4. TEST REPORT

4.1 RF Power Measurements

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

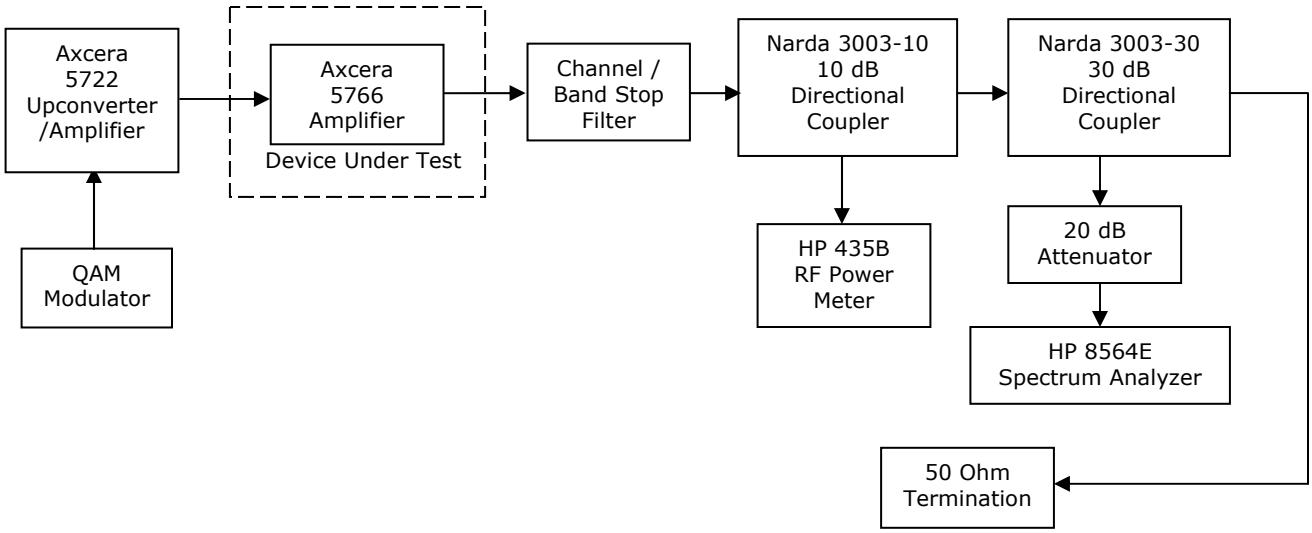

Figure 4-1. Test Equipment Setup for RF Power Measurements

The RF output signal from the upconverter/amplifier was connected to the input of the 5766 amplifier. The upconverter/amplifier was then adjusted to obtain 40 watts average RF output as observed on the power meter.

With the power level properly set to 40 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 QAM, Quadrature Amplitude Modulation, which uses two carriers, each of the same frequency, but 90° apart in phase. This means that one carrier trails the other by one fourth of a cycle. Each is then phase and amplitude modulated by a portion of the digital input signal. The two modulated signals are then combined and transmitted as a single waveform. The spectrum of a QAM signal is noise-like in appearance and has a relatively stable average power and a widely varying peak-envelope-power (PEP). The power is normally referred to in average power. QAM, used in conjunction with digital compression, provides a high bandwidth efficiency allowing a data rate of 30 MBPS in a 6 MHz channel bandwidth.

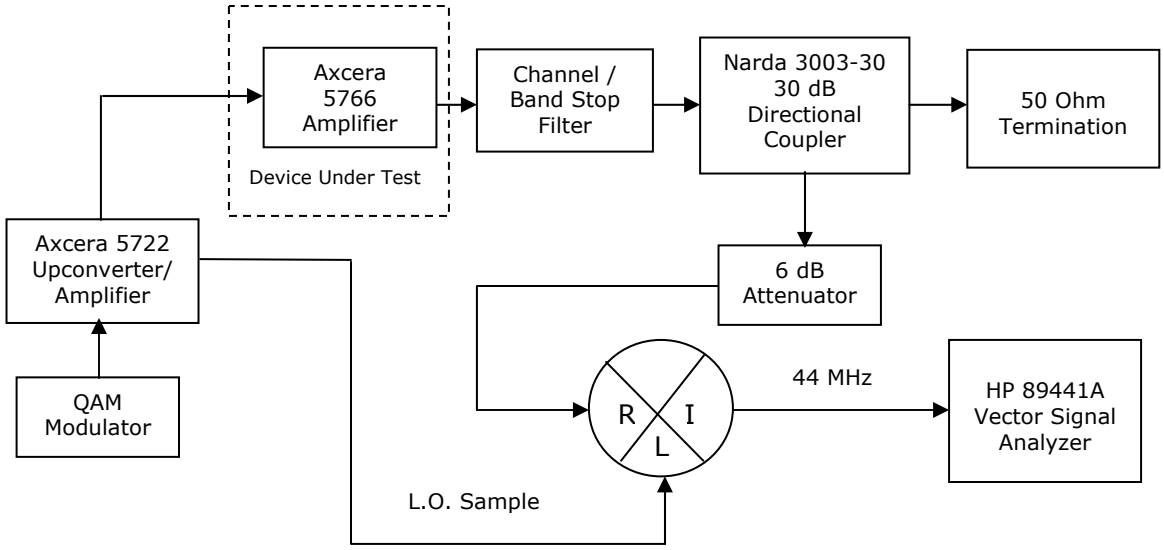

Figure 4-2. Typical QAM Demodulation Test Setup

4.3 Occupied Bandwidth

Using the test setup in Figure 4-4, with the transmitter operating at maximum power, photographs of the transmitter occupied bandwidth spectrum were taken and are shown in Figure 4-5.

