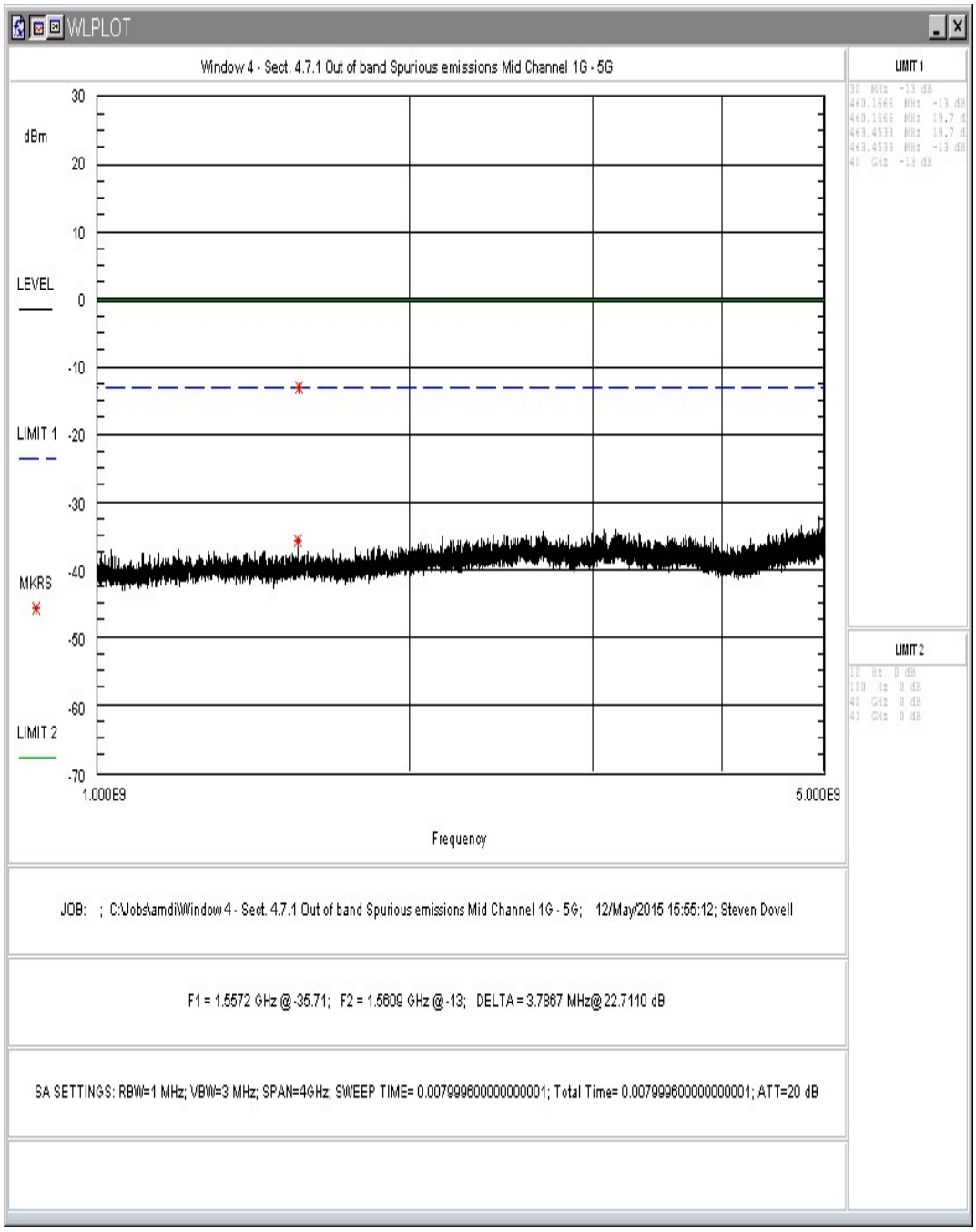

Figure 116. Window 4 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 1G - 5G

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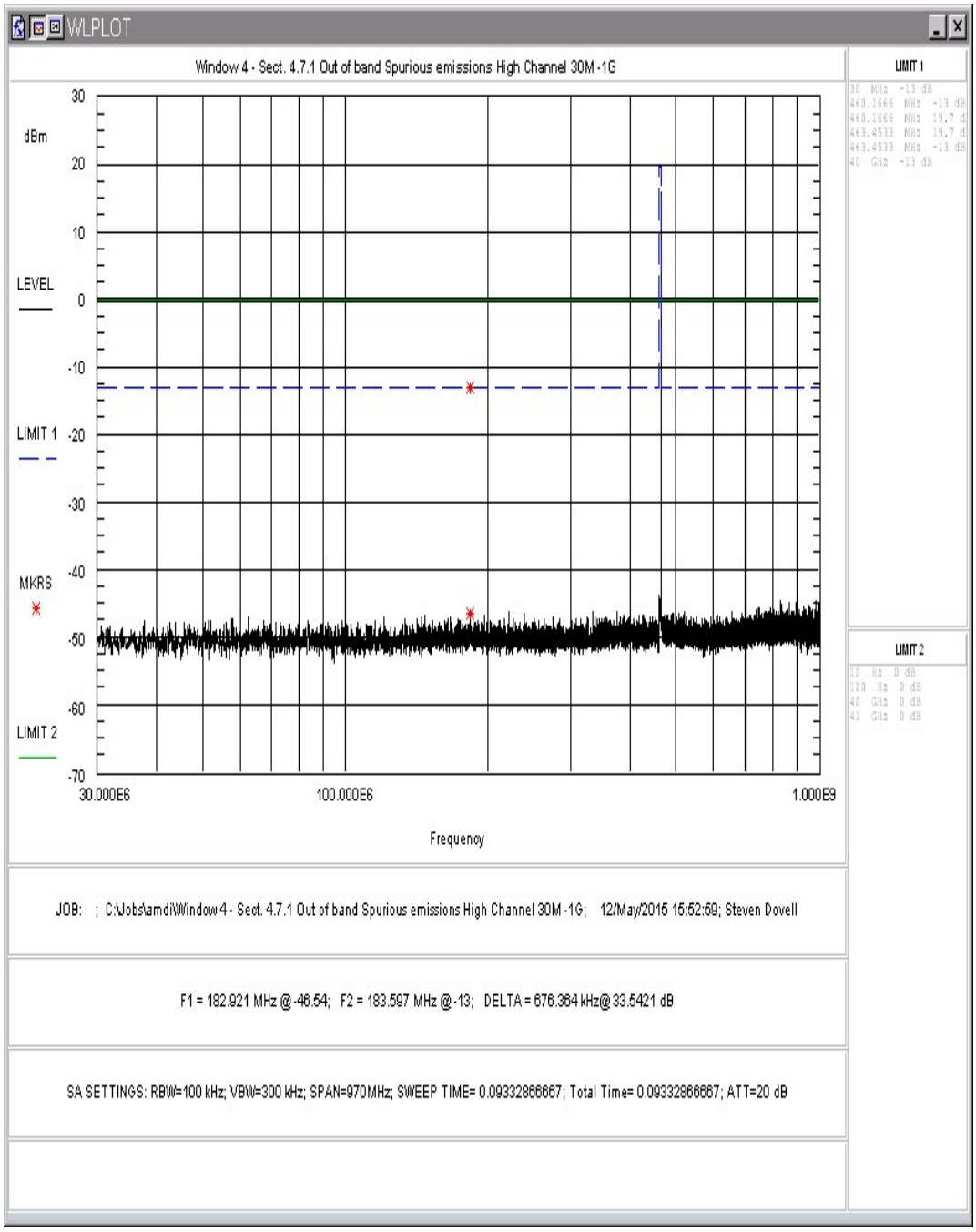

Figure 117. Window 4 - Sect. 4.7.1 Out of band Spurious emissions High Channel 30M -1G

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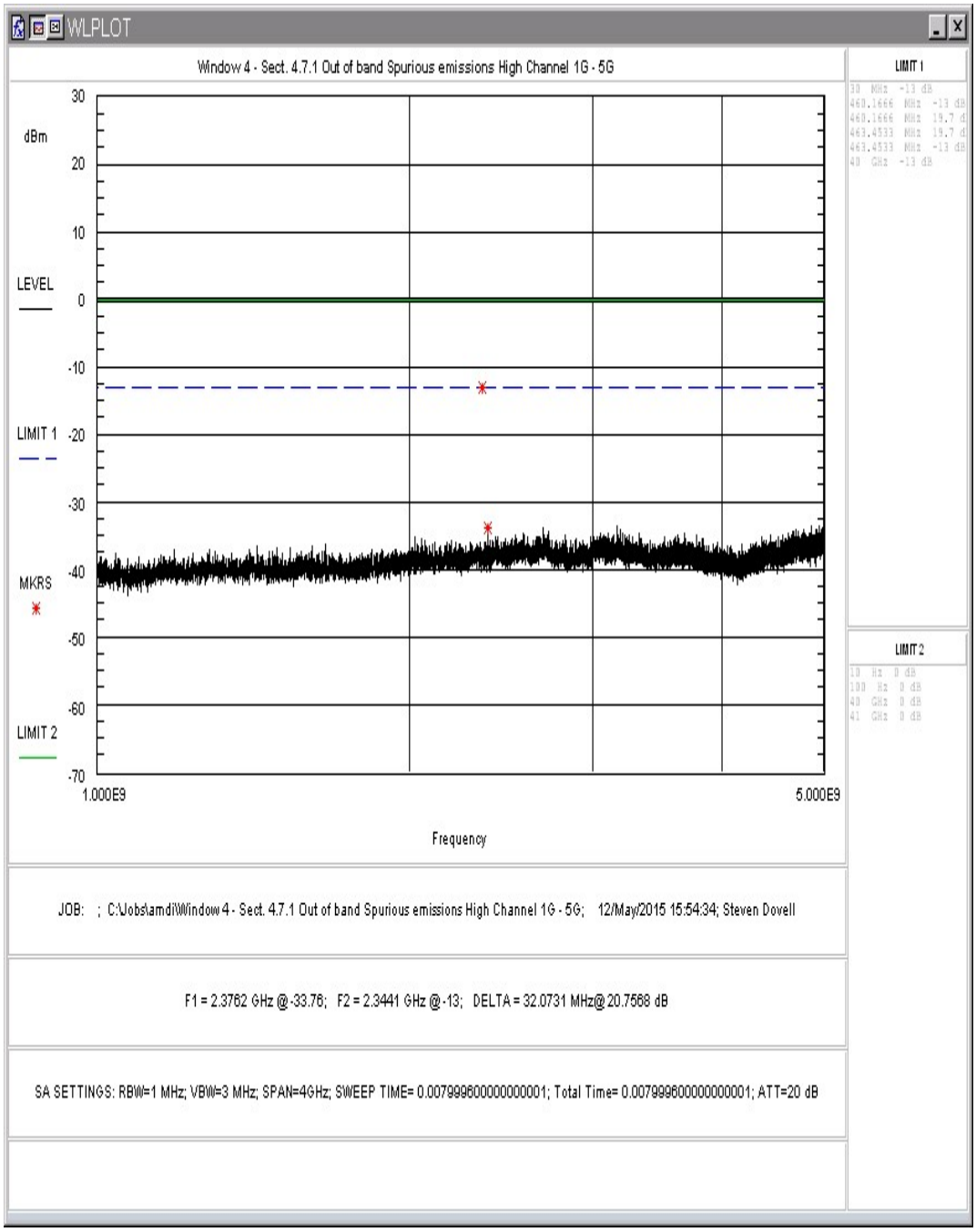

Figure 118. Window 4 - Sect. 4.7.1 Out of band Spurious emissions High Channel 1G - 5G

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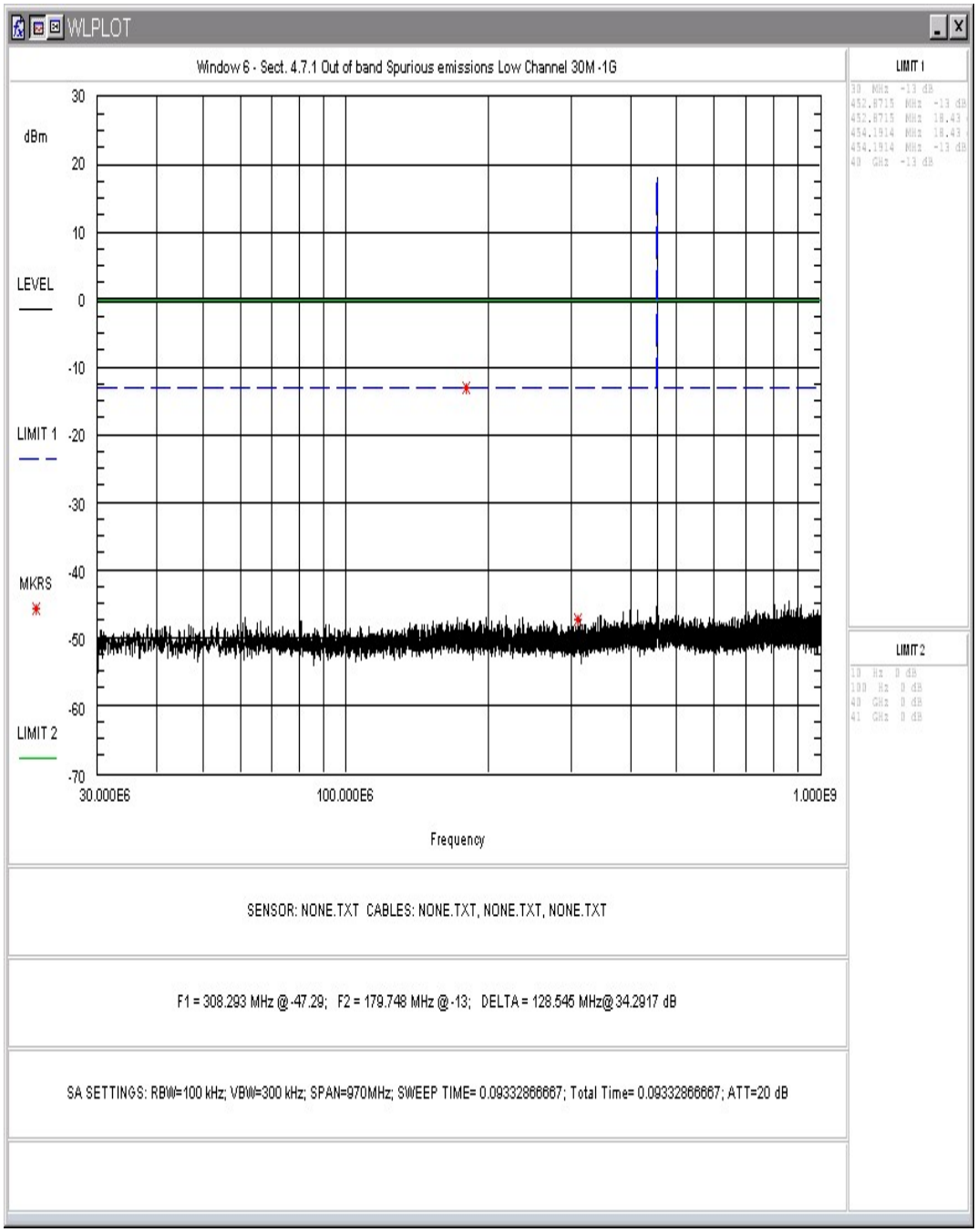

Figure 119. Window 6 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 30M -1G

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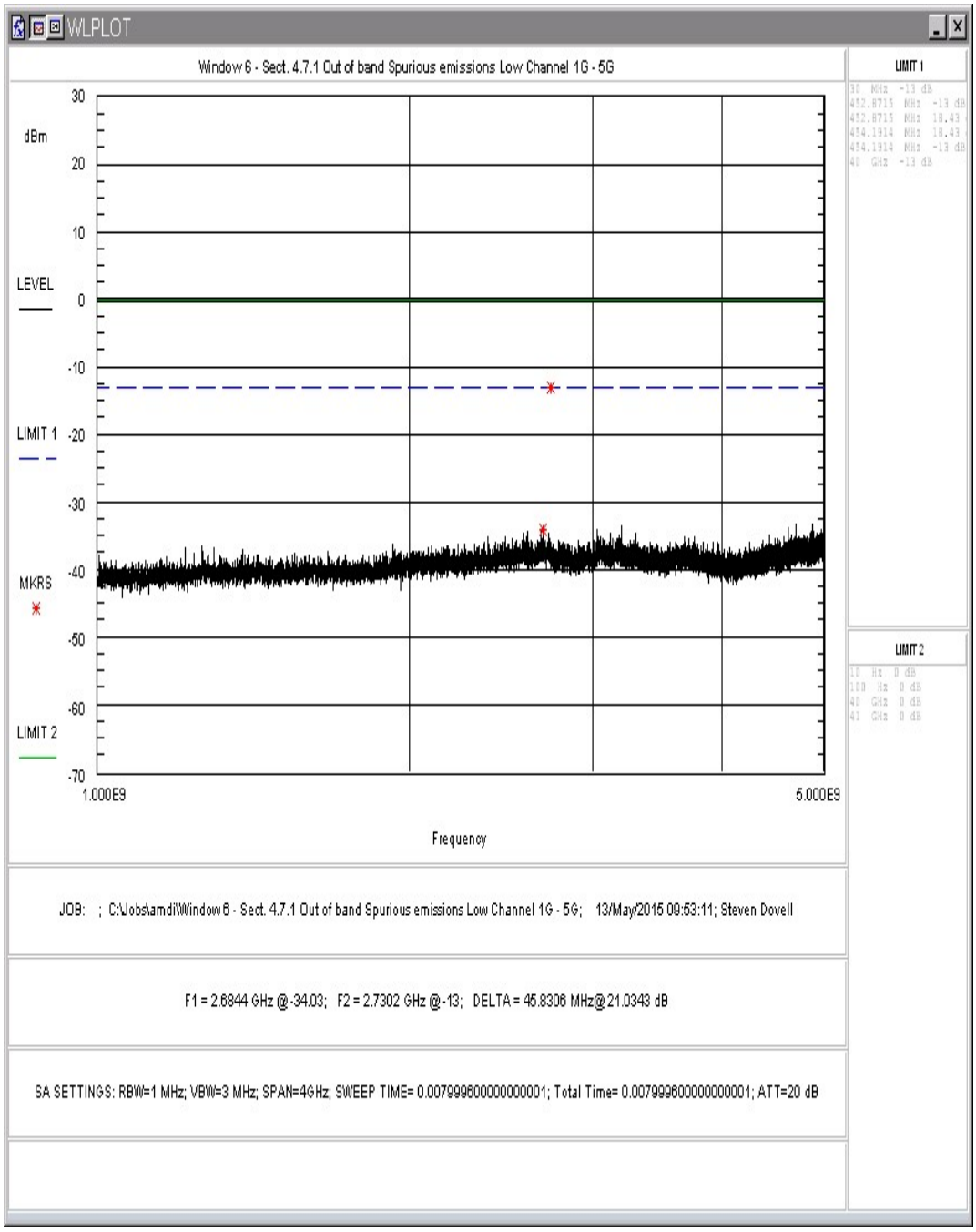

Figure 120. Window 6 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 1G - 5G

 © 2015 Washington Laboratories, Ltd.

