

Schweitzer Engineering Laboratories, Inc.

SEL-3022

June 08, 2005

Report No. SCHW0048

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
Issue Date: June 08, 2005
Schweitzer Engineering Laboratories, Inc.
Model: SEL-3022

Emissions			
Specification	Test Method	Pass	Fail
FCC 15.247(a) Occupied Bandwidth:2005-04	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC 15.247(b) Output Power:2005-04	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC 15.247(d) Band Edge Compliance:2005-04	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC 15.247(d) Spurious Conducted Emissions:2005-04	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC 15.247(d) Spurious Radiated Emissions:2005-04	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC 15.247(e) Power Spectral Density:2005-04	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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

Test Facility

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

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
Phone: (503) 844-4066
Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Donald Fecteau, IS Manager

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		

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 recognized 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 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. 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.



200629-0
200630-0
200676-0

Industry Canada: Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.



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



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0401C.



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



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



Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment, Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.



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 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: R-871, C-1784 and R-1761.*)



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



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



SCOPE

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

<http://www.nwemc.com/scope.asp>

What is measurement uncertainty?

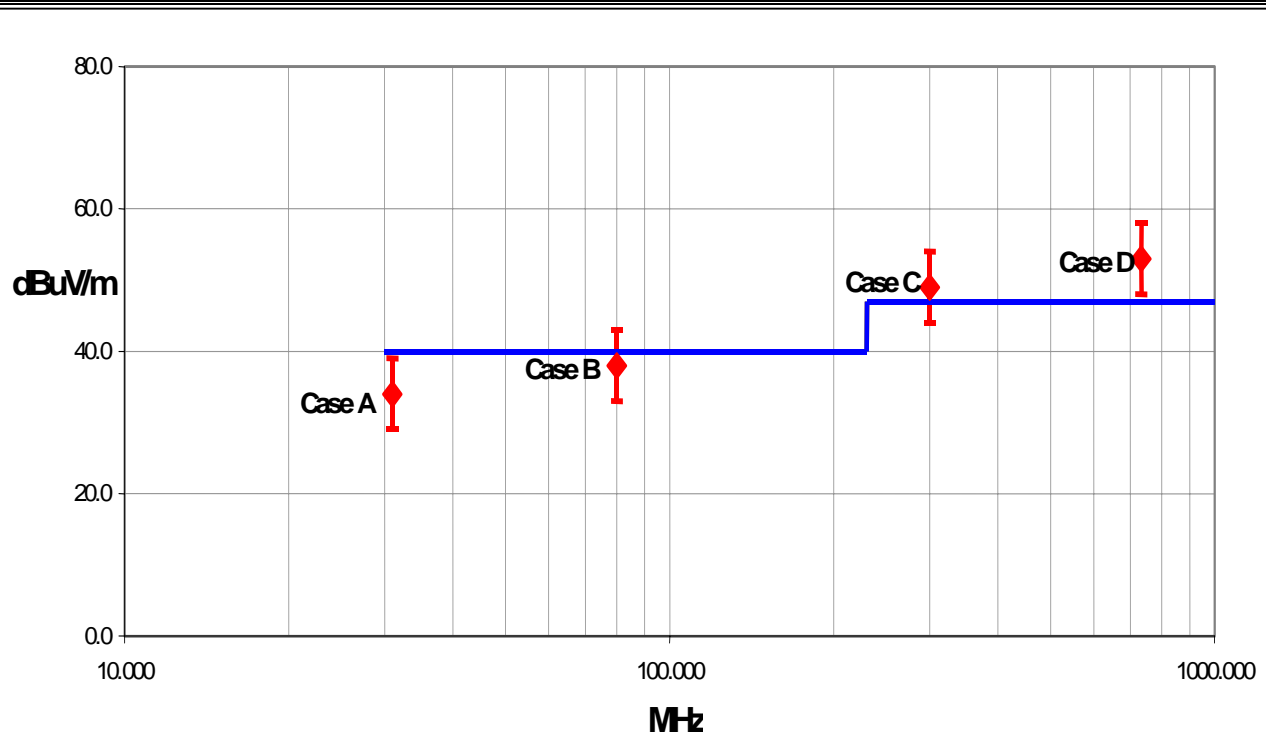
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and - measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:

Case A: Product complies.

Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.

Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.

Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz

Value (dB)

Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86	+ 1.82	+ 2.23	+ 1.29	+ 1.31	+ 1.25
		- 1.88	- 1.87	- 1.41	- 1.26	- 1.27	- 1.25
Expanded uncertainty U (level of confidence ≈ 95%)	normal (k=2)	+ 3.72	+ 3.64	+ 4.46	+ 2.59	+ 2.61	+ 2.49
		- 3.77	- 3.73	- 2.81	- 2.52	- 2.55	- 2.49

Radiated Emissions > 1 GHz

Value (dB)

Test Distance	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29	+ 1.38	- 1.25	- 1.35
		- 1.25	- 1.35	+ 2.57	+ 2.76
Expanded uncertainty U (level of confidence ≈ 95%)	normal (k=2)	+ 2.57	+ 2.76	- 2.51	- 2.70
		- 2.51	- 2.70		

Conducted Emissions

	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.48
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.97

Radiated Immunity

	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.11

Conducted Immunity

	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: k . This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then $k=3$ (CL of 99.7%) can be used. Please note that with a coverage factor of one, $u_c(y)$ yields a confidence level of only 68%.

**California****Orange County Facility****Labs OC01 – OC13**

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

**Oregon****Evergreen Facility****Labs EV01 – EV10**

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

**Oregon****Trails End Facility****Labs TE01 – TE03**

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

**Washington****Sultan Facility****Labs SU01 – SU07**

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test

Company Name:	Schweitzer Engineering Laboratories, Inc.
Address:	2350 NE Hopkins Court
City, State, Zip:	Pullman, WA 99163
Test Requested By:	Pat Schacher
Model:	SEL-3022
First Date of Test:	05/23/2005
Last Date of Test:	05/27/2005
Receipt Date of Samples:	05/23/2005
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided.
I/O Ports:	Serial, Antenna, Alarm terminals, DC power jack, DC power terminals

Functional Description of the EUT (Equipment Under Test):

Wireless Encrypting Transceiver

Client Justification for EUT Selection:

The product is a representative production sample.

Client Justification for Test Selection:

These tests satisfy the requirements for FCC certification under 15.247.

EUT Photo

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Band Edge Compliance	05/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
2	Occupied Bandwidth	05/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
3	Spurious Conducted Emissions	05/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
4	Power Spectral Density	05/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
5	Output Power	05/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
6	Spurious Radiated Emissions	05/27/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low
Mid
High

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Software\Firmware Applied During Test

Exercise software	SEL-5809 Settings Software	Version	0.132.0.0
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing. The software ran on the remote notebook PC and permitted channel selection.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT- SEL-3022	Schweitzer Engineering Laboratories	SEL-3022	None
AC Adapter	APX Technologies Inc.	SP10005	02425173

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Notebook PC	Dell	Inspiron 2500	IS116
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	2.0	No	EUT- SEL-3022	AC Adapter
Serial Cable	Yes	1.4	No	EUT- SEL-3022	Notebook PC

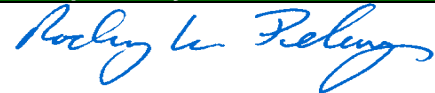
Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

Requirement: Per 47 CFR 15.247(a)(2), the 6 dB bandwidth of a direct sequence channel must be at least 500kHz. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The occupied bandwidth 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 the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation.

Completed by:


NORTHWEST
EMC

OCCUPIED BANDWIDTH

Rev BETA
01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(a)(2)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The minimum 6dB bandwidth is 500KHz

RESULTS

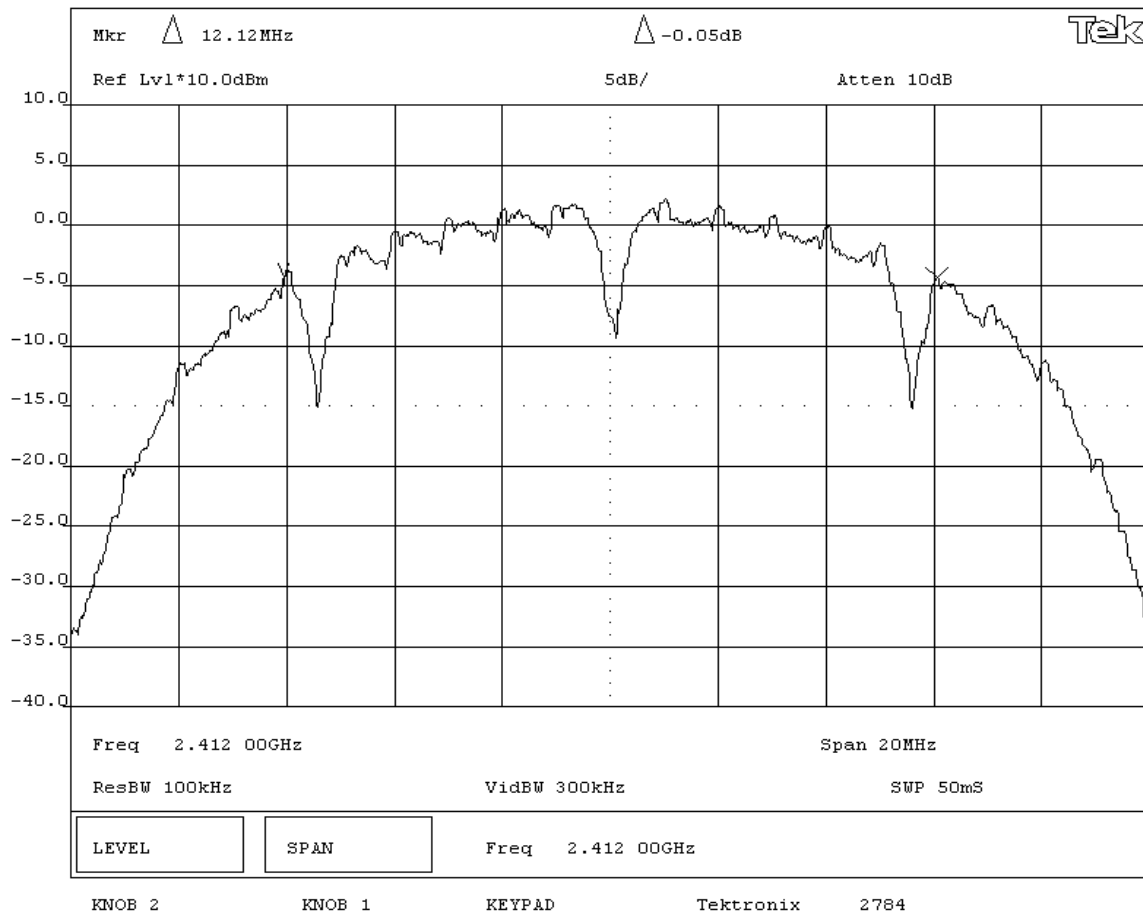
Pass BANDWIDTH 12.12 MHz

SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST

Occupied Bandwidth - Low Channel



EUT: SEL-3022		Work Order: SCHW0048	
Serial Number:		Date:	05/25/05
Customer: Schweitzer Engineering Laboratories		Temperature:	21°C
Attendees: None	Tested by: Rod Peloquin	Humidity:	36% RH
Customer Ref. No.:	Power: 120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(a)(2)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS	

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The minimum 6dB bandwidth is 500KHz

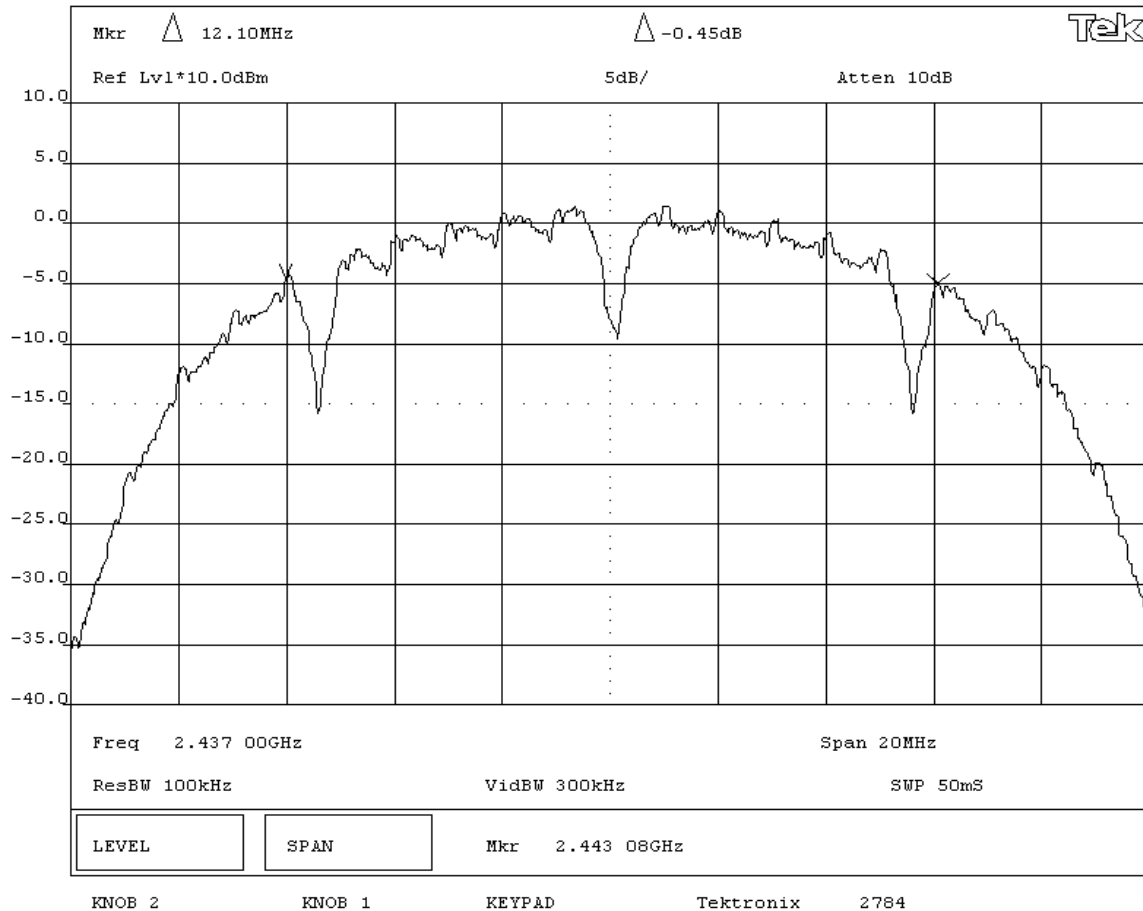
RESULTS	BANDWIDTH
Pass	12.1 MHz

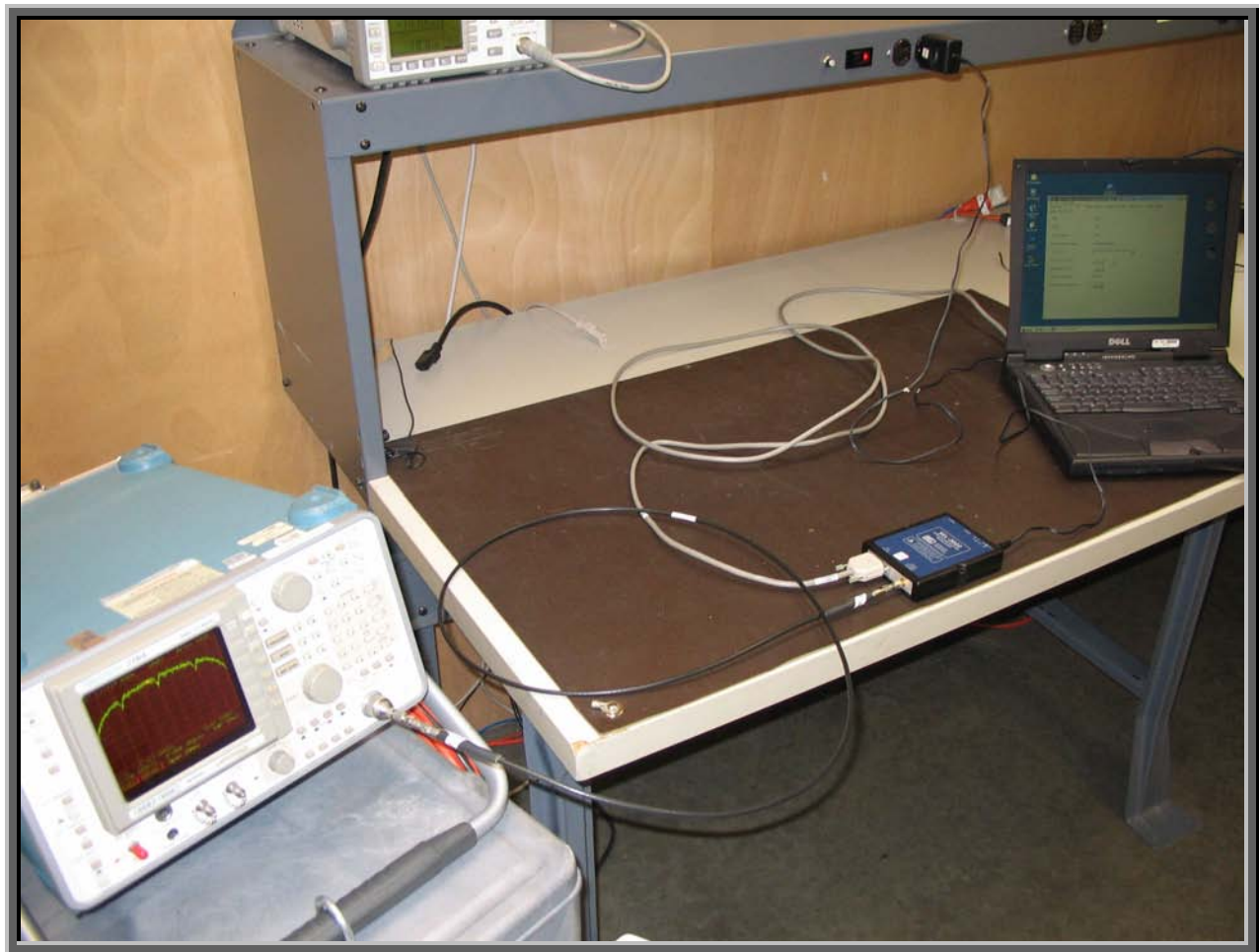
SIGNATURE


 Tested By: _____

DESCRIPTION OF TEST

Occupied Bandwidth - Mid Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low
Mid
High

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Software\Firmware Applied During Test

Exercise software	SEL-5809 Settings Software	Version	0.132.0.0
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing. The software ran on the remote notebook PC and permitted channel selection.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT- SEL-3022	Schweitzer Engineering Laboratories	SEL-3022	None
AC Adapter	APX Technologies Inc.	SP10005	02425173

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Notebook PC	Dell	Inspiron 2500	IS116
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	2.0	No	EUT- SEL-3022	AC Adapter
Serial Cable	Yes	1.4	No	EUT- SEL-3022	Notebook PC

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Oscilloscope	Tektronix	TDS 3052	TOF	12/02/2004	13 mo
RF Detector	RLC Electronics	CR-133-R	ZZA	NCR	NA
Power Meter	Hewlett Packard	E4418A	SPA	07/23/2004	24 mo
Power Sensor	Hewlett-Packard	8481H	SPB	07/23/2004	24 mo
Signal Generator	Hewlett Packard	8341B	TGN	02/07/2005	13 mo

Test Description

Requirement: Per 47 CFR 15.247(b)(3), the maximum peak output power must not exceed 1 Watt.

Configuration: The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The EUT was transmitting at its maximum output power. The data rate of the radio was varied to determine the level that produced the highest output power.

The measurement was made using a direct connection between the RF output of the EUT and a RF detector diode. The DC output of the diode was measured with the oscilloscope. The signal generator, tuned to the transmit frequency, was then substituted for the EUT. The CW output of the signal generator was adjusted until the DC output of the RF detector diode match the peak level produced when connected to the EUT. To further reduce measurement error, the power meter and sensor were then used to measure the output power level of the signal generator.


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

Completed by:

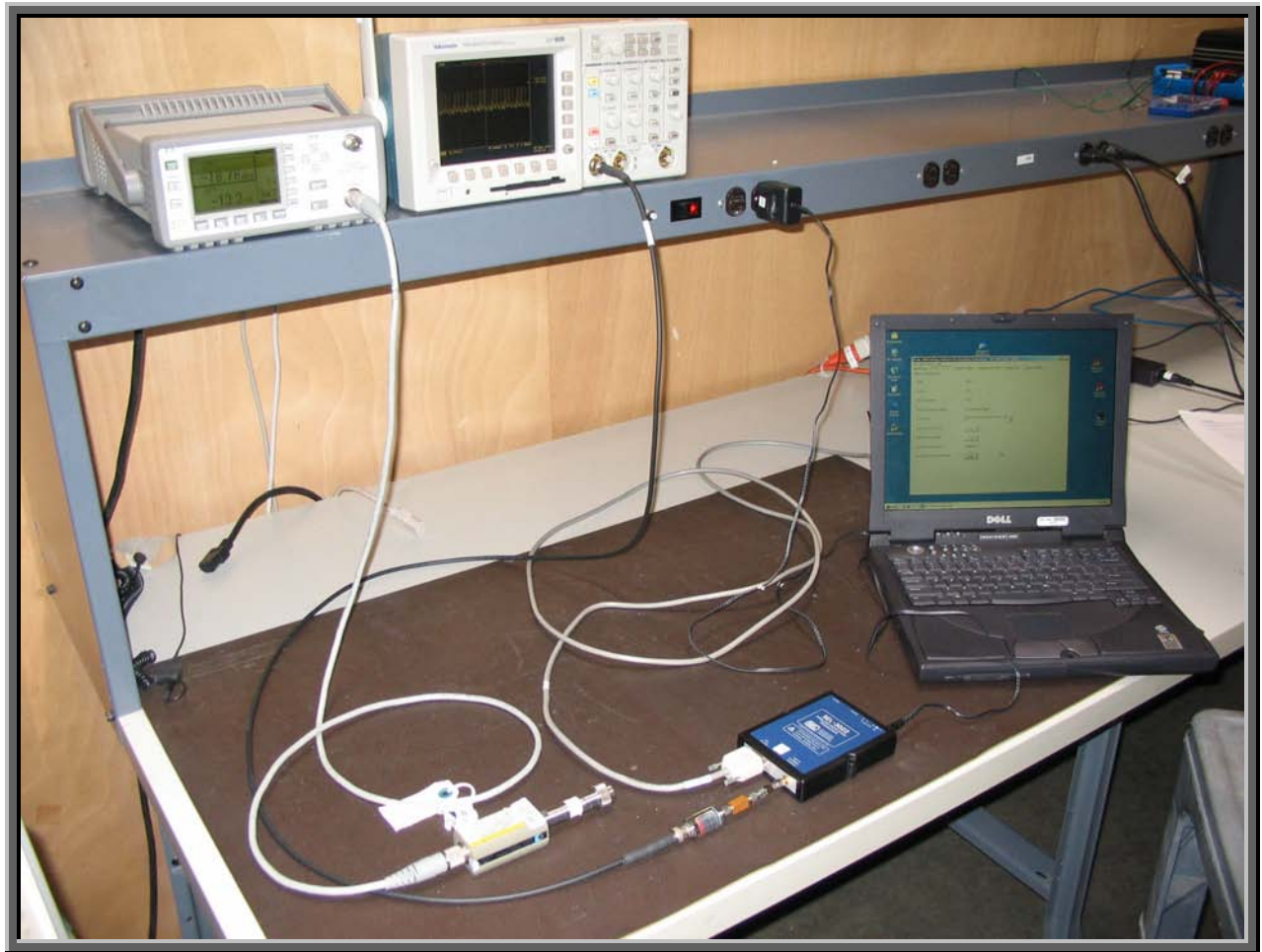


NORTHWEST

EMC**OUTPUT POWER**Rev BETA
01/30/01

EUT:	SEL-3022		Work Order:	SCHW0048			
Serial Number:			Date:	05/25/05			
Customer:	Schweitzer Engineering Laboratories		Temperature:	21°C			
Attendees:	None	Tested by:	Rod Peloquin	Humidity:	36% RH		
Customer Ref. No.:		Power:	120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATIONS							
Specification:	47 CFR 15.247(b)(3)	Year:	2005-04	Method:	FCC 97-114, ANSI C63.4	Year:	2003
SAMPLE CALCULATIONS							
COMMENTS							
EUT OPERATING MODES							
Modulated by PRBS at indicated data rate, at maximum output power. 802.11(b) modulation scheme.							
DEVIATIONS FROM TEST STANDARD							
None							
REQUIREMENTS							
Maximum peak conducted output power does not exceed 1 Watt							
RESULTS		AMPLITUDE					
Pass		33.8 mW					
SIGNATURE							
 Tested By: _____							
DESCRIPTION OF TEST							
Output Power - Low, Mid, & High Channels							

Frequency (MHz)	Power (mW)
2412	33.8
2437	31.1
2462	28.4



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low

High

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Software\Firmware Applied During Test

Exercise software	SEL-5809 Settings Software	Version	0.132.0.0
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing. The software ran on the remote notebook PC and permitted channel selection.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT- SEL-3022	Schweitzer Engineering Laboratories	SEL-3022	None
AC Adapter	APX Technologies Inc.	SP10005	02425173

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Notebook PC	Dell	Inspiron 2500	IS116
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	2.0	No	EUT- SEL-3022	AC Adapter
Serial Cable	Yes	1.4	No	EUT- SEL-3022	Notebook PC

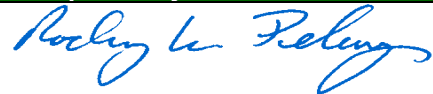
Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

Requirement: Per 47 CFR 15.247(d), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. 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 data rate using direct sequence modulation. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 25 MHz below the band edge to 25 MHz above the band edge.

Completed by:


NORTHWEST EMC BAND EDGE COMPLIANCE Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental.

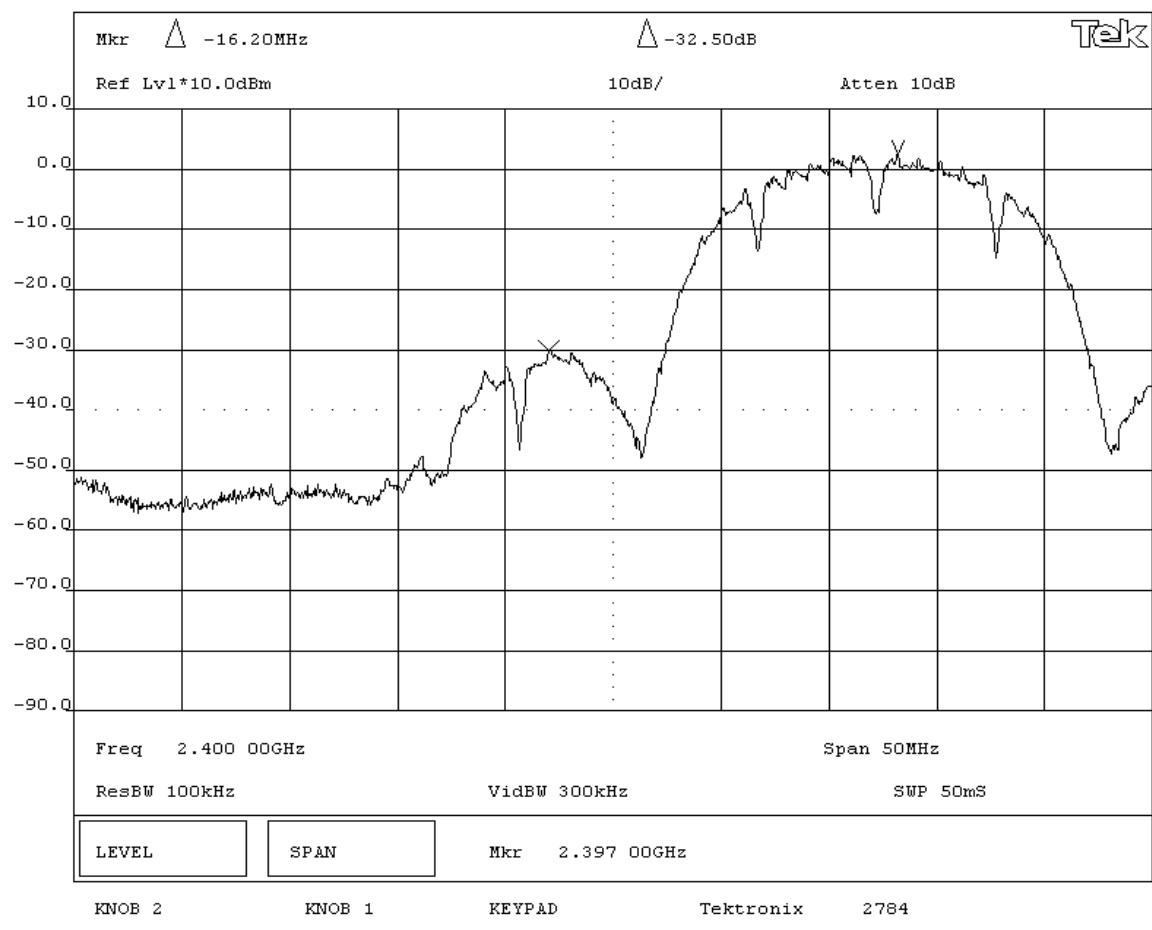
RESULTS	AMPLITUDE
Pass	-32.7 dB

SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST

Band Edge Compliance - Low Channel - 802.11(b) 11 Mbps



NORTHWEST EMC BAND EDGE COMPLIANCE Rev BETA 01/30/01

EUT: SEL-3022		Work Order: SCHW0048	
Serial Number:		Date:	05/25/05
Customer: Schweitzer Engineering Laboratories		Temperature:	21°C
Attendees: None	Tested by: Rod Peloquin	Humidity:	36% RH
Customer Ref. No.:	Power: 120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental.