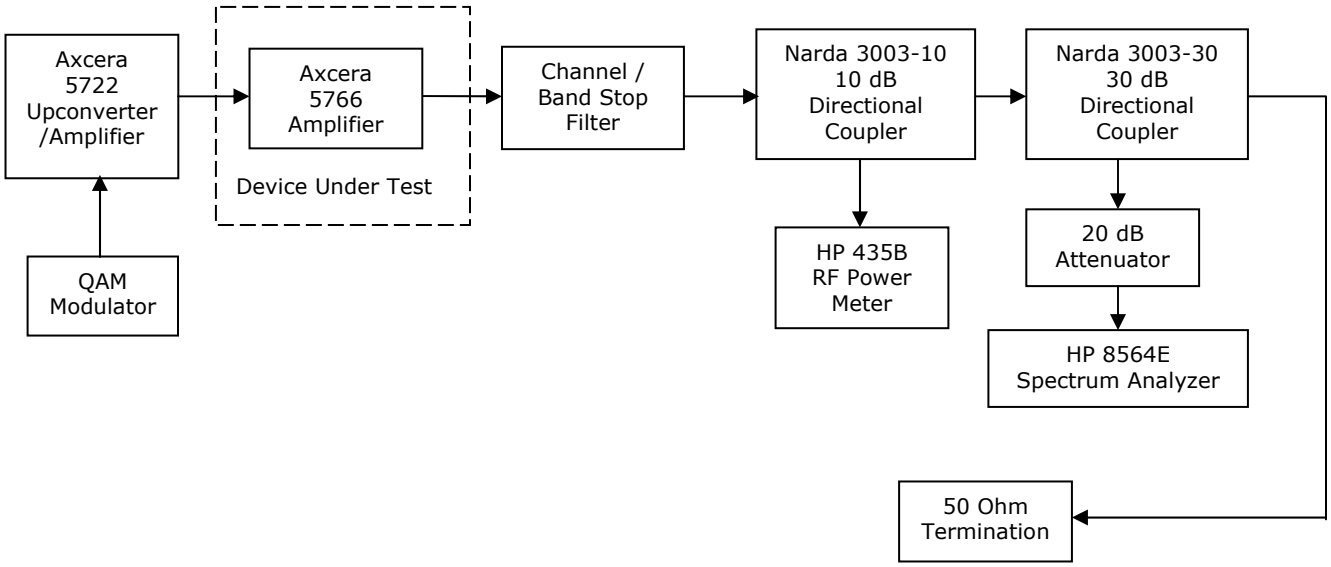

Figure 4-4. Test Setup for Occupied Bandwidth Spectrum Analysis

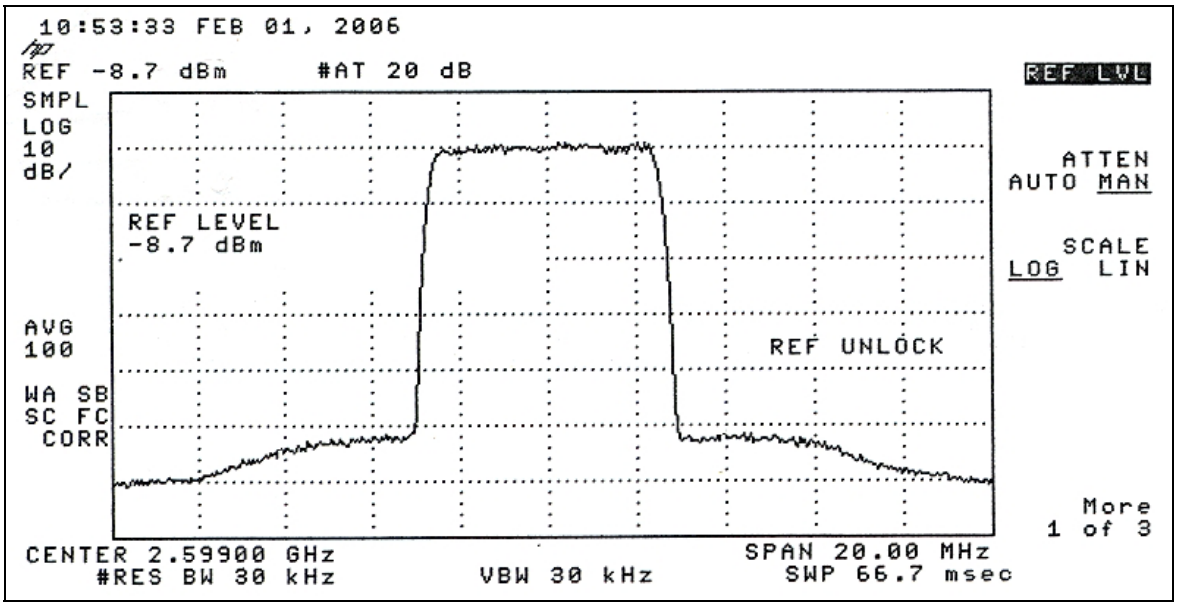

Figure 4-5. Channel Occupied Bandwidth

4.4 Conducted Spurious Emissions

Using the test setup shown in section 4.1, the spectrum outside of the specified channel was observed and the data was taken on all products above the -63 dB noise floor of the spectrum analyzer.

Spurious Emissions were observed on the analyzer at a 1.330 GHz span (see spectrum plots on the following page). With the average in band signal set as the reference, the spurious emissions were observed. The measured data is shown in the table below for 40 watts (average) output power.

This data is shown in Table 4-1 and is presented as graphs in Figure 4-9.

Table 4-1. Products Above the -63 dB Noise Floor of the Spectrum Analyzer

FREQUENCY (MHz)	SOURCE	PEAK LEVEL OBSERVED (dB)
2599.00	Center of Channel	0 dB (Reference)
44.00	IF Frequency	None Observed
2643.00	Local Oscillator	None Observed
5198.00	2nd Harmonic	None Observed
7797.00	3rd Harmonic	None Observed
10396.00	4th Harmonic	None Observed
12995.00	5th Harmonic	None Observed
15594.00	6th Harmonic	None Observed
18193.00	7th Harmonic	None Observed
20792.00	8th Harmonic	None Observed
23391.00	9th Harmonic	None Observed
25990.00	10th Harmonic	None Observed

