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Memorandum

To: Ralph Groves

From: John Effland

Date: 2010-05-13

Revisions: 2010-01-15 jee Initial

Subject: Comparison of Mixer 165 with 3 mA and 4 mA Preamp Drain Currents

To help reduce the possibility of oscillations, it was proposed to decrease preamp drain bias for the 1st and 2nd stages of both preamps from 4 mA to 3 mA. Measurements of mixer 165 show noise temps degrade by only about 4K and gain decreases only about 2 dB for this preamp bias change. Unfortunately, as shown below, mixer 165 doesn't meet mixer specifications regardless of bias values.

Mixer noise temps for 3 mA preamp drain currents are shown in Figure 1 and Figure 2 is the same data with 4 mA drain currents. Ignoring chopper errors in Figure 2, noise temps decrease only a few K when the drain current is increased to the original 4 mA values. Gain for 3 mA preamp bias is shown in Figure 3 and when compared to original 4 mA bias in Figure 4, one can see the gain increases less than about 2 dB. Figure 5 and Figure 6 show noise temps far exceed mixer specifications of 73K for the 3 mA bias, and would certainly still not meet specs for the 4 mA case. Image rejection is shown for completeness in Figure 7 and Figure 8.

Figure 1: Mixer 165 Noise Temps, 3 mA Preamp Drain Currents

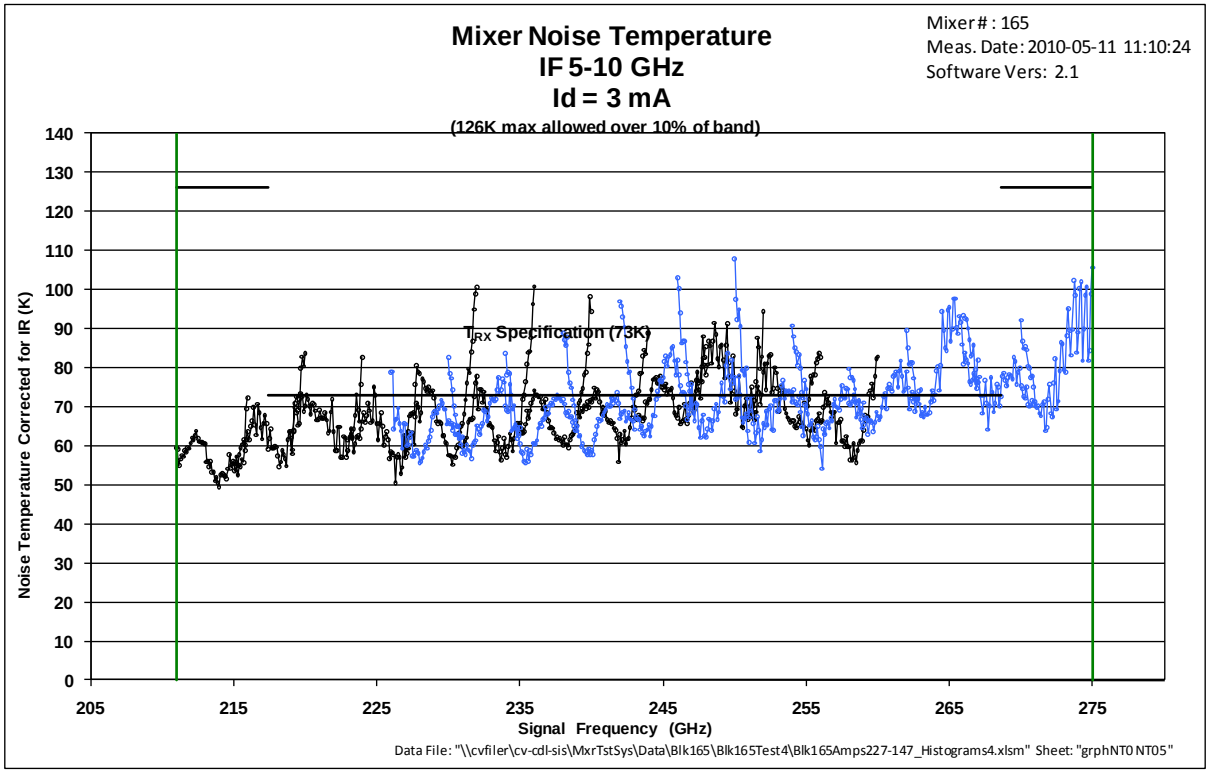

Figure 2: Mixer 165 Noise Temps, 4 mA Preamp Drain Currents

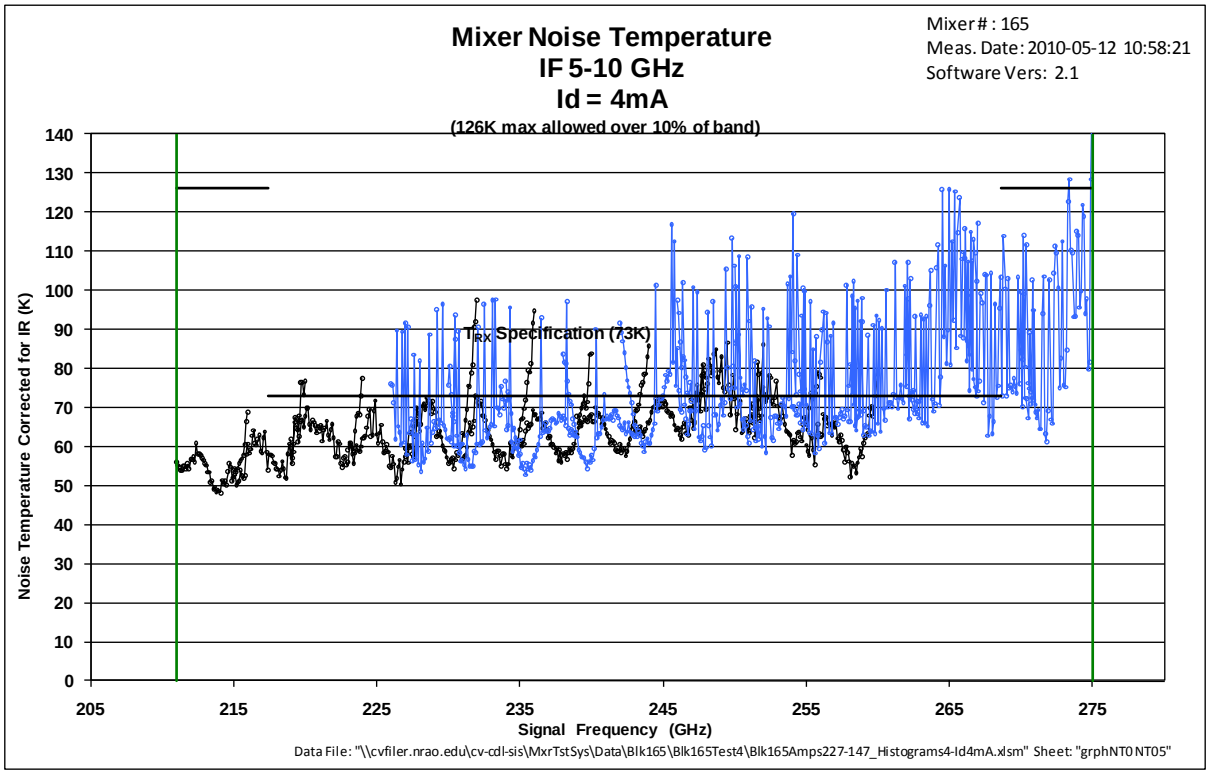

Figure 3: Gain for 3 mA Drain Current

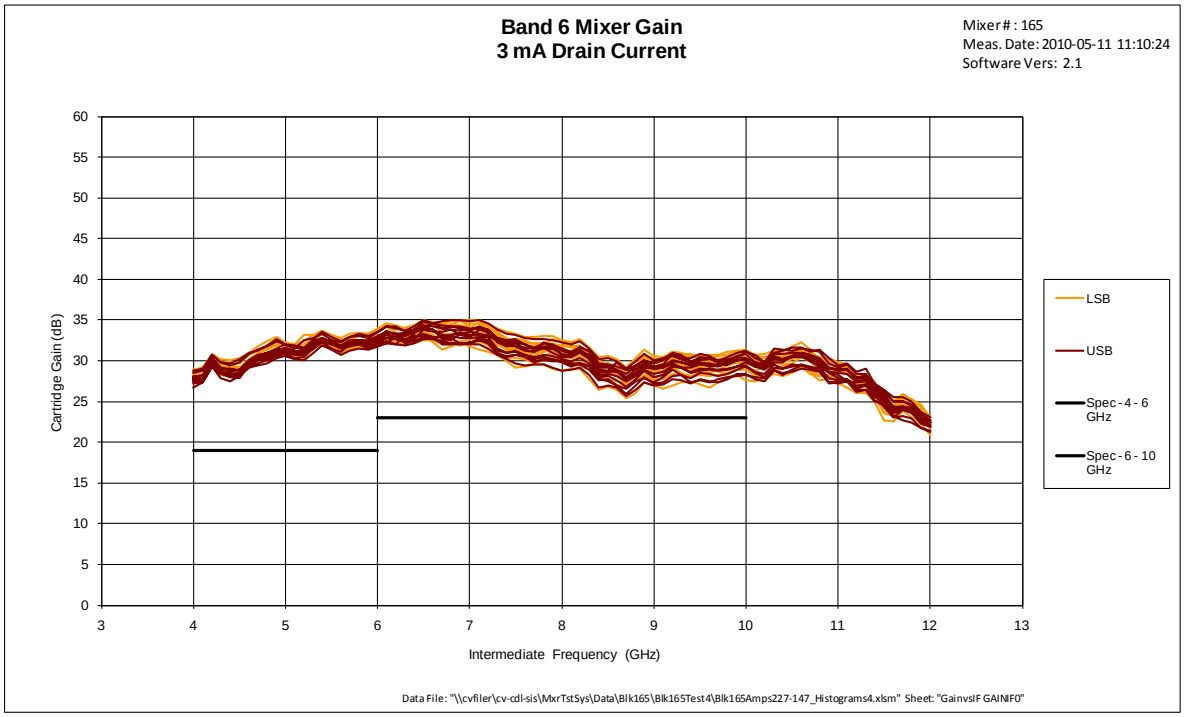