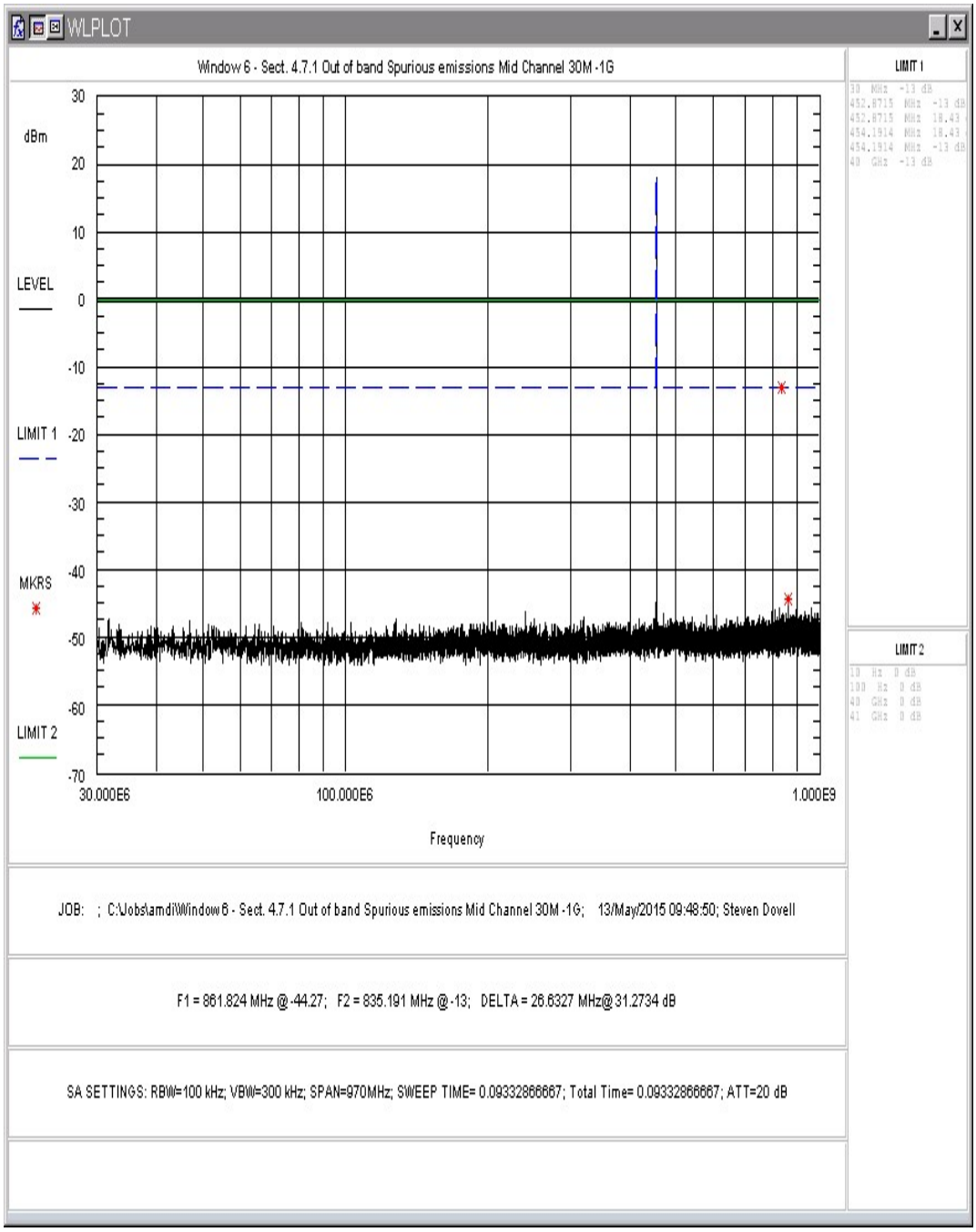

Figure 121. Window 6 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

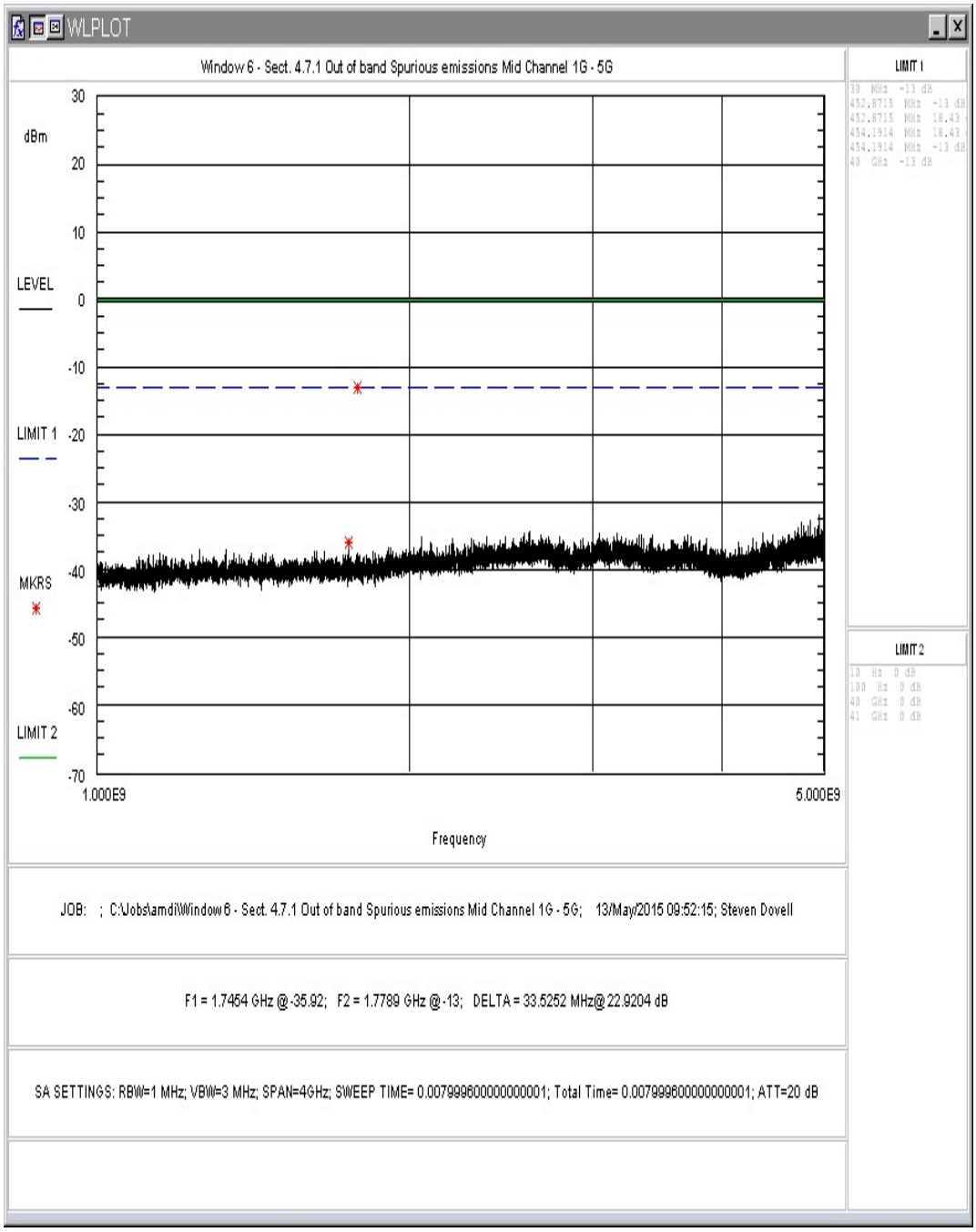

Figure 122. Window 6 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 1G - 5G

 © 2015 Washington Laboratories, Ltd.

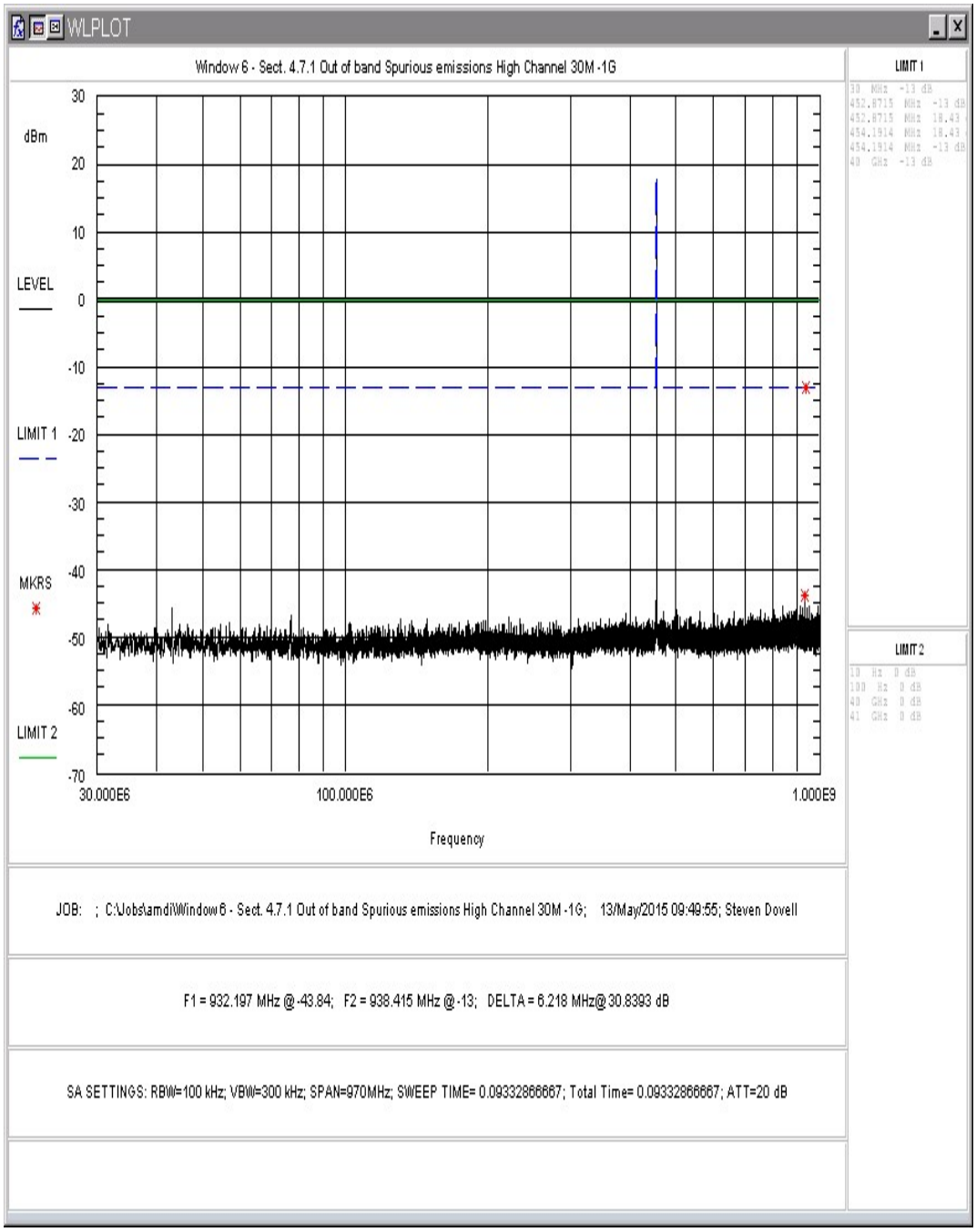

Figure 123. Window 6 - Sect. 4.7.1 Out of band Spurious emissions High Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

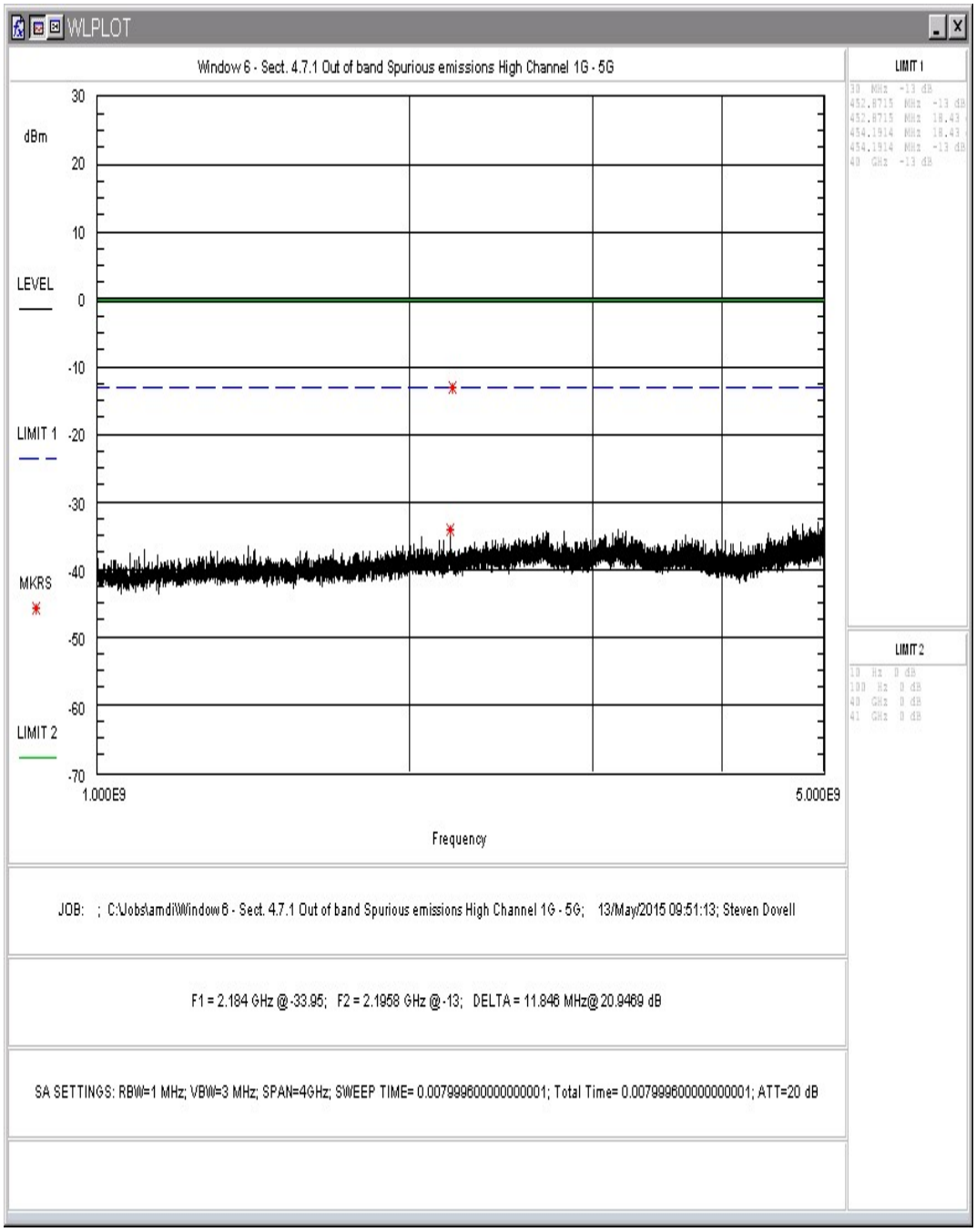

Figure 124. Window 6 - Sect. 4.7.1 Out of band Spurious emissions High Channel 1G - 5G

