

CyberOptics Semiconductor, Inc.

AGS200

February 21, 2008

Report No. CYBR0077.1

Report Prepared By



www.nwemc.com

1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: February 21, 2008
CyberOptics Semiconductor, Inc.
Model: AGS200

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.247 (DTS):2007	ANSI C63.4:2003 KDB No. 558074	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.

Approved By:

Ethan Schoonover, Sultan Lab 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		

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



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



NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0

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



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



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0604C.



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).



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



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (*Registration Numbers. - Hillsboro: C-1071, R-1025, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294.*)



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



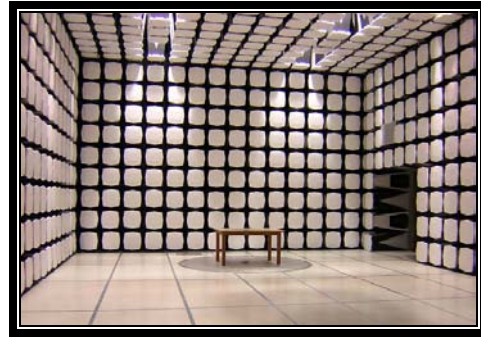
MIC: Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157*)



SCOPE

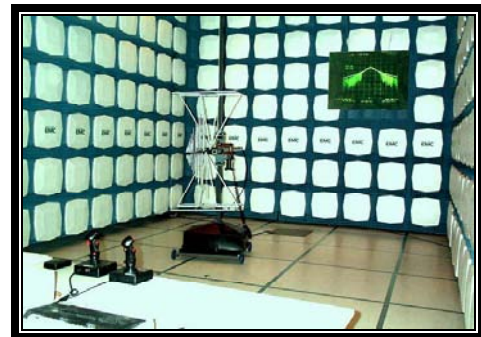
For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/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 – EV11**

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:	CyberOptics Semiconductor, Inc.
Address:	13555 SW Millikan Way
City, State, Zip:	Beaverton, OR 97005
Test Requested By:	Greg Huntzinger
Model:	AGS200
First Date of Test:	February 18, 2008
Last Date of Test:	February 19, 2008
Receipt Date of Samples:	February 18, 2008
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

WaferSense™ AGS200 measures gaps that are critical to the outcome of semiconductor processes such as thin-film deposition, sputtering and etch. AGS200 contains a Bluetooth transceiver to speed equipment setup and maintenance.

Testing Objective:

These tests were selected to satisfy FCC 15.247 radiated spurious emissions requirements.

EUT Photo



CONFIGURATION 1 CYBR0077**Software/Firmware Running during test**

Description	Version
Bluetest3	3

EUT

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Wafer	CyberOptics Semiconductor, Inc.	AGS200	SFE72290051

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	2/18/2008 2/19/2008	Radiated Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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

MODES OF OPERATION

Transmitting Bluetooth GFSK modulation, DH5, low Channel
Transmitting Bluetooth GFSK modulation, DH5, mid Channel
Transmitting Bluetooth GFSK modulation, DH5, High Channel

POWER SETTINGS INVESTIGATED

Battery

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	25 GHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAT	12/7/2007	13
High Pass Filter	Micro-Tronics	HPM50111	HFO	1/16/2008	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	12/29/2006	16
Antenna, Biconilog	EMCO	3141	AXE	1/15/2008	24
EV01 Cables		Bilog Cables	EVA	10/23/2007	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	1/3/2008	13
Antenna, Horn	EMCO	3115	AHC	8/24/2006	24
EV01 Cables		Double Ridge Horn Cables	EVB	1/3/2008	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	6/22/2007	13
Antenna, Horn	ETS	3160-07	AHU	NCR	0
EV01 Cables		Standard Gain Horns Cables	EVF	10/23/2007	13
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	6/22/2007	13
Antenna, Horn	ETS	3160-08	AHV	NCR	0
EV01 Cables		Standard Gain Horns Cables	EVF	10/23/2007	13
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	7/25/2007	13
Antenna, Horn	EMCO	3160-09	AHG	NCR	0
EV01 Cables		6GHz Standard Gain Horn C	EVD	7/25/2007	13