Figure 4: Gain for 4 mA Drain Current

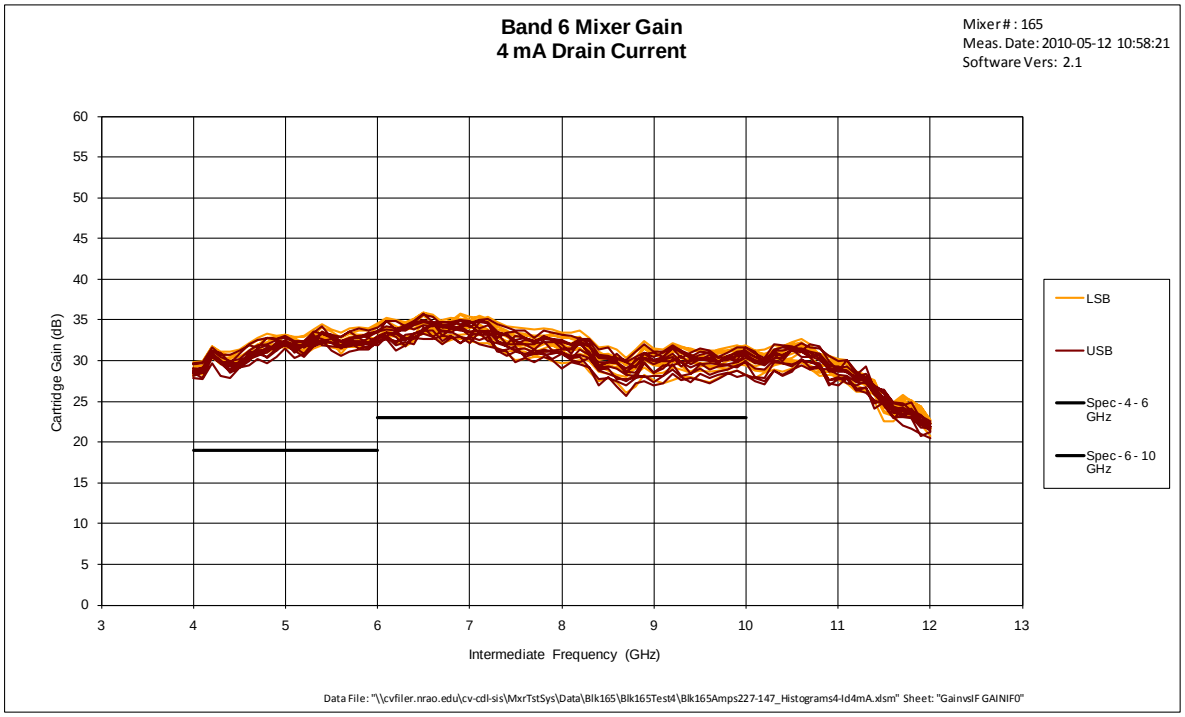

Figure 5: USB Noise Temps, 3 mA drain currents, 39% above mixer spec

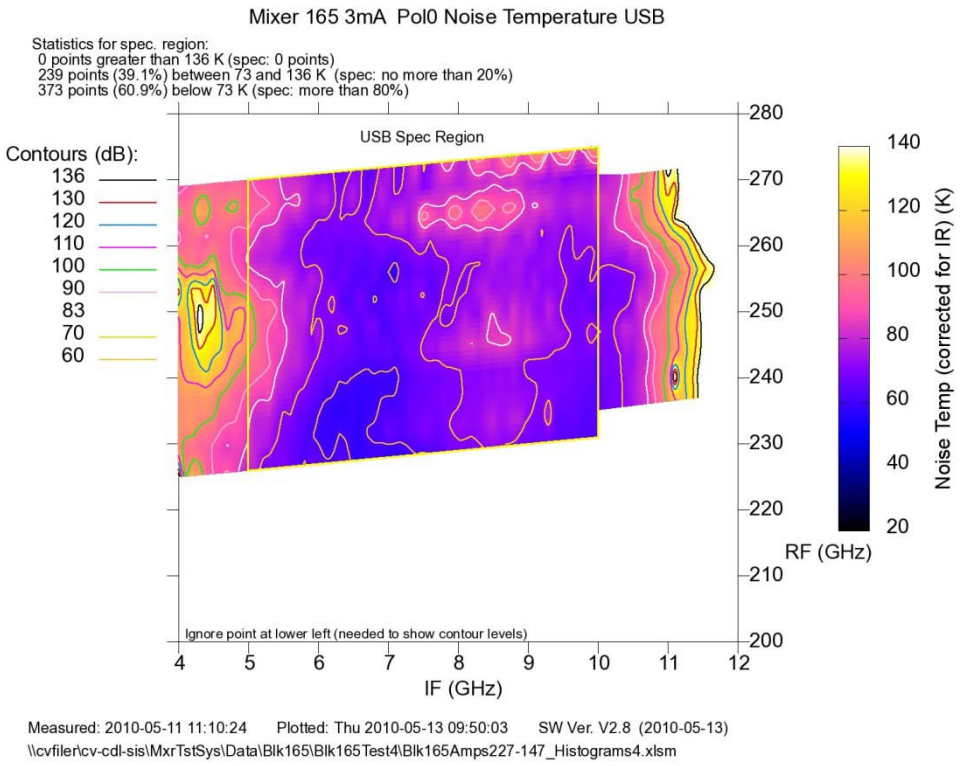

Figure 6: LSB Noise Temps, 3 mA drain currents, 26% above mixer spec

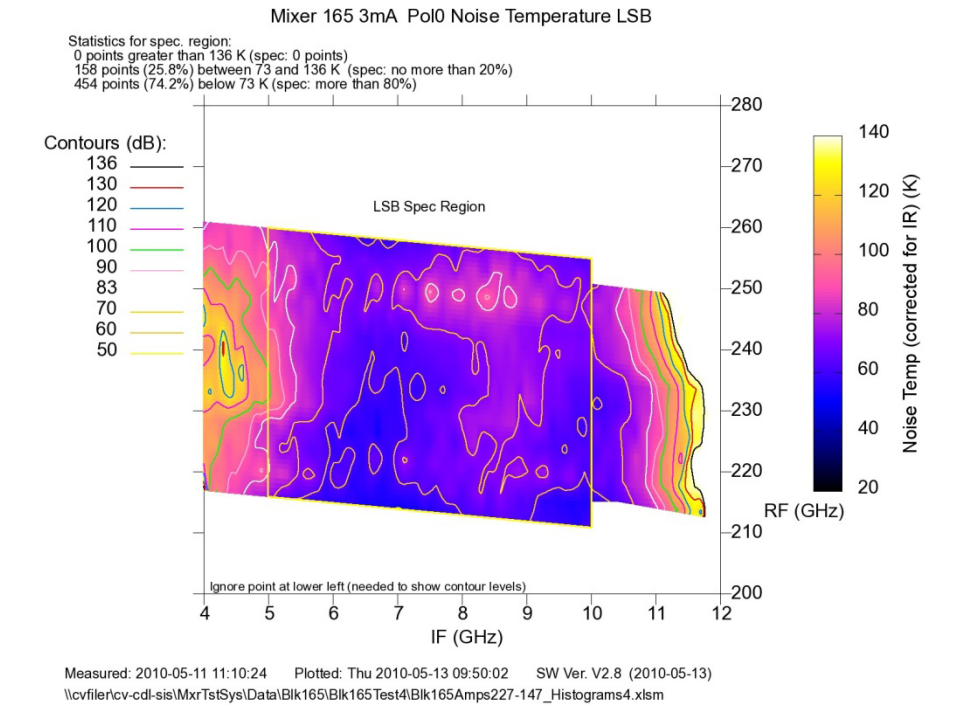

Figure 7: LSB Image Rejection

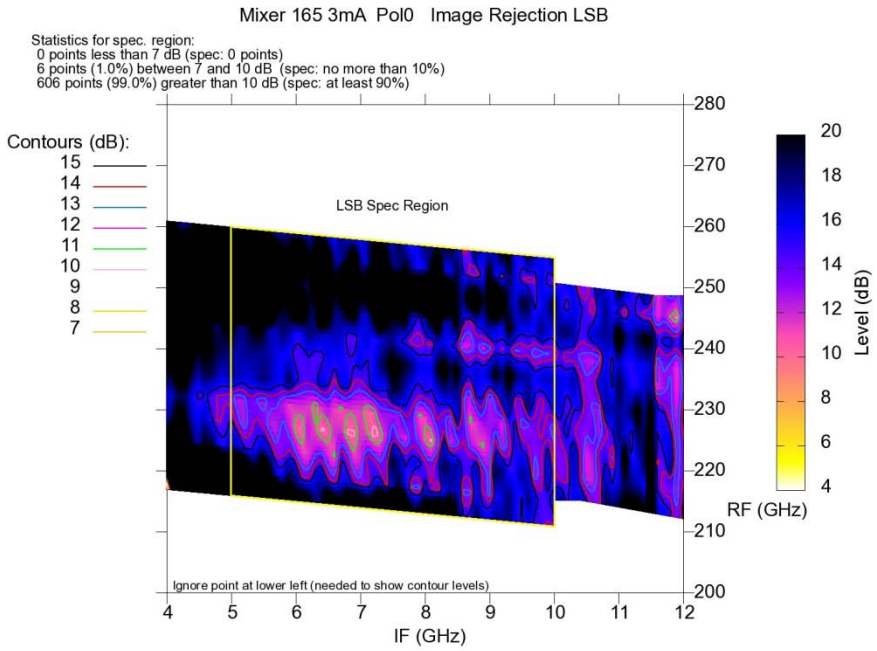

Figure 8: USB Image Rejection