



**FCC CFR47 PART 15 SUBPART C  
CLASS II PERMISSIVE CHANGE  
CERTIFICATION TEST REPORT  
FOR**

**BLUETOOTH SERIAL PORT MODULE**

**MODEL NUMBER: LMX9838SB**

**FCC ID: ED9LMX9838**

**REPORT NUMBER: 07U11080-1**

**ISSUE DATE: AUGUST 31, 2007**

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**NVLAP<sup>®</sup>**

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue	Revisions	Revised By
---	08/31/07	Initial Issue	T. Chan

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** NATIONAL SEMICONDUCTOR  
2900 SEMICONDUCTOR DR.  
SANTA CLARA, CA 95052, USA

**EUT DESCRIPTION:** BLUETOOTH SERIAL PORT MODULE

**MODEL:** LMX9838SB

**SERIAL NUMBER:** QS0714303

**DATE TESTED:** AUGUST 21-22, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



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THU CHAN  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

Tested By:



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THANH NGUYEN  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth Serial Port Module.

The radio module is manufactured by National Semiconductor.

### 5.2. CLASS II PERMISSIVE CHANGE DESCRIPTION

The major change field under this application is:

Change 1: Rev C package height increase by .1mm from 1.9mm to 2.00mm (Substrate is .1mm thicker)  
Change 2: Re-layout (moving traces, via's around Antenna, and crystal, and EEPROM).

Increased pad size's for both antenna and crystal.  
Moved antenna ground via, and add ground shield trace on top layer.  
Moved antenna test point (pin 1) via.  
Removed some ground metal on all layer.  
Changed several trace widths to allow for better solder joints.

### 5.3. MAXIMUM OUTPUT POWER

The EUT has the same peak conducted output power as original project.

### 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna with a maximum gain of -1.48 dBi.

### 5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host Laptop during testing was Window XP

The test utility software used during testing was Simply Blue Commander, rev. 1.6.0.1

### 5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is the channel with the highest output power. The highest measured output power was at 2480 MHz.

The worst-case configuration has been evaluated as the EUT at Y-position. This was determined by comparing the fundamental output power, thus all the tests were performed on radiated emissions @ Y-position.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/DC Adapter	CUI Inc.	EPA-121DPA-05	DTS050250SUDC-P5P-SZ	DoC
Test Fixture	National Semi-	Arizona Lite	QS0513156	N/A

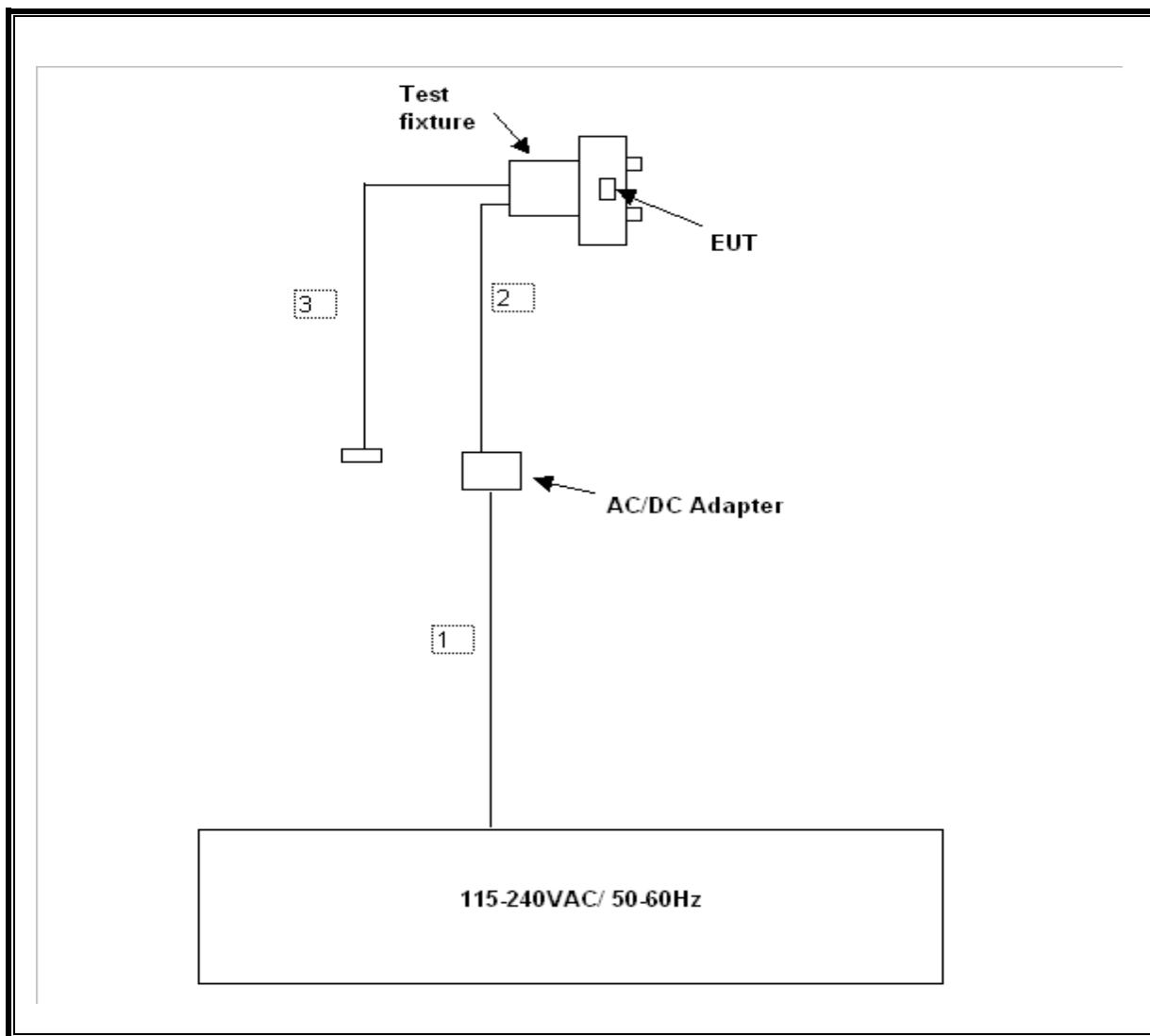
### I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	2m	No
2	DC	1	DC Plug	Un-shielded	2m	No
3	Serial	1	DB9	Shielded	1m	Use for activate command.

### TEST SETUP

The EUT is connected to a laptop computer through serial port to execute software command, then remove laptop during testing.

