Val Avionics Limited

AWOS 2000

Report #: VALA0004

Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: February 14, 2012
Val Avionics Limited
Model: AWOS 2000

Emissions

Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 87:2012	TIA/EIA-603-B:2002	**Pass**

Deviations From Test Standards

None

Approved By:

Tim O'Shea, Operations Manager

NVLAP Lab Code: 200630-0

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400
Hillsboro, OR 97124

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-1).

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision History

Revision Number	Description	Date	Page Number
00	None		

Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP

Northwest EMC, Inc. is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. NVLAP is administered by the National Institute of Standards and Technology (NIST), an agency of the U.S. Commerce Department. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1)*

CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.

Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).

Accreditations and Authorizations

VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-3265, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).*

BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017).

GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157, Brooklyn Park: US0175)*

VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

Locations

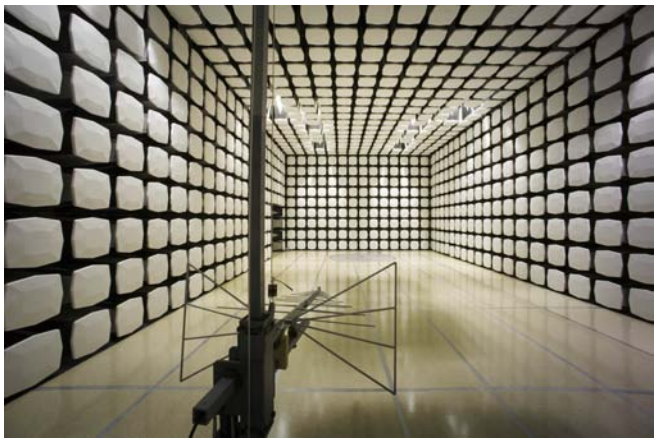
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

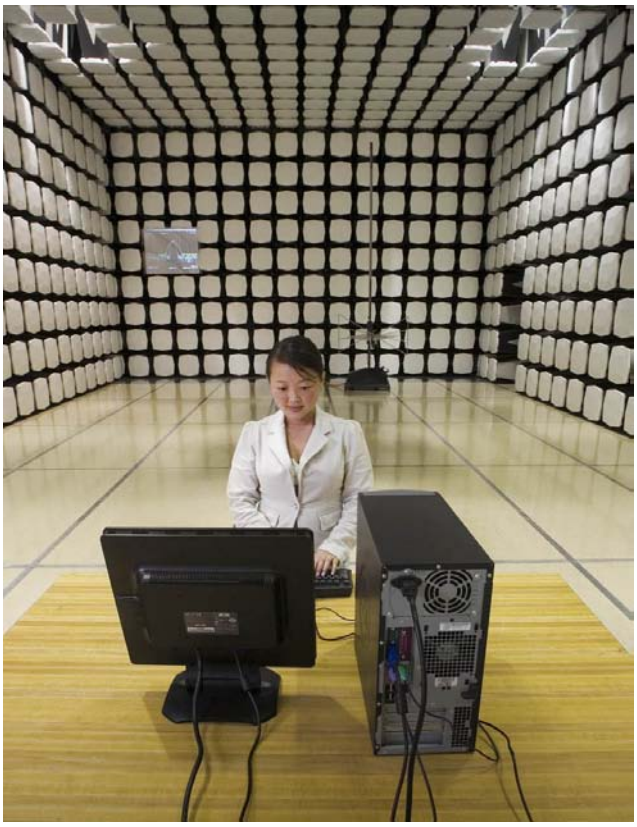
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796





Product Description

Client and Equipment Under Test (EUT) Information

Company Name:	Val Avionics Limited
Address:	3280 25th Street SE
City, State, Zip:	Salem, OR 97302
Test Requested By:	Jim Harr
Model:	INS 429
First Date of Test:	February 14, 2012
Last Date of Test:	February 14, 2012
Receipt Date of Samples:	February 14, 2012
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Transmitter

Testing Objective:
These tests were selected to satisfy the EMC requirements requested by the client.

