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Test Report: 80825-3TRFWL

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

Apparatus: P9-R1K1-C5-001

FCC ID: EOTBDP3-CRE800

In Accordance With: FCC Part 90
Private Land Mobile Radio Services

Tested By: Nemko Canada Inc.
303 River Road
Ottawa, Ontario
K1V 1H2

Authorized By: 
Jason Nixon, Wireless Specialist

Date: May 3, 2007

Total Number of Pages: 20

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	P9-R1K1-C5-001
Specification:	FCC Part 90 Private Land Mobile Radio Services
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Roman Kuleba, EMC/Wireless Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

851-869 MHz Band DataRadio Power Amplifier P9-R1K1-C5-001

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	Rack with power supply and speaker panel	—
2	BSC Module	—
3	Transmitter Module	—
4	BSC Module	—
5	Transmitter Module	—
6	851-869 MHz Band Power Amplifier M/N # P9-R1K1-C5-001	120644695

The first samples were received on: February 6, 2007

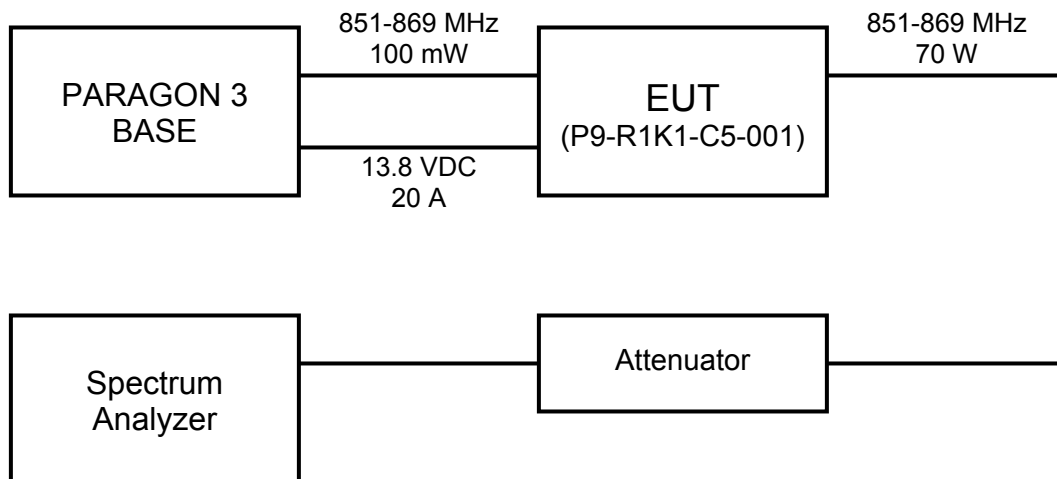
1.3 Theory of Operation

The P9-R1K1-C5-001 is an 851-869 MHz Band 70W RF Power Amplifier that will be integrated into DataRadio PARAGON-3 UHF Base Station.

1.4 Technical Specifications of the EUT

Manufacturer:	DataRadio
Operating Frequency:	851-869 MHz
Emission Designator:	F1D
Rated Power:	70 W (48.45 dBm)
Measured Power:	71.7 W (48.56 dBm)
Modulation:	FSK
Power Source:	13.8 VDC

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 90 Private Land Mobile Radio Services

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range : 15 – 30 °C
Humidity range : 20 - 75 %
Pressure range : 86 - 106 kPa
Power supply range : +/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Rhode & Schwarz	FSP 40 GHz	FA001920	March 17/06	March 17/07
EMI Test Rec./Spectr. Analyzer	Rhode & Schwarz	ESU 26.5 GHz	FA002043	Oct. 24/06	Oct. 24/07
Signal Generator	Rhode & Schwarz	SMR40	FA001879	July 27/06	July 27/07
Signal Generator	Rhode & Schwarz	SMIQ 06B	FA001878	June 28/06	June 28/07
RF Power Meter	HP	E4418B	FA001413	May 15/06	May 15/07
RF Power Sensor	HP	8487A	FA001908	Apr. 4/06	Apr. 4/07
Directional Coupler	Narda	CEL30470	S/N: 3761	COU	COU
Fixed Attenuator 20 dB	Narda	769-20	FA001394	COU	COU
Fixed Attenuator 20 dB	Narda	47-10-30	FA001739	COU	COU
RF Pre-amplifier	JCA	1-2 GHz	FA001498	Aug. 2, 06	Aug. 2, 07
RF Pre-amplifier	JCA	2-4 GHz	FA001496	Aug. 2, 06	Aug. 2, 07
RF Pre-amplifier	JCA	4-8 GHz	FA001497	Aug. 2, 06	Aug. 2, 07
RF Pre-amplifier	Narda	5 - 18GHz	FA001409	COU*	COU*
Bi-Conical Antenna #1	EMCO	3109	FA000805	May 03/06	May 03/07
Log Periodic Antenna #2	EMCO	3148	FA001355	May 16/06	May 16/07
Horn Antenna #2	EMCO	3115	FA000825	Jan. 30/07	Jan. 30/08
Horn Antenna (18 – 40 GHz)	EMCO	3116	FA001847	May 3/06	May 3/07
EMI Test Receiver	Rohde & Schwarz	ESVS-30	FA001445	July 14/06	July 14/07

COU – Calibrate on Use

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 90 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 90 : Test Results

Clause	Test Method	Test Description	Required	Result
90.205	2.1046	Output power	Y	PASS
90.210	2.1051	Spurious Emissions at the antenna terminal (conducted)	Y	PASS
90.210	2.1053	Field strength of spurious radiation (radiated)	Y	PASS
90.213	2.1055	Frequency stability	N	N/A
90.214	—	Transient Frequency Behaviour	N	N/A
90.543 (a)	—	Emission limitations – Adjacent Channel Power	N	N/A
2-11-04/EAB/RF	2.1049	Occupied bandwidth	Y	PASS
2-11-04/EAB/RF	—	Out of band rejection	Y	PASS

- Notes: (1) The EUT is not a band translator and does not contain any frequency translating/converting circuitry.
- (2) The EUT will be integrated into a system that is only allowed to operate on a single channel.

Appendix A: Test Results

Clause 90.205 Output Power

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized for new stations authorized after August 16, 1995 is as follows in FCC Part 90.205(a) through (r).

Test Conditions:

Sample Number:	6	Temperature:	23 °C
Date:	February 21, 2007	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Pass (see table).

Additional Observations: The output RF power was measured on the antenna port by means of a spectrum analyzer with RBW/VBW set to 100 kHz/300 kHz and detector function set to RMS mode.

Conducted TX Power:

Freq. (MHz)	P _{TX} (W)	P _{TX} (dBm)
851	71.7	48.56
860	70.3	48.47
869	69.1	48.39

Clause 90.209 Occupied Bandwidth

(5) Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following Table.

Standard Channel Spacing/Bandwidth

Frequency Band (MHz)	Channel Spacing (kHz)	Authorized Bandwidth (kHz)
Below 25	--	--
25-50	20	20
72-76	20	20
150-174	7.5	20/11.25/6
216-220	6.25	20/11.25/6
220-222	5	4
406-512	6.25	20/11.25/6
806-809/851-854	12.5	20
809-824/854-869	25	20
896-901/935-940	12.5	13.6
902-928	--	--
929-930	25	20
1427-1432	12.5	12.5
2450-2483.5	--	--
Above 2500	--	--

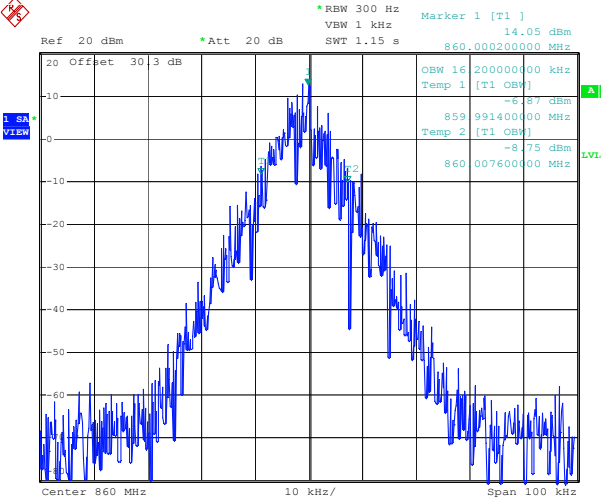
Test Conditions:

Sample Number:	6	Temperature:	23 °C
Date:	February 11, 2007	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results: See Attached Plots.

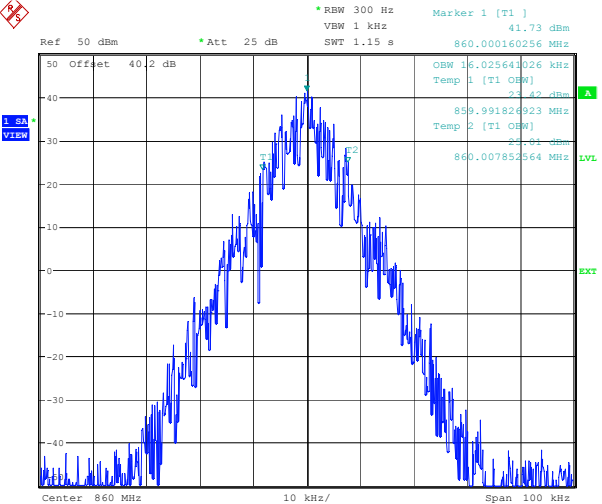
Occupied Bandwidth, continued

99% Occupied Bandwidth – Input:



Date: 11.FEB.2007 20:05:00

99% Occupied Bandwidth – Output:



Date: 11.FEB.2007 19:20:55

Clause 90.210 Spurious emissions at the antenna terminal

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

Test Conditions:

Sample Number:	6	Temperature:	23 °C
Date:	May 3, 2007	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Pass (See Attached Plots).

Additional Observations:

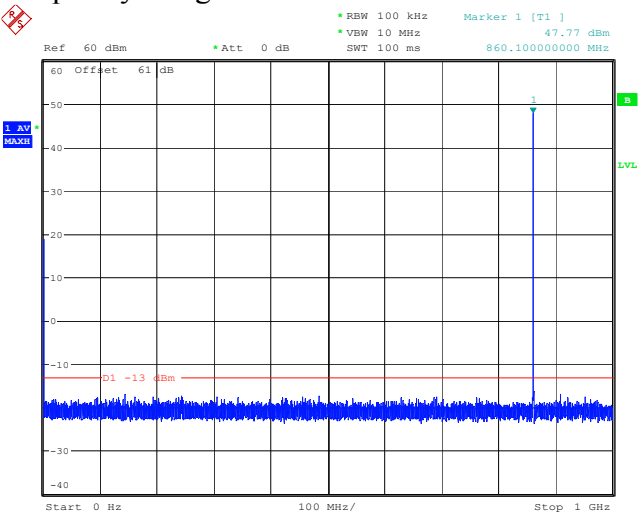
The Spectrum was searched from 30MHz to the 10th Harmonic.

All measurements were performed using an Average Detector with 100 kHz RBW on frequencies below 1 GHz and 1 MHz RBW on frequencies above 1 GHz with VBW > RBW.

Spurious emissions at the antenna terminal, continued

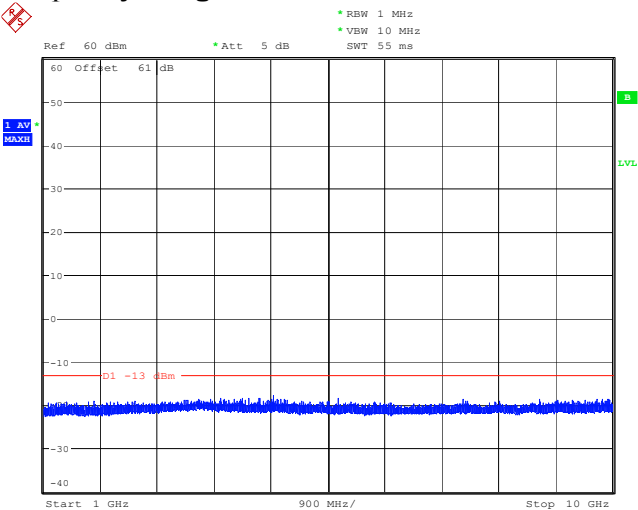
Conducted Emissions at the Antenna Port ($f_{TX} = 860\text{ MHz}$)

