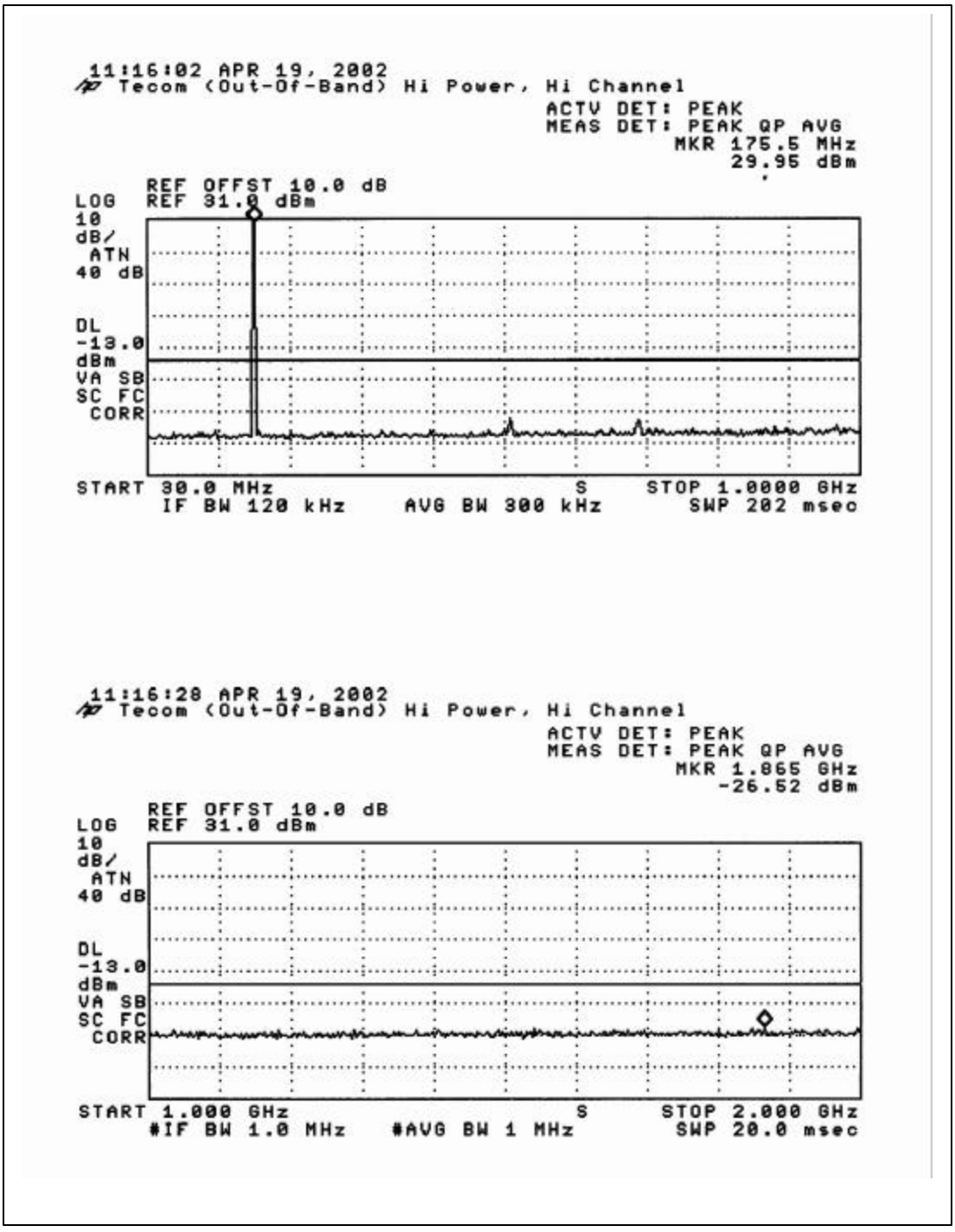

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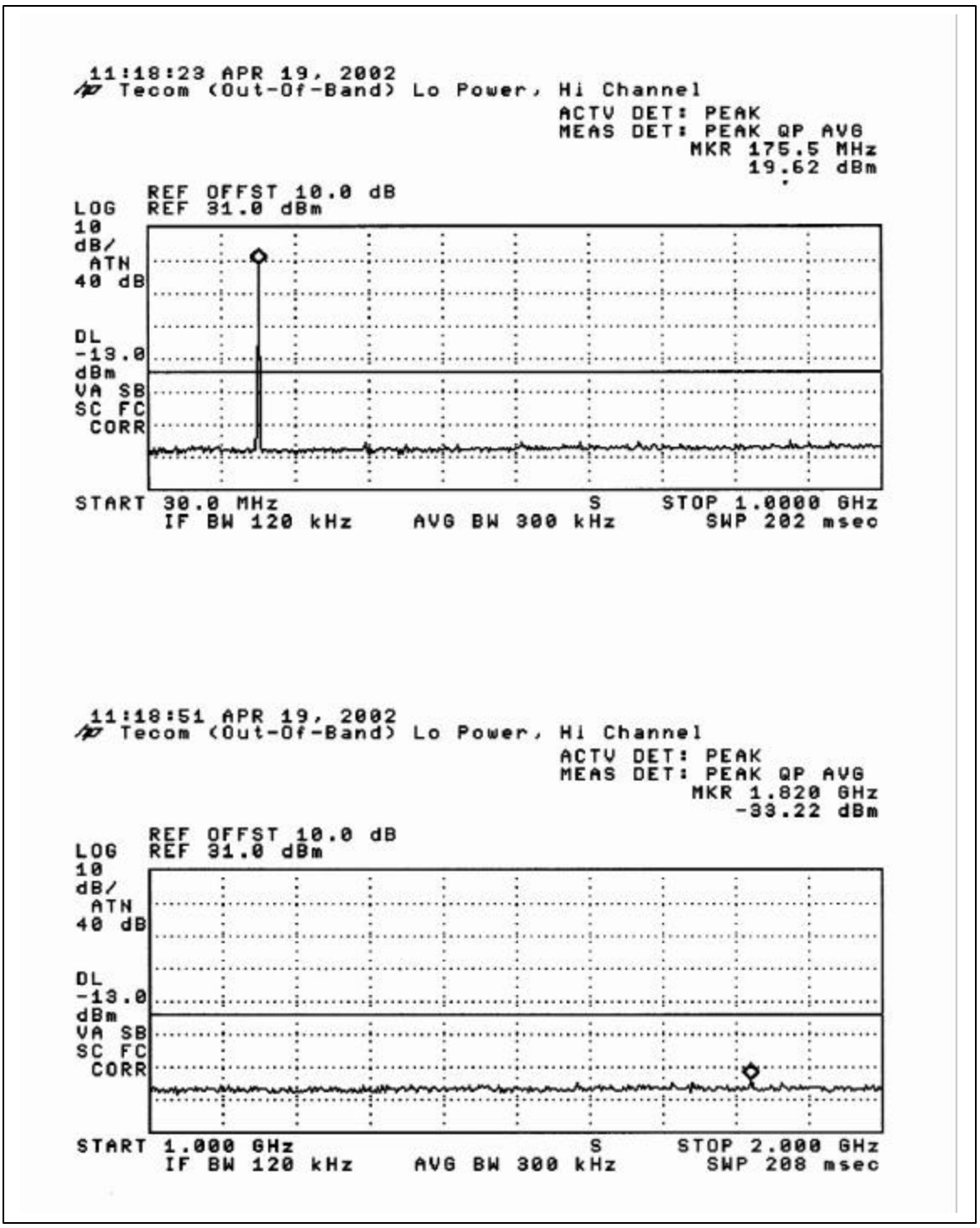

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UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 02I1218-1
Report #: 020429C1
Date& Time: 04/29/02 9:27 AM
Test Engr: Thu Chan

Company: Temco Japan Co., Ltd.
EUT Description: Portable Handheld Transceiver (M/N: SR21A-01A)
Test Configuration : EUT/Support Peripherals
Type of Test: FCC 90
Mode of Operation: Transmitting

Freq. (MHz)	SA Reading (dBuV)	SG Setting (dBm)	Ant Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	ERP Result (dBm)	Limit (dBm)	Margin (dBm)	Pol (H/V)
Hi Power, Hi Channel:									
347.96	44.50	-37.00	0.00	0.00	0.50	-37.50	-13.00	-24.50	3mV
521.93	40.00	-39.00	0.00	0.00	0.70	-39.70	-13.00	-26.70	3mV
695.90	28.00	-45.30	0.00	0.00	0.80	-46.10	-13.00	-33.10	3mV
869.89	17.50	-54.28	0.00	0.00	1.00	-55.28	-13.00	-42.28	3mV
1043.86	15.50	-61.48	5.80	2.15	1.10	-58.93	-13.00	-45.93	3mV
1217.95	8.00	-66.04	6.50	2.15	1.40	-63.09	-13.00	-50.09	3mV
1391.82	11.50	-56.00	7.00	2.15	1.50	-52.65	-13.00	-39.65	3mV
347.95	35.00	-47.00	0.00	0.00	0.50	-47.50	-13.00	-34.50	3mH
521.93	41.00	-35.00	0.00	0.00	0.70	-35.70	-13.00	-22.70	3mH
695.91	27.00	-46.30	0.00	0.00	0.80	-47.10	-13.00	-34.10	3mH
869.88	17.00	-54.78	0.00	0.00	1.00	-55.78	-13.00	-42.78	3mH
1043.86	14.00	-62.98	5.80	2.15	1.10	-60.43	-13.00	-47.43	3mH
1217.95	8.00	-66.04	6.50	2.15	1.40	-63.09	-13.00	-50.09	3mH
1391.31	12.00	-56.00	7.00	2.15	1.50	-52.65	-13.00	-39.65	3mH
80.00	19.00	-71.34	0.00	0.00	0.40	-71.74	-13.00	-58.74	3mV
160.00	16.00	-64.19	0.00	0.00	0.50	-64.69	-13.00	-51.69	3mV
Broadband:									
171.30	19.00	-62.16	0.00	0.00	0.50	-62.66	-13.00	-49.66	3mV
177.02	19.00	-62.90	0.00	0.00	0.50	-63.40	-13.00	-50.40	3mV
80.00	28.00	-62.34	0.00	0.00	0.50	-62.84	-13.00	-49.84	3mH
160.00	18.00	-62.19	0.00	0.00	0.50	-62.69	-13.00	-49.69	3mH
240.00	13.00	-72.16	0.00	0.00	0.50	-72.66	-13.00	-59.66	3mV
280.01	14.00	-68.83	0.00	0.00	0.50	-69.33	-13.00	-56.33	3mV
240.00	21.50	-63.66	0.00	0.00	0.50	-64.16	-13.00	-51.16	3mH
280.00	21.00	-61.83	0.00	0.00	0.50	-62.33	-13.00	-49.33	3mH
320.00	15.00	-66.42	0.00	0.00	0.50	-66.92	-13.00	-53.92	3mH
360.00	16.00	-64.92	0.00	0.00	0.50	-65.42	-13.00	-52.42	3mH

