

Schweitzer Engineering Laboratories, Inc.

SEL-3031

Report No. SCHW0090

Report Prepared By



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

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: October 26, 2009

Schweitzer Engineering Laboratories, Inc.

Model: SEL-3031

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Occupied Bandwidth	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Carrier Frequency Separation	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Number of Hopping Frequencies	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Dwell Time	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Peak Output Power	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Band Edge Compliance	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
Spurious Conducted Emissions	FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000	Pass
AC Powerline Conducted Emissions	FCC 15.207:2009	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: (763) 425-2281 Fax: (763) 424-3469

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:

Tim O'Shea, Operations 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).



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-1658, and R-2318, Irvine: R-1943, C-2766, and T-1659, Sultan: R-871, C-1784, and T-1511, Brooklyn Park: R-3125, 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 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)



SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Northwest EMC Locations



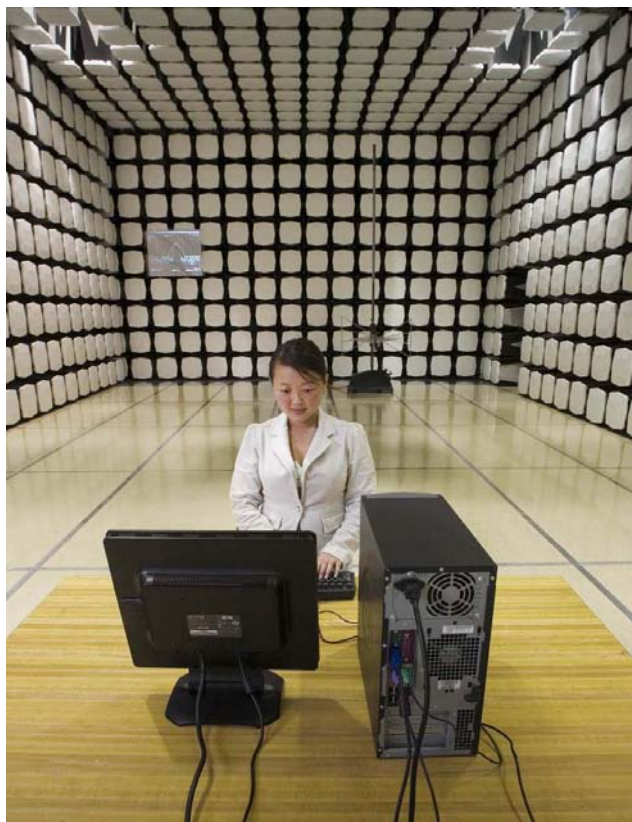
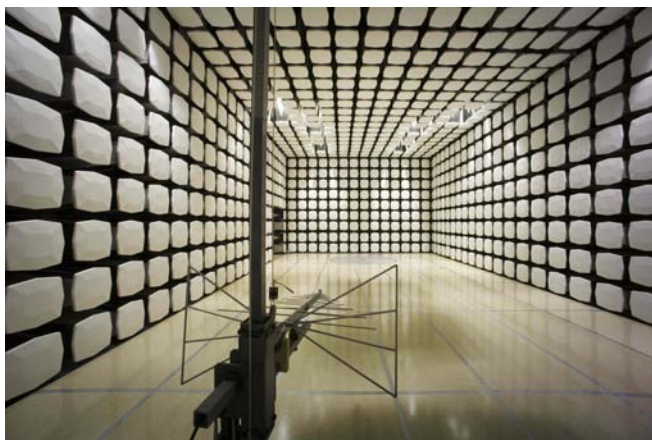
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

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, Inc.
Address:	2350 NE Hopkins Court
City, State, Zip:	Pullman, WA 99163
Test Requested By:	Kim Yauchzee
Model:	SEL-3031
First Date of Test:	October 13, 2009
Last Date of Test:	October 26, 2009
Receipt Date of Samples:	October 12, 2009
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

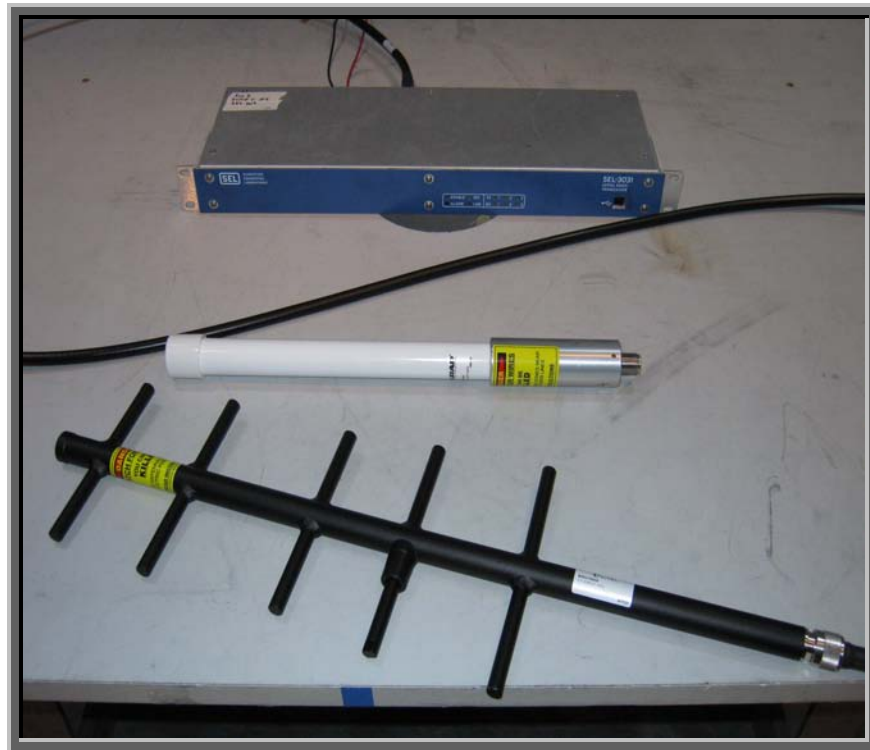
Frequency Hopping radio used in two different enclosures (rack mount and wall mount) with two different antennas - yagi and dipole (also referred to as unity gain antenna).

Testing Objective:

To demonstrate compliance with FCC 15.247 requirements. Seeking limited modular approval.

EUT Photo





CONFIGURATION 1 SCHW0089

Software/Firmware Running during test	
Description	Version
Firmware	X316
RTL	X319
SELBoot	X307

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT - Rackmount (AC)	Schweitzer Engineering Laboratories, Inc.	SEL3031	2009229219
Antenna - Yagi	PCTEL	BMOY8905	447925

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.5m	No	EUT	AC Mains
Port 1	Yes	1.8m	No	EUT	Unterminated
Port 2	Yes	1.8m	No	EUT	Unterminated
Port 3	Yes	3.0m	No	EUT	Unterminated
Antenna	Yes	3.0m	No	EUT	Antenna
Alarm	No	1.8m	No	EUT	Unterminated
USB	Yes	1.8m	No	EUT	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 2 SCHW0089

Software/Firmware Running during test	
Description	Version
Firmware	X316
RTL	X319
SELBoot	X307

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT - Rackmount (AC)	Schweitzer Engineering Laboratories, Inc.	SEL3031	2009229219
Antenna - Unity Gain	Maxrad	MFB9150	436169

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.5m	No	EUT	AC Mains
Port 1	Yes	1.8m	No	EUT	Unterminated
Port 2	Yes	1.8m	No	EUT	Unterminated
Port 3	Yes	3.0m	No	EUT	Unterminated
Antenna	Yes	3.0m	No	EUT	Antenna
Alarm	No	1.8m	No	EUT	Unterminated
USB	Yes	1.8m	No	EUT	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 3 SCHW0089

Software/Firmware Running during test	
Description	Version
Firmware	X316
RTL	X319
SELBoot	X307

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Antenna - Yagi	PCTEL	BMOY8905	447925
EUT - Wallmount	Schweitzer Engineering Laboratories, Inc.	SEL3031	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Adapter	APX Technologies Inc.	EA1030CR	Engineering Sample

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Port 1	Yes	1.8m	No	EUT	Unterminated
Port 2	Yes	1.8m	No	EUT	Unterminated
Port 3	Yes	3.0m	No	EUT	Unterminated
Antenna	Yes	3.0m	No	EUT	Antenna
USB	Yes	1.8m	No	EUT	Unterminated
DC power	PA	1.5m	No	EUT	Power Adapter
Alarm Leads x2	No	1.0m	No	EUT	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 4 SCHW0089**Software/Firmware Running during test**

Description	Version
Firmware	X316
RTL	X319
SELBoot	X307

EUT

Description	Manufacturer	Model/Part Number	Serial Number
Antenna - Unity Gain	Maxrad	MFB9150	436169
EUT - Wallmount	Schweitzer Engineering Laboratories, Inc.	SEL3031	None

Peripherals in test setup boundary

Description	Manufacturer	Model/Part Number	Serial Number
Power Adapter	APX Technologies Inc.	EA1030CR	Engineering Sample

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Port 1	Yes	1.8m	No	EUT	Unterminated
Port 2	Yes	1.8m	No	EUT	Unterminated
Port 3	Yes	3.0m	No	EUT	Unterminated
Antenna	Yes	3.0m	No	EUT	Antenna
USB	Yes	1.8m	No	EUT	Unterminated
DC power	PA	1.5m	No	EUT	Power Adapter
Alarm Leads x2	No	1.0m	No	EUT	Unterminated

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

CONFIGURATION 5 SCHW0090

Software/Firmware Running during test	
Description	Version
SELBoot	X307
Firmware	X316
RTL	X319
Hyperterminal	5.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT - Rackmount (DC)	Schweitzer Engineering Laboratories, Inc.	SEL-3031	2009238196
Antenna - Yagi	PCTEL	BMOY8905	447925

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Port 1	Yes	1.8m	No	EUT	Unterminated
Port 2	Yes	1.8m	No	EUT	Unterminated
Port 3	Yes	3.0m	No	EUT	Unterminated
Antenna	Yes	3.0m	No	EUT	Antenna
Alarm	No	1.8m	No	EUT	Unterminated
USB	Yes	1.8m	No	EUT	Unterminated (to PC for setup)
DC leads	No	1.0m	No	EUT	24VDC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 6 SCHW0090

Software/Firmware Running during test	
Description	Version
SELBoot	X307
Firmware	X316
RTL	X319
Hyperterminal	5.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT - Rackmount (DC)	Schweitzer Engineering Laboratories, Inc.	SEL-3031	2009238196
Antenna - Unity Gain	Maxrad	MFB9150	436169

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Port 1	Yes	1.8m	No	EUT	Unterminated
Port 2	Yes	1.8m	No	EUT	Unterminated
Port 3	Yes	3.0m	No	EUT	Unterminated
Antenna	Yes	3.0m	No	EUT	Antenna
Alarm	No	1.8m	No	EUT	Unterminated
USB	Yes	1.8m	No	EUT	Unterminated (to PC for setup)
DC leads	No	1.0m	No	EUT	24VDC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 7 SCHW0090

Software/Firmware Running during test	
Description	Version
SELBoot	X307
Firmware	X316
RTL	X319
Hyperterminal	5.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT - Wallmount	Schweitzer Engineering Laboratories, Inc.	SEL-3031	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Adapter	APX Technologies Inc.	EA1030CR	Engineering Sample

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC power	PA	1.5m	No	EUT	Power Adapter
USB	Yes	1.8m	No	EUT	PC
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	10/13/2009	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	10/20/2009	Peak Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	10/20/2009	Number of Hopping Frequencies	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	10/20/2009	Carrier Frequency Separation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	10/20/2009	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	10/20/2009	Dwell Time	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	10/20/2009	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
8	10/20/2009	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
9	10/26/2009	AC Powerline Conducted 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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13

MEASUREMENT UNCERTAINTY

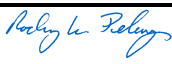
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 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

The channel carrier frequencies in the 902 MHz – 928 MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. The 20 dB occupied bandwidth was measured at 235 kHz as noted elsewhere in this report. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

EMC

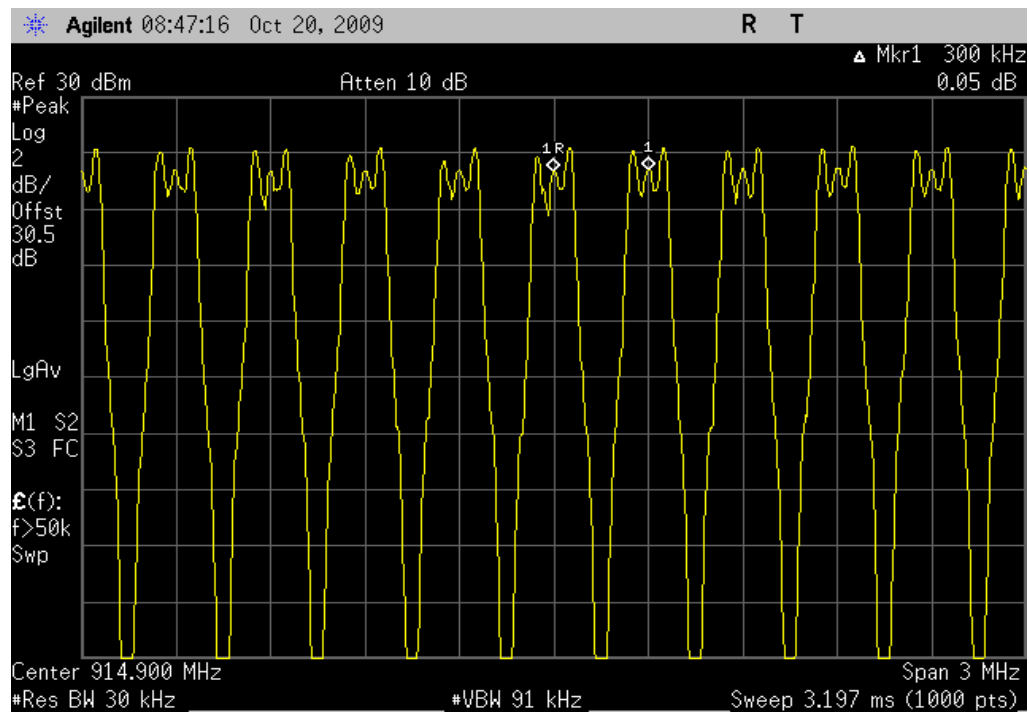
CARRIER FREQUENCY SEPARATION

EUT: SEL-3031		Work Order: SCHW0090	
Serial Number: None		Date: 10/20/09	
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 22°C	
Attendees: None		Humidity: 48%	
Project: None		Barometric Pres.: 30.10 in	
Tested by: Rod Peloquin		Power: 120VAC/60Hz	
		Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247 (FHSS):2009		Test Method	
		ANSI C63.4:2003 DA 00-705:2000	
COMMENTS			
Wall mount unit. Typical hopping mode			
DEVIATIONS FROM TEST STANDARD			
No Deviations			
Configuration #	7	Signature 	
		Value	Limit
Channel Spacing		300 kHz	≥ 235 kHz
			Results
			Pass

Channel Spacing

Result: Pass

Value: 300 kHz

Limit: ≥ 235 kHz



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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13

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

The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

The dwell time of the product met the requirements of the following section of 15.247:

"For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period"

EMC

DWELL TIME

EUT:	SEL-3031	Work Order:	SCHW0090
Serial Number:	None	Date:	10/20/09
Customer:	Schweitzer Engineering Laboratories, Inc.	Temperature:	22°C
Attendees:	None	Humidity:	48%
Project:	None	Barometric Pres.:	30.10 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

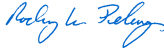
TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000

COMMENTS

Wall mount unit. Typical hopping mode. Dwell time = 129 transmissions x 1.4 mS = 0.18 S in 20 second period.

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	7	Signature 
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	Value	Limit	Results
Pulse Width	1.4 mS	0.4 S in 20 Seconds	Pass
Period	155 mS	0.4 S in 20 Seconds	Pass
2 Second Sweep	13 transmissions	0.4 S in 20 Seconds	Pass
20 Second Sweep	129 Transmissions	0.4 S in 20 Seconds	Pass

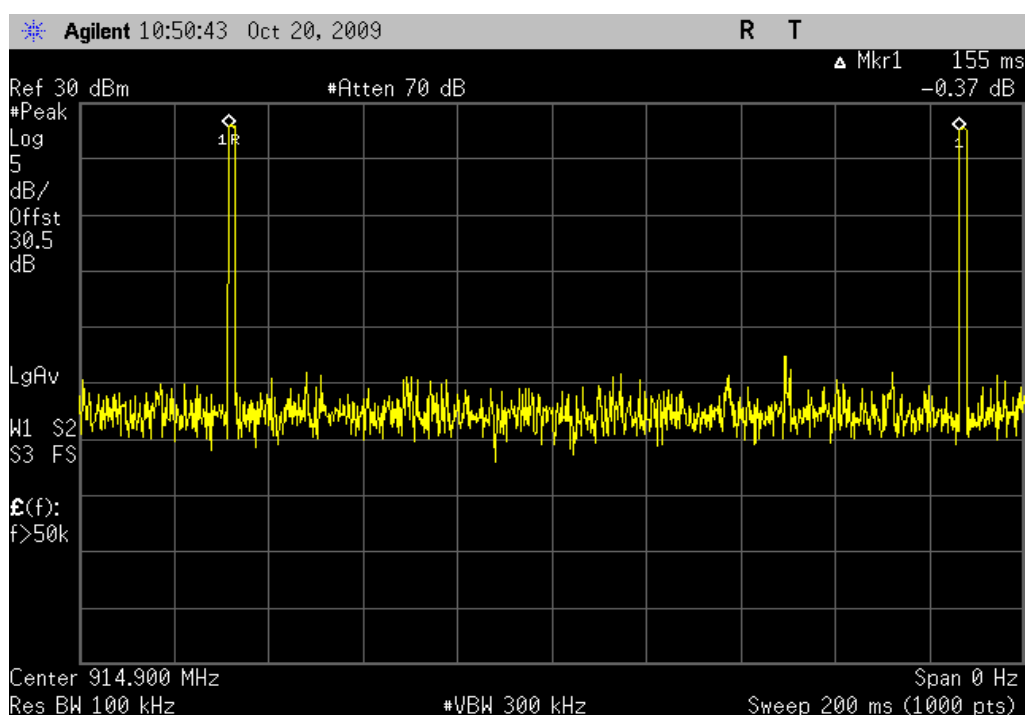
Pulse Width

Result: Pass **Value:** 1.4 mS **Limit:** 0.4 S in 20 Seconds

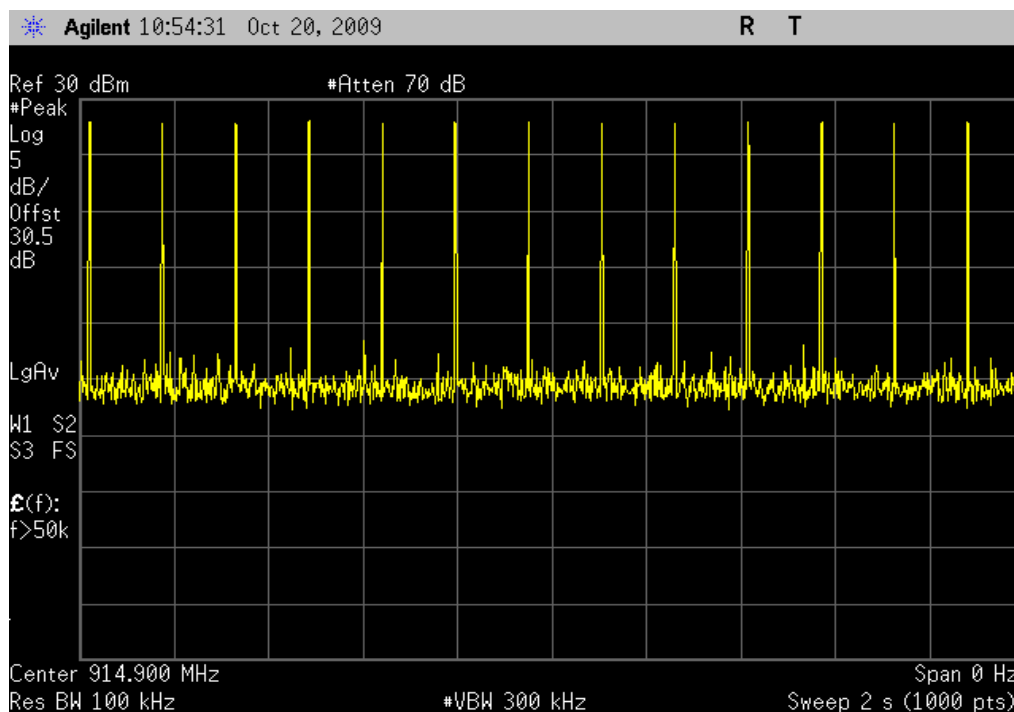


Period

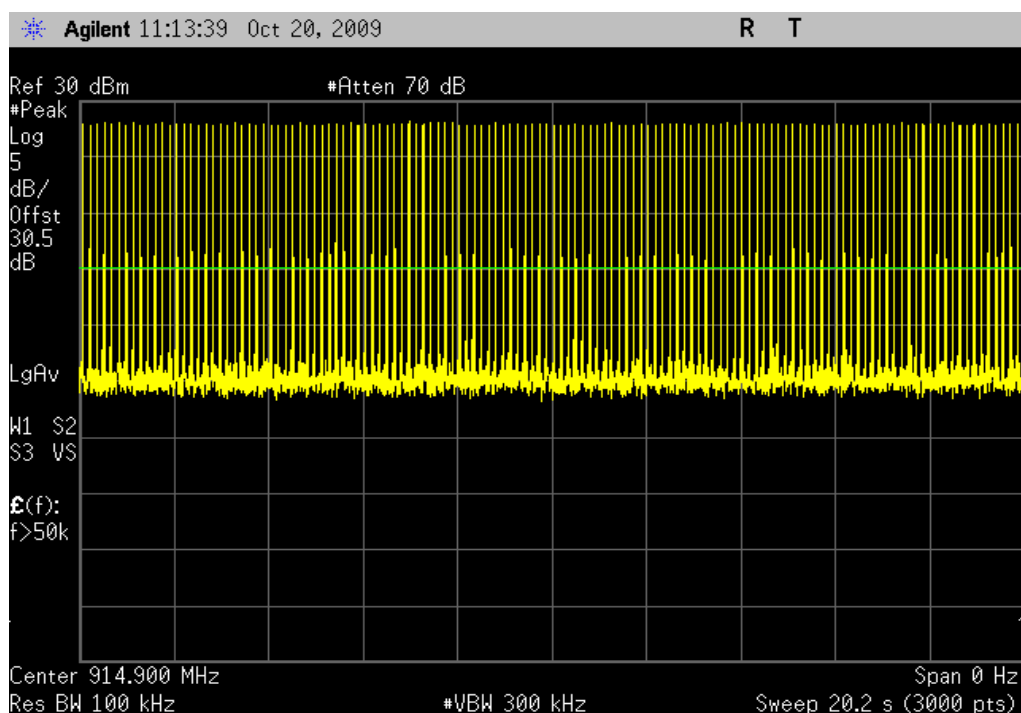
Result: Pass **Value:** 155 ms **Limit:** 0.4 S in 20 Seconds

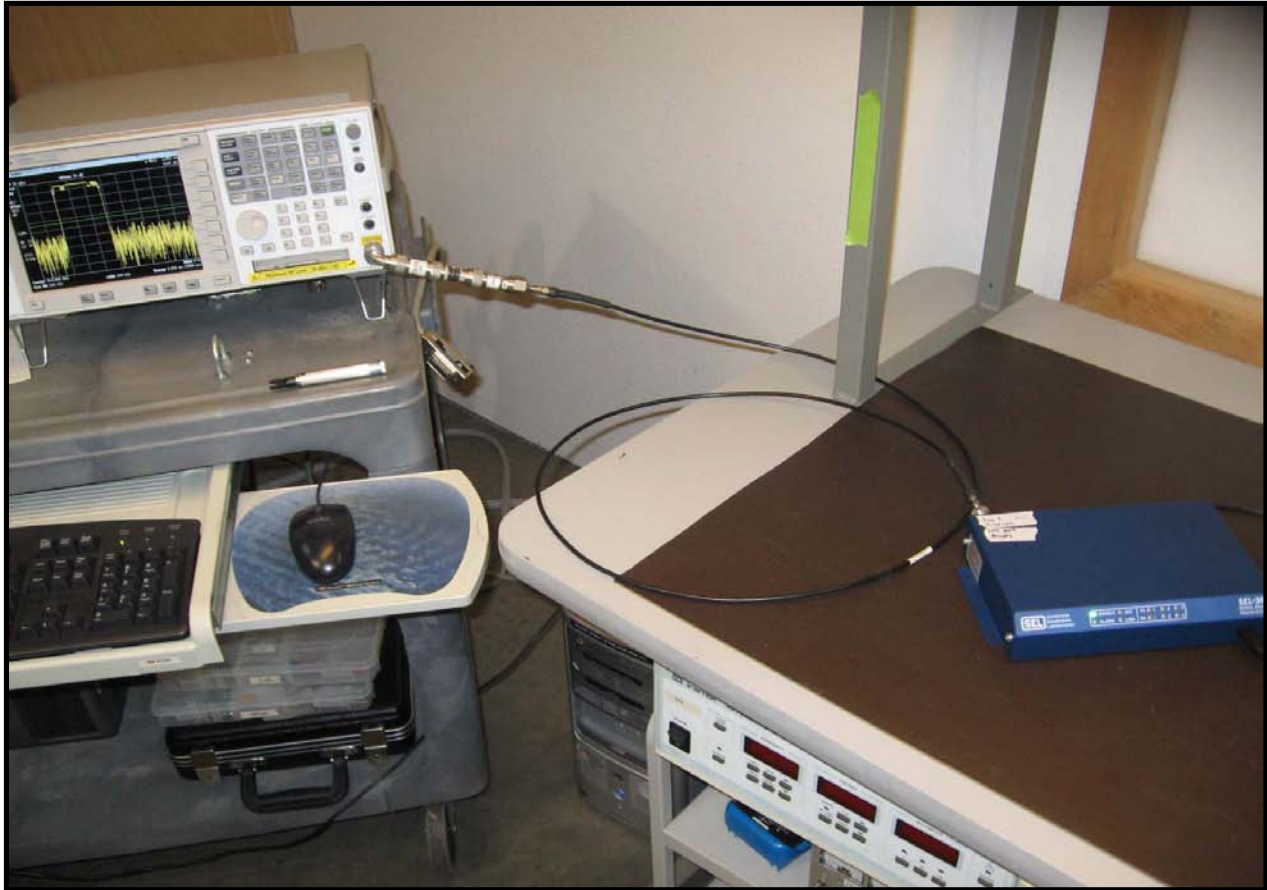


2 Second Sweep

Result: Pass**Value:** 13 transmissions**Limit:** 0.4 S in 20 Seconds

20 Second Sweep

Result: Pass**Value:** 129 Transmissions**Limit:** 0.4 S in 20 Seconds



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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
18 GHz DC Block, N	Fairview Microwave	SD3074	AMF	NCR	N/A
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13

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

The number of hopping frequencies was measured across the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

EMC

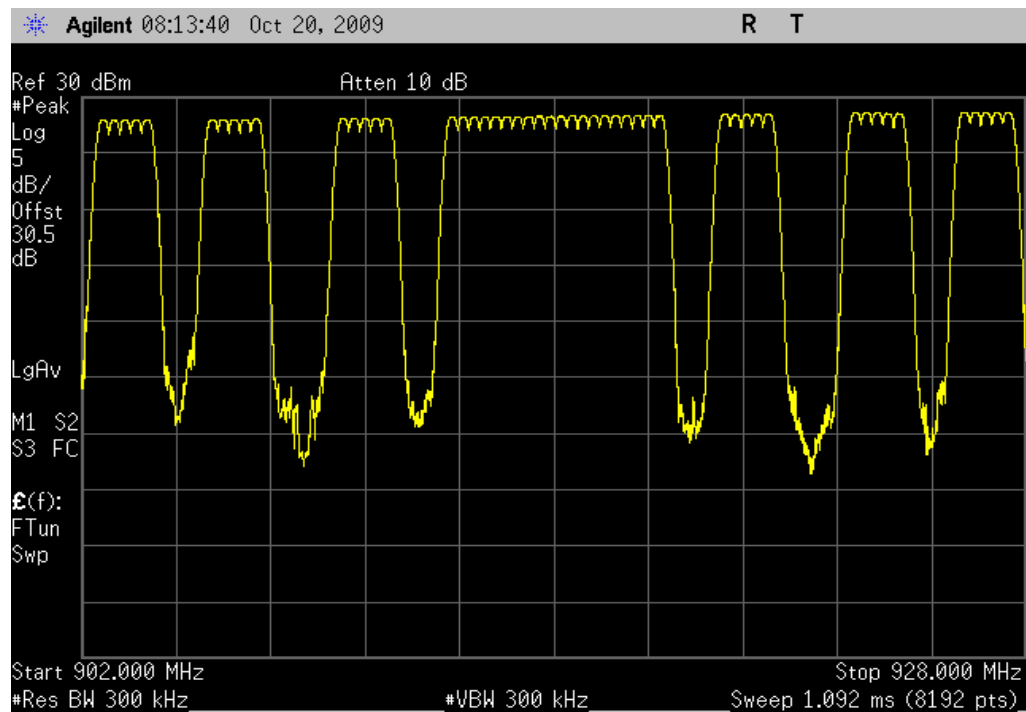
NUMBER OF HOPPING FREQUENCIES

EUT: SEL-3031		Work Order: SCHW0090	
Serial Number: None		Date: 10/20/09	
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 22°C	
Attendees: None		Humidity: 48%	
Project: None		Barometric Pres.: 30.10 in	
Tested by: Rod Peloquin		Power: 120VAC/60Hz	Job Site: EV06
TEST SPECIFICATIONS			
FCC 15.247 (FHSS):2009		Test Method	
		ANSI C63.4:2003 DA 00-705:2000	
COMMENTS			
Wall mount unit. Transmitting in a typical hopping mode with the default hopping groups of 2,4,6,11,13,and 15 being suppressed.			
DEVIATIONS FROM TEST STANDARD			
No Deviations			
Configuration #	7	Signature 	
		Value	Limit
NUMBER OF HOPPING FREQUENCIES		50	≤ 50
			Results
			Pass

NUMBER OF HOPPING FREQUENCIES

NUMBER OF HOPPING FREQUENCIES

Result: Pass	Value: 50	Limit: ≤ 50
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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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
18 GHz DC Block, N	Fairview Microwave	SD3074	AMF	NCR	N/A
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13

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

The occupied bandwidth was measured with the EUT set to transmit in its normal hopping mode, using all 50 channels in its default channel groups. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum output power.