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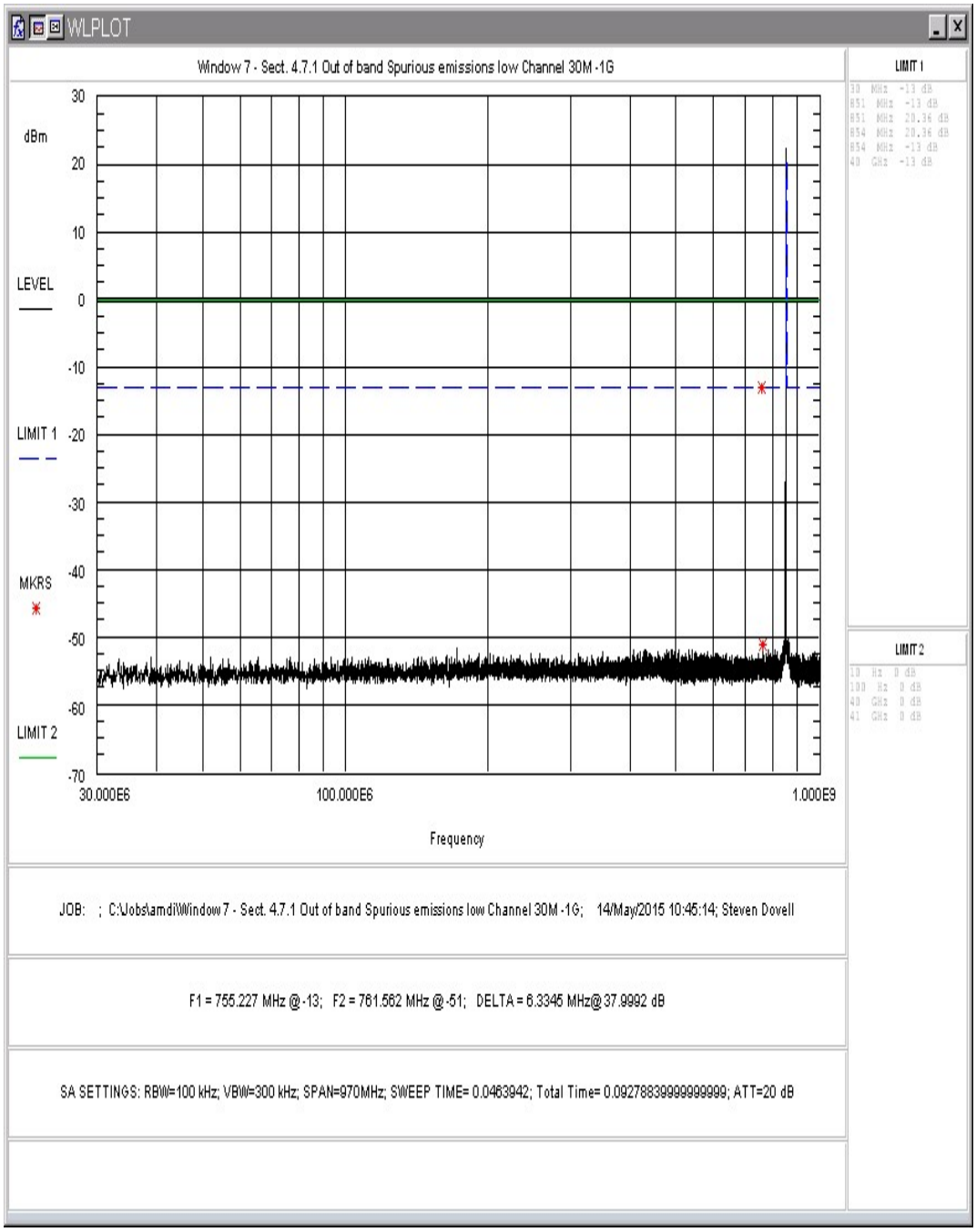

Figure 125. Window 7 - Sect. 4.7.1 Out of band Spurious emissions low Channel 30M -1G

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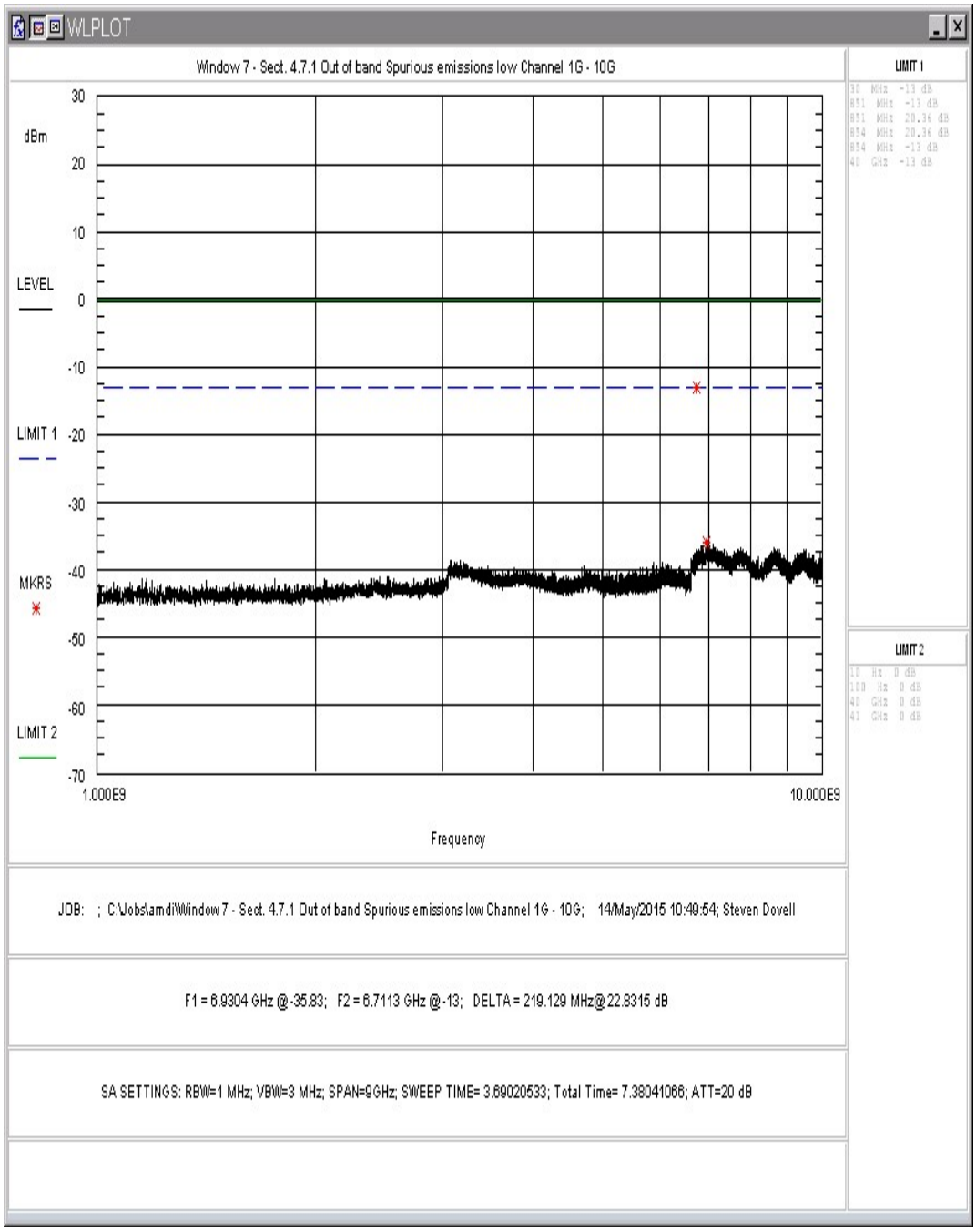

Figure 126. Window 7 - Sect. 4.7.1 Out of band Spurious emissions low Channel 1G - 10G

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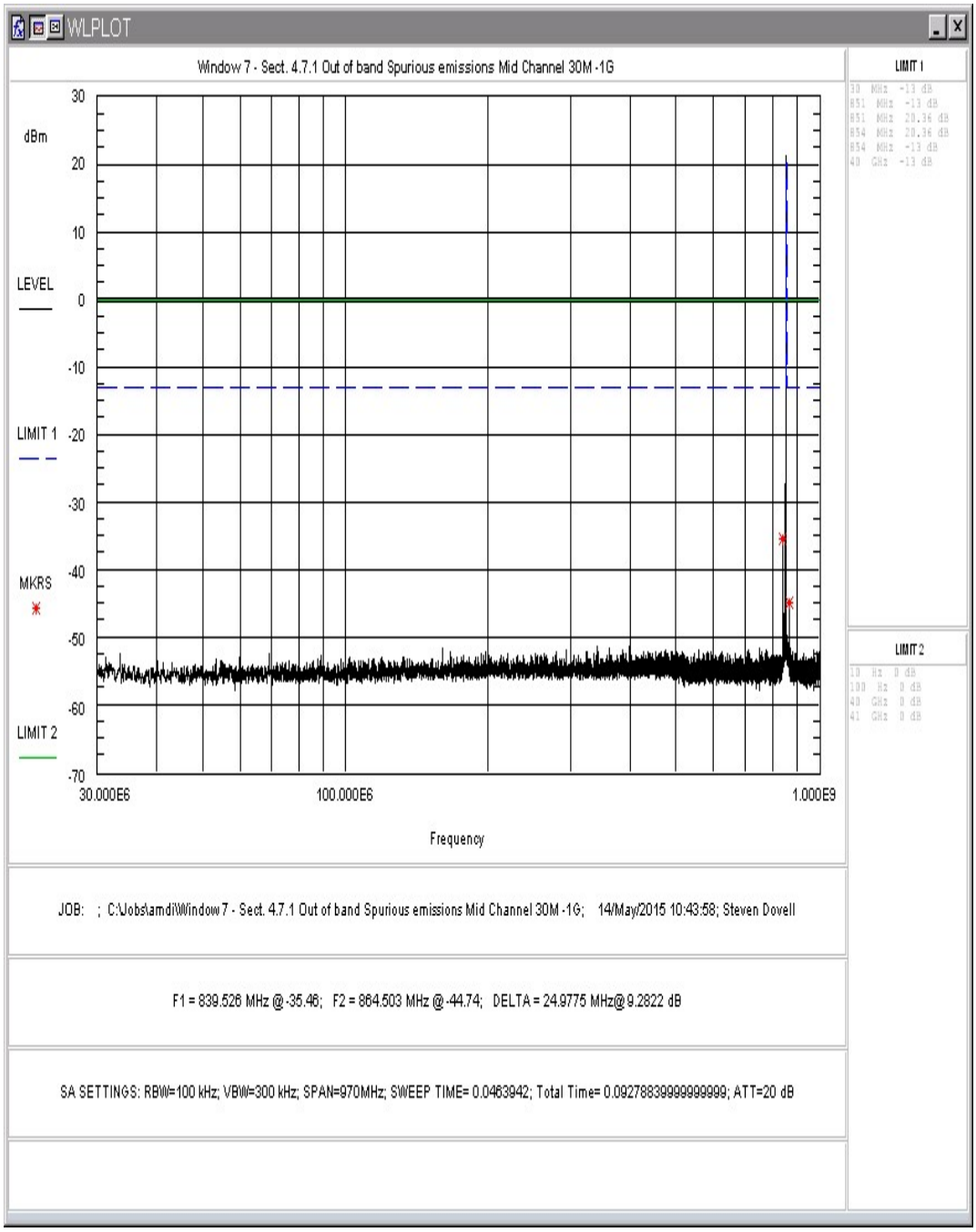

Figure 127. Window 7 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

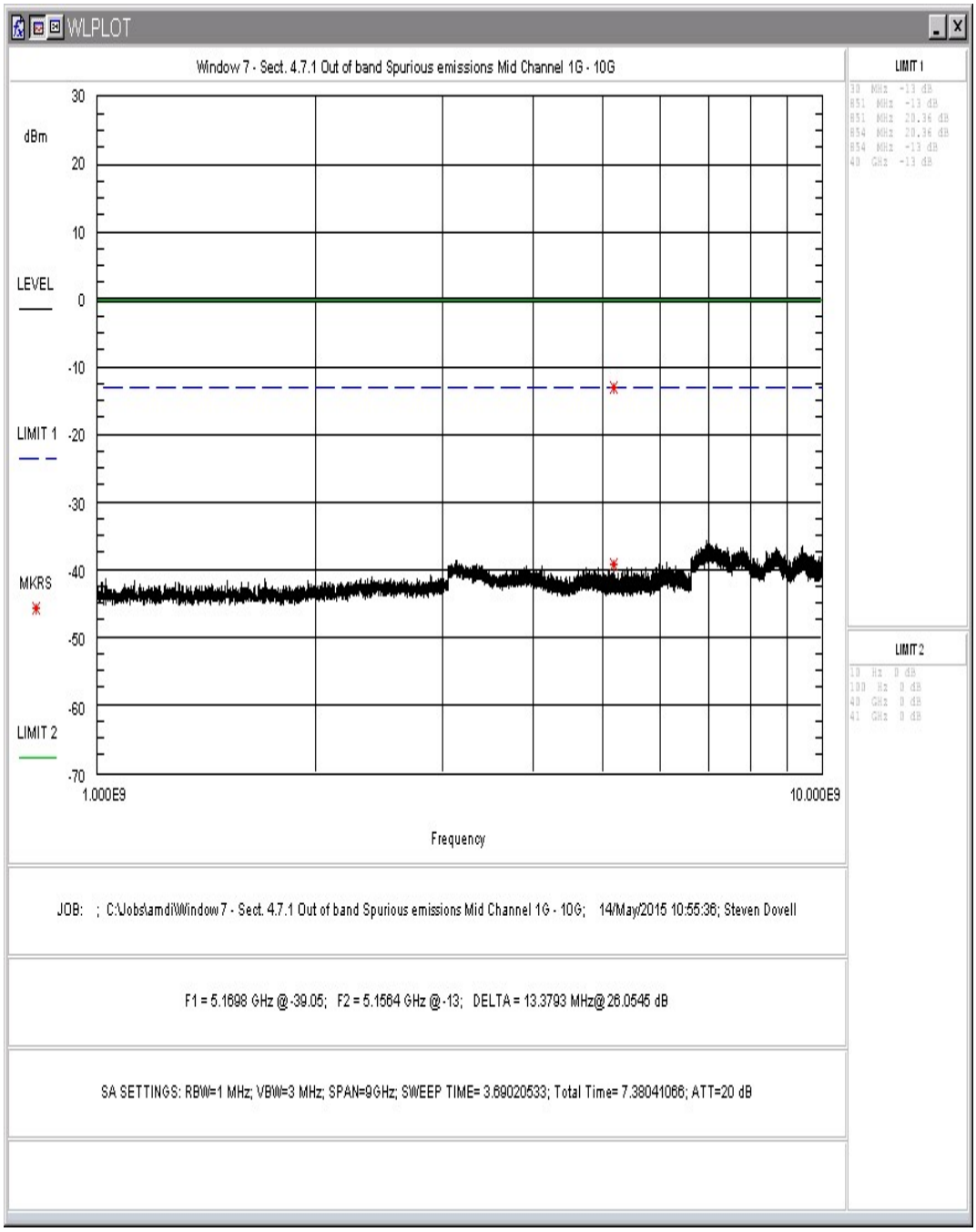

Figure 128. Window 7 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 1G - 10G

 © 2015 Washington Laboratories, Ltd.