Configurations

Configuration 1 VALA0004

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Weather Transmitter	Val Avionics Limited	AWOS 2000	Unit 1

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Bench Supply	MPJA	9950 PS	006708
Terminator	Fairview Microwave	ST6N-20	none

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.25m	No	EUT	Lab power Supply
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Modifications

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2/14/2012	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting, High channel 136.975 MHz
Transmitting, Mid channel 127 MHz
Transmitting, Low channel 118 MHz

POWER SETTINGS INVESTIGATED

13.7 VDC

CONFIGURATIONS INVESTIGATED

VALA0004 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1400 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440	AFE	1/23/2012	12
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/28/2011	12
Antenna, Biconilog	EMCO	3142	AXJ	5/17/2011	12
EV01 Cables	N/A	Bilog Cables	EVA	6/28/2011	12
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	6/28/2011	12
Antenna, Horn	ETS	3115	AIZ	1/24/2011	24
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	6/28/2011	12
Antenna, Horn	EMCO	3115	AHE	NCR	0
Antenna, Dipole	EMCO	3121C-DB1,DB2,DB3,DB4	ADC	NCR	0
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	36
Power Meter	Gigatronics	8651A	SPM	1/9/2012	24
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	24
MXG Vector Signal Generator	Agilent	N5182A	TIF	NCR	0

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the IF bandwidths and detectors specified. No video filter was used, except in the case of the FCC Average Measurements above 1GHz. In that case, a peak detector with a 10Hz video bandwidth was used.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal ½ wave dipole antenna is determined for each radiated spurious emission.

For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The final measurements must be made utilizing the substitution method described above. The 3 meter limit was calculated to be 82.2 dBuV/m at 3 meters

SPURIOUS RADIATED EMISSIONS

EUT:	AWOS 2000			**Work Order:**	VALA0004
Serial Number:	Unit 1			**Date:**	02/14/12
Customer:	Val Avionics Limited			**Temperature:**	22
Attendees:	James Mac Innes			**Humidity:**	38%
Project:	None			**Barometric Pres.:**	29.99 in
Tested by:	Rod Peloquin	**Power:**	13.7 VDC	**Job Site:**	EV01

TEST SPECIFICATIONS

	Test Method
FCC 87.139:2012	TIA/EIA-603-B:2002

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	**Test Distance (m)**	3

COMMENTS

DC Supply on floor, Antenna port terminated

EUT OPERATING MODES

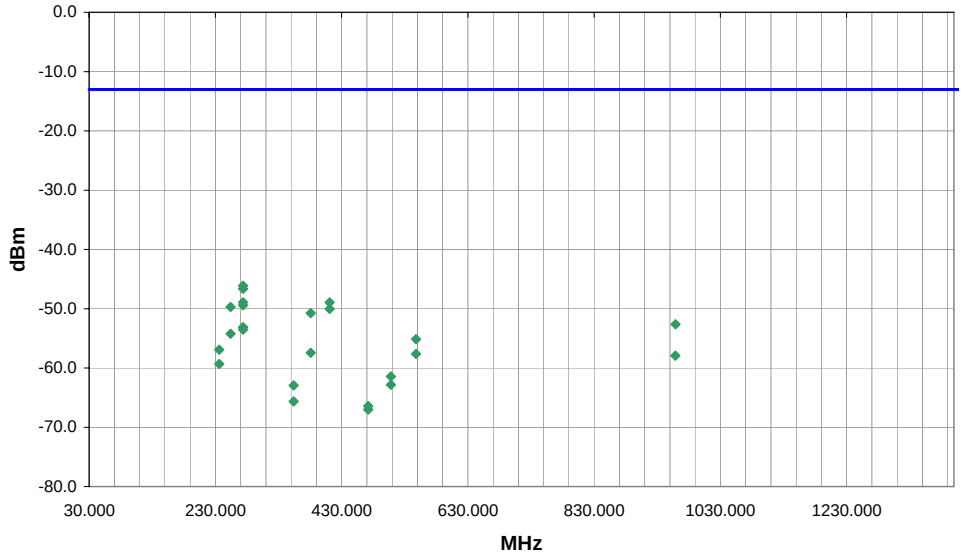
Transmitting

DEVIATIONS FROM TEST STANDARD

No deviations.

