

4. TEST REPORT

4.1 RF Power Measurements

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

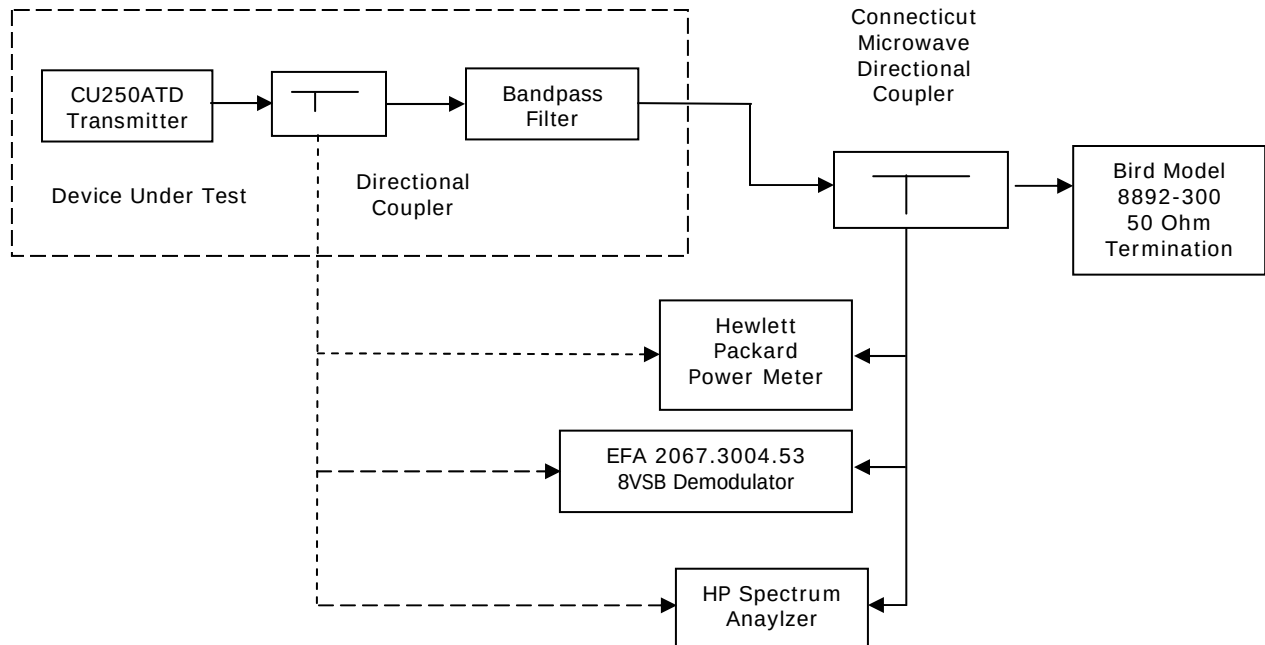


Figure 4-1. Test Equipment Setup for RF Power Measurements

The output power of the CU250ATD was adjusted to obtain 250 watts average RF output as observed on the power meter. At this power level, the final

Measured Power: +14 dBm
Coupling Loss: -40.0 dB
Power: +54.0 dBm
Power = 250 Watts

With the power level properly set to 250 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.