**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	6/12/2008
RF Filter Section	HP	85420E	3705A00256	6/12/2008
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	12/18/2007
438A Power meter	HP	438A	3513U04320	9/4/2007
Power Sensor	HP	8481A	2784	4/22/2008
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	4/15/2008
Preamplifier 1-26.5 GHz	HP	8449B	3008A00931	6/18/2008
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42070220	10/18/2007
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	9/13/2007
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	1/7/2008
SA Display Section 2	Agilent / HP	85662A	2816A16696	4/7/2008
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	1/23/2008

## 7. LIMITS AND RESULTS

### 7.1. AVERAGE POWER

#### AVERAGE POWER LIMIT

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

#### RESULTS

No non-compliance noted:

The cable assembly insertion loss of 10.8 dB (including 10 dB pad and .8 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-0.34
Middle	2441	-0.38
High	2480	-0.22

## 7.2. RADIATED EMISSIONS

### 7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

#### LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

### **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

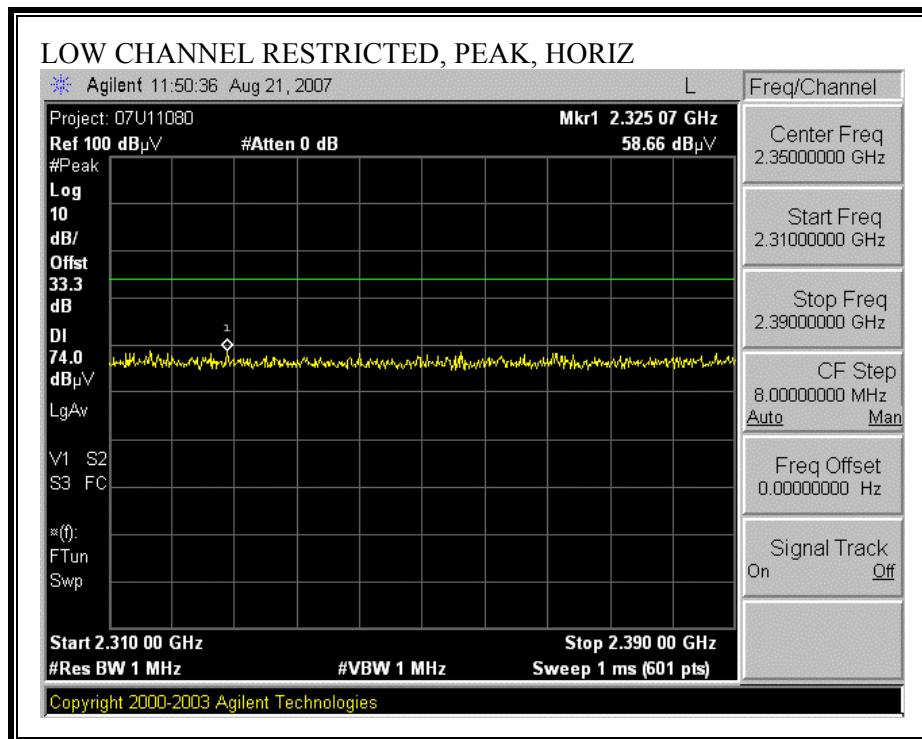
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

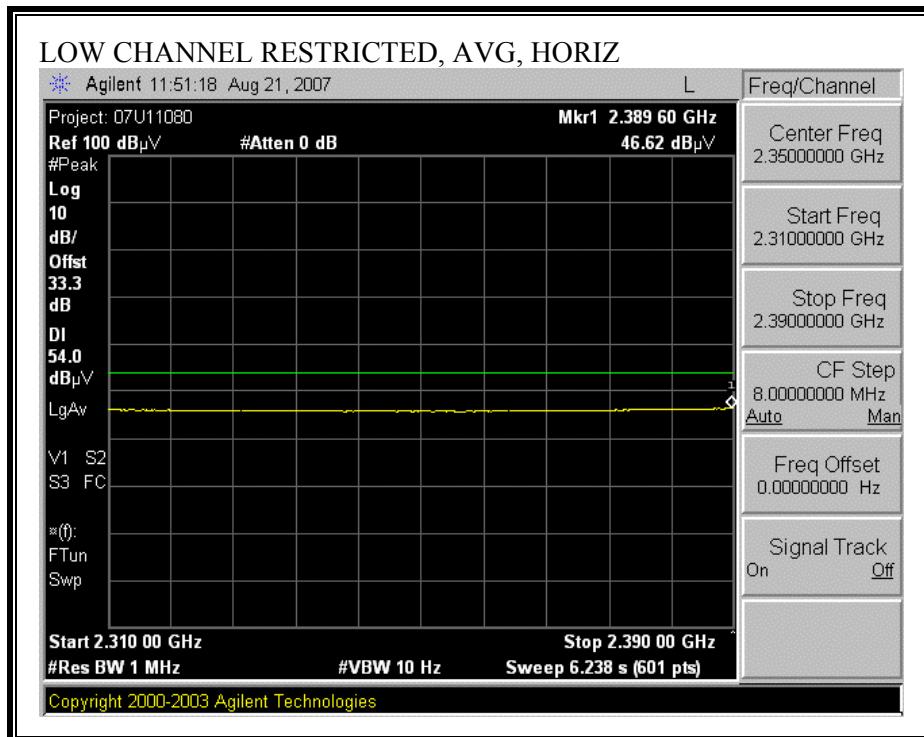
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

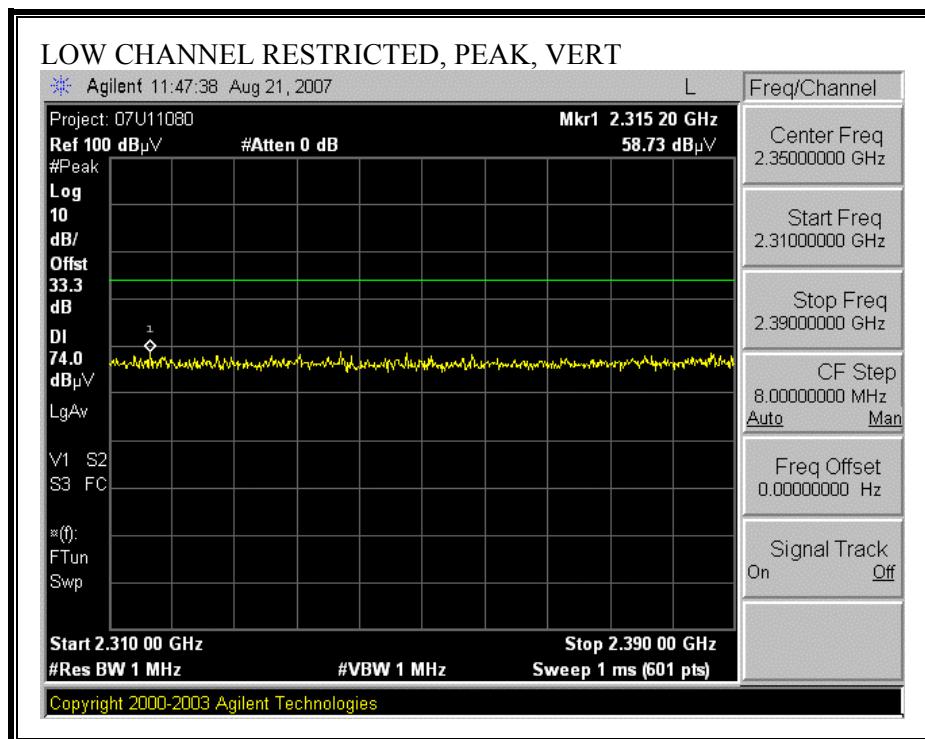
## 7.2.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