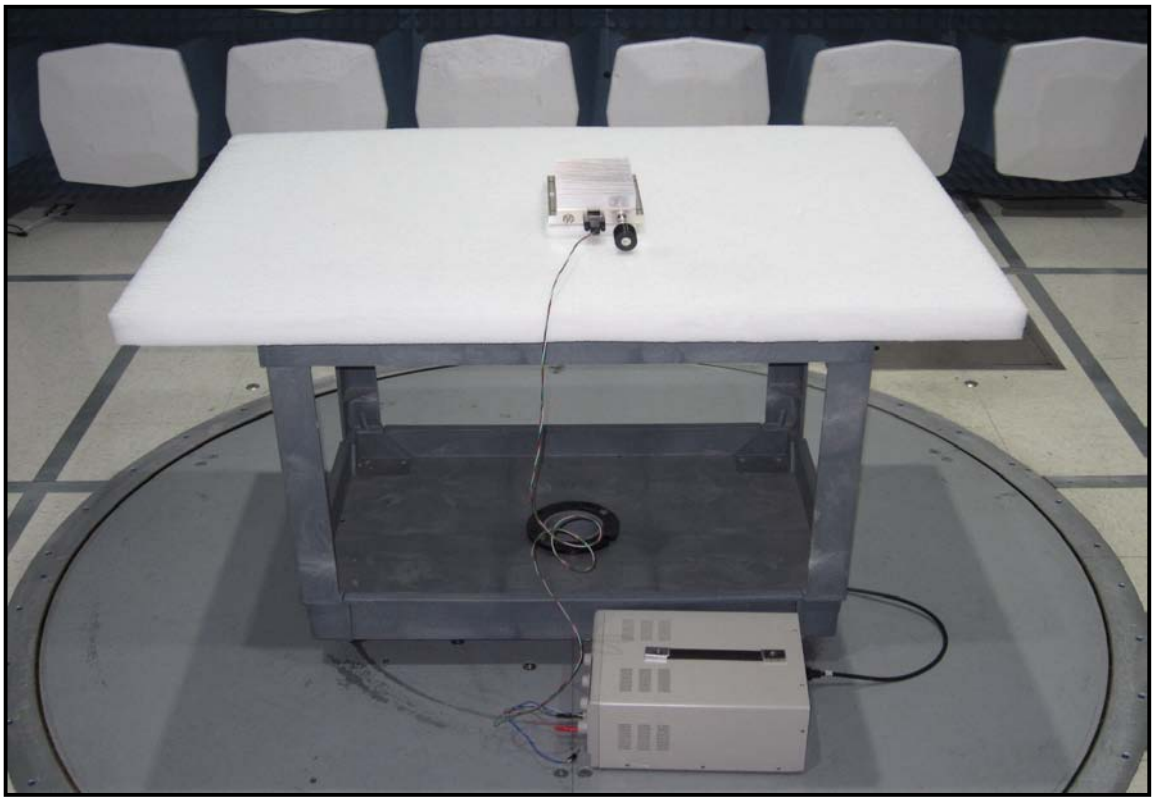
Run #	1
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
273.955			67.0	1.0			H-Bilog	PK	2.44E-08	-46.1	-13.0	-33.1	High channel, EUT on side
273.949			244.0	1.0			H-Bilog	PK	2.17E-08	-46.6	-13.0	-33.6	High channel, EUT horizontal
273.953			166.0	1.0			V-Bilog	PK	1.28E-08	-48.9	-13.0	-35.9	High channel, EUT on end
410.917			67.0	1.0			V-Bilog	PK	1.28E-08	-48.9	-13.0	-35.9	High channel, EUT on end
273.942			228.0	1.1			H-Bilog	PK	1.14E-08	-49.4	-13.0	-36.4	High channel, EUT on end
254.003			84.0	1.0			H-Bilog	PK	1.06E-08	-49.7	-13.0	-36.7	Mid channel, EUT on side
410.922			76.0	1.0			H-Bilog	PK	9.93E-09	-50.0	-13.0	-37.0	High channel, EUT on side
380.995			84.0	1.0			H-Bilog	PK	8.46E-09	-50.7	-13.0	-37.7	Mid channel, EUT on side
958.851			340.0	1.0			V-Bilog	PK	5.46E-09	-52.6	-13.0	-39.6	High channel, EUT on end
273.951			54.0	1.0			V-Bilog	PK	4.87E-09	-53.1	-13.0	-40.1	High channel, EUT on side
273.949			56.0	1.0			V-Bilog	PK	4.44E-09	-53.5	-13.0	-40.5	High channel, EUT horizontal
253.985			193.0	1.0			V-Bilog	PK	3.78E-09	-54.2	-13.0	-41.2	Mid channel, EUT on end
547.872			311.0	1.7			H-Bilog	PK	3.07E-09	-55.1	-13.0	-42.1	High channel, EUT on side
235.989			233.0	1.0			H-Bilog	PK	2.03E-09	-56.9	-13.0	-43.9	Low channel, EUT on side
380.987			125.0	1.5			V-Bilog	PK	1.81E-09	-57.4	-13.0	-44.4	Mid channel, EUT on end
547.883			189.0	1.0			V-Bilog	PK	1.73E-09	-57.6	-13.0	-44.6	High channel, EUT on end
958.733			233.0	1.6			H-Bilog	PK	1.61E-09	-57.9	-13.0	-44.9	High channel, EUT on side
236.001			220.0	1.5			V-Bilog	PK	1.17E-09	-59.3	-13.0	-46.3	Low channel, EUT on end
507.996			214.0	1.0			V-Bilog	PK	7.20E-10	-61.4	-13.0	-48.4	Mid channel, EUT on end
508.003			217.0	1.0			H-Bilog	PK	5.21E-10	-62.8	-13.0	-49.8	Mid channel, EUT on side
353.992			246.0	1.0			H-Bilog	PK	5.09E-10	-62.9	-13.0	-49.9	Low channel, EUT on side
353.966			162.0	1.0			V-Bilog	PK	2.74E-10	-65.6	-13.0	-52.6	Low channel, EUT on end
472.034			164.0	1.0			V-Bilog	PK	2.28E-10	-66.4	-13.0	-53.4	Low channel, EUT on end
471.961			285.0	1.0			H-Bilog	PK	1.98E-10	-67.0	-13.0	-54.0	Low channel, EUT on side

