

APPENDIX A: TEST DATA FOR ADDITIONAL ANTENNAS - MOTORCYCLE OPTION

16 FCC PART 2 §2.1046 (A): RF POWER OUTPUT: RADIATED

16.1 RF POWER OUTPUT: RADIATED TEST PROCEDURE

Substitution Method:

The EUT was setup at an antenna-to-EUT distance of 3 meters on an open area test site. The EUT was placed on a nonconductive turntable 1.0 meter above the ground plane. The physical arrangement of the EUT was varied through three orthogonal planes in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The worst-case maximum radiated emission was recorded and used as reference for the measurement. The EUT was then replaced by a ½ wave dipole antenna and polarized in accordance with the EUT's antenna polarization. The ½ wave dipole antenna was connected to a RF signal generator with a coaxial cable. The search antenna height, and search antenna polarity, were set to levels that produced the maximum reading obtained. The signal generator was adjusted to a level that produced that maximum radiated emission level. The signal generator level was recorded and corrected by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal ½ wave dipole antenna. The signal generator corrected level is the ERP level.

16.2 RF POWER OUTPUT: §2.1046 RADIATED TEST DATA

Frequencies tested: 413.0 and 430.0 MHz

Antennas tested: LE-OM406BK/TNC and LE-OM420BK/TNC

The worst-case Output Power (highest) levels are shown.

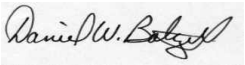
TABLE 16-1: RADIATED CARRIER OUTPUT POWER (WHIP/COIL ANTENNA ON MOTORCYCLE MOUNT)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)*	Antenna Factor (dBd)	ERP (dBm)	ERP (W)
413	125.9	46.6	0.2	-0.60	45.80	38.02
430	126.3	47.0	0.2	-0.55	46.25	42.17

*Cable loss from transmitting antenna to signal generator

*Measurement accuracy is +/- .5 dB

TEST PERSONNEL:

Daniel Baltzell		November 26, 2003
TEST ENGINEER	SIGNATURE	DATE OF TEST

16.3 TEST EQUIPMENT

TABLE 16-2: TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	not req'd
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 - 20 GHz)	3610A00866	8/5/04
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna, (20 MHz - 2 GHz)	2648	7/03/04
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cable, 36"	N/A	1/30/04
901231	IW Microwave Products	KPW-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	w/o top for wireless testing	not req'd
900154	Compliance Design Inc,	Roberts Dipole	Adjustable Elements Dipole Antenna (30 - 1000 MHz)	900154	10/6/04

17 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

17.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

Digital Modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps

The spurious emission levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator and the gain of the antenna was further corrected to a half wave dipole.

17.2 TEST DATA

CFR 47 PART 90.210 REQUIREMENTS

Frequencies tested: 413.0 and 430.0 MHz

Antennas tested: LE-OM406BK/TNC and LE-OM420BK/TNC

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

TABLE 17-1: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL 2 – 413 MHZ; NARROW BAND, HIGH POWER

Limit = $50 + 10 \log P = 67.29 \text{ dBc}$
Conducted Power = 47.29 dBm = 53.6 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
826	49.7	-22.1	0.4	-1.25	71.1	-3.7
1239	46.1	-25.3	0.4	2.14	70.9	-3.6
1652	24.7	-36.9	0.5	4.71	80.0	-12.7
2065	46.2	-55.6	6.1	4.89	104.1	-36.8
2478	42.9	-49.7	6.8	5.14	98.7	-31.4
2891	37	-54.1	7.5	6.01	102.9	-35.6
3304	42.7	-47.8	7.9	6.07	96.9	-29.6
3717	37.9	-51.2	7.8	5.91	100.4	-33.1
4130	35.3	-51.3	8.2	6.16	100.6	-33.3

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the $\frac{1}{2}$ wave dipole antenna.

TABLE 17-2: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL 2 – 430 MHZ; NARROW BAND, HIGH POWER

Limit = $50 + 10 \log P = 67.29 \text{ dBc}$
Conducted Power = $47.29 \text{ dBm} = 53.6 \text{ W}$

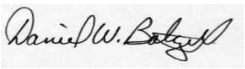
Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
860	49.3	-24.5	0.4	-1.15	73.4	-6.1
1290	45.2	-26.3	0.4	3.1	70.9	-3.6
1720	30	-32.0	0.5	4.74	75.1	-7.8
2150	44.1	-48.4	6.1	4.94	96.9	-29.6
2580	46.4	-45.5	7.4	5.33	94.9	-27.6
3010	40.3	-50.0	7.7	6.24	98.8	-31.5
3440	49.7	-40.6	7.6	5.99	89.5	-22.2
3870	39.3	-49.0	8	5.88	98.4	-31.1
4300	34.8	-51.0	7.8	6.57	99.5	-32.2

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the $\frac{1}{2}$ wave dipole antenna.

TABLE 17-3: TEST EQUIPMENT USED FOR TESTING FIELD STRENGTH OF SPURIOUS RADIATION

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	not req'd
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 - 20 GHz)	3610A00866	8/5/04
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna, (20 MHz - 2 GHz)	2648	7/03/04
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cable, 36"	N/A	1/30/04
901231	IW Microwave Products	KPW-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
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TEST PERSONNEL:

Daniel Baltzell		November 26, 2003
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST