



EN 300 328 v1.7.1 (2006-10)

TEST REPORT

FOR

BLUETOOTH SERIAL PORT MODULE

MODEL NUMBER: LMX9838SB

REPORT NUMBER: 07U11080-3

ISSUE DATE: AUGUST 31, 2007

Prepared for
**NATIONAL SEMICONDUCTOR
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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
<u>---</u>	<u>08/31/07</u>	<u>Initial Issue</u>	<u>T. Chan</u>

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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 22-23, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
EN 300 328 v1.7.1	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standard. 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:

Tested By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented in EN 300 328 v1.7.1 (2006-10).

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
Radio frequency	2.0×10^{-7}
Total RF power, conducted	0.71 dB
RF power density, conducted	2.9 dB
Spurious emissions, conducted	2.8 dB
All emissions, radiated	5.5 dB
Temperature	0.1 deg C
Humidity	1 % RH
DC and low frequency voltages	2 %

Uncertainty figures are valid to confidence level of 95% and follow ETR 028.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth Serial Port Module.

5.2. EUT 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 maximum conducted output power same 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 determined as the channel with the highest output power. The highest measured output power was at 2480 MHz.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

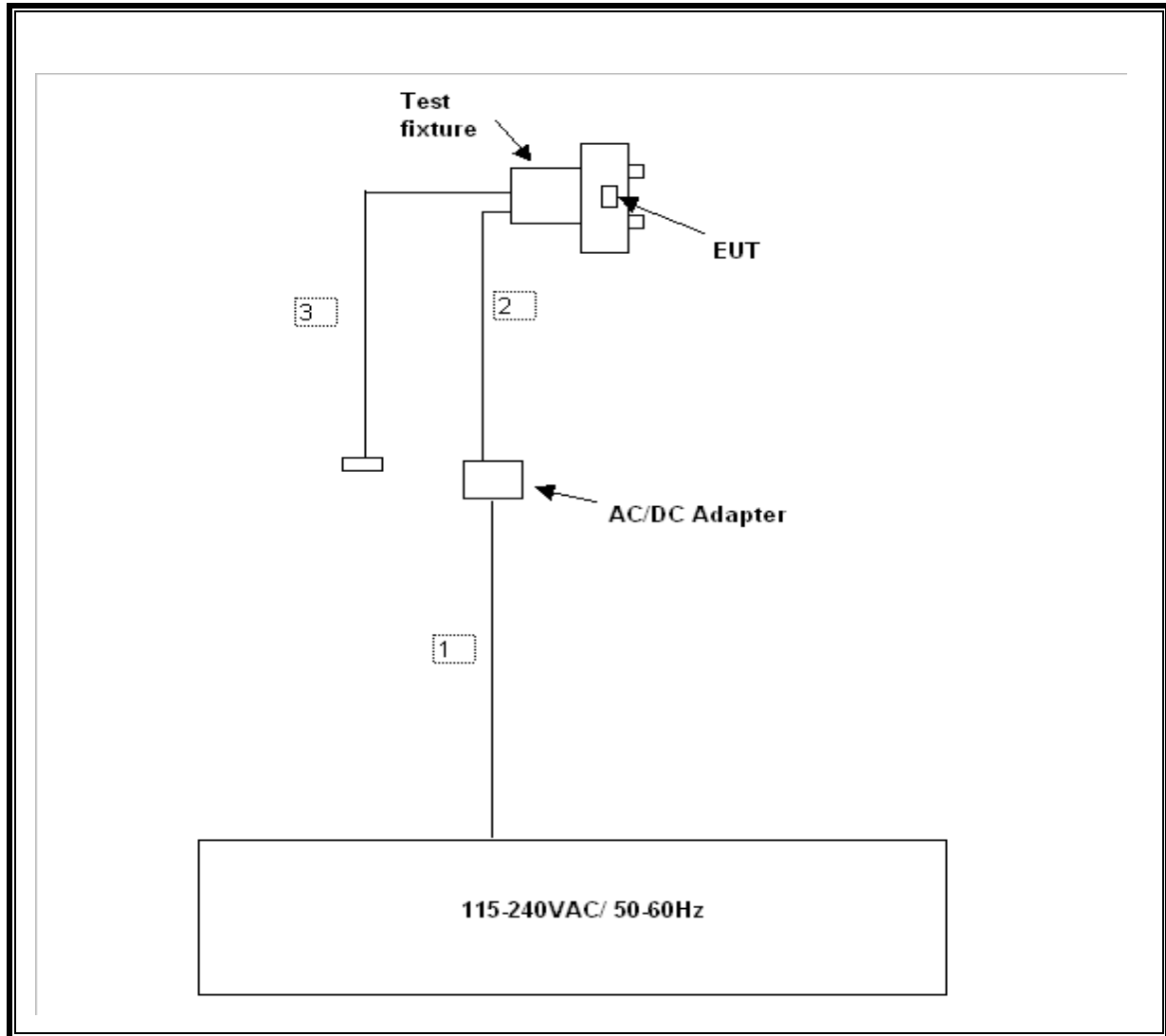
I/O CABLES

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	NA
2	DC	1	DC Plug	Un-shielded	2m	NA
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, 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
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	1/23/2008

