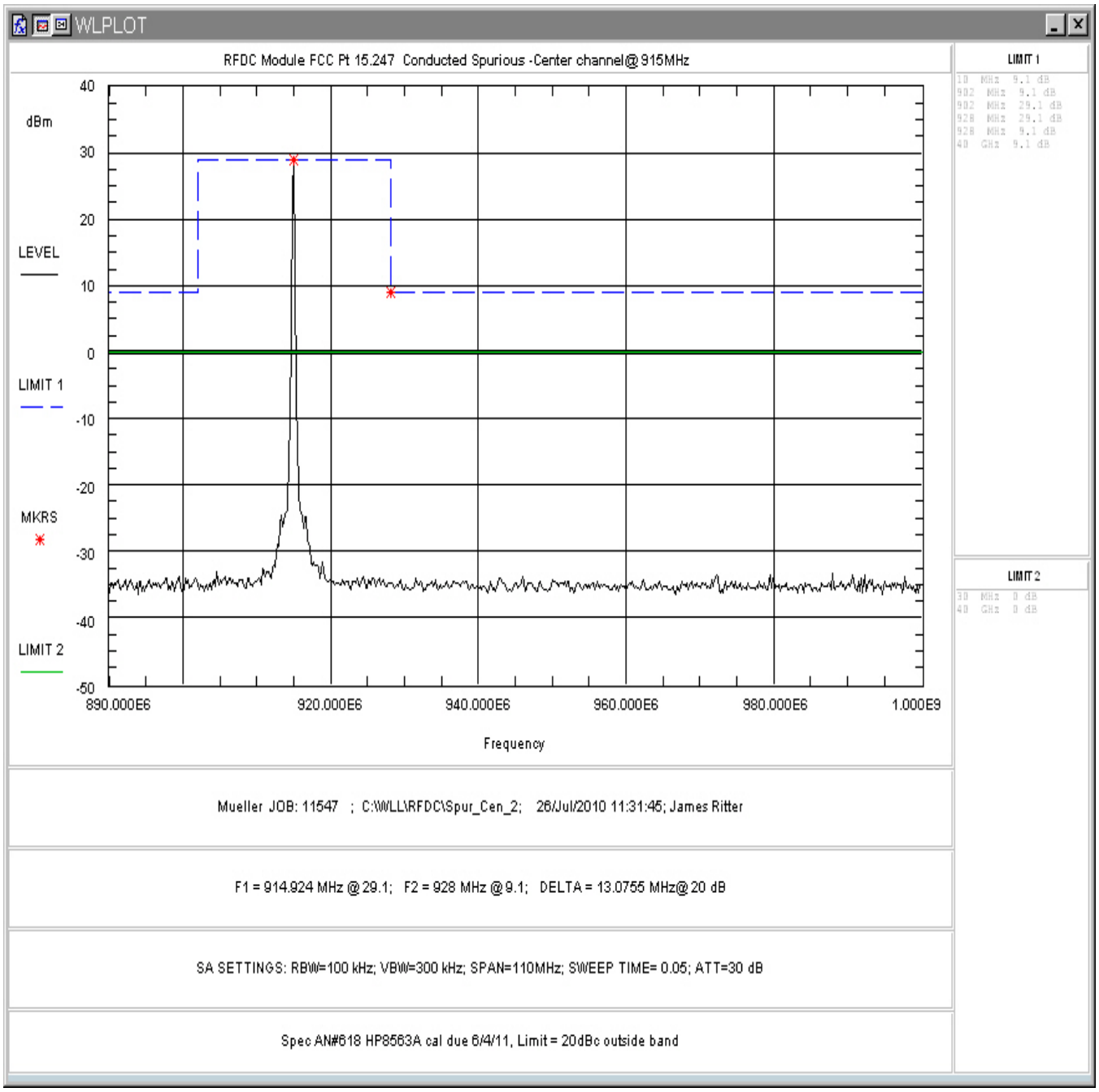

Figure 30: Conducted Spurious Emissions, Mid Data Channel 890-1000MHz

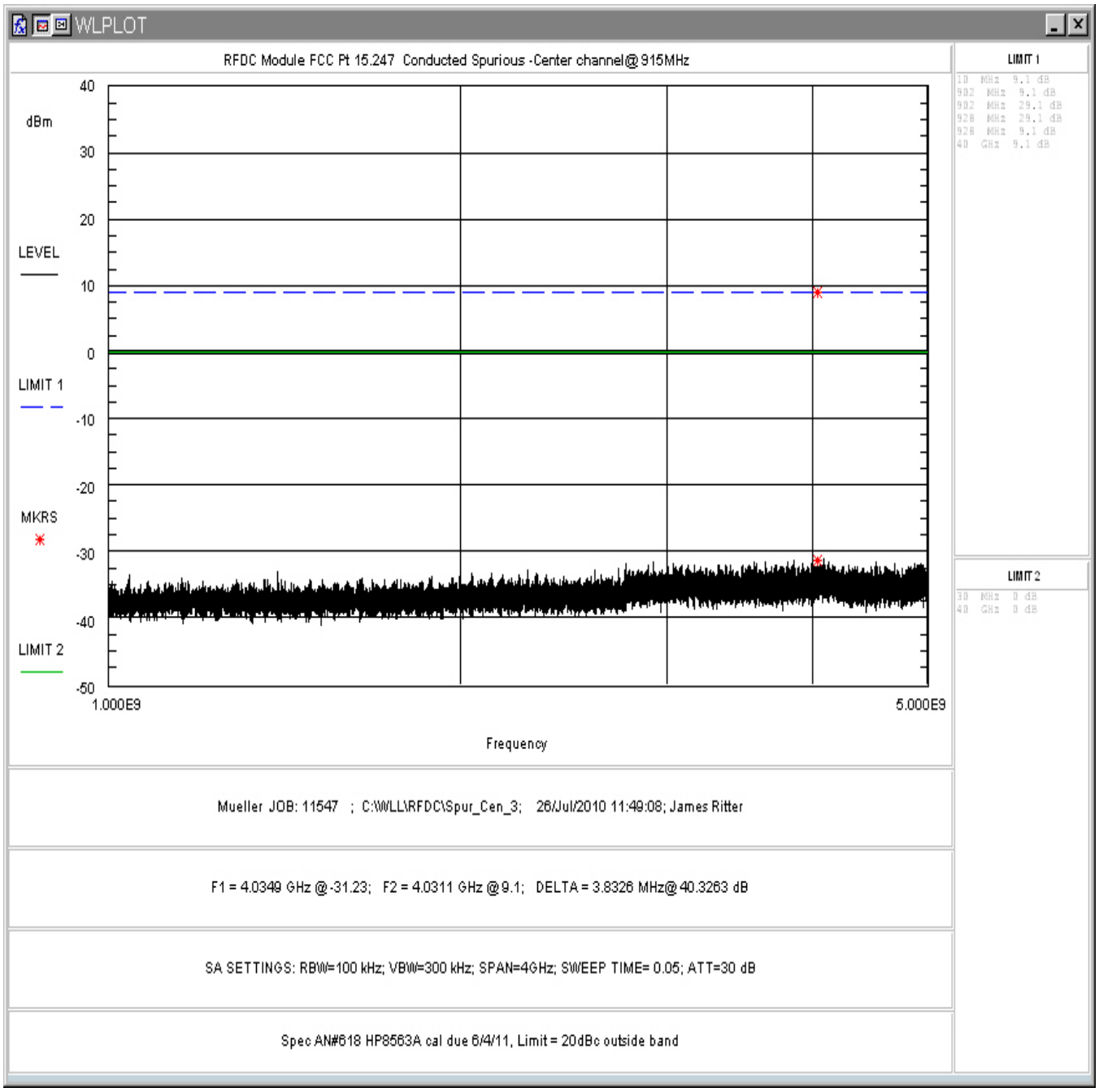

Figure 31: Conducted Spurious Emissions, Mid Data Channel 1-5GHz

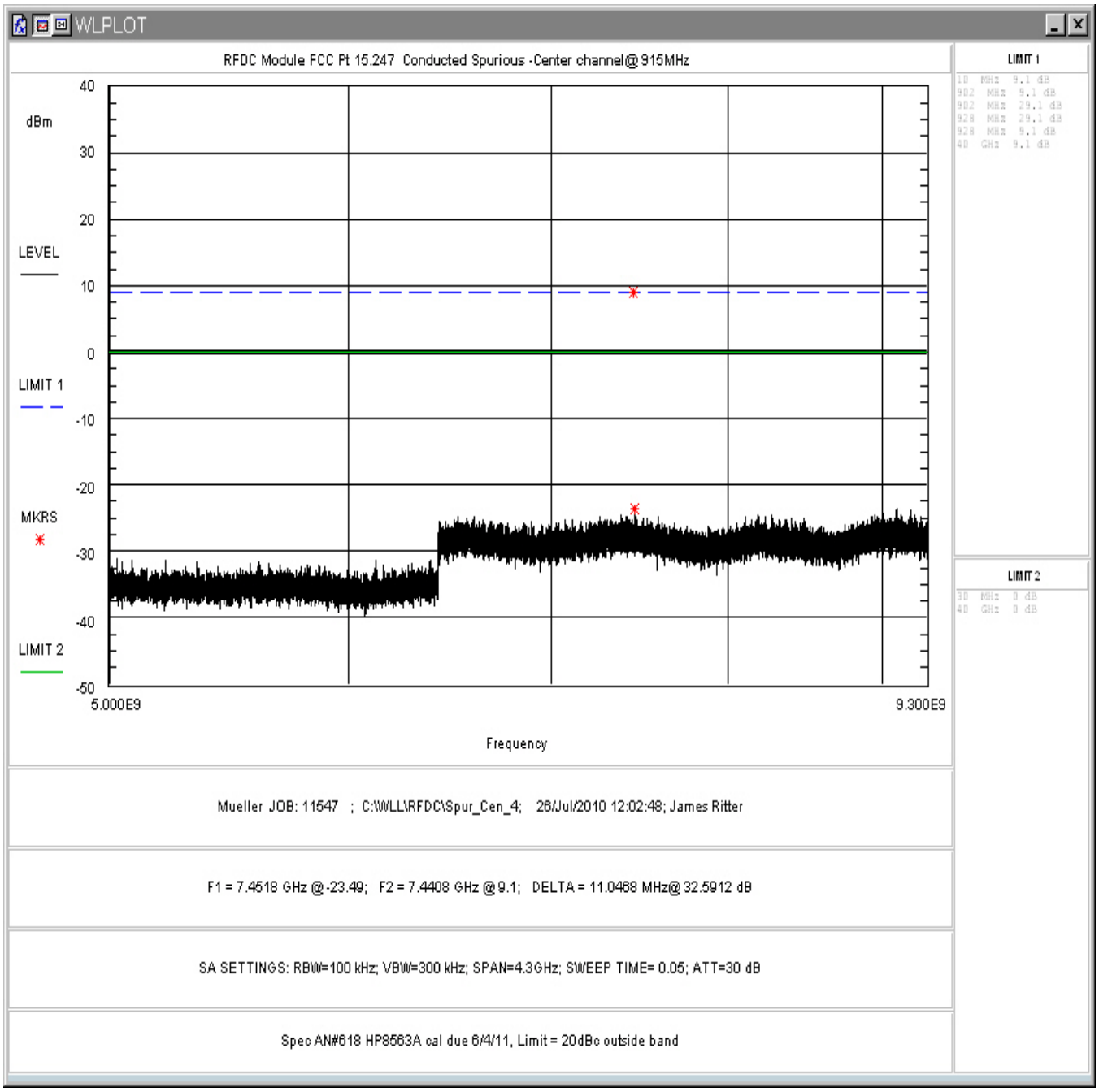

Figure 32: Conducted Spurious Emissions, Mid Data Channel 5 – 9.3GHz

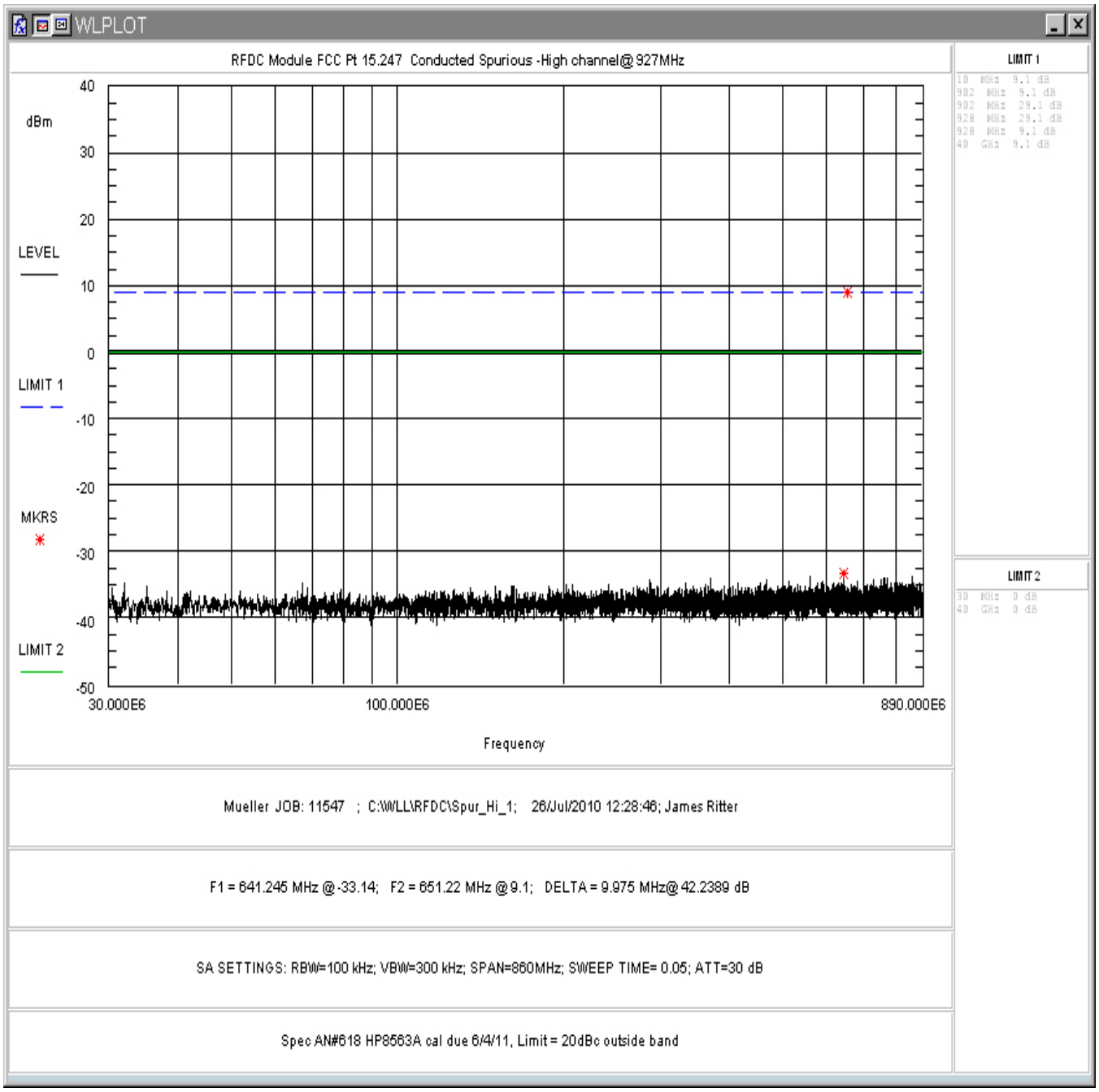