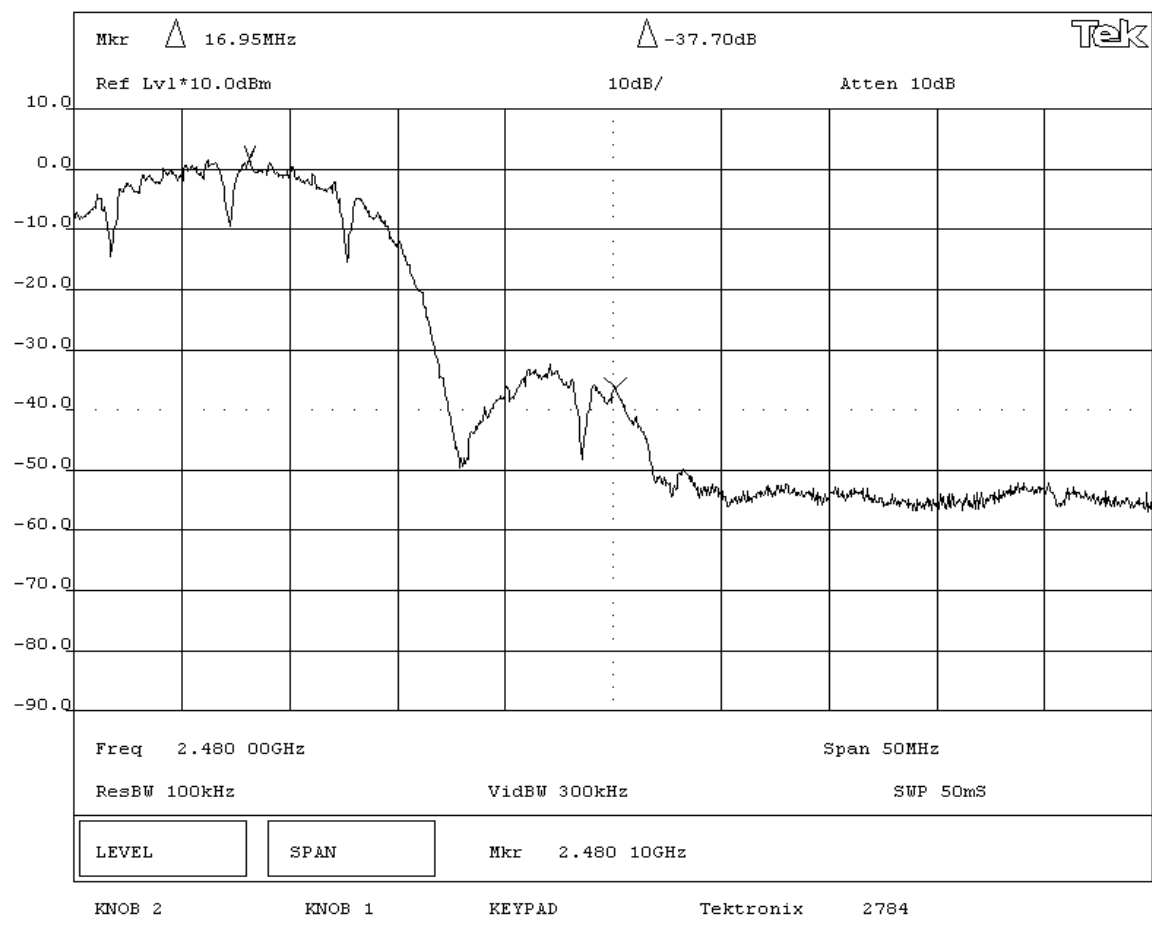
RESULTS	AMPLITUDE
Pass	-37.7 dB

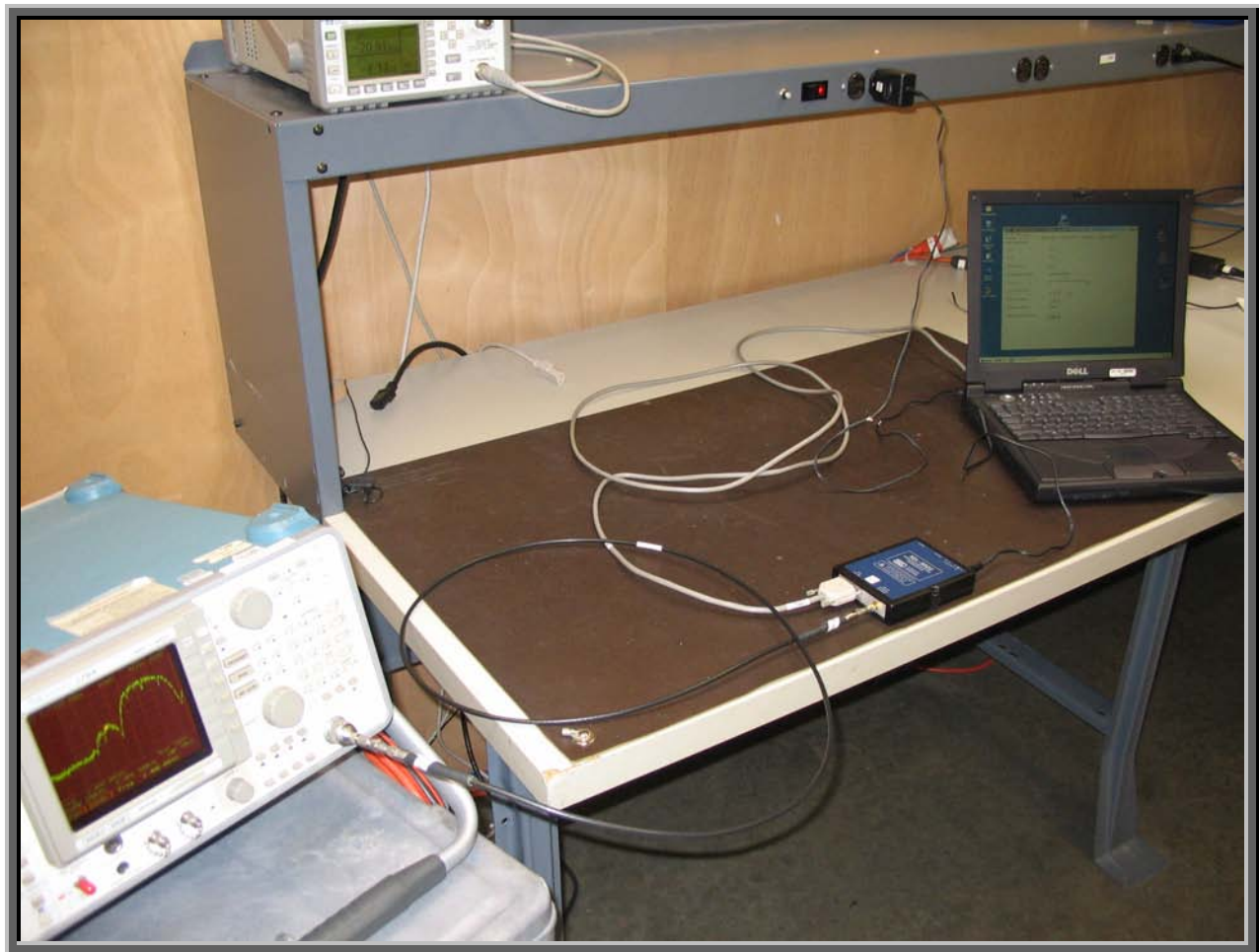
SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST

Band Edge Compliance - High Channel - 802.11(b) 11 Mbps





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low

Mid

High

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Frequency Range Investigated

Start Frequency	30 MHz	Stop Frequency	25 GHz
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Software\Firmware Applied During Test

Exercise software	SEL-5809 Settings Software	Version	0.132.0.0
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Description

The system was tested using standard operating production software to exercise the functions of the device during the testing. The software ran on the remote notebook PC and permitted channel selection.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT- SEL-3022	Schweitzer Engineering Laboratories	SEL-3022	None
AC Adapter	APX Technologies Inc.	SP10005	02425173

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Notebook PC	Dell	Inspiron 2500	IS116
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	2.0	No	EUT- SEL-3022	AC Adapter
Serial Cable	Yes	1.4	No	EUT- SEL-3022	Notebook PC

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

Requirement: Per 47 CFR 15.247(d), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: 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 using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

Completed by:


NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

TEST SPECIFICATIONS

Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

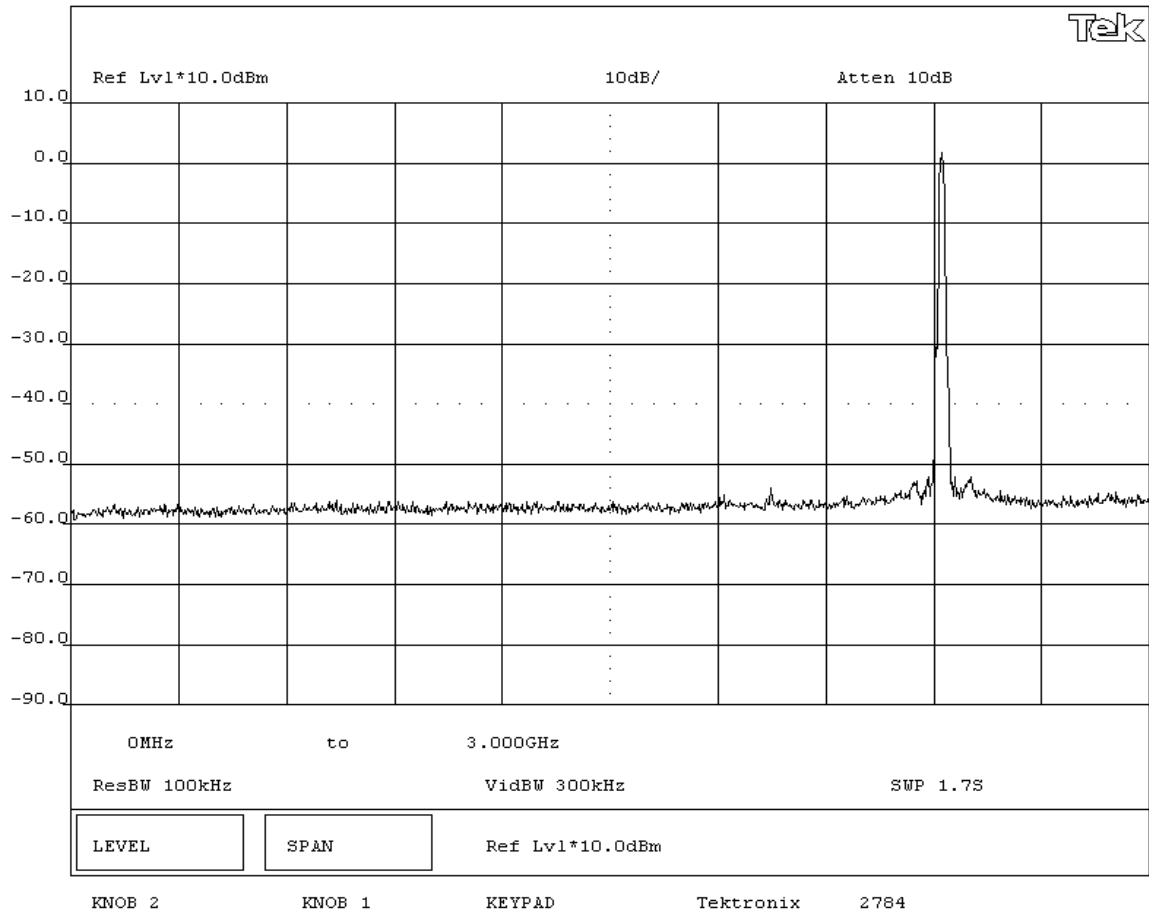
RESULTS
Pass

SIGNATURE

Rod Peloquin

Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 0MHz-3GHz - Low Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS

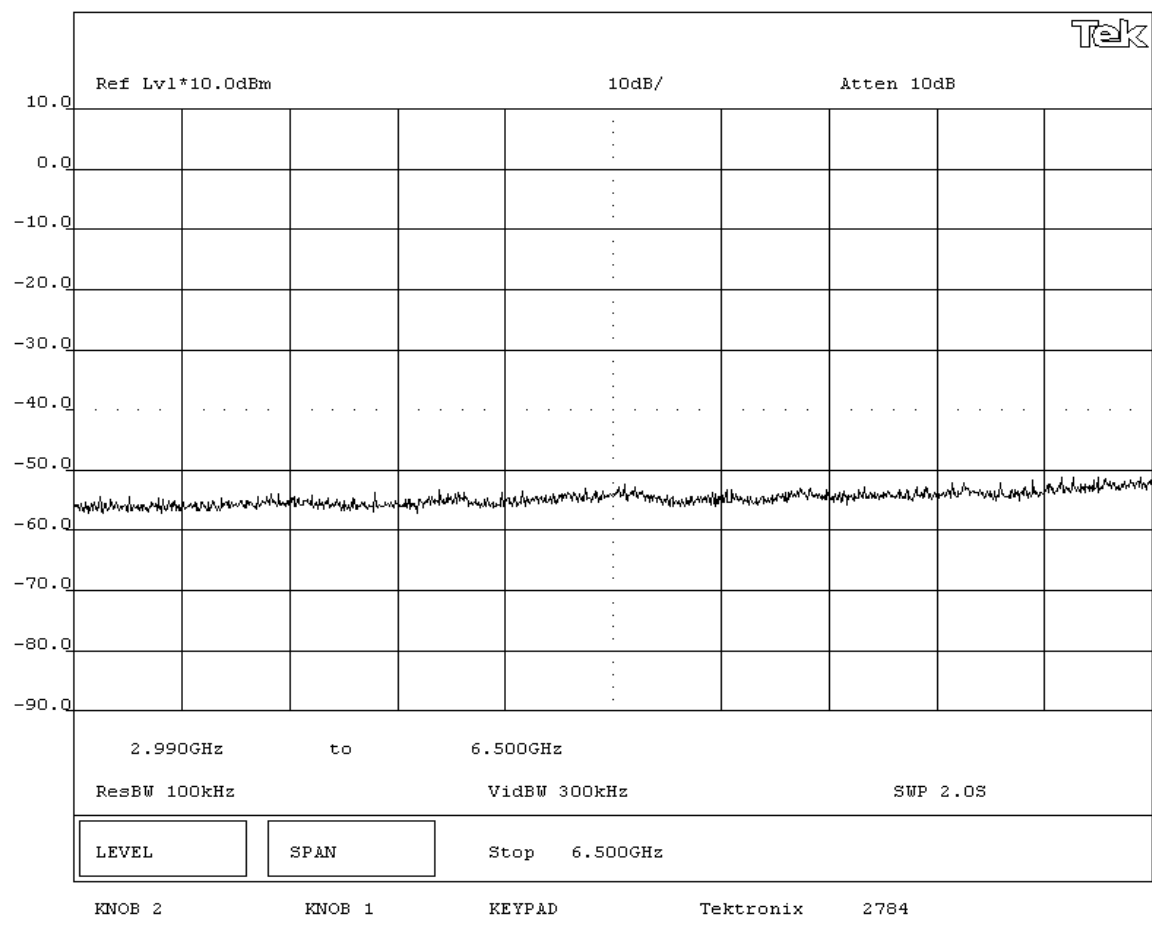
Pass

SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions 3GHz-6.5GHz - Low Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

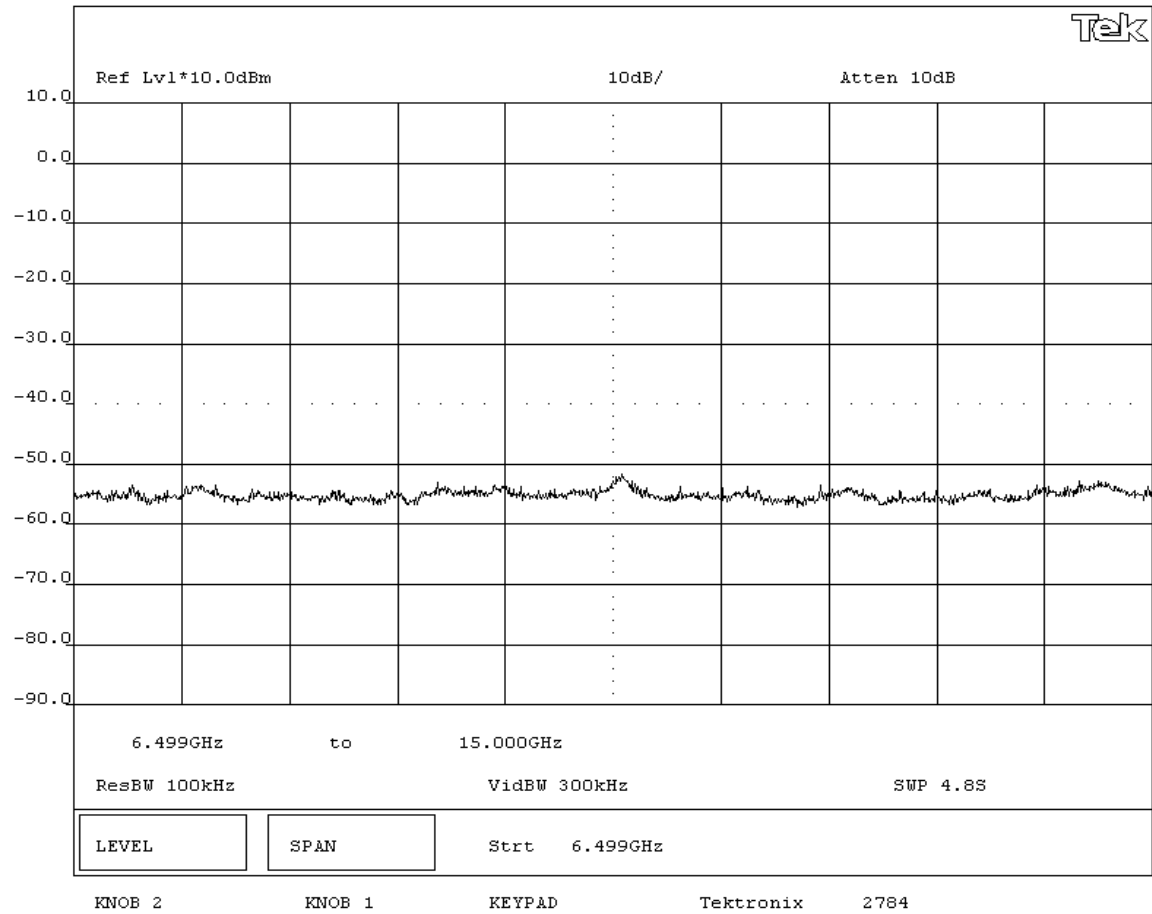
DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS
Pass

SIGNATURE
Rod Peloquin
Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 6.5GHz-15GHz - Low Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS

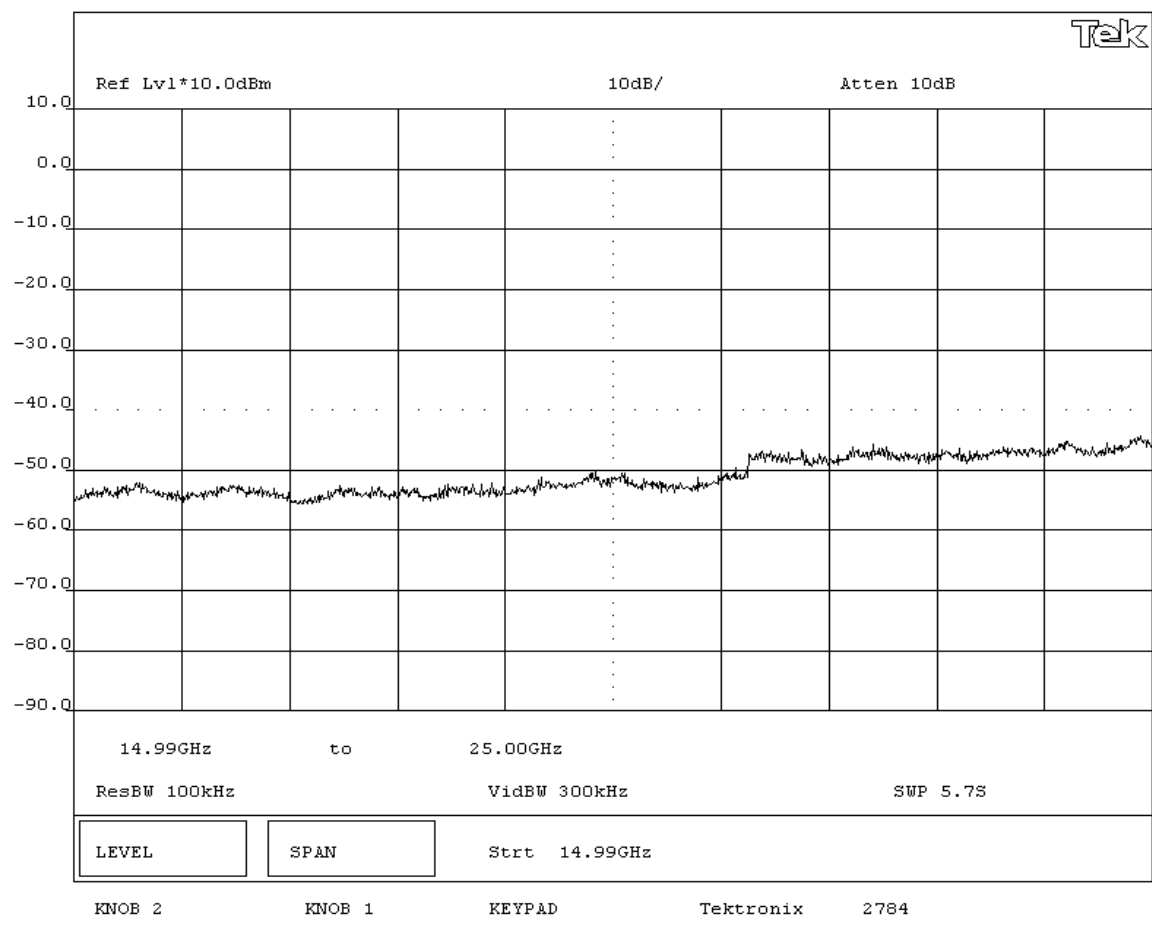
Pass

SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions 15GHz - 25GHz - Low Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

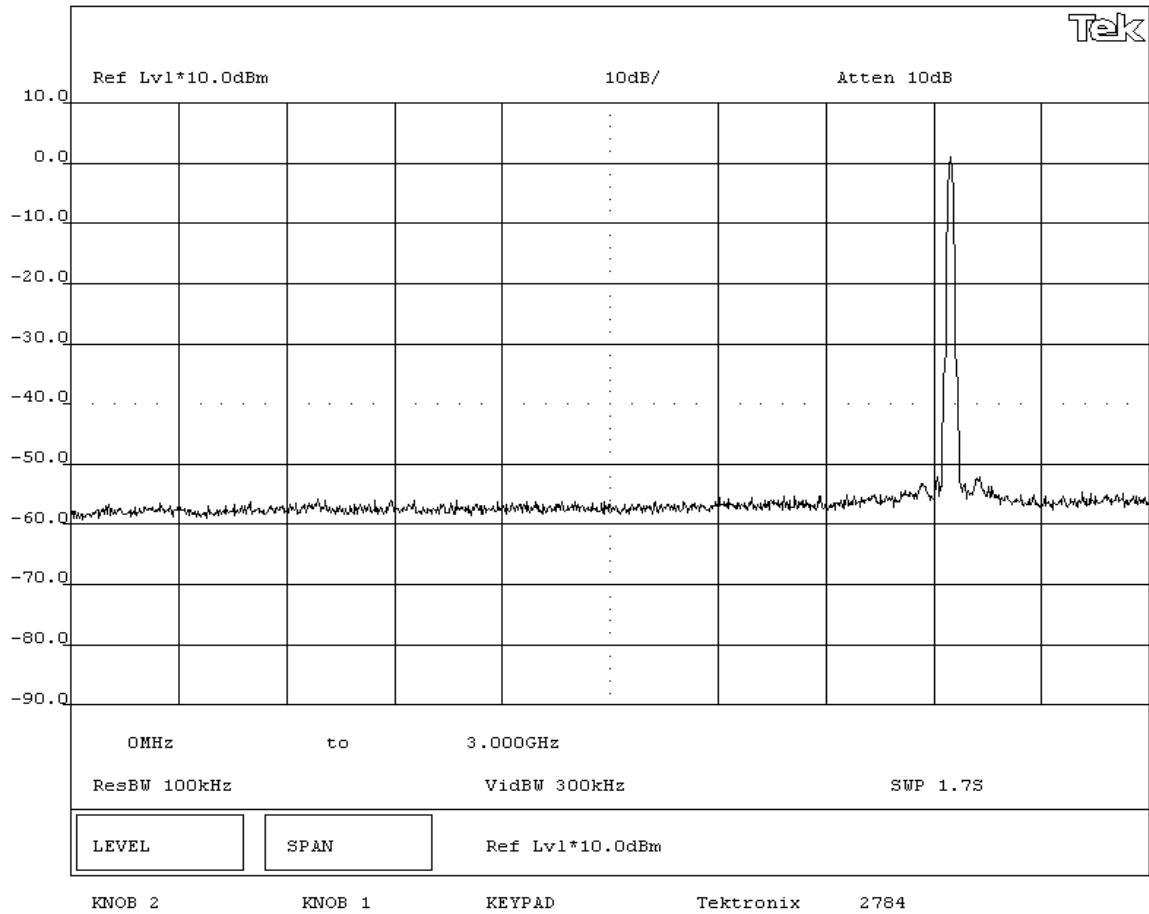
DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS
Pass

SIGNATURE
Rodney L. Peloquin
Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 0MHz-3GHz - Mid Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

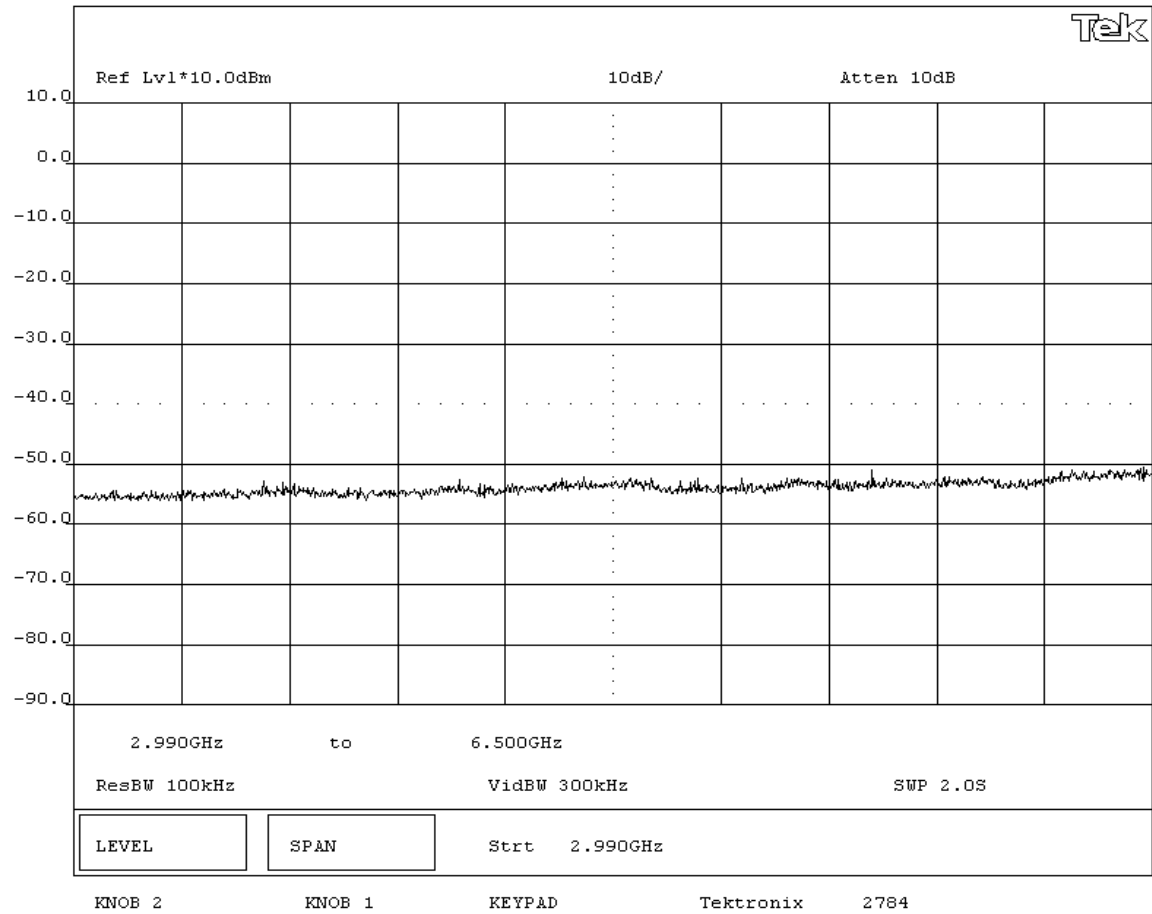
DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS
Pass

SIGNATURE
Rodney L. Peloquin
Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 3GHz-6.5GHz - Mid Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Tested by: Rod Peloquin
	Job Site: EV06

TEST SPECIFICATIONS

Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS

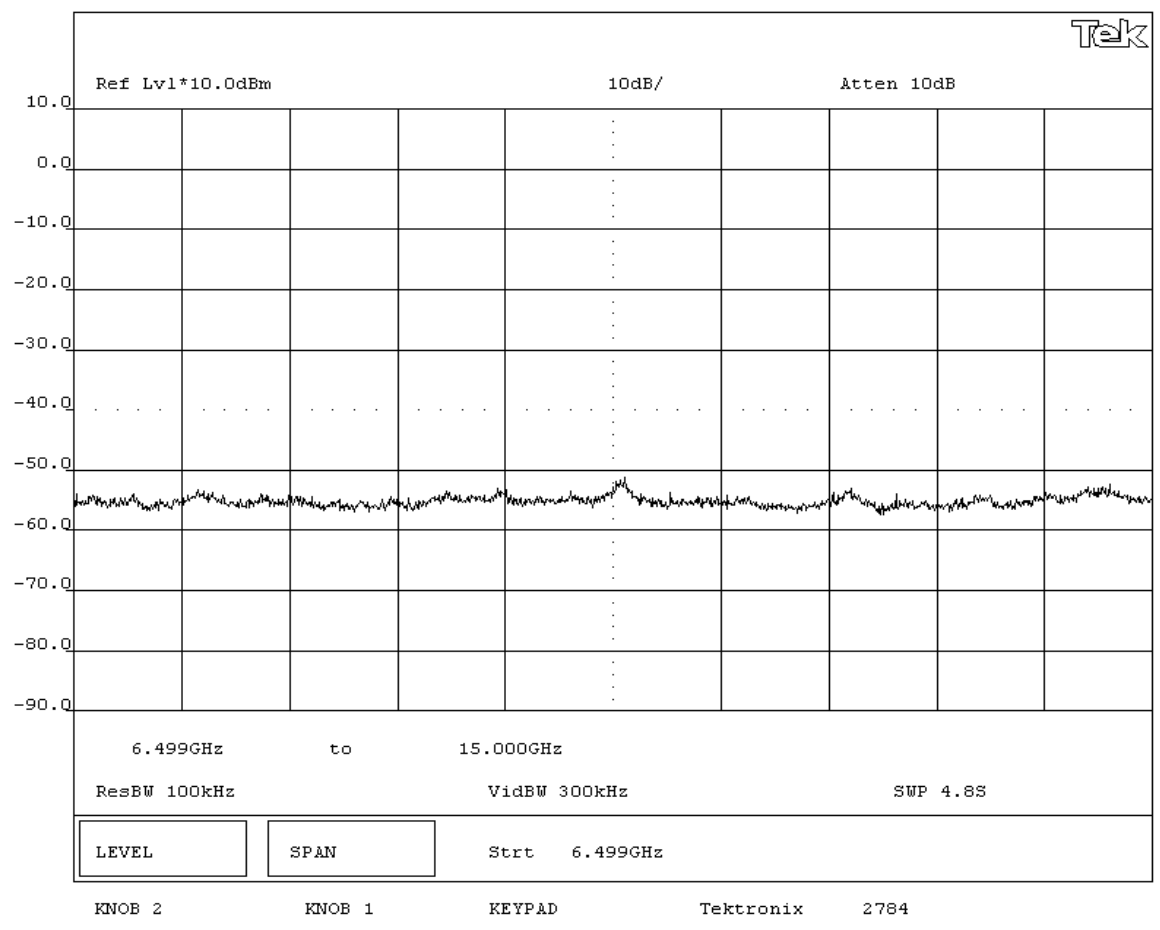
Pass

SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions 6.5GHz-15GHz - Mid Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

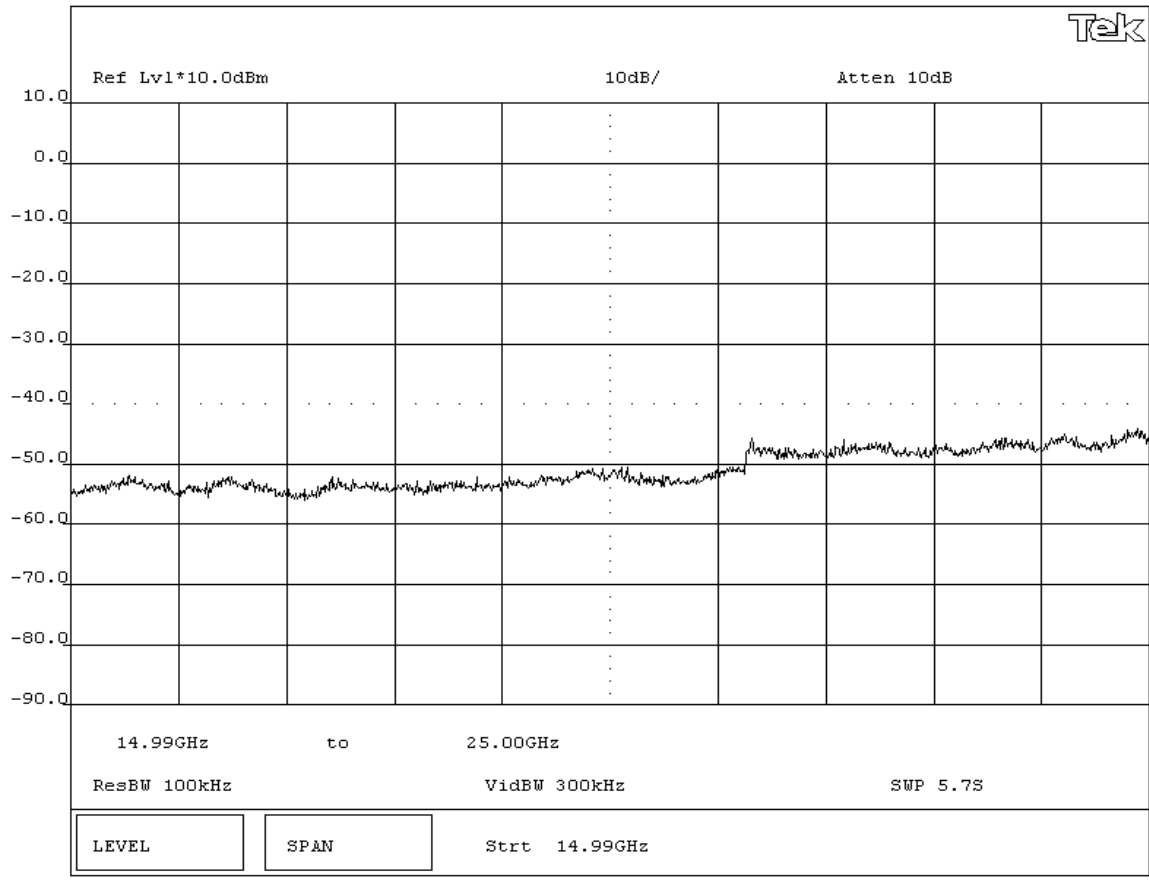
DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS
Pass