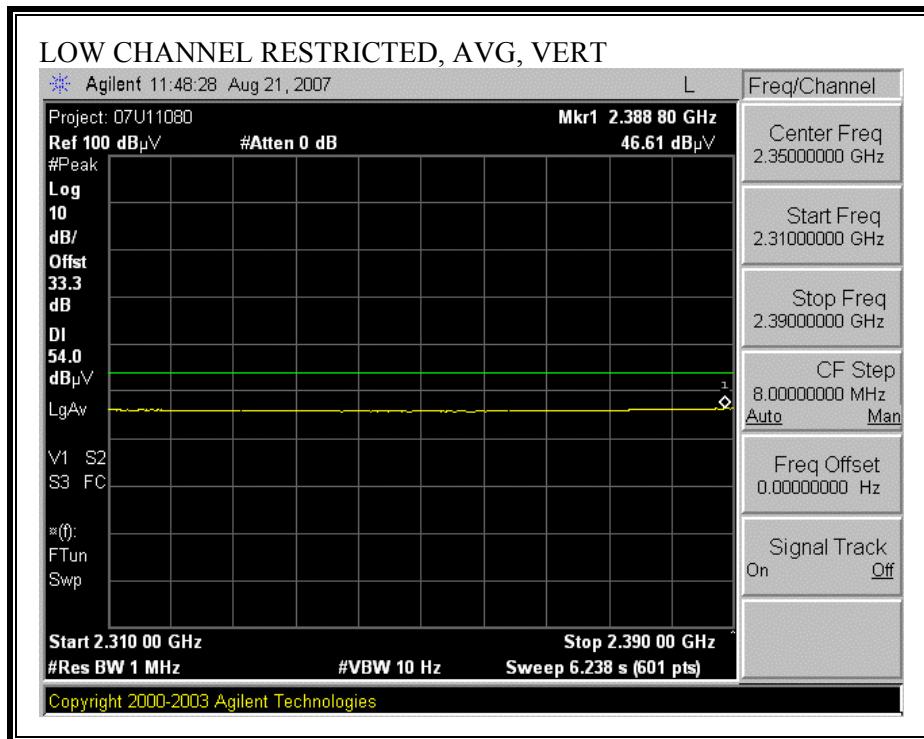
### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



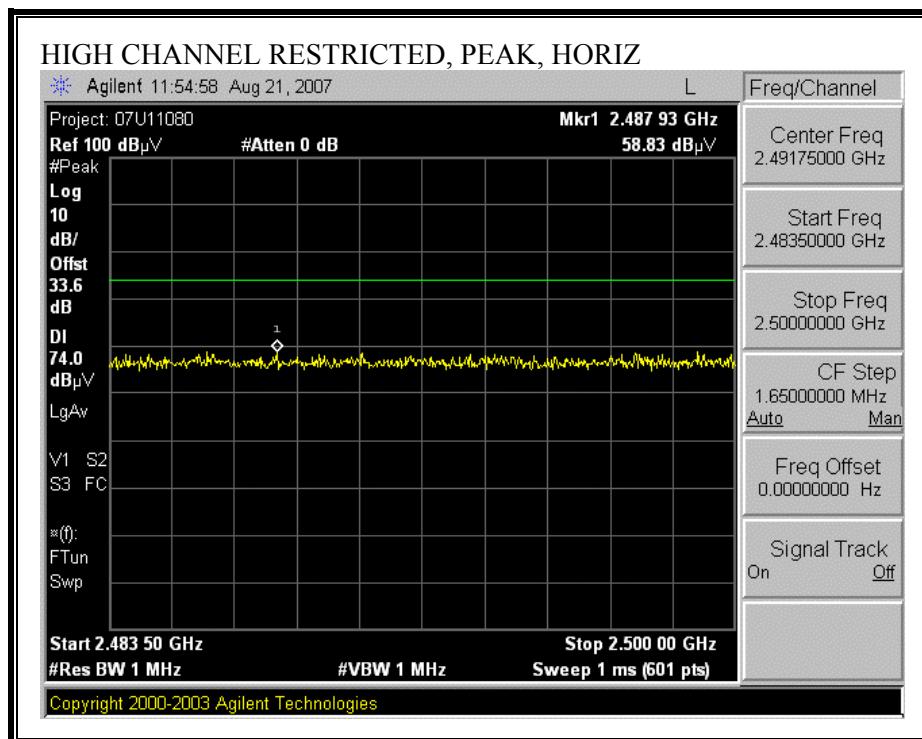


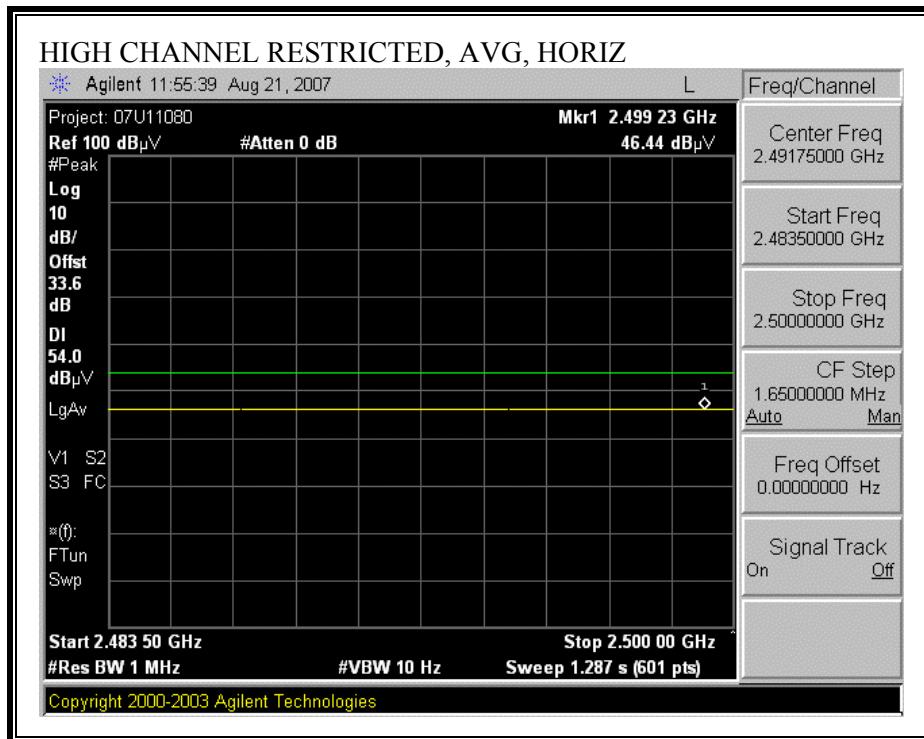
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



