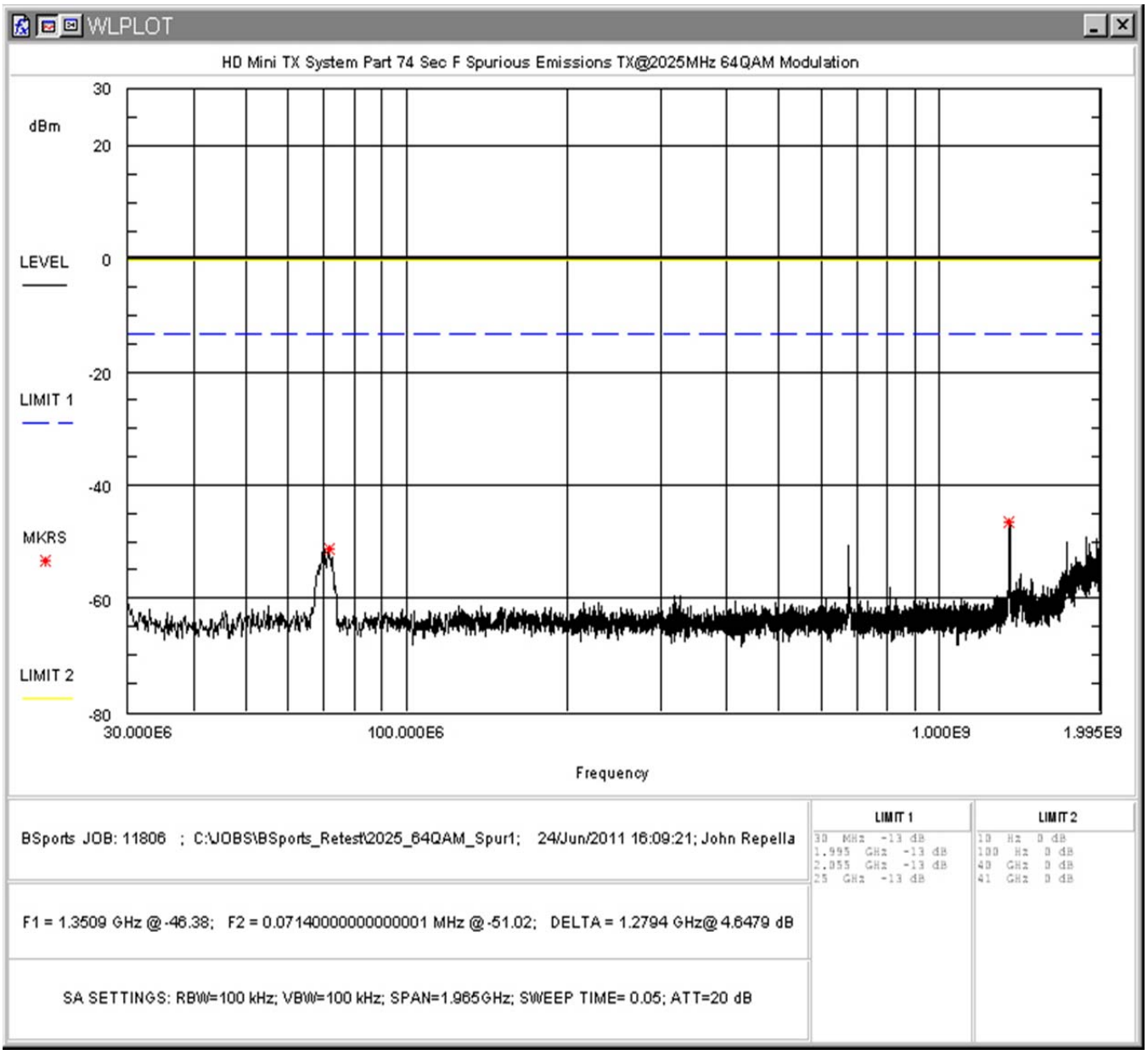

Figure 25: Spurious Emissions, 64QAM Modulation, TX @ 2025MHz, 30MHz-1995MHz

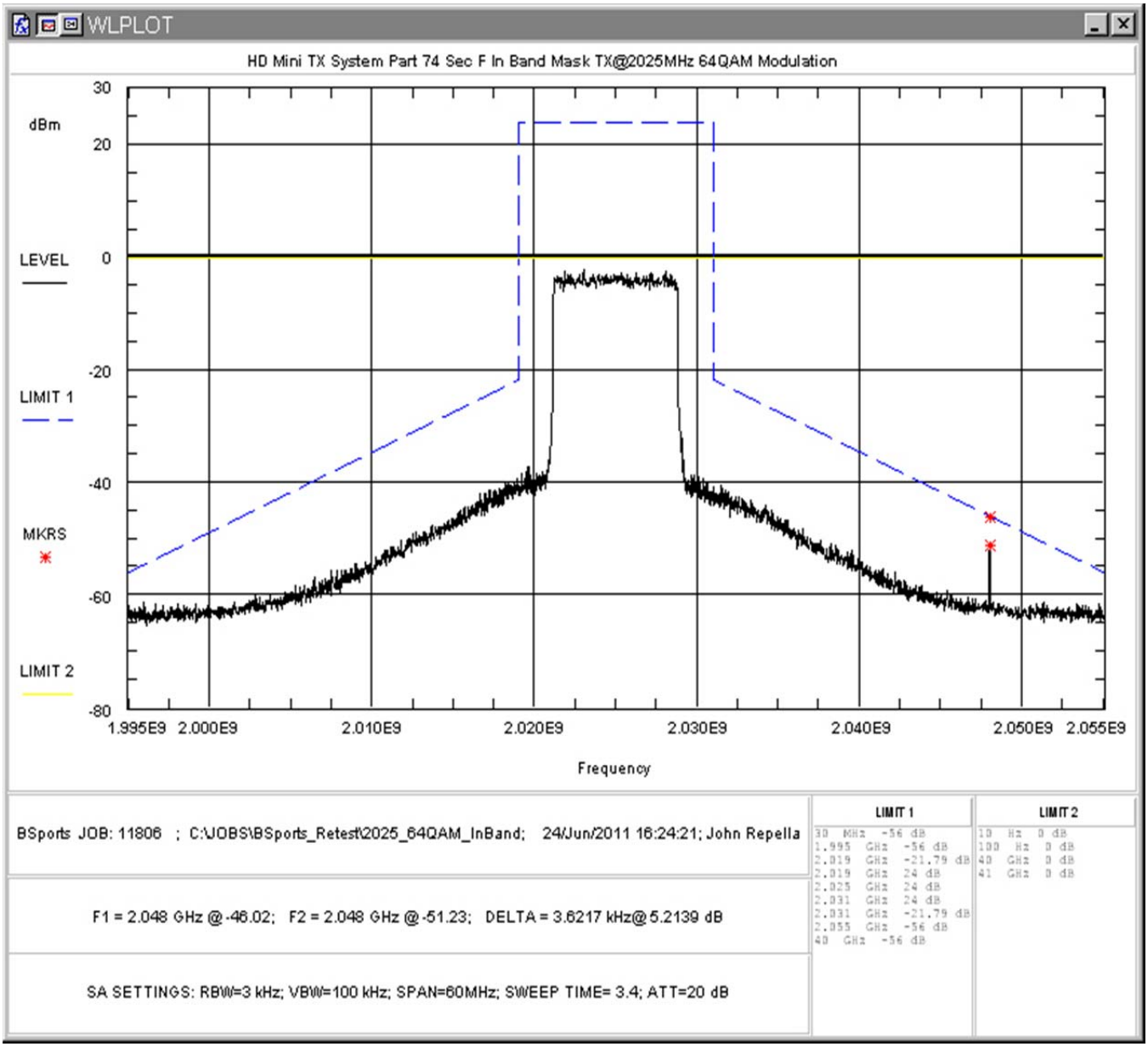

Figure 26: Spurious Emissions, 64QAM Modulation, TX @ 2025MHz, Emission Mask

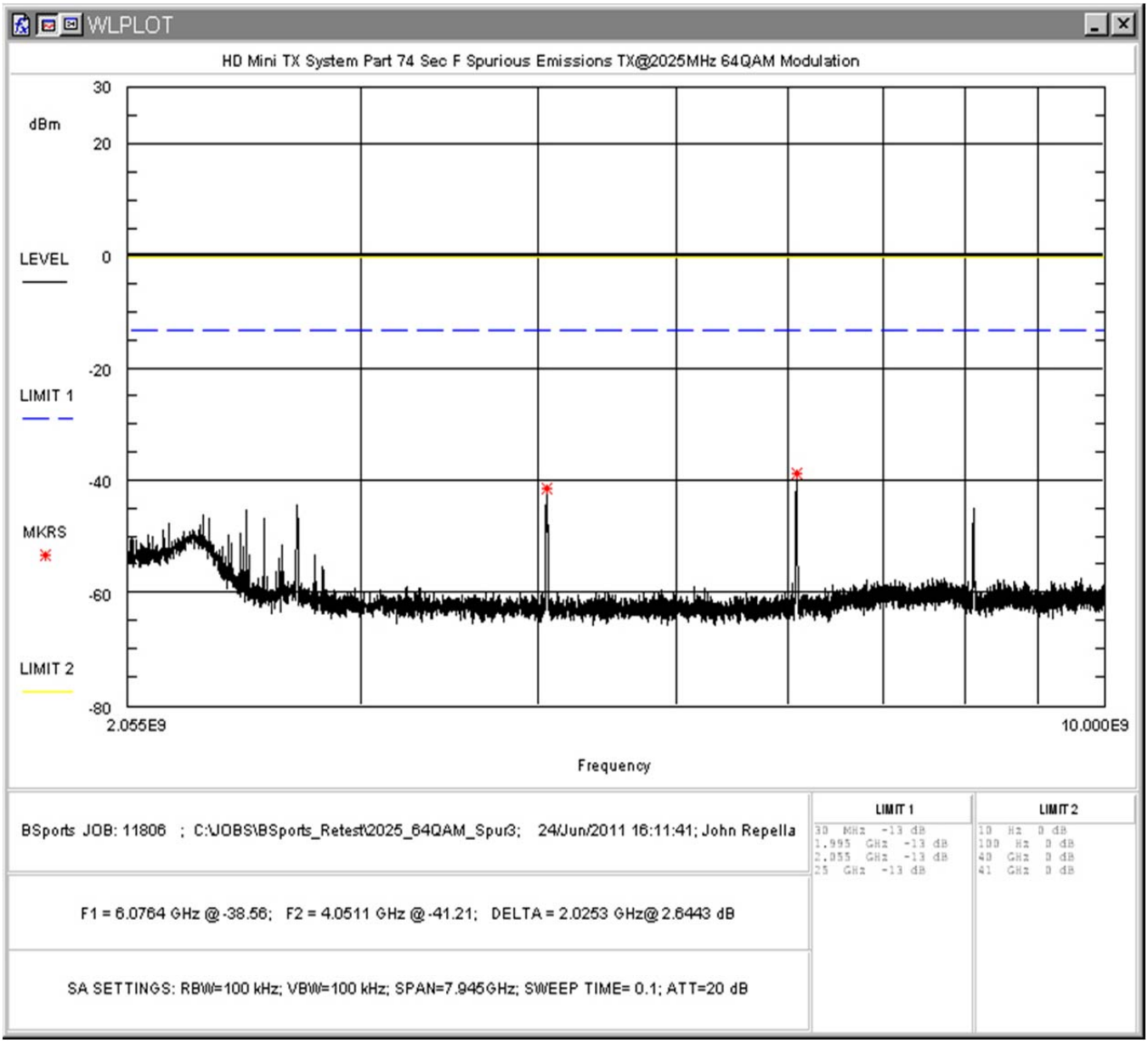

Figure 27: Spurious Emissions, 64QAM Modulation, TX @ 2025MHz, 2055MHz-10GHz

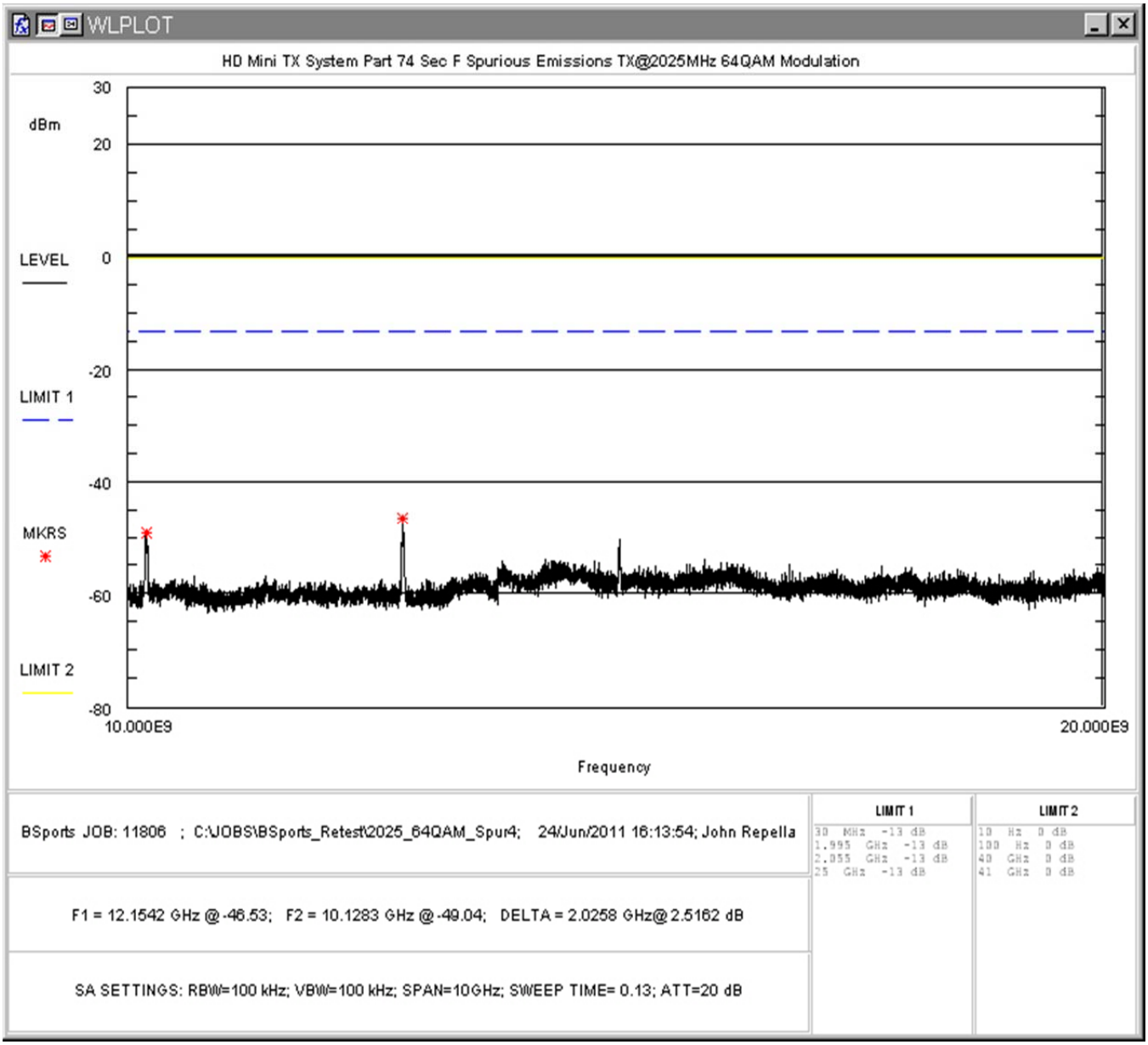

Figure 28: Spurious Emissions, 64QAM Modulation, TX @ 2025MHz, 10GHz-20GHz

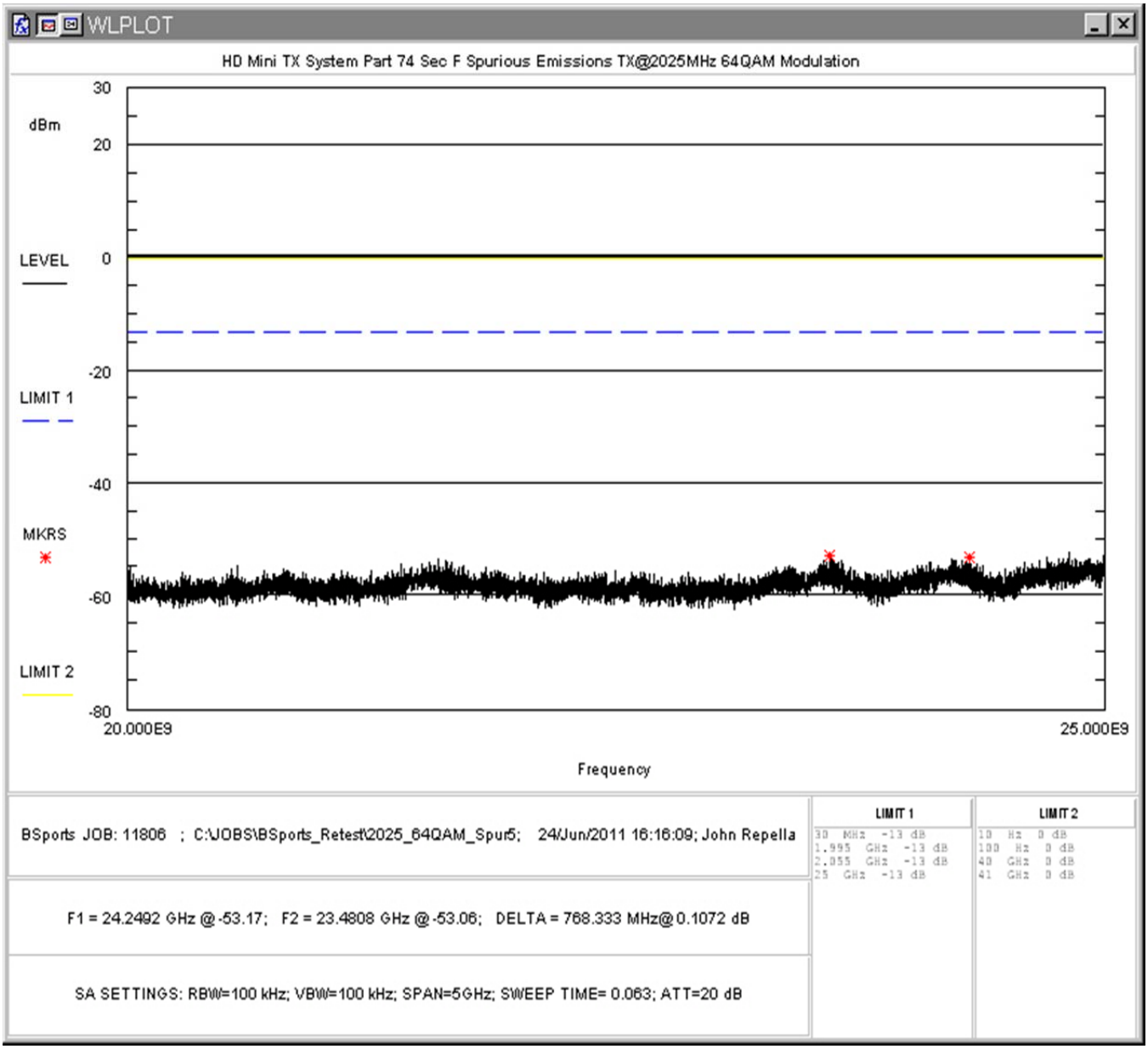

Figure 29: Spurious Emissions, 64QAM Modulation, TX @ 2025MHz, 20GHz-25GHz

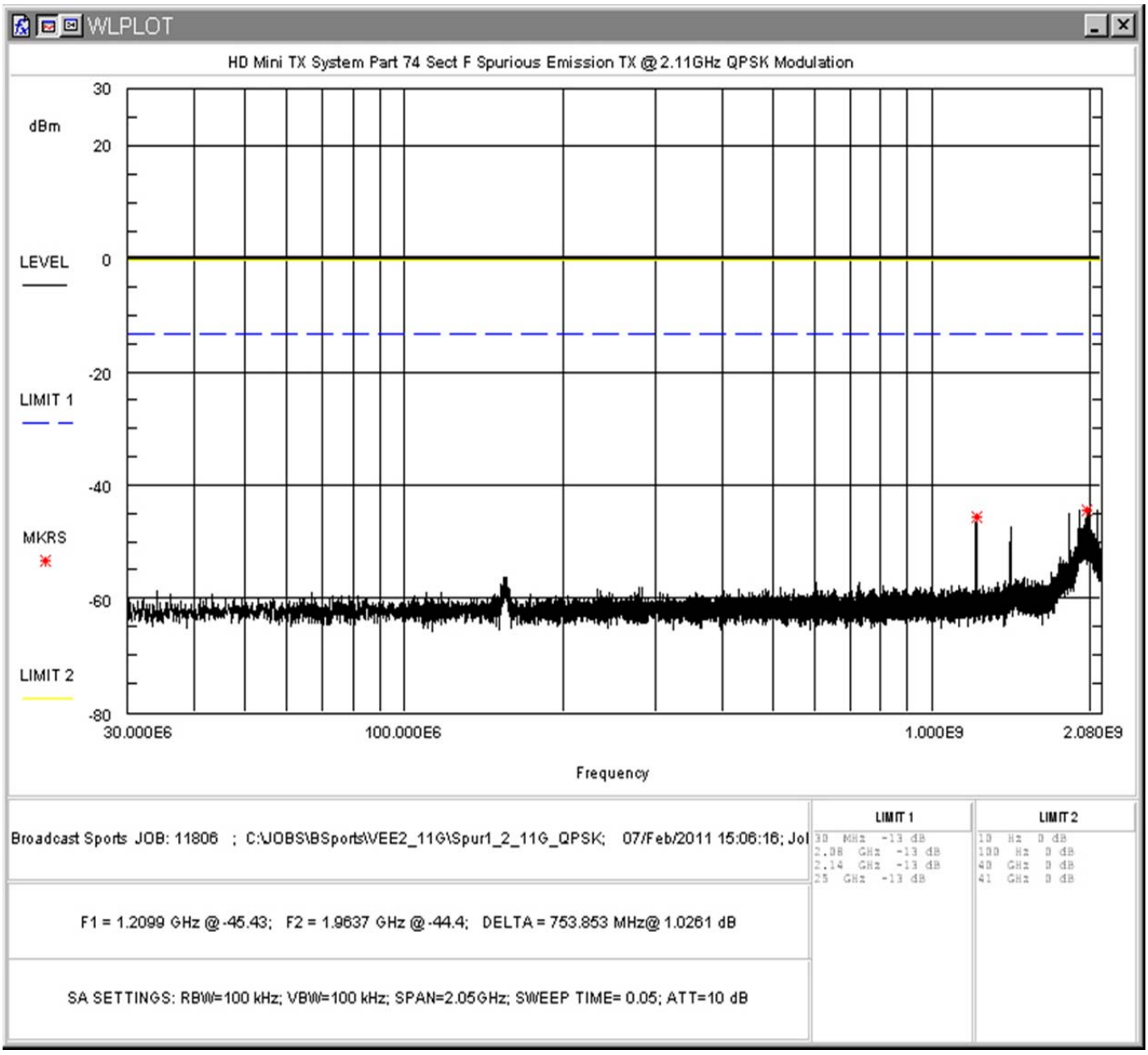

Figure 30: Spurious Emissions, QPSK Modulation, TX @ 2110MHz, 30MHz-2080MHz

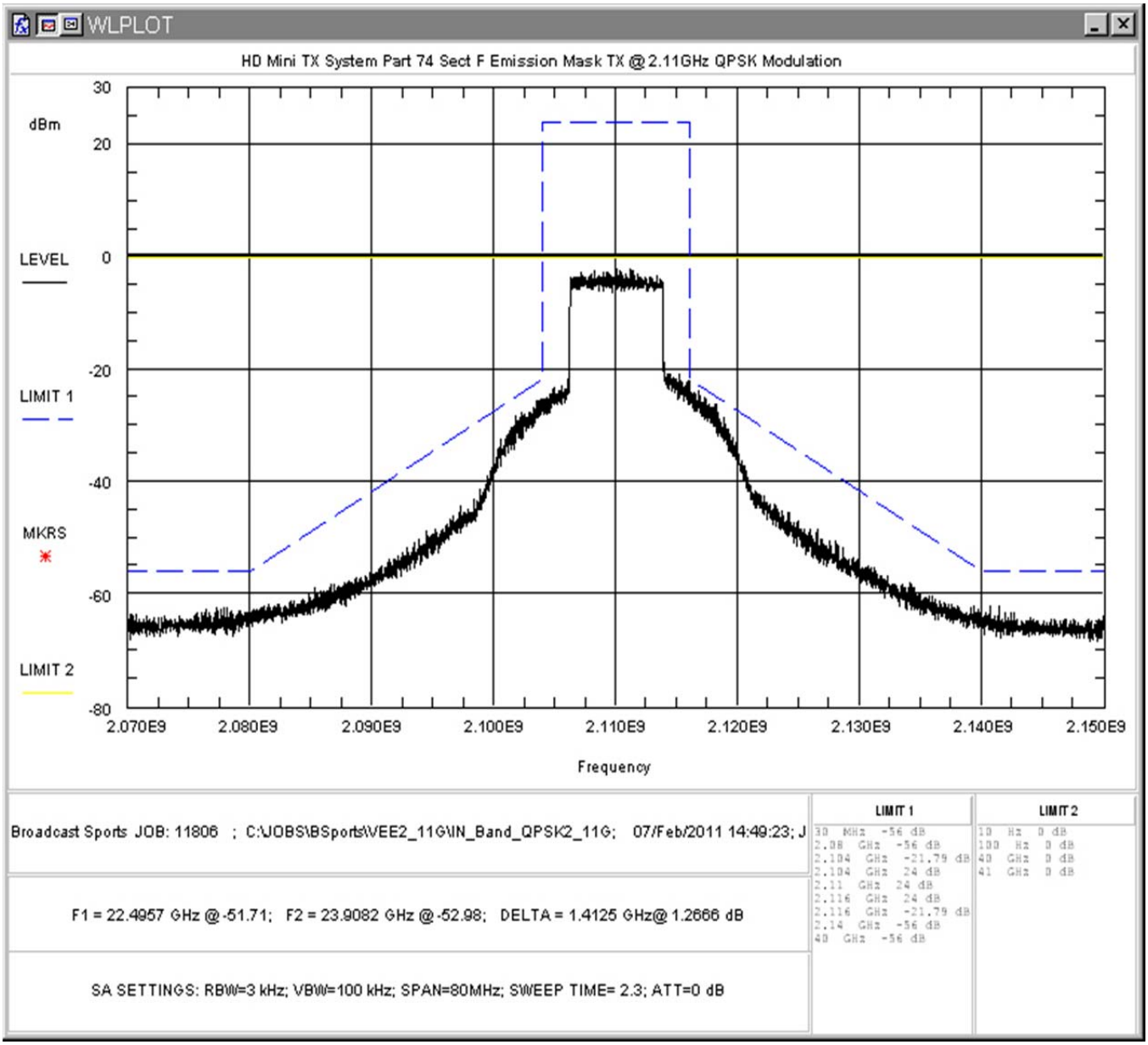

Figure 31: Spurious Emissions, QPSK Modulation, TX @ 2110MHz, Emission Mask

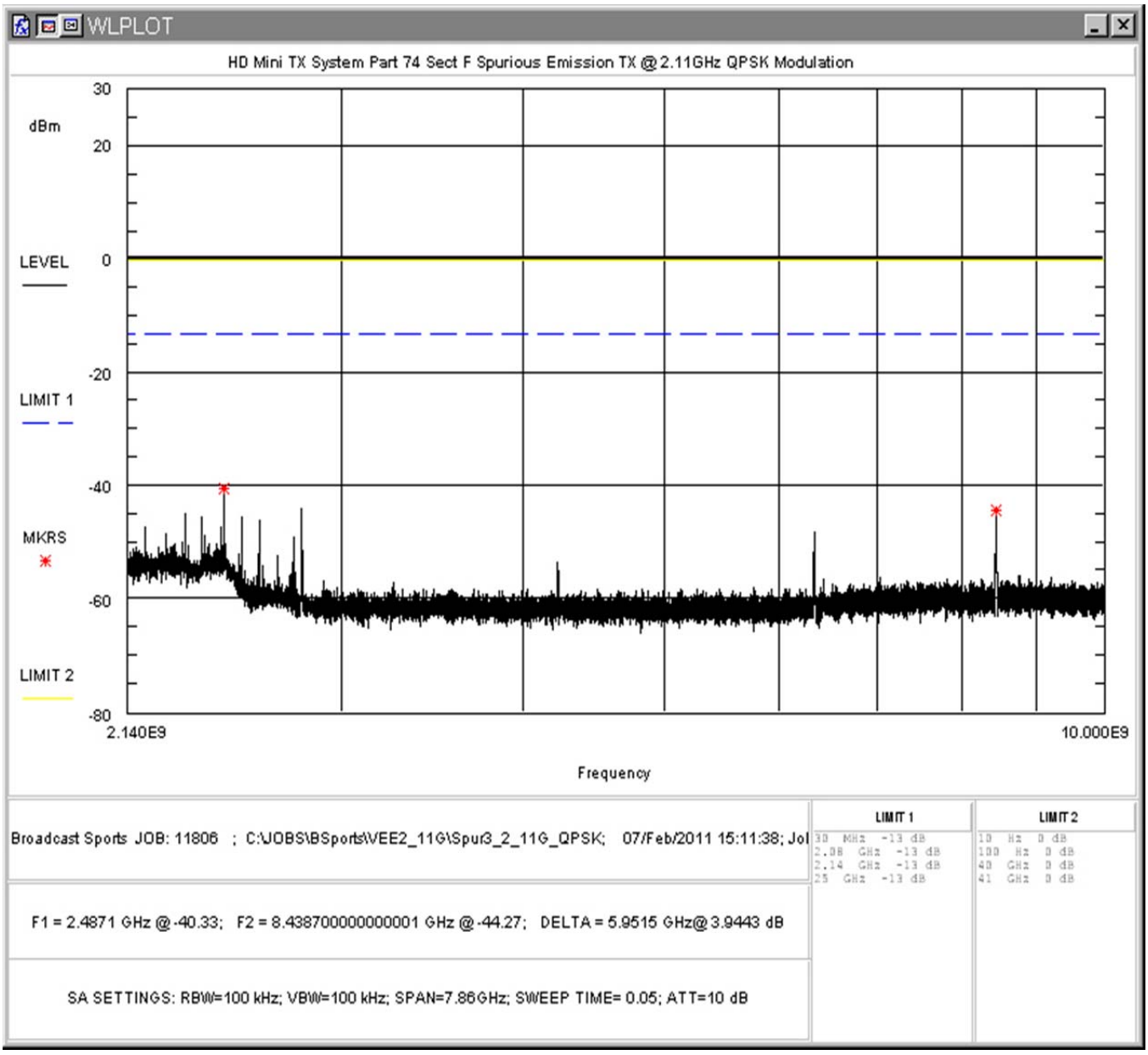

Figure 32: Spurious Emissions, QPSK Modulation, TX @ 2110MHz, 2140MHz-10GHz

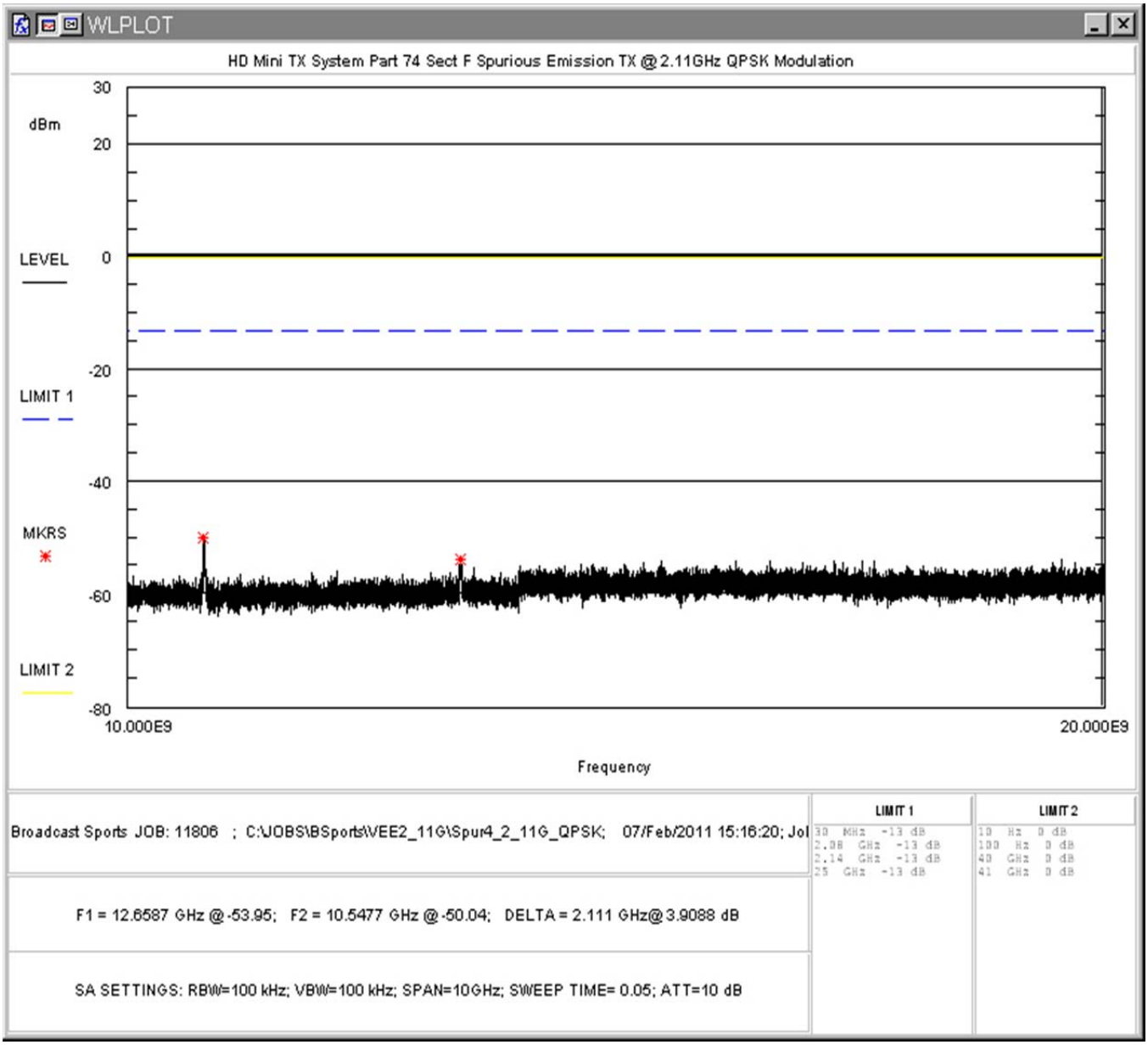

Figure 33: Spurious Emissions, QPSK Modulation, TX @ 2110MHz, 10GHz-20GHz

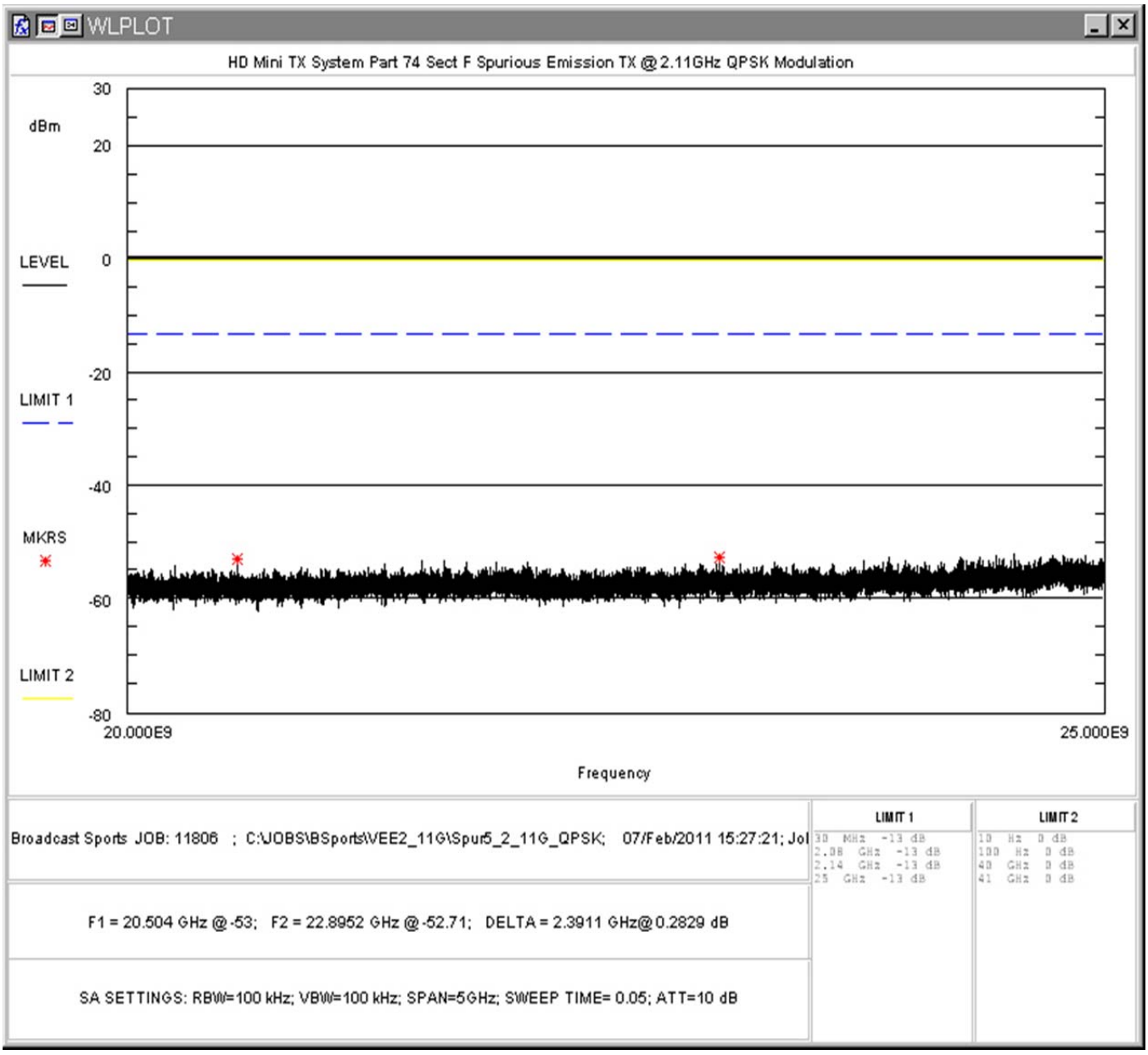

Figure 34: Spurious Emissions, QPSK Modulation, TX @ 2110MHz, 20GHz-25GHz

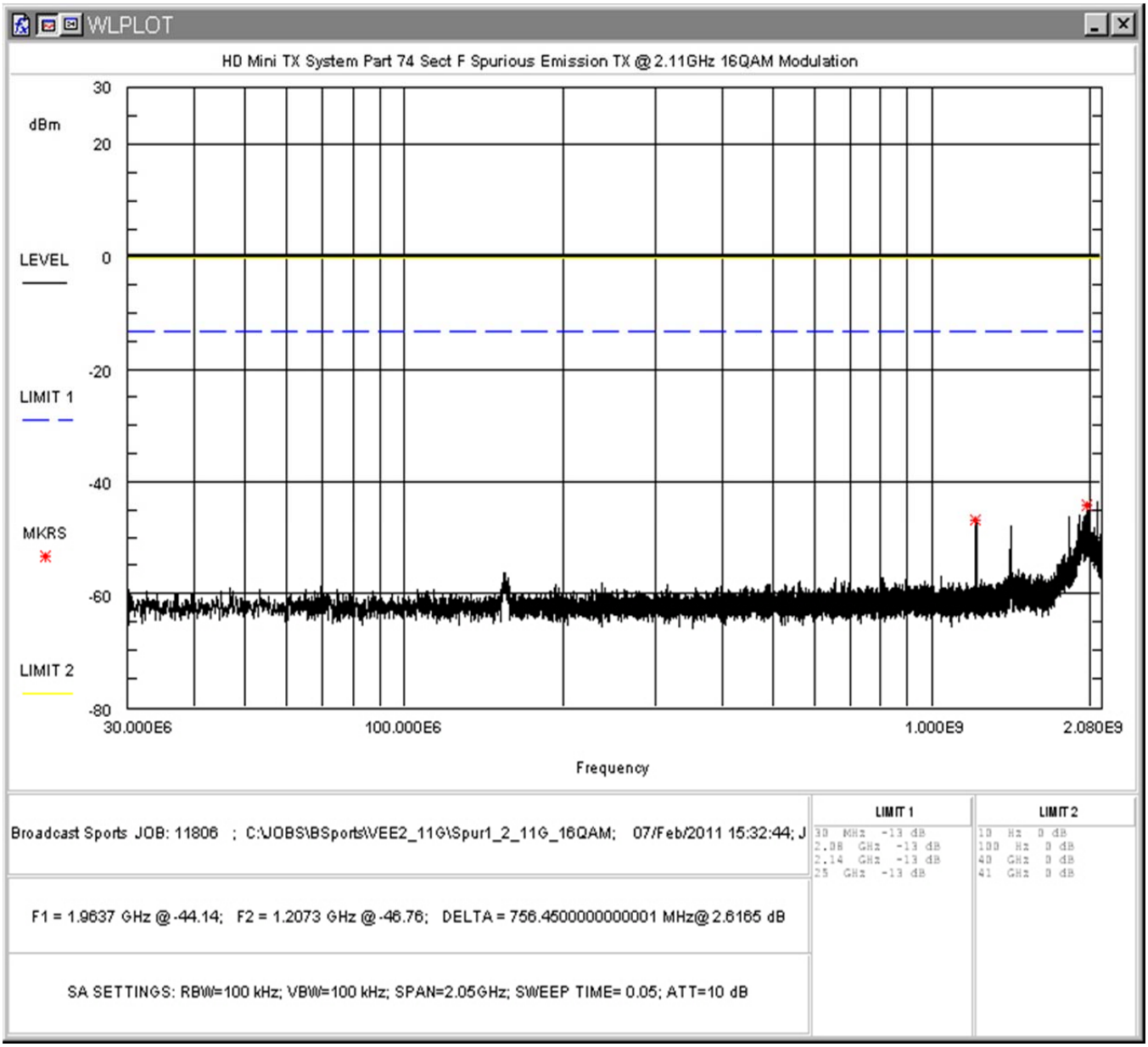

Figure 35: Spurious Emissions, 16QAM Modulation, TX @ 2110MHz, 30MHz-2080MHz

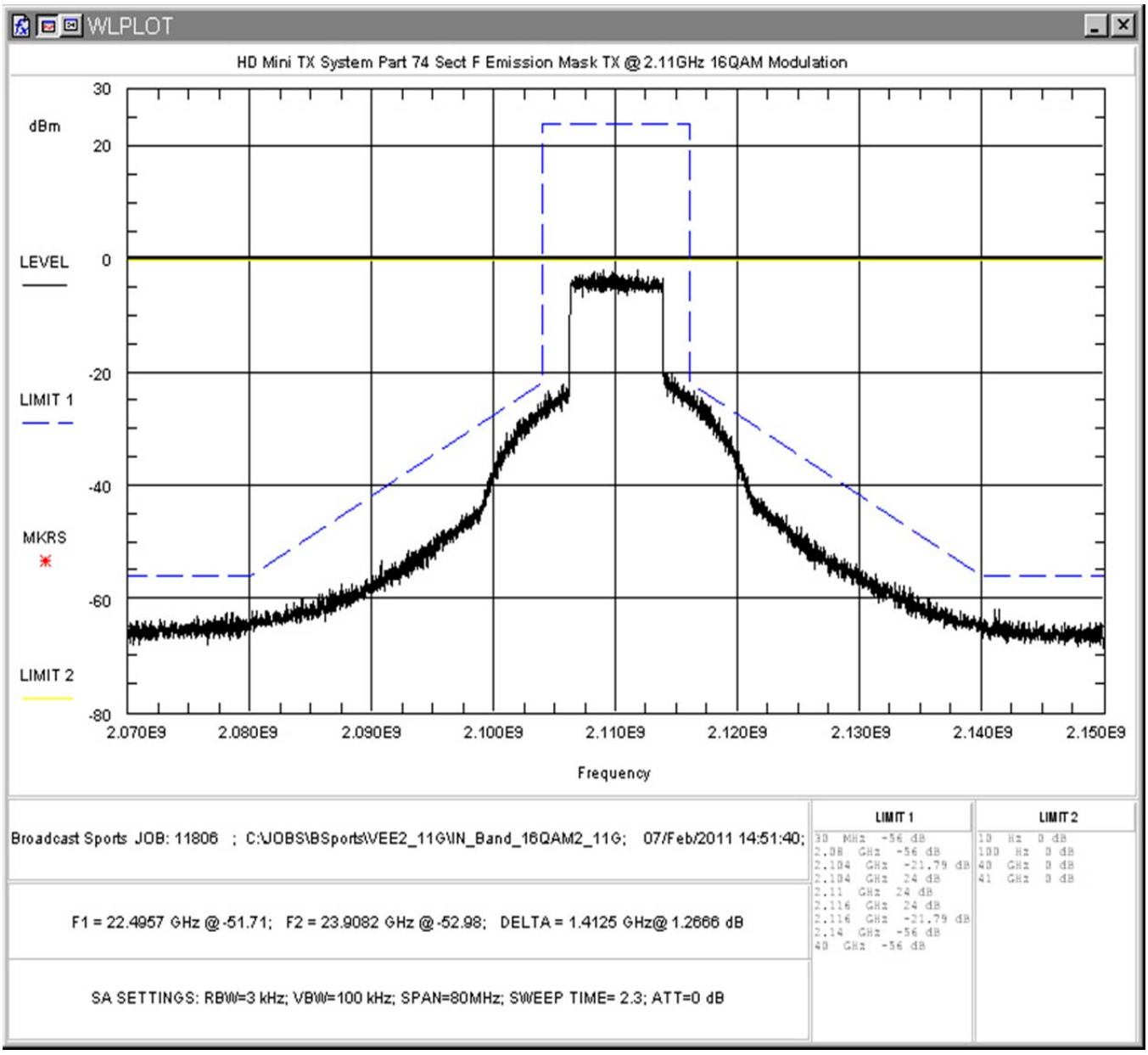

Figure 36: Spurious Emissions, 16QAM Modulation, TX @ 2110MHz, Emission Mask

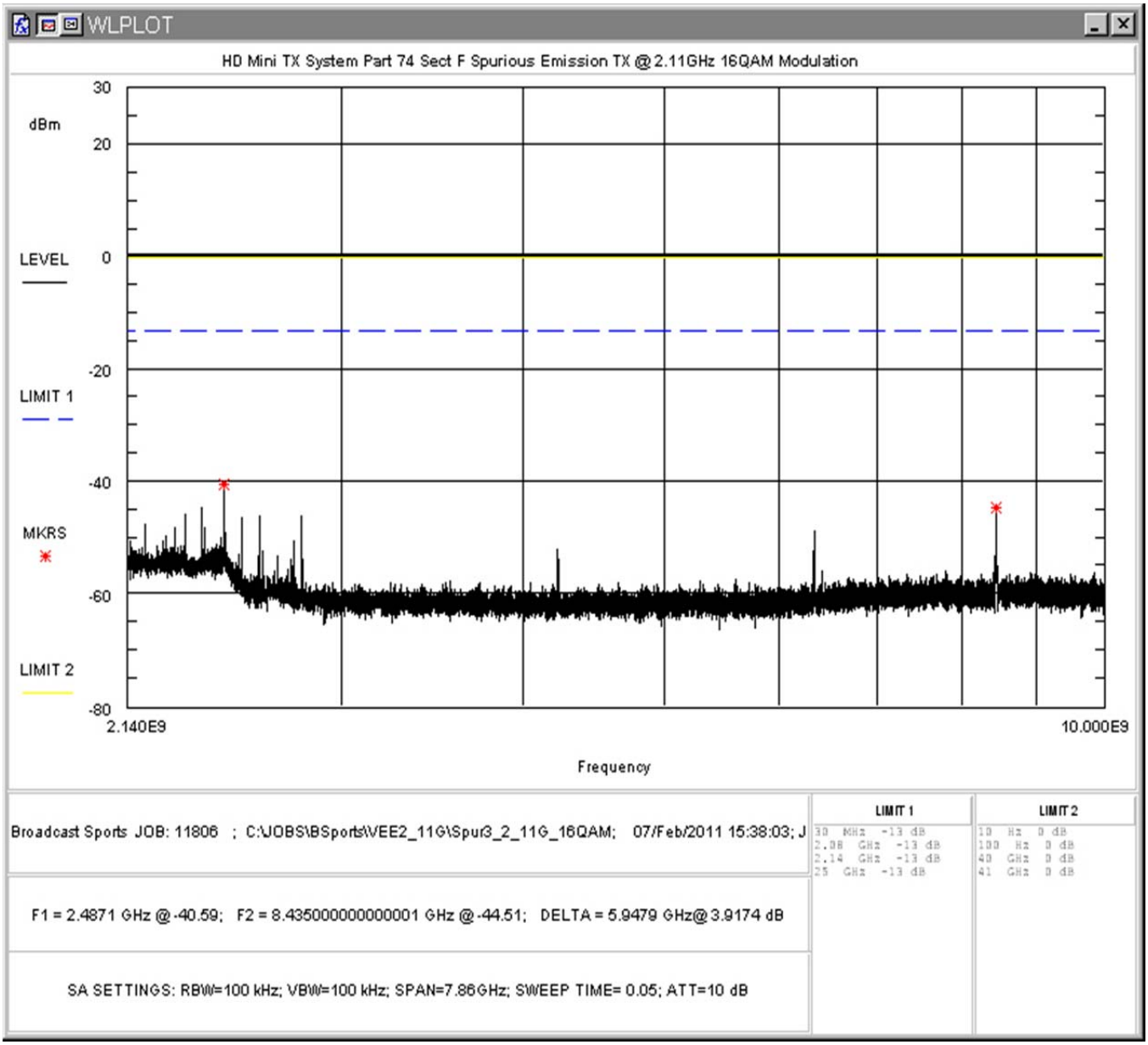

Figure 37: Spurious Emissions, 16QAM Modulation, TX @ 2110MHz, 2140MHz-10GHz

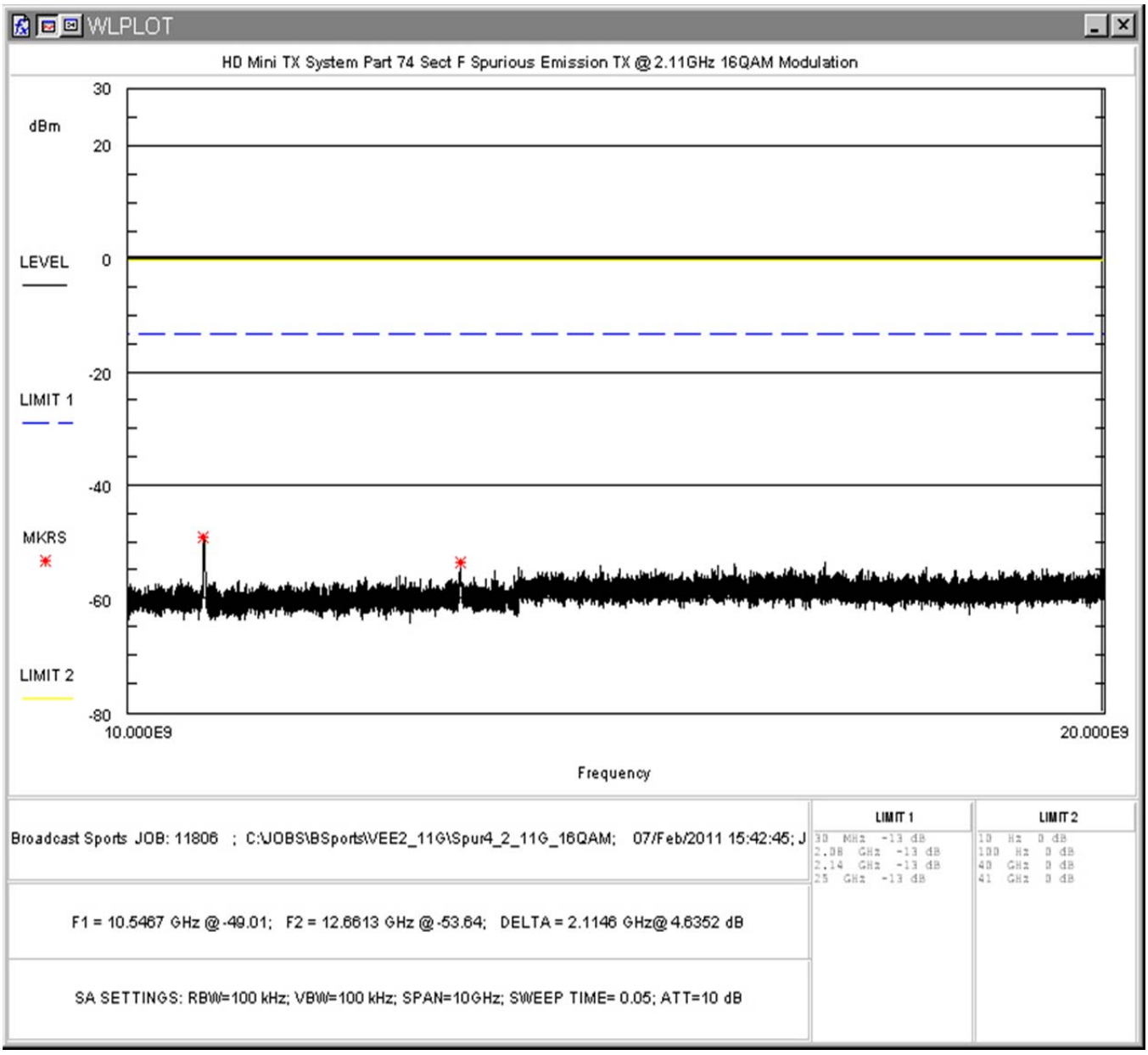

Figure 38: Spurious Emissions, 16QAM Modulation, TX @ 2110MHz, 10GHz-20GHz