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Low Power, Hi Channel:									
347.96	25.50	-55.57	0.00	0.00	0.50	-56.07	-13.00	-43.07	3mV
521.93	42.00	-35.15	0.00	0.00	0.70	-35.85	-13.00	-22.85	3mV
695.90	16.00	-57.30	0.00	0.00	0.80	-58.10	-13.00	-45.10	3mV
869.88	17.00	-54.78	0.00	0.00	1.00	-55.78	-13.00	-42.78	3mV
1043.85	11.00	-65.98	5.80	2.15	1.10	-63.43	-13.00	-50.43	3mV
1217.83	8.00	-66.04	6.50	2.15	1.40	-63.09	-13.00	-50.09	3mV
1391.82	8.00	-62.04	7.00	2.15	1.50	-58.69	-13.00	-45.69	3mV
1565.80	8.00	-59.49	8.10	2.15	1.70	-55.24	-13.00	-42.24	3mV
240.00	13.00	-72.16	0.00	0.00	0.50	-72.66	-13.00	-59.66	3mV
280.00	14.00	-68.83	0.00	0.00	0.50	-69.33	-13.00	-56.33	3mV
347.95	28.00	-53.07	0.00	0.00	0.50	-53.57	-13.00	-40.57	3mH
521.94	28.50	-48.65	0.00	0.00	0.70	-49.35	-13.00	-36.35	3mH
695.91	21.00	-52.30	0.00	0.00	0.80	-53.10	-13.00	-40.10	3mH
869.89	13.50	-58.28	0.00	0.00	1.00	-59.28	-13.00	-46.28	3mH
1043.85	9.00	-67.98	5.80	2.15	1.10	-65.43	-13.00	-52.43	3mH
1217.83	8.00	-66.04	6.50	2.15	1.40	-63.09	-13.00	-50.09	3mH
1391.82	8.00	-62.04	7.00	2.15	1.50	-58.69	-13.00	-45.69	3mH
1565.80	8.00	-59.49	8.10	2.15	1.70	-55.24	-13.00	-42.24	3mH
240.00	21.50	-63.66	0.00	0.00	0.50	-64.16	-13.00	-51.16	3mH
280.00	21.00	-61.83	0.00	0.00	0.50	-62.33	-13.00	-49.33	3mH
320.00	15.00	-66.42	0.00	0.00	0.50	-66.92	-13.00	-53.92	3mH
360.00	16.00	-64.92	0.00	0.00	0.50	-65.42	-13.00	-52.42	3mH
80.00	19.00	-71.34	0.00	0.00	0.50	-71.84	-13.00	-58.84	3mV
160.00	16.00	-64.19	0.00	0.00	0.50	-64.69	-13.00	-51.69	3mV
80.00	28.00	-62.34	0.00	0.00	0.50	-62.84	-13.00	-49.84	3mH
160.00	18.00	-62.19	0.00	0.00	0.50	-62.69	-13.00	-49.69	3mH
Hi Power, Mid Channel:									
324.05	43.00	-37.50	0.00	0.00	0.50	-38.00	-13.00	-25.00	3mV
486.07	36.50	-41.30	0.00	0.00	0.70	-42.00	-13.00	-29.00	3mV
648.09	-35.00	-40.00	0.00	0.00	0.80	-40.80	-13.00	-27.80	3mV
810.12	39.00	-33.98	0.00	0.00	1.00	-34.98	-13.00	-21.98	3mV
972.14	30.00	-40.29	0.00	0.00	1.10	-41.39	-13.00	-28.39	3mV
1134.17	32.00	-43.03	5.80	2.15	1.40	-40.78	-13.00	-27.78	3mV
1296.19	25.00	-48.07	6.50	2.15	1.50	-45.22	-13.00	-32.22	3mV
1458.21	15.00	-53.58	7.00	2.15	1.70	-50.43	-13.00	-37.43	3mV
1620.23	9.00	-57.55	8.20	2.15	1.80	-53.30	-13.00	-40.30	3mV
324.05	58.00	-25.50	0.00	0.00	0.50	-26.00	-13.00	-13.00	3mH
486.07	44.00	-33.82	0.00	0.00	0.70	-34.52	-13.00	-21.52	3mH
648.09	-40.00	-35.00	0.00	0.00	0.80	-35.80	-13.00	-22.80	3mH
810.12	37.00	-35.98	0.00	0.00	1.00	-36.98	-13.00	-23.98	3mH
972.15	29.00	-41.29	0.00	0.00	1.10	-42.39	-13.00	-29.39	3mH
1143.17	28.50	-46.33	5.80	2.15	1.40	-44.08	-13.00	-31.08	3mH
1296.19	25.50	-47.57	6.50	2.15	1.50	-44.72	-13.00	-31.72	3mH
1458.21	21.00	-47.58	7.00	2.15	1.70	-44.43	-13.00	-31.43	3mH
1620.23	9.00	-57.55	8.20	2.15	1.80	-53.30	-13.00	-40.30	3mH

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Low Power, Mid Channel:									
324.05	46.00	-35.00	0.00	0.00	0.50	-35.50	-13.00	-22.50	3mV
486.07	45.00	-32.82	0.00	0.00	0.70	-33.52	-13.00	-20.52	3mV
648.09	27.00	-47.76	0.00	0.00	0.80	-48.56	-13.00	-35.56	3mV
810.12	25.00	-47.98	0.00	0.00	1.00	-48.98	-13.00	-35.98	3mV
972.15	22.00	-48.29	0.00	0.00	1.10	-49.39	-13.00	-36.39	3mV
1143.17	9.00	-65.83	5.80	2.15	1.40	-63.58	-13.00	-50.58	3mV
1296.19	9.00	-64.07	6.50	2.15	1.50	-61.22	-13.00	-48.22	3mV
1458.21	9.00	-59.58	7.00	2.15	1.70	-56.43	-13.00	-43.43	3mV
1620.23	9.00	-57.55	8.20	2.15	1.80	-53.30	-13.00	-40.30	3mV
324.05	50.00	-33.00	0.00	0.00	0.50	-33.50	-13.00	-20.50	3mH
486.07	40.00	-37.82	0.00	0.00	0.70	-38.52	-13.00	-25.52	3mH
648.09	32.00	-42.76	0.00	0.00	0.80	-43.56	-13.00	-30.56	3mH
810.11	16.00	-56.98	0.00	0.00	1.00	-57.98	-13.00	-44.98	3mH
972.13	17.00	-53.29	0.00	0.00	1.10	-54.39	-13.00	-41.39	3mH
1143.17	9.00	-80.89	5.80	2.15	1.40	-78.64	-13.00	-65.64	3mH
1296.19	9.00	-64.07	6.50	2.15	1.50	-61.22	-13.00	-48.22	3mH
1458.21	9.00	-59.58	7.00	2.15	1.70	-56.43	-13.00	-43.43	3mH
1620.23	9.00	-57.55	8.20	2.15	1.80	-53.30	-13.00	-40.30	3mH
Hi Power, Low Channel:									
300.06	46.00	-35.00	0.00	0.00	0.50	-35.50	-13.00	-22.50	3mV
450.08	42.00	-36.91	0.00	0.00	0.70	-37.61	-13.00	-24.61	3mV
600.10	36.00	-40.00	0.00	0.00	0.80	-40.80	-13.00	-27.80	3mV
750.12	30.00	-43.18	0.00	0.00	1.00	-44.18	-13.00	-31.18	3mV
900.15	29.00	-42.18	0.00	0.00	1.10	-43.28	-13.00	-30.28	3mV
1050.73	20.00	-56.83	5.80	2.15	1.40	-54.58	-13.00	-41.58	3mV
1200.19	9.00	-65.26	6.50	2.15	1.50	-62.41	-13.00	-49.41	3mV
1350.22	12.50	-59.12	7.00	2.15	1.70	-55.97	-13.00	-42.97	3mV
1500.02	10.00	-58.75	8.00	2.15	1.80	-54.70	-13.00	-41.70	3mV
300.04	52.00	-32.00	0.00	0.00	0.50	-32.50	-13.00	-19.50	3mH
450.07	34.00	-44.91	0.00	0.00	0.70	-45.61	-13.00	-32.61	3mH
600.09	40.00	-36.24	0.00	0.00	0.80	-37.04	-13.00	-24.04	3mH
750.11	38.00	-35.18	0.00	0.00	1.00	-36.18	-13.00	-23.18	3mH
900.13	29.00	-42.18	0.00	0.00	1.10	-43.28	-13.00	-30.28	3mH
1050.17	19.00	-57.84	5.80	2.15	1.40	-55.59	-13.00	-42.59	3mH
1200.19	9.00	-65.26	6.50	2.15	1.50	-62.41	-13.00	-49.41	3mH
1350.21	9.00	-62.62	7.00	2.15	1.70	-59.47	-13.00	-46.47	3mH
1500.23	9.00	-59.75	8.00	2.15	1.80	-55.70	-13.00	-42.70	3mH
Low Power, Low Channel:									
300.05	29.00	-52.66	0.00	0.00	0.50	-53.16	-13.00	-40.16	3mV
450.07	38.00	-40.91	0.00	0.00	0.70	-41.61	-13.00	-28.61	3mV
60.09	38.00	-52.52	0.00	0.00	0.80	-53.32	-13.00	-40.32	3mV
750.11	9.00	-64.18	0.00	0.00	1.00	-65.18	-13.00	-52.18	3mV
900.15	14.00	-57.18	0.00	0.00	1.10	-58.28	-13.00	-45.28	3mV
1050.16	9.00	-67.84	5.80	2.15	1.40	-65.59	-13.00	-52.59	3mV
1200.83	9.00	-65.25	6.50	2.15	1.50	-62.40	-13.00	-49.40	3mV
1350.21	9.00	-62.62	7.00	2.15	1.70	-59.47	-13.00	-46.47	3mV
1500.23	9.00	-59.75	8.00	2.15	1.80	-55.70	-13.00	-42.70	3mV
300.05	35.00	-46.66	0.00	0.00	0.50	-47.16	-13.00	-34.16	3mH
450.07	25.00	-53.91	0.00	0.00	0.70	-54.61	-13.00	-41.61	3mH
600.09	31.00	-45.24	0.00	0.00	0.80	-46.04	-13.00	-33.04	3mH
750.11	9.00	-64.18	0.00	0.00	1.00	-65.18	-13.00	-52.18	3mH
900.13	12.00	-59.18	0.00	0.00	1.10	-60.28	-13.00	-47.28	3mH
1050.15	9.00	-67.84	5.80	2.15	1.40	-65.59	-13.00	-52.59	3mH
1200.17	9.00	-65.26	6.50	2.15	1.50	-62.41	-13.00	-49.41	3mH
1350.20	9.00	-62.62	7.00	2.15	1.70	-59.47	-13.00	-46.47	3mH
1500.23	9.00	-59.75	8.00	2.15	1.80	-55.70	-13.00	-42.70	3mH

