



NVLAP LAB CODE 200707-0



FCC PART 15.249

EMI MEASUREMENT AND TEST REPORT

For

Cooper Wiring Devices Inc.

203 Cooper Circle, Peachtree City, GA 30269, USA

FCC ID: UH2-RF9505

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: RF Full Control Duplex Receptacle
Test Engineer: Henry Yang <i>Henry Yang</i>	
Report No.: RSH07042451	
Test Date: 2007-04-29 to 2007-05-23	
Report Date: 2007-05-23	
Reviewed By: EMC Manager: Boni Baniqued <i>Boni Baniqued</i>	
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Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratory Corp. (Shenzhen). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Cooper Wiring Devices Inc.*'s product, model number: *RF9505* or the "EUT" as referred to in this report is a *RF Full Control Duplex Receptacle*, which measures approximately 10.7cmL x 4.2cmW x 4.5cmH, rated input voltage: AC 120V/60Hz.

** The test data gathered are from production sample, serial number: 0704116 provided by the manufacturer, we receive the EUT on 2007-04-24.*

Objective

This Type approval report is prepared on behalf of *Cooper Wiring Devices Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratory Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratory Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>.

External I/O Cable

Cable Description	Length (M)	From/Port	To
Unshielded Detachable AC Cable	1.5	EUT	LISN

SYSTEM TEST CONFIGURATION

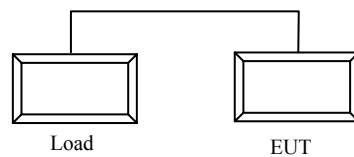
Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

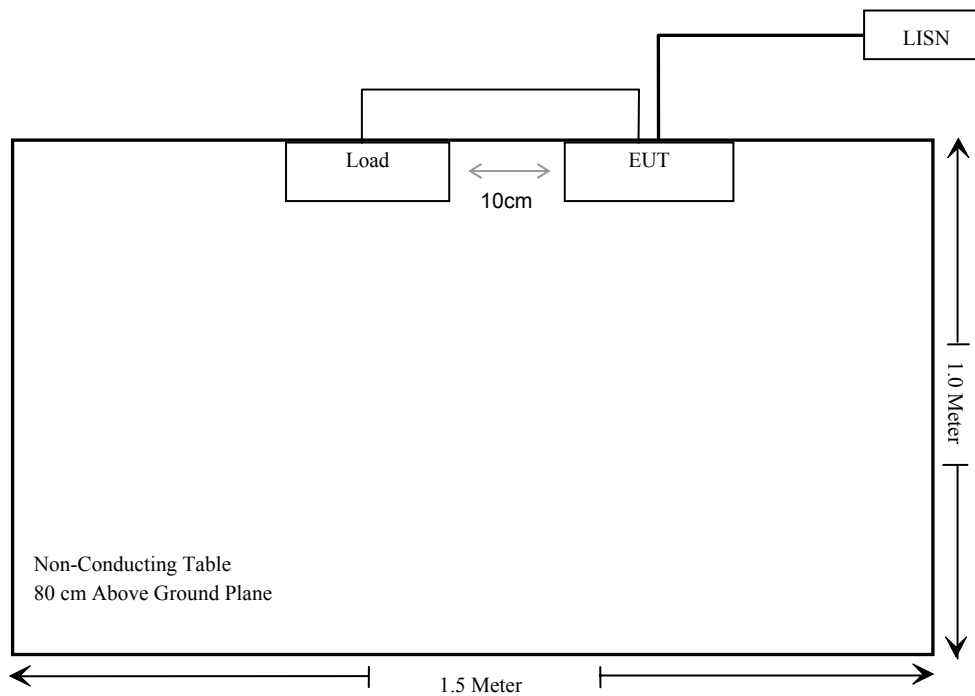
Equipment Modifications

Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the EUT.

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Compliant
§15.205(a), §15.209(a), 15.249(a), §15.249(c)	Radiated Emissions	Compliant
§15.249(d)	Out of Band Emissions	Compliant

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT antenna is a permanently attached antenna, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

Result: Compliant.

§15.207 - CONDUCTED EMISSIONS

Applicable Standard

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 μ 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 frequencies ranges.

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

* Decreases with the logarithm of the frequency.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is ± 2.4 dB.

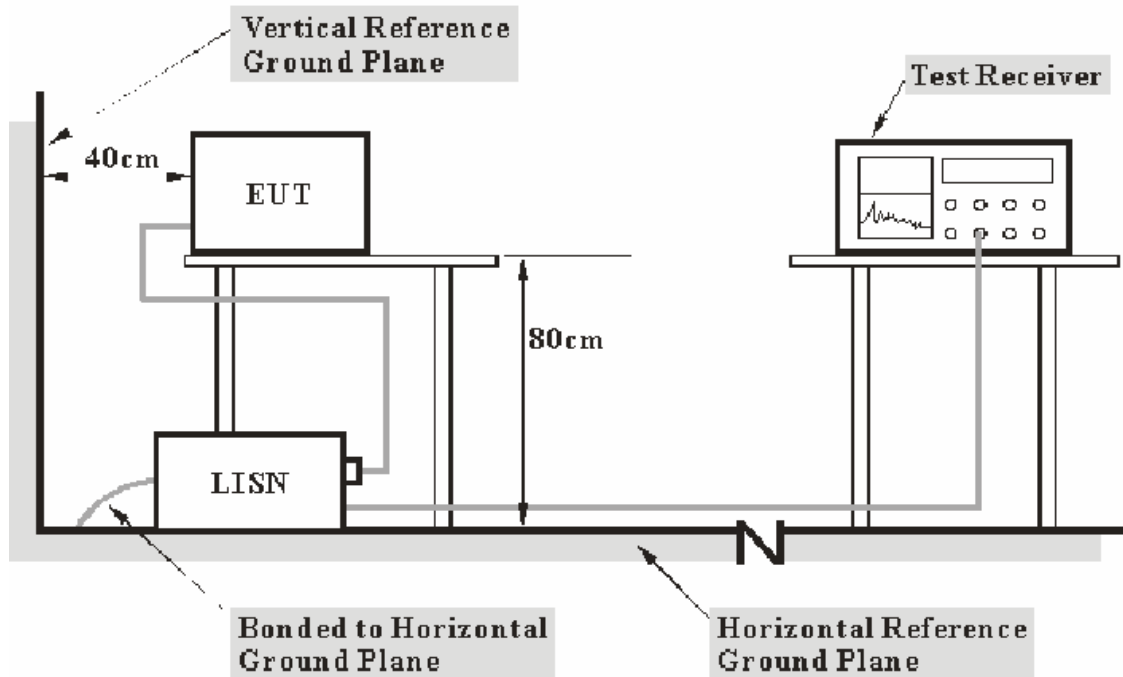
Test Equipment Setup

The test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<i>Frequency Range</i>	<i>IFBW</i>
150 kHz – 30 MHz	9 kHz

EUT Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15 .207 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The EUT was connected to a 120 VAC/60 Hz power source.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330	2007-03-20	2008-03-19
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2007-03-01	2008-03-01

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emissions test, the power cord of the laptop was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

29.20 dB at 28.9700 MHz in the Live conductor mode.

Test Data**Environmental Conditions**

Temperature:	26 ° C
Relative Humidity:	55%
ATM Pressure:	100.1kPa

The testing was performed by Henry Yang on 2007-05-23

Test Mode: Transmitting

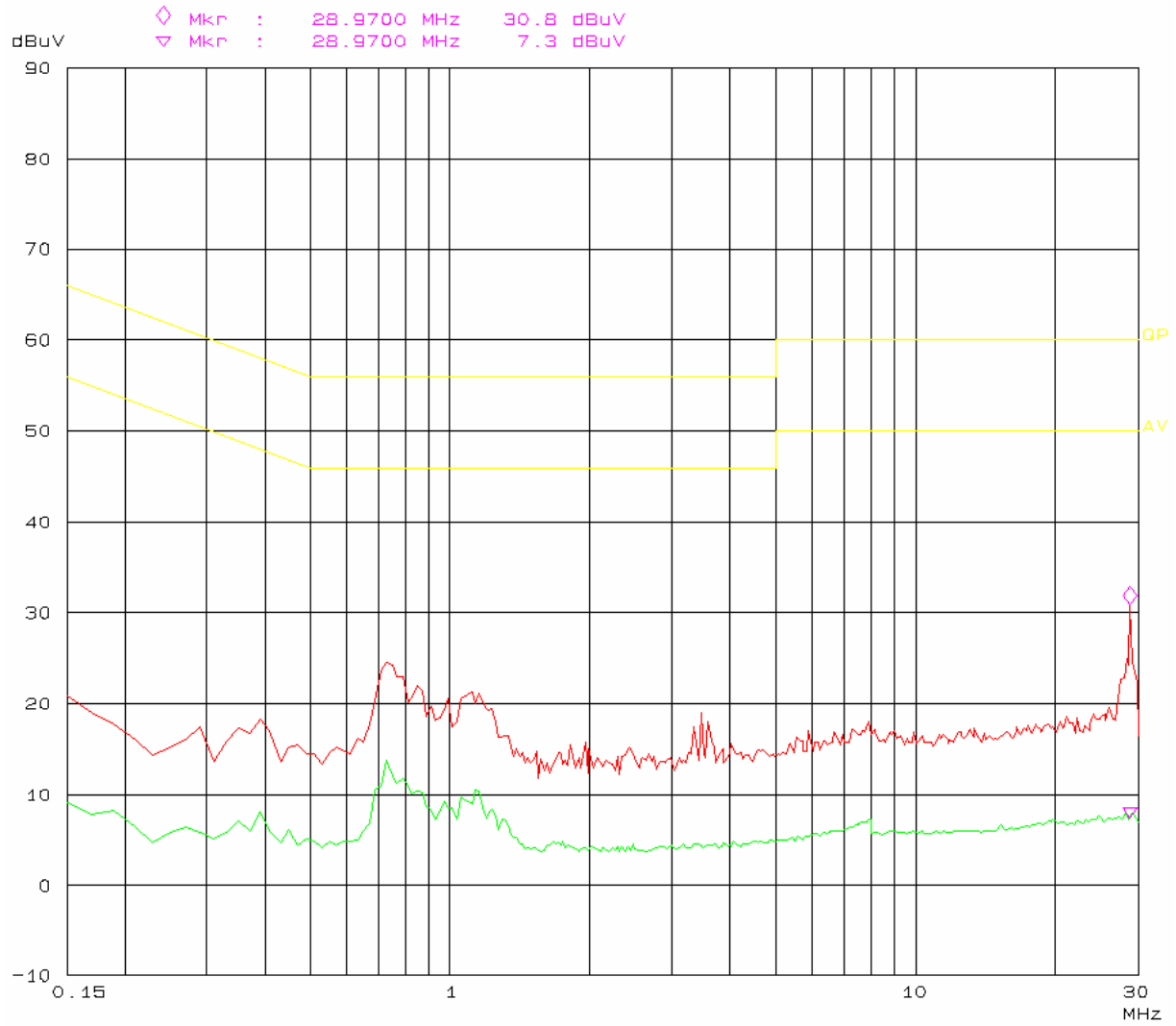
Line Conducted Emissions				FCC PART 15 .207	
Frequency (MHz)	Amplitude (dBµV)	Detector (QP/AV)	Phase (Live/Neutral)	Limit (dBµV)	Margin (dB)
28.9700	30.80	QP	Live	60.00	29.20
29.1500	28.90	QP	Neutral	60.00	31.10
0.7200	22.70	QP	Live	56.00	33.30
3.7700	22.70	QP	Live	56.00	33.30
0.7200	12.60	AV	Live	46.00	33.40
0.7100	22.10	QP	Neutral	56.00	33.90
3.5100	21.90	QP	Live	56.00	34.10
1.2700	21.30	QP	Live	56.00	34.70
0.7900	21.10	QP	Live	56.00	34.90
0.7100	11.10	AV	Neutral	46.00	34.90
1.2700	10.90	AV	Live	46.00	35.10
0.7900	10.50	AV	Live	46.00	35.50
3.4100	19.90	QP	Neutral	56.00	36.10
0.8200	8.60	AV	Neutral	46.00	37.40
1.2100	8.40	AV	Neutral	46.00	37.60
0.8200	18.20	QP	Neutral	56.00	37.80
1.2100	18.10	QP	Neutral	56.00	37.90
1.2900	7.70	AV	Neutral	46.00	38.30
1.2900	17.10	QP	Neutral	56.00	38.90
3.5100	6.10	AV	Live	46.00	39.90
3.7700	5.80	AV	Live	46.00	40.20
3.4100	5.10	AV	Neutral	46.00	40.90
28.9700	7.30	AV	Live	50.00	42.70
29.1500	7.20	AV	Neutral	50.00	42.80

Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

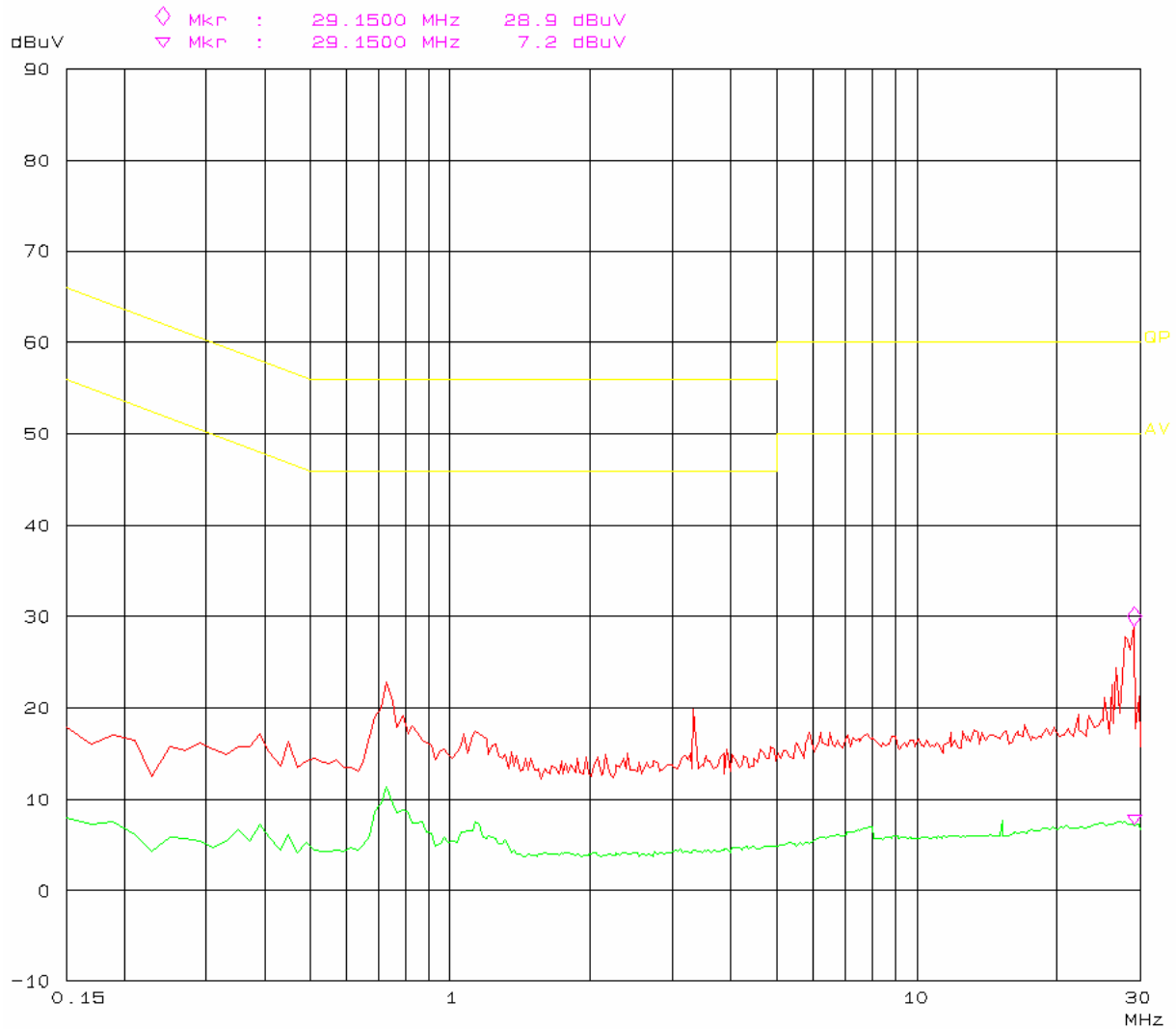
Conducted Disturbance Test FCC Part 15

EUT: RF Full control Duplex Receptacle
Manuf: Cooper
Op Cond: Transmitting
Operator: Henry
Test Spec: AC 120V/60Hz L
Comment: temp: 25°C Humi: 56%



Conducted Disturbance Test FCC Part 15

EUT: RF Full control Duplex Receptacle
Manuf: Cooper
Op Cond: Transmitting
Operator: Henry
Test Spec: AC 120V/60Hz N
Comment: temp: 25 °C Humi: 56%



§15.205(a) §15.209(a) §15.249(a) §15.249(d) - RADIATED EMISSIONS

Applicable Standard

As per §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per §15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is ± 4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

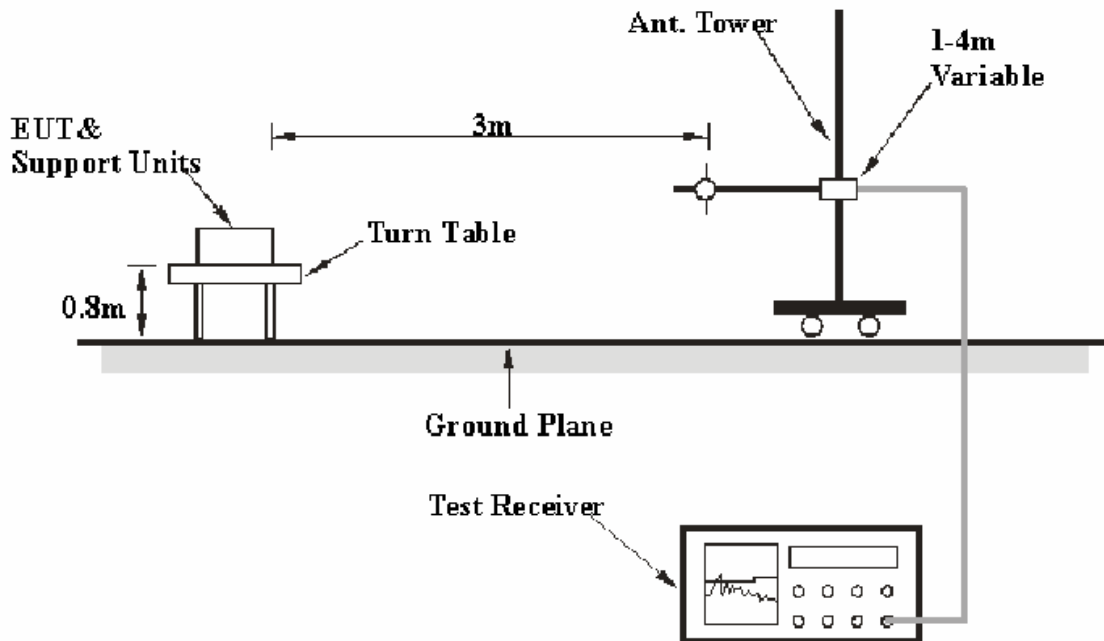
Below 1000MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000MHz:

- (1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
- (2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.249 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The EUT was connected to a 120 VAC/60 Hz power source.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2006-09-29	2007-09-29
HP	Amplifier	8447E	1937A01046	2006-11-15	2007-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2006-08-14	2007-08-14
HP	Amplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2006-07-20	2007-07-20
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.249, with the worst margin reading of:

30 -1000MHz: **11.3 dB** at **72.700700 MHz** in the **Vertical** polarization.

Above 1GHz: **21.94 dB** at **2880 MHz** in the **Vertical** polarization.

Test Data

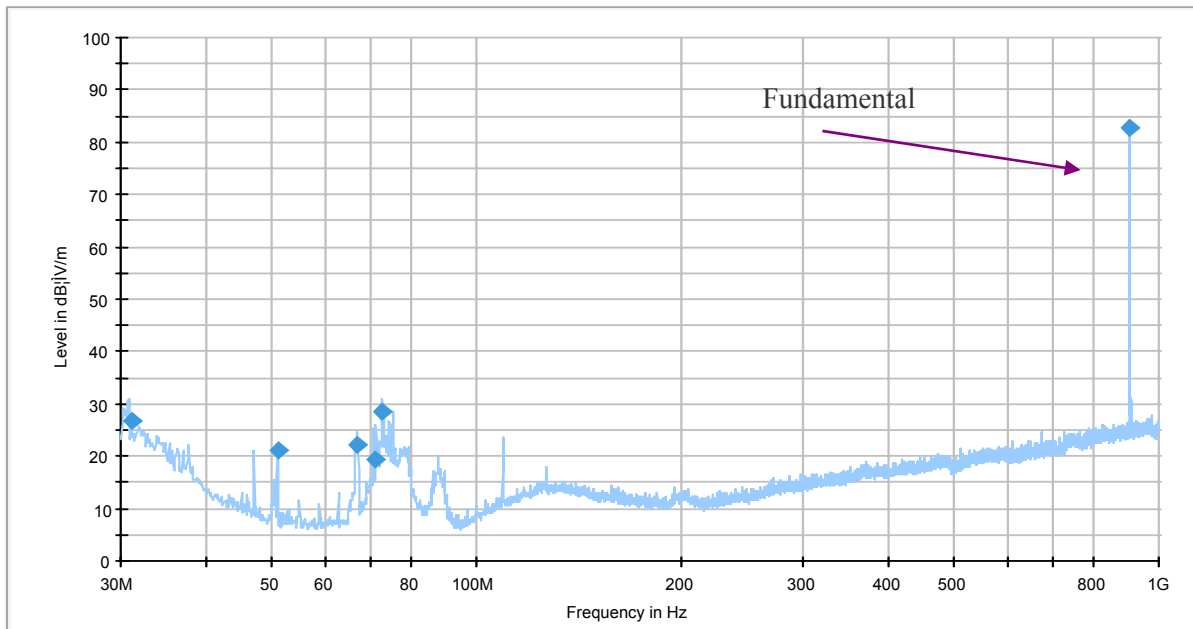
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	53%
ATM Pressure:	100.9kPa

The testing was performed by Henry Yang on 2007-04-29 to 2007-05-23

Test Mode: Continue Transmitting

30-1000 MHz



Frequency (MHz)	Quasi Peak (dBµV/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
72.700700	28.7	114.0	V	224.0	-17.5	40.0	11.3
31.045100	26.9	273.0	V	288.0	-5.6	40.0	13.1
66.651250	22.3	400.0	V	72.0	-17.6	40.0	17.7
50.951275	21.1	242.0	V	278.0	-17.9	40.0	18.9
71.126700	19.2	115.0	V	332.0	-17.5	40.0	20.8

Frequency (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amplifier Gain (dB)	Corr. Ampl. (dBuV/m)	FCC Part 15.209 & 15.249		
										Limit (dBuV/m)	Margin (dB)	Comment
Above 1000MHz												
908.4	79.6	QP	180	1.5	H	22.9	6.6	26.5	82.6	94	11.4	Fund.
908.4	75.6	QP	180	1.5	V	22.9	6.6	26.5	78.6	94	15.4	Fund.I
2880	32.56	AV	324	1.3	V	28.5	4.40	33.4	32.06	54	21.94	Spurious
1816	36.78	AV	148	1.2	V	27.1	2.82	35.0	31.7	54	22.30	Spurious
1816	35.21	AV	230	1.6	H	27.1	2.82	35.0	30.13	54	23.87	Spurious
2830	30.11	AV	56	1.5	H	28.5	4.40	33.4	29.61	54	24.39	Spurious
1225	31.29	AV	166	1.6	V	24.8	2.50	36.0	22.59	54	31.41	Spurious
1015	30.15	AV	148	1.5	H	24.8	1.19	36.0	20.14	54	33.86	Spurious
2880	34.36	PK	324	1.3	V	28.5	4.40	33.4	33.86	74	40.14	Spurious
1816	38.33	PK	230	1.6	H	27.1	2.82	35.0	33.25	74	40.75	Spurious
1816	37.33	PK	148	1.2	V	27.1	2.82	35.0	32.25	74	41.75	Spurious
2830	32.50	PK	56	1.5	H	28.5	4.40	33.4	32	74	42.00	Spurious
1225	32.19	PK	166	1.6	V	24.8	2.50	36.0	23.49	74	50.51	Spurious
1015	31.56	PK	148	1.5	H	24.8	1.19	36.0	21.55	74	52.45	Spurious

Note: Fund. - Fundamental

§15.249(d) – OUT OF BAND EMISSIONS

Applicable Standard

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including the specified frequencies of band edges.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2006-09-29	2007-09-29
HP	Amplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2006-07-20	2007-07-20

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

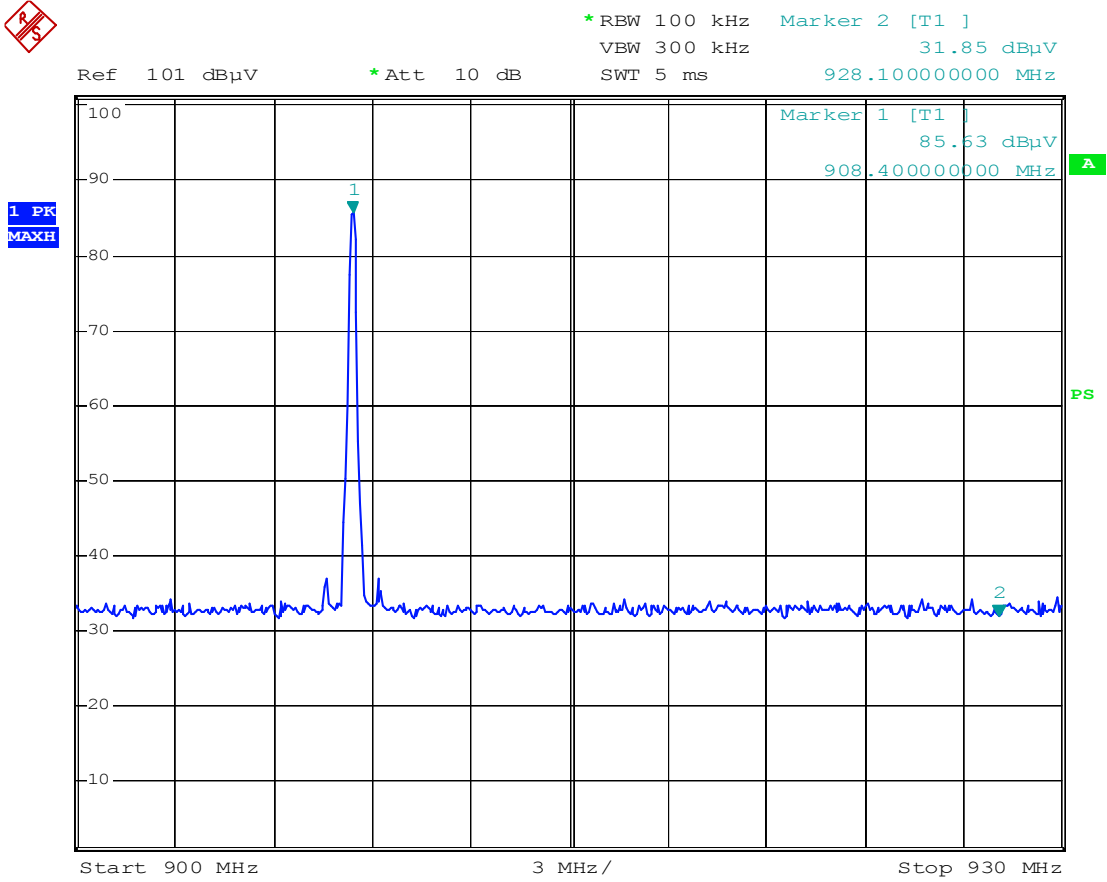
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	100.9kPa

The testing was performed by Henry Yang on 2007-05-09.

Test Mode: Continue Transmitting

Test Result: Compliant.

Please refer to the plots attached.

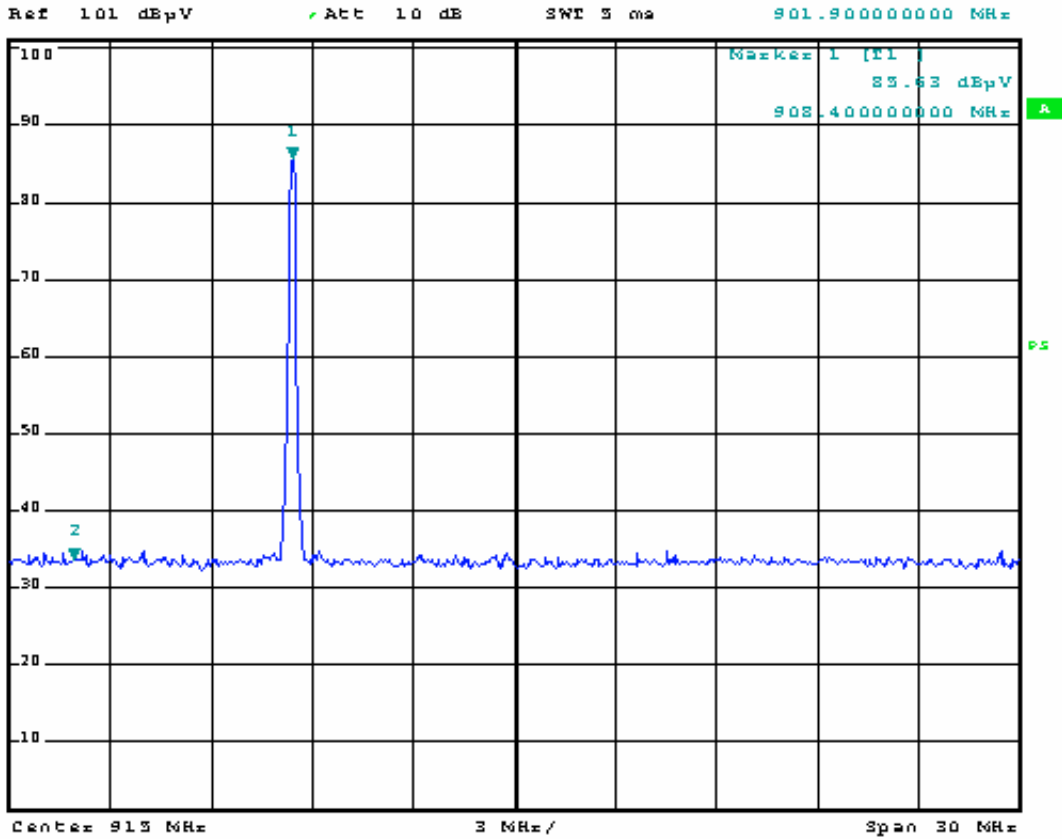


UPPER BANDEDGE

Date: 9.MAY.2007 11:01:23



RESW 100 kHz Marker 2 [T1]
VIEW 300 kHz 33.38 dBμV
SWT 3 ms 901.900000000 MHz



LOW BANDEDGE

Date: 9.MAY.2007 11:08:16