Zonar Systems, LLC

80446 Radio Module
Part 15.247
Fixed Frequency
Test Report

EMC Test Report

Report No. ZONA0022

Report Prepared By

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

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: May 17, 2011
Zonar Systems, LLC
Model: 80446

Emissions			
Test Description	**Specification**	**Test Method**	**Pass/Fail**
Occupied Bandwidth	FCC 15.247:2011	ANSI C63.10:2009	**Pass**
Output Power	FCC 15.247:2011	ANSI C63.10:2009	**Pass**
Band Edge Compliance	FCC 15.247:2011	ANSI C63.10:2009	**Pass**
Spurious Conducted Emissions	FCC 15.247:2011	ANSI C63.10:2009	**Pass**
Power Spectral Density	FCC 15.247:2011	ANSI C63.10:2009	**Pass**
Spurious Radiated Emissions	FCC 15.247:2011	ANSI C63.10:2009	**Pass**
AC Powerline Conducted Emissions	FCC 15.207:2011	ANSI C63.10:2009	**Pass**

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

Test Facility

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

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

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

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-2).

Approved By:

Don Facteau, IS Manager

NVLAP Lab Code: 200630-0

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

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

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

Accreditations and Authorizations

FCC

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

NVLAP

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

Industry Canada

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

CAB

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

Australia/New Zealand

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

Accreditations and Authorizations

VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).*

BSMI

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

GOST

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

KCC

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

VIETNAM

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

SCOPE

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

Northwest EMC Locations

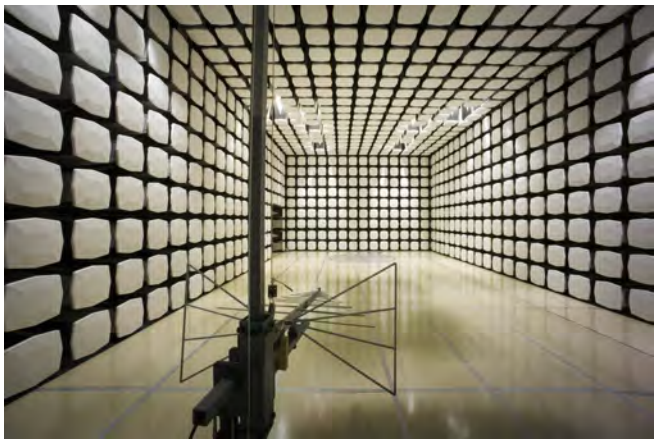
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

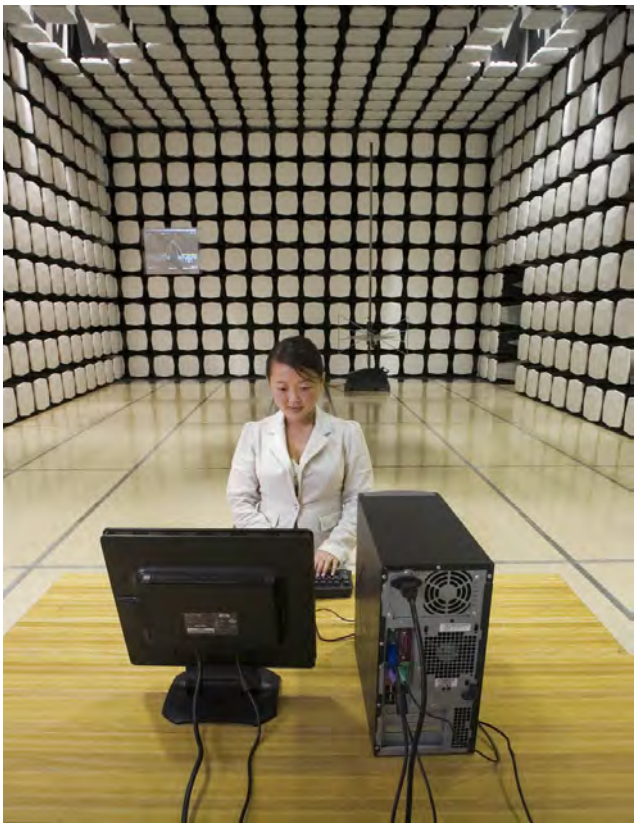
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

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:	Zonar Systems, LLC
Address:	18200 Cascade Ave. S Suite, 200
City, State, Zip:	Seattle, WA 98188
Test Requested By:	Cindy Ross
Model:	80446
First Date of Test:	April 8, 2011
Last Date of Test:	May 17, 2011
Receipt Date of Samples:	March 11, 2011
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
2.4 GHz ISM radio, 10 dBm EIRP expected output power.

Testing Objective:
To demonstrate compliance to FCC 15.247 requirements.

CONFIGURATION 2 ZONA0022

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Module	Zonar	80446	01087110018
Antenna	L-Com	HG2412P	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host PC	HP	RM161UT#ABA	CNF7377XQR
Configuration board	Chipcon	Smart RF04EB	0x47E2
Power Supply	HP	CTWBGTL0AM3YTRPQ	F12941014062356

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Yes	3.0m	No	Host PC	Configuration Board
Antenna Cable	Yes	1.5m	No	Radio Module	Antenna
DC Leads	No	1.5m	No	Power Supply	Host PC
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 3 ZONA0022

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Module	Zonar	80446	01087110018
Antenna	L-Com	HG2412P	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Configuration board	Chipcon	Smart RF04EB	0x47E2

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host PC	HP	RM161UT#ABA	CNF7377XQR
Power Supply	HP	CTWBGTL0AM3YTRPQ	F12941014062356

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Yes	3.0m	No	Host PC	Configuration Board
Antenna Cable	Yes	1.5m	No	Radio Module	Antenna
AC Leads	No	1.2m	No	Power Supply	AC Mains
DC Leads	No	1.5m	No	Power Supply	Host PC
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 1 ZONA0025

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Zonar	80894	1113NMQ00366934

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Configuration board	Chipcon	Smart RF04EB	0x47E2

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host PC	HP	RM161UT#ABA	CNF7377XQR
Power Supply	HP	CTWBGTL0AM3YTRPQ	F12941014062356

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Yes	3.0m	No	Host PC	Configuration Board
AC Leads	No	1.2m	No	Power Supply	AC Mains
DC Leads	No	1.5m	No	Power Supply	Host 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	4/8/2011	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.
2	4/8/2011	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.
3	4/8/2011	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.
4	4/8/2011	Power Spectral Density	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	4/8/2011	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.
6	4/11/2011	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.
7	4/13/2011	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.
8	5/17/2011	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Occupied Bandwidth

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
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	24
Signal Generator	Agilent	E8257D	TGX	3/22/2011	12
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	8/6/2010	12
40GHz DC Block	Miteq	DCB4000	AMD	8/5/2010	13
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24

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 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 with the typical modulation.

NORTHWEST EMC

Occupied Bandwidth

XMit 2011.03.03
PsaTx 2011.02.16

EUT:	80446			Work Order:	ZONA0022
Serial Number:	01087110018			Date:	04/08/11
Customer:	Zonar Systems, LLC			Temperature:	24.4°C
Attendees:	None			Humidity:	28%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	5VDC	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	2	Signature

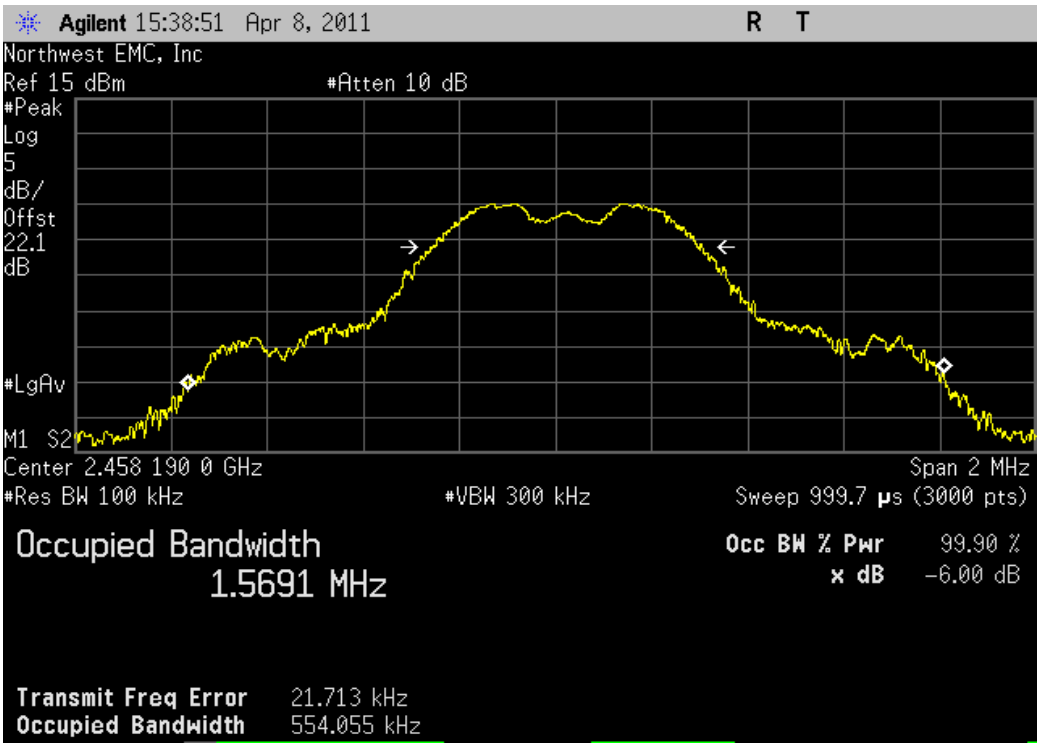
	Value	Limit	Result
Low	550.412 kHz	> 500 kHz	Pass
High	554.055 kHz	> 500 kHz	Pass
Mid	554.402 kHz	> 500 kHz	Pass

Low

Value	Limit	Result				
550.412 kHz	> 500 kHz	Pass				

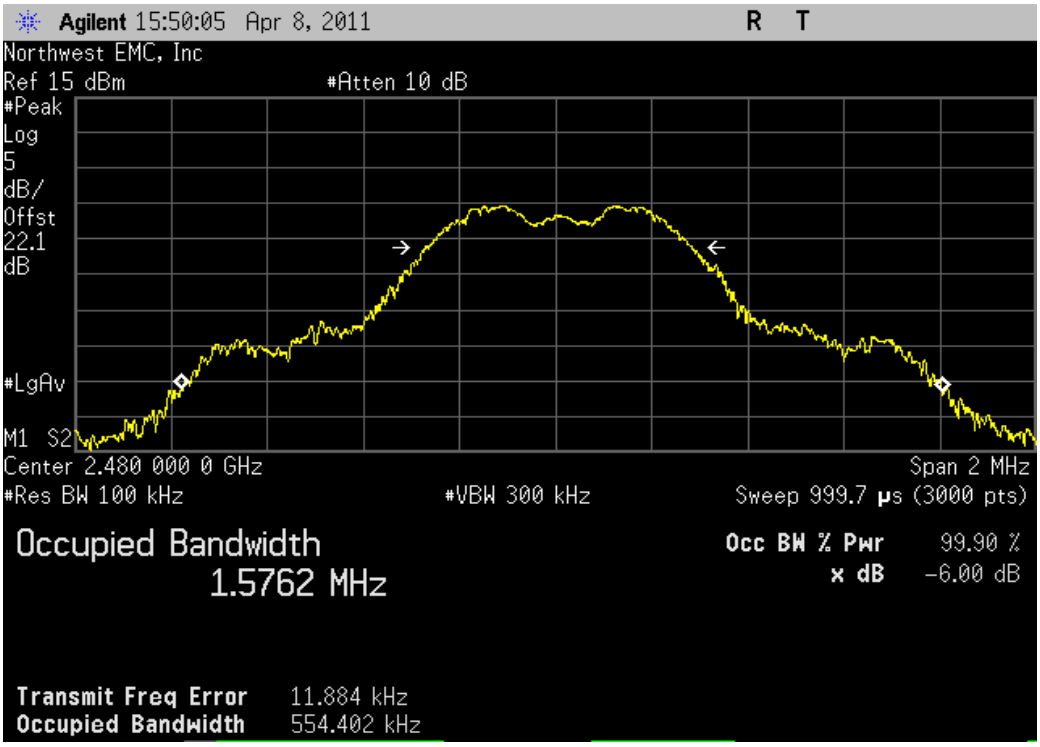
High

Value	Limit	Result				
554.055 kHz	> 500 kHz	Pass				



Mid

Value	Limit	Result				
554.402 kHz	> 500 kHz	Pass				



Output Power

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
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	24
Signal Generator	Agilent	E8257D	TGX	3/22/2011	12
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	8/6/2010	12
40GHz DC Block	Miteq	DCB4000	AMD	8/5/2010	13
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24

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.