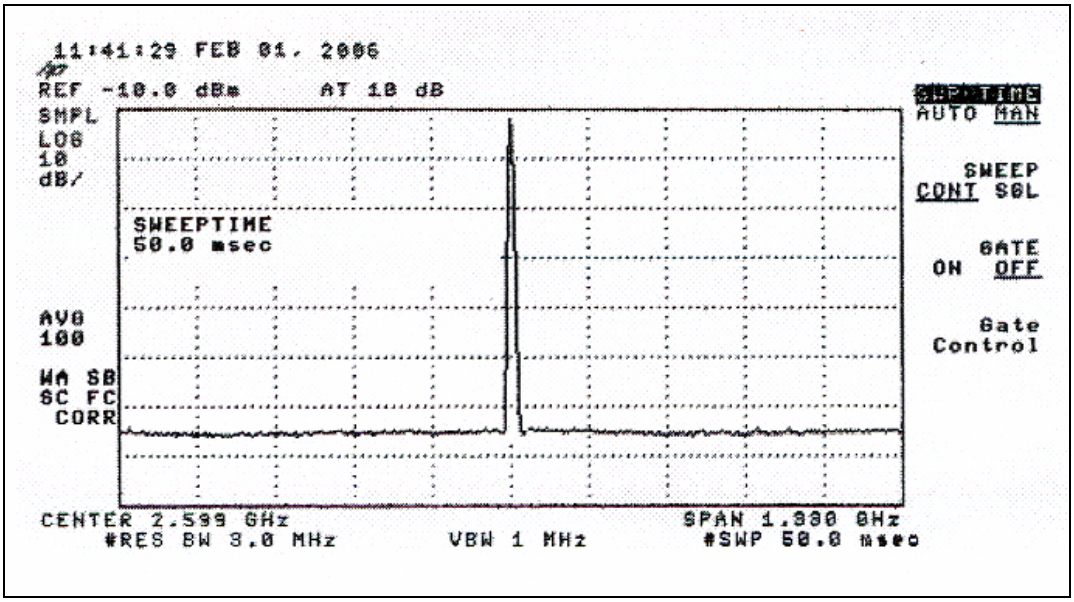

Figure 4-7. Products Above the -63 dB Noise Floor of the Spectrum Analyzer (1.330 GHz Span)

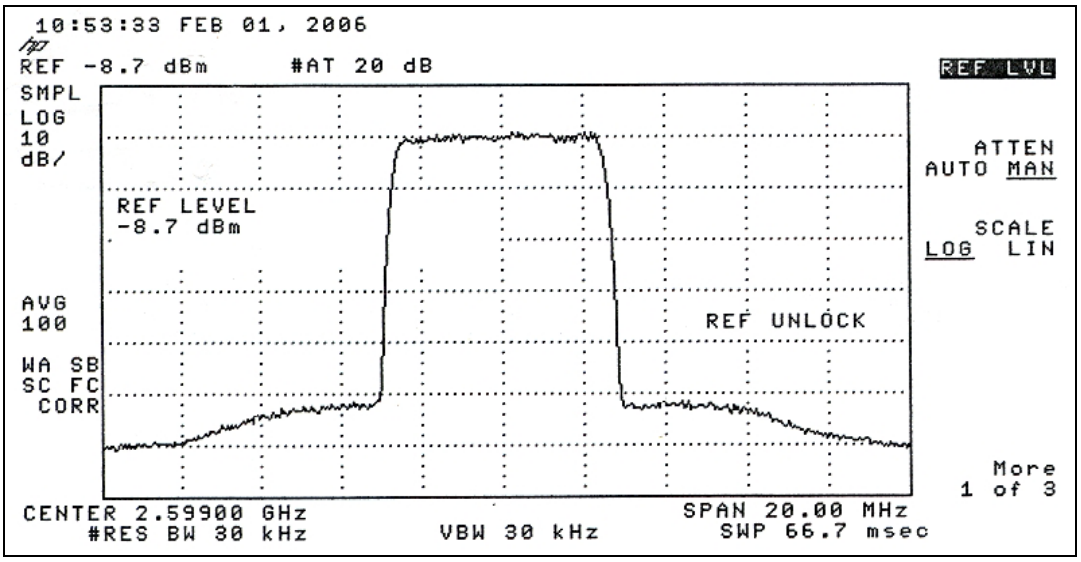

Figure 4-8. Conducted Spurious Emissions (before channel/band stop filter)

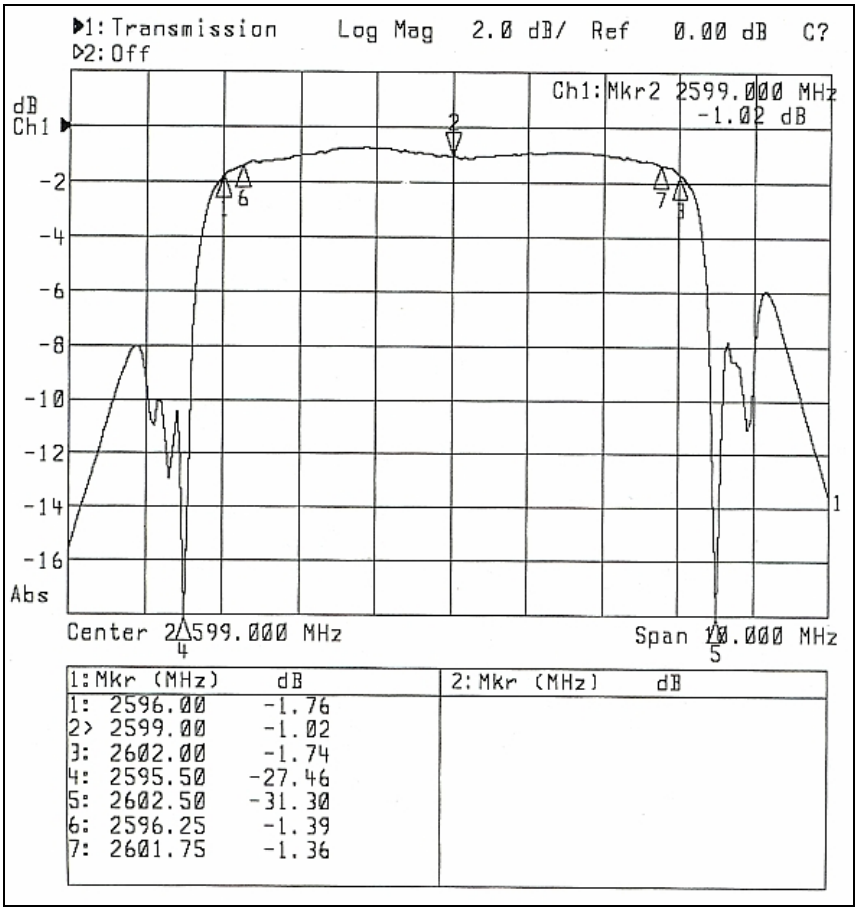

Figure 4-9. Conducted Spurious Emissions
(Filter response of channel/band-stop filter)

Part 27.53 of the Rules states:

27.53 (l)(2) *(l) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts.*
(2) For fixed and temporary fixed digital stations, the attenuation shall be not less than 43 + 10 log (P) dB.