SIGNATURE
Rodney L. Peloquin
Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 15GHz - 25GHz - Mid Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

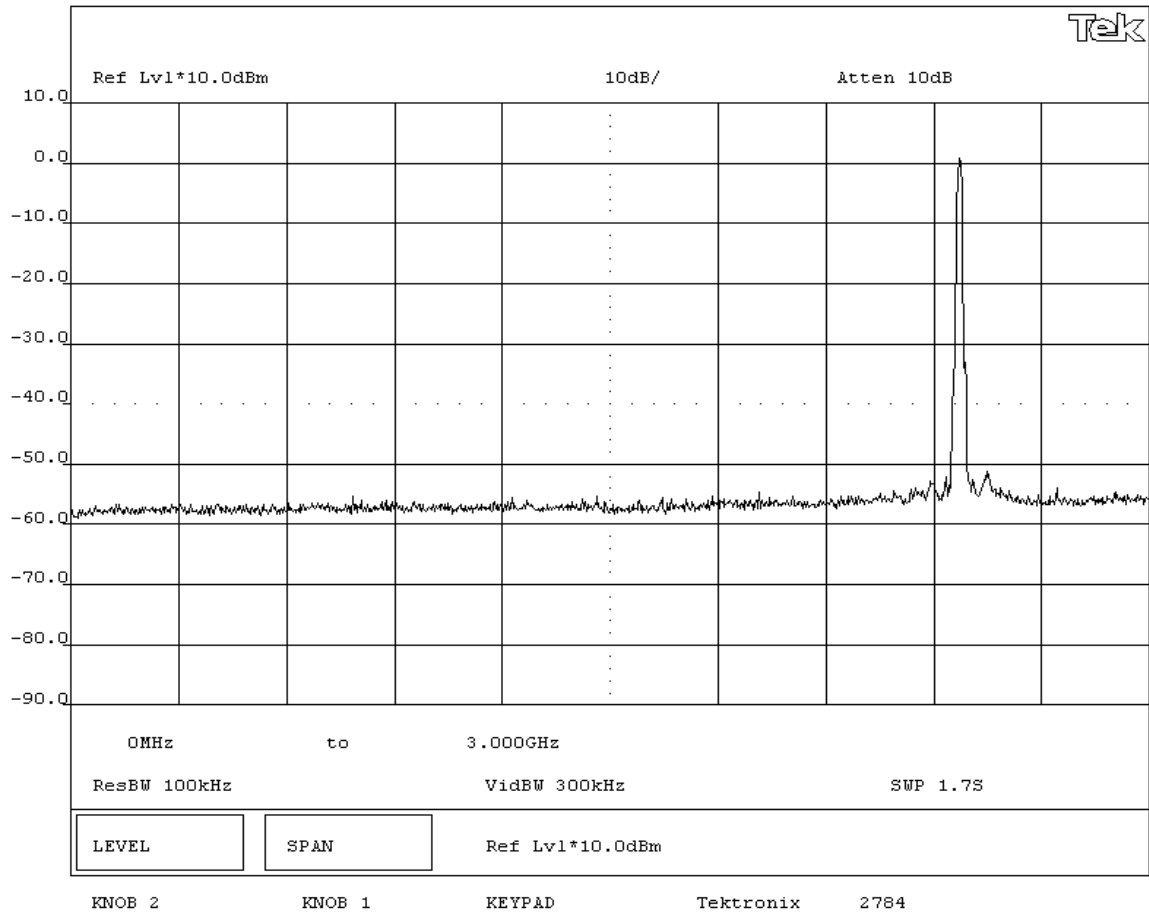
DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS
Pass

SIGNATURE
Rodney L. Peloquin
Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 0MHz-3GHz - High Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS

Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS

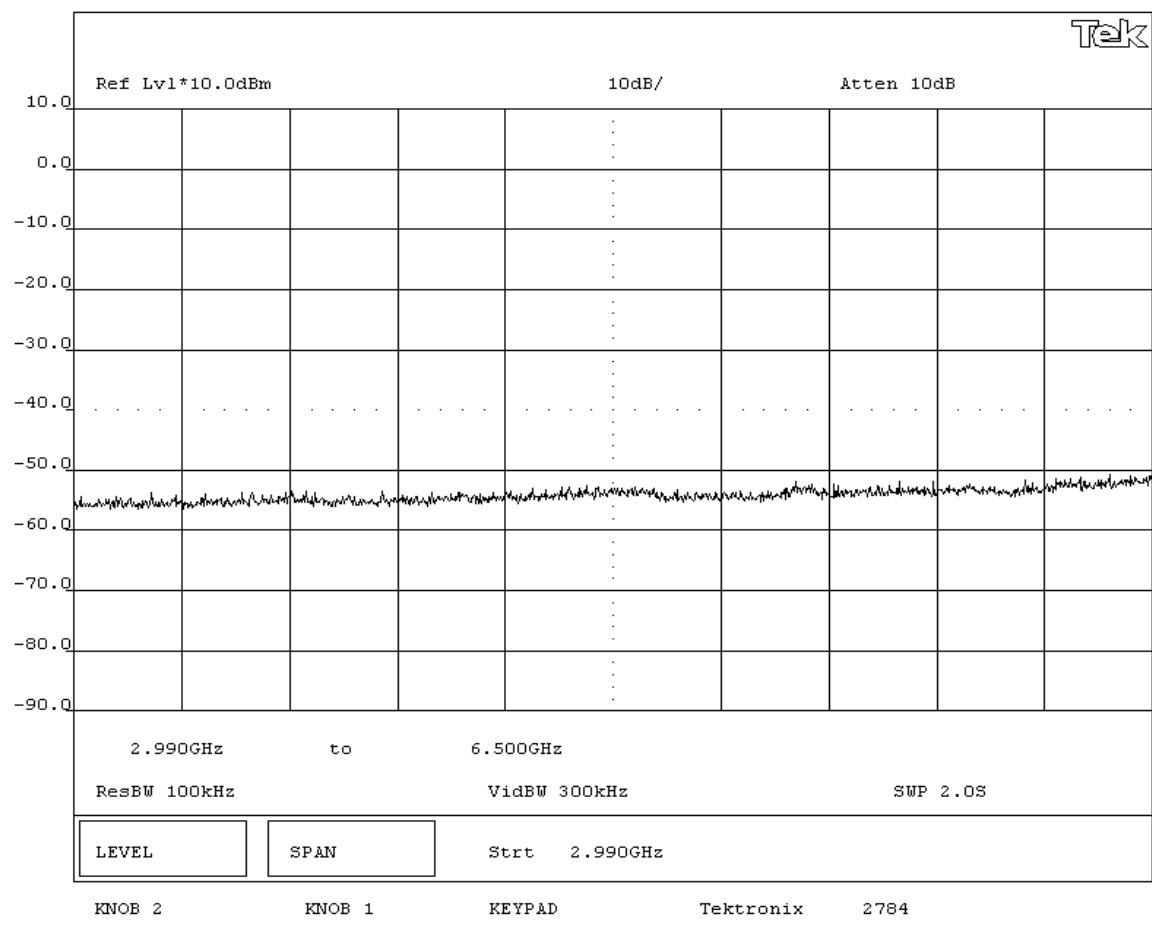
Pass

SIGNATURE

Tested By: *Rodney L. Peloquin*

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions 3GHz-6.5GHz - High Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

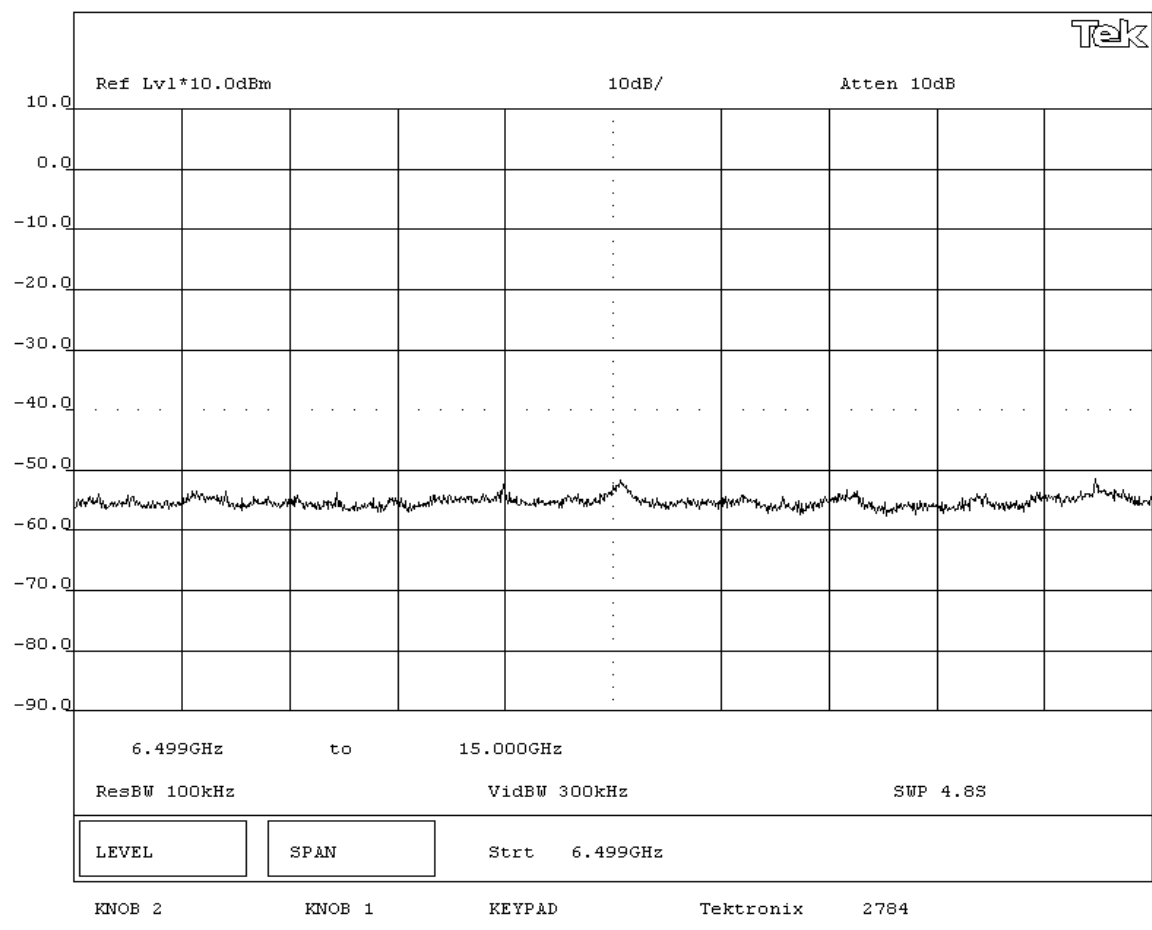
RESULTS

Pass

SIGNATURE

Tested By: *Rod Peloquin*

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 6.5GHz-15GHz - High Channel



NORTHWEST EMC SPURIOUS CONDUCTED EMISSIONS Rev BETA 01/30/01

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS			
Specification: FCC Part 15.247(d)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

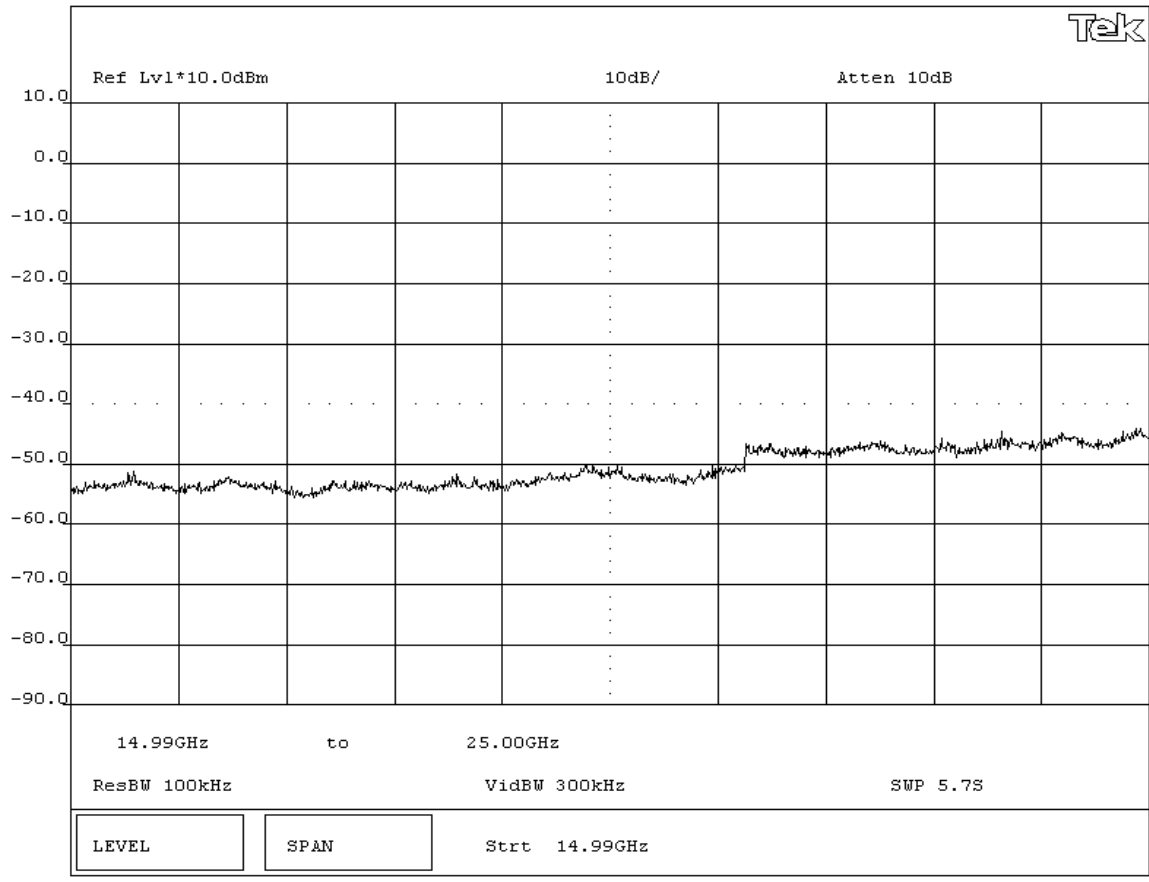
DEVIATIONS FROM TEST STANDARD
None

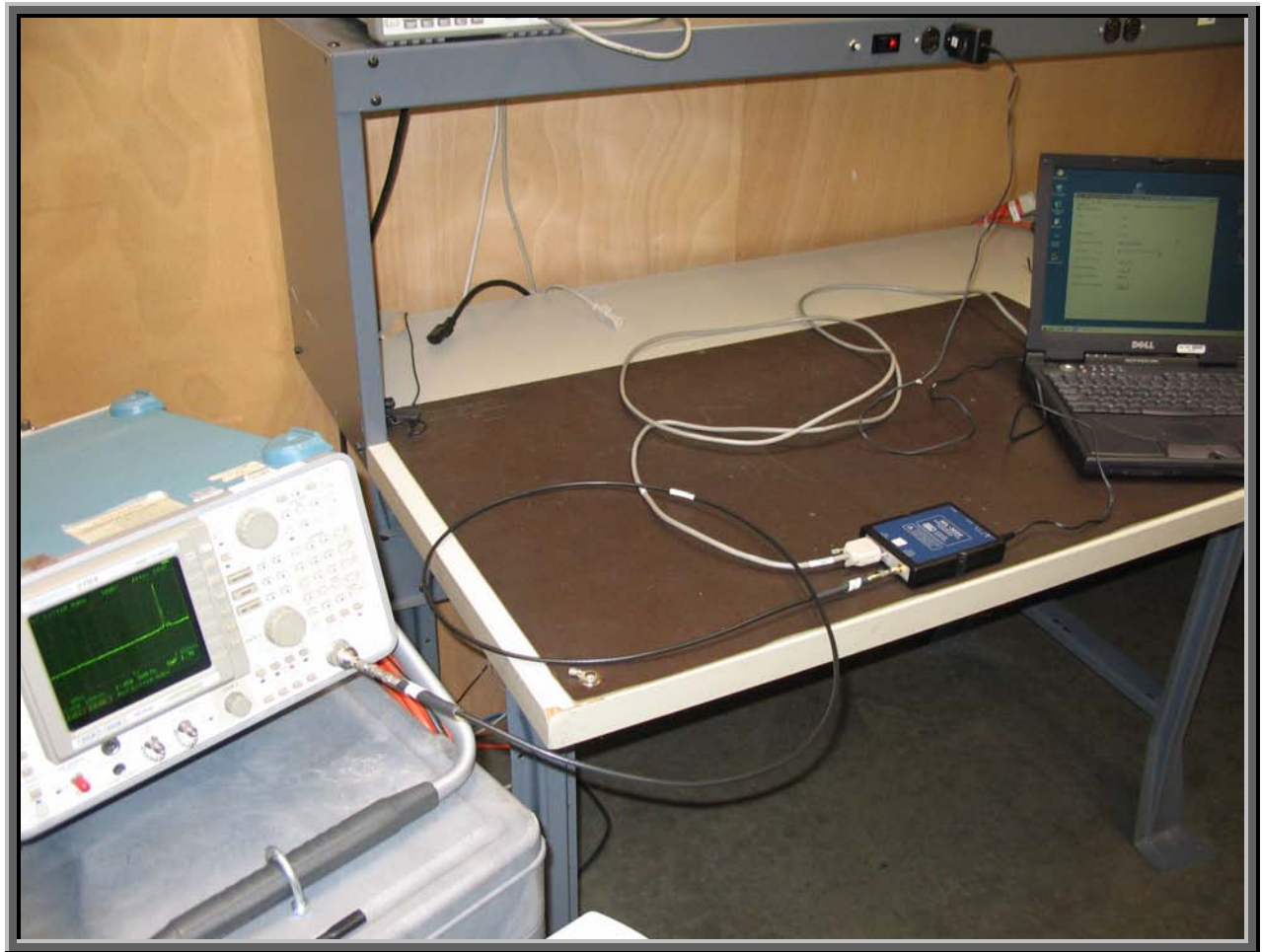
REQUIREMENTS
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental.