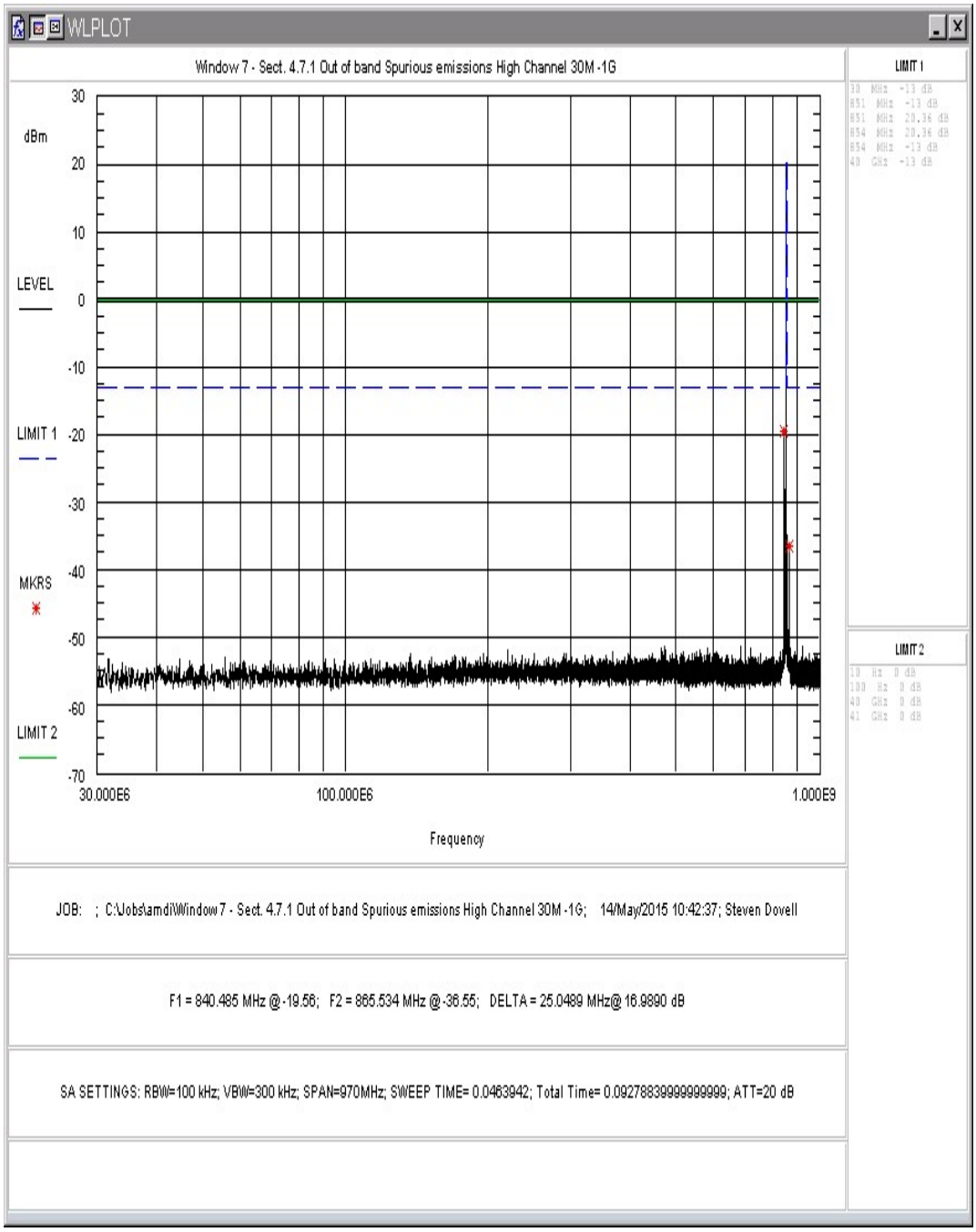

Figure 129. Window 7 - Sect. 4.7.1 Out of band Spurious emissions High Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

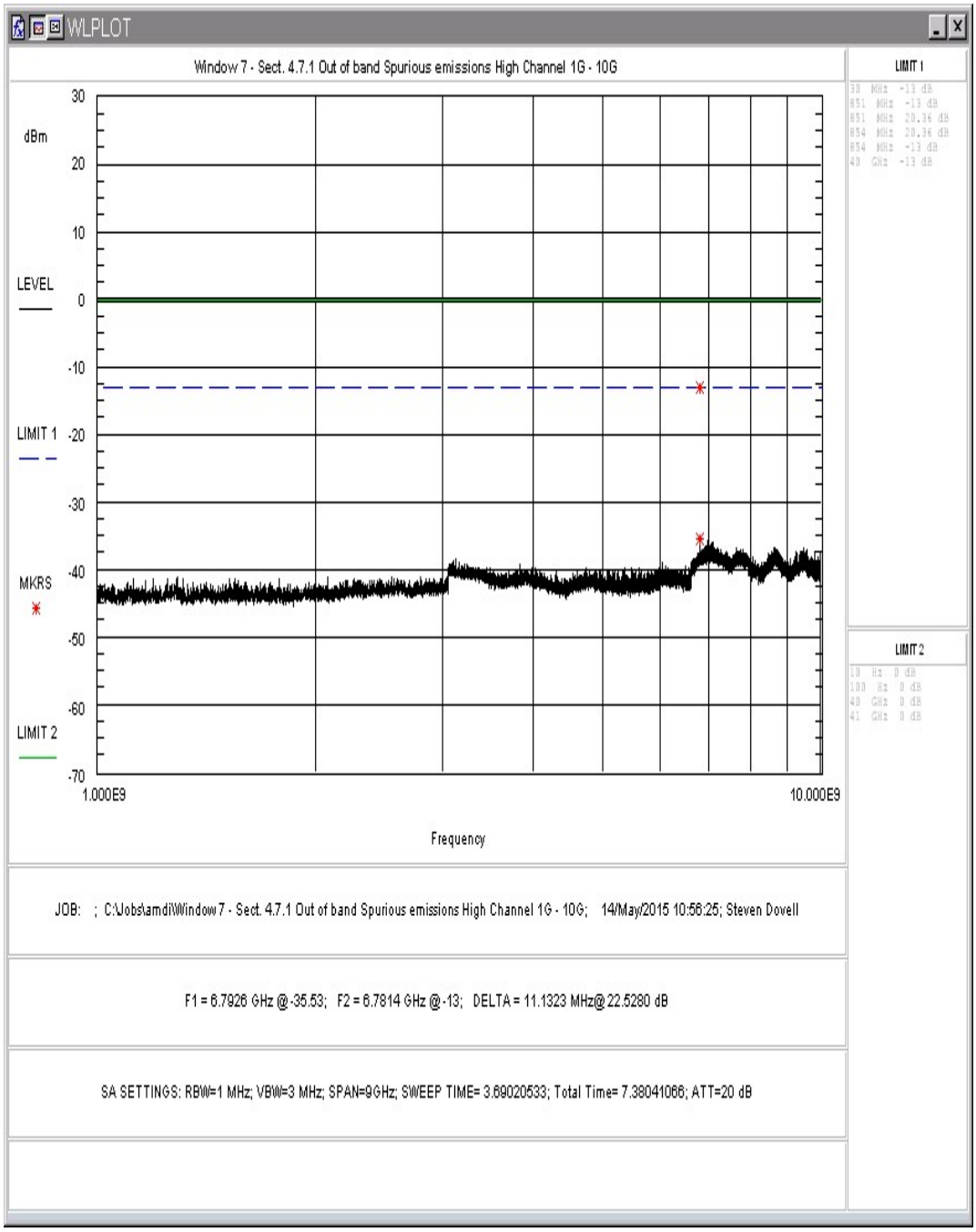

Figure 130. Window 7 - Sect. 4.7.1 Out of band Spurious emissions High Channel 1G - 10G

 © 2015 Washington Laboratories, Ltd.

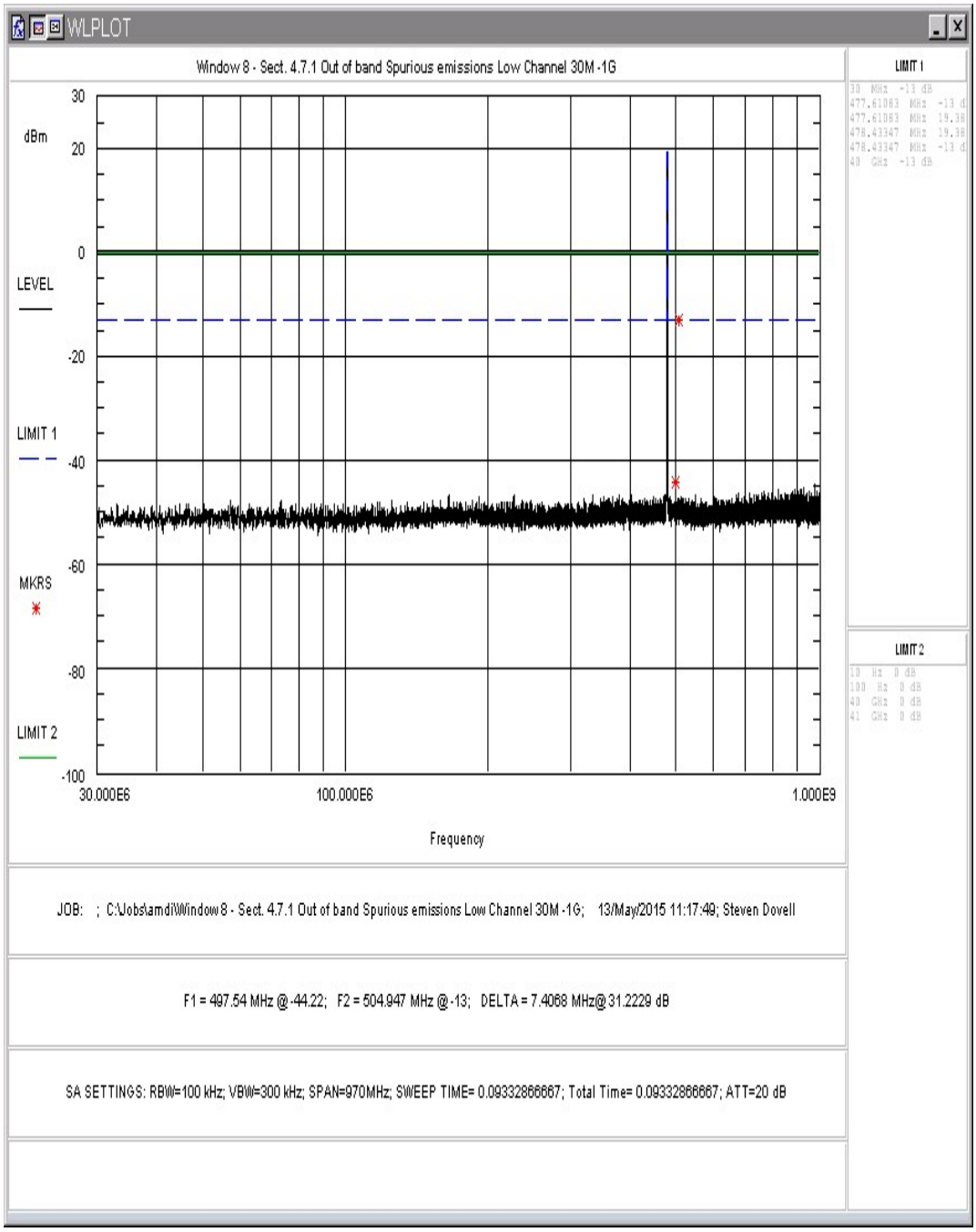

Figure 131. Window 8 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 30M -1G

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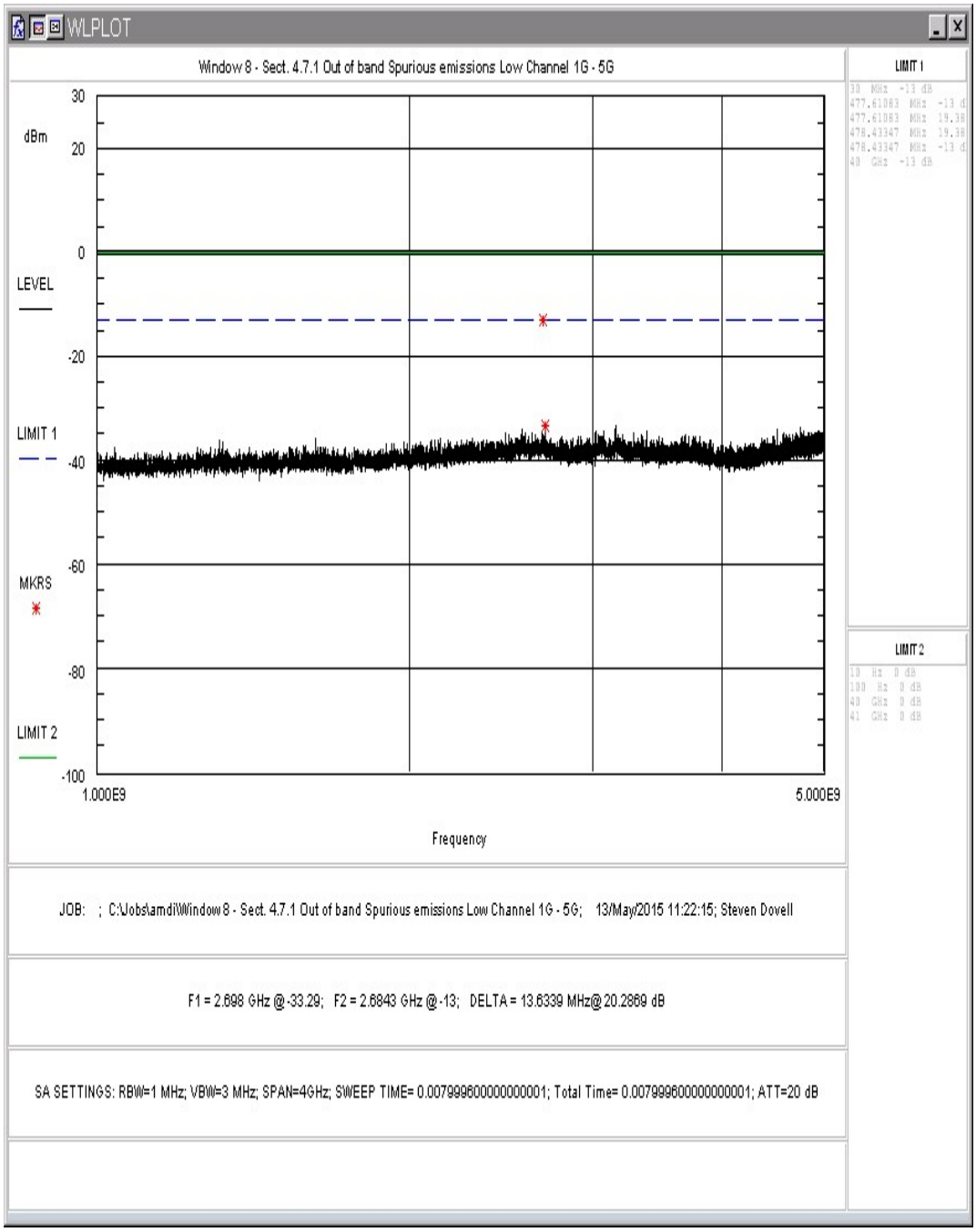

Figure 132. Window 8 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 1G - 5G

 © 2015 Washington Laboratories, Ltd.