Frequency Range: 0.03 – 1 GHz



Date: 3.MAY.2007 10:30:55

Frequency Range: 1 – 10 GHz



Date: 3.MAY.2007 10:41:50

Clause 90.210 Field Strength of spurious radiation

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

Test Conditions:

Sample Number:	6	Temperature:	23 °C
Date:	February 23, 2007	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results:

Pass (see attached tables).

Additional Observations:

The Spectrum was searched from 30MHz to the 10th harmonic.

Radiated spurious emissions were measured by substitution method where EUT was being replaced with tuned dipoles for emissions below 1GHz and calibrated horn antenna for emissions above 1GHz.

All radiated measurements were performed at a distance of 3 meters using a Peak Detector with 100 kHz RBW on frequencies below 1 GHz and 1 MHz RBW on frequencies above 1 GHz with VBW > RBW.

Field Strength of spurious radiation, continued

EIRP of Radiated Emissions

	Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBμV)	Sig. Sub. Factor	Duty Cycle Corr. (dB)	Emission EIRP (dBm)	Limit (dBm)	Margin (dB)	Detector	Amp.
1	851.0000	—	—	—	—	—	—	—	—	—	—
2	1702.0000	Horn2	V	70.4	-118.2	N/A	-47.8	-13.0	34.8	Peak	1-2GHz
3	2553.0000	Horn2	V	80.5	-122.3	N/A	-41.8	-13.0	28.8	Peak	2-4GHz
4	3404.0000	Horn2	V	70.6	-118.2	N/A	-47.6	-13.0	34.6	Peak	2-4GHz
5	4255.0000	Horn2	V	65.8	-114.1	N/A	-48.3	-13.0	35.3	Peak	4-8GHz
6	5106.0000	Horn2	V	62.8	-110.3	N/A	-47.6	-13.0	34.6	Peak	4-8GHz
7	5957.0000	Horn2	V	63.3	-108.9	N/A	-45.6	-13.0	32.6	Peak	4-8GHz
8	6808.0000	Horn2	V	58.3	-106.4	N/A	-48.1	-13.0	35.1	Peak	4-8GHz
9	7659.0000	Horn2	V	62.3	-104.9	N/A	-42.6	-13.0	29.6	Peak	4-8GHz
10	860.0000	—	—	—	—	—	—	—	—	—	—
11	1720.0000	Horn2	V	75.1	-117.9	N/A	-42.8	-13.0	29.8	Peak	1-2GHz
12	2580.0000	Horn2	V	91.2	-122.3	N/A	-31.1	-13.0	18.1	Peak	2-4GHz
13	3440.0000	Horn2	V	80.1	-118.0	N/A	-37.9	-13.0	24.9	Peak	2-4GHz
14	4300.0000	Horn2	V	75.1	-113.9	N/A	-38.8	-13.0	25.8	Peak	4-8GHz
15	5160.0000	Horn2	V	71.7	-110.0	N/A	-38.3	-13.0	25.3	Peak	4-8GHz
16	6020.0000	Horn2	V	73.3	-109.0	N/A	-35.7	-13.0	22.7	Peak	4-8GHz
17	6880.0000	Horn2	V	69.1	-106.8	N/A	-37.7	-13.0	24.7	Peak	4-8GHz
18	7740.0000	Horn2	V	72.2	-104.7	N/A	-32.5	-13.0	19.5	Peak	4-8GHz
19	869.0000	—	—	—	—	—	—	—	—	—	—
20	1738.0000	Horn2	V	81.5	-117.6	N/A	-36.1	-13.0	23.1	Peak	1-2GHz
21	2607.0000	Horn2	V	94.2	-122.2	N/A	-28.0	-13.0	15.0	Peak	2-4GHz
22	3476.0000	Horn2	V	83.4	-117.8	N/A	-34.5	-13.0	21.5	Peak	2-4GHz
23	4345.0000	Horn2	V	77.9	-113.7	N/A	-35.8	-13.0	22.8	Peak	4-8GHz
24	5214.0000	Horn2	V	74.9	-109.7	N/A	-34.8	-13.0	21.8	Peak	4-8GHz
25	6083.0000	Horn2	V	76.3	-108.6	N/A	-32.3	-13.0	19.3	Peak	4-8GHz
26	6952.0000	Horn2	V	71.6	-107.1	N/A	-35.5	-13.0	22.5	Peak	4-8GHz
27	7821.0000	Horn2	V	75.4	-104.2	N/A	-28.8	-13.0	15.8	Peak	4-8GHz
Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole											