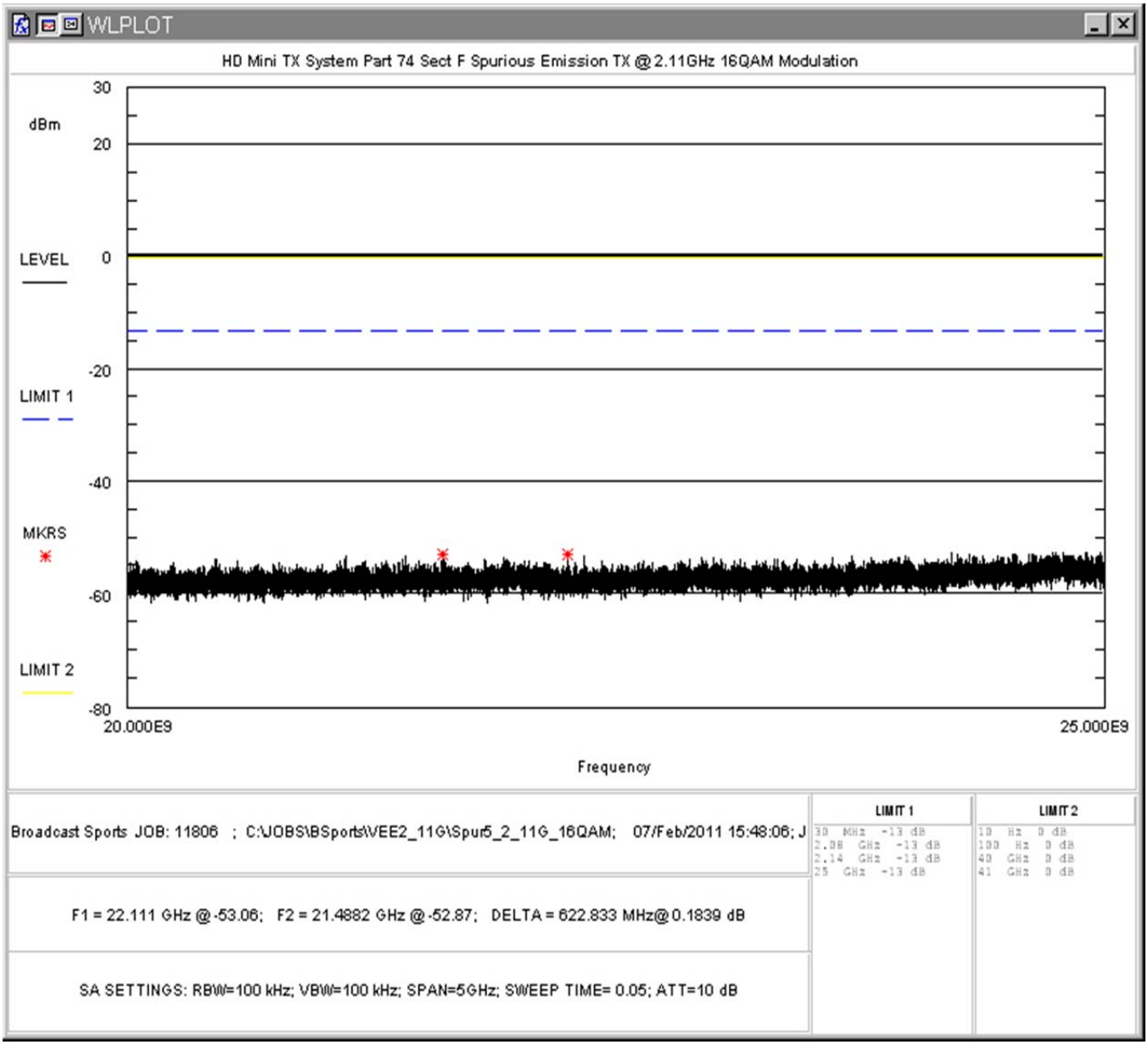

Figure 39: Spurious Emissions, 16QAM Modulation, TX @ 2110MHz, 20GHz-25GHz

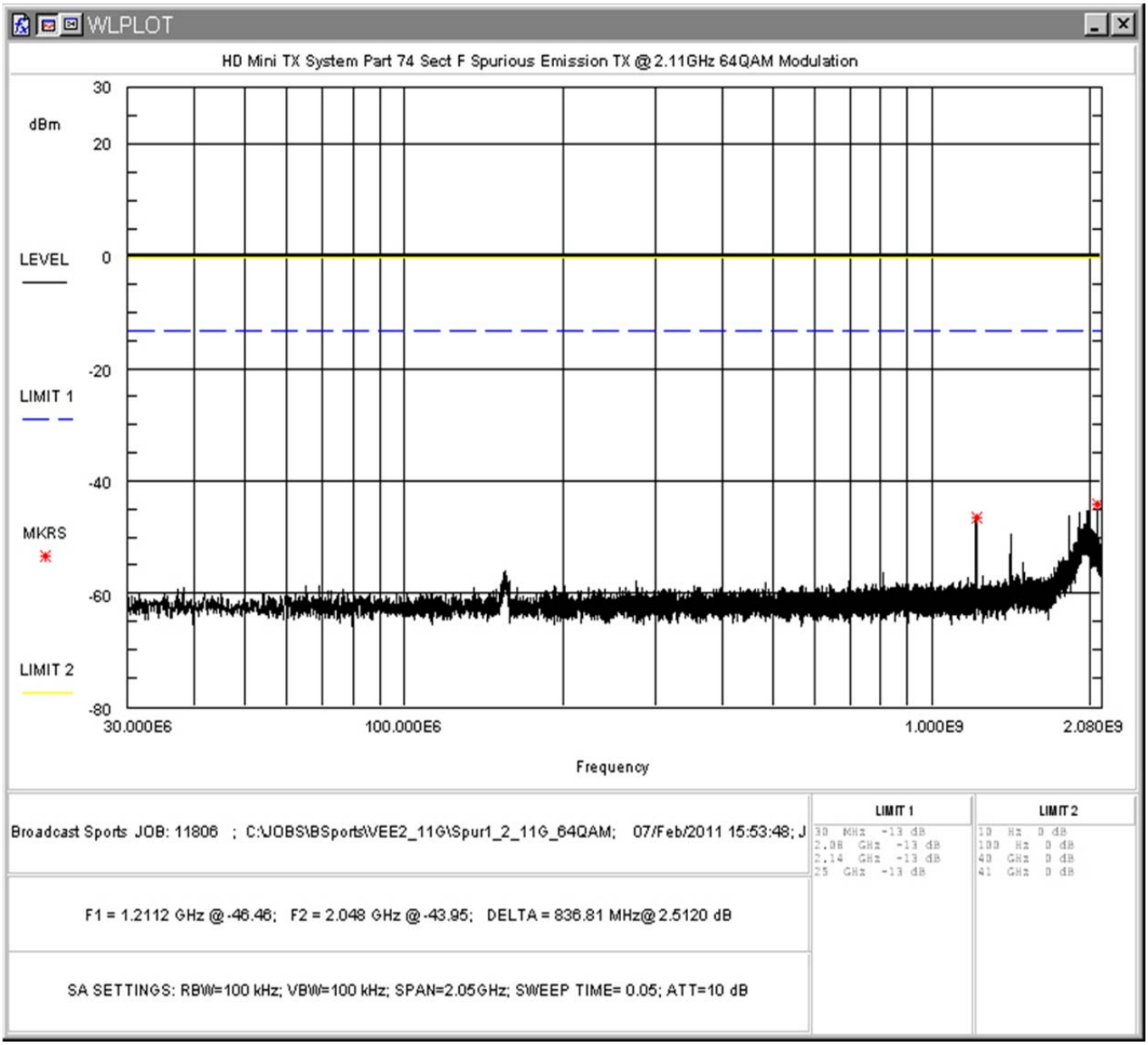

Figure 40: Spurious Emissions, 64QAM Modulation, TX @ 2110MHz, 30MHz-2080MHz

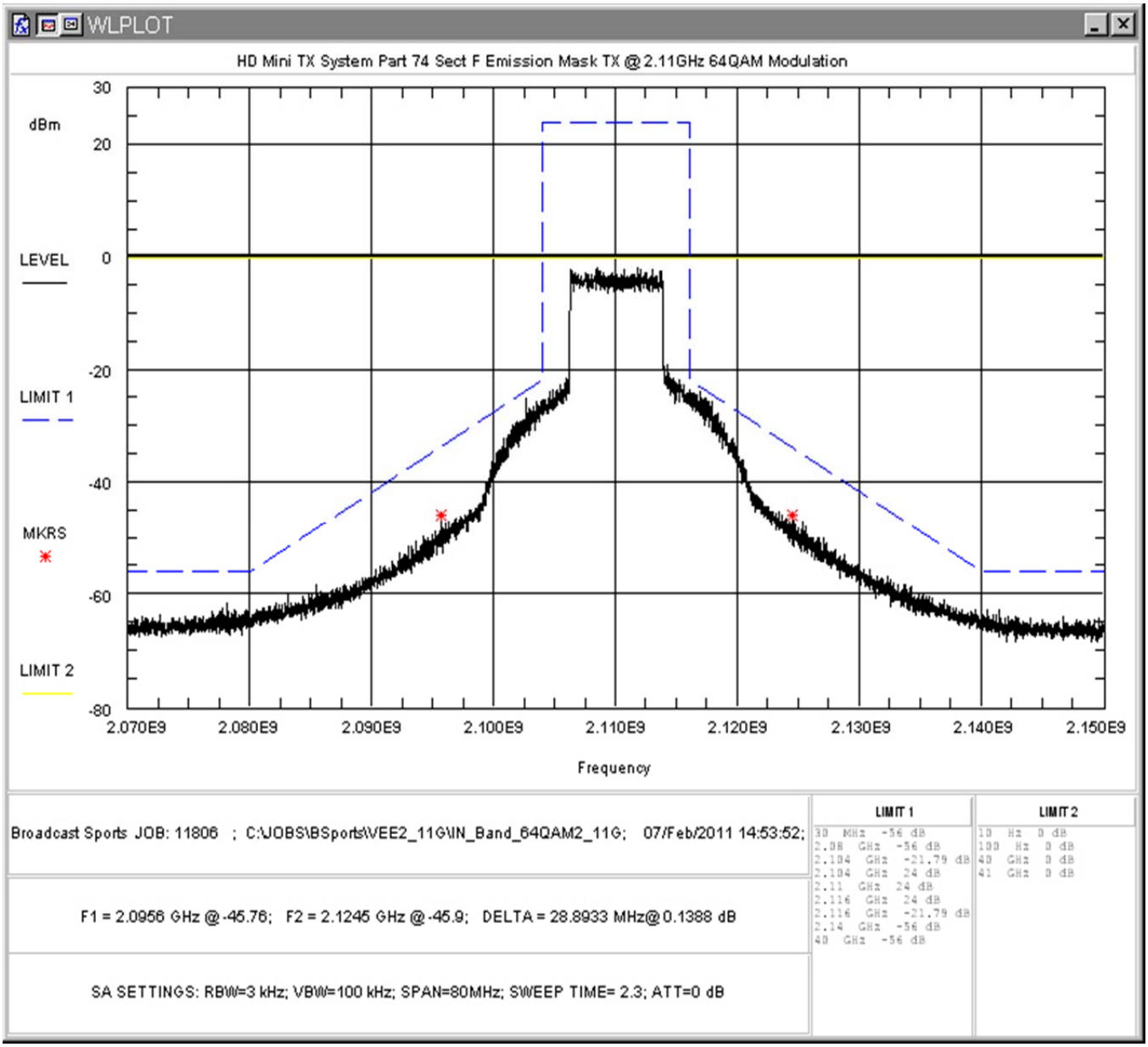

Figure 41: Spurious Emissions, 64QAM Modulation, TX @ 2110MHz, Emission Mask

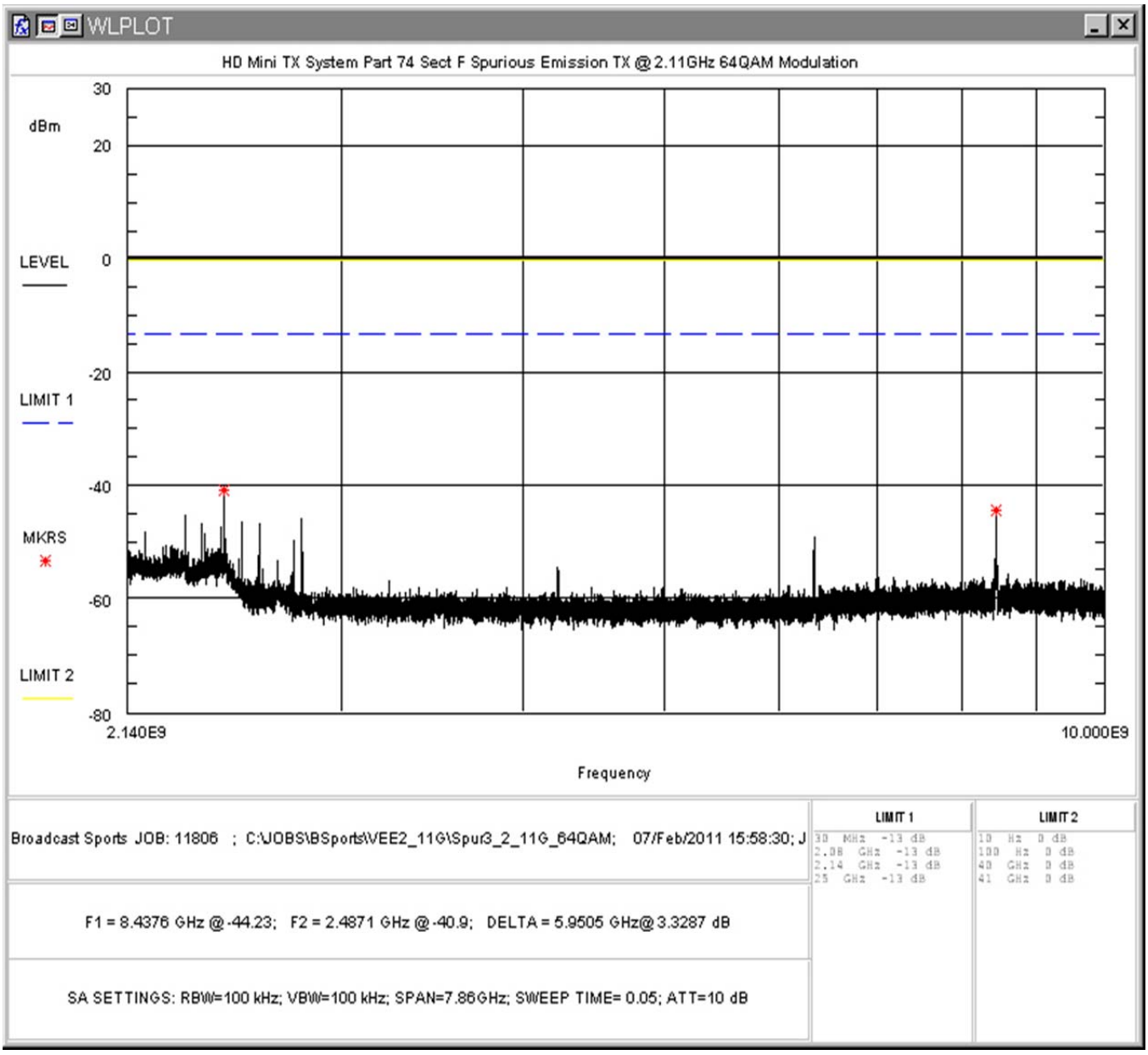

Figure 42: Spurious Emissions, 64QAM Modulation, TX @ 2110MHz, 2140MHz-10GHz

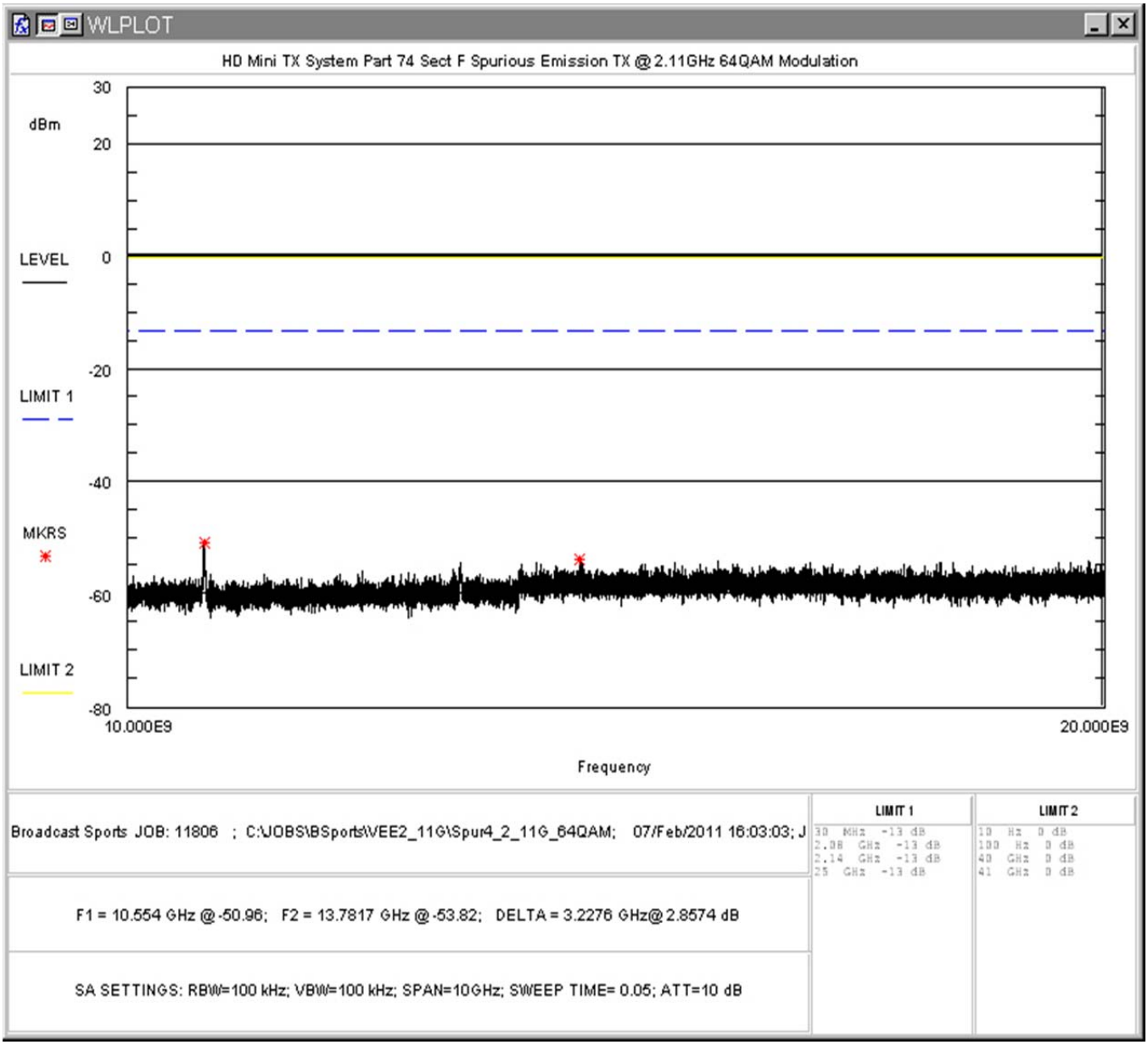

Figure 43: Spurious Emissions, 64QAM Modulation, TX @ 2110MHz, 10GHz-20GHz

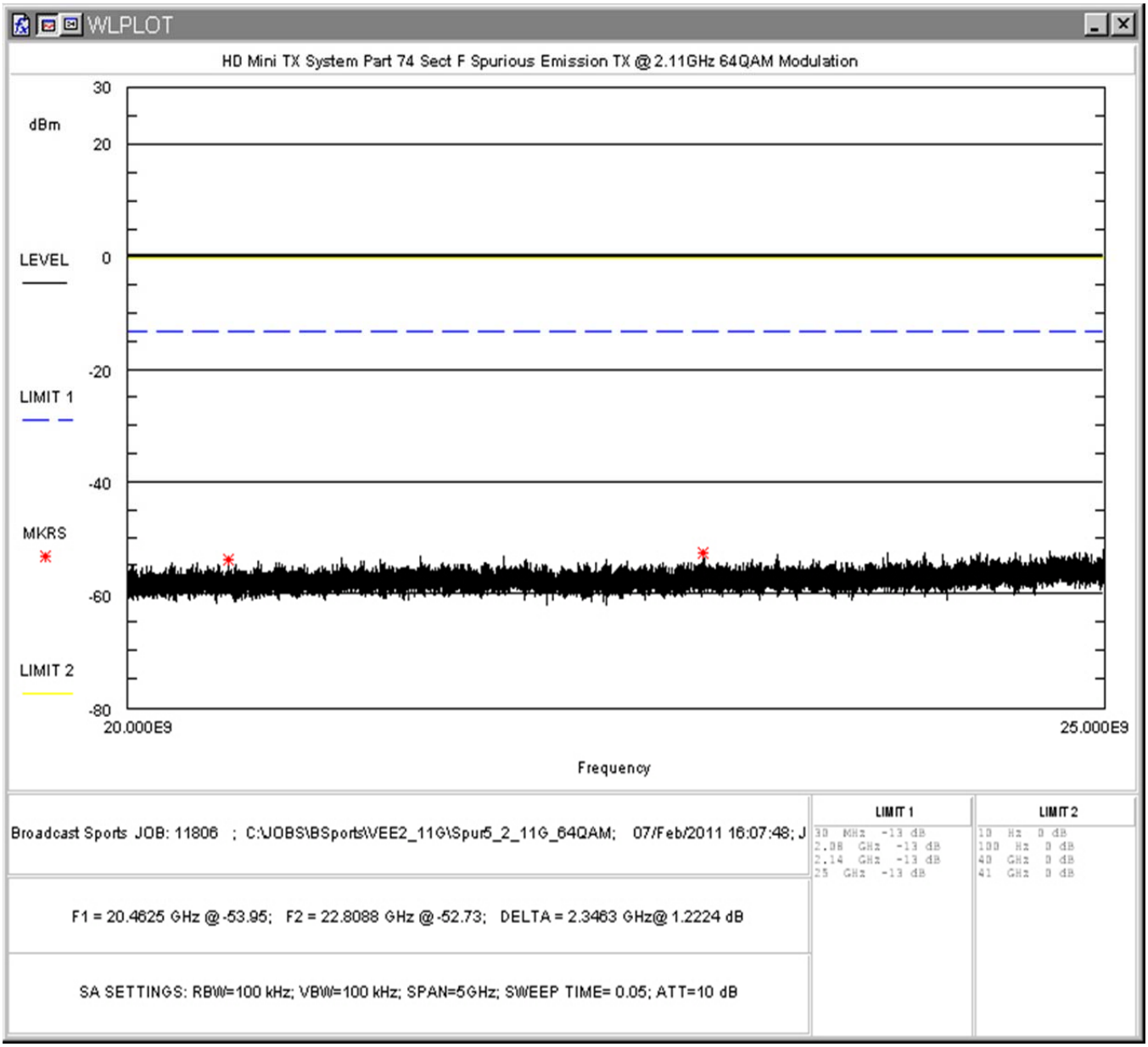

Figure 44: Spurious Emissions, 64QAM Modulation, TX @ 2110MHz, 20GHz-25GHz

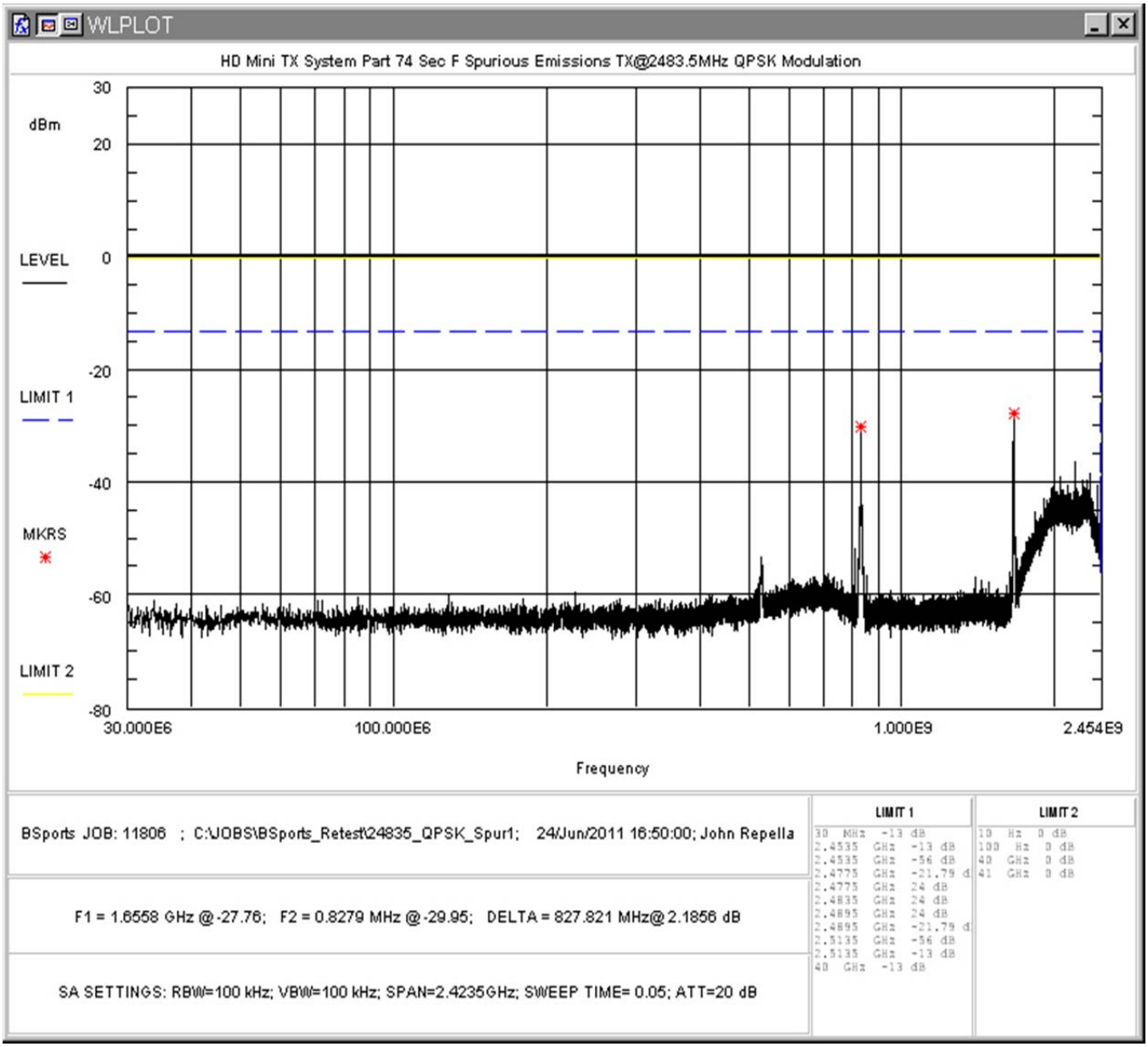

Figure 45: Spurious Emissions, QPSK Modulation, TX @ 2483.5MHz, 30MHz-2453.5MHz

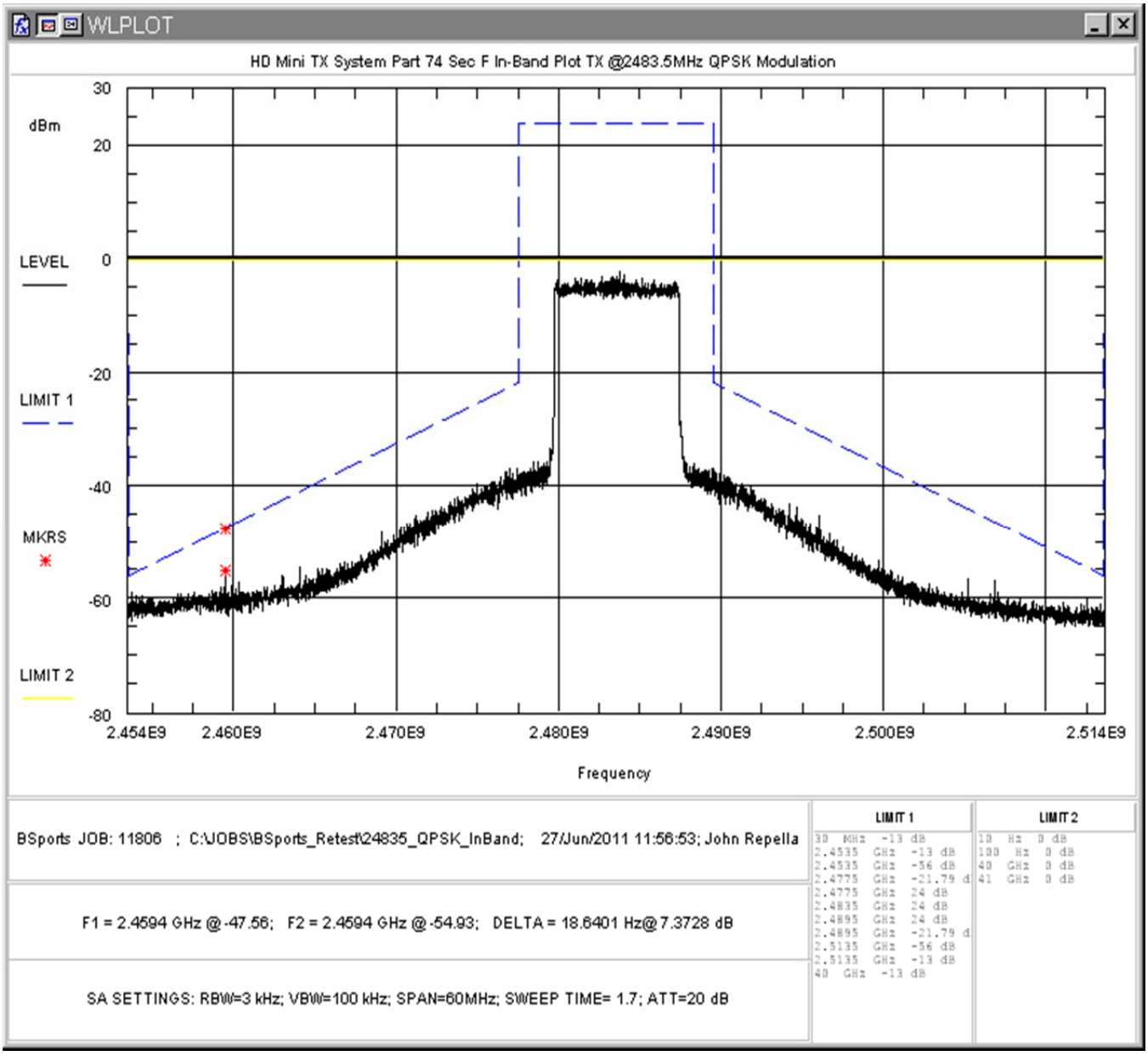

Figure 46: Spurious Emissions, QPSK Modulation, TX @ 2483.5MHz, Emission Mask

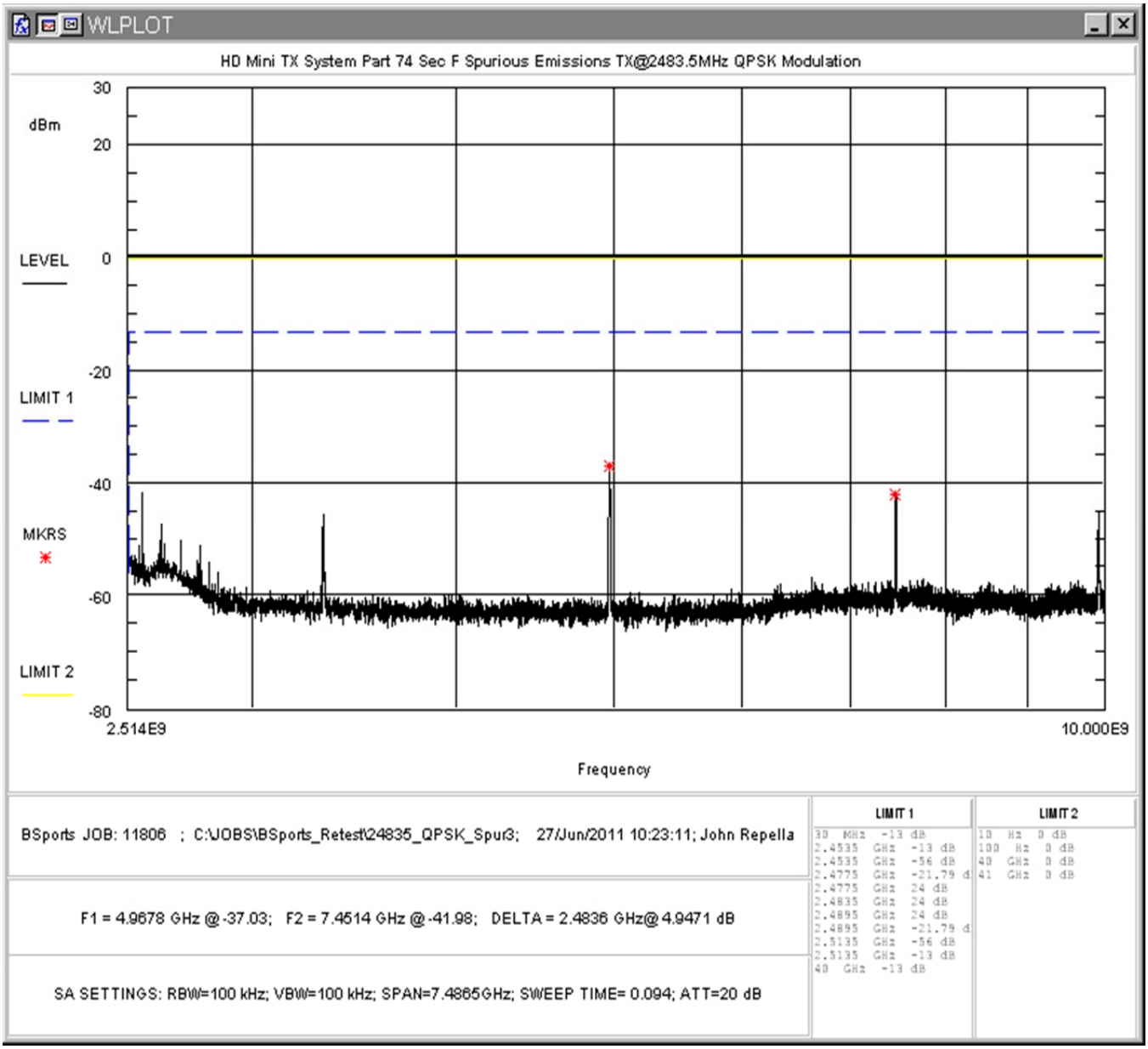

Figure 47: Spurious Emissions, QPSK Modulation, TX @ 2483.5MHz, 2513.5MHz-10GHz

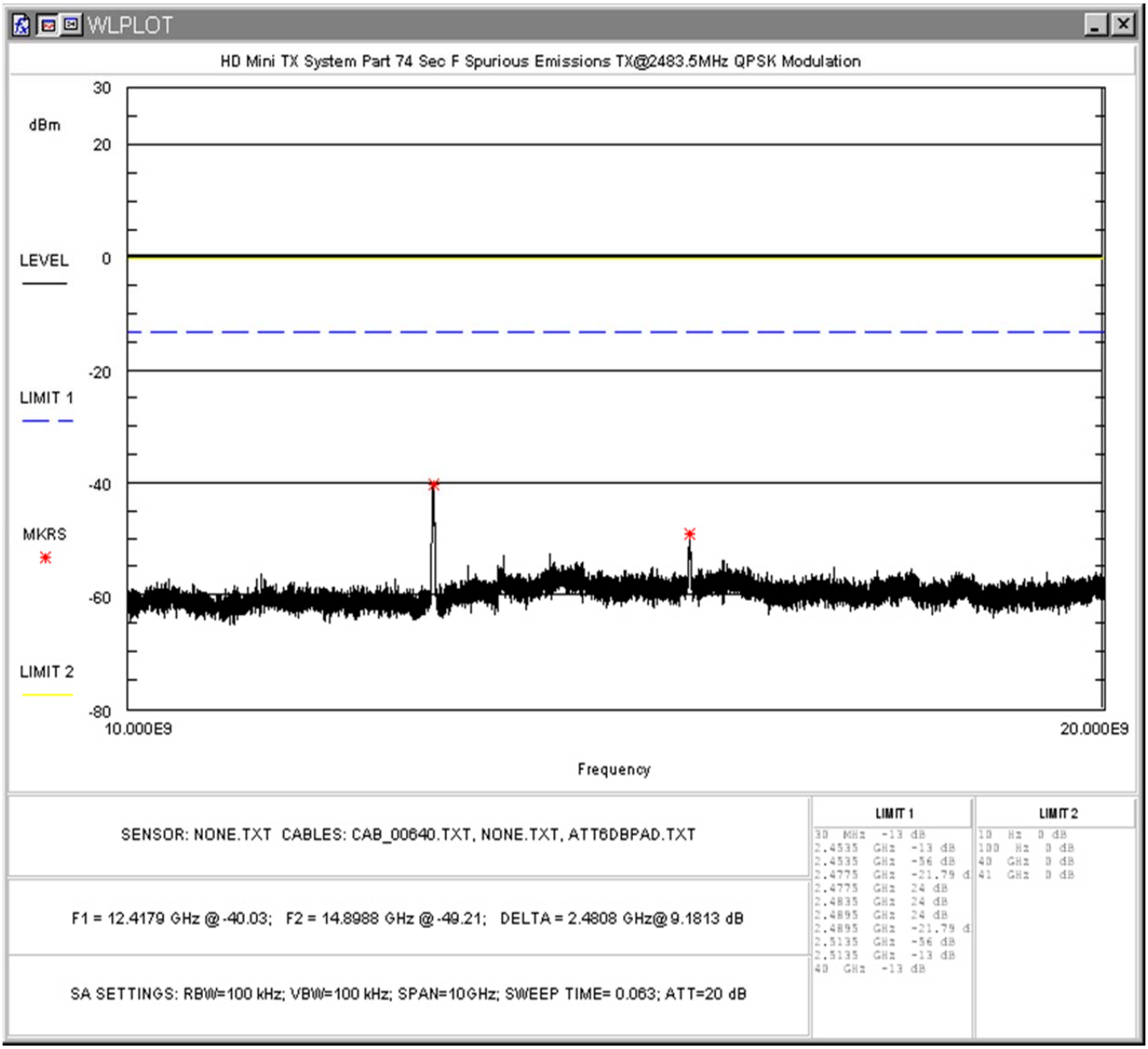

Figure 48: Spurious Emissions, QPSK Modulation, TX @ 2483.5MHz, 10GHz-20GHz

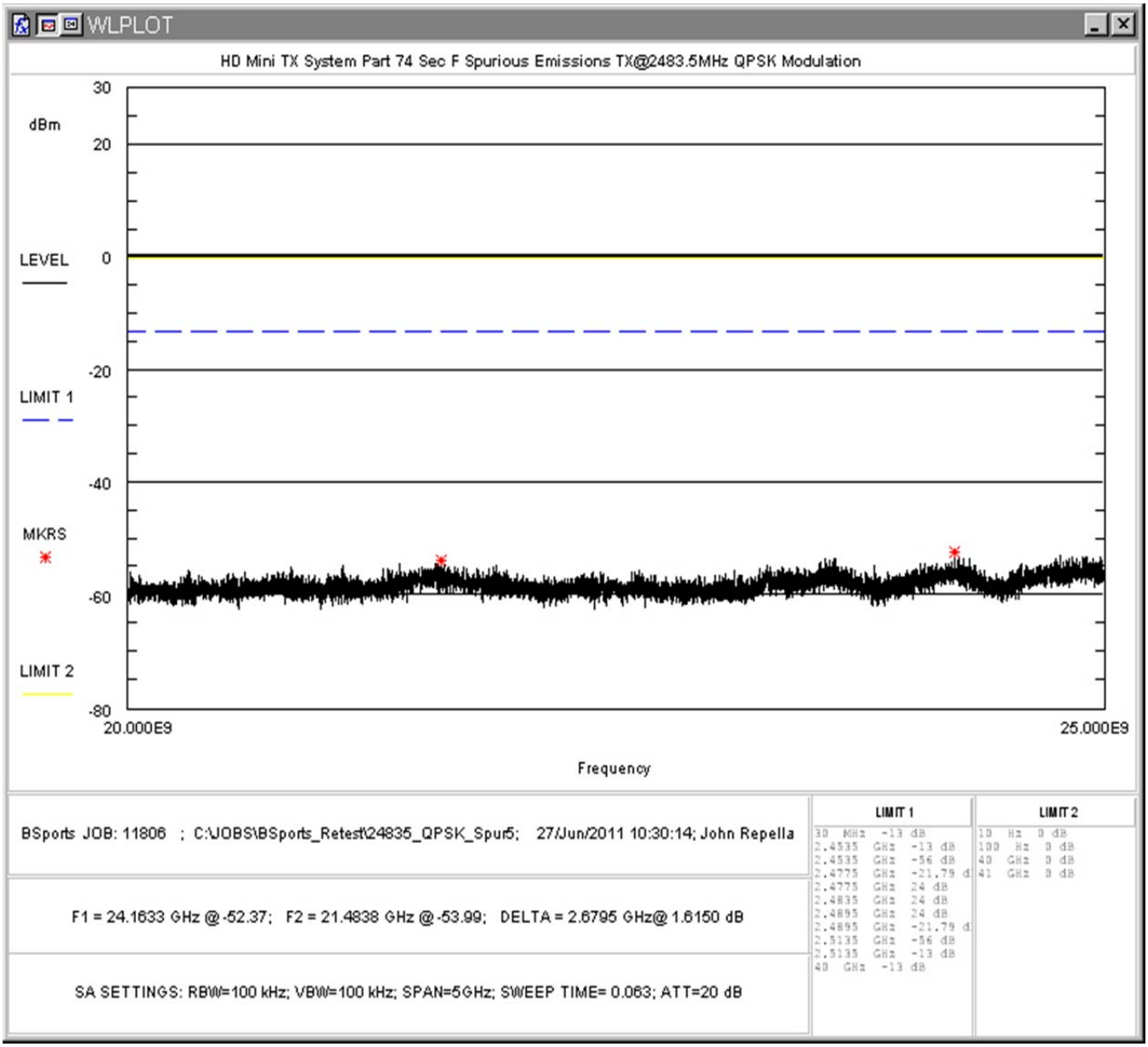

Figure 49: Spurious Emissions, QPSK Modulation, TX @ 2483.5MHz, 20GHz-25GHz

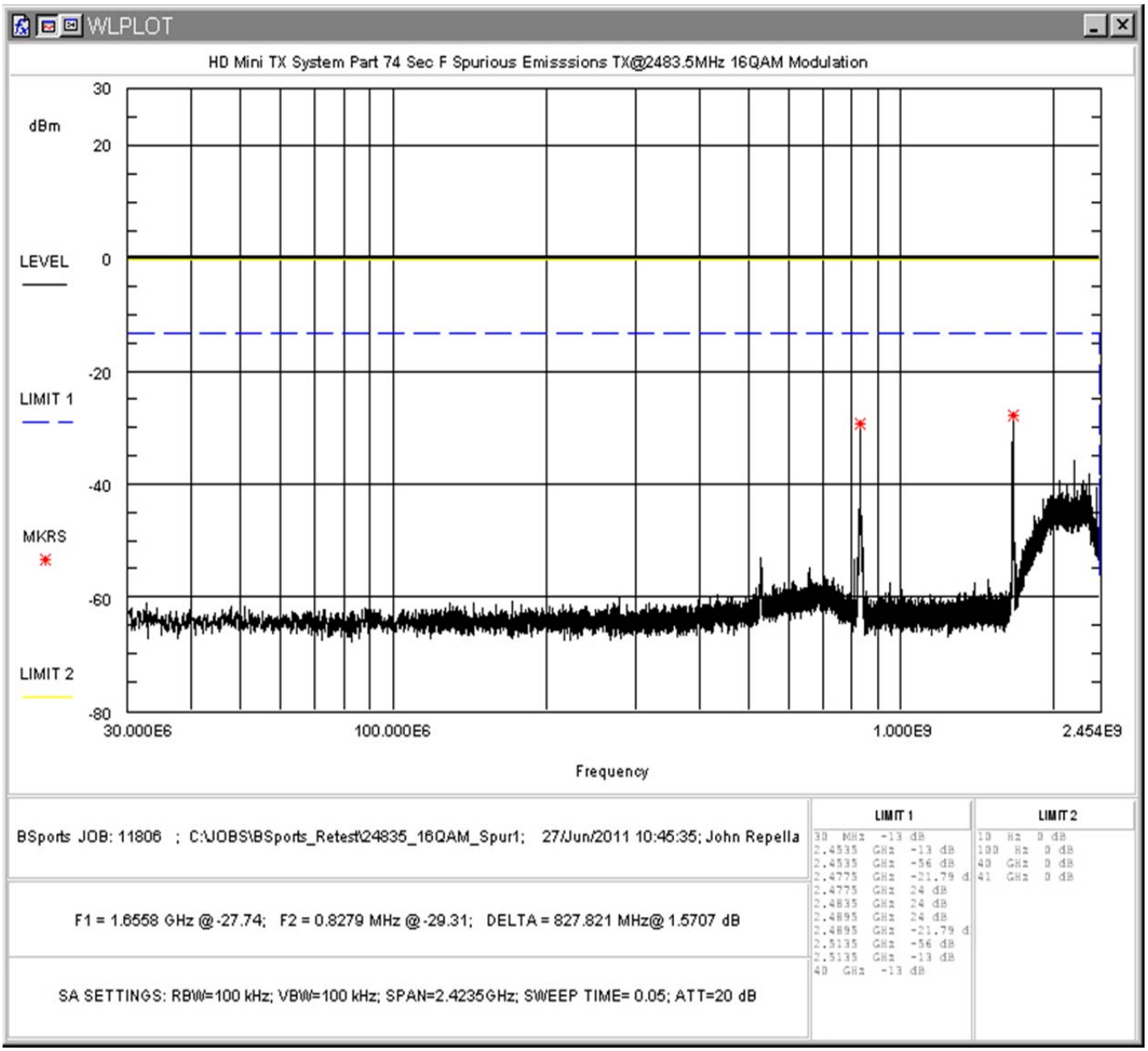

Figure 50: Spurious Emissions, 16QAM Modulation, TX @ 2483.5MHz, 30MHz-2453.5MHz

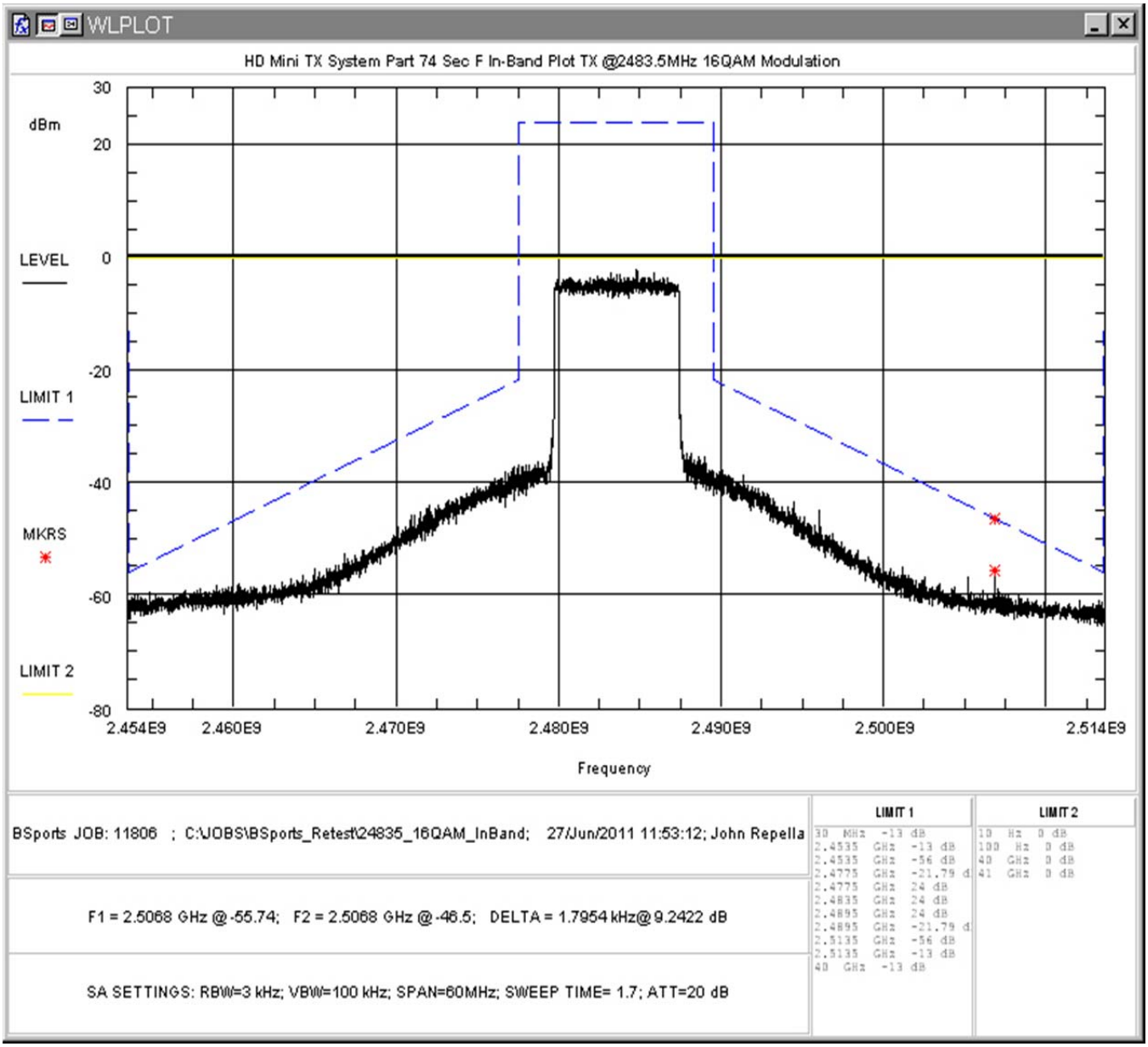

Figure 51: Spurious Emissions, 16QAM Modulation, TX @ 2483.5MHz, Emission Mask

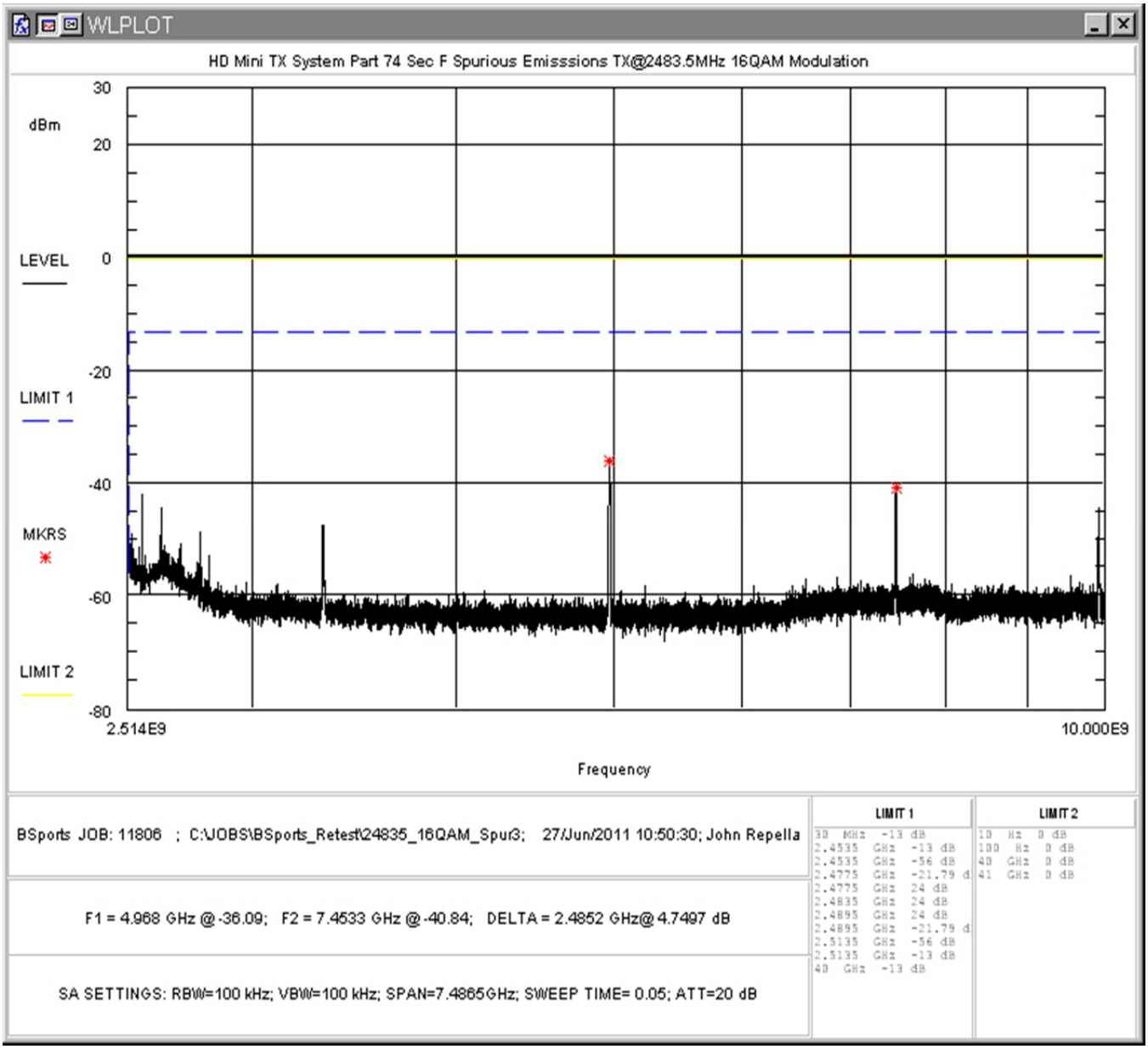

Figure 52: Spurious Emissions, 16QAM Modulation, TX @ 2483.5MHz, 2513.5MHz-10GHz