V.2c

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Low Power, Mid Channel:									
324.05	46.00	-35.00	0.00	0.00	0.50	-35.50	-13.00	-22.50	3mV
486.07	45.00	-32.82	0.00	0.00	0.70	-33.52	-13.00	-20.52	3mV
648.09	27.00	-47.76	0.00	0.00	0.80	-48.56	-13.00	-35.56	3mV
810.12	25.00	-47.98	0.00	0.00	1.00	-48.98	-13.00	-35.98	3mV
972.15	22.00	-48.29	0.00	0.00	1.10	-49.39	-13.00	-36.39	3mV
1143.17	9.00	-65.83	5.80	2.15	1.40	-63.58	-13.00	-50.58	3mV
1296.19	9.00	-64.07	6.50	2.15	1.50	-61.22	-13.00	-48.22	3mV
1458.21	9.00	-59.58	7.00	2.15	1.70	-56.43	-13.00	-43.43	3mV
1620.23	9.00	-57.55	8.20	2.15	1.80	-53.30	-13.00	-40.30	3mV
324.05	50.00	-33.00	0.00	0.00	0.50	-33.50	-13.00	-20.50	3mH
486.07	40.00	-37.82	0.00	0.00	0.70	-38.52	-13.00	-25.52	3mH
648.09	32.00	-42.76	0.00	0.00	0.80	-43.56	-13.00	-30.56	3mH
810.11	16.00	-56.98	0.00	0.00	1.00	-57.98	-13.00	-44.98	3mH
972.13	17.00	-53.29	0.00	0.00	1.10	-54.39	-13.00	-41.39	3mH
1143.17	9.00	-80.89	5.80	2.15	1.40	-78.64	-13.00	-65.64	3mH
1296.19	9.00	-64.07	6.50	2.15	1.50	-61.22	-13.00	-48.22	3mH
1458.21	9.00	-59.58	7.00	2.15	1.70	-56.43	-13.00	-43.43	3mH
1620.23	9.00	-57.55	8.20	2.15	1.80	-53.30	-13.00	-40.30	3mH
Hi Power, Low Channel:									
300.06	46.00	-35.00	0.00	0.00	0.50	-35.50	-13.00	-22.50	3mV
450.08	42.00	-36.91	0.00	0.00	0.70	-37.61	-13.00	-24.61	3mV
600.10	36.00	-40.00	0.00	0.00	0.80	-40.80	-13.00	-27.80	3mV
750.12	30.00	-43.18	0.00	0.00	1.00	-44.18	-13.00	-31.18	3mV
900.15	29.00	-42.18	0.00	0.00	1.10	-43.28	-13.00	-30.28	3mV
1050.73	20.00	-56.83	5.80	2.15	1.40	-54.58	-13.00	-41.58	3mV
1200.19	9.00	-65.26	6.50	2.15	1.50	-62.41	-13.00	-49.41	3mV
1350.22	12.50	-59.12	7.00	2.15	1.70	-55.97	-13.00	-42.97	3mV
1500.02	10.00	-58.75	8.00	2.15	1.80	-54.70	-13.00	-41.70	3mV
300.04	52.00	-32.00	0.00	0.00	0.50	-32.50	-13.00	-19.50	3mH
450.07	34.00	-44.91	0.00	0.00	0.70	-45.61	-13.00	-32.61	3mH
600.09	40.00	-36.24	0.00	0.00	0.80	-37.04	-13.00	-24.04	3mH
750.11	38.00	-35.18	0.00	0.00	1.00	-36.18	-13.00	-23.18	3mH
900.13	29.00	-42.18	0.00	0.00	1.10	-43.28	-13.00	-30.28	3mH
1050.17	19.00	-57.84	5.80	2.15	1.40	-55.59	-13.00	-42.59	3mH
1200.19	9.00	-65.26	6.50	2.15	1.50	-62.41	-13.00	-49.41	3mH
1350.21	9.00	-62.62	7.00	2.15	1.70	-59.47	-13.00	-46.47	3mH
1500.23	9.00	-59.75	8.00	2.15	1.80	-55.70	-13.00	-42.70	3mH
Low Power, Low Channel:									
300.05	29.00	-52.66	0.00	0.00	0.50	-53.16	-13.00	-40.16	3mV
450.07	38.00	-40.91	0.00	0.00	0.70	-41.61	-13.00	-28.61	3mV
60.09	38.00	-52.52	0.00	0.00	0.80	-53.32	-13.00	-40.32	3mV
750.11	9.00	-64.18	0.00	0.00	1.00	-65.18	-13.00	-52.18	3mV
900.15	14.00	-57.18	0.00	0.00	1.10	-58.28	-13.00	-45.28	3mV
1050.16	9.00	-67.84	5.80	2.15	1.40	-65.59	-13.00	-52.59	3mV
1200.83	9.00	-65.25	6.50	2.15	1.50	-62.40	-13.00	-49.40	3mV
1350.21	9.00	-62.62	7.00	2.15	1.70	-59.47	-13.00	-46.47	3mV
1500.23	9.00	-59.75	8.00	2.15	1.80	-55.70	-13.00	-42.70	3mV
300.05	35.00	-46.66	0.00	0.00	0.50	-47.16	-13.00	-34.16	3mH
450.07	25.00	-53.91	0.00	0.00	0.70	-54.61	-13.00	-41.61	3mH
600.09	31.00	-45.24	0.00	0.00	0.80	-46.04	-13.00	-33.04	3mH
750.11	9.00	-64.18	0.00	0.00	1.00	-65.18	-13.00	-52.18	3mH
900.13	12.00	-59.18	0.00	0.00	1.10	-60.28	-13.00	-47.28	3mH
1050.15	9.00	-67.84	5.80	2.15	1.40	-65.59	-13.00	-52.59	3mH
1200.17	9.00	-65.26	6.50	2.15	1.50	-62.41	-13.00	-49.41	3mH
1350.20	9.00	-62.62	7.00	2.15	1.70	-59.47	-13.00	-46.47	3mH
1500.23	9.00	-59.75	8.00	2.15	1.80	-55.70	-13.00	-42.70	3mH

V.2c

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8. FREQUENCY STABILITY MEASUREMENT

8.1. PROVISIONS APPLICABLE

a). According to CFR 47 section 1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30°C to +50°C centigrade.
b). According to CFR 47 section 1055(d)(2), for hand carried battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
c). According to CFR 47 section 90.213, the unit must be maintained within a frequency tolerance of 0.0005%.

8.2. MEASUREMENT METHOD

8.2.1. Frequency stability versus environmental temperature

1). Setup the configuration as shown below for frequencies measurement inside an environmental chamber. Install new battery in the EUT.

2). Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 10 KHz and Video Resolution Bandwidth to 100 KHz and Frequency Span to 100 KHz. Record this frequency as reference frequency.

3). Set the temperature of chamber to 50°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

4). Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, record all measured frequencies on each temperature step.

8.2.2. Frequency stability versus input voltage

1). Setup the configuration as shown below for frequencies measured at temperature if it is within 15°C to 25°C. Otherwise, an environmental chamber set for a temperature of 20°C shall be used. Install new battery in the EUT.

2). Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 10 KHz and Video Resolution Bandwidth to 100 KHz and Frequency Span to 100 KHz. Record this frequency as reference frequency.