MEASUREMENT BANDWIDTHS

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

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

MEASUREMENT UNCERTAINTY

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		PSA 2007.05.07											
EMI 2006.11.29													
EMC													
RADIATED SPURIOUS EMISSIONS													
EUT: AGS200		Work Order: CYBR0077											
Serial Number: SFE72290051		Date: 02/18/08											
Customer: CyberOptics Semiconductor, Inc.		Temperature: 24											
Attendees: Greg Huntzinger		Humidity: 23%											
Project: None		Barometric Pres.: 30.07											
Tested by: Rod Peloquin		Power: Battery											
Job Site: EV01													
TEST SPECIFICATIONS		Test Method											
FCC 15.247 (DTS):2007		ANSI C63.4:2003 KDB No. 558074											
TEST PARAMETERS													
Antenna Height(s) (m)		1 - 4											
Test Distance (m)		3											
COMMENTS													
EUT OPERATING MODES													
Transmitting Bluetooth GFSK modulation, DH5, High Channel													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #		2											
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	26.7	2.2	49.0	1.0	3.0	20.0	H-Horn	AV	0.0	48.9	54.0	-5.1	EUT on side
2483.500	25.3	2.2	34.0	1.0	3.0	20.0	H-Horn	AV	0.0	47.5	54.0	-6.5	EUT vertical
2483.500	25.2	2.2	235.0	1.4	3.0	20.0	V-Horn	AV	0.0	47.4	54.0	-6.6	EUT horizontal
2483.508	24.7	2.2	6.0	1.1	3.0	20.0	V-Horn	AV	0.0	46.9	54.0	-7.1	EUT on side
2483.500	24.0	2.2	213.0	2.6	3.0	20.0	H-Horn	AV	0.0	46.2	54.0	-7.8	EUT horizontal
2484.927	23.9	2.2	335.0	1.1	3.0	20.0	V-Horn	AV	0.0	46.1	54.0	-7.9	EUT vertical
2483.567	42.8	2.2	47.0	1.0	3.0	20.0	H-Horn	PK	0.0	65.0	74.0	-9.0	EUT on side
2483.730	38.6	2.2	6.0	1.1	3.0	20.0	V-Horn	PK	0.0	60.8	74.0	-13.2	EUT on side
2483.615	38.4	2.2	34.0	1.0	3.0	20.0	H-Horn	PK	0.0	60.6	74.0	-13.4	EUT vertical
2483.573	38.2	2.2	235.0	1.4	3.0	20.0	V-Horn	PK	0.0	60.4	74.0	-13.6	EUT horizontal
2483.957	37.9	2.2	335.0	1.1	3.0	20.0	V-Horn	PK	0.0	60.1	74.0	-13.9	EUT vertical
2483.983	37.5	2.2	213.0	2.6	3.0	20.0	H-Horn	PK	0.0	59.7	74.0	-14.3	EUT horizontal

