Spurious Emissions

Spurious output from the transmitter and mask filter was measured as shown below. Because the spectrum analyzer used did not have a Resolution Bandwidth setting of 500kHz, a setting of 300kHz was used. A correction factor of -2.2dB is applied to all readings (note: relative readings all remain the same) and is calculated by the following equation:

$$A = A_{air} + 10 * \log\left(\frac{BW_{air}}{500}\right)$$

Note that these measurements **do not** include the external GPS filter (one supplied with every transmitter) which also provides an additional 85dB within the GPS frequency bands as well as better than 30dB at the second harmonic of the main channel. Typical tuning of this filter found in Figures 11 and 12.

Figure 6 shows the fundamental frequency at a span of 50MHz, showing the spectrum for three channels above and below the channel. Spurious emissions in the 2nd and 3rd adjacent channel are better than -65dB referenced to the fundamental (reference).

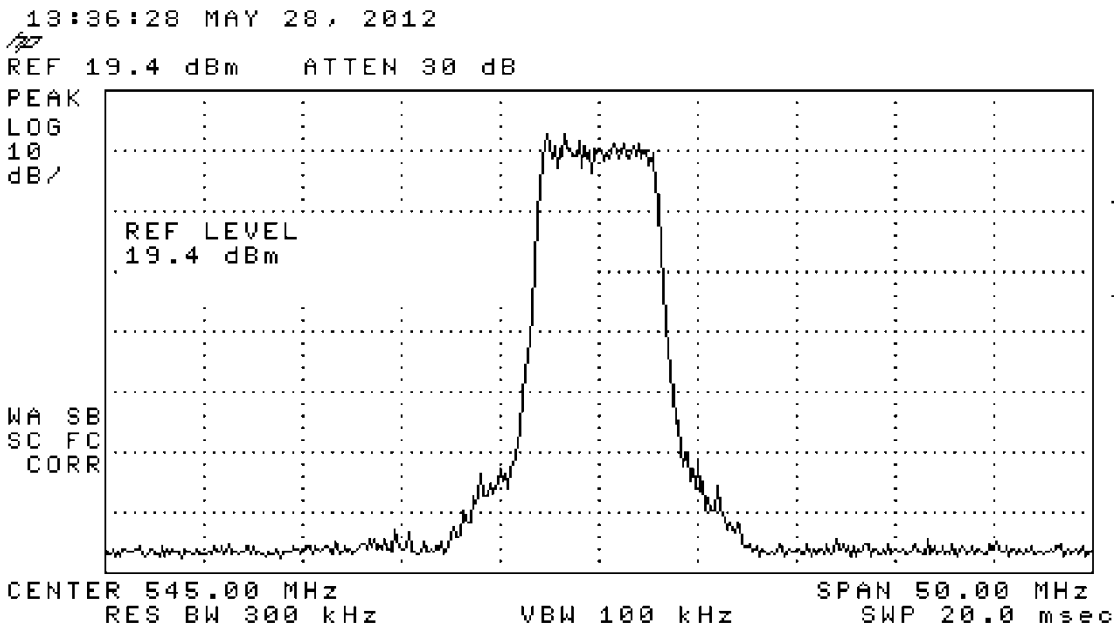

Figure 1: Fundamental

Figure 7 shows the second harmonic level of the transmitter, pre-GPS filter. The reference is the same as for the previous filter. The second harmonic is at -55dB with respect to the fundamental, and the addition of the GPS filter will add another 30dB to this value – resulting in emissions at the second harmonic being better than -85dB relative to the fundamental (reference)