EMC

OCCUPIED BANDWIDTH

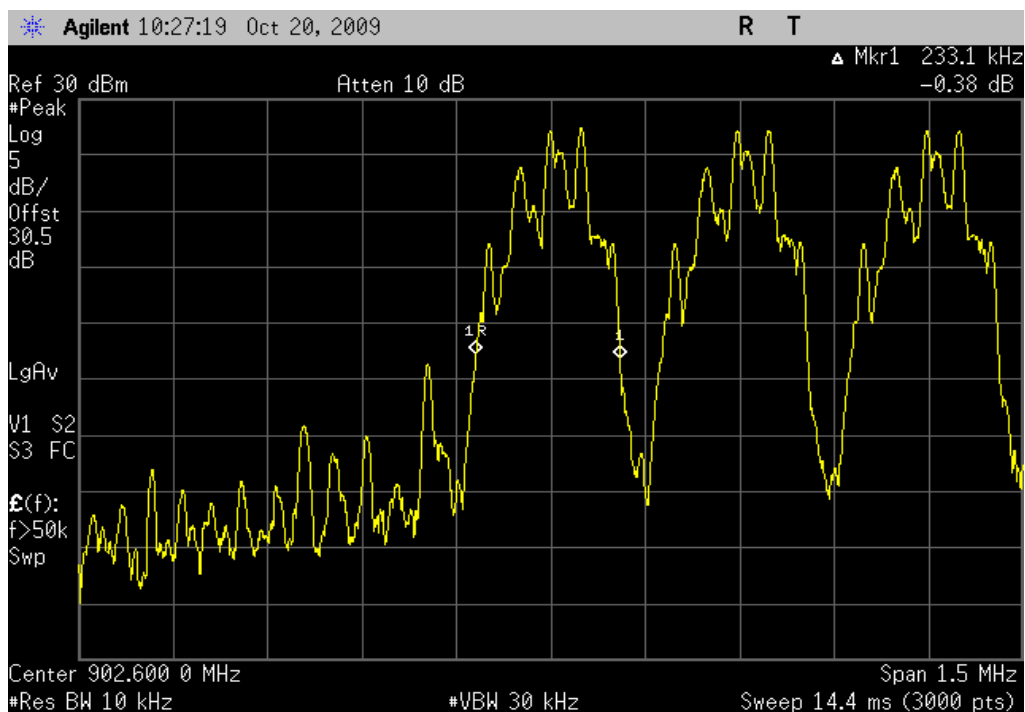
EUT: SEL-3031		Work Order: SCHW0090	
Serial Number: None		Date: 10/20/09	
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 22°C	
Attendees: None		Humidity: 48%	
Project: None		Barometric Pres.: 30.10 in	
Tested by: Rod Peloquin		Power: 120VAC/60Hz	
		Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247 (FHSS):2009		Test Method	
		ANSI C63.4:2003 DA 00-705:2000	
COMMENTS			
Wall mount unit. Normal frequency hopping mode at 30 dBm power setting and default channel groups.			
DEVIATIONS FROM TEST STANDARD			
No Deviations			
Configuration #	7	Signature 	
		Value	Limit
Low Channel		233 kHz	250 kHz
Mid Channel		228 kHz	250 kHz
High Channel		235 kHz	250 kHz
			Results
			Pass
			Pass
			Pass

Low Channel

Result: Pass

Value: 233 kHz

Limit: 250 kHz

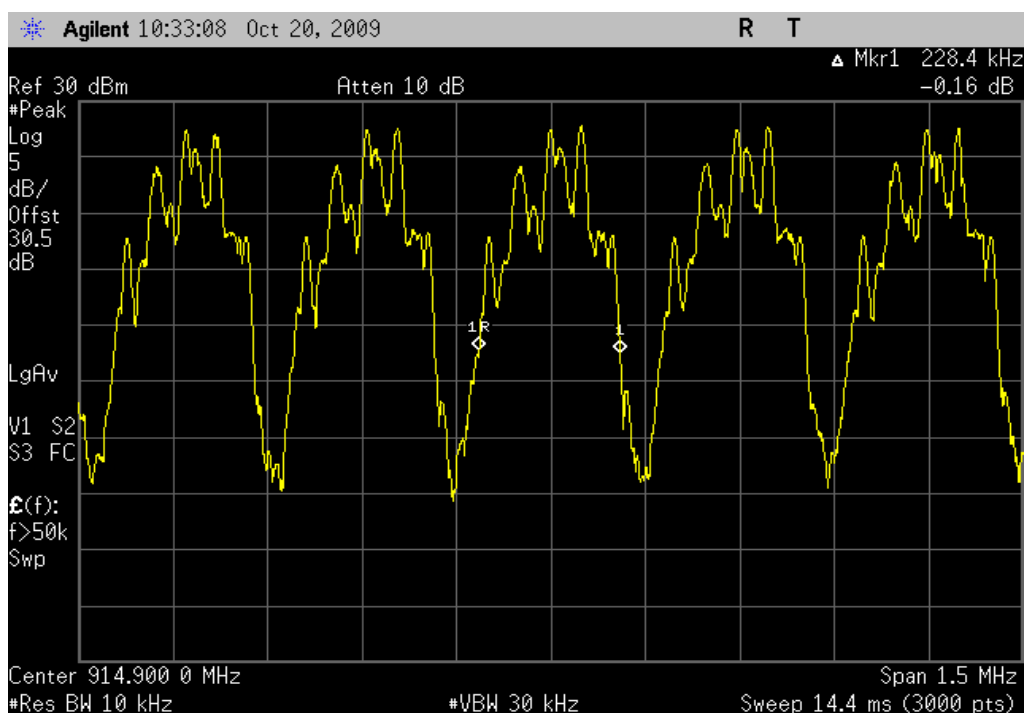


Mid Channel

Result: Pass

Value: 228 kHz

Limit: 250 kHz



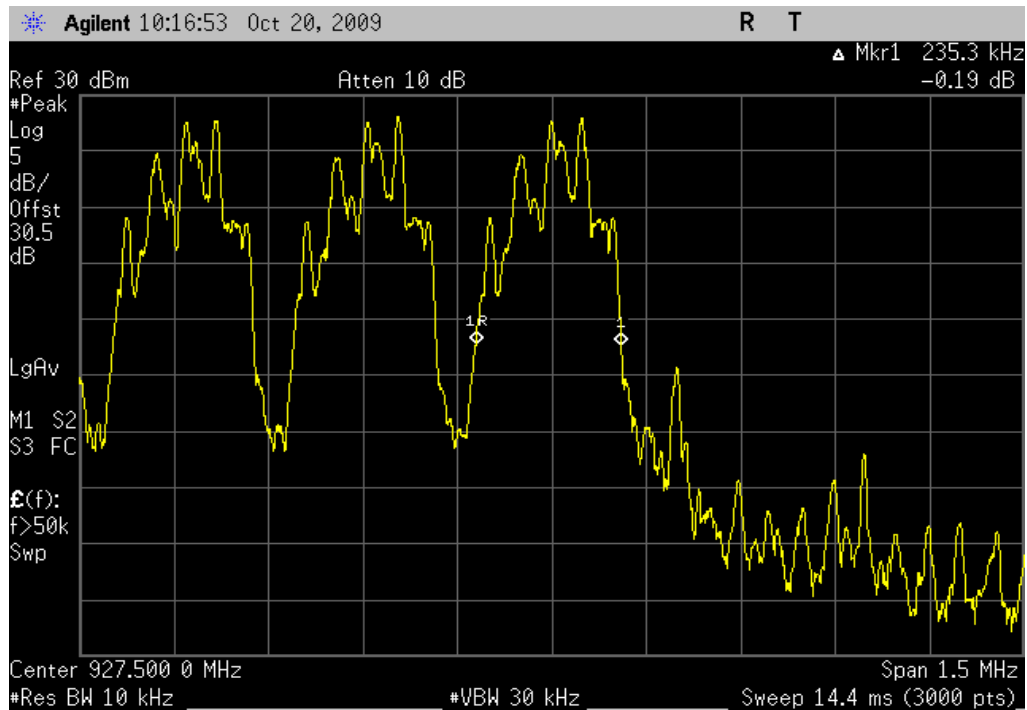
OCCUPIED BANDWIDTH

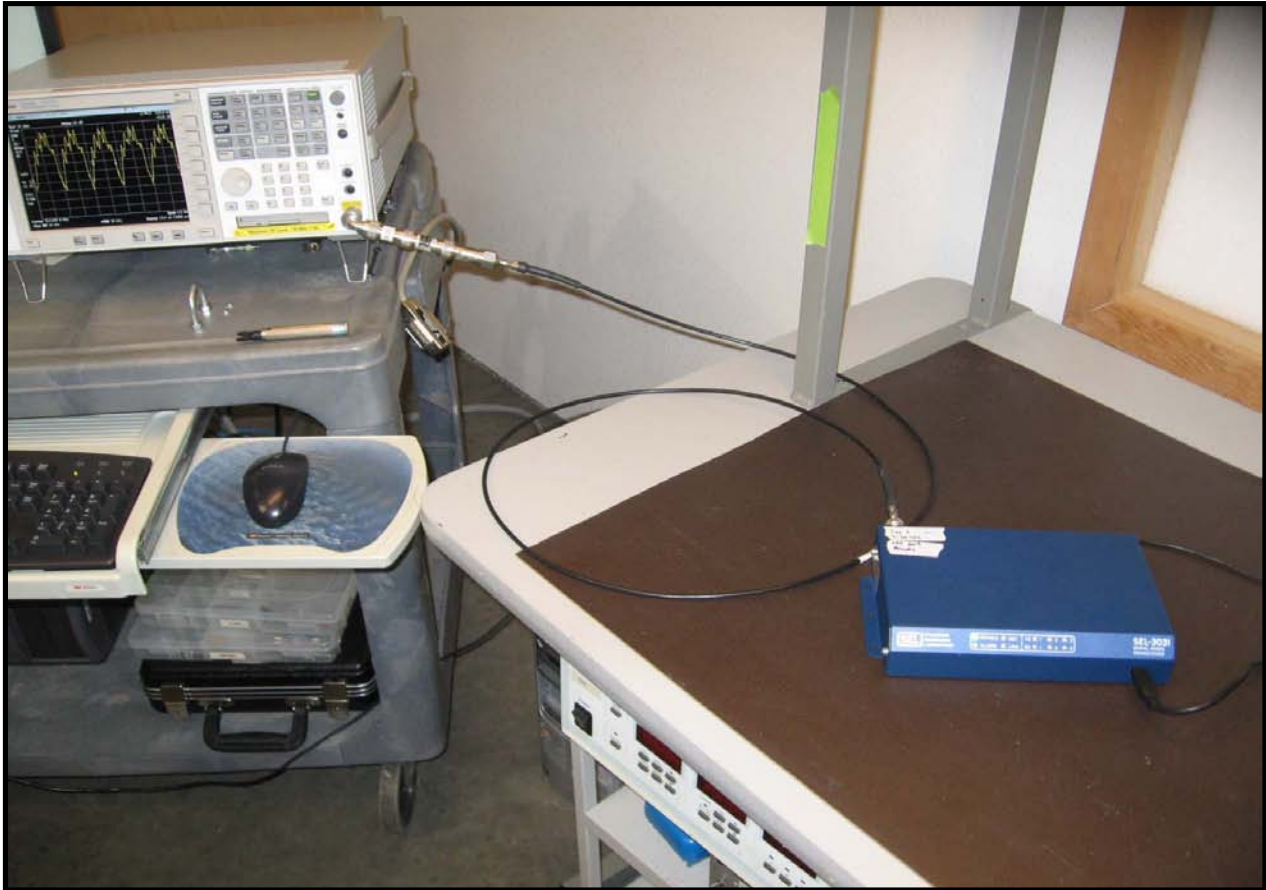
High Channel

Result: Pass

Value: 235 kHz

Limit: 250 kHz





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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
18 GHz DC Block, N	Fairview Microwave	SD3074	AMF	NCR	N/A
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13
Power Meter	Gigatronics	8651A	SPM	12/10/2008	13
Power Sensor	Gigatronics	80701A	SPL	12/10/2008	13
Signal Generator	Hewlett-Packard	8648A	TGA	12/9/2008	13

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

The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

EMC

PEAK OUTPUT POWER

EUT:	SEL-3031	Work Order:	SCHW0090
Serial Number:	None	Date:	10/20/09
Customer:	Schweitzer Engineering Laboratories, Inc.	Temperature:	22°C
Attendees:	None	Humidity:	48%
Project:	None	Barometric Pres.:	30.10 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000

COMMENTS

Wall mount unit. Single channel mode (tcon), Low power setting = 27 dBm in Cal software, High power setting = 30 dBm

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	7	Signature
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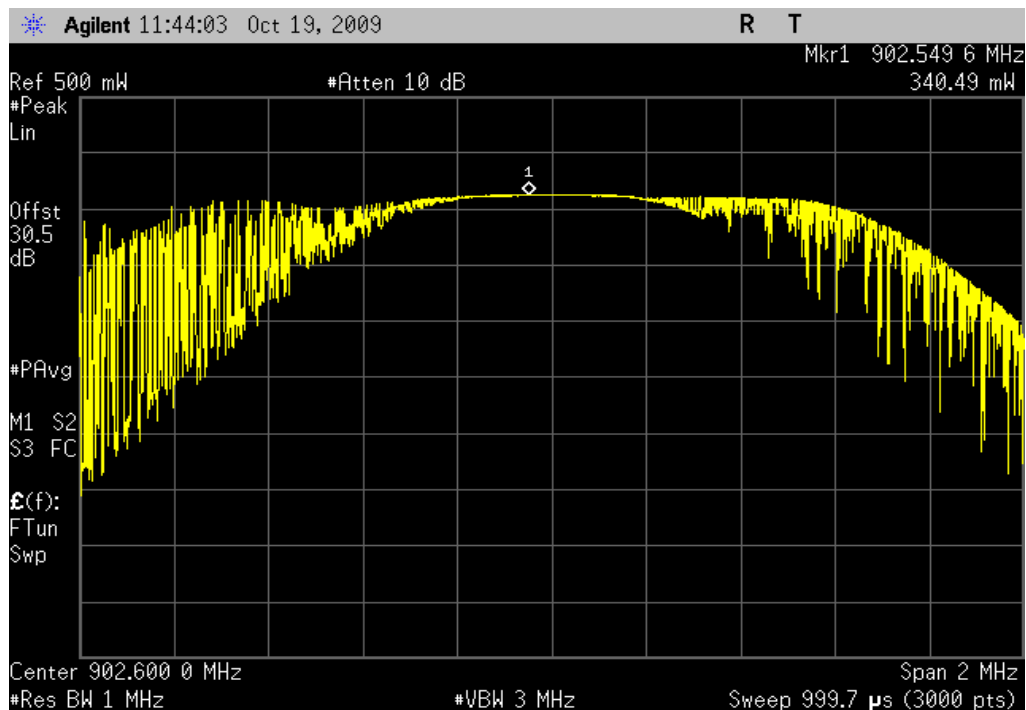
		Value	Limit	Results
Low Power				
	Low Channel	340.5 mW	1 W	Pass
	Mid Channel	323.0 mW	1 W	Pass
	High Channel	321.6 mW	1 W	Pass
High Power				
	Low Channel	608.8 mW	1 W	Pass
	Mid Channel	569.9 mW	1 W	Pass
	High Channel	565.7 mW	1 W	Pass

Low Power, Low Channel

Result: Pass

Value: 340.5 mW

Limit: 1 W

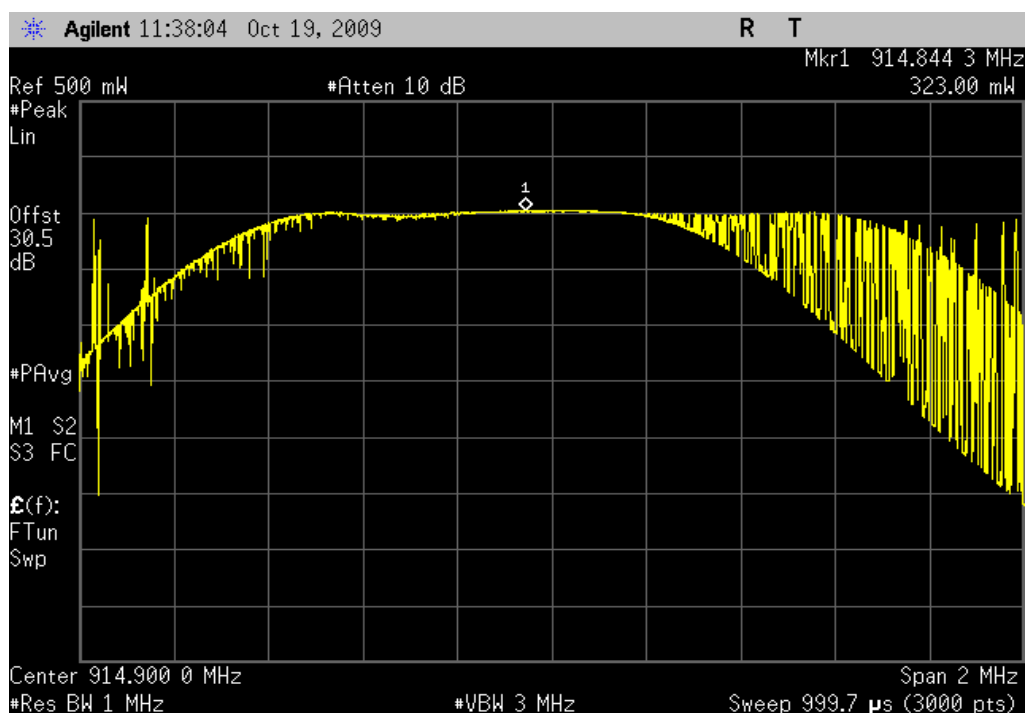


Low Power, Mid Channel

Result: Pass

Value: 323.0 mW

Limit: 1 W



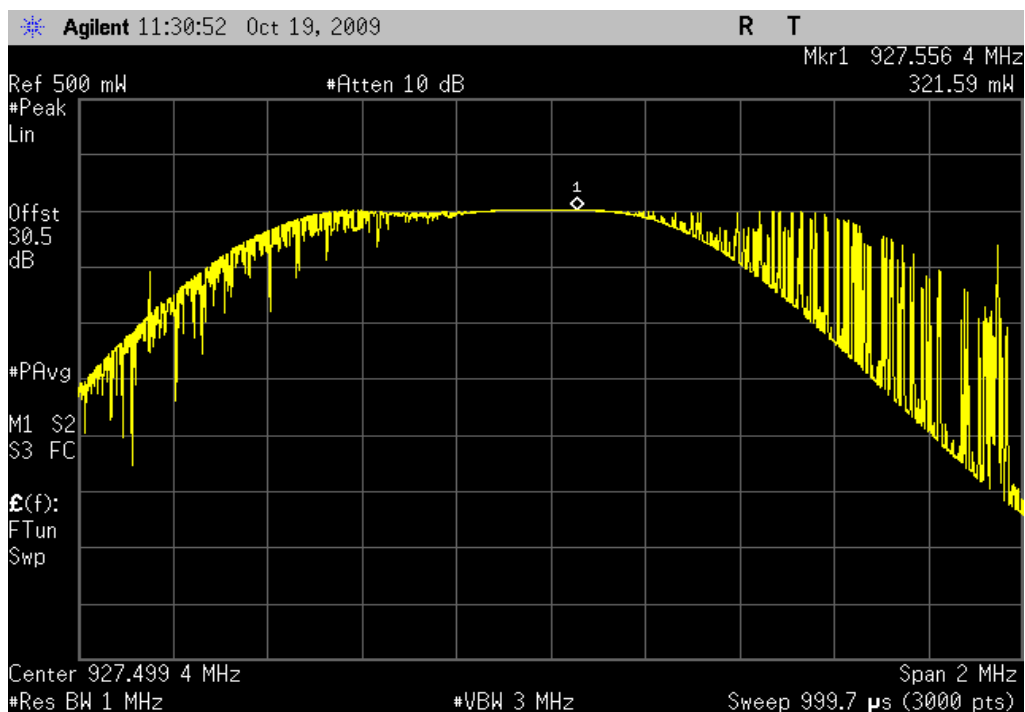
PEAK OUTPUT POWER

Low Power, High Channel

Result: Pass

Value: 321.6 mW

Limit: 1 W

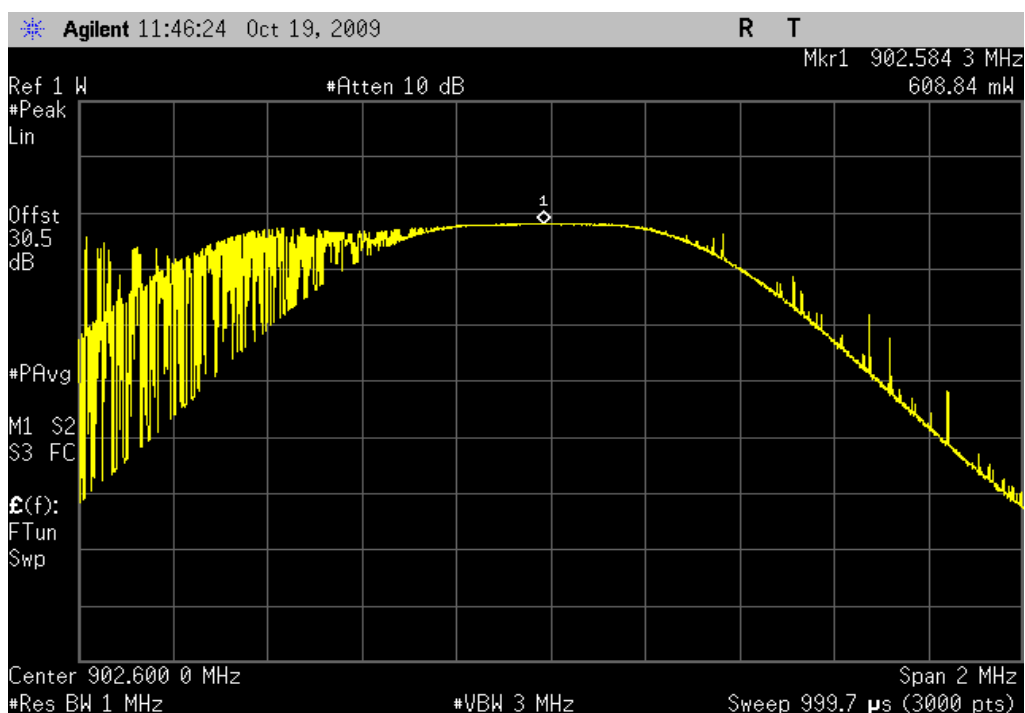


High Power, Low Channel

Result: Pass

Value: 608.8 mW

Limit: 1 W



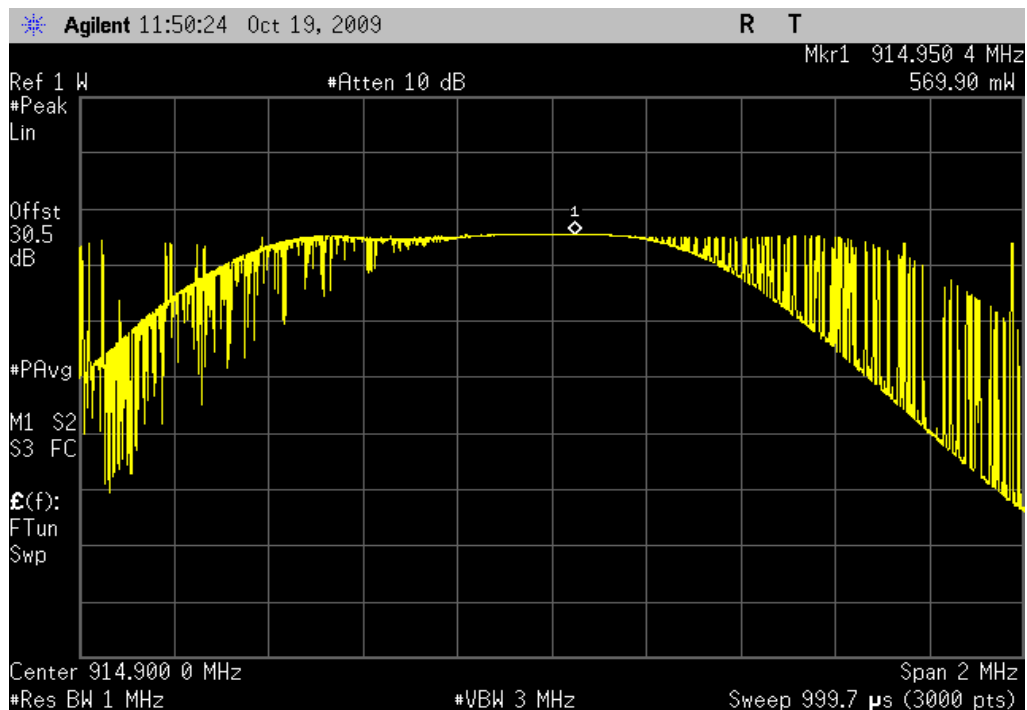
PEAK OUTPUT POWER

High Power, Mid Channel

Result: Pass

Value: 569.9 mW

Limit: 1 W

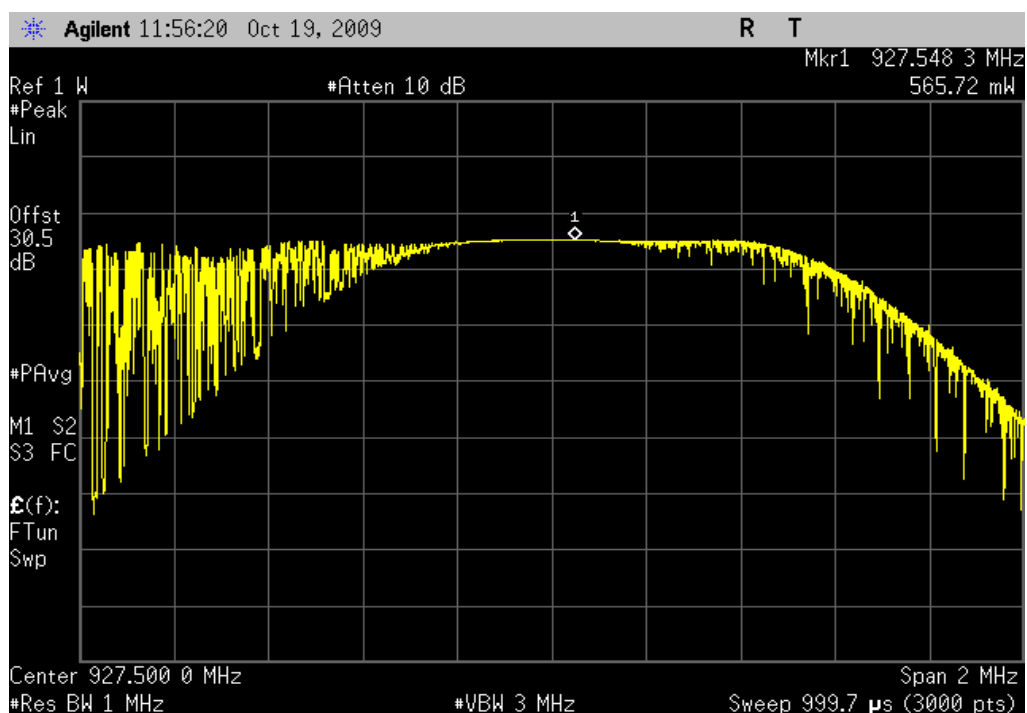


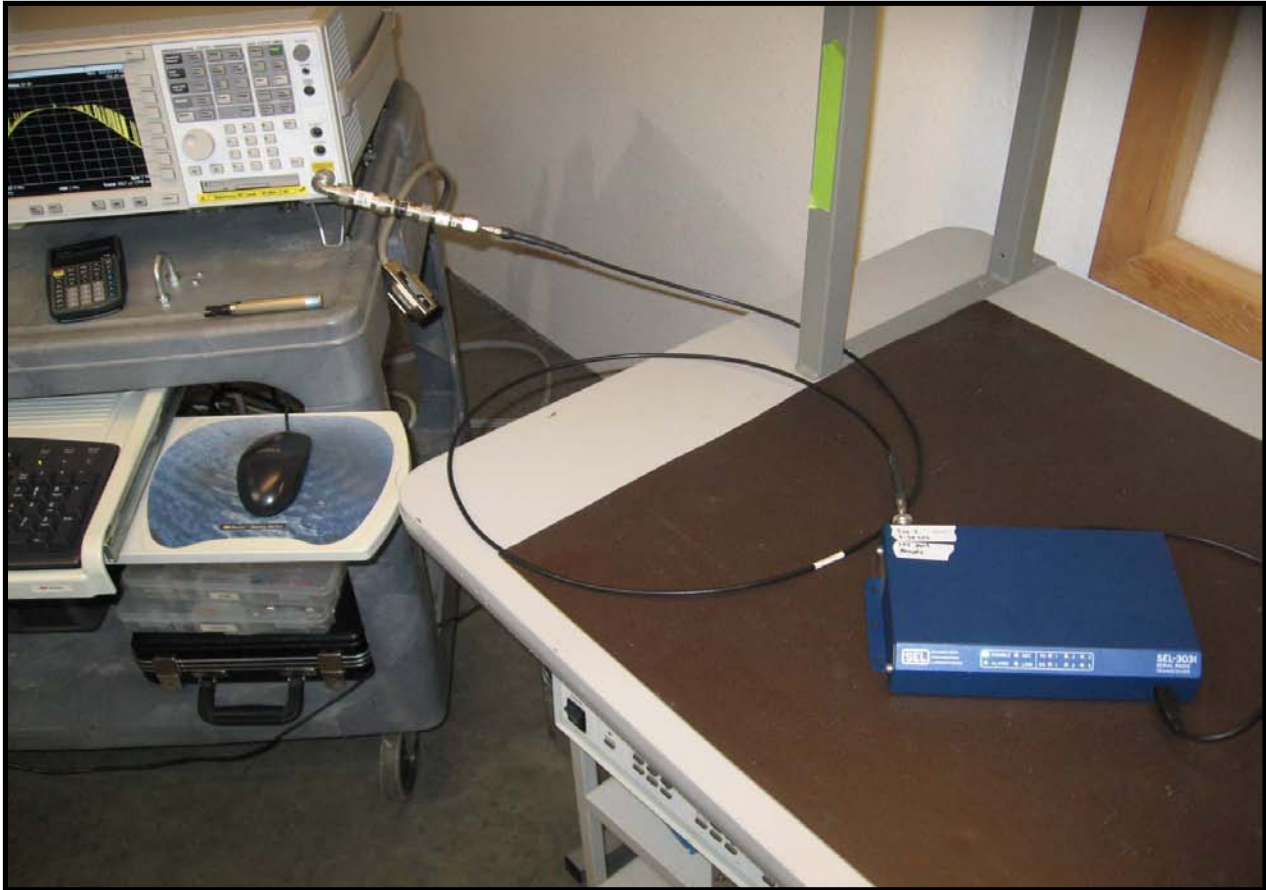
High Power, High Channel

Result: Pass

Value: 565.7 mW

Limit: 1 W





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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
18 GHz DC Block, N	Fairview Microwave	SD3074	AMF	NCR	N/A
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13

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

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to operate in a typical hopping mode. The channel groups closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum was scanned across each band edge from 2.5 MHz below the band edge to 2.5 MHz above the band edge.

EMC

BAND EDGE COMPLIANCE

EUT:	SEL-3031	Work Order:	SCHW0090
Serial Number:	None	Date:	10/20/09
Customer:	Schweitzer Engineering Laboratories, Inc.	Temperature:	22°C
Attendees:	None	Humidity:	48%
Project:	None	Barometric Pres.:	30.10 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000

COMMENTS

Wall mount unit. Typical frequency hopping mode at both 27 dBm and 30 dBm output power settings.

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	7	Signature 
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		Value	Limit	Results
Low Power				
	Low Channel	-28.0 dBc	-20 dBc	Pass
	High Channel	-31.3 dBc	-20 dBc	Pass
High Power				
	Low Channel	-27.6 dBc	-20 dBc	Pass
	High Channel	-31.5 dBc	-20 dBc	Pass

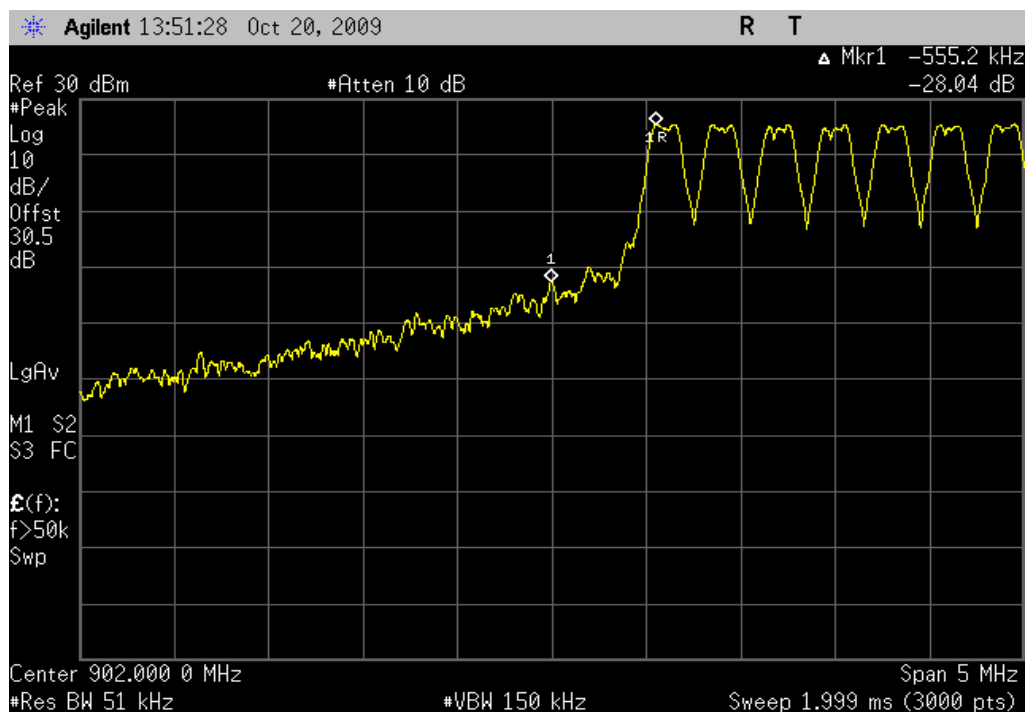
BAND EDGE COMPLIANCE

Low Power, Low Channel

Result: Pass

Value: -28.0 dBc

Limit: -20 dBc

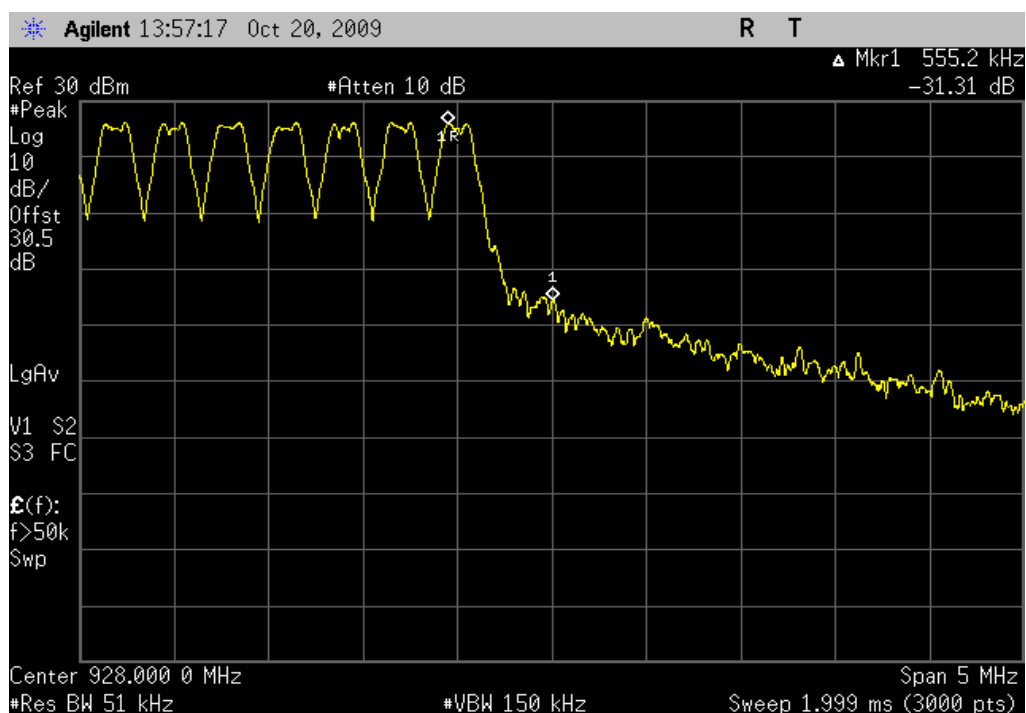


Low Power, High Channel

Result: Pass

Value: -31.3 dBc

Limit: -20 dBc



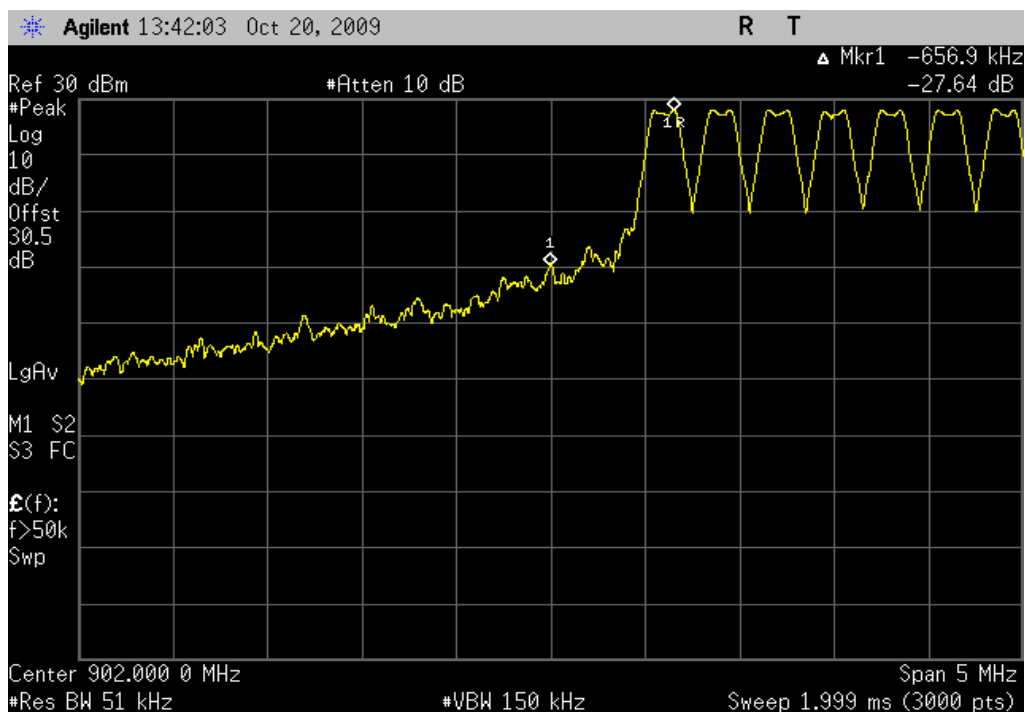
BAND EDGE COMPLIANCE

High Power, Low Channel

Result: Pass

Value: -27.6 dBc

Limit: -20 dBc

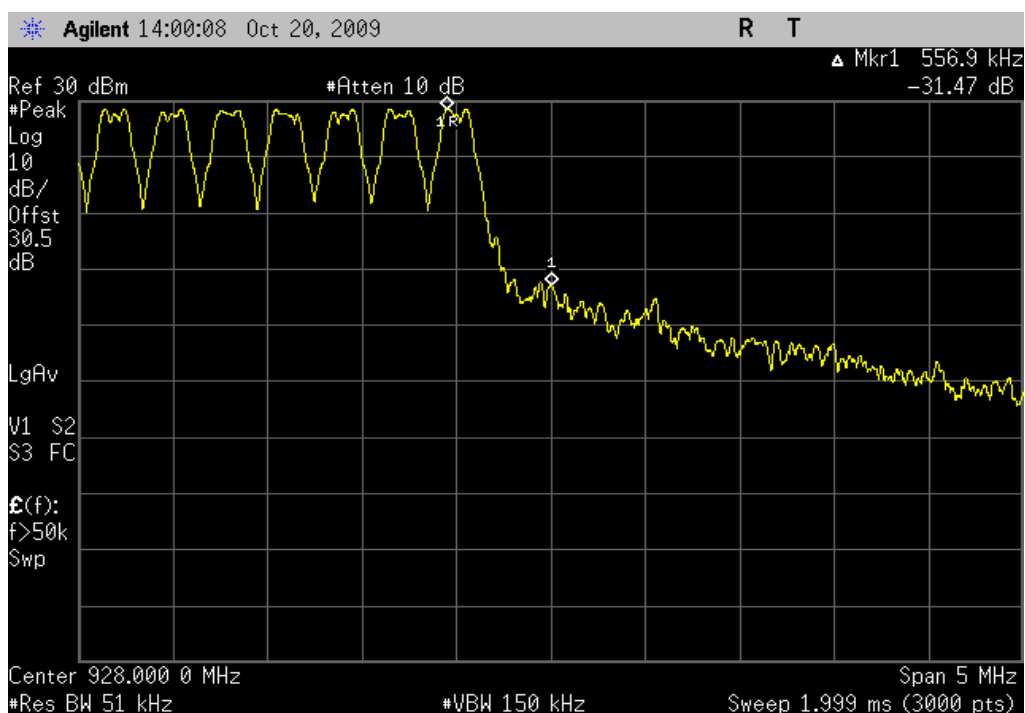


High Power, High Channel

Result: Pass

Value: -31.5 dBc

Limit: -20 dBc





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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
Attenuator	Coaxicom	66702 5910-20	RBJ	4/29/2009	13
Attenuator	Coaxicom	66702 5910-10	RBI	4/29/2009	13

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

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency.