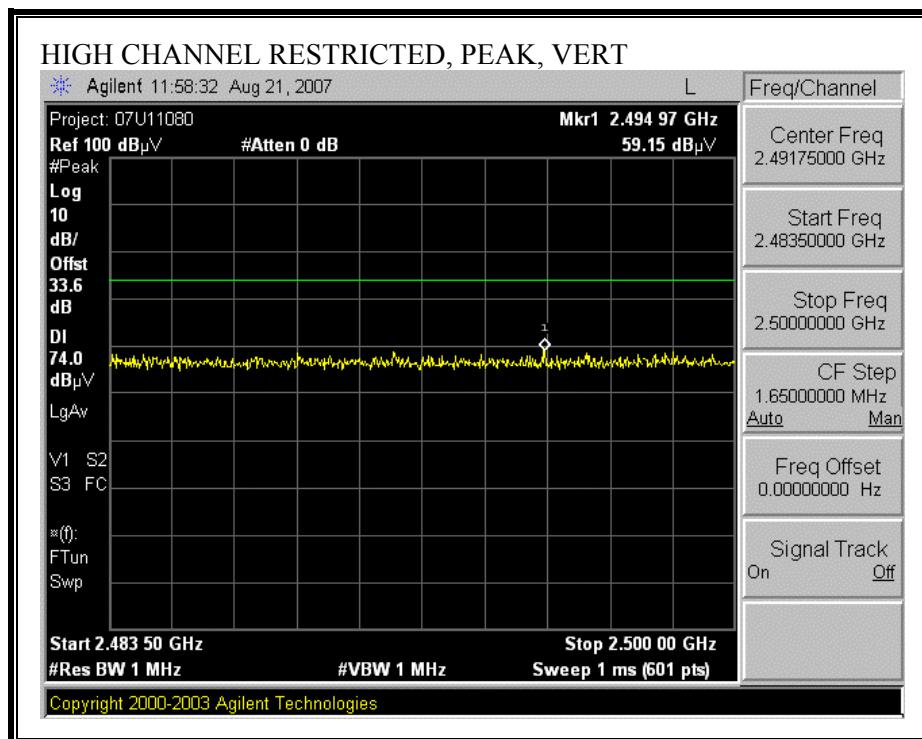


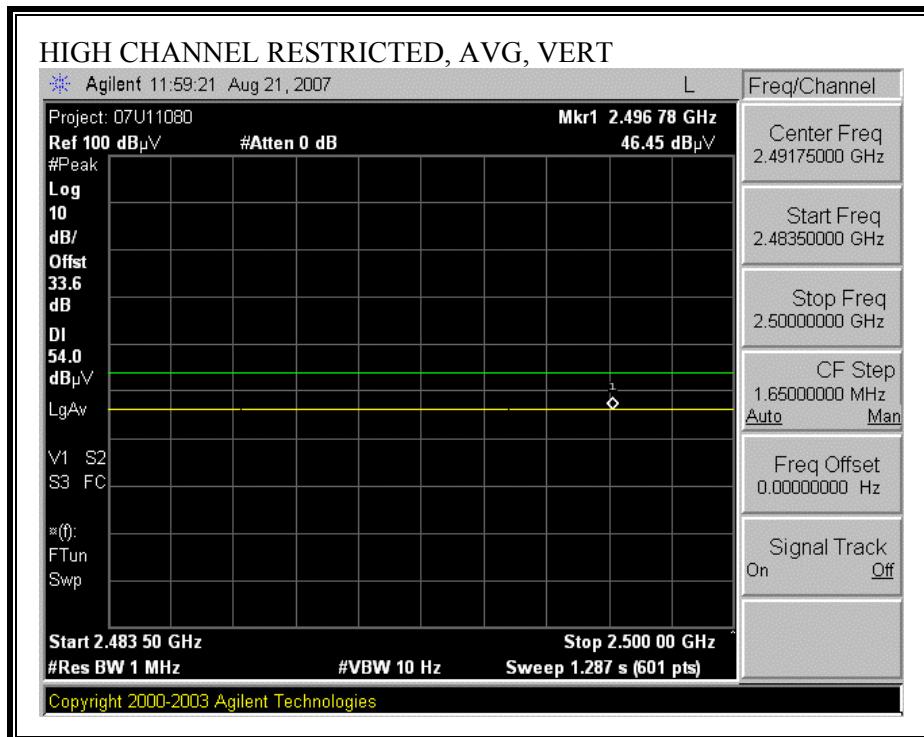
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





**HARMONICS AND SPURIOUS EMISSIONS**

High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Company: National Semiconductor Corp. Project #: 07U11080 Date: August 21, 2007 Test Engineer: Thanh Nguyen Configuration: EUT, AC/DC Adapter, Test Fixture and Mode: Transmit															
Test Equipment:															
Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz			Limit									
T60; S/N: 2238 @3m	T144 Miteq 3008A00931											FCC 15.209			
Hi Frequency Cables															
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz		
						Gordon 203134001			33.92				Average Measurements RBW=1MHz ; VBW=10Hz		
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Spurious emissions															
1.000	3.0	50.34	37.59	25.4	3.0	-39.5	0.0	0.0	39.3	26.5	74	54	-34.7	-27.5	V
1.218	3.0	49.18	37.21	26.0	3.3	-39.2	0.0	0.0	39.3	27.3	74	54	-34.7	-26.7	V
1.398	3.0	48.23	36.35	26.4	3.5	-38.9	0.0	0.0	39.3	27.4	74	54	-34.7	-26.6	V
1.203	3.0	50.51	34.27	25.9	3.3	-39.2	0.0	0.0	40.5	24.3	74	54	-33.5	-29.7	H
Harmonics Spurious															
Low CH															
4.804	3.0	41.51	32.37	33.0	6.9	-36.5	0.0	0.0	44.9	35.8	74	54	-29.1	-18.2	V
7.206	3.0	38.07	24.86	35.4	8.4	-36.2	0.0	0.0	45.6	32.4	74	54	-28.4	-21.6	V
9.608	3.0	36.39	24.58	37.1	9.6	-36.9	0.0	0.0	46.2	34.4	74	54	-27.8	-19.6	V
12.010	3.0	35.45	23.39	37.5	12.2	-35.4	0.0	0.0	49.6	37.6	74	54	-24.4	-16.4	Noise floor
4.804	3.0	42.74	32.76	33.0	6.9	-36.5	0.0	0.0	46.1	36.2	74	54	-27.9	-17.8	H
7.206	3.0	37.50	25.01	35.4	8.4	-36.2	0.0	0.0	45.0	32.5	74	54	-29.0	-21.5	H
9.608	3.0	37.17	24.40	37.1	9.6	-36.9	0.0	0.0	47.0	34.2	74	54	-27.0	-19.8	H
12.010	3.0	35.02	23.25	37.5	12.2	-35.4	0.0	0.0	49.2	37.4	74	54	-24.8	-16.6	Noise floor
Mid CH															
4.882	3.0	41.64	32.86	33.1	6.9	-36.5	0.0	0.0	45.2	36.4	74	54	-28.8	-17.6	H
7.323	3.0	39.07	25.10	35.5	8.4	-36.2	0.0	0.0	46.8	32.8	74	54	-27.2	-21.2	H
9.764	3.0	38.12	24.98	37.2	9.8	-37.0	0.0	0.0	48.1	35.0	74	54	-25.9	-19.0	H
12.205	3.0	35.82	23.62	37.4	12.2	-35.4	0.0	0.0	50.0	37.8	74	54	-24.0	-16.2	Noise floor
4.882	3.0	42.06	32.95	33.1	6.9	-36.5	0.0	0.0	45.6	36.5	74	54	-28.4	-17.5	V
7.323	3.0	38.48	26.96	35.5	8.4	-36.2	0.0	0.0	46.2	34.7	74	54	-27.8	-19.3	V
9.764	3.0	36.95	25.10	37.2	9.8	-37.0	0.0	0.0	47.0	35.1	74	54	-27.0	-18.9	V
12.205	3.0	36.28	23.74	37.4	12.2	-35.4	0.0	0.0	50.5	37.9	74	54	-23.5	-16.1	Noise floor
High CH															
4.960	3.0	43.11	33.77	33.1	7.0	-36.5	0.0	0.0	46.8	37.4	74	54	-27.2	-16.6	V
7.440	3.0	43.83	32.07	35.6	8.5	-36.2	0.0	0.0	51.7	40.0	74	54	-22.3	-14.0	V
9.920	3.0	39.40	29.54	37.3	10.0	-37.1	0.0	0.0	49.6	39.8	74	54	-24.4	-14.2	V
12.400	3.0	35.87	23.16	37.4	12.2	-35.4	0.0	0.0	50.1	37.4	74	54	-23.9	-16.6	Noise floor
4.960	3.0	41.12	30.41	33.1	7.0	-36.5	0.0	0.0	44.8	34.1	74	54	-29.2	-19.9	H
7.440	3.0	37.87	25.78	35.6	8.5	-36.2	0.0	0.0	45.8	33.7	74	54	-28.2	-20.3	H
9.920	3.0	38.32	29.35	37.3	10.0	-37.1	0.0	0.0	48.6	39.6	74	54	-25.4	-14.4	H
12.400	3.0	35.22	23.23	37.4	12.2	-35.4	0.0	0.0	49.4	37.4	74	54	-24.6	-16.6	Noise floor
f Measurement Frequency															
Dist Distance to Antenna	D Corr Distance Correct to 3 meters	Amp Preamp Gain	Avg Lim Average Field Strength Limit												
Read Analyzer Reading	Avg Average Field Strength @ 3 m	Pk Lim Peak Field Strength Limit													
AF Antenna Factor	Peak Calculated Peak Field Strength	Avg Mar Margin vs. Average Limit													
CL Cable Loss	HPF High Pass Filter	Pk Mar Margin vs. Peak Limit													

### 7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

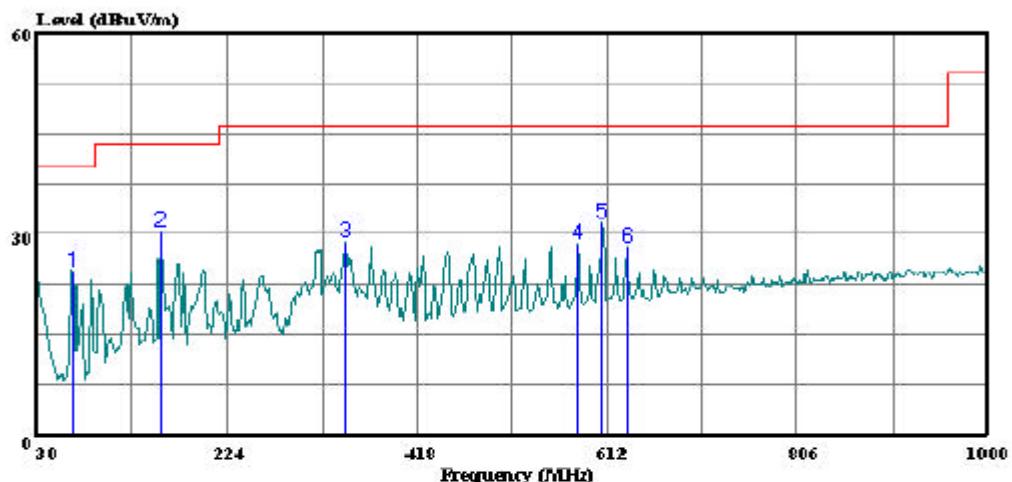
#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

##### HORIZONTAL DATA



Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 20 File#: 07U11080EMI.EMI Date: 08-22-2007 Time: 11:17:01



Trace: 19

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL  
Test Operator::: Thanh Nguyen  
Project #: : 07U11080  
Company: : National Semiconductor Corp.  
Configuration::: EUT with AC/DC Adapter  
Mode : : Transmit worst case  
Target: : FCC Class B

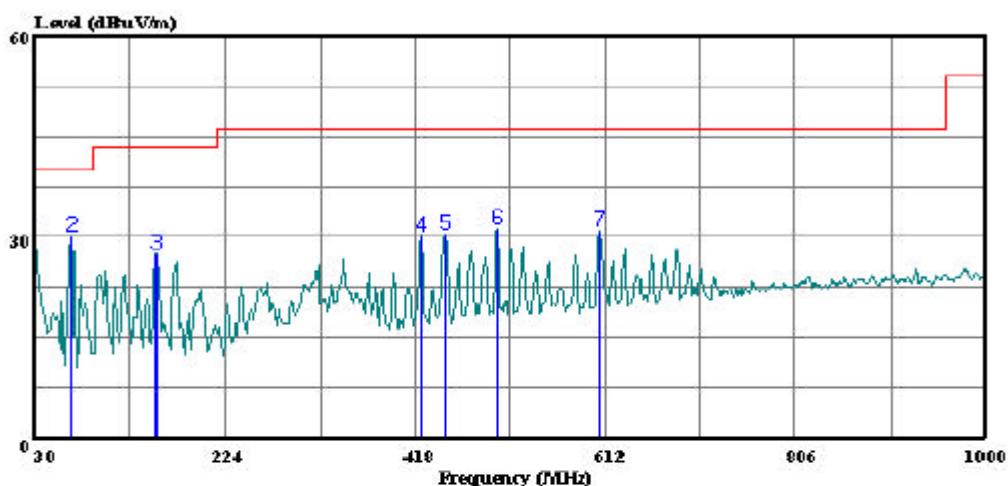
Page: 1

Freq	Read		Limit	Over	Line	Limit	Remark
	Level	Factor					
MHz	dBuV		dB	dBuV/m	dBuV/m	dB	
1	66.860	43.80	-19.28	24.51	40.00	-15.49	Peak
2	155.130	44.55	-14.05	30.50	43.50	-13.00	Peak
3	344.280	40.06	-11.15	28.91	46.00	-17.09	Peak
4	581.930	34.22	-5.72	28.50	46.00	-17.50	Peak
5	606.180	37.03	-5.27	31.76	46.00	-14.24	Peak
6	633.340	32.92	-4.77	28.15	46.00	-17.85	Peak