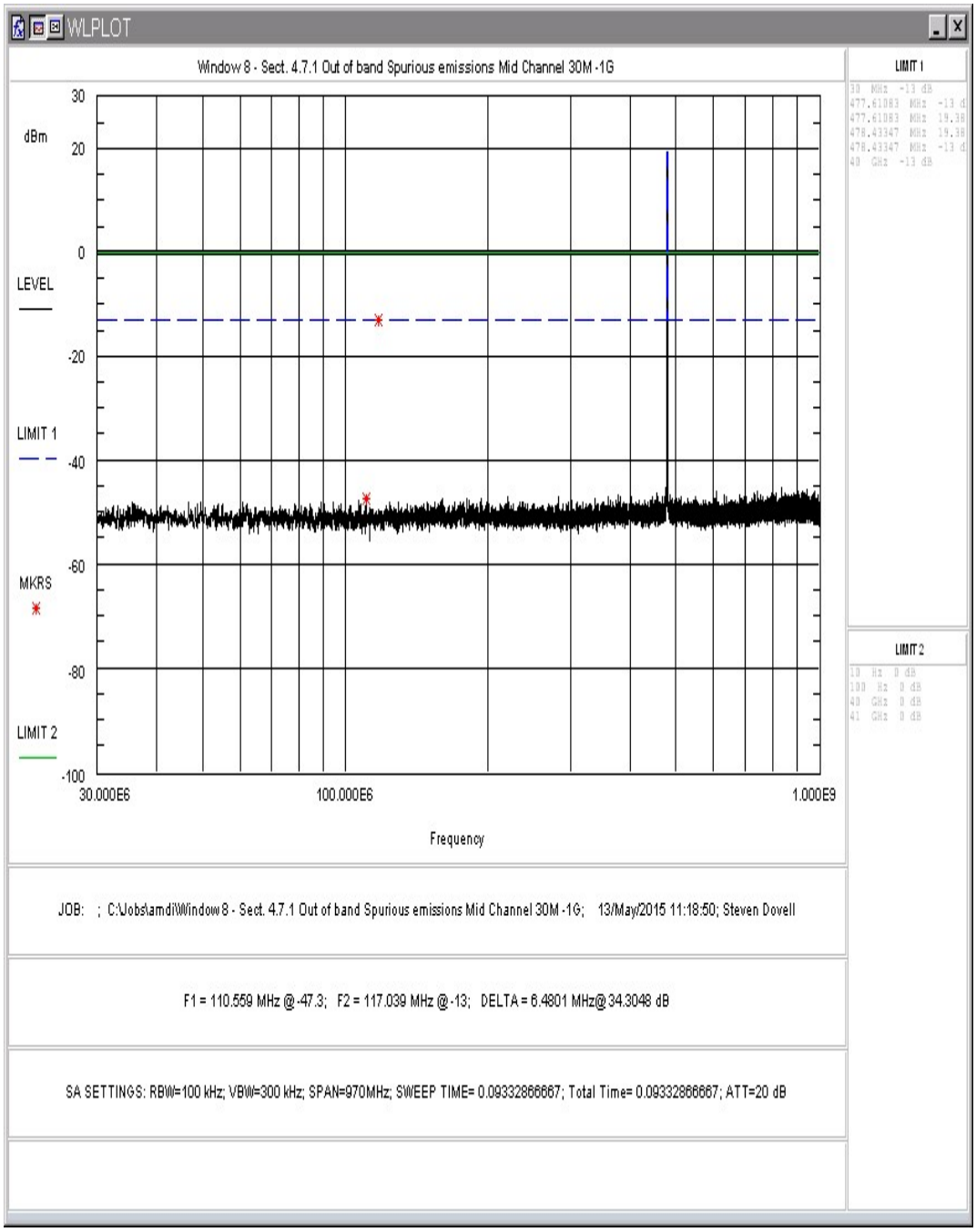

Figure 133. Window 8 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

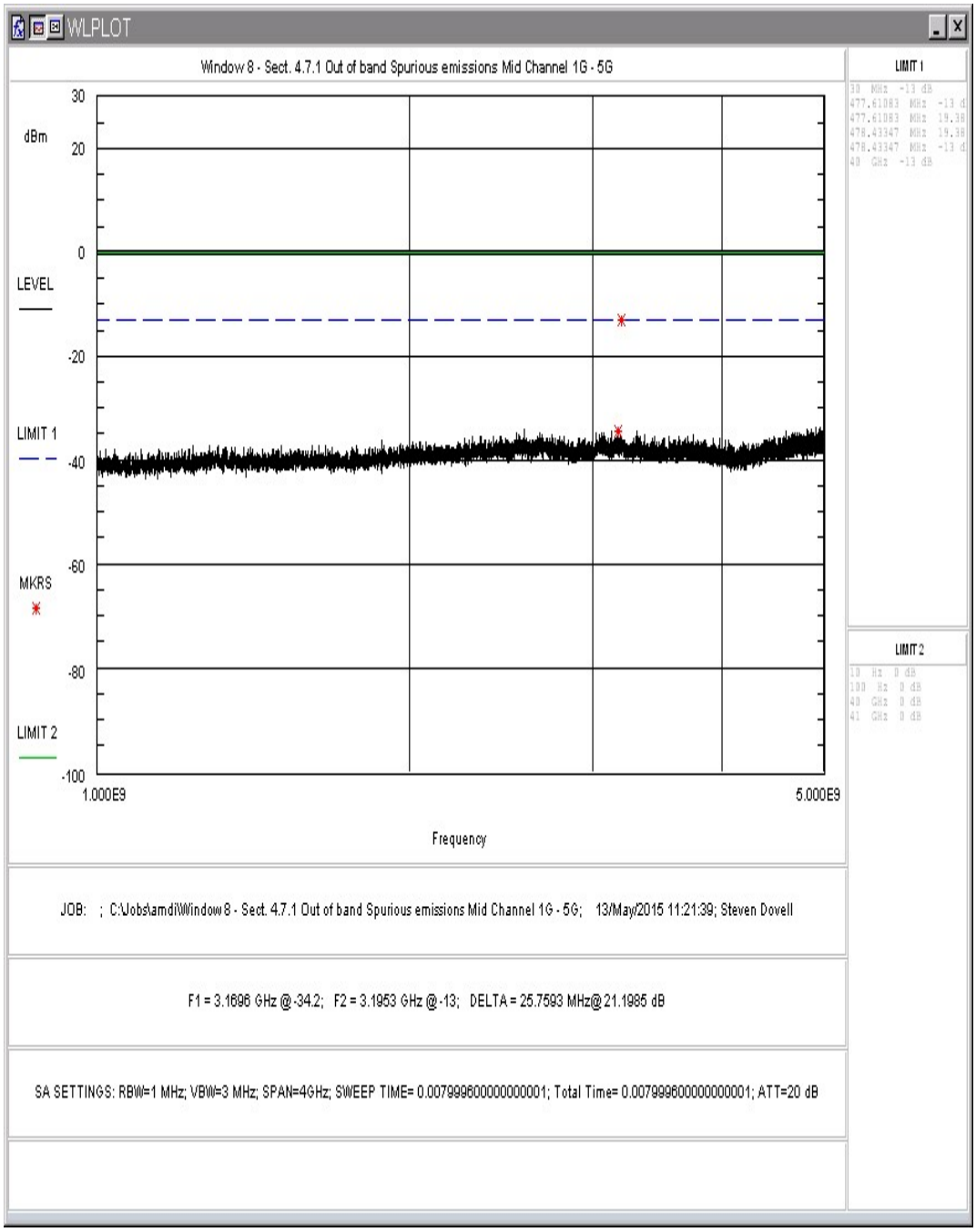

Figure 134. Window 8 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 1G - 5G

 © 2015 Washington Laboratories, Ltd.

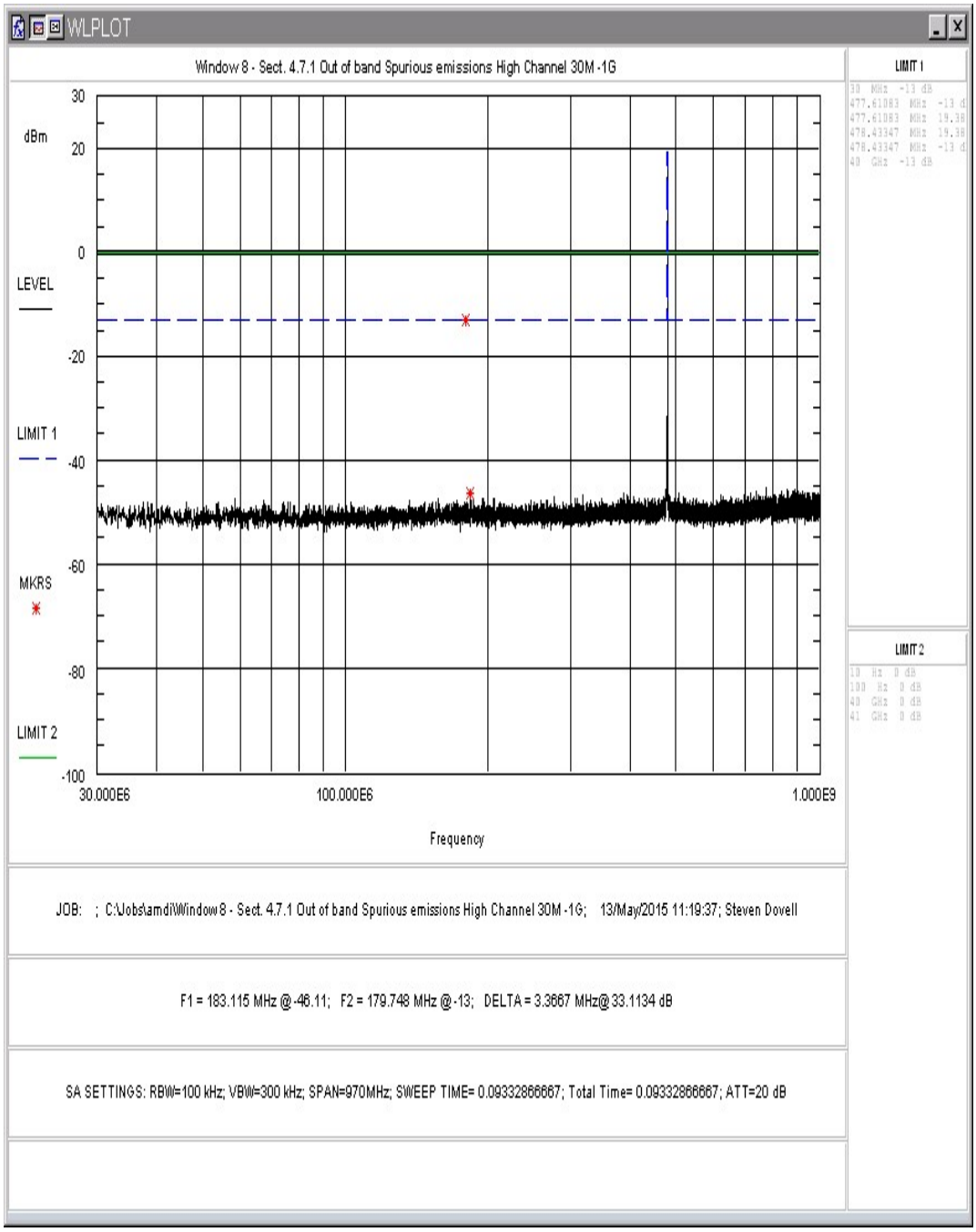

Figure 135. Window 8 - Sect. 4.7.1 Out of band Spurious emissions High Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

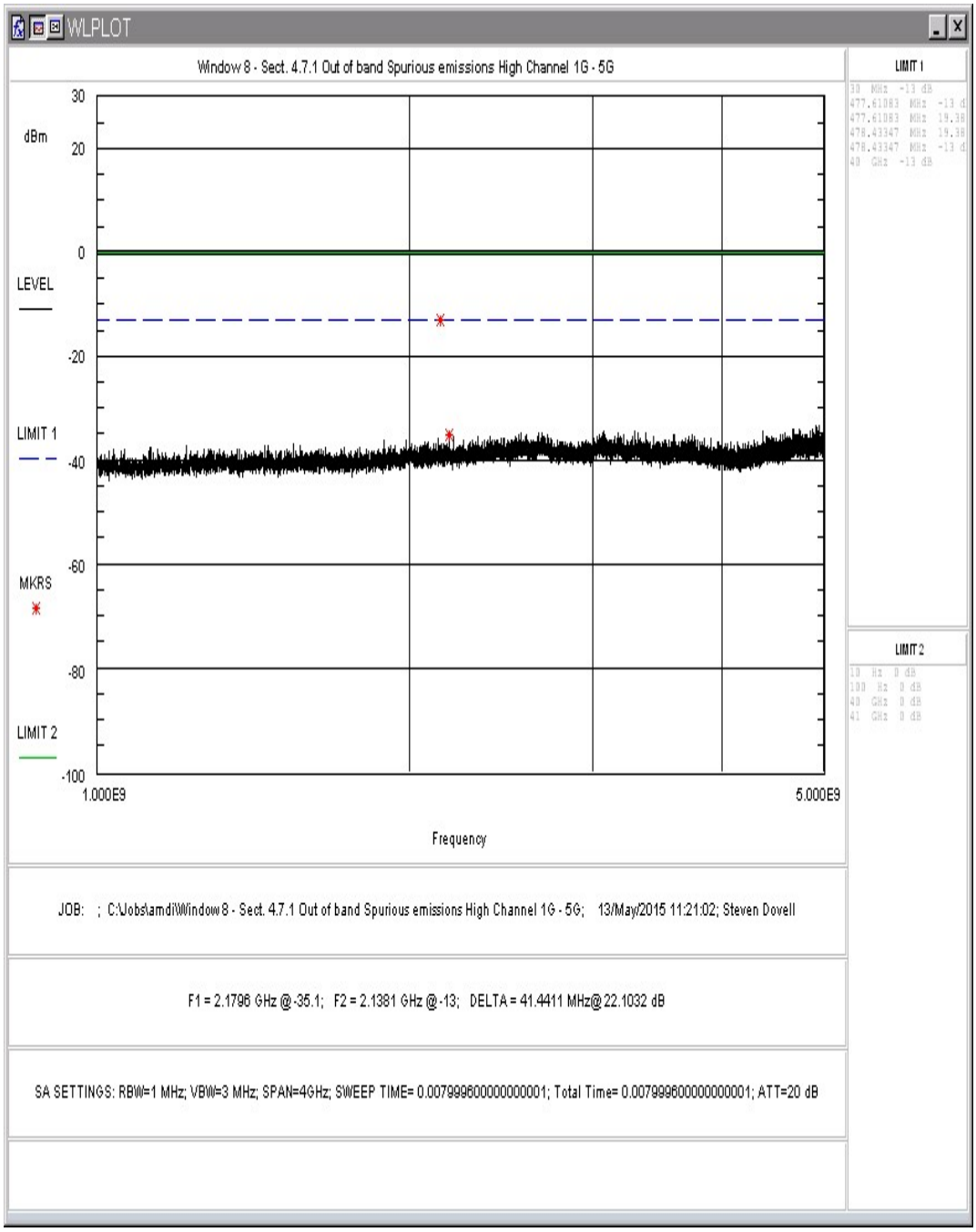

Figure 136. Window 8 - Sect. 4.7.1 Out of band Spurious emissions High Channel 1G - 5G

 © 2015 Washington Laboratories, Ltd.

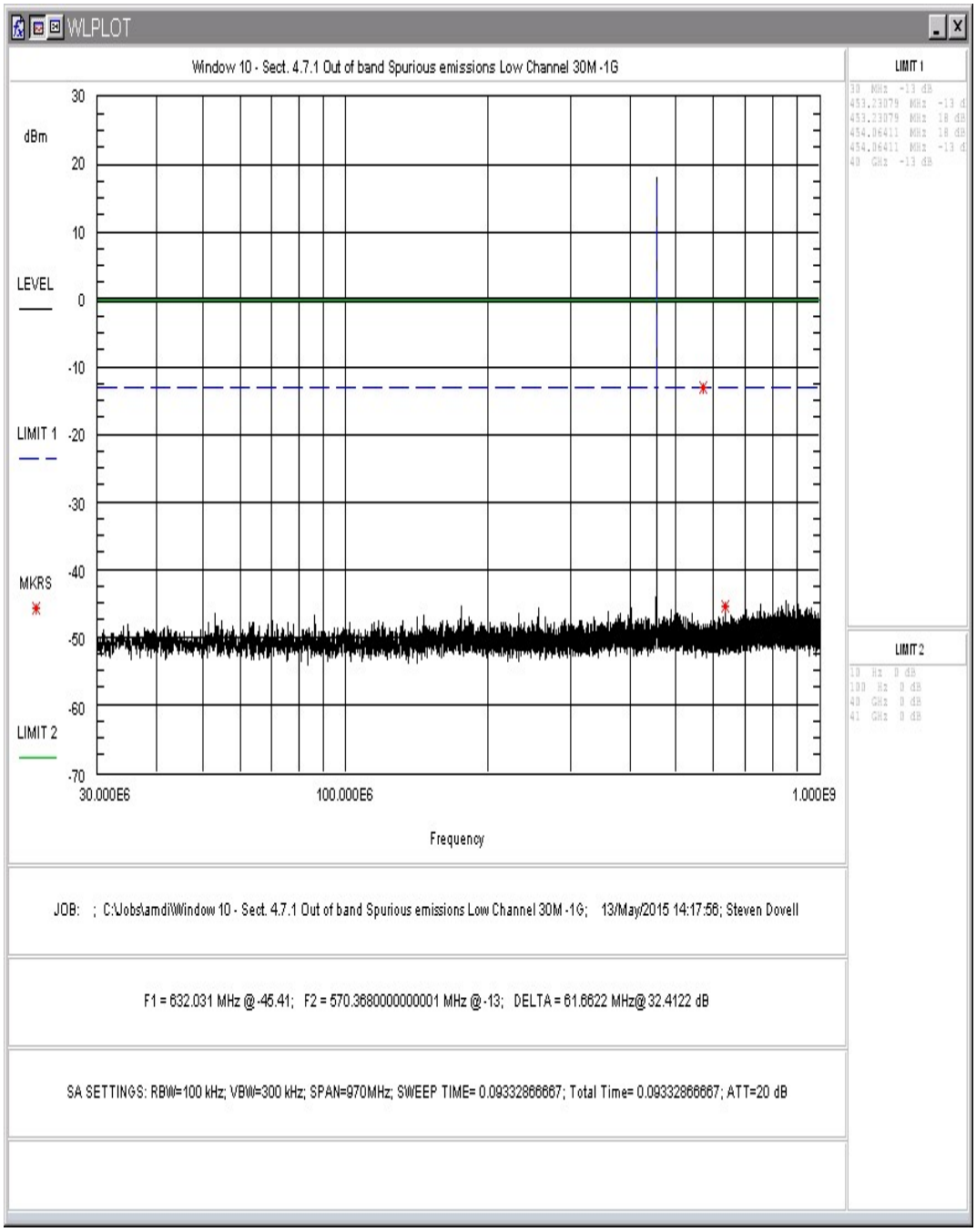

Figure 137. Window 10 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 30M -1G