EMC

SPURIOUS CONDUCTED EMISSIONS

EUT:	SEL-3031	Work Order:	SCHW0090
Serial Number:	None	Date:	10/20/09
Customer:	Schweitzer Engineering Laboratories, Inc.	Temperature:	22°C
Attendees:	None	Humidity:	48%
Project:	None	Barometric Pres.:	30.10 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2009	ANSI C63.4:2003 DA 00-705:2000

COMMENTS

Wall mount unit. Single channel mode at highest output power of 30 dBm in software

DEVIATIONS FROM TEST STANDARD

No Deviations

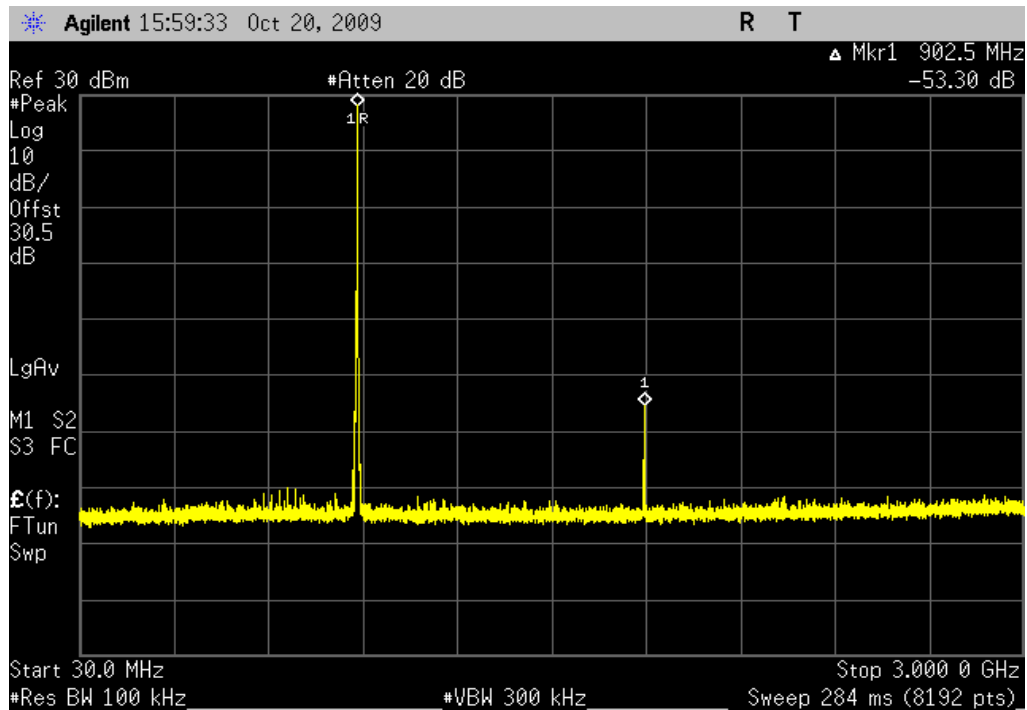
Configuration #	7	Signature 
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		Value	Limit	Results
Low Channel				
	30 MHz - 3 GHz	-53.3 dBc	≤ -20 dBc	Pass
	3 GHz - 10 GHz	< -60 dBc	≤ -20 dBc	Pass
Mid Channel				
	30 MHz - 3 GHz	-55.1 dBc	≤ -20 dBc	Pass
	3 GHz - 10 GHz	< -60 dBc	≤ -20 dBc	Pass
High Channel				
	30 MHz - 3 GHz	-55.1 dBc	≤ -20 dBc	Pass
	3 GHz - 10 GHz	< -60 dBc	≤ -20 dBc	Pass

Low Channel, 30 MHz - 3 GHz

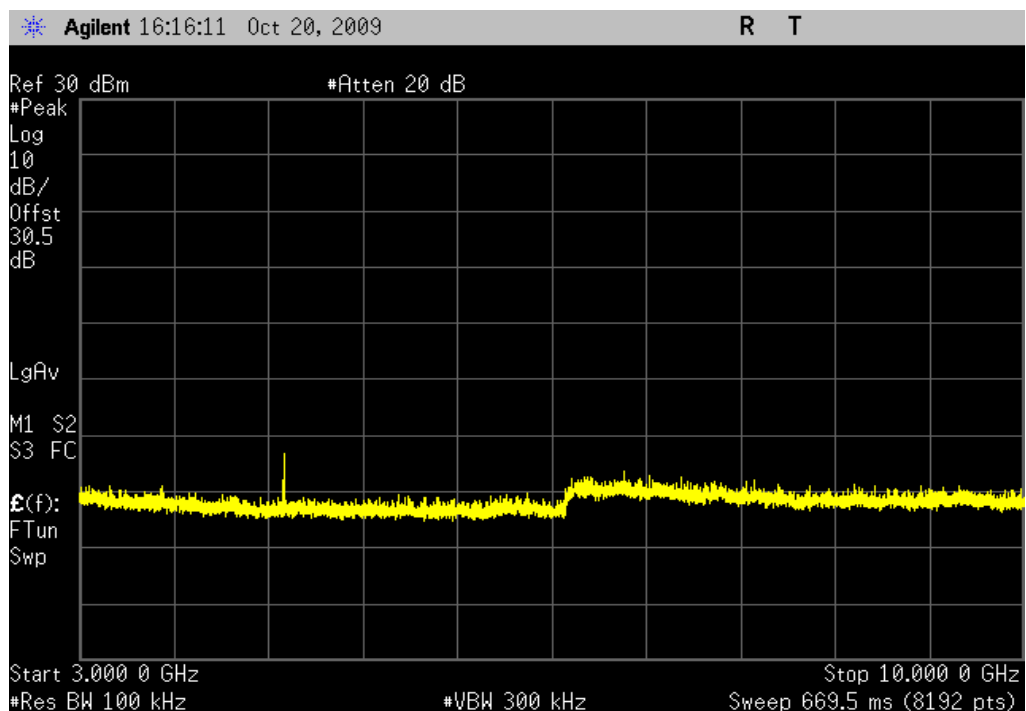
Result: Pass

Value: -53.3 dBc

Limit: ≤ -20 dBc

Low Channel, 3 GHz - 10 GHz

Result: Pass

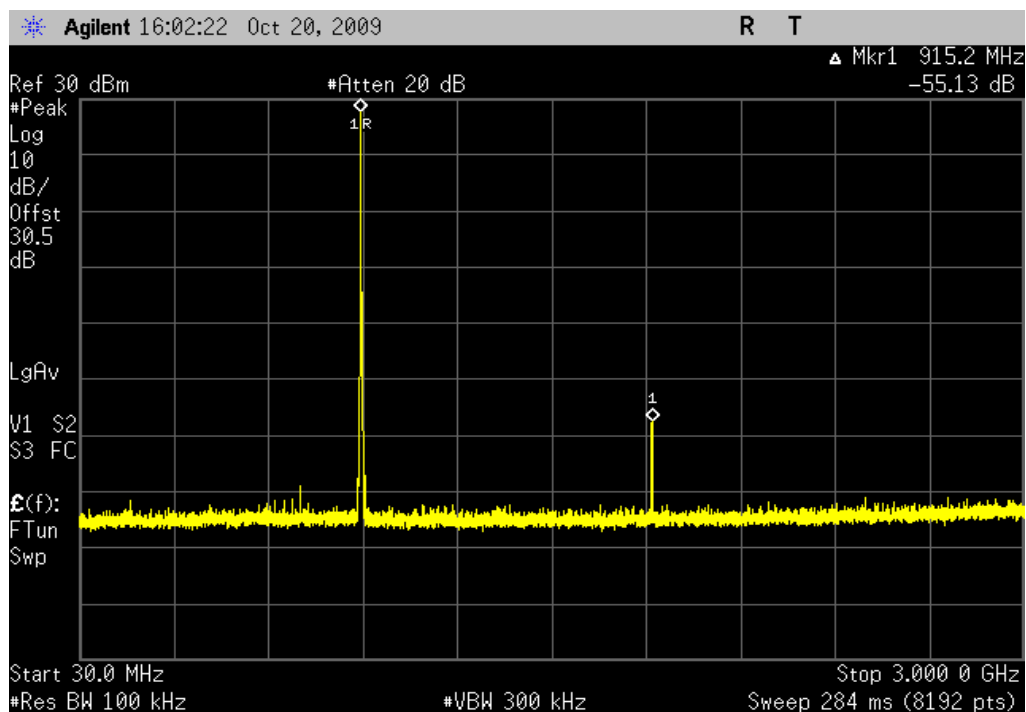
Value: < -60 dBcLimit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

Mid Channel, 30 MHz - 3 GHz

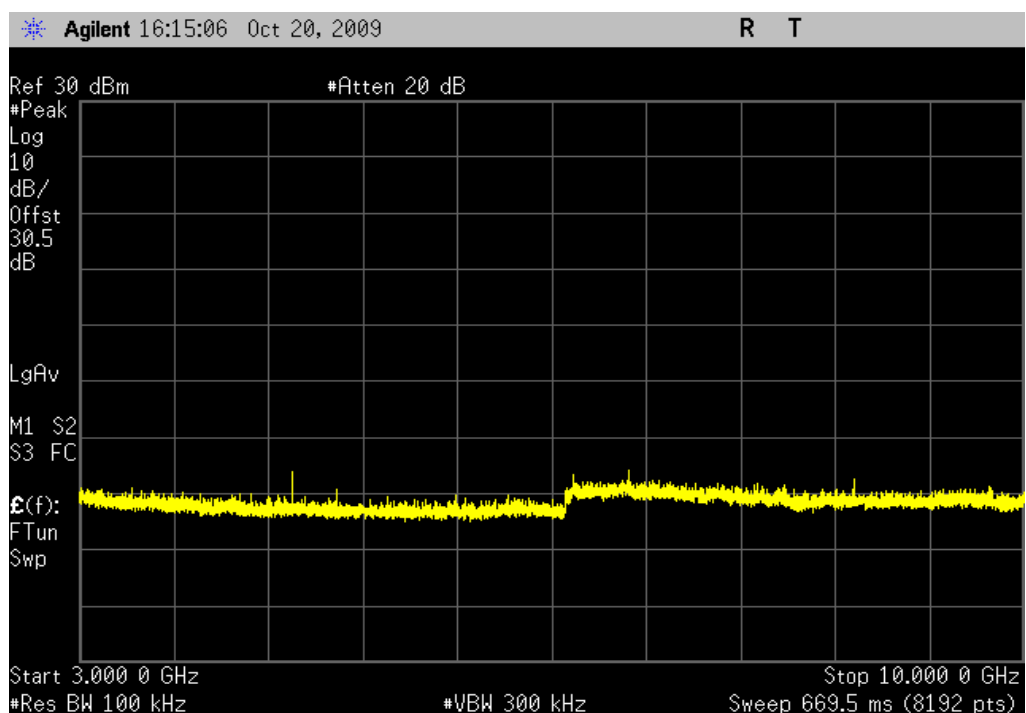
Result: Pass

Value: -55.1 dBc

Limit: ≤ -20 dBc

Mid Channel, 3 GHz - 10 GHz

Result: Pass

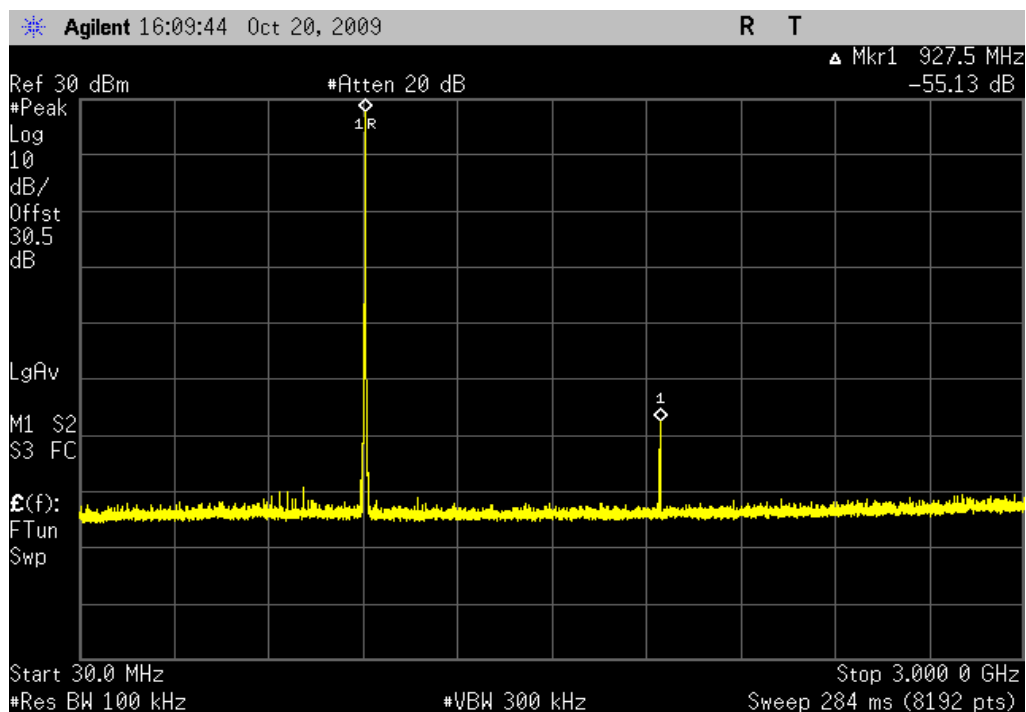
Value: < -60 dBcLimit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

High Channel, 30 MHz - 3 GHz

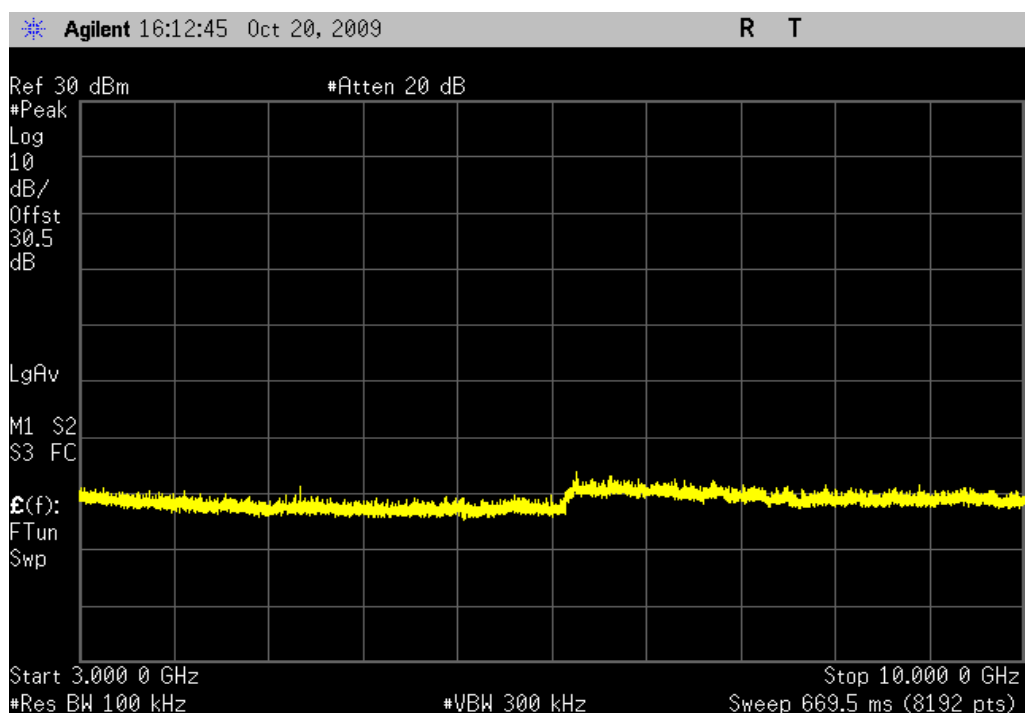
Result: Pass

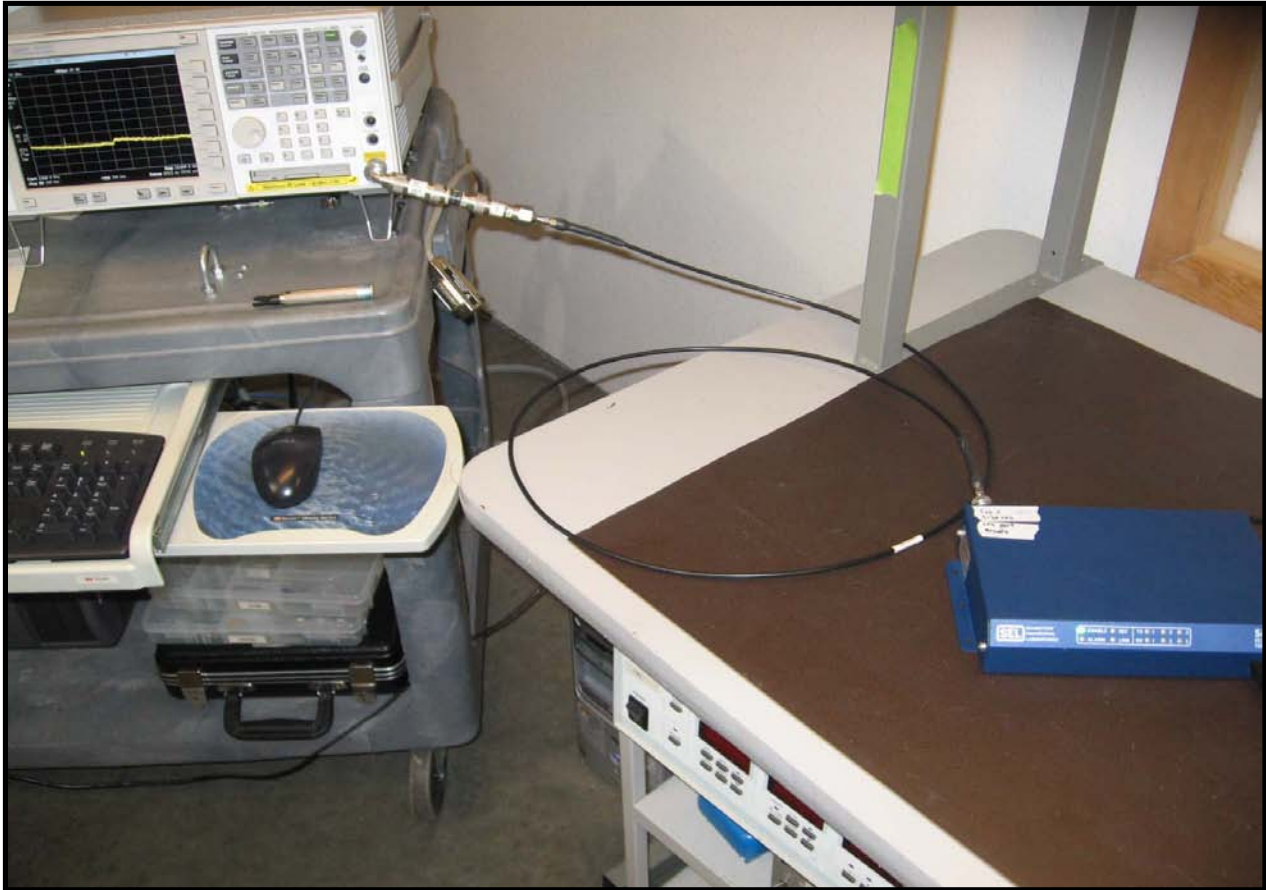
Value: -55.1 dBc

Limit: ≤ -20 dBc

High Channel, 3 GHz - 10 GHz

Result: Pass

Value: < -60 dBcLimit: ≤ -20 dBc



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.

MODES OF OPERATION

Tx, Unity Gain Antenna, See comments for channel and EUT orientation

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	12.5GHz
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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
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	7/2/2008	24
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	12
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Low Pass Filter	Micro-Tronics	LPM50003	HGL	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	13

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
	0.15 - 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

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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST

EMC

Spurious Radiated Emissions

PSA 2008.07.21
EMI 2008.1.9

EUT:	SEL-3031	Work Order:	SCHW0089
Serial Number:	2009229219	Date:	10/14/09
Customer:	Schweitzer Engineering Laboratories, Inc.	Temperature:	22
Attendees:	None	Humidity:	32%
Project:	None	Barometric Pres.:	993.10mb
Tested by:	Jennifer Herrett	Power:	120VAC/60Hz
		Job Site:	EV12

TEST SPECIFICATIONS

FCC 15.247 (FHSS):2009

ANSI C63.4:2003, DA 00-705:2000

TEST PARAMETERS

Antenna Height(s) (m)

1 - 4

Test Distance (m)

3

COMMENTS

Rackmount System with Unity Gain Antenna (output level set at 30dBm).

EUT OPERATING MODES

Tx, Unity Gain Antenna. See comments for channel and EUT orientation.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #

3

Configuration #

2

Results

Pass

Signature

Jennifer Herrett

dBuV/m

MHz

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

2700.000

2900.000

3100.000

3300.000

3500.000

3700.000

3900.000

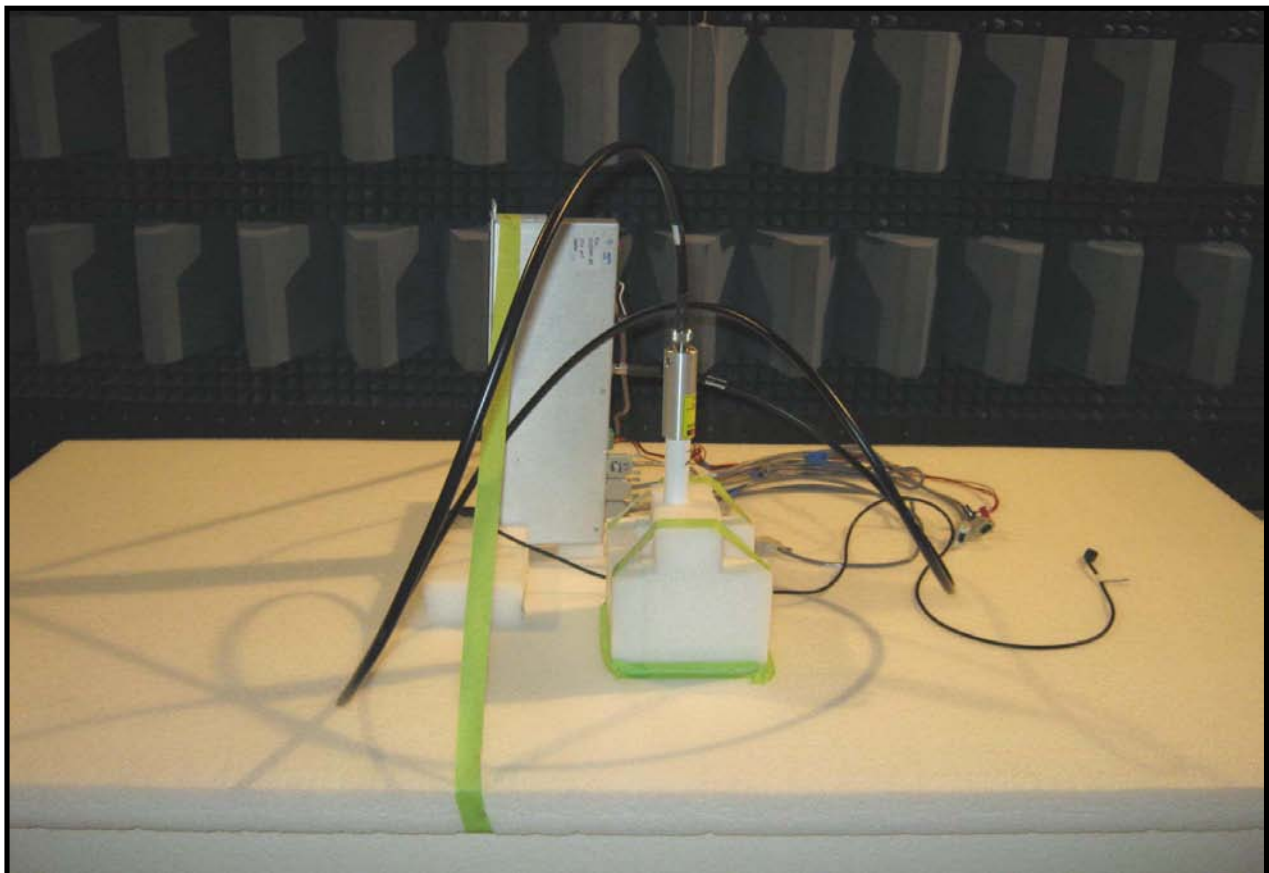
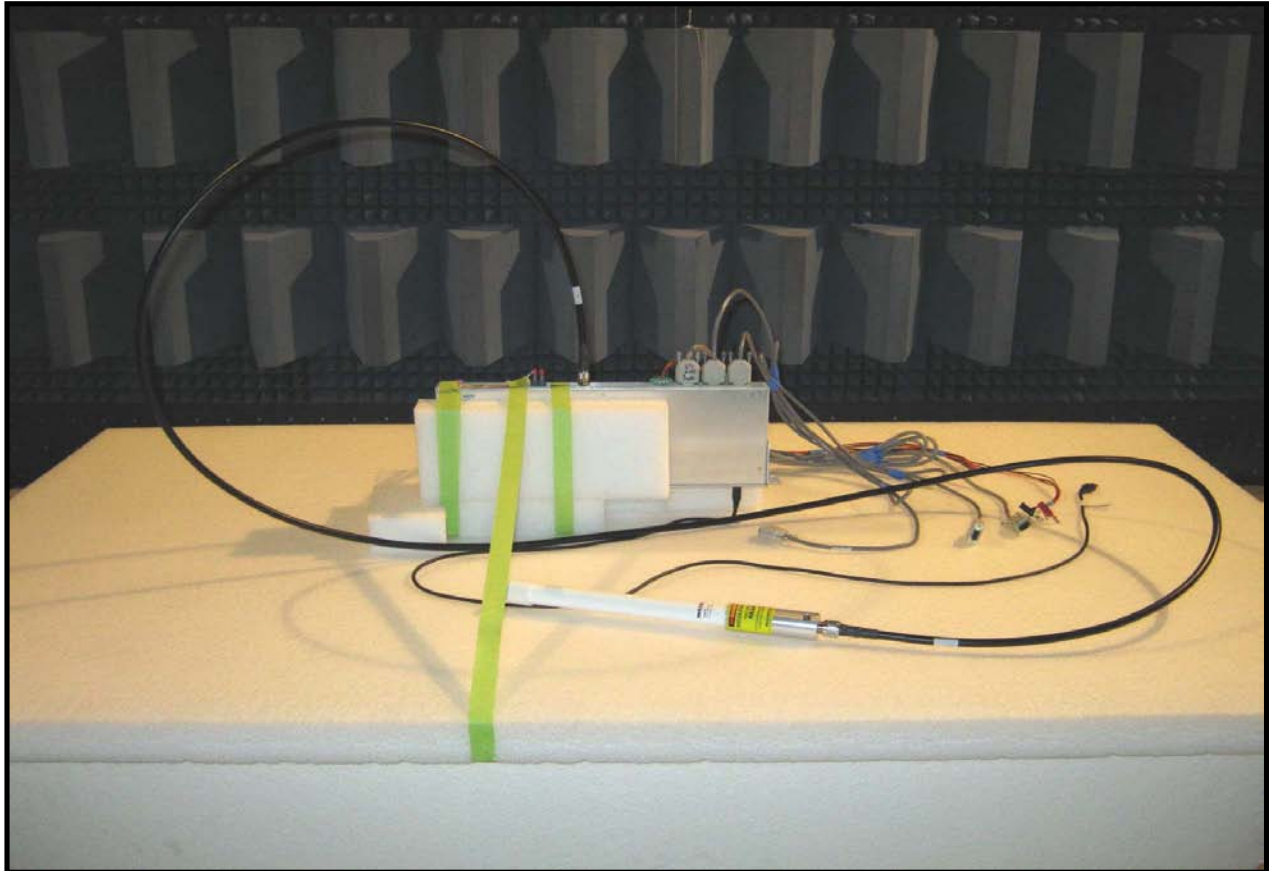
4100.000

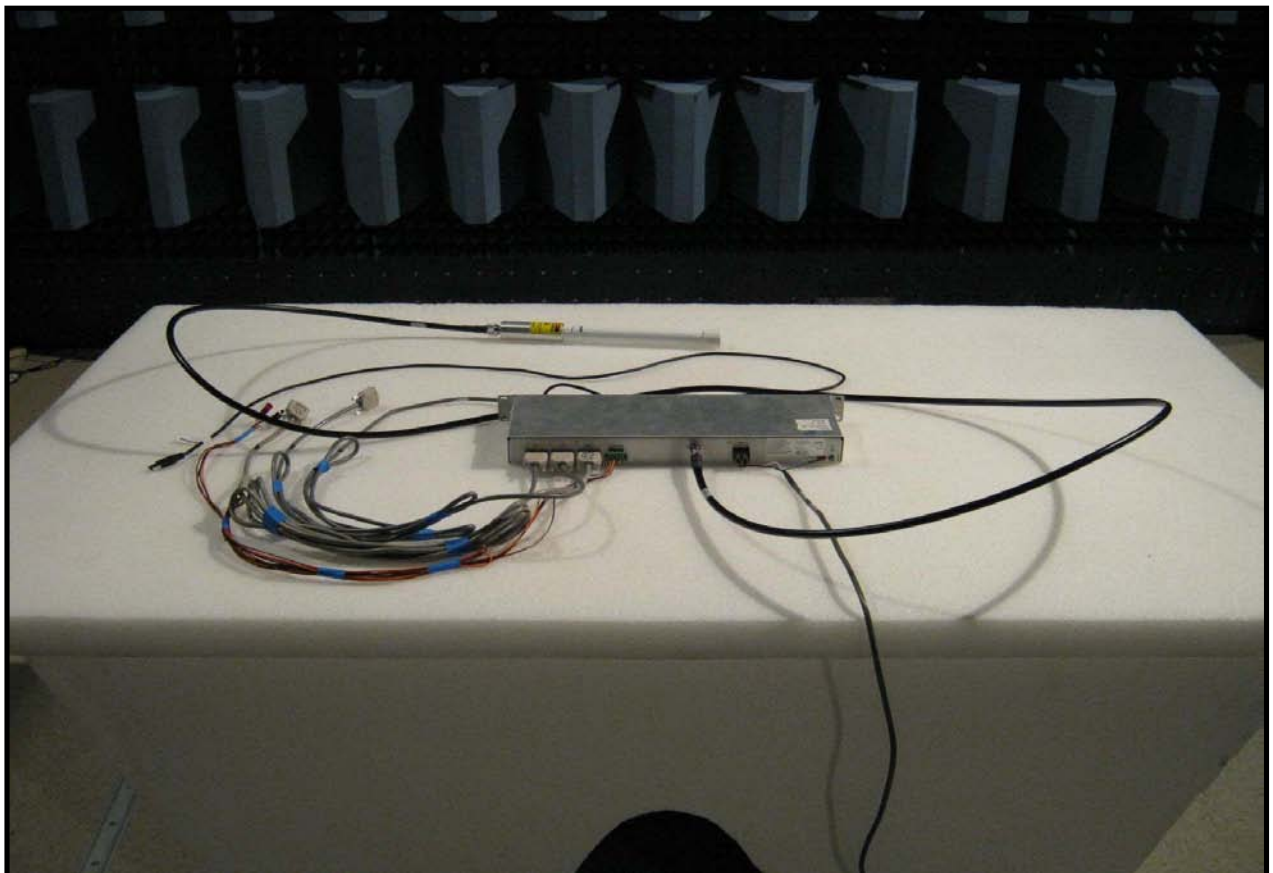
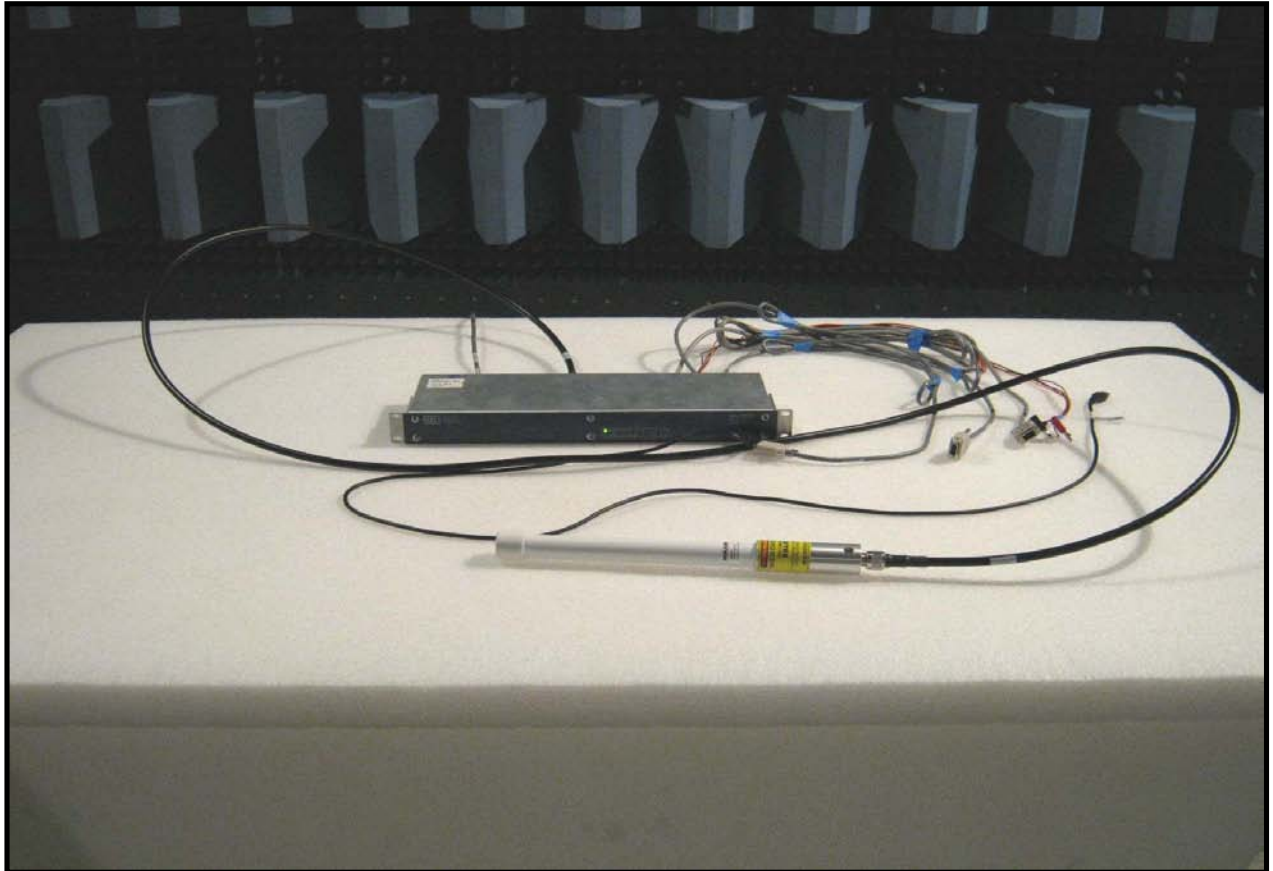
4300.000