3). For battery operated only device, supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

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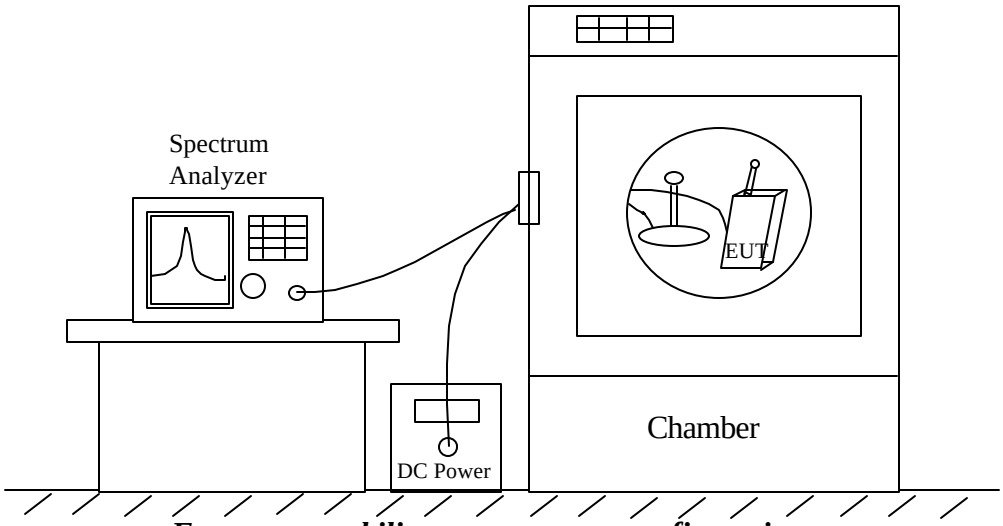

Frequency stability measurement configuration

8.3. MEASUREMENT INSTRUMENT

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/20/02
Attenuator	MINI CIRCUITS	MCL BW-S10W2	NA
Environmental Chamber	Thermotron	SE600-10-10	4/26/03

8.4. MEASUREMENT RESULT

Frequency Tolerance: 0.00034% = 56Hz (limit < 0.0005% = 810.12Hz)

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Reference Frequencies: 20°C @ 162.024972MHz Limit: to stay within ± 5 ppm (810.12Hz)		
Environment Temperature (°C)	Power Supplied (Vac)	Frequency deviation measured with time elapse
		Hz
50	Fixed 115Vac	+56
40	Fixed 115Vac	+5
30	Fixed 115Vac	+5
20	Fixed 115Vac	0
10	Fixed 115Vac	-5
0	Fixed 115Vac	-44
-10	Fixed 115Vac	-36
-20	Fixed 115Vac	-45
-30	Fixed 115Vac	-42

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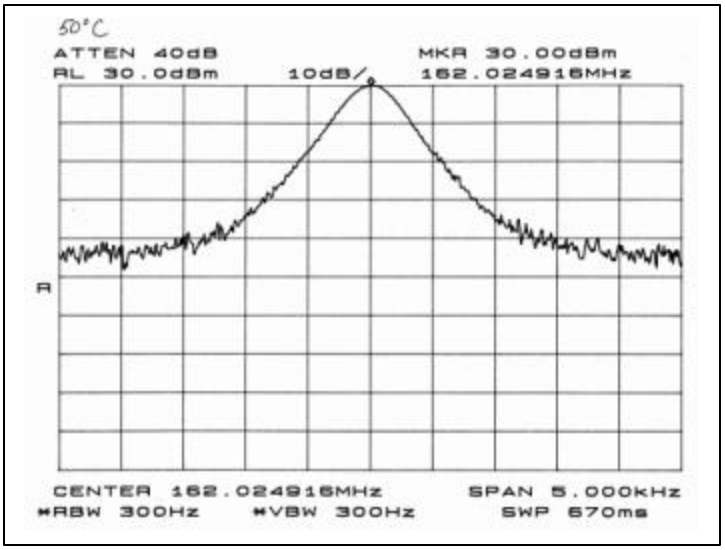
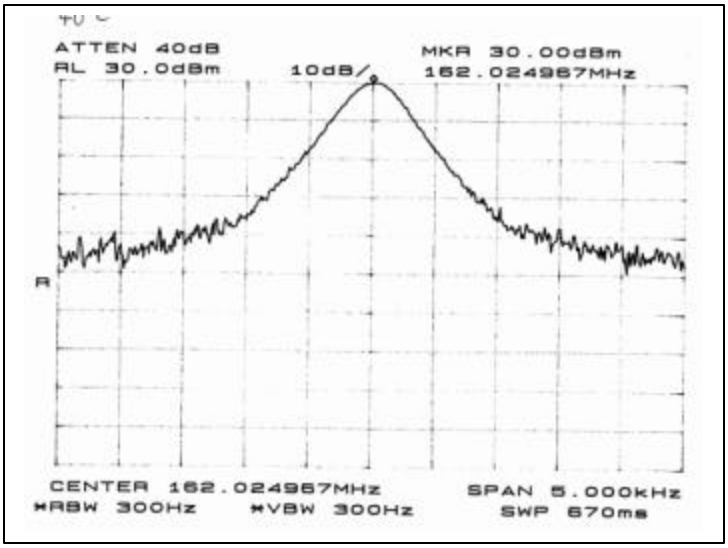
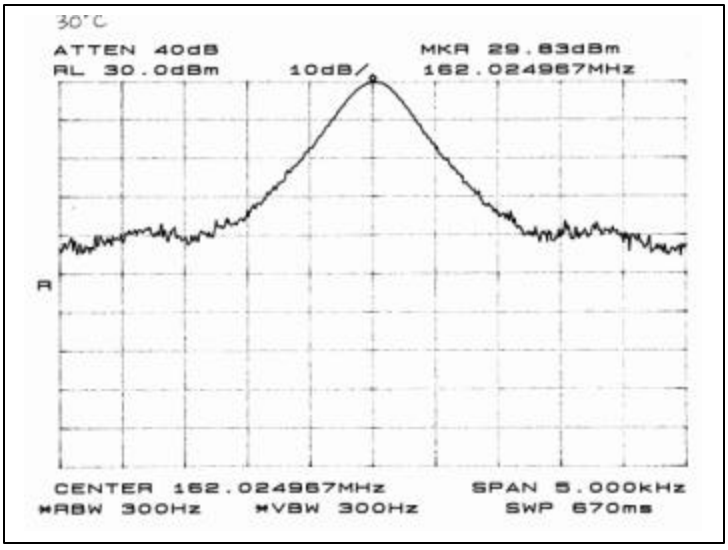
+50 °C



+40 °C



+30 °C



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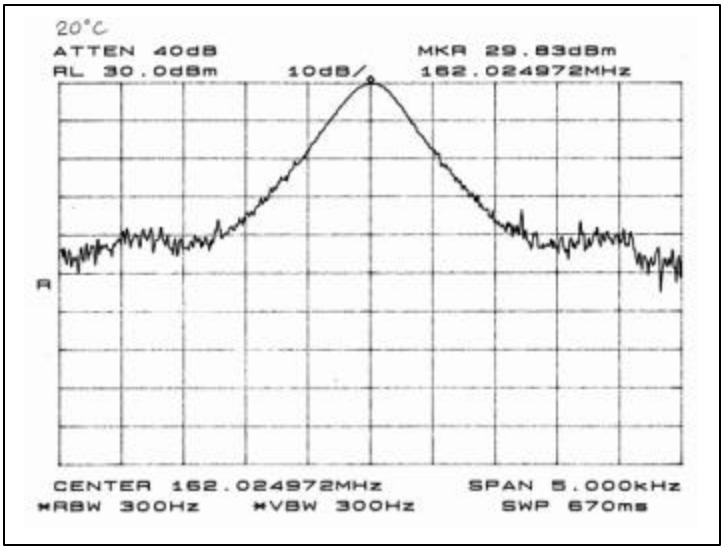
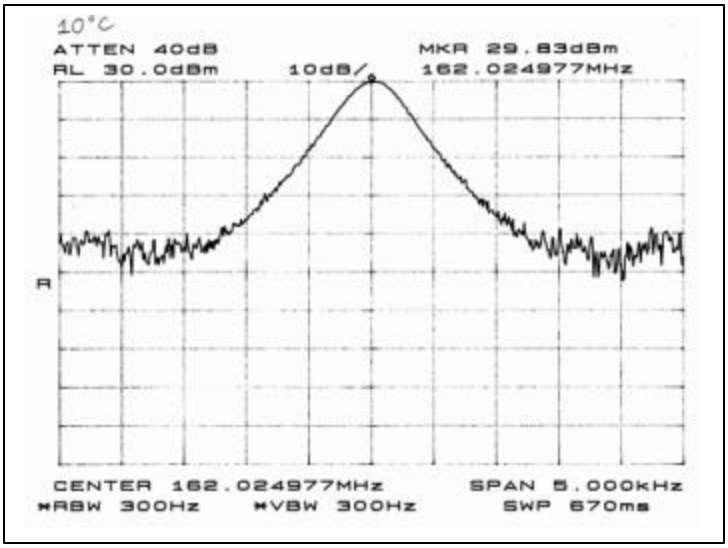
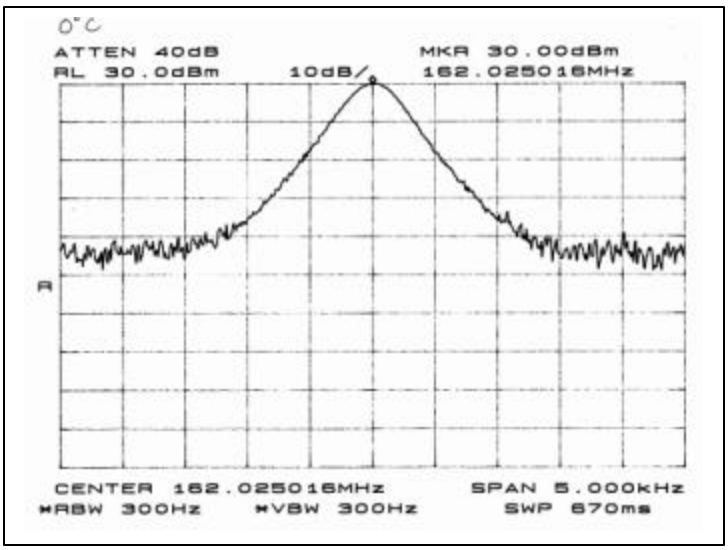
+20 °C