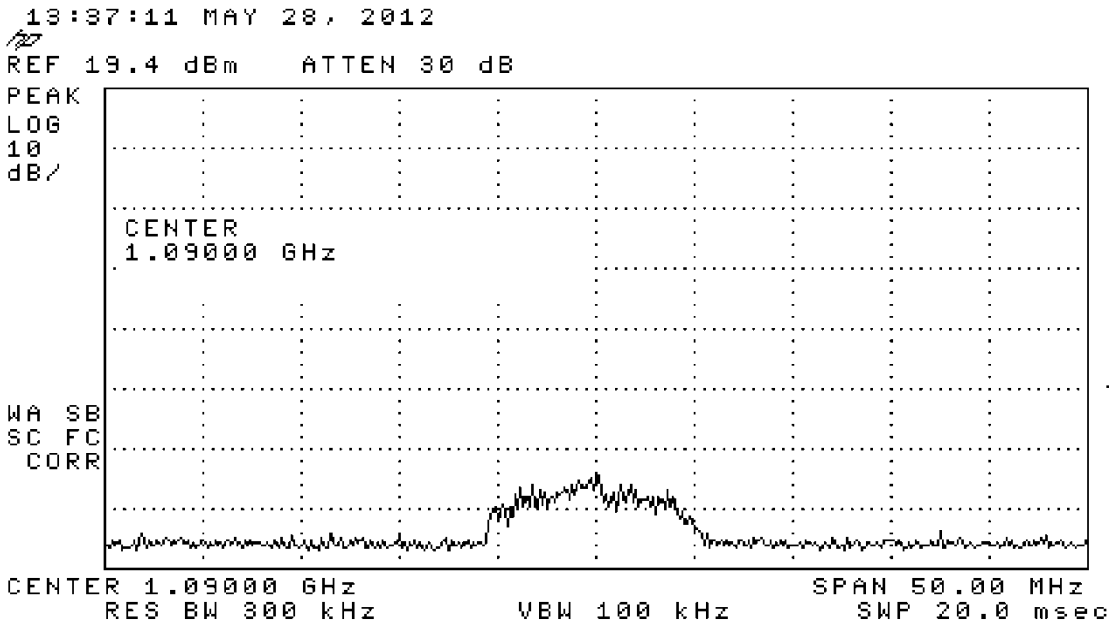

Figure 2: Second harmonic.

Figure 8 shows the spectral emissions from the transmitter across the band up to 6.5GHz (beyond the 10th Harmonic) again, prior to the GPS filter. All emissions up to the second harmonic are better than -60dB relative to the fundamental, and beyond the second harmonic are further attenuated by the GPS filter as shown in the filter response plots.

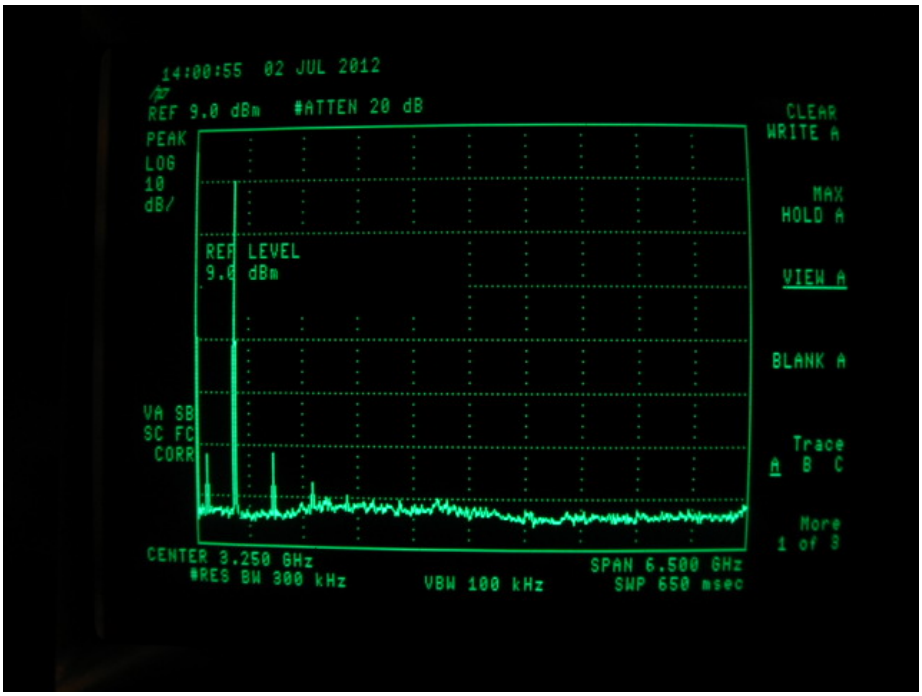

Figure 3: Frequency Spectrum up to 6.5GHz

Shown in Figure 9 and Figure 10 are the emission mask tests for simple and stringent masks.