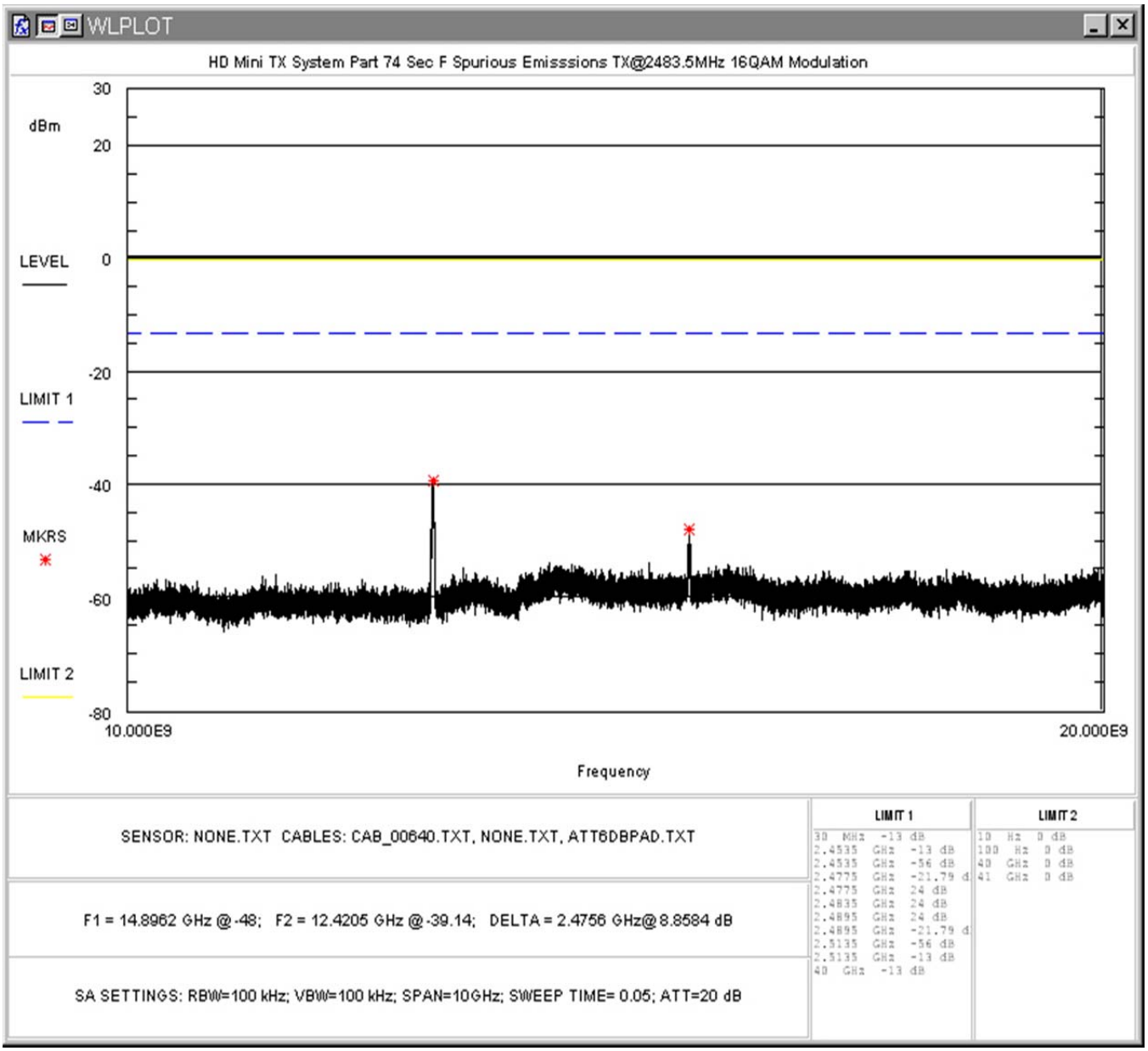

Figure 53: Spurious Emissions, 16QAM Modulation, TX @ 2483.5MHz, 10GHz-20GHz

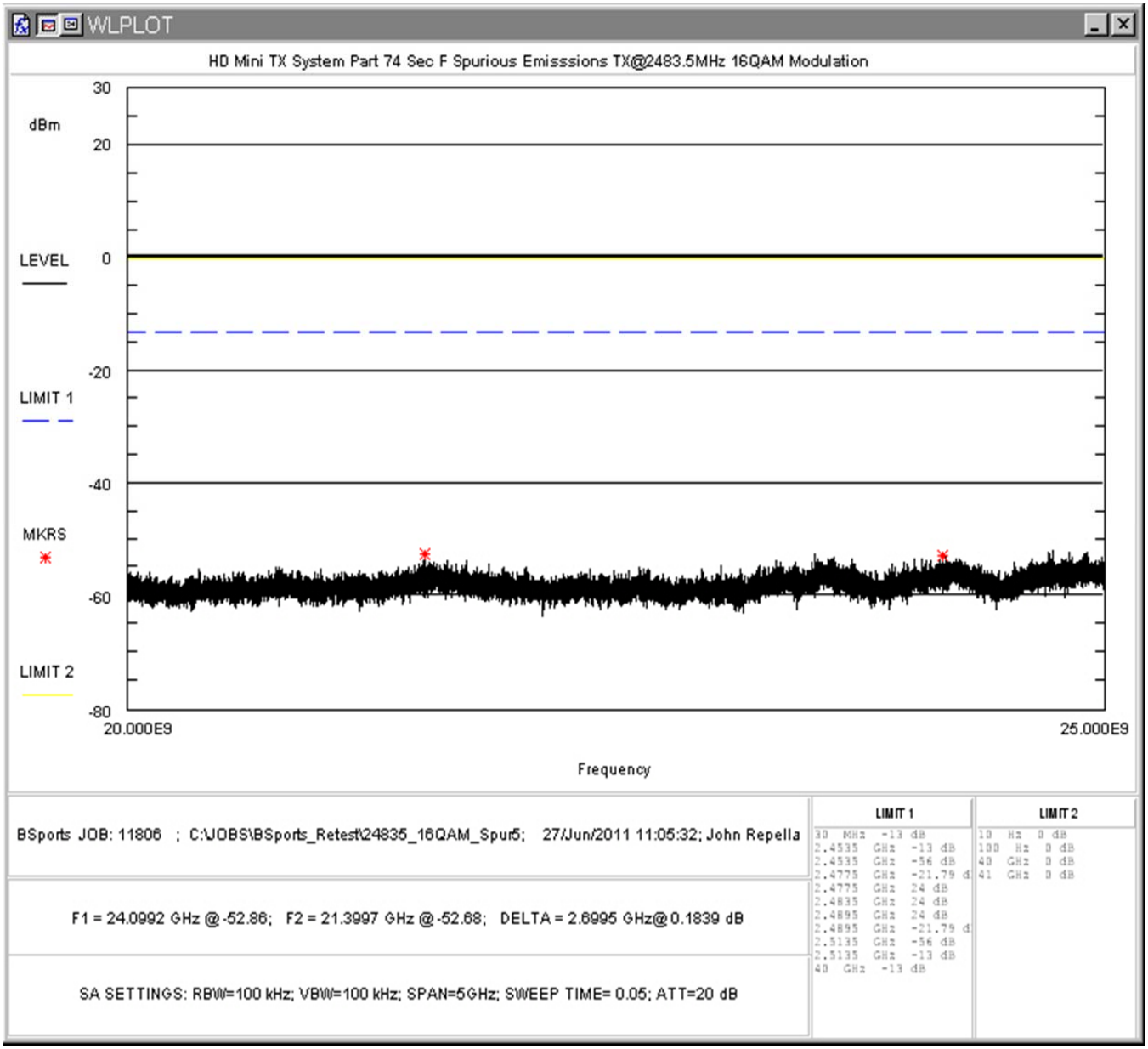

Figure 54: Spurious Emissions, 16QAM Modulation, TX @ 2483.5MHz, 20GHz-25GHz

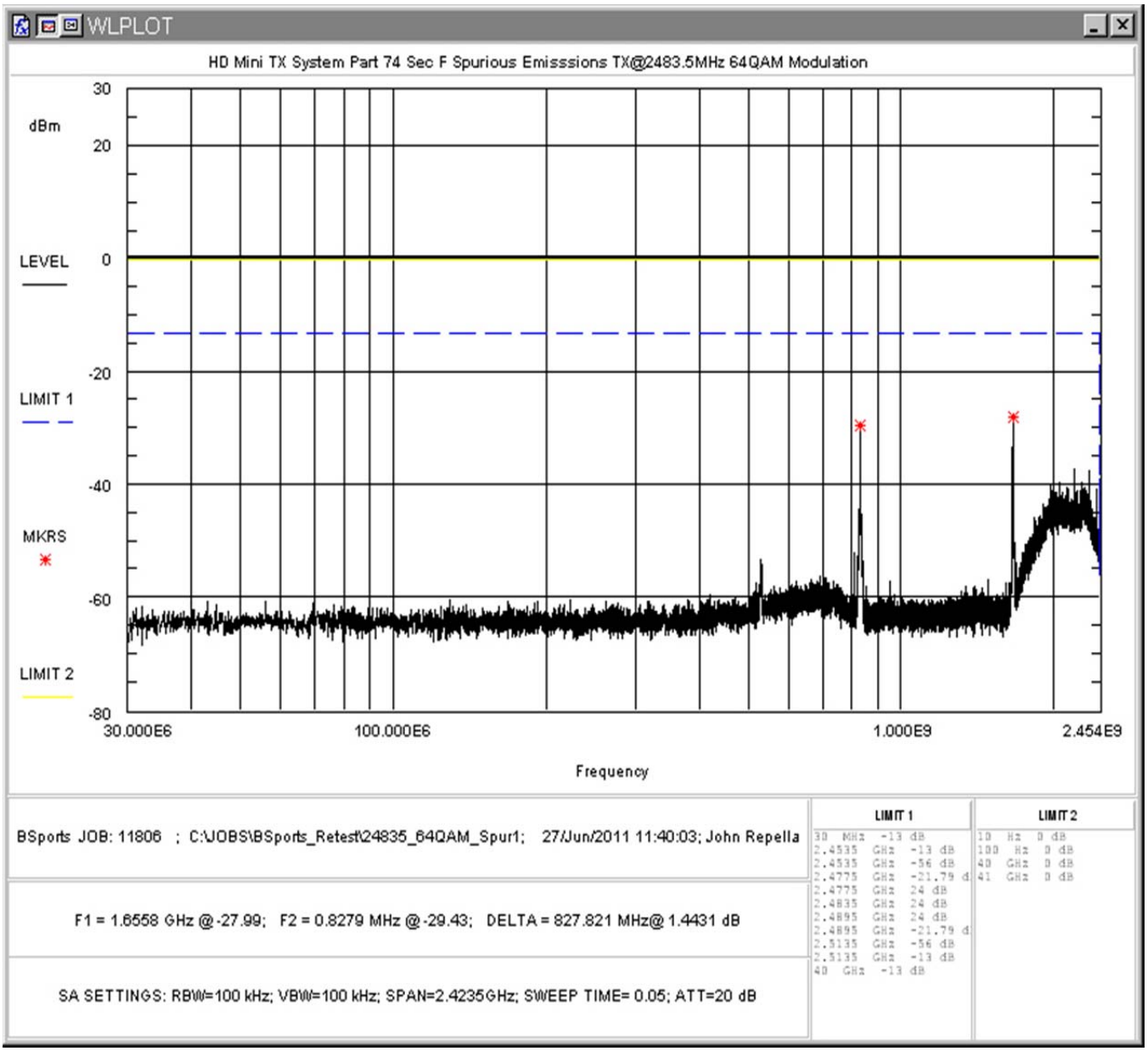

Figure 55: Spurious Emissions, 64QAM Modulation, TX @ 2483.5MHz, 30MHz-2453.5MHz

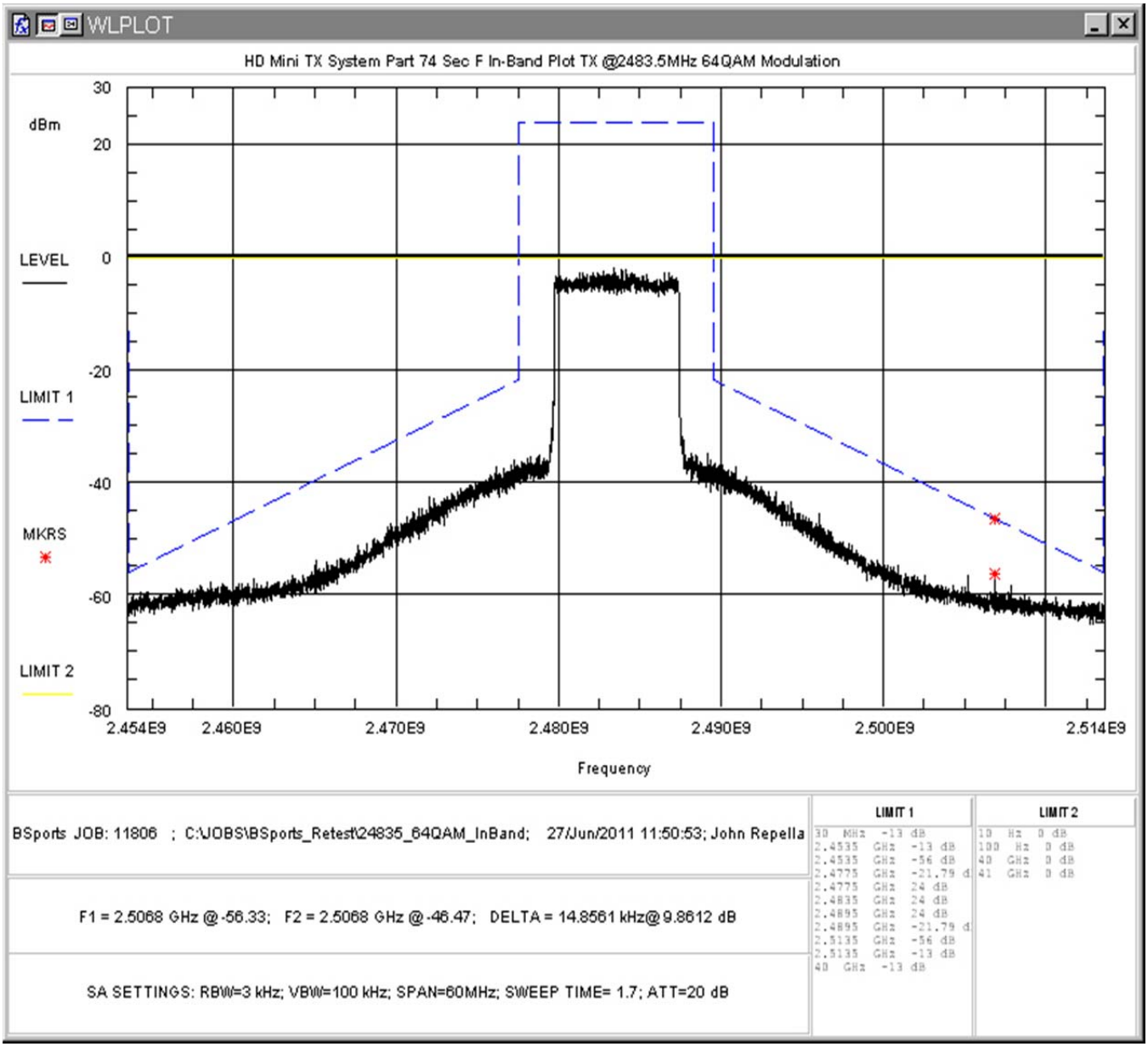

Figure 56: Spurious Emissions, 64QAM Modulation, TX @ 2483.5MHz, Emission Mask

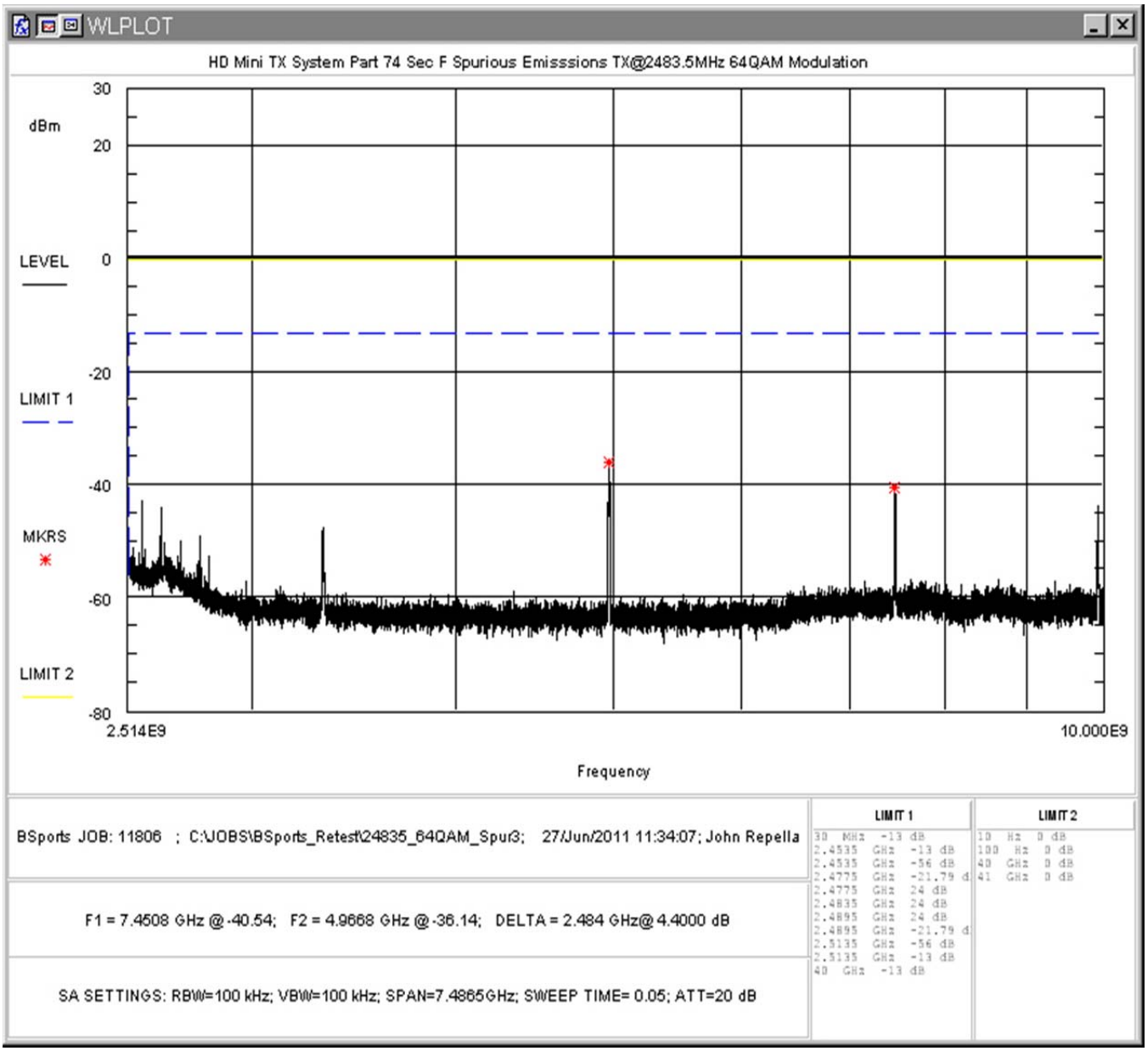

Figure 57: Spurious Emissions, 64QAM Modulation, TX @ 2483.5MHz, 2513.5MHz-10GHz

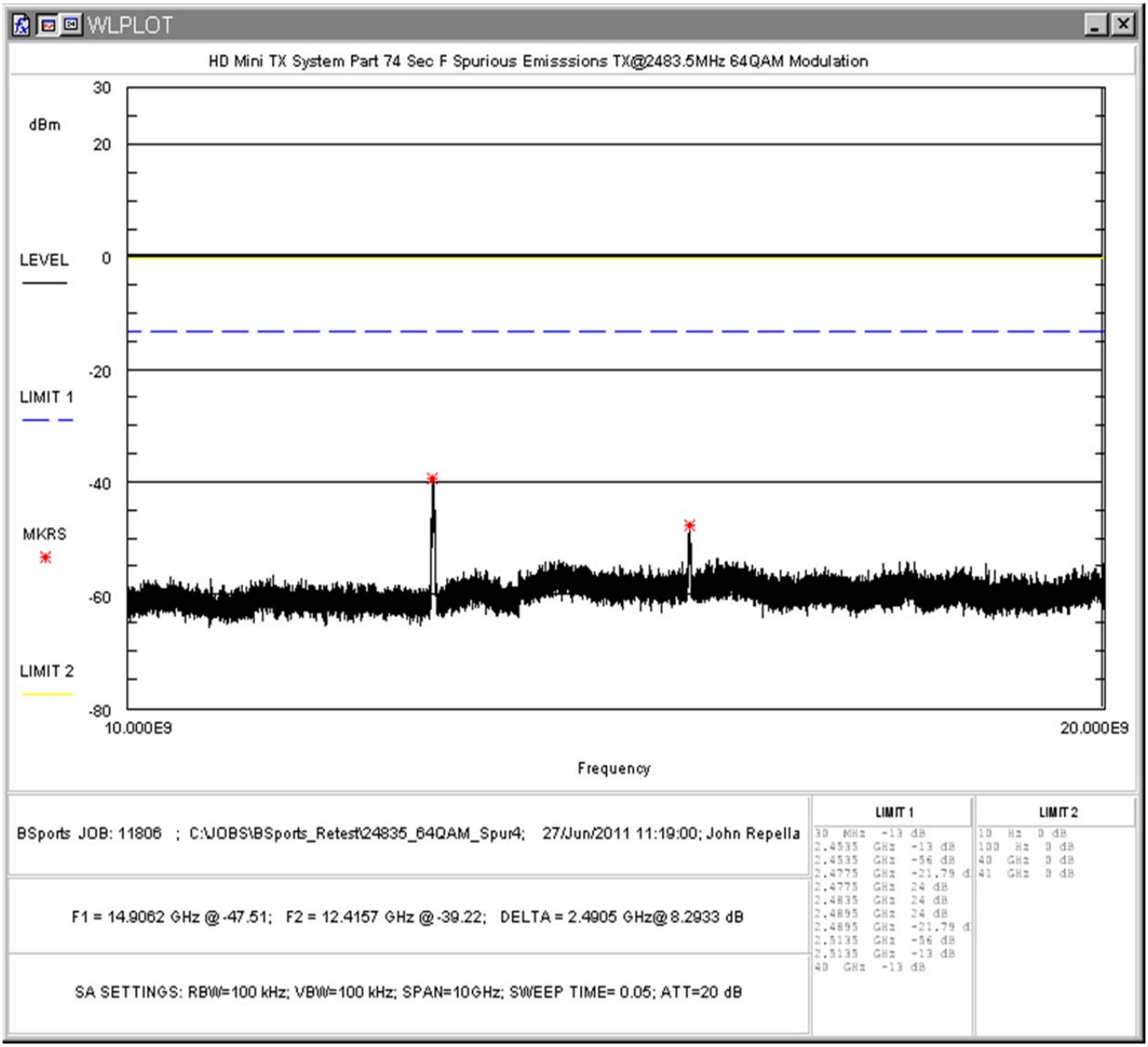

Figure 58: Spurious Emissions, 64QAM Modulation, TX @ 2483.5MHz, 10GHz-20GHz

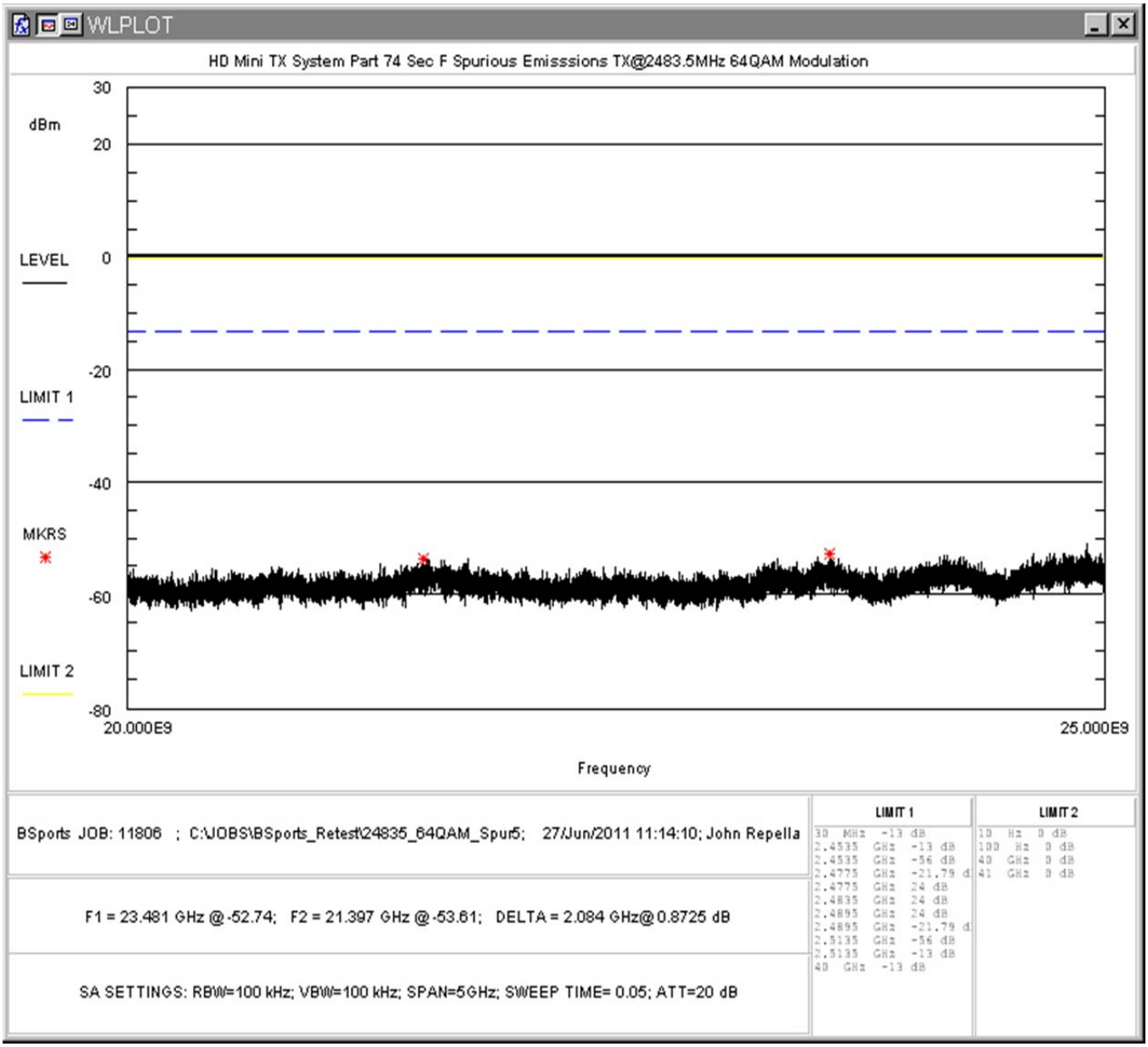

Figure 59: Spurious Emissions, 64QAM Modulation, TX @ 2483.5MHz, 20GHz-25GHz

4.4 Radiated Spurious Emissions (EIRP): (FCC Part §2.1053)

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 C63.4-2001. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The Effective Isotropic Radiated Power (EIRP) levels were measured and were compared with the limit of –13dBm per FCC Part 74. The limit of -13dB is derived from the formula of 43+10 log (P) dB per §74.637(a)(3).

Emissions were measured for a Low Channel 2025MHz, a middle channel 2110MHz and a high channel 2483.5MHz representing channels across the operating band and falling within the specific frequency range of Part 74F. Emissions were scanned up to the 10^{th} harmonic of the fundamental. Worst case measurements are reported. The signal substitution method was used to obtain EIRP levels.