27.53 (l)(6) *(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.*

Applying the formula above, the maximum amount of out-of-band power in a 1MHz bandwidth relative to the transmitter power can be calculated:

40W Transmitter:
43 +10*log(40)=59.02 dB.

The performance of the Mask Filter was measured, and data was generated for its attenuation vs. frequency.

This attenuation was added to the Power Spectral Density of the transmitter's IMD products, and the resulting energy integrated across a 1MHz bandwidth. The energy in the channel was integrated across the channel and the ratio between the in band and out of band energy calculated. The following tables present the data.

The first column is the measurement frequency. The second column shows the measured attenuation of the filter. The third column adds the amplifier's IMD reduced by the filter attenuation. The final column converts the ratio in the third column to power. The energy in the fourth column was then added up across the entire 1 MHz bandwidth adjacent to the channel and compared to the integrated power in the channel. The ratio of the two powers was taken and converted back to decibels. The Out of Band power for the adjacent 1 MHz Spectrum was:

Lower Adjacent 1MHz: 64.20 dB
Upper Adjacent 1 MHz: 63.74 dB

Table 4-2. Lower Adjacent 1MHz

	Lower Side		
Frequency (MHz)	**Filter S21 (dB)**	**Filter+ Regrowth (dB)**	**Energy**
2595	-9.23	-61.23	7.53356E-07
2595.005	-9.36	-61.36	7.31139E-07
2595.01	-9.49	-61.49	7.09578E-07

2595.015	-9.63	-61.63	6.87068E-07
2595.02	-9.77	-61.77	6.65273E-07
2595.025	-9.92	-61.92	6.42688E-07
2595.03	-10.08	-62.08	6.19441E-07
2595.035	-10.23	-62.23	5.98412E-07
2595.04	-10.39	-62.39	5.76766E-07
2595.045	-10.53	-62.53	5.5847E-07
2595.05	-10.69	-62.69	5.3827E-07
2595.055	-10.83	-62.83	5.21195E-07
2595.06	-10.94	-62.94	5.08159E-07
2595.065	-11.05	-63.05	4.9545E-07
2595.07	-11.15	-63.15	4.84172E-07
2595.075	-11.2	-63.2	4.7863E-07
2595.08	-11.24	-63.24	4.74242E-07
2595.085	-11.26	-63.26	4.72063E-07
2595.09	-11.24	-63.24	4.74242E-07
2595.095	-11.21	-63.21	4.77529E-07
2595.1	-11.13	-63.13	4.86407E-07
2595.105	-11.06	-63.06	4.94311E-07
2595.11	-10.97	-62.97	5.04661E-07
2595.115	-10.86	-62.86	5.17607E-07
2595.12	-10.76	-62.76	5.29663E-07
2595.125	-10.63	-62.63	5.45758E-07
2595.13	-10.52	-62.52	5.59758E-07
2595.135	-10.4	-62.4	5.7544E-07
2595.14	-10.3	-62.3	5.88844E-07
2595.145	-10.21	-62.21	6.01174E-07
2595.15	-10.13	-62.13	6.1235E-07
2595.155	-10.07	-62.07	6.20869E-07
2595.16	-10	-62	6.30957E-07
2595.165	-9.96	-61.96	6.36796E-07
2595.17	-9.93	-61.93	6.4121E-07
2595.175	-9.91	-61.91	6.44169E-07
2595.18	-9.91	-61.91	6.44169E-07
2595.185	-9.93	-61.93	6.4121E-07
2595.19	-9.96	-61.96	6.36796E-07
2595.195	-10.02	-62.02	6.28058E-07
2595.2	-10.09	-62.09	6.18016E-07
2595.205	-10.16	-62.16	6.08135E-07
2595.21	-10.26	-62.26	5.94292E-07
2595.215	-10.36	-62.36	5.80764E-07
2595.22	-10.48	-62.48	5.64937E-07
2595.225	-10.63	-62.63	5.45758E-07
2595.23	-10.76	-62.76	5.29663E-07
2595.235	-10.93	-62.93	5.09331E-07
2595.24	-11.11	-63.11	4.88652E-07

2595.245	-11.27	-63.27	4.70977E-07
2595.25	-11.46	-63.46	4.50817E-07
2595.255	-11.67	-63.67	4.29536E-07
2595.26	-11.85	-63.85	4.12098E-07
2595.265	-12.04	-64.04	3.94457E-07
2595.27	-12.22	-64.22	3.78443E-07
2595.275	-12.41	-64.41	3.62243E-07
2595.28	-12.57	-64.57	3.4914E-07
2595.285	-12.71	-64.71	3.38065E-07
2595.29	-12.84	-64.84	3.28095E-07
2595.295	-12.94	-64.94	3.20627E-07
2595.3	-13.02	-65.02	3.14775E-07
2595.305	-13.05	-65.05	3.12608E-07
2595.31	-13.06	-65.06	3.11889E-07
2595.315	-13.02	-65.02	3.14775E-07
2595.32	-12.96	-64.96	3.19154E-07
2595.325	-12.87	-64.87	3.25837E-07
2595.33	-12.74	-64.74	3.35738E-07
2595.335	-12.59	-64.59	3.47536E-07
2595.34	-12.43	-64.43	3.60579E-07
2595.345	-12.26	-64.26	3.74973E-07
2595.35	-12.08	-64.08	3.90841E-07
2595.355	-11.89	-63.89	4.08319E-07
2595.36	-11.7	-63.7	4.2658E-07
2595.365	-11.55	-63.55	4.4157E-07
2595.37	-11.38	-63.38	4.59198E-07
2595.375	-11.24	-63.24	4.74242E-07
2595.38	-11.11	-63.11	4.88652E-07
2595.385	-11.01	-63.01	5.00035E-07
2595.39	-10.93	-62.93	5.09331E-07
2595.395	-10.89	-62.89	5.14044E-07
2595.4	-10.87	-62.87	5.16416E-07
2595.405	-10.87	-62.87	5.16416E-07
2595.41	-10.94	-62.94	5.08159E-07
2595.415	-11.04	-63.04	4.96592E-07
2595.42	-11.18	-63.18	4.80839E-07
2595.425	-11.35	-63.35	4.62381E-07
2595.43	-11.6	-63.6	4.36516E-07
2595.435	-11.85	-63.85	4.12098E-07
2595.44	-12.23	-64.23	3.77572E-07
2595.445	-12.63	-64.63	3.4435E-07
2595.45	-13.12	-65.12	3.0761E-07
2595.455	-13.7	-65.7	2.69153E-07
2595.46	-14.41	-66.41	2.2856E-07
2595.465	-15.23	-67.23	1.89234E-07
2595.47	-16.28	-68.28	1.48594E-07