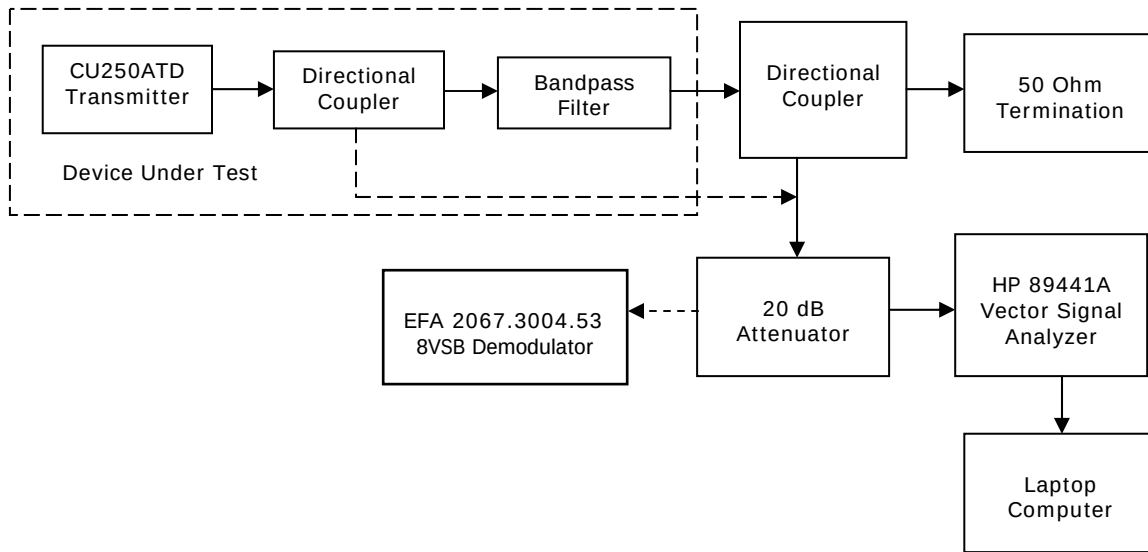


Figure 4-2. Typical Demodulation Test Setup

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

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

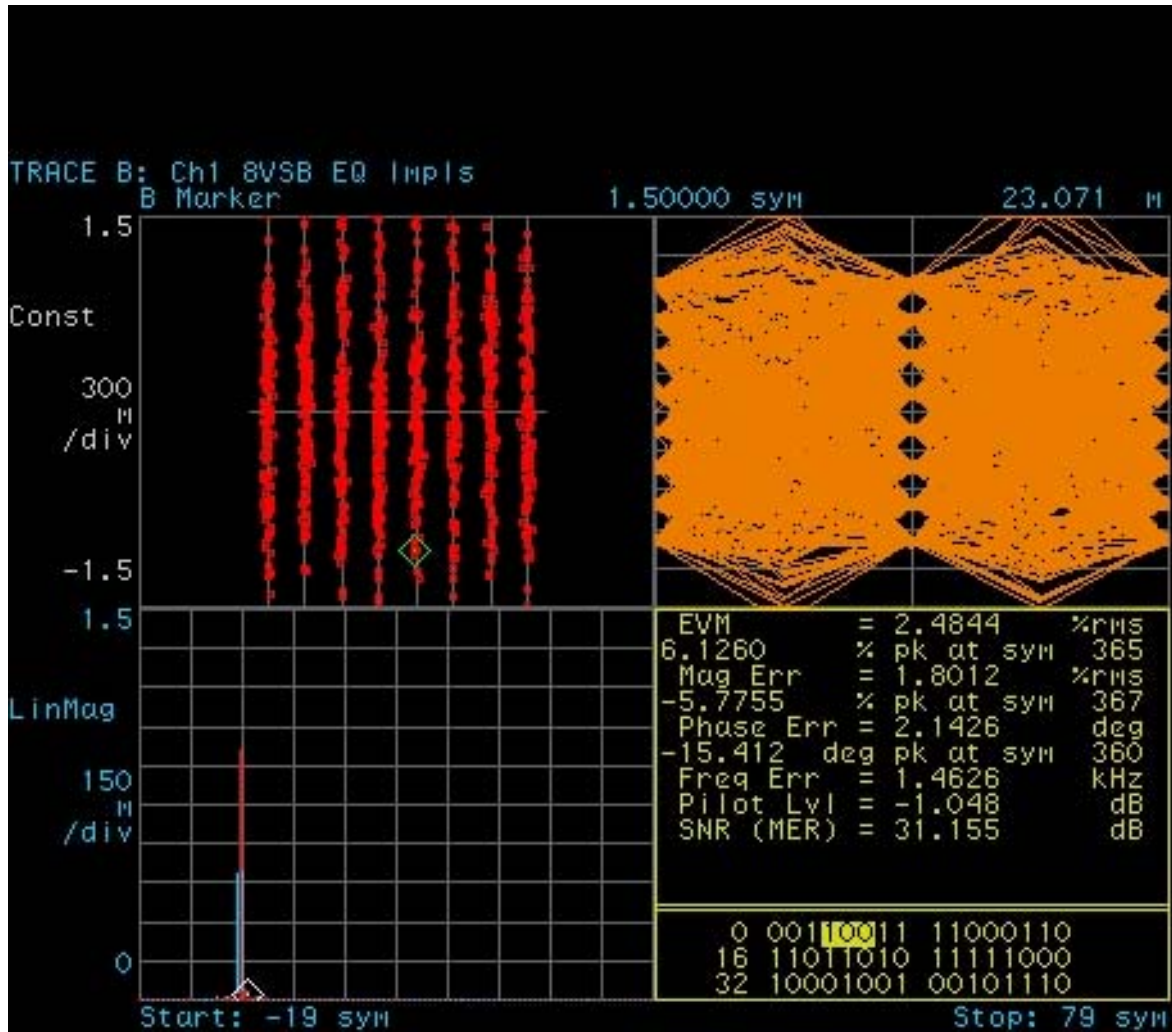


Figure 4-3. Constellation Diagram

4. 4 Frequency Response

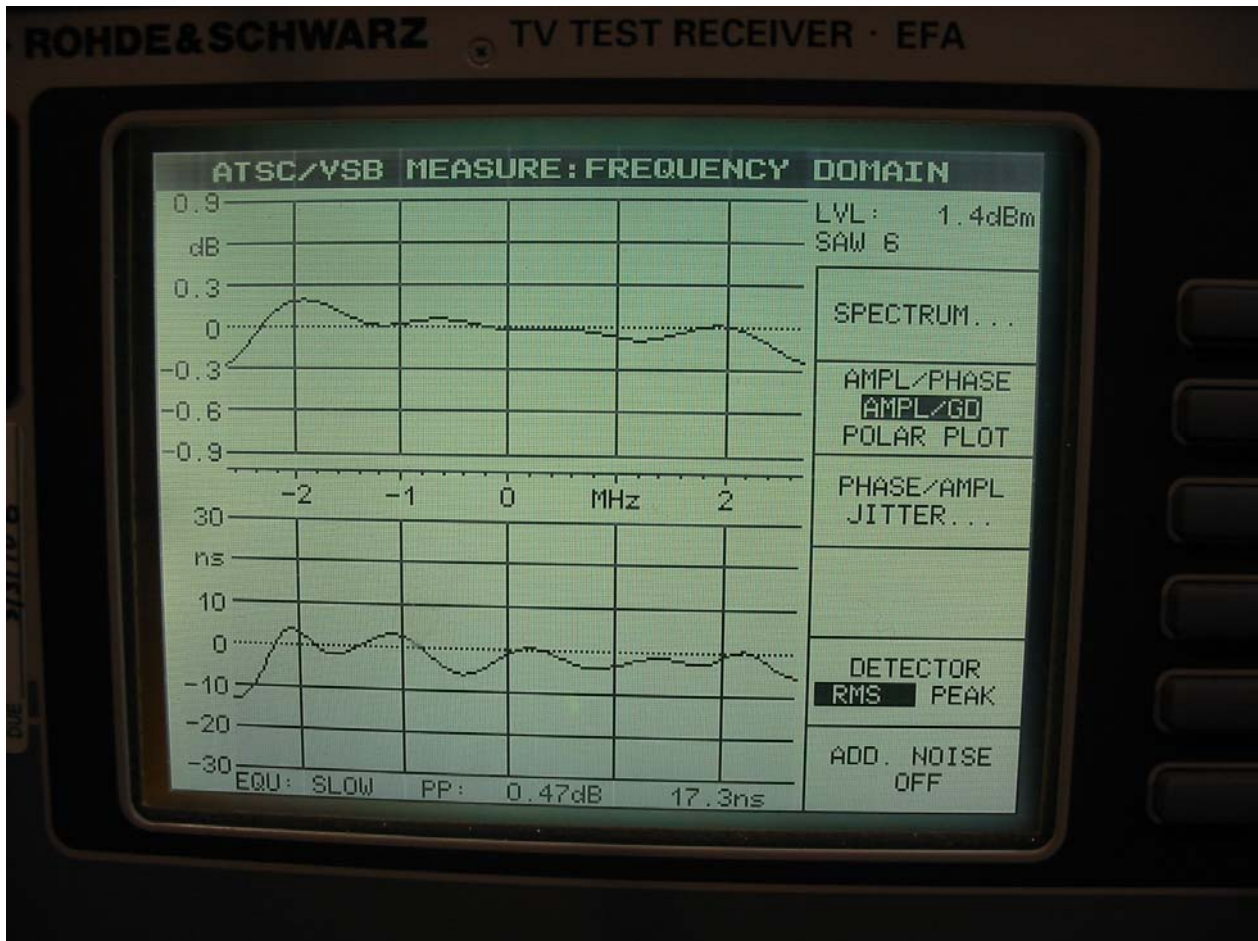


Figure 4-4. Frequency Response Plot

4.5 Peak to Average

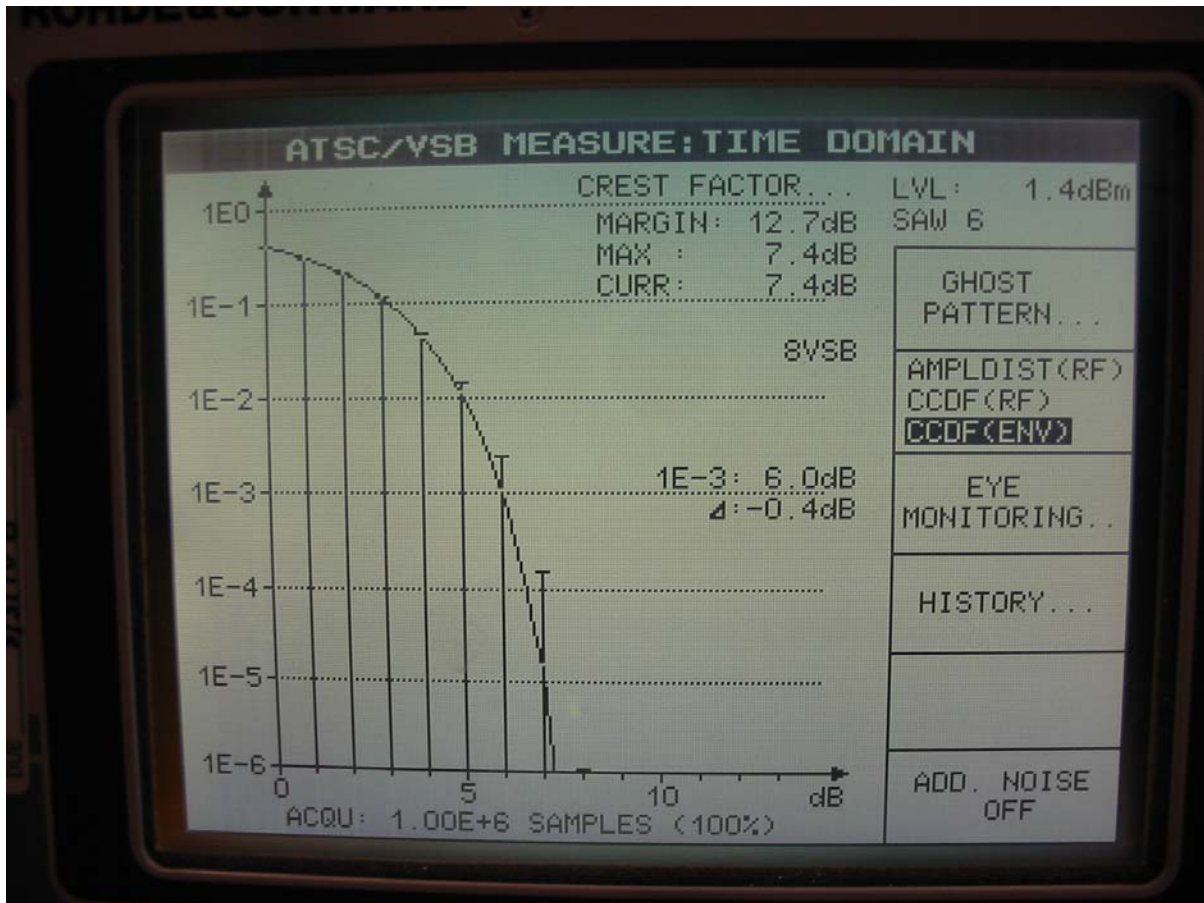


Figure 4-5. Peak to Average Plot

4.6 Phase Noise

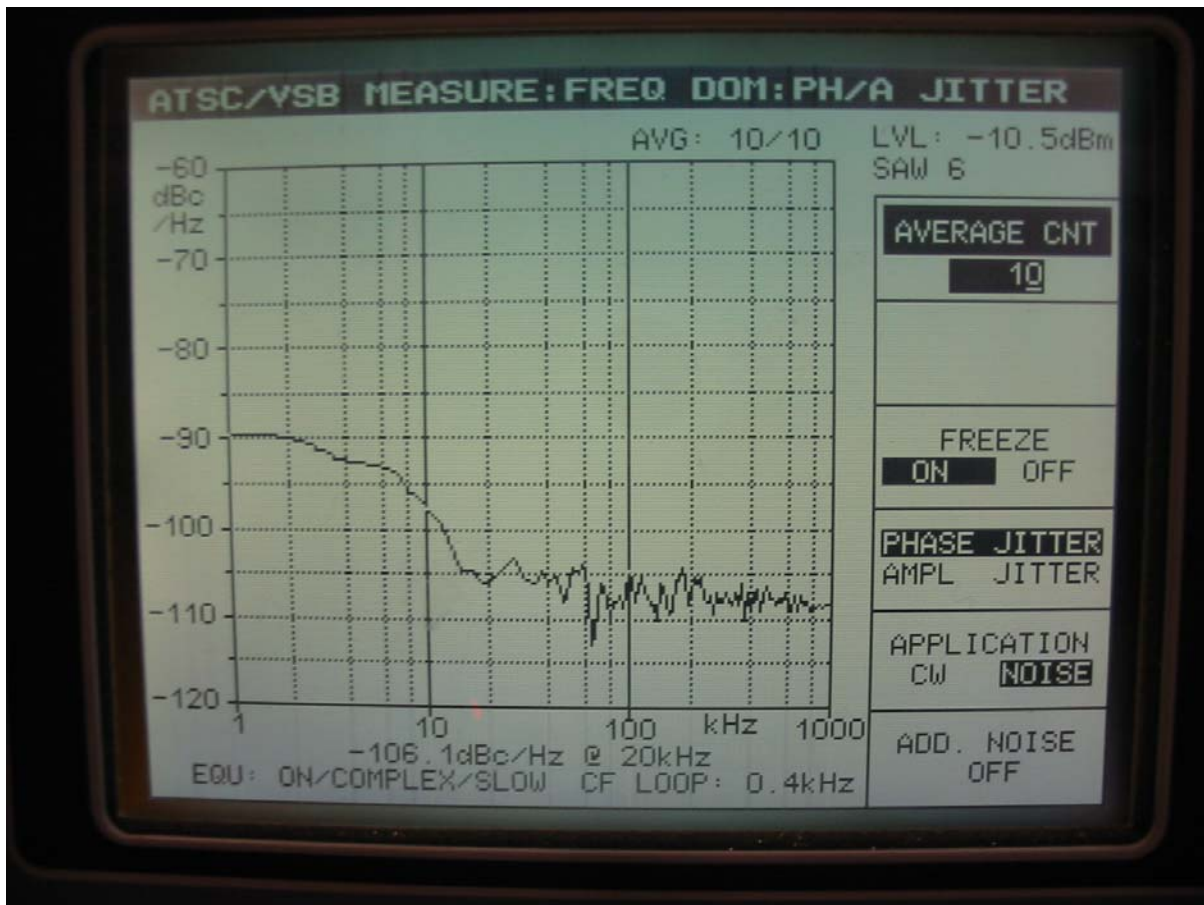


Figure 4-6. Phase Noise Plot

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.

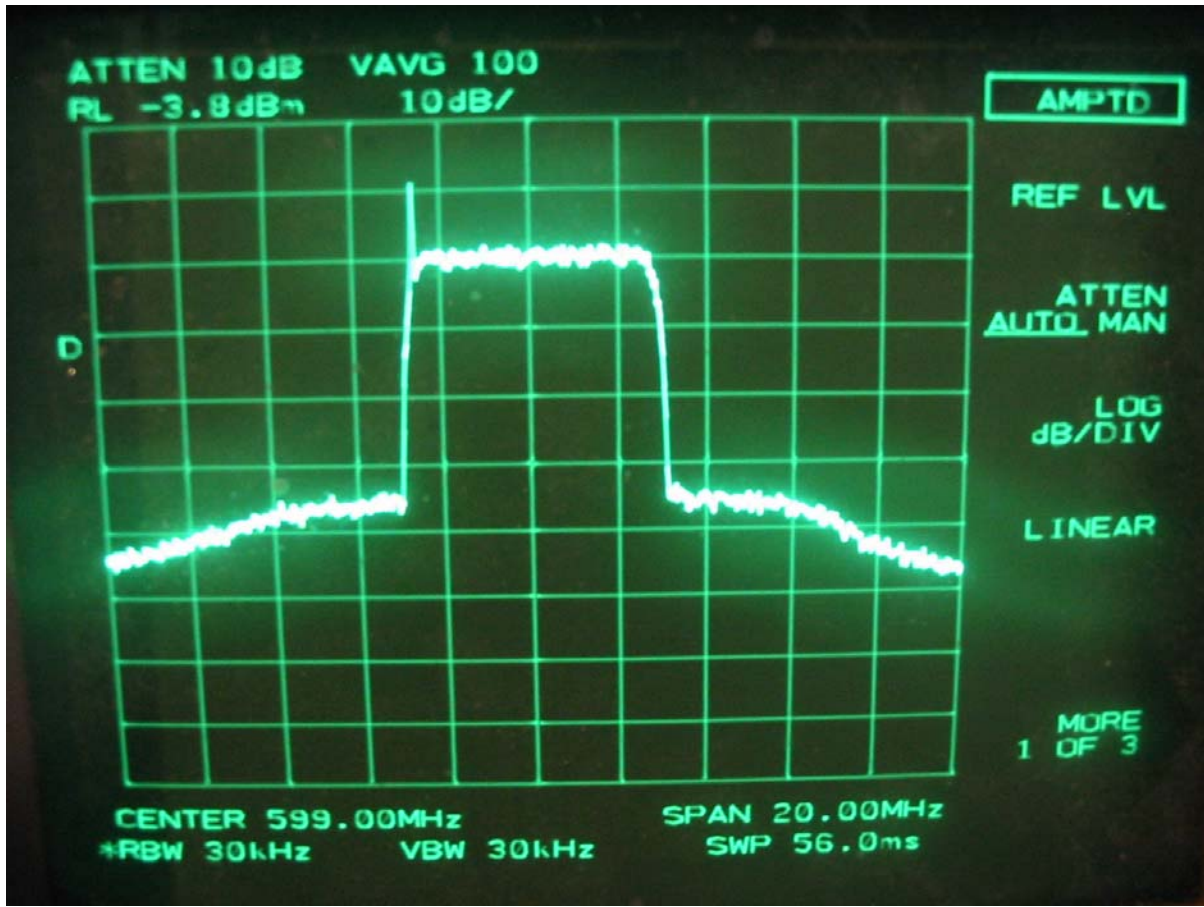


Figure 4-7. Channel Occupied Bandwidth (Pre-Filter)

4.8 Conducted Spurious Emissions

The Hewlett Packard Spectrum Analyzer was used to measure harmonics before mask filter.

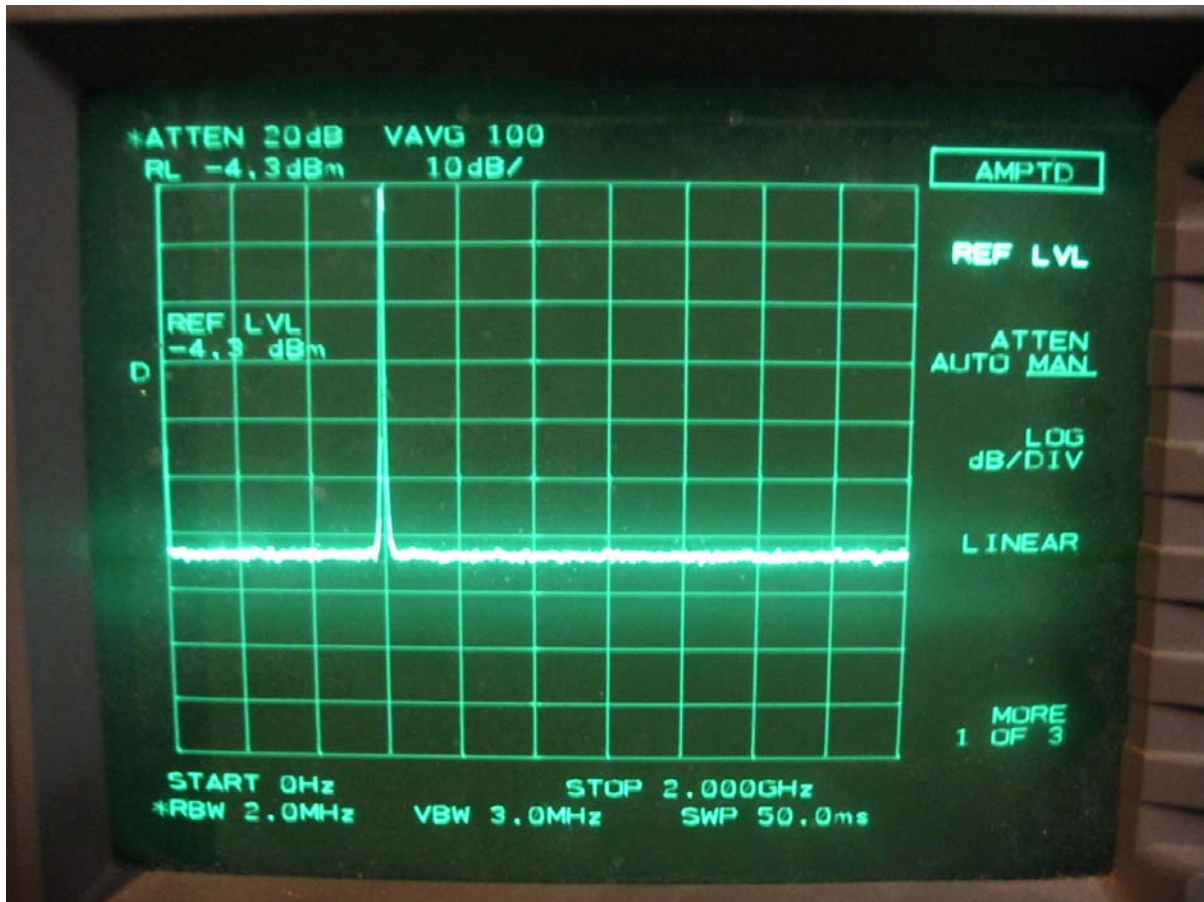


Figure 4-8A. Out of Band Emissions Plot (Pre-Filter)

The test data on the following pages demonstrates that the CU250ATD meets both the simple and stringent mask requirements.

Simple Mask Test Data - Part 74.794 of the Rules states:

(i) Simple mask. At the channel edges, emissions must be attenuated no less than 46 dB. More than 6 MHz from the channel edges, emissions must be attenuated no less than 71 dB. At any frequency between 0 and 6 MHz from the channel edges, emissions must be attenuated no less than the value determined by the following formula: $A \text{ (dB)} = 46 + (Df2 / 1.44)$

(3) The attenuation values for the simple and stringent emission masks are based on a measurement bandwidth of 500 kHz. Other measurement bandwidths may be used and converted to the reference 500 kHz value by the following formula: $A(\text{dB}) = A_{\text{alternate}} + 10 \log (B_{\text{Walternate}} / 500)$ where $A(\text{dB})$ is the measured or calculated attenuation value for the reference 500 kHz bandwidth, and $A_{\text{alternate}}$ is the measured or calculated attenuation for a bandwidth $B_{\text{Walternate}}$. Emissions include sidebands, spurious emissions and radio harmonics. Attenuation is to be measured at the output terminals of the transmitter (including any filters that may be employed). In the event of interference caused to any service by out-of-channel emissions, greater attenuation may be required.

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 46 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
590	-27.1	36	-63.1	4.89779E-07
590.01	-27.09	36	-63.09	4.90908E-07
590.02	-27.08	36	-63.08	4.9204E-07
590.03	-27.04	36	-63.04	4.96592E-07
590.04	-26.99	36	-62.99	5.02343E-07
590.05	-26.97	36	-62.97	5.04661E-07
590.06	-26.97	36	-62.97	5.04661E-07
590.07	-26.92	36	-62.92	5.10505E-07
590.08	-26.9	36	-62.9	5.12861E-07
590.09	-26.85	36	-62.85	5.188E-07
590.1	-26.84	36	-62.84	5.19996E-07
590.11	-26.83	36	-62.83	5.21195E-07
590.12	-26.8	36	-62.8	5.24807E-07
590.13	-26.75	36	-62.75	5.30884E-07
590.14	-26.73	36	-62.73	5.33335E-07
590.15	-26.69	36	-62.69	5.3827E-07
590.16	-26.69	36	-62.69	5.3827E-07
590.17	-26.66	36	-62.66	5.42001E-07
590.18	-26.61	36	-62.61	5.48277E-07
590.19	-26.6	36	-62.6	5.49541E-07

590.2	-26.57	36	-62.57	5.5335E-07
590.21	-26.54	36	-62.54	5.57186E-07
590.22	-26.49	36	-62.49	5.63638E-07
590.23	-26.47	36	-62.47	5.66239E-07
590.24	-26.43	36	-62.43	5.71479E-07
590.25	-26.42	36	-62.42	5.72796E-07
590.26	-26.38	36	-62.38	5.78096E-07
590.27	-26.38	36	-62.38	5.78096E-07
590.28	-26.32	36	-62.32	5.86138E-07
590.29	-26.3	36	-62.3	5.88844E-07
590.3	-26.29	36	-62.29	5.90201E-07
590.31	-26.25	36	-62.25	5.95662E-07
590.32	-26.22	36	-62.22	5.99791E-07
590.33	-26.19	36	-62.19	6.03949E-07
590.34	-26.16	36	-62.16	6.08135E-07
590.35	-26.14	36	-62.14	6.10942E-07
590.36	-26.1	36	-62.1	6.16595E-07
590.37	-26.08	36	-62.08	6.19441E-07
590.38	-26.06	36	-62.06	6.223E-07
590.39	-26.01	36	-62.01	6.29506E-07
590.4	-25.97	36	-61.97	6.35331E-07
590.41	-25.95	36	-61.95	6.38263E-07
590.42	-25.93	36	-61.93	6.4121E-07
590.43	-25.89	36	-61.89	6.47143E-07
590.44	-25.88	36	-61.88	6.48634E-07
590.45	-25.83	36	-61.83	6.56145E-07
590.46	-25.81	36	-61.81	6.59174E-07
590.47	-25.79	36	-61.79	6.62217E-07
590.48	-25.75	36	-61.75	6.68344E-07
590.49	-25.74	36	-61.74	6.69885E-07
590.5	-25.7	36	-61.7	6.76083E-07

Total = 2.9E-05 Ratio to in band = 72.6 dB.

