Zylight LLC

Z50 (Zigbee Radio)

April 14, 2006

Report No. ZYLI0001

Report Prepared By

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

EMC Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: April 14, 2006
Zylight LLC
Model: Z50 (Zigbee Radio)

Emissions				
Test Description	**Specification**	**Test Method**	**Pass**	**Fail**
Radiated Emissions	FCC 15.109(b) Class A:2005-10	ANSI C63.4:2003	☒	☐
AC Powerline Conducted Emissions	FCC 15.207 AC Powerline Conducted Emissions:2005-9 FCC 15.107 Class A:2005-10	ANSI C63.4:2003	☒	☐
Occupied Bandwidth	FCC 15.247(a) Occupied Bandwidth:2005-9	ANSI C63.4:2003	☒	☐
Output Power	FCC 15.247(b) Output Power:2005-9	ANSI C63.4:2003	☒	☐
Band Edge Compliance	FCC 15.247(d) Band Edge Compliance:2005-9	ANSI C63.4:2003	☒	☐
Spurious Conducted Emissions	FCC 15.247(d) Spurious Conducted Emissions:2005-9	ANSI C63.4:2003	☒	☐
Spurious Radiated Emissions	FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003	☒	☐
Power Spectral Density	FCC 15.247(e) Power Spectral Density:2005-9	ANSI C63.4:2003	☒	☐

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

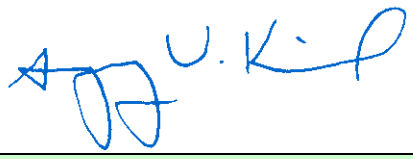
Test Facility

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:



Greg Kiemel, Director of Engineering

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

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

Revision Number	Description	Date	Page Number
00	None		

Accreditations and Authorizations

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

NVLAP: Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 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.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 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 TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories, available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. 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).

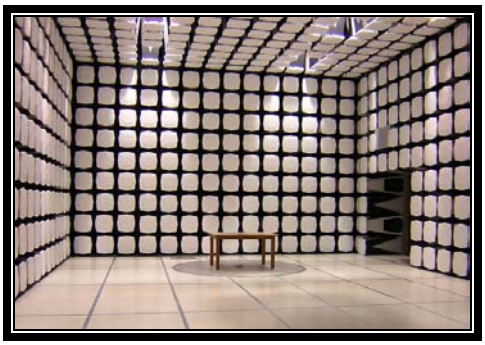
VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, and R-2318, Irvine: C-2094 and R-1943, 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

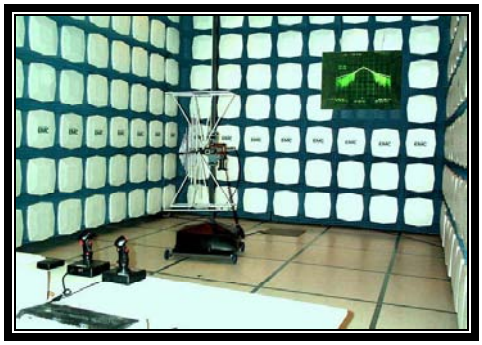
SCOPE

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



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

Washington – Sultan Facility
Labs SU01 – SU07

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

Party Requesting the Test	
Company Name:	Zylight LLC
Address:	2478 SE Spruce St.
City, State, Zip:	Hillsboro, OR 97123
Test Requested By:	Jim Collias
Model:	Z50 (Zigbee Radio)
First Date of Test:	April 10, 2006
Last Date of Test:	April 12, 2006
Receipt Date of Samples:	April 10, 2006
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided.
I/O Ports:	N/A

Functional Description of the EUT (Equipment Under Test):
Professional lighting unit with internal Zigbee (DTS) radio operating in the 2.4GHz band.

Client Justification for EUT Selection:
The product is a representative production sample.

Client Justification for Test Selection:
These tests satisfy the requirements for TCB certification under FCC Part 15.247.

EUT Photo

CONFIGURATION 1 ZYLI0001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT-Light with internal Zigbee radio	Zylight LLC	Z50	31828

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Cincon Electronics Co. Ltd.	TR36A-1201A03	36120-0007320

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC	No	1.6m	Yes (2 TDK ferrites)	EUT	AC Adapter
AC	No	1.6m	No	AC Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 2 ZYLI0001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT - Light with internal Zigbee radio	Zylight LLC	Z50	Zigbee 1

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Cincon Electronics Co. Ltd.	TR36A-1201A03	36120-0007320

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC	No	1.6m	Yes (2 TDK ferrites)	EUT	AC Adapter
AC	No	1.6m	No	AC Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 3 ZYLI0001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT - Light with internal Zigbee radio	Zylight LLC	Z50	Zigbee 2

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Cincon Electronics Co. Ltd.	TR36A-1201A03	36120-0007320

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC	No	1.6m	Yes (2 TDK ferrites)	EUT	AC Adapter
AC	No	1.6m	No	AC Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 4 ZYLI0001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT - Light with internal Zigbee radio	Zylight LLC	Z50	31829

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Cincon Electronics Co. Ltd.	TR36A-1201A03	36120-0007320

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC	No	1.6m	Yes (2 TDK ferrites)	EUT	AC Adapter
AC	No	1.6m	No	AC Adapter	AC Mains
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	4/10/2006	Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	4/11/2006	AC Powerline 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.
3	4/11/2006	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.
4	4/12/2006	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.
5	4/12/2006	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	4/12/2006	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.
7	4/12/2006	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.
8	4/12/2006	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Radiated Emissions Test Description

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

Typical Operating mode

POWER SETTINGS INVESTIGATED

120VAC/60Hz

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Pre-Amplifier	Miteq	AM-1616-1000	AOL	1/4/2006	13
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
Spectrum Analyzer	Agilent	E4446A	AAQ	7/15/2005	12

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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

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

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2006.04.06
EMI 2006.3.27

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0004
Serial Number:	31828			Date:	04/10/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	34%
Project:	None			Barometric Pres.:	30.08
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.109(b) Class A:2005-10	ANSI C63.4:2003

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

COMMENTS

Rev 2 board. Zigbee radio disabled, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

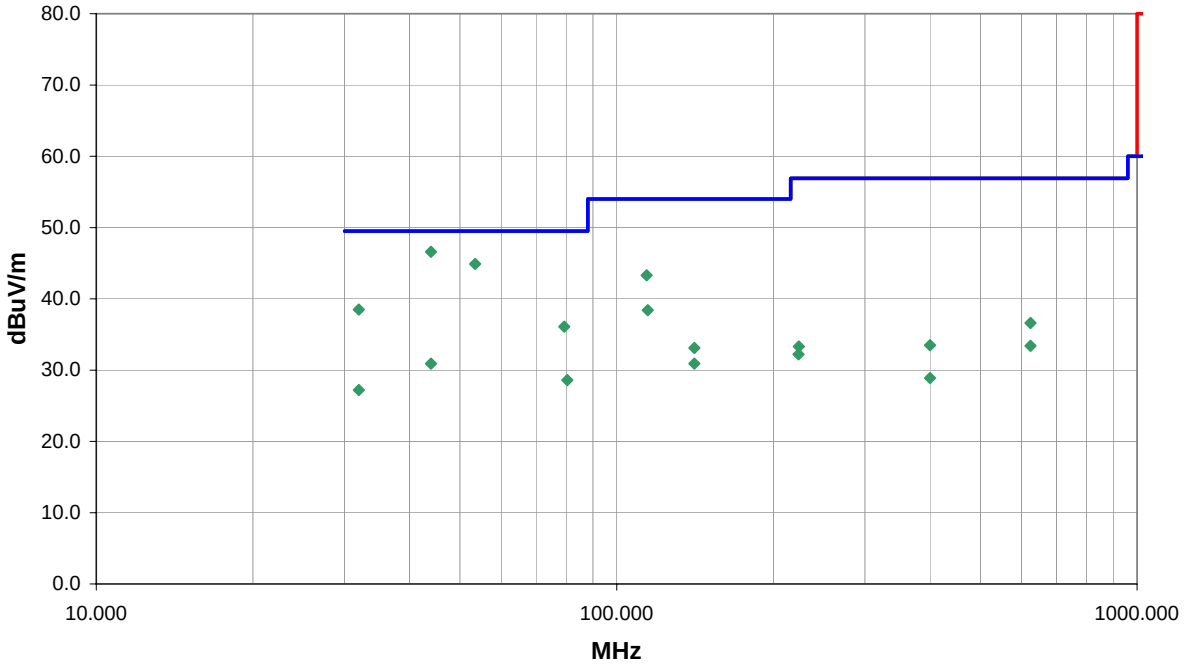
EUT OPERATING MODES

Typical Operating mode

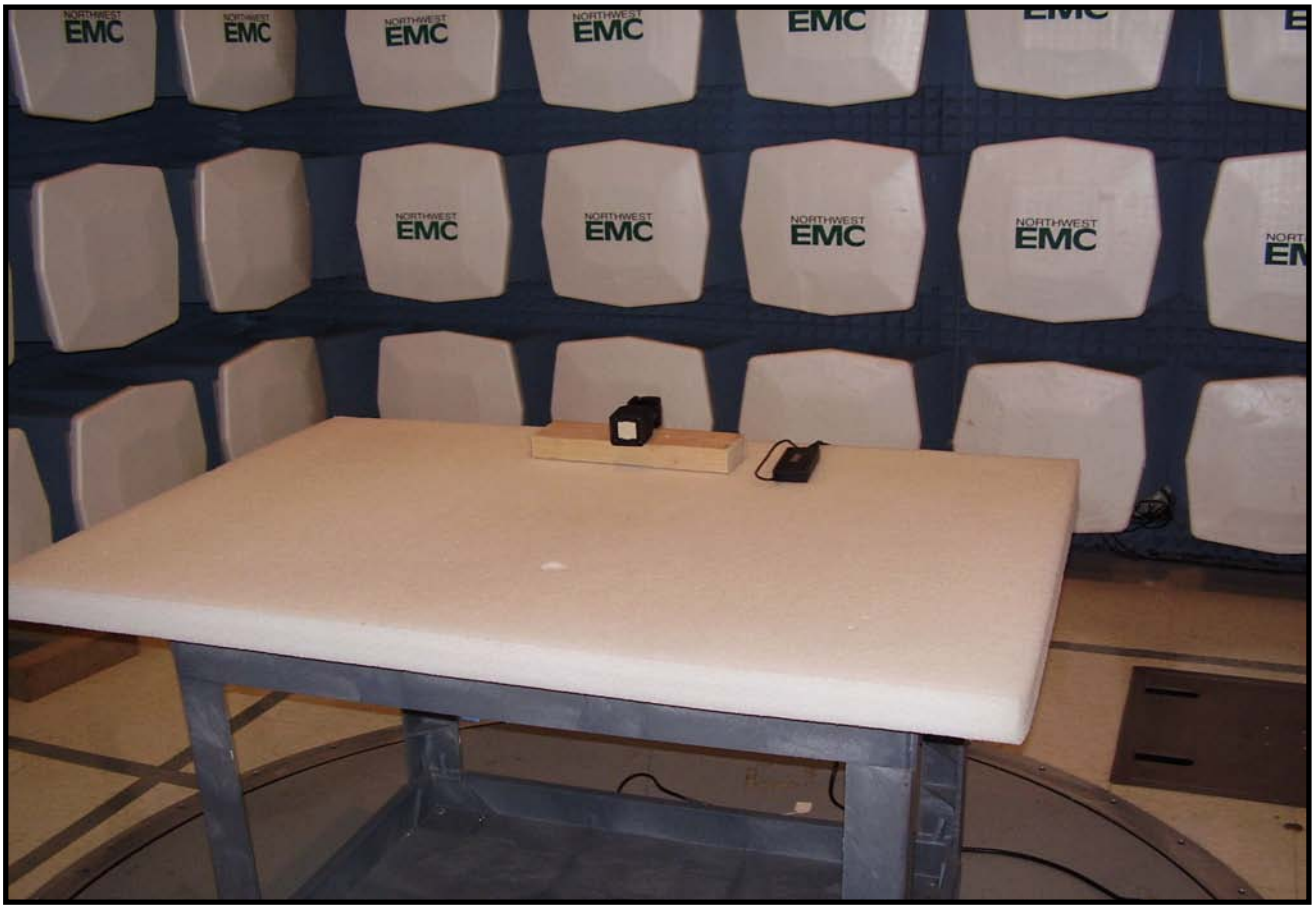
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4		
Configuration #	1		
Results	Pass	NVLAP Lab Code 200630-0	Signature Holly Ashkannejhad



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)
43.978	49.7	-3.1	327.0	1.0	3.0	0.0	V-Bilog	QP	0.0	46.6	49.5	-2.9
53.480	50.2	-5.3	65.0	1.3	3.0	0.0	V-Bilog	QP	0.0	44.9	49.5	-4.6
114.188	49.7	-6.4	243.0	3.0	3.0	0.0	H-Bilog	QP	0.0	43.3	54.0	-10.7
31.961	35.7	2.8	47.0	1.0	3.0	0.0	V-Bilog	QP	0.0	38.5	49.5	-11.0
79.316	43.9	-7.8	147.0	1.5	3.0	0.0	V-Bilog	QP	0.0	36.1	49.5	-13.4
114.740	44.9	-6.5	236.0	1.0	3.0	0.0	V-Bilog	QP	0.0	38.4	54.0	-15.6
43.981	34.0	-3.1	241.0	3.8	3.0	0.0	H-Bilog	QP	0.0	30.9	49.5	-18.6
623.988	28.8	7.8	280.0	1.4	3.0	0.0	H-Bilog	PK	0.0	36.6	56.9	-20.3
80.407	36.4	-7.8	244.0	3.9	3.0	0.0	H-Bilog	QP	0.0	28.6	49.5	-20.9
140.973	39.6	-6.5	172.0	1.0	3.0	0.0	V-Bilog	QP	0.0	33.1	54.0	-20.9


NORTHWEST
EMC

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
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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 in a no hop mode.

