

Schweitzer Engineering Laboratories

SEL 3031

Report No. SCHW0106

Report Prepared By



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

© 2010 Northwest EMC, Inc

EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: October 18, 2010
Schweitzer Engineering Laboratories
Model: SEL 3031

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.247:2010	ANSI C63.10:2009	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 #2834D-2).

Approved By:

Don Facticeau, IS 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		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



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
NVLAP LAB CODE 200881-0

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-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.



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).





Accreditations and Authorizations

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, 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-1784, 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). License No. SL2-IN-E-1017.



GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIIINMASH, 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)



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/>



Northwest EMC Locations



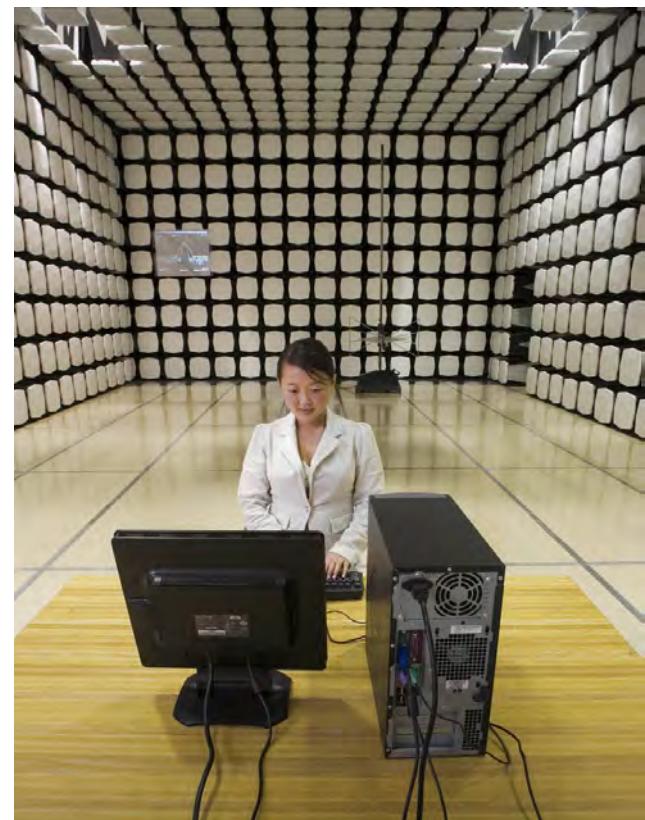
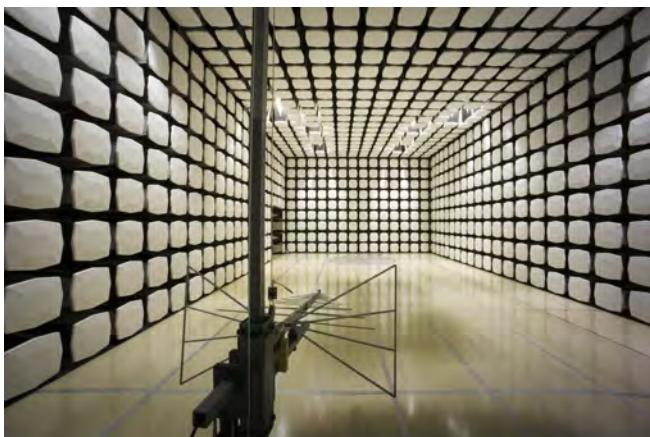
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

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



Party Requesting the Test

Company Name:	Schweitzer Engineering Laboratories
Address:	2350 NE Hopkins Court
City, State, Zip:	Pullman, WA 99163
Test Requested By:	Sam Korslund
Model:	SEL 3031
First Date of Test:	October 18, 2010
Last Date of Test:	October 18, 2010
Receipt Date of Samples:	September 29, 2010
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test**Functional Description of the EUT (Equipment Under Test):**

Professionally installed 902-928 MHz radio sold into utility, industrial, and commercial installations for data transport between fixed location devices.

Testing Objective:

To demonstrate compliance to FCC 15.247 spurious radiated emissions requirements for three new antennas.