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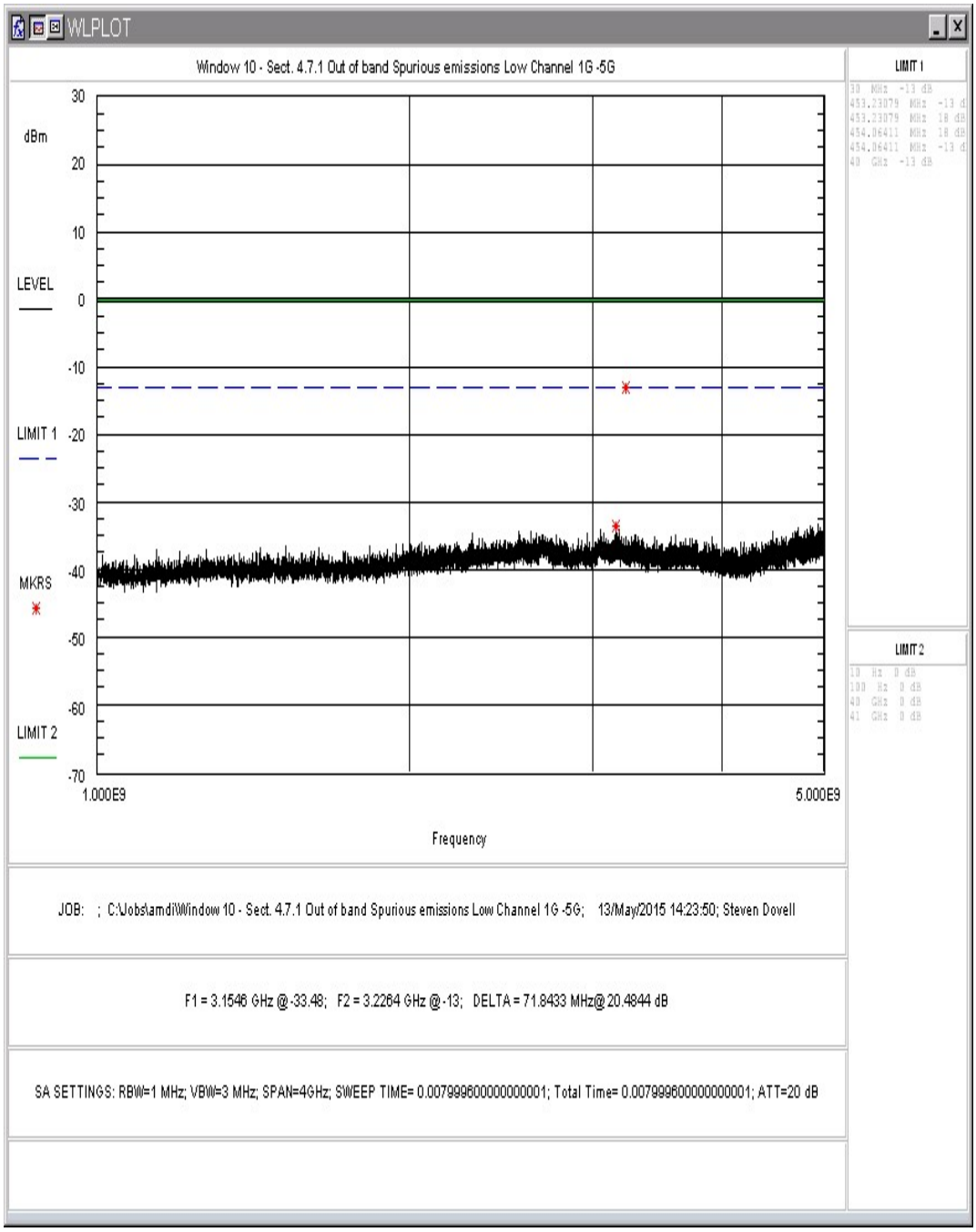

Figure 138. Window 10 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 1G -5G

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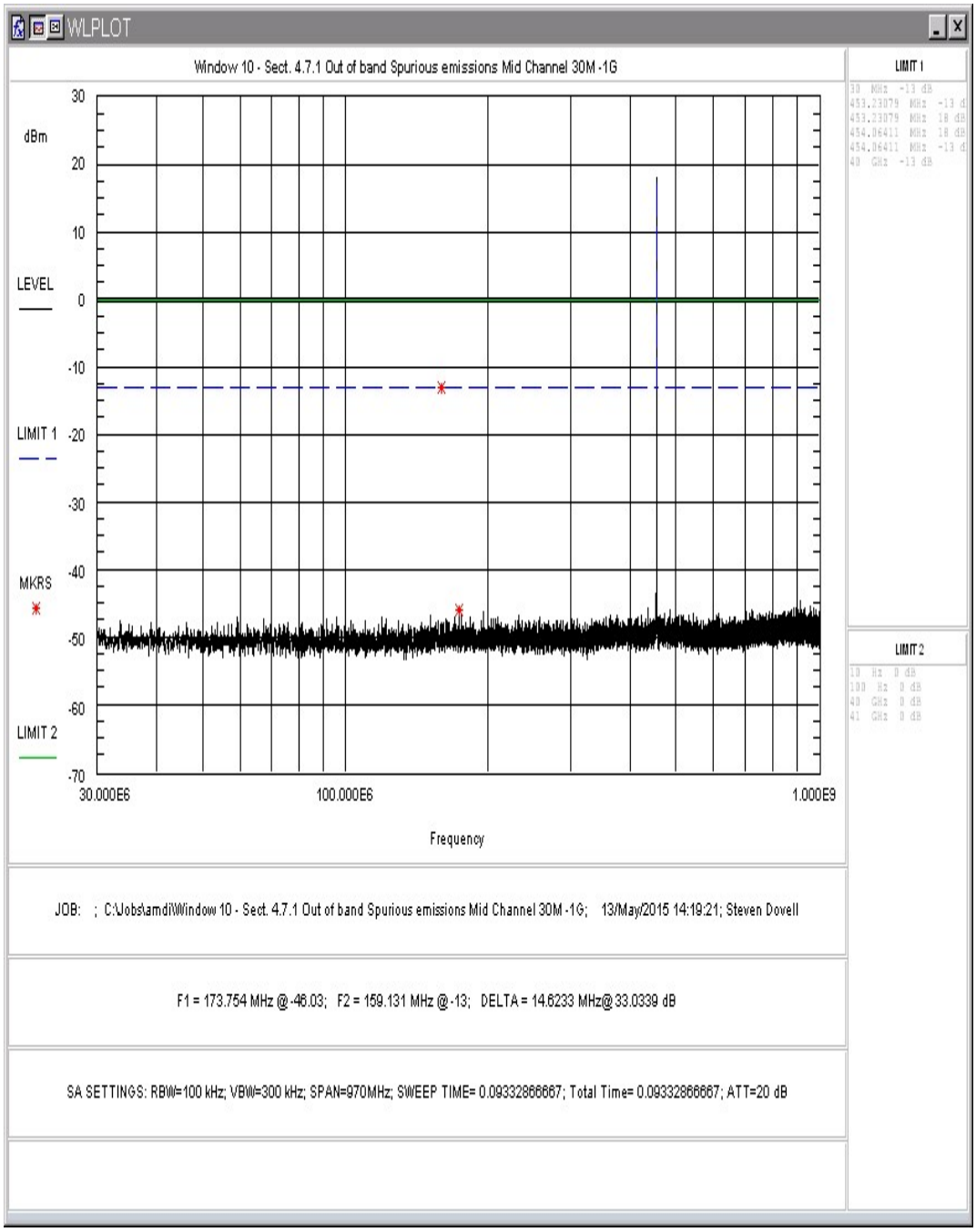

Figure 139. Window 10 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

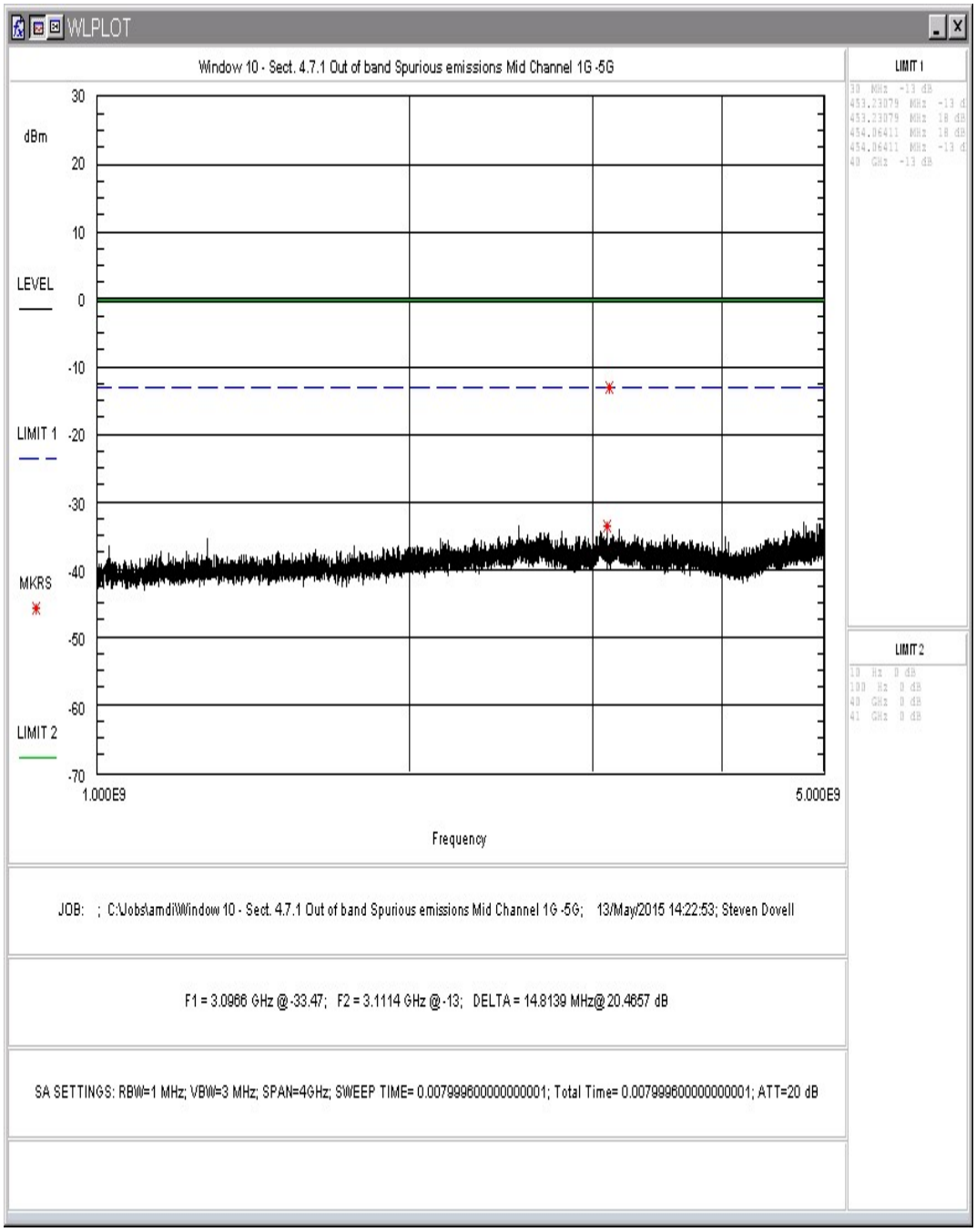

Figure 140. Window 10 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 1G -5G

 © 2015 Washington Laboratories, Ltd.

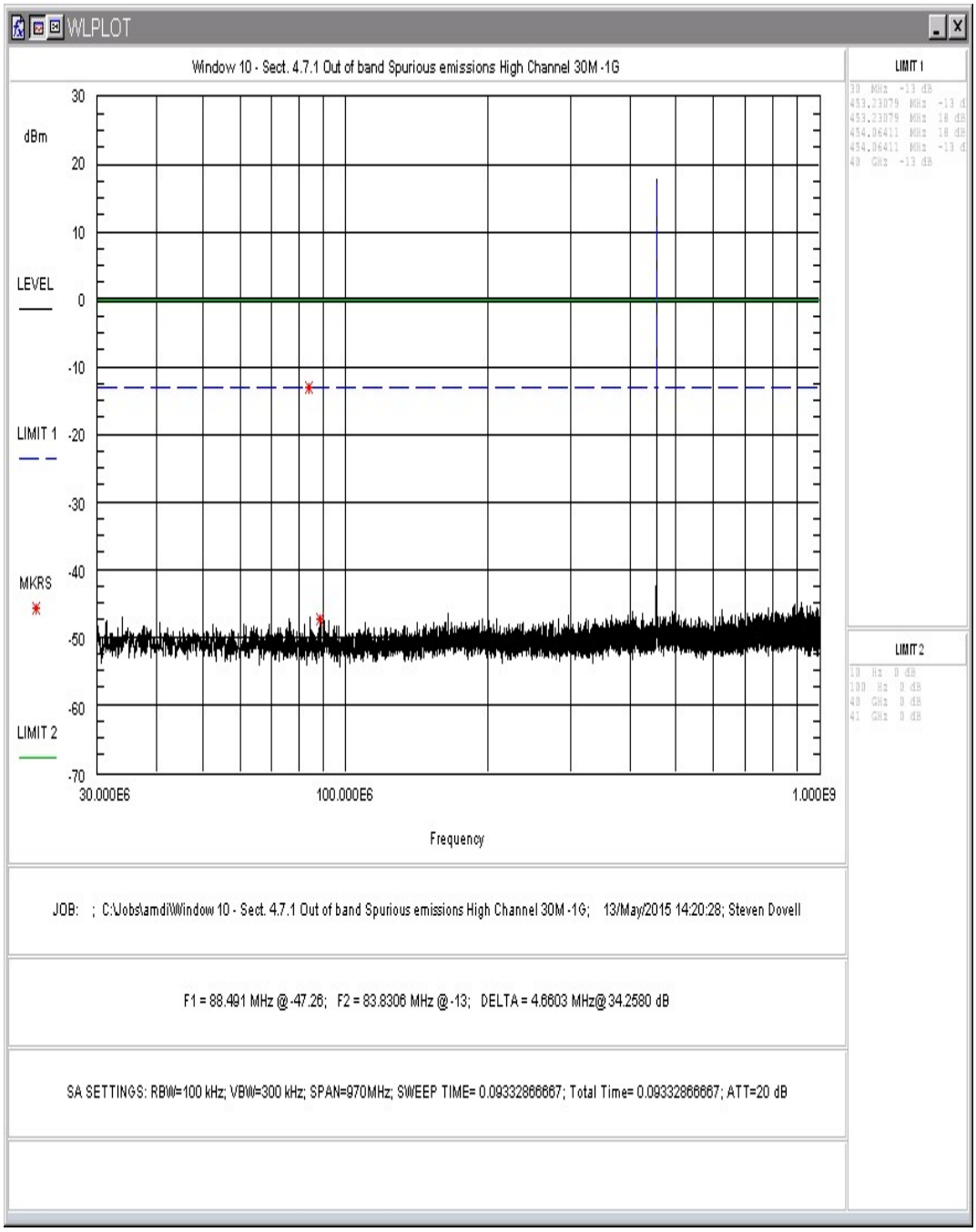

Figure 141. Window 10 - Sect. 4.7.1 Out of band Spurious emissions High Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