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)****VERTICAL DATA**

Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 18 File#: 07U11080EMI.EMI Date: 08-22-2007 Time: 11:08:24



Trace: 17

Ref Trace:

Condition: FCC CLASS-B VERTICAL  
Test Operator::: Thanh Nguyen  
Project #: : 07U11080  
Company: : National Semiconductor Corp.  
Configuration::: EUT with AC/DC Adapter  
Mode : : Transmit worst case  
Target: : FCC Class B

Page: 1

Freq MHz	Read		Limit Line dBuV/m	Over Limit dB	Remark
	Level dBuV	Factor dB			
1 30.000	35.07	-5.76	29.31	40.00	-10.69 Peak
2 67.830	49.25	-19.24	30.01	40.00	-9.99 Peak
3 153.190	41.51	-14.00	27.51	43.50	-15.99 Peak
4 423.820	39.28	-9.24	30.04	46.00	-15.96 Peak
5 449.040	38.92	-8.58	30.34	46.00	-15.66 Peak
6 501.420	38.50	-7.35	31.15	46.00	-14.85 Peak
7 606.180	36.27	-5.27	31.00	46.00	-15.00 Peak

### 7.3. POWERLINE CONDUCTED EMISSIONS

#### LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 <sup>*</sup>	56 to 46 <sup>*</sup>
0.5-5	56	46
5-30	60	50

<sup>\*</sup> Decreases with the logarithm of the frequency.

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

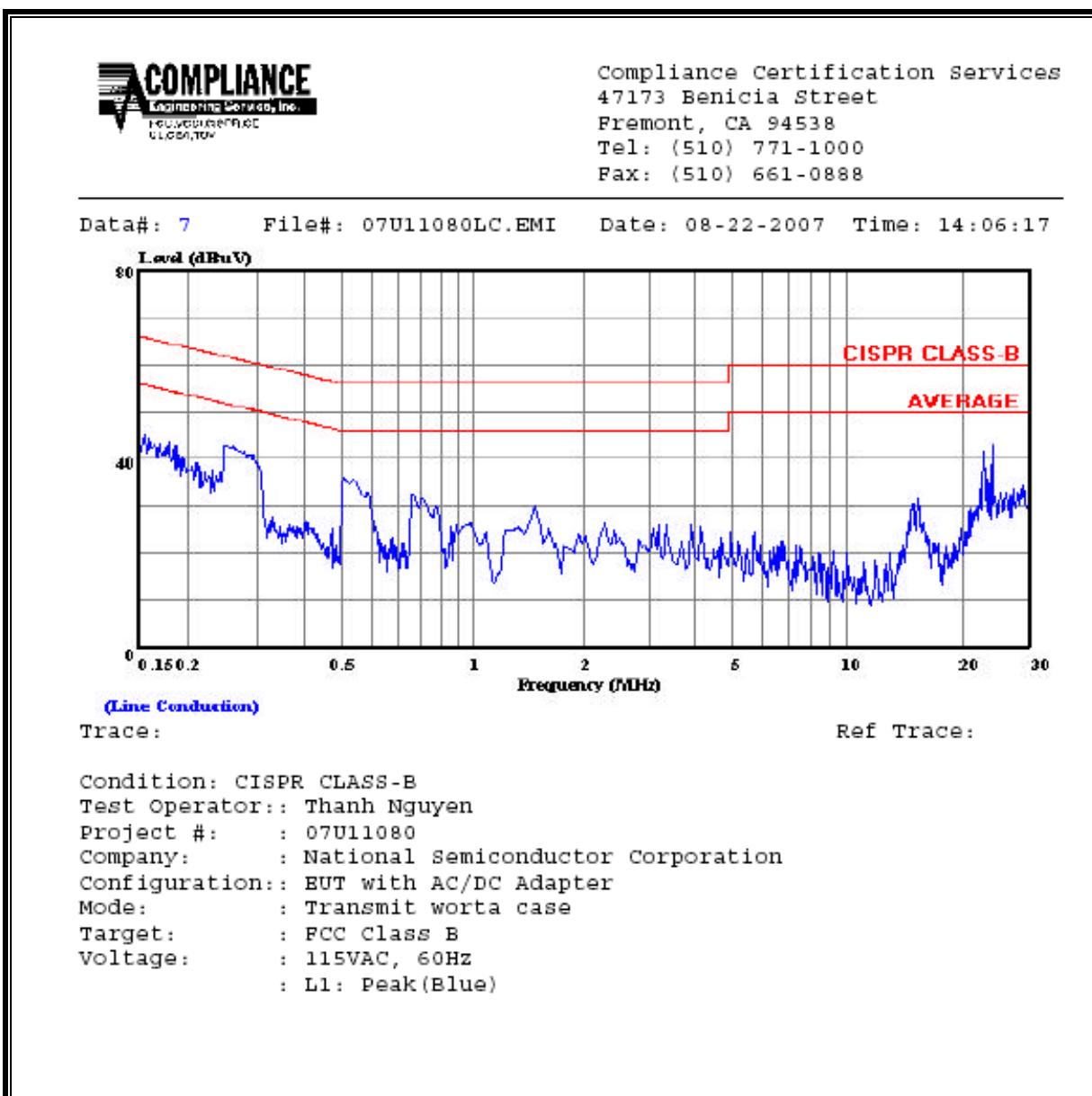
#### RESULTS

No non-compliance noted:

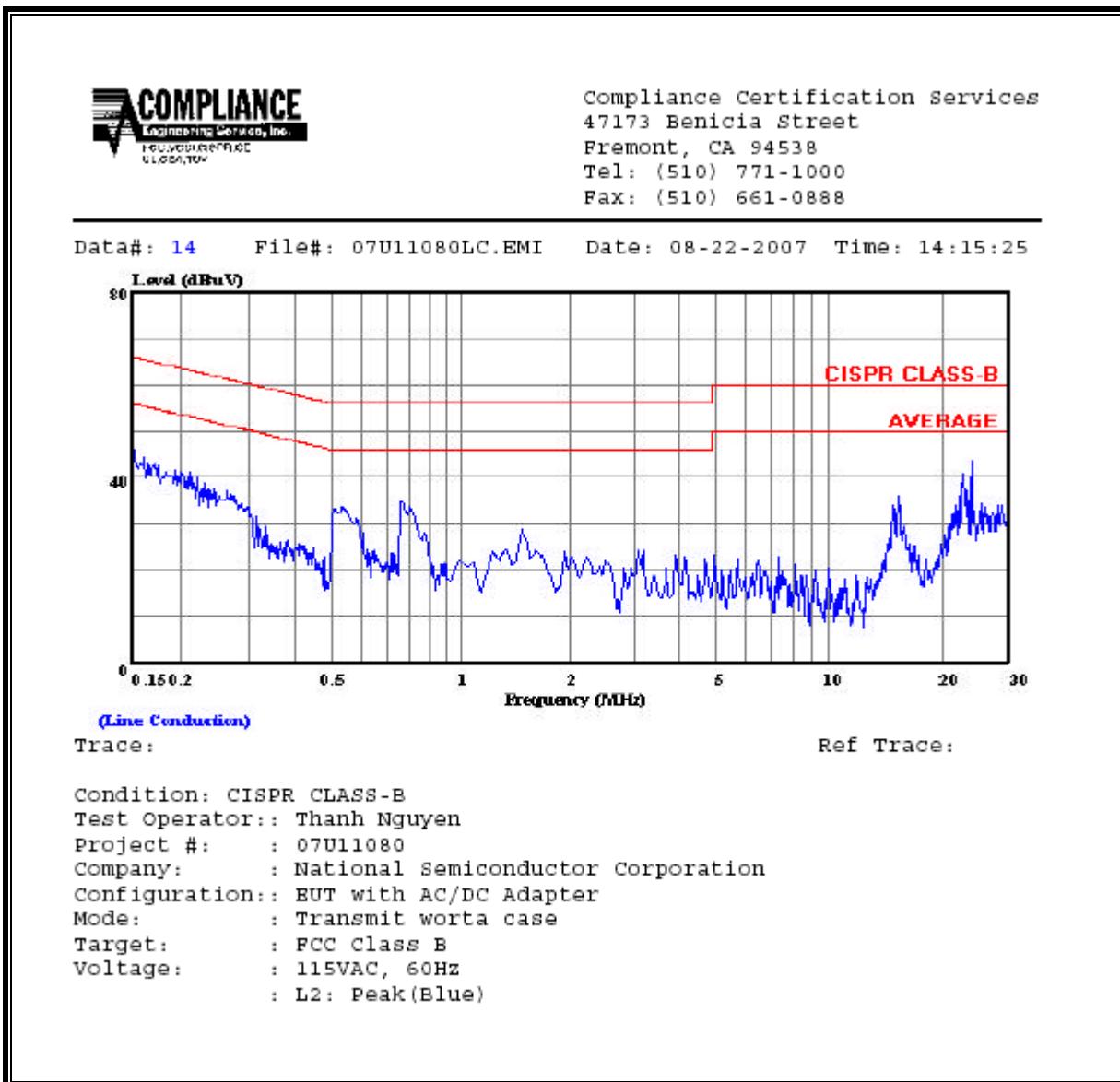
**6 WORST EMISSIONS EUT**

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit		Margin		Remark
	PK (dBuV)	QP (dBuV)	AV (dBuV)		QP	AV	QP (dB)	AV (dB)	
0.25	42.74	--	--	0.00	61.79	51.79	-19.05	-9.05	L1
0.51	35.92	--	--	0.00	56.00	46.00	-20.08	-10.08	L1
24.01	43.04	--	--	0.00	60.00	50.00	-16.96	-6.96	L1
0.15	46.08	--	--	0.00	65.89	55.89	-19.81	-9.81	L2
0.76	34.70	--	--	0.00	56.00	46.00	-21.30	-11.30	L2
24.01	43.74	--	--	0.00	60.00	50.00	-16.26	-6.26	L2
6 Worst Data									