CONFIGURATION 1 SCHW0106

Software/Firmware Running during test	
Description	Version
SEL Boot	X307

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
EUT	Schweitzer Engineering	SEL 3031	2008213554	
Antenna - Yagi	PCTEL	BMYD890M	509827	
Antenna - Panel	PCTEL	MP8068PTMF	508078	
Antenna	PCTEL	MFB9157NF	50807B	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Mains	No	1.5m	No	EUT	AC Mains
Coax	Yes	3.0m	No	EUT	Antenna
USB	Yes	1.5m	No	EUT	Unterminated
Serial	Yes	1.6m	No	EUT	Unterminated

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	10/18/2010	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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

Tx @ 27dBm output power

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	1200 MHz	Stop Frequency	26500 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
Cable	ESM Cable Corp.	KMKG-72	EVY	9/15/2010	13
High Pass Filter	Micro-Tronics	50108	HGF	1/18/2010	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/15/2010	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	7/14/2010	13
Antenna, Horn	ETS	3160.07	AHZ	9/8/2010	24
EV12 Cables	N/A	Standard Gain Horn Cables	EVU	7/14/2010	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	13
Antenna, Horn	ETS	3115	AIB	9/8/2010	24
EV12 Cables	N/A	Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/14/2010	13
Spectrum Analyzer	Agilent	E4440A	AAX	5/14/2010	12

MEASUREMENT BANDWIDTHS

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

Measurements were made using the bandwidths and detectors specified. No video filter 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. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Spurious Radiated Emissions												PSA 2008.07.21	EMI 2008.1.9	
EMC							NORTHWEST							
EUT: SEL3031							Work Order: SCHW0106							
Serial Number: None							Date: 10/18/10							
Customer: Schweitzer Engineering Laboratories, Inc.							Temperature: 24							
Attendee: None							Humidity: 43%							
Project: None							Barometric Pres.: 1014mb							
Tested by: Ethan Schoonover				Power: 120V, 60Hz			Job Site: EV12							
TEST SPECIFICATIONS												Test Method		
FCC 15.247:2010							ANSI C63.10:2009							
TEST PARAMETERS														
Antenna Height(s) (m)				1 - 4			Test Distance (m)				3			
COMMENTS														