7. LIMITS AND RESULTS

7.1. EN 300 328 FHSS REQUIREMENTS

FHSS modulation shall:

either:

a) make use of at least 15 well defined, non-overlapping channels or hopping positions separated by the channel bandwidth as measured at 20 dB below peak power.

Or if capable of adaptive frequency hopping:

b) at least be capable of operating over a minimum of 90 % of the band specified in table 1, from which at any given time a minimum of 20 channels or hopping positions shall be used.

For both cases, the minimum channel separation shall be 1 MHz, while the dwell time per channel shall not exceed 0,4 s.

While the equipment is operating (transmitting and/or receiving) each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of channels. Systems that meet the above constraints shall be tested according to the requirements for FHSS modulation.

RESULTS

The EUT is a Bluetooth system. The Bluetooth Protocol specifications are in accordance with the ETSI EN 300 328 FHSS requirements under criteria a) as stated above.

7.2. SPURIOUS EMISSIONS

LIMIT

EN 300 328 Clause 4.3.4

Table 2: Transmitter Limits for Narrowband Spurious Emissions

Frequency Range	Limit when operating	Limit when in standby
30 MHz to 1.0 GHz	-36 dBm	-57 dBm
1.0 GHz to 12.75 GHz	-30 dBm	-47 dBm
1.8 GHz to 1.9 GHz 5.15 GHz to 5.3 GHz	-47 dBm	-47 dBm

Table 3: Transmitter Limits for Wideband Spurious Emissions

Frequency Range	Limit when operating	Limit when in standby
30 MHz to 1.0 GHz	-86 dBm/Hz	-107 dBm/Hz
1.0 GHz to 12.75 GHz	-80 dBm/Hz	-97 dBm/Hz
1.8 GHz to 1.9 GHz 5.15 GHz to 5.3 GHz	-97 dBm/Hz	-97 dBm/Hz

TEST PROCEDURE

EN 300 328 Clause 5.7.5

OPERATING MODE TEST PROTOCOL

EN 300 328 Clause 5.7.5

The level of spurious emissions are measured as their power in a specified load (conducted spurious emissions); and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation).

RESULTS

No non-compliance noted:

RADIATED SPURIOUS EMISSIONS BELOW 1 GHz

08/22/07 30 - 1000MHz Substitution Measurement											
Compliance Certification Services, Fremont 5m Chamber											
Test Engr: Thanh Nguyen											
Project #: 07U11080											
Company: National Semiconductor Corp.											
EUT Descip.: Bluetooth Serial Port Module											
EUT M/N: LMX9838SB											
Test Target: ETSI 300 328											
Mode Oper: Transmit.											
Test Equipment:											
Bilog Antenna			Cable			Pre-amplifier 8447D			Limit		
5m Chamber Sunol Bilog			5m Chamber Cable						ETSI 300 328 Tx		
f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Channel											
108.57	31.3	H	-49.9	1.4	-1.7	-3.8	-55.1	-36.0	-19.1		
135.73	29.5	H	-50.6	1.5	-1.3	-3.5	-55.6	-36.0	-19.6		
322.94	30.9	H	-47.9	2.2	6.0	3.9	-46.2	-36.0	-10.2		
339.43	29.2	H	-49.2	2.2	6.0	3.9	-47.5	-36.0	-11.5		
439.34	26.7	H	-49.8	2.5	6.1	3.9	-48.3	-36.0	-12.3		
36.79	31.3	H	-45.5	1.0	-14.6	-16.7	-63.2	-36.0	-27.2		
71.71	39.3	H	-48.0	1.2	-1.5	-3.7	-52.9	-36.0	-16.9		
107.60	41.2	V	-40.1	1.4	-1.6	-3.8	-45.2	-36.0	-9.2		
135.73	30.0	V	-50.1	1.5	-1.3	-3.5	-55.1	-36.0	-19.1		
581.93	21.9	V	-52.3	2.9	6.8	4.6	-50.6	-36.0	-14.6		
High Channel											
72.68	32.2	H	-55.1	1.2	-1.4	-3.6	-59.9	-36.0	-23.9		
107.60	31.8	H	-49.6	1.4	-1.6	-3.8	-54.7	-36.0	-18.7		
135.73	29.5	H	-50.6	1.5	-1.3	-3.5	-55.6	-36.0	-19.6		
305.48	34.1	H	-45.2	2.1	6.0	3.9	-43.4	-36.0	-7.4		
339.43	29.2	H	-49.2	2.2	6.0	3.9	-47.5	-36.0	-11.5		
446.13	27.9	H	-48.4	2.5	6.1	4.0	-47.0	-36.0	-11.0		
38.73	32.9	V	-48.2	1.0	-12.9	-15.1	-64.2	-36.0	-28.2		
70.74	44.1	V	-40.5	1.2	-1.7	-3.8	-45.5	-36.0	-9.5		
106.63	42.6	V	-38.9	1.4	-1.5	-3.7	-43.9	-36.0	-7.9		
305.48	27.0	V	-53.2	2.1	6.0	3.9	-51.4	-36.0	-15.4		
581.93	21.9	V	-52.3	2.9	6.8	4.6	-50.6	-36.0	-14.6		
741.01	18.8	V	-53.4	3.2	6.7	4.6	-52.0	-36.0	-16.0		

