CyberOptics Semiconductor, Inc.

WaferSense Link

December 8, 2004

Report No. CYBR0040 Rev. 1

Report Prepared By



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

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Certificate of Test Issue Date: December 8, 2004 CyberOptics Semiconductor, Inc. WaferSense Link

	Emissions		
Specification	Test Method	Pass	Fail
FCC 15.247(a) Occupied Bandwidth:2004	ANSI C63.4:2003	\square	
FCC 15.247(b) Output Power:2004	ANSI C63.4:2003	\boxtimes	
FCC 15.247(d) Band Edge Compliance:2004	ANSI C63.4:2003	\boxtimes	
FCC 15.247(d) Spurious Conducted Emissions:2004	ANSI C63.4:2003	\boxtimes	
FCC 15.247(d) Spurious Radiated Emissions:2004	ANSI C63.4:2003	\boxtimes	
FCC 15.247(e) Power Spectral Density:2004	ANSI C63.4:2003	\boxtimes	
FCC 15.207 AC Power Line Conducted Emissions:2004	ANSI C63.4:2003	\square	

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

Test Facility

The measurement facilities 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

The sites have been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:
Dould Mantan
Don Facteau, IS Manager

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

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



01	Added "Transmitter Statement" to the Certificate of Test	2/2/2005	2
01	Removed "Northwest EMC Performance Criteria" section.	2/2/2005	6,7



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

NVLAP: Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, 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. Accreditation has been granted to Northwest EMC, Inc. under Certificate Numbers: 200629-0, 200630-0, and 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















Accreditations and Authorizations

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. TUV Rheinland **NEMKO:** Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory NEMKO 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 Nos. -Hillsboro: C-1071 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: R-871, C-1784 and R-1761) **BSMI:** Northwest EMC has been designated by NIST and validated by C-Taipei BSMI (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: <u>http://www.nwemc.com/scope.asp</u>



What is measurement uncertainty?

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

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

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

How might measurement uncertainty be applied to test results?

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



Case D: Product does not comply.



Radiated Emissions ≤ 1 GHz	Value (dB)						
	Probability	Probability Biconical		Log Periodic		Dipole	
	Distribution	Antenna		Antenna		Antenna	
Test Distance		3m	10m	3m	10m	3m	10m
Combined standard	normal	+ 1.86	+ 1.82	+ 2.23	+ 1.29	+ 1.31	+ 1.25
uncertainty <i>u_c(y)</i>		- 1.88	- 1.87	- 1.41	- 1.26	- 1.27	- 1.25
Expanded uncertainty U	normal (k=2)	+ 3.72	+ 3.64	+ 4.46	+ 2.59	+ 2.61	+ 2.49
(level of confidence \approx 95%)		- 3.77	- 3.73	-2.81	- 2.52	- 2.55	- 2.49

Radiated Emissions > 1 GHz	Value (dB)		
	Probability	Without High	With High
	Distribution	Pass Filter	Pass Filter
Combined standard uncertainty <i>u_c(y)</i>	normal	+ 1.29	+ 1.38
		- 1.25	- 1.35
Expanded uncertainty U	normal (k=2)	+ 2.57	+ 2.76
(level of confidence \approx 95%)		- 2.51	2.70

Conducted Emissions					
	Probability	Value			
	Distribution	(+/- dB)			
Combined standard uncertainty <i>uc(y)</i>	normal	1.48			
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.97			

Radiated Immunity					
	Probability	Value			
	Distribution	(+/- dB)			
Combined standard uncertainty <i>uc(y)</i>	normal	1.05			
Expanded uncertainty U	normal $(k - 2)$	2 11			
(level of confidence \approx 95 %)	$\operatorname{Hormal}\left(R=2\right)$	2.11			

Conducted Immunity					
	Probability	Value			
	Distribution	(+/- dB)			
Combined standard uncertainty <i>uc(y</i>)	normal	1.05			
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.10			

Legend

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

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



Facilities









California

Orange County Facility

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

Oregon

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

Oregon

 Trails End Facility

 30475 NE Trails End Lane

 Newberg, OR 97132

 (503) 844-4066

 FAX (503) 537-0735

Washington

Sultan Facility

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

Party Requesting the Test	
Company Name:	CyberOptics Semiconductor, Inc.
Address:	10220 SW Nimbus, Suite K5
City, State, Zip:	Portland, OR 97223
Test Requested By:	Greg Huntzinger
Model:	WaferSense ALS
First Date of Test:	11/11/2004
Last Date of Test:	11/23/2004
Receipt Date of Samples:	11/11/2004
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided at the time of test.
I/O Ports:	Serial

Functional Description of the EUT (Equipment Under Test):

Bluetooth radio used for level measurement in wafer fab equipment.

Both the WaferSense ALS 300 and the WaferSense Link use the same Bluetooth Radio, therefore the antenna conducted test data from the WaferSense ALS 300 is being used to satisfy both requirements. Only the radiated spurious emissions was tested for each specific configuration.

Client Justification for EUT Selection:

The product is a representative production sample.

Client Justification for Test Selection:

These test satisfy the requirements for the FCC approval.

EUT Photo





Modifications

	Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT	
			No EMI suppression	Same	EUT remained	
1	Output Power	11/11/2004	devices were added or	configuration as	at Northwest	
			modified during this test.	delivered.	EMC.	
	Spurious		No EMI suppression	Same	EUT remained	
2	Conducted	11/11/2004	devices were added or	configuration as in	at Northwest	
	Emissions		modified during this test.	previous test.	EMC.	
	Band Edge		No EMI suppression	Same	EUT remained	
3 Compliance	Compliance	11/11/2004	devices were added or	configuration as in	at Northwest	
	Compliance		modified during this test.	previous test.	EMC.	
	Occupied	ed 11/11/2004	No EMI suppression	Same	EUT remained	
4 Bandwidth	Bandwidth		devices were added or	configuration as in	at Northwest	
	Danuwidth		modified during this test.	previous test.	EMC.	
	Power Spectral		No EMI suppression	Same	EUT remained	
5	Density	Popeity 11/11/2004	devices were added or	configuration as in	at Northwest	
Density			modified during this test.	previous test.	EMC.	
	Spurious		No EMI suppression	Same	EUT remained	
6	Radiated	11/15/2004	devices were added or	configuration as in	at Northwest	
	Emissions		modified during this test.	previous test.	EMC.	
			No EMI suppression	Same	EUT remained	
7	Emissions	11/23/2004	devices were added or	configuration as in	at Northwest	
Emissions	ETHISSIONS		modified during this test.	previous test.	EMC.	



Justification

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

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated: No Hop

Data Rates Investigated: Maximum

Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz. (5 Vdc from Host Device)

Software\Firmware Applied During Test						
Exercise software	CSR Bluetest	Version	1.19			
Description						
The system was tested us	ing special software develo	ped to test all functions of t	he device during the test.			