2595.475	-17.47	-69.47	1.1298E-07
2595.48	-19	-71	7.94328E-08
2595.485	-20.91	-72.91	5.11682E-08
2595.49	-23.49	-75.49	2.82488E-08
2595.495	-27.47	-79.47	1.1298E-08
2595.5	-34.89	-86.89	2.04644E-09
2595.505	-39.21	-91.21	7.56833E-10
2595.51	-28.7	-80.7	8.51138E-09
2595.515	-24.19	-76.19	2.40436E-08
2595.52	-20.92	-72.92	5.10505E-08
2595.525	-18.67	-70.67	8.57038E-08
2595.53	-16.92	-68.92	1.28233E-07
2595.535	-15.48	-67.48	1.78649E-07
2595.54	-14.24	-66.24	2.37684E-07
2595.545	-13.24	-65.24	2.99226E-07
2595.55	-12.34	-64.34	3.68129E-07
2595.555	-11.55	-63.55	4.4157E-07
2595.56	-10.85	-62.85	5.188E-07
2595.565	-10.25	-62.25	5.95662E-07
2595.57	-9.72	-61.72	6.72977E-07
2595.575	-9.23	-61.23	7.53356E-07
2595.58	-8.78	-60.78	8.35603E-07
2595.585	-8.4	-60.4	9.12011E-07
2595.59	-8.03	-60.03	9.93116E-07
2595.595	-7.69	-59.69	1.07399E-06
2595.6	-7.39	-59.39	1.1508E-06
2595.605	-7.1	-59.1	1.23027E-06
2595.61	-6.85	-58.85	1.30317E-06
2595.615	-6.6	-58.6	1.38038E-06
2595.62	-6.39	-58.39	1.44877E-06
2595.625	-6.15	-58.15	1.53109E-06
2595.63	-5.96	-57.96	1.59956E-06
2595.635	-5.78	-57.78	1.66725E-06
2595.64	-5.59	-57.59	1.74181E-06
2595.645	-5.44	-57.44	1.80302E-06
2595.65	-5.27	-57.27	1.87499E-06
2595.655	-5.13	-57.13	1.93642E-06
2595.66	-4.98	-56.98	2.00447E-06
2595.665	-4.85	-56.85	2.06538E-06
2595.67	-4.73	-56.73	2.12324E-06
2595.675	-4.61	-56.61	2.18273E-06
2595.68	-4.49	-56.49	2.24388E-06
2595.685	-4.38	-56.38	2.30144E-06
2595.69	-4.27	-56.27	2.36048E-06
2595.695	-4.18	-56.18	2.40991E-06
2595.7	-4.08	-56.08	2.46604E-06

2595.705	-3.98	-55.98	2.52348E-06
2595.71	-3.9	-55.9	2.5704E-06
2595.715	-3.85	-55.85	2.60016E-06
2595.72	-3.73	-55.73	2.67301E-06
2595.725	-3.7	-55.7	2.69153E-06
2595.73	-3.58	-55.58	2.76694E-06
2595.735	-3.54	-55.54	2.79254E-06
2595.74	-3.42	-55.42	2.87078E-06
2595.745	-3.4	-55.4	2.88403E-06
2595.75	-3.34	-55.34	2.92415E-06
2595.755	-3.27	-55.27	2.97167E-06
2595.76	-3.21	-55.21	3.01301E-06
2595.765	-3.11	-55.11	3.08319E-06
2595.77	-3.07	-55.07	3.11172E-06
2595.775	-3.07	-55.07	3.11172E-06
2595.78	-3	-55	3.16228E-06
2595.785	-2.95	-54.95	3.1989E-06
2595.79	-2.86	-54.86	3.26588E-06
2595.795	-2.84	-54.84	3.28095E-06
2595.8	-2.8	-54.8	3.31131E-06
2595.805	-2.74	-54.74	3.35738E-06
2595.81	-2.75	-54.75	3.34965E-06
2595.815	-2.66	-54.66	3.41979E-06
2595.82	-2.63	-54.63	3.4435E-06
2595.825	-2.57	-54.57	3.4914E-06
2595.83	-2.53	-54.53	3.52371E-06
2595.835	-2.54	-54.54	3.5156E-06
2595.84	-2.48	-54.48	3.56451E-06
2595.845	-2.47	-54.47	3.57273E-06
2595.85	-2.4	-54.4	3.63078E-06
2595.855	-2.41	-54.41	3.62243E-06
2595.86	-2.37	-54.37	3.65595E-06
2595.865	-2.33	-54.33	3.68978E-06
2595.87	-2.3	-54.3	3.71535E-06
2595.875	-2.22	-54.22	3.78443E-06
2595.88	-2.2	-54.2	3.80189E-06
2595.885	-2.16	-54.16	3.83707E-06
2595.89	-2.17	-54.17	3.82825E-06
2595.895	-2.16	-54.16	3.83707E-06
2595.9	-2.12	-54.12	3.87258E-06
2595.905	-2.1	-54.1	3.89045E-06
2595.91	-2.1	-54.1	3.89045E-06
2595.915	-2.1	-54.1	3.89045E-06
2595.92	-2.04	-54.04	3.94457E-06
2595.925	-2.05	-54.05	3.9355E-06
2595.93	-2	-54	3.98107E-06