4.4.1 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.

Where emissions were detected, the EIRP levels were determined using the method of signal substitution. The measurement bandwidth used was set to 3 kHz. A 1.25dB correction was added to the spectrum analyzer signal level for referencing to the specification bandwidth of 4 kHz. The actual EIRP level was calculated as follows.

EIRP (dBm) = Signal generator substitution level (dBm) + Antenna Gain (dBi)

4.4.2 Test Results

Table 9: Radiated Emission Test Data, TX @ 2.0GHz

Frequency (MHz)	Polarity	Azimuth	Ant. Height (m)	Spurious Level (dBuV)	Sub. Sig. Gen. Level (dBm)	Sub. Power Level (dBm)	Sub. Ant. Factor (dB)	Sub. Ant. Gain (dB)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)
4000.00	V	45.0	2.2	64.88	-38.2	-40.8	36.6	5.7	-35.1	-13	-22.1
6000.00	V	45.0	2.2	59.91	-43.2	-46.6	39.5	6.3	-40.3	-13	-27.3
8000.00	V	45.0	2.2	51.81	-49.5	-54.6	42.4	5.8	-48.7	-13	-35.7
10000.00	V	45.0	2.2	47.50	-44.5	-50.9	44.5	5.7	-45.2	-13	-32.2
4000.00	H	0.0	2.6	60.3	-42.1	-44.7	36.6	5.7	-39.0	-13	-26.0
6000.00	H	0.0	2.6	55.2	-45.4	-48.8	39.5	6.3	-42.5	-13	-29.5
8000.00	H	0.0	2.6	45.6	-51.2	-56.3	42.4	5.8	-50.4	-13	-37.4
10000.00	H	0.0	2.6	44.7	-47.8	-54.2	44.5	5.7	-48.5	-13	-35.5

Table 10: Radiated Emission Test Data, TX @ 2.11GHz

Frequency (MHz)	Polarity	Azimuth	Ant. Height (m)	Spurious Level (dBuV)	Sub. Sig. Gen. Level (dBm)	Sub. Power Level (dBm)	Sub. Ant. Factor (dB)	Sub. Ant. Gain (dB)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)
4220.00	V	45.0	2.1	47.3	-48.5	-51.1	36.5	6.3	-44.8	-13	-31.8
6335.00	V	45.0	2.1	49.8	-44.6	-48.3	39.3	7.0	-41.3	-13	-28.3
8437.00	V	45.0	2.1	53.2	-36.4	-41.8	43.6	5.1	-36.7	-13	-23.7