Monopole 9dBi antenna.														
EUT OPERATING MODES														
Tx @ 27 dBm output power														
DEVIATIONS FROM TEST STANDARD														
No deviations.														
Run #	11		Signature											
Configuration #	1													
Results	Pass													
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments	
4513.020	59.6	7.9	275.0	1.2	0.0	0.0	V-Horn	PK	0.0	67.5	74.0	-6.5	Antenna Horz	
4513.147	57.5	7.9	43.0	1.2	0.0	0.0	H-Horn	PK	0.0	65.4	74.0	-8.6	Antenna Horz	
4513.200	54.8	7.9	360.0	1.2	0.0	0.0	H-Horn	PK	0.0	62.7	74.0	-11.3	Antenna Vert	
4513.100	53.4	7.9	76.0	2.9	0.0	0.0	V-Horn	PK	0.0	61.3	74.0	-12.7	Antenna Vert	
4574.280	49.3	8.2	254.0	1.2	0.0	0.0	V-Horn	PK	0.0	57.5	74.0	-16.5	Antenna Horz	
2707.860	53.2	0.8	287.0	1.1	0.0	0.0	H-Horn	PK	0.0	54.0	74.0	-20.0	Antenna Horz	
4574.360	45.3	8.2	280.0	1.1	0.0	0.0	H-Horn	PK	0.0	53.5	74.0	-20.5	Antenna Horz	
4637.573	44.6	8.4	258.0	1.2	0.0	0.0	H-Horn	PK	0.0	53.0	74.0	-21.0	Antenna Horz	
2707.680	49.8	0.8	271.0	1.1	0.0	0.0	V-Horn	PK	0.0	50.6	74.0	-23.4	Antenna Horz	
4637.327	39.7	8.4	315.0	1.8	0.0	0.0	V-Horn	PK	0.0	48.1	74.0	-25.9	Antenna Horz	
4513.020	57.1	7.9	275.0	1.2	37.0	0.0	V-Horn	AV	0.0	28.0	54.0	-26.0	Antenna Horz	
3610.573	41.9	5.5	72.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.4	74.0	-26.6	Antenna Horz	
3610.507	41.1	5.5	20.0	1.1	0.0	0.0	H-Horn	PK	0.0	46.6	74.0	-27.4	Antenna Horz	
4513.013	54.9	7.9	43.0	1.2	37.0	0.0	H-Horn	AV	0.0	25.8	54.0	-28.2	Antenna Horz	
4513.027	51.9	7.9	360.0	1.2	37.0	0.0	H-Horn	AV	0.0	22.8	54.0	-31.2	Antenna Vert	
4513.020	51.4	7.9	76.0	2.9	37.0	0.0	V-Horn	AV	0.0	22.3	54.0	-31.7	Antenna Vert	
4574.533	46.1	8.2	254.0	1.2	37.0	0.0	V-Horn	AV	0.0	17.3	54.0	-36.7	Antenna Horz	
2707.833	51.5	0.8	287.0	1.1	37.0	0.0	H-Horn	AV	0.0	15.3	54.0	-38.7	Antenna Horz	
2707.827	47.5	0.8	271.0	1.1	37.0	0.0	V-Horn	AV	0.0	11.3	54.0	-42.7	Antenna Horz	
4574.533	39.9	8.2	280.0	1.1	37.0	0.0	H-Horn	AV	0.0	11.1	54.0	-42.9	Antenna Horz	
4637.527	39.0	8.4	258.0	1.2	37.0	0.0	H-Horn	AV	0.0	10.4	54.0	-43.6	Antenna Horz	
3610.453	33.7	5.5	72.0	1.1	37.0	0.0	V-Horn	AV	0.0	2.2	54.0	-51.8	Antenna Horz	
3610.407	32.3	5.5	20.0	1.1	37.0	0.0	H-Horn	AV	0.0	0.8	54.0	-53.2	Antenna Horz	
4637.473	28.7	8.4	315.0	1.8	37.0	0.0	V-Horn	AV	0.0	0.1	54.0	-53.9	Antenna Horz	

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

Tx @ 27dBm output power

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	1200 MHz	Stop Frequency	26500 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
Cable	ESM Cable Corp.	KMKG-72	EVY	9/15/2010	13
High Pass Filter	Micro-Tronics	50108	HGF	1/18/2010	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/15/2010	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	7/14/2010	13
Antenna, Horn	ETS	3160.07	AHZ	9/8/2010	24
EV12 Cables	N/A	Standard Gain Horn Cables	EVU	7/14/2010	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	13
Antenna, Horn	ETS	3115	AIB	9/8/2010	24
EV12 Cables	N/A	Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/14/2010	13
Spectrum Analyzer	Agilent	E4440A	AAX	5/14/2010	12

MEASUREMENT BANDWIDTHS

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

Measurements were made using the bandwidths and detectors specified. No video filter 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. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Spurious Radiated Emissions												PSA 2008.07.21	EMI 2008.1.9
EMC								TEST SPECIFICATIONS					
EUT: SEL3031 Serial Number: None Customer: Schweitzer Engineering Laboratories, Inc. Attendees: None Project: None Tested by: Ethan Schoonover								Work Order: SCHW0106 Date: 10/18/10 Temperature: 24 Humidity: 43% Barometric Pres.: 1014mb Power: 120V, 60Hz Job Site: EV12					
TEST PARAMETERS								Test Method					
FCC 15.247:2010								ANSI C63.10:2009					
TEST OPERATING MODES								COMMENTS					
Tx @ 27 dBm output power								Panel Antenna. MN: MP8068PT. Gain 10dBi.					
DEVIATIONS FROM TEST STANDARD								No deviations.					
Run #	9	Signature	Configuration #	1	Results	Pass							
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4513.187	51.2	7.9	303.0	1.1	0.0	0.0	V-Horn	PK	0.0	59.1	74.0	-14.9	Antenna Horizontal.
4513.013	47.5	7.9	329.0	2.1	0.0	0.0	H-Horn	PK	0.0	55.4	74.0	-18.6	Antenna Vertical
4512.853	47.3	7.9	254.0	1.2	0.0	0.0	V-Horn	PK	0.0	55.2	74.0	-18.8	Antenna Vertical
4513.087	45.1	7.9	226.0	2.1	0.0	0.0	H-Horn	PK	0.0	53.0	74.0	-21.0	Antenna flat on table.
4512.980	43.8	7.9	226.0	2.1	0.0	0.0	H-Horn	PK	0.0	51.7	74.0	-22.3	Antenna Horizontal.
4637.467	42.9	8.4	253.0	1.1	0.0	0.0	V-Horn	PK	0.0	51.3	74.0	-22.7	Antenna Vertical
4637.847	42.9	8.4	283.0	1.1	0.0	0.0	H-Horn	PK	0.0	51.3	74.0	-22.7	Antenna Vertical
4512.593	40.8	7.9	201.0	1.2	0.0	0.0	V-Horn	PK	0.0	48.7	74.0	-25.3	Antenna flat on table.
4574.440	40.3	8.2	286.0	1.1	0.0	0.0	H-Horn	PK	0.0	48.5	74.0	-25.5	Antenna Vertical
2708.000	46.7	0.8	303.0	1.2	0.0	0.0	H-Horn	PK	0.0	47.5	74.0	-26.5	Antenna Vertical
4574.333	37.9	8.2	345.0	2.6	0.0	0.0	V-Horn	PK	0.0	46.1	74.0	-27.9	Antenna Vertical
3610.420	40.3	5.5	341.0	1.2	0.0	0.0	H-Horn	PK	0.0	45.8	74.0	-28.2	Antenna Vertical
3609.320	39.3	5.5	6.0	3.1	0.0	0.0	V-Horn	PK	0.0	44.8	74.0	-29.2	Antenna Vertical
2708.093	41.5	0.8	209.0	1.2	0.0	0.0	V-Horn	PK	0.0	42.3	74.0	-31.7	Antenna Vertical
4513.033	48.1	7.9	303.0	1.1	37.0	0.0	V-Horn	AV	0.0	19.0	54.0	-35.0	Antenna Horizontal.
4513.027	44.1	7.9	329.0	2.1	37.0	0.0	H-Horn	AV	0.0	15.0	54.0	-39.0	Antenna Vertical
4513.020	43.0	7.9	254.0	1.2	37.0	0.0	V-Horn	AV	0.0	13.9	54.0	-40.1	Antenna Vertical
4513.093	39.5	7.9	226.0	2.1	37.0	0.0	H-Horn	AV	0.0	10.4	54.0	-43.6	Antenna flat on table.
4513.087	38.5	7.9	226.0	2.1	37.0	0.0	H-Horn	AV	0.0	9.4	54.0	-44.6	Antenna Horizontal.
4637.527	37.6	8.4	253.0	1.1	37.0	0.0	V-Horn	AV	0.0	9.0	54.0	-45.0	Antenna Vertical
4637.513	35.9	8.4	283.0	1.1	37.0	0.0	H-Horn	AV	0.0	7.3	54.0	-46.7	Antenna Vertical
2707.867	43.1	0.8	303.0	1.2	37.0	0.0	H-Horn	AV	0.0	6.9	54.0	-47.1	Antenna Vertical
4513.027	33.1	7.9	201.0	1.2	37.0	0.0	V-Horn	AV	0.0	4.0	54.0	-50.0	Antenna flat on table.
4574.520	29.9	8.2	286.0	1.1	37.0	0.0	H-Horn	AV	0.0	1.1	54.0	-52.9	Antenna Vertical
4574.487	25.7	8.2	345.0	2.6	37.0	0.0	V-Horn	AV	0.0	-3.1	54.0	-57.1	Antenna Vertical
2707.813	32.3	0.8	209.0	1.2	37.0	0.0	V-Horn	AV	0.0	-3.9	54.0	-57.9	Antenna Vertical
3610.367	27.6	5.5	341.0	1.2	37.0	0.0	H-Horn	AV	0.0	-3.9	54.0	-57.9	Antenna Vertical
3610.500	25.8	5.5	6.0	3.1	37.0	0.0	V-Horn	AV	0.0	-5.7	54.0	-59.7	Antenna Vertical