Figure 33: Conducted Spurious Emissions, High Data Channel 30 - 890MHz

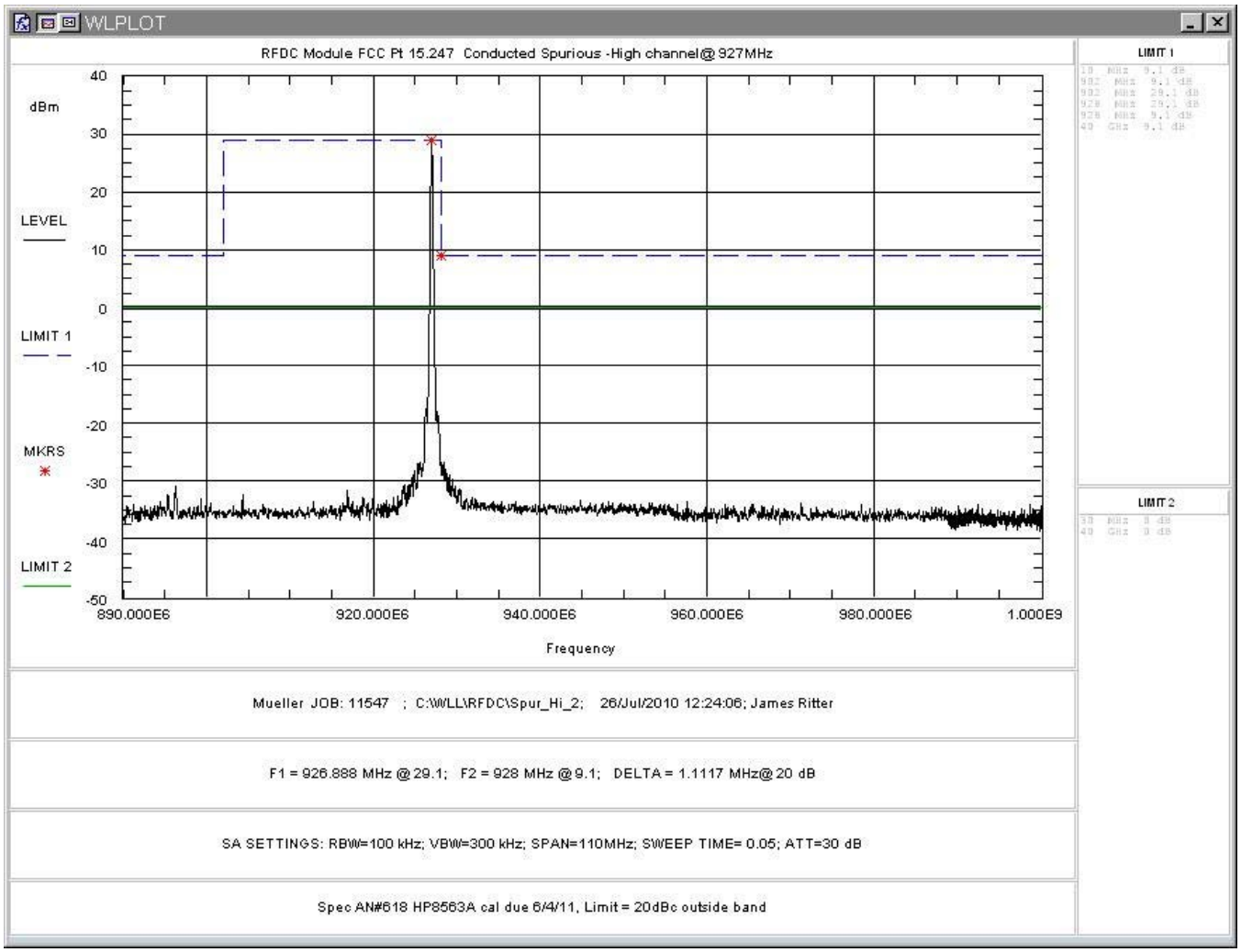

Figure 34: Conducted Spurious Emissions, High Data Channel 890-1000MHz

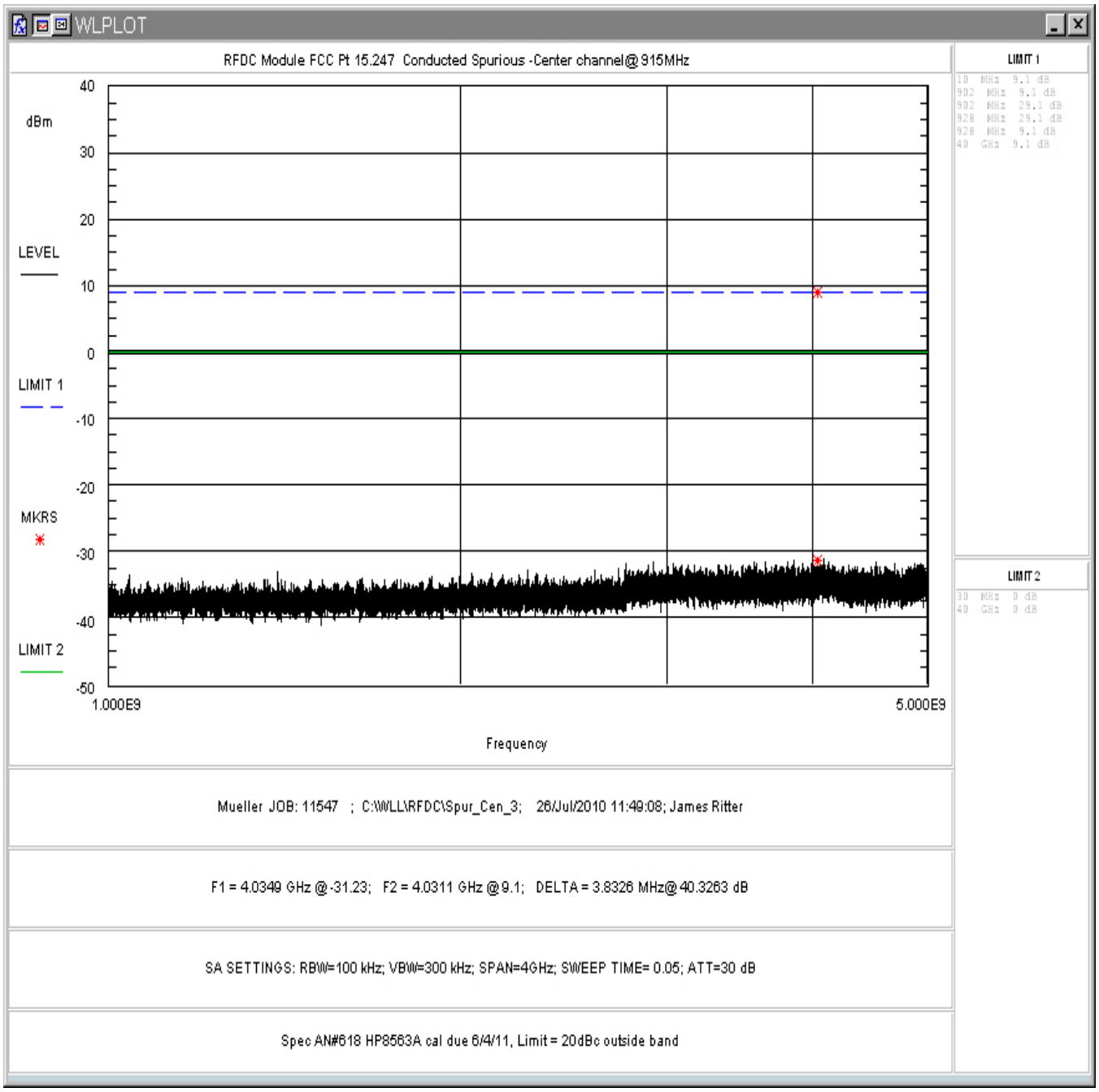

Figure 35: Conducted Spurious Emissions, High Data Channel 1-5GHz

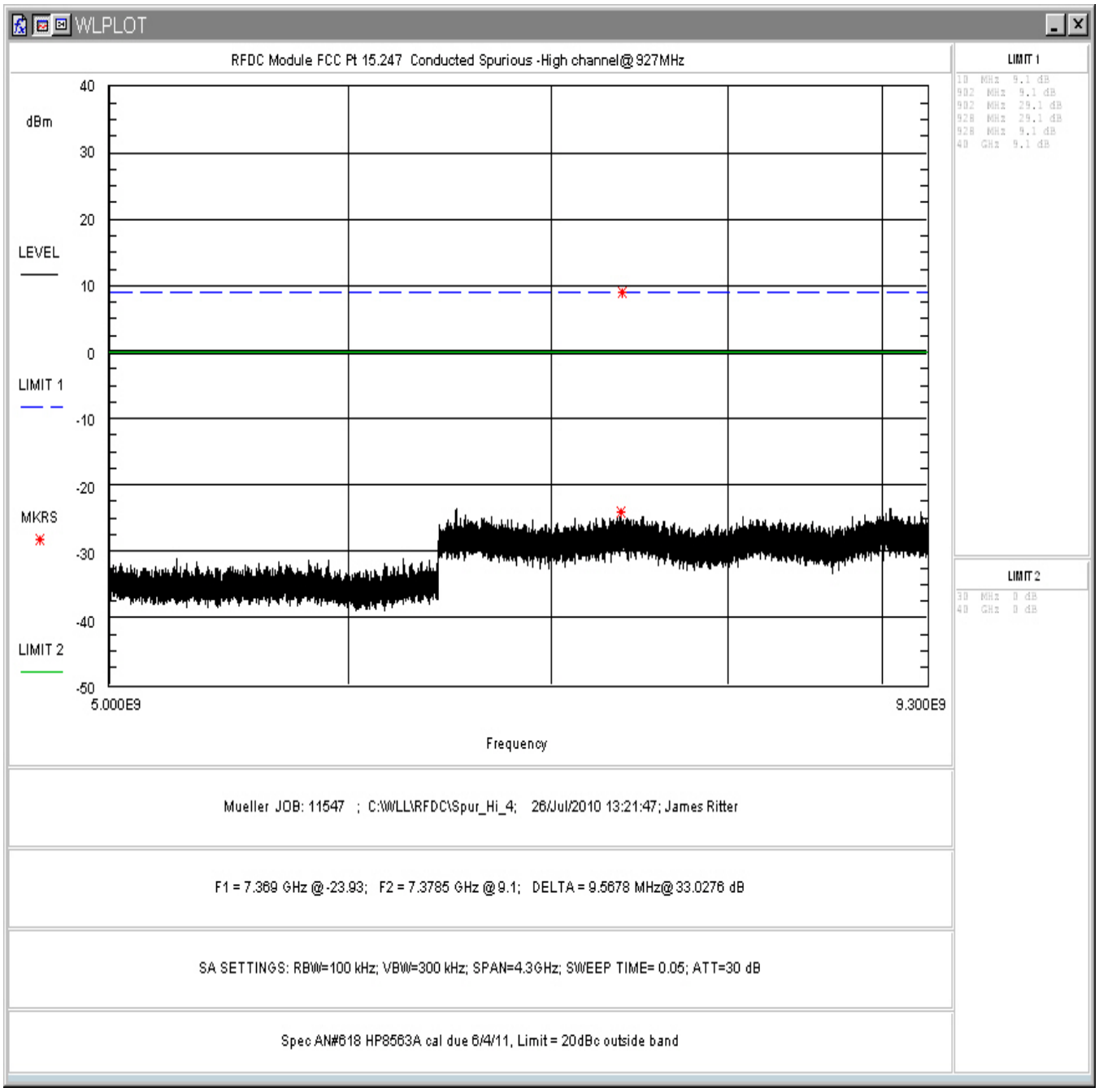

Figure 36: Conducted Spurious Emissions, High Data Channel 5-9.3GHz