SPURIOUS RADIATED EMISSIONS



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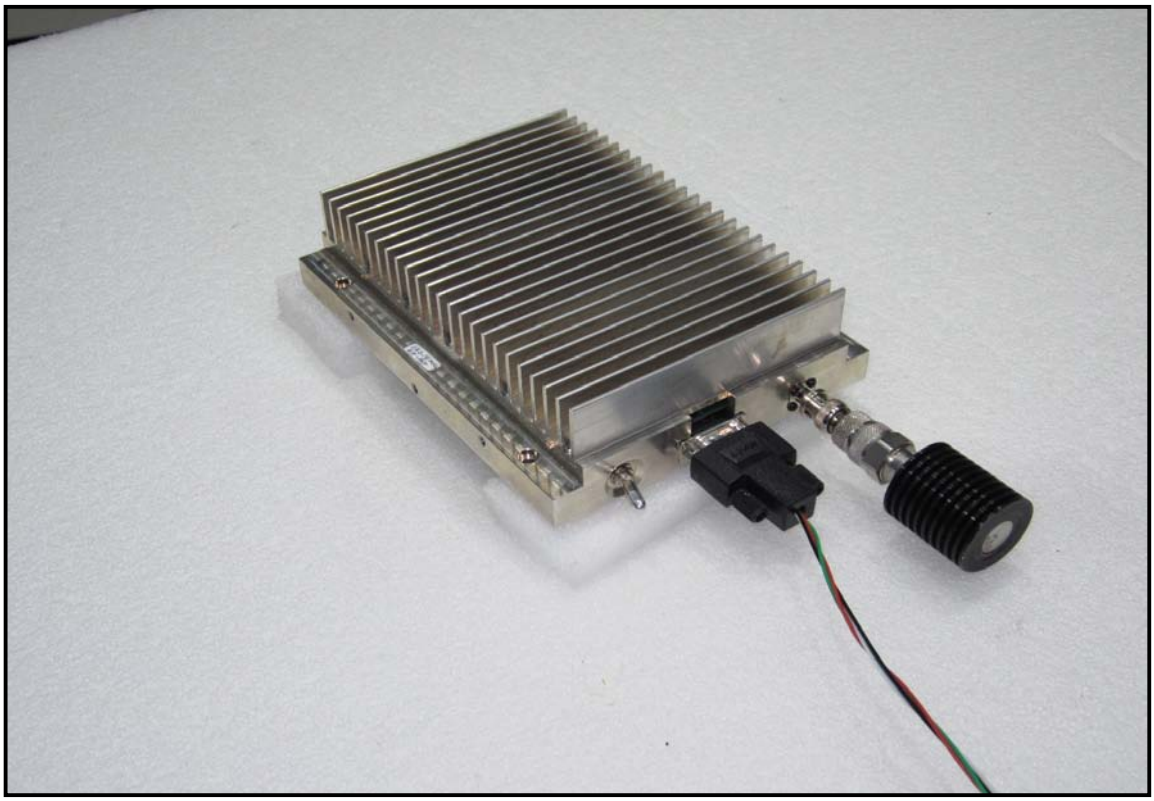

