4. TEST REPORT

4.1 RF Power Measurements

Figure 4-1 shows the test equipment setup for the RF power measurements.

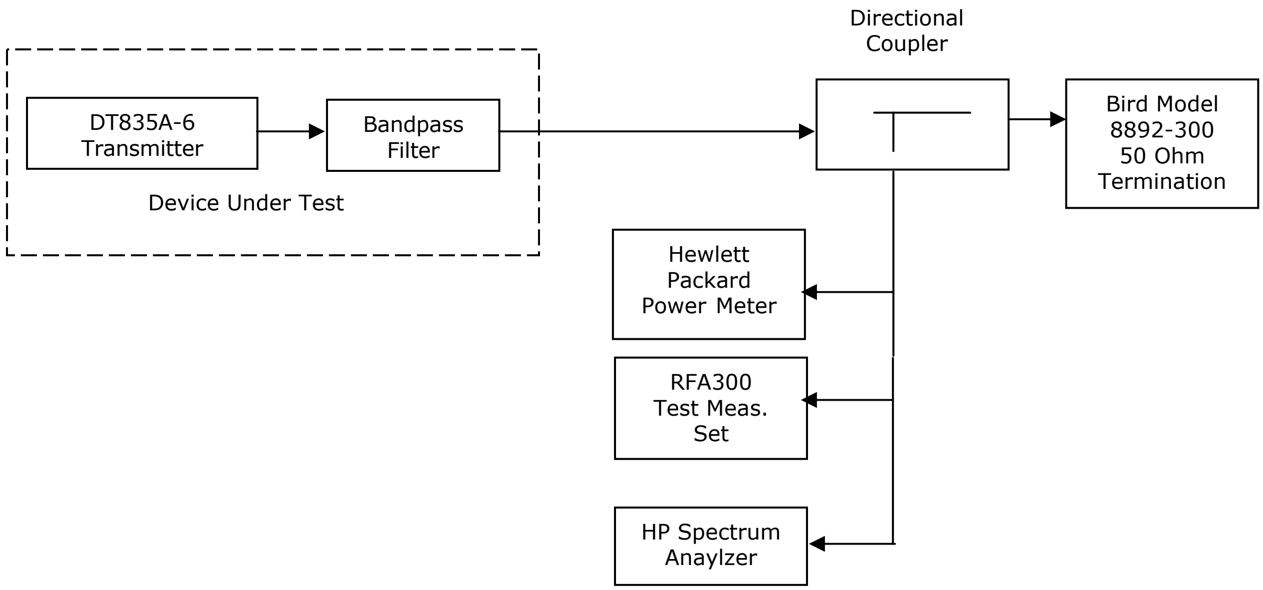

Figure 4-1. Test Equipment Setup for RF Power Measurements

The output power of the DT835A-6 was adjusted to obtain 3000 watts average RF output as observed on the power meter. At this power level, the final

Measured Power: +24.77 dBm
Coupling Loss: -40.0 dB
Power: +64.77 dBm
Power = 3000 Watts

With the power level properly set to 3000 watts average, all required tests were performed and recorded in the following sections.

4. 2 Modulation Characteristics

The modulator tray incorporates a modulation technique known as 8-Level Vestigial Side-band (8-VSB), which uses a layered digital architecture and a single carrier frequency. A pilot tone is provided, to allow rapid acquisition of the signal by receivers. The 8-VSB system transmits a serial data bit stream at a rate of 19.4 Mbps in a 6 MHz television channel. This type of transmission is far less susceptible to propagation impairments such as multi-path, noise and interference as compared to analog transmissions.

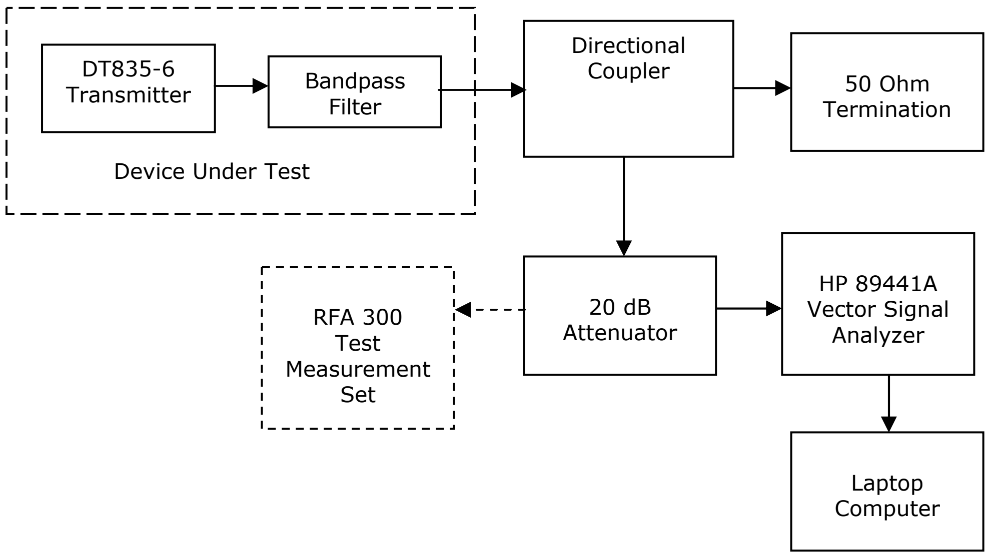

Figure 4-2. Typical Demodulation Test Setup

4. 3 Error Vector Magnitude (EVM) and Signal to Noise Ratio (SNR)

The Hewlett Packard Vector Signal Analyzer and Tektronix RFA 300 were used to measure that the un-equalized patterns are within the ATSC/FCC EVM limit of 4% and SNR limit of 27db.