590.5	-25.7	36	-61.7	6.76E-07
590.51	-25.68	36	-61.68	6.79E-07
590.52	-25.64	36	-61.64	6.85E-07
590.53	-25.63	36	-61.63	6.87E-07
590.54	-25.59	36	-61.59	6.93E-07
590.55	-25.57	36	-61.57	6.97E-07
590.56	-25.51	36	-61.51	7.06E-07
590.57	-25.49	36	-61.49	7.1E-07
590.58	-25.46	36	-61.46	7.14E-07
590.59	-25.41	36	-61.41	7.23E-07
590.6	-25.41	36	-61.41	7.23E-07
590.61	-25.37	36	-61.37	7.29E-07
590.62	-25.35	36	-61.35	7.33E-07
590.63	-25.31	36	-61.31	7.4E-07
590.64	-25.28	36	-61.28	7.45E-07
590.65	-25.27	36	-61.27	7.46E-07

590.66	-25.25	36	-61.25	7.5E-07
590.67	-25.19	36	-61.19	7.6E-07
590.68	-25.17	36	-61.17	7.64E-07
590.69	-25.15	36	-61.15	7.67E-07
590.7	-25.1	36	-61.1	7.76E-07
590.71	-25.06	36	-61.06	7.83E-07
590.72	-25.06	36	-61.06	7.83E-07
590.73	-25.02	36	-61.02	7.91E-07
590.74	-24.99	36	-60.99	7.96E-07
590.75	-24.95	36	-60.95	8.04E-07
590.76	-24.93	36	-60.93	8.07E-07
590.77	-24.91	36	-60.91	8.11E-07
590.78	-24.88	36	-60.88	8.17E-07
590.79	-24.84	36	-60.84	8.24E-07
590.8	-24.82	36	-60.82	8.28E-07
590.81	-24.78	36	-60.78	8.36E-07
590.82	-24.75	36	-60.75	8.41E-07
590.83	-24.72	36	-60.72	8.47E-07
590.84	-24.67	36	-60.67	8.57E-07
590.85	-24.66	36	-60.66	8.59E-07
590.86	-24.65	36	-60.65	8.61E-07
590.87	-24.59	36	-60.59	8.73E-07
590.88	-24.57	36	-60.57	8.77E-07
590.89	-24.52	36	-60.52	8.87E-07
590.9	-24.52	36	-60.52	8.87E-07
590.91	-24.49	36	-60.49	8.93E-07
590.92	-24.46	36	-60.46	8.99E-07
590.93	-24.42	36	-60.42	9.08E-07
590.94	-24.4	36	-60.4	9.12E-07
590.95	-24.35	36	-60.35	9.23E-07
590.96	-24.33	36	-60.33	9.27E-07
590.97	-24.31	36	-60.31	9.31E-07
590.98	-24.27	36	-60.27	9.4E-07
590.99	-24.23	36	-60.23	9.48E-07
591	-24.2	36	-60.2	9.55E-07

Total = 4.5E-05 Ratio to in band = 70.7 dB.

591	-24.2	36	-60.2	9.55E-07
591.01	-24.18	36	-60.18	9.59E-07
591.02	-24.15	36	-60.15	9.66E-07
591.03	-24.11	36	-60.11	9.75E-07
591.04	-24.11	36	-60.11	9.75E-07
591.05	-24.05	36	-60.05	9.89E-07
591.06	-24.03	36	-60.03	9.93E-07
591.07	-23.98	36	-59.98	1E-06
591.08	-23.97	36	-59.97	1.01E-06
591.09	-23.94	36	-59.94	1.01E-06
591.1	-23.91	36	-59.91	1.02E-06

591.11	-23.88	36	-59.88	1.03E-06
591.12	-23.84	36	-59.84	1.04E-06
591.13	-23.8	36	-59.8	1.05E-06
591.14	-23.78	36	-59.78	1.05E-06
591.15	-23.77	36	-59.77	1.05E-06
591.16	-23.72	36	-59.72	1.07E-06
591.17	-23.68	36	-59.68	1.08E-06
591.18	-23.67	36	-59.67	1.08E-06
591.19	-23.64	36	-59.64	1.09E-06
591.2	-23.58	36	-59.58	1.1E-06
591.21	-23.55	36	-59.55	1.11E-06
591.22	-23.54	36	-59.54	1.11E-06
591.23	-23.49	36	-59.49	1.12E-06
591.24	-23.48	36	-59.48	1.13E-06
591.25	-23.43	36	-59.43	1.14E-06
591.26	-23.41	36	-59.41	1.15E-06
591.27	-23.4	36	-59.4	1.15E-06
591.28	-23.35	36	-59.35	1.16E-06
591.29	-23.31	36	-59.31	1.17E-06
591.3	-23.29	36	-59.29	1.18E-06
591.31	-23.25	36	-59.25	1.19E-06
591.32	-23.23	36	-59.23	1.19E-06
591.33	-23.18	36	-59.18	1.21E-06
591.34	-23.17	36	-59.17	1.21E-06
591.35	-23.11	36	-59.11	1.23E-06
591.36	-23.1	36	-59.1	1.23E-06
591.37	-23.07	36	-59.07	1.24E-06
591.38	-23.03	36	-59.03	1.25E-06
591.39	-23	36	-59	1.26E-06
591.4	-22.98	36	-58.98	1.26E-06
591.41	-22.94	36	-58.94	1.28E-06
591.42	-22.91	36	-58.91	1.29E-06
591.43	-22.87	36	-58.87	1.3E-06
591.44	-22.87	36	-58.87	1.3E-06
591.45	-22.8	36	-58.8	1.32E-06
591.46	-22.77	36	-58.77	1.33E-06
591.47	-22.74	36	-58.74	1.34E-06
591.48	-22.73	36	-58.73	1.34E-06
591.49	-22.67	36	-58.67	1.36E-06
591.5	-22.66	36	-58.66	1.36E-06

Total = 5.8E-05 Ratio to in band = 69.7 dB

591.5	-22.66	36	-58.66	1.36E-06
591.51	-22.64	36	-58.64	1.37E-06
591.52	-22.59	36	-58.59	1.38E-06
591.53	-22.57	36	-58.57	1.39E-06
591.54	-22.52	36	-58.52	1.41E-06
591.55	-22.5	36	-58.5	1.41E-06
591.56	-22.45	36	-58.45	1.43E-06

591.57	-22.43	36	-58.43	1.44E-06
591.58	-22.42	36	-58.42	1.44E-06
591.59	-22.38	36	-58.38	1.45E-06
591.6	-22.34	36	-58.34	1.47E-06
591.61	-22.31	36	-58.31	1.48E-06
591.62	-22.27	36	-58.27	1.49E-06
591.63	-22.26	36	-58.26	1.49E-06
591.64	-22.21	36	-58.21	1.51E-06
591.65	-22.18	36	-58.18	1.52E-06
591.66	-22.16	36	-58.16	1.53E-06
591.67	-22.13	36	-58.13	1.54E-06
591.68	-22.08	36	-58.08	1.56E-06
591.69	-22.06	36	-58.06	1.56E-06
591.7	-22.03	36	-58.03	1.57E-06
591.71	-21.99	36	-57.99	1.59E-06
591.72	-21.96	36	-57.96	1.6E-06
591.73	-21.93	36	-57.93	1.61E-06
591.74	-21.91	36	-57.91	1.62E-06
591.75	-21.86	36	-57.86	1.64E-06
591.76	-21.83	36	-57.83	1.65E-06
591.77	-21.83	36	-57.83	1.65E-06
591.78	-21.76	36	-57.76	1.67E-06
591.79	-21.74	36	-57.74	1.68E-06
591.8	-21.69	36	-57.69	1.7E-06
591.81	-21.67	36	-57.67	1.71E-06
591.82	-21.63	36	-57.63	1.73E-06
591.83	-21.59	36	-57.59	1.74E-06
591.84	-21.57	36	-57.57	1.75E-06
591.85	-21.54	36	-57.54	1.76E-06
591.86	-21.52	36	-57.52	1.77E-06
591.87	-21.46	36	-57.46	1.79E-06
591.88	-21.44	36	-57.44	1.8E-06
591.89	-21.42	36	-57.42	1.81E-06
591.9	-21.37	36	-57.37	1.83E-06
591.91	-21.34	36	-57.34	1.85E-06
591.92	-21.31	36	-57.31	1.86E-06
591.93	-21.28	36	-57.28	1.87E-06
591.94	-21.25	36	-57.25	1.88E-06
591.95	-21.22	36	-57.22	1.9E-06
591.96	-21.19	36	-57.19	1.91E-06
591.97	-21.14	36	-57.14	1.93E-06
591.98	-21.11	36	-57.11	1.95E-06
591.99	-21.09	36	-57.09	1.95E-06
592	-21	36	-57	2E-06

Total = 8.4E-05 Ratio to in band = 68.1 dB.

592	-21	36	-57	2E-06
592.01	-20.98	36	-56.98	2E-06
592.02	-20.95	36	-56.95	2.02E-06

592.03	-20.91	36	-56.91	2.04E-06
592.04	-20.89	36	-56.89	2.05E-06
592.05	-20.83	36	-56.83	2.07E-06
592.06	-20.81	36	-56.81	2.08E-06
592.07	-20.78	36	-56.78	2.1E-06
592.08	-20.74	36	-56.74	2.12E-06
592.09	-20.71	36	-56.71	2.13E-06
592.1	-20.69	36	-56.69	2.14E-06
592.11	-20.62	36	-56.62	2.18E-06
592.12	-20.59	36	-56.59	2.19E-06
592.13	-20.56	36	-56.56	2.21E-06
592.14	-20.53	36	-56.53	2.22E-06
592.15	-20.47	36	-56.47	2.25E-06
592.16	-20.46	36	-56.46	2.26E-06
592.17	-20.41	36	-56.41	2.29E-06
592.18	-20.39	36	-56.39	2.3E-06
592.19	-20.39	36	-56.39	2.3E-06
592.2	-20.35	36	-56.35	2.32E-06
592.21	-20.3	36	-56.3	2.34E-06
592.22	-20.26	36	-56.26	2.37E-06
592.23	-20.25	36	-56.25	2.37E-06
592.24	-20.2	36	-56.2	2.4E-06
592.25	-20.16	36	-56.16	2.42E-06
592.26	-20.14	36	-56.14	2.43E-06
592.27	-20.12	36	-56.12	2.44E-06
592.28	-20.1	36	-56.1	2.45E-06
592.29	-20.06	36	-56.06	2.48E-06
592.3	-20.03	36	-56.03	2.49E-06
592.31	-19.98	36	-55.98	2.52E-06
592.32	-19.94	36	-55.94	2.55E-06
592.33	-19.93	36	-55.93	2.55E-06
592.34	-19.88	36	-55.88	2.58E-06
592.35	-19.84	36	-55.84	2.61E-06
592.36	-19.81	36	-55.81	2.62E-06
592.37	-19.8	36	-55.8	2.63E-06
592.38	-19.76	36	-55.76	2.65E-06
592.39	-19.73	36	-55.73	2.67E-06
592.4	-19.7	36	-55.7	2.69E-06
592.41	-19.66	36	-55.66	2.72E-06
592.42	-19.63	36	-55.63	2.74E-06
592.43	-19.58	36	-55.58	2.77E-06
592.44	-19.55	36	-55.55	2.79E-06
592.45	-19.52	36	-55.52	2.81E-06
592.46	-19.49	36	-55.49	2.82E-06
592.47	-19.47	36	-55.47	2.84E-06
592.48	-19.44	36	-55.44	2.86E-06
592.49	-19.38	36	-55.38	2.9E-06
592.5	-19.36	36	-55.36	2.91E-06

Total = 1.2E-04 Ratio to in band = 66.5 dB

592.5	-19.36	36	-55.36	2.91E-06
592.51	-19.32	36	-55.32	2.94E-06
592.52	-19.28	36	-55.28	2.96E-06
592.53	-19.23	36	-55.23	3E-06
592.54	-19.23	36	-55.23	3E-06
592.55	-19.2	36	-55.2	3.02E-06
592.56	-19.16	36	-55.16	3.05E-06
592.57	-19.11	36	-55.11	3.08E-06
592.58	-19.07	36	-55.07	3.11E-06
592.59	-19.04	36	-55.04	3.13E-06
592.6	-19	36	-55	3.16E-06
592.61	-18.99	36	-54.99	3.17E-06
592.62	-18.94	36	-54.94	3.21E-06
592.63	-18.91	36	-54.91	3.23E-06
592.64	-18.86	36	-54.86	3.27E-06
592.65	-18.83	36	-54.83	3.29E-06
592.66	-18.82	36	-54.82	3.3E-06
592.67	-18.75	36	-54.75	3.35E-06
592.68	-18.73	36	-54.73	3.37E-06
592.69	-18.7	36	-54.7	3.39E-06
592.7	-18.67	36	-54.67	3.41E-06
592.71	-18.65	36	-54.65	3.43E-06
592.72	-18.61	36	-54.61	3.46E-06
592.73	-18.56	36	-54.56	3.5E-06
592.74	-18.53	36	-54.53	3.52E-06
592.75	-18.53	36	-54.53	3.52E-06
592.76	-18.47	36	-54.47	3.57E-06
592.77	-18.46	36	-54.46	3.58E-06
592.78	-18.42	36	-54.42	3.61E-06
592.79	-18.38	36	-54.38	3.65E-06
592.8	-18.37	36	-54.37	3.66E-06
592.81	-18.31	36	-54.31	3.71E-06
592.82	-18.29	36	-54.29	3.72E-06
592.83	-18.25	36	-54.25	3.76E-06
592.84	-18.23	36	-54.23	3.78E-06
592.85	-18.19	36	-54.19	3.81E-06
592.86	-18.16	36	-54.16	3.84E-06
592.87	-18.13	36	-54.13	3.86E-06
592.88	-18.1	36	-54.1	3.89E-06
592.89	-18.06	36	-54.06	3.93E-06
592.9	-18.03	36	-54.03	3.95E-06
592.91	-18	36	-54	3.98E-06
592.92	-17.97	36	-53.97	4.01E-06
592.93	-17.95	36	-53.95	4.03E-06
592.94	-17.9	36	-53.9	4.07E-06
592.95	-17.87	36	-53.87	4.1E-06
592.96	-17.85	36	-53.85	4.12E-06
592.97	-17.77	36	-53.77	4.2E-06