4500.000

4700.000

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
4513.055	52.7	8.8	256.0	1.6	0.0	0.0	H-Horn	PK	0.0	61.5	74.0	-12.5	Low Channel, EUT on front face and antenna horizontal.
4512.897	51.0	8.8	234.0	1.6	0.0	0.0	H-Horn	PK	0.0	59.8	74.0	-14.2	Low Channel, EUT vertical and antenna vertical.
4513.063	50.9	8.8	270.0	1.6	0.0	0.0	H-Horn	PK	0.0	59.7	74.0	-14.3	Low Channel, EUT horizontal and antenna horizontal.
4512.698	49.3	8.8	61.0	1.1	0.0	0.0	V-Horn	PK	0.0	58.1	74.0	-15.9	Low Channel, EUT vertical and antenna vertical.
4512.865	47.0	8.8	103.0	1.2	0.0	0.0	V-Horn	PK	0.0	55.8	74.0	-18.2	Low Channel, EUT horizontal and antenna horizontal.
4512.931	46.8	8.8	91.0	1.2	0.0	0.0	V-Horn	PK	0.0	55.6	74.0	-18.4	Low Channel, EUT on front face and antenna horizontal.
4574.358	43.4	8.9	0.0	1.2	0.0	0.0	V-Horn	PK	0.0	52.3	74.0	-21.7	Mid Channel, EUT vertical and antenna vertical.
4637.383	42.1	9.0	360.0	1.1	0.0	0.0	V-Horn	PK	0.0	51.1	74.0	-22.9	High Channel, EUT vertical and antenna vertical.
4637.500	41.5	9.0	290.0	1.2	0.0	0.0	H-Horn	PK	0.0	50.5	74.0	-23.5	High Channel, EUT on front face and antenna horizontal.
2782.542	48.4	0.5	223.0	1.2	0.0	0.0	H-Horn	PK	0.0	48.9	74.0	-25.1	High Channel, EUT on front face and antenna horizontal.
4574.242	40.0	8.9	289.0	1.2	0.0	0.0	H-Horn	PK	0.0	48.9	74.0	-25.1	Mid Channel, EUT on front face and antenna horizontal.
3659.583	42.2	5.0	238.0	1.1	0.0	0.0	H-Horn	PK	0.0	47.2	74.0	-26.8	Mid Channel, EUT on front face and antenna horizontal.
2782.192	46.7	0.5	106.0	1.2	0.0	0.0	V-Horn	PK	0.0	47.2	74.0	-26.8	High Channel, EUT vertical and antenna vertical.
2707.833	47.1	0.1	76.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.2	74.0	-26.8	Low Channel, EUT vertical and antenna vertical.
2744.592	46.5	0.3	115.0	1.2	0.0	0.0	V-Horn	PK	0.0	46.8	74.0	-27.2	Mid Channel, EUT vertical and antenna vertical.
2744.800	46.4	0.3	231.0	1.3	0.0	0.0	H-Horn	PK	0.0	46.7	74.0	-27.3	Mid Channel, EUT on front face and antenna horizontal.
3610.383	40.4	4.8	338.0	1.1	0.0	0.0	V-Horn	PK	0.0	45.2	74.0	-28.8	Low Channel, EUT vertical and antenna vertical.
3709.883	39.5	5.2	262.0	1.1	0.0	0.0	V-Horn	PK	0.0	44.7	74.0	-29.3	High Channel, EUT vertical and antenna vertical.
3710.500	39.4	5.2	281.0	1.2	0.0	0.0	H-Horn	PK	0.0	44.6	74.0	-29.4	High Channel, EUT on front face and antenna horizontal.
3659.592	39.2	5.0	242.0	1.4	0.0	0.0	V-Horn	PK	0.0	44.2	74.0	-29.8	Mid Channel, EUT vertical and antenna vertical.





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.

MODES OF OPERATION

Tx, Yagi Antenna, See comments for Channel and EUT Orientation

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	12.5GHz
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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
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	7/2/2008	24
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	12
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Low Pass Filter	Micro-Tronics	LPM50003	HGL	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	13

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
	0.15 - 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

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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

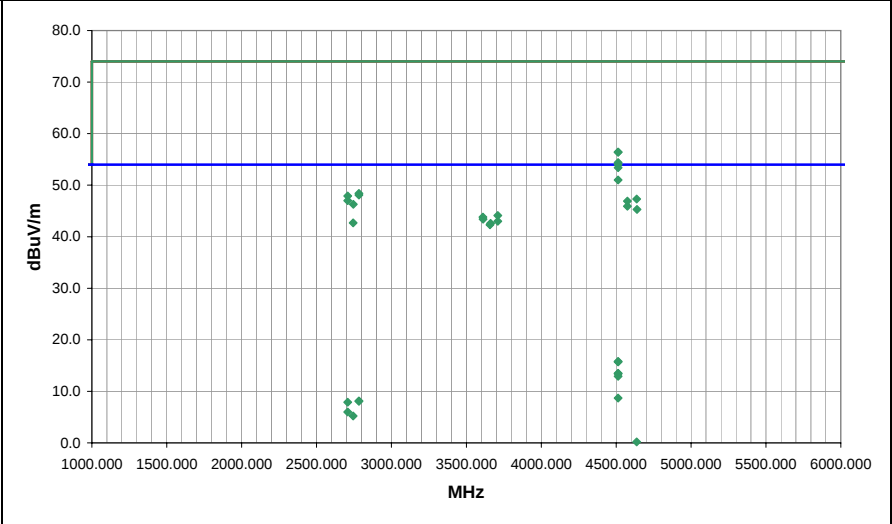
EUT: SEL-3031	Work Order: SCHW0089
Serial Number: 2009229219	Date: 10/13/09
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 20
Attendees: Doug Trout	Humidity: 25%
Project: None	Barometric Pres.: 993.10mb
Tested by: Jennifer Herrett	Power: 120VAC/60Hz
	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247 (FHSS):2009	ANSI C63.4:2003, DA 00-705:2000

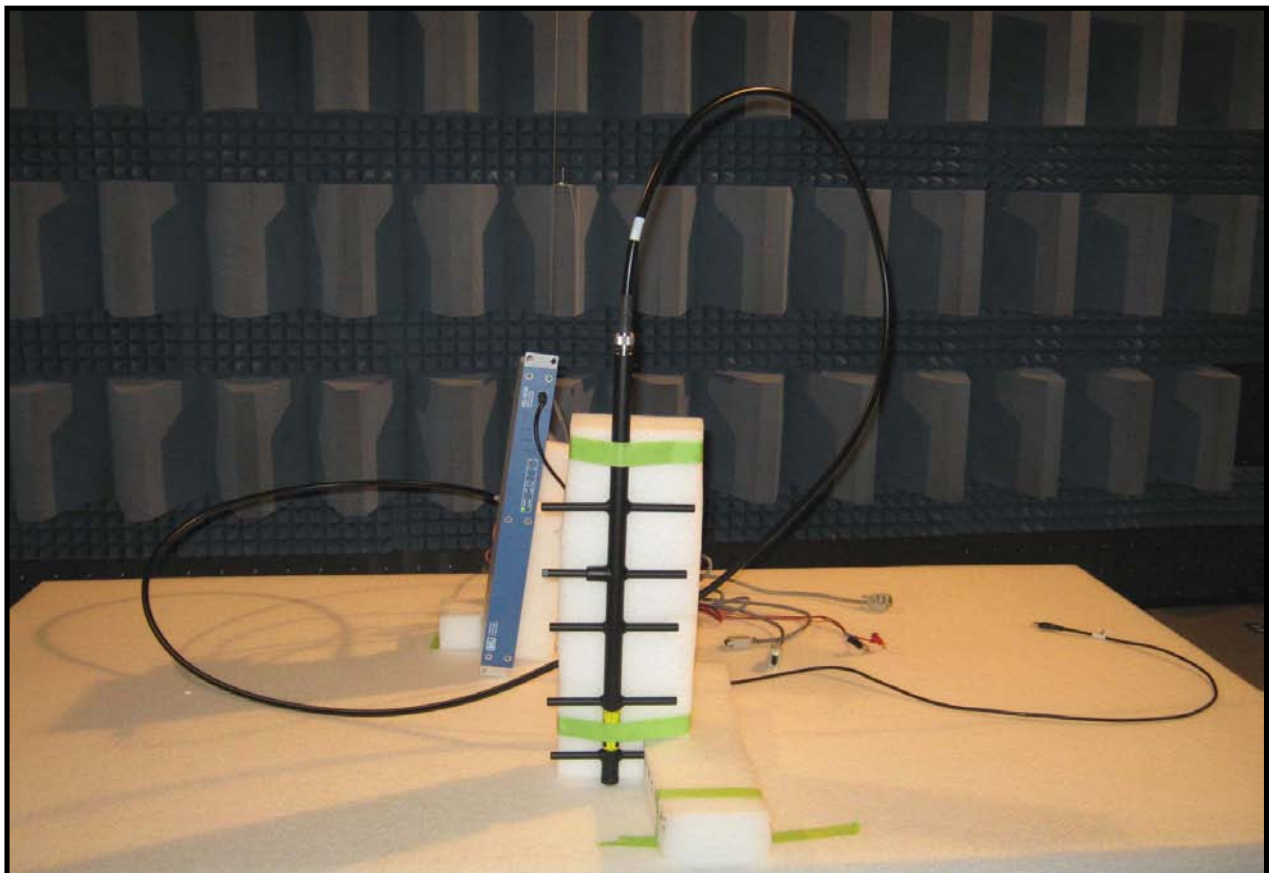
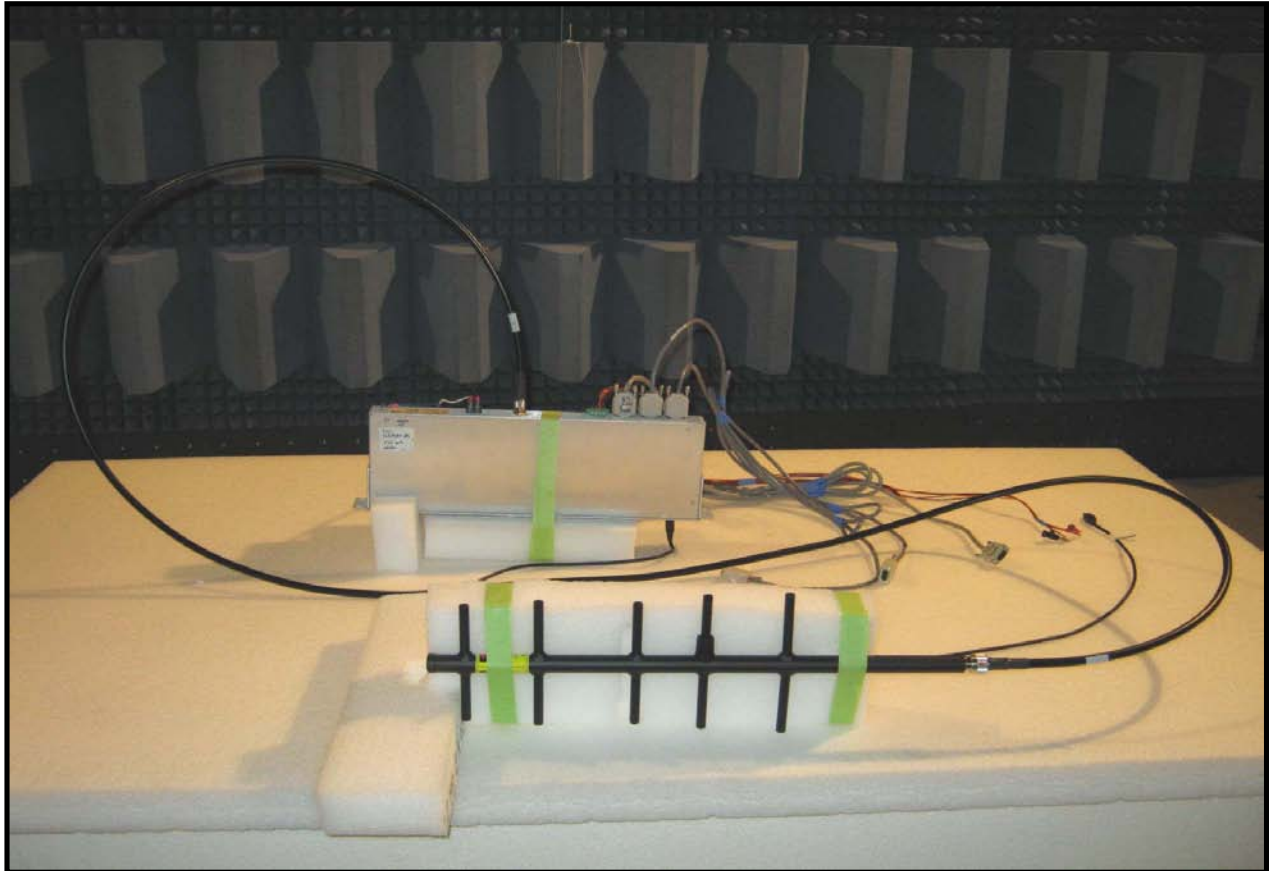
TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

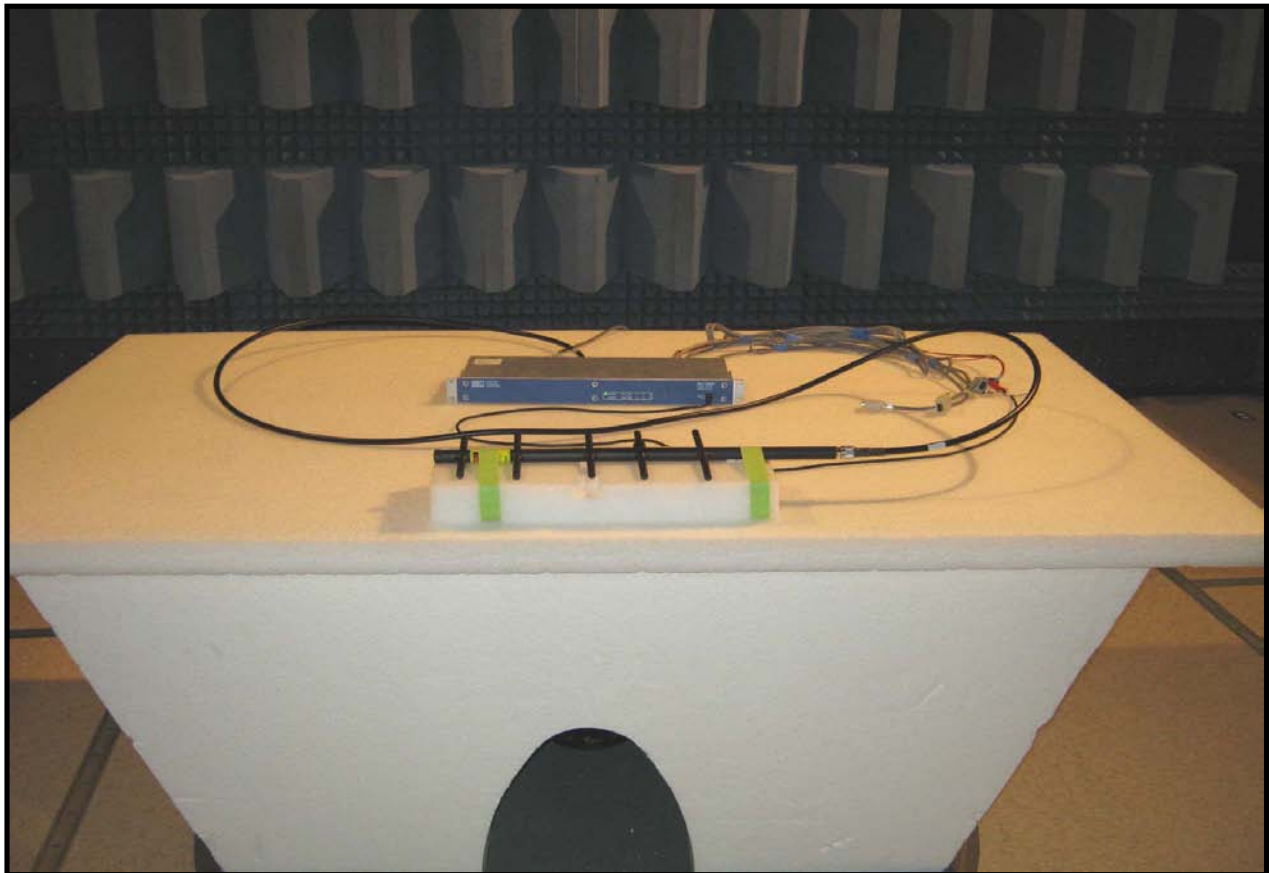
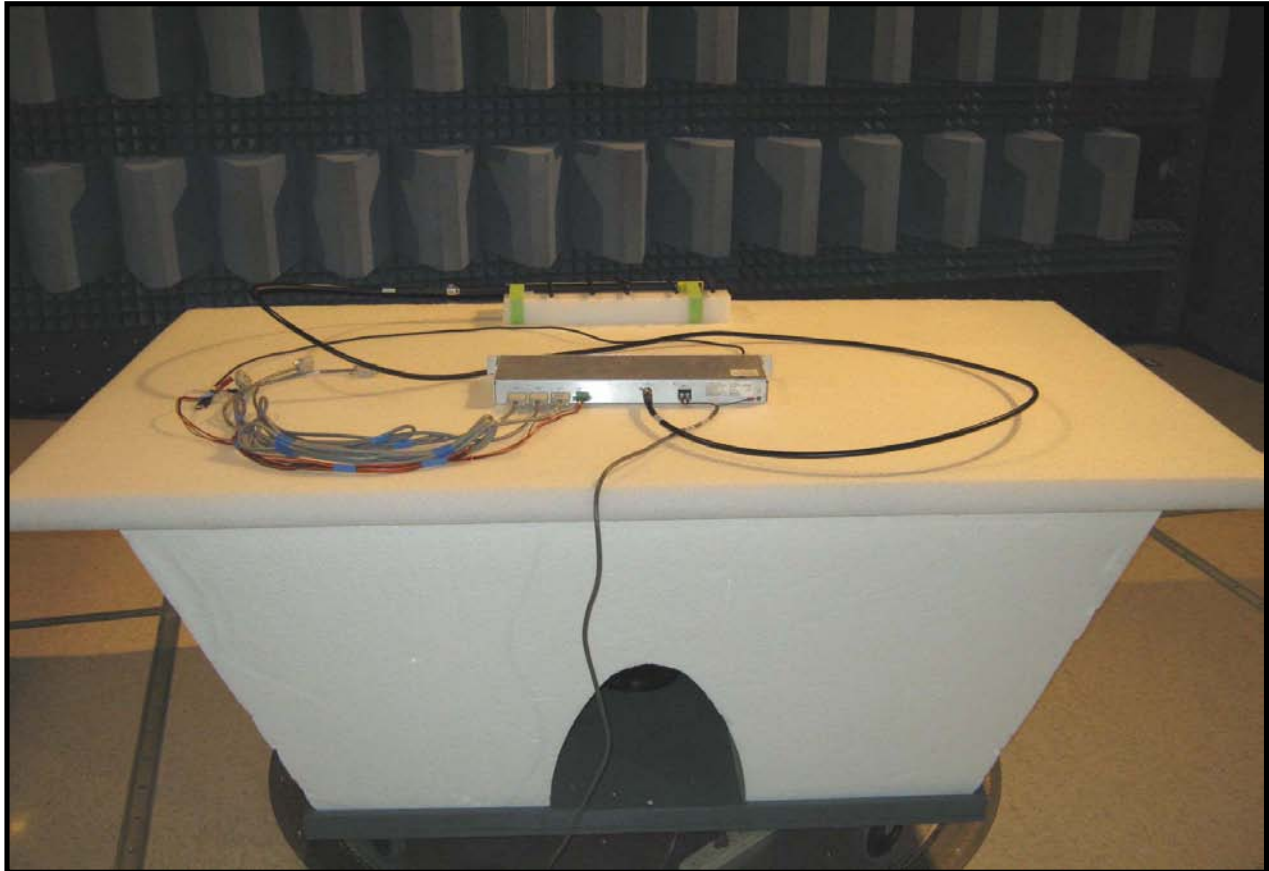
COMMENTS
Rackmount System with Yagi Antenna (output level set at 27dBm).

EUT OPERATING MODES		
Tx, Yagi Antenna, See comments for Channel and EUT Orientation		
DEVIATIONS FROM TEST STANDARD		
No deviations.		
Run #	2	 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
4513.000	48.2	8.2	108.0	1.5	0.0	0.0	H-Horn	PK	0.0	56.4	74.0	-17.6	Low Channel. EUT horizontal, Antenna horizontal.
4513.067	48.2	8.2	296.0	1.3	0.0	0.0	H-Horn	PK	0.0	56.4	74.0	-17.6	Low Channel. EUT vertical, Antenna vertical.
4512.775	46.2	8.2	115.0	1.7	0.0	0.0	V-Horn	PK	0.0	54.4	74.0	-19.6	Low Channel. EUT on front face, Antenna on side.
4512.642	45.8	8.2	115.0	1.5	0.0	0.0	H-Horn	PK	0.0	54.0	74.0	-20.0	Low Channel. EUT on front face, Antenna on side.
4512.758	45.2	8.2	255.0	1.2	0.0	0.0	V-Horn	PK	0.0	53.4	74.0	-20.6	Low Channel. EUT vertical, Antenna vertical.
4512.850	42.8	8.2	74.0	1.5	0.0	0.0	V-Horn	PK	0.0	51.0	74.0	-23.0	Low Channel. EUT horizontal, Antenna horizontal.
2782.558	48.0	0.4	128.0	1.8	0.0	0.0	H-Horn	PK	0.0	48.4	74.0	-25.6	High Channel. EUT horizontal, Antenna horizontal.
2782.433	47.7	0.4	0.0	1.1	0.0	0.0	V-Horn	PK	0.0	48.1	74.0	-25.9	High Channel. EUT on front face, Antenna on side.
2708.000	47.9	0.0	202.0	1.8	0.0	0.0	H-Horn	PK	0.0	47.9	74.0	-26.1	Low Channel. EUT horizontal, Antenna horizontal.
4637.283	39.1	8.2	114.0	1.3	0.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	High Channel. EUT horizontal, Antenna horizontal.
2707.967	47.0	0.0	9.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.0	74.0	-27.0	Low Channel. EUT on front face, Antenna on side.
4575.583	38.7	8.2	160.0	1.6	0.0	0.0	H-Horn	PK	0.0	46.9	74.0	-27.1	Mid Channel. EUT horizontal, Antenna horizontal.
2744.833	46.2	0.1	4.0	1.1	0.0	0.0	V-Horn	PK	0.0	46.3	74.0	-27.7	Mid Channel. EUT on front face, Antenna on side.
4574.717	37.7	8.2	314.0	1.1	0.0	0.0	V-Horn	PK	0.0	45.9	74.0	-28.1	Mid Channel. EUT on front face, Antenna on side.
4638.767	37.1	8.2	323.0	1.1	0.0	0.0	V-Horn	PK	0.0	45.3	74.0	-28.7	High Channel. EUT on front face, Antenna on side.
3710.008	39.3	4.8	119.0	2.2	0.0	0.0	H-Horn	PK	0.0	44.1	74.0	-29.9	High Channel. EUT horizontal, Antenna horizontal.
3610.267	39.4	4.4	0.0	1.9	0.0	0.0	V-Horn	PK	0.0	43.8	74.0	-30.2	Low Channel. EUT on front face, Antenna on side.
3611.542	39.0	4.4	232.0	1.3	0.0	0.0	H-Horn	PK	0.0	43.4	74.0	-30.6	Low Channel. EUT horizontal, Antenna horizontal.
3710.192	38.2	4.8	348.0	1.1	0.0	0.0	V-Horn	PK	0.0	43.0	74.0	-31.0	High Channel. EUT on front face, Antenna on side.
2744.558	42.6	0.1	313.0	1.2	0.0	0.0	H-Horn	PK	0.0	42.7	74.0	-31.3	Mid Channel. EUT horizontal, Antenna horizontal.





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.

MODES OF OPERATION

Tx, Unity Gain Antenna, See comments for channel and EUT orientation

POWER SETTINGS INVESTIGATED

24VDC

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	12.5GHz
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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
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	7/2/2008	24
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	12
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Low Pass Filter	Micro-Tronics	LPM50003	HGL	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	13

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
	0.15 - 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

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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST

EMC

Spurious Radiated Emissions

PSA 2008.07.21
EMI 2008.1.9

EUT: SEL-3031		Work Order: SCHW0090	
Serial Number: 2009238196		Date: 10/20/09	
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 22	
Attendees: None		Humidity: 48%	
Project: None		Barometric Pres.: 1011.70mb	
Tested by: Jennifer Herrett		Power: 24VDC	
		Job Site: EV12	

TEST SPECIFICATIONS

FCC 15.247 (FHSS):2009

ANSI C63.4:2003, DA 00-705:2000

TEST PARAMETERS

Antenna Height(s) (m)1 - 4

Test Distance (m)3

COMMENTS

Rackmount System with Unity Gain Antenna (output level set at 30dBm).

EUT OPERATING MODES

Tx, Unity Gain Antenna. See comments for channel and EUT orientation

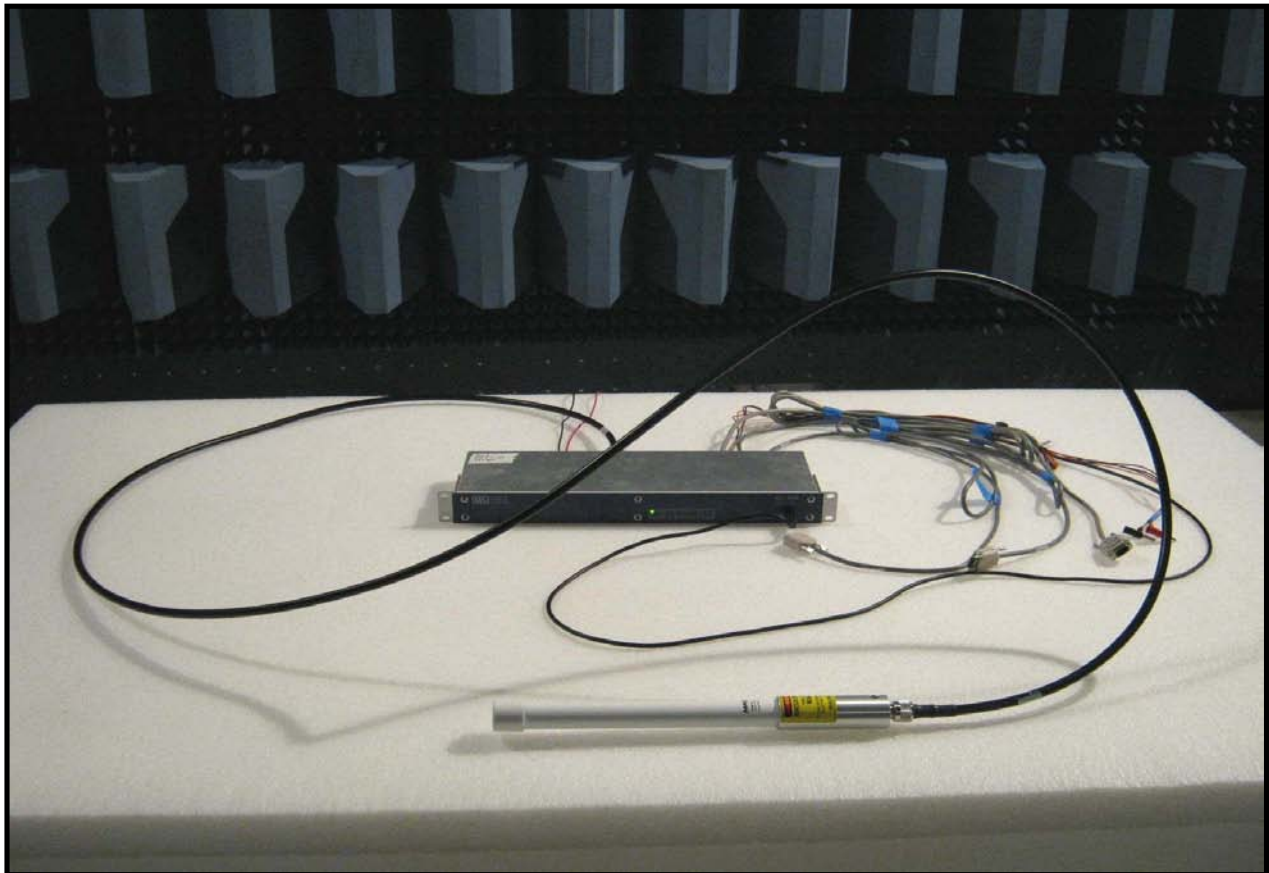
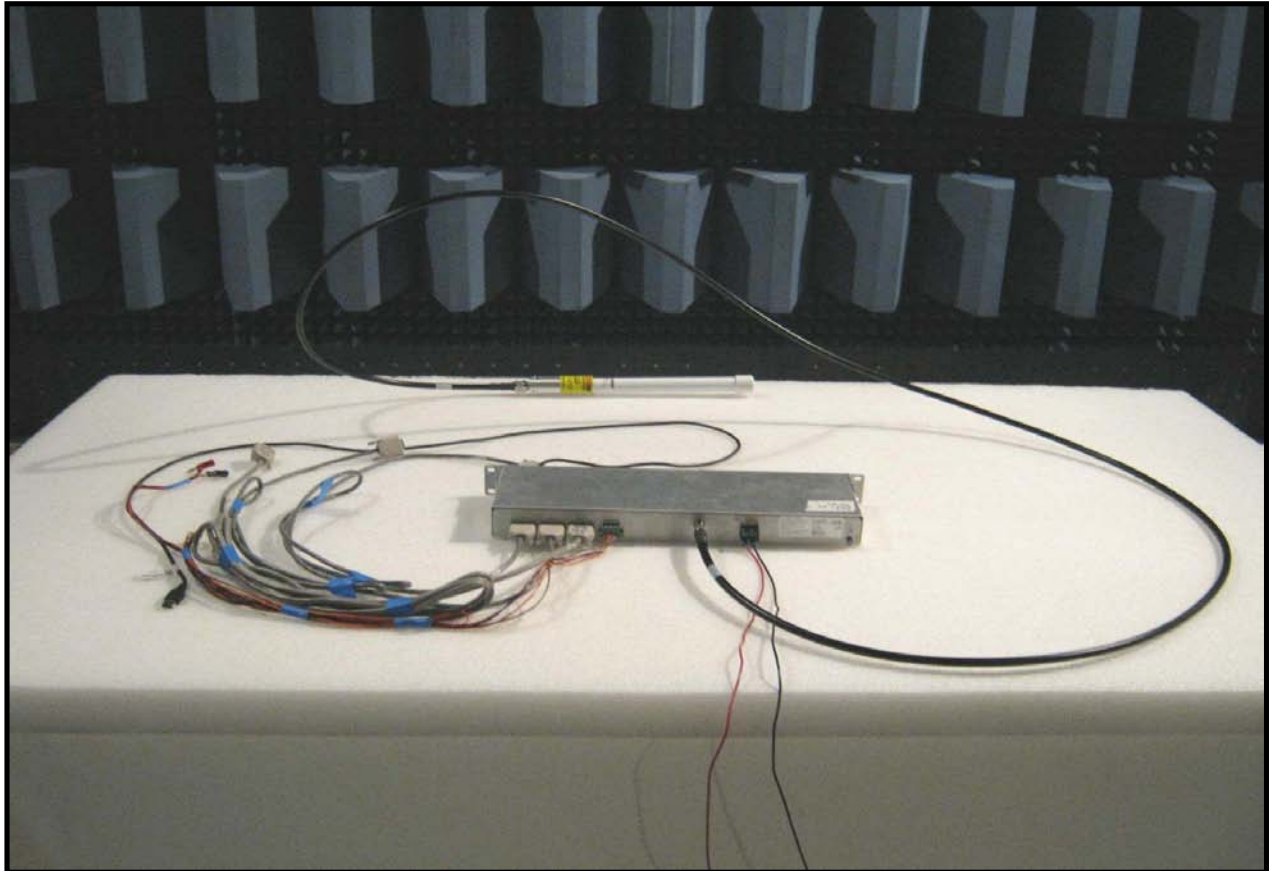
DEVIATIONS FROM TEST STANDARD