+10 °C



0 °C



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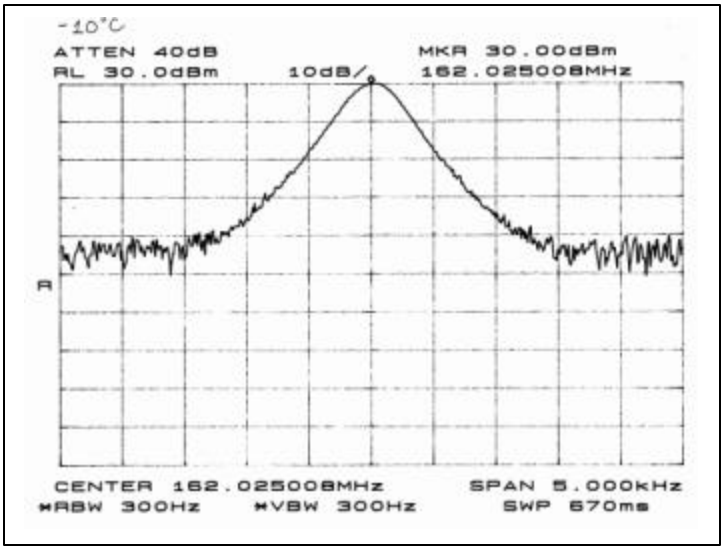
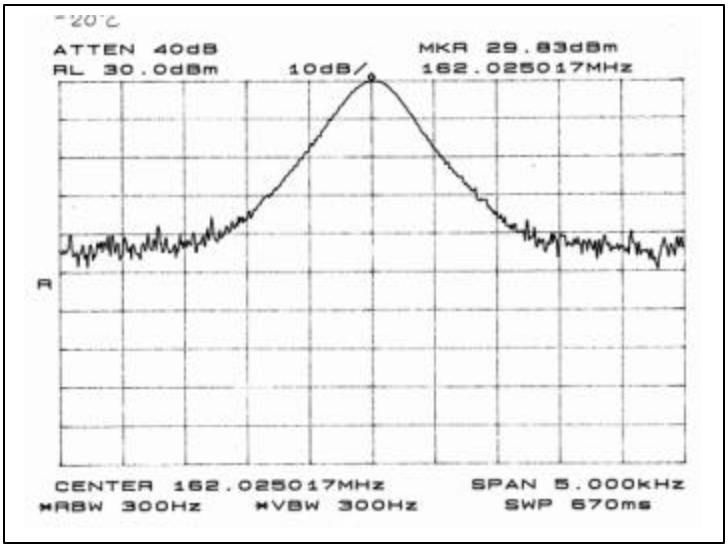
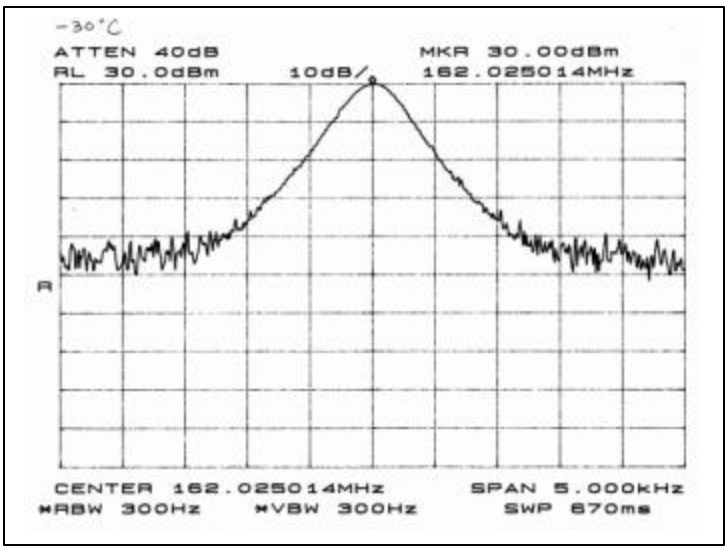
-10 °C



-20 °C



-30 °C



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b). Frequency stability versus input voltage (battery operation end point voltage is 7.2 Vdc)

Reference Frequency: 9Vdc @ 162.024930 MHz Limit: to stay within ± 5 ppm (810.12Hz) Limit: to stay within ± 5 ppm (810.12Hz)		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency deviation measured with time elapse
		Hz
24	7.65	-13
24	9.00	0
24	10.35	-13
24	7.2 (End Point Voltage)	-13

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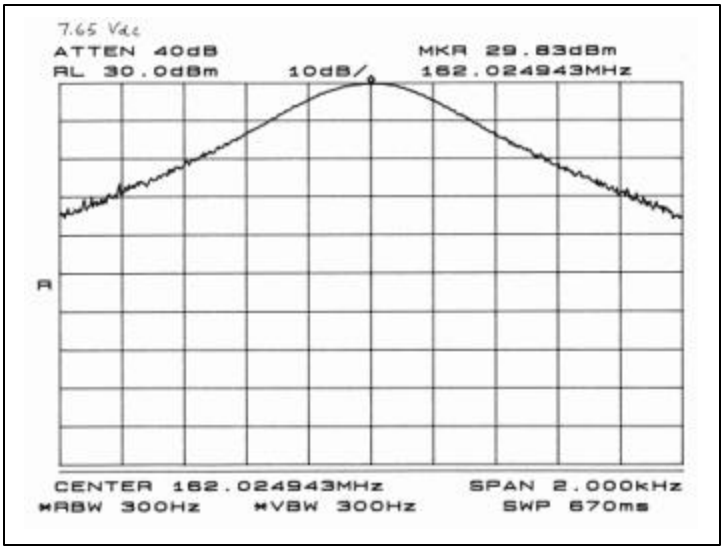
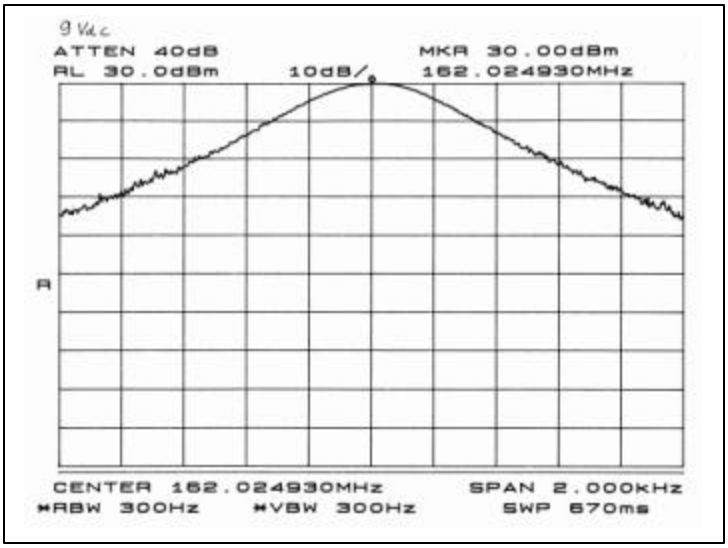
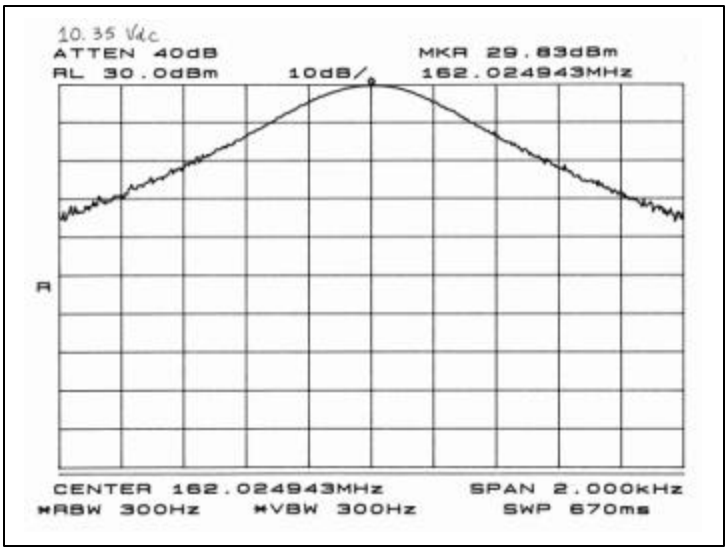
7.65Vdc



