



Test Report 3/2007

Applicant Dataradio Inc., a Calamp Company
5500 Royalmount Avenue
Suite 200, TMR, Montreal
Quebec, Canada, H4P 1H7

EUT catalog number SDR-T-001/80 – Exciter module of the
BDP4-800-F-070-2-8 basestation

Model SDR-T-001/80

**EUT Identification
(FCC, IC, other)** FCC ID: EOTBDP4-EXT8
Industry Canada: 773A-BDP4-EXT8

**In Accordance With
(main references)** Private Land Mobile Radio Services standards as of
US's FCC Part 90 and Canada's RSS 119 issue 9

Tested By R&D of Dataradio COR, a Calamp company
299 Johnson Ave, Suite 110
Waseca, MN 56093

Document #/pages 156-90000-902 / 13 pages

Authorized By Chris Ludewig

A handwritten signature in black ink, appearing to read "Chris Ludewig".

Director of Engineering, Dataradio COR

Release Date Oct 29, 2007

Report Summary

These tests were conducted on a sample of equipment for the purpose of demonstrating its compliance with the restrictions for the unwanted emissions of the transmitter in both radiated or conducted components of the spurious emission. The procedure shown in EIA/TIA 603-B, paragraph 2.2.12 was the standard procedure followed through the test. This measurement method is similar to the one shown in FCC part 90.543(b) or in Canada's RSS 119 issue 9 paragraph 4.3.

The assessment summary is:

EQUIPMENT UNDER TEST Prototype Exciter 26dBm 800 MHz band SDR-T-001/80

SERIAL NUMBER (S): NA

SPECIFICATIONS: FCC part 90.210, RSS 119 issue 9 paragraph 5.8

COMPLAINCE STATUS: **Compliant**

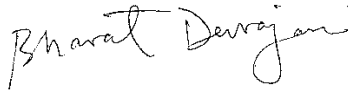
EXCLUSIONS: None

NON-COMPLAINCES: None

TEST RESULTS SUMMARY

Test name	Page No	Worst case data	Margin	Assessment
Conducted Spurious at antenna terminals	4	65.29 dBc	39.29dB	Passed
Field Strength of Spurious Radiation	7	56.84dBc	10.84dB	Passed

The technical data included in this report has been accumulated through tests that were performed by me or under my direction. To the best of my knowledge, all of the data is true and correct



PERFORMED BY:

Bharat Devrajani

Date: 09/04/07

TEST CONDITIONS:

The procedure shown in EIA/TIA 603-B, paragraph 2.2.12 was the standard procedure followed through the test. This measurement method is similar to the one shown in FCC part 90.543(b) or in Canada's RSS 119 issue 9 paragraph 4.3.

The test ran in standard environmental test conditions, at 22⁰C, 30-50% RH.

CALIBRATED TEST EQUIPMENT:

Equipment	Manufacturer	Model
Waveguide Horn Antenna	EMCO	EMCO
Bilog Antenna	Chase	CBL6111B
Log Periodic Linear Polarization Antenna	AILTECH	94612-1
Dipole Antenna	Electro-Metrics	EM-6924
DC Power Source	Hewlett-Packard (Agilent)	HP6284A
Power Meter	Hewlett-Packard (Agilent)	HP436A
Spectrum Analyzer	Hewlett-Packard (Agilent)	HP8563E
Audio Generator	Hewlett-Packard (Agilent)	HP8903B
Reference Generator	Agilent	E8257D
Digital Voltmeter	Fluke	8012A
50-Ohm Load	Lucas Weinschel	58-30-43

The OATS located on

299 Johnson Avenue, Waseca, MN, USA

is registered for 3m OATS measurements with both FCC and Industry Canada.

Registration files are:

FCC Test Firm 15234

IC Test Firm 773B-1

NAME OF TEST: Transmitter Spurious and Harmonic Outputs

RULE PART NUMBER: FCC 2.1051, 90.210 (g)(h); IC RSS Gen, RSS 119 part 5.8.3 9 (mask G) and 5.8.6 (mask D)

MINIMUM STANDARDS: FCC For 0.4 Watts; $43+10\text{Log}_{10}(0.4 \text{ Watts}) = 39 \text{ dBc}$
 For 0.004 Watts; $43+10\text{Log}_{10}(0.004 \text{ Watts}) = 19 \text{ dBc}$
 :IC For 0.4 Watts; $50+10\text{Log}_{10}(0.4 \text{ Watts}) = 46 \text{ dBc}$
 For 0.004 Watts; $50+10\text{Log}_{10}(0.004 \text{ Watts}) = 26 \text{ dBc}$
 or 70 dBc whichever is the lesser attenuation.