RADIATED SPURIOUS EMISSIONS ABOVE 1 GHz

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m A-Chamber

Company: National Semiconductor Corp.
 Project #: 07U11080
 Date: August 22, 2007
 Test Engineer: Thanh Nguyen
 Configuration: EUT, AC/DC Adapter, Test Fixture .
 Mode: Transmit

Test Equipment:

EMCO Horn 1-18GHz

T60; S/N: 2238 @3m

Horn > 18GHz

Limit

ETSI 300 328 Tx

High Pass Filter

Hi Frequency Cables

(2 ft)

(2 ~ 3 ft)

(4 ~ 6 ft)

(12 ft)

Pre-amplifier 1-26GHz

4 Miteq 3008A00931

Pre-amplifier 26-40GHz

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Spurious Emissions										
1.067	53.44	V	-56.4	3.1	5.0	2.9	-56.6	-30.0	-26.6	
1.256	51.35	V	-57.9	3.3	5.7	3.5	-57.7	-30.0	-27.7	
1.400	52.67	V	-56.2	3.5	6.2	4.0	-55.6	-30.0	-25.6	
1.203	54.56	H	-54.2	3.3	5.5	3.4	-54.1	-30.0	-24.1	
Harmonics Spurious										
Low CH										
4.804	42.45	V	-55.1	6.9	10.8	8.7	-53.3	-30.0	-23.3	
7.206	40.44	V	-51.7	8.2	12.0	9.8	-50.0	-30.0	-20.0	
4.804	41.33	H	-55.9	6.9	10.8	8.7	-54.1	-30.0	-24.1	
7.206	38.76	H	-52.6	8.2	12.0	9.8	-50.9	-30.0	-20.9	
High CH										
4.960	45.87	V	-51.5	7.0	11.0	8.9	-49.6	-30.0	-19.6	
7.440	44.67	V	-46.9	8.3	12.0	9.8	-45.4	-30.0	-15.4	
4.960	42.60	H	-54.4	7.0	11.0	8.9	-52.6	-30.0	-22.6	
7.440	40.45	H	-50.4	8.3	12.0	9.8	-48.8	-30.0	-18.8	

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STANDBY MODE TEST PROTOCOL

The standby mode is identical to the receive mode. See Receiver Spurious Emissions results.

ETSI EN 300 328 Clause 5.7.5

The level of spurious emissions are measured as their power in a specified load (conducted spurious emissions); and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation).

RESULTS

No non-compliance noted:

7.3. RECEIVER SPURIOUS EMISSIONS

LIMIT

EN 300 328 Clause 4.3.5

Table 4: Narrowband Spurious Emissions Limits for Receivers

Frequency Range	Limit
30 MHz to 1.0 GHz	-57 dBm
1.0 GHz to 12.75 GHz	-47 dBm

Table 5: Wideband Spurious Emissions Limits for Receivers

Frequency Range	Limit
30 MHz to 1.0 GHz	-107 dBm/Hz
1.0 GHz to 12.75 GHz	-97 dBm/Hz

TEST PROCEDURE

EN 300 328 Clause 5.7.6

TEST PROTOCOL

EN 300 328 Clause 5.7.6

The level of spurious emissions are measured as their power in a specified load (conducted spurious emissions); and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation).