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Radio (EUT)	CyberOptics Semiconductor	WaferSense ALS	H1A01002
Host Device	Cambridge Silicon Radio	Casira	5673121101
PC	Fujitsu	Litebook	R3Y02504
PC Power Adapter	Fujitsu	CA01007-0870	39782749B
Host Device Power Adapter	EGSTON	N2GFSW3	none

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	3.0	No	Host Device	PC
AC Power	No	2.0	No	PC Power Adapter	AC Mains
DC Leads	PA	2.0	PA	PC Power Adapter	PC
DC Leads	PA	2.0	PA	Host Device Power Adapter	Host Device
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment							
Description	Manufacturer	Model	Identifier	Last Cal	Interval		
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo		

Test Description

<u>Requirement</u>: Per an FCC Interpretation # 20021209-001, "Bluetooth devices may apply under the rules in 15.247 as either a Digital Transmission System (DTS), a Frequency Hopping System (FHSS), or a Hybrid System whichever provides an advantage to the grantee as long as all the requirements are met... The hopping function (*of a hybrid*) must be a true hopping system, as described in Section 15.247(a)(1)."

As a DTS system, the minimum 6 dB bandwidth is 500 kHz.

As a FHSS, the maximum 20dB bandwidth of the hopping channel is equal to 1.5 times the channel separation (see 47 CFR 15.247(a)(1)). For example, channel separation for Bluetooth is 1 MHz, therefore the maximum 20 dB bandwidth is 1.5 MHz.

As a Hybrid, it must meet the FHSS requirement as described above.

<u>Configuration</u>: 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.

Completed by:	
ADU.K.P	

NORTHWEST	EMISSIONS	DATA SHEET		Rev BETA 01/30/01				
EUT: WaferSense ALS			Work Order:	CYBR0040				
Serial Number: H1A01002			Date:	11/11/04				
Customer: CyberOptics Semiconductor			Temperature:	70 °F				
Attendees: Greg Huntzinger	Tested by: Greg Kiemel Humidity: 47% RH							
Customer Ref. No.:		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATIONS								
Specification: 47 CFR 15.247(a)	Year: 2004	Method: DA 00-705, ANSI C63.4	Year:	2003				
SAMPLE CALCULATIONS								
COMMENTS								
Measured with a direct connection between the RF outpol	ut and a spectrum analyzer.							
EUT OPERATING MODES								
Modulated by PRBS at maximum data rate								
DEVIATIONS FROM TEST STANDARD								
None								
REQUIREMENTS								
Bluetooth can be authorized as either a Frequency Hopp	ing System (FHSS), a Digital Trans	mission System (DTS), or a Hybrid System.						
As a FHSS, the maximum 20dB bandwidth of the hoppin maximum 20 dB bandwidth is 1.5 MHz.	g channel is equal to 1.5 times the	channel separation. For example, channel sep	aration for Bluetooth i	s 1 MHz, therefore the				
As a DTS system, the minimum 6 dB bandwidth is 500 k	Hz. As a Hybrid, it must meet the F	HSS requirement as described above.						
RESULTS		BANDWIDTH						
Pass		0.966 MHz						
SIGNATURE	SIGNATURE							
Tested By:								
DESCRIPTION OF TEST								
20dB Bandwidth - Low Channel								

	Mkr	Д966кнz				∆0.80	DdB			Tek
15.0	Ref L	vl*15.0dBm				10dB/		Atten 10	dB	
5.Q						www. have why				
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-15.0				Marin Marin			- with with			
-25.0			m m	ู่ 1				M	- HV1.	
-35.Q	"Y Liyinin	Journ Window P.	*** \$\v*** 					- "~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	war war	
-45.0						· :				17Wyrillyn
-55.Q						:				
-65.Q										
-75.0						•				
-85.0										
	Freq	2.402 000	GHz					Span 3.0MH	Ηz	
	ResBW	10kHz		v	idBW 30	kHz		SWP	170mS	
	LEVEL		SPAN	sı	pan 3.0	MHz				
	KNOB	2	KNOB 1	KI	EYPAD	-	Tektronix	2784		

		EMISSIONS	DATA SHE	ET		Rev BETA	
EIVIC	WaferSense ALS				Work Orde	01/30/01	
Serial Number	- H1 A01002				Dat	to: 11/11/04	
Customer	CyberOptics Semiconductor				Temperatur	re: 70 °F	
Attendees:	Greg Huntzinger		Tested by: G	irea Kiemel	Humidi	tv: 47% RH	
Customer Ref. No.	creg riditizinge:	20VAC/60Hz	Job Sit	te: EV06			
TEST SPECIFICATION	NS						
Specification:	47 CFR 15.247(a)	Year: 2004	Method: D	A 00-705, ANSI C63.4	Yea	ar: 2003	
SAMPLE CALCULATI	ONS						
COMMENTS							
Measured with a direct	ct connection between the RF outr	out and a spectrum analyzer.					
FUT OPERATING MO	DES						
Modulated by PRBS a	at maximum data rate						
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
Bluetooth can be auth	norized as either a Frequency Hop	ping System (FHSS), a Digital Tr	ansmission System (DTS),	or a Hybrid System.			
As a FHSS, the maxin	num 20dB bandwidth of the hopping	ng channel is equal to 1.5 times	the channel separation. Fo	or example, channel se	eparation for Blueto	ooth is 1 MHz,	
therefore the maximu	m 20 dB bandwidth is 1.5 MHz.						
As a DTS system, the	minimum 6 dB bandwidth is 500 l	Hz. As a Hybrid, it must meet t	he FHSS requirement as de	scribed above.			
RESULTS	RESULTS BANDWIDTH						
Pass			0.915 MHz				
SIGNATURE							
Tested By	· ABU.K.P						
DESCRIPTION OF TE	ST						
		20dB Bandwid	dth - Mid Chann	el			



NORTHWEST EMC		EMISSIONS	DATA SH	EET		Rev BETA 01/30/01		
EUT:	WaferSense ALS				Work Order:	CYBR0040		
Serial Number:	H1A01002				Date:	11/11/04		
Customer:	CyberOptics Semiconductor				Temperature:	70 °F		
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity	47% RH		
Customer Ref. No.:	. Power: 120VAC/60Hz Job Site: EV06							
TEST SPECIFICATION	NS							
Specification:	47 CFR 15.247(a)	Year: 2004	Method:	DA 00-705, ANSI C63.4	Year:	2003		
SAMPLE CALCULATI	ONS							
COMMENTS								
Measured with a direct	t connection between the RF out	out and a spectrum analyzer.						
EUT OPERATING MO	DES							
Modulated by PRBS a	t maximum data rate							
DEVIATIONS FROM T	EST STANDARD							
None								
REQUIREMENTS								
Bluetooth can be auth	orized as either a Frequency Hop	ping System (FHSS), a Digital Tra	nsmission System (DTS	6), or a Hybrid System.				
As a FHSS, the maxim	num 20dB bandwidth of the hoppi	ng channel is equal to 1.5 times th	ne channel separation.	For example, channel s	eparation for Bluetoo	th is 1 MHz,		
therefore the maximu	m 20 dB bandwidth is 1.5 MHz.							
As a DTS system, the	minimum 6 dB bandwidth is 500 l	KHz. As a Hybrid, it must meet the	e FHSS requirement as o	described above.				
RESULTS	RESULTS BANDWIDTH							
Pass	Pass 0.909 MHz							
SIGNATURE								
Tested By:	A AU.K.P							
DESCRIPTION OF TES	ST							
	20dB Bandwidth - High Channel							

	Mkr 🛆 9	09kHz				∆-0.3	OdB			Tek
15.0	Ref Lvl*1	5.OdBm				10dB/		Atten 10	dB	
5.0					^~\\\					
-5.0					- J	<u>ין</u> ייאע	1 ₁₀			
-15.0				a call			WIN WWW WILL			
-25.0				N ^N				WWW K		
-35.Q	1997	,rn	VIW			· · · · · · · ·		. My	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Ψ
-45.0	howwww	MH								WWWWWWWW
-55.0										
-65.0										
-75.0										
-85.0										
	Freq 2.4	480 000G	Hz					Span 3.0MH	Iz	
	ResBW 10k)	Hz		Vi	idBW 30)	τHz		SWP	170mS	
	LEVEL		3PAN	Fr	req 2.	.480 000GHz				
	KNOB 2		KNOB 1	KE	CYPAD	т	ektronix	2784		





Output Power

Justification

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

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated: No Hop

Data Rates Investigated: Maximum

Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz.