592.98	-17.78	36	-53.78	4.19E-06
592.99	-17.75	36	-53.75	4.22E-06
593	-17.7	36	-53.7	4.27E-06

Total = 8.1E-04 Ratio to in band = 58.2 dB

593	-17.7	36	-53.7	4.27E-06
593.01	-17.65	36	-53.65	4.32E-06
593.02	-17.64	36	-53.64	4.33E-06
593.03	-17.6	36	-53.6	4.37E-06
593.04	-17.56	36	-53.56	4.41E-06
593.05	-17.52	36	-53.52	4.45E-06
593.06	-17.5	36	-53.5	4.47E-06
593.07	-17.44	36	-53.44	4.53E-06
593.08	-17.41	36	-53.41	4.56E-06
593.09	-17.38	36	-53.38	4.59E-06
593.1	-17.35	36	-53.35	4.62E-06
593.11	-17.32	36	-53.32	4.66E-06
593.12	-17.29	36	-53.29	4.69E-06
593.13	-17.27	36	-53.27	4.71E-06
593.14	-17.24	36	-53.24	4.74E-06
593.15	-17.21	36	-53.21	4.78E-06
593.16	-17.17	36	-53.17	4.82E-06
593.17	-17.15	36	-53.15	4.84E-06
593.18	-17.11	36	-53.11	4.89E-06
593.19	-17.07	36	-53.07	4.93E-06
593.2	-17.05	36	-53.05	4.95E-06
593.21	-17	36	-53	5.01E-06
593.22	-16.97	36	-52.97	5.05E-06
593.23	-16.94	36	-52.94	5.08E-06
593.24	-16.93	36	-52.93	5.09E-06
593.25	-16.88	36	-52.88	5.15E-06
593.26	-16.85	36	-52.85	5.19E-06
593.27	-16.82	36	-52.82	5.22E-06
593.28	-16.79	36	-52.79	5.26E-06
593.29	-16.75	36	-52.75	5.31E-06
593.3	-16.74	36	-52.74	5.32E-06
593.31	-16.69	36	-52.69	5.38E-06
593.32	-16.68	36	-52.68	5.4E-06
593.33	-16.64	36	-52.64	5.45E-06
593.34	-16.6	36	-52.6	5.5E-06
593.35	-16.59	36	-52.59	5.51E-06
593.36	-16.54	36	-52.54	5.57E-06
593.37	-16.52	36	-52.52	5.6E-06
593.38	-16.5	36	-52.5	5.62E-06
593.39	-16.44	36	-52.44	5.7E-06
593.4	-16.44	36	-52.44	5.7E-06
593.41	-16.41	36	-52.41	5.74E-06
593.42	-16.37	36	-52.37	5.79E-06
593.43	-16.34	36	-52.34	5.83E-06

593.44	-16.31	36	-52.31	5.87E-06
593.45	-16.28	36	-52.28	5.92E-06
593.46	-16.26	36	-52.26	5.94E-06
593.47	-16.22	36	-52.22	6E-06
593.48	-16.2	36	-52.2	6.03E-06
593.49	-16.17	36	-52.17	6.07E-06
593.5	-16.13	36	-52.13	6.12E-06

Total = 2.6E-04 Ratio to in band = 63.1 dB.

593.5	-16.13	36	-52.13	6.12E-06
593.51	-16.1	36	-52.1	6.17E-06
593.52	-16.08	36	-52.08	6.19E-06
593.53	-16.04	36	-52.04	6.25E-06
593.54	-15.99	36	-51.99	6.32E-06
593.55	-15.98	36	-51.98	6.34E-06
593.56	-15.96	36	-51.96	6.37E-06
593.57	-15.93	36	-51.93	6.41E-06
593.58	-15.92	36	-51.92	6.43E-06
593.59	-15.88	36	-51.88	6.49E-06
593.6	-15.85	36	-51.85	6.53E-06
593.61	-15.82	36	-51.82	6.58E-06
593.62	-15.8	36	-51.8	6.61E-06
593.63	-15.75	36	-51.75	6.68E-06
593.64	-15.73	36	-51.73	6.71E-06
593.65	-15.73	36	-51.73	6.71E-06
593.66	-15.69	36	-51.69	6.78E-06
593.67	-15.63	36	-51.63	6.87E-06
593.68	-15.63	36	-51.63	6.87E-06
593.69	-15.6	36	-51.6	6.92E-06
593.7	-15.57	36	-51.57	6.97E-06
593.71	-15.55	36	-51.55	7E-06
593.72	-15.54	36	-51.54	7.01E-06
593.73	-15.5	36	-51.5	7.08E-06
593.74	-15.49	36	-51.49	7.1E-06
593.75	-15.47	36	-51.47	7.13E-06
593.76	-15.43	36	-51.43	7.19E-06
593.77	-15.41	36	-51.41	7.23E-06
593.78	-15.38	36	-51.38	7.28E-06
593.79	-15.36	36	-51.36	7.31E-06
593.8	-15.33	36	-51.33	7.36E-06
593.81	-15.32	36	-51.32	7.38E-06
593.82	-15.28	36	-51.28	7.45E-06
593.83	-15.26	36	-51.26	7.48E-06
593.84	-15.24	36	-51.24	7.52E-06
593.85	-15.23	36	-51.23	7.53E-06
593.86	-15.2	36	-51.2	7.59E-06
593.87	-15.18	36	-51.18	7.62E-06
593.88	-15.14	36	-51.14	7.69E-06
593.89	-15.13	36	-51.13	7.71E-06

593.9	-15.11	36	-51.11	7.74E-06
593.91	-15.11	36	-51.11	7.74E-06
593.92	-15.09	36	-51.09	7.78E-06
593.93	-15.06	36	-51.06	7.83E-06
593.94	-15.03	36	-51.03	7.89E-06
593.95	-15.02	36	-51.02	7.91E-06
593.96	-15	36	-51	7.94E-06
593.97	-15	36	-51	7.94E-06
593.98	-14.97	36	-50.97	8E-06
593.99	-14.97	36	-50.97	8E-06
594	-14.94	36	-50.94	8.05E-06

Total = 3.6E-04 Ratio to in band = 61.7 dB

594	-14.94	37	-51.94	6.4E-06
594.01	-14.91	37	-51.91	6.44E-06
594.02	-14.9	37	-51.9	6.46E-06
594.03	-14.88	36	-50.88	8.17E-06
594.04	-14.87	36	-50.87	8.18E-06
594.05	-14.84	36	-50.84	8.24E-06
594.06	-14.83	36	-50.83	8.26E-06
594.07	-14.84	36	-50.84	8.24E-06
594.08	-14.79	36	-50.79	8.34E-06
594.09	-14.8	36	-50.8	8.32E-06
594.1	-14.78	36	-50.78	8.36E-06
594.11	-14.76	36	-50.76	8.39E-06
594.12	-14.77	36	-50.77	8.38E-06
594.13	-14.69	36	-50.69	8.53E-06
594.14	-14.72	36	-50.72	8.47E-06
594.15	-14.7	36	-50.7	8.51E-06
594.16	-14.69	36	-50.69	8.53E-06
594.17	-14.69	36	-50.69	8.53E-06
594.18	-14.69	36	-50.69	8.53E-06
594.19	-14.67	36	-50.67	8.57E-06
594.2	-14.68	36	-50.68	8.55E-06
594.21	-14.65	36	-50.65	8.61E-06
594.22	-14.61	36	-50.61	8.69E-06
594.23	-14.64	36	-50.64	8.63E-06
594.24	-14.65	36	-50.65	8.61E-06
594.25	-14.63	36	-50.63	8.65E-06
594.26	-14.64	36	-50.64	8.63E-06
594.27	-14.63	36	-50.63	8.65E-06
594.28	-14.63	36	-50.63	8.65E-06
594.29	-14.63	36	-50.63	8.65E-06
594.3	-14.63	36	-50.63	8.65E-06
594.31	-14.64	36	-50.64	8.63E-06
594.32	-14.65	36	-50.65	8.61E-06
594.33	-14.66	36	-50.66	8.59E-06
594.34	-14.67	36	-50.67	8.57E-06
594.35	-14.65	36	-50.65	8.61E-06

594.36	-14.67	36	-50.67	8.57E-06
594.37	-14.68	36	-50.68	8.55E-06
594.38	-14.68	36	-50.68	8.55E-06
594.39	-14.71	36	-50.71	8.49E-06
594.4	-14.7	36	-50.7	8.51E-06
594.41	-14.7	36	-50.7	8.51E-06
594.42	-14.72	36	-50.72	8.47E-06
594.43	-14.77	36	-50.77	8.38E-06
594.44	-14.75	36	-50.75	8.41E-06
594.45	-14.77	36	-50.77	8.38E-06
594.46	-14.79	36	-50.79	8.34E-06
594.47	-14.82	36	-50.82	8.28E-06
594.48	-14.83	36	-50.83	8.26E-06
594.49	-14.8	36	-50.8	8.32E-06
594.5	-14.89	36	-50.89	8.15E-06

Total = 4.3E-04 Ratio to in band = 61 dB.

595	-21.43	36	-57.43	1.80717E-06
595.01	-21.82	36	-57.82	1.65196E-06
595.02	-22.26	36	-58.26	1.49279E-06
595.03	-22.69	36	-58.69	1.35207E-06
595.04	-23.19	36	-59.19	1.20504E-06
595.05	-23.72	36	-59.72	1.0666E-06
595.06	-24.23	36	-60.23	9.48418E-07
595.07	-24.8	36	-60.8	8.31764E-07
595.08	-25.37	36	-61.37	7.29458E-07
595.09	-25.93	36	-61.93	6.4121E-07
595.1	-26.5	36	-62.5	5.62341E-07
595.11	-26.97	36	-62.97	5.04661E-07
595.12	-27.32	36	-63.32	4.65586E-07
595.13	-27.57	36	-63.57	4.39542E-07
595.14	-27.54	36	-63.54	4.42588E-07
595.15	-27.36	36	-63.36	4.61318E-07
595.16	-26.93	36	-62.93	5.09331E-07
595.17	-26.34	36	-62.34	5.83445E-07
595.18	-25.61	36	-61.61	6.9024E-07
595.19	-24.81	36	-60.81	8.29851E-07
595.2	-23.99	36	-59.99	1.00231E-06
595.21	-23.15	36	-59.15	1.21619E-06
595.22	-22.35	36	-58.35	1.46218E-06
595.23	-21.53	36	-57.53	1.76604E-06
595.24	-20.78	36	-56.78	2.09894E-06
595.25	-20.05	36	-56.05	2.48313E-06
595.26	-19.33	36	-55.33	2.93089E-06
595.27	-18.65	36	-54.65	3.42768E-06
595.28	-18.01	36	-54.01	3.97192E-06
595.29	-17.36	36	-53.36	4.61318E-06
595.3	-16.76	36	-52.76	5.29663E-06
595.31	-16.17	36	-52.17	6.06736E-06

595.32	-15.63	36	-51.63	6.87068E-06
595.33	-15.07	36	-51.07	7.81628E-06
595.34	-14.57	36	-50.57	8.77001E-06
595.35	-14.04	36	-50.04	9.90832E-06
595.36	-13.55	36	-49.55	1.10917E-05
595.37	-13.06	36	-49.06	1.24165E-05
595.38	-12.63	36	-48.63	1.37088E-05
595.39	-12.2	36	-48.2	1.51356E-05
595.4	-11.76	36	-47.76	1.67494E-05
595.41	-11.39	36	-47.39	1.8239E-05
595.42	-11.01	36	-47.01	1.99067E-05
595.43	-10.58	36	-46.58	2.19786E-05
595.44	-10.21	36	-46.21	2.39332E-05
595.45	-9.83	36	-45.83	2.61216E-05
595.46	-9.49	36	-45.49	2.82488E-05
595.47	-9.11	36	-45.11	3.08319E-05
595.48	-8.78	36	-44.78	3.3266E-05
595.49	-8.46	36	-44.46	3.58096E-05
595.5	-8.17	36	-44.17	3.82825E-05

Total = 4.3E-04 Ratio to in band = 61 dB.

595.5	-8.17	36	-44.17	3.83E-05
595.51	-7.87	36	-43.87	4.1E-05
595.52	-7.55	36	-43.55	4.42E-05
595.53	-7.31	36	-43.31	4.67E-05
595.54	-7	36	-43	5.01E-05
595.55	-6.76	36	-42.76	5.3E-05
595.56	-6.51	36	-42.51	5.61E-05
595.57	-6.26	36	-42.26	5.94E-05
595.58	-5.98	36	-41.98	6.34E-05
595.59	-5.76	36	-41.76	6.67E-05
595.6	-5.52	36	-41.52	7.05E-05
595.61	-5.32	36	-41.32	7.38E-05
595.62	-5.15	36	-41.15	7.67E-05
595.63	-4.91	36	-40.91	8.11E-05
595.64	-4.73	36	-40.73	8.45E-05
595.65	-4.55	36	-40.55	8.81E-05
595.66	-4.33	36	-40.33	9.27E-05
595.67	-4.2	36	-40.2	9.55E-05
595.68	-4.02	36	-40.02	9.95E-05
595.69	-3.88	36	-39.88	0.000103
595.7	-3.7	36	-39.7	0.000107
595.71	-3.57	36	-39.57	0.00011
595.72	-3.42	36	-39.42	0.000114
595.73	-3.28	36	-39.28	0.000118
595.74	-3.14	36	-39.14	0.000122
595.75	-3.02	36	-39.02	0.000125
595.76	-2.92	36	-38.92	0.000128
595.77	-2.79	36	-38.79	0.000132

595.78	-2.69	36	-38.69	0.000135
595.79	-2.57	36	-38.57	0.000139
595.8	-2.47	36	-38.47	0.000142
595.81	-2.38	36	-38.38	0.000145
595.82	-2.27	36	-38.27	0.000149
595.83	-2.21	36	-38.21	0.000151
595.84	-2.13	36	-38.13	0.000154
595.85	-2.05	36	-38.05	0.000157
595.86	-1.95	36	-37.95	0.00016
595.87	-1.91	36	-37.91	0.000162
595.88	-1.83	36	-37.83	0.000165
595.89	-1.8	36	-37.8	0.000166
595.9	-1.7	36	-37.7	0.00017
595.91	-1.65	36	-37.65	0.000172
595.92	-1.61	36	-37.61	0.000173
595.93	-1.58	36	-37.58	0.000175
595.94	-1.52	36	-37.52	0.000177
595.95	-1.46	36	-37.46	0.000179
595.96	-1.41	36	-37.41	0.000182
595.97	-1.37	36	-37.37	0.000183
595.98	-1.34	36	-37.34	0.000185
595.99	-1.31	36	-37.31	0.000186
596	-1.27	36	-37.27	0.000187

Total = 6.1E-03 Ratio to in band = 49.5 dB.