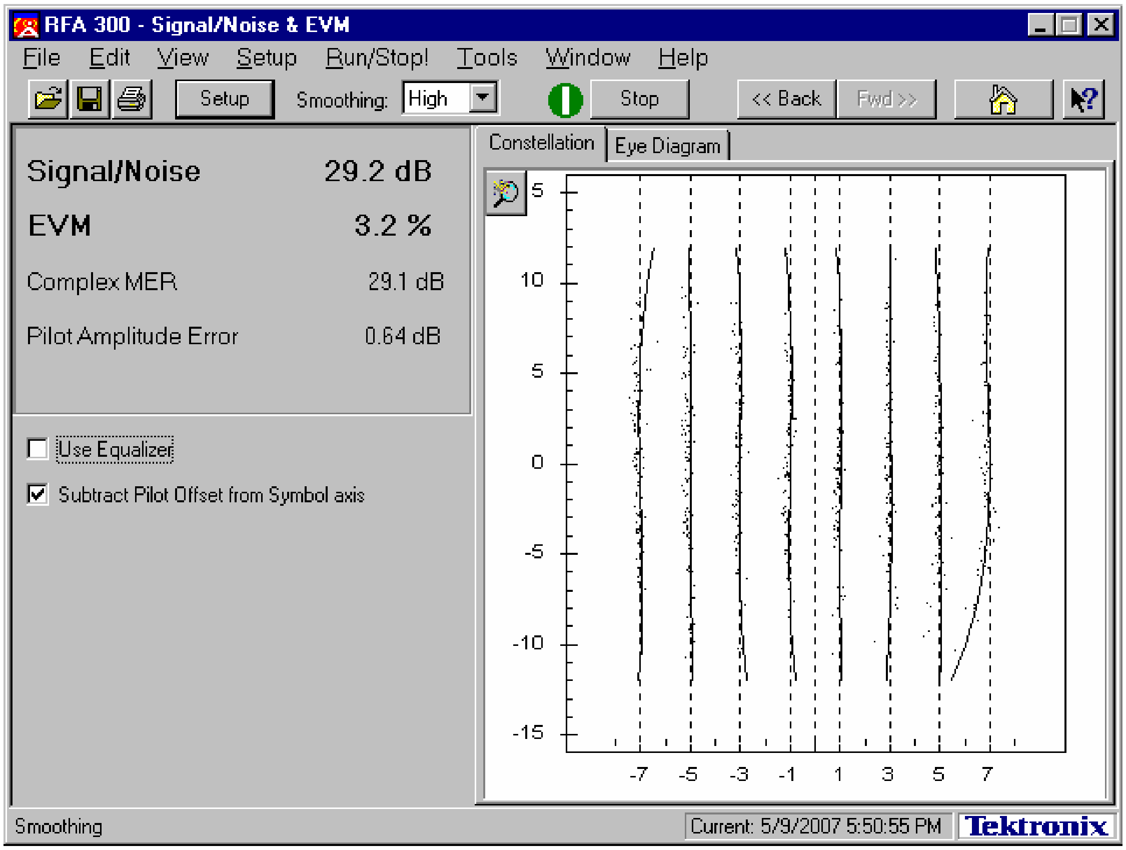

Figure 4-3. Constellation Diagram

4. 4 Frequency Response and Group Delay

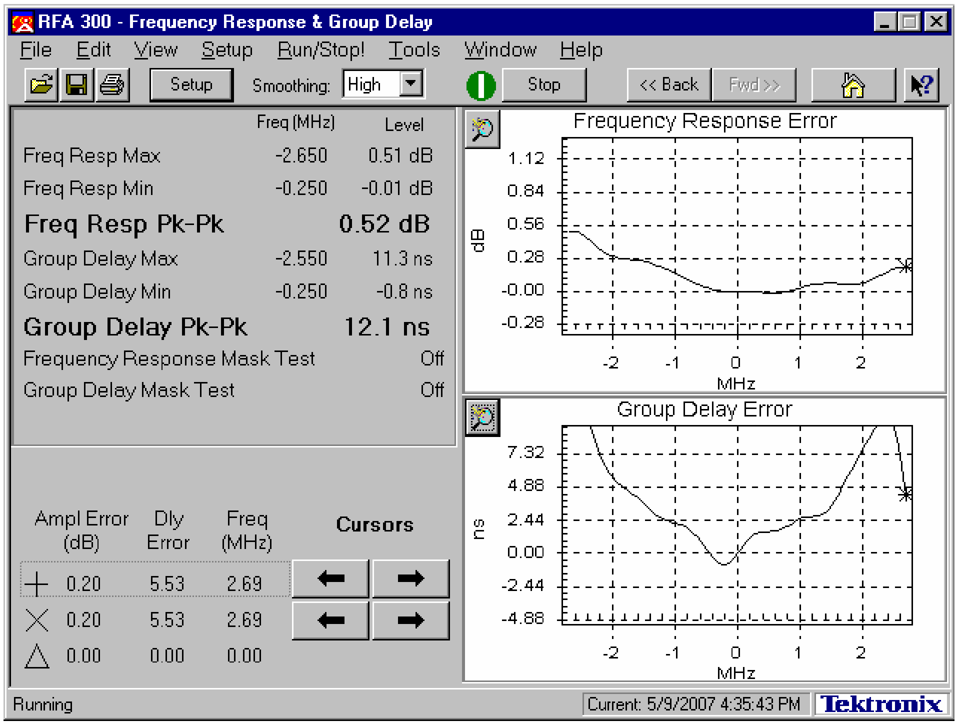

Figure 4-4. Frequency Response and Group Delay Plots

4. 5 Peak to Average

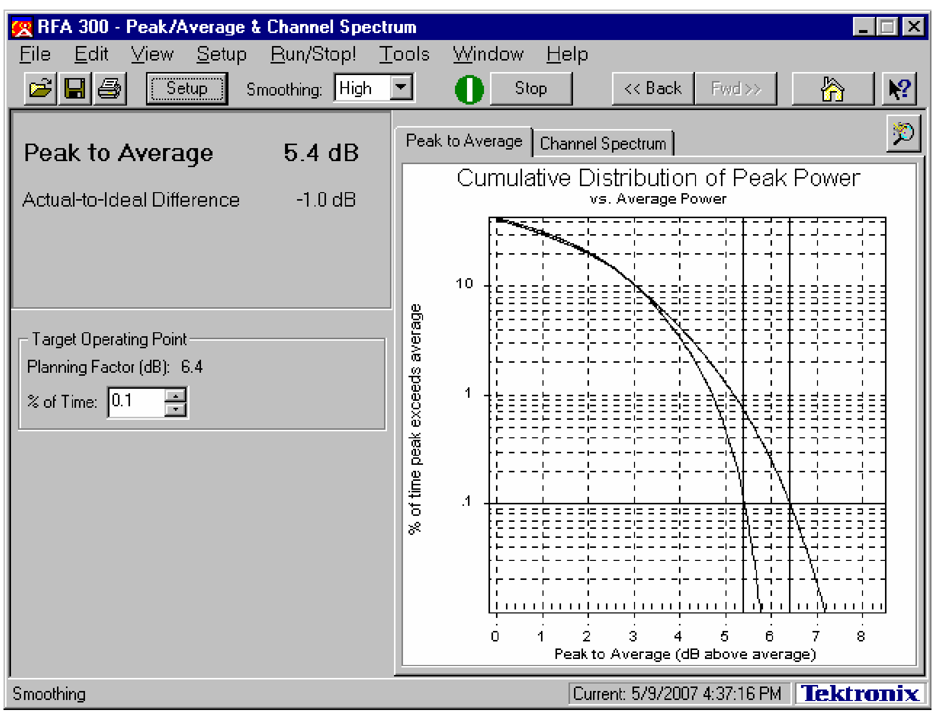

Figure 4-5. Peak to Average Plot

4. 6 Phase Noise

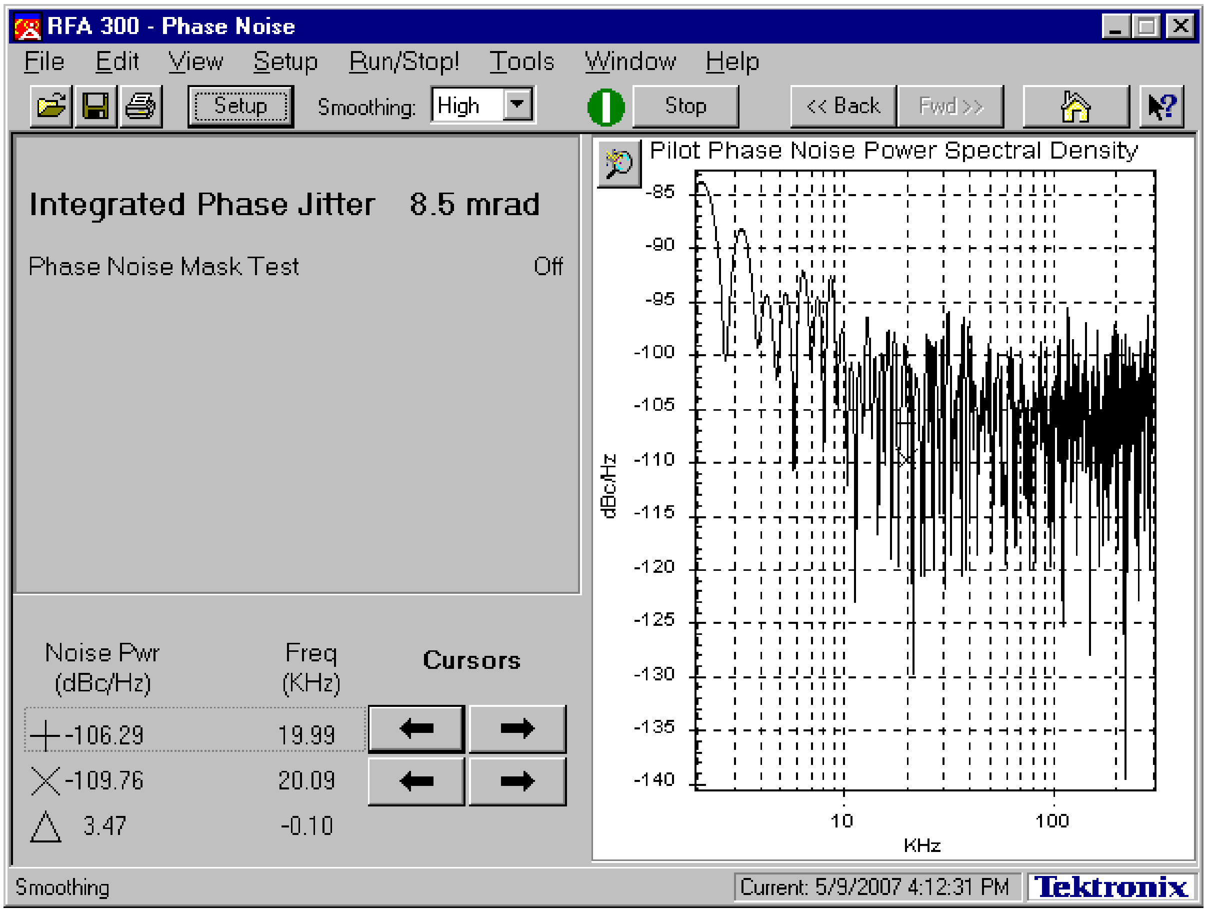

Figure 4-6. Phase Noise Plot

4.7 Occupied Bandwidth

Using the test setup in Figure 4-2, with the transmitter operating at maximum power, a photograph of the transmitter occupied bandwidth spectrum was taken and is shown in Figure 4-7.