RESULTS
Pass

SIGNATURE
Rodney L. Peloquin
Tested By: _____

DESCRIPTION OF TEST
Antenna Conducted Spurious Emissions 15GHz - 25GHz - High Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low

Mid

High

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Software\Firmware Applied During Test

Exercise software	SEL-5809 Settings Software	Version	0.132.0.0
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing. The software ran on the remote notebook PC and permitted channel selection.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT- SEL-3022	Schweitzer Engineering Laboratories	SEL-3022	none
AC Adapter	APX Technologies Inc.	SP10005	02425173

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Notebook PC	Dell	Inspiron 2500	IS116
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	2.0	No	EUT- SEL-3022	AC Adapter
Serial Cable	Yes	1.4	No	EUT- SEL-3022	Notebook PC

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

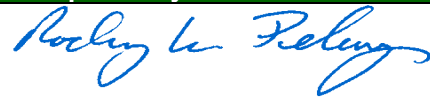
Test Description

Requirement: Per 47 CFR 15.247(e), the peak power spectral density conducted from the antenna port of a direct sequence transmitter must not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission.

Configuration: The peak power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. 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 data rate using direct sequence modulation. Per the procedure outlined in FCC 97-114, the spectrum analyzer was used as follows:

The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = $(SPAN/3 \text{ kHz})$). For example, given a span of 1.5 MHz, the sweep should be $1.5 \times 10^6 \div 3 \times 10^3 = 500$ seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

"If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzers will directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 34.8 dB for correction to 3 kHz."

Completed by:


POWER SPECTRAL DENSITY

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

Specification: FCC Part 15.247(e)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS
 Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.
 Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.
 Bandwidth Correction Factor = $10 \cdot \log(3 \text{ kHz} / 1 \text{ Hz}) = 34.8 \text{ dB}$

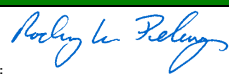
COMMENTS

EUT OPERATING MODES
 Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

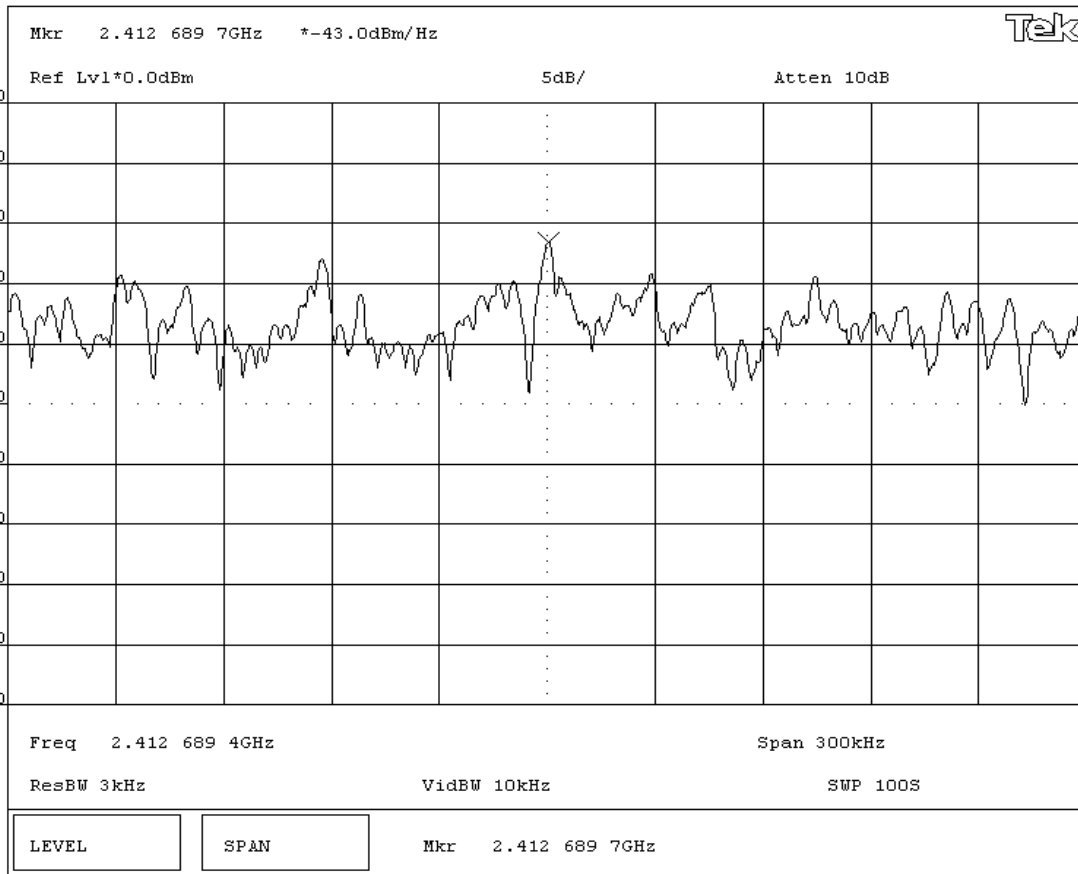
DEVIATIONS FROM TEST STANDARD
 None

REQUIREMENTS
 Maximum peak power spectral density conducted from a DSSS transmitter does not exceed 8 dBm in any 3 kHz band

RESULTS
 Pass Amplitude Power Spectral Density = -8.2 dBm / 3kHz

SIGNATURE

 Tested By: _____

DESCRIPTION OF TEST
Power Spectral Density - Low Channel



POWER SPECTRAL DENSITY

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Humidity: 36% RH
Customer Ref. No.:	Power: 120VAC/60Hz
	Job Site: EV06

Specification: FCC Part 15.247(e)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS
 Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.
 Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.
 Bandwidth Correction Factor = $10 \cdot \log(3 \text{ kHz} / 1 \text{ Hz}) = 34.8 \text{ dB}$

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum peak power spectral density conducted from a DSSS transmitter does not exceed 8 dBm in any 3 kHz band

RESULTS

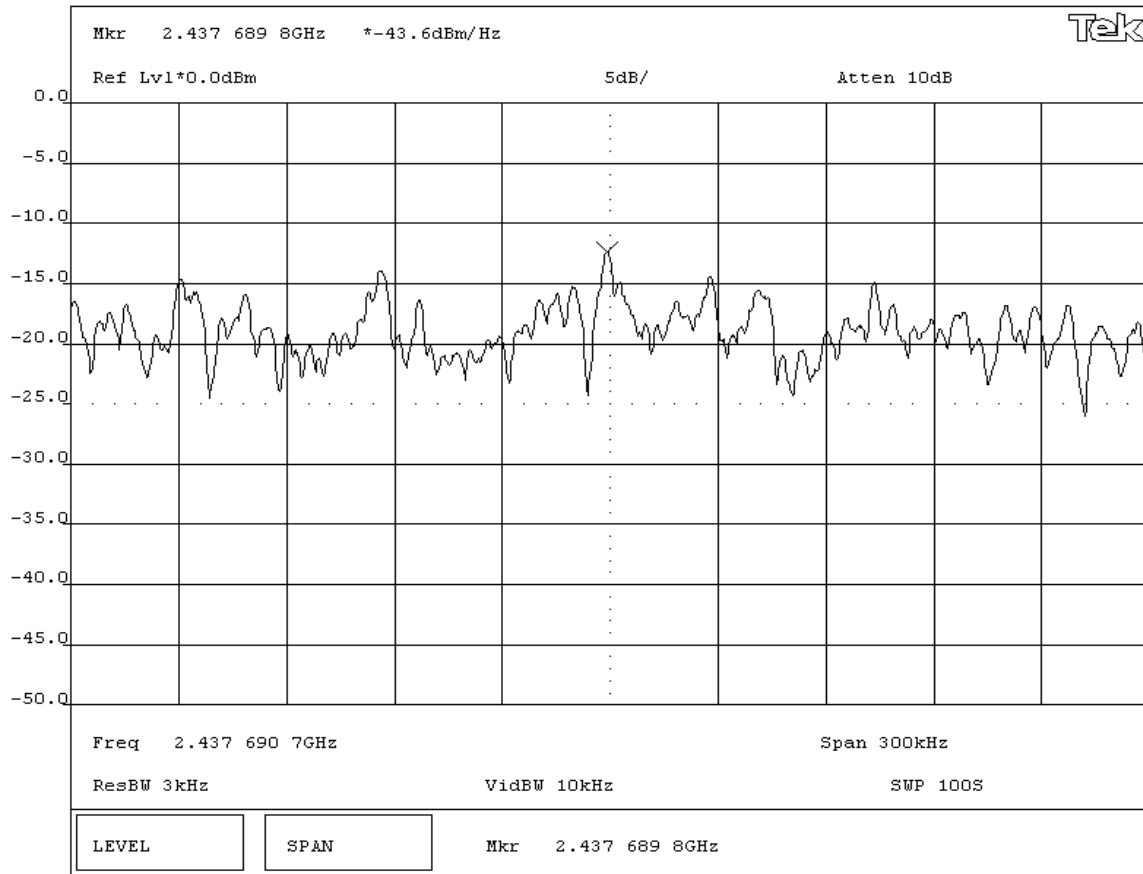
Pass Amplitude
Power Spectral Density = -8.8 dBm / 3kHz

SIGNATURE

Tested By: *Rodney L. Peloquin*

DESCRIPTION OF TEST

Power Spectral Density - Mid Channel



POWER SPECTRAL DENSITY

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/25/05
Customer: Schweitzer Engineering Laboratories	Temperature: 21°C
Attendees: None	Tested by: Rod Peloquin
Customer Ref. No.:	Power: 120VAC/60Hz
	Humidity: 36% RH
	Job Site: EV06

Specification: FCC Part 15.247(e)	Year: 2005-04	Method: FCC 97-114, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS
 Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.
 Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.
 Bandwidth Correction Factor = $10 \cdot \log(3 \text{ kHz} / 1 \text{ Hz}) = 34.8 \text{ dB}$

COMMENTS

EUT OPERATING MODES
 Modulated by PRBS at maximum data rate, 802.11(b) modulation scheme

DEVIATIONS FROM TEST STANDARD
 None

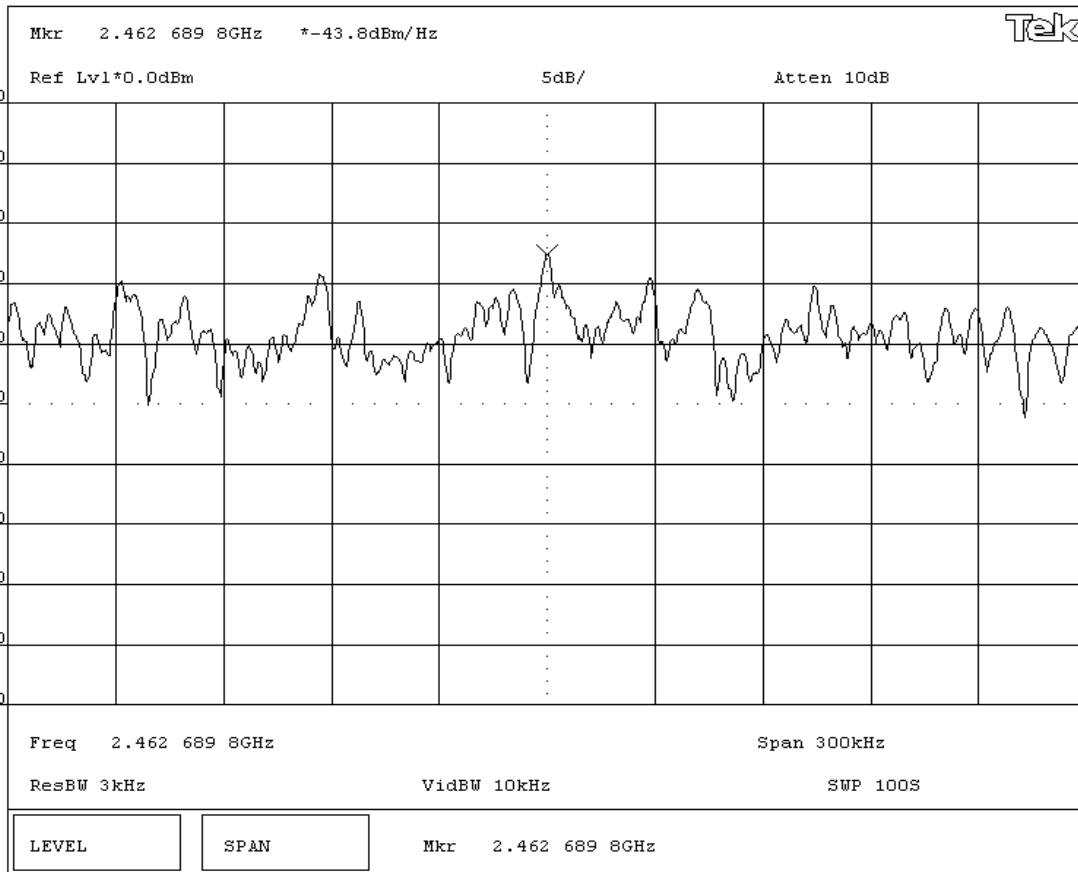
REQUIREMENTS
 Maximum peak power spectral density conducted from a DSSS transmitter does not exceed 8 dBm in any 3 kHz band

RESULTS
 Pass Amplitude Power Spectral Density = -9.0 dBm / 3kHz

SIGNATURE

 Tested By: _____

DESCRIPTION OF TEST
Power Spectral Density - High Channel





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low
Mid
High

Operating Modes Investigated:

Typical

Antennas Investigated:

Omni Antenna: Antenex TRAB24003
Whip Antenna: Mobile Mark PSKN-2400

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Frequency Range Investigated

Start Frequency	30 MHz	Stop Frequency	26 GHz
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Software\Firmware Applied During Test

Exercise software	SEL-5809 Settings Software	Version	0.132.0.0
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing. The software ran on the remote notebook PC and permitted channel selection.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT- SEL-3022	Schweitzer Engineering Laboratories	SEL-3022	N/A
AC Adapter	APX Technologies Inc.	SPU10-102	N/A
Whip Antenna	Mobile Mark	PSKN-2400	N/A
Omni Antenna	Antenex	TRAB24003	N/A

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Notebook PC	Dell	Inspiron 8000	IS115
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Input	No	1.0	No	EUT- SEL-3022	Unterminated
Alarm Leads	No	1.0	No	EUT- SEL-3022	Unterminated
Serial Cables	Yes	5.0	No	EUT- SEL-3022	Notebook PC
DC Leads	No	1.4	No	EUT- SEL-3022	AC Adapter
Antenna	Yes	1.0	No	EUT- SEL-3022	Omni Antenna

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Attenuator	Coaxicom	66702 5910-20	RBJ	02/25/2005	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HFO	03/09/2005	13 mo
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	02/15/2005	13 mo
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/02/2004	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	05/05/2005	3 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	03/01/2005	13 mo
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	02/17/2005	13 mo
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA

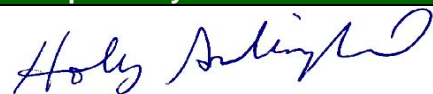
Test Description

Requirement: The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10Hz VBW) must comply with the limits specified in 15.209.