9Vdc



10.35Vdc



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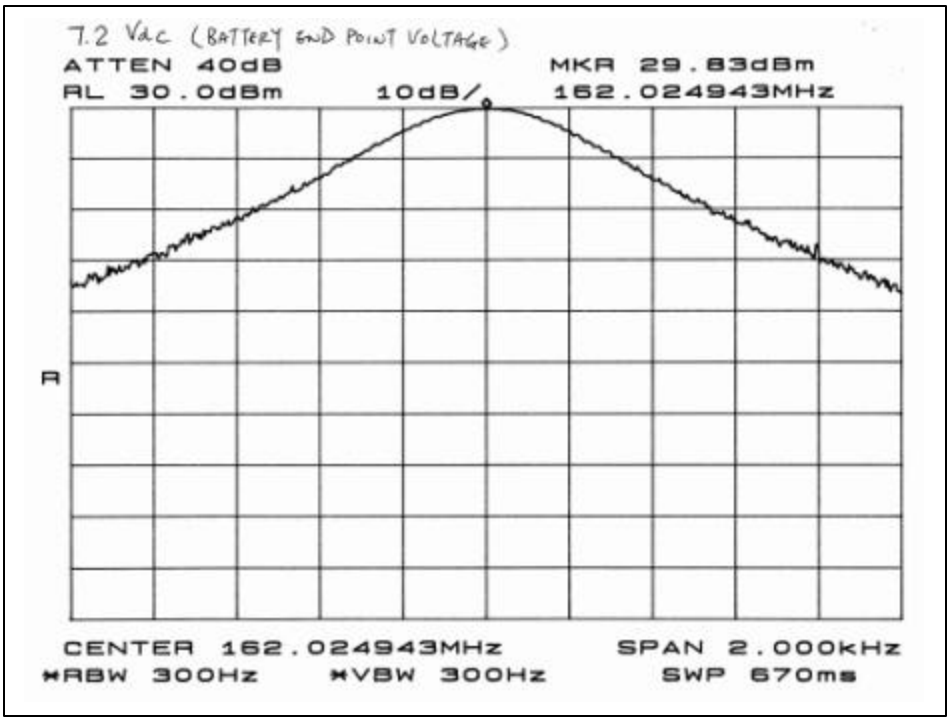

7.2 Vdc Battery End Point Voltage

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9. TRANSIENT FREQUENCY BEHAVIOR

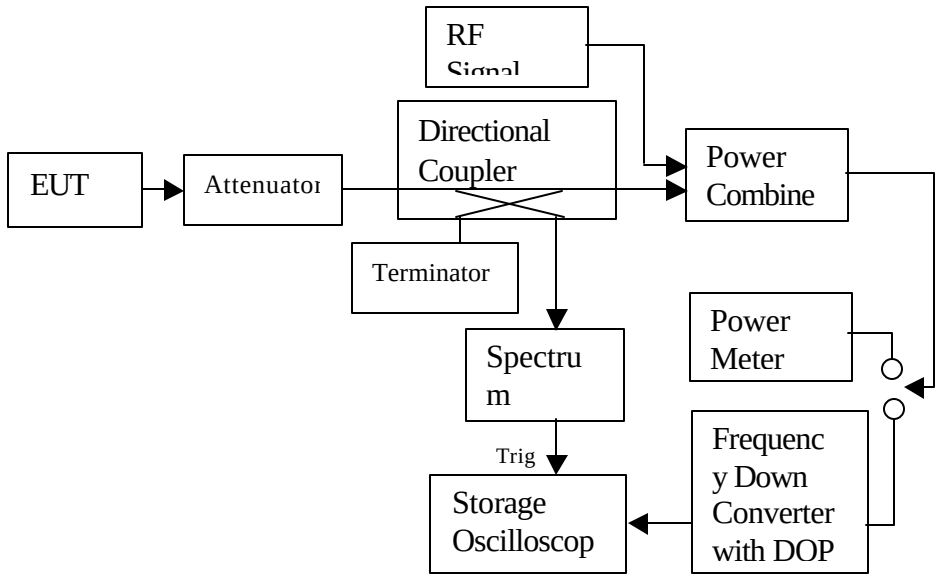
9.1. INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	06/20/03
Modulation Analyzer	HP	8901A	5/31/02
RF Synthesizer	HP	83732B	3/29/03
Storage Oscilloscope	Tektronix	11403/72/34	4/20/03
Power Meter	HP	436B	4/15/03
Directional Coupler	Werlatone	C6021	N.C.R
Power Combiner	N/A	N/A	N/A
Attenuator	N/A	N/A	N/A

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	☒ Peak ☐ Quasi Peak	☒ 100 KHz ☐ 120 KHz	☒ 100 KHz ☐ 120 KHz
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

9.2. TEST SETUP



*p.s. Setup in according to TIA/EIA 603

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9.3. TEST PROCEDURE

a) Connect the equipment as illustrated.
b) Connect the test receiver's Demodulator Output Port (DOP) to the vertical input channel of the storage oscilloscope. Connect the output of the RF peak detector to the external trigger on the storage oscilloscope. Connect the output of the RF combiner to the RF power meter.
c) Set the test receiver to measure FM deviation with the audio bandwidth set at ≤ 50 Hz to ≥15,000 Hz and tune the RF frequency to the transmitter assigned frequency.
d) Set the signal generator to the assigned transmitter frequency and modulated it with a 1 kHz tone at ±25 kHz deviation and set its output level to –100 dBm.
e) Turn the transmitter on.
f) Supply sufficient attenuation via the RF attenuator to provide an input level to the test receiver which is approximately 40 dB below the test receiver's maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the RF power meter.
g) Turn the transmitter off.
h) Adjust the RF level of the signal generator to provide RF power into the RF power meter 20dB below the level noted in step f). This signal generator RF level shall be maintained throughout the rest of the measurement.
i) Disconnect the RF power meter and connect the output of the RF combiner network to the input of the test receiver.
j) Set the horizontal sweep rate on the storage oscilloscope to 10 milliseconds per division and adjust the display to continuously view the 1000 Hz tone from the DOP. Adjust the vertical amplitude control of the oscilloscope to display the 1000 Hz at ±4 divisions vertically centered on the display.
k) Adjust the oscilloscope so it will trigger on an increasing magnitude from the RF peak detector at 1 division from the left side of the display when the transmitter is turned on. Set the controls to store the display.
l) Reduce the attenuation of the RF attenuator so the input to the RF peak detector and the RF combiner is increased by 30 dB when the transmitter is turned on.
m) Turn on the transmitter and observe the stored display. The output at the DOP, due to the change in the ratio of power between the signal generator input power and the transmitter output power will, because of the capture effect of the test receiver, produce a change in display. For the first part of the sweep it will show the 1 kHz test signal. Then once the receiver's demodulator has been captured by the transmitter power, the display will show the frequency difference from the assigned frequency to the actual transmitter frequency versus time. The instant when the 1 kHz test signal is completely suppressed (including any capture time due phasing) is considered to be $t_{on.}$ The trace should be maintained within the allowed divisions during the period t_1 and t_2. See the figure in the appropriate standards section.
n) During the time from the end of t_2 to the beginning of t_3 the frequency difference should not exceed the limits set by the FCC in part 90.213 and outlined in the Carrier

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Frequency Stability sections. The allowed limit is equal to the transmitter frequency times its FCC frequency tolerance times ±4 display divisions divided by 25 kHz. For example, at a transmitter assigned frequency of 500 MHz and a frequency tolerance of 5 ppm. This would be 500 MHz times 5 ppm times ±4 divisions divided by 25 kHz. This equals ±0.4 divisions in this example. Greater vertical sensitivity may be required to view this accuracy.

o) Turn on the transmitter and observe the stored display. The trace should be maintained within the allowed divisions after the end of t_2 and remain within it until the end of the trace. See the figure in the appropriate standards sections.
p) To test t he transient frequency behavior during the period t_3, the transmitter shall be switched on.
q) Adjust the oscilloscope trigger controls so it will trigger on a decreasing magnitude from the RF peak detector, at 1 division from the right side of the display, when the transmitter is turned off. Set the controls to store the display. The moment when the 1 kHz test signal starts to rise is considered to provide $t_{off.}$
r) The transmitter shall be switched off.
s) Observe the display. The trace should remain within the allowed divisions during period $t_{3.}$ See the figures in the appropriate standards section.

9.4. MEASUREMENT RESULT

Complies. See plots *TransientOn* and *TransientOff*.

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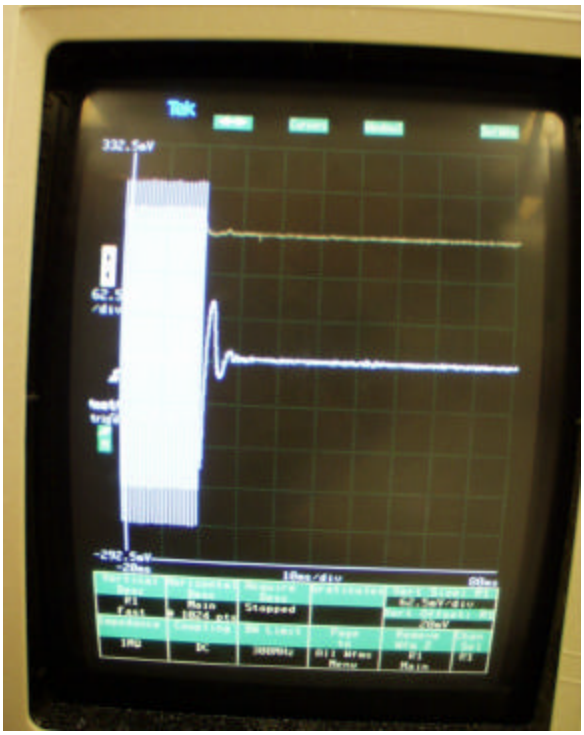
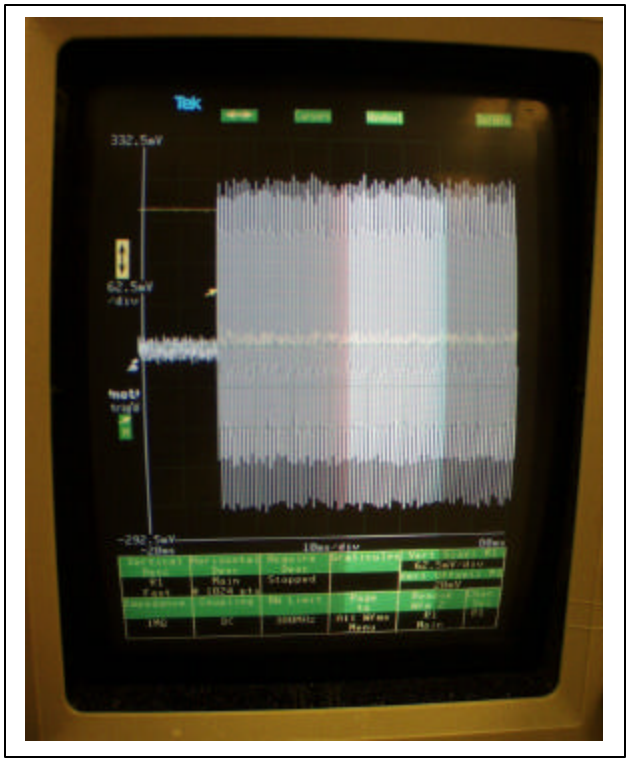
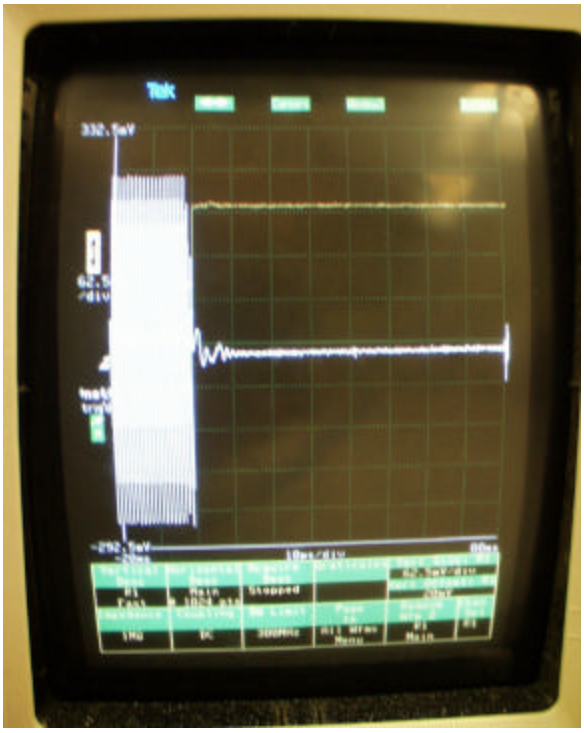