602	-0.68	36	-36.68	0.000215
602.01	-0.69	36	-36.69	0.000214
602.02	-0.7	36	-36.7	0.000214
602.03	-0.69	36	-36.69	0.000214
602.04	-0.7	36	-36.7	0.000214
602.05	-0.73	36	-36.73	0.000212
602.06	-0.71	36	-36.71	0.000213
602.07	-0.74	36	-36.74	0.000212
602.08	-0.74	36	-36.74	0.000212
602.09	-0.78	36	-36.78	0.00021
602.1	-0.78	36	-36.78	0.00021
602.11	-0.8	36	-36.8	0.000209
602.12	-0.78	36	-36.78	0.00021
602.13	-0.81	36	-36.81	0.000208
602.14	-0.81	36	-36.81	0.000208
602.15	-0.84	36	-36.84	0.000207
602.16	-0.87	36	-36.87	0.000206
602.17	-0.86	36	-36.86	0.000206
602.18	-0.88	36	-36.88	0.000205
602.19	-0.89	36	-36.89	0.000205
602.2	-0.93	36	-36.93	0.000203
602.21	-0.95	36	-36.95	0.000202
602.22	-0.98	36	-36.98	0.0002
602.23	-1	36	-37	0.0002

602.24	-1.03	36	-37.03	0.000198
602.25	-1.05	36	-37.05	0.000197
602.26	-1.1	36	-37.1	0.000195
602.27	-1.12	36	-37.12	0.000194
602.28	-1.14	36	-37.14	0.000193
602.29	-1.22	36	-37.22	0.00019
602.3	-1.24	36	-37.24	0.000189
602.31	-1.29	36	-37.29	0.000187
602.32	-1.32	36	-37.32	0.000185
602.33	-1.35	36	-37.35	0.000184
602.34	-1.41	36	-37.41	0.000182
602.35	-1.47	36	-37.47	0.000179
602.36	-1.51	36	-37.51	0.000177
602.37	-1.58	36	-37.58	0.000175
602.38	-1.67	36	-37.67	0.000171
602.39	-1.72	36	-37.72	0.000169
602.4	-1.81	36	-37.81	0.000166
602.41	-1.86	36	-37.86	0.000164
602.42	-1.96	36	-37.96	0.00016
602.43	-2.06	36	-38.06	0.000156
602.44	-2.18	36	-38.18	0.000152
602.45	-2.28	36	-38.28	0.000149
602.46	-2.41	36	-38.41	0.000144
602.47	-2.52	36	-38.52	0.000141
602.48	-2.65	36	-38.65	0.000136
602.49	-2.78	36	-38.78	0.000132
602.5	-2.96	36	-38.96	0.000127

Total = 9.6E-03 Ratio to in band = 47.4 dB

602.5	-2.96	36	-38.96	0.000127
602.51	-3.1	36	-39.1	0.000123
602.52	-3.27	36	-39.27	0.000118
602.53	-3.48	36	-39.48	0.000113
602.54	-3.67	36	-39.67	0.000108
602.55	-3.88	36	-39.88	0.000103
602.56	-4.06	36	-40.06	9.86E-05
602.57	-4.32	36	-40.32	9.29E-05
602.58	-4.55	36	-40.55	8.81E-05
602.59	-4.78	36	-40.78	8.36E-05
602.6	-5.06	36	-41.06	7.83E-05
602.61	-5.33	36	-41.33	7.36E-05
602.62	-5.62	36	-41.62	6.89E-05
602.63	-5.94	36	-41.94	6.4E-05
602.64	-6.2	36	-42.2	6.03E-05
602.65	-6.58	36	-42.58	5.52E-05
602.66	-6.93	36	-42.93	5.09E-05
602.67	-7.26	36	-43.26	4.72E-05
602.68	-7.68	36	-43.68	4.29E-05
602.69	-8.06	36	-44.06	3.93E-05

602.7	-8.39	36	-44.39	3.64E-05
602.71	-8.8	36	-44.8	3.31E-05
602.72	-9.23	36	-45.23	3E-05
602.73	-9.73	36	-45.73	2.67E-05
602.74	-10.16	36	-46.16	2.42E-05
602.75	-10.65	36	-46.65	2.16E-05
602.76	-11.11	36	-47.11	1.95E-05
602.77	-11.72	36	-47.72	1.69E-05
602.78	-12.18	36	-48.18	1.52E-05
602.79	-12.74	36	-48.74	1.34E-05
602.8	-13.28	36	-49.28	1.18E-05
602.81	-13.92	36	-49.92	1.02E-05
602.82	-14.5	36	-50.5	8.91E-06
602.83	-15.16	36	-51.16	7.66E-06
602.84	-15.85	36	-51.85	6.53E-06
602.85	-16.54	36	-52.54	5.57E-06
602.86	-17.25	36	-53.25	4.73E-06
602.87	-18.06	36	-54.06	3.93E-06
602.88	-18.83	36	-54.83	3.29E-06
602.89	-19.65	36	-55.65	2.72E-06
602.9	-20.51	36	-56.51	2.23E-06
602.91	-21.41	36	-57.41	1.82E-06
602.92	-22.31	36	-58.31	1.48E-06
602.93	-23.23	36	-59.23	1.19E-06
602.94	-24.14	36	-60.14	9.68E-07
602.95	-24.98	36	-60.98	7.98E-07
602.96	-25.68	36	-61.68	6.79E-07
602.97	-26.25	36	-62.25	5.96E-07
602.98	-26.58	36	-62.58	5.52E-07
602.99	-26.66	36	-62.66	5.42E-07
603	-26.49	36	-62.49	5.64E-07

Total = 1.9E-03 Ratio to in band = 54.5 dB

603	-26.49	36	-62.49	5.64E-07
603.01	-26.05	36	-62.05	6.24E-07
603.02	-25.61	36	-61.61	6.9E-07
603.03	-25.02	36	-61.02	7.91E-07
603.04	-24.44	36	-60.44	9.04E-07
603.05	-23.84	36	-59.84	1.04E-06
603.06	-23.28	36	-59.28	1.18E-06
603.07	-22.76	36	-58.76	1.33E-06
603.08	-22.24	36	-58.24	1.5E-06
603.09	-21.76	36	-57.76	1.67E-06
603.1	-21.29	36	-57.29	1.87E-06
603.11	-20.88	36	-56.88	2.05E-06
603.12	-20.52	36	-56.52	2.23E-06
603.13	-20.14	36	-56.14	2.43E-06
603.14	-19.8	36	-55.8	2.63E-06
603.15	-19.48	36	-55.48	2.83E-06
603.16	-19.21	36	-55.21	3.01E-06

603.17	-18.93	36	-54.93	3.21E-06
603.18	-18.66	36	-54.66	3.42E-06
603.19	-18.45	36	-54.45	3.59E-06
603.2	-18.22	36	-54.22	3.78E-06
603.21	-17.98	36	-53.98	4E-06
603.22	-17.8	36	-53.8	4.17E-06
603.23	-17.6	36	-53.6	4.37E-06
603.24	-17.43	36	-53.43	4.54E-06
603.25	-17.25	36	-53.25	4.73E-06
603.26	-17.11	36	-53.11	4.89E-06
603.27	-16.94	36	-52.94	5.08E-06
603.28	-16.82	36	-52.82	5.22E-06
603.29	-16.66	36	-52.66	5.42E-06
603.3	-16.57	36	-52.57	5.53E-06
603.31	-16.45	36	-52.45	5.69E-06
603.32	-16.34	36	-52.34	5.83E-06
603.33	-16.22	36	-52.22	6E-06
603.34	-16.14	36	-52.14	6.11E-06
603.35	-16.05	36	-52.05	6.24E-06
603.36	-15.95	36	-51.95	6.38E-06
603.37	-15.86	36	-51.86	6.52E-06
603.38	-15.77	36	-51.77	6.65E-06
603.39	-15.72	36	-51.72	6.73E-06
603.4	-15.64	36	-51.64	6.85E-06
603.41	-15.58	36	-51.58	6.95E-06
603.42	-15.52	36	-51.52	7.05E-06
603.43	-15.46	36	-51.46	7.14E-06
603.44	-15.41	36	-51.41	7.23E-06
603.45	-15.36	36	-51.36	7.31E-06
603.46	-15.3	36	-51.3	7.41E-06
603.47	-15.27	36	-51.27	7.46E-06
603.48	-15.23	36	-51.23	7.53E-06
603.49	-15.19	36	-51.19	7.6E-06
603.5	-15.13	36	-51.13	7.71E-06

Total = 2.3E-04 Ratio to in band = 63.7 dB

603.5	-15.13	36	-51.13	7.71E-06
603.51	-15.12	36	-51.12	7.73E-06
603.52	-15.09	36	-51.09	7.78E-06
603.53	-15.04	36	-51.04	7.87E-06
603.54	-15.02	36	-51.02	7.91E-06
603.55	-14.99	36	-50.99	7.96E-06
603.56	-14.96	36	-50.96	8.02E-06
603.57	-14.93	36	-50.93	8.07E-06
603.58	-14.93	36	-50.93	8.07E-06
603.59	-14.89	36	-50.89	8.15E-06
603.6	-14.89	36	-50.89	8.15E-06
603.61	-14.86	36	-50.86	8.2E-06
603.62	-14.86	36	-50.86	8.2E-06

603.63	-14.84	36	-50.84	8.24E-06
603.64	-14.84	36	-50.84	8.24E-06
603.65	-14.82	36	-50.82	8.28E-06
603.66	-14.83	36	-50.83	8.26E-06
603.67	-14.82	36	-50.82	8.28E-06
603.68	-14.8	36	-50.8	8.32E-06
603.69	-14.81	36	-50.81	8.3E-06
603.7	-14.78	36	-50.78	8.36E-06
603.71	-14.79	36	-50.79	8.34E-06
603.72	-14.78	36	-50.78	8.36E-06
603.73	-14.77	36	-50.77	8.38E-06
603.74	-14.78	36	-50.78	8.36E-06
603.75	-14.78	36	-50.78	8.36E-06
603.76	-14.78	36	-50.78	8.36E-06
603.77	-14.78	36	-50.78	8.36E-06
603.78	-14.77	36	-50.77	8.38E-06
603.79	-14.76	36	-50.76	8.39E-06
603.8	-14.79	36	-50.79	8.34E-06
603.81	-14.82	36	-50.82	8.28E-06
603.82	-14.82	36	-50.82	8.28E-06
603.83	-14.83	36	-50.83	8.26E-06
603.84	-14.84	36	-50.84	8.24E-06
603.85	-14.86	36	-50.86	8.2E-06
603.86	-14.87	36	-50.87	8.18E-06
603.87	-14.88	36	-50.88	8.17E-06
603.88	-14.85	36	-50.85	8.22E-06
603.89	-14.89	36	-50.89	8.15E-06
603.9	-14.92	36	-50.92	8.09E-06
603.91	-14.94	36	-50.94	8.05E-06
603.92	-14.93	36	-50.93	8.07E-06
603.93	-14.95	36	-50.95	8.04E-06
603.94	-14.94	36	-50.94	8.05E-06
603.95	-14.98	36	-50.98	7.98E-06
603.96	-14.99	36	-50.99	7.96E-06
603.97	-15.02	36	-51.02	7.91E-06
603.98	-15.02	36	-51.02	7.91E-06
603.99	-15.03	36	-51.03	7.89E-06
604	-15.05	36	-51.05	7.85E-06

Total = 4.1E-04 Ratio to in band = 61.2 dB

604	-15.05	36	-51.05	7.85E-06
604.01	-15.07	36	-51.07	7.82E-06
604.02	-15.1	36	-51.1	7.76E-06
604.03	-15.11	36	-51.11	7.74E-06
604.04	-15.16	36	-51.16	7.66E-06
604.05	-15.18	36	-51.18	7.62E-06
604.06	-15.17	36	-51.17	7.64E-06
604.07	-15.21	36	-51.21	7.57E-06
604.08	-15.23	36	-51.23	7.53E-06

604.09	-15.25	36	-51.25	7.5E-06
604.1	-15.26	36	-51.26	7.48E-06
604.11	-15.3	36	-51.3	7.41E-06
604.12	-15.3	36	-51.3	7.41E-06
604.13	-15.31	36	-51.31	7.4E-06
604.14	-15.36	36	-51.36	7.31E-06
604.15	-15.36	36	-51.36	7.31E-06
604.16	-15.38	36	-51.38	7.28E-06
604.17	-15.4	36	-51.4	7.24E-06
604.18	-15.42	36	-51.42	7.21E-06
604.19	-15.46	36	-51.46	7.14E-06
604.2	-15.49	36	-51.49	7.1E-06
604.21	-15.52	36	-51.52	7.05E-06
604.22	-15.54	36	-51.54	7.01E-06
604.23	-15.57	36	-51.57	6.97E-06
604.24	-15.6	36	-51.6	6.92E-06
604.25	-15.64	36	-51.64	6.85E-06
604.26	-15.65	36	-51.65	6.84E-06
604.27	-15.67	36	-51.67	6.81E-06
604.28	-15.72	36	-51.72	6.73E-06
604.29	-15.76	36	-51.76	6.67E-06
604.3	-15.79	36	-51.79	6.62E-06
604.31	-15.79	36	-51.79	6.62E-06
604.32	-15.82	36	-51.82	6.58E-06
604.33	-15.85	36	-51.85	6.53E-06
604.34	-15.88	36	-51.88	6.49E-06
604.35	-15.9	36	-51.9	6.46E-06
604.36	-15.93	36	-51.93	6.41E-06
604.37	-15.96	36	-51.96	6.37E-06
604.38	-15.98	36	-51.98	6.34E-06
604.39	-16.01	36	-52.01	6.3E-06
604.4	-16.03	36	-52.03	6.27E-06
604.41	-16.08	36	-52.08	6.19E-06
604.42	-16.09	36	-52.09	6.18E-06
604.43	-16.13	36	-52.13	6.12E-06
604.44	-16.16	36	-52.16	6.08E-06
604.45	-16.19	36	-52.19	6.04E-06
604.46	-16.2	36	-52.2	6.03E-06
604.47	-16.24	36	-52.24	5.97E-06
604.48	-16.29	36	-52.29	5.9E-06
604.49	-16.29	36	-52.29	5.9E-06
604.5	-16.34	36	-52.34	5.83E-06

Total = 3.5E-04 Ratio to in band = 61.9 dB.

604.5	-16.34	36	-52.34	5.83E-06
604.51	-16.38	36	-52.38	5.78E-06
604.52	-16.4	36	-52.4	5.75E-06
604.53	-16.43	36	-52.43	5.71E-06
604.54	-16.45	36	-52.45	5.69E-06

604.55	-16.51	36	-52.51	5.61E-06
604.56	-16.5	36	-52.5	5.62E-06
604.57	-16.54	36	-52.54	5.57E-06
604.58	-16.58	36	-52.58	5.52E-06
604.59	-16.63	36	-52.63	5.46E-06
604.6	-16.64	36	-52.64	5.45E-06
604.61	-16.68	36	-52.68	5.4E-06
604.62	-16.7	36	-52.7	5.37E-06
604.63	-16.71	36	-52.71	5.36E-06
604.64	-16.77	36	-52.77	5.28E-06
604.65	-16.79	36	-52.79	5.26E-06
604.66	-16.85	36	-52.85	5.19E-06
604.67	-16.87	36	-52.87	5.16E-06
604.68	-16.92	36	-52.92	5.11E-06
604.69	-16.94	36	-52.94	5.08E-06
604.7	-16.95	36	-52.95	5.07E-06
604.71	-16.98	36	-52.98	5.04E-06
604.72	-17.03	36	-53.03	4.98E-06
604.73	-17.06	36	-53.06	4.94E-06
604.74	-17.07	36	-53.07	4.93E-06
604.75	-17.09	36	-53.09	4.91E-06
604.76	-17.14	36	-53.14	4.85E-06
604.77	-17.15	36	-53.15	4.84E-06
604.78	-17.19	36	-53.19	4.8E-06
604.79	-17.22	36	-53.22	4.76E-06
604.8	-17.28	36	-53.28	4.7E-06
604.81	-17.32	36	-53.32	4.66E-06
604.82	-17.34	36	-53.34	4.63E-06
604.83	-17.36	36	-53.36	4.61E-06
604.84	-17.42	36	-53.42	4.55E-06
604.85	-17.45	36	-53.45	4.52E-06
604.86	-17.48	36	-53.48	4.49E-06
604.87	-17.52	36	-53.52	4.45E-06
604.88	-17.55	36	-53.55	4.42E-06
604.89	-17.61	36	-53.61	4.36E-06
604.9	-17.63	36	-53.63	4.34E-06
604.91	-17.65	36	-53.65	4.32E-06
604.92	-17.69	36	-53.69	4.28E-06
604.93	-17.7	36	-53.7	4.27E-06
604.94	-17.74	36	-53.74	4.23E-06
604.95	-17.77	36	-53.77	4.2E-06
604.96	-17.8	36	-53.8	4.17E-06
604.97	-17.83	36	-53.83	4.14E-06
604.98	-17.85	36	-53.85	4.12E-06
604.99	-17.89	36	-53.89	4.08E-06
605	-17.92	36	-53.92	4.06E-06

Total = 2.5E-04 Ratio to in band = 63.3 dB.