2595.935	-1.99	-53.99	3.99025E-06
2595.94	-2.01	-54.01	3.97192E-06
2595.945	-1.94	-53.94	4.03645E-06
2595.95	-1.91	-53.91	4.06443E-06
2595.955	-1.9	-53.9	4.0738E-06
2595.96	-1.9	-53.9	4.0738E-06
2595.965	-1.91	-53.91	4.06443E-06
2595.97	-1.85	-53.85	4.12098E-06
2595.975	-1.85	-53.85	4.12098E-06
2595.98	-1.84	-53.84	4.13048E-06
2595.985	-1.82	-53.82	4.14954E-06
2595.99	-1.84	-53.84	4.13048E-06
2595.995	-1.77	-53.77	4.19759E-06
2596	-1.79	-53.79	4.1783E-06
		Total Energy in 1MHz	0.000305552
Insertion Loss		**Filter Loss**	0.788860118
-1.00		**Total Energy in 5.1 MHz**	805.4261801
		Ratio	2635968.11
		Ratio (dB)	**64.20940152**
Transmitter Power (W)			
50			
Power at Waveguide Output (W)		**Required Ratio**	**59.02059991**
40			

Table 4.3 Upper Adjacent 1MHz

	Upper Side		
Frequency (MHz)	**Filter S21 (dB)**	**Filter+ Regrowth (dB)**	**Energy**
2602	-1.7	-53.7	4.2658E-06
2602.005	-1.69	-53.69	4.27563E-06
2602.01	-1.71	-53.71	4.25598E-06
2602.015	-1.74	-53.74	4.22669E-06
2602.02	-1.78	-53.78	4.18794E-06
2602.025	-1.75	-53.75	4.21697E-06
2602.03	-1.78	-53.78	4.18794E-06
2602.035	-1.82	-53.82	4.14954E-06
2602.04	-1.78	-53.78	4.18794E-06
2602.045	-1.78	-53.78	4.18794E-06
2602.05	-1.82	-53.82	4.14954E-06
2602.055	-1.87	-53.87	4.10204E-06
2602.06	-1.88	-53.88	4.09261E-06
2602.065	-1.84	-53.84	4.13048E-06
2602.07	-1.88	-53.88	4.09261E-06
2602.075	-1.87	-53.87	4.10204E-06

2602.08	-1.91	-53.91	4.06443E-06
2602.085	-1.94	-53.94	4.03645E-06
2602.09	-1.93	-53.93	4.04576E-06
2602.095	-1.96	-53.96	4.01791E-06
2602.1	-1.99	-53.99	3.99025E-06
2602.105	-2.02	-54.02	3.96278E-06
2602.11	-2.01	-54.01	3.97192E-06
2602.115	-2.05	-54.05	3.9355E-06
2602.12	-2.04	-54.04	3.94457E-06
2602.125	-2.06	-54.06	3.92645E-06
2602.13	-2.11	-54.11	3.8815E-06
2602.135	-2.11	-54.11	3.8815E-06
2602.14	-2.19	-54.19	3.81066E-06
2602.145	-2.16	-54.16	3.83707E-06
2602.15	-2.17	-54.17	3.82825E-06
2602.155	-2.27	-54.27	3.74111E-06
2602.16	-2.25	-54.25	3.75837E-06
2602.165	-2.31	-54.31	3.70681E-06
2602.17	-2.34	-54.34	3.68129E-06
2602.175	-2.32	-54.32	3.69828E-06
2602.18	-2.39	-54.39	3.63915E-06
2602.185	-2.36	-54.36	3.66438E-06
2602.19	-2.45	-54.45	3.58922E-06
2602.195	-2.49	-54.49	3.55631E-06
2602.2	-2.51	-54.51	3.53997E-06
2602.205	-2.55	-54.55	3.50752E-06
2602.21	-2.65	-54.65	3.42768E-06
2602.215	-2.66	-54.66	3.41979E-06
2602.22	-2.71	-54.71	3.38065E-06
2602.225	-2.77	-54.77	3.33426E-06
2602.23	-2.81	-54.81	3.3037E-06
2602.235	-2.87	-54.87	3.25837E-06
2602.24	-2.92	-54.92	3.22107E-06
2602.245	-2.99	-54.99	3.16957E-06
2602.25	-3.06	-55.06	3.11889E-06
2602.255	-3.11	-55.11	3.08319E-06
2602.26	-3.18	-55.18	3.03389E-06
2602.265	-3.26	-55.26	2.97852E-06
2602.27	-3.33	-55.33	2.93089E-06
2602.275	-3.41	-55.41	2.8774E-06
2602.28	-3.5	-55.5	2.81838E-06
2602.285	-3.58	-55.58	2.76694E-06
2602.29	-3.67	-55.67	2.71019E-06
2602.295	-3.77	-55.77	2.6485E-06
2602.3	-3.87	-55.87	2.58821E-06
2602.305	-3.98	-55.98	2.52348E-06