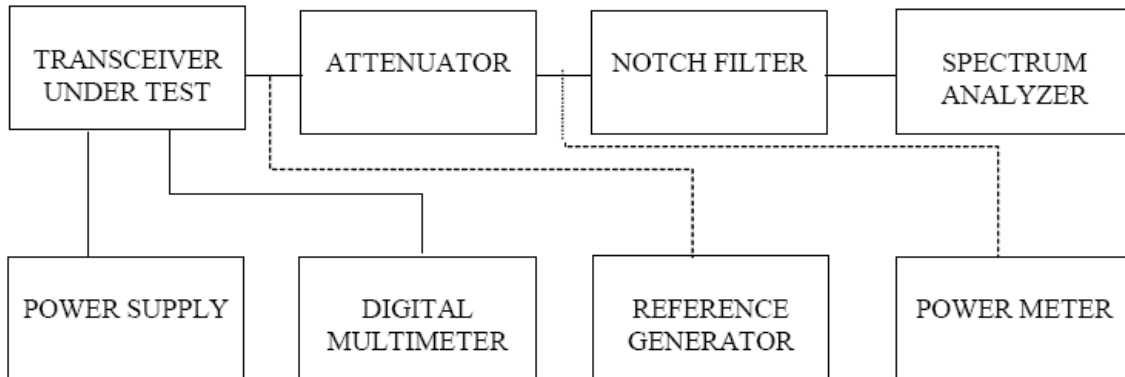
TEST RESULTS: Meets minimum standards (see data on following page)

TEST CONDITIONS: Standard Test Conditions, 25 C
 RF Voltage measured at antenna terminals

TEST PROCEDURE: TIA/EIA – 603-B, 2.2.13

TEST EQUIPMENT: 50-Ohm Attenuators, Pasternack Model PE4131 / 10 dB / 20 Watt
 50-Ohm Attenuators, MCL Model 5W-S20 / 20 dB / 5 Watt
 50-Ohm Attenuators, Inmet Model 6B-10W / 20 dB / 10 Watt
 Power Supply, Instek Model GPS-2303
 Spectrum Analyzer, HP 8563E
 Reference Generator, Agilent Model E8257D
 Notch Filter

TEST SET-UP:



MEASUREMENT PROCEDURE:

1. The transmitter carrier output frequency is 851.00625, 860.0125, and 868.9875 MHz. The reference oscillator frequency is 24.576 MHz. The transmitter has voltage level of 13.6 Volts.
2. After the carrier reference was established on the spectrum analyzer, the notch filter was adjusted to null the carrier fundamental to extend the range of the spectrum analyzer for harmonic measurements.
3. At each spurious frequency, generation substitution was used to establish the true spurious level.
4. The spectrum was scanned to the 10th harmonic

TEST DATA:

Fo = 851.00625 MHz
 13.6 Volts @ 26.0 dBm

Attenuation Spec = 46 dBc

Harmonic	Frequency (MHz)	Level Relative to Carrier (dBc)	Passed by (dB)
2	1702.01250	-97.52	51.52
3	2553.01875	-101.05	55.05
4	3404.02500	-94.87	48.87
5	4255.03125	-102.52	56.52
6	5106.03750	-101.63	55.63
7	5957.04375	-99.27	53.27
8	6808.05000	-101.00	55
9	7659.05625	-92.24	46.24
10	8510.06250	-89.00	43

Fo = 860.0125 MHz
 13.6 Volts @ 26.0 dBm

Attenuation Spec = 46 dBc

Harmonic	Frequency (MHz)	Level Relative to Carrier (dBc)	Passed by (dB)
2	1720.02500	-99.32	53.32
3	2580.03750	-98.92	52.92
4	3440.05000	-90.82	44.82
5	4300.06250	-104.17	58.17
6	5160.07500	-106.28	60.28
7	6020.08750	-99.10	53.1
8	6880.10000	-99.51	53.51
9	7740.11250	-94.15	48.15
10	8600.12500	-90.00	44