Configuration: 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 EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Bandwidths Used for Measurements			
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

Completed by:



RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022		Work Order: SCHW0048
Serial Number:		Date: 05/24/05
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 23
Attendees: None		Humidity: 36%
Cust. Ref. No.:		Barometric Pressure: 30.29
Tested by: Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2005-04	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS	
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation	
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator	

COMMENTS	
whip antenna	

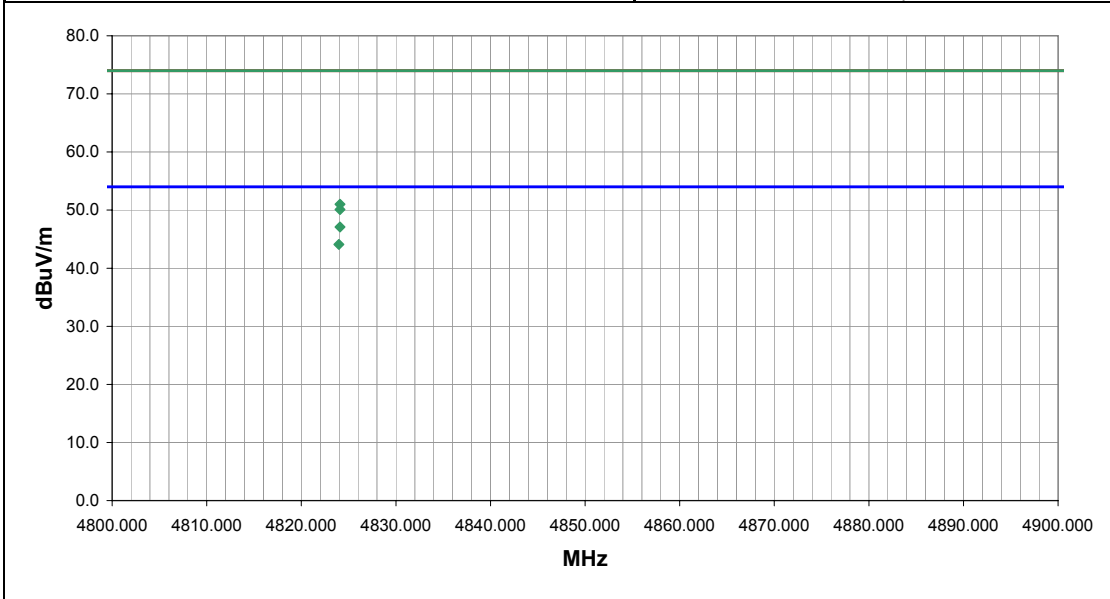
EUT OPERATING MODES	
low channel	

DEVIATIONS FROM TEST STANDARD	
No deviations.	

RESULTS		Run #
Pass		1

Other


 Tested By: _____



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4824.080	41.3	5.8	351.0	1.1	3.0	0.0	V-Horn	AV	0.0	47.1	54.0	-6.9	EUT vertical
4823.960	38.3	5.8	104.0	1.3	3.0	0.0	H-Horn	AV	0.0	44.1	54.0	-9.9	EUT on side
4824.080	45.2	5.8	351.0	1.1	3.0	0.0	V-Horn	PK	0.0	51.0	74.0	-23.0	EUT vertical
4824.080	44.3	5.8	104.0	1.3	3.0	0.0	H-Horn	PK	0.0	50.1	74.0	-23.9	EUT on side

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022		Work Order: SCHW0048	
Serial Number:		Date: 05/24/05	
Customer: Schweitzer Engineering Laboratories, Inc.		Temperature: 23	
Attendees: None		Humidity: 36%	
Cust. Ref. No.:		Barometric Pressure: 30.29	
Tested by: Rod Peloquin		Power: 120VAC/60Hz	
		Job Site: EV01	

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2005-04	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator


COMMENTS
 whip antenna

EUT OPERATING MODES
 mid channel

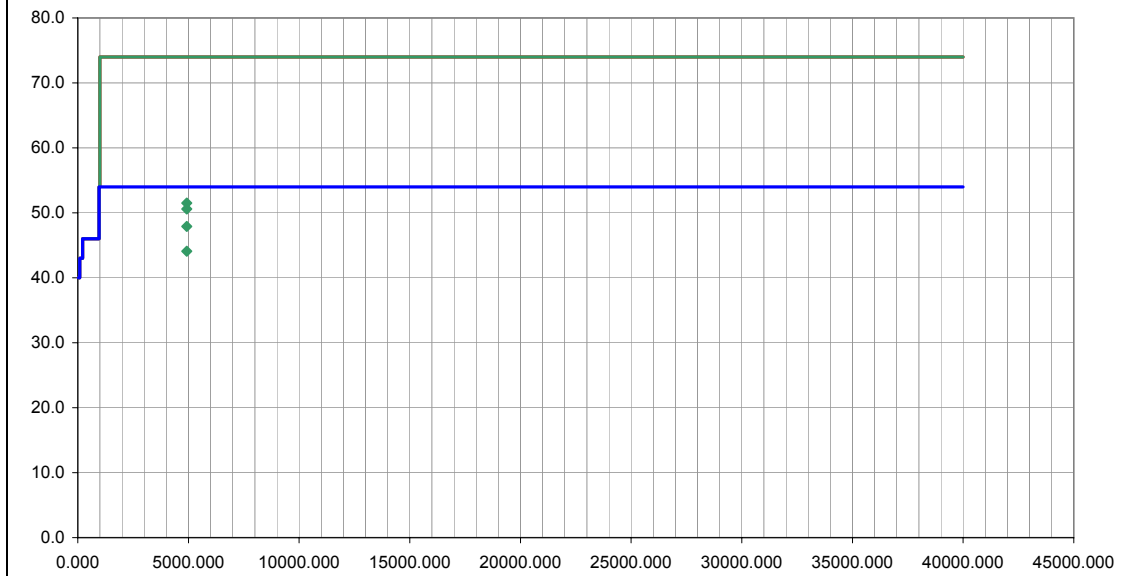
DEVIATIONS FROM TEST STANDARD
 No deviations.

RESULTS	Run #
Pass	2

Other



 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4924.000	41.6	6.3	8.0	1.3	3.0	0.0	H-Horn	AV	0.0	47.9	54.0	-6.1	EUT on side
4924.000	37.8	6.3	3.0	1.1	3.0	0.0	V-Horn	AV	0.0	44.1	54.0	-9.9	EUT Vertical
4924.000	45.2	6.3	8.0	1.3	3.0	0.0	H-Horn	PK	0.0	51.5	74.0	-22.5	EUT on side
4924.000	44.3	6.3	3.0	1.1	3.0	0.0	V-Horn	PK	0.0	50.6	74.0	-23.4	EUT Vertical

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/24/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 23
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 30.29
Tested by: Rod Peloquin	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2005-04	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator


COMMENTS
 whip antenna

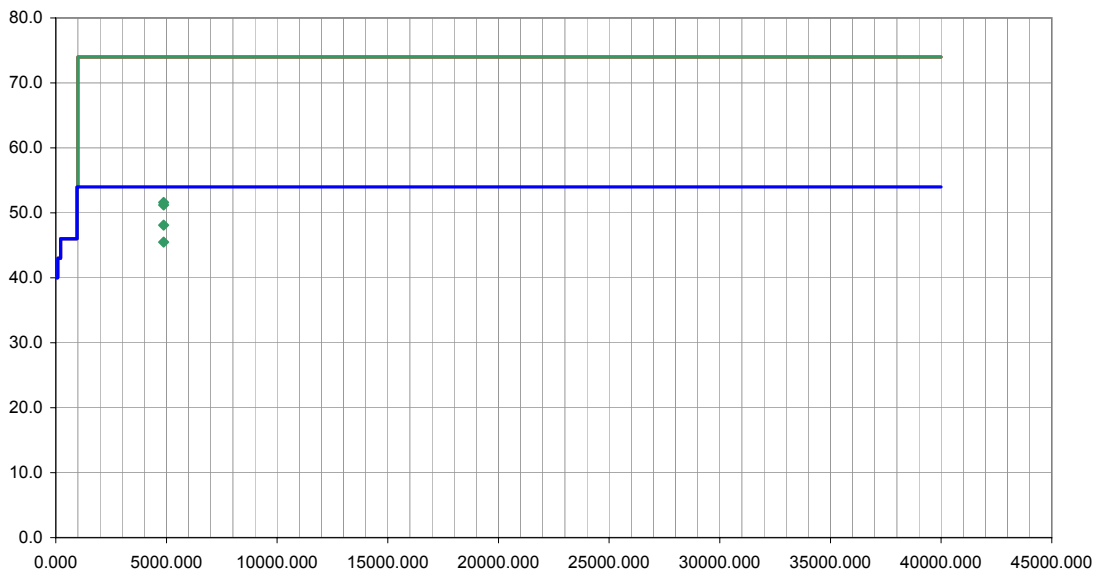
EUT OPERATING MODES
 high channel

DEVIATIONS FROM TEST STANDARD
 No deviations.

RESULTS	Run #
Pass	3

Other


 Tested By: _____



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4874.023	42.1	6.0	-3.0	1.1	3.0	0.0	H-Horn	AV	0.0	48.1	54.0	-5.9	EUT on side
4874.023	39.5	6.0	350.0	1.2	3.0	0.0	V-Horn	AV	0.0	45.5	54.0	-8.5	EUT Vertical
4874.023	45.6	6.0	350.0	1.2	3.0	0.0	V-Horn	PK	0.0	51.6	74.0	-22.4	EUT Vertical
4874.023	45.2	6.0	-3.0	1.1	3.0	0.0	H-Horn	PK	0.0	51.2	74.0	-22.8	EUT on side

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/24/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 23
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 30.29
Tested by: Holly Ashkannejhad	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2004	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS
 Whip antenna

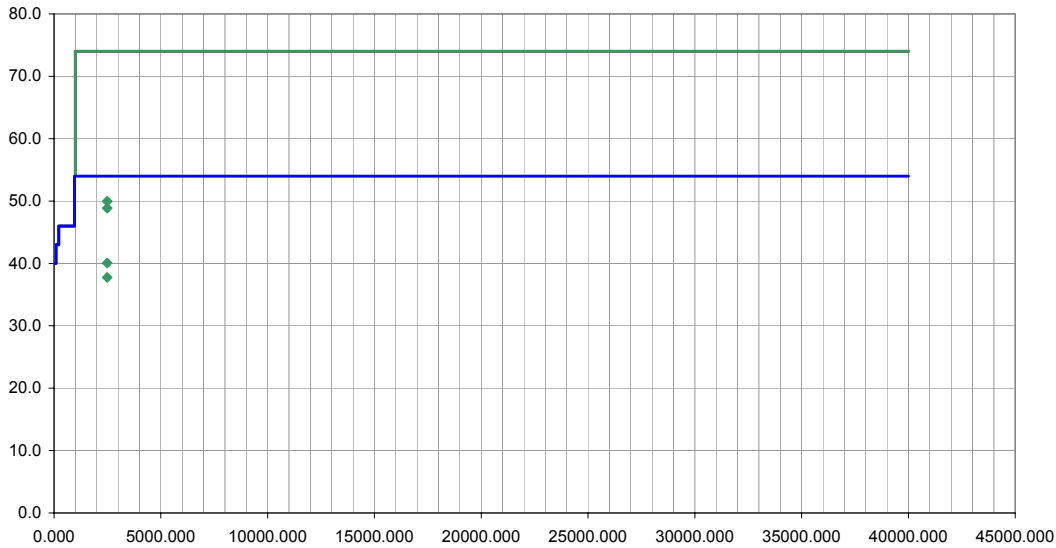
EUT OPERATING MODES
 High channel

DEVIATIONS FROM TEST STANDARD
 No deviations.

RESULTS	Run #
Pass	4

Other


 Tested By: _____



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.500	19.2	30.4	269.0	1.0	1.0	0.0	V-Horn	AV	-9.5	40.1	54.0	-13.9	Antenna vertical
2483.500	16.9	30.4	211.0	1.0	1.0	0.0	H-Horn	AV	-9.5	37.8	54.0	-16.2	Antenna horizontal
2483.500	29.1	30.4	269.0	1.0	1.0	0.0	V-Horn	PK	-9.5	50.0	74.0	-24.0	Antenna vertical
2483.500	28.0	30.4	211.0	1.0	1.0	0.0	H-Horn	PK	-9.5	48.9	74.0	-25.1	Antenna horizontal

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/24/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 23
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 30.29
Tested by: Holly Ashkannejhad	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2004	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS
 Whip antenna

EUT OPERATING MODES
 High channel

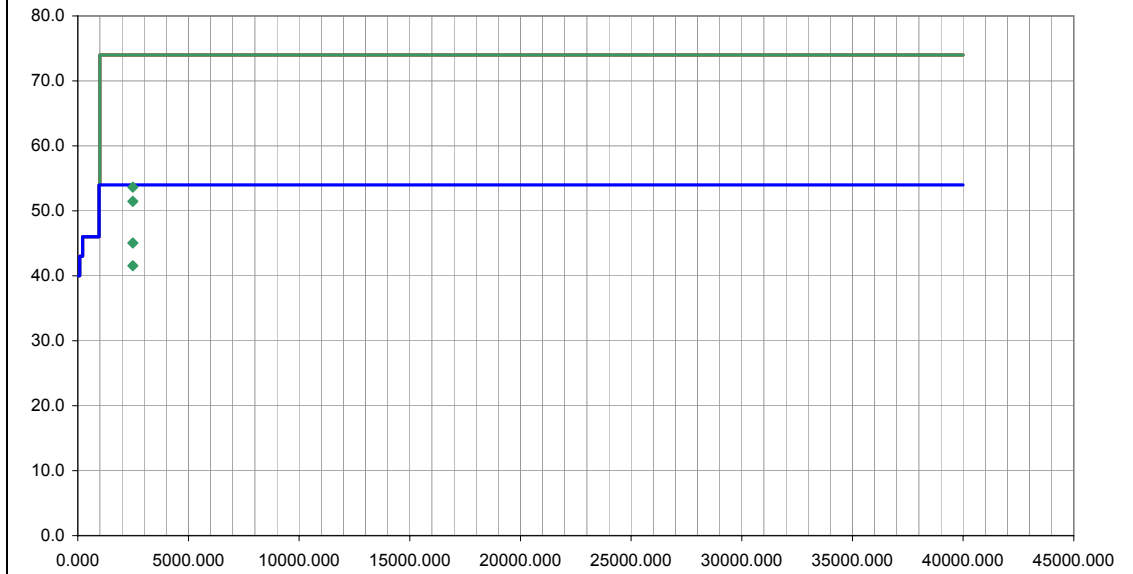
DEVIATIONS FROM TEST STANDARD
 No deviations.