10546.00	V	45.0	2.1	48.4	-38.2	-44.9	45.3	5.4	-39.5	-13	-26.5
4220.00	H	0.0	2.6	45.3	-49.5	-52.1	36.5	6.3	-45.8	-13	-32.8
6330.00	H	0.0	2.6	47.2	-41.3	-45.0	39.3	7.0	-38.0	-13	-25.0
8440.00	H	0.0	2.6	50.8	-31.6	-37.0	43.7	5.1	-31.9	-13	-18.9
10550.00	H	0.0	2.6	44.2	-41.4	-48.1	45.3	5.4	-42.7	-13	-29.7

Table 11: Radiated Emission Test Data, TX @ 2.496GHz

Frequency (MHz)	Polarity	Azimuth	Ant. Height (m)	Spurious Level (dBuV)	Sub. Sig. Gen. Level (dBm)	Sub. Power Level (dBm)	Sub. Ant. Factor (dB)	Sub. Ant. Gain (dB)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)
4992.00	V	45.0	2.3	62.4	-35.2	-38.0	36.9	7.3	-30.7	-13	-17.7
7488.00	V	45.0	2.3	58.09	-33.5	-38.2	40.2	7.5	-30.7	-13	-17.7
9984.00	V	45.0	2.3	55.03	-38.41	-44.8	44.5	5.7	-39.1	-13	-26.1
12480.00	V	45.0	2.3	60.11	-28.14	-35.8	47.4	4.7	-31.1	-13	-18.1
4992.00	H	0.0	2.8	59.5	-37.5	-40.3	36.9	7.3	-33.0	-13	-20.0
7488.00	H	0.0	2.8	51.8	-42.5	-47.2	40.2	7.5	-39.7	-13	-26.7
9984.00	H	0.0	2.8	48.5	-44.5	-50.9	44.5	5.7	-45.2	-13	-32.2
12480.00	H	0.0	2.8	54.7	-30.1	-37.8	47.4	4.7	-33.1	-13	-20.1

4.5 Frequency Stability: (FCC Part §2.1055)

Frequency as a function of temperature and voltage variation shall be maintained within the FCC-prescribed tolerances.

The temperature stability was measured with the unit in an environmental chamber used to vary the temperature of the sample. The sample was held at each temperature step to allow the temperature of the sample to stabilize.

The EUT is powered by DC voltage supplied externally. The manufacturer's power requirements for the EUT include the following:

Low DC Voltage of 10 VDC (manufacturer's specification)