NORTHWEST		PSA 2007.05.07											
EMI 2006.11.29													
EMC													
RADIATED SPURIOUS EMISSIONS													
EUT: AGS200		Work Order: CYBR0077											
Serial Number: SFE72290051		Date: 02/18/08											
Customer: CyberOptics Semiconductor, Inc.		Temperature: 24											
Attendees: Greg Huntzinger		Humidity: 23%											
Project: None		Barometric Pres.: 30.07											
Tested by: Rod Peloquin		Power: Battery											
		Job Site: EV01											
TEST SPECIFICATIONS		Test Method											
FCC 15.247 (DTS):2007		ANSI C63.4:2003 KDB No. 558074											
TEST PARAMETERS													
Antenna Height(s) (m)		1 - 4											
Test Distance (m)		3											
COMMENTS													
EUT OPERATING MODES													
Transmitting Bluetooth GFSK modulation, DH5, High Channel													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #		3											
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
7439.972	28.3	17.7	-1.0	1.4	3.0	0.0	V-Horn	AV	0.0	46.0	54.0	-8.0	EUT on side
7440.010	27.8	17.7	298.0	1.0	3.0	0.0	H-Horn	AV	0.0	45.5	54.0	-8.5	EUT vertical
4960.030	33.7	11.0	14.0	1.1	3.0	0.0	V-Horn	AV	0.0	44.7	54.0	-9.3	EUT on side
4959.968	33.4	11.0	12.0	1.0	3.0	0.0	V-Horn	AV	0.0	44.4	54.0	-9.6	EUT horizontal
4959.958	33.2	11.0	353.0	1.2	3.0	0.0	H-Horn	AV	0.0	44.2	54.0	-9.8	EUT vertical
4960.000	28.6	11.0	5.0	1.1	3.0	0.0	V-Horn	AV	0.0	39.6	54.0	-14.4	EUT vertical
4959.968	27.5	11.0	3.0	1.8	3.0	0.0	H-Horn	AV	0.0	38.5	54.0	-15.5	EUT on side
7440.250	40.2	17.7	298.0	1.0	3.0	0.0	H-Horn	PK	0.0	57.9	74.0	-16.1	EUT vertical
7440.222	38.8	17.7	-1.0	1.4	3.0	0.0	V-Horn	PK	0.0	56.5	74.0	-17.5	EUT on side
4960.028	24.1	11.0	5.0	1.0	3.0	0.0	H-Horn	AV	0.0	35.1	54.0	-18.9	EUT horizontal
4959.720	43.2	11.0	14.0	1.1	3.0	0.0	V-Horn	PK	0.0	54.2	74.0	-19.8	EUT on side
4960.358	42.5	11.0	353.0	1.2	3.0	0.0	H-Horn	PK	0.0	53.5	74.0	-20.5	EUT vertical
4960.358	42.0	11.0	12.0	1.0	3.0	0.0	V-Horn	PK	0.0	53.0	74.0	-21.0	EUT horizontal
4960.158	39.8	11.0	5.0	1.1	3.0	0.0	V-Horn	PK	0.0	50.8	74.0	-23.2	EUT vertical
4959.952	39.7	11.0	3.0	1.8	3.0	0.0	H-Horn	PK	0.0	50.7	74.0	-23.3	EUT on side
4959.778	37.2	11.0	5.0	1.0	3.0	0.0	H-Horn	PK	0.0	48.2	74.0	-25.8	EUT horizontal

EUT: AGS200	Work Order: CYBR0077
Serial Number: SFE72290051	Date: 02/19/08
Customer: CyberOptics Semiconductor, Inc.	Temperature: 24
Attendees: Greg Huntzinger	Humidity: 23%
Project: None	Barometric Pres.: 30.07
Tested by: Rod Peloquin	Power: Battery
	Job Site: EV01

TEST SPECIFICATIONS

FCC 15.247 (DTS):2007

Test Method

ANSI C63.4:2003 KDB No. 558074

TEST PARAMETERS

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

COMMENTS

EUT OPERATING MODES

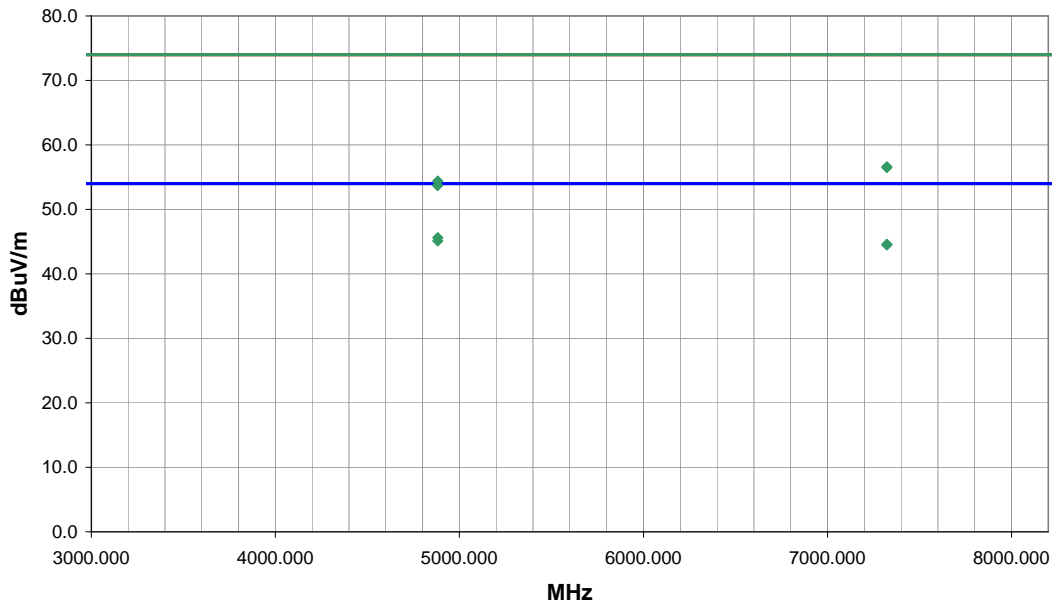
Transmitting Bluetooth GFSK modulation, DH5, mid Channel

DEVIATIONS FROM TEST STANDARD

No deviations.