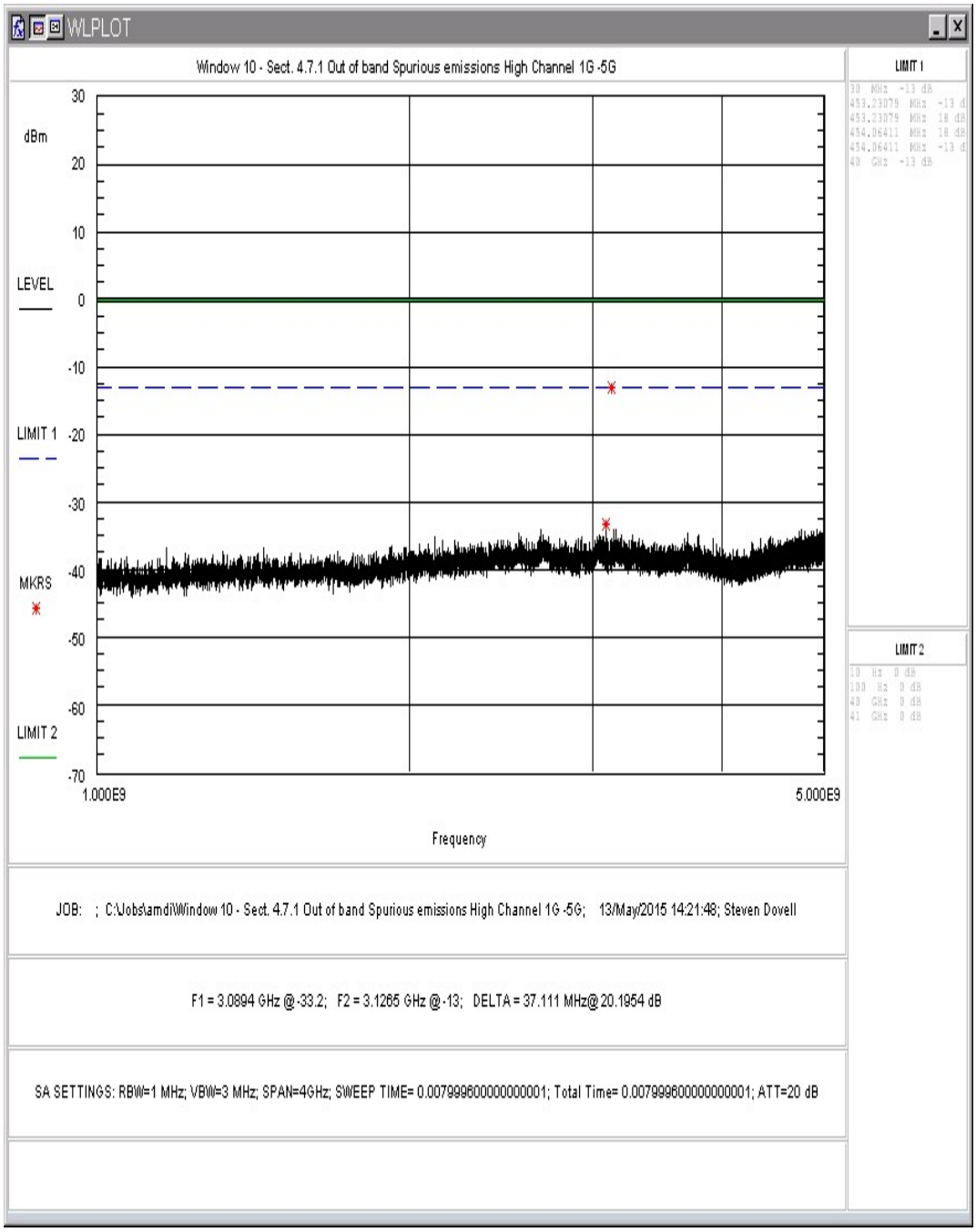

Figure 142. Window 10 - Sect. 4.7.1 Out of band Spurious emissions High Channel 1G -5G

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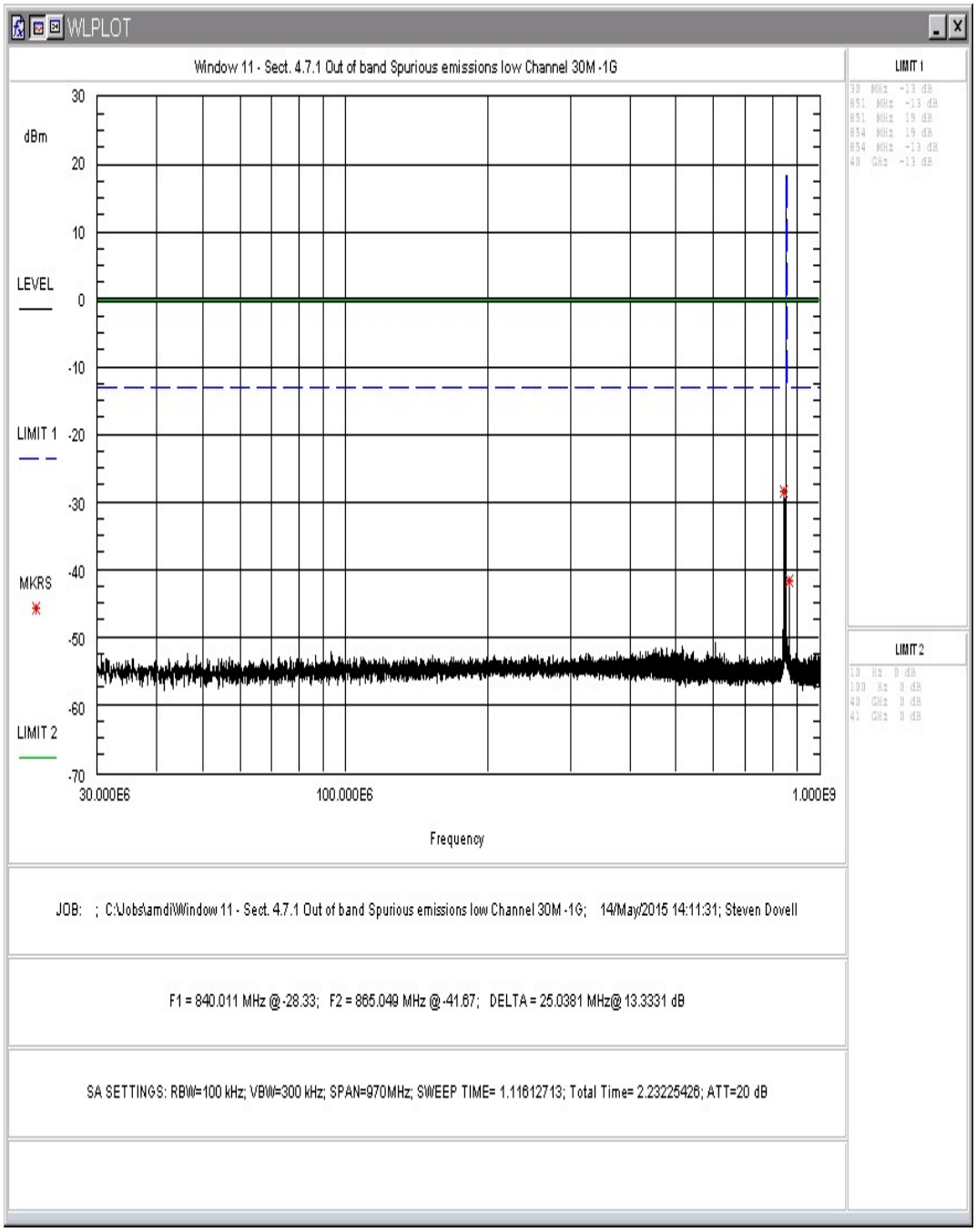

Figure 143. Window 11 - Sect. 4.7.1 Out of band Spurious emissions low Channel 30M -1G

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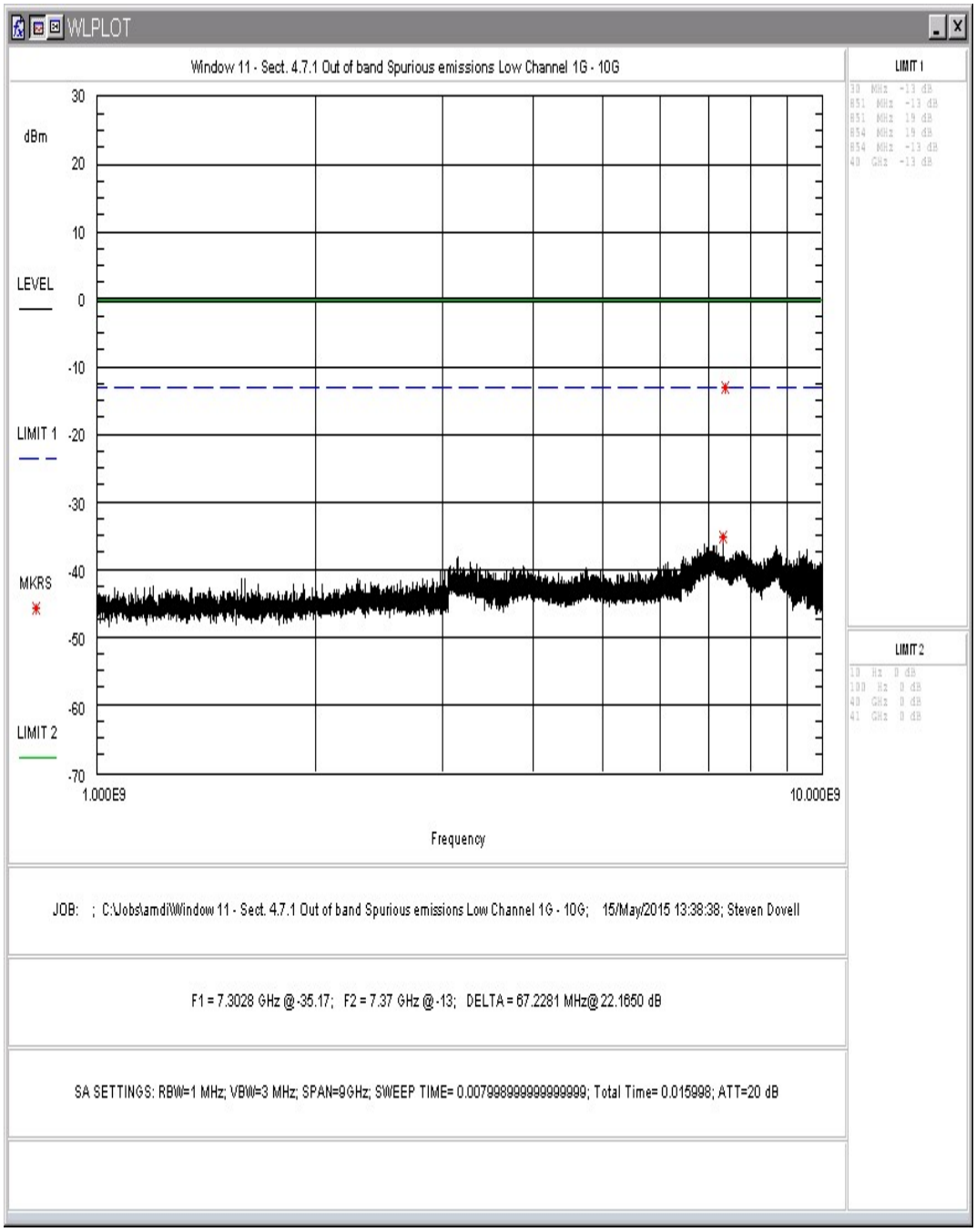

Figure 144. Window 11 - Sect. 4.7.1 Out of band Spurious emissions Low Channel 1G - 10G

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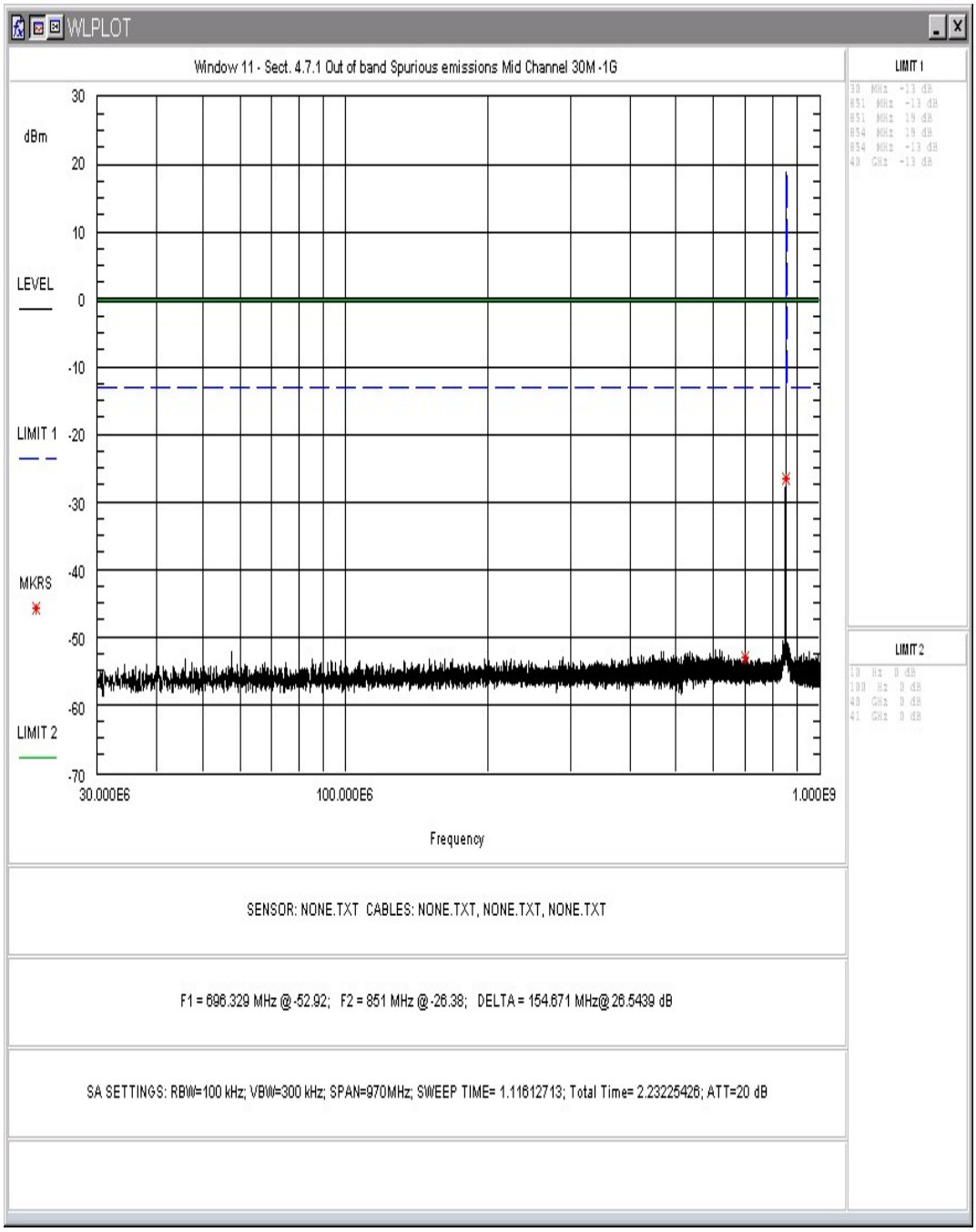

Figure 145. Window 11 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

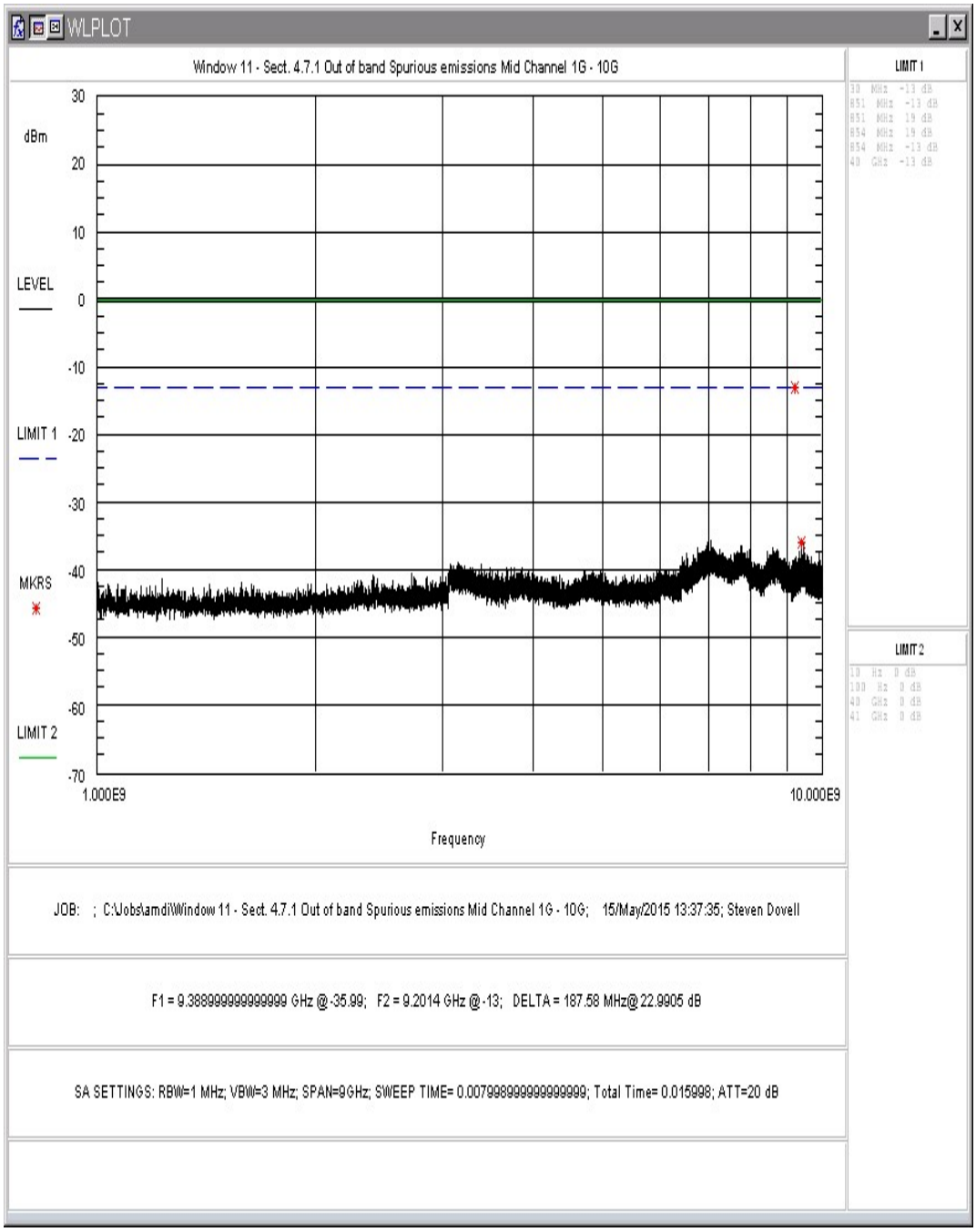

Figure 146. Window 11 - Sect. 4.7.1 Out of band Spurious emissions Mid Channel 1G - 10G

 © 2015 Washington Laboratories, Ltd.