NORTHWEST EMC

Output Power

XMit 2011.03.03
PsaTx 2011.02.16

EUT:	80446			Work Order:	ZONA0022
Serial Number:	01087110018			Date:	04/08/11
Customer:	Zonar Systems, LLC			Temperature:	24.4°C
Attendees:	None			Humidity:	28%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	5VDC	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

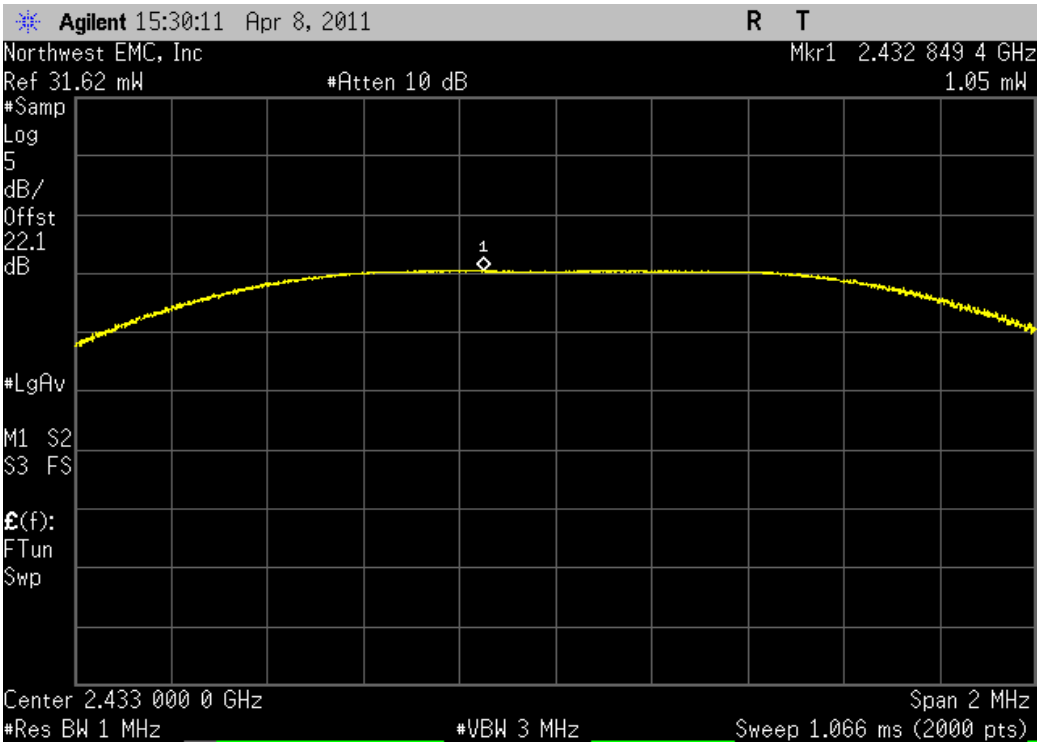
No Deviations

Configuration #	2	Signature

	Value	Limit	Result
Low	1.048 mW	< 125 mW	Pass
High	1.049 mW	< 125 mW	Pass
Mid	949.292 uW	< 125 mW	Pass

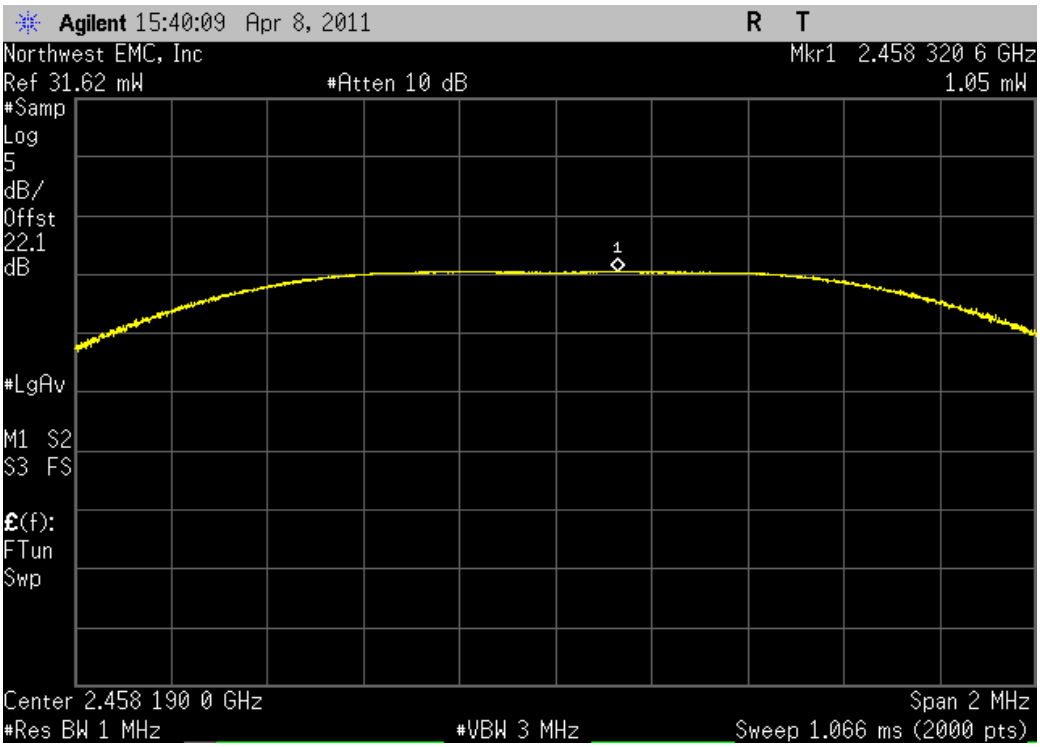
Low

Value	Limit	Result				
1.048 mW	< 125 mW	Pass				



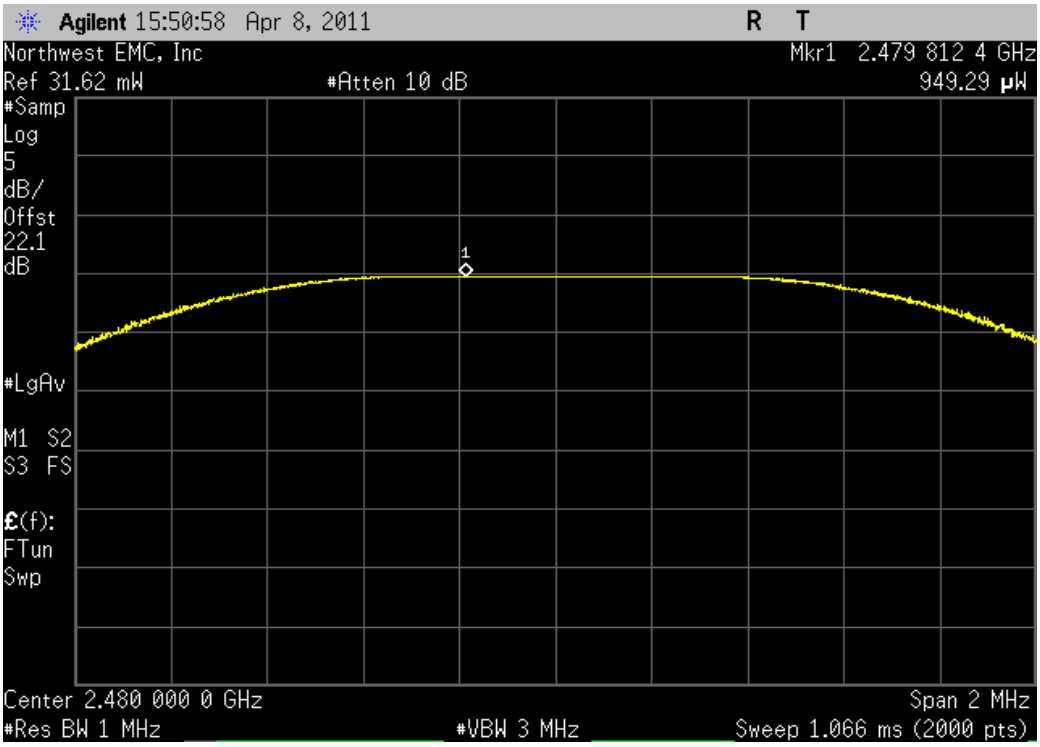
High

Value	Limit	Result				
1.049 mW	< 125 mW	Pass				



Mid

Value	Limit	Result				
949.292 uW	< 125 mW	Pass				



Band Edge Compliance

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
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	24
Signal Generator	Agilent	E8257D	TGX	3/22/2011	12
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	8/6/2010	12
40GHz DC Block	Miteq	DCB4000	AMD	8/5/2010	13
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24

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 requirements of FCC 15.247(d) for emissions at least 20dB below the carrier in any 100kHz bandwidth outside the allowable band was 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 10 MHz below the band edge to 10 MHz above the band edge.

NORTHWEST EMC

Band Edge Compliance

XMit 2011.03.03
PsaTx 2011.02.16

EUT:	80446			Work Order:	ZONA0022
Serial Number:	01087110018			Date:	04/08/11
Customer:	Zonar Systems, LLC			Temperature:	24.4°C
Attendees:	None			Humidity:	28%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	5VDC	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

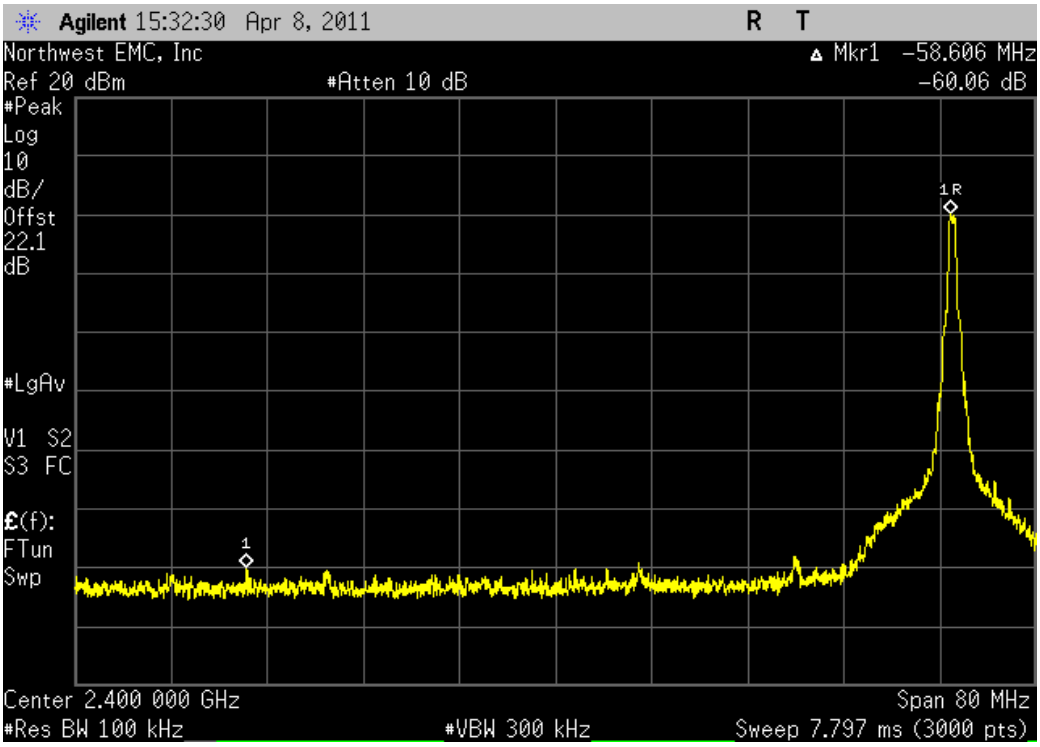
No Deviations

Configuration #	2	Signature

	Value	Limit	Result
Low	-60.07 dBc	≤ -20 dBc	Pass
High	-48.15 dBc	≤ -20 dBc	Pass

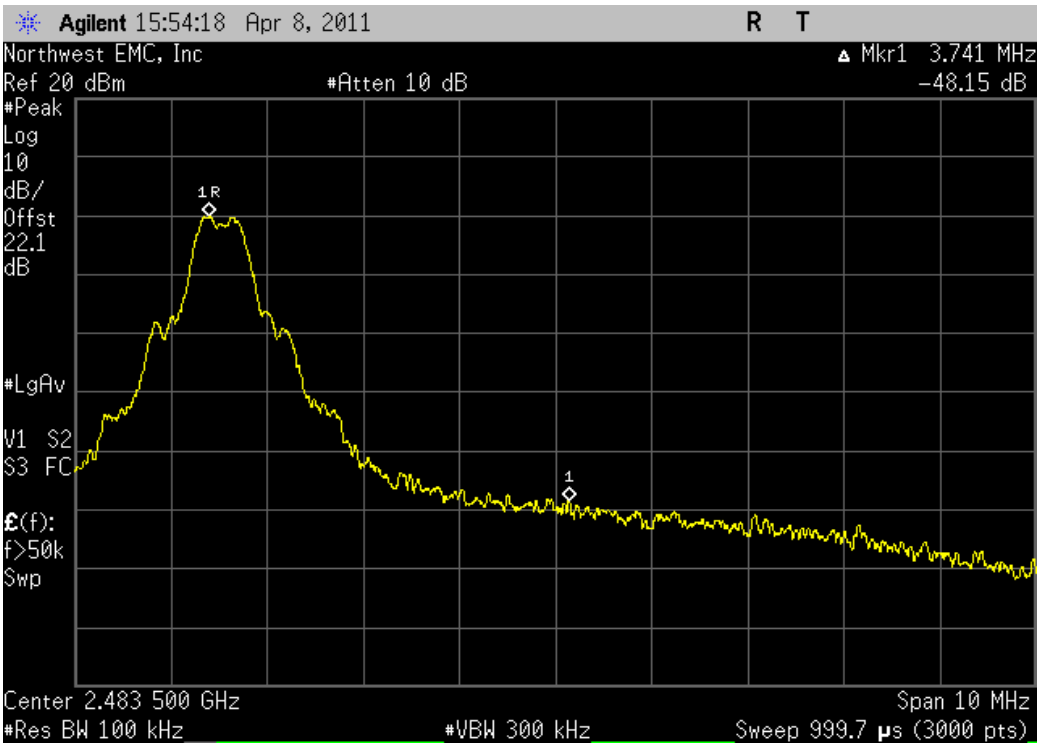
Low

Value	Limit	Result				
-60.07 dBc	≤ -20 dBc	Pass				



High

Value	Limit	Result				
-48.15 dBc	≤ -20 dBc	Pass				



Spurious Conducted 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	24
Signal Generator	Agilent	E8257D	TGX	3/22/2011	12
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	8/6/2010	12
40GHz DC Block	Miteq	DCB4000	AMD	8/5/2010	13
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24