605	-17.92	36	-53.92	4.06E-06
-----	--------	----	--------	----------

605.01	-17.96	36	-53.96	4.02E-06
605.02	-17.98	36	-53.98	4E-06
605.03	-18.02	36	-54.02	3.96E-06
605.04	-18.05	36	-54.05	3.94E-06
605.05	-18.08	36	-54.08	3.91E-06
605.06	-18.13	36	-54.13	3.86E-06
605.07	-18.15	36	-54.15	3.85E-06
605.08	-18.19	36	-54.19	3.81E-06
605.09	-18.22	36	-54.22	3.78E-06
605.1	-18.25	36	-54.25	3.76E-06
605.11	-18.29	36	-54.29	3.72E-06
605.12	-18.31	36	-54.31	3.71E-06
605.13	-18.33	36	-54.33	3.69E-06
605.14	-18.37	36	-54.37	3.66E-06
605.15	-18.41	36	-54.41	3.62E-06
605.16	-18.43	36	-54.43	3.61E-06
605.17	-18.46	36	-54.46	3.58E-06
605.18	-18.51	36	-54.51	3.54E-06
605.19	-18.54	36	-54.54	3.52E-06
605.2	-18.56	36	-54.56	3.5E-06
605.21	-18.63	36	-54.63	3.44E-06
605.22	-18.64	36	-54.64	3.44E-06
605.23	-18.7	36	-54.7	3.39E-06
605.24	-18.74	36	-54.74	3.36E-06
605.25	-18.75	36	-54.75	3.35E-06
605.26	-18.8	36	-54.8	3.31E-06
605.27	-18.82	36	-54.82	3.3E-06
605.28	-18.86	36	-54.86	3.27E-06
605.29	-18.92	36	-54.92	3.22E-06
605.3	-18.94	36	-54.94	3.21E-06
605.31	-18.98	36	-54.98	3.18E-06
605.32	-18.99	36	-54.99	3.17E-06
605.33	-19.03	36	-55.03	3.14E-06
605.34	-19.09	36	-55.09	3.1E-06
605.35	-19.09	36	-55.09	3.1E-06
605.36	-19.14	36	-55.14	3.06E-06
605.37	-19.18	36	-55.18	3.03E-06
605.38	-19.22	36	-55.22	3.01E-06
605.39	-19.24	36	-55.24	2.99E-06
605.4	-19.27	36	-55.27	2.97E-06
605.41	-19.29	36	-55.29	2.96E-06
605.42	-19.34	36	-55.34	2.92E-06
605.43	-19.35	36	-55.35	2.92E-06
605.44	-19.38	36	-55.38	2.9E-06
605.45	-19.42	36	-55.42	2.87E-06
605.46	-19.42	36	-55.42	2.87E-06
605.47	-19.48	36	-55.48	2.83E-06
605.48	-19.49	36	-55.49	2.82E-06
605.49	-19.51	36	-55.51	2.81E-06
605.5	-19.56	36	-55.56	2.78E-06

Total = 1.7E-04 Ratio to in band = 65 dB.

605.5	-19.56	36	-55.56	2.78E-06
605.51	-19.6	36	-55.6	2.75E-06
605.52	-19.61	36	-55.61	2.75E-06
605.53	-19.67	36	-55.67	2.71E-06
605.54	-19.7	36	-55.7	2.69E-06
605.55	-19.72	36	-55.72	2.68E-06
605.56	-19.74	36	-55.74	2.67E-06
605.57	-19.8	36	-55.8	2.63E-06
605.58	-19.83	36	-55.83	2.61E-06
605.59	-19.87	36	-55.87	2.59E-06
605.6	-19.88	36	-55.88	2.58E-06
605.61	-19.93	36	-55.93	2.55E-06
605.62	-19.96	36	-55.96	2.54E-06
605.63	-19.99	36	-55.99	2.52E-06
605.64	-20.04	36	-56.04	2.49E-06
605.65	-20.07	36	-56.07	2.47E-06
605.66	-20.11	36	-56.11	2.45E-06
605.67	-20.14	36	-56.14	2.43E-06
605.68	-20.18	36	-56.18	2.41E-06
605.69	-20.22	36	-56.22	2.39E-06
605.7	-20.24	36	-56.24	2.38E-06
605.71	-20.28	36	-56.28	2.36E-06
605.72	-20.31	36	-56.31	2.34E-06
605.73	-20.33	36	-56.33	2.33E-06
605.74	-20.37	36	-56.37	2.31E-06
605.75	-20.4	36	-56.4	2.29E-06
605.76	-20.42	36	-56.42	2.28E-06
605.77	-20.46	36	-56.46	2.26E-06
605.78	-20.48	36	-56.48	2.25E-06
605.79	-20.52	36	-56.52	2.23E-06
605.8	-20.55	36	-56.55	2.21E-06
605.81	-20.6	36	-56.6	2.19E-06
605.82	-20.63	36	-56.63	2.17E-06
605.83	-20.66	36	-56.66	2.16E-06
605.84	-20.69	36	-56.69	2.14E-06
605.85	-20.71	36	-56.71	2.13E-06
605.86	-20.74	36	-56.74	2.12E-06
605.87	-20.77	36	-56.77	2.1E-06
605.88	-20.82	36	-56.82	2.08E-06
605.89	-20.83	36	-56.83	2.07E-06
605.9	-20.87	36	-56.87	2.06E-06
605.91	-20.92	36	-56.92	2.03E-06
605.92	-20.96	36	-56.96	2.01E-06
605.93	-20.96	36	-56.96	2.01E-06
605.94	-21	36	-57	2E-06
605.95	-21.02	36	-57.02	1.99E-06
605.96	-21.08	36	-57.08	1.96E-06
605.97	-21.09	36	-57.09	1.95E-06

605.98	-21.14	36	-57.14	1.93E-06
605.99	-21.15	36	-57.15	1.93E-06
606	-21.19	36	-57.19	1.91E-06

Total = 1.2E-04 Ratio to in band = 66.5 dB.

606	-21.19	36	-57.19	1.91E-06
606.01	-21.24	36	-57.24	1.89E-06
606.02	-21.27	36	-57.27	1.87E-06
606.03	-21.29	36	-57.29	1.87E-06
606.04	-21.32	36	-57.32	1.85E-06
606.05	-21.35	36	-57.35	1.84E-06
606.06	-21.4	36	-57.4	1.82E-06
606.07	-21.42	36	-57.42	1.81E-06
606.08	-21.47	36	-57.47	1.79E-06
606.09	-21.49	36	-57.49	1.78E-06
606.1	-21.51	36	-57.51	1.77E-06
606.11	-21.55	36	-57.55	1.76E-06
606.12	-21.59	36	-57.59	1.74E-06
606.13	-21.6	36	-57.6	1.74E-06
606.14	-21.64	36	-57.64	1.72E-06
606.15	-21.69	36	-57.69	1.7E-06
606.16	-21.71	36	-57.71	1.69E-06
606.17	-21.73	36	-57.73	1.69E-06
606.18	-21.77	36	-57.77	1.67E-06
606.19	-21.79	36	-57.79	1.66E-06
606.2	-21.83	36	-57.83	1.65E-06
606.21	-21.87	36	-57.87	1.63E-06
606.22	-21.88	36	-57.88	1.63E-06
606.23	-21.92	36	-57.92	1.61E-06
606.24	-21.96	36	-57.96	1.6E-06
606.25	-22	36	-58	1.58E-06
606.26	-22.03	36	-58.03	1.57E-06
606.27	-22.04	36	-58.04	1.57E-06
606.28	-22.08	36	-58.08	1.56E-06
606.29	-22.11	36	-58.11	1.55E-06
606.3	-22.14	36	-58.14	1.53E-06
606.31	-22.19	36	-58.19	1.52E-06
606.32	-22.21	36	-58.21	1.51E-06
606.33	-22.25	36	-58.25	1.5E-06
606.34	-22.26	36	-58.26	1.49E-06
606.35	-22.31	36	-58.31	1.48E-06
606.36	-22.33	36	-58.33	1.47E-06
606.37	-22.37	36	-58.37	1.46E-06
606.38	-22.39	36	-58.39	1.45E-06
606.39	-22.42	36	-58.42	1.44E-06
606.4	-22.47	36	-58.47	1.42E-06
606.41	-22.49	36	-58.49	1.42E-06
606.42	-22.52	36	-58.52	1.41E-06
606.43	-22.56	36	-58.56	1.39E-06

606.44	-22.6	36	-58.6	1.38E-06
606.45	-22.62	36	-58.62	1.37E-06
606.46	-22.65	36	-58.65	1.36E-06
606.47	-22.69	36	-58.69	1.35E-06
606.48	-22.72	36	-58.72	1.34E-06
606.49	-22.73	36	-58.73	1.34E-06
606.5	-22.77	36	-58.77	1.33E-06

Total = 8.2E-05 Ratio to in band = 68.2 dB.

606.5	-22.77	36	-58.77	1.33E-06
606.51	-22.79	36	-58.79	1.32E-06
606.52	-22.84	36	-58.84	1.31E-06
606.53	-22.86	36	-58.86	1.3E-06
606.54	-22.9	36	-58.9	1.29E-06
606.55	-22.93	36	-58.93	1.28E-06
606.56	-22.96	36	-58.96	1.27E-06
606.57	-22.98	36	-58.98	1.26E-06
606.58	-22.99	36	-58.99	1.26E-06
606.59	-23.04	36	-59.04	1.25E-06
606.6	-23.06	36	-59.06	1.24E-06
606.61	-23.13	36	-59.13	1.22E-06
606.62	-23.14	36	-59.14	1.22E-06
606.63	-23.16	36	-59.16	1.21E-06
606.64	-23.19	36	-59.19	1.21E-06
606.65	-23.22	36	-59.22	1.2E-06
606.66	-23.25	36	-59.25	1.19E-06
606.67	-23.28	36	-59.28	1.18E-06
606.68	-23.29	36	-59.29	1.18E-06
606.69	-23.35	36	-59.35	1.16E-06
606.7	-23.37	36	-59.37	1.16E-06
606.71	-23.39	36	-59.39	1.15E-06
606.72	-23.44	36	-59.44	1.14E-06
606.73	-23.47	36	-59.47	1.13E-06
606.74	-23.51	36	-59.51	1.12E-06
606.75	-23.52	36	-59.52	1.12E-06
606.76	-23.57	36	-59.57	1.1E-06
606.77	-23.57	36	-59.57	1.1E-06
606.78	-23.62	36	-59.62	1.09E-06
606.79	-23.65	36	-59.65	1.08E-06
606.8	-23.68	36	-59.68	1.08E-06
606.81	-23.71	36	-59.71	1.07E-06
606.82	-23.73	36	-59.73	1.06E-06
606.83	-23.76	36	-59.76	1.06E-06
606.84	-23.81	36	-59.81	1.04E-06
606.85	-23.83	36	-59.83	1.04E-06
606.86	-23.86	36	-59.86	1.03E-06
606.87	-23.89	36	-59.89	1.03E-06
606.88	-23.91	36	-59.91	1.02E-06
606.89	-23.94	36	-59.94	1.01E-06

606.9	-23.97	36	-59.97	1.01E-06
606.91	-24.01	36	-60.01	9.98E-07
606.92	-24.04	36	-60.04	9.91E-07
606.93	-24.07	36	-60.07	9.84E-07
606.94	-24.1	36	-60.1	9.77E-07
606.95	-24.13	36	-60.13	9.71E-07
606.96	-24.16	36	-60.16	9.64E-07
606.97	-24.19	36	-60.19	9.57E-07
606.98	-24.23	36	-60.23	9.48E-07
606.99	-24.24	36	-60.24	9.46E-07
607	-24.28	36	-60.28	9.38E-07

Total = 5.7E-05 Ratio to in band = 69.8 dB.

607	-24.28	36	-60.28	9.38E-07
607.01	-24.32	36	-60.32	9.29E-07
607.02	-24.34	36	-60.34	9.25E-07
607.03	-24.36	36	-60.36	9.2E-07
607.04	-24.39	36	-60.39	9.14E-07
607.05	-24.42	36	-60.42	9.08E-07
607.06	-24.44	36	-60.44	9.04E-07
607.07	-24.49	36	-60.49	8.93E-07
607.08	-24.51	36	-60.51	8.89E-07
607.09	-24.54	36	-60.54	8.83E-07
607.1	-24.58	36	-60.58	8.75E-07
607.11	-24.59	36	-60.59	8.73E-07
607.12	-24.64	36	-60.64	8.63E-07
607.13	-24.66	36	-60.66	8.59E-07
607.14	-24.66	36	-60.66	8.59E-07
607.15	-24.7	36	-60.7	8.51E-07
607.16	-24.73	36	-60.73	8.45E-07
607.17	-24.75	36	-60.75	8.41E-07
607.18	-24.8	36	-60.8	8.32E-07
607.19	-24.84	36	-60.84	8.24E-07
607.2	-24.87	36	-60.87	8.18E-07
607.21	-24.88	36	-60.88	8.17E-07
607.22	-24.91	36	-60.91	8.11E-07
607.23	-24.94	36	-60.94	8.05E-07
607.24	-24.97	36	-60.97	8E-07
607.25	-25	36	-61	7.94E-07
607.26	-25.03	36	-61.03	7.89E-07
607.27	-25.04	36	-61.04	7.87E-07
607.28	-25.09	36	-61.09	7.78E-07
607.29	-25.12	36	-61.12	7.73E-07
607.3	-25.14	36	-61.14	7.69E-07
607.31	-25.17	36	-61.17	7.64E-07
607.32	-25.19	36	-61.19	7.6E-07
607.33	-25.23	36	-61.23	7.53E-07
607.34	-25.24	36	-61.24	7.52E-07
607.35	-25.27	36	-61.27	7.46E-07

607.36	-25.3	36	-61.3	7.41E-07
607.37	-25.33	36	-61.33	7.36E-07
607.38	-25.35	36	-61.35	7.33E-07
607.39	-25.38	36	-61.38	7.28E-07
607.4	-25.4	36	-61.4	7.24E-07
607.41	-25.45	36	-61.45	7.16E-07
607.42	-25.47	36	-61.47	7.13E-07
607.43	-25.5	36	-61.5	7.08E-07
607.44	-25.56	36	-61.56	6.98E-07
607.45	-25.57	36	-61.57	6.97E-07
607.46	-25.58	36	-61.58	6.95E-07
607.47	-25.59	36	-61.59	6.93E-07
607.48	-25.64	36	-61.64	6.85E-07
607.49	-25.66	36	-61.66	6.82E-07
607.5	-25.71	36	-61.71	6.75E-07

Total = 4.1E-05 Ratio to in band = 71.2 dB.