High DC Voltage of 13.8VDC (manufacturer's specifications)

The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -30°C to +50°C. The carrier frequency was measured while the EUT was in the temperature chamber. The reference frequency of the EUT was measured at the ambient room temperature with the frequency counter.

Two limits were evaluated which are dependent on the frequency band of operation. In the frequency range 2.0-2.11GHz a frequency tolerance of 0.001% must be maintained. In the frequency range 2.45-2.4835GHz a frequency tolerance of 0.005% must be maintained.

4.5.1 Test Procedure

The temperature stability was measured with the unit in an environmental chamber used to vary the temperature of the sample. The sample was held at each temperature step to allow the temperature of the sample to stabilize.

The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -30°C to +50°C. The carrier frequency was measured while the EUT was in the temperature chamber. The reference frequency of the EUT was measured at the ambient room temperature with the frequency counter.

4.5.2 Test Results

The EUT complies with the temperature stability requirements of FCC Part §2.1055. Test results are given in Tables 12-15.

Table 12: Frequency Stability Test Data TX @2110MHz

QPSK

Temperature (Centigrade)	Frequency (MHz)	Difference (Hz)	Deviation (%)
Ambient	2109.999213	0.0	0
-30	2109.999422	209.0	0.000010
-20	2109.999151	-62.0	0.000003
-10	2109.998774	-439.0	0.000021
0	2109.996278	-2935.0	0.000139
10	2109.995896	-3317.0	0.000157
20	2109.999205	-8.0	0.000000
30	2109.999695	482.0	0.000023
40	2109.996984	-2229.0	0.000106
50	2109.996523	-2690.0	0.000127

16QAM