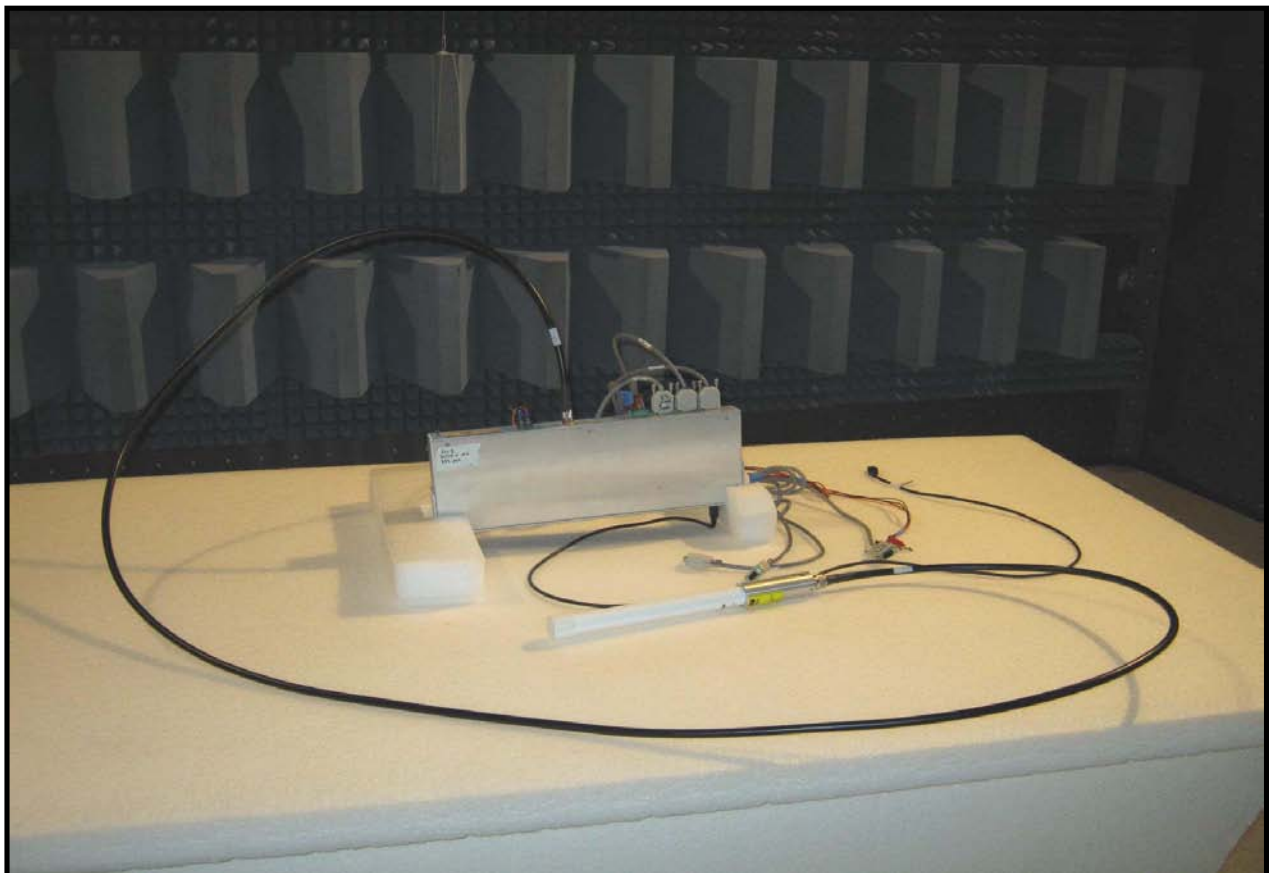
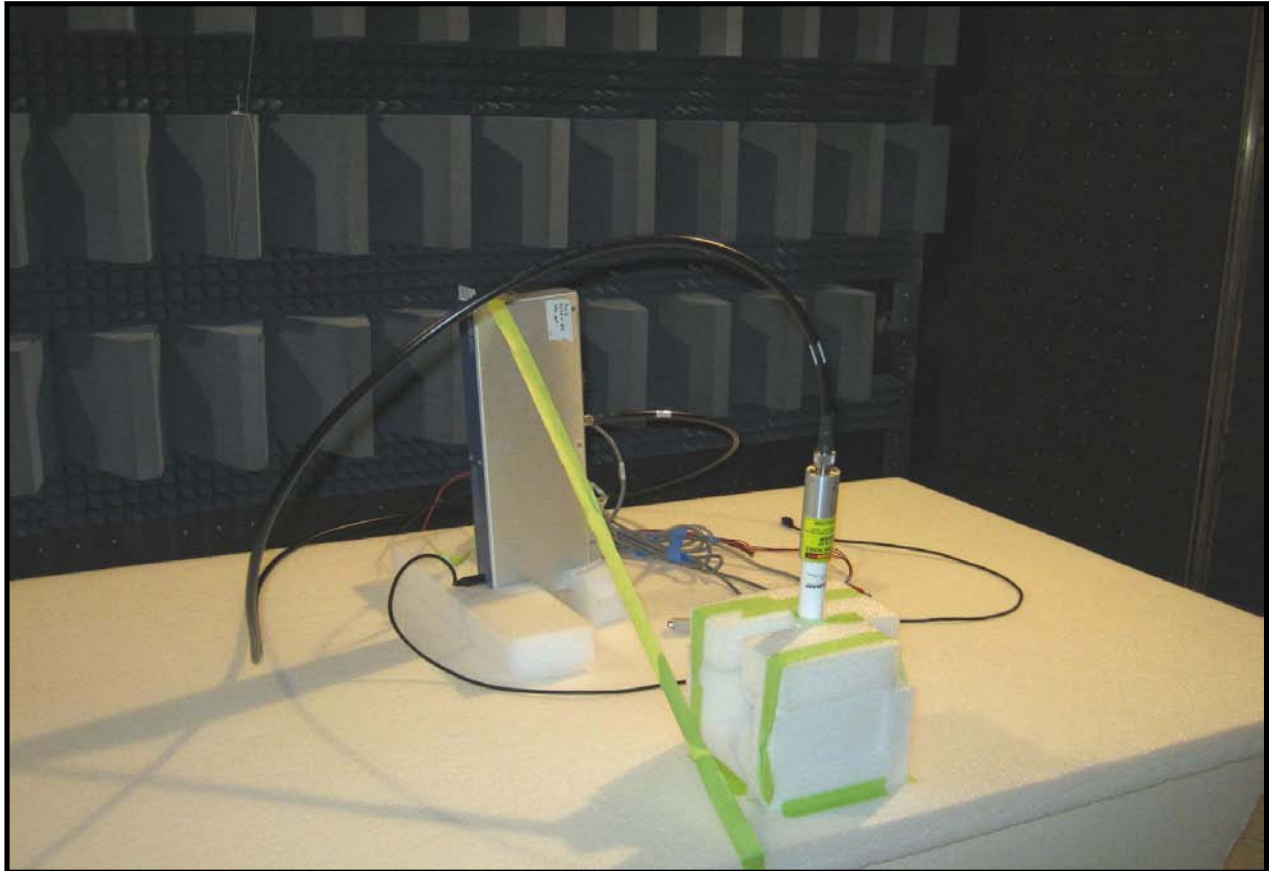
No deviations.

Run #	11	Signature <i>Jennifer Herrett</i>
Configuration #	6	
Results	Pass	

The graph plots dBuV/m on the y-axis (0.0 to 80.0) against MHz on the x-axis (2700.000 to 4700.000). A horizontal green line at 74.0 dBuV/m represents the specification limit. Data points are shown as green diamonds. Most points are below the limit, with a cluster of points between 4500 and 4700 MHz reaching up to approximately 60 dBuV/m. A blue horizontal line is drawn at approximately 54 dBuV/m.

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
4512.742	54.3	8.2	277.0	1.0	0.0	0.0	V-Horn	PK	0.0	62.5	74.0	-11.5	Low Channel, EUT horizontal and antenna horizontal.
4512.925	51.8	8.2	266.0	1.0	0.0	0.0	H-Horn	PK	0.0	60.0	74.0	-14.0	Low Channel, EUT horizontal and antenna horizontal.
4513.140	50.9	8.2	259.0	1.2	0.0	0.0	V-Horn	PK	0.0	59.1	74.0	-14.9	Low Channel, EUT on front face and antenna horizontal.
4513.033	50.7	8.2	76.0	1.0	0.0	0.0	V-Horn	PK	0.0	58.9	74.0	-15.1	Low Channel, EUT vertical and antenna vertical.
4512.925	50.4	8.2	352.0	1.8	0.0	0.0	H-Horn	PK	0.0	58.6	74.0	-15.4	Low Channel, EUT on front face and antenna horizontal.
4637.367	46.8	8.2	271.0	1.2	0.0	0.0	H-Horn	PK	0.0	55.0	74.0	-19.0	High Channel, EUT horizontal and antenna horizontal.
4574.608	46.3	8.2	272.0	1.3	0.0	0.0	H-Horn	PK	0.0	54.5	74.0	-19.5	Mid Channel, EUT horizontal and antenna horizontal.
4512.975	44.0	8.2	182.0	1.8	0.0	0.0	H-Horn	PK	0.0	52.2	74.0	-21.8	Low Channel, EUT vertical and antenna vertical.
4637.875	42.6	8.2	268.0	1.1	0.0	0.0	V-Horn	PK	0.0	50.8	74.0	-23.2	High Channel, EUT horizontal and antenna horizontal.
2782.683	49.2	0.4	233.0	1.2	0.0	0.0	H-Horn	PK	0.0	49.6	74.0	-24.4	High Channel, EUT horizontal and antenna horizontal.
2707.875	49.2	0.0	164.0	1.2	0.0	0.0	V-Horn	PK	0.0	49.2	74.0	-24.8	Low Channel, EUT horizontal and antenna horizontal.
2707.708	47.6	0.0	309.0	1.2	0.0	0.0	H-Horn	PK	0.0	47.6	74.0	-26.4	Low Channel, EUT horizontal and antenna horizontal.
4574.600	39.2	8.2	246.0	1.8	0.0	0.0	V-Horn	PK	0.0	47.4	74.0	-26.6	Mid Channel, EUT horizontal and antenna horizontal.
2782.525	46.9	0.4	143.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.3	74.0	-26.7	High Channel, EUT horizontal and antenna horizontal.
3610.425	42.9	4.4	268.0	1.4	0.0	0.0	V-Horn	PK	0.0	47.3	74.0	-26.7	Low Channel, EUT horizontal and antenna horizontal.
3610.508	42.9	4.4	287.0	1.2	0.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	Low Channel, EUT horizontal and antenna horizontal.
2744.692	47.0	0.1	292.0	1.0	0.0	0.0	H-Horn	PK	0.0	47.1	74.0	-26.9	Mid Channel, EUT horizontal and antenna horizontal.
2744.533	46.2	0.1	143.0	1.1	0.0	0.0	V-Horn	PK	0.0	46.3	74.0	-27.7	Mid Channel, EUT horizontal and antenna horizontal.
3709.883	40.9	4.8	286.0	1.2	0.0	0.0	H-Horn	PK	0.0	45.7	74.0	-28.3	High Channel, EUT horizontal and antenna horizontal.
3659.808	40.7	4.6	285.0	1.0	0.0	0.0	H-Horn	PK	0.0	45.3	74.0	-28.7	Mid Channel, EUT horizontal and antenna horizontal.





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.

MODES OF OPERATION

Tx, Yagi Antenna, See comments for Channel and EUT Orientation

MODE USED FOR FINAL DATA

Tx, Yagi Antenna, See comments for Channel and EUT Orientation

POWER SETTINGS INVESTIGATED

24VDC

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	12.5GHz
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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
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	7/2/2008	24
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	12
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Low Pass Filter	Micro-Tronics	LPM50003	HGL	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	13

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
	0.15 - 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

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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST

EMC

Spurious Radiated Emissions

PSA 2008.07.21
EMI 2008.1.9

EUT:SEL-3031

Serial Number:2009238196

Customer:Schweitzer Engineering Laboratories, Inc.

Attendees:None

Project:None

Tested by:Jennifer Herrett

Power:24VDC

Work Order:SchW0090

Date:10/19/09

Temperature:22

Humidity:48%

Barometric Pres.:1011.70mb

Job Site:EV12

TEST SPECIFICATIONS

FCC 15.247 (FHSS):2009

Test Method

ANSI C63.4:2003, DA 00-705:2000

TEST PARAMETERS

Antenna Height(s) (m)1 - 4

Test Distance (m)3

COMMENTS

Rackmount System with Yagi Antenna (output level set at 27dBm).

EUT OPERATING MODES

Tx, Yagi Antenna. See comments for Channel and EUT Orientation

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #

Configuration #

Results

7

5

Pass

Signature

Jennifer Herrett

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

-10.0

2700.000

2900.000

3100.000

3300.000

3500.000

3700.000

3900.000

4100.000

4300.000

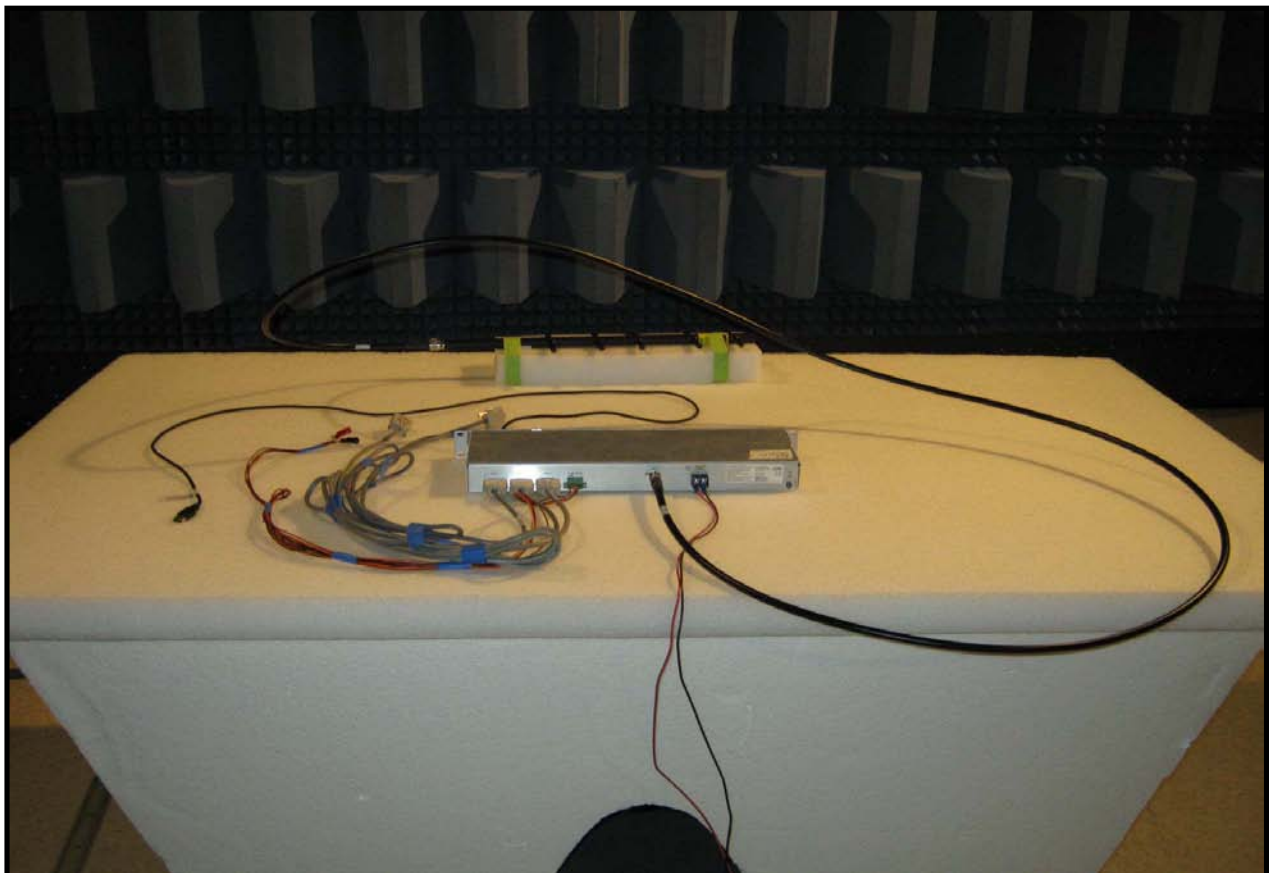
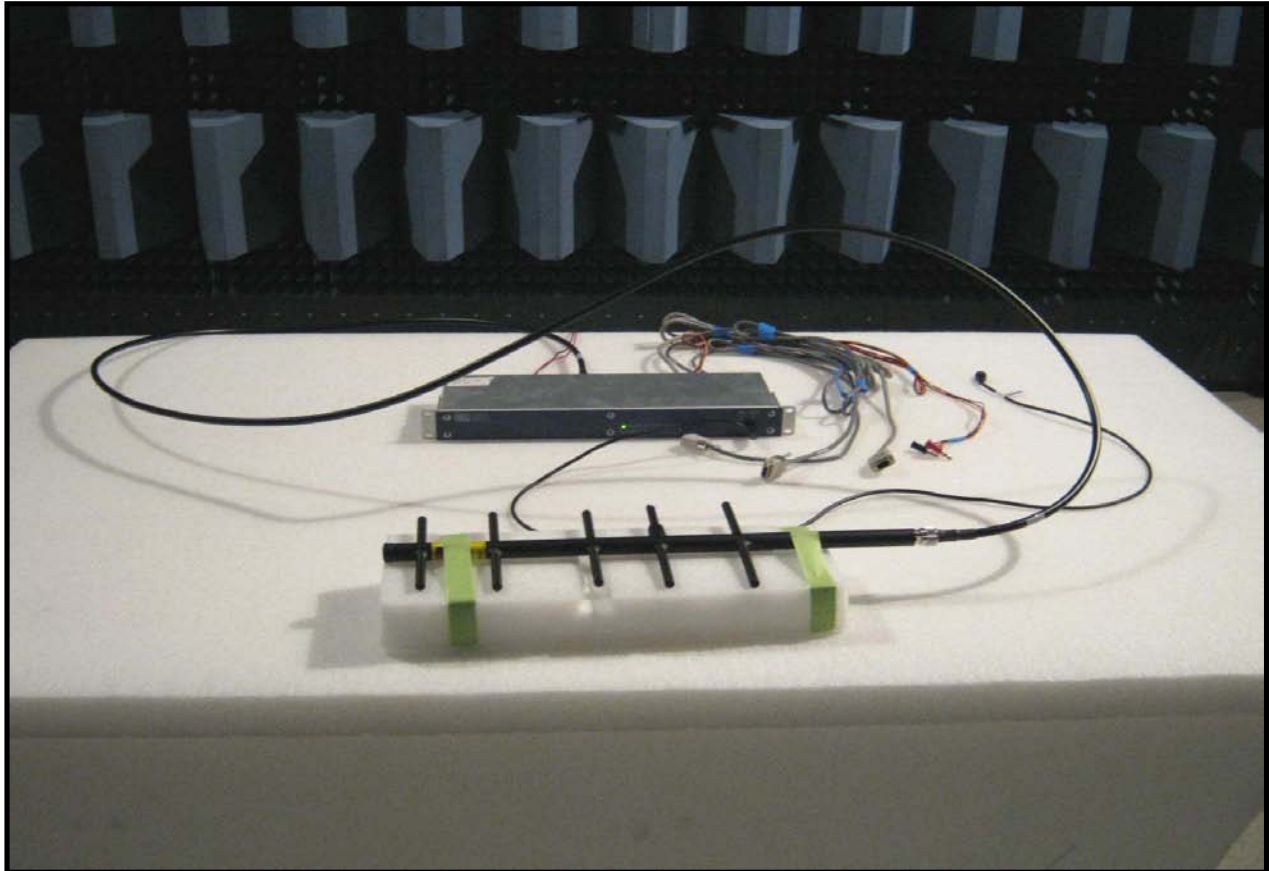
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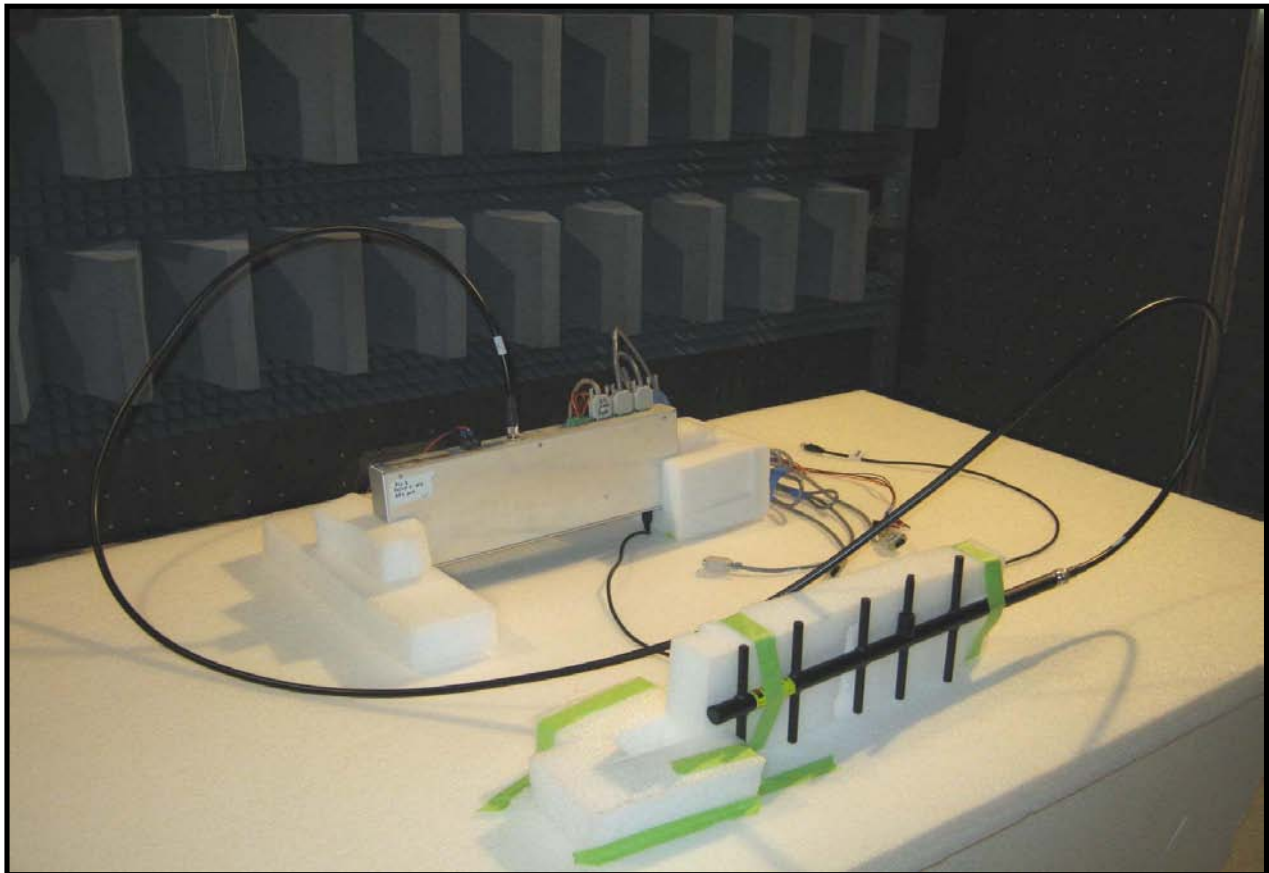
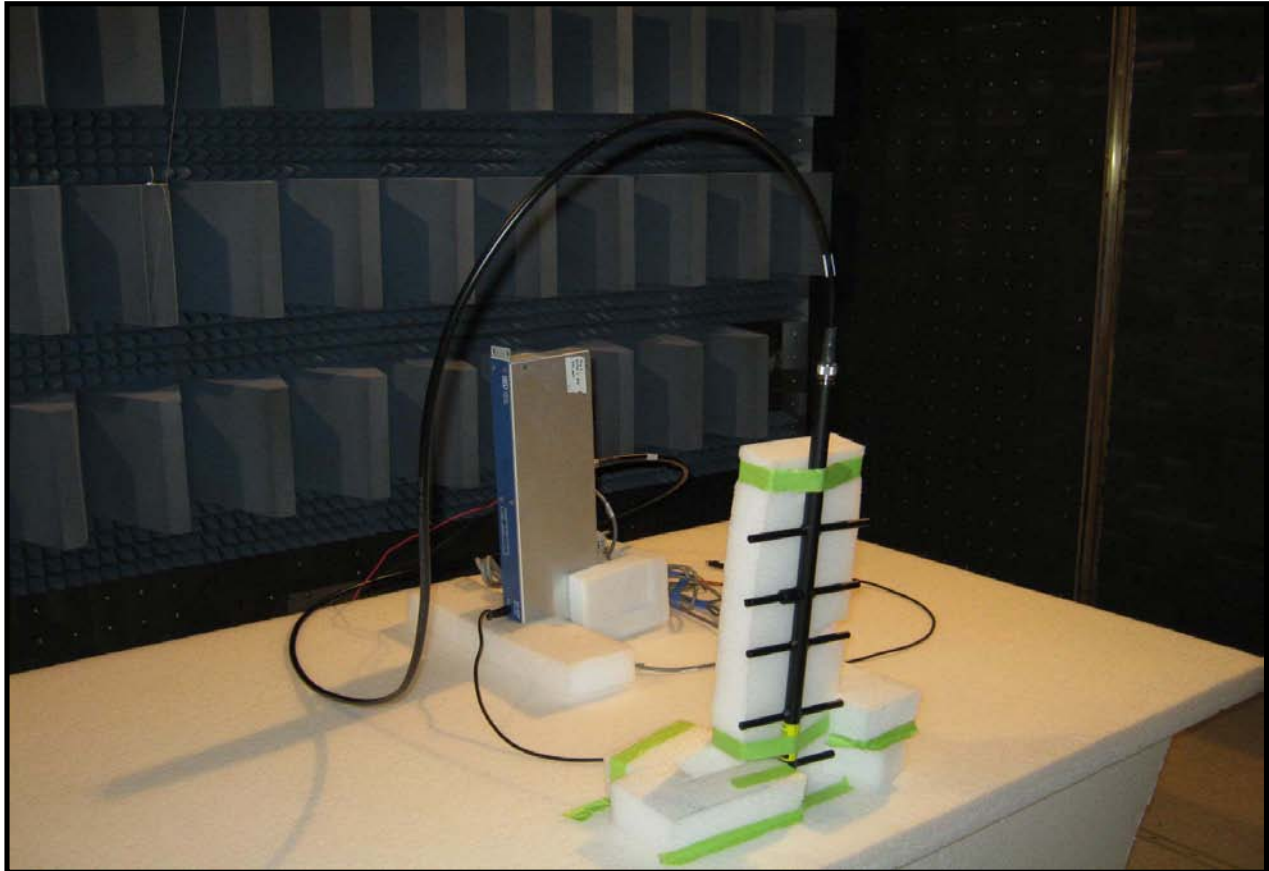
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dBuV/m

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
4513.117	53.2	8.2	134.0	1.6	0.0	0.0	H-Horn	PK	0.0	61.4	74.0	-12.6	Low Channel, EUT horizontal and antenna horizontal.
4513.133	51.7	8.2	201.0	1.6	0.0	0.0	H-Horn	PK	0.0	59.9	74.0	-14.1	Low Channel, EUT vertical and antenna vertical.
4513.192	50.6	8.2	217.0	1.4	0.0	0.0	V-Horn	PK	0.0	58.8	74.0	-15.2	Low Channel, EUT vertical and antenna vertical.
4513.083	47.6	8.2	79.0	2.2	0.0	0.0	V-Horn	PK	0.0	55.8	74.0	-18.2	Low Channel, EUT on front face and antenna on side.
4513.208	47.6	8.2	275.0	2.2	0.0	0.0	V-Horn	PK	0.0	55.8	74.0	-18.2	Low Channel, EUT horizontal and antenna horizontal.
4513.208	45.8	8.2	246.0	1.6	0.0	0.0	H-Horn	PK	0.0	54.0	74.0	-20.0	Low Channel, EUT on front face and antenna on side.
4574.383	41.8	8.2	107.0	1.5	0.0	0.0	H-Horn	PK	0.0	50.0	74.0	-24.0	Mid Channel, EUT horizontal and antenna horizontal.
2707.692	47.9	0.0	214.0	1.2	0.0	0.0	H-Horn	PK	0.0	47.9	74.0	-26.1	Low Channel, EUT horizontal and antenna horizontal.
4574.317	39.7	8.2	269.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.9	74.0	-26.1	Mid Channel, EUT vertical and antenna vertical.
4637.475	39.0	8.2	188.0	1.5	0.0	0.0	H-Horn	PK	0.0	47.2	74.0	-26.8	High Channel, EUT horizontal and antenna horizontal.
2782.667	46.4	0.4	256.0	2.0	0.0	0.0	V-Horn	PK	0.0	46.8	74.0	-27.2	High Channel, EUT vertical and antenna vertical.
4637.508	38.6	8.2	227.0	1.0	0.0	0.0	V-Horn	PK	0.0	46.8	74.0	-27.2	High Channel, EUT vertical and antenna vertical.
2707.617	46.6	0.0	270.0	1.1	0.0	0.0	V-Horn	PK	0.0	46.6	74.0	-27.4	Low Channel, EUT vertical and antenna vertical.
2744.792	44.8	0.1	331.0	1.2	0.0	0.0	H-Horn	PK	0.0	44.9	74.0	-29.1	Mid Channel, EUT horizontal and antenna horizontal.
3610.283	40.2	4.4	109.0	1.2	0.0	0.0	H-Horn	PK	0.0	44.6	74.0	-29.4	Low Channel, EUT horizontal and antenna horizontal.
3711.225	39.2	4.8	120.0	1.3	0.0	0.0	H-Horn	PK	0.0	44.0	74.0	-30.0	High Channel, EUT horizontal and antenna horizontal.
2782.475	43.6	0.4	317.0	1.2	0.0	0.0	H-Horn	PK	0.0	44.0	74.0	-30.0	High Channel, EUT horizontal and antenna horizontal.
3708.050	38.6	4.8	193.0	1.0	0.0	0.0	V-Horn	PK	0.0	43.4	74.0	-30.6	High Channel, EUT vertical and antenna vertical.
3610.200	38.8	4.4	181.0	1.1	0.0	0.0	V-Horn	PK	0.0	43.2	74.0	-30.8	Low Channel, EUT vertical and antenna vertical.
3659.875	38.0	4.6	212.0	1.3	0.0	0.0	H-Horn	PK	0.0	42.6	74.0	-31.4	Mid Channel, EUT horizontal and antenna horizontal.





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.