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

Tx @ 27dBm output power

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	1200 MHz	Stop Frequency	26500 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
Cable	ESM Cable Corp.	KMKG-72	EVY	9/15/2010	13
High Pass Filter	Micro-Tronics	50108	HGF	1/18/2010	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/15/2010	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	7/14/2010	13
Antenna, Horn	ETS	3160.07	AHZ	9/8/2010	24
EV12 Cables	N/A	Standard Gain Horn Cables	EVU	7/14/2010	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	13
Antenna, Horn	ETS	3115	AIB	9/8/2010	24
EV12 Cables	N/A	Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/14/2010	13
Spectrum Analyzer	Agilent	E4440A	AAX	5/14/2010	12

MEASUREMENT BANDWIDTHS

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

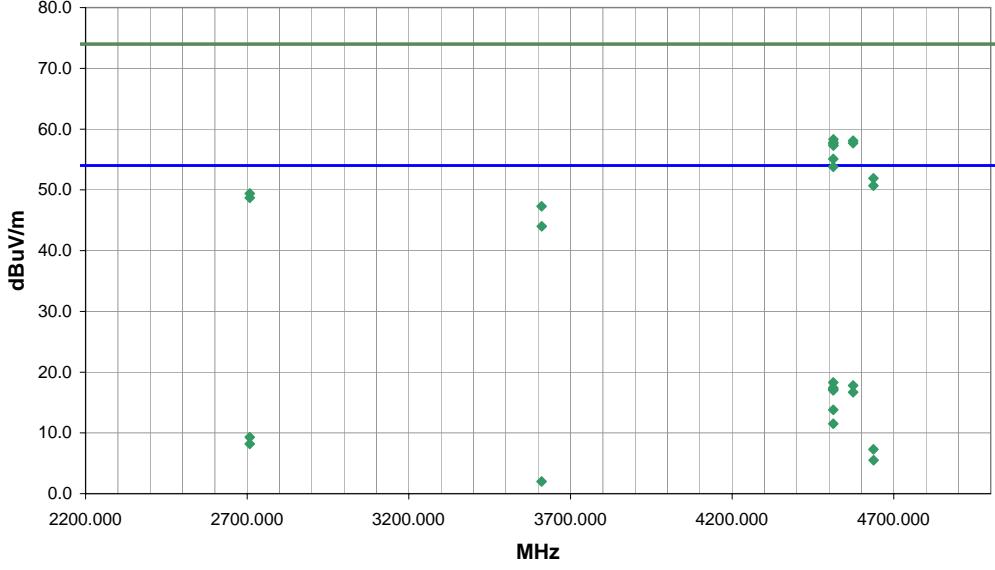
Measurements were made using the bandwidths and detectors specified. No video filter was used.