Field Strength of spurious radiation, continued

EIRP of Radiated Emissions

	Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBμV)	Sig. Sub. Factor	Duty Cycle Corr. (dB)	Emission EIRP (dBm)	Limit (dBm)	Margin (dB)	Detector	Amp.
28	851.0000	—	—	—	—	—	—	—	—	—	—
29	1702.0000	Horn2	H	69.5	-119.0	N/A	-49.5	-13.0	36.5	Peak	1-2GHz
30	2553.0000	Horn2	H	73.0	-122.8	N/A	-49.7	-13.0	36.7	Peak	2-4GHz
31	3404.0000	Horn2	H	64.8	-119.7	N/A	-55.0	-13.0	42.0	Peak	2-4GHz
32	4255.0000	Horn2	H	67.0	-114.8	N/A	-47.8	-13.0	34.8	Peak	4-8GHz
33	5106.0000	Horn2	H	62.1	-110.3	N/A	-48.2	-13.0	35.2	Peak	4-8GHz
34	5957.0000	Horn2	H	51.7	-108.1	N/A	-56.4	-13.0	43.4	Peak	4-8GHz
35	6808.0000	Horn2	H	55.9	-104.6	N/A	-48.7	-13.0	35.7	Peak	4-8GHz
36	7659.0000	Horn2	H	63.8	-106.4	N/A	-42.6	-13.0	29.6	Peak	4-8GHz
37	860.0000	—	—	—	—	—	—	—	—	—	—
38	1720.0000	Horn2	H	73.9	-118.3	N/A	-44.5	-13.0	31.5	Peak	1-2GHz
39	2580.0000	Horn2	H	83.9	-122.9	N/A	-39.0	-13.0	26.0	Peak	2-4GHz
40	3440.0000	Horn2	H	74.4	-119.6	N/A	-45.2	-13.0	32.2	Peak	2-4GHz
41	4300.0000	Horn2	H	76.0	-114.3	N/A	-38.3	-13.0	25.3	Peak	4-8GHz
42	5160.0000	Horn2	H	70.8	-109.7	N/A	-38.9	-13.0	25.9	Peak	4-8GHz
43	6020.0000	Horn2	H	61.4	-107.9	N/A	-46.5	-13.0	33.5	Peak	4-8GHz
44	6880.0000	Horn2	H	67.0	-105.3	N/A	-38.3	-13.0	25.3	Peak	4-8GHz
45	7740.0000	Horn2	H	73.7	-106.2	N/A	-32.5	-13.0	19.5	Peak	4-8GHz
46	869.0000	—	—	—	—	—	—	—	—	—	—
47	1738.0000	Horn2	H	79.9	-117.7	N/A	-37.8	-13.0	24.8	Peak	1-2GHz
48	2607.0000	Horn2	H	87.1	-123.0	N/A	-35.9	-13.0	22.9	Peak	2-4GHz
49	3476.0000	Horn2	H	77.7	-119.5	N/A	-41.8	-13.0	28.8	Peak	2-4GHz
50	4345.0000	Horn2	H	78.3	-113.7	N/A	-35.4	-13.0	22.4	Peak	4-8GHz
51	5214.0000	Horn2	H	73.7	-109.1	N/A	-35.4	-13.0	22.4	Peak	4-8GHz
52	6083.0000	Horn2	H	64.1	-107.2	N/A	-43.1	-13.0	30.1	Peak	4-8GHz
53	6952.0000	Horn2	H	69.9	-106.0	N/A	-36.1	-13.0	23.1	Peak	4-8GHz
54	7821.0000	Horn2	H	78.2	-107.0	N/A	-28.8	-13.0	15.8	Peak	4-8GHz