Software\Firmware Applied During Test						
Exercise software	CSR Bluetest	Version	1.19			
Description						
The system was tested us	ing special software develo	ped to test all functions of t	he device during the test.			

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Radio (EUT	CyberOptics Semiconductor	WaferSense ALS	H1A01002
Host Device	Cambridge Silicon Radio	Casira	5673121101
PC	Fujitsu	Litebook	R3Y02504
PC Power Adapter	Fujitsu	CA01007-0870	39782749B
Host Device Power Adapter	EGSTON	N2GFSW3	none



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	3.0	No	Host Device	PC
AC Power	No	2.0	No	PC Power Adapter	AC Mains
DC Leads	PA	2.0	PA	PC Power Adapter	PC
DC Leads	PA	2.0	PA	Host Device Power Adapter	Host Device
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment							
Description	Manufacturer	Model	Identifier	Last Cal	Interval		
Power Meter	Hewlett Packard	E4418A	SPA	07/23/2004	24 mo		
Power Sensor	Hewlett-Packard	8481H	SPB	07/23/2004	24 mo		
RF Detector	RLC Electronics	CR-133-R	ZZA	NCR	NA		
Oscilloscope	Tektronix	TDS 3052	TOF	07/21/2004	12 mo		
Signal Generator	Hewlett Packard	8341B	TGN	01/23/2004	13 mo		

Test Description

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

Configuration: The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The EUT was transmitting at its maximum output power.

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

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

Completed by:
AJU.K.P

NORTHWEST EMC		EMISSIONS	DATA SH	EET		Rev BETA 01/30/01
EUT:	WaferSense ALS				Work Order:	CYBR0040
Serial Number:	H1A01002				Date:	11/11/04
Customer:	CyberOptics Semiconductor, Inc.				Temperature:	70 °F
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity:	47% RH
Customer Ref. No.:			Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	NS					
Specification:	47 CFR 15.247(b)	Year: 2004	Method:	DA 00-705, ANSI C63.4	4 Year:	2003
SAMPLE CALCULATI	ONS			•		
COMMENTS						
EUT OPERATING MO	DES					
Modulated by PRBS a	t maximum data rate					
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
Maximum peak condu	cted output power does not exce	ed 1 Watt				
RESULTS			AMPLITUDE			
Pass 34.04 mW						
SIGNATURE						
Tested By:						
DESCRIPTION OF TE	ST					
Output Power						

Frequency (MHz)	Peak Power Measured w/ Diode Detector (dBm)	Peak Power (mW)	Spec (mW)
2402.0	15.32	34.04	1000.0
2441.0	15.26	33.57	1000.0
2480.0	15.30	33.88	1000.0





Justification

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

Channels in Specified Band Investigated:
Low
High

Operating Modes Investigated: No Hop

Data Rates Investigated: Maximum

Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated: 120 VAC, 60 Hz (5 Vdc from Host)

Software\Firmware Applied During Test						
Exercise software	CSR Bluetest	Version	1.19			
Description						
The system was tested us	ing special software develo	ped to test all functions of t	he device during the test.			

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Radio (EUT)	CyberOptics Semiconductor	WaferSense ALS	H1A01002
Host Device	Cambridge Silicon Radio	Casira	5673121101
PC	Fujitsu	Litebook	R3Y02504
PC Power Adapter	Fujitsu	CA01007-0870	39782749B
Host Device Power Adapter	EGSTON	N2GFSW3	none

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	3.0	No	Host Device	PC
AC Power	No	2.0	No	PC Power Adapter	AC Mains
DC Leads	PA	2.0	PA	PC Power Adapter	PC
DC Leads	PA	2.0	PA	Host Device Power Adapter	Host Device
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment						
Description	Manufacturer	Model	Identifier	Last Cal	Interval	
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo	

Test Description

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

Configuration: The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 5 MHz below the band edge to 5 MHz above the band edge.

Completed by:	
ADU.K.P	

NORTHWEST				
EMC		EMISSIONS [DATA SHEET	Rev BETA 01/30/01
EUT:	WaferSense ALS			Work Order: CYBR0040
Serial Number:	H1A01002			Date: 11/11/04
Customer:	CyberOptics Semiconductor			Temperature: 70 °F
Attendees:	Greg Huntzinger		Tested by: Greg Kiemel	Humidity: 47% RH
Customer Ref. No.:			Power: 120VAC/60Hz	Job Site: EV06
TEST SPECIFICATION	IS			
Specification:	47 CFR 15.247(d)	Year: 2004	Method: DA 00-705, ANSI C63.4	Year: 2003
SAMPLE CALCULATIO	ONS			
COMMENTS				
EUT OPERATING MOI	DES			
Modulated by PRBS a	t maximum data rate			
DEVIATIONS FROM T	EST STANDARD			
None				
REQUIREMENTS				
Maximum level of any	spurious emission at the edge of	the authorized band is 20 dB down	n from the fundamental	
RESULTS			AMPLITUDE	
Pass			-50.5 dB	
SIGNATURE				
	1 - U.K.			
	ALT.			
Tested By:				
DESCRIPTION OF THE	ST.			
DESCRIPTION OF TEX				
		Band Edge Complia	ance - Low Channel	



	Mkr 🛆	-2.04MI	Iz	∆ -50.50dB						Tek
20.0	Ref Lvl	*20.0dBm			1	.0dB/		Atten 10	ЗB	
10.0					-		r	K.		
0.0					-					
-10.0					-					
-20.0					-		M		n.	
-30.0						N			"] 	
-40.0					Min and	Sur Mark			- When	1
-50.Q	6	L. d. open son and a start of	Warman ward	t. Water in the second	Al MANA ANT					W
-60.0	and the second	Profession								
-70.0					-					
-80.0										
	Freq 2	2.400 OOGH	Iz					Span 10MHz	:	
	ResBW 10)0kHz		v	idBW 300kH	Iz		SWP	50mS	
	LEVEL		SPAN	F	req 2.40	O OOGHz				
	KINOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NORTHWEST		EMISSIONS I	DATA SHEET		Rev BETA 01/30/01		
EUT:	WaferSense ALS			Work Order:	CYBR0040		
Serial Number:	H1A01002			Date:	11/11/04		
Customer:	CyberOptics Semiconductor			Temperature:	70 °F		
Attendees:	Greg Huntzinger		Tested by: Greg Kiemel	Humidity:	47% RH		
Customer Ref. No.:			Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATION	S						
Specification:	47 CFR 15.247(d)	Year: 2004	Method: DA 00-705, ANSI C63.4	Year:	2003		
SAMPLE CALCULATIO	ONS						
COMMENTS							
EUT OPERATING MOD	DES						
Modulated by PRBS at	maximum data rate						
DEVIATIONS FROM TE	ST STANDARD						
None							
REQUIREMENTS							
Maximum level of any	spurious emission at the edge of t	he authorized band is 20 dB down	from the fundamental				
RESULTS			AMPLITUDE				
Pass			-58.8 dB				
SIGNATURE							
Tested By:	ADU.K.P						
DESCRIPTION OF TES	т						
	Band Edge Compliance - High Channel						









Justification

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

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated: No Hop

Data Rates Investigated: Maximum

Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz (5 Vdc from Host)

Software\Firmware Applied During Test						
Exercise software	CSR Bluetest	Version	1.19			
Description						
The system was tested using special software developed to test all functions of the device during the test.						