Fo = 868.9875 MHz
 13.6 Volts @ 26.0 dBm

Attenuation Spec = 46 dBc

Harmonic	Frequency (MHz)	Level Relative to Carrier (dBc)	Passed by (dB)
2	1737.97500	-99.12	53.12
3	2606.96250	-98.75	52.75
4	3475.95000	-90.82	44.82
5	4344.93750	-104.17	58.17
6	5213.92500	-106.30	60.3
7	6082.91250	-99.10	53.1
8	6951.90000	-98.84	52.84
9	7820.88750	-94.15	48.15
10	8689.87500	-89.00	43

Fo = 851.00625 MHz
 13.6 Volts @ 6.0 dBm

Attenuation Spec = 26 dBc

Harmonic	Frequency (MHz)	Level Relative to Carrier (dBc)	Passed by (dB)
2	1702.01250	-75.53	49.53
3	2553.01875	-80.67	54.67
4	3404.02500	-77.74	51.74
5	4255.03125	-76.56	50.56
6	5106.03750	-82.51	56.51
7	5957.04375	-83.56	57.56
8	6808.05000	-73.30	47.3
9	7659.05625	-74.14	48.14
10	8510.06250	-68.29	42.29

Fo = 860.0125 MHz
 13.6 Volts @ 6.0 dBm

Attenuation Spec = 26 dBc

Harmonic	Frequency (MHz)	Level Relative to Carrier (dBc)	Passed by (dB)
2	1720.02500	-75.73	49.73
3	2580.03750	-82.69	56.69
4	3440.05000	-76.04	50.04
5	4300.06250	-78.13	52.13
6	5160.07500	-82.21	56.21
7	6020.08750	-82.00	56
8	6880.10000	-81.33	55.33
9	7740.11250	-67.82	41.82
10	8600.12500	-66.27	40.27

Fo = 868.9875 MHz
 13.6 Volts @ 6.0 dBm

Attenuation Spec = 26 dBc

Harmonic	Frequency (MHz)	Level Relative to Carrier (dBc)	Passed by (dB)
2	1737.97500	-78.95	52.95
3	2606.96250	-84.85	58.85
4	3475.95000	-78.75	52.75
5	4344.93750	-74.93	48.93
6	5213.92500	-80.69	54.69
7	6082.91250	-80.56	54.56
8	6951.90000	-78.32	52.32
9	7820.88750	-69.10	43.1
10	8689.87500	-65.29	39.29

NAME OF TEST: Field Strength of Spurious Radiation

RULE PART NUMBER: FCC 2.1051, 90.210 (g)(h); IC RSS Gen, RSS 119 part 5.8.3 9 (mask G) and 5.8.6 (mask D)

MINIMUM STANDARDS: FCC For 0.4 Watts; $43+10\text{Log}_{10}(0.4 \text{ Watts}) = 39 \text{ dBc}$
 For 0.004 Watts; $43+10\text{Log}_{10}(0.004 \text{ Watts}) = 19 \text{ dBc}$
 :IC For 0.4 Watts; $50+10\text{Log}_{10}(0.4 \text{ Watts}) = 46 \text{ dBc}$
 For 0.004 Watts; $50+10\text{Log}_{10}(0.004 \text{ Watts}) = 26 \text{ dBc}$
 or 70 dBc whichever is the lesser attenuation.