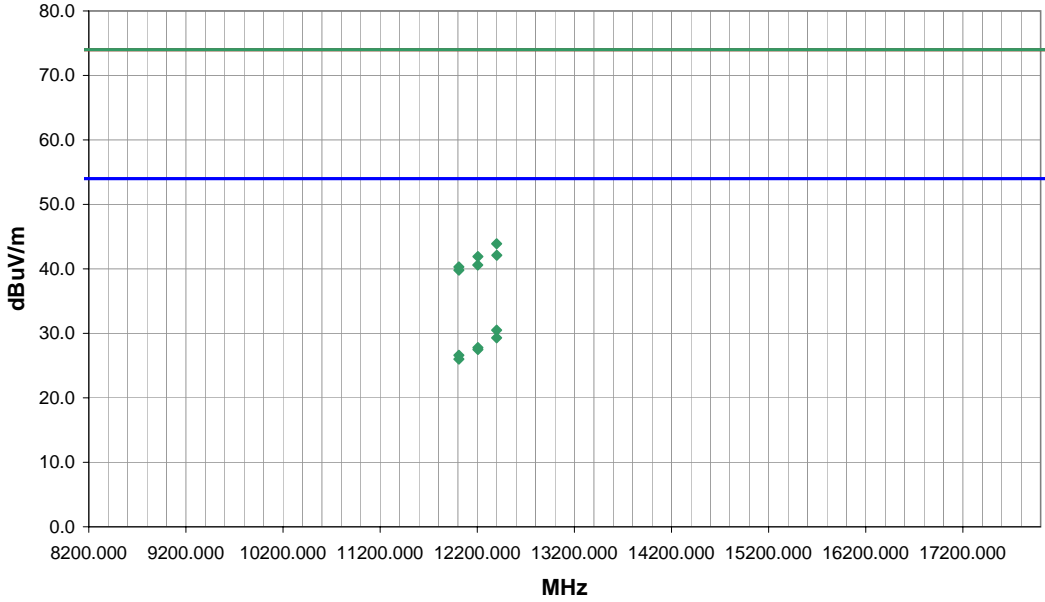
Run #	4
Configuration #	1
Results	Pass

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
4882.002	35.1	10.5	353.0	1.2	3.0	0.0	H-Horn	AV	0.0	45.6	54.0	-8.4	EUT vertical
4882.018	34.6	10.5	15.0	1.0	3.0	0.0	V-Horn	AV	0.0	45.1	54.0	-8.9	EUT on side
7322.965	27.5	17.1	331.0	1.0	3.0	0.0	H-Horn	AV	0.0	44.6	54.0	-9.4	EUT vertical
7323.022	27.4	17.1	355.0	1.3	3.0	0.0	V-Horn	AV	0.0	44.5	54.0	-9.5	EUT on side
7322.550	39.5	17.1	355.0	1.3	3.0	0.0	V-Horn	PK	0.0	56.6	74.0	-17.4	EUT on side
7322.498	39.4	17.1	331.0	1.0	3.0	0.0	H-Horn	PK	0.0	56.5	74.0	-17.5	EUT vertical
4881.968	43.9	10.5	353.0	1.2	3.0	0.0	H-Horn	PK	0.0	54.4	74.0	-19.6	EUT vertical
4881.728	43.2	10.5	15.0	1.0	3.0	0.0	V-Horn	PK	0.0	53.7	74.0	-20.3	EUT on side