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

NORTHWEST EMC

Spurious Conducted Emissions

XMit 2011.03.03
PsaTx 2011.02.16

EUT:	80446			Work Order:	ZONA0022
Serial Number:	01087110018			Date:	04/08/11
Customer:	Zonar Systems, LLC			Temperature:	24.4°C
Attendees:	None			Humidity:	28%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	5VDC	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

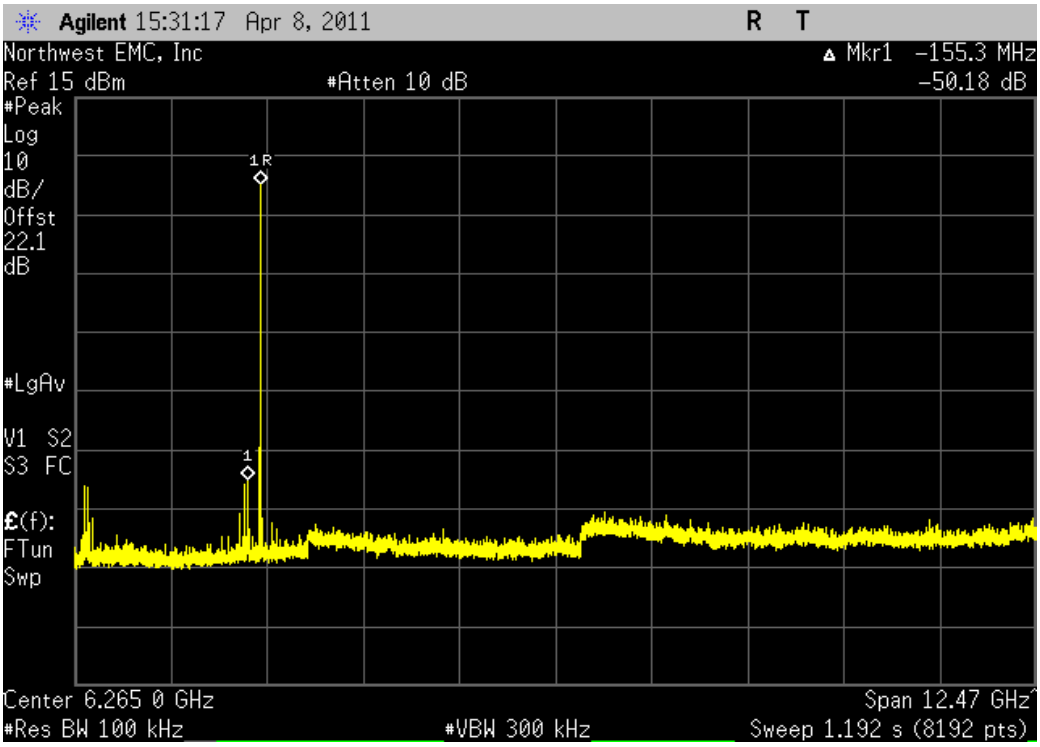
No Deviations

Configuration #	2	Signature

	Value	Limit	Result
Low	-50.18 dBc	≤ -20 dBc	Pass
Low	-52.57 dBc	≤ -20 dBc	Pass
High	-46.45 dBc	≤ -20 dBc	Pass
High	-51.83 dBc	≤ -20 dBc	Pass
Mid	-50.84 dBc	≤ -20 dBc	Pass
Mid	-51.96 dBc	≤ -20 dBc	Pass