MODES OF OPERATION

Tx, Unity Gain Antenna, See comments for Channel and EUT Orientation

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	12.5GHz
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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
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	7/2/2008	24
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	12
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Low Pass Filter	Micro-Tronics	LPM50003	HGL	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	13

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
	0.15 - 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

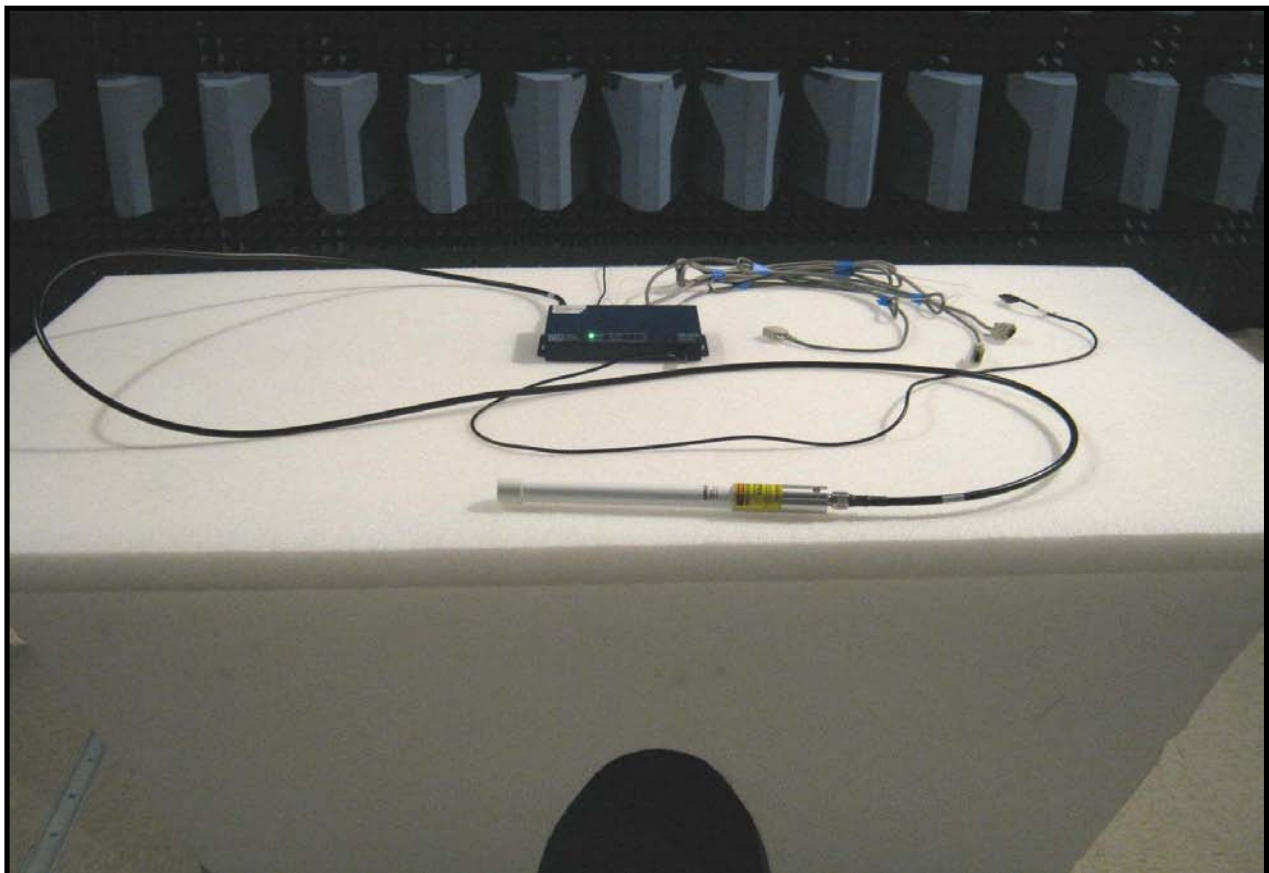
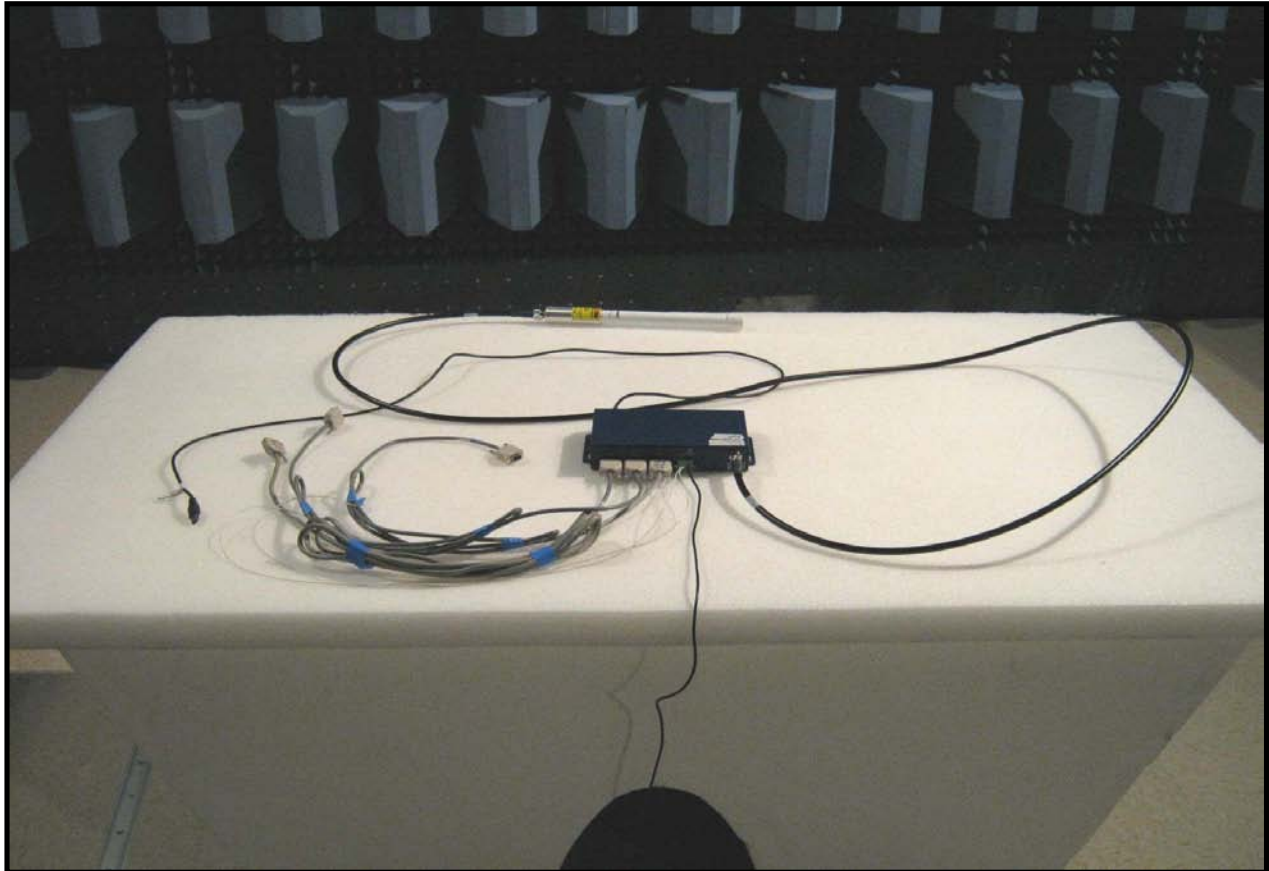
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

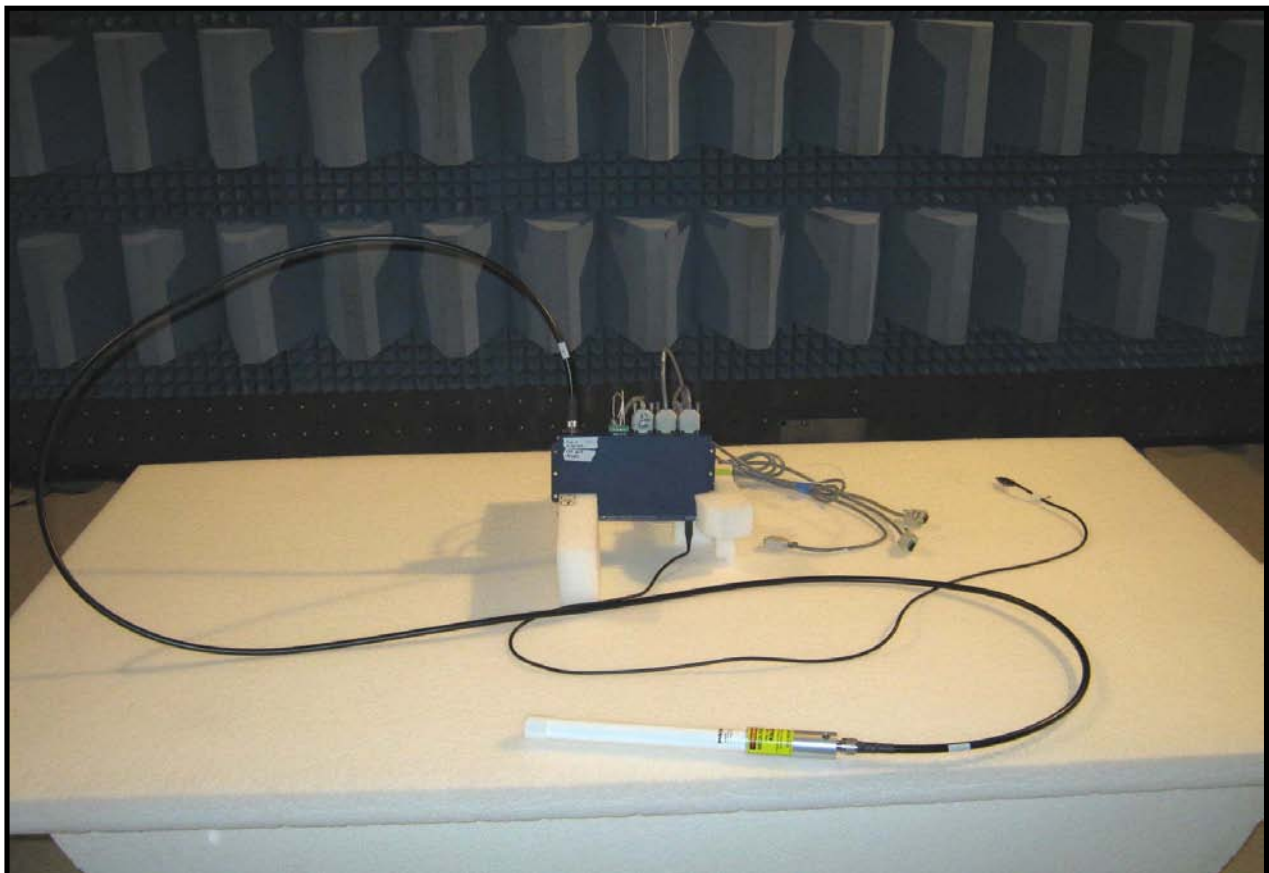
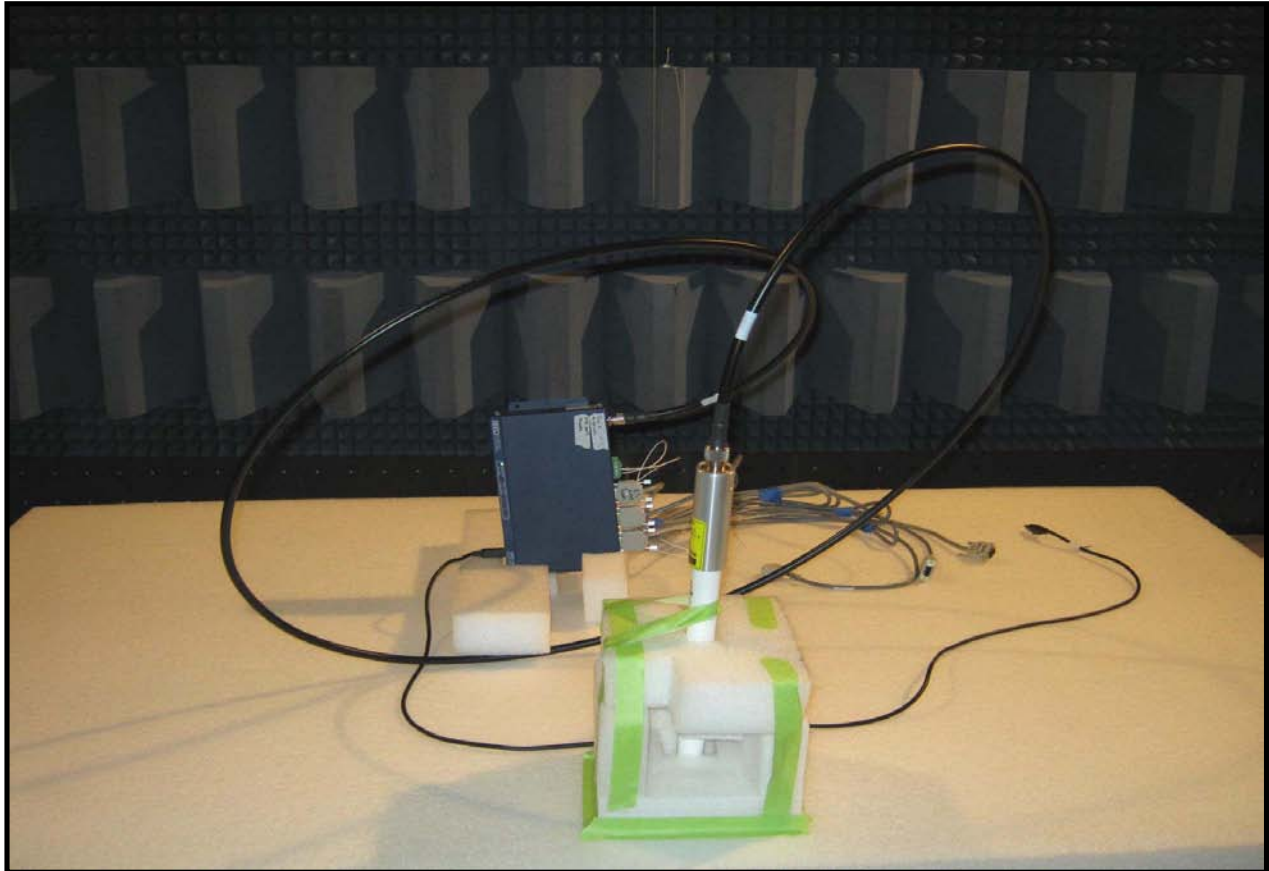
TEST DESCRIPTION

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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST		Spurious Radiated Emissions		PSA 2008.07.21 EMI 2008.1.9	
EMC					
EUT: SEL-3031				Work Order: SCHW0089	
Serial Number: None (Wallmount System)				Date: 10/14/09	
Customer: Schweitzer Engineering Laboratories, Inc.				Temperature: 22	
Attendees: None				Humidity: 32%	
Project: None				Barometric Pres.: 993.10mb	
Tested by: Jennifer Herrett				Power: 120VAC/60Hz	
Test Method				Job Site: EV12	
TEST SPECIFICATIONS				FCC 15.247 (FHSS):2009	
				ANSI C63.4:2003, DA 00-705:2000	
TEST PARAMETERS					
Antenna Height(s) (m)		1 - 4		Test Distance (m)	
				3	
COMMENTS					
Wallmount System with Unity Gain Antenna (output level set at 30dBm).					
EUT OPERATING MODES					
Tx, Unity Gain Antenna. See comments for Channel and EUT Orientation					
DEVIATIONS FROM TEST STANDARD					
No deviations.					
Run #		4			
Configuration #		4			
Results		Pass			
Signature <i>Jennifer Herrett</i>					
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					
4513.208 55.2 8.8 251.0 1.7 0.0 0.0 H-Horn PK 0.0 64.0 74.0 -10.0 Low Channel, EUT vertical and antenna vertical.					
4512.983 54.0 8.8 252.0 1.7 0.0 0.0 H-Horn PK 0.0 62.8 74.0 -11.2 Low Channel, EUT on front face and antenna horizontal.					
4513.167 50.1 8.8 268.0 1.3 0.0 0.0 H-Horn PK 0.0 58.9 74.0 -15.1 Low Channel, EUT horizontal and antenna horizontal.					
4512.825 48.3 8.8 296.0 1.1 0.0 0.0 V-Horn PK 0.0 57.1 74.0 -16.9 Low Channel, EUT vertical and antenna vertical.					
4513.208 47.7 8.8 267.0 1.1 0.0 0.0 V-Horn PK 0.0 56.5 74.0 -17.5 Low Channel, EUT horizontal and antenna horizontal.					
4513.125 46.3 8.8 87.0 2.0 0.0 0.0 V-Horn PK 0.0 55.1 74.0 -18.9 Low Channel, EUT on front face and antenna horizontal.					
4513.033 53.5 8.8 251.0 1.7 37.0 0.0 H-Horn AV 0.0 25.3 54.0 -28.7 Low Channel, EUT vertical and antenna vertical.					
4513.025 52.3 8.8 252.0 1.7 37.0 0.0 H-Horn AV 0.0 24.1 54.0 -29.9 Low Channel, EUT on front face and antenna horizontal.					
4513.042 47.6 8.8 268.0 1.3 37.0 0.0 H-Horn AV 0.0 19.4 54.0 -34.6 Low Channel, EUT horizontal and antenna horizontal.					
4513.025 44.8 8.8 296.0 1.1 37.0 0.0 V-Horn AV 0.0 16.6 54.0 -37.4 Low Channel, EUT vertical and antenna vertical.					
4513.033 44.3 8.8 267.0 1.1 37.0 0.0 V-Horn AV 0.0 16.1 54.0 -37.9 Low Channel, EUT horizontal and antenna horizontal.					
4513.017 42.5 8.8 87.0 2.0 37.0 0.0 V-Horn AV 0.0 14.3 54.0 -39.7 Low Channel, EUT on front face and antenna horizontal.					

NORTHWEST		PSA 2008.07.21											
EMI		EMI 2008.1.9											
Spurious Radiated Emissions													
EUT: SEL-3031		Work Order: SCHW0089											
Serial Number: None (Wallmount System)		Date: 10/15/09											
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 21											
Attendees: None		Humidity: 41%											
Project: None		Barometric Pres.: 1019.70mb											
Tested by: Jennifer Herrett		Power: 120VAC/60Hz											
		Job Site: EV12											
TEST SPECIFICATIONS		Test Method											
FCC 15.247 (FHSS):2009		ANSI C63.4:2003, DA 00-705:2000											
TEST PARAMETERS													
Antenna Height(s) (m)		1 - 4	Test Distance (m)										
			3										
COMMENTS													
Wallmount System with Unity Gain Antenna (output level set at 30dBm).													
EUT OPERATING MODES													
Tx, Unity Gain Antenna, See comments for Channel and EUT Orientation													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #	5	Signature <i>Jennifer Herrett</i>											
Configuration #	4												
Results	Pass												
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
2707.858	53.0	0.1	151.0	1.1	0.0	0.0	V-Horn	PK	0.0	53.1	74.0	-20.9	Low Channel, EUT vertical and antenna vertical.
4637.342	43.2	9.0	338.0	1.1	0.0	0.0	V-Horn	PK	0.0	52.2	74.0	-21.8	High Channel, EUT vertical and antenna vertical.
4574.825	42.9	8.9	288.0	1.1	0.0	0.0	V-Horn	PK	0.0	51.8	74.0	-22.2	Mid Channel, EUT vertical and antenna vertical.
4574.283	41.3	8.9	47.0	1.2	0.0	0.0	H-Horn	PK	0.0	50.2	74.0	-23.8	Mid Channel, EUT vertical and antenna vertical.
2707.842	50.0	0.1	26.0	1.3	0.0	0.0	H-Horn	PK	0.0	50.1	74.0	-23.9	Low Channel, EUT vertical and antenna vertical.
4637.033	39.4	9.0	34.0	1.2	0.0	0.0	H-Horn	PK	0.0	48.4	74.0	-25.6	High Channel, EUT vertical and antenna vertical.
2782.625	47.4	0.5	255.0	1.4	0.0	0.0	V-Horn	PK	0.0	47.9	74.0	-26.1	High Channel, EUT vertical and antenna vertical.
2744.792	47.2	0.3	205.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.5	74.0	-26.5	Mid Channel, EUT vertical and antenna vertical.
2744.642	47.0	0.3	23.0	1.3	0.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	Mid Channel, EUT vertical and antenna vertical.
2782.417	46.6	0.5	64.0	1.3	0.0	0.0	H-Horn	PK	0.0	47.1	74.0	-26.9	High Channel, EUT vertical and antenna vertical.
3659.433	39.4	5.0	194.0	1.1	0.0	0.0	V-Horn	PK	0.0	44.4	74.0	-29.6	Mid Channel, EUT vertical and antenna vertical.
3608.300	39.3	4.8	320.0	1.1	0.0	0.0	V-Horn	PK	0.0	44.1	74.0	-29.9	Low Channel, EUT vertical and antenna vertical.
3710.258	38.7	5.2	121.0	1.4	0.0	0.0	V-Horn	PK	0.0	43.9	74.0	-30.1	High Channel, EUT vertical and antenna vertical.
3712.267	38.4	5.2	46.0	1.2	0.0	0.0	H-Horn	PK	0.0	43.6	74.0	-30.4	High Channel, EUT vertical and antenna vertical.
3661.917	38.3	5.0	72.0	1.2	0.0	0.0	H-Horn	PK	0.0	43.3	74.0	-30.7	Mid Channel, EUT vertical and antenna vertical.
3610.342	38.4	4.8	50.0	1.3	0.0	0.0	H-Horn	PK	0.0	43.2	74.0	-30.8	Low Channel, EUT vertical and antenna vertical.
2707.825	50.9	0.1	151.0	1.1	37.0	0.0	V-Horn	AV	0.0	14.0	54.0	-40.0	Low Channel, EUT vertical and antenna vertical.
4637.525	37.5	9.0	338.0	1.1	37.0	0.0	V-Horn	AV	0.0	9.5	54.0	-44.5	High Channel, EUT vertical and antenna vertical.
2707.867	46.3	0.1	26.0	1.3	37.0	0.0	H-Horn	AV	0.0	9.4	54.0	-44.6	Low Channel, EUT vertical and antenna vertical.
4574.492	37.3	8.9	288.0	1.1	37.0	0.0	V-Horn	AV	0.0	9.2	54.0	-44.8	Mid Channel, EUT vertical and antenna vertical.





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.

MODES OF OPERATION

Tx, Yagi Antenna, See comments for Channel and EUT Orientation

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	12.5GHz
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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
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	7/2/2008	24
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	12
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Low Pass Filter	Micro-Tronics	LPM50003	HGL	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	13

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
	0.15 - 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.

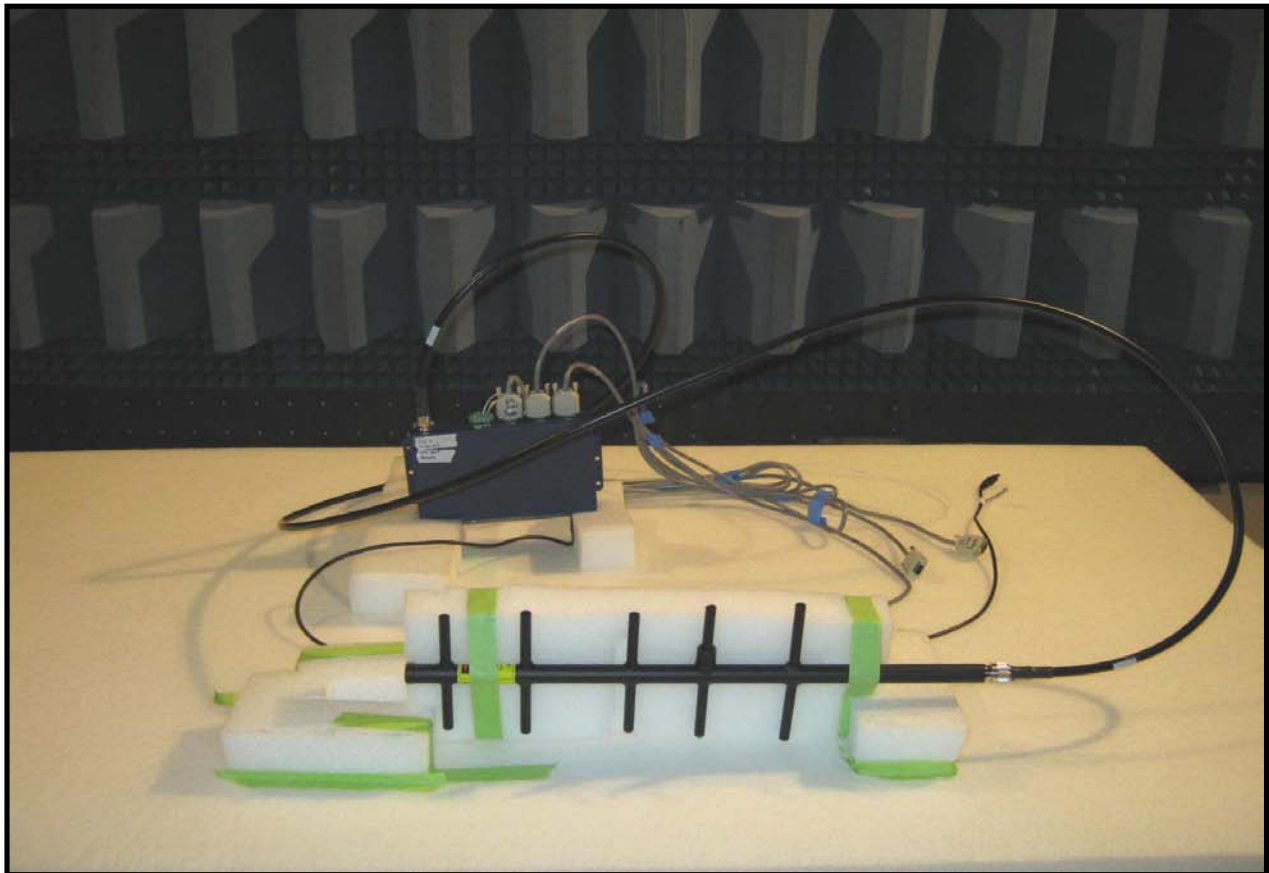
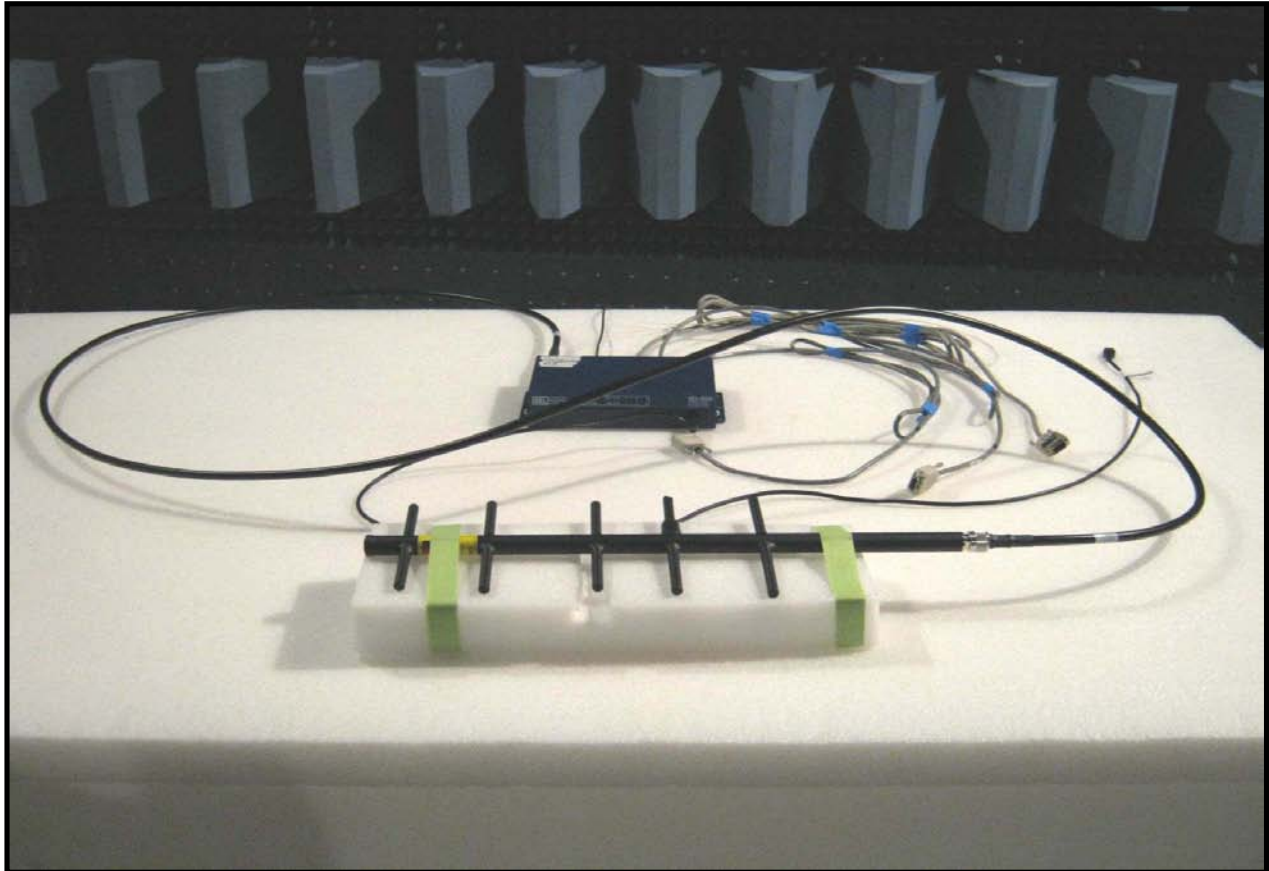
MEASUREMENT UNCERTAINTY

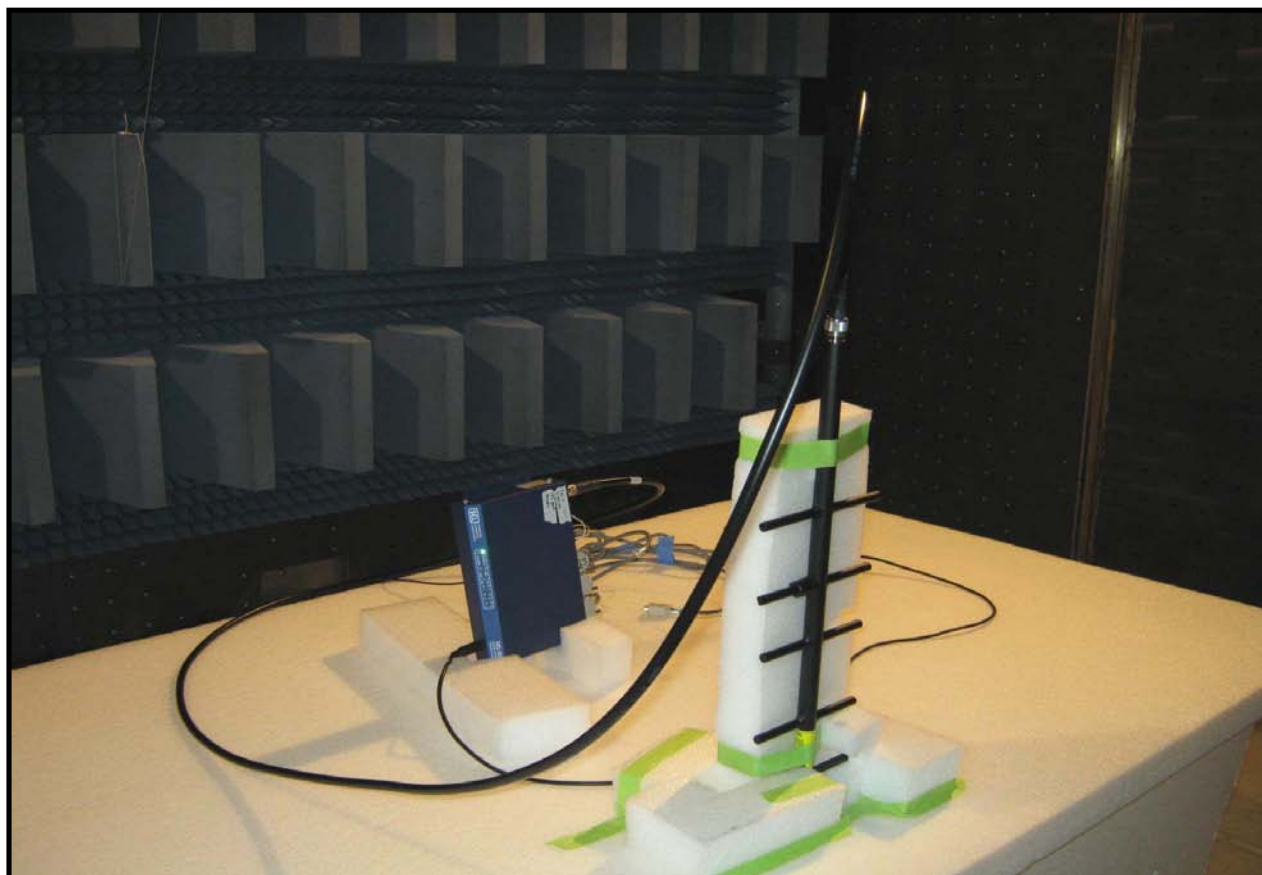
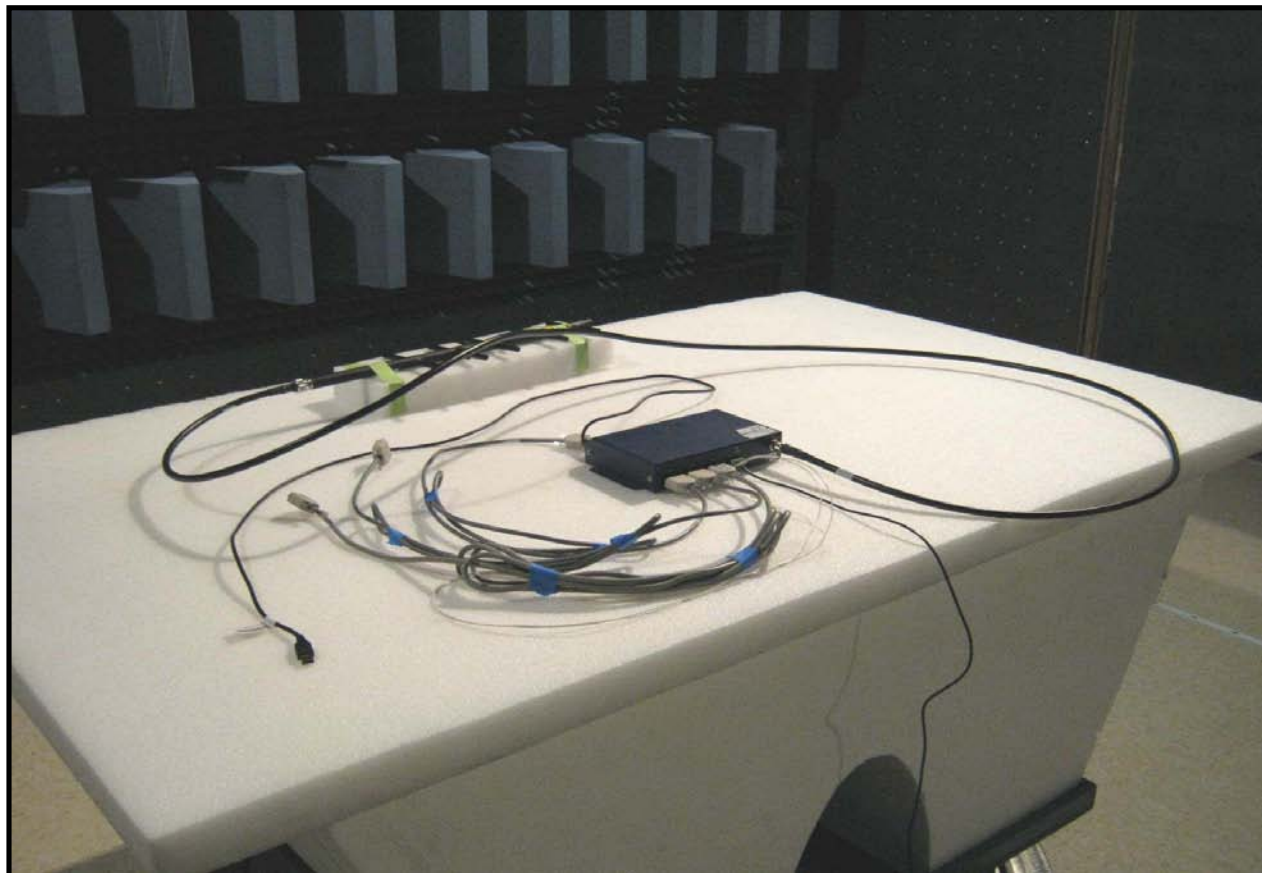
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST		Spurious Radiated Emissions		PSA 2008.07.21									
EMC				EMI 2008.1.9									
EUT: SEL-3031		Work Order: SCHW0089											
Serial Number: None (Wallmount System)		Date: 10/15/09											
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 22											
Attendees: None		Humidity: 32%											
Project: None		Barometric Pres.: 993.10mb											
Tested by: Jennifer Herrett		Power: 120VAC/60Hz		Job Site: EV12									
TEST SPECIFICATIONS		Test Method											
FCC 15.247 (FHSS):2009		ANSI C63.4:2003, DA 00-705:2000											
TEST PARAMETERS													
Antenna Height(s) (m)		1 - 4		Test Distance (m) 3									
COMMENTS													
Wallmount System with Yagi Antenna (output level set at 27dBm).													
EUT OPERATING MODES													
Tx, Yagi Antenna. See comments for Channel and EUT Orientation													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #		6											
Configuration #		3											
Results		Pass		Signature <i>Jennifer Herrett</i>									
Comments													
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
4512.600	49.3	8.8	120.0	1.7	0.0	0.0	H-Horn	PK	0.0	58.1	74.0	-15.9	Low Channel, EUT horizontal and antenna horizontal.
4513.058	49.2	8.8	240.0	1.3	0.0	0.0	H-Horn	PK	0.0	58.0	74.0	-16.0	Low Channel, EUT vertical and antenna vertical.
4513.058	48.5	8.8	245.0	1.1	0.0	0.0	V-Horn	PK	0.0	57.3	74.0	-16.7	Low Channel, EUT vertical and antenna vertical.
4513.275	45.4	8.8	183.0	1.1	0.0	0.0	V-Horn	PK	0.0	54.2	74.0	-19.8	Low Channel, EUT horizontal and antenna horizontal.
4512.958	45.0	8.8	286.0	1.0	0.0	0.0	H-Horn	PK	0.0	53.8	74.0	-20.2	Low Channel, EUT on front face and antenna on side.
4513.192	45.0	8.8	296.0	1.1	0.0	0.0	V-Horn	PK	0.0	53.8	74.0	-20.2	Low Channel, EUT on front face and antenna on side.
4574.800	40.0	8.9	124.0	1.3	0.0	0.0	H-Horn	PK	0.0	48.9	74.0	-25.1	Mid Channel, EUT horizontal and antenna horizontal.
4637.408	39.0	9.0	119.0	1.6	0.0	0.0	H-Horn	PK	0.0	48.0	74.0	-26.0	High Channel, EUT horizontal and antenna horizontal.
4574.967	38.7	8.9	251.0	1.1	0.0	0.0	V-Horn	PK	0.0	47.6	74.0	-26.4	Mid Channel, EUT vertical and antenna vertical.
2707.733	47.2	0.1	203.0	1.2	0.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	Low Channel, EUT horizontal and antenna horizontal.
2744.825	46.4	0.3	205.0	1.7	0.0	0.0	H-Horn	PK	0.0	46.7	74.0	-27.3	Mid Channel, EUT horizontal and antenna horizontal.
2782.483	46.2	0.5	225.0	1.7	0.0	0.0	H-Horn	PK	0.0	46.7	74.0	-27.3	High Channel, EUT horizontal and antenna horizontal.
4635.675	37.2	9.0	123.0	1.1	0.0	0.0	V-Horn	PK	0.0	46.2	74.0	-27.8	High Channel, EUT vertical and antenna vertical.
2782.567	44.9	0.5	249.0	2.3	0.0	0.0	V-Horn	PK	0.0	45.4	74.0	-28.6	High Channel, EUT vertical and antenna vertical.
2707.533	44.8	0.1	253.0	1.1	0.0	0.0	V-Horn	PK	0.0	44.9	74.0	-29.1	Low Channel, EUT vertical and antenna vertical.
3709.883	39.4	5.2	234.0	1.7	0.0	0.0	H-Horn	PK	0.0	44.6	74.0	-29.4	High Channel, EUT horizontal and antenna horizontal.
2744.625	44.3	0.3	274.0	1.1	0.0	0.0	V-Horn	PK	0.0	44.6	74.0	-29.4	Mid Channel, EUT vertical and antenna vertical.
3659.375	38.7	5.0	220.0	1.0	0.0	0.0	H-Horn	PK	0.0	43.7	74.0	-30.3	Mid Channel, EUT horizontal and antenna horizontal.
3712.325	38.2	5.2	258.0	1.1	0.0	0.0	V-Horn	PK	0.0	43.4	74.0	-30.6	High Channel, EUT vertical and antenna vertical.
3609.267	38.4	4.8	249.0	2.3	0.0	0.0	V-Horn	PK	0.0	43.2	74.0	-30.8	Low Channel, EUT vertical and 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