607.5	-25.71	36	-61.71	6.75E-07
607.51	-25.72	36	-61.72	6.73E-07
607.52	-25.74	36	-61.74	6.7E-07
607.53	-25.77	36	-61.77	6.65E-07
607.54	-25.81	36	-61.81	6.59E-07
607.55	-25.83	36	-61.83	6.56E-07
607.56	-25.85	36	-61.85	6.53E-07
607.57	-25.87	36	-61.87	6.5E-07
607.58	-25.92	36	-61.92	6.43E-07
607.59	-25.94	36	-61.94	6.4E-07
607.6	-25.97	36	-61.97	6.35E-07
607.61	-26.01	36	-62.01	6.3E-07
607.62	-26.03	36	-62.03	6.27E-07
607.63	-26.08	36	-62.08	6.19E-07
607.64	-26.09	36	-62.09	6.18E-07
607.65	-26.12	36	-62.12	6.14E-07
607.66	-26.15	36	-62.15	6.1E-07
607.67	-26.15	36	-62.15	6.1E-07
607.68	-26.2	36	-62.2	6.03E-07
607.69	-26.23	36	-62.23	5.98E-07
607.7	-26.25	36	-62.25	5.96E-07
607.71	-26.28	36	-62.28	5.92E-07
607.72	-26.31	36	-62.31	5.87E-07
607.73	-26.33	36	-62.33	5.85E-07
607.74	-26.36	36	-62.36	5.81E-07
607.75	-26.39	36	-62.39	5.77E-07
607.76	-26.4	36	-62.4	5.75E-07
607.77	-26.44	36	-62.44	5.7E-07
607.78	-26.47	36	-62.47	5.66E-07
607.79	-26.51	36	-62.51	5.61E-07
607.8	-26.53	36	-62.53	5.58E-07
607.81	-26.56	36	-62.56	5.55E-07

607.82	-26.6	36	-62.6	5.5E-07
607.83	-26.62	36	-62.62	5.47E-07
607.84	-26.64	36	-62.64	5.45E-07
607.85	-26.67	36	-62.67	5.41E-07
607.86	-26.68	36	-62.68	5.4E-07
607.87	-26.7	36	-62.7	5.37E-07
607.88	-26.73	36	-62.73	5.33E-07
607.89	-26.76	36	-62.76	5.3E-07
607.9	-26.8	36	-62.8	5.25E-07
607.91	-26.81	36	-62.81	5.24E-07
607.92	-26.85	36	-62.85	5.19E-07
607.93	-26.89	36	-62.89	5.14E-07
607.94	-26.89	36	-62.89	5.14E-07
607.95	-26.91	36	-62.91	5.12E-07
607.96	-26.97	36	-62.97	5.05E-07
607.97	-26.99	36	-62.99	5.02E-07
607.98	-27	36	-63	5.01E-07
607.99	-27.03	36	-63.03	4.98E-07

Total = 3.0E-05 Ratio to in band = 72.5 dB.

Harmonics:

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 much less than -110dB at output of the mask filter.

Harmonic (MHz)	Pre Filter Level (dBm)	Filter Rejection (dB)	Post Filter Level (dBm)
Second (1198)	-60.00	-110.00	-170.00
Third (1797)	-60.00	-110.00	-170.00

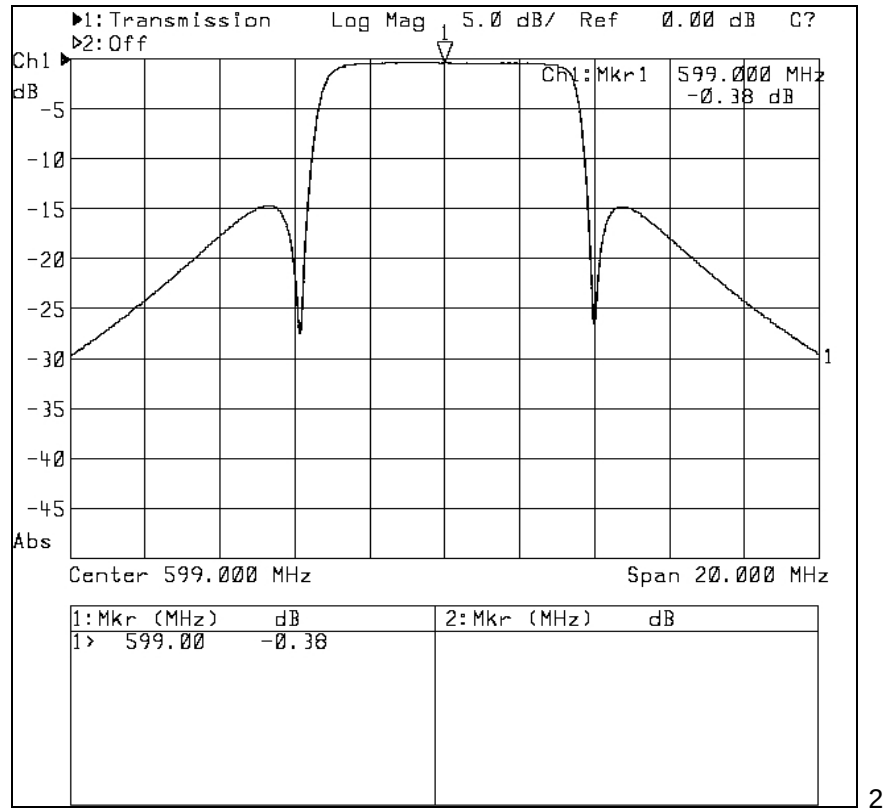


Figure 4-8B. Simple Mask Filter Response

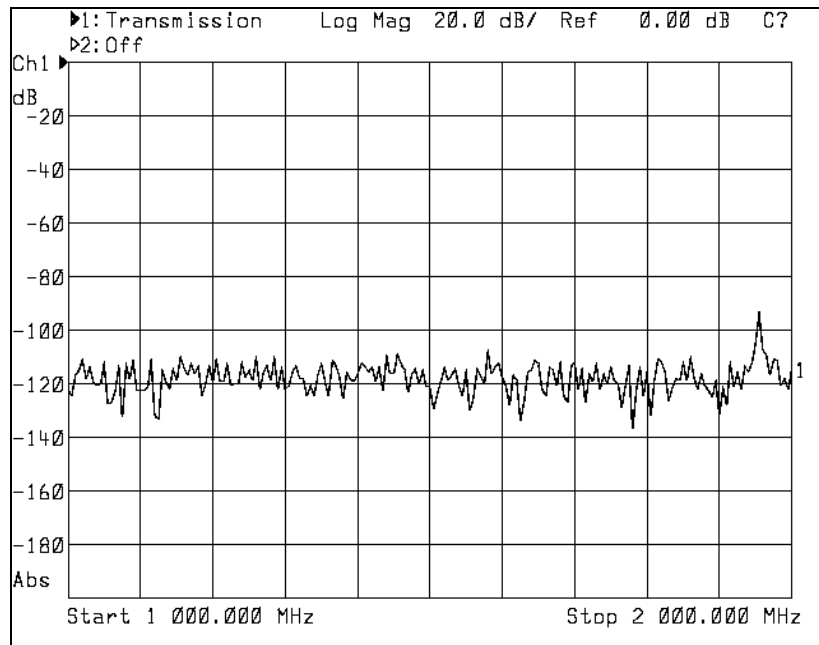


Figure 4-8C. Simple Mask Filter Harmonic Rejection

Stringent Mask Test Data - Part 74.794 of the Rules states:

(ii) Stringent mask. *In the first 500kHz 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: $A(\text{dB}) = 47 + 11.5 (Df - 0.5)$*

(3) The attenuation values for the simple and stringent emission masks are based on a measurement bandwidth of 500 kHz. Other measurement bandwidths may be used and converted to the reference 500 kHz value by the following formula: $A(\text{dB}) = A_{\text{alternate}} + 10 \log (B_{\text{alternate}} / 500)$ where $A(\text{dB})$ is the measured or calculated attenuation value for the reference 500 kHz bandwidth, and $A_{\text{alternate}}$ is the measured or calculated attenuation for a bandwidth $B_{\text{alternate}}$. Emissions include sidebands, spurious emissions and radio harmonics. Attenuation is to be measured at the output terminals of the transmitter (including any filters that may be employed). In the event of interference caused to any service by out-of-channel emissions, greater attenuation may be required.

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	35	-58.9	1.29E-06
595.51	-21.4	35	-58.4	1.45E-06
595.52	-20.8	35	-57.8	1.66E-06
595.53	-20.3	35	-57.3	1.86E-06
595.54	-19.8	35	-56.8	2.09E-06
595.55	-19.2	35	-56.2	2.40E-06
595.56	-18.7	35	-55.7	2.69E-06
595.57	-18.2	35	-55.2	3.02E-06
595.58	-17.7	35	-54.7	3.39E-06
595.59	-17.2	35	-54.2	3.80E-06
595.6	-16.6	35	-53.6	4.37E-06
595.61	-16.1	35	-53.1	4.90E-06
595.62	-15.6	35	-52.6	5.50E-06
595.63	-15.1	35	-52.1	6.17E-06
595.64	-14.6	35	-51.6	6.92E-06
595.65	-14.1	35	-51.1	7.76E-06
595.66	-13.6	35	-50.6	8.71E-06
595.67	-13.1	35	-50.1	9.77E-06
595.68	-12.6	35	-49.6	1.10E-05
595.69	-12.1	35	-49.1	1.23E-05
595.7	-11.6	35	-48.6	1.38E-05
595.71	-11.1	35	-48.1	1.55E-05
595.72	-10.6	35	-47.6	1.74E-05

595.73	-10.1	35	-47.1	1.95E-05
595.74	-9.6	35	-46.6	2.19E-05
595.75	-9.2	35	-46.2	2.40E-05
595.76	-8.7	35	-45.7	2.69E-05
595.77	-8.2	35	-45.2	3.02E-05
595.78	-7.8	35	-44.8	3.31E-05
595.79	-7.4	35	-44.4	3.63E-05
595.8	-7	35	-44	3.98E-05
595.81	-6.5	35	-43.5	4.47E-05
595.82	-6.2	35	-43.2	4.79E-05
595.83	-5.8	35	-42.8	5.25E-05
595.84	-5.4	35	-42.4	5.75E-05
595.85	-5.1	35	-42.1	6.17E-05
595.86	-4.7	35	-41.7	6.76E-05
595.87	-4.4	35	-41.4	7.24E-05
595.88	-4.1	35	-41.1	7.76E-05
595.89	-3.8	35	-40.8	8.32E-05
595.9	-3.6	35	-40.6	8.71E-05
595.91	-3.3	35	-40.3	9.33E-05
595.92	-3.1	35	-40.1	9.77E-05
595.93	-2.9	35	-39.9	1.02E-04
595.94	-2.7	35	-39.7	1.07E-04
595.95	-2.5	35	-39.5	1.12E-04
595.96	-2.4	35	-39.4	1.15E-04
595.97	-2.2	35	-39.2	1.20E-04
595.98	-2.1	35	-39.1	1.23E-04
595.99	-2	35	-39	1.26E-04
596	-1.9	35	-38.9	1.29E-04

Total = 3.4E-3

The ratio of in band to out of band power is $10 \cdot \log(5.38\text{MHz}/(10\text{kHz} \cdot 3.4 \text{ E-03})) = 51.9 \text{ dB}$

The upper sideband can be calculated in a similar fashion.

Frequency	Filter Response	Amp IMD	Total	Power
602	-1.6	37	-38.6	1.38E-04
602.01	-1.6	37	-38.6	1.38E-04
602.02	-1.7	37	-38.7	1.35E-04
602.03	-1.8	37	-38.8	1.32E-04
602.04	-1.9	37	-38.9	1.29E-04
602.05	-2	37	-39	1.26E-04
602.06	-2.2	37	-39.2	1.20E-04
602.07	-2.3	37	-39.3	1.17E-04
602.08	-2.4	37	-39.4	1.15E-04
602.09	-2.6	37	-39.6	1.10E-04
602.1	-2.8	37	-39.8	1.05E-04
602.11	-3	37	-40	1.00E-04
602.12	-3.2	37	-40.2	9.55E-05

602.13	-3.4	37	-40.4	9.12E-05
602.14	-3.7	37	-40.7	8.51E-05
602.15	-3.9	37	-40.9	8.13E-05
602.16	-4.2	37	-41.2	7.59E-05
602.17	-4.5	37	-41.5	7.08E-05
602.18	-4.8	37	-41.8	6.61E-05
602.19	-5.1	37	-42.1	6.17E-05
602.2	-5.5	37	-42.5	5.62E-05
602.21	-5.9	37	-42.9	5.13E-05
602.22	-6.2	37	-43.2	4.79E-05
602.23	-6.6	37	-43.6	4.37E-05
602.24	-7	37	-44	3.98E-05
602.25	-7.4	37	-44.4	3.63E-05
602.26	-7.9	37	-44.9	3.24E-05
602.27	-8.3	37	-45.3	2.95E-05
602.28	-8.7	37	-45.7	2.69E-05
602.29	-9.2	37	-46.2	2.40E-05
602.3	-9.6	37	-46.6	2.19E-05
602.31	-10.1	37	-47.1	1.95E-05
602.32	-10.6	37	-47.6	1.74E-05
602.33	-11	37	-48	1.58E-05
602.34	-11.5	37	-48.5	1.41E-05
602.35	-12	37	-49	1.26E-05
602.36	-12.5	37	-49.5	1.12E-05
602.37	-13	37	-50	1.00E-05
602.38	-13.5	37	-50.5	8.91E-06
602.39	-14	37	-51	7.94E-06
602.4	-14.5	37	-51.5	7.08E-06
602.41	-15	37	-52	6.31E-06
602.42	-15.5	37	-52.5	5.62E-06
602.43	-16	37	-53	5.01E-06
602.44	-16.5	37	-53.5	4.47E-06
602.45	-17	37	-54	3.98E-06
602.46	-17.5	37	-54.5	3.55E-06
602.47	-18	37	-55	3.16E-06
602.48	-18.5	37	-55.5	2.82E-06
602.49	-19	37	-56	2.51E-06
602.5	-19.5	37	-56.5	2.24E-06

Total = 4.2E-3 The ratio of in band to out of band power is
 $10 \cdot \log(5.38\text{MHz}/(10\text{kHz} \cdot 4.2\text{E-03})) = 51.1 \text{ dB}.$

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	35	-93.8	4.17E-10
595.01	-59.9	36	-95.9	2.57E-10
595.02	-60.6	37	-97.6	1.74E-10