5.5.2 Hailing Mode Conducted Spurious

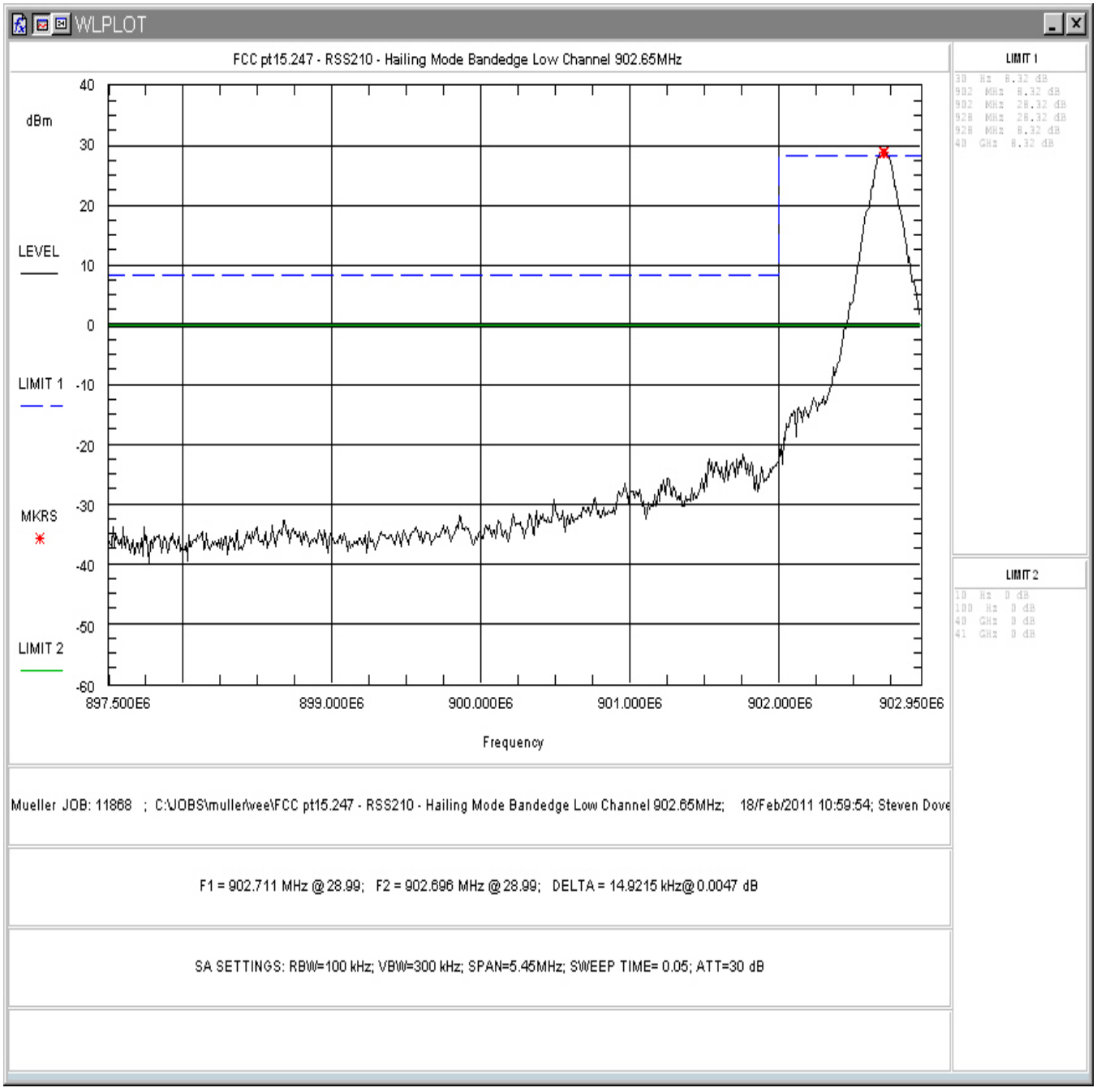

Figure 37 Low Band Edge Plot, Low Hailing Channel, Non-hopping

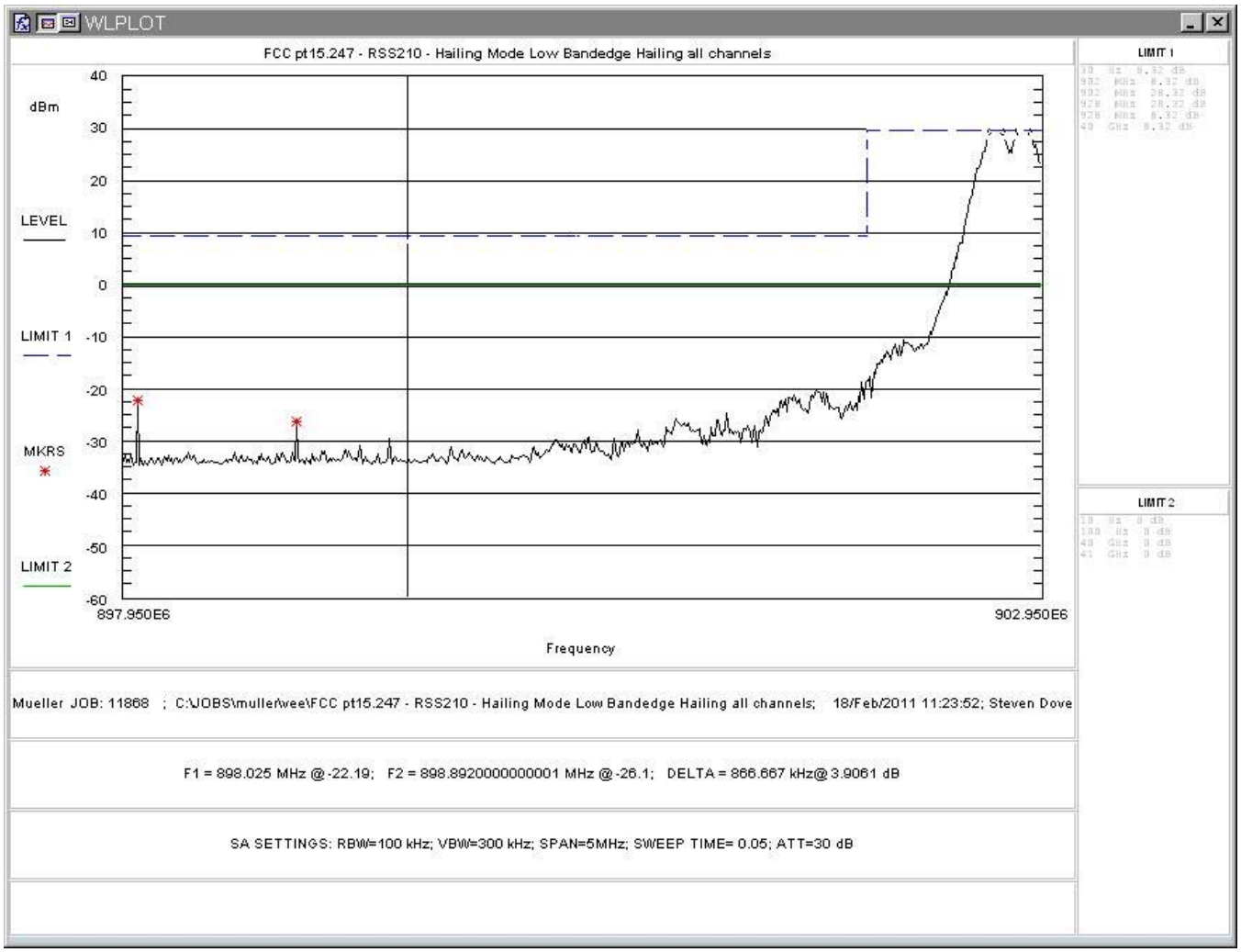

Figure 38 Lower Band Edge Plot, Hopping Mode

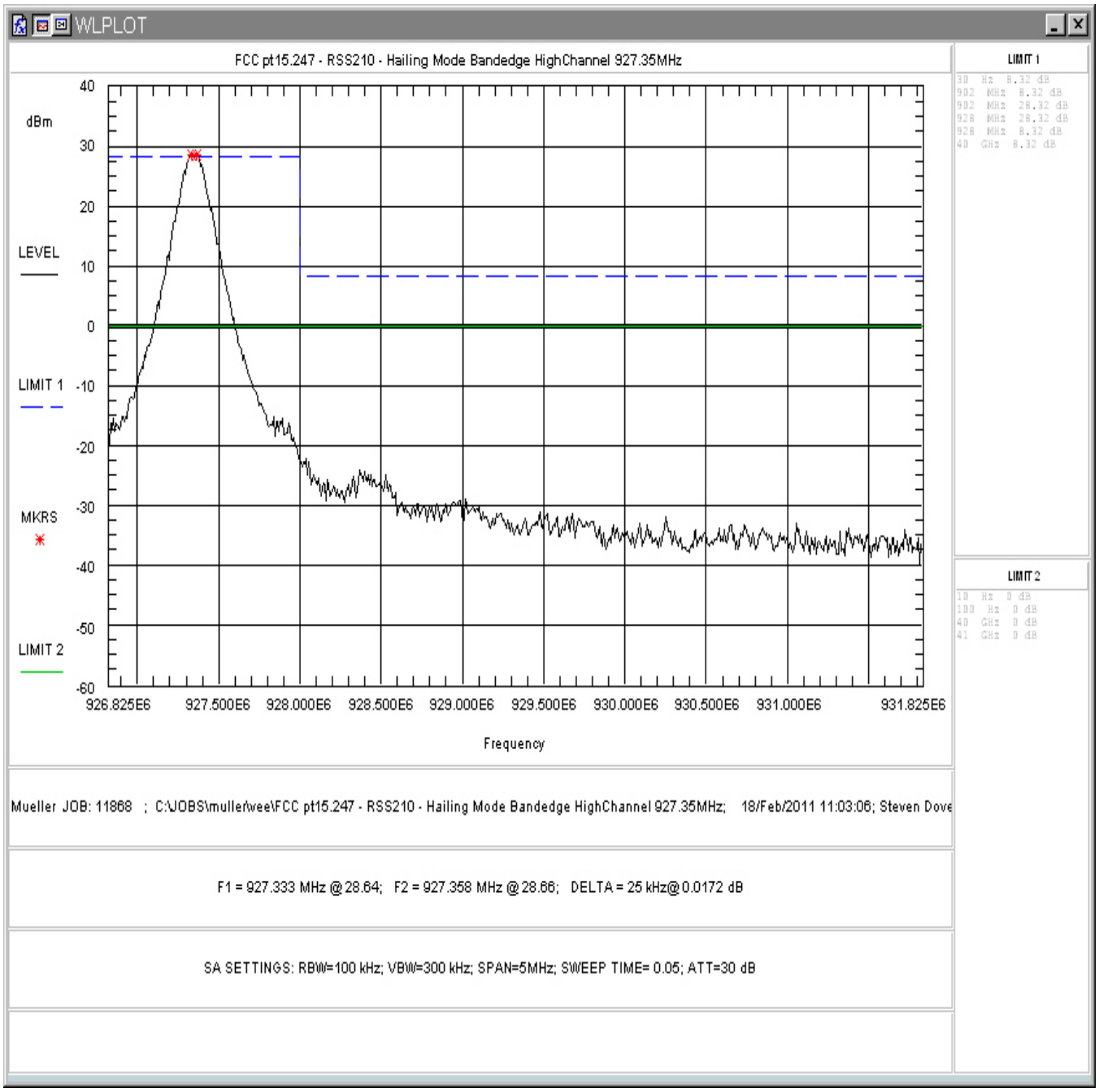

Figure 39 Upper Band Edge Plot, High Hailing Channel

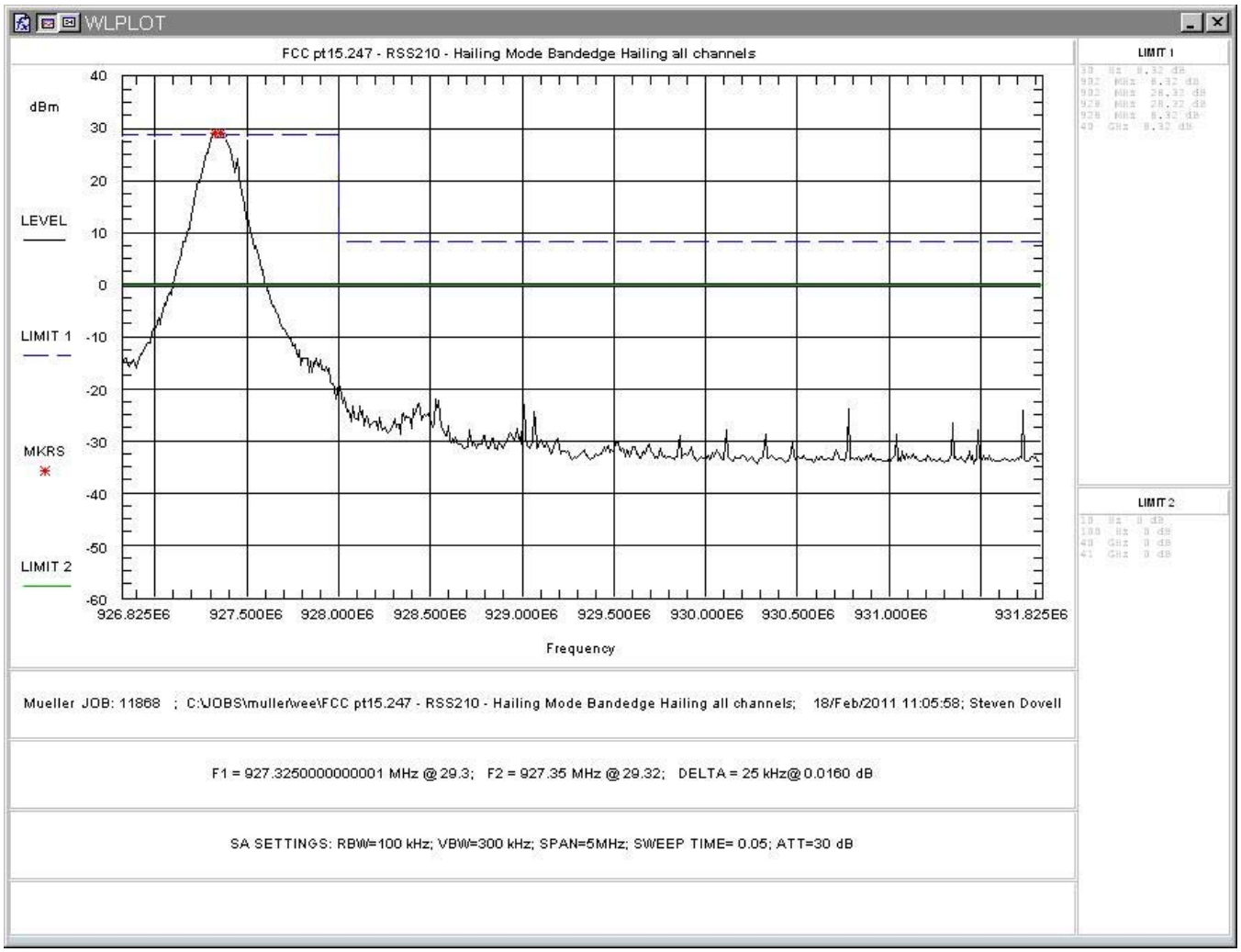