NORTHWEST EMC										RADIATED SPURIOUS EMISSIONS										PSA 2007.05.07 EMI 2006.11.29			
EUT: AGS200										Work Order: CYBR0077													
Serial Number: SFE72290051										Date: 02/19/08													
Customer: CyberOptics Semiconductor, Inc.										Temperature: 24													
Attendees: Greg Huntzinger										Humidity: 23%													
Project: None										Barometric Pres.: 30.07													
Tested by: Rod Peloquin										Power: Battery										Job Site: EV01			
TEST SPECIFICATIONS										Test Method													
FCC 15.247 (DTS):2007										ANSI C63.4:2003 KDB No. 558074													
TEST PARAMETERS																							
Antenna Height(s) (m)										1 - 4										Test Distance (m)		3	
COMMENTS																							
EUT OPERATING MODES																							
Transmitting Bluetooth GFSK modulation, DH5, low Channel																							
DEVIATIONS FROM TEST STANDARD																							
No deviations.																							
Run #										5													
Configuration #										1													
Results										Pass										Signature <i>Rodry L. Peloquin</i>			
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										
4803.990	34.4	10.1	10.0	1.1	3.0	0.0	V-Horn	AV	0.0	44.5	54.0	-9.5	EUT on side										
4804.005	34.3	10.1	11.0	1.1	3.0	0.0	H-Horn	AV	0.0	44.4	54.0	-9.6	EUT vertical										
4803.715	43.8	10.1	10.0	1.1	3.0	0.0	V-Horn	PK	0.0	53.9	74.0	-20.1	EUT on side										
4803.938	43.4	10.1	11.0	1.1	3.0	0.0	H-Horn	PK	0.0	53.5	74.0	-20.5	EUT vertical										

NORTHWEST EMC		RADIATED SPURIOUS EMISSIONS										PSA 2007.05.07 EMI 2006.11.29	
EUT: AGS200						Work Order: CYBR0077							
Serial Number: SFE72290051						Date: 02/19/08							
Customer: CyberOptics Semiconductor, Inc.						Temperature: 24							
Attendees: Greg Huntzinger						Humidity: 23%							
Project: None						Barometric Pres.: 30.07							
Tested by: Rod Peloquin						Power: Battery		Job Site: EV01					
TEST SPECIFICATIONS													
FCC 15.247 (DTS):2007						Test Method							
						ANSI C63.4:2003 KDB No. 558074							
TEST PARAMETERS													
Antenna Height(s) (m)		1 - 4				Test Distance (m)		3					
COMMENTS													
EUT OPERATING MODES													
Transmitting Bluetooth GFSK modulation, DH5													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #		6				 Signature							
Configuration #		1											
Results		Pass											
													
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
12399.490	33.7	-3.2	312.0	1.1	3.0	0.0	H-Horn	AV	0.0	30.5	54.0	-23.5	High channel
12399.470	32.5	-3.2	19.0	1.0	3.0	0.0	V-Horn	AV	0.0	29.3	54.0	-24.7	High channel
12205.540	32.5	-4.7	65.0	1.0	3.0	0.0	H-Horn	AV	0.0	27.8	54.0	-26.2	Mid channel
12205.700	32.2	-4.7	345.0	1.0	3.0	0.0	V-Horn	AV	0.0	27.5	54.0	-26.5	Mid channel
12010.480	32.7	-6.1	350.0	1.0	3.0	0.0	H-Horn	AV	0.0	26.6	54.0	-27.4	Low channel
12010.550	32.1	-6.1	344.0	1.0	3.0	0.0	V-Horn	AV	0.0	26.0	54.0	-28.0	Low channel
12399.610	47.1	-3.2	312.0	1.1	3.0	0.0	H-Horn	PK	0.0	43.9	74.0	-30.1	High channel
12400.590	45.3	-3.2	19.0	1.0	3.0	0.0	V-Horn	PK	0.0	42.1	74.0	-31.9	High channel
12205.850	46.6	-4.7	65.0	1.0	3.0	0.0	H-Horn	PK	0.0	41.9	74.0	-32.1	Mid channel
12204.830	45.3	-4.7	345.0	1.0	3.0	0.0	V-Horn	PK	0.0	40.6	74.0	-33.4	Mid channel
12010.340	46.4	-6.1	350.0	1.0	3.0	0.0	H-Horn	PK	0.0	40.3	74.0	-33.7	Low channel
12010.460	45.9	-6.1	344.0	1.0	3.0	0.0	V-Horn	PK	0.0	39.8	74.0	-34.2	Low channel