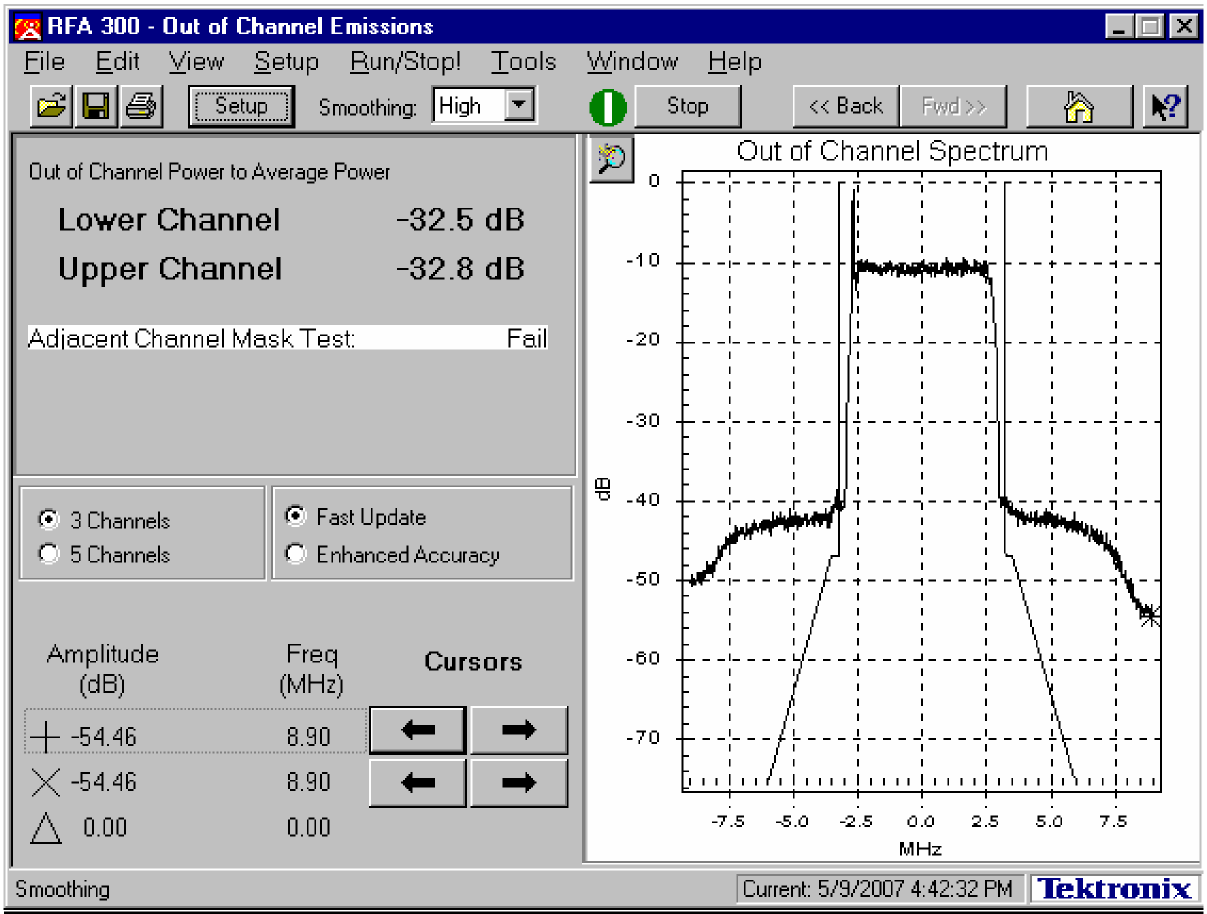

Figure 4-7. Channel Occupied Bandwidth (Pre-Filter)

4.8 Conducted Spurious Emissions

The Hewlett Packard Spectrum Analyzer was used to measure harmonics before the low pass and mask filter. The levels were then added to the filter attenuation at the 2nd and 3rd harmonics for a reading of less than –110dB at output of the mask filter.

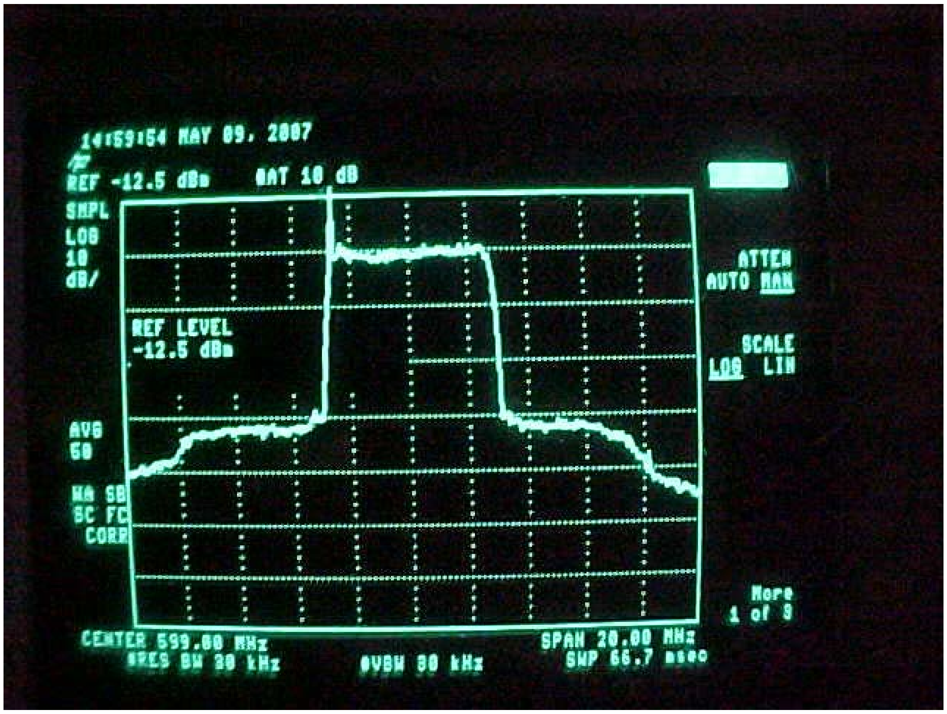

Figure 4-8A. Reference (599 MHz) = -12.50 dBm (Pre-Filter)

Figure 4-8B. Second Harmonic (1198 MHz) = -72.50 dBm (Pre-Filter)