Figure 40 Upper Band Edge Plot, Hopping mode

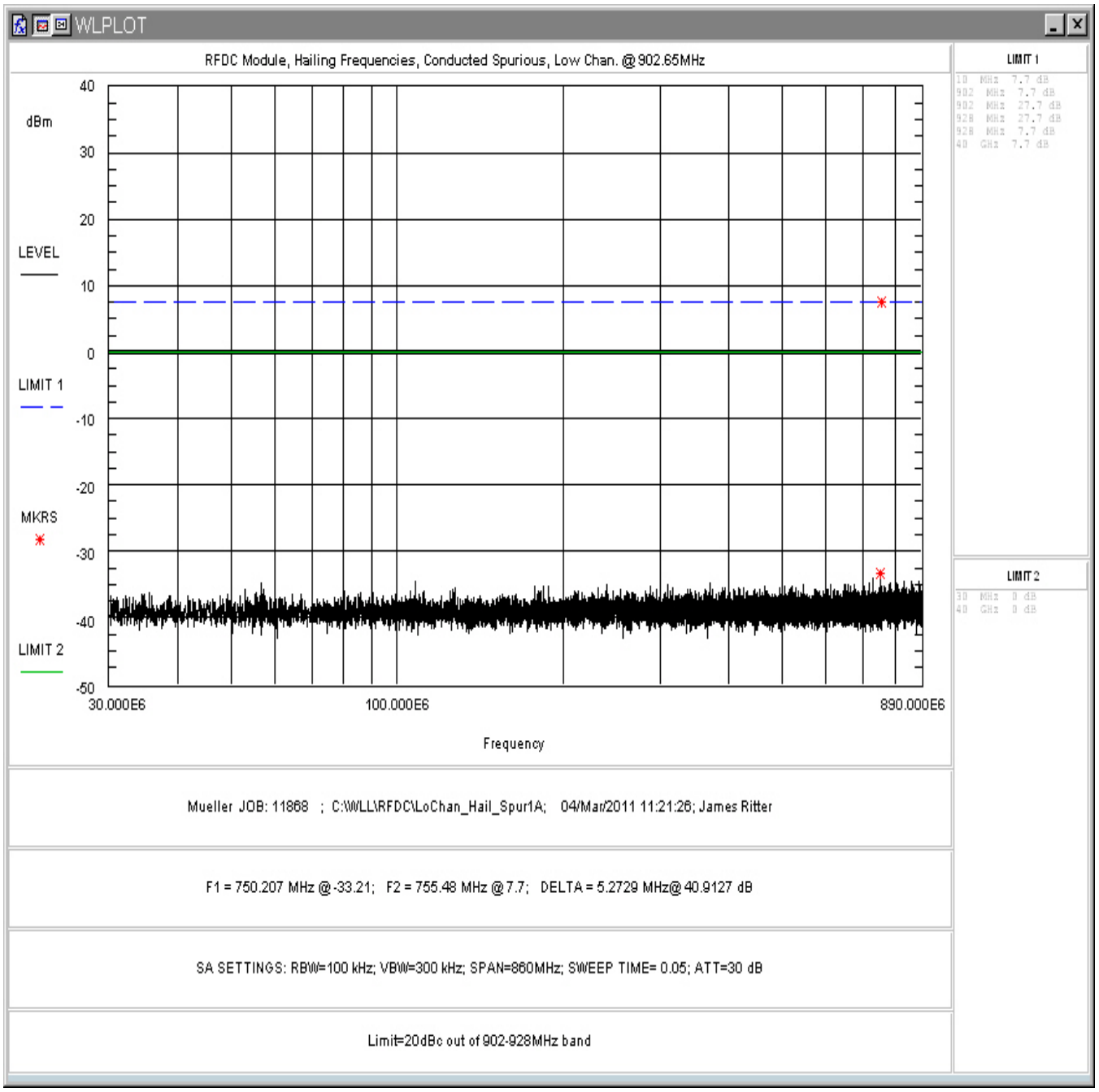

Figure 41 Conducted Spurious Emissions, Low Hailing Channel 30-890MHz

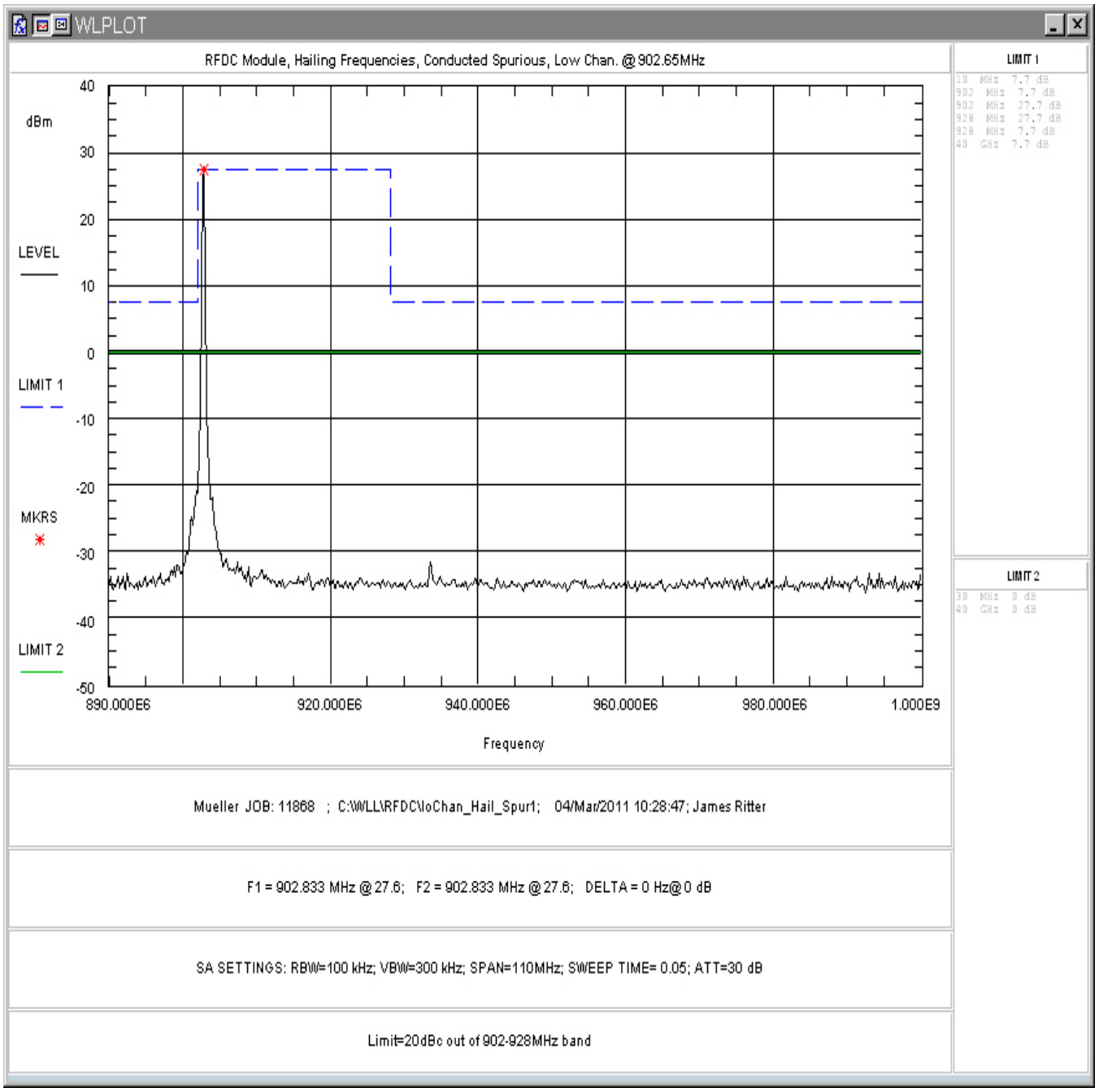

Figure 42 Conducted Spurious Emissions, Low Hailing Channel 890-1000MHz

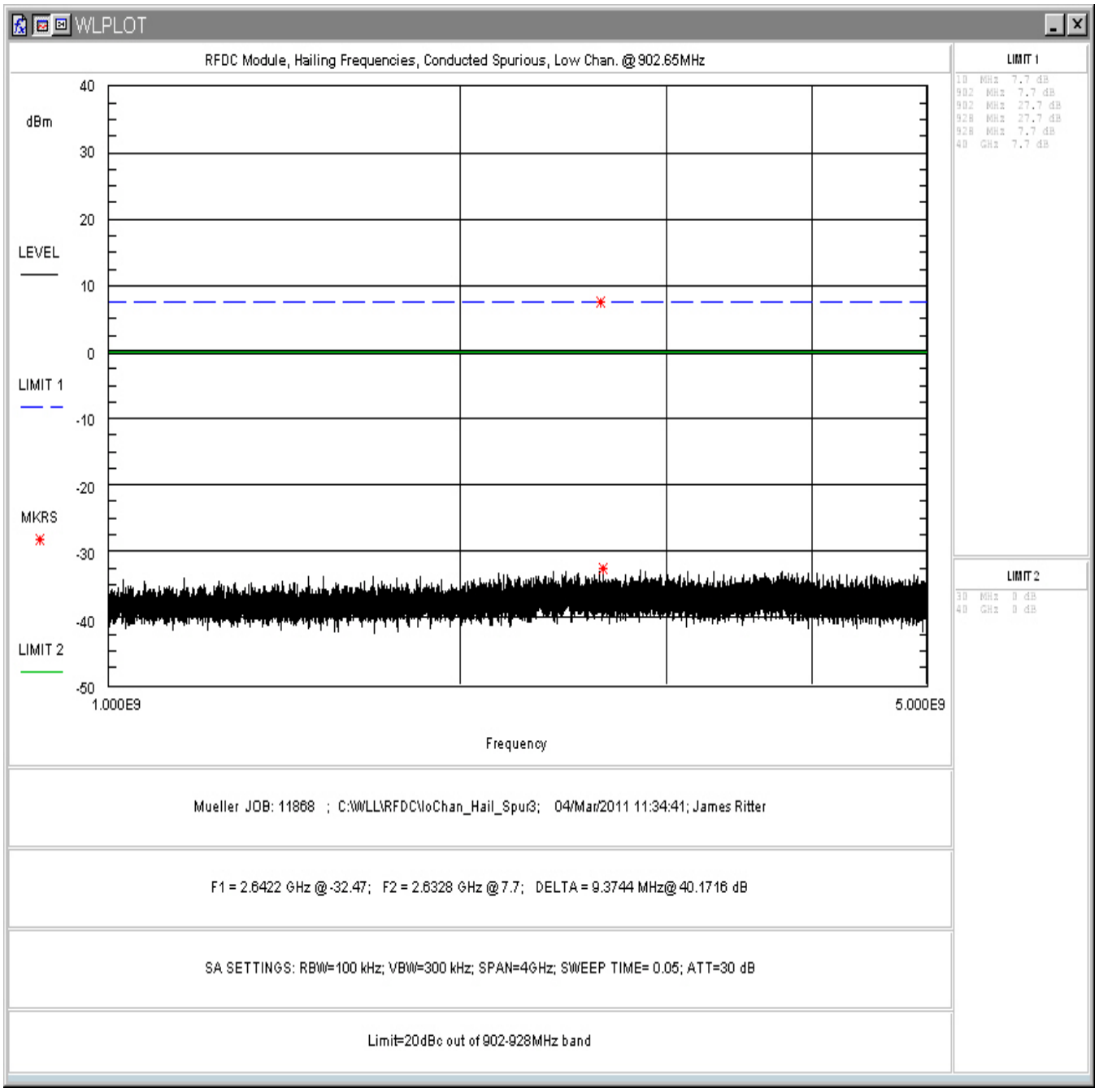

Figure 43 Conducted Spurious Emissions, Low Hailing Channel 1-5GHz