RESULTS	Run #
Pass	5

Other



Tested By: _____



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.500	24.2	30.4	63.0	1.0	1.0	0.0	V-Horn	AV	-9.5	45.1	54.0	-8.9	EUT Vertical
2483.500	20.7	30.4	128.0	1.0	1.0	0.0	V-Horn	AV	-9.5	41.6	54.0	-12.4	EUT on side
2483.500	32.8	30.4	63.0	1.0	1.0	0.0	V-Horn	PK	-9.5	53.7	74.0	-20.3	EUT Vertical
2483.500	30.6	30.4	128.0	1.0	1.0	0.0	V-Horn	PK	-9.5	51.5	74.0	-22.5	EUT on side

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/24/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 23
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 30.29
Tested by: Holly Ashkannejhad	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS

Specification: FCC 15.247(d) Spurious Radiated Emissions:2004	Method: ANSI C63.4:2003
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SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS
 Whip antenna

EUT OPERATING MODES
 See comments for channel

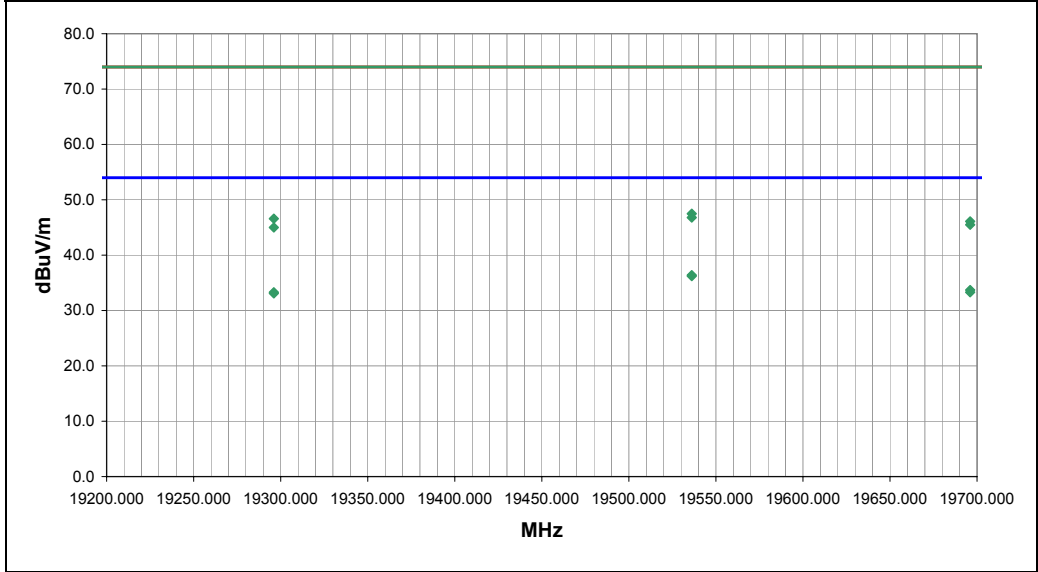
DEVIATIONS FROM TEST STANDARE
 No deviations.

RESULTS

Pass	Run #
	6

Other

Holly Ashkannejhad
 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
19536.080	28.0	8.4	122.0	1.0	3.0	0.0	+-High Horr	AV	0.0	36.4	54.0	-17.6	Mid channel, EUT on side
19536.080	27.8	8.4	32.0	1.0	3.0	0.0	V-High Horr	AV	0.0	36.2	54.0	-17.8	Mid channel, EUT vertical
19696.090	25.1	8.6	138.0	1.0	3.0	0.0	+-High Horr	AV	0.0	33.7	54.0	-20.3	High channel, EUT on side
19296.090	25.3	8.0	45.0	1.0	3.0	0.0	V-High Horr	AV	0.0	33.3	54.0	-20.7	Low channel, EUT vertical
19696.090	24.7	8.6	85.0	1.0	3.0	0.0	V-High Horr	AV	0.0	33.3	54.0	-20.7	High channel, EUT vertical
19296.090	25.1	8.0	114.0	1.0	3.0	0.0	+-High Horr	AV	0.0	33.1	54.0	-20.9	Low channel, EUT on side
19536.080	39.1	8.4	122.0	1.0	3.0	0.0	+-High Horr	PK	0.0	47.5	74.0	-26.5	Mid channel, EUT on side
19536.080	38.4	8.4	32.0	1.0	3.0	0.0	V-High Horr	PK	0.0	46.8	74.0	-27.2	Mid channel, EUT vertical
19296.090	38.6	8.0	45.0	1.0	3.0	0.0	V-High Horr	PK	0.0	46.6	74.0	-27.4	Low channel, EUT vertical
19696.090	37.5	8.6	138.0	1.0	3.0	0.0	+-High Horr	PK	0.0	46.1	74.0	-27.9	High channel, EUT on side
19696.090	36.9	8.6	85.0	1.0	3.0	0.0	V-High Horr	PK	0.0	45.5	74.0	-28.5	High channel, EUT vertical
19296.090	37.0	8.0	114.0	1.0	3.0	0.0	+-High Horr	PK	0.0	45.0	74.0	-29.0	Low channel, EUT on side

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/27/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 25
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 29.7
Tested by: Holly Ashkannejhad	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2005-04	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator


COMMENTS
 Omni antenna

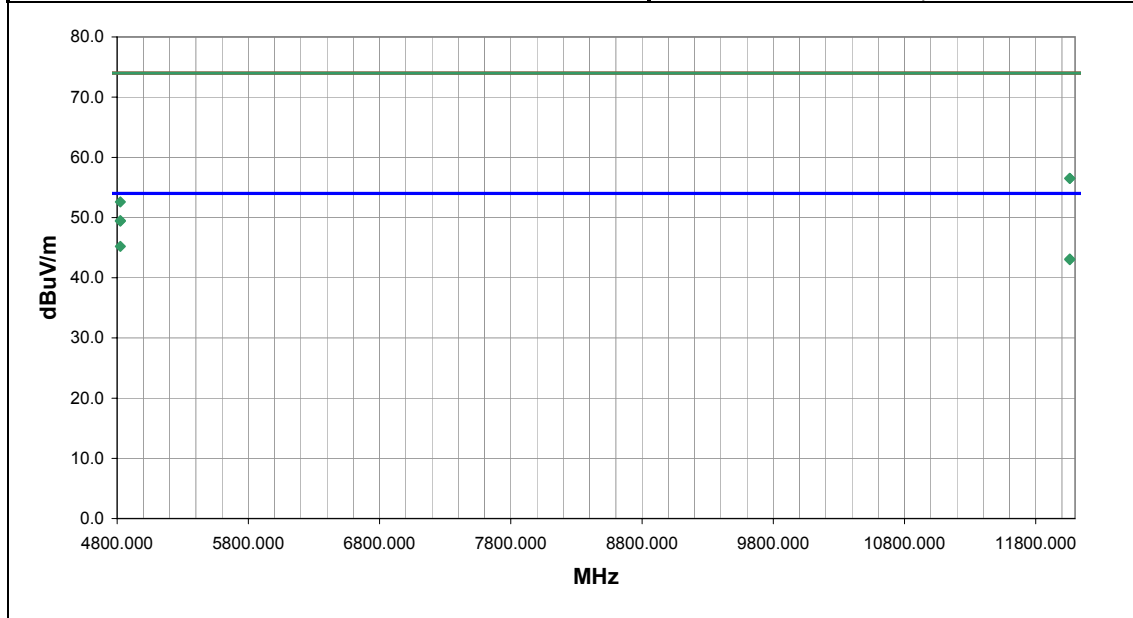
EUT OPERATING MODES
 Low channel

DEVIATIONS FROM TEST STANDARD
 No deviations.

RESULTS	Run #
Pass	7

Other


 Tested By: _____



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4824.020	43.7	5.8	359.0	1.6	3.0	0.0	H-Horn	AV	0.0	49.5	54.0	-4.5	EUT on side
4824.020	39.4	5.8	119.0	1.2	3.0	0.0	V-Horn	AV	0.0	45.2	54.0	-8.8	EUT vertical
12060.000	25.8	17.3	200.0	3.3	3.0	0.0	H-Horn	AV	0.0	43.1	54.0	-10.9	EUT on side
12060.000	25.7	17.3	162.0	1.2	3.0	0.0	V-Horn	AV	0.0	43.0	54.0	-11.0	EUT vertical
12060.000	39.2	17.3	200.0	3.3	3.0	0.0	H-Horn	PK	0.0	56.5	74.0	-17.5	EUT on side
12060.000	39.2	17.3	162.0	1.2	3.0	0.0	V-Horn	PK	0.0	56.5	74.0	-17.5	EUT vertical
4824.020	46.8	5.8	359.0	1.6	3.0	0.0	H-Horn	PK	0.0	52.6	74.0	-21.4	EUT on side
4824.020	43.6	5.8	119.0	1.2	3.0	0.0	V-Horn	PK	0.0	49.4	74.0	-24.6	EUT vertical

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/27/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 25
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 29.7
Tested by: Holly Ashkannejhad	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2005-04	Method: ANSI C63.4:2003


SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

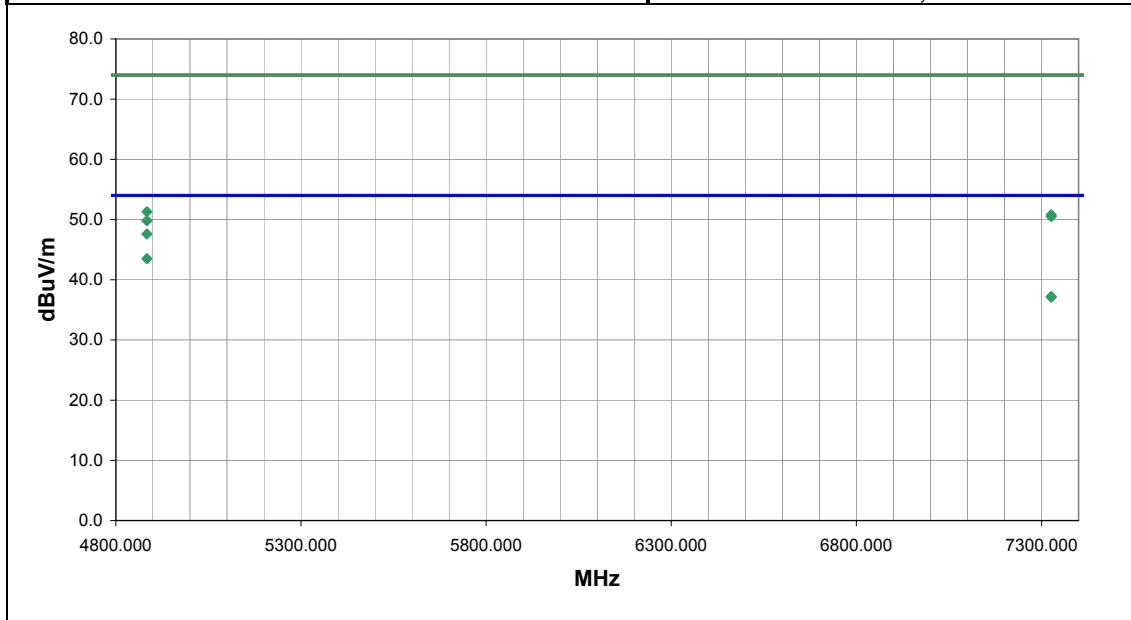
COMMENTS
Omni antenna

EUT OPERATING MODES
Mid channel

DEVIATIONS FROM TEST STANDARD
No deviations.

RESULTS	Run #
Pass	8

Other	 Tested By: _____
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4884.027	41.4	6.2	89.0	1.2	3.0	0.0	H-Horn	AV	0.0	47.6	54.0	-6.4	EUT on side
4884.027	37.3	6.2	149.0	1.3	3.0	0.0	V-Horn	AV	0.0	43.5	54.0	-10.5	EUT Vertical
7326.000	25.4	11.8	166.0	2.7	3.0	0.0	V-Horn	AV	0.0	37.2	54.0	-16.8	EUT Vertical
7326.000	25.3	11.8	287.0	3.9	3.0	0.0	H-Horn	AV	0.0	37.1	54.0	-16.9	EUT on side
4884.027	45.1	6.2	89.0	1.2	3.0	0.0	H-Horn	PK	0.0	51.3	74.0	-22.7	EUT on side
7326.000	39.0	11.8	287.0	3.9	3.0	0.0	H-Horn	PK	0.0	50.8	74.0	-23.2	EUT on side
7326.000	38.7	11.8	166.0	2.7	3.0	0.0	V-Horn	PK	0.0	50.5	74.0	-23.5	EUT Vertical
4884.027	43.6	6.2	149.0	1.3	3.0	0.0	V-Horn	PK	0.0	49.8	74.0	-24.2	EUT Vertical

RADIATED EMISSIONS DATA SHEET

EUT: SEL-3022	Work Order: SCHW0048
Serial Number:	Date: 05/27/05
Customer: Schweitzer Engineering Laboratories, Inc.	Temperature: 25
Attendees: None	Humidity: 36%
Cust. Ref. No.:	Barometric Pressure: 29.7
Tested by: Holly Ashkannejhad	Power: 120VAC/60Hz
	Job Site: EV01

TEST SPECIFICATIONS	
Specification: FCC 15.247(d) Spurious Radiated Emissions:2005-04	Method: ANSI C63.4:2003

SAMPLE CALCULATIONS
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS
 Omni antenna

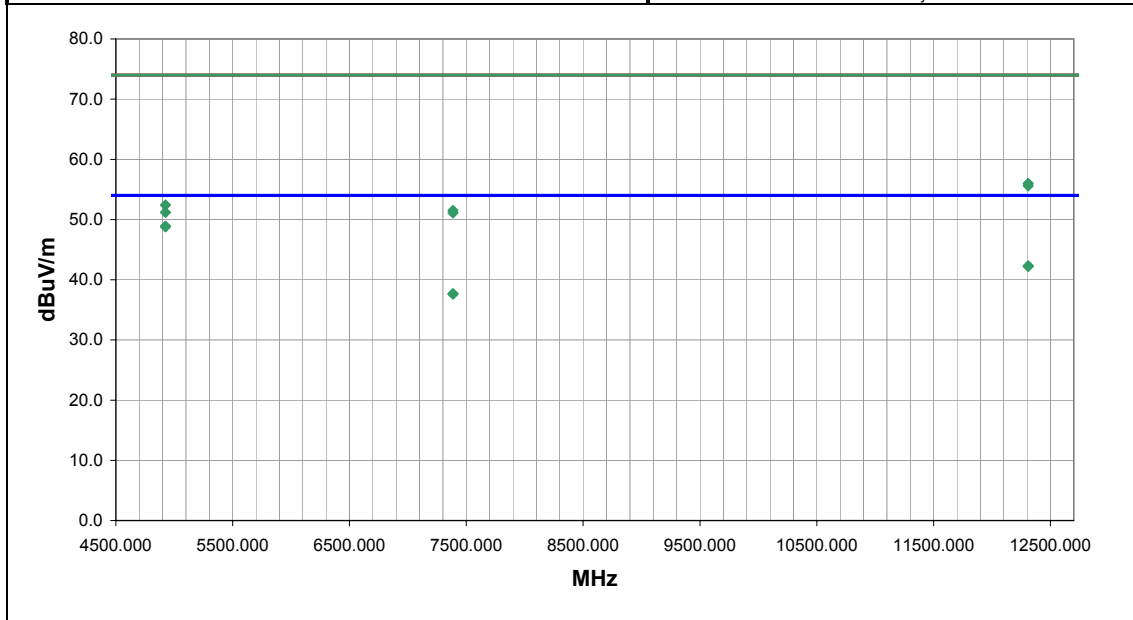
EUT OPERATING MODES
 High channel

DEVIATIONS FROM TEST STANDARD
 No deviations.

RESULTS	Run #
Pass	9

Other

Holly Ashkannejhad
 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4924.031	42.6	6.3	150.0	1.5	3.0	0.0	V-Horn	AV	0.0	48.9	54.0	-5.1	EUT Vertical
4924.031	42.5	6.3	155.0	1.6	3.0	0.0	H-Horn	AV	0.0	48.8	54.0	-5.2	EUT on side
12310.000	25.1	17.2	232.0	1.2	3.0	0.0	V-Horn	AV	0.0	42.3	54.0	-11.7	EUT Vertical
12310.000	25.0	17.2	183.0	1.3	3.0	0.0	H-Horn	AV	0.0	42.2	54.0	-11.8	EUT on side
7386.000	25.7	12.0	279.0	1.8	3.0	0.0	V-Horn	AV	0.0	37.7	54.0	-16.3	EUT Vertical
7386.000	25.6	12.0	234.0	1.3	3.0	0.0	H-Horn	AV	0.0	37.6	54.0	-16.4	EUT on side
12310.000	38.8	17.2	183.0	1.3	3.0	0.0	H-Horn	PK	0.0	56.0	74.0	-18.0	EUT on side
12310.000	38.4	17.2	232.0	1.2	3.0	0.0	V-Horn	PK	0.0	55.6	74.0	-18.4	EUT Vertical
4924.031	46.1	6.3	150.0	1.5	3.0	0.0	V-Horn	PK	0.0	52.4	74.0	-21.6	EUT Vertical
7386.000	39.5	12.0	279.0	1.8	3.0	0.0	V-Horn	PK	0.0	51.5	74.0	-22.5	EUT Vertical
4924.031	44.9	6.3	155.0	1.6	3.0	0.0	H-Horn	PK	0.0	51.2	74.0	-22.8	EUT on side
7386.000	39.1	12.0	234.0	1.3	3.0	0.0	H-Horn	PK	0.0	51.1	74.0	-22.9	EUT on side



