Spectrum Technology, Inc.

Sceptar II Paging Receiver

April 08, 2008

Report No. SPTE0081

Report Prepared By

www.nwemc.com
1-888-EMI-CERT

EMC Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: April 08, 2008
Spectrum Technology, Inc.
Model: Sceptar II Paging Receiver

Emissions			
Test Description	**Specification**	**Test Method**	**Pass/Fail**
Spurious Radiated Emissions of the Receiver	FCC 15.109:2007	ANSI C63.4:2003	**Pass**

Modifications made to the product
See the Modifications section of this report

Test Facility

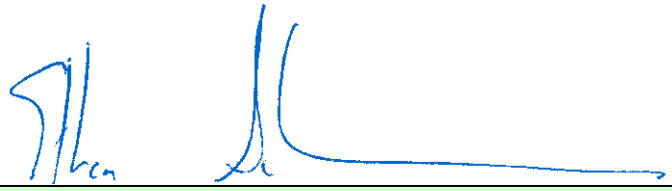
The measurement facility used to collect the data is located at:

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 #3496A).

Approved By:



Ethan Schoonover, Sultan Lab Manager

NVLAP Lab Code: 200630-0

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 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 United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. 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.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0

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 212, Issue 1 (Provisional) 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.

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.

TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories, available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0604C.

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.

NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

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).

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, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294).*

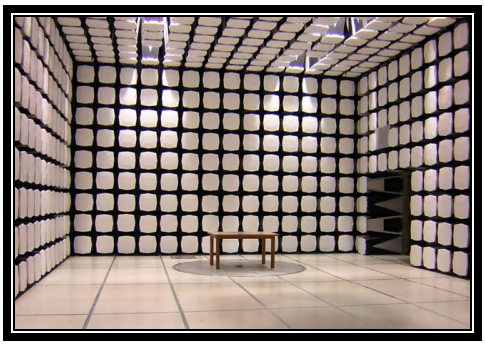
BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.

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

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

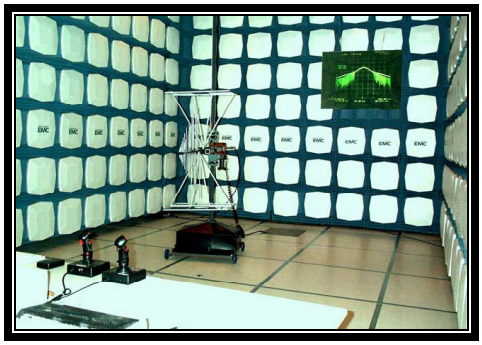
SCOPE

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



California – Orange County Facility
Labs OC01 – OC13

41 Tesla Ave. Irvine, CA 92618
(888) 364-2378 Fax: (503) 844-3826



Oregon – Evergreen Facility
Labs EV01 – EV11

22975 NW Evergreen Pkwy. Suite 400 Hillsboro, OR 97124
(503) 844-4066 Fax: (503) 844-3826

Washington – Sultan Facility
Labs SU01 – SU07

14128 339th Ave. SE Sultan, WA 98294
(888) 364-2378

Party Requesting the Test

Company Name:	Spectrum Technology, Inc.
Address:	209 Dayton Street Suite #205
City, State, Zip:	Edmonds, WA 98020
Test Requested By:	Rod Munro
Model:	Sceptar II Paging Receiver
First Date of Test:	April 7, 2008
Last Date of Test:	April 7, 2008
Receipt Date of Samples:	April 7, 2008
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Scanning VHF receiver operating in the 151-160MHz, 159-167MHz, and 167-174MHz bands.

Testing Objective:
Certification of Part 15 scanning receiver. VHF portion only. Battery powered.

CONFIGURATION 1 SPTE0081

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
VHF - M	SCA	Sceptar II Paging Receiver	VHF-M1
VHF - M	SCA	Sceptar II Paging Receiver	VHF-M2

CONFIGURATION 2 SPTE0081

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
VHF - H	SCA	Sceptar II Paging Receiver	VHF-H1
VHF - H	SCA	Sceptar II Paging Receiver	VHF-H2

CONFIGURATION 3 SPTE0081

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
VHF-HH	SCA	Sceptar II Paging Receiver	VHF-HH Sample 1
VHF-HH	SCA	Sceptar II Paging Receiver	VHF-HH Sample 2

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	4/7/2008	Spurious Radiated Emissions of the Receiver	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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.