RESULTS

No non-compliance noted:

RADIATED SPURIOUS EMISSIONS BELOW 1 GHZ

08/21/07 30 - 1000MHz Substitution Measurement Compliance Certification Services, Fremont 5m Chamber										
Test Engr: Thanh Nguyen Project #: 07U11080 Company: National Semiconductor Corp. EUT Descip.: Bluetooth Serial Port Module EUT M/N: LMX9838SC Test Target: ETSI 300 328 Mode Oper: Receive mode.										
Test Equipment:										
Bilog Antenna		Cable		Pre-amplifer 8447D		Limit				
5m Chamber Sunol Bilog		5m Chamber Cable		T5 8447D		ETSI 300 328 Rx				
f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Channel										
167.74	45.2	H	-63.9	1.6	2.0	-0.2	-65.7	-57.0	-8.7	
191.99	45.0	H	-64.5	1.7	3.8	1.7	-64.6	-57.0	-7.6	
449.04	36.9	H	-67.1	2.5	6.1	4.0	-65.7	-57.0	-8.7	
685.72	33.4	H	-68.0	3.1	6.8	4.6	-66.4	-57.0	-9.4	
67.83	48.0	V	-67.1	1.2	-1.9	-4.0	-72.2	-57.0	-15.2	
86.26	54.5	V	-56.6	1.2	-0.3	-2.5	-60.3	-57.0	-3.3	
189.08	44.2	V	-65.2	1.7	3.6	1.5	-65.5	-57.0	-8.5	
685.72	35.0	V	-65.7	3.1	6.8	4.6	-64.2	-57.0	-7.2	
High Channel										
36.79	42.4	H	-62.1	1.0	-14.6	-16.7	-79.8	-57.0	-22.8	
90.14	46.6	H	-66.7	1.3	-0.2	-2.4	-70.4	-57.0	-13.4	
449.04	38.4	H	-65.6	2.5	6.1	4.0	-64.2	-57.0	-7.2	
659.53	33.4	H	-68.4	3.0	6.8	4.7	-66.8	-57.0	-9.8	
683.78	34.8	H	-66.5	3.1	6.8	4.6	-65.0	-57.0	-8.0	
67.83	50.6	H	-64.2	1.2	-1.9	-4.0	-69.4	-57.0	-12.4	
352.04	36.4	V	-69.8	2.2	6.0	3.9	-68.1	-57.0	-11.1	
659.53	33.2	V	-68.0	3.0	6.8	4.7	-66.4	-57.0	-9.4	
685.72	34.9	V	-65.8	3.1	6.8	4.6	-64.3	-57.0	-7.3	
710.94	31.9	V	-69.0	3.2	6.7	4.6	-67.6	-57.0	-10.6	

RADIATED SPURIOUS EMISSIONS ABOVE 1 GHz

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m A-Chamber

Company: National Semiconductor Corp.
 Project #: 07U11080
 Date: August 22, 2007
 Test Engineer: Thanh Nguyen
 Configuration: EUT, Test Fixture , AC/DC Adapter
 Mode: Receive mode

Test Equipment:

EMCO Horn 1-18GHz Horn > 18GHz Limit High Pass Filter
 T60; S/N: 2238 @3m ETSI 300 328 Rx

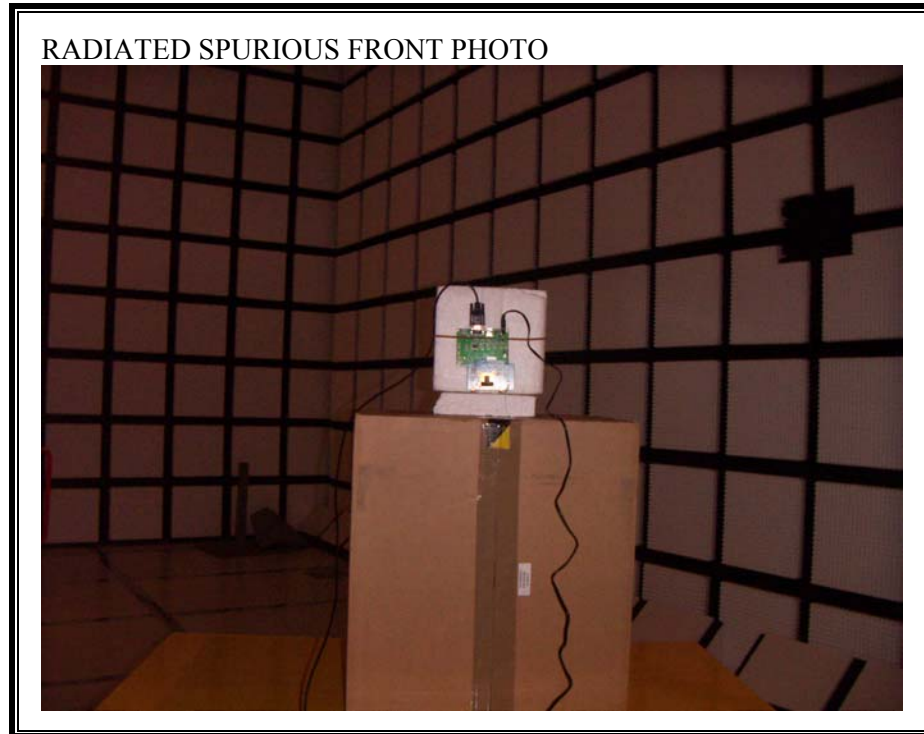
Hi Frequency Cables Pre-amplifier 1-26GHz Pre-amplifier 26-40GHz
 (2 ft) (2~3 ft) (4~6 ft) (12 ft) 4 Miteq 3008A00931