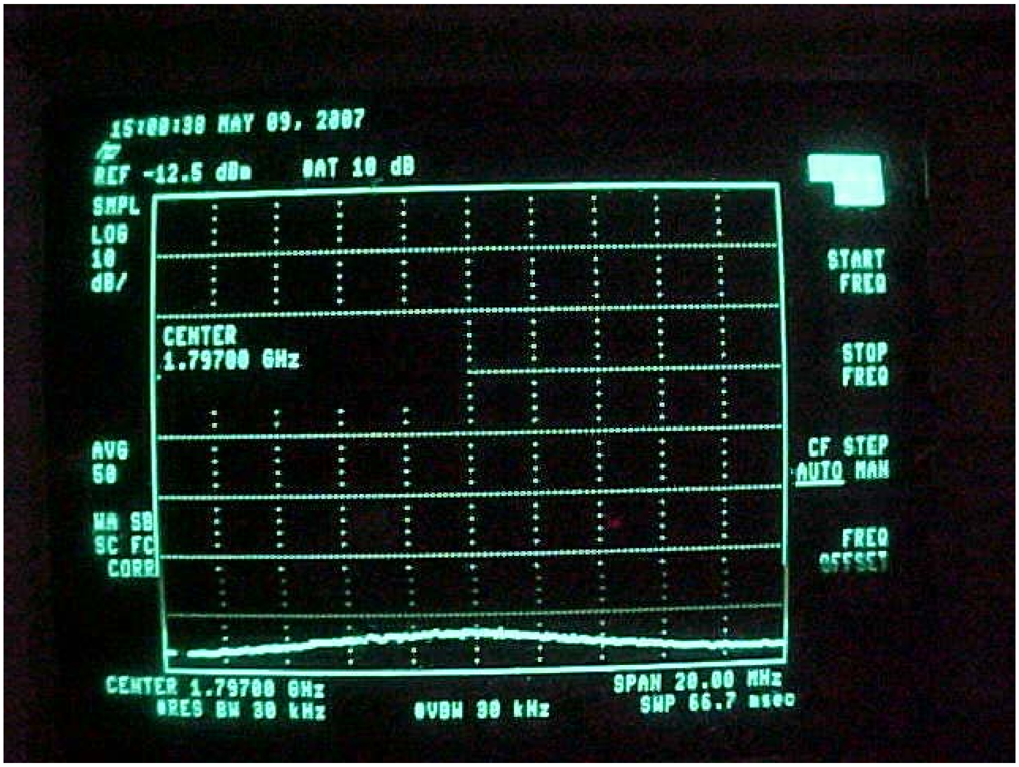

Figure 4-8C. Third Harmonic (1797 MHz) = -85.50 dBm (Pre-Filter)

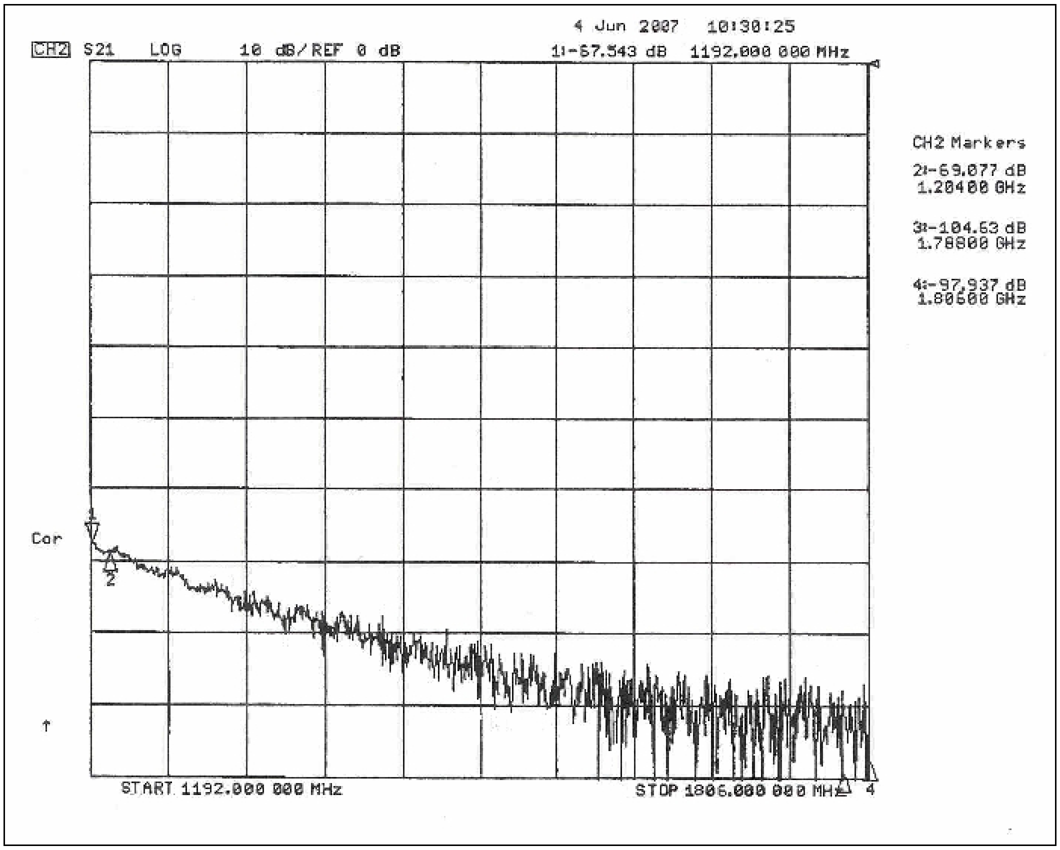

Figure 4-8D. Harmonic Filter Sweep

Harmonic (MHz)	Pre Filter Level (dBm)	Filter Rejection (dB)	Post Filter Level (dBm)
Second (1198)	-60.00	-78.00	-138.00
Third (1797)	-73.00	-98.00	-171.00

Table 4-1. Post Filter Harmonic Levels

Part 74.794 of the Rules states:

(ii) *Stringent mask. In the first 500 kHz from the channel edges, emissions must be attenuated no less than 47 dB. More than 3 MHz from the channel edges, emissions must be attenuated no less than 76 dB. At any frequency between 0.5 and 3 MHz from the channel edges, emissions must be attenuated no less than the value determined by the following formula: A(dB) = 47 + 11.5 (Df–0.5).*

Mask data was measured for the filter with results plotted at 10 kHz steps. In the first 500 kHz adjacent to the channel edge, the out of band power must be 47 dB below the total channel power. To determine the out of band power, the amplifier IMD measured at the final amplifier output before the mask filter was added to the filter response and the power was summed over 500 kHz to give the total out of band power in that band.

The total channel power can be found by multiplying the power in 10 kHz by the number of 10 kHz subsections in the occupied bandwidth. The ratio of the out of band to in band power is then calculated.

Frequency	Filter Response	Amp IMD	Total	Power
595.5	-21.9	31	-52.9	5.14E-06
595.51	-21.4	31	-52.4	5.81E-06
595.52	-20.8	31	-51.8	6.57E-06
595.53	-20.3	31	-51.3	7.42E-06
595.54	-19.8	31	-50.8	8.38E-06
595.55	-19.2	31	-50.2	9.45E-06
595.56	-18.7	31	-49.7	1.07E-05
595.57	-18.2	31	-49.2	1.2E-05
595.58	-17.7	31	-48.7	1.36E-05
595.59	-17.2	31	-48.2	1.53E-05
595.6	-16.6	31	-47.6	1.72E-05
595.61	-16.1	31	-47.1	1.94E-05
595.62	-15.6	31	-46.6	2.19E-05
595.63	-15.1	31	-46.1	2.46E-05
595.64	-14.6	31	-45.6	2.77E-05
595.65	-14.1	31	-45.1	3.11E-05
595.66	-13.6	31	-44.6	3.5E-05
595.67	-13.1	31	-44.1	3.93E-05
595.68	-12.6	31	-43.6	4.41E-05
595.69	-12.1	31	-43.1	4.95E-05
595.7	-11.6	31	-42.6	5.55E-05
595.71	-11.1	31	-42.1	6.21E-05
595.72	-10.6	31	-41.6	6.95E-05
595.73	-10.1	31	-41.1	7.76E-05
595.74	-9.6	31	-40.6	8.65E-05
595.75	-9.2	31	-40.2	9.64E-05
595.76	-8.7	31	-39.7	0.000107
595.77	-8.2	31	-39.2	0.000119
595.78	-7.8	31	-38.8	0.000132
595.79	-7.4	31	-38.4	0.000145
595.8	-7.0	31	-38.0	0.00016

595.81	-6.5	31	-37.5	0.000176
595.82	-6.2	31	-37.2	0.000193
595.83	-5.8	31	-36.8	0.00021
595.84	-5.4	31	-36.4	0.000229
595.85	-5.1	31	-36.1	0.000248
595.86	-4.7	31	-35.7	0.000268
595.87	-4.4	31	-35.4	0.000288
595.88	-4.1	31	-35.1	0.000308
595.89	-3.8	31	-34.8	0.000329
595.9	-3.6	31	-34.6	0.000349
595.91	-3.3	31	-34.3	0.000369
595.92	-3.1	31	-34.1	0.000389
595.93	-2.9	31	-33.9	0.000408
595.94	-2.7	31	-33.7	0.000427
595.95	-2.5	31	-33.5	0.000444
595.96	-2.4	31	-33.4	0.000461
595.97	-2.2	31	-33.2	0.000476
595.98	-2.1	31	-33.1	0.000491
595.99	-2.0	31	-33.0	0.000505
596	-1.9	30	-31.9	0.000651

Total: = 8.08E-3

The ratio of in band to out of band power is 10*log(5.38MHz/10kHz*8.08E-03) = 48.2 dB.