MODES OF OPERATION
VHF-M1 receiving Ch 1, 152 MHz. VHF-M2 receiving Ch 2, 159 MHz.
VHF-H1 receiving Ch 1, 160 MHz. VHF-H2 receiving Ch 2, 166 MHz.
VHF-HH Sample 1 receiving Ch 1, 168 MHz. VHF-HH Sample 2 receiving Ch 2, 173 MHz.

POWER SETTINGS INVESTIGATED
Battery

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	2 GHz

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	E4446A	AAT	12/7/2007	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	12/29/2006	16
Antenna, Biconilog	EMCO	3141	AXE	1/15/2008	24
EV01 Cables		Bilog Cables	EVA	10/23/2007	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	1/3/2008	13
Antenna, Horn	EMCO	3115	AHC	8/24/2006	24
EV01 Cables		Double Ridge Horn Cables	EVB	1/3/2008	13

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 bandwidths and detectors specified. No video filter was used.				

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 3 meters or 10 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2007.05.07
EMI 2006.11.29

EUT:	Sceptar II Paging Receiver			Work Order:	SPTE0081
Serial Number:	VHF-HH sample 1 /2			Date:	04/07/08
Customer:	Spectrum Technology, Inc.			Temperature:	21
Attendees:	None			Humidity:	26%
Project:	None			Barometric Pres.:	1015.5
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.109:2007	ANSI C63.4:2003

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

COMMENTS

VHF 166 - 175 MHz band. Two scanning VHF receivers on table

EUT OPERATING MODES

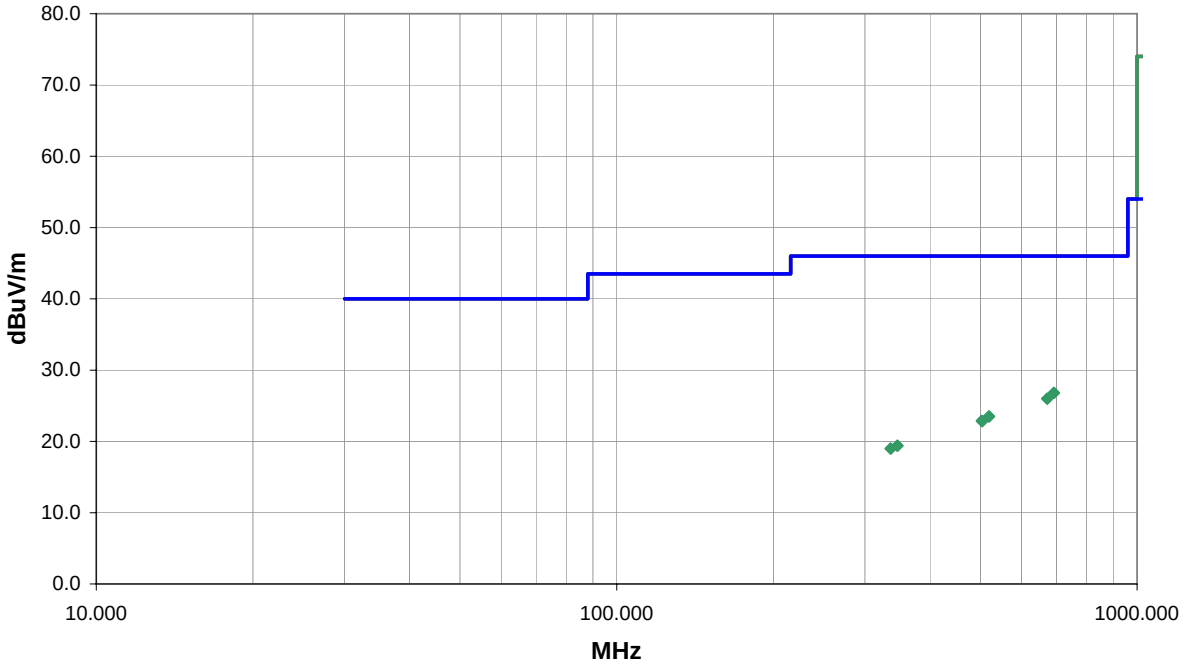
VHF-HH Sample 1 receiving Ch 1, 168 MHz. VHF-HH Sample 2 receiving Ch 2, 173 MHz.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	3
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
691.946	16.7	10.1	78.0	1.5	3.0	0.0	H-Bilog	QP	0.0	26.8	46.0	-19.2
692.156	16.7	10.1	133.0	1.6	3.0	0.0	V-Bilog	QP	0.0	26.8	46.0	-19.2
671.733	16.7	9.3	78.0	1.2	3.0	0.0	V-Bilog	QP	0.0	26.0	46.0	-20.0
672.116	16.7	9.3	334.0	1.5	3.0	0.0	H-Bilog	QP	0.0	26.0	46.0	-20.0
519.327	16.8	6.7	172.0	1.2	3.0	0.0	V-Bilog	QP	0.0	23.5	46.0	-22.5
519.476	16.8	6.7	310.0	1.5	3.0	0.0	H-Bilog	QP	0.0	23.5	46.0	-22.5
503.043	16.9	6.0	27.0	1.2	3.0	0.0	V-Bilog	QP	0.0	22.9	46.0	-23.1
504.046	16.8	6.0	216.0	1.5	3.0	0.0	H-Bilog	QP	0.0	22.8	46.0	-23.2
346.032	16.9	2.5	175.0	1.2	3.0	0.0	V-Bilog	QP	0.0	19.4	46.0	-26.6
346.529	16.9	2.5	64.0	1.5	3.0	0.0	H-Bilog	QP	0.0	19.4	46.0	-26.6
336.049	16.8	2.2	187.0	1.5	3.0	0.0	H-Bilog	QP	0.0	19.0	46.0	-27.0
336.209	16.8	2.2	83.0	1.5	3.0	0.0	V-Bilog	QP	0.0	19.0	46.0	-27.0