NORTHWEST EMC

OCCUPIED BANDWIDTH

XMit 2006.03.01

EUT:	**Z50 (Zigbee Radio)**			**Work Order:**	**ZYLI0001**
Serial Number:	**ZIGBEE2**			**Date:**	**04/12/06**
Customer:	**Zylight LLC**			**Temperature:**	**22°C**
Attendees:	**None**			**Humidity:**	**36%**
Project:	**None**			**Barometric Pres.:**	**30.01**
Tested by:	**Rod Peloquin**	**Power:**	**120VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	Test Method
FCC 15.247(a) Occupied Bandwidth 2005-9	ANSI C63.4 2003

COMMENTS

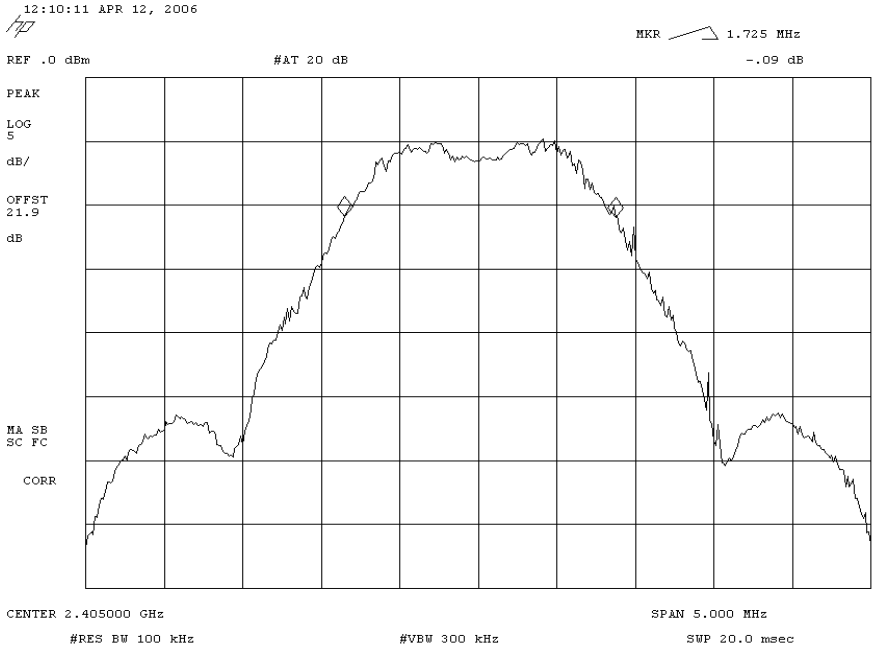
DEVIATIONS FROM TEST STANDARD

Configuration #	**3**	*Signature* 

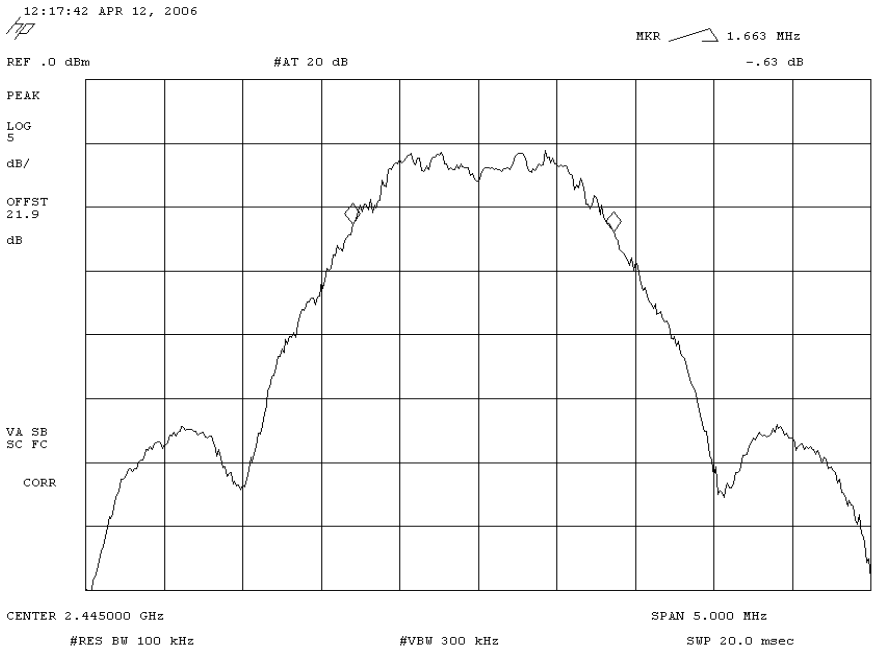
Modes of Operation and Test Conditions	**Value**	**Limit**	**Result**
Low Channel	1.725 MHz	> 500 kHz	Pass
Mid Channel	1.663 MHz	> 500 kHz	Pass
High Channel	1.650 MHz	> 500 kHz	Pass

OCCUPIED BANDWIDTH

Low Channel					
Result:	Pass	**Value:**	1.725 MHz	**Limit:**	> 500 kHz

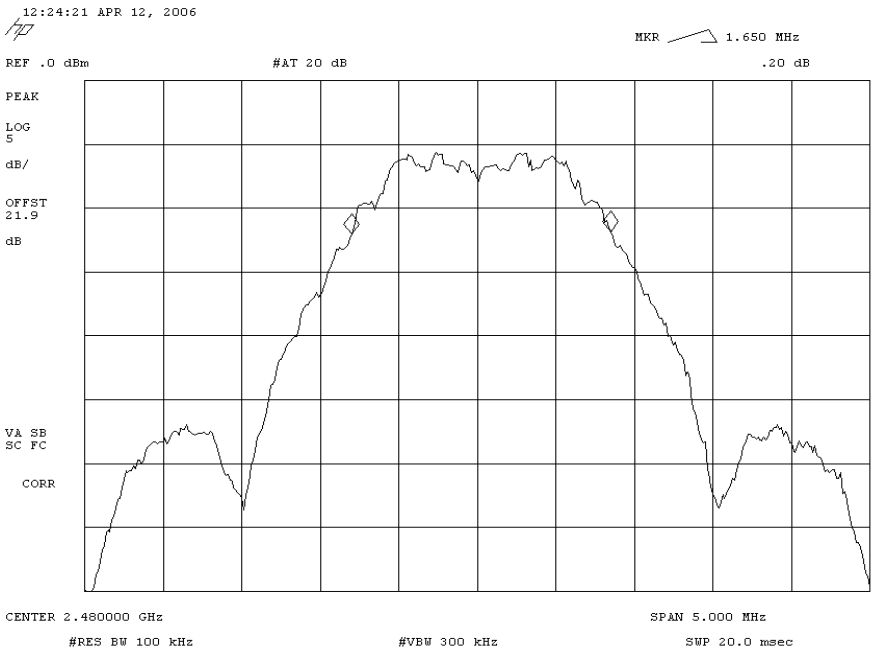


Mid Channel					
Result:	Pass	**Value:**	1.663 MHz	**Limit:**	> 500 kHz

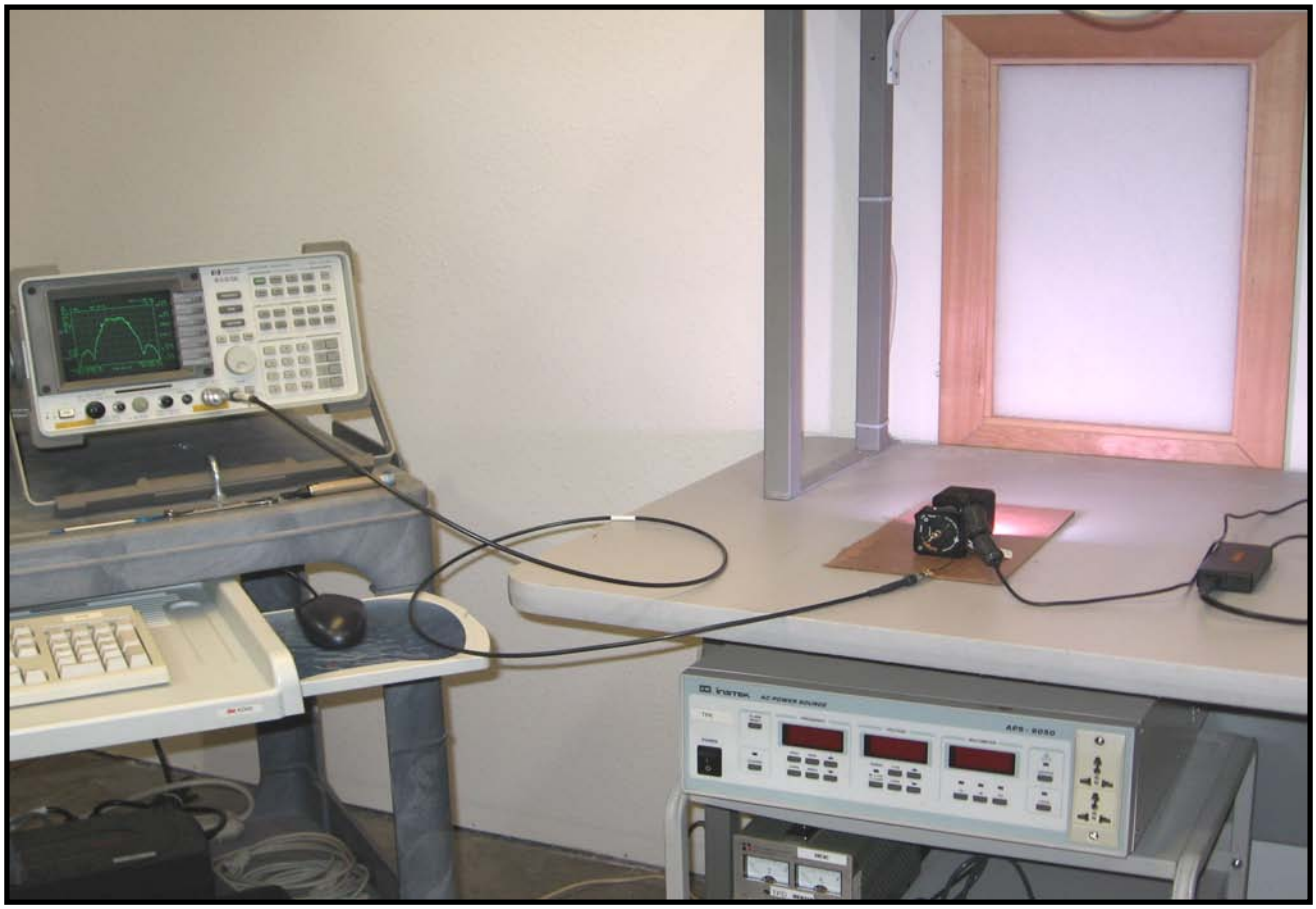


OCCUPIED BANDWIDTH

High Channel		
Result: Pass	**Value:** 1.650 MHz	**Limit:** > 500 kHz



OCCUPIED BANDWIDTH



PEAK 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
RF Detector	RLC Electronics	CR-133-R	ZZA	NCR	0
Oscilloscope	Tektronix	TDS 3052	TOF	12/8/2005	13
Power Meter	Hewlett Packard	E4418A	SPA	7/23/2004	24
Power Sensor	Hewlett-Packard	8481H	SPB	7/23/2004	24
Signal Generator	Hewlett-Packard	8648D	TGC	1/27/2006	13

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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 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.

NORTHWEST EMC

PEAK OUTPUT POWER

XMit 2006.03.01

EUT:	Z50 (Zigbee Radio)			**Work Order:**	ZYLI0001
Serial Number:	ZIGBEE2			**Date:**	04/12/06
Customer:	Zylight LLC			**Temperature:**	22°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	30.01
Tested by:	Rod Peloquin	**Power:**	120VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247(b) Output Power 2005-9	ANSI C63.4 2003

COMMENTS

DEVIATIONS FROM TEST STANDARD

Configuration #	3	Signature

Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel	.47 mW	1 W	Pass
Mid Channel	.56 mW	1 W	Pass
High Channel	.63 mW	1 W	Pass

PEAK OUTPUT POWER

Low Channel					
Result:	Pass	**Value:**	.47 mW	**Limit:**	1 W

FREQUENCY	OUTPUT POWER
(MHz)	(mW)
2405	0.47

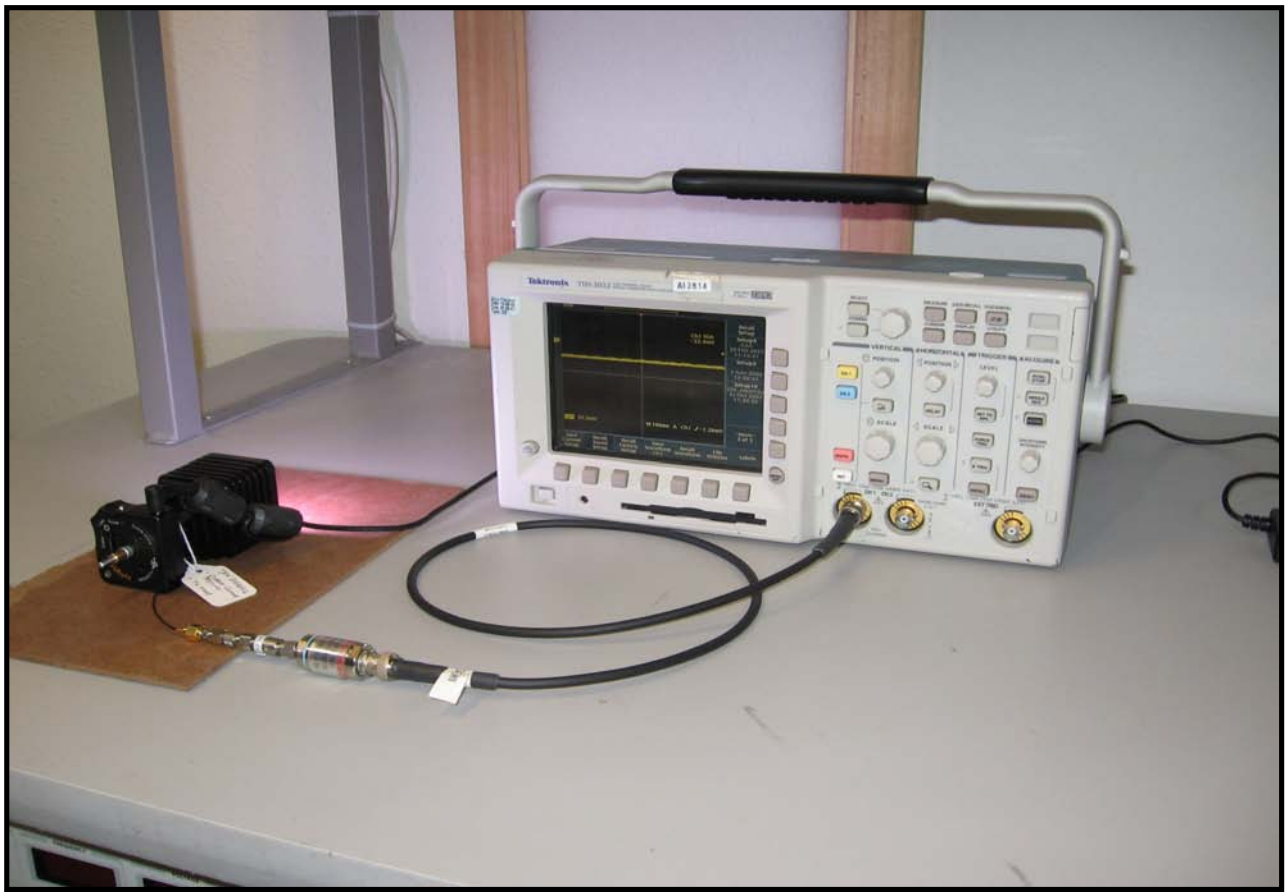
Mid Channel					
Result:	Pass	**Value:**	.56 mW	**Limit:**	1 W