2602.31	-4.07	-56.07	2.47172E-06
2602.315	-4.19	-56.19	2.40436E-06
2602.32	-4.32	-56.32	2.33346E-06
2602.325	-4.45	-56.45	2.26464E-06
2602.33	-4.58	-56.58	2.19786E-06
2602.335	-4.73	-56.73	2.12324E-06
2602.34	-4.88	-56.88	2.05116E-06
2602.345	-5.06	-57.06	1.96789E-06
2602.35	-5.23	-57.23	1.89234E-06
2602.355	-5.41	-57.41	1.81552E-06
2602.36	-5.62	-57.62	1.72982E-06
2602.365	-5.83	-57.83	1.64816E-06
2602.37	-6.06	-58.06	1.56315E-06
2602.375	-6.3	-58.3	1.47911E-06
2602.38	-6.56	-58.56	1.39316E-06
2602.385	-6.84	-58.84	1.30617E-06
2602.39	-7.13	-59.13	1.2218E-06
2602.395	-7.44	-59.44	1.13763E-06
2602.4	-7.79	-59.79	1.04954E-06
2602.405	-8.14	-60.14	9.68278E-07
2602.41	-8.56	-60.56	8.79023E-07
2602.415	-8.99	-60.99	7.96159E-07
2602.42	-9.42	-61.42	7.21107E-07
2602.425	-9.92	-61.92	6.42688E-07
2602.43	-10.46	-62.46	5.67545E-07
2602.435	-11.03	-63.03	4.97737E-07
2602.44	-11.65	-63.65	4.31519E-07
2602.445	-12.36	-64.36	3.66438E-07
2602.45	-13.08	-65.08	3.10456E-07
2602.455	-13.95	-65.95	2.54097E-07
2602.46	-14.91	-66.91	2.03704E-07
2602.465	-16	-68	1.58489E-07
2602.47	-17.26	-69.26	1.18577E-07
2602.475	-18.8	-70.8	8.31764E-08
2602.48	-20.67	-72.67	5.40754E-08
2602.485	-22.92	-74.92	3.22107E-08
2602.49	-25.82	-77.82	1.65196E-08
2602.495	-30.14	-82.14	6.10942E-09
2602.5	-32.63	-84.63	3.4435E-09
2602.505	-28.7	-80.7	8.51138E-09
2602.51	-24.52	-76.52	2.22844E-08
2602.515	-21.55	-73.55	4.4157E-08
2602.52	-19.28	-71.28	7.44732E-08
2602.525	-17.52	-69.52	1.11686E-07
2602.53	-16.03	-68.03	1.57398E-07
2602.535	-14.76	-66.76	2.10863E-07

2602.54	-13.68	-65.68	2.70396E-07
2602.545	-12.81	-64.81	3.3037E-07
2602.55	-11.98	-63.98	3.99945E-07
2602.555	-11.29	-63.29	4.68813E-07
2602.56	-10.69	-62.69	5.3827E-07
2602.565	-10.17	-62.17	6.06736E-07
2602.57	-9.74	-61.74	6.69885E-07
2602.575	-9.36	-61.36	7.31139E-07
2602.58	-9.04	-61.04	7.87046E-07
2602.585	-8.75	-60.75	8.41395E-07
2602.59	-8.52	-60.52	8.87156E-07
2602.595	-8.31	-60.31	9.31108E-07
2602.6	-8.16	-60.16	9.63829E-07
2602.605	-8	-60	0.000001
2602.61	-7.91	-59.91	1.02094E-06
2602.615	-7.82	-59.82	1.04232E-06
2602.62	-7.76	-59.76	1.05682E-06
2602.625	-7.73	-59.73	1.06414E-06
2602.63	-7.72	-59.72	1.0666E-06
2602.635	-7.72	-59.72	1.0666E-06
2602.64	-7.73	-59.73	1.06414E-06
2602.645	-7.77	-59.77	1.05439E-06
2602.65	-7.81	-59.81	1.04472E-06
2602.655	-7.87	-59.87	1.03039E-06
2602.66	-7.94	-59.94	1.01391E-06
2602.665	-8.02	-60.02	9.95405E-07
2602.67	-8.09	-60.09	9.7949E-07
2602.675	-8.18	-60.18	9.59401E-07
2602.68	-8.26	-60.26	9.4189E-07
2602.685	-8.34	-60.34	9.24698E-07
2602.69	-8.42	-60.42	9.07821E-07
2602.695	-8.49	-60.49	8.93305E-07
2602.7	-8.55	-60.55	8.81049E-07
2602.705	-8.6	-60.6	8.70964E-07
2602.71	-8.63	-60.63	8.64968E-07
2602.715	-8.65	-60.65	8.60994E-07
2602.72	-8.66	-60.66	8.59014E-07
2602.725	-8.66	-60.66	8.59014E-07
2602.73	-8.65	-60.65	8.60994E-07
2602.735	-8.63	-60.63	8.64968E-07
2602.74	-8.61	-60.61	8.6896E-07
2602.745	-8.58	-60.58	8.74984E-07
2602.75	-8.56	-60.56	8.79023E-07
2602.755	-8.53	-60.53	8.85116E-07
2602.76	-8.52	-60.52	8.87156E-07
2602.765	-8.51	-60.51	8.89201E-07

2602.77	-8.52	-60.52	8.87156E-07
2602.775	-8.52	-60.52	8.87156E-07
2602.78	-8.55	-60.55	8.81049E-07
2602.785	-8.58	-60.58	8.74984E-07
2602.79	-8.61	-60.61	8.6896E-07
2602.795	-8.65	-60.65	8.60994E-07
2602.8	-8.71	-60.71	8.4918E-07
2602.805	-8.78	-60.78	8.35603E-07
2602.81	-8.85	-60.85	8.22243E-07
2602.815	-8.94	-60.94	8.05378E-07
2602.82	-9.03	-61.03	7.8886E-07
2602.825	-9.12	-61.12	7.72681E-07
2602.83	-9.23	-61.23	7.53356E-07
2602.835	-9.35	-61.35	7.32825E-07
2602.84	-9.47	-61.47	7.12853E-07
2602.845	-9.6	-61.6	6.91831E-07
2602.85	-9.73	-61.73	6.71429E-07
2602.855	-9.87	-61.87	6.5013E-07
2602.86	-10.02	-62.02	6.28058E-07
2602.865	-10.17	-62.17	6.06736E-07
2602.87	-10.31	-62.31	5.87489E-07
2602.875	-10.47	-62.47	5.66239E-07
2602.88	-10.61	-62.61	5.48277E-07
2602.885	-10.75	-62.75	5.30884E-07
2602.89	-10.89	-62.89	5.14044E-07
2602.895	-10.99	-62.99	5.02343E-07
2602.9	-11.1	-63.1	4.89779E-07
2602.905	-11.18	-63.18	4.80839E-07
2602.91	-11.24	-63.24	4.74242E-07
2602.915	-11.29	-63.29	4.68813E-07
2602.92	-11.28	-63.28	4.69894E-07
2602.925	-11.26	-63.26	4.72063E-07
2602.93	-11.2	-63.2	4.7863E-07
2602.935	-11.1	-63.1	4.89779E-07
2602.94	-10.99	-62.99	5.02343E-07
2602.945	-10.85	-62.85	5.188E-07
2602.95	-10.68	-62.68	5.39511E-07
2602.955	-10.48	-62.48	5.64937E-07
2602.96	-10.27	-62.27	5.92925E-07
2602.965	-10.03	-62.03	6.26614E-07
2602.97	-9.8	-61.8	6.60693E-07
2602.975	-9.57	-61.57	6.96627E-07
2602.98	-9.32	-61.32	7.37904E-07
2602.985	-9.08	-61.08	7.7983E-07
2602.99	-8.84	-60.84	8.24138E-07
2602.995	-8.61	-60.61	8.6896E-07