595.03	-60.4	38	-98.4	1.45E-10
595.04	-59.3	39	-98.3	1.48E-10
595.05	-57.7	40	-97.7	1.70E-10
595.06	-56	41	-97	2.00E-10
595.07	-54.3	42	-96.3	2.34E-10
595.08	-52.7	43	-95.7	2.69E-10
595.09	-51.3	44	-95.3	2.95E-10
595.1	-49.9	45	-94.9	3.24E-10
595.11	-48.7	46	-94.7	3.39E-10
595.12	-47.5	47	-94.5	3.55E-10
595.13	-46.4	48	-94.4	3.63E-10
595.14	-45.4	49	-94.4	3.63E-10
595.15	-44.4	50	-94.4	3.63E-10
595.16	-43.5	51	-94.5	3.55E-10
595.17	-42.6	52	-94.6	3.47E-10
595.18	-41.8	53	-94.8	3.31E-10
595.19	-40.9	54	-94.9	3.24E-10
595.2	-40.1	55	-95.1	3.09E-10
595.21	-39.4	56	-95.4	2.88E-10
595.22	-38.6	57	-95.6	2.75E-10
595.23	-37.9	58	-95.9	2.57E-10
595.24	-37.2	59	-96.2	2.40E-10
595.25	-36.5	60	-96.5	2.24E-10
595.26	-35.8	61	-96.8	2.09E-10
595.27	-35.2	62	-97.2	1.91E-10
595.28	-34.5	63	-97.5	1.78E-10
595.29	-33.9	64	-97.9	1.62E-10
595.3	-33.2	65	-98.2	1.51E-10
595.31	-32.6	66	-98.6	1.38E-10
595.32	-32	67	-99	1.26E-10
595.33	-31.4	68	-99.4	1.15E-10
595.34	-30.8	69	-99.8	1.05E-10
595.35	-30.2	70	-100.2	9.55E-11
595.36	-29.6	71	-100.6	8.71E-11
595.37	-29	72	-101	7.94E-11
595.38	-28.5	73	-101.5	7.08E-11
595.39	-27.9	74	-101.9	6.46E-11
595.4	-27.3	75	-102.3	5.89E-11
595.41	-26.8	76	-102.8	5.25E-11
595.42	-26.2	77	-103.2	4.79E-11
595.43	-25.7	78	-103.7	4.27E-11
595.44	-25.1	79	-104.1	3.89E-11
595.45	-24.6	80	-104.6	3.47E-11
595.46	-24	81	-105	3.16E-11
595.47	-23.5	82	-105.5	2.82E-11
595.48	-23	83	-106	2.51E-11
595.49	-22.4	84	-106.4	2.29E-11
595.5	-21.9	85	-106.9	2.04E-11

Total = 1.7E-05 Ratio to in band = 75 dB

Frequency	Filter Response	Amp IMD	Total	Power
602.5	-19.5	35	-54.5	3.55E-06
602.51	-20	35	-55	3.16E-06
602.52	-20.6	35	-55.6	2.75E-06
602.53	-21.1	35	-56.1	2.45E-06
602.54	-21.6	35	-56.6	2.19E-06
602.55	-22.1	35	-57.1	1.95E-06
602.56	-22.6	35	-57.6	1.74E-06
602.57	-23.2	35	-58.2	1.51E-06
602.58	-23.7	35	-58.7	1.35E-06
602.59	-24.2	35	-59.2	1.20E-06
602.6	-24.7	35	-59.7	1.07E-06
602.61	-25.3	35	-60.3	9.33E-07
602.62	-25.8	35	-60.8	8.32E-07
602.63	-26.3	35	-61.3	7.41E-07
602.64	-26.9	35	-61.9	6.46E-07
602.65	-27.4	35	-62.4	5.75E-07
602.66	-28	35	-63	5.01E-07
602.67	-28.5	35	-63.5	4.47E-07
602.68	-29.1	35	-64.1	3.89E-07
602.69	-29.7	35	-64.7	3.39E-07
602.7	-30.2	35	-65.2	3.02E-07
602.71	-30.8	35	-65.8	2.63E-07
602.72	-31.4	35	-66.4	2.29E-07
602.73	-32	35	-67	2.00E-07
602.74	-32.6	35	-67.6	1.74E-07
602.75	-33.2	35	-68.2	1.51E-07
602.76	-33.8	35	-68.8	1.32E-07
602.77	-34.4	35	-69.4	1.15E-07
602.78	-35	35	-70	1.00E-07
602.79	-35.7	35	-70.7	8.51E-08
602.8	-36.3	35	-71.3	7.41E-08
602.81	-37	35	-72	6.31E-08
602.82	-37.7	35	-72.7	5.37E-08
602.83	-38.4	35	-73.4	4.57E-08
602.84	-39.1	35	-74.1	3.89E-08
602.85	-39.9	35	-74.9	3.24E-08
602.86	-40.6	35	-75.6	2.75E-08
602.87	-41.4	35	-76.4	2.29E-08
602.88	-42.2	35	-77.2	1.91E-08
602.89	-43.1	35	-78.1	1.55E-08
602.9	-44	35	-79	1.26E-08
602.91	-44.9	35	-79.9	1.02E-08
602.92	-45.9	35	-80.9	8.13E-09
602.93	-46.9	35	-81.9	6.46E-09
602.94	-48	35	-83	5.01E-09
602.95	-49.1	35	-84.1	3.89E-09
602.96	-50.4	35	-85.4	2.88E-09
602.97	-51.7	35	-86.7	2.14E-09
602.98	-53.2	35	-88.2	1.51E-09

602.99	-54.7	35	-89.7	1.07E-09
603	-56.4	35	-91.4	7.24E-10

Total = 3.1E-05 Total Ratio = 72.3

Both sidebands at this point are beyond the ultimate limit of 71 dB. As you can see from the attached plot the filter has more rejection.

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 much less than -110dB at output of the mask filter.

Harmonic (MHz)	Pre Filter Level (dBm)	Filter Rejection (dB)	Post Filter Level (dBm)
Second (1198)	-60.00	-78.00	-138.00
Third (1797)	-60.00	-98.00	-168.00

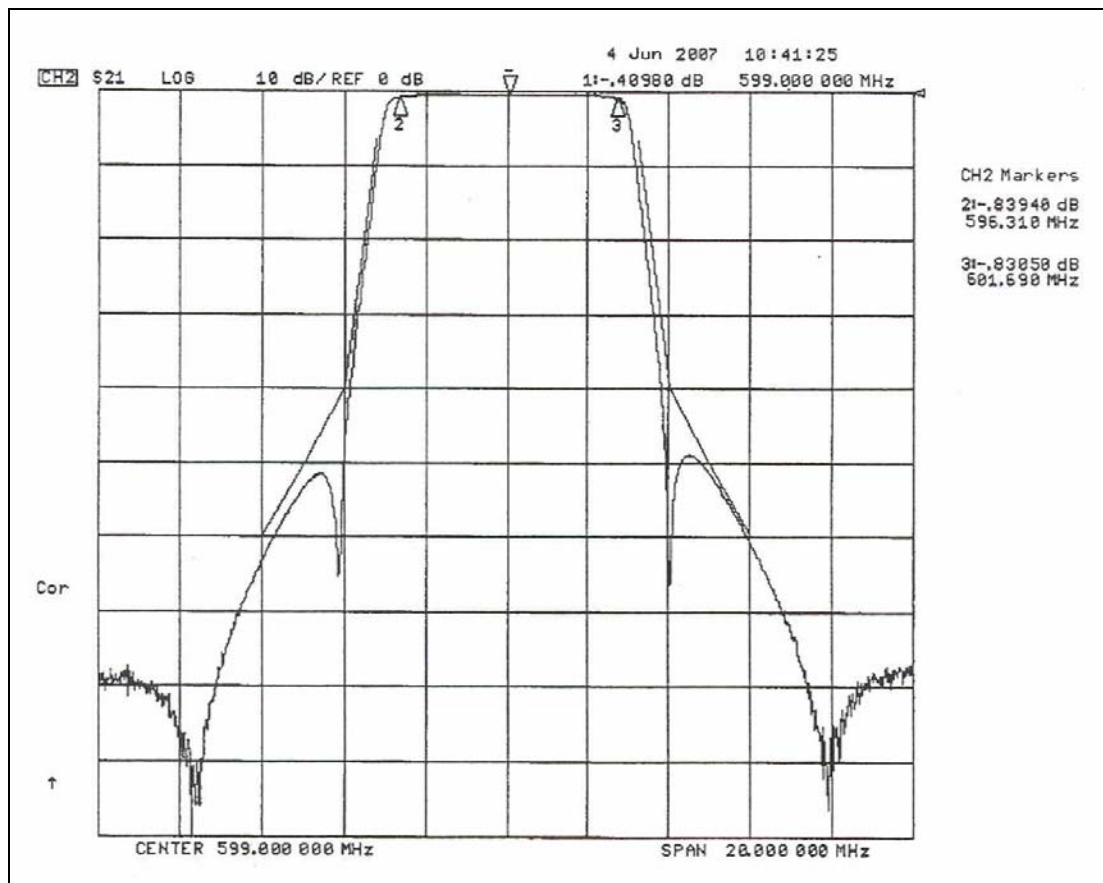


Figure 4-8D. Bandpass Filter Response (Stringent Mask)

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 3 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	-28 dBm

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

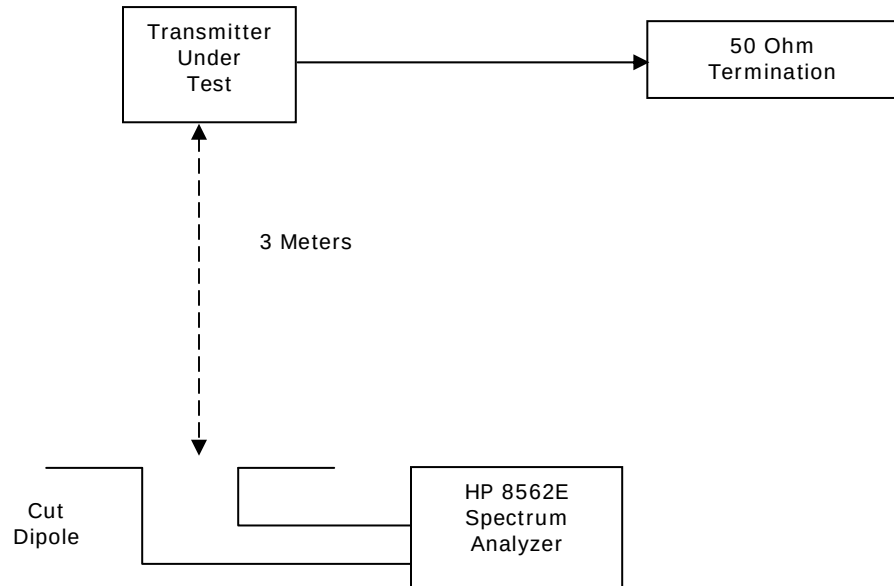


Figure 4-9. Test Setup for Measuring Radiated Emissions

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 3 meters would be:

$$P = P_t / 4\pi R^2 = 250 / 4\pi \cdot (3)^2 = 2.21 \text{ w/m}^2$$

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

$$1.64 \times 2.21 = 3.62 \text{ w/m}^2$$

If a dipole-receive antenna of area $1.64 \times \lambda^2 / 4\pi$ is used to receive the signal, the received level would be: +22 dBm

The receive level at -28 dBm was therefore at -50 dB relative to this level.

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:

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

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

4.10 Frequency Stability

The transmitter is designed to operate using either an internal or external 10 MHz precise reference oscillator. The frequency stability of this reference determines the frequency stability of the transmitter.

The frequency determining variables of the transmitter may be defined as follows:

F_{LO1} = Desired local oscillator 1 frequency

F_{LO2} = Desired local oscillator 2 frequency

F_{IF} = Desired IF oscillator frequency

F_R = Desired external reference oscillator frequency

F_{RF} = Desired RF output frequency

E_{LO1} = Local oscillator 1 frequency offset error

E_{LO2} = Local oscillator 2 frequency offset error

E_{IF} = IF oscillator frequency offset error

E_R = External reference oscillator frequency offset error

E_{RF} = RF output frequency error

The PLL circuitry maintains a constant ratio between the external reference frequency and the output frequency of the oscillator. This ratio is defined below for both the LO and IF oscillators.

$$G_{LO1} = F_{LO1} / F_R$$

$$G_{LO2} = F_{LO2} / F_R$$

$$G_{IF} = F_{IF} / F_R$$

Any change in the external 10 MHz reference will effect a corresponding change in the output frequency such that the above ratios are maintained.

$$G_{LO1} = (F_{LO1} + E_{LO1}) / (F_R + E_R) = F_{LO1} / F_R$$

$$G_{LO2} = (F_{LO2} + E_{LO2}) / (F_R + E_R) = F_{LO2} / F_R$$

$$G_{IF} = (F_{IF} + E_{IF}) / (F_R + E_R) = F_{IF} / F_R$$

Solving for the change in output frequency yields:

$$E_{LO1} = E_R * (F_{LO1} / F_R) = E_R * G_{LO1}$$

$$E_{LO2} = E_R * (F_{LO2} / F_R) = E_R * G_{LO2}$$

$$E_{IF} = E_R * (F_{IF} / F_R) = E_R * G_{IF}$$

The desired RF carrier frequency is equal to the LO2 frequency minus the LO1 Frequency and the IF frequency:

$$F_{RF} = F_{LO2} - F_{IF} - F_{LO1}$$

The actual RF frequency, including any error introduced by the external reference, may be defined as follows:

$$F_{RF} + E_{RF} = (F_{LO2} + E_{LO2}) - (F_{IF} + E_{IF}) - (F_{LO1} + E_{LO1})$$

$$F_{RF} + E_{RF} = (F_{LO2} - F_{LO1} - F_{IF}) - (E_{LO2} - E_{LO1} - E_{IF})$$

$$F_{RF} + E_{RF} = F_{RF} + (E_{LO2} - E_{LO1} - E_{IF})$$

Calculating for the error of the carrier yields:

$$E_{RF} = (E_{LO2} - E_{LO1} - E_{IF})$$

$$E_{RF} = E_R (G_{LO2} - G_{LO1} - G_{IF})$$

$$E_{RF} = E_R / F_R * (F_{LO2} - F_{LO1} - F_{IF})$$

$$E_{RF} = E_R / F_R * F_{RF}$$

Therefore, the error of the RF carrier is a function of the external 10 MHz reference error.

The maximum RF frequency error for this service is +/- 1.0 KHz. The highest channel frequency for this service (CH. 69 = 803 MHz) represents the worst case condition. With these values, the maximum allowable reference error ($E_{R(max)}$) can be calculated.

$$E_{R(max)} = 12.5 \text{ Hz}$$

The required reference oscillator stability may be calculated as follows:

$$\text{Stability} = E_{R(max)} / F_R$$

$$\text{Stability} = 12.5 \text{ Hz} / 10 \times 10^6 \text{ Hz} = 1.25 \times 10^{-6}$$

Therefore, the RF frequency error of the transmitter will not exceed +/- 1.0 KHz when operated with a precise reference oscillator with a stability equal to or better than 1.25×10^{-6} .

The 10 MHz oscillator was tested over temperature and voltage below:

TEMP. (°C)	10 MHz Error
-30	5.2 Hz
-20	4.3 Hz
-10	3.6 Hz
0	2.6 Hz
+10	2.2 Hz
+20	0.2 Hz
+30	1.0 Hz
+40	1.9 Hz
+50	2.2 Hz

Line Voltage	Reference Oscillator Error
95V	0.2 Hz
115V	0.2 Hz
135V	0.2 Hz

4.11 Test Equipment

The test equipment that was used to analyze the Axcera CU250ATD system is listed in Table 4-13.

Table 4-13. Test Equipment

MODEL	MANUFACTURER	DESCRIPTION	SERIAL #
435B	Hewlett Packard	Power Meter	2732UO9080
8482B	Hewlett Packard	Power Sensor	N/A
8892-300	Bird	50 Ω Termination	2867
EFA 2067.3004.53	Rohde & Schwarz	8VSB Demodulator	100137
450029	Connecticut Microwave	Directional Coupler	891P
89441A	Hewlett-Packard	Vector Signal Analyzer	3416A01547
8562E	Hewlett-Packard	Spectrum Analyzer	03760
8714B	Hewlett-Packard	Network Analyzer	U535490409