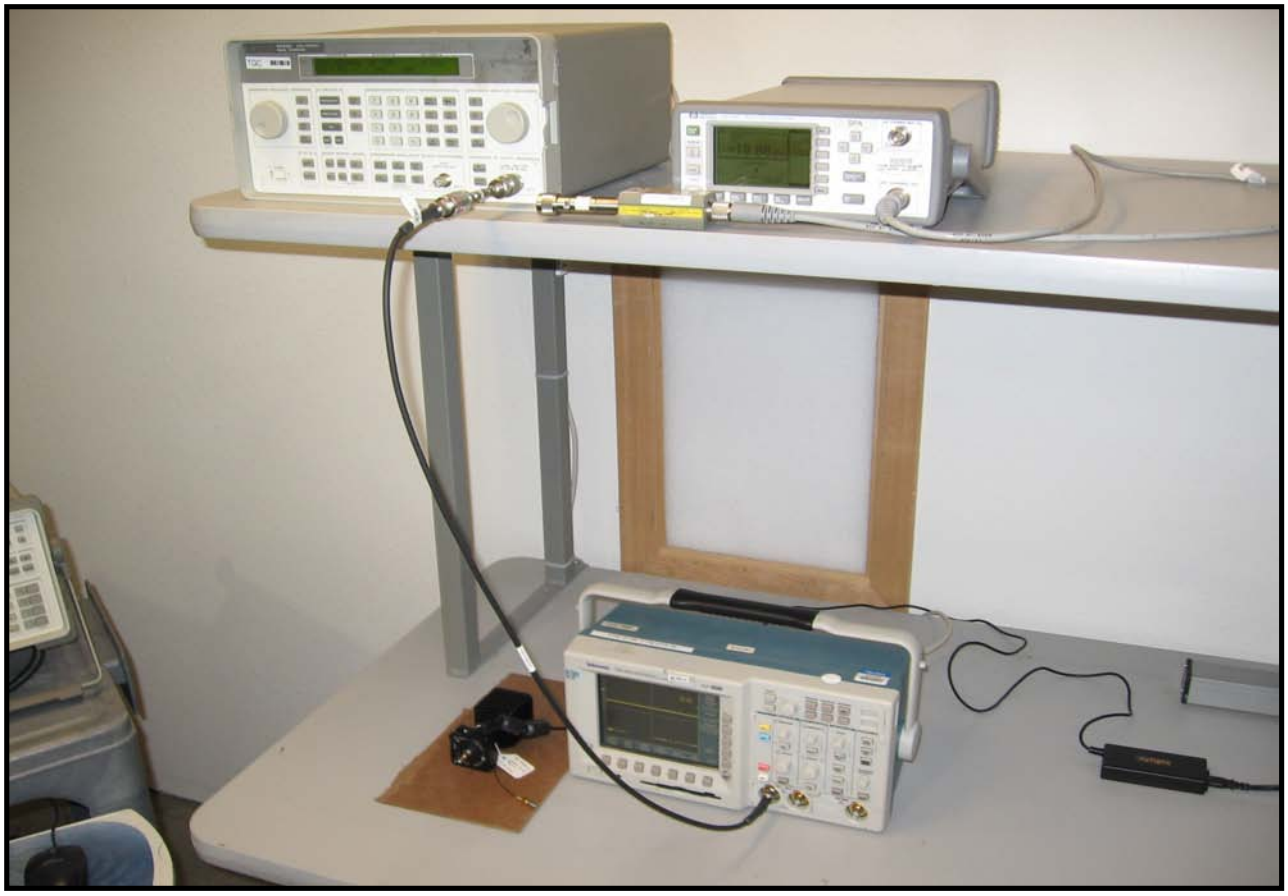
FREQUENCY	OUTPUT POWER
(MHz)	(mW)
2445	0.56

PEAK OUTPUT POWER

High Channel		
Result: Pass	**Value:** .63 mW	**Limit:** 1 W

FREQUENCY	OUTPUT POWER
(MHz)	(mW)
2480	0.63


Tektronix



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
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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 2006.03.01

EUT:	**Z50 (Zigbee Radio)**			**Work Order:**	**ZYLI0001**
Serial Number:	**ZIGBEE2**			**Date:**	**04/12/06**
Customer:	**Zylight LLC**			**Temperature:**	**22°C**
Attendees:	**None**			**Humidity:**	**36%**
Project:	**None**			**Barometric Pres.:**	**30.01**
Tested by:	**Rod Peloquin**	**Power:**	**120VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Band Edge Compliance 2005-9	ANSI C63.4 2003

COMMENTS

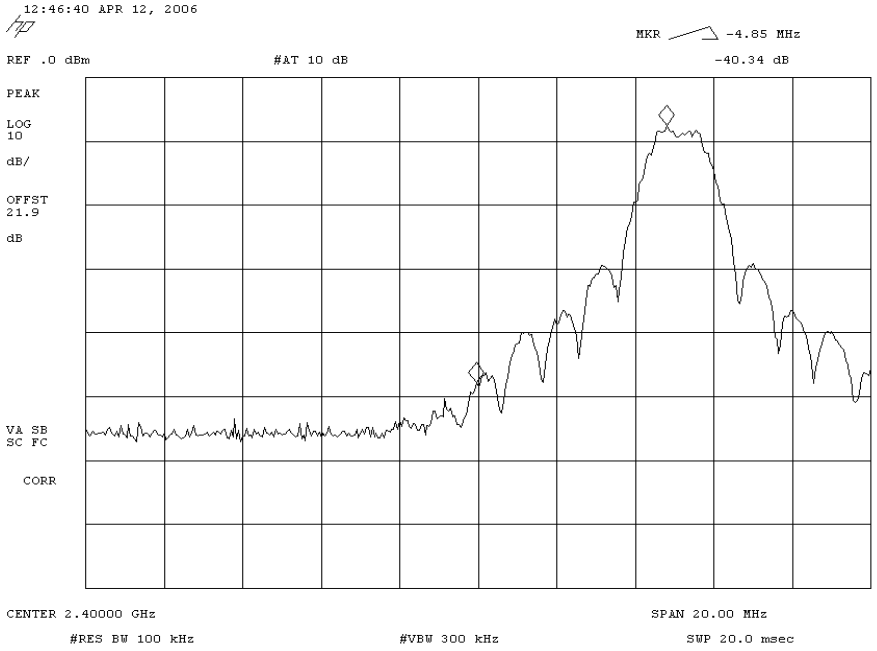
DEVIATIONS FROM TEST STANDARD

Configuration #	**3**	*Signature* 

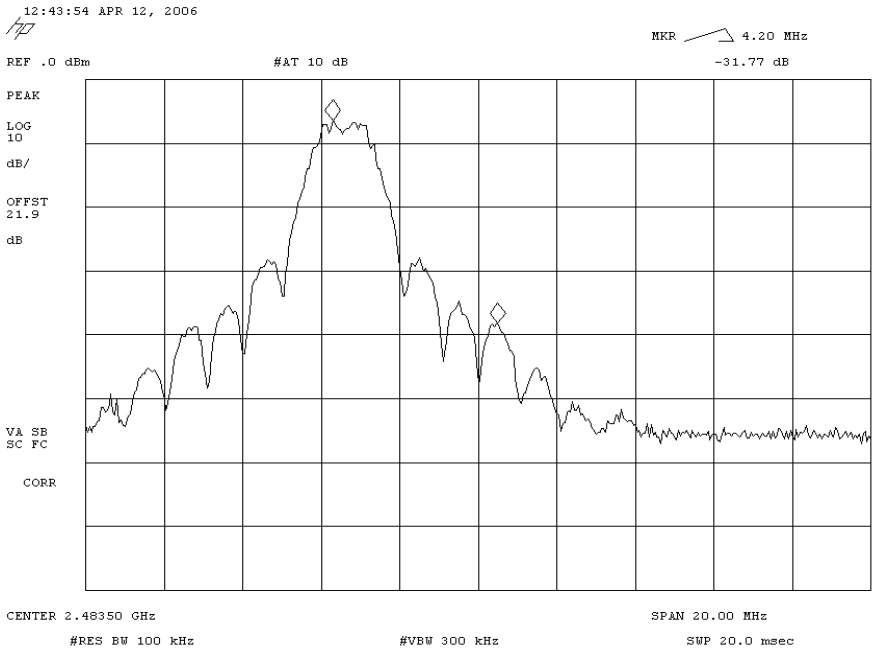
Modes of Operation and Test Conditions	**Value**	**Limit**	**Result**
Low Channel	40.3 dBc	> 20 dBc	Pass
High Channel	31.8 dBc	> 20dBc	Pass

BAND EDGE COMPLIANCE

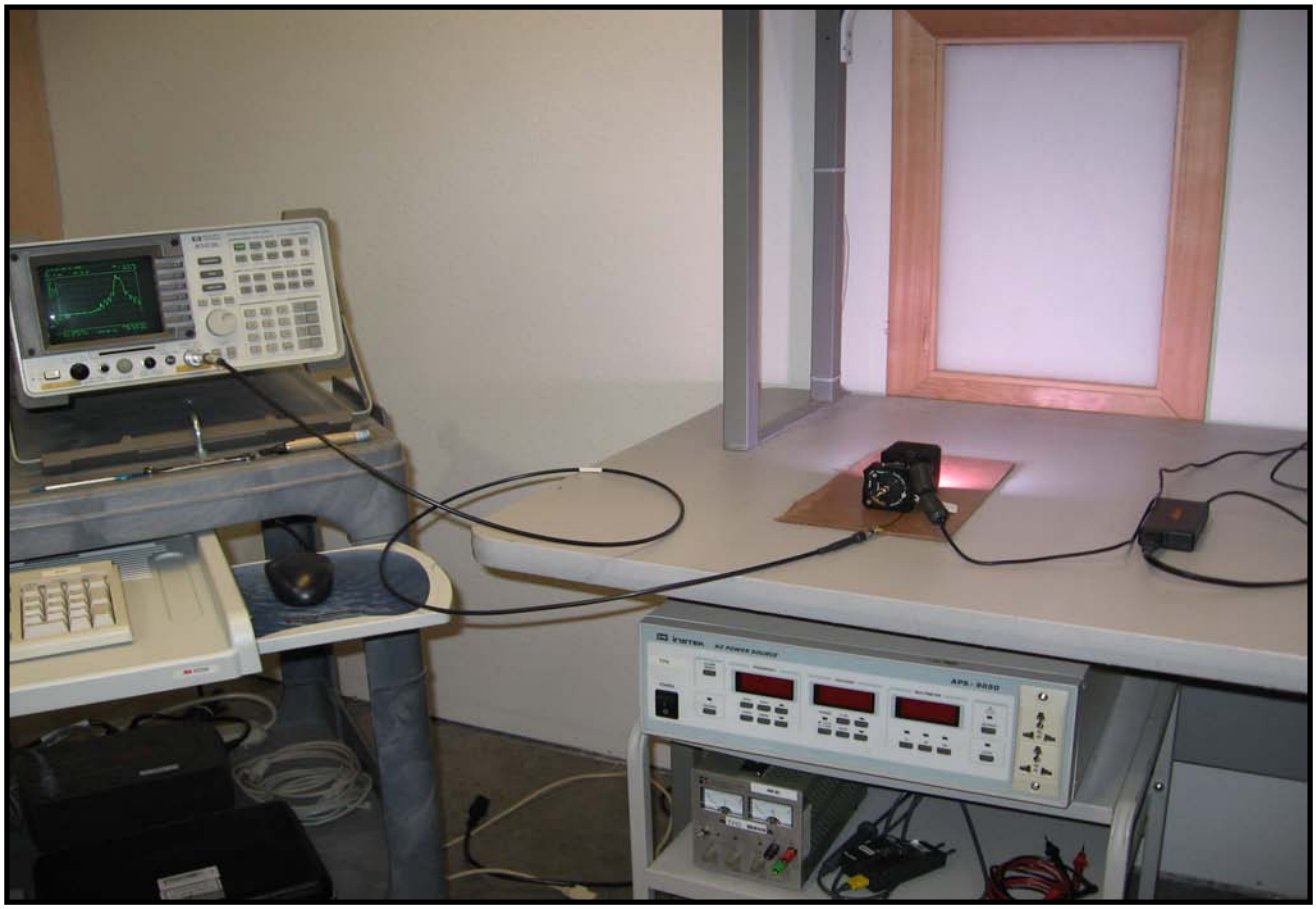
Low Channel					
Result:	Pass	**Value:**	40.3 dBc	**Limit:**	> 20 dBc



High Channel					
Result:	Pass	**Value:**	31.8 dBc	**Limit:**	> 20dBc



BAND EDGE COMPLIANCE



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
Spectrum Analyzer	Agilent	E4446A	AAT	4/4/2006	12

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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 2006.03.01

EUT:	Z50 (Zigbee Radio)			**Work Order:**	ZYLI0001
Serial Number:	ZIGBEE2			**Date:**	04/12/06
Customer:	Zylight LLC			**Temperature:**	22°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	30.01
Tested by:	Rod Peloquin	**Power:**	120VAC/60Hz	**Job Site:**	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Conducted Emissions 2005-9	ANSI C63.4 2003