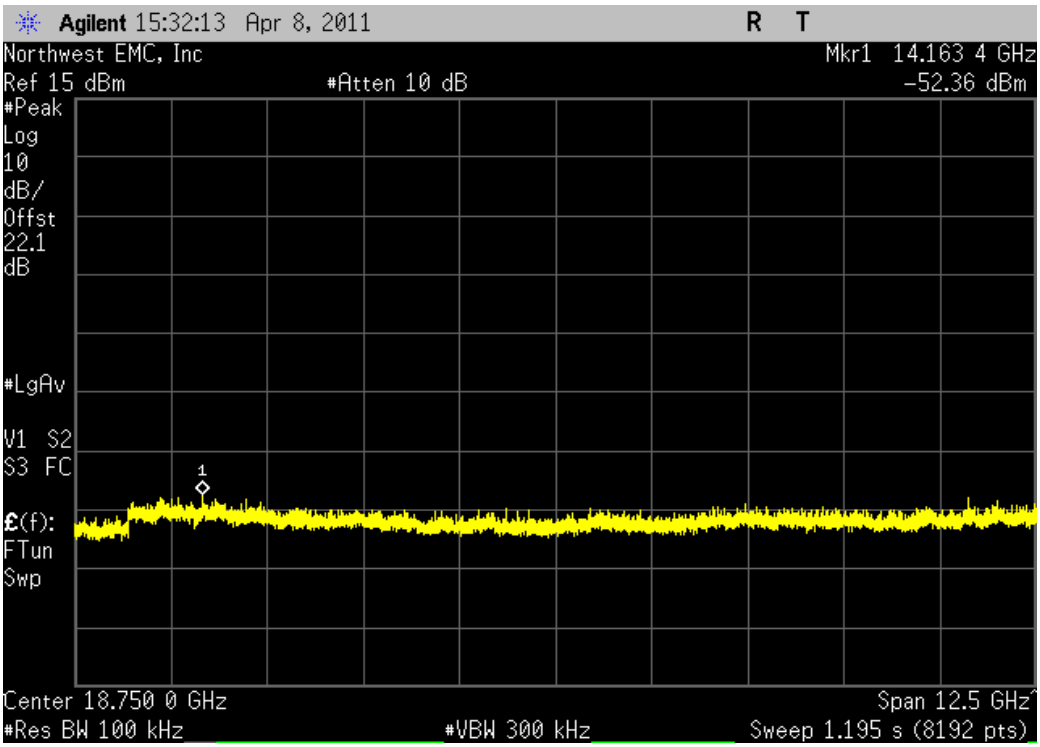
Low

Value	Limit	Result				
-50.18 dBc	≤ -20 dBc	Pass				



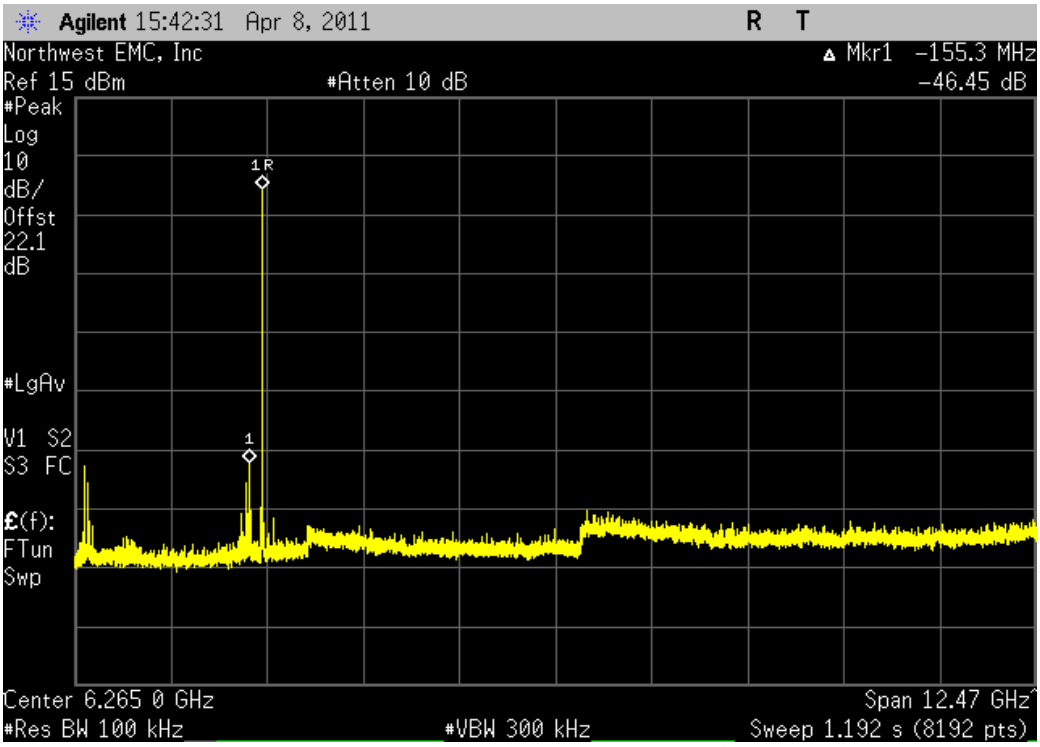
Low

Value	Limit	Result				
-52.57 dBc	≤ -20 dBc	Pass				



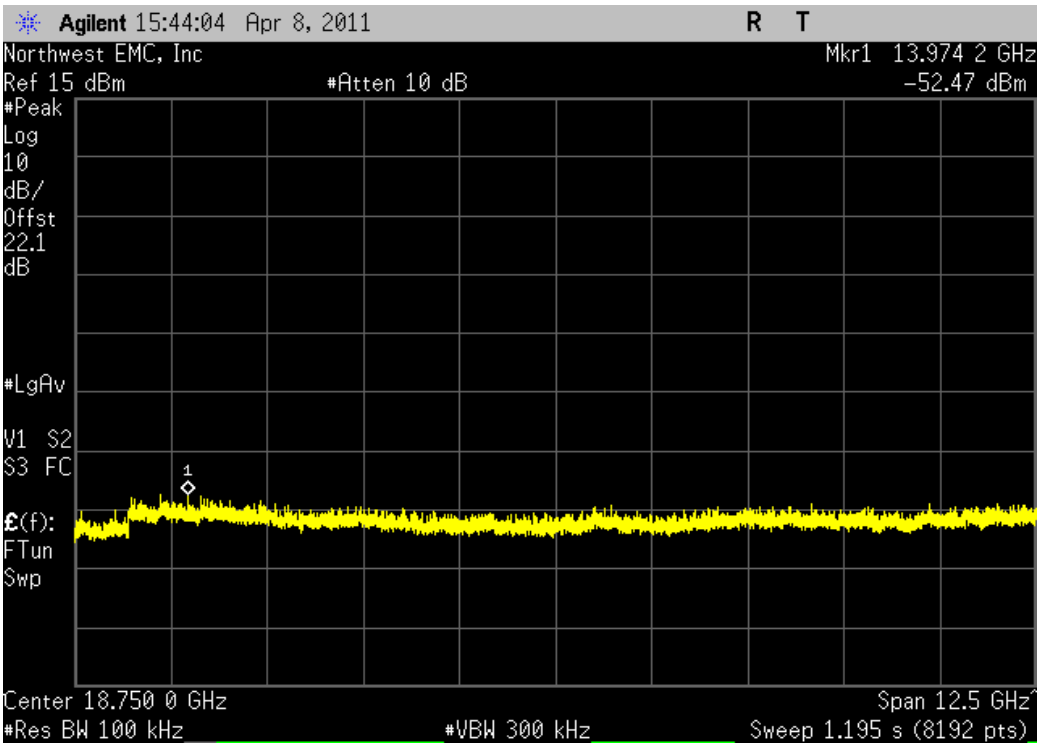
High

Value	Limit	Result				
-46.45 dBc	≤ -20 dBc	Pass				



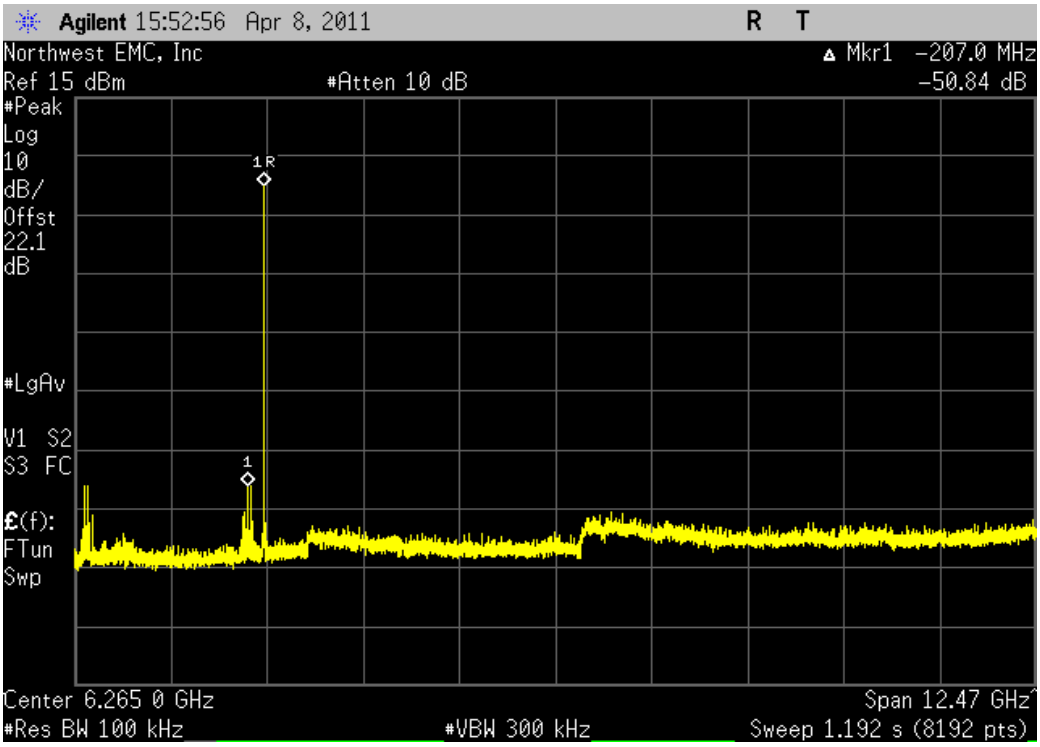
High

Value	Limit	Result				
-51.83 dBc	≤ -20 dBc	Pass				



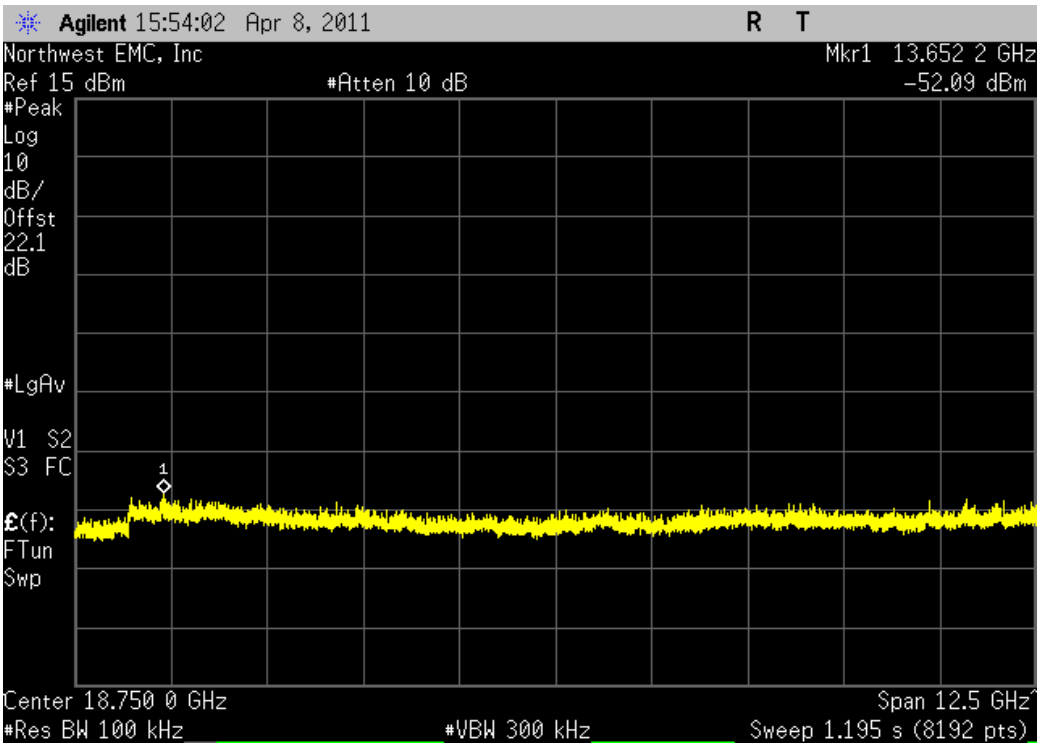
Mid

Value	Limit	Result				
-50.84 dBc	≤ -20 dBc	Pass				



Mid

Value	Limit	Result				
-51.96 dBc	≤ -20 dBc	Pass				



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
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	24
Signal Generator	Agilent	E8257D	TGX	3/22/2011	12
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	8/6/2010	12
40GHz DC Block	Miteq	DCB4000	AMD	8/5/2010	13
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24

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 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 for each modulation type available. ANSI C63.10:2009, Section 6.11.2.3 was followed. The spectrum analyzer was set as follows:

The emission peak was located and zoomed in on within the passband.

a) RBW = 3 kHz

b) VBW = 10 kHz

c) Span = 300 kHz

d) Sweep time = 100s

e) Trace set to MAX

f) The 1 hz Marker Noise function on the analyzer was used. The data was corrected to 3 kHz by adding 34.8 dB to the reading.

NORTHWEST EMC

Power Spectral Density

XMit 2011.03.03
PsaTx 2011.02.16

EUT:	80446			Work Order:	ZONA0022
Serial Number:	01087110018			Date:	04/08/11
Customer:	Zonar Systems, LLC			Temperature:	24.4°C
Attendees:	None			Humidity:	28%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	5VDC	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

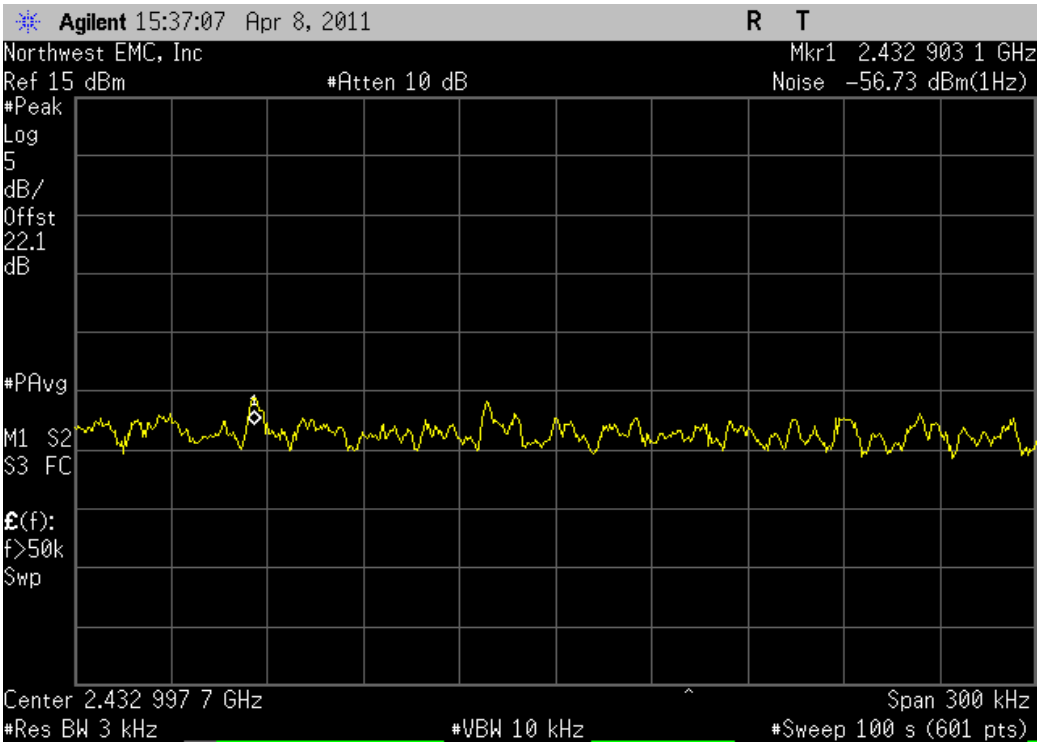
No Deviations

Configuration #	2	Signature

	Value	Limit	Result
Low	-21.929 dBm / 3 kHz	< 8 dBm / 3 kHz	Pass
High	-21.808 dBm / 3 kHz	< 8 dBm / 3 kHz	Pass
Mid	-22.285 dBm / 3 kHz	< 8 dBm / 3 kHz	Pass