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole

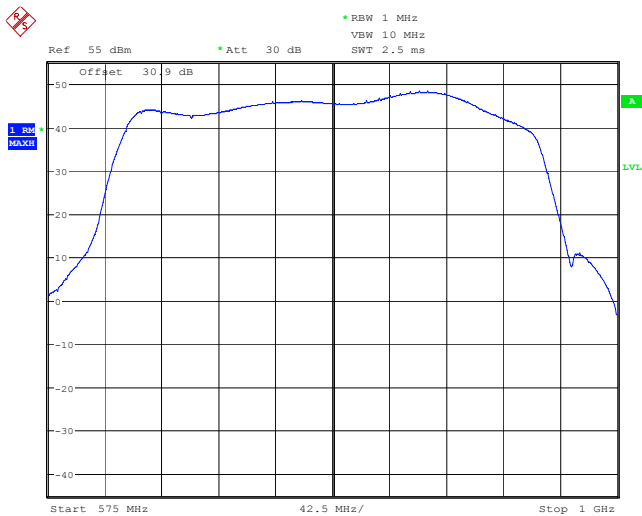
Clause 2-11-04/EAB/RF Out of Band Rejection

Plots showing the filter frequency response.

Test Conditions:

Sample Number:	7	Temperature:	23 °C
Date:	April 1, 2007	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

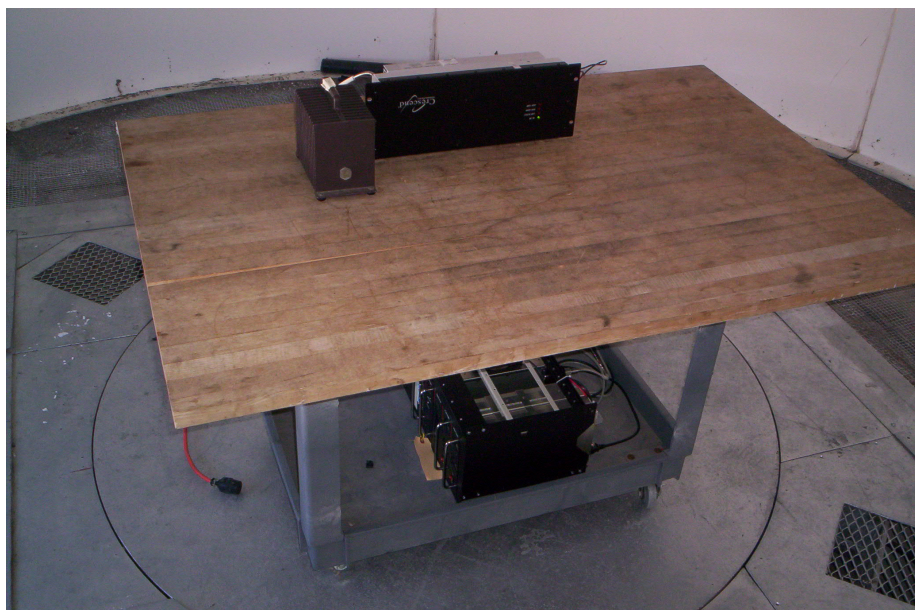
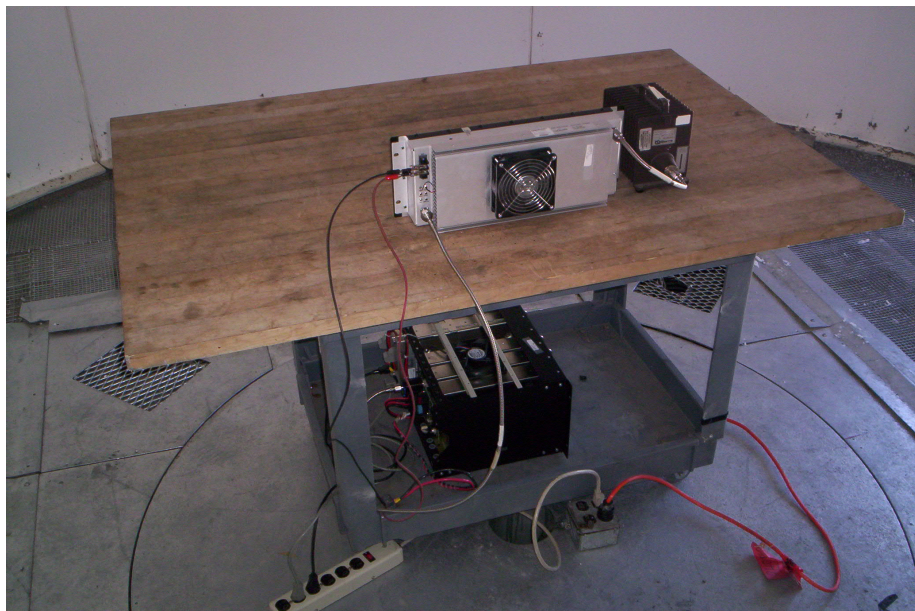
Test Results: See Attached Plot.