**LINE 1 RESULTS**

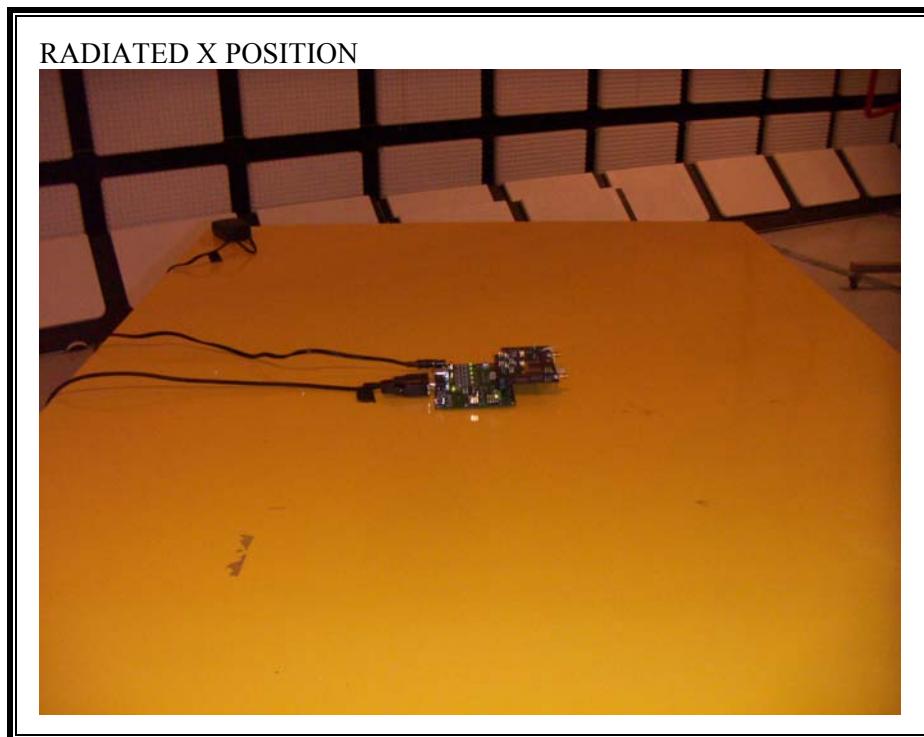


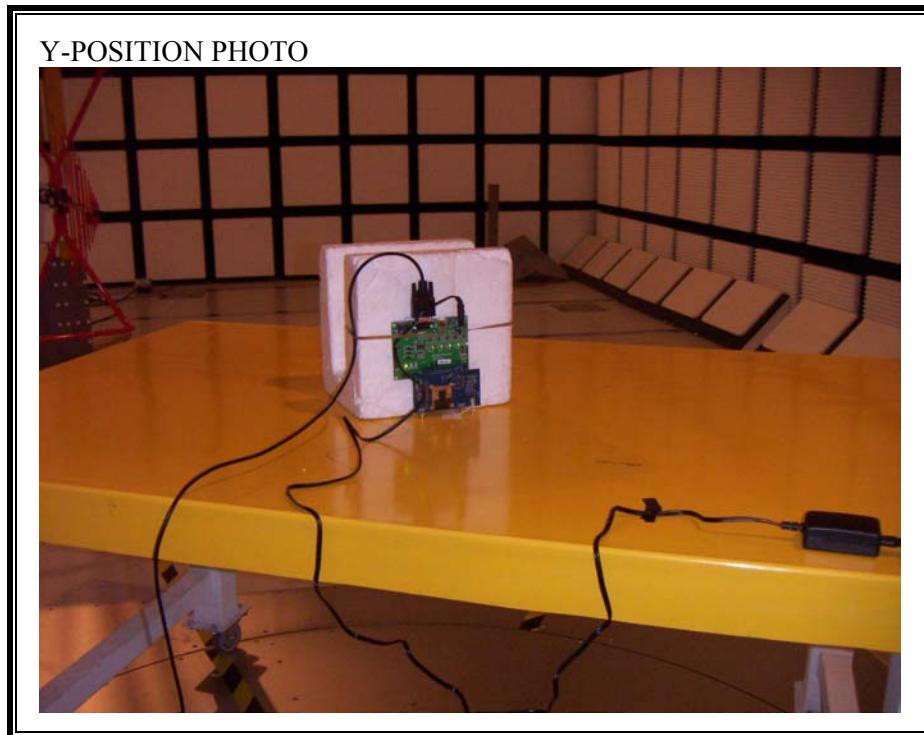
**LINE 2 RESULTS**

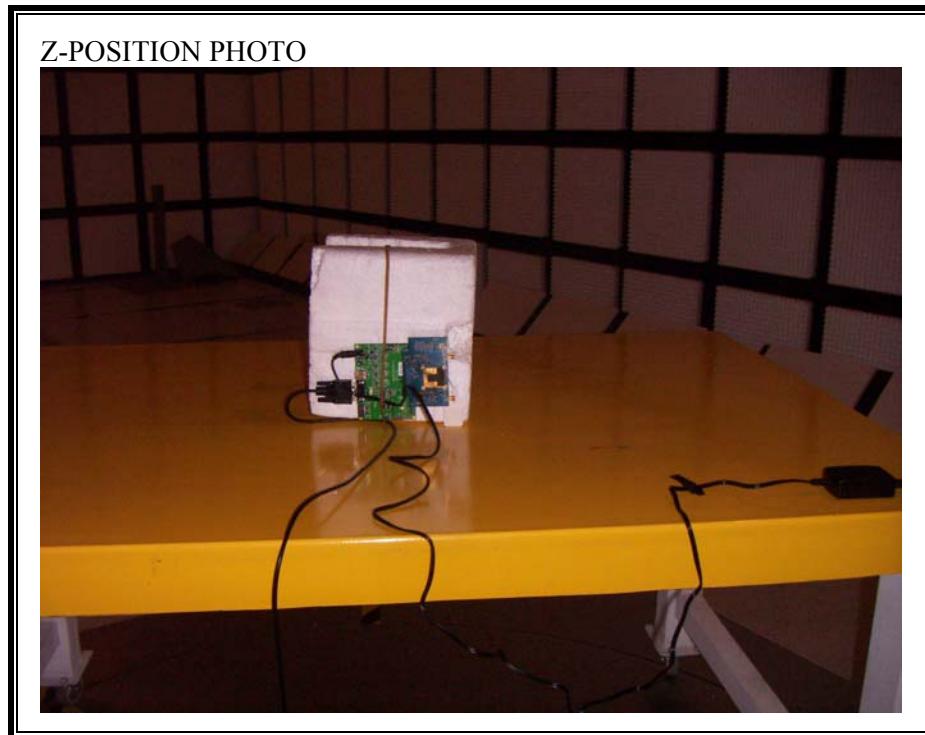


## 8. SETUP PHOTOS

### RADIATED RF MEASUREMENT SETUP

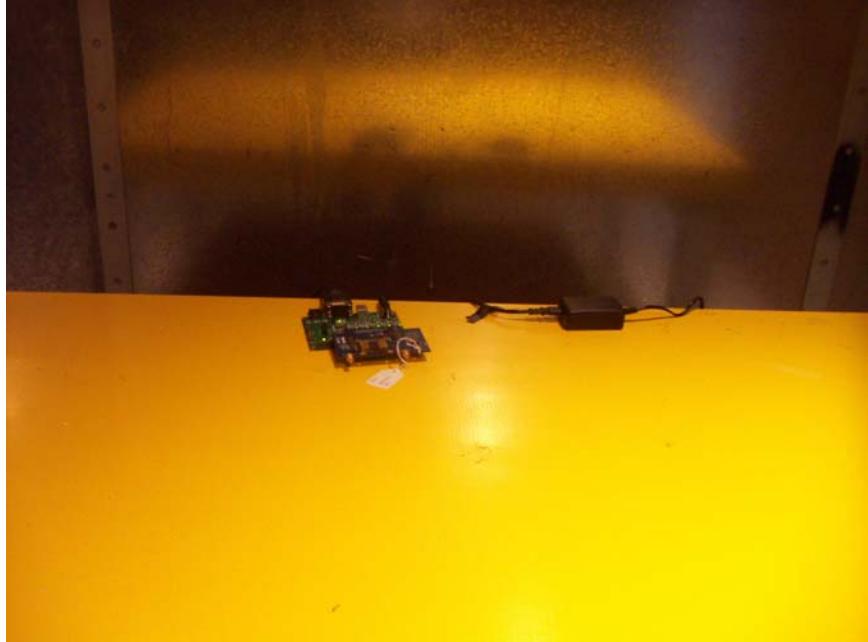




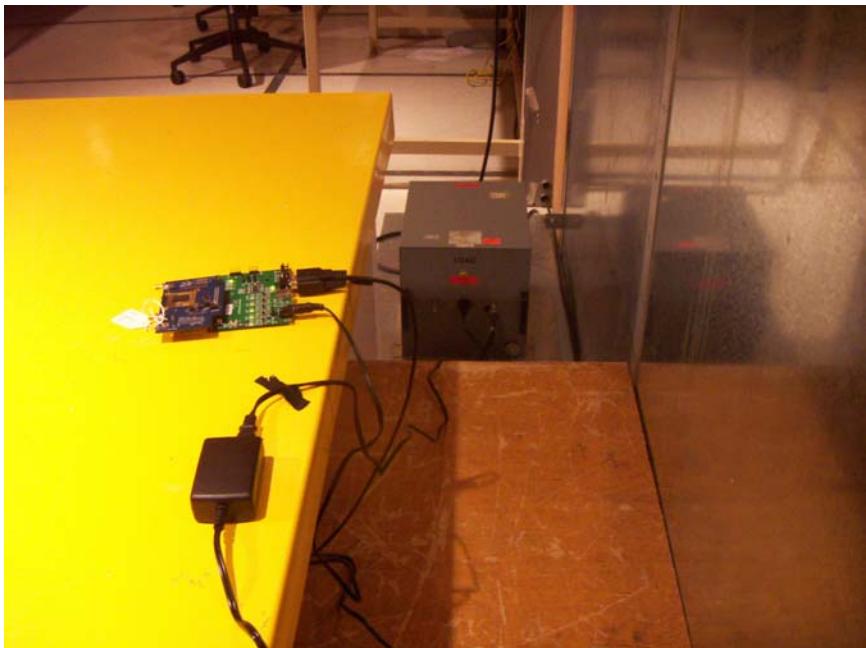


**POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP**

EUT LINE CONDUCTED FRONT PHOTO



EUT LINE CONDUCTED BACK PHOTO



**END OF REPORT**