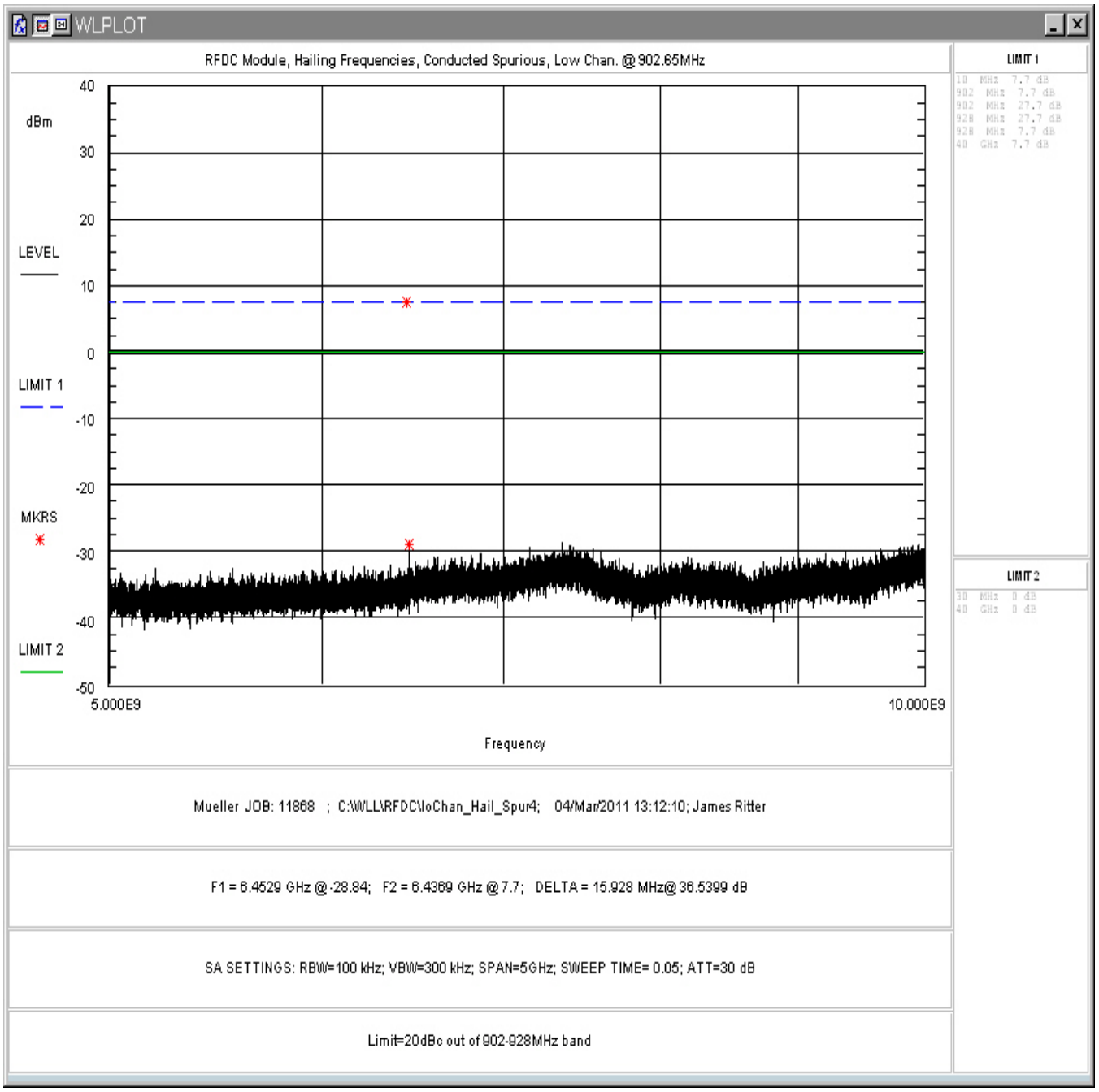

Figure 44 Conducted Spurious Emissions, Low Hailing Channel 5-10GHz

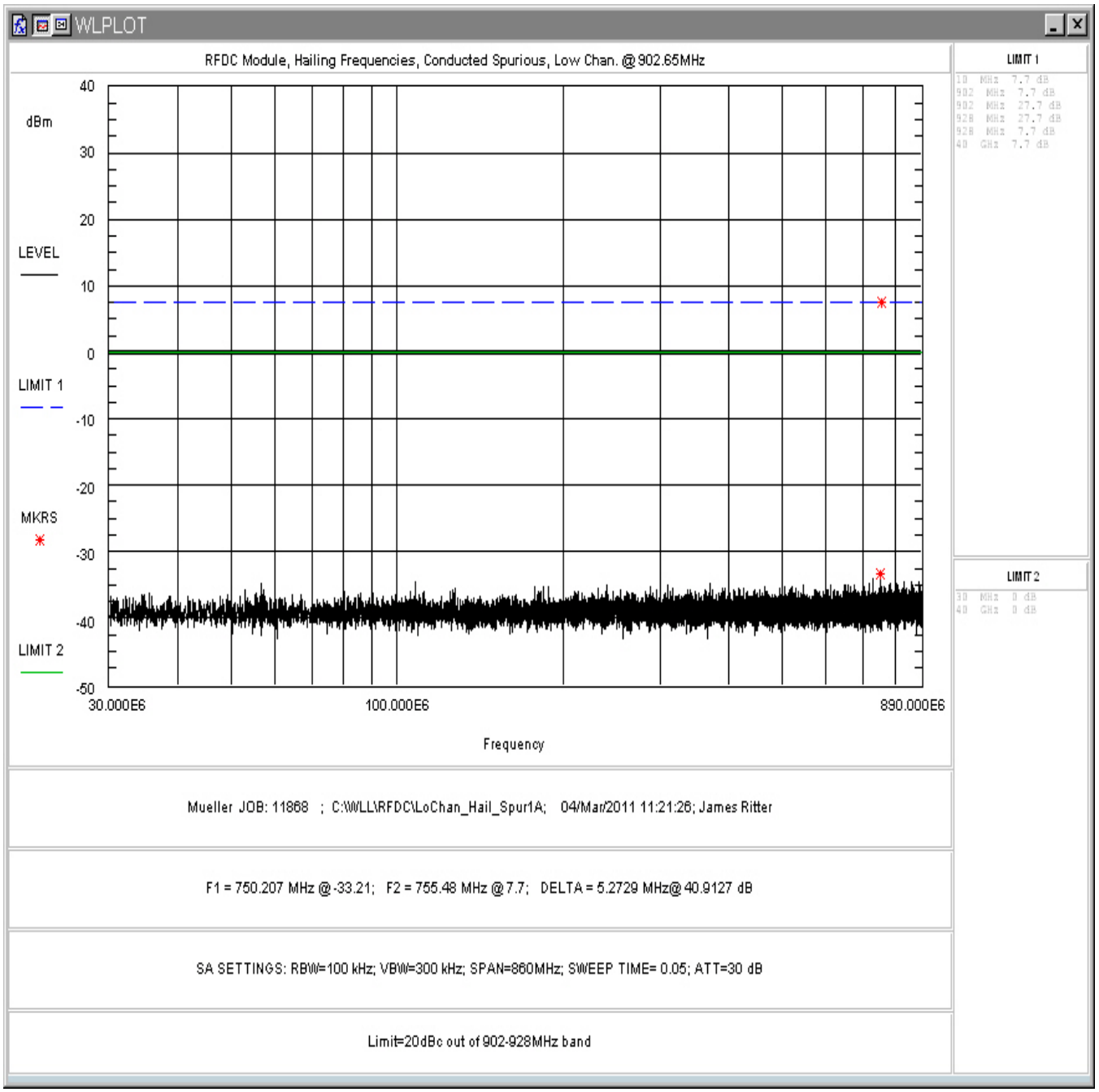

Figure 45 Conducted Spurious Emissions, Center Hailing Channel 30-890MHz

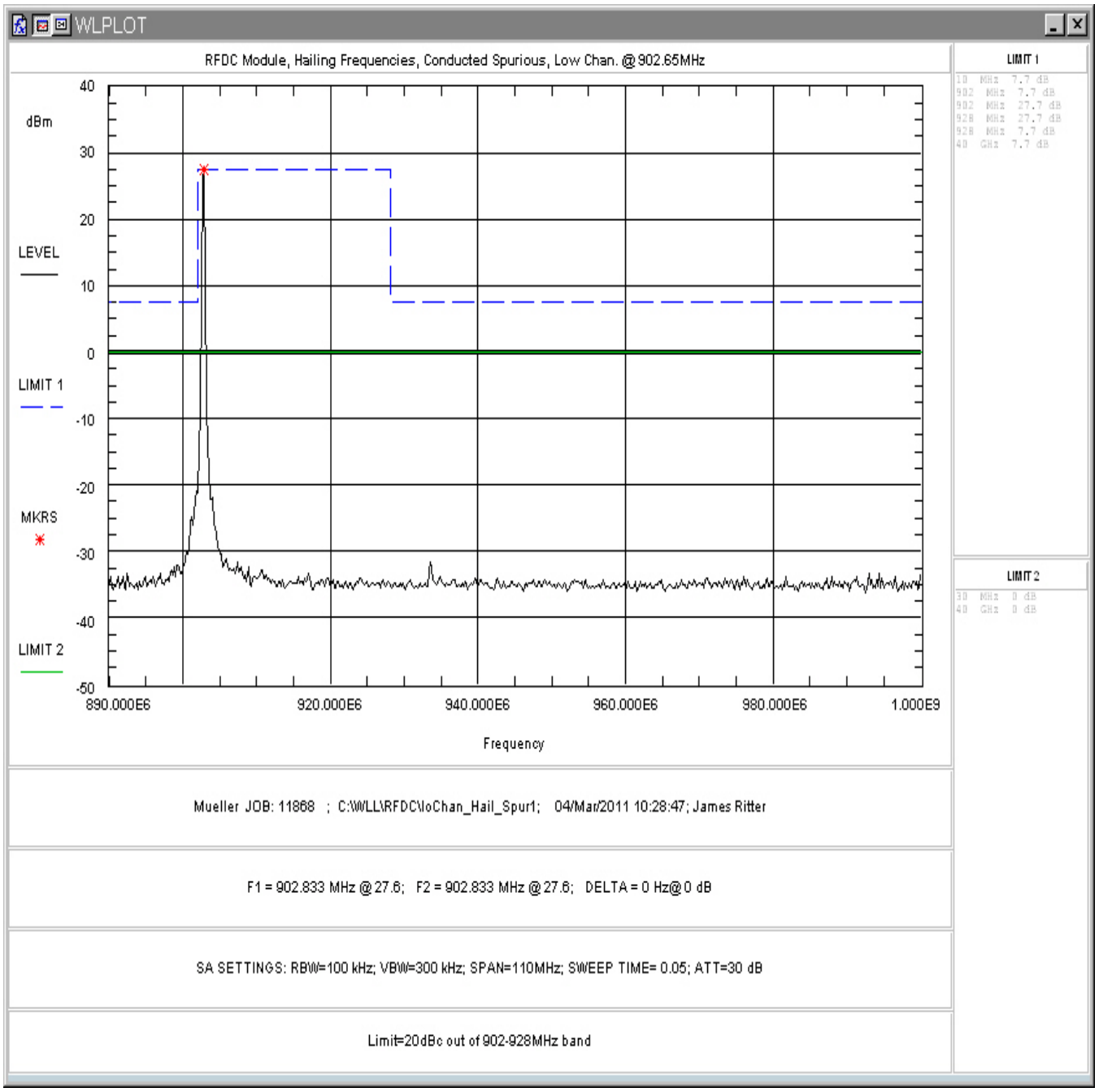

Figure 46 Conducted Spurious Emissions, Center Hailing Channel 890-1000MHz