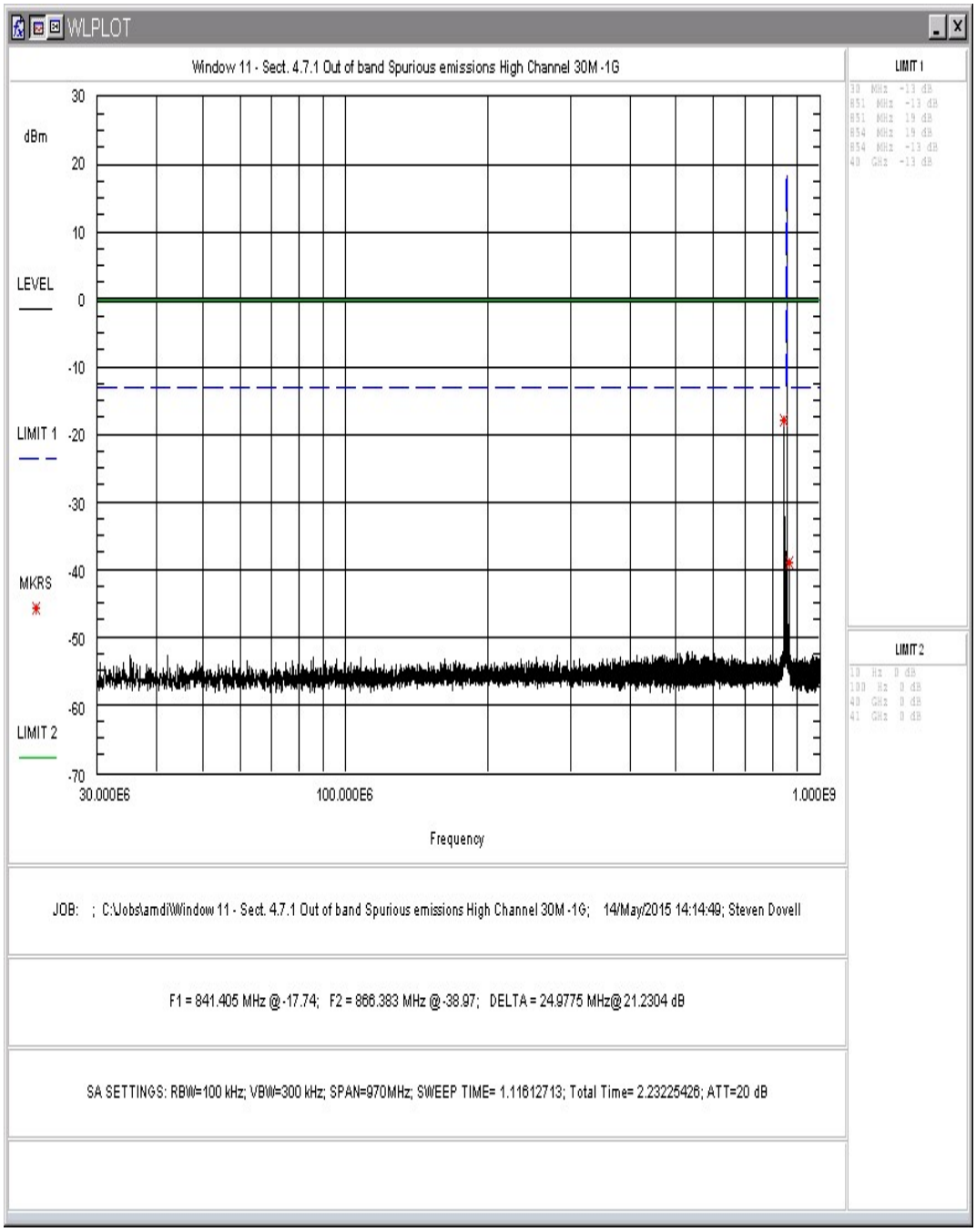

Figure 147. Window 11 - Sect. 4.7.1 Out of band Spurious emissions High Channel 30M -1G

 © 2015 Washington Laboratories, Ltd.

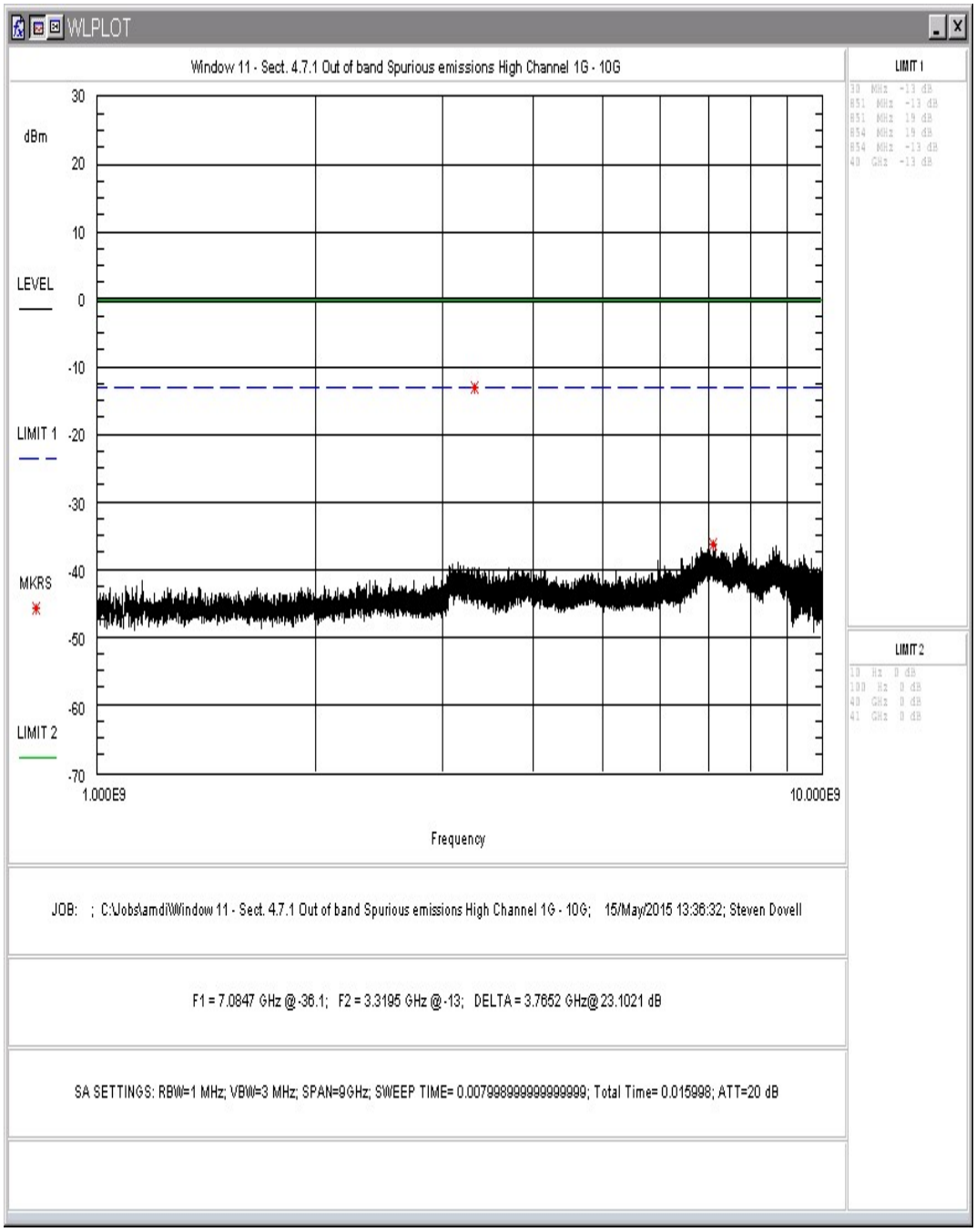

Figure 148. Window 11 - Sect. 4.7.1 Out of band Spurious emissions High Channel 1G - 10G

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4.7 EUT frequency stability measurements

Procedure: KDB 935210 D05 Indus Booster Basic Meas v01 DR07-42107: Section 4.8

90.219(e)(4)(i) requires that a signal being retransmitted by an amplifier, booster, or repeater meet the frequency stability requirements of 90.213. However, this requirement presumes that the EUT processes an input signal in a manner that can influence the output signal frequency/frequencies (i.e., most signal boosters do not incorporate an oscillator). If this is not the case (i.e., the amplifier, booster, or repeater does not alter the input signal in any way), then a frequency stability test may not be required.

Documentation provided by the manufacture explains why temperature variations will not affect / alter the frequency of the input to output signal. See attached documents ***WL_IntOsc_2015-0513.pdf*** and ***DspWtc_Block_Diagram.pdf*** for a complete explanation.

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4.8 EUT spurious emissions radiated measurements

Procedure: KDB 935210 D05 Indus Booster Basic Meas v01 DR07-42107: Section 4.9

This measurement is intended to produce the data necessary to demonstrate compliance to the radiated spurious emission requirements specified in §2.1053 of the FCC rules. This test is intended to capture any emissions that radiate directly from the case, cabinet, control circuits, etc., instead of via the antenna output port, and thus would not be captured in conducted measurements. See KDB Publication 971168 for additional guidance.

4.8.1 Test Method

The EUT was tested out of band (>250 % of authorized bandwidth) for radiated emissions on an open air test site (OATS) using a substitution method. 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 EUT was tested in 3 orthogonal positions for compliance. A resolution bandwidth of 100 kHz was used for radiated measurements < 1GHz and a resolution bandwidth of 1MHz for measurements > 1GHz . The EUT antenna port was terminated for these readings.

The EUT was excited with a low frequency (453.2124MHz) and mid frequency (482.7125MHz) and a high frequency (853.9125MHz) signal modulated with a FM. Levels were set just below the AGC threshold.

4.8.2 Test Limit

The EUT will be used for both 12.5 kHz and 25 kHz channels. Emission mask D was chosen as the limit since it is the most stringent.

Emission Mask D. 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd−2.88 kHz) dB.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

4.8.3 Test Results

No emissions were related to the transmit signals. No spurious emissions were closer than -9.5dB to the limit. Radiated results are shown in Table 11 and Table 12.

The EUT complied with the requirements of FCC Part [90.210 d (1)(2)(3)].

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Table 11: Radiated Emission Test Data < 1GHz

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)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
117.15	V	355	1	24.8	-52.4	-55.9	11.3	0.3	-57.7	-25	-32.7
225	V	0	1	27	-55.4	-60.1	13.5	3.8	-58.5	-25	-33.5
250	V	5	1	26.8	-54.9	-59.8	13.2	5	-57	-25	-32
275	V	5	1	23.74	-56	-61.2	14.9	4.1	-59.2	-25	-34.2
325	V	345	1	25.3	-53.9	-59.5	14	6.4	-55.2	-25	-30.2
333.25	V	60	1	24.4	-54.6	-60.3	14.4	6.3	-56.2	-25	-31.2
375	V	0	1.74	22.8	-52.6	-58.7	15.6	6.1	-54.7	-25	-29.7
416.6	V	5	1.2	20.96	-55.6	-62	16.6	6	-58.2	-25	-33.2
425	V	0	1.4	23.1	-51.8	-58.3	16.9	5.9	-54.6	-25	-29.6
499.9	V	10	1.1	21.1	-48.5	-55.7	16.7	7.5	-50.3	-25	-25.3
625	V	0	1	16.2	-51.6	-59.7	19.2	6.9	-54.9	-25	-29.9
833.45	V	5	1	13.5	-51.6	-61	22.1	6.5	-56.7	-25	-31.7
1000	V	0	1	10.2	-51.7	-62.1	22.8	7.4	-56.8	-25	-31.8
250	H	90	2.5	24	-56.7	-61.6	13.2	5	-58.8	-25	-33.8
275	H	15	2.15	22.5	-57.6	-62.8	14.9	4.1	-60.8	-25	-35.8
300	H	45	2	24.8	-55.3	-60.7	14	5.8	-57	-25	-32
333.26	H	45	1.76	28.8	-50.6	-56.3	14.4	6.3	-52.2	-25	-27.2
375	H	45	1.7	24.2	-54.1	-60.2	15.6	6.1	-56.2	-25	-31.2
400	H	10	1.3	21.2	-52.7	-59	15.5	6.8	-54.4	-25	-29.4
416.59	H	0	1	22.23	-53	-59.4	16.6	6	-55.6	-25	-30.6
425	H	0	1	25.5	-50.1	-56.6	16.9	5.9	-52.9	-25	-27.9
499.9	H	300	1	23.5	-50.3	-57.5	16.7	7.5	-52.1	-25	-27.1
625	H	0	1	17.9	-53	-61.1	19.2	6.9	-56.3	-25	-31.3
1000	H	300	1	15.4	-47.9	-58.3	22.8	7.4	-53	-25	-28

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Table 12: Radiated Emission Test Data > 1GHz

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)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
1166.8	V	0	2	60.3	-57.7	-60	25.5	6	-56.1	-25	-31.1
1250	V	5	2	64.8	-54.5	-56.8	25.7	6.5	-52.5	-25	-27.5
1333.4	V	15	2	63.5	-56.3	-58.5	25.6	7.1	-53.5	-25	-28.5
1500	V	355	2	69.4	-48.5	-50.7	25.5	8.3	-44.6	-25	-19.6
1583.1	V	340	2	65.5	-54.2	-56.7	25.4	8.8	-50.1	-25	-25.1
1666.5	V	350	2	67.2	-50.3	-52.8	25.5	9.1	-45.8	-25	-20.8
4845.2	V	355	2.22	60.2	-45.4	-52.6	32.4	11.5	-43.2	-25	-18.2
6408.0	V	0	2.1	57.5	-43.8	-50.2	34.8	11.5	-40.8	-25	-15.8
6545.8	V	180	2	56.1	-37.5	-43.7	35.3	11.2	-34.6	-25	-9.6
1166.8	H	0	2.24	60	-61.6	-63.9	25.5	6	-60	-25	-35
1250	H	340	2.2	67.9	-51.4	-53.7	25.7	6.5	-49.4	-25	-24.4
1333.4	H	350	2.2	61.5	-58.5	-60.7	25.6	7.1	-55.7	-25	-30.7
1500	H	300	2.26	70	-49.7	-51.9	25.5	8.3	-45.8	-25	-20.8
1583.1	H	350	2.13	71.63	-48.3	-50.8	25.4	8.8	-44.2	-25	-19.2
1666.5	H	300	2.1	70.1	-48.5	-51	25.5	9.1	-44	-25	-19
4845.2	H	350	2	60.2	-44	-51.2	32.4	11.5	-41.8	-25	-16.8
6408.0	H	5	2	58.1	-42.1	-48.5	34.8	11.5	-39.1	-25	-14.1
6545.8	H	0	2	56.2	-37.4	-43.6	35.3	11.2	-34.5	-25	-9.5

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