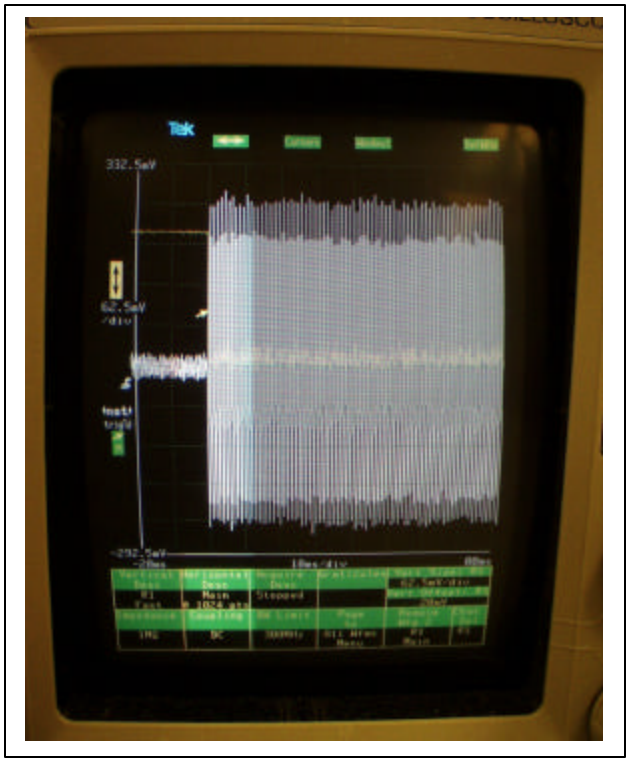
Hi Power_ Channel 1_On



Hi Power_ Channel 1_Off



Low Power_ Channel 1_On



Low Power_ Channel 1_Off

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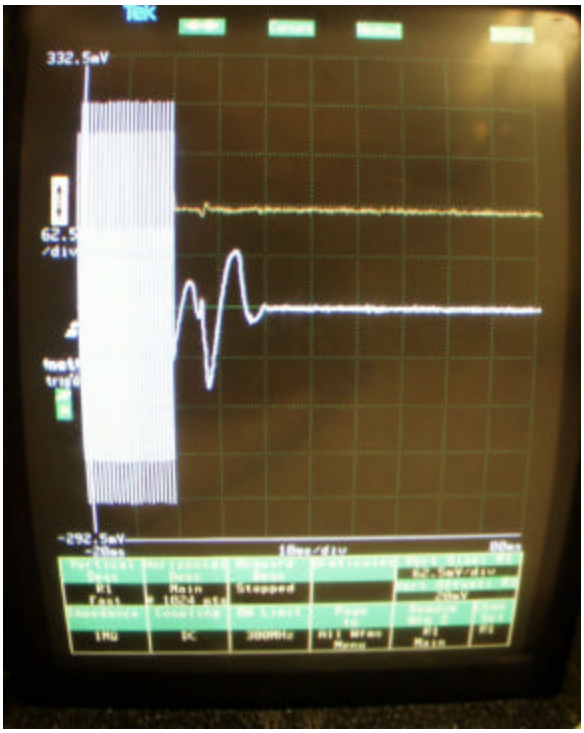
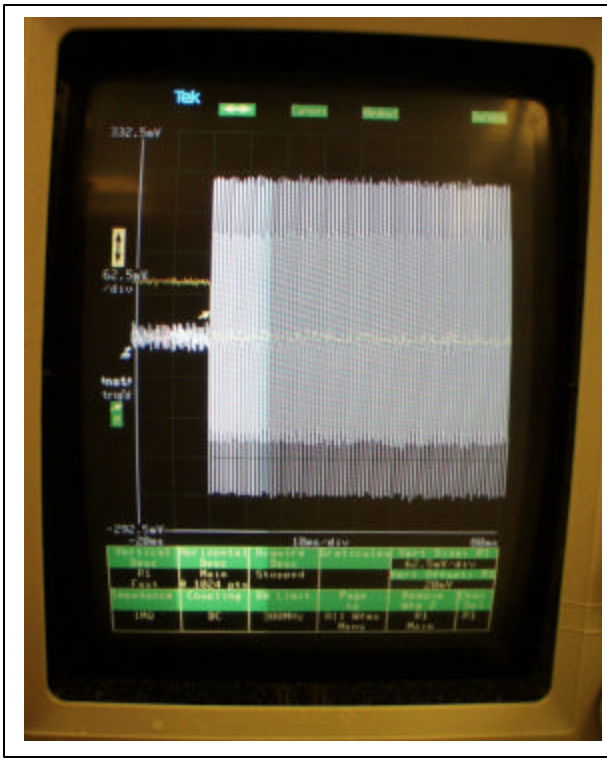
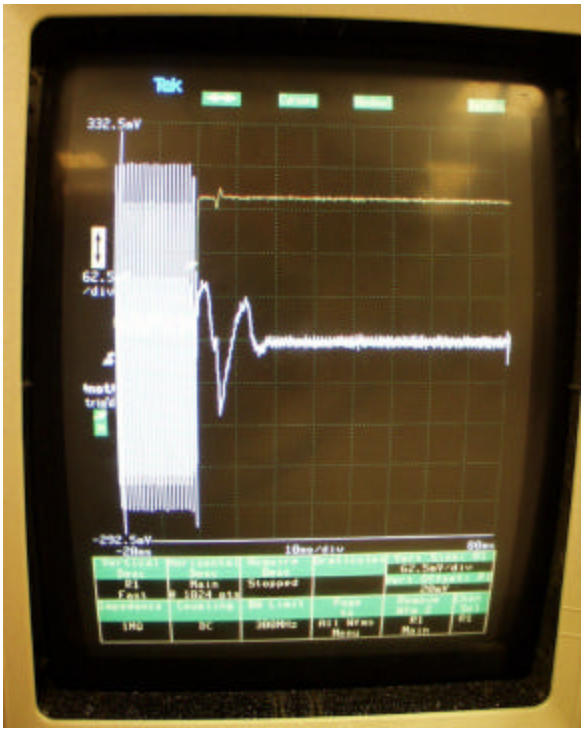