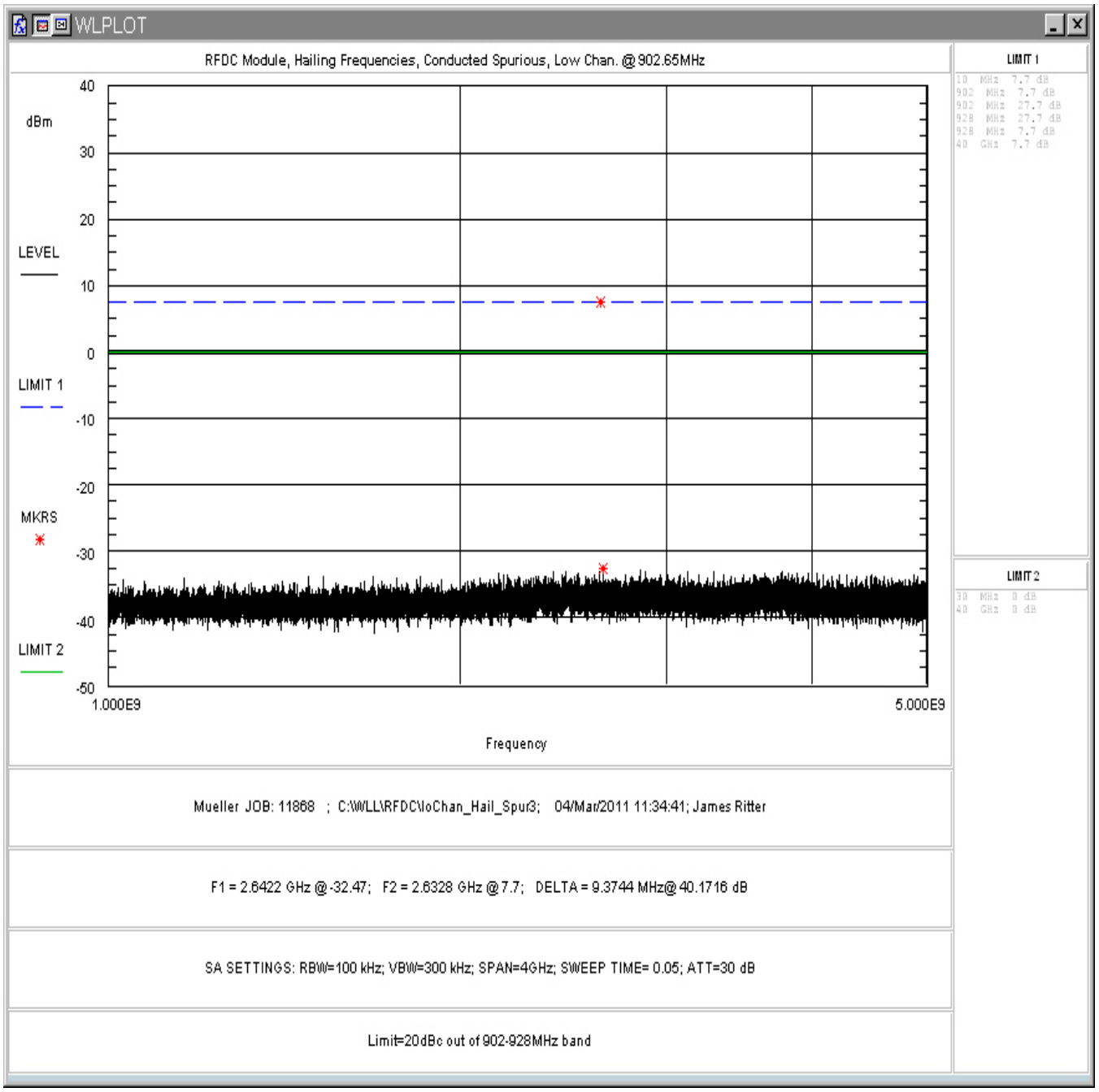

Figure 47 Conducted Spurious Emissions, Center Hailing Channel 1-5GHz

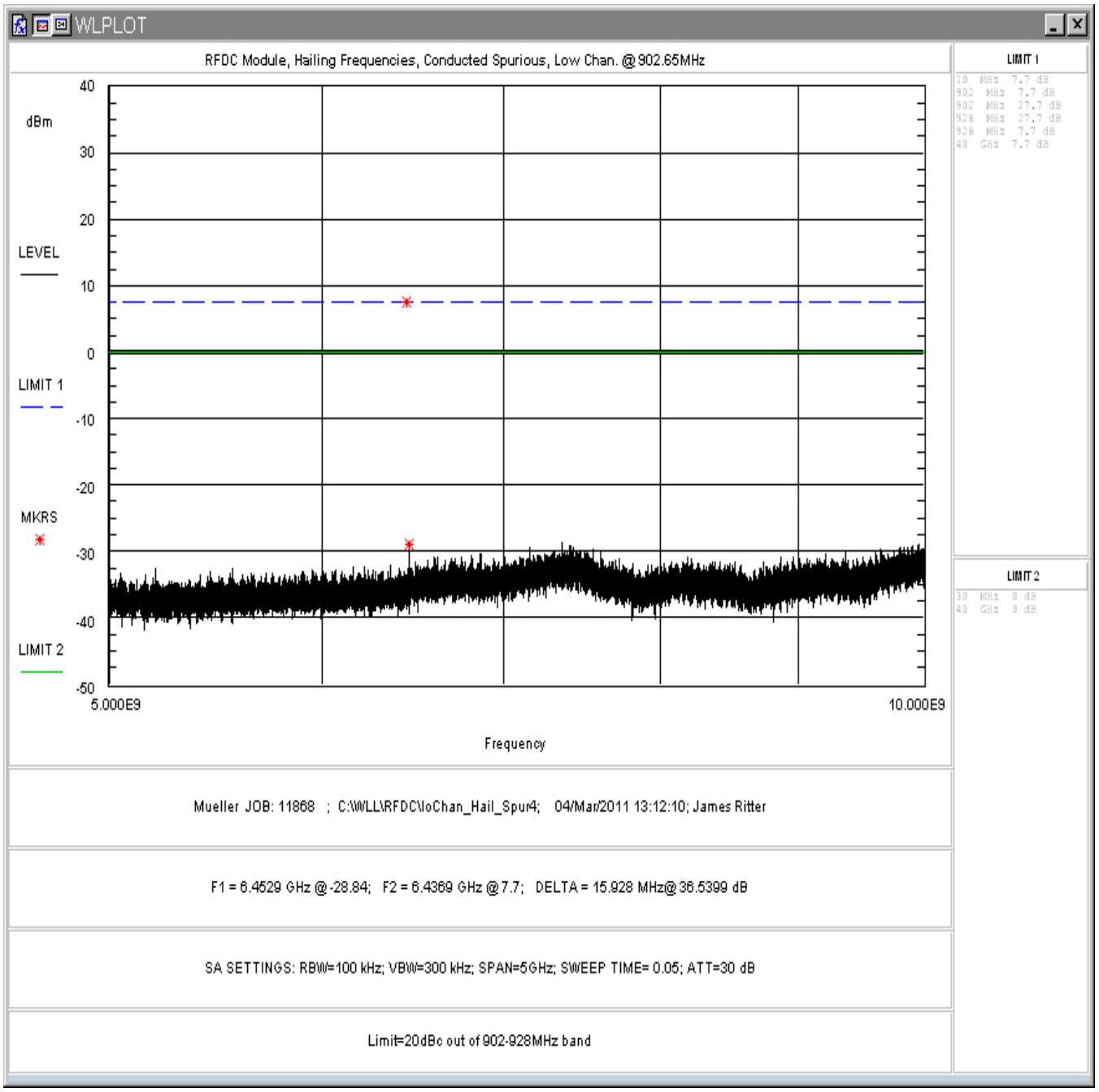

Figure 48 Conducted Spurious Emissions, Center Hailing Channel 5-10GHz

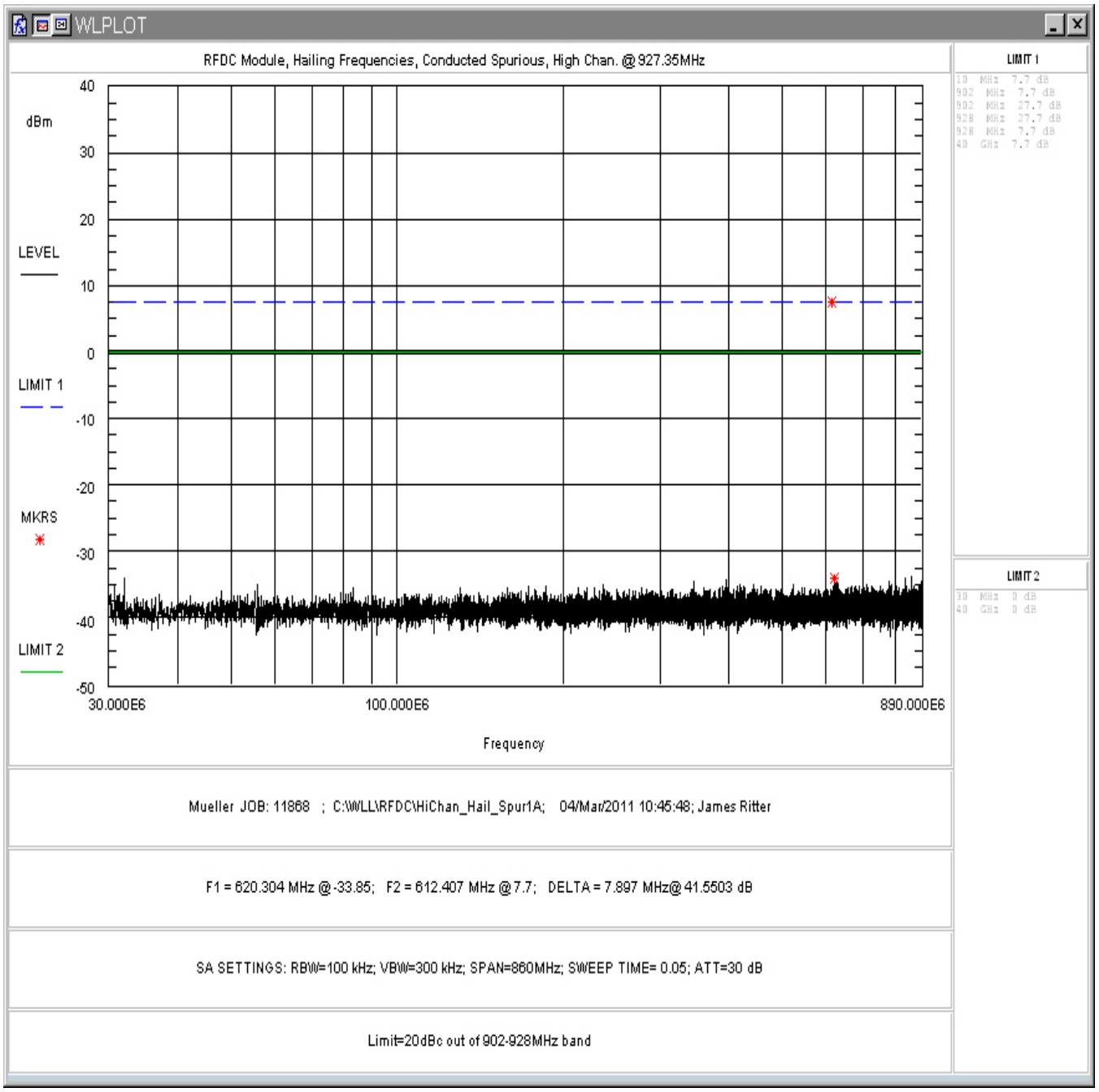

Figure 49 Conducted Spurious Emissions, High Hailing Channel 30-890MHz

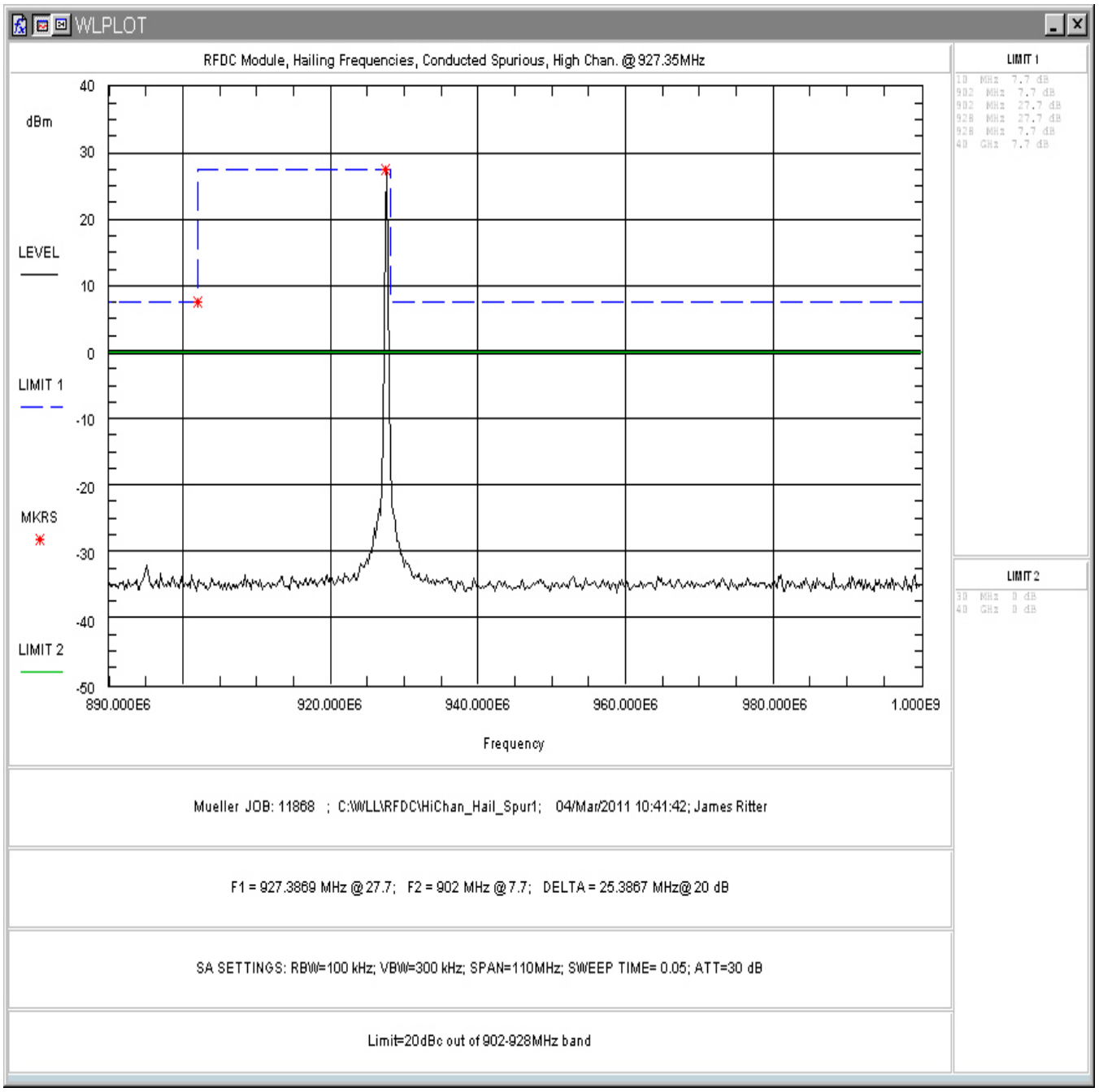