COMMENTS

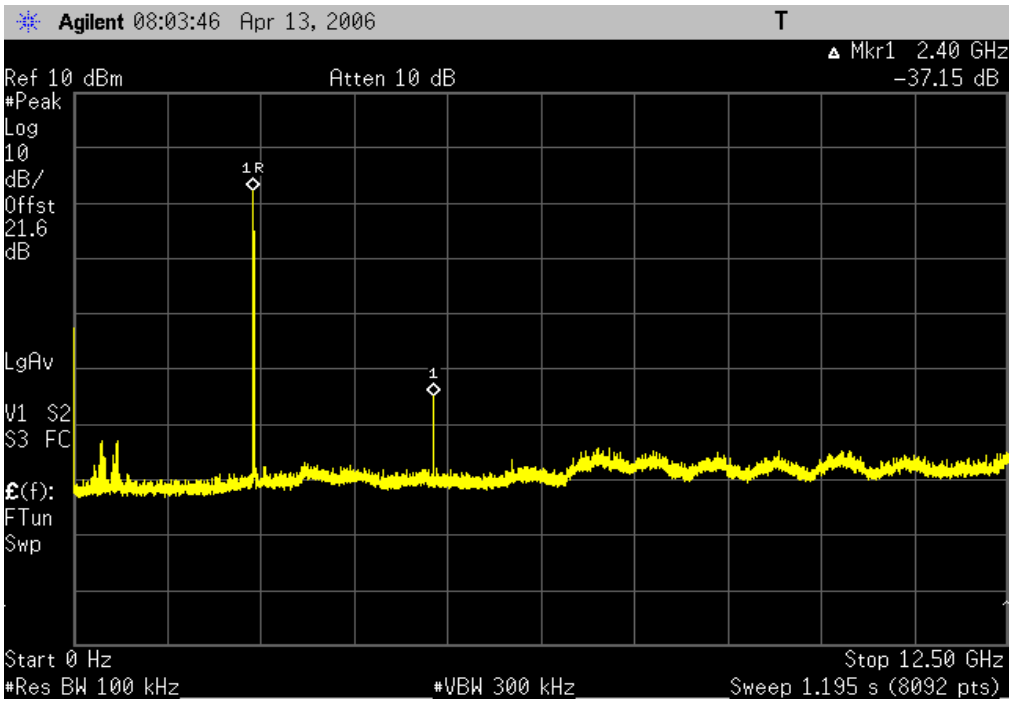
DEVIATIONS FROM TEST STANDARD

Configuration #	3	Signature

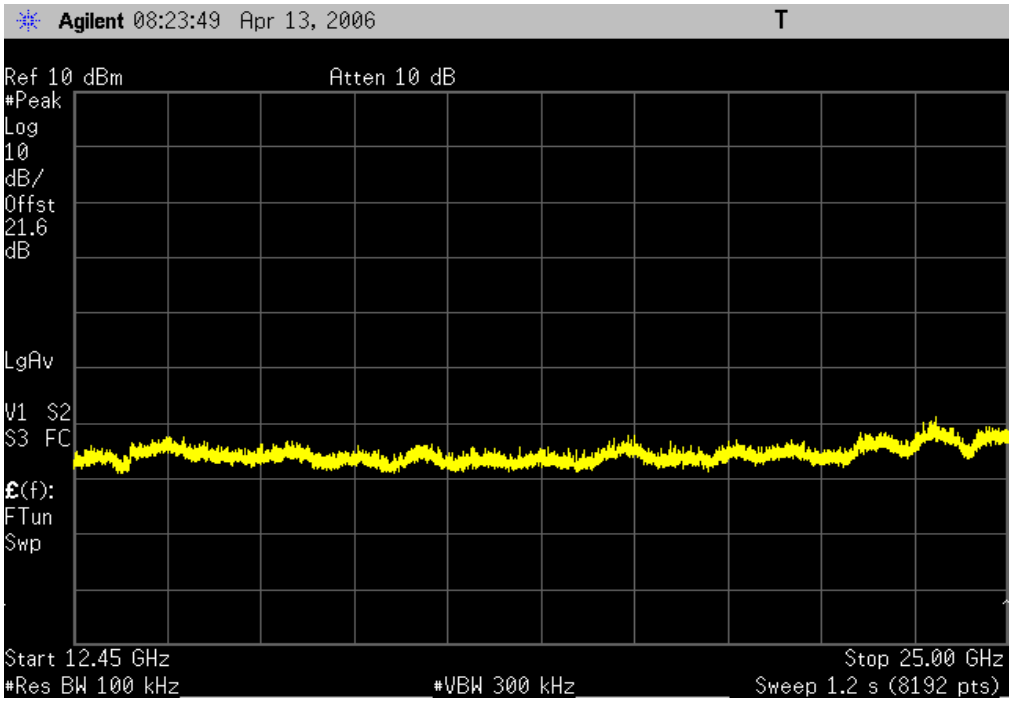
Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel, 0MHz - 12.5GHz	-37.2 dBc	≤ -20 dBc	Pass
Low Channel, 12.45GHz - 25GHz	< -40 dBc	≤ -20 dBc	Pass
Mid Channel, 0MHz - 12.5GHz	-38 dBc	≤ -20 dBc	Pass
Mid Channel, 12.45GHz - 25GHz	< -40 dBc	≤ -20 dBc	Pass
High Channel, 0MHz - 12.5GHz	-38.3 dBc	≤ -20 dBc	Pass
High Channel, 12.45GHz - 25GHz	< -40 dBc	≤ -20 dBc	Pass

SPURIOUS CONDUCTED EMISSIONS

Low Channel, 0MHz - 12.5GHz					
Result:	Pass	**Value:**	-37.2 dBc	**Limit:**	≤ -20 dBc

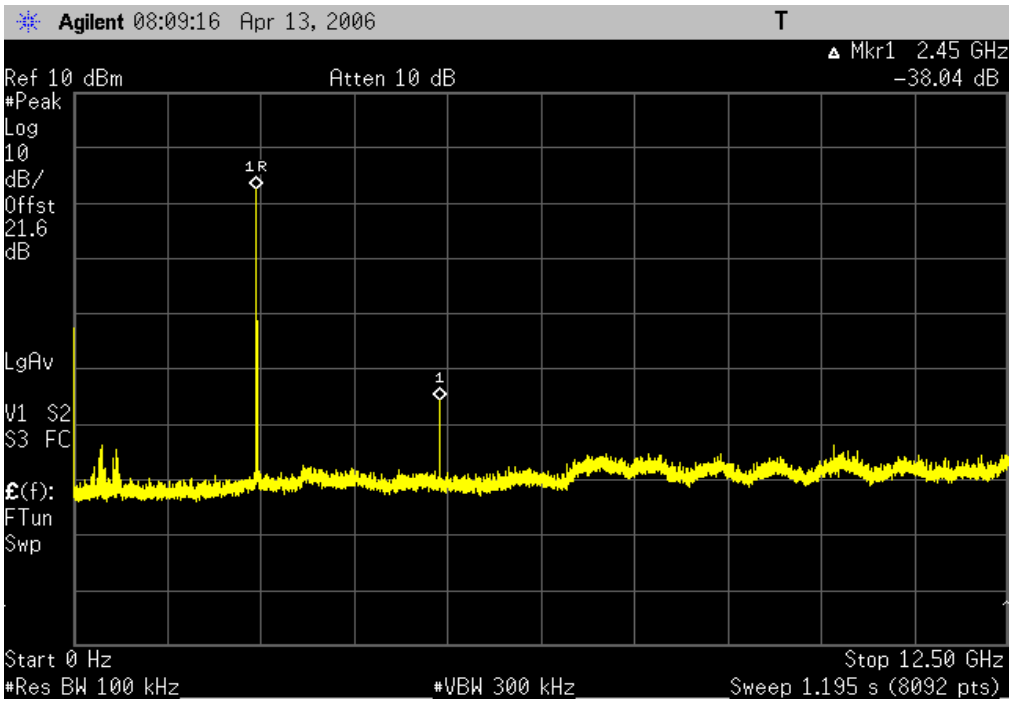


Low Channel, 12.45GHz - 25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -20 dBc

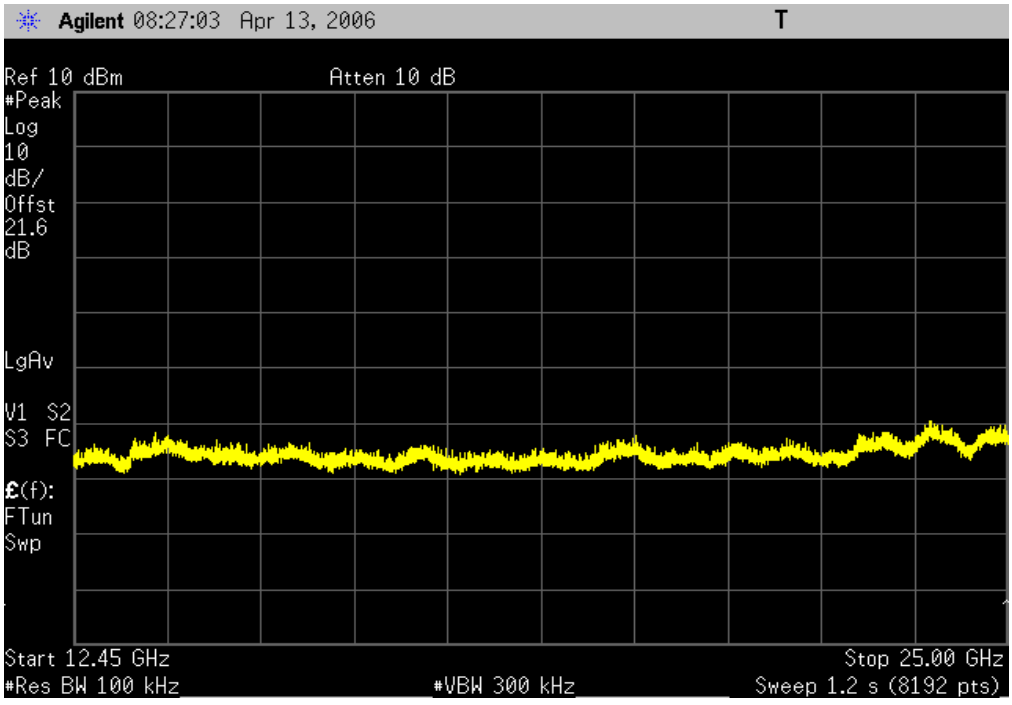


SPURIOUS CONDUCTED EMISSIONS

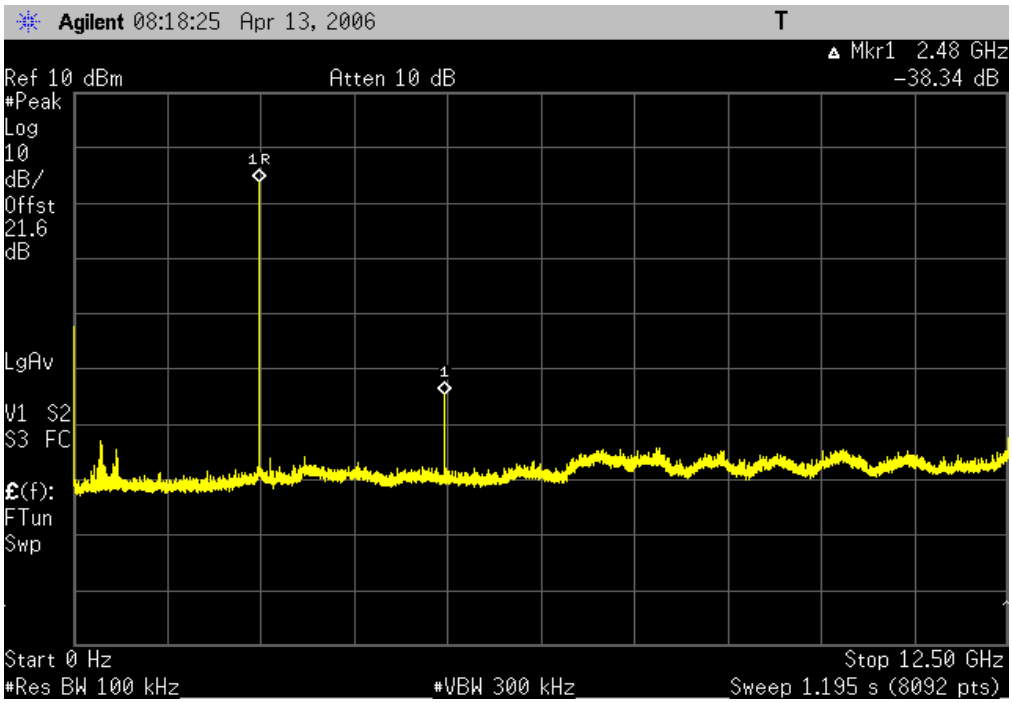
Mid Channel, 0MHz - 12.5GHz					
Result:	Pass	**Value:**	-38 dBc	**Limit:**	≤ -20 dBc



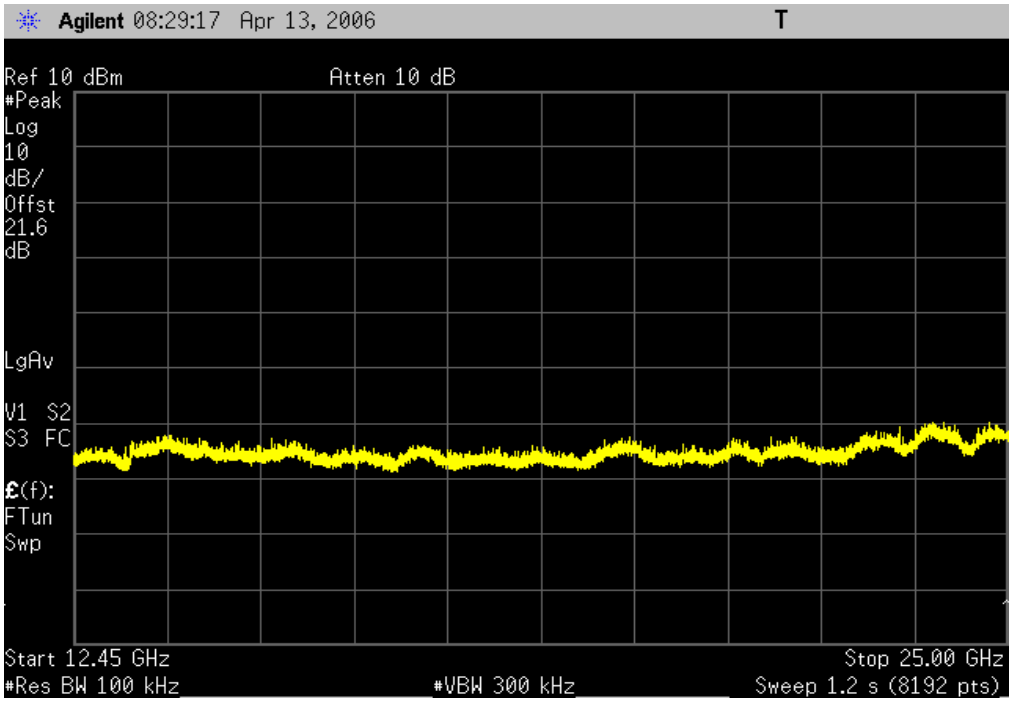
Mid Channel, 12.45GHz - 25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -20 dBc