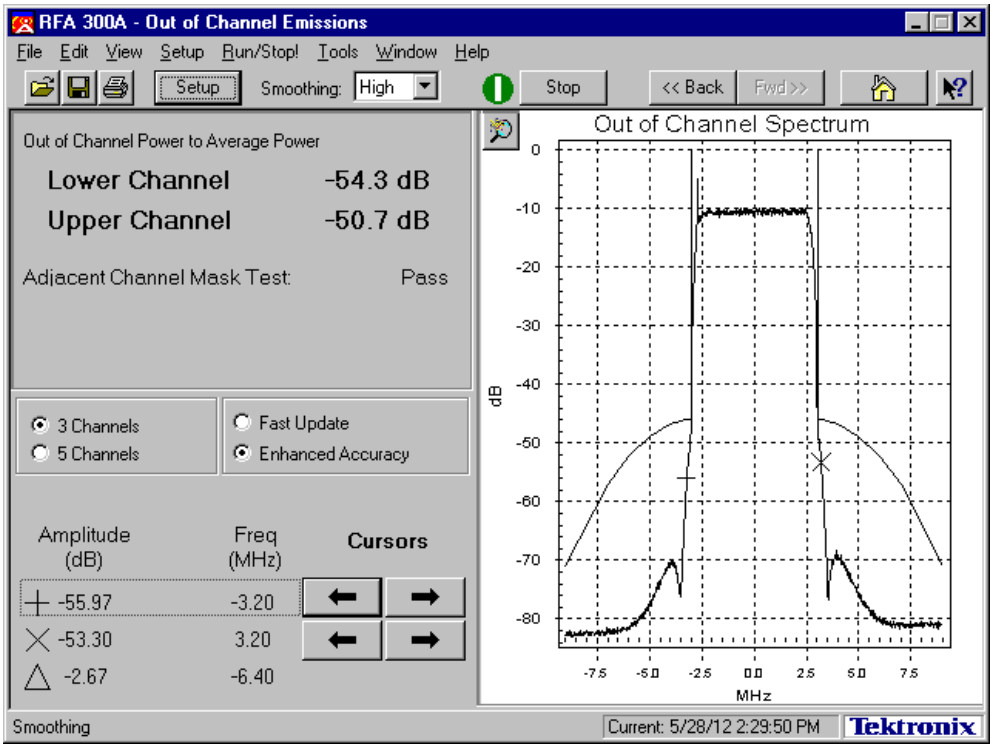

Figure 4: Simple mask test.