Master, Yagi Antenna Channel 80

Master, Yagi Antenna Channel 40

Master, Yagi Antenna Channel 1

POWER SETTINGS INVESTIGATED

120V/60Hz

CONFIGURATIONS INVESTIGATED

SCHW0090 - 9

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIR	2/4/2009	13 mo
Attenuator	Coaxicom	66702 2910-20	ATO	7/21/2009	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	5/27/2009	13 mo
EV07 Cables		Conducted Cables	EVG	6/1/2009	13 mo
Receiver	Rohde & Schwarz	ESCI	ARH	9/25/2009	24 mo

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
0.15 - 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

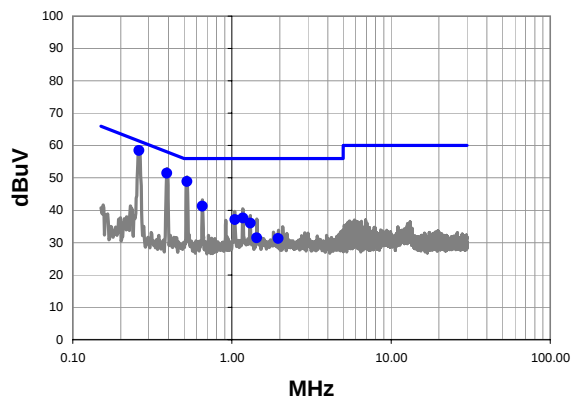
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 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

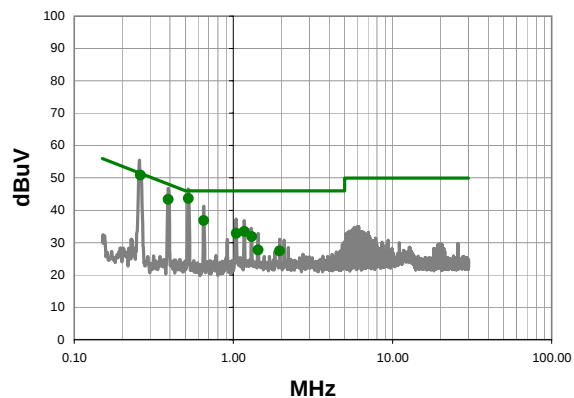
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	9 - Radiated Emissions Configuration - Rackmount (AC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	120V/60Hz						
Operating Mode:	Master, Yagi Antenna Channel 1						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	25	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



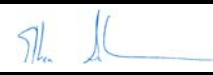
Average Data - vs - Average Limit



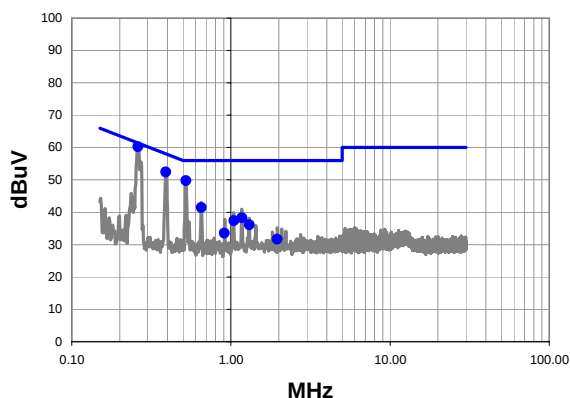
Quasi Peak Data - vs - Quasi Peak Limit						Average Data - vs - Average Limit					
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)	Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.261	37.6	20.9	58.5	61.4	-2.9	0.261	30.0	20.9	50.9	51.4	-0.5
0.390	30.9	20.6	51.5	58.1	-6.6	0.521	23.1	20.5	43.6	46.0	-2.4
0.521	28.4	20.5	48.9	56.0	-7.1	0.390	22.8	20.6	43.4	48.1	-4.7
0.652	20.8	20.5	41.3	56.0	-14.7	0.652	16.3	20.5	36.8	46.0	-9.2
1.172	17.2	20.4	37.6	56.0	-18.4	1.172	13.0	20.4	33.4	46.0	-12.6
1.044	16.7	20.4	37.1	56.0	-18.9	1.044	12.5	20.4	32.9	46.0	-13.1
1.304	15.6	20.4	36.0	56.0	-20.0	1.304	11.5	20.4	31.9	46.0	-14.1
1.432	11.1	20.4	31.5	56.0	-24.5	1.432	7.3	20.4	27.7	46.0	-18.3
1.956	10.9	20.4	31.3	56.0	-24.7	1.956	7.0	20.4	27.4	46.0	-18.6

EMC

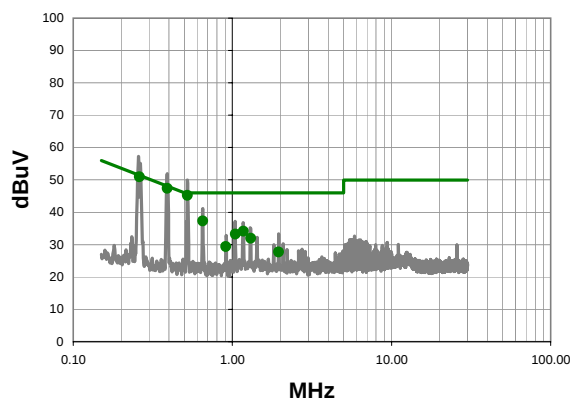
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	9 - Radiated Emissions Configuration - Rackmount (AC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	120V/60Hz						
Operating Mode:	Master, Yagi Antenna Channel 1						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	26	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.261	39.4	20.9	60.3	61.4	-1.1
0.390	31.9	20.6	52.5	58.1	-5.6
0.521	29.3	20.5	49.8	56.0	-6.2
0.652	21.0	20.5	41.5	56.0	-14.5
1.172	17.9	20.4	38.3	56.0	-17.7
1.044	17.0	20.4	37.4	56.0	-18.6
1.304	15.7	20.4	36.1	56.0	-19.9
0.911	13.2	20.4	33.6	56.0	-22.4
1.956	11.3	20.4	31.7	56.0	-24.3

Average Data - vs - Average Limit

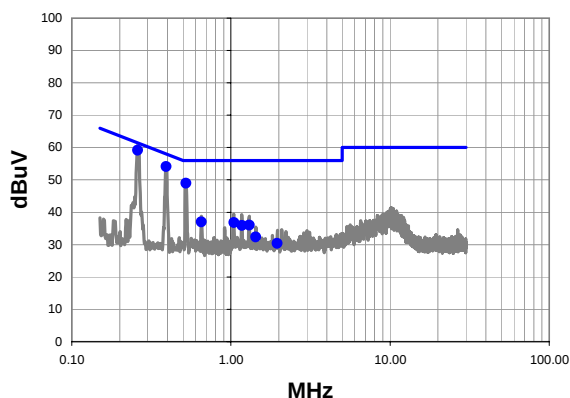
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.261	30.1	20.9	51.0	51.4	-0.4
0.390	26.8	20.6	47.4	48.1	-0.7
0.521	24.7	20.5	45.2	46.0	-0.8
0.652	16.8	20.5	37.3	46.0	-8.7
1.172	13.7	20.4	34.1	46.0	-11.9
1.044	12.9	20.4	33.3	46.0	-12.7
1.304	11.6	20.4	32.0	46.0	-14.0
0.911	9.0	20.4	29.4	46.0	-16.6
1.956	7.3	20.4	27.7	46.0	-18.3

EMC

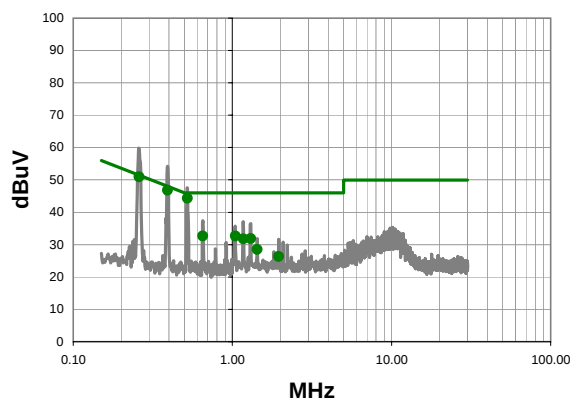
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SCHW0090	Date:	10/26/09		
Project:	None	Temperature:	21		
Job Site:	EV07	Humidity:	47		
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover	
EUT:	SEL-3031				
Configuration:	9 - Radiated Emissions Configuration - Rackmount (AC powered) with Yagi Antenna				
Customer:	Schweitzer Engineering Laboratories, Inc.				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Master, Yagi Antenna Channel 40				
Deviations:	No deviations.				
Comments:	Rackmount System with Yagi Antenna.				
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003		
Run #	27	Line:	Neutral	Ext. Attenuation: 20	Results Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.259	38.3	20.9	59.2	61.5	-2.3
0.391	33.5	20.6	54.1	58.0	-4.0
0.521	28.5	20.5	49.0	56.0	-7.0
0.653	16.5	20.5	37.0	56.0	-19.0
1.044	16.4	20.4	36.8	56.0	-19.2
1.304	15.6	20.4	36.0	56.0	-20.0
1.176	15.5	20.4	35.9	56.0	-20.1
1.436	12.0	20.4	32.4	56.0	-23.6
1.956	10.0	20.4	30.4	56.0	-25.6

Average Data - vs - Average Limit

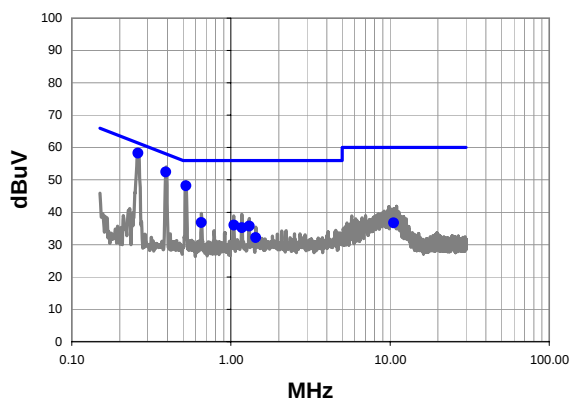
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.259	30.1	20.9	51.0	51.5	-0.5
0.391	26.2	20.6	46.8	48.0	-1.3
0.521	23.8	20.5	44.3	46.0	-1.7
1.044	12.3	20.4	32.7	46.0	-13.3
0.653	12.2	20.5	32.7	46.0	-13.3
1.304	11.5	20.4	31.9	46.0	-14.1
1.176	11.4	20.4	31.8	46.0	-14.2
1.436	8.1	20.4	28.5	46.0	-17.5
1.956	5.9	20.4	26.3	46.0	-19.7

EMC

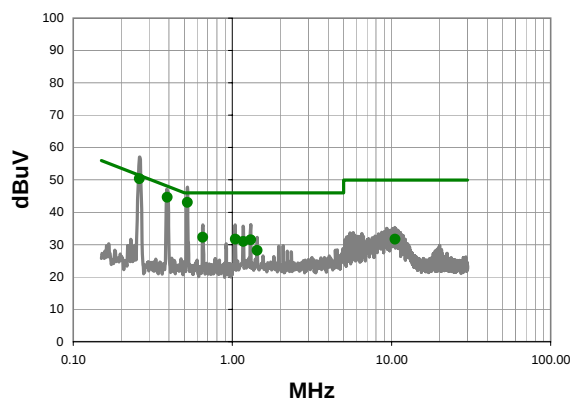
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	9 - Radiated Emissions Configuration - Rackmount (AC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	120V/60Hz						
Operating Mode:	Master, Yagi Antenna Channel 40						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	28	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

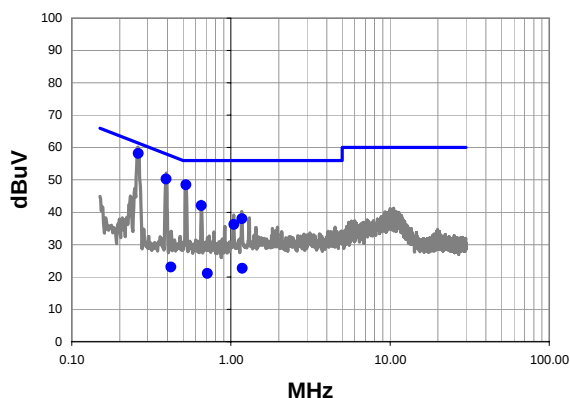
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.261	37.4	20.9	58.3	61.4	-3.1
0.390	31.9	20.6	52.5	58.1	-5.6
0.522	27.7	20.5	48.2	56.0	-7.8
0.653	16.3	20.5	36.8	56.0	-19.2
1.044	15.6	20.4	36.0	56.0	-20.0
1.304	15.3	20.4	35.7	56.0	-20.3
1.176	14.8	20.4	35.2	56.0	-20.8
10.518	16.2	20.5	36.7	60.0	-23.3
1.436	11.8	20.4	32.2	56.0	-23.8

Average Data - vs - Average Limit

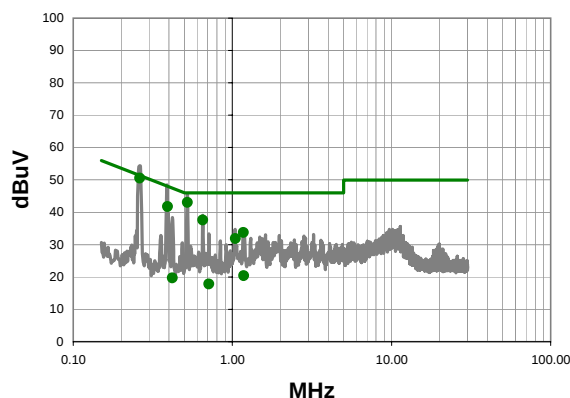
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.261	29.5	20.9	50.4	51.4	-1.0
0.522	22.5	20.5	43.0	46.0	-3.0
0.390	24.0	20.6	44.6	48.1	-3.5
0.653	11.8	20.5	32.3	46.0	-13.7
1.044	11.3	20.4	31.7	46.0	-14.3
1.304	11.1	20.4	31.5	46.0	-14.5
1.176	10.6	20.4	31.0	46.0	-15.0
1.436	7.8	20.4	28.2	46.0	-17.8
10.518	11.1	20.5	31.6	50.0	-18.4

Work Order:	SCHW0090	Date:	10/26/09		
Project:	None	Temperature:	21		
Job Site:	EV07	Humidity:	47		
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover	
EUT:	SEL-3031				
Configuration:	9 - Radiated Emissions Configuration - Rackmount (AC powered) with Yagi Antenna				
Customer:	Schweitzer Engineering Laboratories, Inc.				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Master, Yagi Antenna Channel 80				
Deviations:	No deviations.				
Comments:	Rackmount System with Yagi Antenna.				
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003		
Run #	29	Line:	High Line	Ext. Attenuation: 20	Results Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

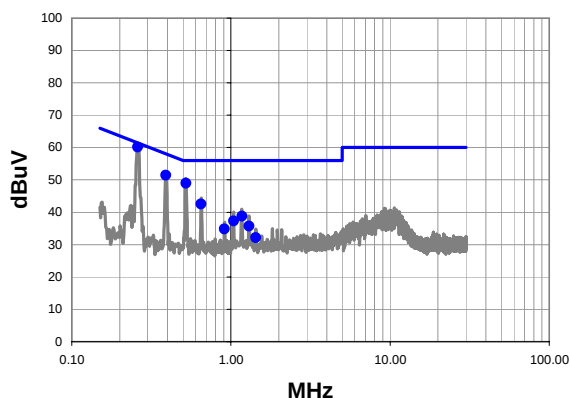
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.262	37.3	20.9	58.2	61.4	-3.2
0.521	28.0	20.5	48.5	56.0	-7.5
0.392	29.7	20.6	50.3	58.0	-7.8
0.652	21.6	20.5	42.1	56.0	-13.9
1.172	17.6	20.4	38.0	56.0	-18.0
1.044	15.8	20.4	36.2	56.0	-19.8
1.180	2.3	20.4	22.7	56.0	-33.3
0.420	2.5	20.6	23.1	57.4	-34.4
0.713	0.7	20.4	21.1	56.0	-34.9

Average Data - vs - Average Limit

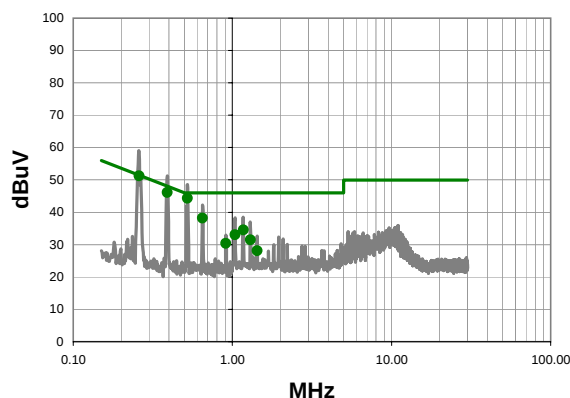
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.262	29.7	20.9	50.6	51.4	-0.8
0.521	22.5	20.5	43.0	46.0	-3.0
0.392	21.2	20.6	41.8	48.0	-6.3
0.652	17.1	20.5	37.6	46.0	-8.4
1.172	13.3	20.4	33.7	46.0	-12.3
1.044	11.5	20.4	31.9	46.0	-14.1
1.180	0.0	20.4	20.4	46.0	-25.6
0.420	-0.9	20.6	19.7	47.4	-27.8
0.713	-2.6	20.4	17.8	46.0	-28.2

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover			
EUT:	SEL-3031						
Configuration:	9 - Radiated Emissions Configuration - Rackmount (AC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	120V/60Hz						
Operating Mode:	Master, Yagi Antenna Channel 80						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	30	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit

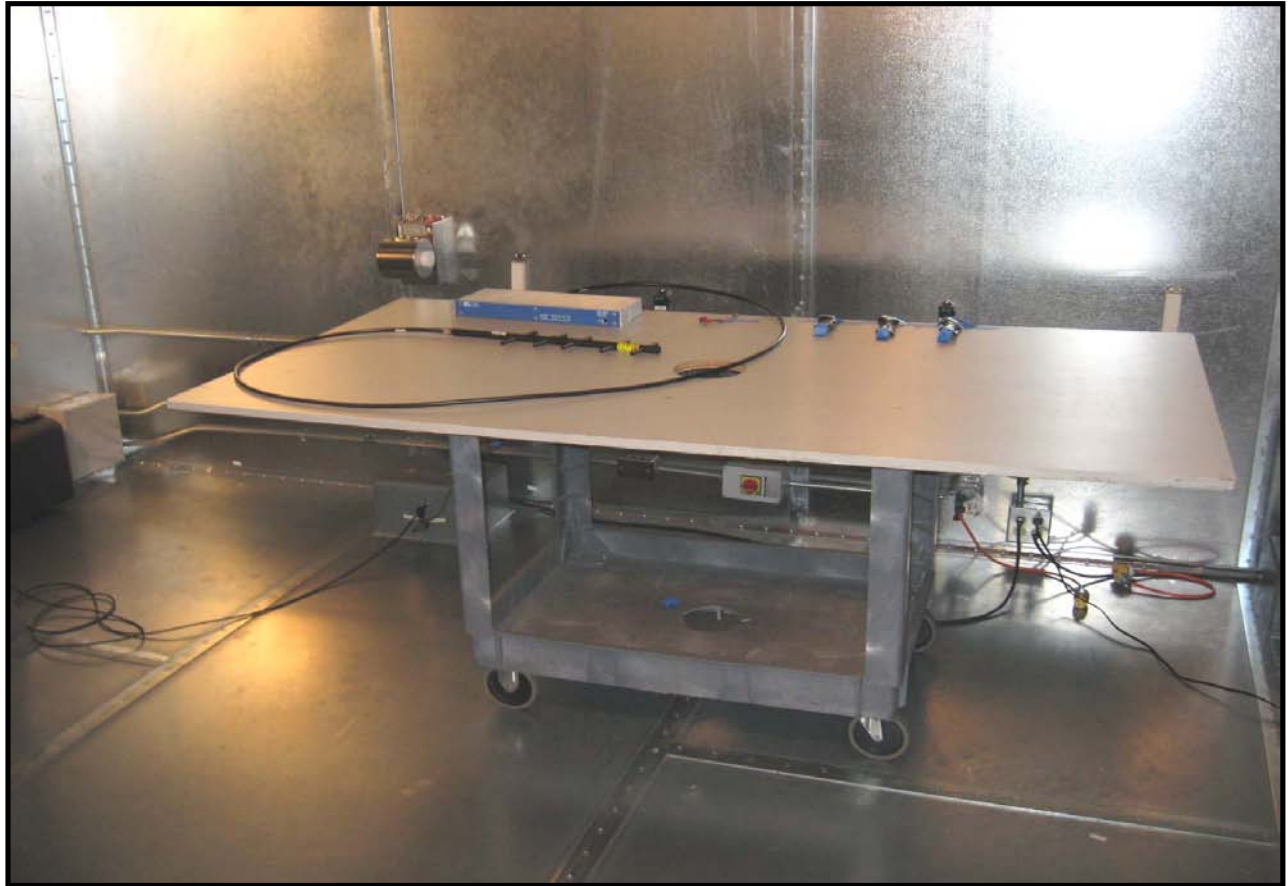


Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.259	39.3	20.9	60.2	61.5	-1.3
0.390	30.9	20.6	51.5	58.1	-6.6
0.522	28.5	20.5	49.0	56.0	-7.0
0.650	22.1	20.5	42.6	56.0	-13.4
1.172	18.4	20.4	38.8	56.0	-17.2
1.040	16.9	20.4	37.3	56.0	-18.7
1.300	15.3	20.4	35.7	56.0	-20.3
0.912	14.4	20.4	34.8	56.0	-21.2
1.432	11.8	20.4	32.2	56.0	-23.8

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.259	30.4	20.9	51.3	51.5	-0.2
0.522	23.8	20.5	44.3	46.0	-1.7
0.390	25.5	20.6	46.1	48.1	-2.0
0.650	17.7	20.5	38.2	46.0	-7.8
1.172	14.1	20.4	34.5	46.0	-11.5
1.040	12.7	20.4	33.1	46.0	-12.9
1.300	11.1	20.4	31.5	46.0	-14.5
0.912	10.0	20.4	30.4	46.0	-15.6
1.432	7.7	20.4	28.1	46.0	-17.9



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

Master, Yagi Antenna Channel 80

Master, Yagi Antenna Channel 40

Master, Yagi Antenna Channel 1

POWER SETTINGS INVESTIGATED

24 VDC

CONFIGURATIONS INVESTIGATED

SCHW0090 - 13

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIR	2/4/2009	13 mo
Attenuator	Coaxicom	66702 2910-20	ATO	7/21/2009	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	5/27/2009	13 mo
EV07 Cables		Conducted Cables	EVG	6/1/2009	13 mo
Receiver	Rohde & Schwarz	ESCI	ARH	9/25/2009	24 mo

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
0.15 - 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

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

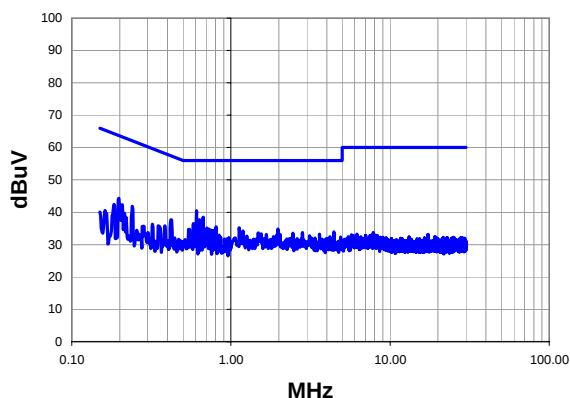
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

EMC

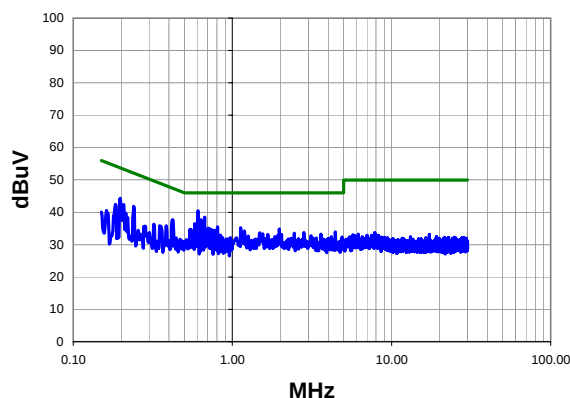
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	13 - Radiated Emissions Configuration - Rackmount (DC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 1						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications			Test Method				
FCC 15.207:2009			ANSI C63.4:2003				
Run #	31	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

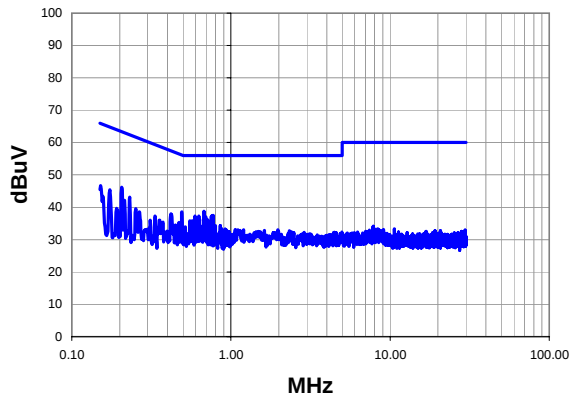
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.607	20.0	20.5	40.5	56.0	-15.5
0.670	18.0	20.5	38.5	56.0	-17.5
0.635	17.2	20.5	37.7	56.0	-18.3
0.198	23.1	21.2	44.3	63.7	-19.4
0.580	16.0	20.5	36.5	56.0	-19.5
0.420	17.1	20.6	37.7	57.4	-19.8
0.645	15.5	20.5	36.0	56.0	-20.0
0.240	20.9	21.0	41.9	62.1	-20.2
0.806	15.1	20.4	35.5	56.0	-20.5
1.128	14.8	20.4	35.2	56.0	-20.8
0.208	21.3	21.1	42.4	63.3	-20.9
0.706	14.7	20.4	35.1	56.0	-20.9
1.976	14.4	20.4	34.8	56.0	-21.2
0.726	14.4	20.4	34.8	56.0	-21.2
0.687	14.3	20.4	34.7	56.0	-21.3
0.541	14.2	20.5	34.7	56.0	-21.3
0.550	14.2	20.5	34.7	56.0	-21.3
0.747	14.1	20.4	34.5	56.0	-21.5
0.782	14.0	20.4	34.4	56.0	-21.6
0.764	13.9	20.4	34.3	56.0	-21.7

Peak Data - vs - Average Limit

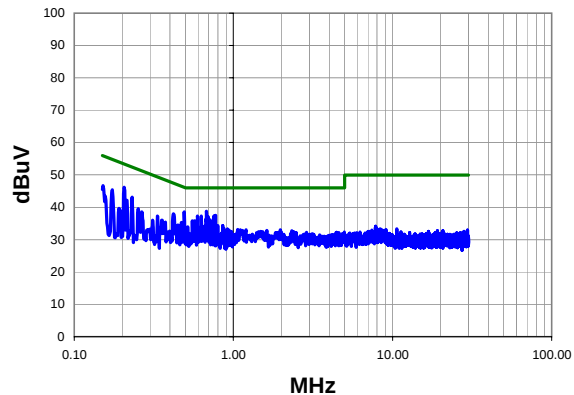
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.607	20.0	20.5	40.5	46.0	-5.5
0.670	18.0	20.5	38.5	46.0	-7.5
0.635	17.2	20.5	37.7	46.0	-8.3
0.198	23.1	21.2	44.3	53.7	-9.4
0.580	16.0	20.5	36.5	46.0	-9.5
0.420	17.1	20.6	37.7	47.4	-9.8
0.645	15.5	20.5	36.0	46.0	-10.0
0.240	20.9	21.0	41.9	52.1	-10.2
0.806	15.1	20.4	35.5	46.0	-10.5
1.128	14.8	20.4	35.2	46.0	-10.8
0.208	21.3	21.1	42.4	53.3	-10.9
0.706	14.7	20.4	35.1	46.0	-10.9
1.976	14.4	20.4	34.8	46.0	-11.2
0.726	14.4	20.4	34.8	46.0	-11.2
0.687	14.3	20.4	34.7	46.0	-11.3
0.541	14.2	20.5	34.7	46.0	-11.3
0.550	14.2	20.5	34.7	46.0	-11.3
0.747	14.1	20.4	34.5	46.0	-11.5
0.782	14.0	20.4	34.4	46.0	-11.6
0.764	13.9	20.4	34.3	46.0	-11.7

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	13 - Radiated Emissions Configuration - Rackmount (DC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 1						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	32	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

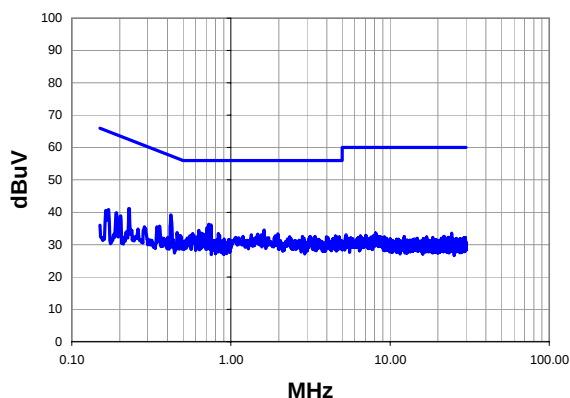
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.206	25.1	21.1	46.2	63.4	-17.2
0.677	18.3	20.5	38.8	56.0	-17.2
0.492	18.1	20.5	38.6	56.1	-17.6
0.772	17.1	20.4	37.5	56.0	-18.5
0.760	17.0	20.4	37.4	56.0	-18.6
0.595	16.8	20.5	37.3	56.0	-18.7
0.629	16.8	20.5	37.3	56.0	-18.7
0.752	16.8	20.4	37.2	56.0	-18.8
0.694	16.7	20.4	37.1	56.0	-18.9
0.232	22.2	21.0	43.2	62.4	-19.2
0.152	25.0	21.6	46.6	65.9	-19.3
0.174	24.1	21.3	45.4	64.8	-19.4
0.420	17.4	20.6	38.0	57.4	-19.5
0.714	15.7	20.4	36.1	56.0	-19.9
0.551	15.3	20.5	35.8	56.0	-20.2
0.570	15.3	20.5	35.8	56.0	-20.2
0.731	15.0	20.4	35.4	56.0	-20.6
0.215	21.1	21.1	42.2	63.0	-20.9
0.471	14.8	20.5	35.3	56.5	-21.2
0.798	13.9	20.4	34.3	56.0	-21.7

Peak Data - vs - Average Limit

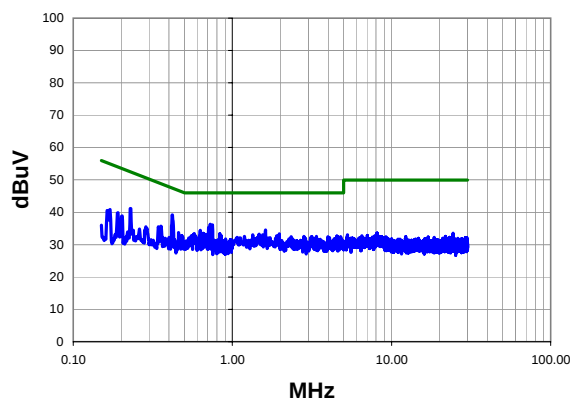
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.206	25.1	21.1	46.2	53.4	-7.2
0.677	18.3	20.5	38.8	46.0	-7.2
0.492	18.1	20.5	38.6	46.1	-7.6
0.772	17.1	20.4	37.5	46.0	-8.5
0.760	17.0	20.4	37.4	46.0	-8.6
0.595	16.8	20.5	37.3	46.0	-8.7
0.629	16.8	20.5	37.3	46.0	-8.7
0.752	16.8	20.4	37.2	46.0	-8.8
0.694	16.7	20.4	37.1	46.0	-8.9
0.232	22.2	21.0	43.2	52.4	-9.2
0.152	25.0	21.6	46.6	55.9	-9.3
0.174	24.1	21.3	45.4	54.8	-9.4
0.420	17.4	20.6	38.0	47.4	-9.5
0.714	15.7	20.4	36.1	46.0	-9.9
0.551	15.3	20.5	35.8	46.0	-10.2
0.570	15.3	20.5	35.8	46.0	-10.2
0.731	15.0	20.4	35.4	46.0	-10.6
0.215	21.1	21.1	42.2	53.0	-10.9
0.471	14.8	20.5	35.3	46.5	-11.2
0.798	13.9	20.4	34.3	46.0	-11.7

Work Order:	SCHW0090	Date:	10/26/09		
Project:	None	Temperature:	21		
Job Site:	EV07	Humidity:	47		
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover	
EUT:	SEL-3031				
Configuration:	13 - Radiated Emissions Configuration - Rackmount (DC powered) with Yagi Antenna				
Customer:	Schweitzer Engineering Laboratories, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	Master, Yagi Antenna Channel 40				
Deviations:	No deviations.				
Comments:	Rackmount System with Yagi Antenna.				
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003		
Run #	33	Line:	High Line	Ext. Attenuation: 20	Results Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