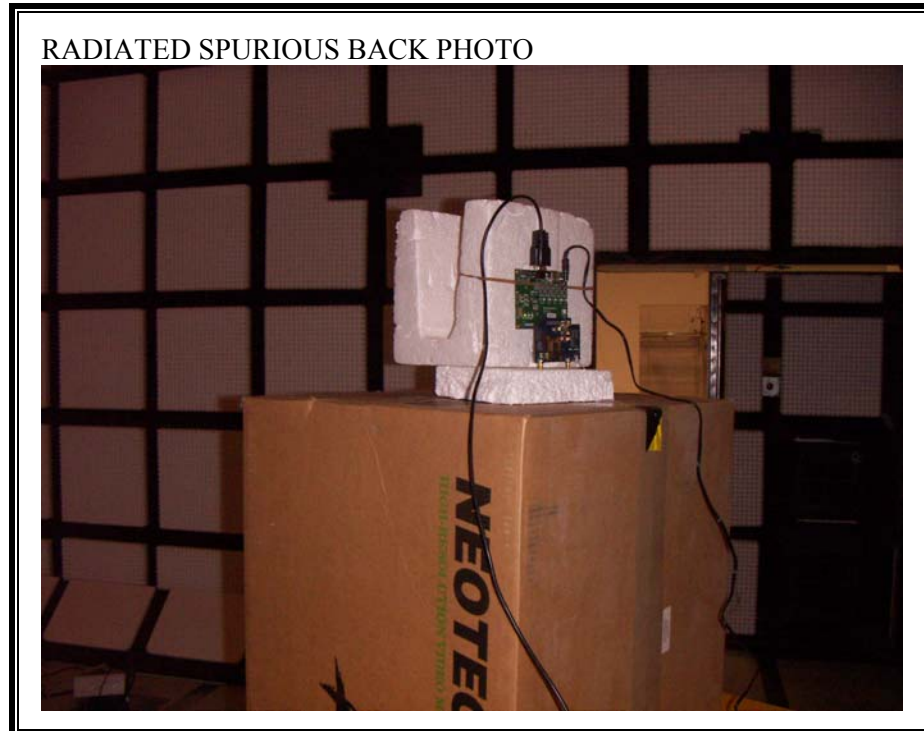
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Channel										
1.068	58.50	V	-51.3	3.1	5.0	2.9	-51.5	-47.0	-4.5	
1.128	51.29	V	-58.4	3.2	5.2	3.1	-58.4	-47.0	-11.4	
1.863	46.73	V	-60.7	4.1	7.8	5.7	-59.2	-47.0	-12.2	
2.127	44.44	V	-62.0	4.5	8.6	6.5	-60.0	-47.0	-13.0	
1.203	50.51	H	-58.2	3.3	5.5	3.4	-58.1	-47.0	-11.1	
1.348	47.33	H	-60.9	3.5	6.0	3.9	-60.5	-47.0	-13.5	
High Channel										
1.120	59.3	V	-50.3	3.2	5.2	3.1	-50.4	-47.0	-3.4	
1.133	52.1	V	-57.6	3.2	5.3	3.1	-57.7	-47.0	-10.7	
1.923	50.3	V	-56.9	4.2	8.0	5.9	-55.2	-47.0	-8.2	
2.237	46.8	V	-59.4	4.6	8.9	6.7	-57.2	-47.0	-10.2	
1.256	53.4	H	-55.2	3.3	5.7	3.5	-55.0	-47.0	-8.0	
1.425	49.7	H	-58.4	3.6	6.3	4.1	-57.8	-47.0	-10.8	

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8. SETUP PHOTOS

RADIATED SPURIOUS EMISSIONS





END OF REPORT