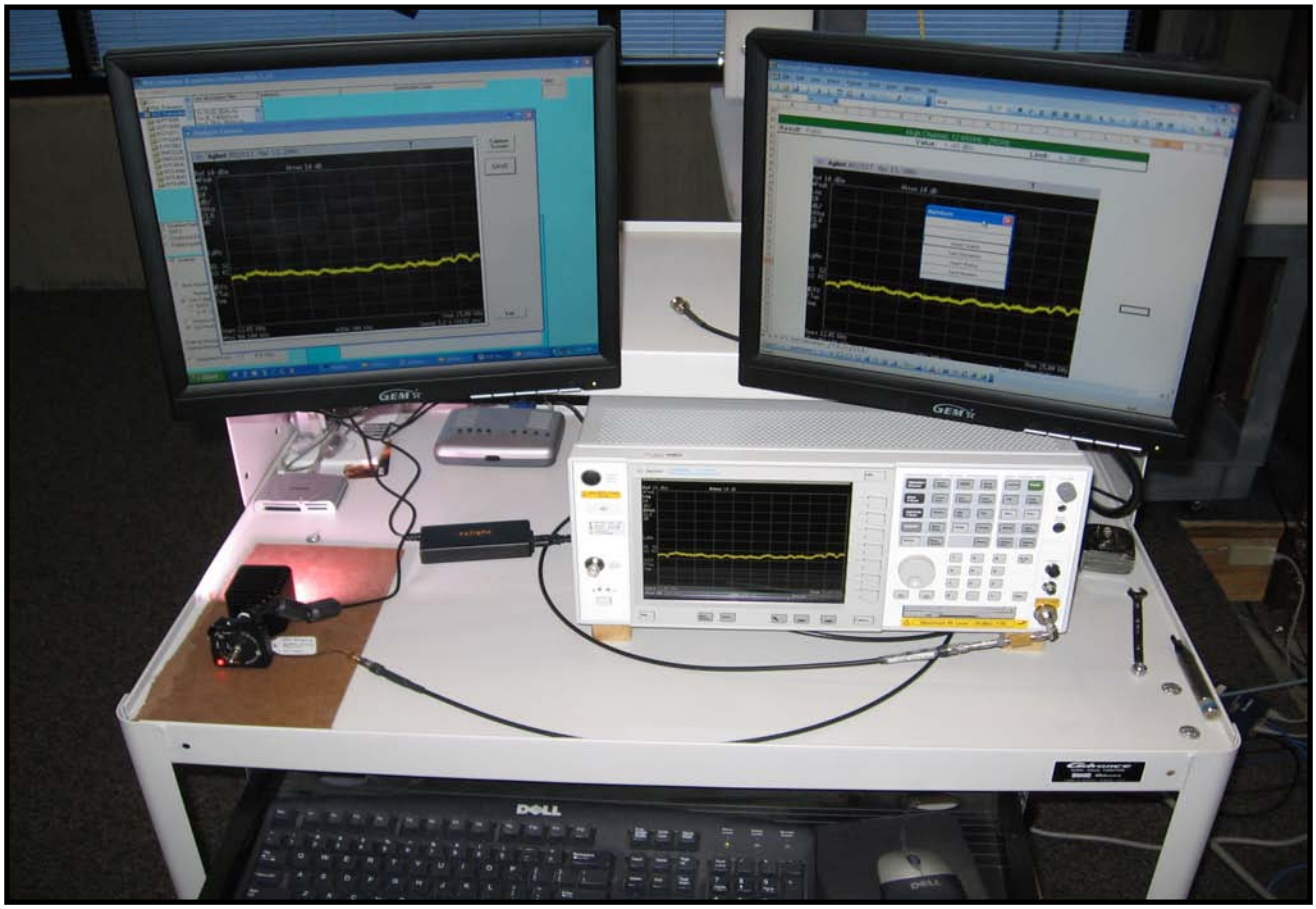


High Channel, 0MHz - 12.5GHz					
Result:	Pass	**Value:**	-38.3 dBc	**Limit:**	≤ -20 dBc



High Channel, 12.45GHz - 25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -20 dBc




DELL

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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 kHz)). For example, given a span of 1.5 MHz, the sweep should be 1.5 x 10^6 ÷ 3 x 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."

NORTHWEST EMC

POWER SPECTRAL DENSITY

XMit 2006.03.01

EUT:	**Z50 (Zigbee Radio)**			**Work Order:**	**ZYLI0001**
Serial Number:	**ZIGBEE2**			**Date:**	**04/12/06**
Customer:	**Zylight LLC**			**Temperature:**	**22°C**
Attendees:	**None**			**Humidity:**	**36%**
Project:	**None**			**Barometric Pres.:**	**30.01**
Tested by:	**Rod Peloquin**	**Power:**	**120VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	Test Method
FCC 15.247(e) Power Spectral Density 2005-9	ANSI C63.4 2003

COMMENTS

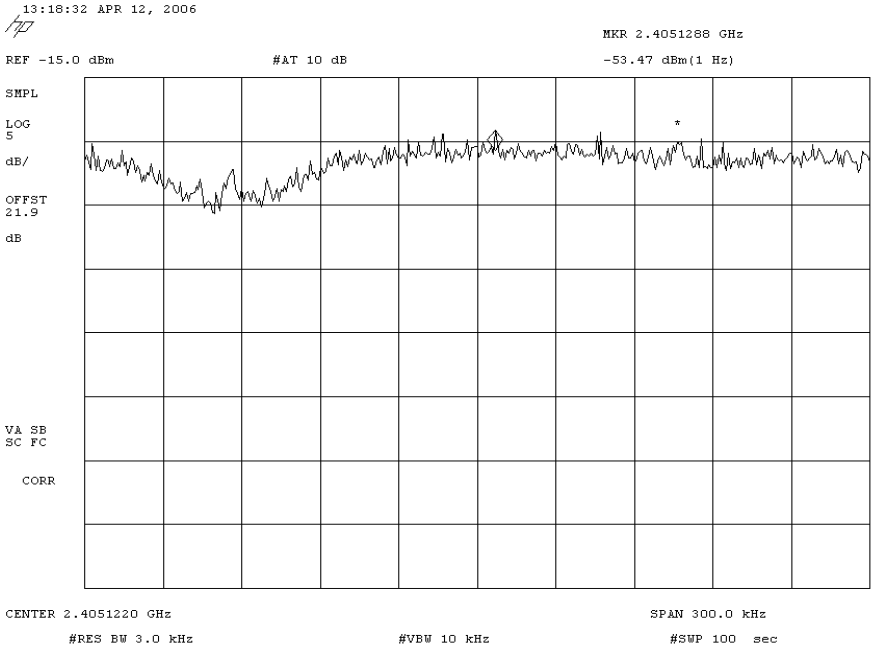
DEVIATIONS FROM TEST STANDARD

Configuration #	**3**	*Signature*

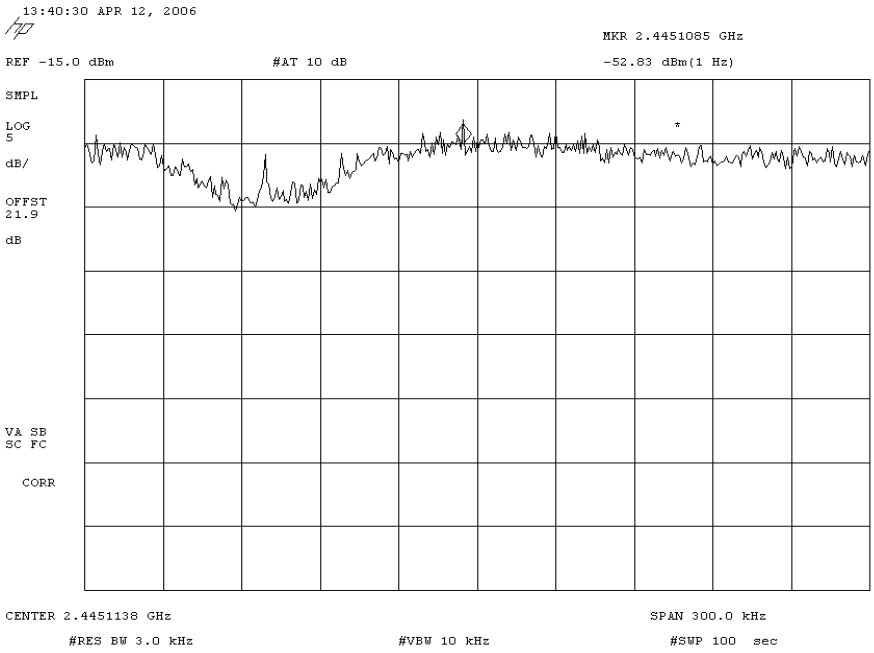
Modes of Operation and Test Conditions	**Value**	**Limit**	**Result**
Low Channel	-18.7 dBm / 3 kHz	8 dBm / 3 kHz	Pass
Mid Channel	-18.0 dBm / 3 kHz	8 dBm / 3 kHz	Pass
High Channel	-17.9 dBm / 3 kHz	8 dBm / 3 kHz	Pass

POWER SPECTRAL DENSITY

Low Channel		
Result: Pass	**Value:** -18.7 dBm / 3 kHz	**Limit:** 8 dBm / 3 kHz

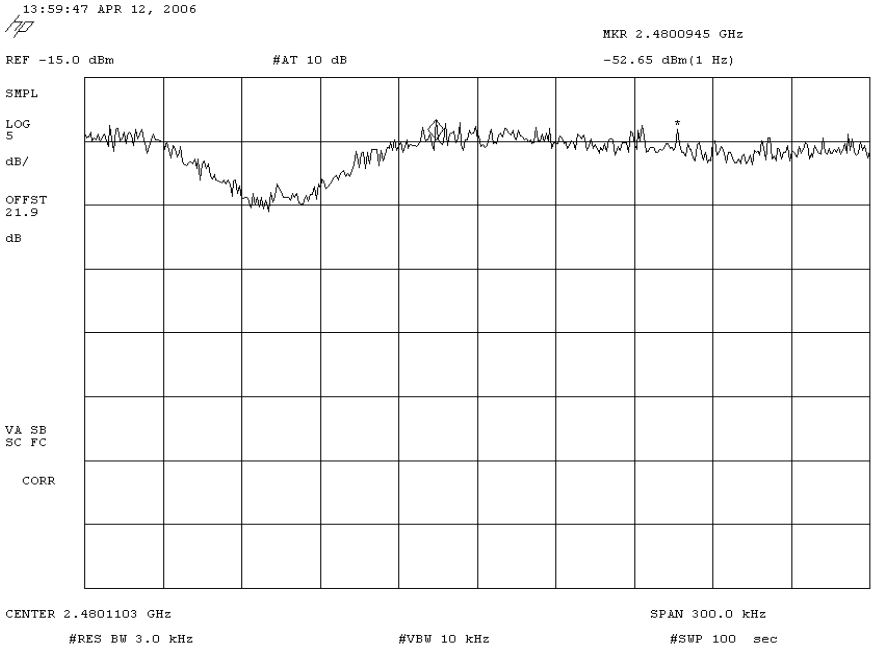


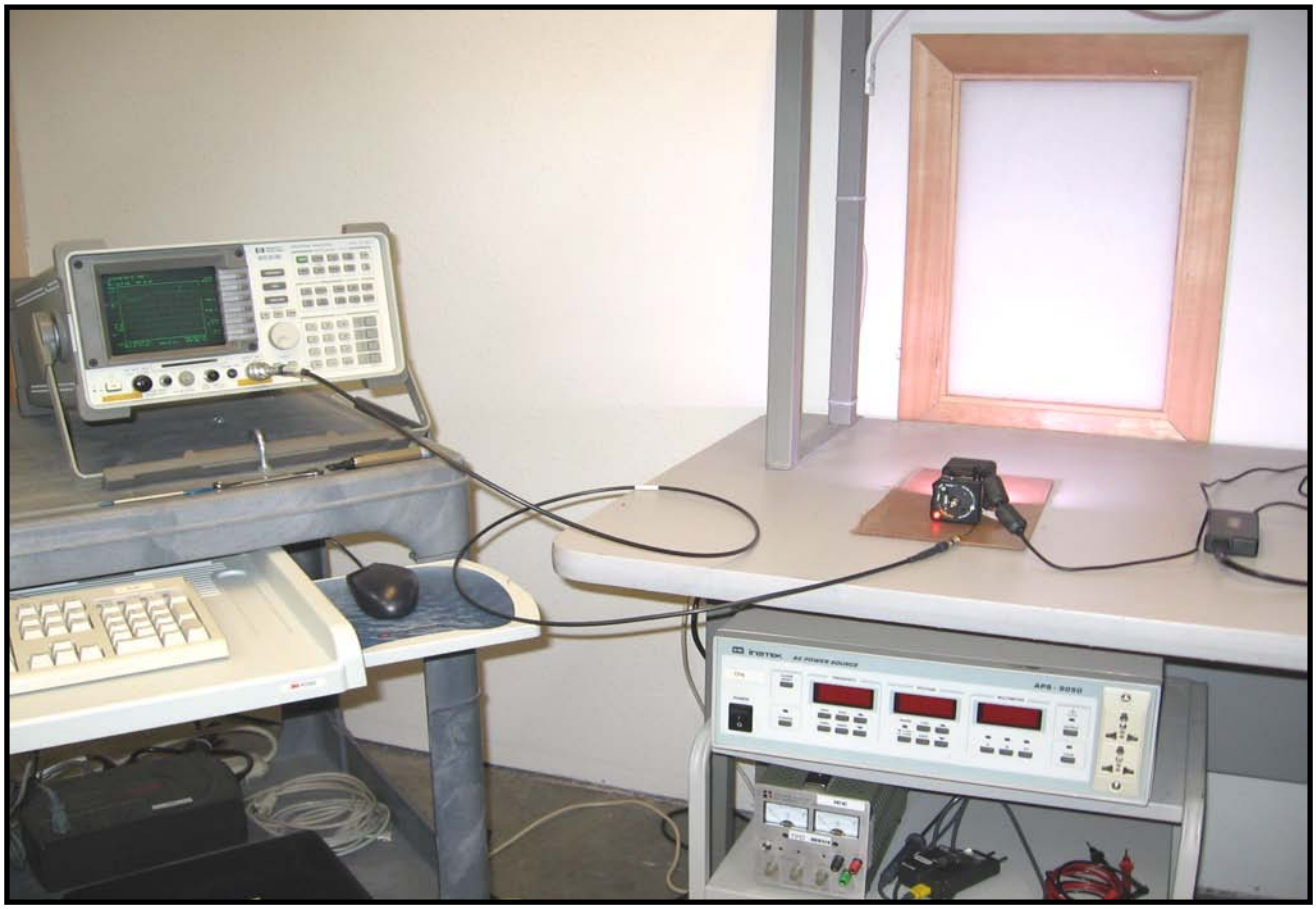
Mid Channel		
Result: Pass	**Value:** -18.0 dBm / 3 kHz	**Limit:** 8 dBm / 3 kHz



POWER SPECTRAL DENSITY

High Channel		
Result: Pass	**Value:** -17.9 dBm / 3 kHz	**Limit:** 8 dBm / 3 kHz





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
Transmitting high channel, power level 8.
Transmitting mid channel, power level 8.
Transmitting low channel, power level 8.

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	26 GHz

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Horn	EMCO	3160-08	AHK	NCR	0
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	2/17/2005	16
Antenna, Horn	EMCO	3160-09	AHG	NCR	0
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	3/23/2006	13
Antenna, Horn	EMCO	3160-09	AHG	NCR	0
High Pass Filter	Micro-Tronics	HPM50111	HFO	4/4/2006	13
Low Pass Filter 0-1000 MHz	Micro-Tronics	LPM50004	LFD	9/28/2005	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	8/2/2005	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	1/4/2006	13
Antenna, Horn	EMCO	3115	AHC	8/30/2005	12
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
Spectrum Analyzer	Agilent	E4446A	AAQ	7/15/2005	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

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

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST EMC

Spurious Radiated Emissions DATA SHEET

PSA 2006.04.06
EMI 2006.3.27

EUT:	Z50 (Zigbee Radio)			**Work Order:**	ZYLI0004
Serial Number:	Zigbee 1			**Date:**	04/10/06
Customer:	Zylight LLC			**Temperature:**	23
Attendees:	None			**Humidity:**	34%
Project:	None			**Barometric Pres.:**	30.08
Tested by:	Holly Ashkannejhad	**Power:**	120VAC/60Hz	**Job Site:**	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS

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

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

EUT OPERATING MODES

Transmitting low channel, power level 8.