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Radio (EUT	CyberOptics Semiconductor	WaferSense ALS	H1A01002
Host Device	Cambridge Silicon Radio	Casira	5673121101
PC	Fujitsu	Litebook	R3Y02504
PC Power Adapter	Fujitsu	CA01007-0870	39782749B
Host Device Power Adapter	EGSTON	N2GFSW3	none

Cables						
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2	
Serial	Yes	3.0	No	Host Device	PC	
AC Power	No	2.0	No	PC Power Adapter	AC Mains	
DC Leads	PA	2.0	PA	PC Power Adapter	PC	
DC Leads	PA	2.0	PA	Host Device Power Adapter	Host Device	
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.						

Measurement Equipment							
Description	Manufacturer	Model	Identifier	Last Cal	Interval		
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo		

Test Description

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

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

Completed by:	
ADU.K.P	

NORTHWEST							
EMC		EMISSIONS I	DATA SHEET		Rev BETA 01/30/01		
EUT:	WaferSense ALS			Work Order:	CYBR0040		
Serial Number:	H1A01002			Date:	11/11/04		
Customer:	CyberOptics Semiconductor			Temperature:	70 °F		
Attendees:	Greg Huntzinger		Tested by: Greg Kiemel	Humidity:	47% RH		
Customer Ref. No.:			Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATIONS	3						
Specification:	47 CFR 15.247(d)	Year: 2004	Method: DA 00-705, ANSI C63.4	Year:	2003		
SAMPLE CALCULATIO	NS						
COMMENTS							
EUT OPERATING MOD	ES						
Modulated by PRBS at	maximum data rate						
DEVIATIONS FROM TE	ST STANDARD						
None							
REQUIREMENTS							
Maximum level of any s	spurious emission outside of the au	thorized band is 20 dB down from	the fundamental				
RESULTS							
Pass							
SIGNATURE							
	An V.K.P						
NA							
Tested By:							
DECONTRACTOR OF TEST		enteral Creamine or Error		- 2011-			
	Antenna Condi	ucted Spurious Emi	ssions - Low Channel UMH	IZ-3GHZ			

Antenna Conducted Spurious Emissions - Low Channel 0MHz-3GHz

	Mkr 2	.601GHz	*-49	.50dBm						Tek
20.0	Ref Lvl	*20.OdBm			10d	в/		Atten 100	łВ	
40.0										
10.0										
0.0										
-10.Q					· · ·					
-20.0					: : :					
-30.Q					· · · · · · ·					
-40.Q										
-50.Q										
-60 0	men with the second	Journey Marine and the	waranter and the second s	e	Honney makelensing me	reptatestrum in mo	1.x1-111/0.14444474/4++4/4++4/4++4/4++	whether	Harmertellerigh	hannonman
-00.0										
-70.Q					•					
-80.Q					:					
	OMHz		to	3.0	OOGHz					
	ResBW 10	DOkHz		V	idBW 300kHz			SWP	1.75	
	LEVEL		SPAN	Re	ef Lv1*20.0d)	Зm				
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NORTHWEST					D DETA			
EMC					01/30/01			
EUT:	WaferSense ALS			Work Order: C	YBR0040			
Serial Number:	H1A01002			Date: 1	1/11/04			
Customer:	CyberOptics Semiconductor			Temperature: 7	0 °F			
Attendees:	Greg Huntzinger		Tested by: Greg Kiemel	Humidity: 4	7% RH			
Customer Ref. No.:			Power: 120VAC/60Hz	Job Site: E	V06			
TEST SPECIFICATION	IS							
Specification:	47 CFR 15.247(d)	Year: 2004	Method: DA 00-705, ANSI C63.4	Year: 2	003			
SAMPLE CALCULATI	ONS							
COMMENTS								
EUT OPERATING MOI	DES							
Modulated by PRBS a	t maximum data rate							
DEVIATIONS FROM T	EST STANDARD							
None								
REQUIREMENTS								
Maximum level of any	spurious emission outside of the au	thorized band is 20 dB down fro	om the fundamental					
RESULTS								
Pass								
SIGNATURE								
	ADU.K.P							
Tested By:								
DESCRIPTION OF TES	ESCRIPTION OF TEST							
	Antenna Conduct	ted Spurious Emis	ssions - Low Channel 3GF	lz-6.5GHz				

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

										Tek
20.0	Ref Lvl	*20.OdBm			100	1B/		Atten 100	1B	
10.0										
10.0										
0.0					•					
-10.0										
-20.Q										
-30.0										
-40.Q										
-50.Q										
-60.0	Kabupatah Madayak mbatikah	burnenappoppinghan	n~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	_{กษ} ุจารุษที่ไห้ระโรโะจึงสูโทร	and the second second and	Howard	appinguration	ulahanyydydronwegoriano	mantantant	phinopsignalpoolsedfill
-70 0					-					
-10.0					-					
-00.0	2.99(JGHz	to	6.5	OOGHz		1	1		
	ResBW 10	DOkHz		v	idBW 300kHz			SWP	2.05	
	LEVEL		SPAN	R	≥f Lv1*20.00	lBm				
·	KINOB 2		KNOB 1	K	EYPAD	Te	ktronix	2784		

NORTHWEST					
EMC	EMISSIONS	JATA SH	EEI		Rev BETA 01/30/01
EUT: WaferSense ALS				Work Order:	CYBR0040
Serial Number: H1A01002				Date:	11/11/04
Customer: CyberOptics Semiconductor				Temperature:	70 °F
Attendees: Greg Huntzinger		Tested by:	Greg Kiemel	Humidity:	47% RH
Customer Ref. No.:		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)	Year: 2004	Method:	DA 00-705, ANSI C63.4	Year:	2003
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the	authorized band is 20 dB down fro	om the fundamental			
RESULTS					
Pass					
SIGNATURE					
AMU.K.P					
Tested By:					
DESCRIPTION OF TEST					
Antenna Conduc	ted Spurious Emis	sions - Low (Channel 6.5G	Hz-15GHz	