The upper sideband can be calculated in a similar fashion.

Frequency	**Filter Response**	**Amp IMD**	**Total**	**Power**
602	-1.6	30	-31.6	0.000696
602.01	-1.6	31	-32.6	0.000544
602.02	-1.7	31	-32.7	0.000534
602.03	-1.8	31	-32.8	0.000523
602.04	-1.9	31	-32.9	0.000511
602.05	-2.0	31	-33.0	0.000498
602.06	-2.2	31	-33.2	0.000484
602.07	-2.3	31	-33.3	0.000469
602.08	-2.4	31	-33.4	0.000453
602.09	-2.6	31	-33.6	0.000437
602.1	-2.8	31	-33.8	0.000419
602.11	-3.0	32	-35.0	0.000318
602.12	-3.2	32	-35.2	0.000303
602.13	-3.4	32	-35.4	0.000287
602.14	-3.7	32	-35.7	0.000272
602.15	-3.9	32	-35.9	0.000256
602.16	-4.2	32	-36.2	0.00024
602.17	-4.5	32	-36.5	0.000224
602.18	-4.8	32	-36.8	0.000208
602.19	-5.1	32	-37.1	0.000193
602.2	-5.5	32	-37.5	0.000178
602.21	-5.9	32	-37.9	0.000164

602.22	-6.2	32	-38.2	0.00015
602.23	-6.6	32	-38.6	0.000138
602.24	-7.0	32	-39.0	0.000125
602.25	-7.4	32	-39.4	0.000114
602.26	-7.9	32	-39.9	0.000103
602.27	-8.3	32	-40.3	9.36E-05
602.28	-8.7	32	-40.7	8.45E-05
602.29	-9.2	32	-41.2	7.62E-05
602.3	-9.6	32	-41.6	6.86E-05
602.31	-10.1	32	-42.1	6.16E-05
602.32	-10.6	32	-42.6	5.53E-05
602.33	-11.0	32	-43.0	4.96E-05
602.34	-11.5	32	-43.5	4.44E-05
602.35	-12.0	32	-44.0	3.97E-05
602.36	-12.5	32	-44.5	3.55E-05
602.37	-13.0	32	-45.0	3.17E-05
602.38	-13.5	32	-45.5	2.83E-05
602.39	-14.0	32	-46.0	2.53E-05
602.4	-14.5	32	-46.5	2.25E-05
602.41	-15.0	32	-47.0	2.01E-05
602.42	-15.5	32	-47.5	1.79E-05
602.43	-16.0	32	-48.0	1.59E-05
602.44	-16.5	32	-48.5	1.42E-05
602.45	-17.0	32	-49.0	1.26E-05
602.46	-17.5	32	-49.5	1.12E-05
602.47	-18.0	32	-50.0	1E-05
602.48	-18.5	32	-50.5	8.9E-06
602.49	-19.0	32	-51.0	7.91E-06
602.5	-19.5	32	-51.5	7.03E-06

Total = 8.98E-3

The ratio of in band to out of band power is 10*log(5.38MHz/10kHz*8.98E-03) = 47.8 dB.

A similar calculation can be done for the next 500 kHz bands on each side of the channel. The data is shown below:

Frequency	Filter Response	Amp IMD	Total	Power
595	-58.8	32	-90.8	8.3E-10
595.01	-59.9	32	-91.9	6.46E-10
595.02	-60.6	32	-92.6	5.55E-10
595.03	-60.4	32	-92.4	5.78E-10
595.04	-59.3	32	-91.3	7.39E-10
595.05	-57.7	32	-89.7	1.06E-09
595.06	-56.0	32	-88.0	1.59E-09
595.07	-54.3	32	-86.3	2.34E-09
595.08	-52.7	32	-84.7	3.36E-09
595.09	-51.3	32	-83.3	4.7E-09
595.1	-49.9	32	-81.9	6.4E-09

595.11	-48.7	32	-80.7	8.53E-09
595.12	-47.5	32	-79.5	1.12E-08
595.13	-46.4	32	-78.4	1.43E-08
595.14	-45.4	32	-77.4	1.82E-08
595.15	-44.4	32	-76.4	2.27E-08
595.16	-43.5	32	-75.5	2.82E-08
595.17	-42.6	32	-74.6	3.46E-08
595.18	-41.8	32	-73.8	4.21E-08
595.19	-40.9	32	-72.9	5.09E-08
595.2	-40.1	32	-72.1	6.11E-08
595.21	-39.4	32	-71.4	7.29E-08
595.22	-38.6	32	-70.6	8.66E-08
595.23	-37.9	32	-69.9	1.02E-07
595.24	-37.2	32	-69.2	1.21E-07
595.25	-36.5	32	-68.5	1.41E-07
595.26	-35.8	32	-67.8	1.65E-07
595.27	-35.2	32	-67.2	1.93E-07
595.28	-34.5	32	-66.5	2.24E-07
595.29	-33.9	32	-65.9	2.59E-07
595.3	-33.2	32	-65.2	3E-07
595.31	-32.6	32	-64.6	3.46E-07
595.32	-32.0	32	-64.0	3.98E-07
595.33	-31.4	32	-63.4	4.58E-07
595.34	-30.8	32	-62.8	5.25E-07
595.35	-30.2	32	-62.2	6.02E-07
595.36	-29.6	32	-61.6	6.88E-07
595.37	-29.0	32	-61.0	7.86E-07
595.38	-28.5	32	-60.5	8.97E-07
595.39	-27.9	32	-59.9	1.02E-06
595.4	-27.3	32	-59.3	1.16E-06
595.41	-26.8	32	-58.8	1.32E-06
595.42	-26.2	32	-58.2	1.51E-06
595.43	-25.7	32	-57.7	1.71E-06
595.44	-25.1	32	-57.1	1.94E-06
595.45	-24.6	32	-56.6	2.2E-06
595.46	-24.0	32	-56.0	2.49E-06
595.47	-23.5	32	-55.5	2.82E-06
595.48	-23.0	32	-55.0	3.19E-06
595.49	-22.4	31	-53.4	4.55E-06
595.5	-21.9	31	-52.9	5.14E-06

Total = 3.6E-5. Ratio to in band = 71.7 dB

Frequency	Filter Response	Amp IMD	Total	Power
602.5	-19.5	32	-51.5	7.03E-06
602.51	-20.0	32	-52.0	6.25E-06
602.52	-20.6	32	-52.6	5.55E-06
602.53	-21.1	32	-53.1	4.93E-06
602.54	-21.6	32	-53.6	4.37E-06