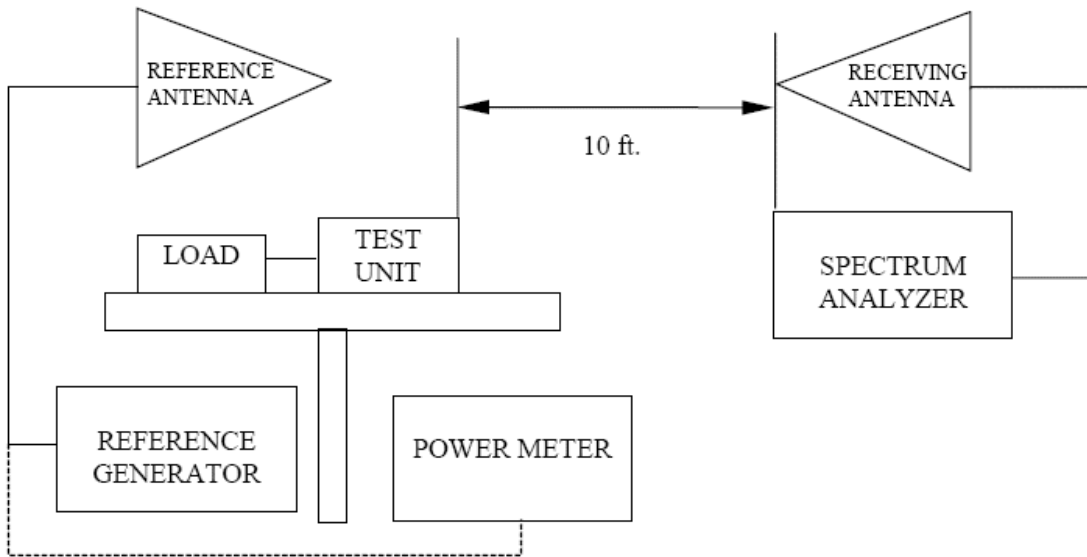
TEST RESULTS: Meets minimum standards (see data on following page)

TEST CONDITIONS: Standard Test Conditions, 25 C

TEST EQUIPMENT: Waveguide Horn Antenna, EMCO Model 3115
 Bilog Antenna, Chase Model CBL6111B
 Log Periodic Linear Polarization Antenna, AILTECH Model 94612-1
 Dipole Antenna, Electro-Metrics Model EM-6924
 Power Supply, Model HP-6284A
 Spectrum Analyzer, Model Hp-8563E
 Reference Generator, Agilent Model E8257D
 Power Meter, Model HP436A
 50-Ohm Load, Lucas Weinschel 58-30-43

MEASUREMENT PROCEDURE: Radiated spurious attenuation was measured according to TIA/EIA Standard 603-B Section 2.2.12

TEST SET-UP:



Frequency: 851.00625 MHz Power: 26 dBm @ 13.6V Attenuation Spec = 46 dBc

Spurious Frequency (MHz)	Polarization (Horz/Vert)	Spurious Level (dBm)	Subs. Gen. (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Spurious Attenuation dBc
1702.01250	H	-90.48	-48.8	3.33	3.09	75.04
	V	-90.23	-47.5	3.33	3.09	73.74
2553.01875	H	-89.80	-41.4	5.33	2.33	70.4
	V	-91.45	-45.1	5.33	2.33	74.1
3404.02500	H	-89.28	-39.8	7.00	3.20	69.6
	V	-89.45	-39.5	7.00	3.20	69.3
4255.03125	H	-88.85	-34.2	8.50	2.90	65.8
	V	-90.48	-37.5	8.50	2.90	69.1
5106.03750	H	-90.34	-33.3	9.00	2.54	65.76
	V	-90.10	-34.3	9.00	2.54	66.76
5957.04375	H	-90.10	-30.7	11.17	2.36	65.51
	V	-89.70	-29.5	11.17	2.36	64.31
6808.05000	H	-90.67	-24.7	12.00	-0.65	63.35
	V	-89.28	-25.0	12.00	-0.65	63.65
7659.05625	H	-90.10	-23.1	12.87	1.35	60.62
	V	-90.00	-23.7	12.87	1.35	61.22
8510.06250	H	-93.77	-24.0	13.00	1.04	61.96
	V	-92.67	-23.3	13.00	1.04	61.26