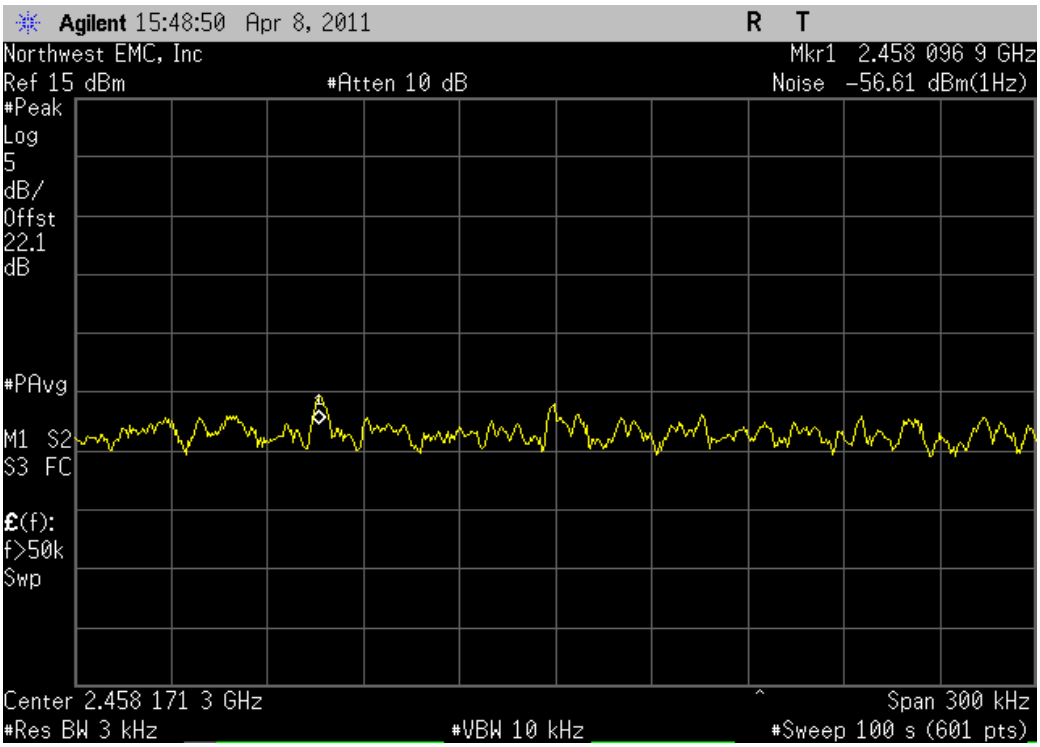
Low

Value	Limit	Result
-21.929 dBm / 3 kHz	< 8 dBm / 3 kHz	Pass



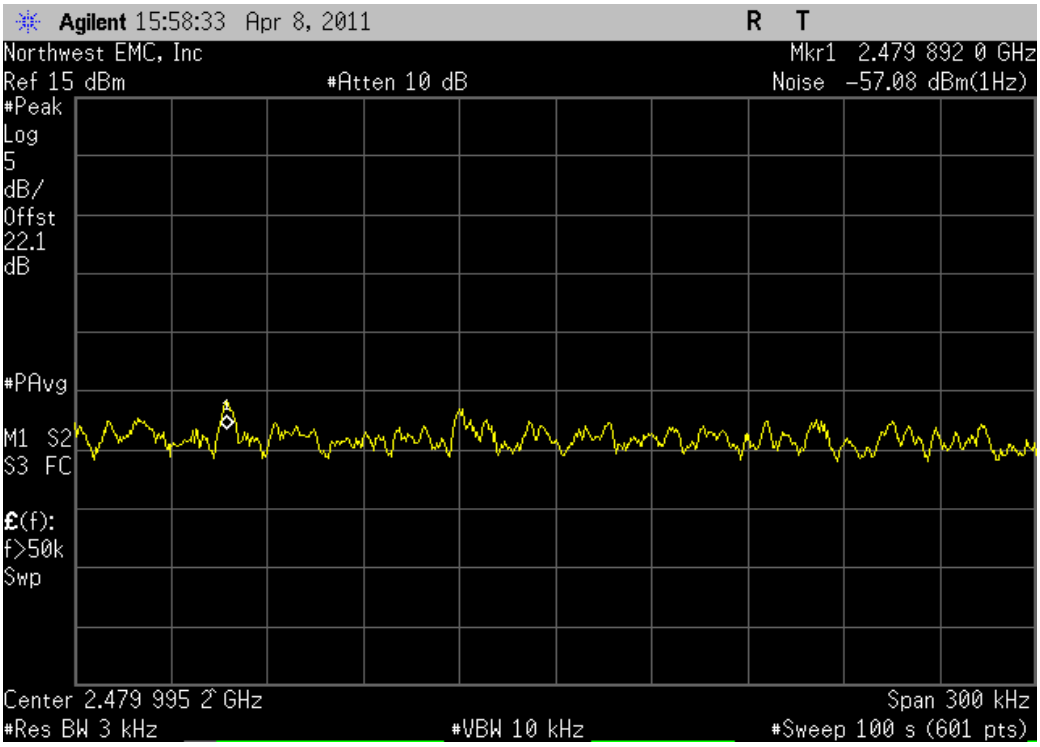
High

Value	Limit	Result
-21.808 dBm / 3 kHz	< 8 dBm / 3 kHz	Pass



Mid

Value	Limit	Result
-22.285 dBm / 3 k	≤ 8 dBm / 3 kHz	Pass



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 MSK modulation

POWER SETTINGS INVESTIGATED

5VDC

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
High Pass Filter	Micro-Tronics	50111	HGE	7/14/2010	24
Attenuator	Pasternack	PE7005-20	AUN	7/14/2010	12
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Antenna, Horn	ETS	3160.07	AHZ	9/8/2010	24
Antenna, Horn	ETS	3115	AIB	9/8/2010	24
Antenna, Biconilog	EMCO	3141	AXG	3/15/2010	24
Cable	ESM Cable Corp.	KMKM-72	EVY	9/15/2010	12
EV12 Cables	N/A	Standard Gain Horn Cables	EVU	7/14/2010	12
EV12 Cables	N/A	Double Ridge Horn Cables	EVT	11/22/2010	12
EV12 Cables	N/A	Bilog Cables	EVS	7/14/2010	12
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/15/2010	12
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	7/14/2010	12
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	12
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/14/2010	12
Pre-Amplifier	Miteq	AM-1616-1000	AVM	7/14/2010	12

MEASUREMENT BANDWIDTHS

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

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

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2008.07.21
EMI 2008.1.9

EUT:	80446	Work Order:	ZONA0022
Serial Number:	None	Date:	04/11/11
Customer:	Zonar Systems, LLC	Temperature:	21.4
Attendees:	None	Humidity:	20%
Project:	None	Barometric Pres.:	1021
Tested by:	Ethan Schoonover	Power: 5VDC	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

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

COMMENTS

L-Com Mini Panel Antenna

EUT OPERATING MODES

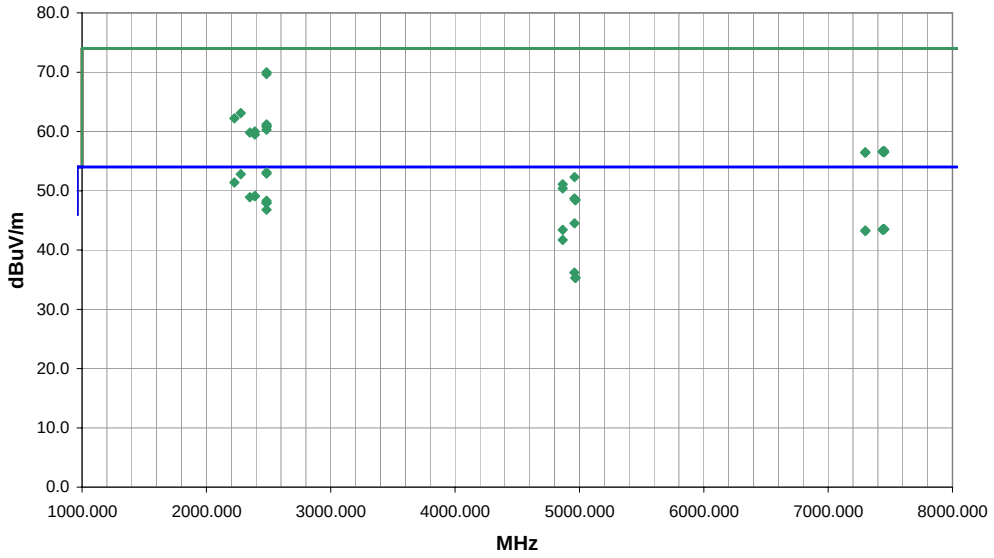
Tx MSK modulation

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	3
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.500	33.2	-0.1	317.0	1.0	3.0	20.0	V-Horn	AV	0.0	53.1	54.0	-0.9	EUT Vert. High Channel
2483.500	33.0	-0.1	334.0	1.0	3.0	20.0	H-Horn	AV	0.0	52.9	54.0	-1.1	EUT On side. High Channel
2277.000	43.3	-0.5	337.0	1.0	3.0	10.0	H-Horn	AV	0.0	52.8	54.0	-1.2	EUT Vert. Low Channel
2225.043	32.1	-0.7	334.0	1.0	3.0	20.0	H-Horn	AV	0.0	51.4	54.0	-2.6	EUT Vert. Low Channel
2483.507	50.1	-0.1	317.0	1.0	3.0	20.0	V-Horn	PK	0.0	70.0	74.0	-4.0	EUT Vert. High Channel
2483.692	49.8	-0.1	334.0	1.0	3.0	20.0	H-Horn	PK	0.0	69.7	74.0	-4.3	EUT On side. High Channel
2389.452	29.4	-0.3	160.0	1.0	3.0	20.0	V-Horn	AV	0.0	49.1	54.0	-4.9	EUT Vert. Low Channel
2389.838	29.4	-0.3	40.0	1.0	3.0	20.0	H-Horn	AV	0.0	49.1	54.0	-4.9	EUT Vert. Low Channel
2349.920	29.3	-0.4	148.0	1.5	3.0	20.0	V-Horn	AV	0.0	48.9	54.0	-5.1	EUT Vert. Low Channel
2483.082	28.4	-0.1	42.0	1.0	3.0	20.0	H-Horn	AV	0.0	48.3	54.0	-5.7	EUT Horz. High Channel
2483.560	28.1	-0.1	238.0	1.0	3.0	20.0	V-Horn	AV	0.0	48.0	54.0	-6.0	EUT Horz. High Channel
2483.643	28.0	-0.1	294.0	1.0	3.0	20.0	H-Horn	AV	0.0	47.9	54.0	-6.1	EUT Vert. High Channel
2483.970	26.9	-0.1	194.0	1.0	3.0	20.0	V-Horn	AV	0.0	46.8	54.0	-7.2	EUT On side. High Channel
4960.040	34.9	9.6	209.0	1.0	3.0	0.0	V-Horn	AV	0.0	44.5	54.0	-9.5	EUT Vert. High Channel
7440.317	24.8	18.7	30.0	3.2	3.0	0.0	H-Horn	AV	0.0	43.5	54.0	-10.5	EUT Vert. High Channel
7449.637	24.8	18.7	315.0	2.9	3.0	0.0	V-Horn	AV	0.0	43.5	54.0	-10.5	EUT Vert. Mid Channel
7451.200	24.8	18.7	38.0	1.0	3.0	0.0	H-Horn	AV	0.0	43.5	54.0	-10.5	EUT Vert. Mid Channel
7439.440	24.7	18.7	106.0	1.1	3.0	0.0	V-Horn	AV	0.0	43.4	54.0	-10.6	EUT Vert. High Channel
4866.073	34.2	9.2	156.0	1.3	3.0	0.0	V-Horn	AV	0.0	43.4	54.0	-10.6	EUT Vert. Low Channel
7299.177	25.2	18.1	145.0	1.1	3.0	0.0	V-Horn	AV	0.0	43.3	54.0	-10.7	EUT Vert. Low Channel
7300.337	25.1	18.1	266.0	1.1	3.0	0.0	H-Horn	AV	0.0	43.2	54.0	-10.8	EUT Vert. Low Channel
2277.110	43.6	-0.5	338.0	1.0	3.0	20.0	H-Horn	PK	0.0	63.1	74.0	-10.9	EUT Vert. Low Channel
2224.923	42.9	-0.7	334.0	1.0	3.0	20.0	H-Horn	PK	0.0	62.2	74.0	-11.8	EUT Vert. Low Channel
4866.040	32.5	9.2	172.0	1.0	3.0	0.0	H-Horn	AV	0.0	41.7	54.0	-12.3	EUT Vert. Low Channel
2483.730	41.3	-0.1	238.0	1.0	3.0	20.0	V-Horn	PK	0.0	61.2	74.0	-12.8	EUT Horz. High Channel
2483.607	41.0	-0.1	42.0	1.0	3.0	20.0	H-Horn	PK	0.0	60.9	74.0	-13.1	EUT Horz. High Channel
2484.293	40.9	-0.1	294.0	1.0	3.0	20.0	H-Horn	PK	0.0	60.8	74.0	-13.2	EUT Vert. High Channel
2483.568	40.4	-0.1	194.0	1.0	3.0	20.0	V-Horn	PK	0.0	60.3	74.0	-13.7	EUT On side. High Channel
2389.867	40.3	-0.3	40.0	1.0	3.0	20.0	H-Horn	PK	0.0	60.0	74.0	-14.0	EUT Vert. Low Channel
2349.915	40.2	-0.4	148.0	1.5	3.0	20.0	V-Horn	PK	0.0	59.8	74.0	-14.2	EUT Vert. Low Channel
2389.512	39.8	-0.3	160.0	1.0	3.0	20.0	V-Horn	PK	0.0	59.5	74.0	-14.5	EUT Vert. Low Channel
7450.810	38.0	18.7	315.0	2.9	3.0	0.0	V-Horn	PK	0.0	56.7	74.0	-17.3	EUT Vert. Mid Channel
7439.307	37.9	18.7	106.0	1.1	3.0	0.0	V-Horn	PK	0.0	56.6	74.0	-17.4	EUT Vert. High Channel
7439.523	37.9	18.7	30.0	3.2	3.0	0.0	H-Horn	PK	0.0	56.6	74.0	-17.4	EUT Vert. High Channel
7298.307	38.4	18.1	145.0	1.1	3.0	0.0	V-Horn	PK	0.0	56.5	74.0	-17.5	EUT Vert. Low Channel
7449.987	37.8	18.7	38.0	1.0	3.0	0.0	H-Horn	PK	0.0	56.5	74.0	-17.5	EUT Vert. Mid Channel
7298.827	38.3	18.1	266.0	1.1	3.0	0.0	H-Horn	PK	0.0	56.4	74.0	-17.6	EUT Vert. Low Channel
4960.007	26.6	9.6	132.0	1.7	3.0	0.0	H-Horn	AV	0.0	36.2	54.0	-17.8	EUT Vert. High Channel

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
4966.677	25.7	9.6	188.0	1.0	3.0	0.0	V-Horn	AV	0.0	35.3	54.0	-18.7	EUT Vert. Mid Channel
4968.427	25.7	9.6	246.0	1.0	3.0	0.0	H-Horn	AV	0.0	35.3	54.0	-18.7	EUT Vert. Mid Channel
4960.040	42.7	9.6	209.0	1.0	3.0	0.0	V-Horn	PK	0.0	52.3	74.0	-21.7	EUT Vert. High Channel
4865.997	41.9	9.2	156.0	1.3	3.0	0.0	V-Horn	PK	0.0	51.1	74.0	-22.9	EUT Vert. Low Channel
4865.873	41.2	9.2	172.0	1.0	3.0	0.0	H-Horn	PK	0.0	50.4	74.0	-23.6	EUT Vert. Low Channel
4959.937	39.1	9.6	132.0	1.7	3.0	0.0	H-Horn	PK	0.0	48.7	74.0	-25.3	EUT Vert. High Channel
4967.787	38.9	9.6	246.0	1.0	3.0	0.0	H-Horn	PK	0.0	48.5	74.0	-25.5	EUT Vert. Mid Channel
4967.343	38.8	9.6	188.0	1.0	3.0	0.0	V-Horn	PK	0.0	48.4	74.0	-25.6	EUT Vert. Mid Channel