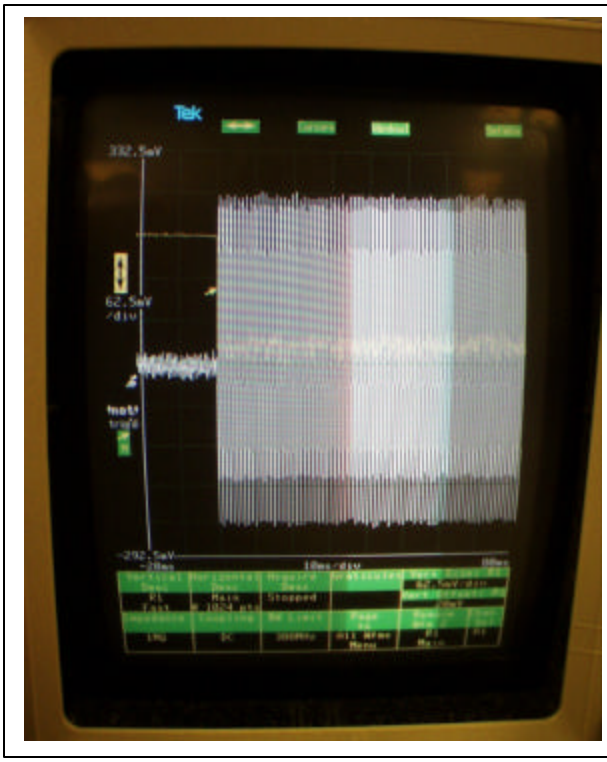
Hi Power_ Channel 2_On



Hi Power_ Channel 2_Off



Low Power_ Channel 2_On



Low Power_ Channel 2_Off

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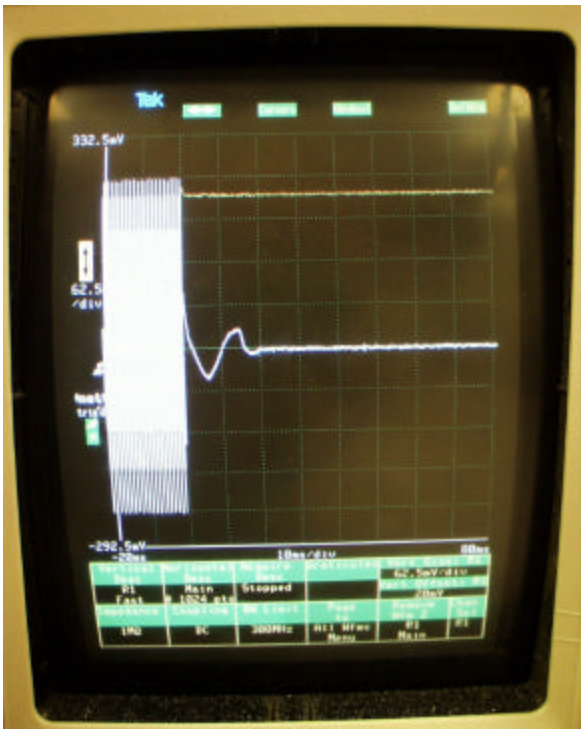
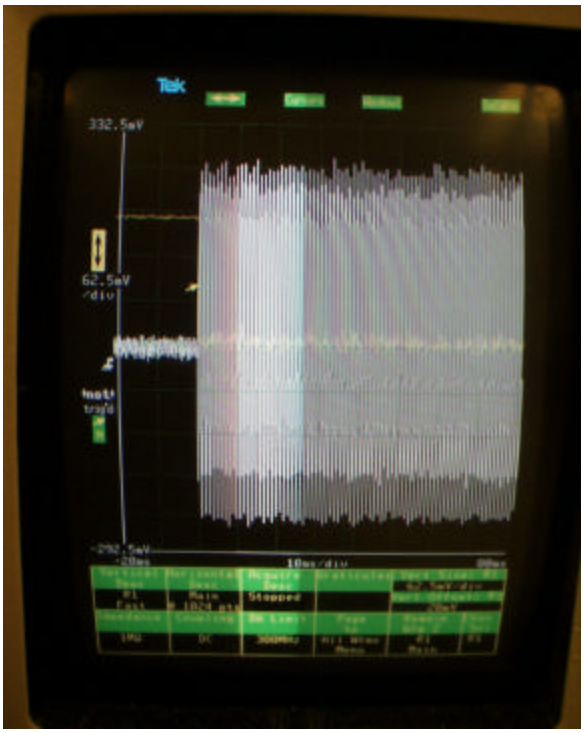
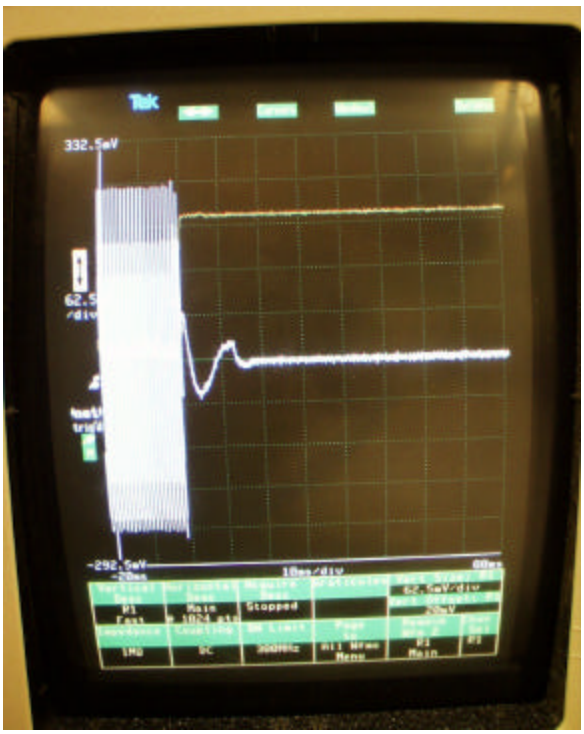


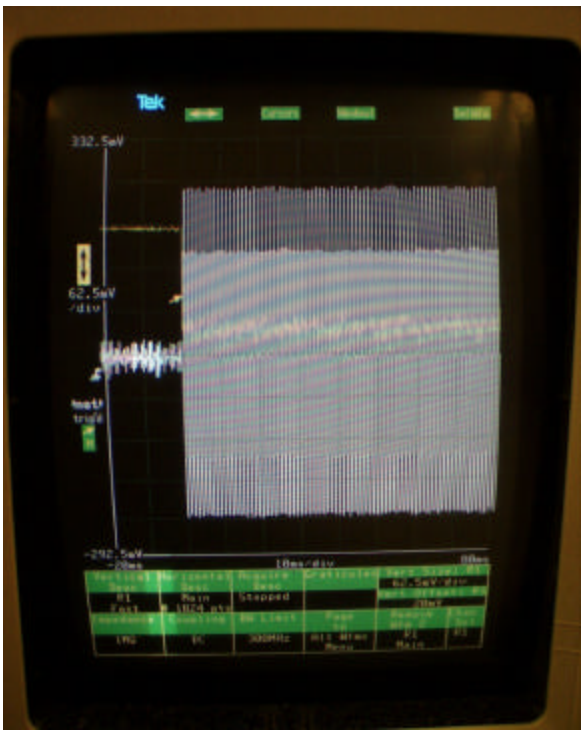
Hi Power_ Channel 3_On



Hi Power_ Channel 3_Off



Low Power_ Channel 3_On



Low Power_ Channel 3_Off

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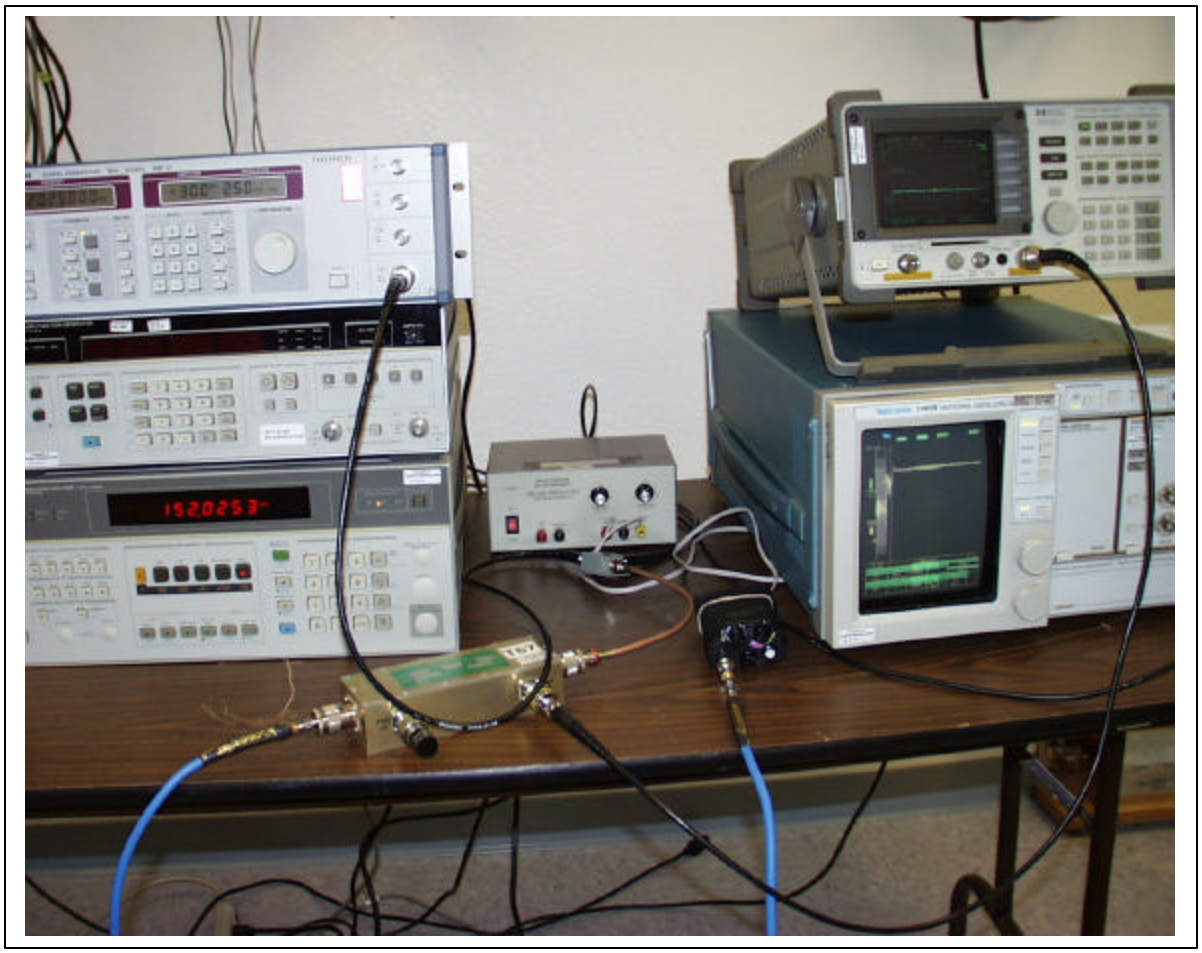

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10. APPENDIX

EXHIBIT 1: **User Manual**

EXHIBIT 2: **EUT External Photos**

EXHIBIT 3: **EUT Internal Photos**

EXHIBIT 4: **Schematic**

EXHIBIT 5: **Block Diagram**

EXHIBIT 6: **Operational Description**

EXHIBIT 7: **Report of Measurements**

EXHIBIT 8: **Setup photo**

EXHIBIT 9: **Labeling**

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