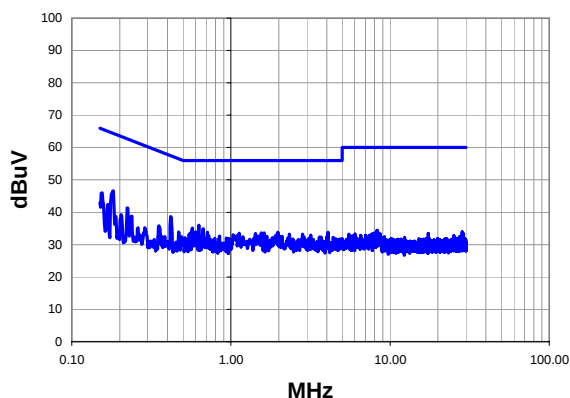
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.419	18.6	20.6	39.2	57.5	-18.3
0.726	15.9	20.4	36.3	56.0	-19.7
0.750	15.7	20.4	36.1	56.0	-19.9
0.708	14.9	20.4	35.3	56.0	-20.7
0.228	20.2	21.0	41.2	62.5	-21.3
1.616	14.1	20.4	34.5	56.0	-21.5
0.628	13.9	20.5	34.4	56.0	-21.6
0.655	13.1	20.5	33.6	56.0	-22.4
0.575	13.0	20.5	33.5	56.0	-22.5
0.665	12.9	20.5	33.4	56.0	-22.6
0.833	13.0	20.4	33.4	56.0	-22.6
1.976	12.9	20.4	33.3	56.0	-22.7
1.472	12.8	20.4	33.2	56.0	-22.8
0.687	12.7	20.4	33.1	56.0	-22.9
0.459	13.3	20.5	33.8	56.7	-22.9
1.344	12.6	20.4	33.0	56.0	-23.0
1.552	12.6	20.4	33.0	56.0	-23.0
0.356	15.1	20.6	35.7	58.8	-23.1
0.551	12.3	20.5	32.8	56.0	-23.2
0.621	12.2	20.5	32.7	56.0	-23.3

Peak Data - vs - Average Limit

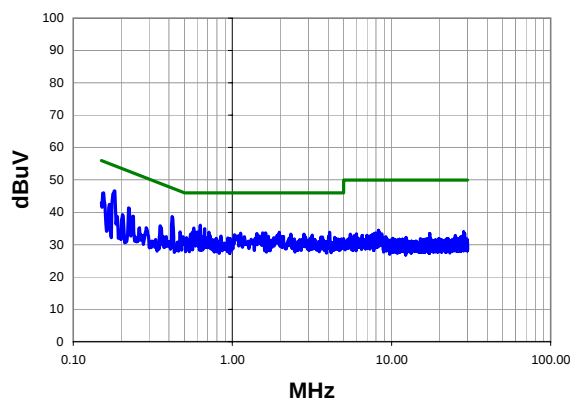
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.419	18.6	20.6	39.2	47.5	-8.3
0.726	15.9	20.4	36.3	46.0	-9.7
0.750	15.7	20.4	36.1	46.0	-9.9
0.708	14.9	20.4	35.3	46.0	-10.7
0.228	20.2	21.0	41.2	52.5	-11.3
1.616	14.1	20.4	34.5	46.0	-11.5
0.628	13.9	20.5	34.4	46.0	-11.6
0.655	13.1	20.5	33.6	46.0	-12.4
0.575	13.0	20.5	33.5	46.0	-12.5
0.665	12.9	20.5	33.4	46.0	-12.6
0.833	13.0	20.4	33.4	46.0	-12.6
1.976	12.9	20.4	33.3	46.0	-12.7
1.472	12.8	20.4	33.2	46.0	-12.8
0.687	12.7	20.4	33.1	46.0	-12.9
0.459	13.3	20.5	33.8	46.7	-12.9
1.344	12.6	20.4	33.0	46.0	-13.0
1.552	12.6	20.4	33.0	46.0	-13.0
0.356	15.1	20.6	35.7	48.8	-13.1
0.551	12.3	20.5	32.8	46.0	-13.2
0.621	12.2	20.5	32.7	46.0	-13.3

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	13 - Radiated Emissions Configuration - Rackmount (DC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 40						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	34	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

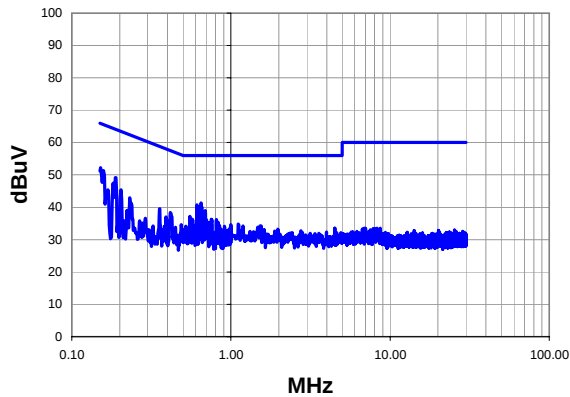
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.181	25.3	21.3	46.6	64.5	-17.9
0.419	18.1	20.6	38.7	57.5	-18.8
0.155	24.4	21.6	46.0	65.7	-19.7
0.628	15.5	20.5	36.0	56.0	-20.0
0.572	14.6	20.5	35.1	56.0	-20.9
0.670	14.4	20.5	34.9	56.0	-21.1
0.223	20.3	21.0	41.3	62.7	-21.4
0.602	13.4	20.5	33.9	56.0	-22.1
4.088	13.5	20.3	33.8	56.0	-22.2
1.976	13.4	20.4	33.8	56.0	-22.2
0.711	13.4	20.4	33.8	56.0	-22.2
1.552	13.2	20.4	33.6	56.0	-22.4
1.616	13.2	20.4	33.6	56.0	-22.4
1.128	13.1	20.4	33.5	56.0	-22.5
0.470	13.5	20.5	34.0	56.5	-22.6
1.424	13.0	20.4	33.4	56.0	-22.6
0.550	12.9	20.5	33.4	56.0	-22.6
0.169	21.0	21.4	42.4	65.0	-22.6
2.816	12.8	20.4	33.2	56.0	-22.8
2.328	12.8	20.4	33.2	56.0	-22.8

Peak Data - vs - Average Limit

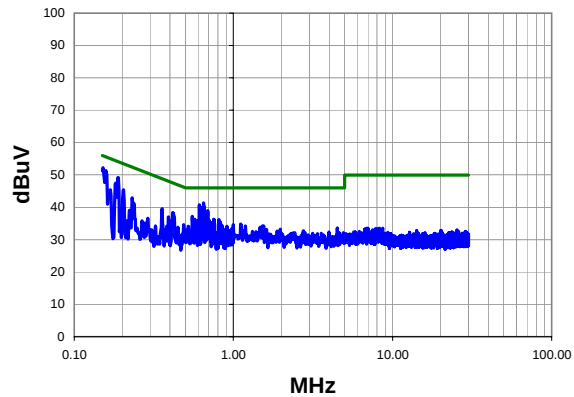
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.181	25.3	21.3	46.6	54.5	-7.9
0.419	18.1	20.6	38.7	47.5	-8.8
0.155	24.4	21.6	46.0	55.7	-9.7
0.628	15.5	20.5	36.0	46.0	-10.0
0.572	14.6	20.5	35.1	46.0	-10.9
0.670	14.4	20.5	34.9	46.0	-11.1
0.223	20.3	21.0	41.3	52.7	-11.4
0.602	13.4	20.5	33.9	46.0	-12.1
4.088	13.5	20.3	33.8	46.0	-12.2
1.976	13.4	20.4	33.8	46.0	-12.2
0.711	13.4	20.4	33.8	46.0	-12.2
1.552	13.2	20.4	33.6	46.0	-12.4
1.616	13.2	20.4	33.6	46.0	-12.4
1.128	13.1	20.4	33.5	46.0	-12.5
0.470	13.5	20.5	34.0	46.5	-12.6
1.424	13.0	20.4	33.4	46.0	-12.6
0.550	12.9	20.5	33.4	46.0	-12.6
0.169	21.0	21.4	42.4	55.0	-12.6
2.816	12.8	20.4	33.2	46.0	-12.8
2.328	12.8	20.4	33.2	46.0	-12.8

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	13 - Radiated Emissions Configuration - Rackmount (DC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 80						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	35	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

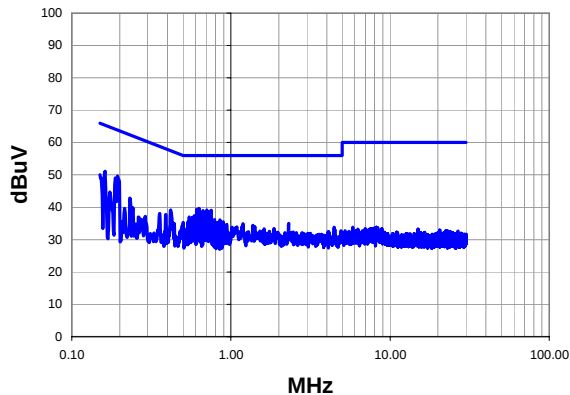
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.152	30.6	21.6	52.2	65.9	-13.7
0.159	29.8	21.6	51.4	65.5	-14.2
0.650	20.9	20.5	41.4	56.0	-14.6
0.187	27.9	21.3	49.2	64.2	-15.0
0.612	20.3	20.5	40.8	56.0	-15.2
0.657	19.7	20.5	40.2	56.0	-15.8
0.638	19.6	20.5	40.1	56.0	-15.9
0.182	26.2	21.3	47.5	64.4	-16.9
0.691	18.6	20.4	39.0	56.0	-17.0
0.204	24.3	21.1	45.4	63.4	-18.0
0.551	16.7	20.5	37.2	56.0	-18.8
0.417	17.8	20.6	38.4	57.5	-19.1
0.357	18.9	20.6	39.5	58.8	-19.3
0.232	22.0	21.0	43.0	62.4	-19.4
0.169	24.0	21.4	45.4	65.0	-19.6
0.573	15.8	20.5	36.3	56.0	-19.7
0.753	15.9	20.4	36.3	56.0	-19.7
0.810	15.8	20.4	36.2	56.0	-19.8
0.703	15.7	20.4	36.1	56.0	-19.9
0.828	15.0	20.4	35.4	56.0	-20.6

Peak Data - vs - Average Limit

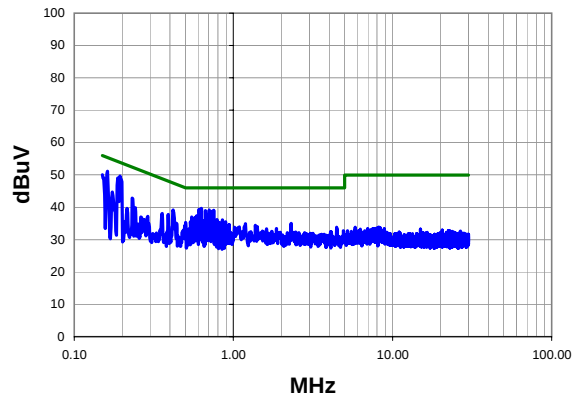
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.152	30.6	21.6	52.2	55.9	-3.7
0.159	29.8	21.6	51.4	55.5	-4.2
0.650	20.9	20.5	41.4	46.0	-4.6
0.187	27.9	21.3	49.2	54.2	-5.0
0.612	20.3	20.5	40.8	46.0	-5.2
0.657	19.7	20.5	40.2	46.0	-5.8
0.638	19.6	20.5	40.1	46.0	-5.9
0.182	26.2	21.3	47.5	54.4	-6.9
0.691	18.6	20.4	39.0	46.0	-7.0
0.204	24.3	21.1	45.4	53.4	-8.0
0.551	16.7	20.5	37.2	46.0	-8.8
0.417	17.8	20.6	38.4	47.5	-9.1
0.357	18.9	20.6	39.5	48.8	-9.3
0.232	22.0	21.0	43.0	52.4	-9.4
0.169	24.0	21.4	45.4	55.0	-9.6
0.573	15.8	20.5	36.3	46.0	-9.7
0.753	15.9	20.4	36.3	46.0	-9.7
0.810	15.8	20.4	36.2	46.0	-9.8
0.703	15.7	20.4	36.1	46.0	-9.9
0.828	15.0	20.4	35.4	46.0	-10.6

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover			
EUT:	SEL-3031						
Configuration:	13 - Radiated Emissions Configuration - Rackmount (DC powered) with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 80						
Deviations:	No deviations.						
Comments:	Rackmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	36	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.194	28.4	21.2	49.6	63.9	-14.2
0.162	29.6	21.5	51.1	65.4	-14.2
0.187	27.8	21.3	49.1	64.2	-15.1
0.150	28.4	21.7	50.1	66.0	-15.9
0.629	19.2	20.5	39.7	56.0	-16.3
0.607	18.9	20.5	39.4	56.0	-16.6
0.704	18.8	20.4	39.2	56.0	-16.8
0.752	18.7	20.4	39.1	56.0	-16.9
0.669	18.5	20.5	39.0	56.0	-17.0
0.736	18.4	20.4	38.8	56.0	-17.2
0.618	17.7	20.5	38.2	56.0	-17.8
0.419	18.6	20.6	39.2	57.5	-18.3
0.590	16.9	20.5	37.4	56.0	-18.6
0.548	16.5	20.5	37.0	56.0	-19.0
0.577	16.4	20.5	36.9	56.0	-19.1
0.232	21.9	21.0	42.9	62.4	-19.5
0.675	15.8	20.5	36.3	56.0	-19.7
0.787	15.8	20.4	36.2	56.0	-19.8
0.854	15.7	20.4	36.1	56.0	-19.9
0.174	23.4	21.3	44.7	64.8	-20.1

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.194	28.4	21.2	49.6	53.9	-4.2
0.162	29.6	21.5	51.1	55.4	-4.2
0.187	27.8	21.3	49.1	54.2	-5.1
0.150	28.4	21.7	50.1	56.0	-5.9
0.629	19.2	20.5	39.7	46.0	-6.3
0.607	18.9	20.5	39.4	46.0	-6.6
0.704	18.8	20.4	39.2	46.0	-6.8
0.752	18.7	20.4	39.1	46.0	-6.9
0.669	18.5	20.5	39.0	46.0	-7.0
0.736	18.4	20.4	38.8	46.0	-7.2
0.618	17.7	20.5	38.2	46.0	-7.8
0.419	18.6	20.6	39.2	47.5	-8.3
0.590	16.9	20.5	37.4	46.0	-8.6
0.548	16.5	20.5	37.0	46.0	-9.0
0.577	16.4	20.5	36.9	46.0	-9.1
0.232	21.9	21.0	42.9	52.4	-9.5
0.675	15.8	20.5	36.3	46.0	-9.7
0.787	15.8	20.4	36.2	46.0	-9.8
0.854	15.7	20.4	36.1	46.0	-9.9
0.174	23.4	21.3	44.7	54.8	-10.1



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

Master, Yagi Antenna Channel 80

Master, Yagi Antenna Channel 40

Master, Yagi Antenna Channel 1

POWER SETTINGS INVESTIGATED

24 VDC

CONFIGURATIONS INVESTIGATED

SCHW0090 - 11

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIR	2/4/2009	13 mo
Attenuator	Coaxicom	66702 2910-20	ATO	7/21/2009	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	5/27/2009	13 mo
EV07 Cables		Conducted Cables	EVG	6/1/2009	13 mo
Receiver	Rohde & Schwarz	ESCI	ARH	9/25/2009	24 mo

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
	0.15 - 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

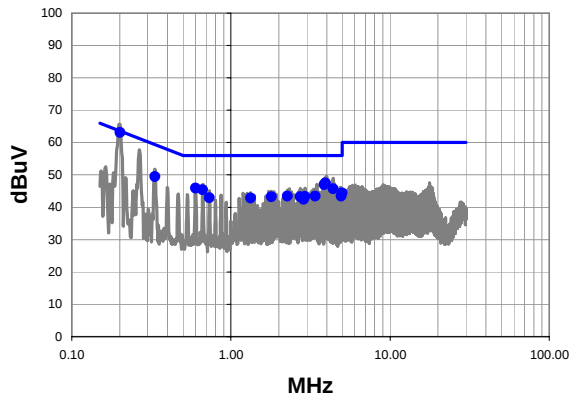
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 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

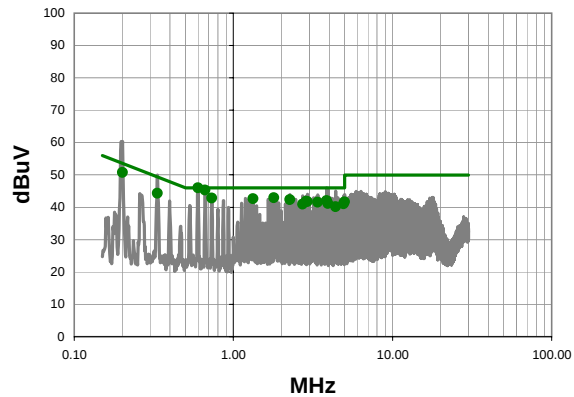
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
EUT:	SEL-3031						
Configuration:	11 - Radiated Emissions Configuration - Wallmount with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 1						
Deviations:	No deviations.						
Comments:	Wallmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009				Test Method ANSI C63.4:2003			
Run #	37	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit

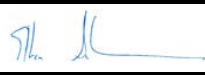


Quasi Peak Data - vs - Quasi Peak Limit

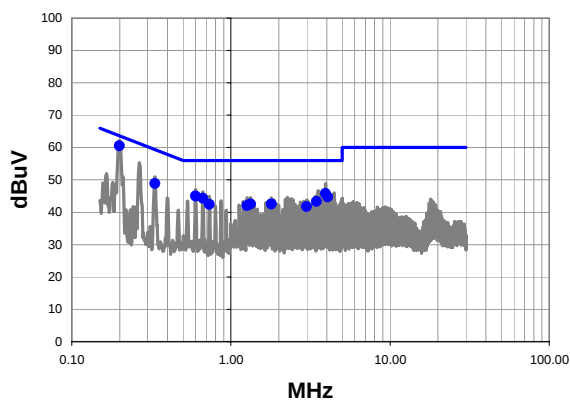
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.201	42.0	21.2	63.2	63.6	-0.4
3.928	27.1	20.3	47.4	56.0	-8.6
3.860	26.7	20.3	47.0	56.0	-9.0
0.334	28.8	20.7	49.5	59.4	-9.9
0.599	25.4	20.5	45.9	56.0	-10.1
4.392	25.4	20.3	45.7	56.0	-10.3
0.665	24.9	20.5	45.4	56.0	-10.6
4.992	24.0	20.4	44.4	56.0	-11.6
4.924	23.0	20.4	43.4	56.0	-12.6
3.396	23.1	20.3	43.4	56.0	-12.6
2.264	23.0	20.4	43.4	56.0	-12.6
2.928	22.9	20.4	43.3	56.0	-12.7
2.728	22.8	20.4	43.2	56.0	-12.8
1.796	22.8	20.4	43.2	56.0	-12.8
0.731	22.5	20.4	42.9	56.0	-13.1
1.332	22.4	20.4	42.8	56.0	-13.2
2.864	22.0	20.4	42.4	56.0	-13.6

Average Data - vs - Average Limit

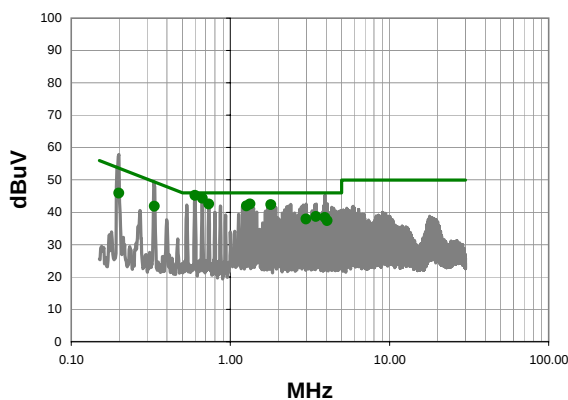
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	25.5	20.5	46.0	46.0	0.0
0.665	24.8	20.5	45.3	46.0	-0.7
0.201	29.6	21.2	50.8	53.6	-2.8
1.796	22.5	20.4	42.9	46.0	-3.1
0.731	22.4	20.4	42.8	46.0	-3.2
1.332	22.2	20.4	42.6	46.0	-3.4
2.264	21.9	20.4	42.3	46.0	-3.7
3.860	21.7	20.3	42.0	46.0	-4.0
2.864	21.4	20.4	41.8	46.0	-4.2
2.928	21.3	20.4	41.7	46.0	-4.3
4.992	21.2	20.4	41.6	46.0	-4.4
3.396	21.2	20.3	41.5	46.0	-4.5
3.928	20.8	20.3	41.1	46.0	-4.9
4.924	20.6	20.4	41.0	46.0	-5.0
0.334	23.6	20.7	44.3	49.4	-5.1
2.728	20.5	20.4	40.9	46.0	-5.1
4.392	19.8	20.3	40.1	46.0	-5.9

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover			
EUT:	SEL-3031						
Configuration:	11 - Radiated Emissions Configuration - Wallmount with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 1						
Deviations:	No deviations.						
Comments:	Wallmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	38	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

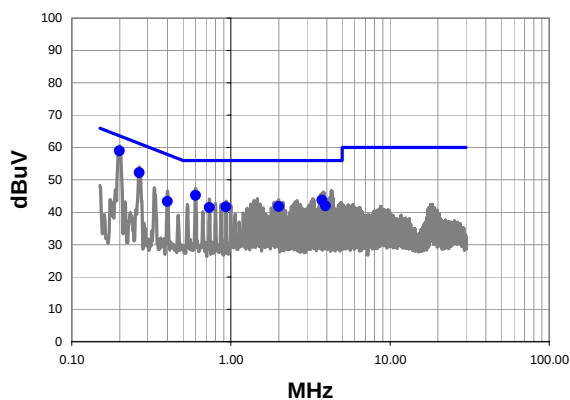
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.199	39.4	21.2	60.6	63.7	-3.1
3.928	25.5	20.3	45.8	56.0	-10.2
0.334	28.2	20.7	48.9	59.4	-10.5
0.599	24.5	20.5	45.0	56.0	-11.0
4.060	24.4	20.3	44.7	56.0	-11.3
0.667	23.8	20.5	44.3	56.0	-11.7
3.460	23.0	20.3	43.3	56.0	-12.7
1.796	22.1	20.4	42.5	56.0	-13.5
1.332	22.1	20.4	42.5	56.0	-13.5
0.731	22.1	20.4	42.5	56.0	-13.5
1.264	21.6	20.4	42.0	56.0	-14.0
2.996	21.3	20.4	41.7	56.0	-14.3

Average Data - vs - Average Limit

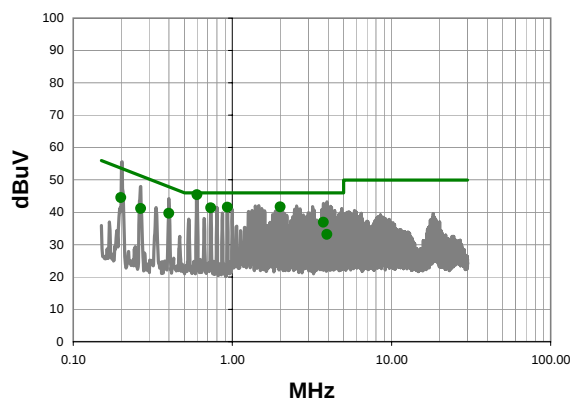
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	24.7	20.5	45.2	46.0	-0.8
0.667	23.8	20.5	44.3	46.0	-1.7
0.731	22.2	20.4	42.6	46.0	-3.4
1.332	22.1	20.4	42.5	46.0	-3.5
1.796	21.9	20.4	42.3	46.0	-3.7
1.264	21.5	20.4	41.9	46.0	-4.1
3.460	18.4	20.3	38.7	46.0	-7.3
0.334	21.2	20.7	41.9	49.4	-7.5
3.928	18.0	20.3	38.3	46.0	-7.7
0.199	24.7	21.2	45.9	53.7	-7.8
2.996	17.5	20.4	37.9	46.0	-8.1
4.060	17.0	20.3	37.3	46.0	-8.7

Work Order:	SCHW0090	Date:	10/26/09		
Project:	None	Temperature:	21		
Job Site:	EV07	Humidity:	47		
Serial Number:	2009238196	Barometric Pres.:	1017.9		
EUT:	SEL-3031				
Configuration:	11 - Radiated Emissions Configuration - Wallmount with Yagi Antenna				
Customer:	Schweitzer Engineering Laboratories, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	Master, Yagi Antenna Channel 40				
Deviations:	No deviations.				
Comments:	Wallmount System with Yagi Antenna.				
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003		
Run #	39	Line:	Neutral	Ext. Attenuation:	20
Results				Pass	

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

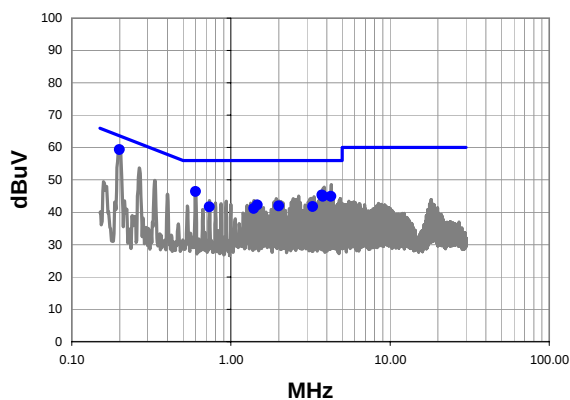
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.199	37.8	21.2	59.0	63.7	-4.7
0.266	31.4	20.8	52.2	61.2	-9.0
0.599	24.7	20.5	45.2	56.0	-10.8
3.728	23.4	20.3	43.7	56.0	-12.3
3.928	21.6	20.3	41.9	56.0	-14.1
1.996	21.3	20.4	41.7	56.0	-14.3
0.932	21.3	20.4	41.7	56.0	-14.3
0.400	22.8	20.6	43.4	57.9	-14.5
0.731	21.1	20.4	41.5	56.0	-14.5

Average Data - vs - Average Limit

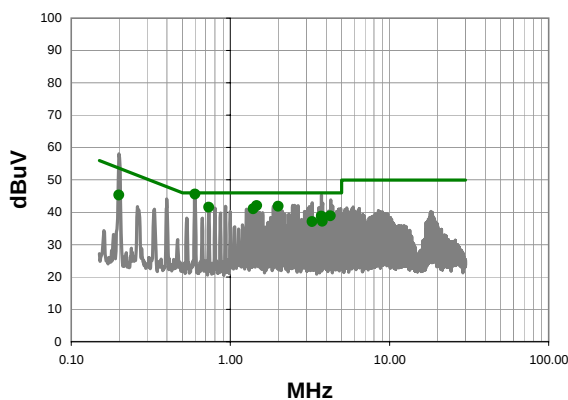
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	24.9	20.5	45.4	46.0	-0.6
1.996	21.2	20.4	41.6	46.0	-4.4
0.932	21.2	20.4	41.6	46.0	-4.4
0.731	21.0	20.4	41.4	46.0	-4.6
0.400	19.1	20.6	39.7	47.9	-8.2
3.728	16.6	20.3	36.9	46.0	-9.1
0.199	23.3	21.2	44.5	53.7	-9.2
0.266	20.3	20.8	41.1	51.2	-10.1
3.928	12.8	20.3	33.1	46.0	-12.9

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9				
				Tested by: Ethan Schoonover			
EUT:	SEL-3031						
Configuration:	11 - Radiated Emissions Configuration - Wallmount with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 40						
Deviations:	No deviations.						
Comments:	Wallmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	40	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

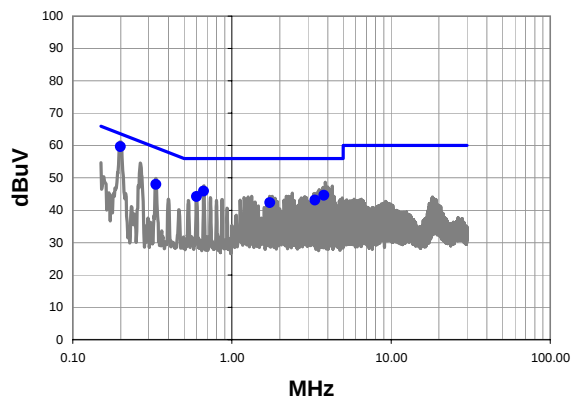
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.199	38.2	21.2	59.4	63.7	-4.3
0.599	25.9	20.5	46.4	56.0	-9.6
3.728	25.0	20.3	45.3	56.0	-10.7
4.260	24.6	20.3	44.9	56.0	-11.1
3.796	24.6	20.3	44.9	56.0	-11.1
1.464	21.8	20.4	42.2	56.0	-13.8
1.996	21.5	20.4	41.9	56.0	-14.1
3.260	21.4	20.4	41.8	56.0	-14.2
0.733	21.3	20.4	41.7	56.0	-14.3
1.396	20.8	20.4	41.2	56.0	-14.8

Average Data - vs - Average Limit

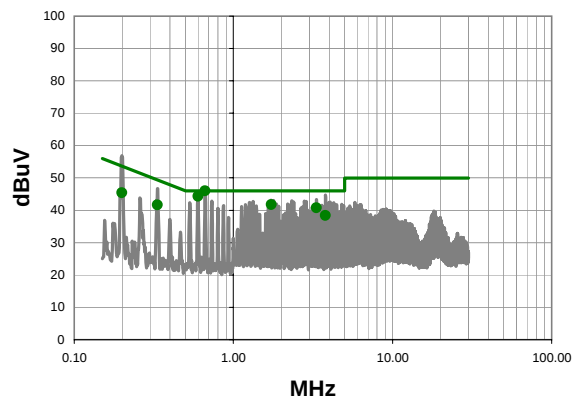
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	25.1	20.5	45.6	46.0	-0.4
1.464	21.6	20.4	42.0	46.0	-4.0
1.996	21.4	20.4	41.8	46.0	-4.2
0.733	21.2	20.4	41.6	46.0	-4.4
1.396	20.7	20.4	41.1	46.0	-4.9
4.260	18.5	20.3	38.8	46.0	-7.2
3.728	18.4	20.3	38.7	46.0	-7.3
0.199	24.1	21.2	45.3	53.7	-8.4
3.796	16.9	20.3	37.2	46.0	-8.8
3.260	16.7	20.4	37.1	46.0	-8.9

Work Order:	SCHW0090	Date:	10/26/09		
Project:	None	Temperature:	21		
Job Site:	EV07	Humidity:	47		
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover	
EUT:	SEL-3031				
Configuration:	11 - Radiated Emissions Configuration - Wallmount with Yagi Antenna				
Customer:	Schweitzer Engineering Laboratories, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	Master, Yagi Antenna Channel 80				
Deviations:	No deviations.				
Comments:	Wallmount System with Yagi Antenna.				
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003		
Run #	41	Line:	High Line	Ext. Attenuation: 20	Results Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

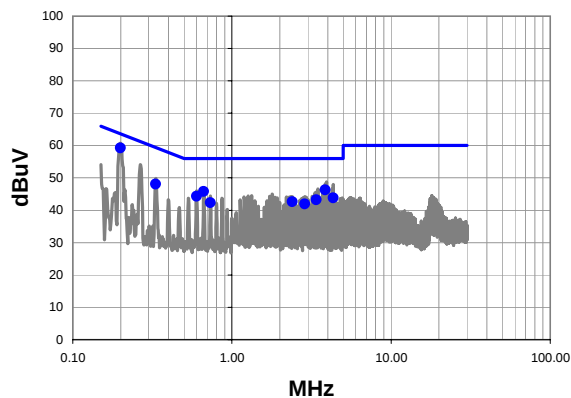
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.199	38.5	21.2	59.7	63.7	-4.0
0.665	25.4	20.5	45.9	56.0	-10.1
3.796	24.3	20.3	44.6	56.0	-11.4
0.334	27.3	20.7	48.0	59.4	-11.4
0.599	23.7	20.5	44.2	56.0	-11.8
3.328	22.8	20.3	43.1	56.0	-12.9
1.732	21.9	20.4	42.3	56.0	-13.7

Average Data - vs - Average Limit

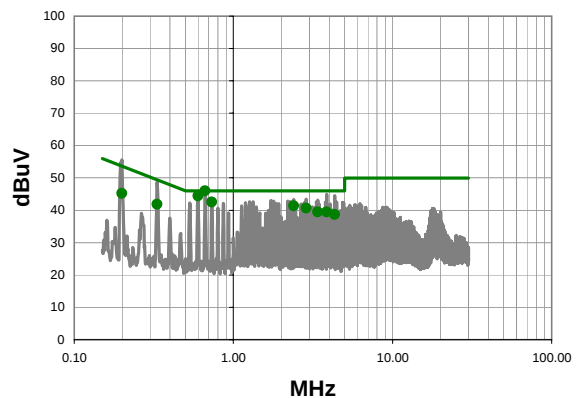
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.665	25.5	20.5	46.0	46.0	0.0
0.599	23.8	20.5	44.3	46.0	-1.7
1.732	21.3	20.4	41.7	46.0	-4.3
3.328	20.4	20.3	40.7	46.0	-5.3
3.796	18.0	20.3	38.3	46.0	-7.7
0.334	21.0	20.7	41.7	49.4	-7.7
0.199	24.2	21.2	45.4	53.7	-8.3

Work Order:	SCHW0090	Date:	10/26/09				
Project:	None	Temperature:	21				
Job Site:	EV07	Humidity:	47				
Serial Number:	2009238196	Barometric Pres.:	1017.9	Tested by: Ethan Schoonover			
EUT:	SEL-3031						
Configuration:	11 - Radiated Emissions Configuration - Wallmount with Yagi Antenna						
Customer:	Schweitzer Engineering Laboratories, Inc.						
Attendees:	None						
EUT Power:	24 VDC						
Operating Mode:	Master, Yagi Antenna Channel 80						
Deviations:	No deviations.						
Comments:	Wallmount System with Yagi Antenna.						
Test Specifications FCC 15.207:2009			Test Method ANSI C63.4:2003				
Run #	43	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.199	38.1	21.2	59.3	63.7	-4.4
3.860	26.0	20.3	46.3	56.0	-9.7
0.665	25.3	20.5	45.8	56.0	-10.2
0.332	27.4	20.7	48.1	59.4	-11.3
0.599	23.8	20.5	44.3	56.0	-11.7
4.328	23.5	20.3	43.8	56.0	-12.2
3.396	22.9	20.3	43.2	56.0	-12.8
2.396	22.2	20.4	42.6	56.0	-13.4
0.733	22.0	20.4	42.4	56.0	-13.6
2.864	21.5	20.4	41.9	56.0	-14.1

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.665	25.5	20.5	46.0	46.0	0.0
0.599	23.9	20.5	44.4	46.0	-1.6
0.733	22.2	20.4	42.6	46.0	-3.4
2.396	20.9	20.4	41.3	46.0	-4.7
2.864	20.2	20.4	40.6	46.0	-5.4
3.860	19.1	20.3	39.4	46.0	-6.6
3.396	19.1	20.3	39.4	46.0	-6.6
4.328	18.3	20.3	38.6	46.0	-7.4
0.332	21.2	20.7	41.9	49.4	-7.5
0.199	24.0	21.2	45.2	53.7	-8.5