602.55	-22.1	32	-54.1	3.88E-06
602.56	-22.6	32	-54.6	3.44E-06
602.57	-23.2	32	-55.2	3.05E-06
602.58	-23.7	32	-55.7	2.7E-06
602.59	-24.2	32	-56.2	2.4E-06
602.6	-24.7	32	-56.7	2.12E-06
602.61	-25.3	32	-57.3	1.88E-06
602.62	-25.8	32	-57.8	1.66E-06
602.63	-26.3	32	-58.3	1.46E-06
602.64	-26.9	32	-58.9	1.29E-06
602.65	-27.4	32	-59.4	1.14E-06
602.66	-28.0	32	-60.0	1E-06
602.67	-28.5	32	-60.5	8.85E-07
602.68	-29.1	32	-61.1	7.78E-07
602.69	-29.7	32	-61.7	6.83E-07
602.7	-30.2	32	-62.2	5.99E-07
602.71	-30.8	32	-62.8	5.25E-07
602.72	-31.4	32	-63.4	4.59E-07
602.73	-32.0	32	-64.0	4.01E-07
602.74	-32.6	32	-64.6	3.5E-07
602.75	-33.2	32	-65.2	3.04E-07
602.76	-33.8	32	-65.8	2.64E-07
602.77	-34.4	32	-66.4	2.29E-07
602.78	-35.0	32	-67.0	1.98E-07
602.79	-35.7	32	-67.7	1.71E-07
602.8	-36.3	32	-68.3	1.47E-07
602.81	-37.0	32	-69.0	1.26E-07
602.82	-37.7	32	-69.7	1.07E-07
602.83	-38.4	32	-70.4	9.13E-08
602.84	-39.1	32	-71.1	7.74E-08
602.85	-39.9	32	-71.9	6.53E-08
602.86	-40.6	32	-72.6	5.47E-08
602.87	-41.4	32	-73.4	4.57E-08
602.88	-42.2	32	-74.2	3.78E-08
602.89	-43.1	32	-75.1	3.11E-08
602.9	-44.0	32	-76.0	2.54E-08
602.91	-44.9	32	-76.9	2.05E-08
602.92	-45.9	32	-77.9	1.64E-08
602.93	-46.9	32	-78.9	1.29E-08
602.94	-48.0	32	-80.0	1.01E-08
602.95	-49.1	32	-81.1	7.71E-09
602.96	-50.4	32	-82.4	5.79E-09
602.97	-51.7	32	-83.7	4.25E-09
602.98	-53.2	32	-85.2	3.04E-09
602.99	-54.7	32	-86.7	2.12E-09
603	-56.4	32	-88.4	1.44E-09

Total = 6.09E-5. Ratio to in band = 69.5 dB.

The next two 500 kHz bands are down even farther.

Frequency	Filter Response	Amp IMD	Total	Power
594.5	-48.8	32	-80.8	8.34E-09
594.51	-48.7	32	-80.7	8.47E-09
594.52	-48.7	32	-80.7	8.6E-09
594.53	-48.6	32	-80.6	8.72E-09
594.54	-48.5	32	-80.5	8.84E-09
594.55	-48.5	32	-80.5	8.96E-09
594.56	-48.4	32	-80.4	9.07E-09
594.57	-48.4	32	-80.4	9.17E-09
594.58	-48.3	32	-80.3	9.27E-09
594.59	-48.3	32	-80.3	9.36E-09
594.6	-48.3	32	-80.3	9.44E-09
594.61	-48.2	32	-80.2	9.51E-09
594.62	-48.2	32	-80.2	9.58E-09
594.63	-48.2	32	-80.2	9.63E-09
594.64	-48.1	32	-80.1	9.68E-09
594.65	-48.1	32	-80.1	9.71E-09
594.66	-48.1	32	-80.1	9.73E-09
594.67	-48.1	32	-80.1	9.74E-09
594.68	-48.1	32	-80.1	9.73E-09
594.69	-48.1	32	-80.1	9.71E-09
594.7	-48.1	32	-80.1	9.68E-09
594.71	-48.2	32	-80.2	9.63E-09
594.72	-48.2	32	-80.2	9.56E-09
594.73	-48.2	32	-80.2	9.47E-09
594.74	-48.3	32	-80.3	9.37E-09
594.75	-48.3	32	-80.3	9.25E-09
594.76	-48.4	32	-80.4	9.1E-09
594.77	-48.5	32	-80.5	8.94E-09
594.78	-48.6	32	-80.6	8.75E-09
594.79	-48.7	32	-80.7	8.55E-09
594.8	-48.8	32	-80.8	8.32E-09
594.81	-48.9	32	-80.9	8.06E-09
594.82	-49.1	32	-81.1	7.79E-09
594.83	-49.3	32	-81.3	7.49E-09
594.84	-49.4	32	-81.4	7.17E-09
594.85	-49.7	32	-81.7	6.83E-09
594.86	-49.9	32	-81.9	6.47E-09
594.87	-50.2	32	-82.2	6.09E-09
594.88	-50.4	32	-82.4	5.69E-09
594.89	-50.8	32	-82.8	5.27E-09
594.9	-51.2	32	-83.2	4.84E-09
594.91	-51.6	32	-83.6	4.4E-09
594.92	-52.0	32	-84.0	3.95E-09
594.93	-52.6	32	-84.6	3.5E-09
594.94	-53.2	32	-85.2	3.05E-09
594.95	-53.8	32	-85.8	2.6E-09

594.96	-54.6	32	-86.6	2.18E-09
594.97	-55.5	32	-87.5	1.78E-09
594.98	-56.5	32	-88.5	1.41E-09
594.99	-57.6	32	-89.6	1.09E-09
595	-58.8	32	-90.8	8.3E-10

Total = 3.8E-7. Total Ratio = 91.5 dB

Frequency	**Filter Response**	**Amp IMD**	**Total**	**Power**
603	-56.4	32	-88.4	1.44E-09
603.01	-58.1	32	-90.1	9.77E-10
603.02	-59.6	32	-91.6	6.89E-10
603.03	-60.6	32	-92.6	5.54E-10
603.04	-60.6	32	-92.6	5.45E-10
603.05	-59.9	32	-91.9	6.42E-10
603.06	-58.8	32	-90.8	8.27E-10
603.07	-57.7	32	-89.7	1.08E-09
603.08	-56.6	32	-88.6	1.39E-09
603.09	-55.6	32	-87.6	1.75E-09
603.1	-54.7	32	-86.7	2.14E-09
603.11	-53.9	32	-85.9	2.55E-09
603.12	-53.3	32	-85.3	2.98E-09
603.13	-52.7	32	-84.7	3.41E-09
603.14	-52.1	32	-84.1	3.85E-09
603.15	-51.7	32	-83.7	4.29E-09
603.16	-51.3	32	-83.3	4.72E-09
603.17	-50.9	32	-82.9	5.15E-09
603.18	-50.6	32	-82.6	5.56E-09
603.19	-50.3	32	-82.3	5.95E-09
603.2	-50.0	32	-82.0	6.33E-09
603.21	-49.7	32	-81.7	6.69E-09
603.22	-49.5	32	-81.5	7.03E-09
603.23	-49.3	32	-81.3	7.35E-09
603.24	-49.2	32	-81.2	7.65E-09
603.25	-49.0	32	-81.0	7.92E-09
603.26	-48.9	32	-80.9	8.18E-09
603.27	-48.7	32	-80.7	8.41E-09
603.28	-48.6	32	-80.6	8.63E-09
603.29	-48.5	32	-80.5	8.82E-09
603.3	-48.5	32	-80.5	9E-09
603.31	-48.4	32	-80.4	9.15E-09
603.32	-48.3	32	-80.3	9.28E-09
603.33	-48.3	32	-80.3	9.4E-09
603.34	-48.2	32	-80.2	9.5E-09
603.35	-48.2	32	-80.2	9.58E-09
603.36	-48.2	32	-80.2	9.64E-09
603.37	-48.1	32	-80.1	9.69E-09
603.38	-48.1	32	-80.1	9.72E-09
603.39	-48.1	32	-80.1	9.74E-09

603.4	-48.1	32	-80.1	9.74E-09
603.41	-48.1	32	-80.1	9.74E-09
603.42	-48.1	32	-80.1	9.72E-09
603.43	-48.1	32	-80.1	9.69E-09
603.44	-48.2	32	-80.2	9.64E-09
603.45	-48.2	32	-80.2	9.59E-09
603.46	-48.2	32	-80.2	9.53E-09
603.47	-48.2	32	-80.2	9.46E-09
603.48	-48.3	32	-80.3	9.38E-09
603.49	-48.3	32	-80.3	9.3E-09
603.5	-48.4	32	-80.4	9.21E-09

Total = 3.3E-7 Total Ratio = 92.1 dB.