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2007.05.07
EMI 2006.11.29

EUT:	Sceptar II Paging Receiver			Work Order:	SPTE0081
Serial Number:	VHF-H1, VHF-H2			Date:	04/07/08
Customer:	Spectrum Technology, Inc.			Temperature:	21
Attendees:	None			Humidity:	26%
Project:	None			Barometric Pres.:	1015.5
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.109:2007	ANSI C63.4:2003

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

COMMENTS

VHF 157 - 166 MHz band. Two scanning VHF receivers on table

EUT OPERATING MODES

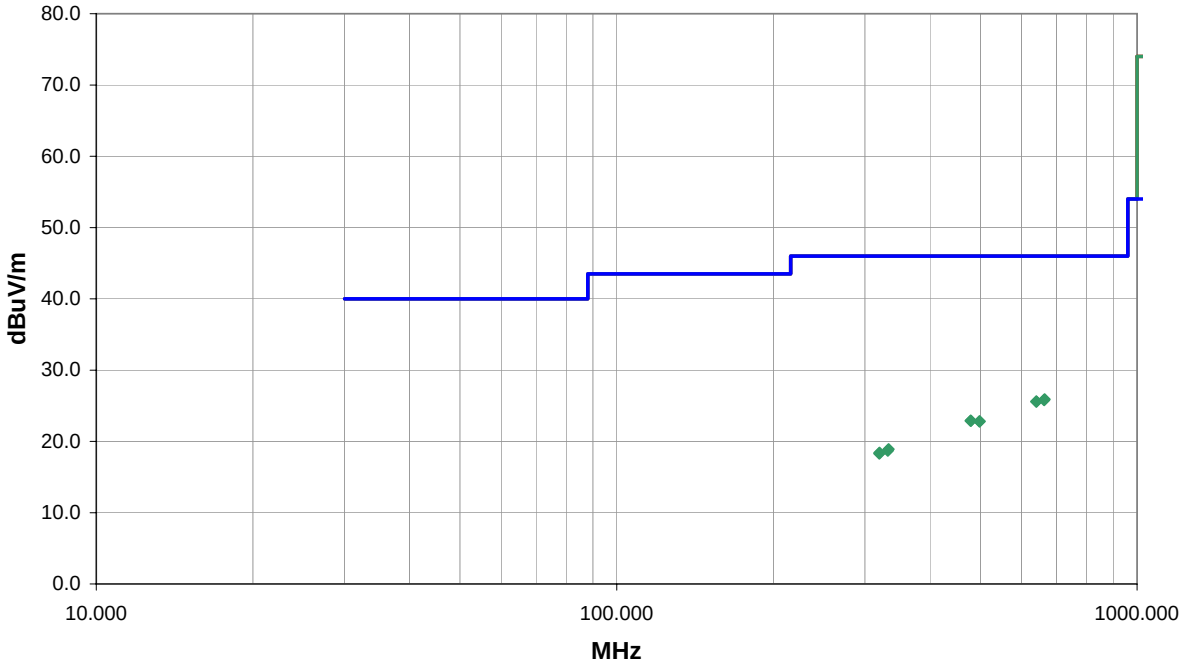
VHF-H1 receiving Ch 1, 160 MHz. VHF-H2 receiving Ch 2, 166 MHz.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	2
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
664.234	16.8	9.1	215.0	1.2	3.0	0.0	H-Bilog	QP	0.0	25.9	46.0	-20.1
663.007	16.7	9.1	136.0	1.0	3.0	0.0	V-Bilog	QP	0.0	25.8	46.0	-20.2
640.106	16.7	8.9	351.0	1.2	3.0	0.0	H-Bilog	QP	0.0	25.6	46.0	-20.4
640.575	16.7	8.9	330.0	1.0	3.0	0.0	V-Bilog	QP	0.0	25.6	46.0	-20.4
478.976	16.9	6.0	207.0	1.2	3.0	0.0	H-Bilog	QP	0.0	22.9	46.0	-23.1
479.177	16.9	6.0	194.0	1.0	3.0	0.0	V-Bilog	QP	0.0	22.9	46.0	-23.1
497.983	16.9	5.9	179.0	1.2	3.0	0.0	H-Bilog	QP	0.0	22.8	46.0	-23.2
498.108	16.9	5.9	31.0	1.0	3.0	0.0	V-Bilog	QP	0.0	22.8	46.0	-23.2
332.962	16.8	2.1	128.0	1.0	3.0	0.0	V-Bilog	QP	0.0	18.9	46.0	-27.1
331.822	16.7	2.0	266.0	1.2	3.0	0.0	H-Bilog	QP	0.0	18.7	46.0	-27.3
319.970	16.9	1.5	325.0	1.0	3.0	0.0	V-Bilog	QP	0.0	18.4	46.0	-27.6
319.744	16.8	1.5	338.0	1.2	3.0	0.0	H-Bilog	QP	0.0	18.3	46.0	-27.7