Figure 50 Conducted Spurious Emissions, High Hailing Channel 890-1000MHz

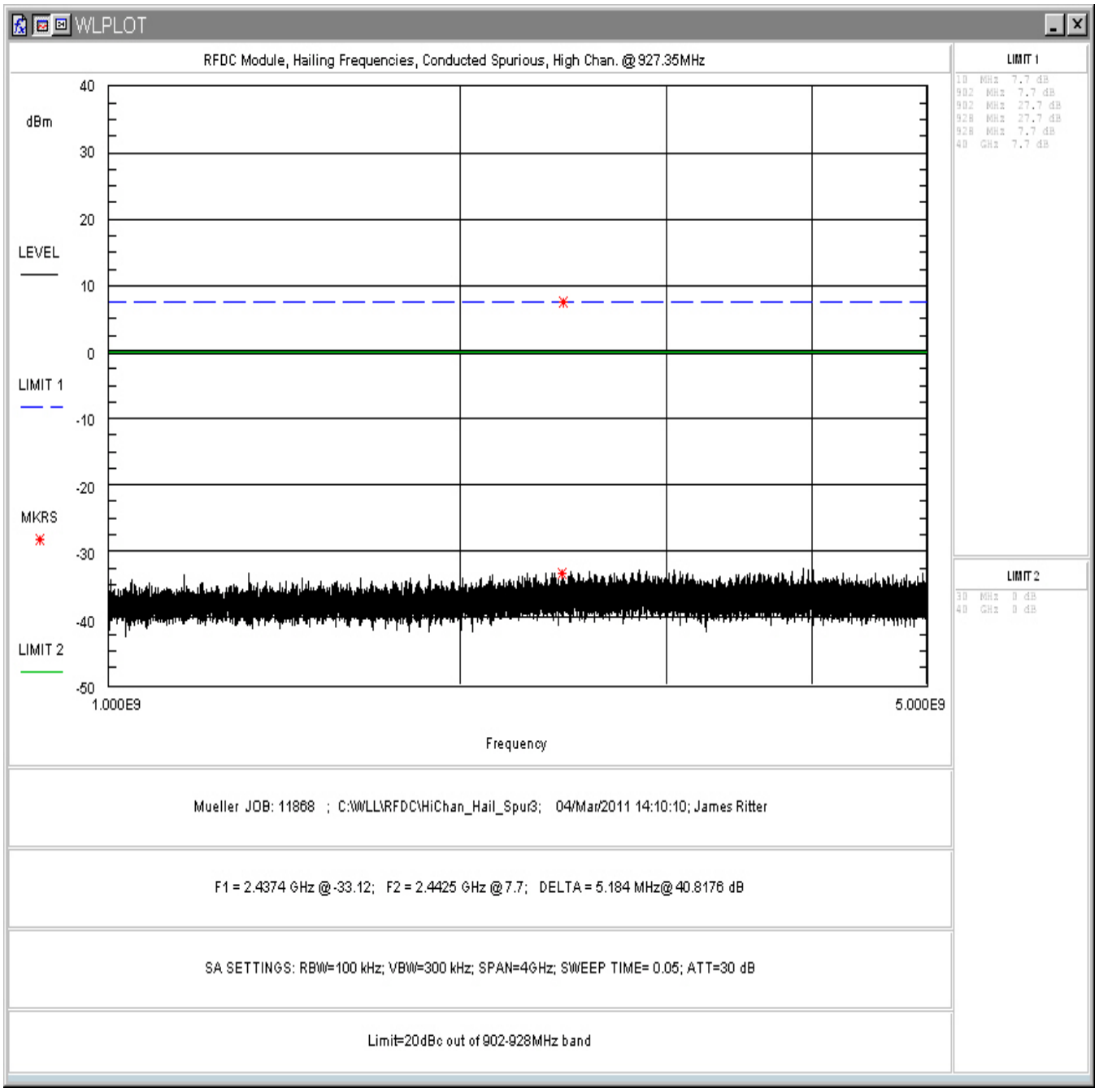

Figure 51 Conducted Spurious Emissions, High Hailing Channel 1-5GHz

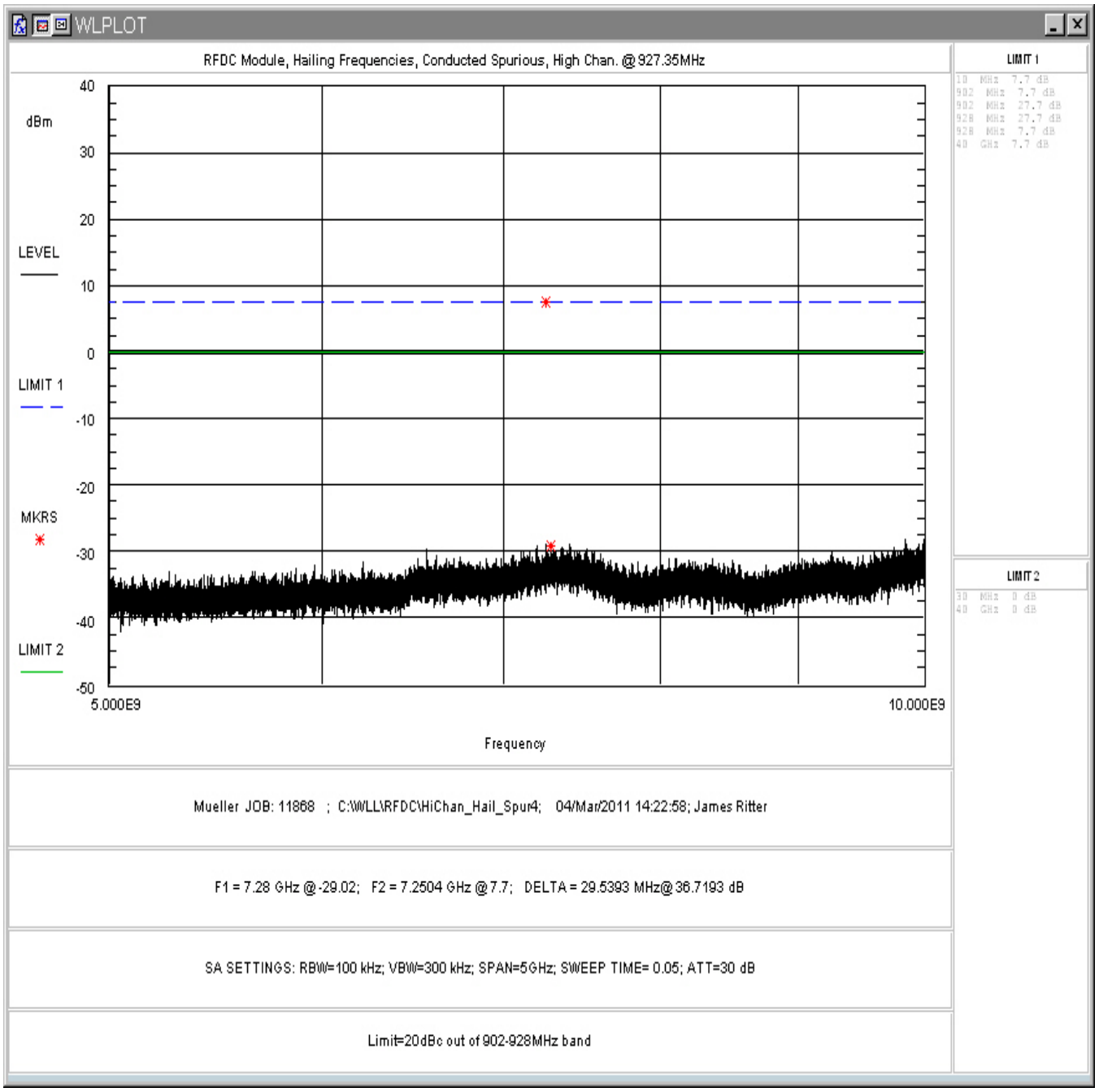

Figure 52 Conducted Spurious Emissions, High Hailing Channel 5-10GHz

5.6 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.209 and §15.35(b) for peak measurements.