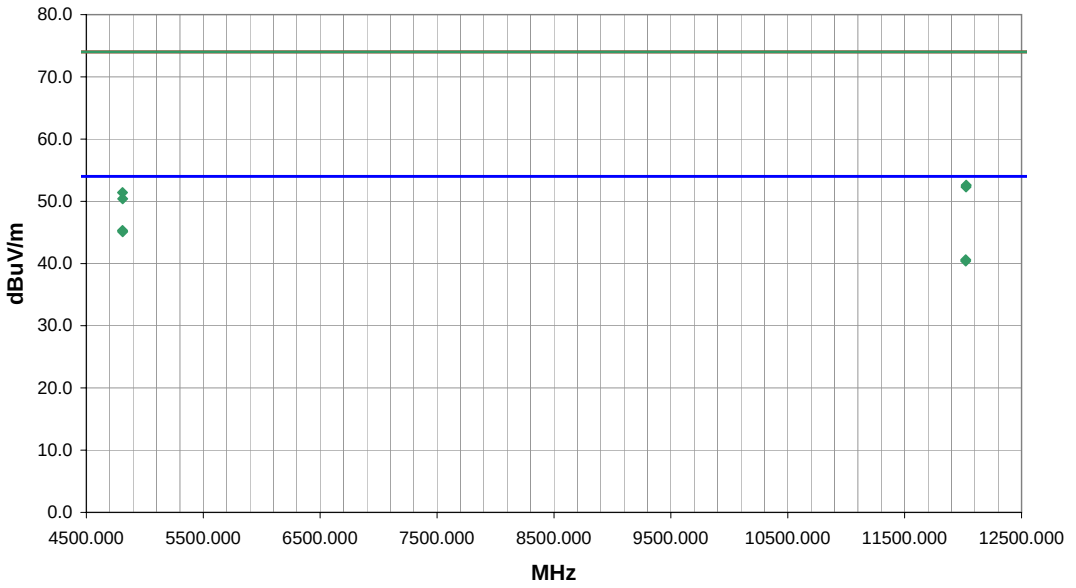
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	2
Results	Pass

NVLAP Lab Code 200630-0

Signature Holly Ashkannejhad



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
4810.004	38.9	6.4	122.0	1.0	0.0	0.0	H-Horn	AV	0.0	45.3	54.0	-8.7	EUT vertical
4810.085	38.7	6.4	160.0	1.0	0.0	0.0	V-Horn	AV	0.0	45.1	54.0	-8.9	EUT horizontal
12021.740	24.5	16.1	209.0	1.0	0.0	0.0	H-Horn	AV	0.0	40.6	54.0	-13.4	EUT horizontal
12022.070	24.3	16.1	296.0	1.0	0.0	0.0	V-Horn	AV	0.0	40.4	54.0	-13.6	EUT vertical
12026.100	36.5	16.1	296.0	1.0	0.0	0.0	V-Horn	PK	0.0	52.6	74.0	-21.4	EUT vertical
12024.630	36.2	16.1	209.0	1.0	0.0	0.0	H-Horn	PK	0.0	52.3	74.0	-21.7	EUT horizontal
4809.878	45.0	6.4	122.0	1.0	0.0	0.0	H-Horn	PK	0.0	51.4	74.0	-22.6	EUT vertical
4810.080	44.0	6.4	160.0	1.0	0.0	0.0	V-Horn	PK	0.0	50.4	74.0	-23.6	EUT horizontal

NORTHWEST EMC

Spurious Radiated Emissions DATA SHEET

PSA 2006.04.06
EMI 2006.3.27

EUT:	Z50 (Zigbee Radio)	Work Order:	ZYLI0004
Serial Number:	Zigbee 1	Date:	04/10/06
Customer:	Zylight LLC	Temperature:	23
Attendees:	None	Humidity:	34%
Project:	None	Barometric Pres.:	30.08
Tested by:	Holly Ashkannejhad	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

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

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

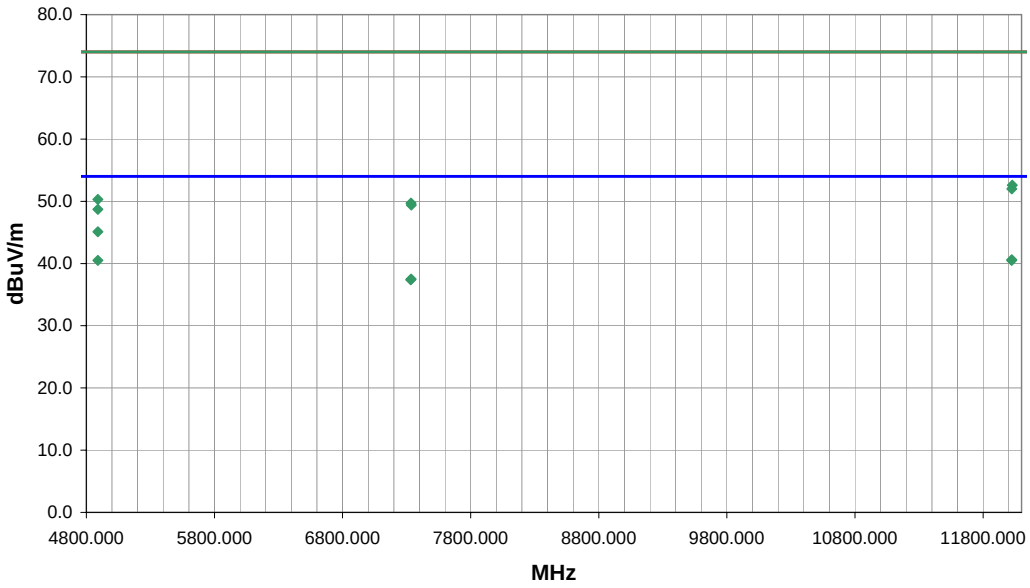
EUT OPERATING MODES

Transmitting mid channel, power level 8.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6		
Configuration #	2		
Results	Pass	NVLAP Lab Code 200630-0	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
4890.042	38.5	6.6	22.0	1.0	3.0	0.0	V-Horn	AV	0.0	45.1	54.0	-8.9	EUT Vertical
12024.280	24.5	16.1	319.0	1.0	3.0	0.0	H-Horn	AV	0.0	40.6	54.0	-13.4	EUT horizontal
4889.957	33.9	6.6	76.0	1.0	3.0	0.0	H-Horn	AV	0.0	40.5	54.0	-13.5	EUT horizontal
12022.180	24.4	16.1	171.0	1.0	3.0	0.0	V-Horn	AV	0.0	40.5	54.0	-13.5	EUT Vertical
7335.880	24.0	13.5	92.0	1.0	3.0	0.0	H-Horn	AV	0.0	37.5	54.0	-16.5	EUT horizontal
7332.125	23.9	13.5	202.0	3.7	3.0	0.0	V-Horn	AV	0.0	37.4	54.0	-16.6	EUT Vertical
12027.480	36.5	16.1	171.0	1.0	3.0	0.0	V-Horn	PK	0.0	52.6	74.0	-21.4	EUT Vertical
12024.050	35.9	16.1	319.0	1.0	3.0	0.0	H-Horn	PK	0.0	52.0	74.0	-22.0	EUT horizontal
4889.667	43.7	6.6	22.0	1.0	3.0	0.0	V-Horn	PK	0.0	50.3	74.0	-23.7	EUT Vertical
7334.564	36.2	13.5	202.0	3.7	3.0	0.0	V-Horn	PK	0.0	49.7	74.0	-24.3	EUT Vertical
7335.985	35.9	13.5	92.0	1.0	3.0	0.0	H-Horn	PK	0.0	49.4	74.0	-24.6	EUT horizontal
4889.690	42.1	6.6	76.0	1.0	3.0	0.0	H-Horn	PK	0.0	48.7	74.0	-25.3	EUT horizontal

NORTHWEST EMC

Spurious Radiated Emissions DATA SHEET

PSA 2006.04.06
EMI 2006.3.27

EUT:	Z50 (Zigbee Radio)	Work Order:	ZYLI0004
Serial Number:	Zigbee 1	Date:	04/10/06
Customer:	Zylight LLC	Temperature:	23
Attendees:	None	Humidity:	34%
Project:	None	Barometric Pres.:	30.08
Tested by:	Holly Ashkannejhad	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

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

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

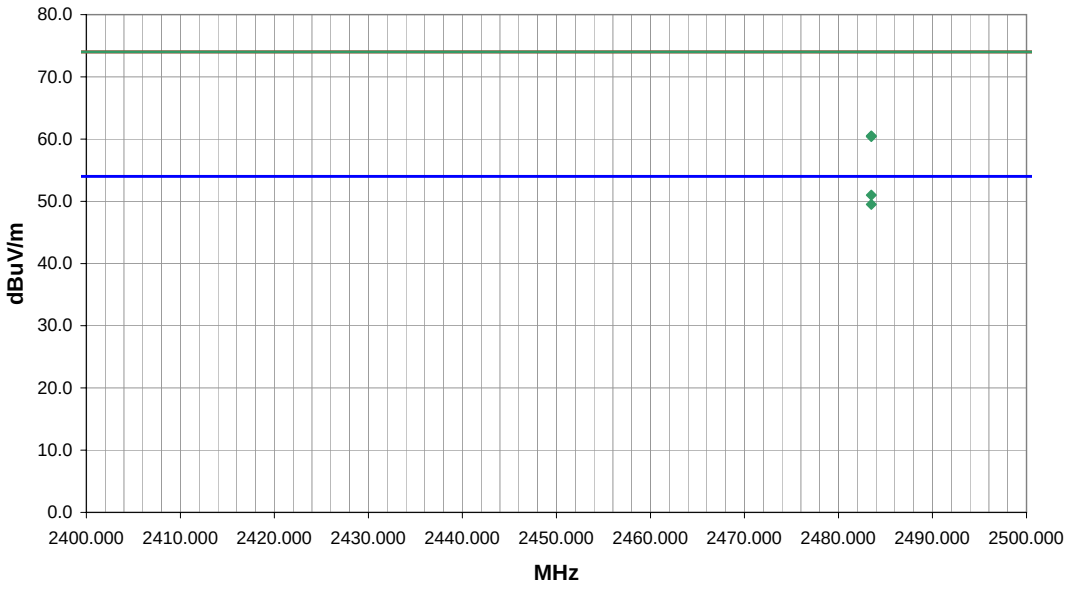
EUT OPERATING MODES

Transmitting high channel, power level 8.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7		
Configuration #	2		
Results	Pass	NVLAP Lab Code 200630-0	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	30.5	0.5	67.0	1.0	3.0	20.0	V-Horn	AV	0.0	51.0	54.0	-3.0	EUT vertical
2483.500	29.0	0.5	189.0	1.8	3.0	20.0	H-Horn	AV	0.0	49.5	54.0	-4.5	EUT horizontal
2483.500	40.0	0.5	67.0	1.0	3.0	20.0	V-Horn	PK	0.0	60.5	74.0	-13.5	EUT vertical
2483.500	39.9	0.5	189.0	1.8	3.0	20.0	H-Horn	PK	0.0	60.4	74.0	-13.6	EUT horizontal

NORTHWEST EMC

Spurious Radiated Emissions DATA SHEET

PSA 2006.04.06
EMI 2006.3.27

EUT:	Z50 (Zigbee Radio)	Work Order:	ZYLI0004
Serial Number:	Zigbee 1	Date:	04/10/06
Customer:	Zylight LLC	Temperature:	23
Attendees:	None	Humidity:	34%
Project:	None	Barometric Pres.:	30.08
Tested by:	Holly Ashkannejhad	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

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

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

EUT OPERATING MODES

Transmitting high channel, power level 8.

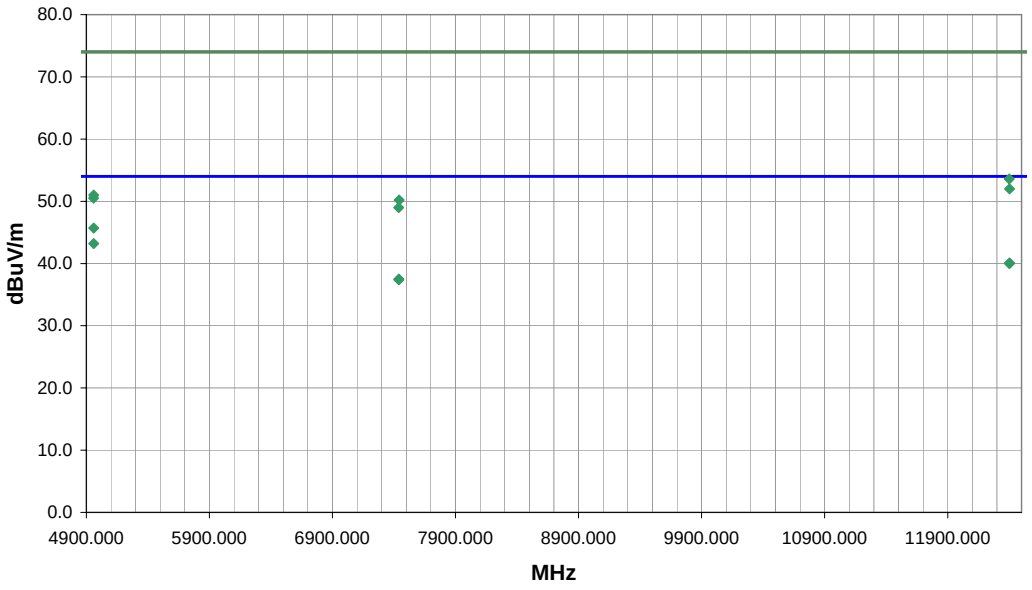
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	8
Configuration #	2
Results	Pass