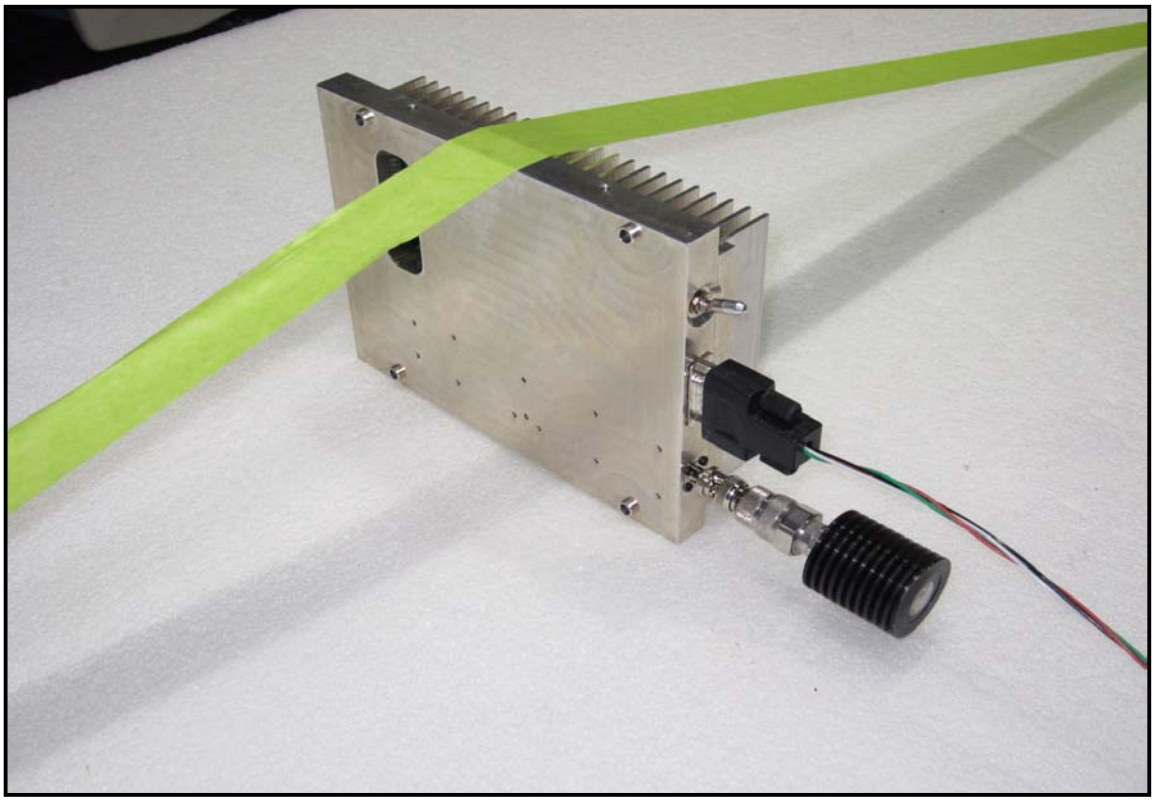

SPURIOUS RADIATED EMISSIONS