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 MSK modulation

POWER SETTINGS INVESTIGATED

5VDC

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	26GHz

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
High Pass Filter	Micro-Tronics	50111	HGE	7/14/2010	24
Attenuator	Pasternack	PE7005-20	AUN	7/14/2010	12
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Antenna, Horn	ETS	3160.07	AHZ	9/8/2010	24
Antenna, Horn	ETS	3115	AIB	9/8/2010	24
Antenna, Biconilog	EMCO	3141	AXG	3/15/2010	24
Cable	ESM Cable Corp.	KMKM-72	EVY	9/15/2010	12
EV12 Cables	N/A	Standard Gain Horn Cables	EVU	7/14/2010	12
EV12 Cables	N/A	Double Ridge Horn Cables	EVT	11/22/2010	12
EV12 Cables	N/A	Bilog Cables	EVS	7/14/2010	12
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/15/2010	12
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	7/14/2010	12
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	12
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/14/2010	12
Pre-Amplifier	Miteq	AM-1616-1000	AVM	7/14/2010	12
Spectrum Analyzer	Agilent	E4440A	AAW	4/19/2011	12

MEASUREMENT BANDWIDTHS

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

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

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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

NORTHWEST EMC

Spurious Radiated Emissions

PSA 2011.05.11
EMI 2008.1.9

EUT:	RF80446	Work Order:	ZONA0025
Serial Number:	1113NMQ00366934	Date:	05/17/11
Customer:	Zonar Systems, LLC	Temperature:	22.1
Attendees:	none	Humidity:	31%
Project:	None	Barometric Pres.:	1019
Tested by:	Ethan Schoonover	Power: 5VDC	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247:2011	ANSI C63.10:2009

TEST PARAMETERS

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

COMMENTS

PCB Etch antenna

EUT OPERATING MODES

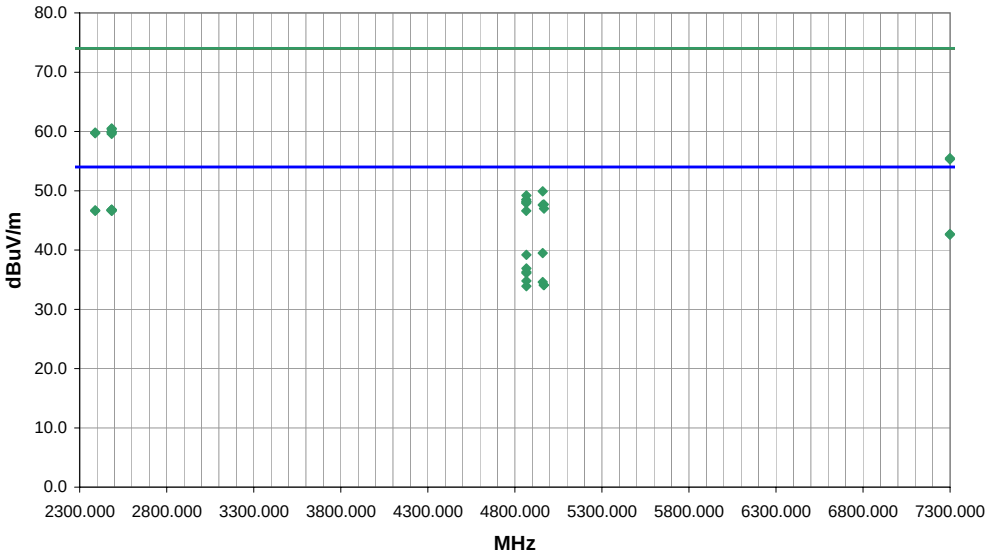
Tx MSK modulation

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.500	26.9	-0.1	268.0	1.0	3.0	20.0	H-Horn	AV	0.0	46.8	54.0	-7.2	EUT On side. High Channel.
2483.500	26.9	-0.1	186.0	1.0	3.0	20.0	V-Horn	AV	0.0	46.8	54.0	-7.2	EUT Vert. High Channel.
2389.500	27.0	-0.3	105.0	1.0	3.0	20.0	V-Horn	AV	0.0	46.7	54.0	-7.3	EUT Vert. Low Channel.
2483.500	26.8	-0.1	339.0	1.0	3.0	20.0	H-Horn	AV	0.0	46.7	54.0	-7.3	EUT Horz. High Channel.
2483.500	26.8	-0.1	21.0	1.0	3.0	20.0	V-Horn	AV	0.0	46.7	54.0	-7.3	EUT Horz. High Channel.
2483.500	26.8	-0.1	53.0	1.0	3.0	20.0	V-Horn	AV	0.0	46.7	54.0	-7.3	EUT On side. High Channel.
2389.500	26.9	-0.3	193.0	1.5	3.0	20.0	H-Horn	AV	0.0	46.6	54.0	-7.4	EUT Vert. Low Channel.
2483.500	26.7	-0.1	349.0	1.0	3.0	20.0	H-Horn	AV	0.0	46.6	54.0	-7.4	EUT Vert. High Channel.
7299.063	24.6	18.1	97.0	1.4	3.0	0.0	V-Horn	AV	0.0	42.7	54.0	-11.3	EUT Vert. Low Channel.
7298.720	24.5	18.1	249.0	2.8	3.0	0.0	H-Horn	AV	0.0	42.6	54.0	-11.4	EUT Vert. Low Channel.
2483.500	40.6	-0.1	339.0	1.0	3.0	20.0	H-Horn	PK	0.0	60.5	74.0	-13.5	EUT Horz. High Channel.
2483.500	40.5	-0.1	21.0	1.0	3.0	20.0	V-Horn	PK	0.0	60.4	74.0	-13.6	EUT Horz. High Channel.
2483.500	40.1	-0.1	186.0	1.0	3.0	20.0	V-Horn	PK	0.0	60.0	74.0	-14.0	EUT Vert. High Channel.
2483.500	40.0	-0.1	349.0	1.0	3.0	20.0	H-Horn	PK	0.0	59.9	74.0	-14.1	EUT Vert. High Channel.
2389.500	40.1	-0.3	193.0	1.5	3.0	20.0	H-Horn	PK	0.0	59.8	74.0	-14.2	EUT Vert. Low Channel.
2483.500	39.9	-0.1	268.0	1.0	3.0	20.0	H-Horn	PK	0.0	59.8	74.0	-14.2	EUT On side. High Channel.
2389.500	40.0	-0.3	105.0	1.0	3.0	20.0	V-Horn	PK	0.0	59.7	74.0	-14.3	EUT Vert. Low Channel.
2483.500	39.7	-0.1	53.0	1.0	3.0	20.0	V-Horn	PK	0.0	59.6	74.0	-14.4	EUT On side. High Channel.
4959.960	29.9	9.6	141.0	1.0	3.0	0.0	H-Horn	AV	0.0	39.5	54.0	-14.5	EUT Vert. High Channel.
4865.985	30.0	9.2	79.0	1.7	3.0	0.0	H-Horn	AV	0.0	39.2	54.0	-14.8	EUT On Side. Low Channel.
4865.957	27.7	9.2	275.0	1.0	3.0	0.0	V-Horn	AV	0.0	36.9	54.0	-17.1	EUT Vert. Low Channel.
4865.965	27.1	9.2	244.0	1.6	3.0	0.0	V-Horn	AV	0.0	36.3	54.0	-17.7	EUT Horz. Low Channel.
4865.988	26.9	9.2	259.0	1.7	3.0	0.0	H-Horn	AV	0.0	36.1	54.0	-17.9	EUT Vert. Low Channel.
7299.020	37.4	18.1	249.0	2.8	3.0	0.0	H-Horn	PK	0.0	55.5	74.0	-18.5	EUT Vert. Low Channel.
7299.077	37.2	18.1	97.0	1.4	3.0	0.0	V-Horn	PK	0.0	55.3	74.0	-18.7	EUT Vert. Low Channel.
4865.922	25.6	9.2	243.0	1.7	3.0	0.0	H-Horn	AV	0.0	34.8	54.0	-19.2	EUT Horz. Low Channel.
4959.840	25.0	9.6	74.0	1.7	3.0	0.0	V-Horn	AV	0.0	34.6	54.0	-19.4	EUT Vert. High Channel.
4966.162	24.5	9.6	305.0	2.6	3.0	0.0	H-Horn	AV	0.0	34.1	54.0	-19.9	EUT Vert. Mid Channel.
4966.617	24.5	9.6	254.0	1.1	3.0	0.0	V-Horn	AV	0.0	34.1	54.0	-19.9	EUT Vert. Mid Channel.
4866.015	24.7	9.2	34.0	1.3	3.0	0.0	V-Horn	AV	0.0	33.9	54.0	-20.1	EUT On Side. Low Channel.
4959.978	40.3	9.6	141.0	1.0	3.0	0.0	H-Horn	PK	0.0	49.9	74.0	-24.1	EUT Vert. High Channel.
4866.363	40.0	9.2	79.0	1.7	3.0	0.0	H-Horn	PK	0.0	49.2	74.0	-24.8	EUT On Side. Low Channel.
4865.637	39.3	9.2	275.0	1.0	3.0	0.0	V-Horn	PK	0.0	48.5	74.0	-25.5	EUT Vert. Low Channel.
4865.848	39.0	9.2	259.0	1.7	3.0	0.0	H-Horn	PK	0.0	48.2	74.0	-25.8	EUT Vert. Low Channel.
4866.182	38.9	9.2	244.0	1.6	3.0	0.0	V-Horn	PK	0.0	48.1	74.0	-25.9	EUT Horz. Low Channel.
4865.520	38.7	9.2	243.0	1.7	3.0	0.0	H-Horn	PK	0.0	47.9	74.0	-26.1	EUT Horz. Low Channel.
4966.600	38.1	9.6	254.0	1.1	3.0	0.0	V-Horn	PK	0.0	47.7	74.0	-26.3	EUT Vert. Mid Channel.
4959.698	38.0	9.6	74.0	1.7	3.0	0.0	V-Horn	PK	0.0	47.6	74.0	-26.4	EUT Vert. High Channel.

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
4967.092	37.4	9.6	305.0	2.6	3.0	0.0	H-Horn	PK	0.0	47.0	74.0	-27.0	EUT Vert. Mid Channel.
4865.630	37.4	9.2	34.0	1.3	3.0	0.0	V-Horn	PK	0.0	46.6	74.0	-27.4	EUT On Side. Low Channel.

AC POWERLINE CONDUCTED 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 MSK modulation

POWER SETTINGS INVESTIGATED

5VDC

CONFIGURATIONS INVESTIGATED

ZONA0022 - 2

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Receiver	Rohde & Schwarz	ESCI	ARH	3/30/2011	12 mo
EV07 Cables	N/A	Conducted Cables	EVG	6/21/2010	12 mo
Attenuator	Coaxicom	66702 2910-20	ATO	8/6/2010	12 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	2/9/2011	24 mo
LISN	Solar	9252-50-R-24-BNC	LIN	5/27/2010	12 mo

MEASUREMENT BANDWIDTHS

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

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

MEASUREMENT UNCERTAINTY

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 EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

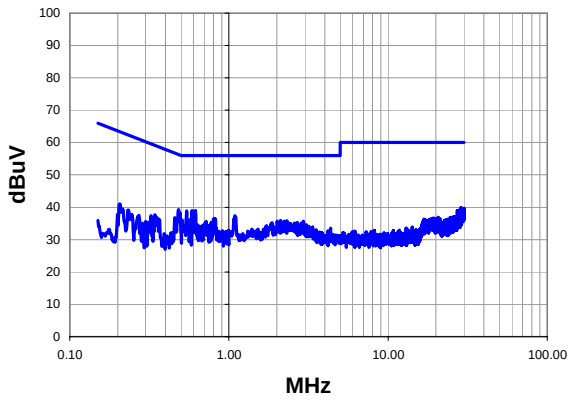
PSA-ESCI 2010.04.06
Version 2010.4.15

Work Order:	ZONA0022	**Date:**	04/13/11		
Project:	None	**Temperature:**	21.4		
Job Site:	EV07	**Humidity:**	20		
Serial Number:	None	**Barometric Pres.:**	1021	**Tested by:**	Ethan Schoonover
EUT:	80446				
Configuration:	2 - CE and OB				
Customer:	Zonar Systems, LLC				
Attendees:	None				
EUT Power:	5VDC				
Operating Mode:	Tx MSK modulation				
Deviations:	No deviations.				
Comments:	Low Channel.				