NVLAP Lab Code 200630-0

Signature Holly Ashkannejhad



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
4960.026	39.0	6.7	225.0	1.3	3.0	0.0	V-Horn	AV	0.0	45.7	54.0	-8.3	EUT vertical
4960.029	36.5	6.7	72.0	1.0	3.0	0.0	H-Horn	AV	0.0	43.2	54.0	-10.8	EUT horizontal
12402.800	23.9	16.2	242.0	2.6	3.0	0.0	H-Horn	AV	0.0	40.1	54.0	-13.9	EUT horizontal
12401.760	23.8	16.2	5.0	1.0	3.0	0.0	V-Horn	AV	0.0	40.0	54.0	-14.0	EUT vertical
7439.949	23.7	13.8	80.0	1.0	3.0	0.0	V-Horn	AV	0.0	37.5	54.0	-16.5	EUT vertical
7438.825	23.6	13.8	185.0	3.7	3.0	0.0	H-Horn	AV	0.0	37.4	54.0	-16.6	EUT horizontal
12399.630	37.4	16.2	242.0	2.6	3.0	0.0	H-Horn	PK	0.0	53.6	74.0	-20.4	EUT horizontal
12402.000	35.8	16.2	5.0	1.0	3.0	0.0	V-Horn	PK	0.0	52.0	74.0	-22.0	EUT vertical
4960.077	44.3	6.7	225.0	1.3	3.0	0.0	V-Horn	PK	0.0	51.0	74.0	-23.0	EUT vertical
4958.994	43.8	6.7	72.0	1.0	3.0	0.0	H-Horn	PK	0.0	50.5	74.0	-23.5	EUT horizontal
7441.662	36.4	13.8	80.0	1.0	3.0	0.0	V-Horn	PK	0.0	50.2	74.0	-23.8	EUT vertical
7438.477	35.2	13.8	185.0	3.7	3.0	0.0	H-Horn	PK	0.0	49.0	74.0	-25.0	EUT horizontal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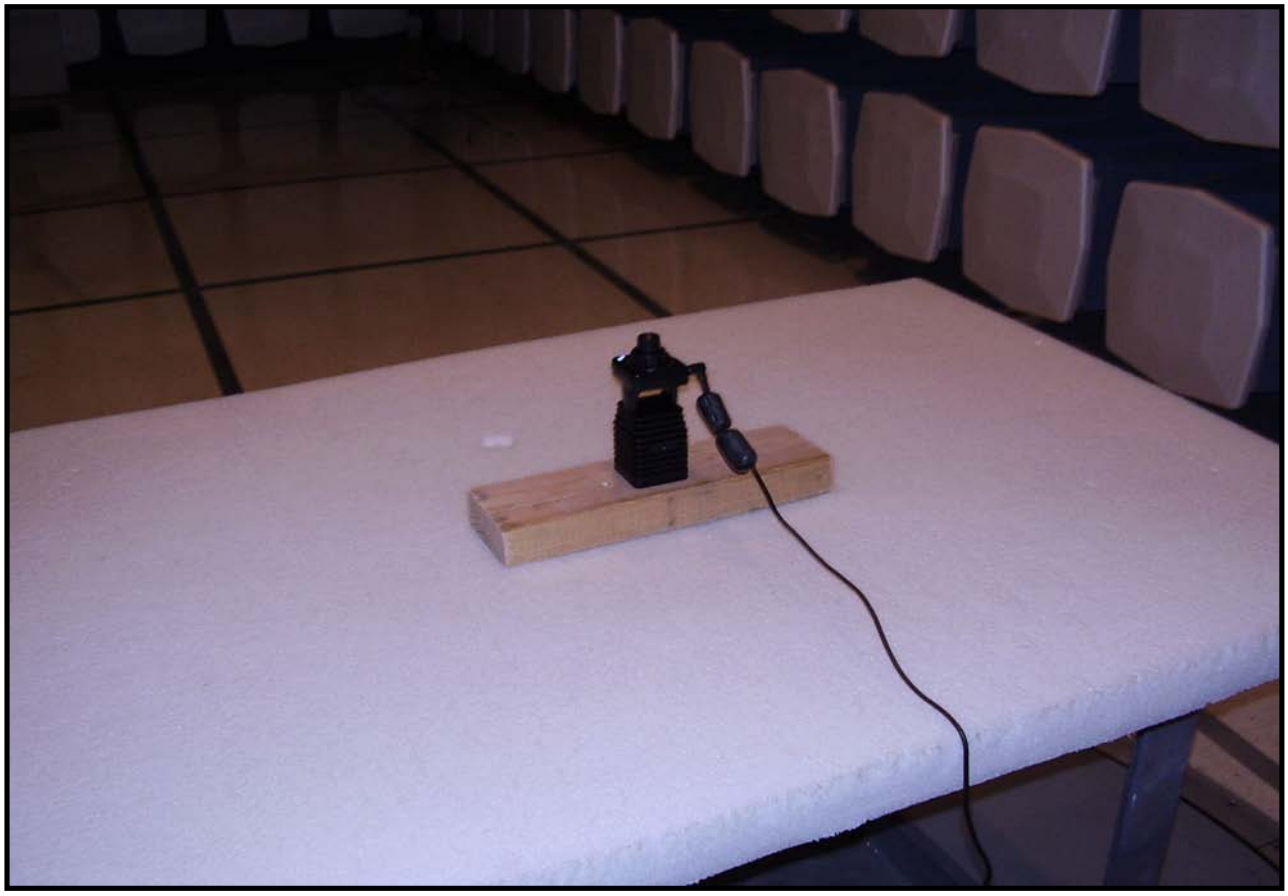
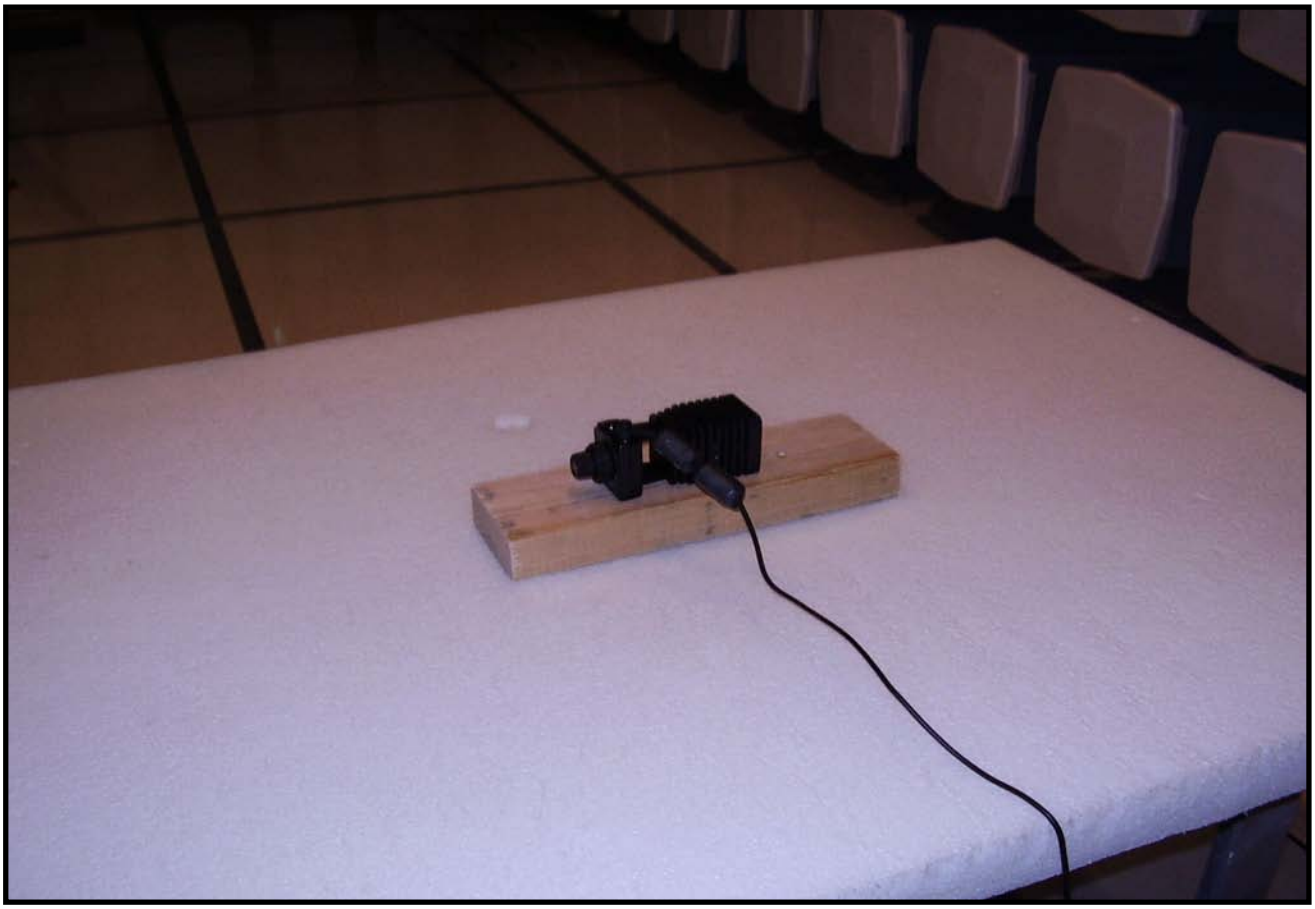




AC Powerline Conducted Emissions

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
Transmitting high channel, power level 8.
Transmitting mid channel, power level 8.
Transmitting low channel, power level 8.

POWER SETTINGS INVESTIGATED
120VAC/60Hz

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIQ	12/13/2005	13
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQD	12/21/2005	13
Spectrum Analyzer Display	Hewlett Packard	85662A	AAID	12/21/2005	13
Spectrum Analyzer	Hewlett-Packard	8568B	AAI	12/21/2005	13

MEASUREMENT BANDWIDTHS

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

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

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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

NORTHWEST EMC

AC Powerline Conducted Emissions

ACQ-2006.04.06
EMI 2005.9.18

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0001
Serial Number:	Zigbee 1			Date:	04/11/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	30%
Project:	None			Barometric Pres.:	29.83
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV07

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	L1

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

EUT OPERATING MODES

Transmitting low channel, power level 8.

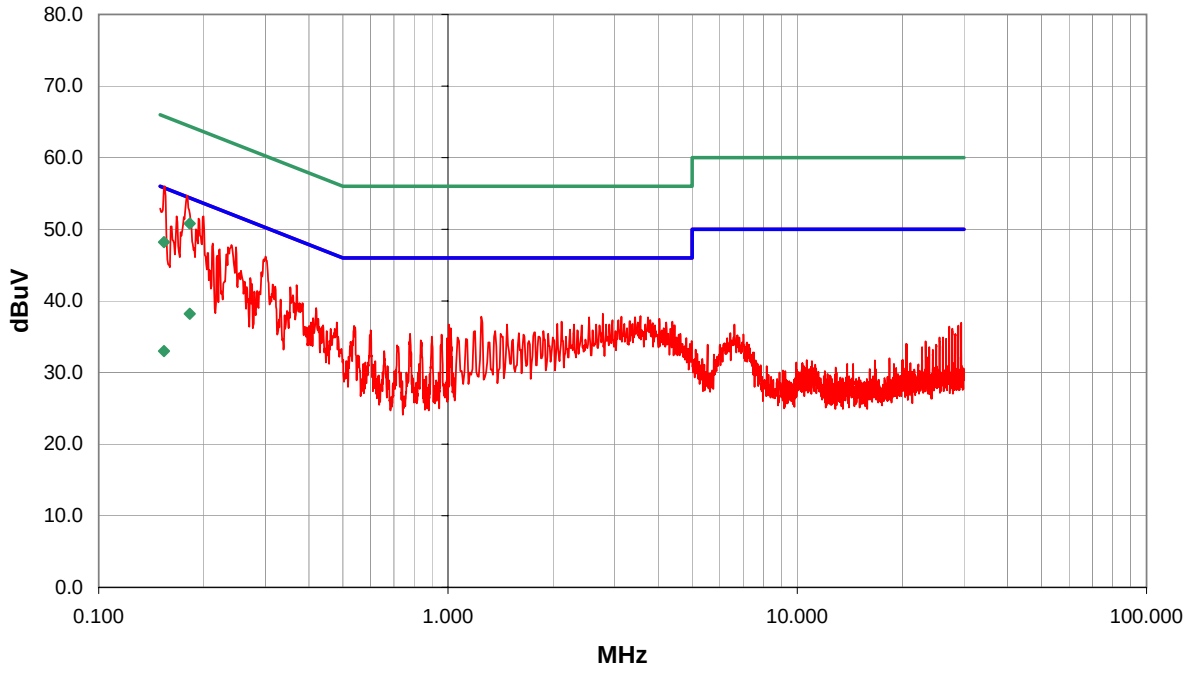
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	2
Results	Pass

NVLAP Lab Code 200630-0

Signature Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.182	30.8			0.0	0.0	20.0		QP		50.8	64.4	-13.6
0.182	18.2			0.0	0.0	20.0		AV		38.2	54.4	-16.2
0.154	28.2			0.0	0.0	20.0		QP		48.2	65.8	-17.6
0.154	13.0			0.0	0.0	20.0		AV		33.0	55.8	-22.8

NORTHWEST EMC

AC Powerline Conducted Emissions

ACQ-2006.04.06
EMI 2005.9.18

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0001
Serial Number:	Zigbee 1			Date:	04/11/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	30%
Project:	None			Barometric Pres.:	29.83
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV07

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	N

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

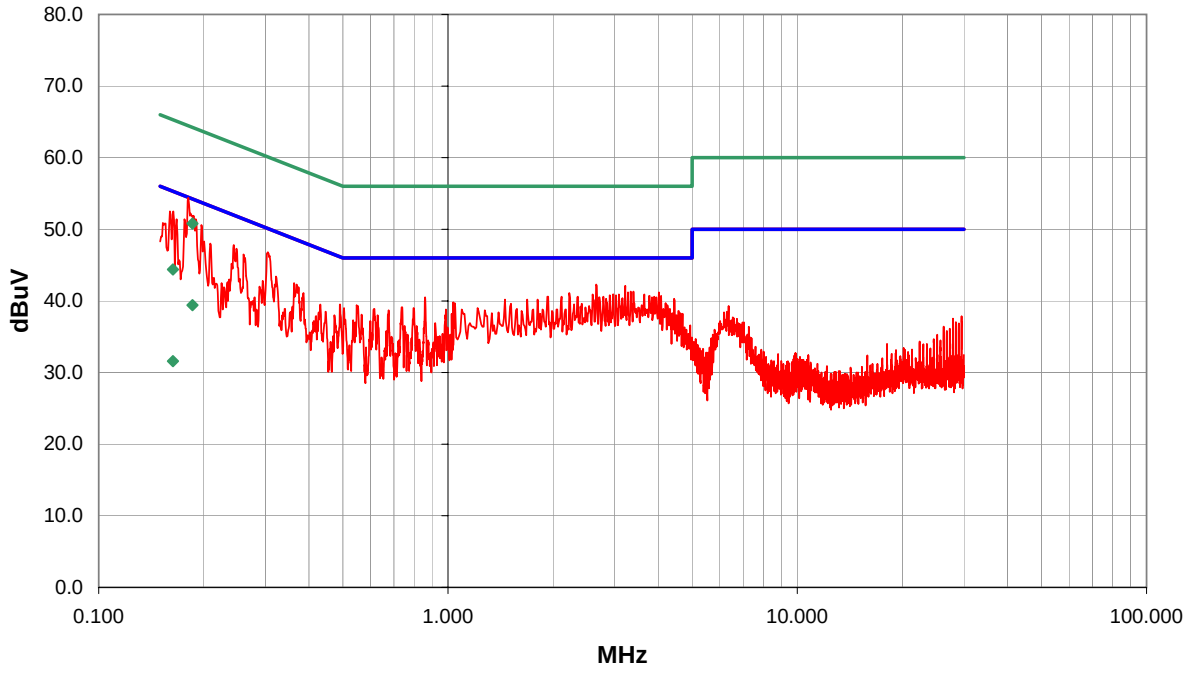
EUT OPERATING MODES

Transmitting low channel, power level 8.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2		
Configuration #	2		
Results	Pass	NVLAP Lab Code 200630-0	Signature Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.186	30.8			0.0	0.0	20.0		QP		50.8	64.2	-13.4
0.186	19.4			0.0	0.0	20.0		AV		39.4	54.2	-14.8
0.163	24.4			0.0	0.0	20.0		QP		44.4	65.3	-20.9
0.163	11.6			0.0	0.0	20.0		AV		31.6	55.3	-23.7

NORTHWEST EMC

AC Powerline Conducted Emissions

ACQ-2006.04.06
EMI 2005.9.18

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0001
Serial Number:	Zigbee 1			Date:	04/11/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	30%
Project:	None			Barometric Pres.:	29.83
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV07

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	N

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

EUT OPERATING MODES

Transmitting mid channel, power level 8.