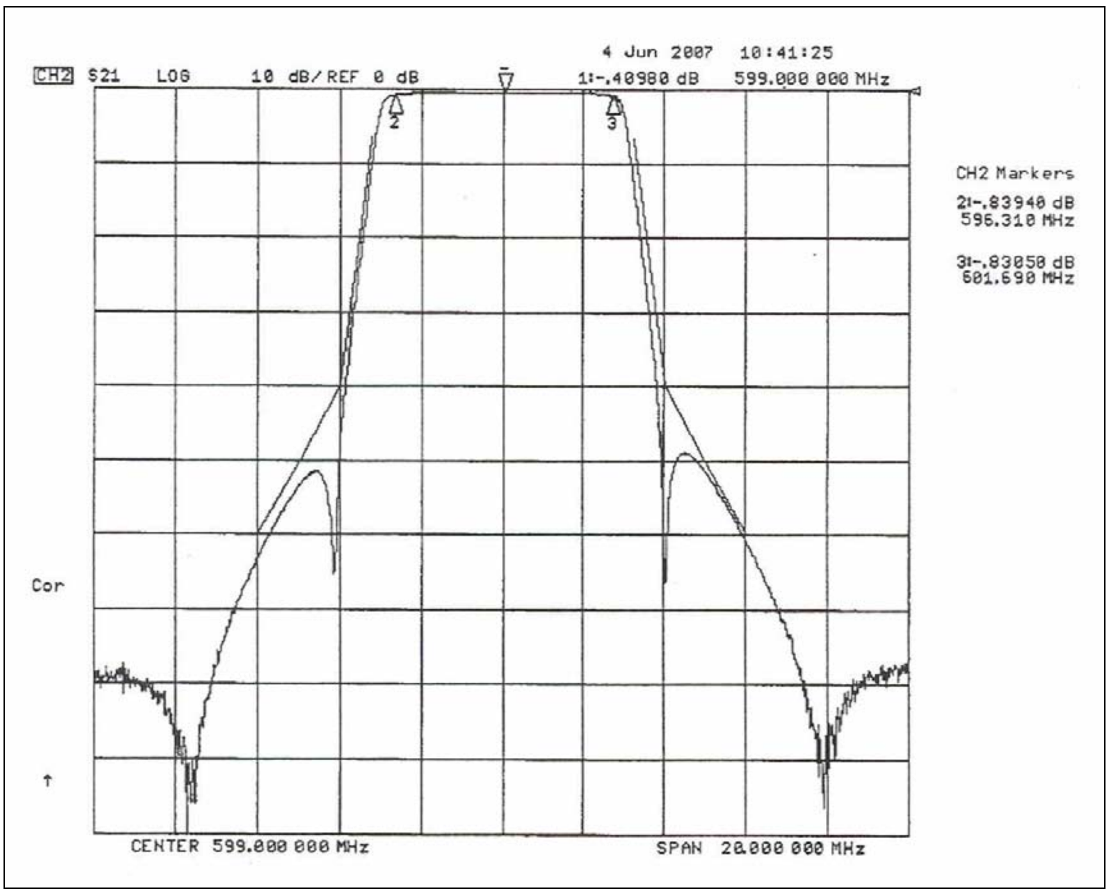

Figure 4-8E. Bandpass Filter Response

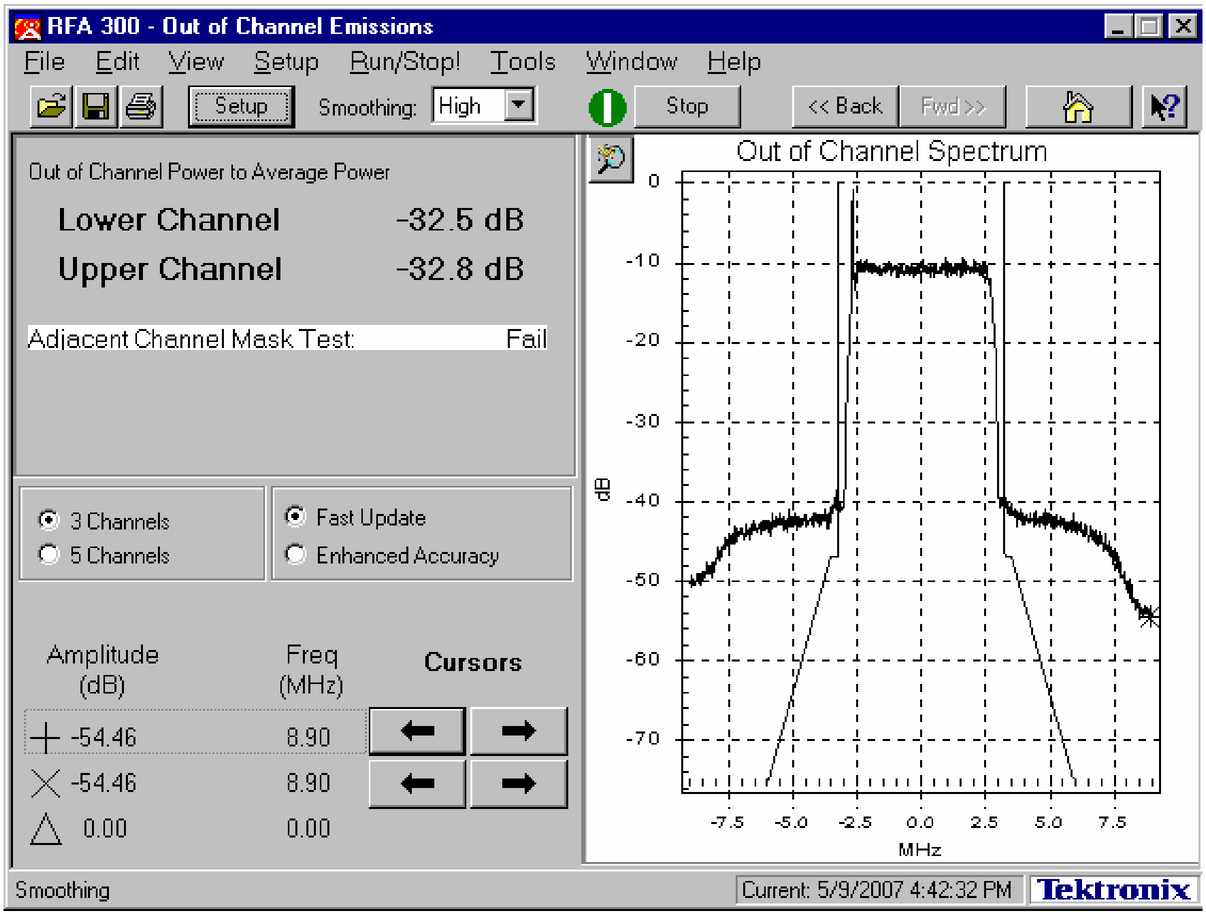

Figure 4-8F. Out of Band Emissions Plot (Pre-Filter)

4.9 Radiated Emissions

Using the test setup shown in Figure 4-1, with the transmitter operating at full power, the spectrum analyzer was moved 20 meters from the transmitter and connected to a dipole antenna cut to the 599 MHz. This antenna was oriented to maximize the received level and the data was recorded. The antenna was then cut to the local oscillator frequency and the second and third through harmonic frequencies of the transmitter, and all of the signals received, were maximized by antenna orientation and their absolute levels were recorded.

With these various antennas, the only measurable level observed was at 599 MHz. This level is shown below in Table 4-2 and an analysis of the relative field and strength is provided in the following paragraphs.

Table 4-2. Measurable Levels Observed in Frequency Spectrum

FREQUENCY	MEASURED LEVEL (INTO 50 Ω)
599.00	-35 dBm

The spectrum analyzer had a maximum sensitivity of -110 dBm during these tests.