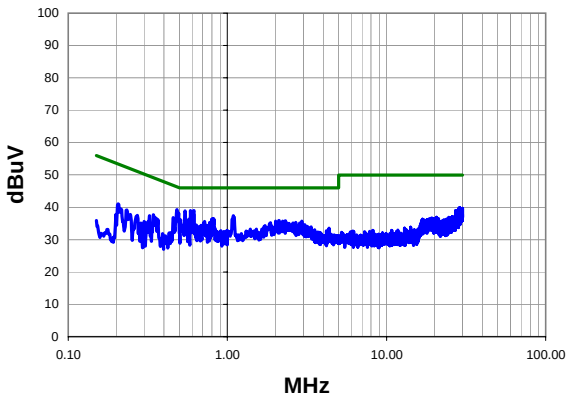
Test Specifications	**Test Method**
FCC 15.207:2011	ANSI C63.10:2009

Run #	1	**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)
0.483	19.1	20.2	39.3	56.3	-17.0
0.587	18.8	20.2	39.0	56.0	-17.0
0.614	18.8	20.2	39.0	56.0	-17.0
0.543	18.7	20.2	38.9	56.0	-17.1
1.088	17.2	20.2	37.4	56.0	-18.6
0.811	16.3	20.2	36.5	56.0	-19.5
0.573	16.1	20.2	36.3	56.0	-19.7
0.507	15.9	20.2	36.1	56.0	-19.9
0.456	16.6	20.2	36.8	56.8	-20.0
2.104	15.7	20.2	35.9	56.0	-20.1
0.595	15.7	20.2	35.9	56.0	-20.1
2.320	15.6	20.2	35.8	56.0	-20.2
28.930	18.2	21.6	39.8	60.0	-20.2
28.800	18.2	21.6	39.8	60.0	-20.2
2.936	15.5	20.2	35.7	56.0	-20.3
28.580	18.2	21.5	39.7	60.0	-20.3
2.008	15.5	20.2	35.7	56.0	-20.3
2.224	15.5	20.2	35.7	56.0	-20.3
29.980	18.0	21.6	39.6	60.0	-20.4
0.719	15.4	20.2	35.6	56.0	-20.4

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.483	19.1	20.2	39.3	46.3	-7.0
0.587	18.8	20.2	39.0	46.0	-7.0
0.614	18.8	20.2	39.0	46.0	-7.0
0.543	18.7	20.2	38.9	46.0	-7.1
1.088	17.2	20.2	37.4	46.0	-8.6
0.811	16.3	20.2	36.5	46.0	-9.5
0.573	16.1	20.2	36.3	46.0	-9.7
0.507	15.9	20.2	36.1	46.0	-9.9
0.456	16.6	20.2	36.8	46.8	-10.0
2.104	15.7	20.2	35.9	46.0	-10.1
0.595	15.7	20.2	35.9	46.0	-10.1
2.320	15.6	20.2	35.8	46.0	-10.2
28.930	18.2	21.6	39.8	50.0	-10.2
28.800	18.2	21.6	39.8	50.0	-10.2
2.936	15.5	20.2	35.7	46.0	-10.3
28.580	18.2	21.5	39.7	50.0	-10.3
2.008	15.5	20.2	35.7	46.0	-10.3
2.224	15.5	20.2	35.7	46.0	-10.3
29.980	18.0	21.6	39.6	50.0	-10.4
0.719	15.4	20.2	35.6	46.0	-10.4

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

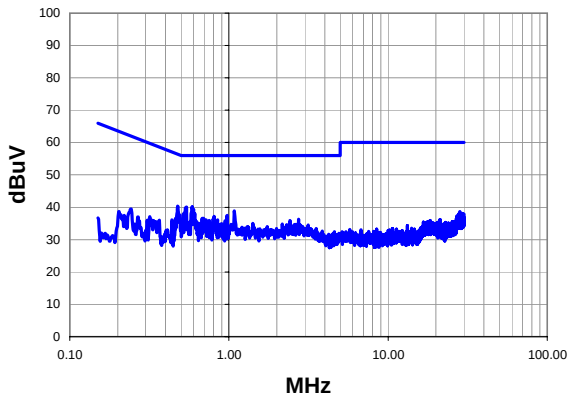
PSA-ESCI 2010.04.06
Version 2010.4.15

Work Order:	ZONA0022	**Date:**	04/13/11		
Project:	None	**Temperature:**	21.4		
Job Site:	EV07	**Humidity:**	20		
Serial Number:	None	**Barometric Pres.:**	1021	**Tested by:**	Ethan Schoonover
EUT:	80446				
Configuration:	2 - CE and OB				
Customer:	Zonar Systems, LLC				
Attendees:	None				
EUT Power:	5VDC				
Operating Mode:	Tx MSK modulation				
Deviations:	No deviations.				
Comments:	Low Channel.				

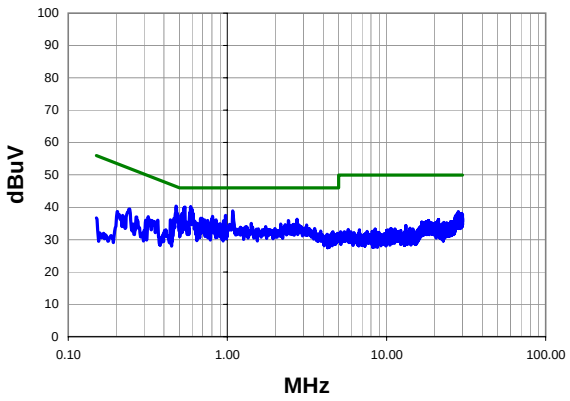
Test Specifications	**Test Method**
FCC 15.207:2011	ANSI C63.10:2009

Run #	2	**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)
0.589	20.0	20.2	40.2	56.0	-15.8
0.539	19.9	20.2	40.1	56.0	-15.9
0.476	20.2	20.2	40.4	56.4	-16.0
0.599	19.2	20.2	39.4	56.0	-16.6
1.080	18.7	20.2	38.9	56.0	-17.1
0.609	17.9	20.2	38.1	56.0	-17.9
0.517	17.8	20.2	38.0	56.0	-18.0
0.974	17.3	20.2	37.5	56.0	-18.5
0.806	17.0	20.2	37.2	56.0	-18.8
0.679	16.4	20.2	36.6	56.0	-19.4
0.694	16.4	20.2	36.6	56.0	-19.4
0.796	16.2	20.2	36.4	56.0	-19.6
2.736	16.1	20.2	36.3	56.0	-19.7
0.718	15.9	20.2	36.1	56.0	-19.9
0.849	15.9	20.2	36.1	56.0	-19.9
2.416	15.7	20.2	35.9	56.0	-20.1
0.750	15.7	20.2	35.9	56.0	-20.1
0.946	15.6	20.2	35.8	56.0	-20.2
0.567	15.2	20.2	35.4	56.0	-20.6
0.760	15.0	20.2	35.2	56.0	-20.8

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.589	20.0	20.2	40.2	46.0	-5.8
0.539	19.9	20.2	40.1	46.0	-5.9
0.476	20.2	20.2	40.4	46.4	-6.0
0.599	19.2	20.2	39.4	46.0	-6.6
1.080	18.7	20.2	38.9	46.0	-7.1
0.609	17.9	20.2	38.1	46.0	-7.9
0.517	17.8	20.2	38.0	46.0	-8.0
0.974	17.3	20.2	37.5	46.0	-8.5
0.806	17.0	20.2	37.2	46.0	-8.8
0.679	16.4	20.2	36.6	46.0	-9.4
0.694	16.4	20.2	36.6	46.0	-9.4
0.796	16.2	20.2	36.4	46.0	-9.6
2.736	16.1	20.2	36.3	46.0	-9.7
0.718	15.9	20.2	36.1	46.0	-9.9
0.849	15.9	20.2	36.1	46.0	-9.9
2.416	15.7	20.2	35.9	46.0	-10.1
0.750	15.7	20.2	35.9	46.0	-10.1
0.946	15.6	20.2	35.8	46.0	-10.2
0.567	15.2	20.2	35.4	46.0	-10.6
0.760	15.0	20.2	35.2	46.0	-10.8

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

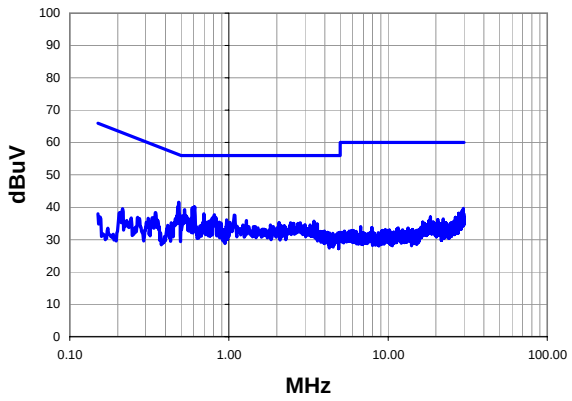
PSA-ESCI 2010.04.06
Version 2010.4.15

Work Order:	ZONA0022	**Date:**	04/13/11		
Project:	None	**Temperature:**	21.4		
Job Site:	EV07	**Humidity:**	20		
Serial Number:	None	**Barometric Pres.:**	1021	**Tested by:**	Ethan Schoonover
EUT:	80446				
Configuration:	2 - CE and OB				
Customer:	Zonar Systems, LLC				
Attendees:	None				
EUT Power:	5VDC				
Operating Mode:	Tx MSK modulation				
Deviations:	No deviations.				
Comments:	Mid Channel.				

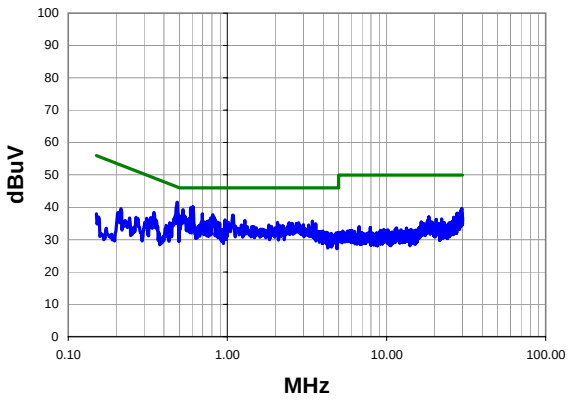
Test Specifications	**Test Method**
FCC 15.207:2011	ANSI C63.10:2009

Run #	3	**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)
0.483	21.4	20.2	41.6	56.3	-14.7
0.609	20.0	20.2	40.2	56.0	-15.8
0.589	19.7	20.2	39.9	56.0	-16.1
0.527	19.1	20.2	39.3	56.0	-16.7
0.697	17.8	20.2	38.0	56.0	-18.0
0.810	17.5	20.2	37.7	56.0	-18.3
1.080	17.4	20.2	37.6	56.0	-18.4
0.786	16.5	20.2	36.7	56.0	-19.3
0.578	16.4	20.2	36.6	56.0	-19.4
0.968	15.9	20.2	36.1	56.0	-19.9
1.288	15.7	20.2	35.9	56.0	-20.1
0.769	15.7	20.2	35.9	56.0	-20.1
3.424	15.4	20.3	35.7	56.0	-20.3
29.670	18.1	21.6	39.7	60.0	-20.3
0.752	15.5	20.2	35.7	56.0	-20.3
0.777	15.5	20.2	35.7	56.0	-20.3
0.686	15.2	20.2	35.4	56.0	-20.6
0.733	15.2	20.2	35.4	56.0	-20.6
0.867	15.2	20.2	35.4	56.0	-20.6
0.346	18.2	20.2	38.4	59.1	-20.7

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.483	21.4	20.2	41.6	46.3	-4.7
0.609	20.0	20.2	40.2	46.0	-5.8
0.589	19.7	20.2	39.9	46.0	-6.1
0.527	19.1	20.2	39.3	46.0	-6.7
0.697	17.8	20.2	38.0	46.0	-8.0
0.810	17.5	20.2	37.7	46.0	-8.3
1.080	17.4	20.2	37.6	46.0	-8.4
0.786	16.5	20.2	36.7	46.0	-9.3
0.578	16.4	20.2	36.6	46.0	-9.4
0.968	15.9	20.2	36.1	46.0	-9.9
1.288	15.7	20.2	35.9	46.0	-10.1
0.769	15.7	20.2	35.9	46.0	-10.1
3.424	15.4	20.3	35.7	46.0	-10.3
29.670	18.1	21.6	39.7	50.0	-10.3
0.752	15.5	20.2	35.7	46.0	-10.3
0.777	15.5	20.2	35.7	46.0	-10.3
0.686	15.2	20.2	35.4	46.0	-10.6
0.733	15.2	20.2	35.4	46.0	-10.6
0.867	15.2	20.2	35.4	46.0	-10.6
0.346	18.2	20.2	38.4	49.1	-10.7

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

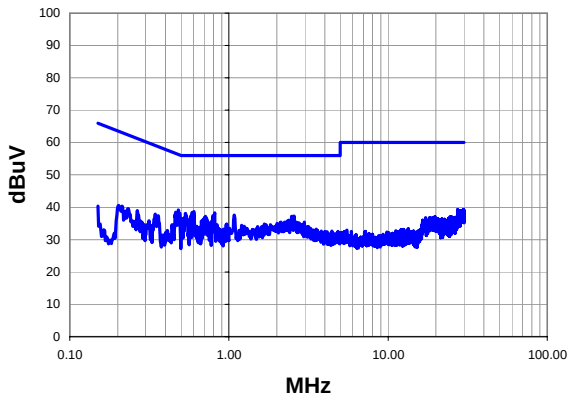
PSA-ESCI 2010.04.06
Version 2010.4.15

Work Order:	ZONA0022	**Date:**	04/13/11		
Project:	None	**Temperature:**	21.4		
Job Site:	EV07	**Humidity:**	20		
Serial Number:	None	**Barometric Pres.:**	1021	**Tested by:**	Ethan Schoonover
EUT:	80446				
Configuration:	2 - CE and OB				
Customer:	Zonar Systems, LLC				
Attendees:	None				
EUT Power:	5VDC				
Operating Mode:	Tx MSK modulation				
Deviations:	No deviations.				
Comments:	Mid Channel.				