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. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Spurious Radiated Emissions												PSA 2008.07.21	EMI 2008.1.9		
NORTHWEST								EMC							
EUT: SEL3031								Work Order: SCHW0106							
Serial Number: None								Date: 10/18/10							
Customer: Schweitzer Engineering Laboratories, Inc.								Temperature: 24							
Attendees: None								Humidity: 43%							
Project: None								Barometric Pres.: 1014mb							
Tested by: Ethan Schoonover				Power: 120V, 60Hz				Job Site: EV12				Test Method			
TEST SPECIFICATIONS															
FCC 15.247:2010								ANSI C63.10:2009							
TEST PARAMETERS															
Antenna Height(s) (m)				1 - 4				Test Distance (m)				3			
COMMENTS															
Yagi Antenna. MN: BMYD890M. Gain 12dBi.															
EUT OPERATING MODES															
Tx @ 27 dBm output power															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
Run #	10														
Configuration #	1														
Results	Pass														
Graph of dBuV/m vs MHz															
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments		
4513.207	50.4	7.9	360.0	1.4	0.0	0.0	V-Horn	PK	0.0	58.3	74.0	-15.7	Antenna Horizontal		
4574.440	49.9	8.2	28.0	1.2	0.0	0.0	H-Horn	PK	0.0	58.1	74.0	-15.9	Antenna Flat on table		
4513.240	49.9	7.9	309.0	1.2	0.0	0.0	H-Horn	PK	0.0	57.8	74.0	-16.2	Antenna Flat on table		
4574.333	49.5	8.2	56.0	1.2	0.0	0.0	V-Horn	PK	0.0	57.7	74.0	-16.3	Antenna Flat on table		
4513.107	49.7	7.9	234.0	1.0	0.0	0.0	H-Horn	PK	0.0	57.6	74.0	-16.4	Antenna Vertical		
4513.240	49.4	7.9	62.0	1.2	0.0	0.0	V-Horn	PK	0.0	57.3	74.0	-16.7	Antenna Flat on table		
4512.893	47.2	7.9	258.0	2.2	0.0	0.0	V-Horn	PK	0.0	55.1	74.0	-18.9	Antenna Vertical		
4513.120	45.9	7.9	204.0	2.0	0.0	0.0	H-Horn	PK	0.0	53.8	74.0	-20.2	Antenna Horizontal		
4637.033	43.5	8.4	87.0	1.2	0.0	0.0	V-Horn	PK	0.0	51.9	74.0	-22.1	Antenna Flat on table		
4637.427	42.3	8.4	29.0	1.1	0.0	0.0	H-Horn	PK	0.0	50.7	74.0	-23.3	Antenna Flat on table		
2707.880	48.6	0.8	304.0	1.2	0.0	0.0	V-Horn	PK	0.0	49.4	74.0	-24.6	Antenna Flat on table		
2707.700	47.9	0.8	14.0	1.2	0.0	0.0	H-Horn	PK	0.0	48.7	74.0	-25.3	Antenna Flat on table		
3610.527	41.8	5.5	318.0	1.1	0.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	Antenna Flat on table		
3610.953	38.5	5.5	201.0	1.1	0.0	0.0	V-Horn	PK	0.0	44.0	74.0	-30.0	Antenna Flat on table		
4513.047	47.4	7.9	309.0	1.2	37.0	0.0	H-Horn	AV	0.0	18.3	54.0	-35.7	Antenna Flat on table		
4574.527	46.6	8.2	56.0	1.2	37.0	0.0	V-Horn	AV	0.0	17.8	54.0	-36.2	Antenna Flat on table		
4513.027	46.5	7.9	62.0	1.2	37.0	0.0	V-Horn	AV	0.0	17.4	54.0	-36.6	Antenna Flat on table		
4513.027	46.3	7.9	234.0	1.0	37.0	0.0	H-Horn	AV	0.0	17.2	54.0	-36.8	Antenna Vertical		
4512.920	46.1	7.9	360.0	1.4	37.0	0.0	V-Horn	AV	0.0	17.0	54.0	-37.0	Antenna Horizontal		
4574.520	45.5	8.2	28.0	1.2	37.0	0.0	H-Horn	AV	0.0	16.7	54.0	-37.3	Antenna Flat on table		
4513.027	42.9	7.9	258.0	2.2	37.0	0.0	V-Horn	AV	0.0	13.8	54.0	-40.2	Antenna Vertical		
4513.027	40.6	7.9	204.0	2.0	37.0	0.0	H-Horn	AV	0.0	11.5	54.0	-42.5	Antenna Horizontal		
2707.827	45.5	0.8	304.0	1.2	37.0	0.0	V-Horn	AV	0.0	9.3	54.0	-44.7	Antenna Flat on table		
2707.820	44.4	0.8	14.0	1.2	37.0	0.0	H-Horn	AV	0.0	8.2	54.0	-45.8	Antenna Flat on table		
4637.300	35.9	8.4	87.0	1.2	37.0	0.0	V-Horn	AV	0.0	7.3	54.0	-46.7	Antenna Flat on table		
4637.540	34.1	8.4	29.0	1.1	37.0	0.0	H-Horn	AV	0.0	5.5	54.0	-48.5	Antenna Flat on table		
3610.440	33.5	5.5	318.0	1.1	37.0	0.0	H-Horn	AV	0.0	2.0	54.0	-52.0	Antenna Flat on table		
3610.407	26.1	5.5	201.0	1.1	37.0	0.0	V-Horn	AV	0.0	-5.4	54.0	-59.4	Antenna Flat on table		