2603	-8.38	-60.38	9.1622E-07
		Total Energy in 1MHz	0.000339658
Insertion Loss		**Filter Loss**	0.788860118
-1.00 dB		**Total Energy in 5.1 MHz**	805.4261801
		Ratio	2371286.91
		Ratio (dB)	**63.74984104**
Transmitter Power (W)			
50			
Power at Waveguide Output (W)		**Required Ratio**	**59.02059991**
40			

4.5 Radiated Emissions

Using the test setup shown in Figure 4-10, 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 IF frequency (44 MHz). This antenna was oriented to maximize the received level and the data was recorded. The antenna was then cut to the carrier frequency, local oscillator frequency and the second through tenth harmonic frequencies of the transmitter, and all of the signals received, were maximized by antenna orientation and their absolute levels were recorded.

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

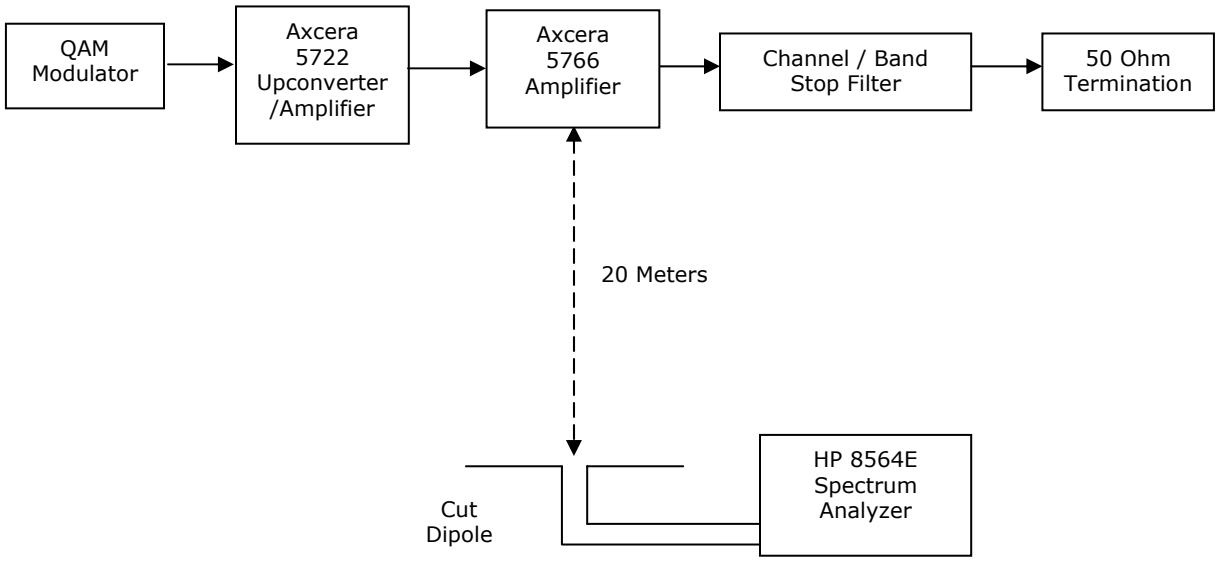

Figure 4-10. Test Setup for Measuring Radiated Emissions

FREQUENCY (MHz)	SOURCE	PEAK LEVEL OBSERVED (dB)
44.00	IF Frequency	None Observed
2599.00	Center of Channel	- 65 dBm
2643.00	Local Oscillator	None Observed
5198.00	2nd Harmonic	None Observed
7797.00	3rd Harmonic	None Observed
10396.00	4th Harmonic	None Observed
12995.00	5th Harmonic	None Observed
15594.00	6th Harmonic	None Observed
18193.00	7th Harmonic	None Observed
20792.00	8th Harmonic	None Observed
23391.00	9th Harmonic	None Observed
25990.00	10th Harmonic	None Observed

Table 4-4. Radiated Emissions Data

If all of the amplifier's power (40 Watts) was radiated by an isotropic radiator, the power density at 20 meters would be:

$Pd = Pt/4\pi R^2 = 40/4\pi (20)^2 = .008 \ w/m^2$

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

$1.64 \times .004 = .01312 \ w/m^2$

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:

-16.4 dBm

Therefore, the measured value was at the following relative level:

Frequency (MHz)	Relative Measured Level (Ref = -16.4 dBm)
2599.00 MHz	-48.6 dB

The cabinet radiation was also checked with the receive dipole antenna cut to 2599 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 +0.0 dBm.

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

4.7 Test Equipment

The test equipment that was used to analyze the Axcera 5766 system is listed in Table 4-6.

Table 4-6. Test Equipment

MODEL	MANUFACTURER	DESCRIPTION	SERIAL #
8564E	Hewlett-Packard	Spect. Analyzer 9 KHz-40 GHz	3619A02929
8595E	Hewlett-Packard	Spect. Analyzer 9 KHz-6.5 GHz	3543A01613
3003-30	Narda	Directional Coupler	41991
3003-10	Narda	Directional Coupler	09049
435B	Hewlett-Packard	30 Watt Power Head	2732009080
2349A	Hewlett-Packard	30 dB Directional Coupler	3318A05525
2230	Tektronix	Oscilloscope	2230B025251
1992	Racal-Dana	Frequency Counter	950304
8135	Bird	50 Ohm Termination	8520
79	Fluke	Digital Multi-meter	56660032
89441A	Hewlett-Packard	Vector Sig. Analyzer (IF Section)	3416A01020
89441A	Hewlett-Packard	Vector Sig. Analyzer (RF Section)	3415A00333