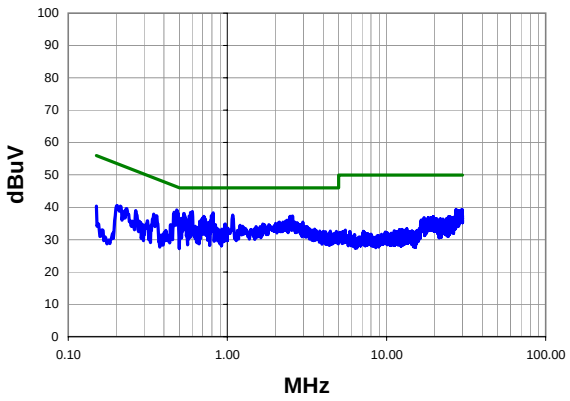
Test Specifications	**Test Method**
FCC 15.207:2011	ANSI C63.10:2009

Run #	4	**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)
0.482	19.0	20.2	39.2	56.3	-17.1
0.602	18.5	20.2	38.7	56.0	-17.3
0.587	18.2	20.2	38.4	56.0	-17.6
0.813	18.1	20.2	38.3	56.0	-17.7
0.533	17.9	20.2	38.1	56.0	-17.9
0.463	18.3	20.2	38.5	56.6	-18.2
1.080	17.4	20.2	37.6	56.0	-18.4
2.568	17.1	20.2	37.3	56.0	-18.7
0.577	17.1	20.2	37.3	56.0	-18.7
2.472	17.0	20.2	37.2	56.0	-18.8
2.504	17.0	20.2	37.2	56.0	-18.8
0.711	17.0	20.2	37.2	56.0	-18.8
0.701	16.6	20.2	36.8	56.0	-19.2
0.522	16.5	20.2	36.7	56.0	-19.3
0.504	16.3	20.2	36.5	56.0	-19.5
0.689	16.1	20.2	36.3	56.0	-19.7
0.726	16.0	20.2	36.2	56.0	-19.8
0.568	15.9	20.2	36.1	56.0	-19.9
2.376	15.8	20.2	36.0	56.0	-20.0
0.782	15.6	20.2	35.8	56.0	-20.2

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.482	19.0	20.2	39.2	46.3	-7.1
0.602	18.5	20.2	38.7	46.0	-7.3
0.587	18.2	20.2	38.4	46.0	-7.6
0.813	18.1	20.2	38.3	46.0	-7.7
0.533	17.9	20.2	38.1	46.0	-7.9
0.463	18.3	20.2	38.5	46.6	-8.2
1.080	17.4	20.2	37.6	46.0	-8.4
2.568	17.1	20.2	37.3	46.0	-8.7
0.577	17.1	20.2	37.3	46.0	-8.7
2.472	17.0	20.2	37.2	46.0	-8.8
2.504	17.0	20.2	37.2	46.0	-8.8
0.711	17.0	20.2	37.2	46.0	-8.8
0.701	16.6	20.2	36.8	46.0	-9.2
0.522	16.5	20.2	36.7	46.0	-9.3
0.504	16.3	20.2	36.5	46.0	-9.5
0.689	16.1	20.2	36.3	46.0	-9.7
0.726	16.0	20.2	36.2	46.0	-9.8
0.568	15.9	20.2	36.1	46.0	-9.9
2.376	15.8	20.2	36.0	46.0	-10.0
0.782	15.6	20.2	35.8	46.0	-10.2

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

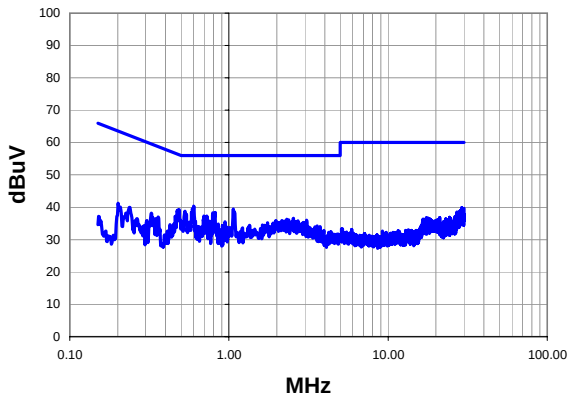
PSA-ESCI 2010.04.06
Version 2010.4.15

Work Order:	ZONA0022	**Date:**	04/13/11		
Project:	None	**Temperature:**	21.4		
Job Site:	EV07	**Humidity:**	20		
Serial Number:	None	**Barometric Pres.:**	1021	**Tested by:**	Ethan Schoonover
EUT:	80446				
Configuration:	2 - CE and OB				
Customer:	Zonar Systems, LLC				
Attendees:	None				
EUT Power:	5VDC				
Operating Mode:	Tx MSK modulation				
Deviations:	No deviations.				
Comments:	High Channel.				

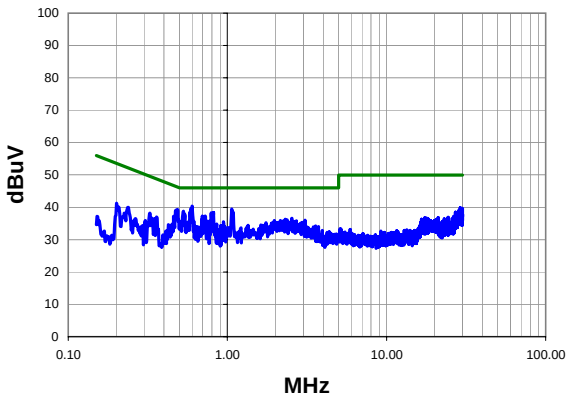
Test Specifications	**Test Method**
FCC 15.207:2011	ANSI C63.10:2009

Run #	5	**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)
0.601	20.2	20.2	40.4	56.0	-15.6
0.590	19.4	20.2	39.6	56.0	-16.4
1.064	19.3	20.2	39.5	56.0	-16.5
0.487	19.1	20.2	39.3	56.2	-17.0
0.529	18.6	20.2	38.8	56.0	-17.2
0.582	18.3	20.2	38.5	56.0	-17.5
0.818	18.2	20.2	38.4	56.0	-17.6
0.791	18.1	20.2	38.3	56.0	-17.7
0.799	17.3	20.2	37.5	56.0	-18.5
0.697	17.1	20.2	37.3	56.0	-18.7
0.726	17.1	20.2	37.3	56.0	-18.7
0.713	16.8	20.2	37.0	56.0	-19.0
2.544	16.4	20.2	36.6	56.0	-19.4
0.459	17.0	20.2	37.2	56.7	-19.5
2.312	16.1	20.2	36.3	56.0	-19.7
2.376	15.9	20.2	36.1	56.0	-19.9
3.080	15.7	20.3	36.0	56.0	-20.0
1.976	15.7	20.2	35.9	56.0	-20.1
2.152	15.7	20.2	35.9	56.0	-20.1
29.010	18.3	21.6	39.9	60.0	-20.1

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	20.2	20.2	40.4	46.0	-5.6
0.590	19.4	20.2	39.6	46.0	-6.4
1.064	19.3	20.2	39.5	46.0	-6.5
0.487	19.1	20.2	39.3	46.2	-7.0
0.529	18.6	20.2	38.8	46.0	-7.2
0.582	18.3	20.2	38.5	46.0	-7.5
0.818	18.2	20.2	38.4	46.0	-7.6
0.791	18.1	20.2	38.3	46.0	-7.7
0.799	17.3	20.2	37.5	46.0	-8.5
0.697	17.1	20.2	37.3	46.0	-8.7
0.726	17.1	20.2	37.3	46.0	-8.7
0.713	16.8	20.2	37.0	46.0	-9.0
2.544	16.4	20.2	36.6	46.0	-9.4
0.459	17.0	20.2	37.2	46.7	-9.5
2.312	16.1	20.2	36.3	46.0	-9.7
2.376	15.9	20.2	36.1	46.0	-9.9
3.080	15.7	20.3	36.0	46.0	-10.0
1.976	15.7	20.2	35.9	46.0	-10.1
2.152	15.7	20.2	35.9	46.0	-10.1
29.010	18.3	21.6	39.9	50.0	-10.1

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

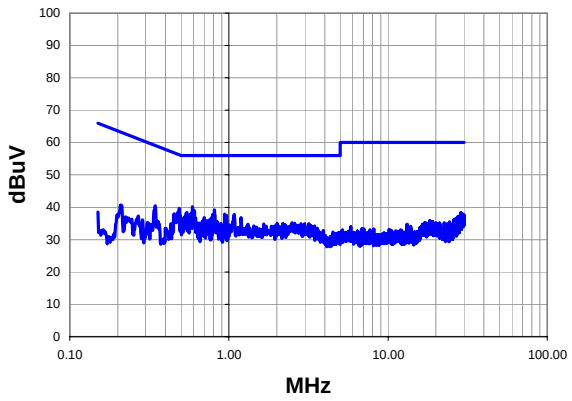
PSA-ESCI 2010.04.06
Version 2010.4.15

Work Order:	ZONA0022	**Date:**	04/13/11		
Project:	None	**Temperature:**	21.4		
Job Site:	EV07	**Humidity:**	20		
Serial Number:	None	**Barometric Pres.:**	1021	**Tested by:**	Ethan Schoonover
EUT:	80446				
Configuration:	2 - CE and OB				
Customer:	Zonar Systems, LLC				
Attendees:	None				
EUT Power:	5VDC				
Operating Mode:	Tx MSK modulation				
Deviations:	No deviations.				
Comments:	High Channel.				

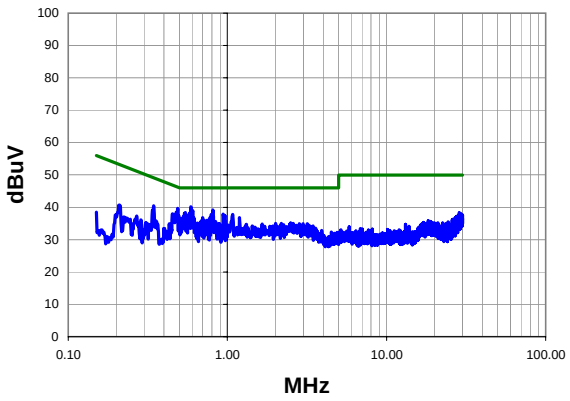
Test Specifications	**Test Method**
FCC 15.207:2011	ANSI C63.10:2009

Run #	6	**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)
0.590	20.0	20.2	40.2	56.0	-15.8
0.487	19.5	20.2	39.7	56.2	-16.6
0.811	19.0	20.2	39.2	56.0	-16.8
0.606	18.8	20.2	39.0	56.0	-17.0
0.544	18.2	20.2	38.4	56.0	-17.6
0.582	18.1	20.2	38.3	56.0	-17.7
0.942	17.7	20.2	37.9	56.0	-18.1
1.080	17.6	20.2	37.8	56.0	-18.2
0.961	17.3	20.2	37.5	56.0	-18.5
0.495	17.3	20.2	37.5	56.1	-18.6
0.344	20.3	20.2	40.5	59.1	-18.6
0.531	17.1	20.2	37.3	56.0	-18.7
1.192	16.6	20.2	36.8	56.0	-19.2
0.699	16.6	20.2	36.8	56.0	-19.2
0.618	16.5	20.2	36.7	56.0	-19.3
0.774	16.5	20.2	36.7	56.0	-19.3
0.517	16.4	20.2	36.6	56.0	-19.4
0.509	16.0	20.2	36.2	56.0	-19.8
0.747	15.8	20.2	36.0	56.0	-20.0
0.949	15.6	20.2	35.8	56.0	-20.2

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.590	20.0	20.2	40.2	46.0	-5.8
0.487	19.5	20.2	39.7	46.2	-6.6
0.811	19.0	20.2	39.2	46.0	-6.8
0.606	18.8	20.2	39.0	46.0	-7.0
0.544	18.2	20.2	38.4	46.0	-7.6
0.582	18.1	20.2	38.3	46.0	-7.7
0.942	17.7	20.2	37.9	46.0	-8.1
1.080	17.6	20.2	37.8	46.0	-8.2
0.961	17.3	20.2	37.5	46.0	-8.5
0.495	17.3	20.2	37.5	46.1	-8.6
0.344	20.3	20.2	40.5	49.1	-8.6
0.531	17.1	20.2	37.3	46.0	-8.7
1.192	16.6	20.2	36.8	46.0	-9.2
0.699	16.6	20.2	36.8	46.0	-9.2
0.618	16.5	20.2	36.7	46.0	-9.3
0.774	16.5	20.2	36.7	46.0	-9.3
0.517	16.4	20.2	36.6	46.0	-9.4
0.509	16.0	20.2	36.2	46.0	-9.8
0.747	15.8	20.2	36.0	46.0	-10.0
0.949	15.6	20.2	35.8	46.0	-10.2