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

	Mkr 9	.593GHz	*-4	9.00dBm						Tek
20.0	Ref Lvl	*20.0dBm			10	dB/		Atten 100	1B	
					-					
10.0										
0.0					•					
-10.0										
-20.0										
-30.0										
-40.0					· ·					
-50.Q				Y						
-60.0	runk yh in ingersalies	And the state of the second state of the secon	Martha hind madan branch	www.	musandanad	where have	www.	MAN WINDOW	when a when the particular the	(human)utation)
-70.0					· ·					
-80.0					:					
	6.49	9GHz	to	15.0	OOGHz					
	ResBW 1	OOkHz		v	idBW 300kHz			SWP	4.85	
	LEVEL		SPAN	SI	trt 6.499(GHz				
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NODTUNEOT						
EMC		EMISSIONS	DATA SH	EET		Rev BETA 01/30/01
EUT:	WaferSense ALS				Work Orde	r: CYBR0040
Serial Number:	H1A01002				Date	e: 11/11/04
Customer:	CyberOptics Semiconductor				Temperature	∌: 70 °F
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity	y: 47% RH
Customer Ref. No.:			Power:	120VAC/60Hz	Job Site	e: EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 15.247(d)	Year: 2004	Method:	DA 00-705, ANSI C63.4	Yea	r: 2003
SAMPLE CALCULATIO	ONS					
COMMENTS						
COMMENTS						
	DES					
Modulated by PRBS a	t maximum data rate					
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
Maximum level of any	spurious emission outside of the	authorized band is 20 dB down f	rom the fundamental			
RESULTS						
Pass						
SIGNATURE						
Tested By:	A BU.K.P					
DESCRIPTION OF TES	бТ					
	Antenna Conduc	ted Spurious Emis	sions - Low (Channel 15GF	lz - 25GHz	

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

									Tek
20.0	Ref Lv1*20.0d	lBm		10dB/			Atten 100	iB	
10.0				- - - -					
10.0									
υ.υ									
-10.0									
-20.Q				•					
-30.Q				· · · · · · · · · · · ·					
-40.Q				· · · · · · · · · · · · · · · · · · ·					
-50.Q					Mar all all all all all all all all all a	the whopped	LAnwine were about	water	Anan water and
-60.Q	gl-addabater - Adday - Alyndrae - Alyndrae - A	and a contraction of the second s	⋈⋕⋏⋎∊⋾⋐⋕⋎⋽⋩⋎⋐⋎⋏	And Annual Contraction of the Annual Contrac					
-70.Q									
-80.Q				:					
	14.99GHz	to	25.	OOGHz					
	ResBW 100kHz		V:	idBW 300kHz			SWP	5.78	
	LEVEL	SPAN	Re	≥f Lv1*20.0dBm					
	KNOB 2	KNOB 1	KI	EYPAD	Tektro	nix	2784		

NORTHWEST			
EMC	EMISSION	S DATA SHEET	Rev BETA 01/30/01
EUT:	WaferSense ALS		Work Order: CYBR0040
Serial Number:	H1A01002		Date: 11/11/04
Customer	CyberOptics Semiconductor		Temperature: 70 °F
Attendees:	Greg Huntzinger	Tested by: Greg Kiemel	Humidity: 47% RH
Customer Ref. No.:		Power: 120VAC/60Hz	Job Site: EV06
TEST SPECIFICATION	15		
Specification:	47 CFR 15.247(d) Year: 2004	Method: DA 00-705, ANSI C63.4	Year: 2003
SAMPLE CALCULATI	ONS		
COMMENTO			
COMMENTS			
Modulated by PRBS a	DES at maximum data rate		
DEVIATIONS FROM T			
None	ESI SIANDARD		
ROUREMENTS			
Maximum level of any	spurious emission outside of the authorized hand is 20 dB do	own from the fundamental	
RESULTS			
Pass			
SIGNATURE			
	An U. Kil		
Tested By:			
DESCRIPTION OF TE	ST		
	Antenna Conducted Spurious	Emissions - Mid Channel 0M	Hz-3GHz
I	•		

Antenna Conducted Spurious Emissions - Mid Channel 0MHz-3GHz

	Mkr 2041	MHz	*-5	1.70dBm						Tek
20.0	Ref Lvl	*20.0dBm			10d)	3/		Atten 10	dB	
					-					
10.0					:					
0.0					:					
-10.0					: : :					
-20.0					•					
-30.0					· · · · ·					
-40.0					-					
-50.0					- - - -				I A	
		an and a second and a second	unducedtheresting	بالمراجع والمراجع والمراجع	Manus Marine Sugar	h-Halanay kan Hala	man marked and a second	and mertion and and a start	1 han alalan	paulateration (MA)
-00.0					:					
-70.0										
-80.0					•					
	OMHz		to	3.0	OOGHz					
	ResBW 10	OOkHz		Vi	idBW 300kHz			SWP	1.75	
	LEVEL		SPAN	Mł	tr 204MHz					
	KNOB 2		KNOB 1	KI	EYPAD	Tel	ktronix	2784		

NORTHWEST				D DETA
				01/30/01
EUT: WaferSense ALS			Work Order: C	YBR0040
Serial Number: H1A01002			Date: 1	1/11/04
Customer: CyberOptics Semiconductor			Temperature: 7	0 °F
Attendees: Greg Huntzinger		Tested by: Greg Kiemel	Humidity: 4	7% RH
Customer Ref. No.:		Power: 120VAC/60Hz	Job Site: E	V06
TEST SPECIFICATIONS				
Specification: 47 CFR 15.247(d) Y	/ear: 2004	Method: DA 00-705, ANSI C63.4	Year: 2	003
SAMPLE CALCULATIONS				
COMMENTS				
EUT OPERATING MODES				
Modulated by PRBS at maximum data rate				
DEVIATIONS FROM TEST STANDARD				
DEOLUDEMENTO				
REQUIREMENTS	izod band is 20 dB down fro	m the fundamental		
maximum level of any spurious emission outside of the author	izeu banu is zo ub uowii iro	in the fundamental		
Resol				
PASS				
SIGNATORE				
A V.K.				
AUG				
Tested By:				
		Nid Channel 201		
Antenna Conducted	a Spurious Emis	ssions - Mid Channel 3GH	1Z-0.3GHZ	

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

	Mkr 4	.892GHz	*-48	3.00dBm						Tek
20.0	Ref Lvl	*20.OdBm			:	10dB/		Atten 100	1B	
40.0										
10.0										
0.0						• •				
-10.0										
-20.0										
-30.Q						· · · · · · · ·				
-40.Q										
-50.Q						: : Y				
-60.0	ng the state of the	where the provident	Munuharationation	Norman	www.anglight.gather.com.com	harrow	++++++++++++++++++++++++++++++++++++++	www.maniplathashilama	quiliprocenticounter	authorized for the stand the set
-70 0										
-70.0										
-8U.Q	2.99	OGHz	to	6.5	OOGHz		1			
	ResBW 1	OOkHz		V:	idBW 300kH	łz		SWP	2.05	
	LEVEL		SPAN	Re	≘f Lv1*20.	.OdBm				
	KNOB 2		KNOB 1	к	EYPAD	Te	ktronix	2784		