5.6.1 Test Procedure

The EUT was placed on a motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The EUT was tested in 3 orthogonals with the worst case readings provided. Both the horizontal and vertical field components were measured. Measurements below 1 GHz include both restricted and non-restricted bands.

The emissions were measured using the following resolution bandwidths:

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

5.6.2 Areas of concern

None

Table 10: Radiated Emission Test Data, Low Frequency Data (<1GHz) (same for all Channels)

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
115.77	V	270.00	1.00	7.10	15.0	12.8	150.0	-21.4	BB/RB
120.29	V	270.00	1.00	7.70	15.7	14.7	150.0	-20.2	BB/RB
124.81	V	270.00	1.00	12.80	15.2	25.1	150.0	-15.5	BB/RB
126.45	V	270.00	1.00	14.60	15.1	30.7	150.0	-13.8	BB/RB
128.87	V	270.00	1.00	10.50	15.1	19.0	150.0	-17.9	BB/RB
131.13	V	270.00	1.00	5.80	15.0	11.0	150.0	-22.7	BB/RB
135.47	V	270.00	1.00	5.00	15.0	10.0	150.0	-23.5	BB/RB
138.85	V	0.00	1.00	11.50	14.7	20.4	150.0	-17.3	BB
115.77	H	90.00	4.00	3.80	15.0	8.7	150.0	-24.7	BB/RB
120.29	H	90.00	4.00	4.50	15.7	10.2	150.0	-23.4	BB/RB
124.81	H	90.00	4.00	9.20	15.2	16.6	150.0	-19.1	BB/RB
126.45	H	90.00	4.00	10.10	15.1	18.3	150.0	-18.3	BB/RB
128.87	H	90.00	4.00	6.60	15.1	12.1	150.0	-21.8	BB/RB
131.13	H	90.00	4.00	4.10	15.0	9.1	150.0	-24.4	BB/RB
135.47	H	90.00	4.00	3.90	15.0	8.8	150.0	-24.6	BB/RB
138.85	V	0.00	3.60	9.60	14.7	16.4	150.0	-19.2	BB

Note: emissions were common to all tested channels, the frequencies listed are the highest emitted restricted bands

Table 11: Radiated Emission Test Data, High Frequency Data (>1GHz)

(Restricted Bands)

(Worst case readings are with EUT Flat)

Low Channel-902.5MHz

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
2707.50	V	145.00	2.00	48.00	-1.4	212.7	5000.0	-27.4	P
2707.50	V	145.00	2.00	38.10	-1.4	68.0	500.0	-17.3	A
3610.00	H	270.00	2.30	42.83	0.5	147.1	5000.0	-30.6	P
3610.00	H	270.00	2.30	33.50	0.5	50.3	500.0	-20.0	A
4512.50	V	225.00	2.00	44.83	2.5	232.6	5000.0	-26.6	P
4512.50	V	225.00	2.00	33.67	2.5	64.4	500.0	-17.8	A
7220.00	V	90.00	2.19	42.50	8.2	343.8	5000.0	-23.3	P
7220.00	V	90.00	2.19	32.50	8.2	108.7	500.0	-13.3	A
2707.50	H	270.00	2.10	46.00	-1.4	169.0	5000.0	-29.4	P
2707.50	H	270.00	2.00	34.20	-1.4	43.4	500.0	-21.2	A
3610.00	H	270.00	2.30	43.50	0.5	158.9	5000.0	-30.0	P
3610.00	H	270.00	2.30	32.17	0.5	43.1	500.0	-21.3	A
4512.50	H	180.00	2.30	46.67	2.5	287.5	5000.0	-24.8	P
4512.50	H	180.00	2.30	37.17	2.5	96.3	500.0	-14.3	A
7220.00	H	90.00	2.19	42.67	8.2	350.6	5000.0	-23.1	P
7220.00	H	90.00	2.20	31.17	8.2	93.3	500.0	-14.6	A

Center Channel – 915MHz

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
2745.00	V	145.00	2.00	47.29	-1.5	194.8	5000.0	-28.2	P
2745.00	V	145.00	2.00	37.85	-1.5	65.7	500.0	-17.6	A
4575.00	V	225.00	2.00	45.80	2.4	258.0	5000.0	-25.7	P
4575.00	V	225.00	2.00	34.59	2.4	71.0	500.0	-17.0	A
7320.00	V	0.00	2.00	44.49	9.0	474.9	5000.0	-20.4	P
7320.00	V	0.00	2.00	33.15	9.0	128.7	500.0	-11.8	A
2745.00	H	270.00	2.00	47.41	-1.5	197.6	5000.0	-28.1	P
2745.00	H	270.00	2.00	37.40	-1.5	62.4	500.0	-18.1	A
4575.00	H	270.00	2.30	46.96	2.4	294.9	5000.0	-24.6	P
4575.00	H	270.00	2.30	37.60	2.4	100.4	500.0	-13.9	A
7320.00	H	0.00	2.00	44.49	9.0	474.9	5000.0	-20.4	P
7320.00	H	0.00	2.00	33.15	9.0	128.7	500.0	-11.8	A

High Hailing Channel-927.35MHz

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
2782.03	V	180.00	2.00	46.50	0.0	211.3	5000.0	-27.5	Peak
2782.03	V	180.00	2.00	35.50	0.0	59.6	500.0	-18.5	Average
4636.75	V	315.00	2.83	43.17	0.0	144.0	5000.0	-30.8	Peak
4636.75	V	315.00	2.83	33.50	0.0	47.3	500.0	-20.5	Average
2782.03	H	180.00	2.31	45.00	0.0	177.8	5000.0	-29.0	Peak
2782.03	H	180.00	2.31	35.83	0.0	61.9	500.0	-18.1	Average
4636.75	H	215.00	2.35	42.67	0.0	136.0	5000.0	-31.3	Peak
4636.75	H	215.00	2.35	33.67	0.0	48.3	500.0	-20.3	Average

5.7 AC Conducted Emissions (FCC Pt.15.207)

5.7.1 Requirements

Test Arrangement: Table Top

Compliance Standard: FCC Class B

FCC Compliance Limits		
Frequency	**Quasi-peak**	**Average**
0.15 - 0.5MHz	66 to 56dBµV	56 to 46dBµV
0.5 - 5MHz	56dBµV	46dBµV
5 - 30MHz	60dBµV	50dBµV

5.7.2 Test Procedure

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 was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω 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 average measurements the post-detector filter was set to 10 Hz.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed. The Conducted emissions level to be compared to the FCC limit is calculated as shown in the following example.

Example:

Spectrum Analyzer Voltage: VdBµV

LISN Correction Factor: LISN dB

Cable Correction Factor: CF dB

Electric Field: EdBµV = V dBµV + LISN dB + CF dB

5.7.3 Test Data

The EUT complied with the Class B Conducted Emissions requirements. This system runs off of 100-240VAC (Data shows the typical voltages used 120VAC and 230VAC). Table 10-11 provide the test results for phase and neutral line power line conducted emissions.

Emissions were tested in the "transmit on" state with the EUT tuned to 915MHz.

Table 12: Conducted Emissions Data 120VAC, Transmit On

NEUTRAL (TX @ 915)

Frequency (MHz)	Level QP (dBµV)	Level AVG (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBµV)	Level Corr Avg (dBµV)	Limit QP (dBµV)	Limit AVG (dBµV)	Margin QP (dB)	Margin AVG (dB)
0.243	34.5	21.6	10.3	0.4	45.2	32.3	62.0	52.0	-16.8	-19.7
0.273	30.6	19.1	10.3	0.5	41.3	29.8	61.0	51.0	-19.7	-21.2
1.867	38.9	14.1	10.5	0.4	49.8	25.0	56.0	46.0	-6.2	-21.0
2.020	40.0	14.3	10.6	0.4	50.9	25.2	56.0	46.0	-5.1	-20.8
2.298	36.5	12.2	10.6	0.4	47.4	23.1	56.0	46.0	-8.6	-22.9
9.202	22.2	7.6	11.0	0.6	33.8	19.2	60.0	50.0	-26.2	-30.8

PHASE

Frequency (MHz)	Level QP (dBµV)	Level AVG (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBµV)	Level Corr Avg (dBµV)	Limit QP (dBµV)	Limit AVG (dBµV)	Margin QP (dB)	Margin AVG (dB)
0.243	34.3	21.5	10.3	0.6	45.1	32.3	62.0	52.0	-16.9	-19.7
0.273	30.4	19.3	10.3	0.6	41.2	30.1	61.0	51.0	-19.8	-20.9
1.867	38.8	13.9	10.5	0.4	49.7	24.8	56.0	46.0	-6.3	-21.2
2.020	39.8	14.1	10.6	0.4	50.7	25.0	56.0	46.0	-5.3	-21.0
2.298	37.4	12.6	10.6	0.4	48.4	23.6	56.0	46.0	-7.6	-22.4
9.202	22.0	7.3	11.0	0.9	33.9	19.2	60.0	50.0	-26.1	-30.8

5.8 Receiver Radiated Emissions

5.8.1 Requirements

Test Arrangement: Table Top

Compliance Standard: RSS210 section 2.6

RSS210 Compliance Limits for Receivers	
Frequency	**Limits**
30-88 MHz	100 µV/m
88-216 MHz	150 µV/m
216-960 MHz	200 µV/m
>960MHz	500 µV/m

5.8.2 Test Procedure

The requirements of RSS210 section 2.6 call for the EUT to be placed on an 80 cm high 1 X 1.5 meters non-conductive 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. Biconical and log periodic broadband 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 output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 30 MHz to 3 GHz were measured. 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 output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak, peak, or average as appropriate. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

All measurements above 1GHz were made at a distance of 3m with a Resolution Bandwidth of 1MHz and a Video bandwidth of 10Hz.

5.8.3 Test Data

The EUT complied with the Receiver Radiated Emissions requirements. Table 9 provides the test results for radiated emissions.

5.8.4 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included into the antenna factor (AF) column of the table and in the cable factor (CF) column of the table. The AF (in dB/m) and the CF (in dB) is algebraically added to the raw Spectrum Analyzer Voltage in dBµV to obtain

the Radiated Electric Field in dBµV/m. This logarithm amplitude is converted to a linear amplitude, then compared to the Industry Canada limit.

Example:

Spectrum Analyzer Voltage: VdBµV

Antenna Correction Factor: AFdB/m

Cable Correction Factor: CFdB

Electric Field: EdBV/m = V dBµV + AFdB/m + CFdB

To convert to linear units of measure: EdBV/m/20 Inv log

Table 13: Receiver Radiated Emission Test Data

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)
115.77	V	270.00	1.00	7.10	15.0	12.8	150.0	-21.4
120.29	V	270.00	1.00	7.70	15.7	14.7	150.0	-20.2
124.81	V	270.00	1.00	12.80	15.2	25.1	150.0	-15.5
126.45	V	270.00	1.00	14.60	15.1	30.7	150.0	-13.8
128.87	V	270.00	1.00	10.50	15.1	19.0	150.0	-17.9
131.13	V	270.00	1.00	5.80	15.0	11.0	150.0	-22.7
135.47	V	270.00	1.00	5.00	15.0	10.0	150.0	-23.5
138.85	V	0.00	1.00	11.50	14.7	20.4	150.0	-17.3
115.77	H	90.00	4.00	3.80	15.0	8.7	150.0	-24.7
120.29	H	90.00	4.00	4.50	15.7	10.2	150.0	-23.4
124.81	H	90.00	4.00	9.20	15.2	16.6	150.0	-19.1
126.45	H	90.00	4.00	10.10	15.1	18.3	150.0	-18.3
128.87	H	90.00	4.00	6.60	15.1	12.1	150.0	-21.8
131.13	H	90.00	4.00	4.10	15.0	9.1	150.0	-24.4
135.47	H	90.00	4.00	3.90	15.0	8.8	150.0	-24.6
138.85	V	0.00	3.60	9.60	14.7	16.4	150.0	-19.2