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2007.05.07
EMI 2006.11.29

EUT:	Sceptar II Paging Receiver			Work Order:	SPTE0081
Serial Number:	VHF-M1, VHF-M2			Date:	04/07/08
Customer:	Spectrum Technology, Inc.			Temperature:	21
Attendees:	None			Humidity:	26%
Project:	None			Barometric Pres.:	1015.5
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.109:2007	ANSI C63.4:2003

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

COMMENTS

VHF 150 - 157 MHz band. Two scanning VHF receivers on table

EUT OPERATING MODES

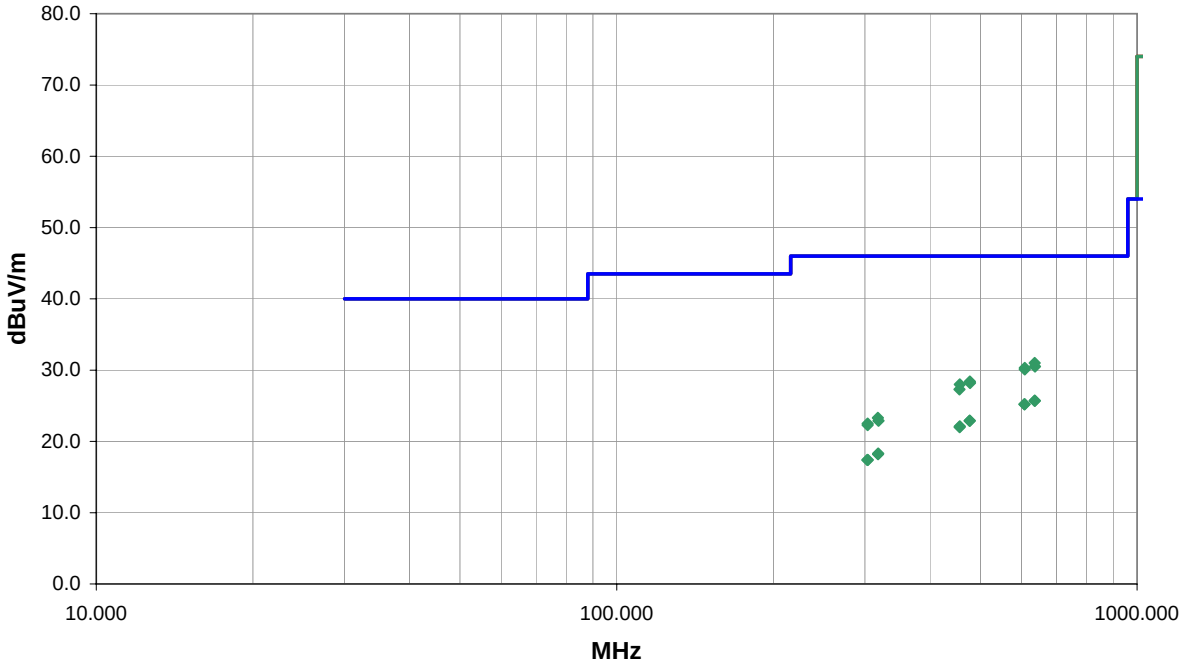
VHF-M1 receiving Ch 1, 152 MHz. VHF-M2 receiving Ch 2, 159 MHz.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
635.840	22.0	9.0	86.0	1.2	3.0	0.0	H-Bilog	PK	0.0	31.0	46.0	-15.0
636.373	21.5	9.0	220.0	1.0	3.0	0.0	V-Bilog	PK	0.0	30.5	46.0	-15.5
608.240	21.9	8.4	88.0	1.2	3.0	0.0	H-Bilog	PK	0.0	30.3	46.0	-15.7
608.442	21.7	8.4	126.0	1.0	3.0	0.0	V-Bilog	PK	0.0	30.1	46.0	-15.9
477.252	22.4	6.0	165.0	1.2	3.0	0.0	H-Bilog	PK	0.0	28.4	46.0	-17.6
477.492	22.2	6.0	296.0	1.0	3.0	0.0	V-Bilog	PK	0.0	28.2	46.0	-17.8
456.369	22.8	5.2	167.0	1.7	3.0	0.0	V-Bilog	PK	0.0	28.0	46.0	-18.0