EUT: WaferSense ALS	NORTHWEST						
EUT: Work Order: CYBR0040 Serial Number: H1401002 Date: 11/11/04 Customer: CyberOptics Semiconductor Temperature: 70 "F Attendees: Greg Huntzinger Tested by: Greg Kiemel Humidity: 47% RH Customer: CyberOptics Semiconductor Power: 120VAC/60Hz Job Site: EV06 TEST SPECIFICATIONS Sample: Specification: 47% CFR 15.247(d) Year: 2004 Method:: DA 00-705, ANSI C63.4 Year: 2003 SAMPLE CALCULATIONS Sample: EV06 EV06 EV06 EV06 EV06 EV06 EV06 EV06 EV06 EV07 EV06 EV07 EV06 EV07 EV06 EV07 EV06 EV07 EV06 EV07 EV06 <	EMC		EMISSIONS	JATA SH	221		Rev BETA 01/30/01
Serial Number: H1401002 Date: 11/11/04 Customer: CyberOptics Semiconductor Temperature: 70 °F Attendees: Greg Huntzinger Tested by: Greg Kiemel Humidity: 47% RH Customer Ref. No.: Power: 120VAC/60Hz Job Site: EV06 Specification: 47 CFR 15.247(d) Year: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 SAMPLE CALCULATIONS	EUT:	WaferSense ALS				Work Order:	CYBR0040
Customer: CyberOptics Semiconductor Temperature: 70 °F Attendees: Greg Huntzinger Tested by: Greg Kiemel Humidity: 47% RH Customer Ref. No: Power: 120VAC/60Hz Job Site: EV06 TEST SPECIFICATIONS Specification: 47 CFR 15.247(d) Year: 2003 SAMPLE CALCULATIONS Vear: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 COMMENTS Vear: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 COMMENTS Vear: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 COMMENTS Vear: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 COMMENTS Vear: 2003 Vear: 2003 Vear: 2003 DEVIATIONS FROM TEST STANDARD Vear: Vear: Vear: 2003 None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Vear: Semistrice of the authorized band is 20 dB down from the fundamental Vear: Vear:<	Serial Number:	H1A01002				Date:	11/11/04
Attendees: Tested by: Greg Huntzinger Humidity: AT% RH Customer Ref. No.: Power: 120VAC/60Hz Job Site: EV06 TEST SPECIFICATIONS Sample Control (1998) Method: DA 00-705, ANSI C63.4 Year: 2003 SAMPLE CALCULATIONS Sample Control (1998) Method: DA 00-705, ANSI C63.4 Year: 2003 COMMENTS Comments Sample Control (1998) Sample Control (1998) Sample Control (1998) Sample Control (1998) Modulated by PRBS at maximum data rate Description (1998) Sample Control (1998) Sample Control (1998) Sample Control (1998) None RESULTS Sample Control (1998) Sample Control (1998) Sample Control (1998) Sample Control (1998) None RESULTS Sample Control (1998) Sample Control (1998	Customer:	CyberOptics Semiconductor				Temperature:	70 °F
Customer Ref. No.: Power: 120VAC/60Hz Job Site: EV06 TEST SPECIFICATIONS Specification: 47 CFR 15.247(d) Year: 2003 SAMPLE CALCULATIONS Vear: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 COMMENTS EUT OPERATING MODES USA DESTING MODES USA DESTING MODES USA DESTING MODES USA DESTING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD USA DESTING MODES USA DESTING MODES REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental USA DESTING USA DESTING MODES RESULTS Pass SIGNATURE USA DESTING MODES USA DESTING MODES DESCRIPTION OF TEST DESCRIPTION OF TEST USA DESTING MODES USA DESTING MODES	Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity:	47% RH
TEST SPECIFICATIONS Specification: [47 CFR 15.247(d) Year: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 SAMPLE CALCULATIONS COMMENTS EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST DESCRIPTION OF TEST	Customer Ref. No.:			Power:	120VAC/60Hz	Job Site:	EV06
Specification: 47 CFR 15.247(d) Year: 2004 Method: DA 00-705, ANSI C63.4 Year: 2003 SAMPLE CALCULATIONS	TEST SPECIFICATION	S					
SAMPLE CALCULATIONS COMMENTS EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST	Specification:	47 CFR 15.247(d)	Year: 2004	Method:	DA 00-705, ANSI C63.4	Year:	2003
COMMENTS EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST	SAMPLE CALCULATIO	ONS					
COMMENTS EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST							
COMMENTS EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST							
COMMENTS EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST							
EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST	COMMENTS						
EUT OPERATING MODES Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST							
Modulated by PRBS at maximum data rate DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST	EUT OPERATING MOD	DES					
DEVIATIONS FROM TEST STANDARD None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST	Modulated by PRBS at	t maximum data rate					
None REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE Tested By: DESCRIPTION OF TEST	DEVIATIONS FROM T	EST STANDARD					
REQUIREMENTS Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE Tested By: DESCRIPTION OF TEST	None						
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental RESULTS Pass SIGNATURE DESCRIPTION OF TEST	REQUIREMENTS						
RESULTS Pass SIGNATURE Tested By: DESCRIPTION OF TEST	Maximum level of any	spurious emission outside of the	authorized band is 20 dB down fro	om the fundamental			
Pass SIGNATURE Tested By: DESCRIPTION OF TEST	RESULTS						
Tested By:	Pass						
Tested By:	SIGNATURE						
Tested By:		1-U.K.D					
DESCRIPTION OF TEST		Alt					
DESCRIPTION OF TEST	Tested By:						
	DESCRIPTION OF TES	T					
Antenna Conducted Spurious Emissions - Mid Channel 6.5GHz-15GHz		Antenna Condu	cted Spurious Emis	sions - Mid C	Channel 6.5G	Hz-15GHz	

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

	Mkr	7.324GHz	*-4	3.30dBm						Tek
20.0	Ref Ly	71*20.0dBm			10	DdB/		Atten 10	цВ	
					:					
10.0										
0.0					:					
-10.0					:					
-20.0										
-30.0										
-40.0										
-50.0		Ť								
_60.0	hall all for the state of the	un the head and the second	Muran war war war	mennender	Kungerwahanakterikten te	Warner Aller	and the section and the	mint when my say	here the river with the leave	www.alumahtura.an
-00.0					· · ·					
-70.0					•					
-80.0										
	6.4	499GHz	to	15.0	OOGHz					
	ResBW	100kHz		v	idBW 300kH:	z		SWP	4.85	
	LEVEL		SPAN	Si	trt 6.499	9GHz				
	KNOB 2	2	KNOB 1	KI	EYPAD	Te	ktronix	2784		

NORTHWEST									
FMC		EMISSIONS [DATA SH	EET		Rev BETA			
						01/30/01			
EUT:	WaferSense ALS				Work Order:	CYBR0040			
Serial Number:	H1A01002				Date:	11/11/04			
Customer:	CyberOptics Semiconductor			1	Temperature:	70 °F			
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity:	47% RH			
Customer Ref. No.:			Power:	120VAC/60Hz	Job Site:	EV06			
TEST SPECIFICATION	IS								
Specification:	47 CFR 15.247(d)	Year: 2004	Method:	DA 00-705, ANSI C63.4	Year:	2003			
SAMPLE CALCULATIO	ONS								
COMMENTS									
EUT OPERATING MOD	DES								
Modulated by PRBS at	t maximum data rate								
DEVIATIONS FROM T	EST STANDARD								
None									
REQUIREMENTS									
Maximum level of any	spurious emission outside of the	authorized band is 20 dB down fro	m the fundamental						
RESULTS									
Bass									
SIGNATURE									
SIGNATORE									
	An U.K.P								
	~ () ()								
Tested By: V V									
DESCRIPTION OF TEST									
	Antenna Condu	cted Spurious Emis	sions - Mid 🤇	Channel 15G	Hz-25GHz				