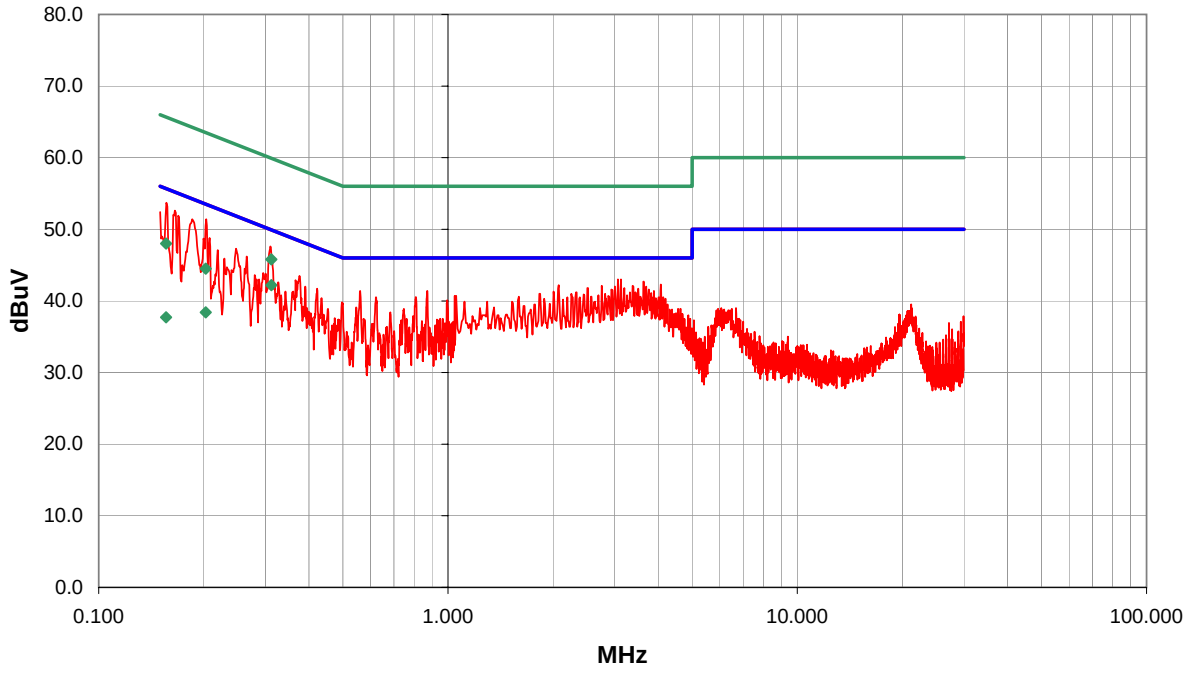
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	2
Results	Pass

NVLAP Lab Code 200630-0

Signature Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.312	22.2			0.0	0.0	20.0		AV		42.2	49.9	-7.7
0.312	25.8			0.0	0.0	20.0		QP		45.8	59.9	-14.1
0.202	18.4			0.0	0.0	20.0		AV		38.4	53.5	-15.1
0.156	28.0			0.0	0.0	20.0		QP		48.0	65.7	-17.7
0.156	17.7			0.0	0.0	20.0		AV		37.7	55.7	-18.0
0.202	24.5			0.0	0.0	20.0		QP		44.5	63.5	-19.0

NORTHWEST EMC

AC Powerline Conducted Emissions

ACQ-2006.04.06
EMI 2005.9.18

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0001
Serial Number:	Zigbee 1			Date:	04/11/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	30%
Project:	None			Barometric Pres.:	29.83
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV07

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	L1

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

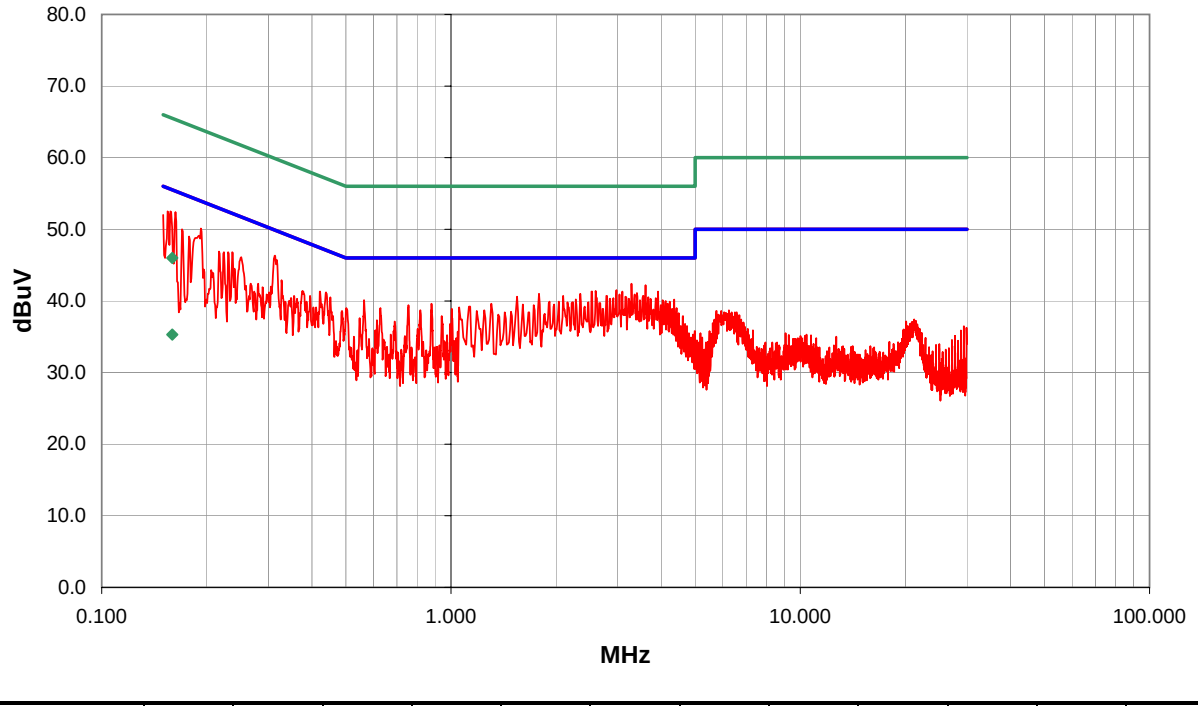
EUT OPERATING MODES

Transmitting mid channel, power level 8.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4		
Configuration #	2		
Results	Pass	NVLAP Lab Code 200630-0	*Signature* Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.159	26.0			0.0	0.0	20.0		QP		46.0	65.5	-19.5
0.159	15.3			0.0	0.0	20.0		AV		35.3	55.5	-20.2

NORTHWEST EMC

AC Powerline Conducted Emissions

ACQ-2006.04.06
EMI 2005.9.18

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0001
Serial Number:	Zigbee 1			Date:	04/11/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	30%
Project:	None			Barometric Pres.:	29.83
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV07

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	L1

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

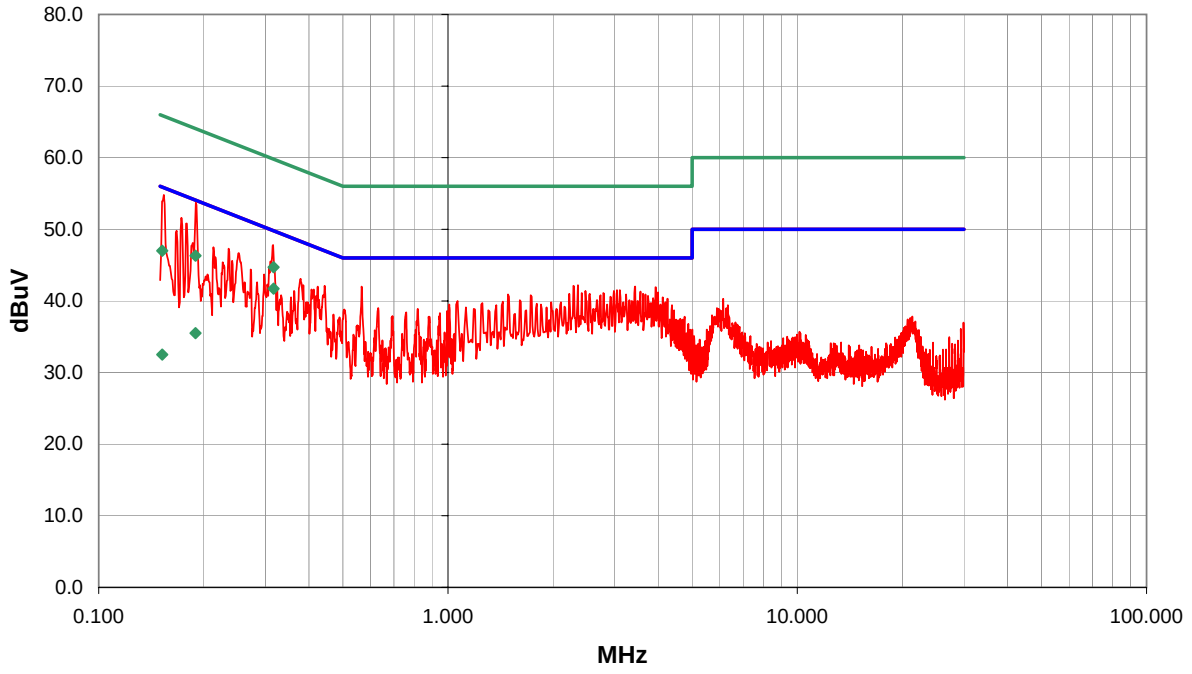
EUT OPERATING MODES

Transmitting high channel, power level 8.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5		
Configuration #	2		
Results	Pass	NVLAP Lab Code 200630-0	Signature Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.317	21.7			0.0	0.0	20.0		AV		41.7	49.8	-8.1
0.317	24.7			0.0	0.0	20.0		QP		44.7	59.8	-15.1
0.189	26.3			0.0	0.0	20.0		QP		46.3	64.1	-17.8
0.189	15.5			0.0	0.0	20.0		AV		35.5	54.1	-18.6
0.152	27.0			0.0	0.0	20.0		QP		47.0	65.9	-18.9
0.152	12.5			0.0	0.0	20.0		AV		32.5	55.9	-23.4

NORTHWEST EMC

AC Powerline Conducted Emissions

ACQ-2006.04.06
EMI 2005.9.18

EUT:	Z50 (Zigbee Radio)			Work Order:	ZYLI0001
Serial Number:	Zigbee 1			Date:	04/11/06
Customer:	Zylight LLC			Temperature:	23
Attendees:	None			Humidity:	30%
Project:	None			Barometric Pres.:	29.83
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz	Job Site:	EV07

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	N

COMMENTS

Zigbee radio, pre-production sample. Two TDK Ferrite ZCAT2035-0930 on the DC power cable at the EUT.

EUT OPERATING MODES

Transmitting high channel, power level 8.

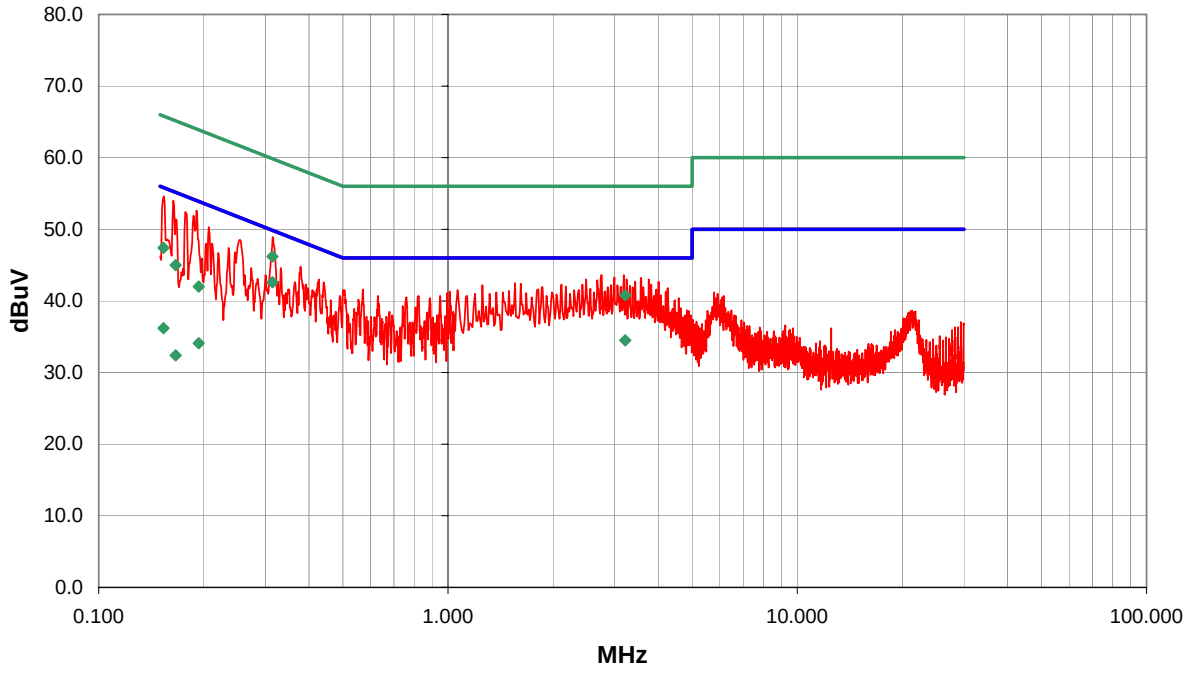
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6
Configuration #	2
Results	Pass

NVLAP Lab Code 200630-0

Signature Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.315	22.6			0.0	0.0	20.0		AV		42.6	49.8	-7.2
3.217	14.5			0.0	0.0	20.0		AV		34.5	46.0	-11.5
0.315	26.2			0.0	0.0	20.0		QP		46.2	59.8	-13.6
3.217	20.8			0.0	0.0	20.0		QP		40.8	56.0	-15.2
0.153	27.4			0.0	0.0	20.0		QP		47.4	65.8	-18.4
0.153	16.2			0.0	0.0	20.0		AV		36.2	55.8	-19.6
0.193	14.1			0.0	0.0	20.0		AV		34.1	53.9	-19.8
0.166	25.0			0.0	0.0	20.0		QP		45.0	65.2	-20.2
0.193	22.0			0.0	0.0	20.0		QP		42.0	63.9	-21.9
0.166	12.4			0.0	0.0	20.0		AV		32.4	55.2	-22.8