455.645	22.1	5.2	69.0	1.2	3.0	0.0	H-Bilog	PK	0.0	27.3	46.0	-18.7
635.767	16.7	9.0	220.0	1.0	3.0	0.0	V-Bilog	QP	0.0	25.7	46.0	-20.3
635.926	16.7	9.0	86.0	1.2	3.0	0.0	H-Bilog	QP	0.0	25.7	46.0	-20.3
607.649	16.8	8.4	126.0	1.0	3.0	0.0	V-Bilog	QP	0.0	25.2	46.0	-20.8
607.982	16.8	8.4	88.0	1.2	3.0	0.0	H-Bilog	QP	0.0	25.2	46.0	-20.8
317.687	21.9	1.4	62.0	1.0	3.0	0.0	V-Bilog	PK	0.0	23.3	46.0	-22.7
318.431	21.5	1.4	170.0	1.2	3.0	0.0	H-Bilog	PK	0.0	22.9	46.0	-23.1
477.001	16.9	6.0	296.0	1.0	3.0	0.0	V-Bilog	QP	0.0	22.9	46.0	-23.1
477.008	16.9	6.0	165.0	1.2	3.0	0.0	H-Bilog	QP	0.0	22.9	46.0	-23.1
303.502	21.8	0.7	157.0	1.3	3.0	0.0	V-Bilog	PK	0.0	22.5	46.0	-23.5
303.574	21.6	0.7	302.0	1.2	3.0	0.0	H-Bilog	PK	0.0	22.3	46.0	-23.7
456.273	16.8	5.3	69.0	1.2	3.0	0.0	H-Bilog	QP	0.0	22.1	46.0	-23.9
456.212	16.8	5.2	167.0	1.7	3.0	0.0	V-Bilog	QP	0.0	22.0	46.0	-24.0
317.998	16.9	1.4	62.0	1.0	3.0	0.0	V-Bilog	QP	0.0	18.3	46.0	-27.7

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
317.910	16.8	1.4	170.0	1.2	3.0	0.0	H-Bilog	QP	0.0	18.2	46.0	-27.8
303.737	16.7	0.7	302.0	1.2	3.0	0.0	H-Bilog	QP	0.0	17.4	46.0	-28.6
303.176	16.8	0.6	157.0	1.3	3.0	0.0	V-Bilog	QP	0.0	17.4	46.0	-28.6


NORTHWEST
EMC