Temperature (Centigrade)	Frequency (MHz)	Difference (Hz)	Deviation (%)
Ambient	2109.999327	0.0	0
-30	2109.999321	-6.0	0.000000
-20	2109.999251	-76.0	0.000004
-10	2109.998424	-903.0	0.000043
0	2109.996724	-2603.0	0.000123
10	2109.995758	-3569.0	0.000169
20	2109.999872	545.0	0.000026
30	2109.998186	-1141.0	0.000054
40	2109.997510	-1817.0	0.000086
50	2109.995922	-3405.0	0.000161

64QAM

Temperature (Centigrade)	Frequency (MHz)	Difference (Hz)	Deviation (%)
Ambient	2109.999147	0.0	0
-30	2109.999091	-56.0	0.000003
-20	2109.999209	62.0	0.000003
-10	2109.998204	-943.0	0.000045
0	2109.996428	-2719.0	0.000129
10	2109.995949	-3198.0	0.000152
20	2109.999747	600.0	0.000028
30	2109.998787	-360.0	0.000017
40	2109.996542	-2605.0	0.000123
50	2109.996643	-2504.0	0.000119

Table 13: Frequency Stability Test Data (Voltage Variation) TX @2110MHz

QPSK

Voltage (Volts)	Frequency (MHz)	Difference (Hz)	Deviation (%)	Voltage (Volts)
At rated	2109.999213	0	0.0	12VDC
At 85%	2109.997834	1379	0.000065	10.9VDC
At 115%	2109.997449	1764	0.000084	13.8VDC

16QAM

Voltage (Volts)	Frequency (MHz)	Difference (Hz)	Deviation (%)	Voltage (Volts)
At rated	2109.999327	0	0.0	12VDC
At 85%	2109.997653	1674	0.000079	10.9VDC
At 115%	2109.997400	1927	0.000091	13.8VDC

64QAM

Voltage (Volts)	Frequency (MHz)	Difference (Hz)	Deviation (%)	Voltage (Volts)
At rated	2109.999147	0	0.0	12VDC
At 85%	2109.997337	1810	0.000086	10.9VDC
At 115%	2109.997611	1536	0.000073	13.8VDC

Table 14: Frequency Stability Test Data TX @2450MHz

QPSK

Temperature (Centigrade)	Frequency (MHz)	Difference (Hz)	Deviation (%)
Ambient	2450.000013	0.0	0
-30	2449.999321	-692.0	0.000028
-20	2449.999151	-862.0	0.000035