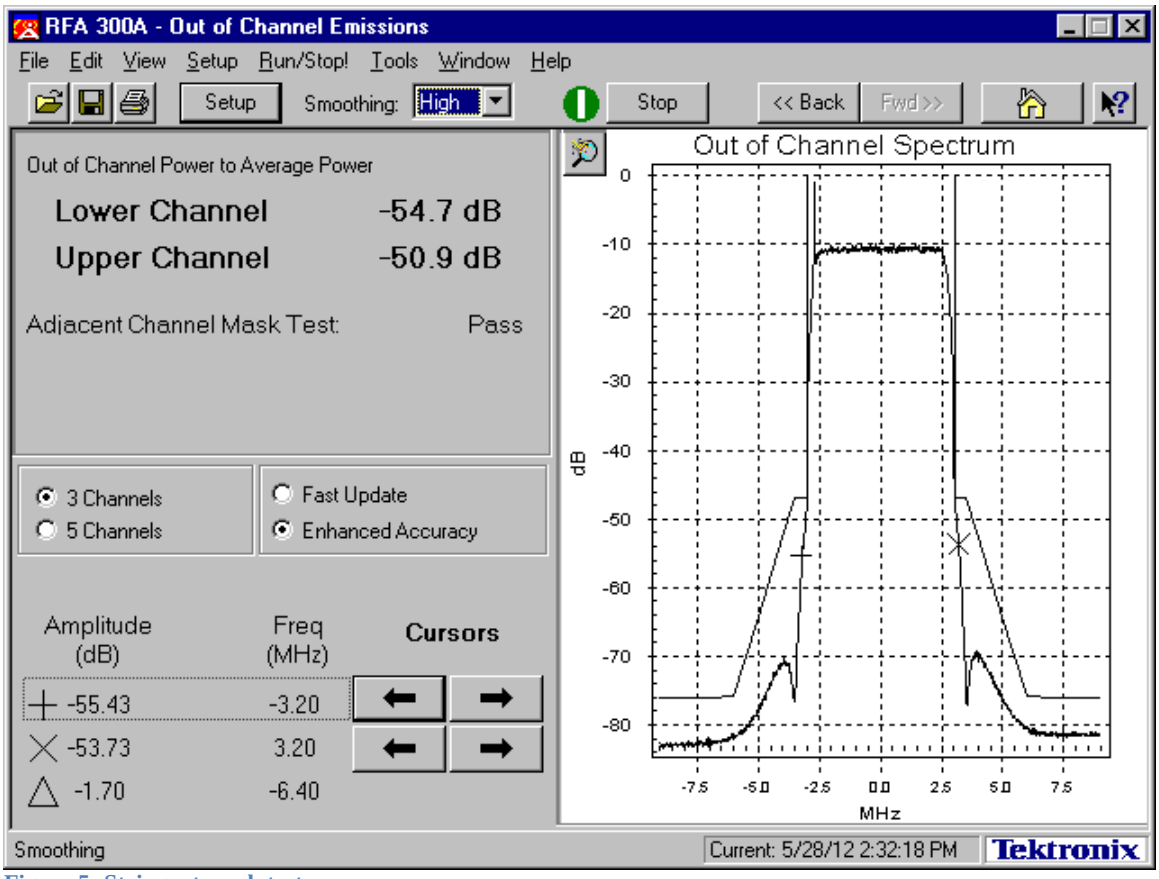

Figure 5: Stringent mask test

GPS filters are included with every transmitter, regardless of channel, due to the fact that these transmitters may someday be repurposed in different installations, or used as spare units where a customer is required to maintain more than one site. The filter tuning is given in Figures 11, and 12, showing a minimum attenuation of 65dB within the GPS frequency bands.