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

										Tek
20.0	Ref Lvl	*20.OdBm			10d	в/		Atten 100	1B	
					-					
10.0					:					
0.0					:					
-10.0					:					
					:					
-20.Q					· ·					
-30.Q										
-40.0					:					
-50.0							manulu	Marine	water water	Mondana
-30.0	urb-ablestations	weeky were to all the setting to	and a start of the Andrew and a	where where the second s	In the strend of the stand of the stand	more	www.			
-60.0			under all .							
-70 0										
.0.0										
-80.0										
	14.990	GHz	to	25.	OOGHz					
	ResBW 10	OkHz		Vi	idBW 300kHz			SWP	5.78	
	LEVEL		SPAN	Re	≘f Lv1*20.0d	Bm				
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NORTHWEET			
EMC	EMISSIONS	DATA SHEET	Rev BETA 01/30/01
EUT:	WaferSense ALS		Work Order: CYBR0040
Serial Number:	H1A01002		Date: 11/11/04
Customer:	CyberOptics Semiconductor		Temperature: 70 °F
Attendees:	Greg Huntzinger	Tested by: Greg Kiemel	Humidity: 47% RH
Customer Ref. No.:		Job Site: EV06	
TEST SPECIFICATION	IS		
Specification:	47 CFR 15.247(d) Year: 2004	Method: DA 00-705, ANSI C63.4	Year: 2003
SAMPLE CALCULATI	ONS		
COMMENTS			
COMMENTO			
FUT OPERATING MO	DES		
Modulated by PRBS a	t maximum data rate		
DEVIATIONS FROM T	EST STANDARD		
None			
REQUIREMENTS			
Maximum level of any	spurious emission outside of the authorized band is 20 dB dowr	n from the fundamental	
RESULTS	·		
Pass			
SIGNATURE			
	1 + 1 = 0		
	An V. Kit		
Tested By:			
DESCRIPTION OF TE	ST		
	Antenna Conducted Spurious Er	nissions - High Channel 0M	Hz-3GHz
L			

Antenna Conducted Spurious Emissions - High Channel 0MHz-3GHz

	Mkr 2041	MHz	*-5	2.20dBm						Tek
20.0	Ref Lvl	*20.0dBm			10d	в/		Atten 100	ЗB	
40.0					-					
10.0										
0.0										
-10.0										
-20.0					· · ·					
-30 0					- - - -					
-30.0										
-40.0										
-50.0										
-60.0	www.	mannanali	mmontent	when when the	الماليه المعارية المالية المعالية المعالية المعالية المعالية المعالية المعالية المعالية المعالية المعالية المع	hontentation	6~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	matultur	hadde Workida alan	waren of the reason of the second
-00.0		-			· · ·					
-70.0										
-80.0										
	OMHz		to	3.0	OOGHz					
	ResBW 10	DOkHz		V:	idBW 300kHz			SWP	1.75	
	LEVEL		SPAN	M	tr 204MHz					
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NORTHWEST		EMICCIONE							
EMC		EMISSIONS I	JATA SHEET			Rev BETA 01/30/01			
EUT:	WaferSense ALS				Work Order: CYBR004	0			
Serial Number:	H1A01002				Date: 11/11/04				
Customer:	CyberOptics Semiconductor			-	Temperature: 70 °F				
Attendees:	Greg Huntzinger		Tested by: Greg Kiemel		Humidity: 47% RH				
Customer Ref. No.:			Power: 120VAC/60Hz		Job Site: EV06				
TEST SPECIFICATION	IS								
Specification:	47 CFR 15.247(d)	Year: 2004	Method: DA 00-705, AN	SI C63.4	Year: 2003				
SAMPLE CALCULATI	ONS								
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	t maximum data rate								
DEVIATIONS FROM T	EST STANDARD								
None									
REQUIREMENTS									
Maximum level of any	spurious emission outside of the	authorized band is 20 dB down fro	om the fundamental						
RESULTS									
Pass									
SIGNATURE									
	An Kit								
Tested By:	14								
reated by:	Tested By:								
DESCRIPTION OF TEST									
Antonna Conducted Spurious Emissions - High Channel 3GHz 6 5GHz									
	Antenna Condu	cieu opunous Linis	Salona - mgn Ghannei	30112-0.	50112				

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

	Mkr 4	.970GHz	*-39	9.00dBm						Tek
20.0	Ref Lvl	*20.0dBm			1	OdB/		Atten 10	цВ	
					:					
10.0					:					
0.0					:		_			
-10.Q							_			
-20.0										
-30.Q										
-40.Q					-	Y				
-50.Q										
- 60 0	have a start and the start of the	nunnummutuur	when his many substanting	where the second second	and the second	munic	muniphytheter	a	. Marila Andrew Angeline Mar	dogentel an annound an
-00.0										
-70.Q					· · · · · · · · · · · · · · · · · · ·					
-80.Q					:					
	2.99	DGHz	to	6.5	OOGHz					
	ResBW 10	DOkHz		V:	idBW 300kH	z		SWP	2.05	
	LEVEL		SPAN	Re	≘f Lv1*20.	OdBm				
	KNOB 2		KNOB 1	KI	EYPAD	1	Cektronix	2784		

NORTHWEST		EMICCIONE						
EMC		EMISSIONS I	JATA SHEET			Rev BETA 01/30/01		
EUT:	WaferSense ALS				Work Order: C	YBR0040		
Serial Number:	H1A01002				Date: 1	1/11/04		
Customer:	CyberOptics Semiconductor				Temperature: 7	0 °F		
Attendees:	Greg Huntzinger		Tested by: Greg Kiemel		Humidity: 4	7% RH		
Customer Ref. No.:			Power: 120VAC/60Hz	z	Job Site: E	V06		
TEST SPECIFICATION	IS							
Specification:	47 CFR 15.247(d)	Year: 2004	Method: DA 00-705, A	NSI C63.4	Year: 2	003		
SAMPLE CALCULATI	ONS							
COMMENTS								
EUT OPERATING MO	DES							
Modulated by PRBS a	t maximum data rate							
DEVIATIONS FROM T	EST STANDARD							
None								
REQUIREMENTS								
Maximum level of any	spurious emission outside of the	authorized band is 20 dB down fro	om the fundamental					
RESULTS								
Pass								
SIGNATURE								
	(1)							
	ANCKI							
Tested By:	NA.							
,-								
DESCRIPTION OF TEST								
	Antenna Conduc	ted Spurious Emis	sions - High Channe	16.5GHz	z-15GHz			
			elene lingh onallio					

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

	Mkr 7	.443GHz	*-4	4.10dBm						Tek
20.0	Ref Lvl	*20.OdBm			:	10dB/		Atten 100	18	
10.0										
0.0										
-10.0						•				
-20.0						•				
-30.0						•				
						· · · · · ·				
-40.0										
-50.Q		ļ į				•				
-60.0	hereignerstates		gedan, when we proved	www.	how when a supplicity is	ind the stand when the	markamenta da de de de de	a will we had a will be a	down warden all and played	Allow and and a set
-70.0						• •				
-80.0						•				
	6.49	9GHz	to	15.0	OOGHz					
	ResBW 1	OOkHz		v	idBW 300kH	Iz		SWP	4.85	
	LEVEL		SPAN	SI	trt 6.49	99GHz				
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NODTHWEET										
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01				
EUT:	WaferSense ALS				Work Order:	CYBR0040				
Serial Number:	H1A01002				Date:	11/11/04				
Customer:	CyberOptics Semiconductor				Temperature:	70 °F				
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity:	47% RH				
Customer Ref. No.:		120VAC/60Hz	Job Site:	EV06						
TEST SPECIFICATION	IS									
Specification:	47 CFR 15.247(d)	Year: 2004	Method:	DA 00-705, ANSI C63.4	Year:	2003				
SAMPLE CALCULATI	ONS									
COMMENTS										
COMMENTS										
FUT OPERATING MO	DES									
Modulated by PRBS a	t maximum data rate									
DEVIATIONS FROM T										
None	EOTOTANDARD									
REQUIREMENTS										
Maximum level of any	spurious emission outside of the	authorized band is 20 dB down fro	om the fundamental							
RESULTS										
Dess										
SIGNATURE										
SIGNATORE										
	An U.K.P									
	(J)									
Tested By:										
DESCRIPTION OF TES	DESCRIPTION OF TEST									
	Antenna Conducted Spurious Emissions - High Channel 15GHz-25GHz									
		Spanous Enno	siene ingli							