-10	2449.998774	-1239.0	0.000051
0	2449.996278	-3735.0	0.000152
10	2449.995896	-4117.0	0.000168
20	2449.999205	-808.0	0.000033
30	2449.999695	-318.0	0.000013
40	2449.996984	-3029.0	0.000124
50	2449.996523	-3490.0	0.000142

16QAM

Temperature (Centigrade)	Frequency (MHz)	Difference (Hz)	Deviation (%)
Ambient	2450.000027	0.0	0
-30	2449.999321	-706.0	0.000029
-20	2449.999251	-776.0	0.000032
-10	2449.998424	-1603.0	0.000065
0	2449.996724	-3303.0	0.000135
10	2449.995758	-4269.0	0.000174
20	2449.999872	-155.0	0.000006
30	2449.998186	-1841.0	0.000075
40	2449.997510	-2517.0	0.000103
50	2449.995922	-4105.0	0.000168

64QAM

Temperature (Centigrade)	Frequency (MHz)	Difference (Hz)	Deviation (%)
Ambient	2450.000047	0.0	0
-30	2449.999091	-956.0	0.000039
-20	2449.999209	-838.0	0.000034
-10	2449.998204	-1843.0	0.000075
0	2449.996428	-3619.0	0.000148
10	2449.995949	-4098.0	0.000167
20	2449.999747	-300.0	0.000012
30	2449.998787	-1260.0	0.000051
40	2449.996542	-3505.0	0.000143
50	2449.996643	-3404.0	0.000139

Table 15: Frequency Stability Test Data (Voltage Variation) TX @2450MHz

QPSK

Voltage (Volts)	Frequency (MHz)	Difference (Hz)	Deviation (%)	Voltage (Volts)
At rated	2450.000013	0	0.0	12VDC
At 85%	2449.997834	2179	0.000089	10.9VDC
At 115%	2449.997449	2564	0.000105	13.8VDC

16QAM

Voltage (Volts)	Frequency (MHz)	Difference (Hz)	Deviation (%)	Voltage (Volts)
At rated	2450.000027	0	0.0	12VDC
At 85%	2449.997653	2374	0.000097	10.9VDC
At 115%	2449.997400	2627	0.000107	13.8VDC

64QAM

Voltage (Volts)	Frequency (MHz)	Difference (Hz)	Deviation (%)	Voltage (Volts)
At rated	2450.000047	0	0.0	12VDC
At 85%	2449.997337	2710	0.000111	10.9VDC
At 115%	2449.997611	2436	0.000099	13.8VDC