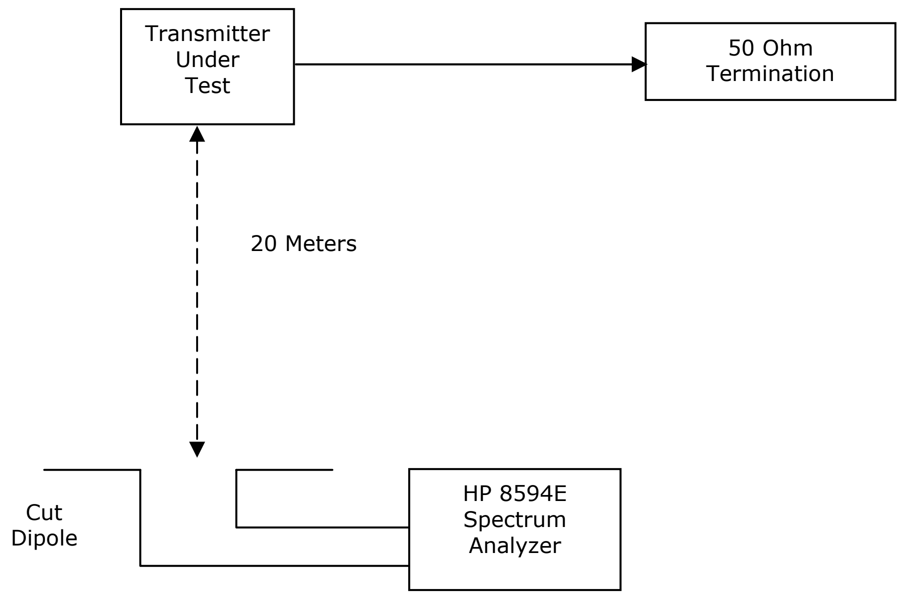

Figure 4-9. Test Setup for Measuring Radiated Emissions

One level was compared to the following reference level.

If all of the power of the transmitter was radiated by an isotropic radiator, the power density at 20 meters would be:

$$P = Pt/4\pi R^2 = 3000/4\pi \bullet (20)^2 = .6 \text{ w/m}^2$$

Using a dipole-transmitting antenna increases this by 1.64 to:

$$1.64 \text{ x } .6 = 1 \text{ w/m}^2$$

If a dipole-receive antenna of area 1.64 x $\lambda^2/4\pi$ is used to receive the signal, the received level would be:

1w = +30 dBm

The receive level at –35 dBm was therefore at -65 dB relative to this level.

The receive levels were therefore at the relative levels shown in Table 4-3.

Table 4-3. Receive Levels

FREQUENCY	(REF = +30 dBm) RELATIVE MEASURED LEVEL
599.00	-65 dB

The cabinet radiation was also checked with the receive dipole antenna cut to 599.00 MHz, within very close proximity to the trays of the transmitters, and the received level that was recorded at no time exceeded a power density in excess of 0 dBm:

$$Pr/A = 10 \text{ mw/cm}^2$$

This level is far less than the current or proposed standard for safe radiation levels.

4.10 Frequency Stability

The output carrier frequency is determined by the crystal oscillator/multiplier of the exciter.

The oscillator was placed in a temperature-controlled chamber and the temperature was varied from –30° C to +50° C. The chamber was slowly heated and the frequency was measured at 10° C increments up to +50° C. The oscillator was allowed to stabilize at each temperature before measurements were recorded.

Tables 4-10, 4-11, and 4-12 provide data on the oscillator frequencies; a calculation of the output frequency error indicates that the output frequency of the transmitter is well within the FCC tolerance for this service.

Table 4-10. Oscillator Data

TEMP (°C)	OVEN-CONTROLLED EXCITER CRYSTAL OSCILLATOR (MHz)
-30	81.124932
-20	81.124968
-10	81.124969
0	81.124975
10	81.124986
20	81.125000
30	81.125031
40	81.125057
50	81.125070

Table 4-11. Calculated Frequency Errors

TEMP (°C)	DUAL OVEN OSCILLATOR ERROR Δ^1 KHz	TOTAL OUTPUT ERROR (kHz)
-30	-0.068	-0.544
-20	-0.032	-0.256
-10	-0.031	-0.248
0	-0.025	-0.200
10	-0.014	-0.112
20	0.0	0.0
30	0.031	0.248
40	0.057	0.456
50	0.070	0.560

Table 4-12. Frequency Stability Versus Line Voltage

LINE VOLTAGE	OSCILLATOR (MHz)	TOTAL OUTPUT ERROR kHz
95V	81.125000	0.0
115V	81.125000	0.0
135V	81.125000	0.0

4.10.1 Pilot Frequency Measurement

The Hewlett Packard Spectrum Analyzer was used to verify the pilot frequency met the frequency stability of +/- 1000 Hz.

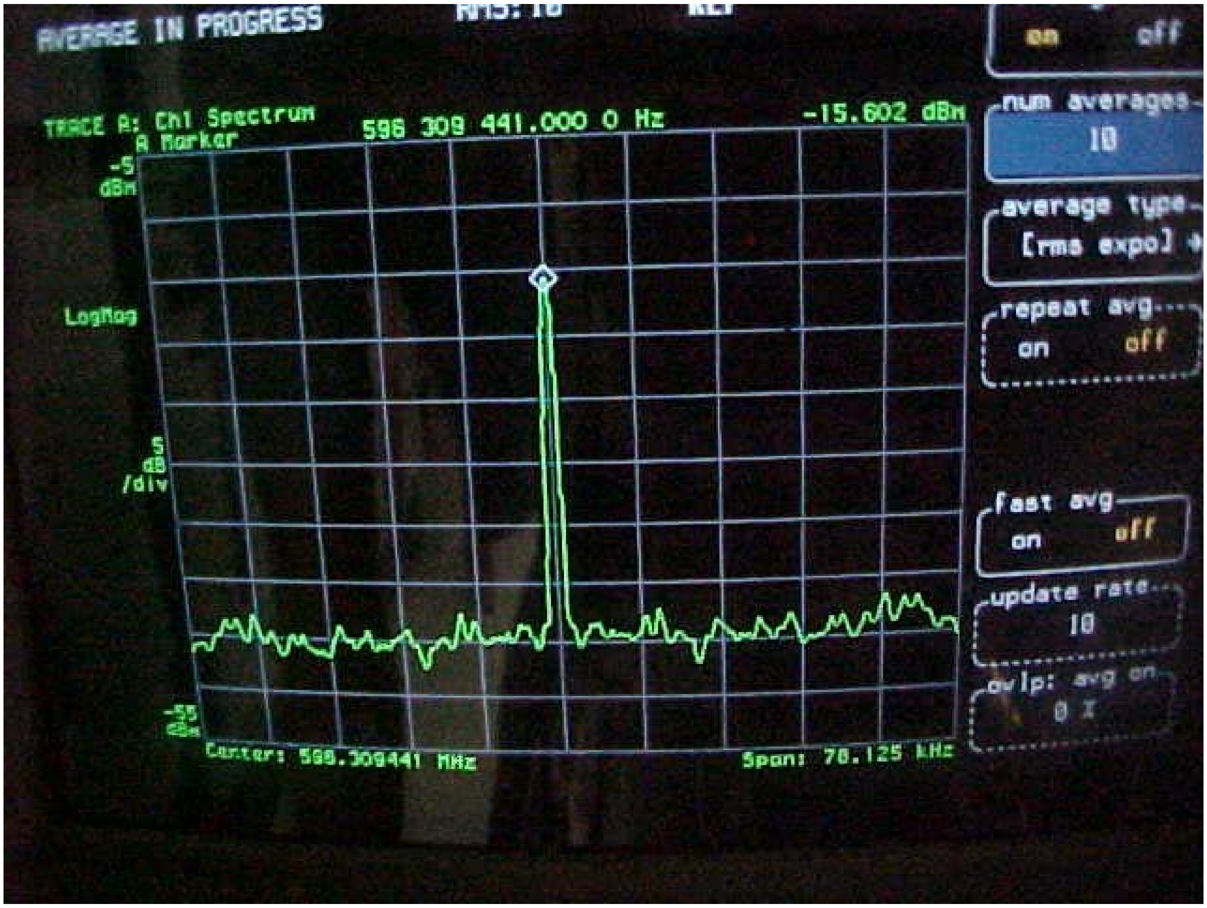

Figure 4-12. Pilot Frequency Plot

4.11 Test Equipment

The test equipment that was used to analyze the Axcera DT835A-6 system is listed in Table 4-13.

Table 4-13. Test Equipment

MODEL	MANUFACTURER	DESCRIPTION	SERIAL #
435B	Hewlett Packard	Power Meter	2445A10994
8482B	Hewlett Packard	Power Sensor	N/A
8892-300	Bird	50 Ω Termination	2867
8594E	Hewlett-Packard	Spectrum Analyzer	10118
1016-1043	Axcera	Directional Coupler	--
RFA300	Tektronix	Test Measurement Set	B010226
89441A	Hewlett-Packard	Vector Signal Analyzer	3416A01547