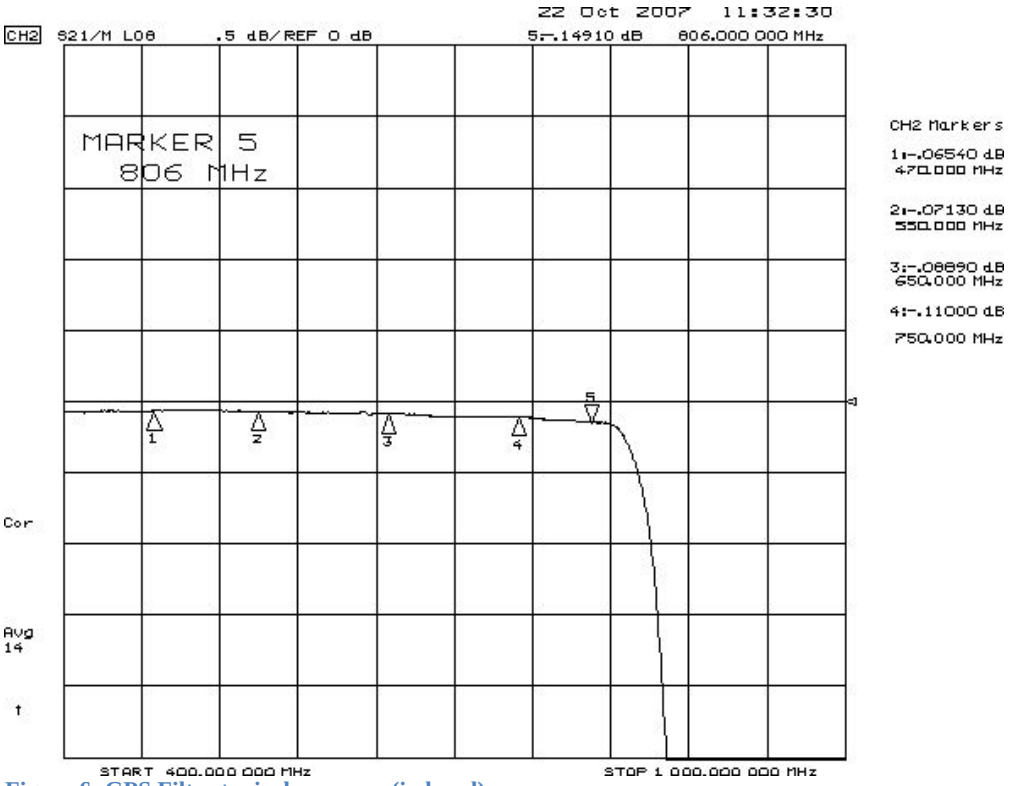

Figure 6: GPS Filter typical response (in band)

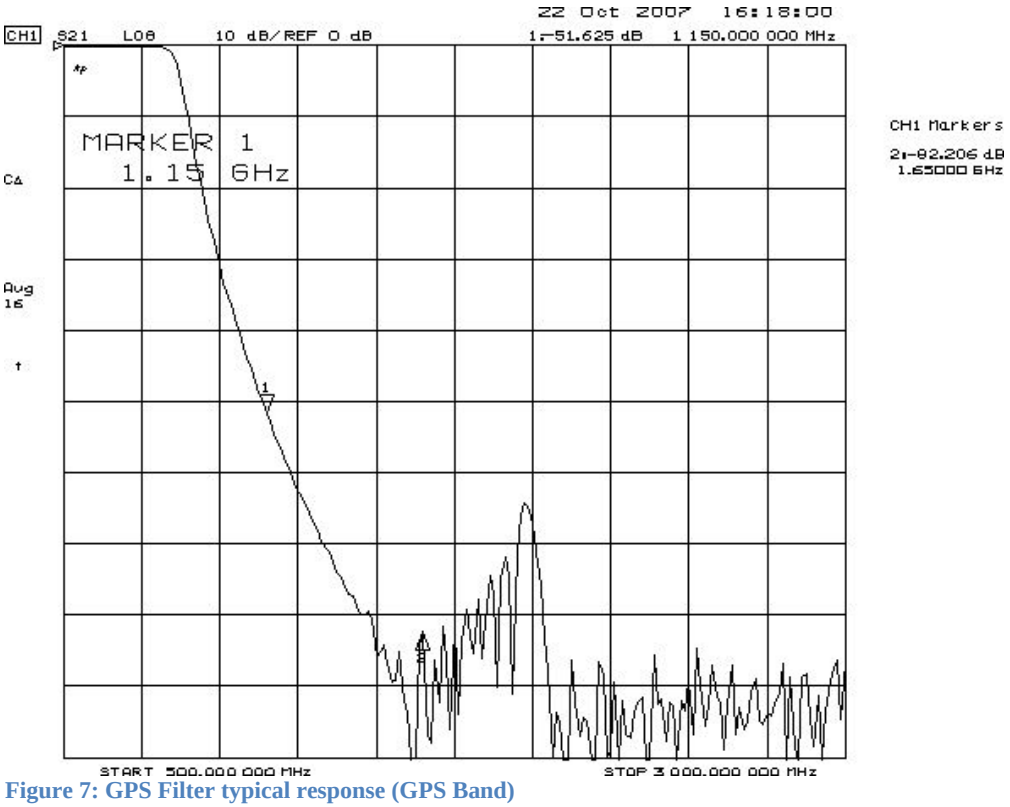

Figure 7: GPS Filter typical response (GPS Band)