Frequency: 860.0125 MHz Power: 26 dBm @ 13.6V Attenuation Spec = 46 dBc

Spurious Frequency (MHz)	Polarization (Horz/Vert)	Spurious Level (dBm)	Subs. Gen. (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Spurious Attenuation dBc
1720.02500	H	-90.28	-48.5	3.33	3.09	74.74
	V	-91.91	-49.0	3.33	3.09	75.24
2580.03750	H	-90.10	-43.1	5.33	2.33	72.1
	V	-89.28	-42.7	5.33	2.33	71.7
3440.05000	H	-88.67	-38.6	7.00	3.20	68.4
	V	-92.10	-41.9	7.00	3.20	71.7
4300.06250	H	-90.10	-36.5	8.50	2.90	68.1
	V	-89.00	-36.0	8.50	2.90	67.6
5160.07500	H	-88.00	-32.0	9.00	3.73	63.27
	V	-88.00	-31.1	9.00	3.73	62.37
6020.08750	H	-89.00	-28.0	11.17	2.36	62.81
	V	-90.28	-28.9	11.17	2.36	63.71
6880.10000	H	-90.34	-25.1	12.00	-0.65	63.75
	V	-91.10	-26.6	12.00	-0.65	65.25
7740.11250	H	-91.20	-23.2	13.00	1.35	60.85
	V	-92.00	-23.3	13.00	1.35	60.95
8600.12500	H	-93.54	-22.5	14.00	1.04	61.46
	V	-93.33	-23.3	14.00	1.04	62.26

Frequency: 868.9875 MHz Power: 26 dBm @ 13.6V Attenuation Spec = 46 dBc

Spurious Frequency (MHz)	Polarization (Horz/Vert)	Spurious Level (dBm)	Subs. Gen. (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Spurious Attenuation dBc
1737.97500	H	-90.48	-48.0	3.33	3.09	74.24
	V	-91.91	-48.6	3.33	3.09	74.84
2606.96250	H	-91.10	-44.2	5.33	4.48	71.05
	V	-89.28	-42.3	5.33	4.48	69.15
3475.95000	H	-88.67	-37.4	7.33	3.20	67.53
	V	-92.13	-42.0	7.33	3.20	72.13
4344.93750	H	-90.20	-37.7	8.50	3.93	68.27
	V	-89.00	-36.0	8.50	3.93	66.57
5213.92500	H	-87.00	-29.3	9.15	3.73	60.72
	V	-88.34	-30.3	9.15	3.73	61.72
6082.91250	H	-89.37	-26.6	11.17	2.36	61.41
	V	-90.28	-28.3	11.17	2.36	63.11
6951.90000	H	-90.34	-26.3	12.00	3.58	60.72
	V	-91.17	-26.5	12.00	3.58	60.92
7820.88750	H	-91.33	-22.3	13.50	4.66	57.14
	V	-90.00	-22.0	13.50	4.66	56.84
8689.87500	H	-92.00	-21.8	14.35	1.87	60.28
	V	-94.50	-24.3	14.35	1.87	62.78

Frequency: 851.00625 MHz Power: 6.0 dBm @ 13.6V Attenuation Spec = 26 dBc

Spurious Frequency (MHz)	Polarization (Horz/Vert)	Spurious Level (dBm)	Subs. Gen. (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Spurious Attenuation dBc
1702.01250	H	-90.00	-48.3	3.33	3.09	54.54
	V	-88.28	-45.6	3.33	3.09	51.84
2553.01875	H	-88.67	-40.3	5.33	2.33	49.3
	V	-92.13	-45.8	5.33	2.33	54.8
3404.02500	H	-90.20	-40.7	7.00	3.20	50.5
	V	-89.00	-39.0	7.00	3.20	48.8
4255.03125	H	-90.10	-35.4	8.50	2.90	47
	V	-89.28	-36.3	8.50	2.90	47.9
5106.03750	H	-88.67	-31.7	9.00	2.54	44.16
	V	-92.10	-36.3	9.00	2.54	48.76
5957.04375	H	-88.67	-29.2	11.17	2.36	44.01
	V	-92.13	-31.9	11.17	2.36	46.71
6808.05000	H	-90.20	-24.2	12.00	-0.65	42.85
	V	-89.00	-24.7	12.00	-0.65	43.35
7659.05625	H	-89.00	-22.0	12.87	1.35	39.52
	V	-88.34	-22.0	12.87	1.35	39.52
8510.06250	H	-93.15	-23.4	13.00	1.04	41.36
	V	-94.00	-24.7	13.00	1.04	42.66