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

										Tek
20.0	Ref Lvl	*20.0dBm			10d	ιв∕		Atten 100	1B	
10.0										
10.0										
0.0										
-10.Q					:					
-20.0					· · · · · · · · · · · · · · · · · · ·					
-30.0										
00.0										
-40.Q										
-50.Q							prover and	www.	-antone land and the	naltheatingtager 19th
60.0	efterbeaution of approaches	when the the way and the state of the state	anoto many month	-dwa-forenangery	Wardwin Handrichard Mar	and an a factor of the second	ges.A			
-00.0					:					
-70.Q					•					
-80.Q					· ·					
	14.990	GHz	to	25.	OOGHz					
	ResBW 10	OOkHz		Vi	idBW 300kHz			SWP	5.7%	
	LEVEL		SPAN	Re	≥f Lv1*20.0d	lBm				
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		





Justification

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

Channels in Specified Band Investigated:							
Low							
Mid							
High							

Operating Modes Investigated: No Hop

Data Rates Investigated: Maximum

Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated:

120 VAC, 60 Hz (5 Vdc from Host)

Software\Firmware Applied During Test							
Exercise software	CSR Bluetest	Version	1.19				
Description							
The system was tested using special software developed to test all functions of the device during the test.							

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Radio (EUT	CyberOptics Semiconductor	WaferSense ALS	H1A01002
Host Device	Cambridge Silicon Radio	Casira	5673121101
PC	Fujitsu	Litebook	R3Y02504
PC Power Adapter	Fujitsu	CA01007-0870	39782749B
Host Device Power Adapter	EGSTON	N2GFSW3	none

Cables						
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2	
Serial	Yes	3.0	No	Host Device	PC	
AC Power	No	2.0	No	PC Power Adapter	AC Mains	
DC Leads	PA	2.0	PA	PC Power Adapter	PC	
DC Leads	PA	2.0	PA	Host Device Power Adapter	Host Device	
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.						

Measurement Equipment							
Description	Manufacturer	Model	Identifier	Last Cal	Interval		
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo		

Test Description

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

Configuration: The peak power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation. Per the procedure outlined in FCC 97-114, the spectrum analyzer was used as follows:

The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be $1.5 \times 106 \div 3 \times 103 = 500$ seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

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

Completed by:	
ADU.K.P	

NORTHWEST						
EMC EMISSIONS DATA SHEET						
EUT:	WaferSense ALS				Work Order:	CYBR0040
Serial Number:	H1A01002				Date:	11/11/04
Customer:	CyberOptics Semiconductor, Inc.				Temperature:	70 °F
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity:	47% RH
Customer Ref. No.:			Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 15.247(e)	Year: 2004	Method:	FCC 97-114, ANSI C63.	4 Year:	2003
SAMPLE CALCULATIO	ONS					
Meter reading on spec	trum analyzer is internally compe	nsated for cable loss and external	attenuation.			
Power Spectral Densit	ty per 3kHz bandwidth = Power Sp	ectral Density per 1 Hz bandwidth	+ Bandwidth Correction	on Factor.		
Bandwidth Correction	Factor = 10*log(3kHz/1Hz) = 34.8	dB				
COMMENTS						
EUT OPERATING MOD	DES					
Modulated by PRBS at	t maximum data rate					
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
Maximum peak power	spectral density conducted from	a DSSS transmitter does not excee	ed 8 dBm in any 3 kHz	band		
RESULTS			AMPLITUDE			
Pass Power Spectral Density = 6.2 dBm / 3kHz						
SIGNATURE						
	An U.K.					
Tested Du	~ 04 .					
rested By:						
DESCRIPTION OF TES	эт					





NORTHWEST							
EMC EMISSIONS DATA SHEET							
EUT:	WaferSense ALS				Work Or	der: CYBR0040	
Serial Number:	H1A01002				D	ate: 11/11/04	
Customer:	CyberOptics Semiconductor, Inc.				Temperature: 70 °F		
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity: 47% RH		
Customer Ref. No.:			Power:	120VAC/60Hz	Job Site: EV06		
TEST SPECIFICATION	IS						
Specification:	47 CFR 15.247(e)	Year: 2004	Method:	FCC 97-114, ANSI C63.4	Y	ear: 2003	
SAMPLE CALCULATION	ONS						
Meter reading on spec	trum analyzer is internally compe	nsated for cable loss and external	attenuation				
Power Spectral Densit	ty per 3kHz bandwidth = Power Sp	ectral Density per 1 Hz bandwidth	+ Bandwidth Correction	on Factor.			
Bandwidth Correction	Factor = 10*log(3kHz/1Hz) = 34.8	dB					
COMMENTS							
EUT OPERATING MOI	DES						
Modulated by PRBS a	t maximum data rate						
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
Maximum peak power	spectral density conducted from	a DSSS transmitter does not exce	ed 8 dBm in any 3 kHz	band			
RESULTS			AMPLITUDE				
Pass Power Spectral Density = 5.7 dBm / 3kHz							
SIGNATURE							
	AJU.K.P						
lested by:							
DESCRIPTION OF TES	ST						





NORTHWEST						
EMISSIONS DATA SHEET						
EUT:	WaferSense ALS				Work Order:	CYBR0040
Serial Number:	H1A01002				Date:	11/11/04
Customer:	CyberOptics Semiconductor, Inc.				Temperature:	70 °F
Attendees:	Greg Huntzinger		Tested by:	Greg Kiemel	Humidity: 47% RH	
Customer Ref. No.:			Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 15.247(e)	Year: 2004	Method:	FCC 97-114, ANSI C63.4	4 Year:	2003
SAMPLE CALCULATION	ONS					
Meter reading on spec	trum analyzer is internally compe	nsated for cable loss and external	attenuation			
Power Spectral Densit	ty per 3kHz bandwidth = Power Sp	ectral Density per 1 Hz bandwidth	+ Bandwidth Correction	on Factor.		
Bandwidth Correction	Factor = 10*log(3kHz/1Hz) = 34.8 d	dB				
COMMENTS						
EUT OPERATING MOI	DES					
Modulated by PRBS a	t maximum data rate					
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
Maximum peak power	spectral density conducted from a	a DSSS transmitter does not exce	ed 8 dBm in any 3 kHz	band		
RESULTS			AMPLITUDE			
Pass Power Spectral Density = 5.9 dBm / 3kHz						
SIGNATURE						
Tested By:						
DESCRIPTION OF TES	ST					