Date: 1.APR.2007 18:27:02

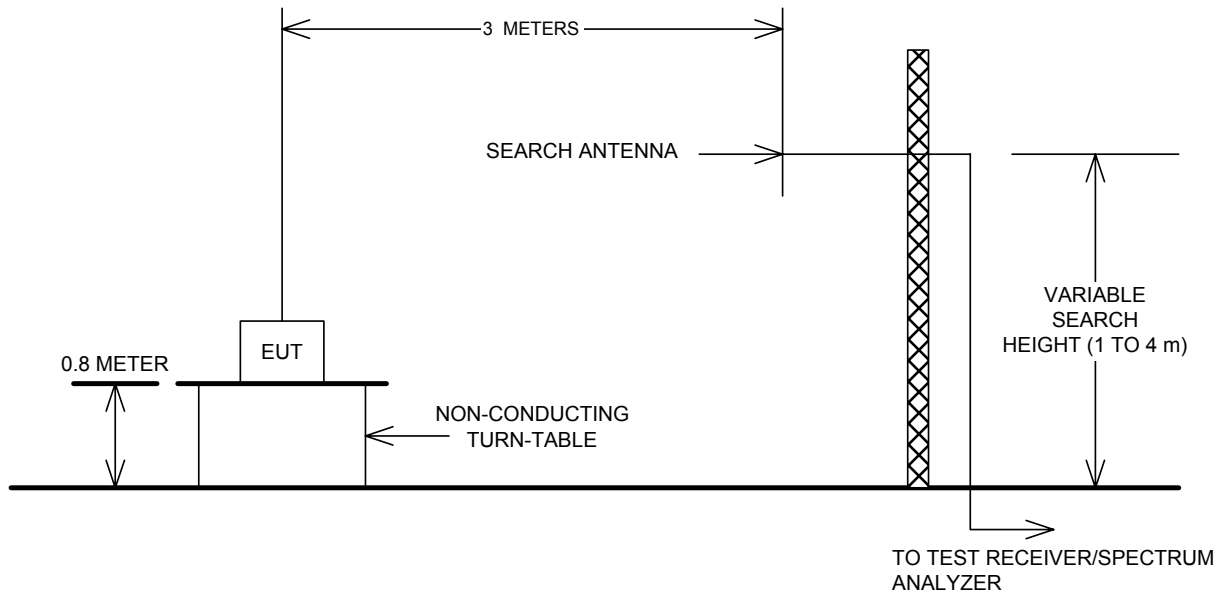
Appendix B: Setup Photographs

Radiated Spurious Emissions Setup:



Appendix C: Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions, Output power, Occupied Bandwidth