Frequency: 860.0125 MHz Power: 6.0 dBm @ 13.6V Attenuation Spec = 26 dBc

Spurious Frequency (MHz)	Polarization (Horz/Vert)	Spurious Level (dBm)	Subs. Gen. (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Spurious Attenuation dBc
1720.02500	H	-90.10	-48.3	3.33	3.09	54.54
	V	-89.70	-46.8	3.33	3.09	53.04
2580.03750	H	-90.67	-43.7	5.33	2.33	52.7
	V	-89.28	-42.7	5.33	2.33	51.7
3440.05000	H	-90.67	-40.6	7.00	3.20	50.4
	V	-89.28	-39.1	7.00	3.20	48.9
4300.06250	H	-90.10	-36.5	8.50	2.90	48.1
	V	-93.25	-40.3	8.50	2.90	51.9
5160.07500	H	-91.10	-35.1	9.00	3.73	46.37
	V	-91.20	-34.3	9.00	3.73	45.57
6020.08750	H	-90.00	-29.0	11.17	2.36	43.81
	V	-88.28	-26.9	11.17	2.36	41.71
6880.10000	H	-88.67	-23.4	12.00	-0.65	42.05
	V	-92.13	-27.6	12.00	-0.65	46.25
7740.11250	H	-90.20	-22.2	13.00	1.35	39.85
	V	-89.00	-20.3	13.00	1.35	37.95
8600.12500	H	-87.00	-16.0	14.00	1.04	34.96
	V	-92.13	-22.1	14.00	1.04	41.06

Frequency: 868.9875 MHz Power: 6.0 dBm @ 13.6V Attenuation Spec = 26 dBc

Spurious Frequency (MHz)	Polarization (Horz/Vert)	Spurious Level (dBm)	Subs. Gen. (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Spurious Attenuation dBc
1737.97500	H	-88.67	-46.2	3.33	3.09	52.44
	V	-92.13	-48.8	3.33	3.09	55.04
2606.96250	H	-90.20	-43.3	5.33	4.48	50.15
	V	-89.00	-42.1	5.33	4.48	48.95
3475.95000	H	-90.10	-38.8	7.33	3.20	48.93
	V	-89.28	-39.1	7.33	3.20	49.23
4344.93750	H	-88.67	-36.2	8.50	3.93	46.77
	V	-92.10	-39.1	8.50	3.93	49.67
5213.92500	H	-90.10	-32.4	9.15	3.73	43.82
	V	-89.00	-31.0	9.15	3.73	42.42
6082.91250	H	-90.10	-27.3	11.17	2.36	42.11
	V	-90.10	-28.1	11.17	2.36	42.91
6951.90000	H	-89.70	-25.7	12.00	3.58	40.12
	V	-93.00	-28.3	12.00	3.58	42.72
7820.88750	H	-92.44	-23.4	13.50	4.66	38.24
	V	-90.10	-22.1	13.50	4.66	36.94
8689.87500	H	-93.45	-23.3	14.35	1.87	41.78
	V	-93	-22.8	14.35	1.87	41.28

CALCULATIONS FOR FIELD STRENGTH OF SPURIOUS RADIATION TESTS:

The transmitter carrier frequency was set to 851.00625 MHz. The reference oscillator frequency of the transmitter is 12.288 MHz. The output of the transceiver was searched from 12.288 MHz to the tenth harmonic of the carrier frequencies.

Because the antennas used for the measurements recorded above 1 GHz were not flat in gain and differed from a dipole, the generator output was corrected for gain at each spurious frequency. The cable loss in the measurements is the loss in the cable between the signal generator and the substitution antenna.

A notch filter was used in front of the spectrum analyzer to notch the fundamental to extend the dynamic range of the spectrum analyzer.

EXAMPLE:

At 1702.01250 (860.00625 MHz tuned), 0.4 Watts and horizontal polarization.

r = Substitution Gen - Cable Loss	-48.8 – 3.33 = -52.13
R = Reference Generator (dBm)	-52.13
A = Antenna Gain (dBd)	3.09
R' (Corrected Reference (dBm)) = R + A =>	-52.13 + 3.09 = -49.04 dBm
Po = Radiated Carrier Power (dBm)	0.4 Watts = 26 dBm
Radiated Spurious Attenuation (dBc) = Po -R' =>	26 - (-49.04) = 75.04 dBc

NAME OF TEST: Field Strength of Spurious Radiation Annex A – Pictures of the set-up



